USDA Natural Resources Conservation Service

Ecological site R035XB232AZ
Limestone/Sandstone Upland 6-10" p.z.

Accessed: 05/12/2025

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.

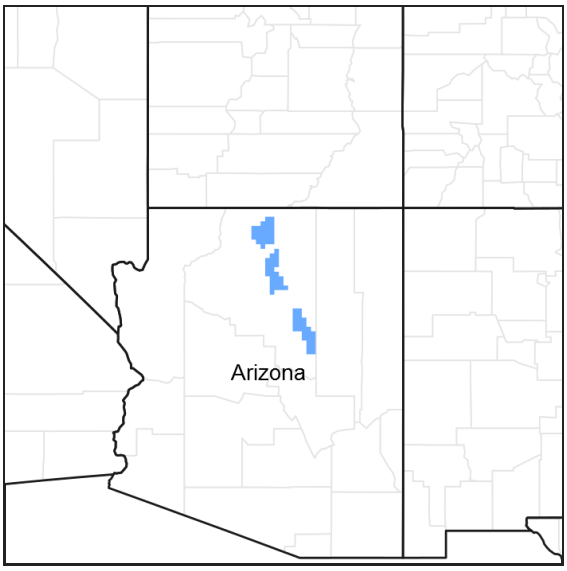

Figure 1. Mapped extent

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 6 to 10 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.

Associated sites

R035XB233AZ	**Limestone/Sandstone Upland 6-10" p.z. Saline**
R035XB240AZ	**Limestone/Sandstone Cliffs 6-10" p.z.**
R035XB251AZ	**Mudstone/Sandstone Hills 6-10" p.z. Warm**

Similar sites

R035XB233AZ	**Limestone/Sandstone Upland 6-10" p.z. Saline** The soils of this site are very similar, but are more alkaline (pH > 8.8)

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex canescens* (2) *Krascheninnikovia lanata*
Herbaceous	(1) *Achnatherum hymenoides* (2) *Sporobolus*

Physiographic features

This site is found on limestone and calcareous sandstone of the Kaibab formation on benches and slopes of plateaus. It usually has an undulating appearance. The predominant slope of the site is 1 to 10 percent, but may be as high as 15 percent for short distances. Soils are shallow (<20") to bedrock.

Table 2. Representative physiographic features

Landforms	(1) Plateau
Flooding frequency	None
Ponding frequency	None
Elevation	1,158–1,768 m
Slope	0–15%
Aspect	Aspect is not a significant factor

Climatic features

The 35.2 Colorado Plateau Cold Desert Shrub - Grassland common resource area has a very dry and windy climate that is hot in the summer and cold in the winter. The annual precipitation averages between 6 and 10 inches. The soil moisture regime is typic aridic and the soil temperature regime is mesic. A slight majority of the precipitation arrives during the late fall, winter, and early spring. This winter season moisture originates in the Pacific Ocean and arrives as rain, or sometimes snow, during widespread frontal storms of generally low intensity. The majority of the snow (average range of 1 to 17 inches) falls from December through February, but rarely lasts more than a few days. A seasonal drought occurs from late May through early July. Summer rains occur from July through September during brief intense local thunderstorms. The rain is sporadic in intensity and location. The moisture originates from the Gulf of Mexico in the early summer and the Gulf of California in the late summer/early fall. Windy conditions are common year round, but the winds are strongest and most frequent during the spring.

Table 3. Representative climatic features

Frost-free period (average)	181 days
Freeze-free period (average)	207 days
Precipitation total (average)	254 mm

Influencing water features

The soil moisture on this ecological site comes from precipitation. The site does not benefit significantly from run-on moisture. Shallow bedrock areas will concentrate water in deeper soil pockets, where most of the vegetation production occurs. Because of the shallow soils, larger rainfall events will not be entirely captured by the site. This site contributes runoff to other ecological sites.

Soil features

Soils associated with this site have developed in mixed residuum an alluvium from parent material of limestone and sandstone. The soils are moderately alkaline (PH 7.9-8.4),and are strongly effervescent at or near the surface. They are generally very shallow to shallow, often with small areas of rock outcrop and/or soil of only a few inches in depth. There may be occasional spots where the soils is deeper.

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

SSA-629 Coconino County - North Kaibab part MU's 21 & 22-Kinan, 21, 22, 35 & 36-Pennell;

SSA-631 Coconino County Central area MU 63-Winona;

SSA-701 Grand Canyon Area MU 45-Haplocalcids;

SSA-707 Little Colorado River Area MU's 11-Hajisho, 12-Hajisho, and 13-Hajisho/Seeg.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone and sandstone
Surface texture	(1) Gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	13–51 cm
Surface fragment cover <=3"	40–55%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	4.14–5.59 cm
Calcium carbonate equivalent (0-101.6cm)	5–30%
Electrical conductivity (0-101.6cm)	4–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	5–13
Soil reaction (1:1 water) (0-101.6cm)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	40–55%
Subsurface fragment volume >3" (Depth not specified)	0–5%

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

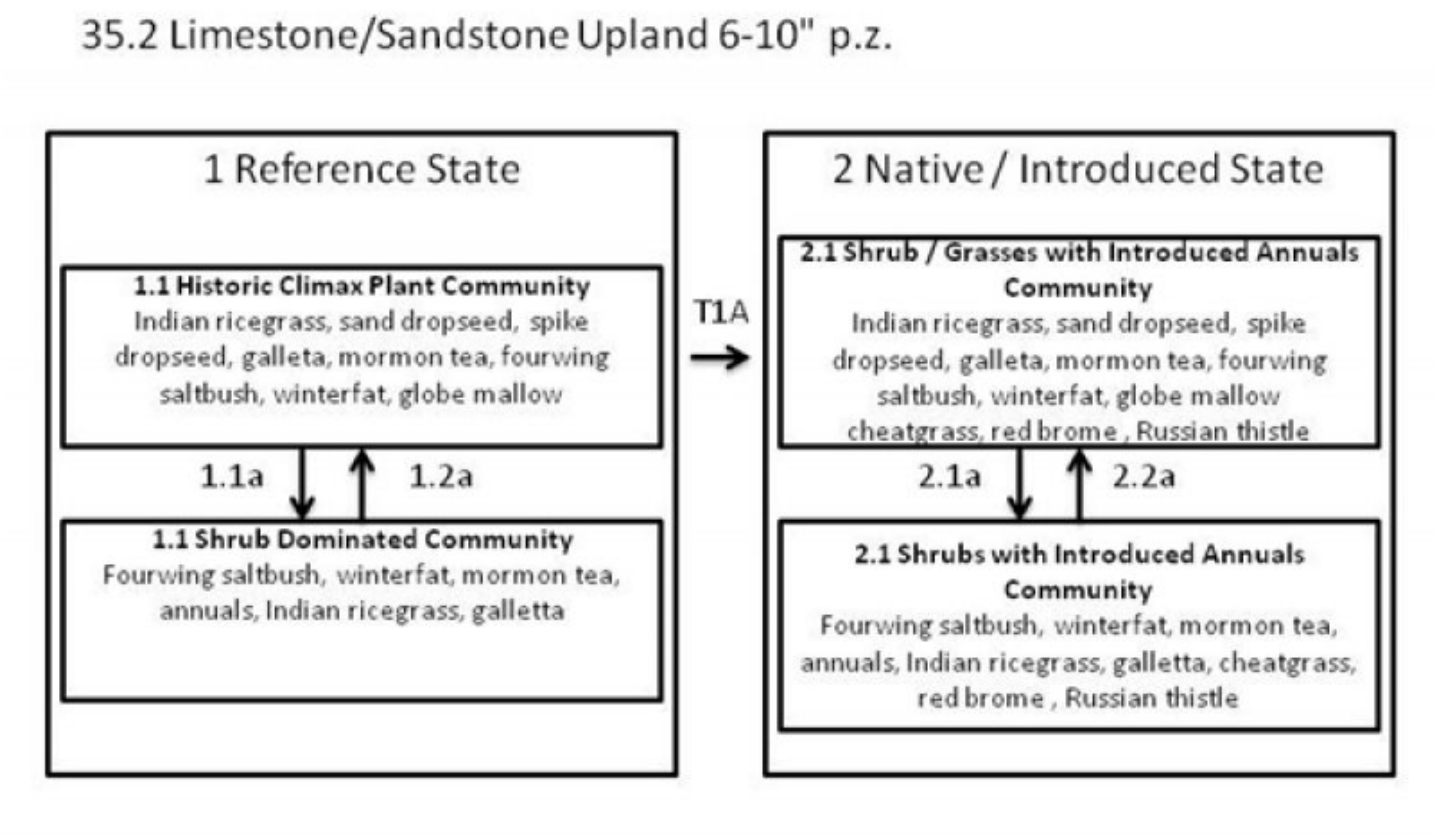

Figure 4. 352 LimestoneSandstoneUpland S&T

State 1
Reference State

Community 1.1
Historic Climax Plant Community

The dominant aspect of this site is a shrub-grassland. Fourwing saltbush, winterfat and ephedra are apparent in the visual aspect. Indian ricegrass is very apparent and will dominate the aspect following an average or better winter and spring growing season. Warm season grasses, predominantly galleta and dropseeds, are also readily apparent in the aspect. The occurrence and production of sand dropseed may be expected to decrease in years of below average warm season precipitation and increase in years of above average warm season precipitation. Cool season annuals may increase as a result of above average cool season precipitation and decrease as a result of below average cool season precipitation.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	168	280	336
Shrub/Vine	90	146	202
Forb	11	22	45
Total	**269**	**448**	**583**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-15%
Grass/grasslike foliar cover	8-16%
Forb foliar cover	0-2%
Non-vascular plants	0%
Biological crusts	0-2%
Litter	10-20%
Surface fragments >0.25" and <=3"	40-55%
Surface fragments >3"	0-5%
Bedrock	0-5%
Water	0%
Bare ground	30-35%

Table 7. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	0-2%
Grass/grasslike basal cover	4-8%
Forb basal cover	0-1%
Non-vascular plants	0%
Biological crusts	0-2%
Litter	10-20%
Surface fragments >0.25" and <=3"	40-55%
Surface fragments >3"	0-5%
Bedrock	0-4%
Water	0%
Bare ground	30-35%

Table 8. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	0-1%
>0.15 <= 0.3	–	0-5%	5-10%	0-1%
>0.3 <= 0.6	–	9-11%	2-6%	–
>0.6 <= 1.4	–	0-1%	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Community 1.2
Fourwing saltbush/winterfat/ephedra/native annuals/perennial warm and cool season grasses

The dominant aspect of this site is a shrub-grassland. Fourwing saltbush, winterfat and ephedra are apparent in the visual aspect. Warm season grasses, predominantly galleta and dropseeds, are also readily apparent in the aspect. Indian ricegrass is sub-dominant or only a minor component of the plant community. Annuals and unpalatable perennial plants have become a major component, possibly more common than perennial grasses.

Pathway 1A
Community 1.1 to 1.2

Severe extended drought or/and extreme herbivory combined with severe soil surface disturbance weakens perennial plants providing annuals and unpalatable and drought tolerant perennial plants a competitive edge.

Pathway 2A
Community 1.2 to 1.1

Return to more normal precipitation amounts or/and removal of any extreme herbivory and severe soil surface disturbance allows perennial plant populations reduced due to drought or extreme herbivory to regain vigor and, over time, increase to "normal" amounts.

State 2
Natives / Introduced Annuals State

Community 2.1
Fourwing saltbush/winterfat/Ephedra/perennial cool and warm season grasses/exotic and native annuals

Figure 6. R035XB232AZ Reference Plant Community

Figure 7. R035XB232AZ Reference Plant Community

The dominant aspect of this site is a grass-shrub mix. Fourwing saltbush, winterfat and ephedra are apparent in the visual aspect. Indian ricegrass is very apparent and will dominate the aspect following an average or better winter and spring growing season. Warm season grasses, predominantly galleta and dropseeds, are also readily apparent in the aspect. The occurrence and production of sand dropseed may be expected to decrease in years of below average warm season precipitation and increase in years of above average warm season precipitation. Introduced annuals, both grasses and forbs, occur in minor amounts. Cool season annuals, including introduced annuals, may increase as a result of above average cool season precipitation and decrease as a result of below average cool season precipitation.

Table 9. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	148	238	356
Shrub/Vine	112	179	269
Forb	20	31	47
Total	**280**	**448**	**672**

Table 10. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-15%
Grass/grasslike foliar cover	8-16%
Forb foliar cover	0-2%
Non-vascular plants	0%

Biological crusts	0-2%
Litter	10-20%
Surface fragments >0.25" and <=3"	40-55%
Surface fragments >3"	0-5%
Bedrock	0-5%
Water	0%
Bare ground	30-35%

Table 11. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	0-2%
Grass/grasslike basal cover	4-8%
Forb basal cover	0-1%
Non-vascular plants	0%
Biological crusts	0-2%
Litter	10-20%
Surface fragments >0.25" and <=3"	40-55%
Surface fragments >3"	0-5%
Bedrock	0-5%
Water	0%
Bare ground	30-35%

Table 12. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	0-1%
>0.15 <= 0.3	–	0-5%	5-10%	0-1%
>0.3 <= 0.6	–	9-11%	2-6%	–
>0.6 <= 1.4	–	0-1%	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 9. Plant community growth curve (percent production by month). AZ3521, 35.2 6-10" p.z. all sites. Growth begins in the spring and continues through the summer. Most growth in this CRA occurs in the spring using stored winter moisture..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	9	20	27	14	10	11	5	3	0	0

Figure 10. Plant community growth curve (percent production by month). AZ5201, 35.2 6-10" p.z. galleta. Growth begins in spring, most growth occurs during summer rains..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	10	20	10	15	35	5	0	0	0

Figure 11. Plant community growth curve (percent production by month). AZ5202, Indian ricegrass, 35.2 6-10" p.z.. Growth begins in spring, most growth occurs in May, goes dormant during summer heat..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	10	15	40	20	0	0	10	5	0	0

Figure 12. Plant community growth curve (percent production by month). AZ5208, 35.2 6-10" p.z. Cutler Mormon tea. Most growth occurs in the spring, goes dormant in the summer, some growth occurs in the fall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	10	50	30	0	0	0	5	5	0	0

Figure 13. Plant community growth curve (percent production by month). AZ5211, 35.2 6-10" p.z. fourwing saltbush. Growth begins in spring and continues through the summer. Seed stalk extension occurs in summer with seed set in the fall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	10	15	20	20	15	10	5	0	0

Figure 14. Plant community growth curve (percent production by month). AZ5214, 35.2 6-10" p.z. sand dropseed. Growth occurs mostly during the summer rainy season..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	5	5	30	50	10	0	0	0

Community 2.2
Fourwing saltbush/winterfat/ephedra/exotic and native annuals/perennial warm and cool season grasses

The dominant aspect of this site is a shrub-grassland. Fourwing saltbush, winterfat and ephedra are apparent in the visual aspect. Warm season grasses, predominantly galleta and dropseeds, are also readily apparent in the aspect. Indian ricegrass is sub-dominant or only a minor component of the plant community. Annuals, including introduced annuals, and unpalatable perennial plants have become a major component, possibly more common than perennial grasses.

Pathway 1A
Community 2.1 to 2.2

Severe extended drought or/and extreme herbivory combined with severe soil surface disturbance weakens perennial plants providing annuals and unpalatable and drought tolerant perennial plants a competitive edge.

Pathway 2A
Community 2.2 to 2.1

Return to more normal precipitation amounts or/and removal of any extreme herbivory and severe soil surface disturbance allows perennial plant populations reduced due to drought or extreme herbivory to regain vigor and, over time, increase to "normal" amounts.

Transition 1
State 1 to 2

Exotic annuals are introduced into the ecosystem.

Additional community tables

Table 13. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Grass/Grasslikes**			157–269	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	67–112	–
	James' galleta	PLJA	*Pleuraphis jamesii*	45–67	–
	spike dropseed	SPCO4	*Sporobolus contractus*	22–67	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	22–67	–
2	**Other Grasses**			34–78	
	black grama	BOER4	*Bouteloua eriopoda*	11–22	–
	burrograss	SCBR2	*Scleropogon brevifolius*	11–22	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	0–11	–
	Grass, annual	2GA	*Grass, annual*	0–11	–
	Grass, perennial	2GP	*Grass, perennial*	0–11	–
	gyp dropseed	SPNE	*Sporobolus nealleyi*	0–6	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–2	–
Forb					
3	**Perennial Forbs**			11–28	
	spike dropseed	SPCO4	*Sporobolus contractus*	22–67	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	22–67	–
	globemallow	SPHAE	*Sphaeralcea*	11–22	–
	Forb, perennial	2FP	*Forb, perennial*	0–6	–
	rose heath	CHER2	*Chaetopappa ericoides*	0–6	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–6	–
	gyp dropseed	SPNE	*Sporobolus nealleyi*	0–4	–
	milkvetch	ASTRA	*Astragalus*	0–2	–
4	**Annual Forbs**			6–28	
	James' galleta	PLJA	*Pleuraphis jamesii*	45–67	–
	fleabane	ERIGE2	*Erigeron*	6–11	–
	blazingstar	MENTZ	*Mentzelia*	6–11	–
	evening primrose	OENOT	*Oenothera*	0–6	–
	Forb, annual	2FA	*Forb, annual*	0–6	–
	fiddleneck	AMSIN	*Amsinckia*	0–6	–
	sunflower	HELIA3	*Helianthus*	0–6	–
	spurge	EUPHO	*Euphorbia*	0–2	–
	phacelia	PHACE	*Phacelia*	0–2	–
	wirelettuce	STEPH	*Stephanomeria*	0–2	–
Shrub/Vine					
5	**Dominant Shrubs**			90–202	
	fourwing saltbush	ATCA2	*Atriplex canescens*	45–90	–

	winterfat	KRLA2	*Krascheninnikovia lanata*	45–90	–
	Cutler's jointfir	EPCU	*Ephedra cutleri*	6–45	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	6–45	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	6–45	–
	burrograss	SCBR2	*Scleropogon brevifolius*	13–22	–
6	**Other Shrubs**			6–17	
	black grama	BOER4	*Bouteloua eriopoda*	13–22	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–11	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–6	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–6	–
7	**Cactus**			0–17	
	grizzlybear pricklypear	OPPOH	*Opuntia polyacantha var. hystricina*	0–17	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–1	–

Table 14. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant Grasses**			157–269	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	67–112	–
	James' galleta	PLJA	*Pleuraphis jamesii*	22–67	–
	spike dropseed	SPCO4	*Sporobolus contractus*	22–67	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	22–67	–
2	**Other Perennial Grass**			22–78	
	burrograss	SCBR2	*Scleropogon brevifolius*	11–22	–
	black grama	BOER4	*Bouteloua eriopoda*	11–22	–
	Grass, perennial	2GP	*Grass, perennial*	0–11	–
	gyp dropseed	SPNE	*Sporobolus nealleyi*	0–6	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–2	–
3	**Annual Grasses**			6–17	
	spike dropseed	SPCO4	*Sporobolus contractus*	22–67	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	22–67	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	1–13	–
	Grass, annual	2GA	*Grass, annual*	0–11	–
	red brome	BRRU2	*Bromus rubens*	0–4	–
	cheatgrass	BRTE	*Bromus tectorum*	0–4	–
	gyp dropseed	SPNE	*Sporobolus nealleyi*	0–4	–
Forb					
4	**Perennial Forbs**			11–22	
	James' galleta	PLJA	*Pleuraphis jamesii*	45–67	–
	globemallow	SPHAE	*Sphaeralcea*	11–22	–
	rose heath	CHER2	*Chaetopappa ericoides*	0–6	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–6	–
	Forb, perennial	2FP	*Forb, perennial*	0–4	–

	milkvetch	ASTRA	*Astragalus*	0–2	–
5	**Annual Forbs**			9–22	
	burrograss	SCBR2	*Scleropogon brevifolius*	13–22	–
	fleabane	ERIGE2	*Erigeron*	6–17	–
	blazingstar	MENTZ	*Mentzelia*	6–17	–
	evening primrose	OENOT	*Oenothera*	0–6	–
	lambsquarters	CHAL7	*Chenopodium album*	0–6	–
	phacelia	PHACE	*Phacelia*	0–2	–
	Russian thistle	SAKA	*Salsola kali*	0–2	–
	wirelettuce	STEPH	*Stephanomeria*	0–2	–
	spurge	EUPHO	*Euphorbia*	0–2	–
	sunflower	HELIA3	*Helianthus*	0–2	–
	Forb, annual	2FA	*Forb, annual*	0–2	–
	fiddleneck	AMSIN	*Amsinckia*	0–2	–
Shrub/Vine					
6	**Dominant Shrubs**			90–202	
	fourwing saltbush	ATCA2	*Atriplex canescens*	45–90	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	45–90	–
	Cutler's jointfir	EPCU	*Ephedra cutleri*	6–45	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	6–45	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	6–45	–
	black grama	BOER4	*Bouteloua eriopoda*	13–22	–
7	**Other Shrubs**			6–17	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–11	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–6	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–6	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–1	–
8	**Cactus**			0–17	
	grizzlybear pricklypear	OPPOH	*Opuntia polyacantha var. hystricina*	0–17	–

Animal community

This site is suitable for grazing during any period of the year by cows and calves, stocker cattle, sheep and horses.

The potential plant community provides a variety of food and cover plants for wildlife.

Recreational uses

Site is typically low, gently rolling plateaus and fans. It produces high desert grasslands which can be very picturesque.

Winters are cold, however, relatively mild spring, fall and summer months are attractive to recreationists.

Activities include hunting, cross-country riding, photography, hiking, rock collecting, and wildlife observation.

Wood products

No wood products are produced from this site.

Type locality

Location 1: Coconino County, AZ	
Township/Range/Section	T38N R6E S32
UTM zone	N
UTM northing	4055670
UTM easting	0430537
Latitude	36° 38′ 38″
Longitude	111° 46′ 37″
General legal description	Rider Point, Marble Canyon Area; Section 32, T38N, R6E. Emmett Wash Quad; about 6 miles south of Cliff Dwellers, AZ.

Contributors

Karlynn Huling
Ken Gishi
Larry D. Ellicott
Steve Cassady

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
Contact for lead author	NRCS State Rangeland Management Specialist, Phoenix AZ
Date	11/16/2010
Approved by	Steve Barker
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None. May see a few short rills on steeper slopes.

2. **Presence of water flow patterns:** None. May see a few short flow patterns on steeper slopes

3. **Number and height of erosional pedestals or terracettes:** None.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not**

bare ground): Expect 30 to 35 percent bare ground.

---

5. **Number of gullies and erosion associated with gullies:** None.

---

6. **Extent of wind scoured, blowouts and/or depositional areas:** None. Vegetative cover and rock fragments on soil surface proctect the soil surface against wind erosion.

---

7. **Amount of litter movement (describe size and distance expected to travel):** Expect very little litter movement.

---

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Expect an average soil surface stability value of 3.0 to 4.0. The average value under canopy is 5.0 to 6.0. The average value on non-canopied areas is 2.3 to 3.6. In areas with substantial rock outcrop the values should be expected to be on the higher end of these ranges and, conversely, areas with less rock outcrop expect the values to be on the lower end of these ranges.

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** SOM is naturally very low in soils associated with this ecological site. A-horizons may be very hard to distinguish even in reference state. Evidence of SOM loss is noticeable sheet erosion, rills, water flow patterns, wind scouring, litter movement and/or reduced soil surface stability scores.

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Expect shrubs to be randomly, but uniformly scattered across the ecological site. Herbaceous vegetation is generally uniformly scattered within the interspaces, but may be in patches, especially galleta and black grama. Expect larger patches without herbaceous vegetation in areas where bedrock is at or very near the surface. The average fetch (the distance from a sample point, such as line point, to the nearest perennial plant) is 5 to 15 inches. Extremes of 0 (basal occurences) to as high as 41 inches (areas with bedrock at or near the surface) should be expected. Typically the range will be 3 to 18 inches.

---

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None.

---

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: Perennial grasses

    Sub-dominant: Shrubs

    Other:

    Additional: Warm season perennial grasses > shrubs> cool season perennial grasses >> native forbs > native annual grasses > exotic annual grasses and forbs.

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Expect to see some evidence of decadance in longer lived perennial bunch grasses, such as black grama and to a lesser extent Indian ricegrass. Expect to see some dead fourwing saltbush in various stages of decay, but should be less than 10 percent of the total number of plants.

14. **Average percent litter cover (%) and depth (in):** In ungrazed areas the majority of litter seen in interspaces is from annual forbs and grasses. Even this tends to remain standing for several months after the plant has senesced. Leaf litter from shrubs tends to stay within a few inches of the dripline of the shrub. Litter from perennial grasses and forbs often remains standing for several years.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Expect in an average year 350 to 450 pounds per acre (air-dried).

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:** Invasives plants expected in minor amounts are Russian thistle, cheatgrass and red brome. The total annual production of these should never be more than 10 pounds per acre (air-dried).

17. **Perennial plant reproductive capability:** The only natural limitations to reproductive capability are weather related and natural disease or herbivory that reduces reproductive capability.