

Ecological site R035XC317AZ
Sandy Loam Upland 10-14" p.z.

Accessed: 05/11/2025

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.

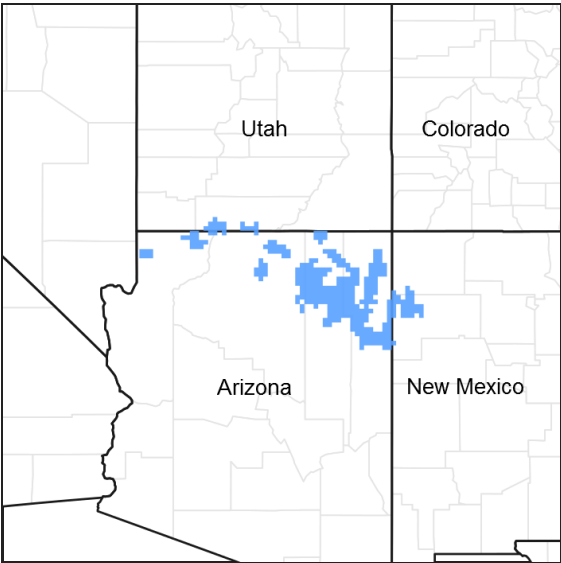


Figure 1. Mapped extent

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

Common Resource Area 35.3 – Colorado Plateau Sagebrush – Grasslands

This Common Resource Area 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. Elevations for the Common Resource Area where this ecological site may occur range from 4800 to 6700 feet and precipitation averages 10 to 14 inches. The elevation range is lower (about 4500 to 6000) on the western edge of the Colorado Plateau along the Grand Canyon, and moves up about 500 to 800 feet higher on the eastern side in the areas of the Navajo and Hopi Indian Reservations due to rain shadow effects from the Kaibab Plateau and Mogollon Rim. Common vegetation in this region 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. Sedimentary rock classes dominate the plateau with volcanic fields occurring for the most part near its margin. The soil temperature regime is mesic and the soil moisture regime is ustic aridic.

Table 1. Dominant plant species

Tree	Not specified
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Shrub	(1) <i>Ephedra</i> (2) <i>Atriplex canescens</i>
Herbaceous	(1) <i>Pleuraphis jamesii</i> (2) <i>Bouteloua gracilis</i>

Physiographic features

This site occurs in an upland position on plateaus, fans and mesas where slopes are less than 15%. The soils are very deep and well drained.

Table 2. Representative physiographic features

Landforms	(1) Plateau (2) Fan (3) Mesa
Flooding frequency	None
Ponding frequency	None to rare
Elevation	4,800–6,700 ft
Slope	1–5%
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)	14 in

Influencing water features

The soil moisture on this ecological site comes from precipitation. The site does not benefit significantly from run-on moisture. The sandy surface texture of the soil allows the site to capture the majority of both gentle winter storms and intense summer thunderstorms with little runoff.

Soil features

Soils on this site are deep and well drained. Surface textures range from very fine sandy loam to sandy loam. Subsurface textures range from fine sandy loam to sandy clay loam. This site has enough soil development to have some accumulations of clay or carbonates (argillic or cambic) within 20 inches of the surface that help hold moisture within the rooting depth of the plant community.

Soil map unit components that have been correlated to this ecological site include:

Shivwits Area (AZ623) 53-Mespin;

Mohave County Area NE part (AZ625) 2-Barx;

Coconino County North Kaibab part (AZ629) 5-Barx;

Little Colorado River Area (AZ707) 3-Begay/Milok, 39-Progresso

Navajo Mountain Area (AZ711) 6-Begay, 8-Councilor/Hawaikuh, 12-Florita, moderately deep, 29-Ustic Camborthid,

Canyon de Chelly (AZ712) 2-Atrac family/Bowdish, 6-Begay family, 23-Zia family;

Chinle Area (AZ713) 3-Aquima/Begay, 4-Ustic Haplocmbids, 6-Begay, 10-Begay, 11-Begay, 14-Councilor/Hawaikuh, 43-Shedado, 54-Councilor

Hopi Area (AZ714) 18-Begay 24-Begay, 3-Bighams, 19-Milok, 24-Penistaja;

Fort Defiance Area AZ/NM (AZ715) 9-Doakum family, 10-Begay, 14-Bettonnie family, 27-Bettonnie, 28-Bettonnie family, 61-Milok family, 79-Penistaja family/Begay, 83-Begay, 84-Begay 114-Zia

Shiprock Area AZ/NM (AZ717) 301-Sanostee, 306-Kitsilli, 313-Kitsilli/Marjane.

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone and shale
Surface texture	(1) Fine sandy loam (2) Very fine sandy loam (3) Fine sand
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to rapid
Soil depth	40–60 in
Surface fragment cover <=3"	0–15%
Available water capacity (0-40in)	7–10 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–15%

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 estimated 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.

If there is significant loss of soil surface through erosion, if there is a loss of the soil stability on the site due to active erosion on the site, if the hydrology of the site is significantly modified by increasing runoff amounts and/or patterns, if there are changes in availability of surface and subsurface water, or if the biotic integrity of the site is altered through changes in plant structural and functional types or the introduction of non-native species, then potential of the ecological site to return to the historic climax plant community can be lost, or restoration would require significant inputs. The site deterioration results in the crossing of a threshold or irreversible boundary to another state, or equilibrium, for the ecological site. 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.

State and transition model

35.3 Sandy Loam Upland 10-14" p.z.

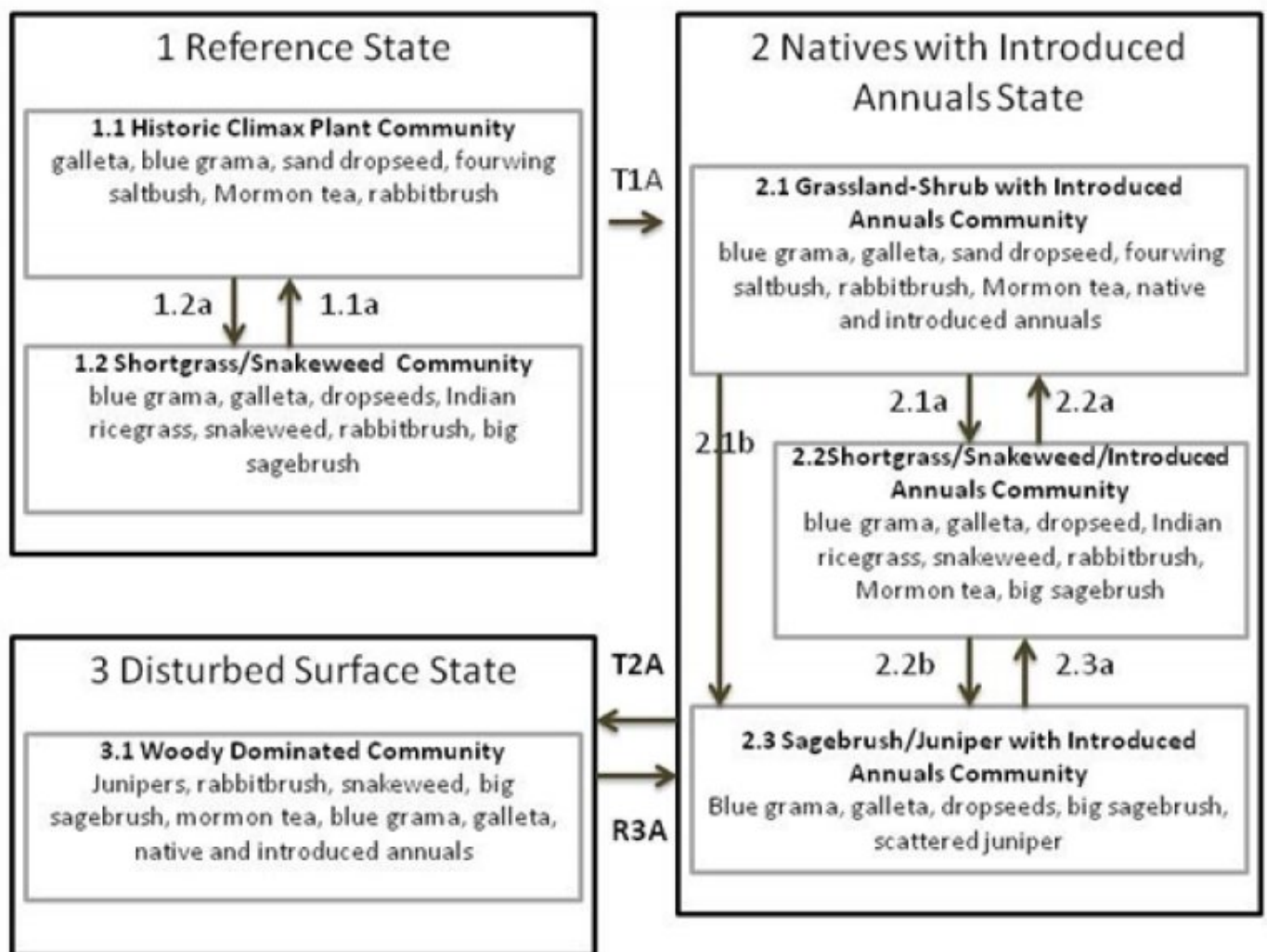


Figure 4. 353 SandyLoamUpland S&T

State 1 Reference State

The reference state includes the historic climax plant community that evolved with the soils and climate in the area. In this state, the plant communities are dominated by warm and cool season grasses with scattered shrubs and trees. With drought, long term winter dominated moisture patterns, grazing and other disturbances, perennial grasses will decrease and shrubs will increase on the site. Introduced annuals are present in this common resource area, and very minor amounts of these may occur in the plant communities in this state.

Community 1.1 Historic Climax Plant Community



Figure 5. Sandy Loam Upland 10-14" p.z

The Historic Climax Plant Community is dominated by mid and short warm and cool season grasses with a relatively small percentage of forbs and scattered shrubs and half shrubs. Plant species most likely to increase on this site when it is disturbed are broom snakeweed, rabbitbrush and annuals. There will be an increase in juniper on this site in the higher elevation and rainfall areas of this common resource area.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	315	420	525
Shrub/Vine	120	165	200
Forb	35	45	55
Tree	0	10	20
Total	470	640	800

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	0-5%
Grass/grasslike basal cover	5-15%
Forb basal cover	0-1%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0-15%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	—	—	0-5%	0-1%
>0.5 <= 1	—	0-2%	0-10%	0-1%
>1 <= 2	0-1%	0-5%	0-5%	—
>2 <= 4.5	0-1%	0-2%	0-1%	—
>4.5 <= 13	—	—	—	—
>13 <= 40	—	—	—	—
>40 <= 80	—	—	—	—
>80 <= 120	—	—	—	—
>120	—	—	—	—

Figure 7. Plant community growth curve (percent production by month).
AZ3503, 35.3 10-14" p.z. galleta. Growth begins in spring, most growth occurs during summer and early fall rainy season. Plants will green up again in the fall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	5	20	15	20	30	10	0	0

Figure 8. Plant community growth curve (percent production by month).
AZ3504, 35.3 10-14" p.z. bottlebrush squirreltail. Growth occurs in late winter, spring, and fall. Plants often remain green through the winter..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	5	15	35	25	10	0	0	5	5	0	0

Figure 9. Plant community growth curve (percent production by month).
AZ3563, 35.3 10-14" p.z. fourwing saltbush. Growth occurs in late spring through summer..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	10	25	35	25	5	0	0	0

Figure 10. Plant community growth curve (percent production by month).
AZ5104, 35.3 10-14" p.z. sand dropseed. Growth begins in spring and extends into the fall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	10	5	30	35	15	0	0	0

Community 1.2

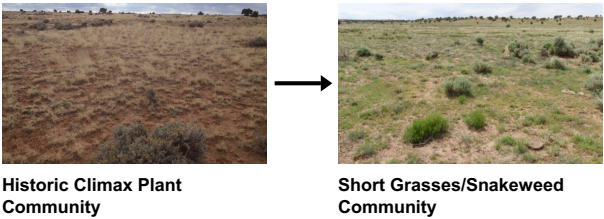
Short Grasses/Snakeweed Community



Figure 11. 353 SandyLoamUpland Community 1.2

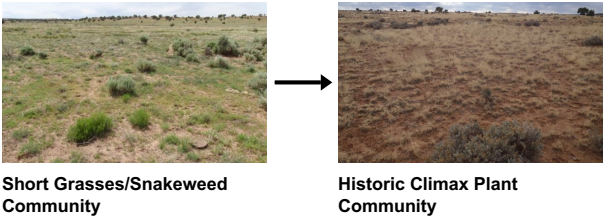
This plant community is characterized by increase of shrubs such as broom snakeweed and Greene’s rabbitbrush. There is a decline of perennial grasses as shrubs increase. Other shrubs that increase include Wyoming big sagebrush at higher precipitation and/or mormon tea on dryer sites.

Pathway 1.1a
Community 1.1 to 1.2



Unmanged grazing, drought

Pathway 1.2a
Community 1.2 to 1.1



Manged livestock grazing, fire, and favorable moisture/climate

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Natives with Introduced Annuals State

The plant communities in this state include the same species and plant community structures as the reference state. Introduced herbaceous species are now part of those plant communities and compete with native species for available moisture. Disturbances over time, such as fire, drought, and uncontrolled grazing, will now have the potential to allow an increase the introduced species on the site.

Community 2.1

Grassland/Shrub with Introduced Annuals Community

This plant community is very similar to the historic climax plant community, but it includes introduced exotic annual grasses and forbs that are affecting the biotic integrity of the site.

Community 2.2

Shortgrass/Snakeweed with Introduced Annuals Community

Introduced annual grasses and forbs are present in the plant community, but the amount and proportions of native plants is similar to that found in plant community 1.2, Shortgrass/Snakeweed.

Community 2.3

Sagebrush and Juniper with Introduced Annuals Community

This plant community is characterized by a dominance of shrubs and a increase of junipers. Introduced annual grasses and forbs are present in minor amounts in the plant community. Common shrubs include snakeweed, big sagebrush, rabbitbrush, mormon tea and yucca.

Pathway 2.1a

Community 2.1 to 2.2

Unmanaged grazing, drought

Pathway 2.1b

Community 2.1 to 2.3

Continuous improper grazing, drought

Pathway 2.2a

Community 2.2 to 2.1

Time without disturbance, well managed grazing, favorable moisture/climate

Conservation practices

Prescribed Grazing

Pathway 2.2b

Community 2.2 to 2.3

Unmanaged grazing, soil surface disturbance, reduced perennial grass cover allows favors establishment of woody species, such as sagebrush and/or juniper.

Pathway 2.3a

Community 2.3 to 2.2

Reduction of woody canopy (Fire, prolonged drought), removal of soil disturbances, prescribed grazing.

Conservation practices

Brush Management
Prescribed Burning
Prescribed Grazing

State 3

Disturbed Surface State

Shrubs such as snakeweed and/or rabbitbrush dominate the understory along with junipers. Wind and water caused soil erosion is prevalent creating rills and/or hummocks.

Community 3.1

Woody Dominated Community

Junipers and shrubs crowds and competes with understory species. Some grasses and forbs remain with annuals. Accelerated erosion occurs with Wind and water erosion is prevalent creating rills and/or hummocks.

Transition T1A

State 1 to 2

Introduction of non-native annuals species creates an irreversible change in the plant community

Transition T2A

State 2 to 3

Severe drought, unmanaged grazing, severe soil disturbances create areas of bare ground, increase erosion with rills and gullies.

Restoration pathway R3A

State 3 to 2

Removal of woody canopy with mechanical treatments or fire, prescribed grazing, seed source of grasses recovery, time without soil surface disturbance

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	Dominant Grasses			300–480	
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	180–240	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	90–120	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	30–60	–
	squirrealtail	ELELE	<i>Elymus elymoides</i> ssp. <i>elymoides</i>	5–30	–
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	5–20	–
	black grama	BOER4	<i>Bouteloua eriopoda</i>	5–20	–
2	Other Perennial Grasses			0–10	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–5	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0–5	–
	needle and thread	HECOC8	<i>Hesperostipa comata</i> ssp. <i>comata</i>	0–5	–
3	Annual Grasses			0–15	
	Grass, annual	2GA	<i>Grass, annual</i>	0–10	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–6	–
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	0–5	–
Forb					
4	Annual Forbs			0–30	
	Forb, annual	2FA	<i>Forb, annual</i>	0–30	–
5	Perennial Forbs			5–20	
	mariposa lily	CALOC	<i>Calochortus</i>	5–15	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	5–15	–
Shrub/Vine					
6	Dominant Shrubbs			90–240	
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	30–90	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	30–60	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	5–30	–
	pale desert-thorn	LYPA	<i>Lycium pallidum</i>	5–20	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	5–20	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	5–20	–
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	0–10	–
7	Other Shrubs			0–20	
	Whipple cholla	CYWH	<i>Cylindropuntia whipplei</i>	0–15	–
	Subshrub (<.5m)	2SUBS	<i>Subshrub (<.5m)</i>	0–10	–
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	0–5	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0–5	–
Tree					
9	Trees			0–20	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	0–20	–

Animal community

Site is favorable for grazing throughout most of the year except when snow cover restricts availability of forage. With continuous grazing use during winter and spring, the relatively scarce cool season mid grasses are replaced by big sagebrush, rabbit brush, snakeweed and lower value forbs and grasses. Planned grazing systems adapt well to use on this site.

The potential plant community produced by this site provides food for those species of wildlife that utilize grass as a major portion of their diet. When vegetative retrogression occurs, unpalatable shrubby species increase and some wildlife species may be benefit.

Recreational uses

Site is typically fans and low stream terraces. 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.

Type locality

Location 1: Mohave County, AZ	
Township/Range/Section	T41N R7W S35
General legal description	Approximately four miles south of Colorado City, AZ. Lost Spring Mountain East Quad; Section 35, T41N, R7W; Mohave County, AZ.

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)	Kevin Williams
Contact for lead author	NRCS Page Soil Survey
Date	11/01/2007
Approved by	S. Cassady
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None. Due to the low to medium runoff, well to somewhat excessively drained and moderate to rapid permeability, rills would not be expected on this site.

2. **Presence of water flow patterns:** None. Due to the low to medium runoff, well to somewhat excessively drained and moderate to rapid permeability, water patterns would not be expected on this site.

3. **Number and height of erosional pedestals or terracettes:** There may be a few occasional pedestals and terracettes, especially during a drought, due to the high wind erosion hazards of the soils.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground ranges from 10-20%. This site has the potential to produce a moderate amount of plant cover and litter due to an average availability of water capacity of 7-10 inches. Drought may cause an increase in bare ground.

5. **Number of gullies and erosion associated with gullies:** None. Any gullies present are revegetating and not actively eroding.

6. **Extent of wind scoured, blowouts and/or depositional areas:** Some wind scoured areas, blowouts and/or depositional areas may occur, especially during droughts due to high wind erosion hazard of the soils.

7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous and fine woody litter will be transported by wind and in water flow pathways. Coarse woody litter will remain under shrub and tree canopies.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface textures include loamy sand, fine sandy loam, and very fine sandy loam. A few soils have gravelly surfaces, but most soils do not have any rock fragments. When well vegetated, these soils have a moderate to high resistance to water erosion, but only a low resistance to wind erosion.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is weak to moderate thin platy. The thickness of the A-horizon is 2-10 inches. The color of the A-horizon did not contrast with the subsurface soil horizons for very deep soils, but showed a darker color on moderately deep soils with gentle slopes (2-9% slope).

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 grasses and trees, with lesser amounts of shrubs and forbs. Trees are often scattered sparsely across the site. Canopy cover ranges from 5-15% (grasses > shrubs > forbs). Basal cover ranges from 0-2% (grasses > forbs > shrubs > trees) for vascular plants and 30-50% for biological crust (cyanobacteria > lichen > moss). Both canopy and basal cover values 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. Many of the soils have a naturally granular 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: perennial colonizing grasses >
- Sub-dominant: shrubs > perennial bunchgrasses > perennial forbs > annual grasses > annual forbs > succulents
- Other:
- 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 in all but the most severe droughts. Severe winter droughts affect shrubs and trees the most. Severe summer droughts affect grasses the most.
-
14. **Average percent litter cover (%) and depth (in):** Of the total litter amount, it would be expected that approximately 7-90% would be herbaceous litter and approximately 10-30% would be woody litter. Litter amounts increase during the first few years of drought and 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):** 350-500 lbs/ac dry years; 500-650 lbs/ac median years; 650-800 lbs/ac 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, Greene's rabbitbrush, prickly pear, silverleaf nightshade and false buffalograss are natives that have the potential to increase and dominate after fire or heavy grazing. Cheatgrass is an exotic annual that is becoming endemic to the site regardless of management or fire frequency. It may become dominant after a fire, even with conservative or no grazing. Russian thistle, filaree, silverleaf nightshade, puncturevine, cocklebur and kochia are native and exotic forbs that have the potential to invade the site after heavy grazing and/or disturbance, especially if the site is near farm fields or disturbed lands.
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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/or rhizomes except during the most severe drought.
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