

Ecological site R035XC315AZ
Sandy 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.

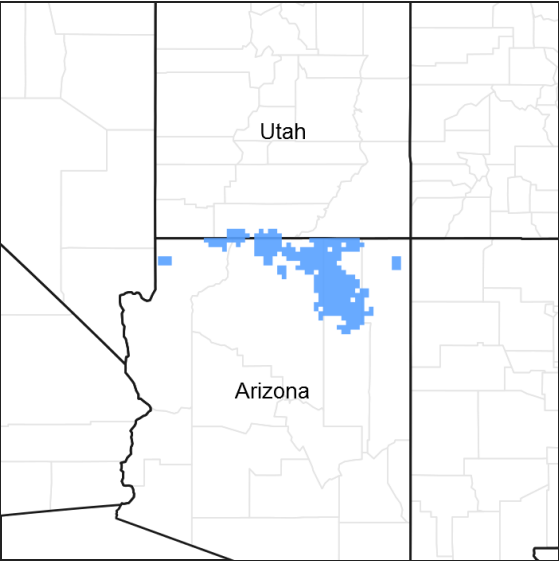


Figure 1. Mapped extent

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>Artemisia</i> (2) <i>Ephedra cutleri</i>
Herbaceous	(1) <i>Achnatherum hymenoides</i> (2) <i>Hesperostipa comata</i>

Physiographic features

This ecological site is found on nearly level to gently rolling uplands to partially stabilized or stabilized dunes on plateaus, fans and abandoned stream terraces. The soils are deep to very deep to any plant root restricting layer. The texture of the soil throughout the profile is generally sandy loams to loamy coarse sand. The slope of the site is generally 1 to 10 percent, but may be as high as 15 percent.

Table 2. Representative physiographic features

Landforms	(1) Plateau (2) Fan (3) Dune
Flooding frequency	None
Ponding frequency	None
Elevation	4,800–6,500 ft
Slope	0–15%
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 or no runoff.

Soil features

The soils associated with this ecological site are deep to very deep to any plant root restricting layer. The soil textures throughout the profile range from loamy fine sands to coarse sands. Where the site has been stable for long periods of time, there may be some accumulation of carbonates at moderate depths that can help the site retain more soil moisture within the root zone. The soil ranges from neutral to moderately alkaline (pH 6.6 to 8.4). The permeability is rapid to very rapid and the soil profile can capture both gentle winter rains and intense summer thunderstorms. The available water capacity is low. Wind erosion is a severe problem if the vegetative cover is lost.

This ecological site has been correlated to the following soil survey map unit components:

Shivwits Area (AZ623) 53-Mespu;

Mohave County NE part (AZ625) 37- Mido, 38-Mido;

Coconino County North Kaibab part (AZ629)2-Pensom, 3-Pensom, 5-Pensom/Barx, 37-Pensom, 38-Pensom, 39 Pensom, 10 Curhollow, 23-Klondike, 10-Mellenthin , 25-Mellenthin, 26-Mellenthin, 38-Arches;

Little Colorado River Area (AZ707) 3-Mido

Navajo Mountain Area (AZ711) 11-Pensom, 20-Mespu/Bispen, 28-Mido, 32-Pensom, 33-Pinavetes, 34 Pinavettes/ Pinavettes moderately deep, 39-Mido, 43 Mido

Chinle Area (AZ713)6-Mido, 10-Mido, 41-Mido

Hopi Area (AZ714) 17-Mido, 18-Mido, 19 Mido;

Fort Defiance Area AZ/NM (AZ715) 53-Tonalea, 61-Pinavettes family, 81-Pinavettes family & 83 Pinavettes family

Shiprock Area AZ/NM (AZ717) 306-Mido, 314 Mido.

Table 4. Representative soil features

Parent material	(1) Eolian sands–sandstone (2) Residuum–mudstone
Surface texture	(1) Loamy fine sand (2) Sand (3) Coarse sandy loam
Family particle size	(1) Sandy
Drainage class	Excessively drained
Permeability class	Rapid to very rapid
Soil depth	60 in
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	1.92–3.66 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–1%
Subsurface fragment volume >3" (Depth not specified)	0%

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.

If there is significant loss of soil surface through erosion, if there 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 though 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.

Plant production data provided in this site description is standardized to the air-dry weight of one year's growth. The plant communities described in this site description are based on near normal rainfall years.

State and transition model

35.3 Sandy Upland 10-14" p.z.

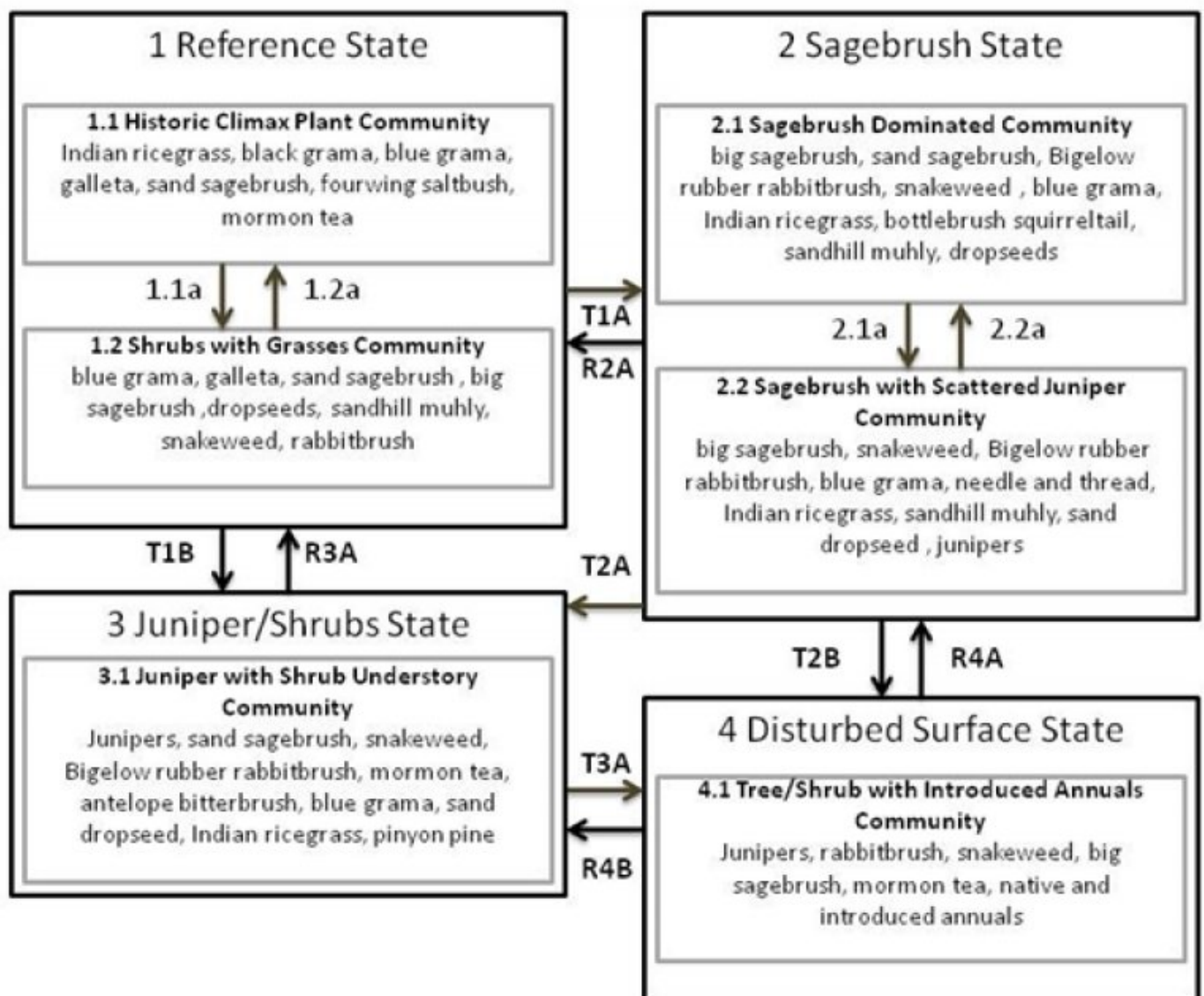


Figure 4. 353 SandyUpland S&T

State 1
Reference State

Community 1.1
Historic Climax Plant Community



Figure 5. Grassland with shrubs

The historic climax plant community is composed of mid and short grasses with a moderate percentage of forbs and shrubs. There is a mixture of both cool and warm season grasses and half-shrubs. Plant species most likely to invade or increase on this site when it deteriorates are sand sagebrush, big sagebrush, rabbitbrush, annuals, sandhill muhly, wooly groundsel, and snakeweed.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	275	400	500
Shrub/Vine	100	150	200
Tree	0	20	65
Forb	20	30	50
Total	395	600	815

Figure 7. Plant community growth curve (percent production by month). AZ3501, 35.3 10-14" p.z. needle and thread. Growth starts in spring and extends into summer, plants may be green in the fall..

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

Figure 8. 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

Community 1.2

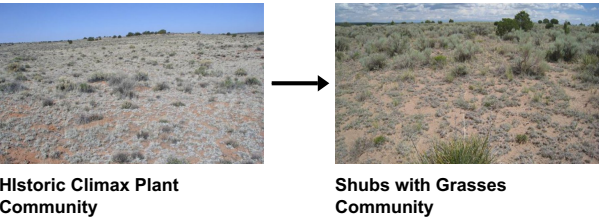
Shubs with Grasses Community



Figure 9. Shrubland with Grasses

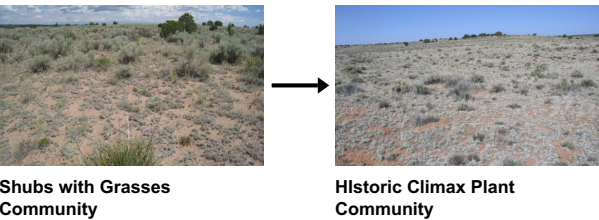
This plant community is characterized by a mix of shrubs and grasses. There is a slight increase of large and half shrubs, decrease in perennial grasses, especially cool season grasses. Grasses in decline include black grama, needle and thread and Indian ricegrass.

Pathway 1.1a
Community 1.1 to 1.2



Unmanaged grazing, long term winter dominated precipitation, and/or drought that reduces perennial warm and cool season grasses.

Pathway 1.2a
Community 1.2 to 1.1



Managed grazing, adequate precipitation

Conservation practices

Prescribed Grazing

State 2
Sagebrush State

Community 2.1
Sagebrush Dominated Community

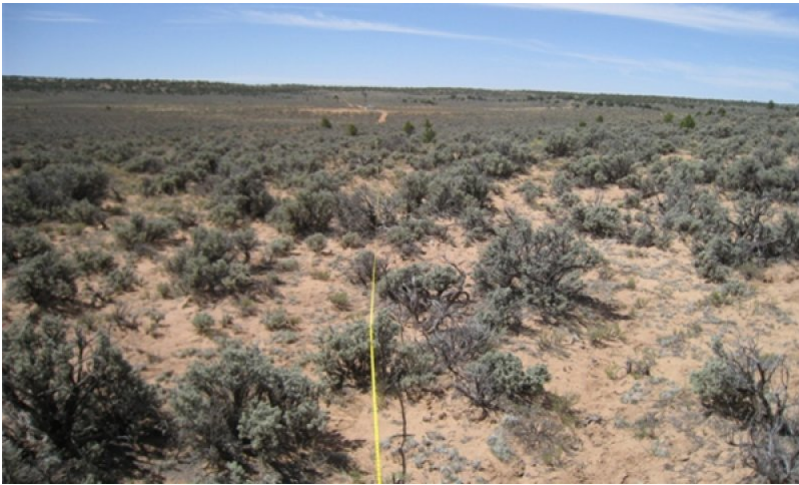


Figure 10. Sagebrush Dominated Site

Sagebrush species such as big sagebrush and/or sand sagebrush. Other shrubs in moderate amounts include rabbitbrush species and snakeweed. In the understory is a mix of warm and cool season grasses dominated by blue grama, Indian ricegrass, squirreltail, and dropseeds.

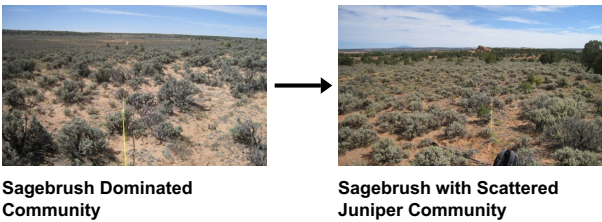
Community 2.2
Sagebrush with Scattered Juniper Community



Figure 11. Sagebrush with Scattered Junipers

The dominant aspect of this site is a shrubland with a scattered overstory of junipers. Dominant shrubs include sagebrush, snakeweed, Bigelow rubber rabbitbrush and other native shrubs. The herbaceous understory is dominated by blue grama, needle and thread, sand dropseed, sandhill muhly and Indian ricegrass.

Pathway 2.1a
Community 2.1 to 2.2

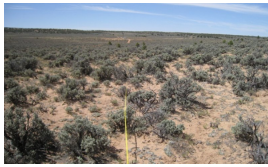


Unmanaged grazing, summer drought, seed source for juniper

Pathway 2.2a
Community 2.2 to 2.1



Sagebrush with Scattered Juniper Community



Sagebrush Dominated Community

Natural patchy fire, well managed grazing, and adequate precipitation

Conservation practices

Prescribed Burning
Prescribed Grazing

**State 3
Juniper / Shrubs State**

**Community 3.1
Juniper with Shrub Understory Community**



Figure 12. Juniper Overstory

Juniper and occasional pinyon pine increases to dominate overstory with a shrub understory. Shrubs species include sagebrush, snakeweed, rabbitbrush, Cultler's mormon tea and antelope bitterbrsh. There is also a increase of introduced annual forbs and grasses. Dominant grasses are sandhill muhly, blueg grama, sand dropseed and Indian ricegrass.

**State 4
Disturbed Surface State**

**Community 4.1
Tree/Shrub with Introduced Annuals Community**



Figure 13. Disturbed Surface with Shrub-Trees

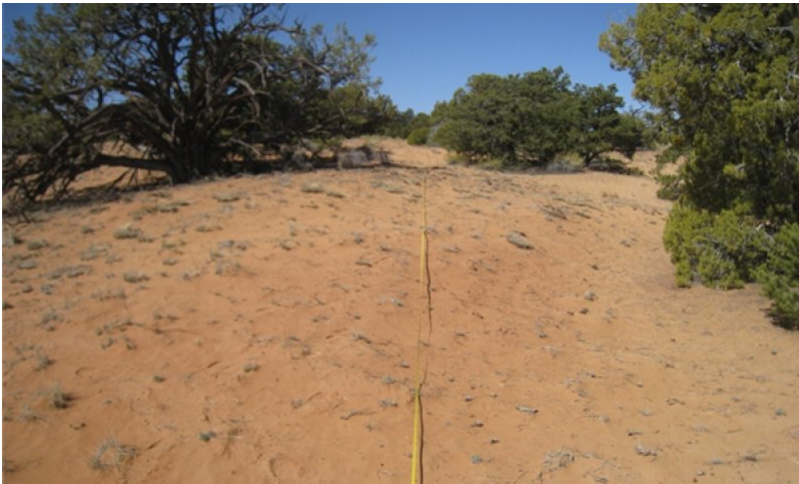


Figure 14. Disturbed surface with Trees

The dominant aspect of the site is woody overstory of shrubs and trees with a herbaceous understory dominated by forbs. This site has a high degree of bare ground with active signs of soil erosion. Bare ground can reach as high as 85%, but in wet years can be as low as 35% with high forb production. Plant understory composition by weight for forbs and annual grasses can range from 25-45%, but can be as high as 80% during high precipitation events. Dominate grasses include sandhill muhly, dropseeds and Indian ricegrass. Dominate shrubs include Bigelow rubber rabbitbrush, Greene's rabbtbrush, sand sagebrush, frosted mint, antelope bitterbrush and sand buckwheat. Tree canopy can vary, but is dominated by juniper species.

Transition T1A

State 1 to 2

Loss of biotic integrity due to loss of perennial grasses and shrub encroachment, causing some loss of soil site stability and hydrologic function with more stability and infiltration under shrubs.

Transition T1B

State 1 to 3

Loss of biotic integrity due to loss of perennial grasses and juniper and shrub encroachment, causing some loss of soil site stability and hydrologic function.

Transition T2A

State 2 to 3

Further loss of biotic integrity with increasing juniper. Soil site stability and hyrdologic function at least moderately departed from the reference state due to changes in infiltration pattern.

Transition T2B

State 2 to 4

Drought, unmanaged grazing and/or fire removes the perennial herbaceous component of the plant community. Introduced annual grasses and forbs move into the plant community further reducing the biotic integrity of the site. Soil site stability is lost except around remaining trees and shrubs.

Restoration pathway R3A

State 3 to 1

Reduction of juniper and other woody shrubs that have encroached on the site. Seeding or planting where remaining seed source is inadequate. Well managed grazing before and after treatment.

Conservation practices

Brush Management
Prescribed Burning
Range Planting
Prescribed Grazing

Transition T3A

State 3 to 4

Drought, fire, and/or unmanaged grazing reduce the perennial herbaceous component and some of the shrubs further reducing the biotic integrity of the site. Introduced annual grasses and forbs move into the plant community. Soil site stability and hydrologic function are at least moderately departed from the reference state.

Restoration pathway R4A

State 4 to 2

Reduction of junipers and shrub species that have encroached on the site. Seeding where there is not an adequate seed source of the desired species. Control of introduced grasses and fobs may be needed if they are significant on the site. Well managed grazing is required before and after treatment.

Conservation practices

Brush Management
Prescribed Burning
Range Planting
Prescribed Grazing
Herbaceous Weed Control

Restoration pathway R4B

State 4 to 3

Control of introduced annuals and seeding of native perennial grasses where the existing seed source is not adequate. Control of some tree and shrub encroachment may be needed. Well managed grazing is required before and after treatments.

Conservation practices

Brush Management
Prescribed Grazing
Herbaceous Weed Control

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	Dominant Grasses			300–450	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	130–225	—
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	65–120	—
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	30–60	—
	black grama	BOER4	<i>Bouteloua eriopoda</i>	30–60	—
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	30–60	—
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	30–60	—
2	Other Grasses			80–200	
	sandhill muhly	MUPU2	<i>Muhlenbergia pungens</i>	5–40	—
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	5–40	—
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	5–40	—
	mesa dropseed	SPFL2	<i>Sporobolus flexuosus</i>	5–40	—
	Grass, annual	2GA	<i>Grass, annual</i>	0–30	—
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–30	—
	Fendler's threeawn	ARPUF	<i>Aristida purpurea var. fendleriana</i>	5–30	—
Forb					
3	Forbs			25–50	
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	32–65	—
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–20	—
	globemallow	SPHAE	<i>Sphaeralcea</i>	0–20	—
	Rocky Mountain zinnia	ZIGR	<i>Zinnia grandiflora</i>	0–20	—
	Forb, annual	2FA	<i>Forb, annual</i>	0–10	—
Shrub/Vine					
5	Dominant Shrubs			100–200	
	sand sagebrush	ARFI2	<i>Artemisia filifolia</i>	75–100	—
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	32–98	—
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	25–75	—
	jointfir	EPHED	<i>Ephedra</i>	40–75	—
6	Other Shrubs			0–100	
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	32–98	—
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	25–40	—
	rubber rabbitbrush	ERNAB	<i>Ericameria nauseosa ssp. nauseosa var. bernardina</i>	25–40	—
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	5–30	—
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	5–30	—
	pricklypear	OPUNT	<i>Opuntia</i>	5–30	—
	yucca	YUCCA	<i>Yucca</i>	5–30	—

Tree					
7	Trees			0–65	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	0–65	–
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	0–65	–

Animal community

This site is suitable for grazing throughout most of the year with shrubs providing forage during the period when snow covers palatable grasses. When the ground cover is removed, this site is highly subject to wind erosion. However, the site responds quickly to proper management.

The habitat diversity of this shrub-grassland is restricted due to the lack of a tree overstory and permanent waters. Some animals may tend to avoid the site when the plant cover is sparse because of the poor traction properties of dry sand. This may give predators a slight advantage. Deer, rabbits, and buteos (hawks) typify the fauna on the site. Maintaining the site in good or excellent conditions provides the greatest habitat diversity for wildlife.

Recreational uses

This site may occur near the base of sandstone cliffs as rolling hills or fans or on undulating plateaus with sandstone parent material.

The winters are cold and summers are warm. Late spring, summer and fall are the most pleasant seasons for recreation activities.

Activities may include hunting, cross-country riding, photography, and wildlife observation.

Type locality

Location 1: Mohave County, AZ	
Township/Range/Section	T42N R6W S31
General legal description	Colorado City United Effort farm field number one. (conservation plan map)

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)	Steve Cassady, Kyle Spencer, Tobiah Salvail
Contact for lead author	NRCS State Rangeland Management Specialist, Phoenix Az
Date	05/30/2008
Approved by	Steve Barker

Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

3. **Number and height of erosional pedestals or terracettes:** No pedestalling, but turf building of ¼ to ½ inch occurs on blue grama. Some mounding, 1 to 2 inches, on long-lived shrubs.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is < or = 40 percent.

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):** No appreciable movement of litter.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** A thin crust or "cap" will develop on the soil surface providing some protection against erosion. This crust is easily broken.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface of soils associated with this site are single grained; loose. Color is reddish yellow (7.5YR 6/6) dry, yellowish red (7.5YR 4/6) moist.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Randomly scattered plants consisting of about 70 percent grasses, 25 percent shrubs and 5 percent forbs promote infiltration and reduce runoff. The average distance to the nearest perennial plant (fetch) is 2 inches, with the majority ranging from 0 to 3 inches, but occasionally as far as 5 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: Grasses (60 to 75%) >> Shrubs (25 to 40%) > Forbs (5 to 10%).

Sub-dominant:

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Due to the relatively droughty nature of these soils, drought, even short term, will result in plant mortality. In "normal" precipitation years mortality will be less than 10 percent.
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14. **Average percent litter cover (%) and depth (in):**
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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 600 to 700 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:** Broom snakeweed (*Gutierrezia sarothrae*) is natural on the site, but disturbance may cause an increase in its abundance.
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17. **Perennial plant reproductive capability:** All plants native to this site are adapted to the climate and are capable of producing seeds, stolons, and/or rhizomes except during the most severe droughts.
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