

Ecological site R035XB217AZ Sandy Upland 6-10" p.z.

Accessed: 05/07/2024

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.

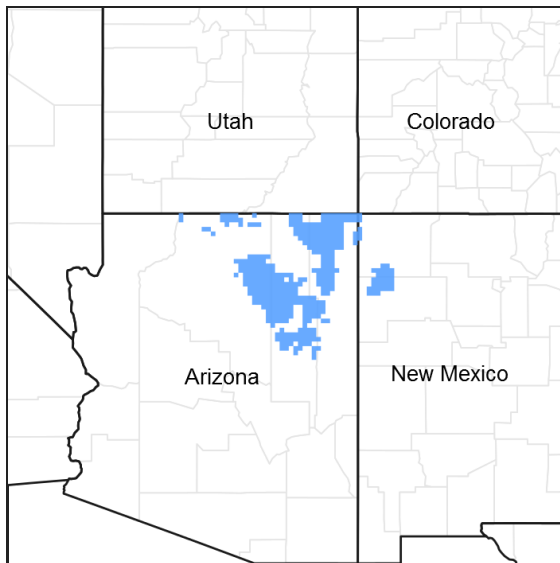


Figure 1. Mapped extent

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 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

DX035X04B204	Sandstone Upland 6-10" p.z. Upland sites with sandy textures, but very shallow to sandstone
R035XB219AZ	Sandy Loam Upland 6-10" p.z. Upland sites with deep coarse-loamy soils with minimum horizon development

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Atriplex canescens</i> (2) <i>Artemisia filifolia</i>
Herbaceous	(1) <i>Achnatherum hymenoides</i> (2) <i>Hesperostipa comata</i> ssp. <i>comata</i>

Physiographic features

This site occurs in an upland position on undulating plains, plateaus and stabilized dunes. Also occurs on fan remnants, treads of abandoned floodplains and summits of structural benches, which may be eolian-mantled. Slopes range from 0 to 15 percent. The soils are sandy texture throughout, and moderately deep to very deep to any root restricting layers. This ecological site neither benefits significantly from run-in of moisture nor does it suffer from excessive loss from runoff. It can occur on all exposures.

Table 2. Representative physiographic features

Landforms	(1) Sand sheet (2) Fan remnant (3) Structural bench
Flooding frequency	None to rare
Ponding frequency	None
Elevation	1,158–1,768 m
Slope	0–15%
Aspect	Aspect is not a significant factor

Climatic features

The area has a very dry and windy climate that is hot in the summer and cold in the winter. Average annual precipitation is from 6 to 10 inches. 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 falls from December through February, but rarely lasts more than a few days. The driest period is from late May to early July. Summer rains occur from July through September during brief intense local thunderstorms. The rain is sporadic in intensity and location. Windy conditions are common year round with the strongest most frequently in 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

This site does not benefit from run-on moisture. Water tables are well below rooting depth.

Soil features

Soils on this site are deep, somewhat excessively drained, with no plant root restricting layers. The surface texture ranges from sand to course sandy loam. The substratum is loamy fine sand, loamy sand or sand. The soil ranges from neutral to moderately alkaline (pH 6.6 to 8.4). Permeability is rapid and the soil can absorb all the moisture the climate supplies but has a low available water capacity.

Typical taxonomic units include:

Coconino County North (AZ629)- Soil Map Units-31, 44 & 45 Sheppard;
 Navajo County Central (AZ633)Soil Map Units- 60 & 61 Sheppard;
 Little Colorado River Area (AZ707) Soil Map Units-36, 50, 51, & 53 Sheppard, 53 Sheppard (moderately deep), 55 Shoegame;
 Navajo Mountain Area (AZ711)Soil Map Units- 9 Denazar, 9, 18, 40, 47, 51, 54, Sheppard, 18 & 19 Marcou, 57 Sheppard (moderately deep);
 Canyon de Chelly (AZ712)Soil Map Units- 7;
 Chinle Area (AZ713)Soil Map Units - 2, 17, 31, 32, 44, 46 & 47 Sheppard, 2 Aneth, 17 Denazar;
 Hopi (AZ714)MU's 29, 31, 32 & 33 Sheppard;
 Fort Defiance Area (AZ/NM)(AZ715) Soil Map Units- 13 Fruitland, 43 Jeddito, 65 Ives, 91 Razito, 105, 106 & 107 Sheppard;
 Shiprock Area (NM/AZ) (AZ717) - Soil Map Units- 521 & 526 Sandbench; 507, 518 & 521 Sheppard; 115 & 120 Denazar; 133, 145 & 275 Razito; 513 Sogzie, 505, 513, 514 & 523 Aneth;
 Glen Canyon Area (UT689)Soil Map Units- 222 Denazar, 442 Very deep component, 242 & 248 Sheppard.

Table 4. Representative soil features

Parent material	(1) Sand flow deposits–sandstone (2) Eolian sands–calcareous sandstone
Surface texture	(1) Coarse sand (2) Sand (3) Coarse sandy loam
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained to excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	51–152 cm
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	3.81–14.48 cm
Calcium carbonate equivalent (0-101.6cm)	0–10%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–10
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.5
Subsurface fragment volume <=3" (Depth not specified)	0–5%
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.

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

**35.2AZ Sandy Upland 6-10" p.z.
(R035XB217AZ)**

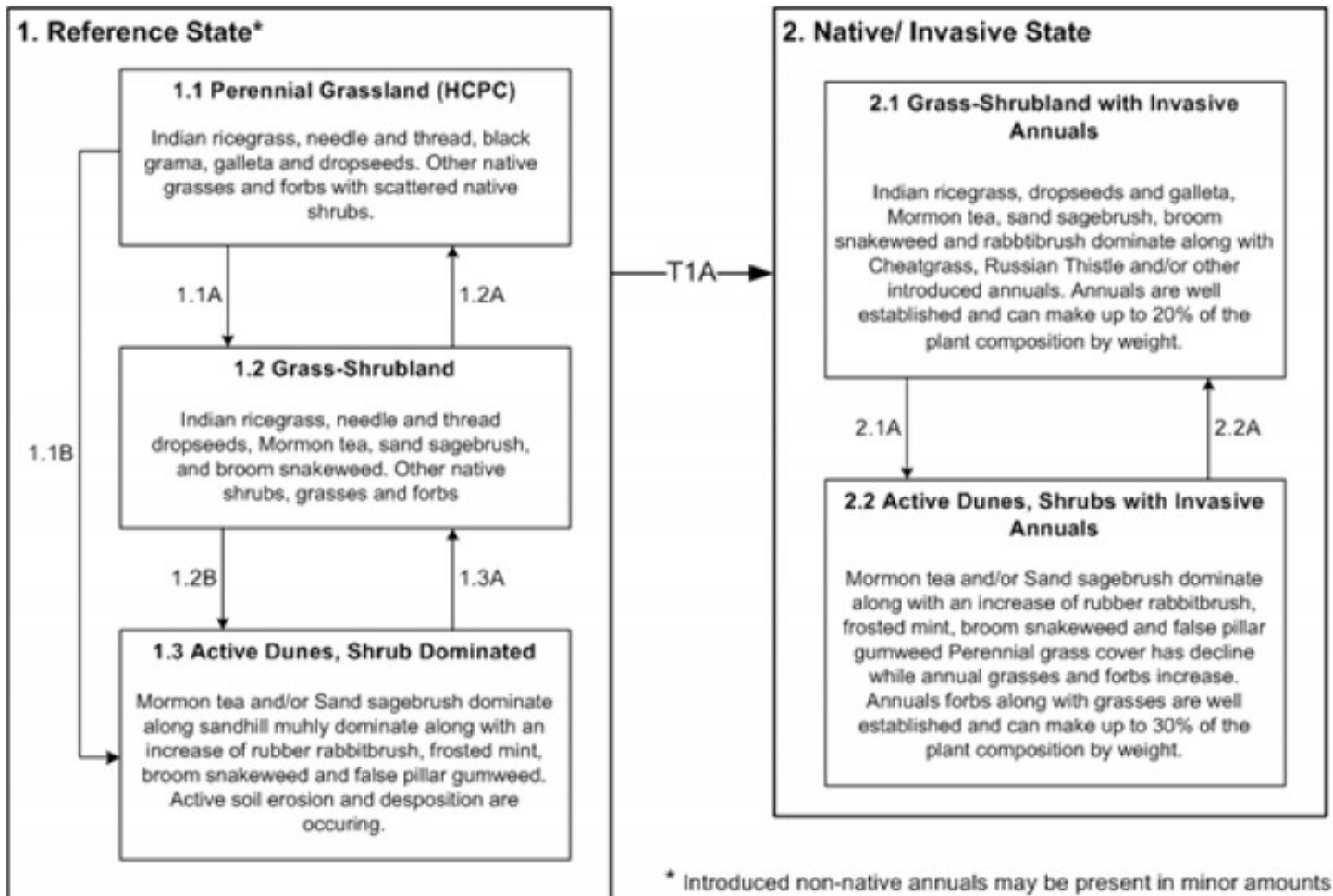


Figure 4. STM - R035XB217AZ

**State 1
Reference State**

This plant community includes the Historic Climax Plant Community (HCPC) and has been estimated by observing and sampling relatively undisturbed sites. This perennial grassland plant community has a mix of cool season bunchgrasses such as Indian ricegrass and needle-and-thread, and warm season grasses, such as black grama, galleta and blue grama. A mix of shrubs makes up the second most dominant component of the plant community followed by a mix of forbs, both perennial and annual. The production and percent composition of both individual plants and groups of plants varies from season to season and year to year due to the bi-modal nature of precipitation as well as variation from one year to the next in the amount and timing of precipitation received.

**Community 1.1
Perennial Grassland**



Figure 5. Perennial Grassland Community

This plant community is made up primarily 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. Dominant grasses are Indian ricegrass, needle-and-thread, black grama, and dropseeds. Dominant shrubs are Cutler Mormon tea, sand sagebrush, rush scurfpea and gilia beardtongue.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	303	432	560
Shrub/Vine	56	90	123
Forb	11	28	45
Total	370	550	728

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	1-5%
Grass/grasslike basal cover	3-10%
Forb basal cover	1-2%
Non-vascular plants	0%
Biological crusts	1-10%
Litter	25-45%
Surface fragments >0.25" and <=3"	0-2%
Surface fragments >3"	0-1%
Bedrock	0%
Water	0%
Bare ground	35-55%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	1-5%	10-20%	1-3%
>0.15 <= 0.3	–	1-3%	5-10%	1-2%
>0.3 <= 0.6	–	0-1%	0-1%	–
>0.6 <= 1.4	–	0-1%	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 7. 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 8. 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 9. Plant community growth curve (percent production by month). AZ5204, 35.2 6-10" p.z. bottlebrush squirreltail. Most growth occurs in the spring, plants may remain green during the winter..

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

Community 1.2 Grass-Shrubland

Shrubs such as sand sagebrush, rubber rabbitbrush, jimmyweed and broom snakeweed increase over more palatable shrubs. Perennial bunchgrasses such as Indian ricegrass and needle-and-thread decrease in relation to perennial sodgrasses such as sandhill muhly, galleta, and blue grama. Perennial forbs decrease in relation to annual forbs.

Community 1.3 Active Dunes, Shrub Dominated



Figure 10. 1.3 Active Dunes Shrub Dominated

Cutler's jointfir and/or sand sagebrush dominate this site along with an increase of rubber rabbitbrush, frosted mint, broom snakeweed, and false pillar gumweed. Perennial grasses and forbs decline while annual grasses and forbs increase. Wind caused soil erosion is prevalent creating dunes and hummocks.

**Pathway 1.1A
Community 1.1 to 1.2**

Prolonged drought and disturbance reduces vigor of perennial grasses and forbs allowing more drought tolerant shrubs to increase.

**Pathway 1.1B
Community 1.1 to 1.3**



Perennial Grassland



Active Dunes, Shrub Dominated

Severe, continuous soil surface disturbance, prolonged drought or a combination of the two reduce cover allowing for wind erosion, soil movement and soil deposition in hummocks and/or dunes.

**Pathway 1.2A
Community 1.2 to 1.1**

Return to more normal precipitation allows for recovery of perennial bunch grasses, perennial forbs, and more palatable shrubs.

**Pathway 1.2B
Community 1.2 to 1.3**

Severe, long term drought causes excessive perennial grass and forb mortality resulting in reduced ground cover allowing increased soil surface disturbance by wind erosion.

**Pathway 1.3A
Community 1.3 to 1.2**

Reduced disturbance and/or return to more "normal" precipitation for an extended period allows for increased soil surface cover from shrubs and perennial grasses.

State 2

Native/ Invasive State

This state is characterized by a increase of shrubs with scattered perennial grasses, but non-native annual grasses and forbs are well established in the plant community. In this state the amount of annual grasses and forbs varies from 2-20%, but will fluctuate from year to year due to variable precipitation and degree of disturbance. Soil surface disturbance, especially when frequently disturbed, can cause the amount of non-native annual grasses and forbs to increase.

Community 2.1

Grass-Shrubland with Invasive Annuals

Indian ricegrass, dropseeds and galleta, Mormon tea, sand sagebrush, broom snakeweed and rabbitbrush dominate along with Cheatgrass, Russian Thistle and/or other introduced annuals. Annuals are well established and can make up to 20% of the plant composition by weight.

Community 2.2

Active Dunes, Shrubs with Invasive Annuals

Mormon tea and/or Sand sagebrush dominate along with an increase of rubber rabbitbrush, frosted mint, broom snakeweed and false pillar gumweed. Perennial grass cover has decline while annual grasses and forbs increase. Annuals forbs along with grasses are well established and can make up to 30% of the plant composition by weight.

Pathway 2.1A

Community 2.1 to 2.2

Unmanaged grazing and/or severe, prolonged drought causes perennial grasses and forbs reduction allowing less palatable and/or more drought tolerant shrubs to increase, resulting in reduced ground cover and increased wind erosion.

Pathway 2.2A

Community 2.2 to 2.1

Reduced soil disturbance, managed or no grazing and/or return to more normal precipitation allows for recovery soil surface structure resulting in recovery of perennial bunch grasses, perennial forbs, and more palatable shrubs.

Conservation practices

Prescribed Grazing

Transition T1A

State 1 to 2

The invasion and establishment of non-native annual grasses and forbs along with continuous surface disturbance, reduce perennial cover.

Transition R2A

State 2 to 1

This possible return pathway may take several years or even decades. Reduce or no soil surface disturbance, prescribed grazing or no grazing, favorable precipitation, soil stability, seed source for grass recovery, possible reseeding of grasses and shrubs. Possible weed treatment for introduced annuals, large area may not be feasible.

Additional community tables

Table 8. Community 1.1 plant community composition

					Annual Production	Foliar Cover
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Group	Common Name	Symbol	Scientific Name	(Kg/Hectare)	(%)
Grass/Grasslike					
0	Common Grasses			258–432	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	84–168	–
	black grama	BOER4	<i>Bouteloua eriopoda</i>	56–112	–
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	56–112	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	45–90	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	45–90	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	45–90	–
	sand sagebrush	ARFI2	<i>Artemisia filifolia</i>	17–28	–
1	Occasional Grasses			45–129	
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	28–56	–
	mesa dropseed	SPFL2	<i>Sporobolus flexuosus</i>	28–56	–
	giant dropseed	SPGI	<i>Sporobolus giganteus</i>	0–28	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	11–28	–
	sandhill muhly	MUPU2	<i>Muhlenbergia pungens</i>	11–28	–
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	0–11	–
	Grass, annual	2GA	<i>Grass, annual</i>	0–11	–
	threeawn	ARIST	<i>Aristida</i>	0–11	–
Forb					
2	Forbs			11–45	
	globemallow	SPHAE	<i>Sphaeralcea</i>	6–11	–
	Forb, annual	2FA	<i>Forb, annual</i>	0–11	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–11	–
	fineleaf hymenopappus	HYFI	<i>Hymenopappus filifolius</i>	6–11	–
	hoary tansyaster	MACA2	<i>Machaeranthera canescens</i>	6–11	–
	threeawn	ARIST	<i>Aristida</i>	6–11	–
	sandhill muhly	MUPU2	<i>Muhlenbergia pungens</i>	6–11	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	6–11	–
	mesa dropseed	SPFL2	<i>Sporobolus flexuosus</i>	6–11	–
	giant dropseed	SPGI	<i>Sporobolus giganteus</i>	6–11	–
	Rocky Mountain zinnia	ZIGR	<i>Zinnia grandiflora</i>	6–11	–
	evening primrose	OENOT	<i>Oenothera</i>	0–6	–
	ipomopsis	IPOMO2	<i>Ipomopsis</i>	0–6	–
	snowball sand verbena	ABFR2	<i>Abronia fragrans</i>	0–6	–
	ragweed	AMBRO	<i>Ambrosia</i>	0–6	–
	rose heath	CHER2	<i>Chaetopappa ericoides</i>	0–6	–
	Wright's bird's beak	COWR2	<i>Cordylanthus wrightii</i>	0–6	–
	longbeak streptanthella	STLO4	<i>Streptanthella longirostris</i>	0–6	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0–2	–
	flax	LINUM	<i>Linum</i>	0–2	–
	woolly plantain	PLPAP	<i>Plantago patagonica</i>	0–2	–

	woody perennial	Tree	Herbaceous perennial	Grass	Forb
Shrub/Vine					
3	Common Shrubs			56-90	
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	22-45	-
	sand sagebrush	ARFI2	<i>Artemisia filifolia</i>	11-34	-
	jointfir	EPHED	<i>Ephedra</i>	6-28	-
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	6-28	-
4	Occasional Shrubs			0-34	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0-11	-
	Greene's rabbitbrush	CHGR6	<i>Chrysothamnus greenei</i>	0-11	-
	Whipple cholla	CYWH	<i>Cylindropuntia whipplei</i>	0-11	-
	sand buckwheat	ERLE9	<i>Eriogonum leptoclados</i>	0-11	-
	rubber rabbitbrush	ERNAB2	<i>Ericameria nauseosa ssp. nauseosa var. bigelovii</i>	0-11	-
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0-11	-
	narrowleaf yucca	YUAN2	<i>Yucca angustissima</i>	0-11	-

Animal community

This site is suitable for yearlong grazing by either cows and calves or stocker cattle and is easily traversed by all classes of livestock. Prescribed Grazing systems adapt very well to use on this site. Soils on this site have high wind erosion hazard, particularly on disturbed areas such as roads and livestock concentration areas.

This site offers a fair diversity of vegetation for use by wildlife. The site is most suitable to grassland wildlife species.

Recreational uses

Site is located on gently sloping plains and mesa tops which lend themselves to activities such as horseback riding, wildlife observation and hunting.

This site has a variety of spring and summer flowers which are particularly noticeable after good moisture periods. It has good aesthetic appeal when not disturbed.

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

Wood products

No wood products are produced on this site.

Type locality

Location 1: Navajo County, AZ	
General legal description	East slope of Tucker Mesa, five miles north of Winslow, AZ.
Location 2: Coconino County, AZ	
UTM zone	N
UTM northing	418730
UTM easting	4061708
General legal description	Dominguez - Escalante Historic Site, House Rock Valley Area North of Highway 89-A
Location 3: Navajo County, AZ	

Township/Range/Section	T18N R21E S20
General legal description	Holbrook Airport Area

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, Kenneth Gishi and Steve Cassady
Contact for lead author	State Rangeland Management Specialist, NRCS-Arizona State Office, Phoenix, AZ
Date	03/14/2007
Approved by	Byron Lambeth
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- Number and extent of rills:** There are none on this site and none are expected due to the high intake potential of these soils and soil surface protection provided by vegetation cover.

- Presence of water flow patterns:** Water flow patterns (WFP) are usually hard to distinguish. These soils have high saturated hydraulic conductivity and low to very low runoff and WFP are most apparent immediately after brief intense storm events. These WFP, if present, are less than 5 feet, sinuous and discontinuous.

- Number and height of erosional pedestals or terracettes:** Pedestals may occur, but are not common and are less than 1 inch in height. Terracettes are not expected. Some deposition may occur around the base of perennial plants and is not considered erosional.

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

bare ground): Bare ground ranges from 35-55% and can vary considerably due to the droughty nature of the site. Bare ground may be higher where this site integrates with sand dunes. Drought may cause an increase in bare ground.

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** Wind scours and blowouts are not common, due to high herbaceous cover. Blowouts and deposition areas are stable and healed, if present. Some soil deposition may occur around long lived perennial vegetation during prolonged droughts or high wind events.

7. **Amount of litter movement (describe size and distance expected to travel):** Fine and medium herbaceous litter and fine woody litter will be transported short distances, primarily by wind. In rare occurrences, it will be transported in water flow pathways as a result of brief intense storm events. Coarse woody litter will remain under shrub canopies. Water is not normally a factor in litter movement due to the high rate of infiltration.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface textures are loamy sand to sand. These soils have very few rock fragments. Canopy cover can vary considerably due to the droughty nature of the site. Soil Site Stability values from slake test generally range from 2-3 across the site, with higher values resulting from the presence of weak cryptobiotic discontinuous crusts that can develop on the soil surface.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface horizon is generally 2 inches thick with a single grain, loose to granular structure. The color of the A-horizon is not significantly different from the subsurface soil horizons.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** This site is characterized by groups of grasses, shrubs and forbs in descending order. Vegetative cover ranges 25-45% (grasses > shrubs > forbs). Basal cover ranges 6-15% for vascular plants (predominantly grasses) and 1-10% for biological crust (cyanobacteria > lichen > moss). Both canopy and basal cover values decrease during prolonged drought.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Most of the soils are not easily compacted.

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 warm season sodgrasses > perennial cool season bunchgrasses > perennial warm season bunchgrasses >

Sub-dominant: shrubs

Other: perennial forbs > annual forbs and grasses > succulents

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 cool season grasses the most. Severe summer droughts affect warm season grasses the most. Forbs are affected differently by species depending on their particular life cycle. Observed mortality on perennial grasses and shrubs ranges from 1 to 3 percent.
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14. **Average percent litter cover (%) and depth (in):** Litter cover ranges from 25-45% with an average depth of less than 1/4 inches. Of the litter amount, it would be expected that approximately 70-90% would be herbaceous litter and approximately 10-30% woody litter. Litter amounts increase during the first couple 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):** Total average annual production in a normal year is about 450 to 550 lbs/ac.
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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, rubber rabbitbrush, and Cutler's jointfir are native to the site, but have the potential to increase and dominate after heavy continuous grazing. Cheatgrass is an exotic annual grass that has the potential to invade and dominate, with or without disturbance. Russian thistle and shepherd's purse are exotic forbs that have the potential to invade and dominate 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 capable of producing seeds, stolons and/or rhizomes except during the most severe droughts.
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