

# Ecological site R035XE516AZ Sedimentary Cliffs 6-10" p.z.

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## 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.

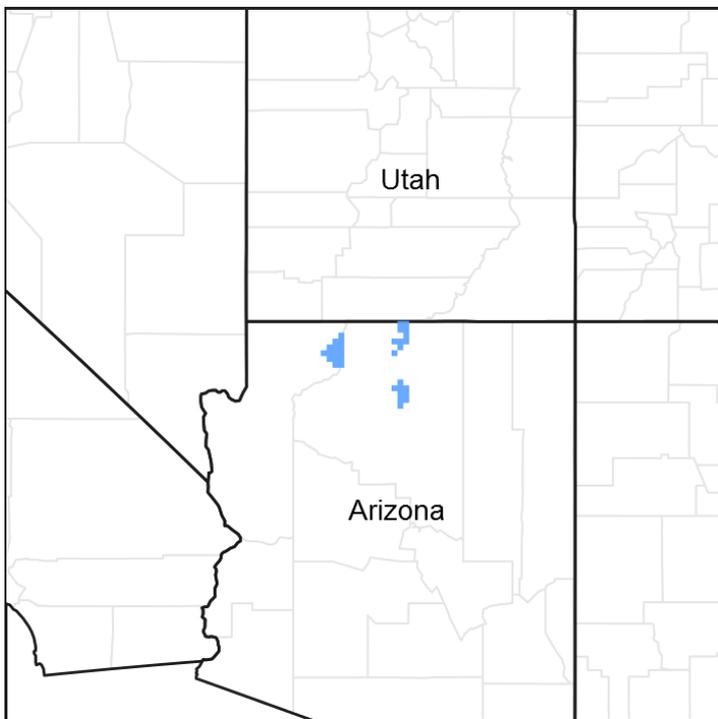


Figure 1. Mapped extent

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 35.5 – Grand Canyon Corridor

Elevations range from 1600 to 4500 feet and precipitation averages 6 to 10 inches per

year. Extreme elevation and aspect changes make this area unique. Vegetation includes Mormon tea, catclaw, white brittlebush, blackbrush, prickly pear, cholla species, big galleta, and blue threeawn. The soil temperature regime ranges from thermic to mesic and the soil moisture regime is typic aridic. This unit occurs within the Colorado Plateau Physiographic Province and is characterized by extreme vertical escarpments and strong aspect differences over short distances. Sedimentary rock classes dominate the Grand Canyon and exposures consist of a thick sequence of relatively undeformed formations.

## Associated sites

|             |   |
|-------------|---|
| R035XE502AZ | <b>Channery Hills 6-10" p.z.</b><br>Areas of mudstone/siltstone with no colluvium from geologic formations above. |
| R035XE504AZ | <b>Schist Hills 6-10" p.z.</b><br>Areas of intermixing of igneous formations such as Vishnu Schist.               |

**Table 1. Dominant plant species**

|            |   |
|------------|---|
| Tree       | Not specified   |
| Shrub      | (1) <i>Ephedra viridis</i><br>(2) <i>Encelia farinosa</i>     |
| Herbaceous | (1) <i>Pleuraphis rigida</i><br>(2) <i>Pleuraphis jamesii</i> |

## Physiographic features

This ecological site occurs on the ledges and steep colluvial slopes of the cliffs and escarpments of various sedimentary formations. Soils are sandy loam and fine sandy loam, and range in depth from a few inches in pockets in the bedrock to deep on some steep slopes. This site occurs on all aspects, and the plant communities are significantly influenced by the strong relief and aspect changes. Slopes on some ledges are as low as 2 percent, but the typical slope range is 15 to 60 percent and can be much higher. Eolian sand deposits from 1/2 to 3 inches in depth, especially in the wind corridors, are an important influence.

**Table 2. Representative physiographic features**

|                    |   |
|--------------------|---|
| Landforms          | (1) Escarpment<br>(2) Scarp<br>(3) Canyon |
| Flooding frequency | None                                      |
| Ponding frequency  | None                                      |
| Elevation          | 1,600–4,600 ft                            |
| Slope              | 15–100%                                   |

|                   |                                    |
|-------------------|------------------------------------|
| Water table depth | 60–72 in                           |
| Aspect            | Aspect is not a significant factor |

## Climatic features

The climate of the land resource unit is arid to semiarid with warm summers and cool winters. The mean annual precipitation ranges from 6 – 10 inches, but it is very erratic, often varying substantially from year to year. The majority of the precipitation falls during the between October through May. This precipitation comes as gentle rain or occasionally snow from frontal storms coming out to the Pacific Ocean. Snow is infrequent and rarely last more than 1-2 days. The remaining precipitation comes from July through September as spotty, unreliable and sometimes violent thunderstorms. The moisture for this precipitation originates in the Gulf of Mexico (and the Pacific Ocean in the fall) and flows into the area on the north end of the Mexican monsoon. Late May through late June is generally a dry period. The mean annual air temperature ranges from 55 to 69 degrees Fahrenheit (F). The frost-free period (air temperature > 32 degrees F) ranges from 180 to 220 days (@ 50 percent probability).

**Table 3. Representative climatic features**

|                               |          |
|-------------------------------|----------|
| Frost-free period (average)   | 200 days |
| Freeze-free period (average)  | 220 days |
| Precipitation total (average) | 10 in    |

## Influencing water features

Soil moisture on this ecological site if from precipitation. The bedrock on the site can concentrate moisture in areas with deeper soil pockets, increasing available soil moisture in those areas.

## Soil features

Soil surface textures are sandy loam to loamy very fine sand and are very gravelly to extremely stony or channery. Soil depth can range from 4 to 60 inches, but is commonly 20 to 50 inches to bedrock. The surface can range from slightly to strongly effervescent. Soils may be slightly saline, depending on the influence of certain formations.

Soil Survey Map Unit Components Correlated to This Ecological Site:

Mohave County NE part (AZ625) Map units 65-Torriorthents;

Coconino County North Kaibab part (AZ629) Map Units 43-Torriorthents;

Hualapai-Havasupai Area (AZ699) Map Units 39 Torriorthents;

Grand Canyon Area (AZ701) Map Units 68 & 115 Lithic Torriorthents and 117 Typic torriorthents;

Little Colorado River Area (AZ707) Map Units 45-Lithic torriorthents Supai Group, 47-Lithic Torriorthents Hermit Formation, 48 Typic torriorthents Tonto Group Redwall Formation.

**Table 4. Representative soil features**

|   |  |
|---|--|
| Parent material   | (1) Colluvium–sandstone and shale<br>(2) Residuum–limestone and sandstone                          |
| Surface texture   | (1) Very gravelly sandy loam<br>(2) Extremely stony loamy very fine sand<br>(3) Extremely channery |
| Family particle size                                    | (1) Sandy  |
| Drainage class  | Well drained   |
| Permeability class                                      | Moderate to moderately rapid   |
| Soil depth  | 4–60 in  |
| Surface fragment cover ≤3"                              | 20%  |
| Surface fragment cover >3"                              | 40%  |
| Available water capacity<br>(0-40in)                    | 0–5 in   |
| Calcium carbonate equivalent<br>(0-40in)                | 10–25%   |
| Electrical conductivity<br>(0-40in)                     | 0–8 mmhos/cm   |
| Soil reaction (1:1 water)<br>(0-40in)                   | 7.9–8.4  |
| Subsurface fragment volume ≤3"<br>(Depth not specified) | 30%  |
| Subsurface fragment volume >3"<br>(Depth not specified) | 50%  |

## **Ecological dynamics**

The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The historical climax plant community represents the natural potential plant

communities found on relict or relatively undisturbed sites. Other plant communities described here represent plant communities that are known to occur when the site is disturbed by factors such as grazing, fire, or drought.

Production data provided in this site description is standardized to air-dry weight at the end of the summer growing season. The plant communities described in this site description are based on near normal rainfall years.

NRCS uses a Similarity Index to compare existing plant communities to the plant communities described here. Similarity Index is determined by comparing the production and composition of a plant community to the production and composition of a plant community described in this site description. To determine Similarity Index, compare the production (air-dry weight) of each species to that shown in the plant community description. For each species, count no more than the maximum amount shown for the species, and for each group, count no more than the maximum shown for the group. Divide the resulting total by the total normal year production shown in the plant community description. If rainfall has been significantly above or below normal, use the total production shown for above or below normal years. If field data is not collected at the end of the summer growing season, then the field data must be corrected to the end of the year production before comparing it to the site description. The growth curve can be used as a guide for estimating production at the end of the summer growing season.

## **State and transition model**

35.3 Sedimentary Cliffs 10-14" p.z.

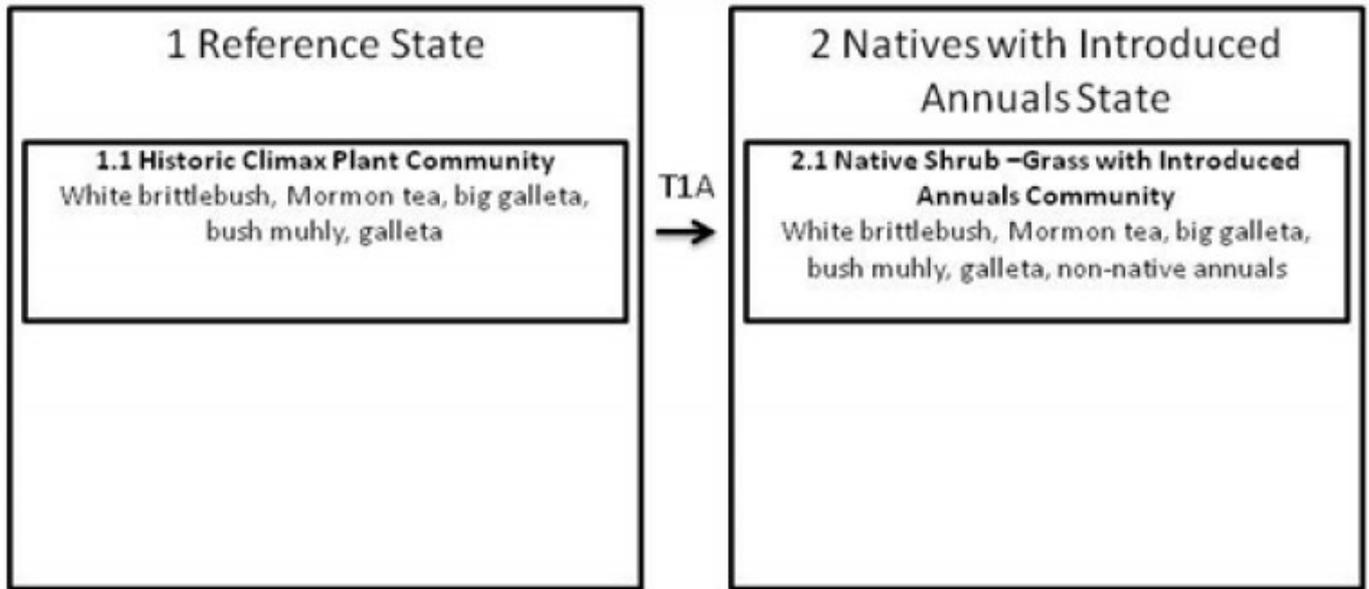


Figure 4. 355 SedimentaryCliffs S&T

**State 1**  
**Reference State**

**Community 1.1**  
**Historic Climax Plant Community**



**Figure 5. 355 SedimentaryCliffs**

This community has a substantial shrub component that varies with aspect and the presence or absence of eolian sand. Exposed slopes can be very hot and dominated by white brittlebush, while cooler slopes have more grasses and ephedras and catclaw acacia. Areas with an eolian sand influence have significantly more warm season and cool season grasses (annual and perennial) than do areas with no sand influence.

**Table 5. Annual production by plant type**

| <b>Plant Type</b> | <b>Low<br/>(Lb/Acre)</b> | <b>Representative Value<br/>(Lb/Acre)</b> | <b>High<br/>(Lb/Acre)</b> |
|-------------------|--------------------------|---|---------------------------|
| Shrub/Vine        | 120                      | 200                                       | 260                       |
| Grass/Grasslike   | 20                       | 60  | 100                       |
| Forb              | 40                       | 50  | 60                        |
| <b>Total</b>      | <b>180</b>               | <b>310</b>                                | <b>420</b>                |

## **State 2**

### **Natives with Introduced Annuals State**

#### **Community 2.1**

##### **Native Shrub - Grass with Introduced Annuals Community**

This community is similar to 1.1, but the introduced annuals such as red brome and Russian thistle. This plant community has a substantial shrub component that varies with aspect and the presence or absence of eolian sand. Exposed slopes can be very hot and dominated by white brittlebush, while cooler slopes have more grasses and ephedras and catclaw acacia. Areas with an eolian sand influence have significantly more warm season and cool season grasses (annual and perennial) than do areas with no sand influence. Introduced annuals are present in minor amounts.

# Transition T1A

## State 1 to 2

Introduction of non-native annuals

### Additional community tables

Table 6. Community 1.1 plant community composition

| Group                  | Common Name   | Symbol | Scientific Name                        | Annual Production (Lb/Acre) | Foliar Cover (%) |
|------------------------|---|--------|--|-----------------------------|------------------|
| <b>Grass/Grasslike</b> |   |        |  |                             |                  |
| 1                      | <b>Dominant Native perennial Summer Mid Grasses</b>     |        |  | 15–50                       |                  |
|                        | James' galleta  | PLJA   | <i>Pleuraphis jamesii</i>              | 15–35                       | –                |
|                        | big galleta   | PLRI3  | <i>Pleuraphis rigida</i>               | 15–35                       | –                |
|                        | bush muhly  | MUPO2  | <i>Muhlenbergia porteri</i>            | 5–15                        | –                |
| 2                      | <b>Occasional Native Perennial Summer Mid Grasses</b>   |        |  | 5–15                        |                  |
|                        | Grass, perennial  | 2GP    | <i>Grass, perennial</i>                | 0–15                        | –                |
|                        | cane bluestem   | BOBA3  | <i>Bothriochloa barbinodis</i>         | 0–15                        | –                |
|                        | sideoats grama  | BOCU   | <i>Bouteloua curtipendula</i>          | 0–15                        | –                |
|                        | black grama   | BOER4  | <i>Bouteloua eriopoda</i>              | 0–15                        | –                |
|                        | spike dropseed  | SPCO4  | <i>Sporobolus contractus</i>           | 0–15                        | –                |
|                        | sand dropseed   | SPCR   | <i>Sporobolus cryptandrus</i>          | 0–15                        | –                |
|                        | mesa dropseed   | SPFL2  | <i>Sporobolus flexuosus</i>            | 0–15                        | –                |
| 3                      | <b>Occasional Native Perennial Summer Short Grasses</b> |        |  | 0–10                        |                  |
|                        | Grass, perennial  | 2GP    | <i>Grass, perennial</i>                | 0–10                        | –                |
|                        | Rothrock's grama  | BORO2  | <i>Bouteloua rothrockii</i>            | 0–10                        | –                |
|                        | red grama   | BOTR2  | <i>Bouteloua trifida</i>               | 0–10                        | –                |
|                        | low woollygrass   | DAPU7  | <i>Dasyochloa pulchella</i>            | 0–10                        | –                |
| 4                      | <b>Common Native Perennia Spring Mid Grasses</b>        |        |  | 5–35                        |                  |
|                        | purple threeawn   | ARPU9  | <i>Aristida purpurea</i>               | 0–10                        | –                |
|                        | blue threeawn   | ARPUN  | <i>Aristida purpurea var. nealleyi</i> | 0–10                        | –                |
| 5                      | <b>Occasional Native Perennial Spring Mid Grasses</b>   |        |  | 5–15                        |                  |
|                        | Grass, perennial  | 2GP    | <i>Grass, perennial</i>                | 0–15                        | –                |
|                        | desert needlegrass                                      | ACSP12 | <i>Achnatherum spaciosum</i>           | 0–15                        | –                |

|             |   |        |  |       |   |
|-------------|---|--------|--|-------|---|
|             |   |        | <i>speciosum</i>                                 |       |   |
|             | needle and thread                                     | HECOC8 | <i>Hesperostipa comata</i><br><i>ssp. comata</i> | 0–15  | – |
|             | New Mexico<br>feathergrass                            | HENE5  | <i>Hesperostipa</i><br><i>neomexicana</i>        | 0–15  | – |
|             | slim tridens  | TRMU   | <i>Tridens muticus</i>                           | 0–15  | – |
| 6           | <b>Occasional Native Annual Grasses</b>               |        |  | 5–35  |   |
|             | Grass, annual   | 2GA    | <i>Grass, annual</i>                             | 0–15  | – |
|             | sixweeks threawn                                      | ARAD   | <i>Aristida adscensionis</i>                     | 0–15  | – |
|             | sixweeks grama  | BOBA2  | <i>Bouteloua barbata</i>                         | 0–15  | – |
|             | muhly   | MUHLE  | <i>Muhlenbergia</i>                              | 0–15  | – |
|             | panicgrass  | PANIC  | <i>Panicum</i>                                   | 0–15  | – |
|             | sixweeks fescue                                       | VUOC   | <i>Vulpia octoflora</i>                          | 0–15  | – |
| <b>Forb</b> |   |        |  |       |   |
| 7           | <b>Occasional Native Perennial Spring Short Forbs</b> |        |  | 5–15  |   |
|             | Forb, perennial                                       | 2FP    | <i>Forb, perennial</i>                           | 0–15  | – |
|             | brownfoot   | ACWR5  | <i>Acourtia wrightii</i>                         | 0–15  | – |
|             | desert trumpet  | ERIN4  | <i>Eriogonum inflatum</i>                        | 0–15  | – |
|             | desert stingbush                                      | EUUR   | <i>Eucnide urens</i>                             | 0–15  | – |
|             | desert pepperweed                                     | LEFR2  | <i>Lepidium fremontii</i>                        | 0–15  | – |
|             | roving sailor   | MAAN9  | <i>Maurandella</i><br><i>antirrhiniflora</i>     | 0–15  | – |
|             | phlox   | PHLOX  | <i>Phlox</i>                                     | 0–15  | – |
|             | globemallow   | SPHAE  | <i>Sphaeralcea</i>                               | 0–15  | – |
| 8           | <b>Occasional Native Perennial Summer Short Forbs</b> |        |  | 5–15  |   |
|             | Forb, perennial                                       | 2FP    | <i>Forb, perennial</i>                           | 0–15  | – |
|             | trailing windmills                                    | ALIN   | <i>Allionia incarnata</i>                        | 0–15  | – |
|             | Indian paintbrush                                     | CASTI2 | <i>Castilleja</i>                                | 0–15  | – |
|             | Colorado four o'clock                                 | MIMU   | <i>Mirabilis multiflora</i>                      | 0–15  | – |
|             | goldenrod   | SOLID  | <i>Solidago</i>                                  | 0–15  | – |
|             | brownplume<br>wirelettuce                             | STPA4  | <i>Stephanomeria</i><br><i>pauciflora</i>        | 0–15  | – |
| 9           | <b>Occasional Native Annual Forbs</b>                 |        |  | 55–35 |   |
|             | Forb, annual  | 2FA    | <i>Forb, annual</i>                              | 0–5   | – |
|             | fiddleneck  | AMSIN  | <i>Amsinckia</i>                                 | 0–5   | – |
|             | white easterbonnets                                   | ANLA7  | <i>Antheropeas lanosum</i>                       | 0–5   | – |

|  |                                   |        |                                   |     |   |
|--|-----------------------------------|--------|-----------------------------------|-----|---|
|  | Crescent milkvetch                | ASAM5  | <i>Astragalus amphioxys</i>       | 0–5 | – |
|  | Esteve's pincushion               | CHST   | <i>Chaenactis stevioides</i>      | 0–5 | – |
|  | thistle                           | CIRSI  | <i>Cirsium</i>                    | 0–5 | – |
|  | sacred thorn-apple                | DAWR2  | <i>Datura wrightii</i>            | 0–5 | – |
|  | flatcrown buckwheat               | ERDE6  | <i>Eriogonum deflexum</i>         | 0–5 | – |
|  | fleabane                          | ERIGE2 | <i>Erigeron</i>                   | 0–5 | – |
|  | Texas stork's bill                | ERTE13 | <i>Erodium texanum</i>            | 0–5 | – |
|  | spurge                            | EUPHO  | <i>Euphorbia</i>                  | 0–5 | – |
|  | shaggyfruit<br>pepperweed         | LELA   | <i>Lepidium lasiocarpum</i>       | 0–5 | – |
|  | desertdandelion                   | MALAC3 | <i>Malacothrix</i>                | 0–5 | – |
|  | desert tobacco                    | NIOB   | <i>Nicotiana obtusifolia</i>      | 0–5 | – |
|  | phacelia                          | PHACE  | <i>Phacelia</i>                   | 0–5 | – |
|  | yellow nightshade<br>groundcherry | PHCR4  | <i>Physalis crassifolia</i>       | 0–5 | – |
|  | popcornflower                     | PLAGI  | <i>Plagiobothrys</i>              | 0–5 | – |
|  | desert Indianwheat                | PLOV   | <i>Plantago ovata</i>             | 0–5 | – |
|  | woolly tidestromia                | TILA2  | <i>Tidestromia<br/>lanuginosa</i> | 0–5 | – |

### Shrub/Vine

|    |                                  |        |                                       |       |   |
|----|----------------------------------|--------|---------------------------------------|-------|---|
| 10 | <b>Common Native Half Shrubs</b> |        |                                       | 15–50 |   |
|    | Subshrub (<.5m)                  | 2SUBS  | <i>Subshrub (&lt;.5m)</i>             | 0–10  | – |
|    | white sagebrush                  | ARLU   | <i>Artemisia ludoviciana</i>          | 0–10  | – |
|    | dyssodia                         | DYSSO  | <i>Dyssodia</i>                       | 0–10  | – |
|    | starry bedstraw                  | GAST   | <i>Galium stellatum</i>               | 0–10  | – |
|    | broom snakeweed                  | GUSA2  | <i>Gutierrezia sarothrae</i>          | 0–10  | – |
|    | lacy tansyaster                  | MAPI   | <i>Machaeranthera<br/>pinnatifida</i> | 0–10  | – |
|    | mountain phlox                   | PHAU3  | <i>Phlox austromontana</i>            | 0–10  | – |
|    | bush arrowleaf                   | PLPL   | <i>Pleurocoronis pluriseta</i>        | 0–10  | – |
|    | slender poreleaf                 | POGR5  | <i>Porophyllum gracile</i>            | 0–10  | – |
|    | Coues' cassia                    | SECO10 | <i>Senna covesii</i>                  | 0–10  | – |
|    | desert princesplume              | STPI   | <i>Stanleya pinnata</i>               | 0–10  | – |
|    | pricklyleaf dogweed              | THAC   | <i>Thymophylla acerosa</i>            | 0–10  | – |
|    | turpentinebroom                  | THMO   | <i>Thamnosma montana</i>              | 0–10  | – |
|    | woody crinklemat                 | TICA3  | <i>Tiquilia canescens</i>             | 0–10  | – |

|    |                                     |        |   |        |   |
|----|-------------------------------------|--------|---|--------|---|
|    | matted crinklemat                   | TILA6  | <i>Tiquilia latior</i>                  | 0–10   | – |
|    | goldeneye                           | VIGUI  | <i>Viguiera</i>                         | 0–10   | – |
|    | Mojave woodyaster                   | XYTO2  | <i>Xylorhiza tortifolia</i>             | 0–10   | – |
| 11 | <b>Dominant Native Shrubs</b>       |        |   | 80–160 |   |
|    | brittlebush                         | ENFA   | <i>Encelia farinosa</i>                 | 30–100 | – |
|    | Nevada jointfir                     | EPNE   | <i>Ephedra nevadensis</i>               | 15–30  | – |
|    | Torrey's jointfir                   | EPTO   | <i>Ephedra torreyana</i>                | 15–30  | – |
|    | mormon tea                          | EPVI   | <i>Ephedra viridis</i>                  | 15–30  | – |
|    | catclaw acacia                      | ACGR   | <i>Acacia greggii</i>                   | 5–30   | – |
| 12 | <b>Occasional Native Mid Shrubs</b> |        |   | 15–30  |   |
|    | Shrub (>.5m)                        | 2SHRUB | <i>Shrub (&gt;.5m)</i>                  | 0–50   | – |
|    | Wright's beebrush                   | ALWR   | <i>Aloysia wrightii</i>                 | 0–50   | – |
|    | fourwing saltbush                   | ATCA2  | <i>Atriplex canescens</i>               | 0–50   | – |
|    | shadscale saltbush                  | ATCO   | <i>Atriplex confertifolia</i>           | 0–50   | – |
|    | shortleaf baccharis                 | BABR   | <i>Baccharis brachyphylla</i>           | 0–50   | – |
|    | sweetbush                           | BEJU   | <i>Bebbia juncea</i>                    | 0–50   | – |
|    | California brickellbush             | BRCA3  | <i>Brickellia californica</i>           | 0–50   | – |
|    | netleaf hackberry                   | CELAR  | <i>Celtis laevigata var. reticulata</i> | 0–50   | – |
|    | button brittlebush                  | ENFR   | <i>Encelia frutescens</i>               | 0–50   | – |
|    | Apache plume                        | FAPA   | <i>Fallugia paradoxa</i>                | 0–50   | – |
|    | ocotillo                            | FOSP2  | <i>Fouquieria splendens</i>             | 0–50   | – |
|    | burrobrush                          | HYSA   | <i>Hymenoclea salsola</i>               | 0–50   | – |
|    | water jacket                        | LYAN   | <i>Lycium andersonii</i>                | 0–50   | – |
|    | Arizona desert-thorn                | LYEX   | <i>Lycium exsertum</i>                  | 0–50   | – |
|    | mariola                             | PAIN2  | <i>Parthenium incanum</i>               | 0–50   | – |
|    | honey mesquite                      | PRGL2  | <i>Prosopis glandulosa</i>              | 0–50   | – |
|    | Fremont's dalea                     | PSFR   | <i>Psorothamnus fremontii</i>           | 0–50   | – |
|    | skunkbush sumac                     | RHTR   | <i>Rhus trilobata</i>                   | 0–50   | – |
|    | purple sage                         | SADO4  | <i>Salvia dorrii</i>                    | 0–50   | – |
|    | American threefold                  | TRCA8  | <i>Trixis californica</i>               | 0–50   | – |
| 13 | <b>Common Native Cacti</b>          |        |   | 5–30   |   |
|    | beavertail pricklypear              | OPBA2  | <i>Opuntia basilaris</i>                | 0–15   | – |

|    |   |       |                                     |      |   |
|----|---|-------|-------------------------------------|------|---|
|    | cactus apple                              | OPEN3 | <i>Opuntia engelmannii</i>          | 0–15 | – |
|    | plains pricklypear                        | OPPO  | <i>Opuntia polyacantha</i>          | 0–15 | – |
|    | dollarjoint pricklypear                   | OPCH  | <i>Opuntia chlorotica</i>           | 0–5  | – |
|    | Engelmann's hedgehog cactus               | ECEN  | <i>Echinocereus engelmannii</i>     | 0–5  | – |
|    | cottontop cactus                          | ECPO2 | <i>Echinocactus polycephalus</i>    | 0–5  | – |
|    | kingcup cactus                            | ECTR  | <i>Echinocereus triglochidiatus</i> | 0–5  | – |
|    | California barrel cactus                  | FECY  | <i>Ferocactus cylindraceus</i>      | 0–5  | – |
| 14 | <b>Occasional Native Agave-Yucca-Like</b> |       |                                     | 5–15 |   |
|    | Utah agave                                | AGUT  | <i>Agave utahensis</i>              | 0–10 | – |
|    | sacahuista                                | NOMI  | <i>Nolina microcarpa</i>            | 0–10 | – |
|    | narrowleaf yucca                          | YUAN2 | <i>Yucca angustissima</i>           | 0–10 | – |
|    | banana yucca                              | YUBA  | <i>Yucca baccata</i>                | 0–10 | – |
|    | soaptree yucca                            | YUEL  | <i>Yucca elata</i>                  | 0–10 | – |

## Animal community

This is an important site for birds that utilize cliffs for nesting and cover. Other wildlife may utilize accessible areas of the site for food and cover. Bedrock outcroppings can hold puddles of water temporarily after rain events.

## Hydrological functions

This site can be important in contributing run-on moisture to adjacent sites.

## Recreational uses

This site is used for recreational rock climbing.

## Wood products

This site does not produce wood products.

## Type locality

|                                 |            |
|---------------------------------|------------|
| Location 1: Coconino County, AZ |            |
| Latitude                        | 36° 26' 5" |

|                           |  |
|---------------------------|--|
| Longitude                 | 111° 51' 13"   |
| General legal description | In the interior of the Grand Canyon; 2,551 feet southwest of Tatahatso Wash; |

## 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.

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|---|--|
| Author(s)/participant(s)                    | Karlynn Huling   |
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| Date  | 04/18/2006   |
| Approved by                                 | Steve Barker   |
| Approval date                               |  |
| Composition (Indicators 10 and 12) based on | Annual Production  |

## Indicators

1. **Number and extent of rills:** The soils on the site are variable. Till formation may be common in areas that have loam and sandy loam surface textures, moderate permeability, few surface rock fragments, rapid runoff, and very steep slopes. Rill formation is not likely in areas that have loamy sand surface textures, rapid to very rapid permeability, and a high

cover of rock fragments, especially on the more gentle slopes.

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2. **Presence of water flow patterns:** Soils on this site are variable. Water flow patterns may be common in areas that have moderate permeability, shallow depth, few surface rock fragments and very steep slopes. They are not likely in areas with rapid to very rapid permeability, deeper soils, and a high cover of rock fragments, especially on the more gentle slopes.

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3. **Number and height of erosional pedestals or terracettes:** Some short pedestals and terracettes may form, but they will be limited by the amount of surface rock fragments.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** This site should have no more than 40% bare ground. Areas with a greater cover of rock fragments and/or rock outcrop will have less bare ground. Drought may cause an increase in bare ground.

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

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Soils on this site are variable. Most areas will not have any significant signs of wind erosion. Areas with loamy sand surfaces may have a few minor blowouts and depositional areas.

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7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous and fine woody litter will be transported in water flow pathways and by wind. Most coarse woody litter will remain under shrub canopies, but some will be transported in water flow pathways in the steepest areas.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface textures include loamy sands, sandy loam, fine sandy loam and loam. All surface horizons are very to extremely gravelly, channery, stony or bouldery. Most soils have a significant amount of rock fragments on the surface; the

average is 20% gravels and 40% cobbles, channers, or stones. When well vegetated or covered with rock fragment armor, these soils have a low to high resistance to water erosion and a moderate to high resistance to wind erosion.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure may be subangular blocky (weak, fine), granular (moderate, fine), single grain, platy (weak, thin), or massive. Surface thickness range is 1-10 inches. Color is variable depending upon parent material.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** This site is characterized by a patchy distribution of mostly shrubs with some grass and a few forbs. Plant distribution is influenced by changes in soil (texture, depth, amount and size of rock fragments), hydrology (slope, position on the slope, amount of bedrock, cracking and weathering of the bedrock), and aspect across the site. Both plant cover values (canopy and basal) decrease during prolonged drought.
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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 due to the extensive cover of rock fragment armor and the high volume of rock fragments within the surface horizon of the profile.
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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: shrubs >

Sub-dominant: warm season colonizing grasses >

Other: Minor: half shrubs = cool season bunchgrasses = warm season bunchgrasses > cacti = perennial forbs = annual forbs = annual grasses >

Additional: Trace: Agave family.

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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 years except the most severe droughts. Severe winter droughts affect shrubs the most. Severe summer droughts affect grasses the most.

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14. **Average percent litter cover (%) and depth ( in):** Mostly woody litter with some herbaceous. Litter amounts increase during the first few years of drought, then decrease in later years.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 250-300 pounds per acre (dry weight) in dry years, 300-400 pounds per acre in median years, 400-450 pounds per acre in 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:** Access to and through this site may be extremely difficult. These conditions have preserved the native plant communities and biodiversity in most areas. More information is needed to determine which native or exotic species is capable of increasing or dominating the site, especially in the more accessible areas.

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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 rhizomes in most years except for the most severe droughts.

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