USDA Natural Resources Conservation Service

# Ecological site R035XE507AZ
# Limy Slopes 6-10" p.z.

Accessed: 05/19/2024

## 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.

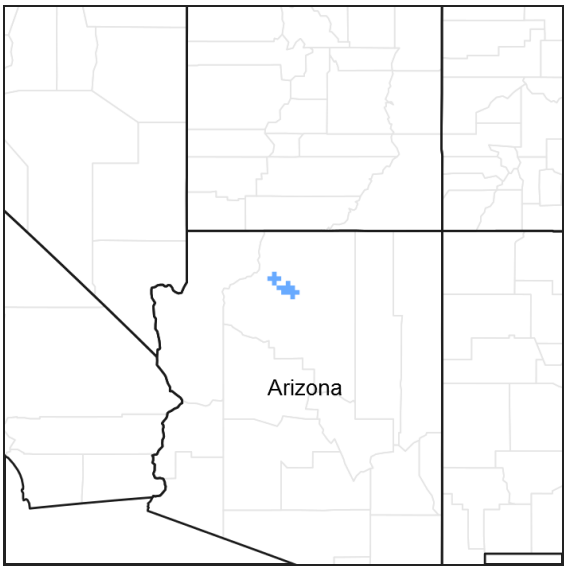



**Figure 1. Mapped extent**

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

AZ CRA 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

| | |
|---|---|
| R035XE516AZ | **Sedimentary Cliffs 6-10" p.z.**<br>Sedimentary Cliffs, 6-10" p.z. Cliff escarpments above and sometimes below the Limy Slopes ecological site. |
| R035XE517AZ | **Limy Slopes 6-10" p.z. Shallow**<br>Limy Slopes, Shallow, 6-10" p.z. Sites with soils shallow to a petrocalcic horizon. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | (1) *Ephedra nevadensis* |
| Herbaceous | (1) *Pleuraphis jamesii*<br>(2) *Bouteloua eriopoda* |

## Physiographic features

The ecological site occurs on steep colluvial sideslopes and fan terraces of plateau escarpments and canyon sidewalls. Soils are moderately deep to deep; textures are sandy loam to loam and very gravelly and cobbly to bouldery. The soil surface is strongly to violently effervescent. This site occurs on all aspects. Water table depth is deep to very deep.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Fan<br>(2) Terrace<br>(3) Escarpment |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 488–1,402 m |
| Slope | 15–60% |
| 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 gentile 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) | 254 mm |

## Influencing water features

## Soil features

Soils on this ecological site are sandy loam to loam in texture, and very to extremely gravelly, cobbly and/or bouldery. They are strongly effervescent on the surface and approach being carbonatic in the control section. Soil depth is generally moderately deep to deep to bedrock, but the site may have some areas of shallow soils.

Soil temperature regime is typic thermic; moisture regime is aridic. Water erosion hazard is high; wind erosion hazard moderate.Soil pH range is 7.9-8.4.

Waterholding class is very low to low.

A typical soil profile is:
A-0 to 2 inches; extremely cobbly loam; 45 perecent gravel, 20 percent cobble, and 10 percent stone; violently effervescent,
C-1 to 10 inches; very cobbly loam; 25 percent gravel, 20 percent cobble, violently effervescent,
C2-1- to 30 inches; extremely gravelly loam; 55 percent gravel, 10 percent cobble; violently effervescent,
C3-30 to 60 inches extremely gravelly sandy loam; 55 percent gravel. 10 percent cobble; violently effervescent.

Taxonomic classification of soils correlated to this ecological site include Loamy-skeletal, mixed, calcareous, mesic Lithic Torriorthents (Beraztic family soils); Loamy-skeletal, mixed, superactive, calcareous, mesic Typic Torriorthents (Cliffdown family soils); Loamy-skeletal, mixed, superactive, mesic Typic Haplocambide (Whirlo family soils); and Loamy-skeletal, carbonatic, mesic Typic Haplocalcids (Dera family soils).

Map units correlated to this site include:

SSA-701 Grand Canyon Area MU's 17 Typic haplocambids, 24 Cliffdown (family) & Cliffdown (family-moderately deep), 32 Whirlo (family), 34 Dera (family), 136 Typic haplocalcids and 159 Berzatic (family).

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Alluvium–calcareous sandstone<br>(2) Residuum–calcareous sandstone<br>(3) Colluvium–limestone and sandstone |
| Surface texture | (1) Very cobbly sandy loam<br>(2) Very gravelly loam<br>(3) Bouldery silt loam |
| Family particle size | (1) Loamy |
| Drainage class | Well drained |
| Permeability class | Moderate to moderately rapid |
| Soil depth | 51–152 cm |
| Surface fragment cover <=3" | 35–45% |
| Surface fragment cover >3" | 15–30% |
| Available water capacity (0-101.6cm) | 6.35–17.78 cm |
| Calcium carbonate equivalent (0-101.6cm) | 15–40% |
| Electrical conductivity (0-101.6cm) | 0–2 mmhos/cm |
| Sodium adsorption ratio (0-101.6cm) | 0–2 |
| Soil reaction (1:1 water) (0-101.6cm) | 7.9–8.4 |
| Subsurface fragment volume <=3" (Depth not specified) | 5–55% |
| Subsurface fragment volume >3" (Depth not specified) | 5–25% |

## Ecological dynamics

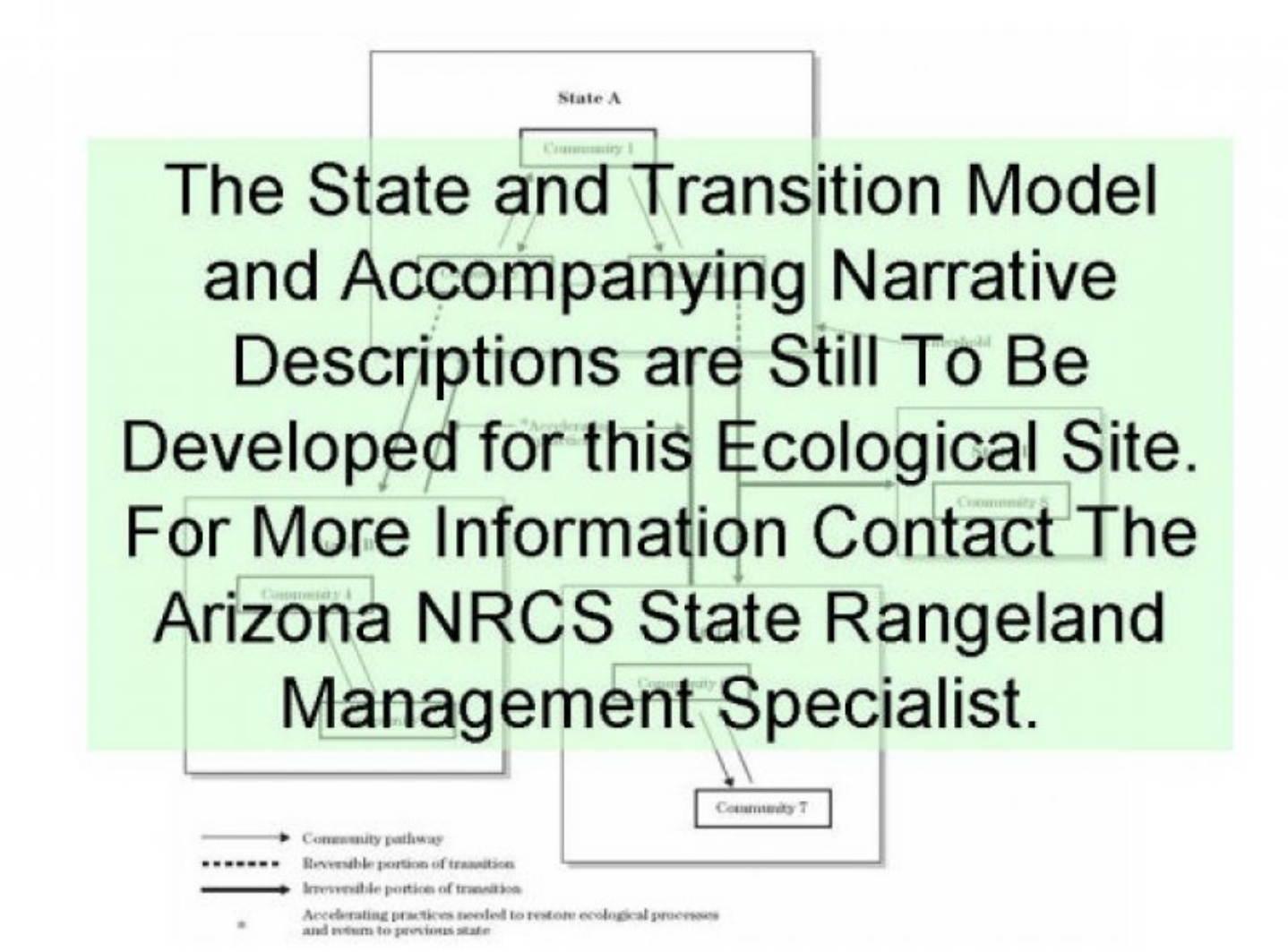
The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The historical climax plant community represents the natural potential plant communities found on relict or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




The State and Transition Model and Accompanying Narrative Descriptions are Still To Be Developed for this Ecological Site. For More Information Contact The Arizona NRCS State Rangeland Management Specialist.

**State 1**
**Historic Climax Plant Community**

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

This plant community has a large component of warm season perennial grasses; cool season perennial grasses are somewhat less abundant, but still significant. The plant community also has a significant shrub component.

Blackbrush and ephedras can be fairly common, while a variety of other shrubs may be scattered across the site.

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

| Plant Type | Low (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|---|---|---|---|
| Grass/Grasslike | 269 | 303 | 336 |
| Shrub/Vine | 90 | 123 | 157 |
| Forb | 4 | 22 | 45 |
| Tree | – | – | 4 |
| **Total** | **363** | **448** | **542** |

**Figure 5. Plant community growth curve (percent production by month). AZ3552, 35.5 6-10" p.z. upland sites. Growth begins in the spring and continues through the summer..**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 8 | 18 | 19 | 11 | 14 | 20 | 8 | 2 | 0 | 0 |

## Additional community tables

**Table 6. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Kg/Hectare) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | **Common Native Perennial Summer Mid Grasses** | | | 135–179 | |
| | sideoats grama | BOCU | *Bouteloua curtipendula* | 45–90 | – |
| | black grama | BOER4 | *Bouteloua eriopoda* | 45–90 | – |
| | James' galleta | PLJA | *Pleuraphis jamesii* | 45–90 | – |
| 2 | **Occasional Native Perennial Summer Mid Grasses** | | | 22–45 | |
| | bush muhly | MUPO2 | *Muhlenbergia porteri* | 6–22 | – |
| | spike dropseed | SPCO4 | *Sporobolus contractus* | 6–22 | – |
| | sand dropseed | SPCR | *Sporobolus cryptandrus* | 6–22 | – |
| | Grass, perennial | 2GP | *Grass, perennial* | 0–11 | – |
| | cane bluestem | BOBA3 | *Bothriochloa barbinodis* | 0–11 | – |
| 3 | **Occasional Native Perennial Summer Short Grasses** | | | 0–11 | |
| | Grass, perennial | 2GP | *Grass, perennial* | 0–9 | – |
| | blue grama | BOGR2 | *Bouteloua gracilis* | 0–9 | – |
| | low woollygrass | DAPU7 | *Dasyochloa pulchella* | 0–9 | – |
| | nineawn pappusgrass | ENDE | *Enneapogon desvauxii* | 0–9 | – |
| | shortleaf woollygrass | ERAV | *Erioneuron avenaceum* | 0–9 | – |
| | Hall's panicgrass | PAHA | *Panicum hallii* | 0–9 | – |
| | burrograss | SCBR2 | *Scleropogon brevifolius* | 0–9 | – |
| 4 | **Common Native Perennial Spring Mid Grasses** | | | 45–90 | |
| | desert needlegrass | ACSP12 | *Achnatherum speciosum* | 22–45 | – |
| | blue threeawn | ARPUN | *Aristida purpurea var. nealleyi* | 6–22 | – |
| | needle and thread | HECOC8 | *Hesperostipa comata ssp. comata* | 6–22 | – |
| | New Mexico feathergrass | HENE5 | *Hesperostipa neomexicana* | 6–22 | – |
| | Indian ricegrass | ACHY | *Achnatherum hymenoides* | 6–22 | – |

| | | | | | |
|---|---|---|---|---|---|
| | Indian ricegrass | ACHY | *Achnatherum hymenoides* | 0–22 | |
| 5 | **Occasional Native Perennial Spring Mid Grasses** | | | 0–11 | |
| | Grass, perennial | 2GP | *Grass, perennial* | 0–9 | – |
| | squirreltail | ELELE | *Elymus elymoides ssp. elymoides* | 0–9 | – |
| | prairie Junegrass | KOMA | *Koeleria macrantha* | 0–9 | – |
| 6 | **Occasional Native Annual Grasses** | | | 0–11 | |
| | Grass, annual | 2GA | *Grass, annual* | 0–9 | – |
| | Wright's threeawn | ARPUW | *Aristida purpurea var. wrightii* | 0–9 | – |
| | sixweeks grama | BOBA2 | *Bouteloua barbata* | 0–9 | – |
| **Forb** | | | | | |
| 7 | **Occasional Native Perennial Spring Short Forbs** | | | 6–22 | |
| | Forb, perennial | 2FP | *Forb, perennial* | 0–13 | – |
| | perennial rockcress | ARPE2 | *Arabis perennans* | 0–13 | – |
| | lipfern | CHEIL | *Cheilanthes* | 0–13 | – |
| | rose heath | CHER2 | *Chaetopappa ericoides* | 0–13 | – |
| | desert trumpet | ERIN4 | *Eriogonum inflatum* | 0–13 | – |
| | globemallow | SPHAE | *Sphaeralcea* | 0–13 | – |
| 8 | **Occasional Native Perennial Summer Short Forbs** | | | 6–22 | |
| | Forb, perennial | 2FP | *Forb, perennial* | 0–13 | – |
| | fireweed | CHAME2 | *Chamerion* | 0–13 | – |
| | spurge | EUPHO | *Euphorbia* | 0–13 | – |
| | twinevine | FUNAS | *Funastrum* | 0–13 | – |
| | Colorado four o'clock | MIMU | *Mirabilis multiflora* | 0–13 | – |
| | beardtongue | PENST | *Penstemon* | 0–13 | – |
| | brownplume wirelettuce | STPA4 | *Stephanomeria pauciflora* | 0–13 | – |
| | longstalk greenthread | THLO | *Thelesperma longipes* | 0–13 | – |
| 9 | **Occasional Native Annual Forbs** | | | 0–11 | |
| | Forb, annual | 2FA | *Forb, annual* | 0–9 | – |
| | sagebrush | ARTEM | *Artemisia* | 0–9 | – |
| | milkvetch | ASTRA | *Astragalus* | 0–9 | – |
| | cryptantha | CRYPT | *Cryptantha* | 0–9 | – |
| | fleabane | ERIGE2 | *Erigeron* | 0–9 | – |
| | spurge | EUPHO | *Euphorbia* | 0–9 | – |
| | popcornflower | PLAGI | *Plagiobothrys* | 0–9 | – |
| | desert Indianwheat | PLOV | *Plantago ovata* | 0–9 | – |
| **Shrub/Vine** | | | | | |
| 10 | **Occasional Native Half Shrubs** | | | 0–11 | |
| | Shrub, other | 2S | *Shrub, other* | 0–11 | – |
| | white sagebrush | ARLU | *Artemisia ludoviciana* | 0–11 | – |
| | Eastern Mojave buckwheat | ERFA2 | *Eriogonum fasciculatum* | 0–11 | – |
| | bastardsage | ERWR | *Eriogonum wrightii* | 0–11 | – |
| | bedstraw | GALIU | *Galium* | 0–11 | – |
| | broom snakeweed | GUSA2 | *Gutierrezia sarothrae* | 0–11 | – |
| | desert princesplume | STPI | *Stanleya pinnata* | 0–11 | – |

| | | | | | |
|---|---|---|---|---|---|
| | desert princesplume | STPI | *Stanleya pinnata* | 0–11 | – |
| | pricklyleaf dogweed | THAC | *Thymophylla acerosa* | 0–11 | – |
| | turpentinebroom | THMO | *Thamnosma montana* | 0–11 | – |
| | goldeneye | VIGUI | *Viguiera* | 0–11 | – |
| | Mojave woodyaster | XYTO2 | *Xylorhiza tortifolia* | 0–11 | – |
| 11 | **Common Native Mid Shrubs** | | | 22–45 | |
| | blackbrush | CORA | *Coleogyne ramosissima* | 6–45 | – |
| | Nevada jointfir | EPNE | *Ephedra nevadensis* | 6–22 | – |
| | mormon tea | EPVI | *Ephedra viridis* | 6–22 | – |
| | rubber rabbitbrush | ERNA10 | *Ericameria nauseosa* | 6–22 | – |
| 12 | **Occasional Native Mid Shrubs** | | | 22–67 | |
| | fourwing saltbush | ATCA2 | *Atriplex canescens* | 0–11 | – |
| | mouse's eye | BEMY | *Bernardia myricifolia* | 0–11 | – |
| | skunkbush sumac | RHTR | *Rhus trilobata* | 0–11 | – |
| | mariola | PAIN2 | *Parthenium incanum* | 0–11 | – |
| | Sonoran scrub oak | QUTU2 | *Quercus turbinella* | 0–9 | – |
| | purple sage | SADO4 | *Salvia dorrii* | 0–9 | – |
| | brittlebush | ENFA | *Encelia farinosa* | 0–9 | – |
| | button brittlebush | ENFR | *Encelia frutescens* | 0–9 | – |
| | crispleaf buckwheat | ERCO14 | *Eriogonum corymbosum* | 0–9 | – |
| | Apache plume | FAPA | *Fallugia paradoxa* | 0–9 | – |
| | Arizona desert-thorn | LYEX | *Lycium exsertum* | 0–9 | – |
| | catclaw acacia | ACGR | *Acacia greggii* | 0–9 | – |
| | Wright's beebrush | ALWR | *Aloysia wrightii* | 0–9 | – |
| 13 | **Occasional Native Cacti** | | | 6–22 | |
| | Whipple cholla | CYWH | *Cylindropuntia whipplei* | 0–11 | – |
| | beavertail pricklypear | OPBA2 | *Opuntia basilaris* | 0–11 | – |
| | cactus apple | OPEN3 | *Opuntia engelmannii* | 0–11 | – |
| | tulip pricklypear | OPPH | *Opuntia phaeacantha* | 0–11 | – |
| | plains pricklypear | OPPO | *Opuntia polyacantha* | 0–11 | – |
| | grizzlybear pricklypear | OPPOE | *Opuntia polyacantha var. erinacea* | 0–11 | – |
| | Engelmann's hedgehog cactus | ECEN | *Echinocereus engelmannii* | 0–4 | – |
| | cottontop cactus | ECPO2 | *Echinocactus polycephalus* | 0–4 | – |
| | California barrel cactus | FECY | *Ferocactus cylindraceus* | 0–4 | – |
| 14 | **Occasional Native Agave-Yucca-Like** | | | 0–6 | |
| | Utah agave | AGUT | *Agave utahensis* | 0–4 | – |
| | banana yucca | YUBA | *Yucca baccata* | 0–4 | – |
| **Tree** | | | | | |
| 14 | **Occasional Native Trees** | | | 0–6 | |
| | California redbud | CEOR9 | *Cercis orbiculata* | 0–4 | – |
| | Utah juniper | JUOS | *Juniperus osteosperma* | 0–4 | – |
| | twoneedle pinyon | PIED | *Pinus edulis* | 0–4 | – |
| | pallid hoptree | PTTRP | *Ptelea trifoliata ssp. pallida* | 0–4 | – |

## Type locality

| | |
|---|---|
| Location 1: Coconino County, AZ | |
| Latitude | 36° 10′ 8″ |
| Longitude | 112° 2′ 30″ |
| General legal description | Type location of Cliffdown families soil. In Bright Angel Canyon; 267 feet southwest of Cottonwood Camp. |
| Location 2: Coconino County, AZ | |
| Latitude | 36° 4′ 53″ |
| Longitude | 112° 7′ 32″ |
| General legal description | Type location for Whirlo family soils. On the Tonto Platform; 1,876 feet southwest of Indian Garden. |
| Location 3: Coconino County, AZ | |
| Latitude | 36° 4′ 55″ |
| Longitude | 112° 6′ 41″ |
| General legal description | Type location for Dera family soils. On the Tonto Platform; 2776 feet norteast of Indian Garden. |
| Location 4: Coconino County, AZ | |
| Latitude | 36° 9′ 20″ |
| Longitude | 112° 2′ 55″ |
| General legal description | Type location for Berzatic family soils. In Bright Angel Canyon; 2173 feet northeast of Ribbon Falls. |

## 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) | |
| Contact for lead author | |
| Date | |
| Approved by | |
| Approval date | |
| Composition (Indicators 10 and 12) based on | Annual Production |

## Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

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

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

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

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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

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:

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or**

**decadence):**

14. **Average percent litter cover (%) and depth ( in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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:**

17. **Perennial plant reproductive capability:**