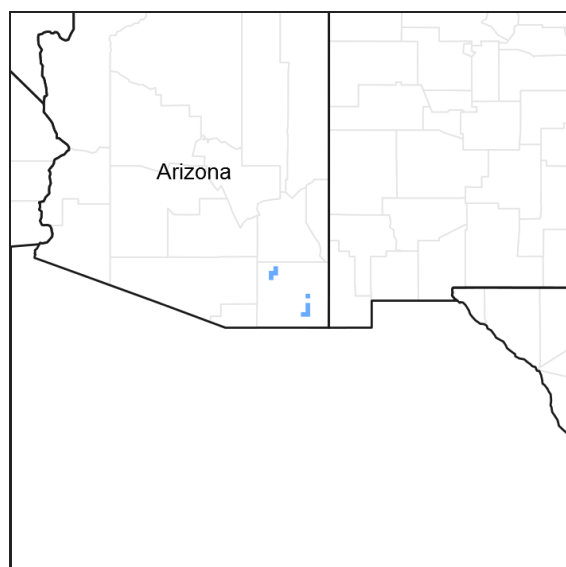


## **Ecological site R041XA101AZ** **Clayey Swale 16-20" p.z.**

Last updated: 4/09/2021  
 Accessed: 05/12/2025

### **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): 041X–Madrean Archipelago

AZ 41.1 – Mexican Oak-Pine Forest and Oak Savannah

Elevations range from 4500 to 10,700 feet and precipitation ranges from 16 to 30 inches. Vegetation includes Emory oak, Mexican blue oak, Arizona white oak, one-seed juniper, alligator juniper, sacahuista, California bricklebrush, skunkbush sumac, Arizona rosewood, wait-a-bit mimosa, sideoats grama, blue grama, purple grama, wooly bunchgrass, plains lovegrass, squirreltail, and pinyon ricegrass. The soil temperature regime ranges from thermic to mesic and the soil moisture regime ranges from aridic ustic to typic ustic. This unit occurs within the Basin and Range Physiographic Province and is characterized by numerous mountain ranges that rise abruptly from broad, plain-like valleys and basins. Igneous and metamorphic rock classes dominate the mountain ranges and sediments filling the basins represent combinations of fluvial, lacustrine, colluvial and alluvial deposits.

### **Associated sites**

|             |                                     |
|-------------|-------------------------------------|
| R041XC304AZ | <b>Clayey Upland 12-16" p.z.</b>    |
| R041XC305AZ | <b>Clay Loam Upland 12-16" p.z.</b> |
| R041XC312AZ | <b>Loamy Bottom 12-16" p.z.</b>     |

## Similar sites

|             |                           |
|-------------|---------------------------|
| R040XA102AZ | Clayey Swale 10"-13" p.z. |
| R041XB202AZ | Clayey Swale 8-12" p.z.   |

Table 1. Dominant plant species

|            |  |
|------------|--|
| Tree       | Not specified  |
| Shrub      | Not specified  |
| Herbaceous | (1) <i>pleuraphis mutica</i><br>(2) <i>panicum obtusum</i> |

## Physiographic features

This site occurs in the middle elevations of the Madrean Basin and Range province in southeastern Arizona. It occurs on alluvial fans and floodplains. The site receives extra moisture in the form of runoff from adjacent upland areas.

Table 2. Representative physiographic features

|                    |  |
|--------------------|--|
| Landforms          | (1) Alluvial fan<br>(2) Flood plain<br>(3) Swale               |
| Flooding duration  | Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours) |
| Flooding frequency | Frequent   |
| Ponding duration   | Very brief (4 to 48 hours) to brief (2 to 7 days)              |
| Ponding frequency  | None to rare   |
| Elevation          | 975–1,524 m  |
| Slope              | 0–2%   |
| Aspect             | Aspect is not a significant factor                             |

## Climatic features

Precipitation in this common resource area ranges from 12-16 inches yearly in the eastern part with elevations from 3600-5000 feet, and 13-17 inches in the western part where elevations are 3300-4500 feet. Winter-Summer rainfall ratios are 40-60% in the west and 30-70% in the east. Summer rains fall July-September, originate in the Gulf of Mexico and are convective, usually brief, intense thunderstorms. Cool season moisture tends to be frontal, originate in the Pacific and Gulf of California, and falls in widespread storms with long duration and low intensity. Snow rarely lasts more than one day. May and June are the driest months of the year. Humidity is generally very low.

Temperatures are mild. Freezing temperatures are common at night from December-April; however temperatures during the day are frequently above 50 F. Occasionally in December-February, brief 0 F temperatures may be experienced some nights. During June, July and August, some days may exceed 100 F.

Cool season plants start growth in early spring and mature in early summer. Warm season plants take advantage of summer rains and are growing and nutritious July-September. Warm season grasses may remain green throughout the year.

Table 3. Representative climatic features

|                               |          |
|-------------------------------|----------|
| Frost-free period (average)   | 220 days |
| Freeze-free period (average)  |          |
| Precipitation total (average) | 406 mm   |

## Influencing water features

There are no water features associated with this site.

## Soil features

These are deep soils which have formed in clayey alluvium from basic igneous sources. They are very dark colored and have high shrink-swell potentials. Churning and cracking cause very rough surfaces. Plant-soil moisture relationships are very good due to extra water the site receives.

Soils mapped on this site include;

SSA-666 Cochise county Northwestern Part-MU 4 Ashcreek; SSA-671 Cochise county Douglas-Tombstone area-MU's 4 Ashcreek & 26 Cazador.

**Table 4. Representative soil features**

|  |                     |
|--|---------------------|
| Surface texture  | (1) Silty clay loam |
| Family particle size                                     | (1) Clayey          |
| Drainage class   | Well drained        |
| Permeability class                                       | Slow to very slow   |
| Soil depth   | 152 cm              |
| Surface fragment cover <=3"                              | 0–10%               |
| Surface fragment cover >3"                               | 0–1%                |
| Available water capacity<br>(0-101.6cm)                  | 21.34–24.38 cm      |
| Calcium carbonate equivalent<br>(0-101.6cm)              | 1–15%               |
| Electrical conductivity<br>(0-101.6cm)                   | 0–2 mmhos/cm        |
| Sodium adsorption ratio<br>(0-101.6cm)                   | 0–2                 |
| Soil reaction (1:1 water)<br>(0-101.6cm)                 | 7.4–8.4             |
| Subsurface fragment volume <=3"<br>(Depth not specified) | 0–8%                |
| Subsurface fragment volume >3"<br>(Depth not specified)  | 0–1%                |

## Ecological dynamics

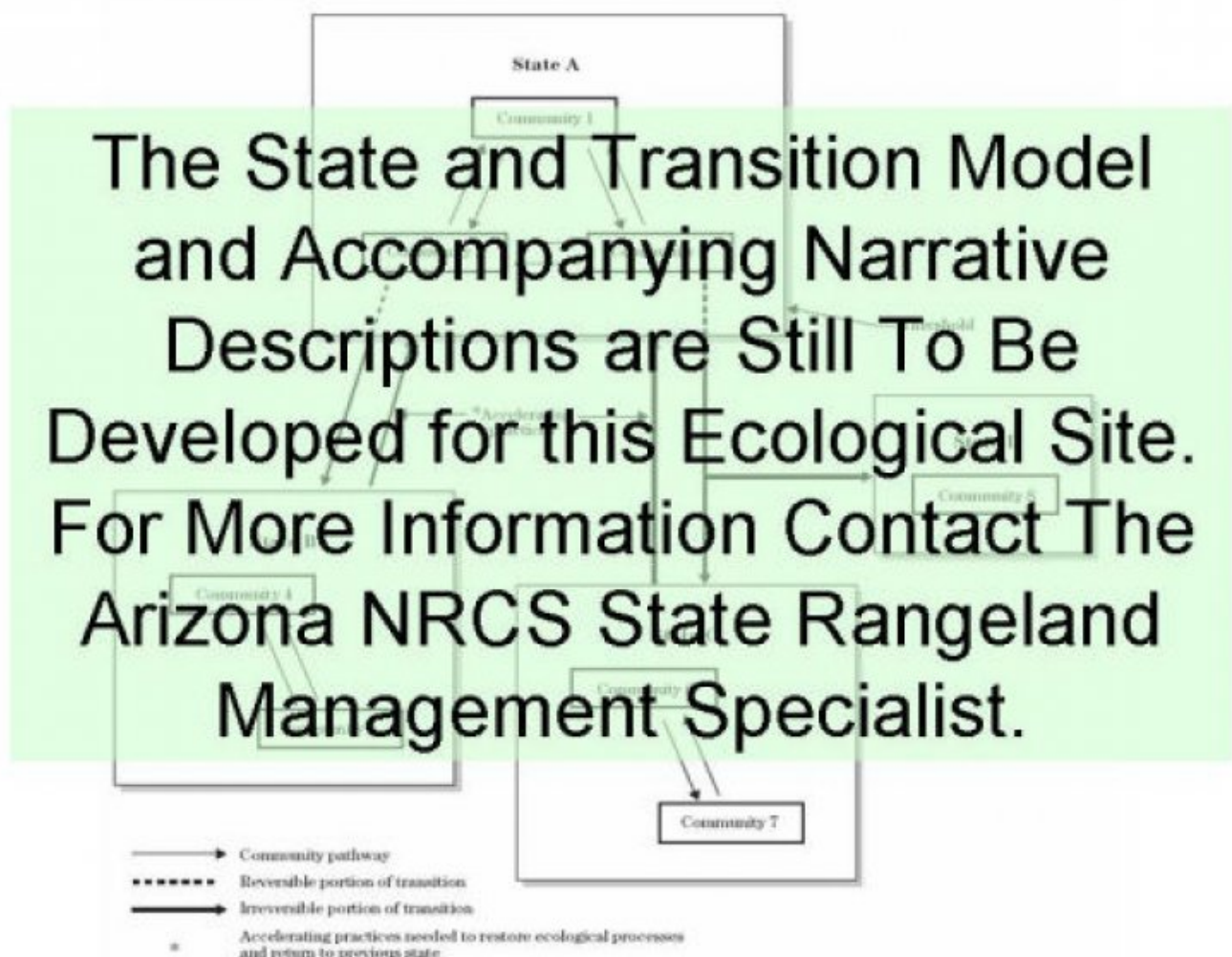
The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The Historical Climax Plant Community represents the natural potential plant communities found on relict or 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 fire, grazing, 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 amount shown for each group. Divide the resulting total by the total normal year production shown in the plant community description. If the 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. This plant community is a tobosa grassland with a canopy cover from 45 to 75%. Vine mesquite occurs in patches on the site. The plant community has a diverse flora of native annual and perennial forbs as well as annual grasses. Periodic wildfires occurred, June thru August, and helped control shrubs encroaching from adjacent upland sites. Tobosa is a very poor seed producer and when reduced to canopy levels below 5%, may not be able to recover its dominance. Johnson grass and bermuda grass can invade areas of this site but never dominate and exist only in minor amounts if the site is grazed as they are much more palatable than Tobosa. Possible, exotic, invasive weeds on this site include; yellow and malta starthistle, and Russian and spotted knapweed.

## State and transition model



## State 1 Historic Climax Plant Community

## Community 1.1

### Historic Climax Plant Community

The potential plant community on this site is dominated by warm season perennial grasses, mainly tobosa and vine mesquite. The major perennial grasses on the site are well dispersed over areas of the site. The aspect is open grassland. With continuous heavy grazing, patches develop which are dominated by annual forbs and grasses. Also palatable forbs and vine mesquite are easily grazed out and replaced by annuals. Snakeweed, burroweed and mesquite can invade and become dominant on the site. Natural fire may have been important in development of the potential plant community.

Table 5. Annual production by plant type

| Plant Type      | Low<br>(Kg/Hectare) | Representative Value<br>(Kg/Hectare) | High<br>(Kg/Hectare) |
|-----------------|---------------------|--------------------------------------|----------------------|
| Grass/Grasslike | 942                 | 1681                                 | 2466                 |
| Forb            | 45                  | 112                                  | 224                  |
| Shrub/Vine      | —                   | 50                                   | 146                  |
| <b>Total</b>    | <b>987</b>          | <b>1843</b>                          | <b>2836</b>          |

Figure 5. Plant community growth curve (percent production by month). AZ4111, 41.1 16-30. Growth begins in the spring, semi-dormancy occurs during the June drought, most growth occurs during the summer rainy season..

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0   | 0   | 0   | 5   | 10  | 0   | 15  | 45  | 20  | 5   | 0   | 0   |

## State 2

### Annual Forbs and grasses

## Community 2.1

### Annual Forbs and grasses

Tobosa canopy is reduced (less than 5%) due to the interactions of drought, heavy grazing and / or fire. In some circumstances the normal overland flow of floodwaters have been diverted by roads, drainage ditches and diversions. Some areas of this site have been created by cultivation for irrigated farming and subsequent abandonment. Native and non-native annual species dominate. Tobosa will not be able to recolonize this state because cover is too low and patchy in distribution, and a lack of viable seed in the soil seedbank. Vertic soil properties maintain good soil tilth and good infiltration rates (when soils are dry). Plant production remains high, even with the lack of perennial grass cover, due to soil activity and good hydrologic relationships.

## State 3

### Mesquite, native grasses

## Community 3.1

### Mesquite, native grasses

Mesquite has invaded and occurs at canopy levels from 2 to 15%. Other shrubs may also occur. Fire has been excluded for long periods of time. Tobosa still dominates the understory with annual forbs and grasses. Johnson grass and bermuda grass may be present in areas but will not dominate the state as long as it is grazed. Fires can burn through this community but mesquite is well established, it's root crowns protected by sediment accumulation, and it will sprout and quickly re-assume dominance.

## State 4

### Eroded state

## Community 4.1

### Eroded state

Very heavy traffic by livestock or machinery has caused persistent compaction. Diversion of overland flow and runoff water in farming areas may have caused rilling and gullies to form. Concentration of runoff by road and railroad culverts and bridges may also cause gullyng. Some areas of this site are tributary to large bottoms that gullied at the turn of the century and base level changes in those systems have caused more recent gullyng of the tributary bottoms. The soil profile no longer gets wet so the inherent, vertic, soil properties cannot act to maintain good tilth and promote infiltration of rainfall.

## State 5

### Tobosa unflooded

## Community 5.1

### Tobosa unflooded

This state occurs where the natural flooding regime has been interrupted by the construction of dikes, levees and roads and drainages ditches. It is usually found in cultivated areas like the Sulphur Springs Valley. The new site potential is the same as for Clayey Upland # R041XC304AZ.

## Additional community tables

Table 6. Community 1.1 plant community composition

| Group                  | Common Name                    | Symbol | Scientific Name                         | Annual Production (Kg/Hectare) | Foliar Cover (%) |
|------------------------|--------------------------------|--------|---|--------------------------------|------------------|
| <b>Grass/Grasslike</b> |                                |        |   |                                |                  |
| 1                      | <b>Dominant mid-grasses</b>    |        |   | 807–1681                       |                  |
|                        | tobosagrass                    | PLMU3  | <i>Pleuraphis mutica</i>                | 785–1233                       | –                |
|                        | vine mesquite                  | PAOB   | <i>Panicum obtusum</i>                  | 56–224                         | –                |
| 2                      | <b>Misc. perennial grasses</b> |        |   | 112–224                        |                  |
|                        | big sacaton                    | SPWR2  | <i>Sporobolus wrightii</i>              | 0–112                          | –                |
|                        | sideoats grama                 | BOCU   | <i>Bouteloua curtipendula</i>           | 0–112                          | –                |
|                        | blue grama                     | BOGR2  | <i>Bouteloua gracilis</i>               | 0–112                          | –                |
|                        | squirreltail                   | ELEL5  | <i>Elymus elymoides</i>                 | 0–56                           | –                |
|                        | cane bluestem                  | BOBA3  | <i>Bothriochloa barbinodis</i>          | 0–56                           | –                |
|                        | curly-mesquite                 | HIBE   | <i>Hilaria belangeri</i>                | 0–28                           | –                |
|                        | green sprangletop              | LEDU   | <i>Leptochloa dubia</i>                 | 0–28                           | –                |
|                        | creeping muhly                 | MURE   | <i>Muhlenbergia repens</i>              | 0–28                           | –                |
|                        | whiplash pappusgrass           | PAVA2  | <i>Pappophorum vaginatum</i>            | 0–28                           | –                |
|                        | hairy grama                    | BOHI2  | <i>Bouteloua hirsuta</i>                | 0–28                           | –                |
|                        | plains bristlegrass            | SEVU2  | <i>Setaria vulpiseta</i>                | 0–28                           | –                |
|                        | alkali sacaton                 | SPAI   | <i>Sporobolus airoides</i>              | 0–28                           | –                |
|                        | sand dropseed                  | SPCR   | <i>Sporobolus cryptandrus</i>           | 0–17                           | –                |
|                        | burrograss                     | SCBR2  | <i>Scleropogon brevifolius</i>          | 0–11                           | –                |
|                        | Arizona cottontop              | DICA8  | <i>Digitaria californica</i>            | 0–2                            | –                |
| 3                      | <b>Perennial threeawns</b>     |        |   | 11–56                          |                  |
|                        | spidergrass                    | ARTE3  | <i>Aristida ternipes</i>                | 0–28                           | –                |
|                        | spidergrass                    | ARTEG  | <i>Aristida ternipes var. gentilis</i>  | 0–22                           | –                |
|                        | Fendler threeawn               | ARPUL  | <i>Aristida purpurea var. longiseta</i> | 0–11                           | –                |
|                        | Deschamps threeawn             | ARPUDE | <i>Aristida purpurea var. parishii</i>  | 0–11                           | –                |

|             |                           |        |   |        |   |
|-------------|---------------------------|--------|---|--------|---|
|             | Parish's threeawn         | ARPU3  | <i>Aristida purpurea</i> var. <i>parishii</i>           | 0–11   | – |
|             | poverty threeawn          | ARDI5  | <i>Aristida divaricata</i>                              | 0–6    | – |
| 4           | <b>Annual grasses</b>     |        |   | 11–280 |   |
|             | little barley             | HOPU   | <i>Hordeum pusillum</i>                                 | 1–112  | – |
|             | Mexican sprangletop       | LEFUU  | <i>Leptochloa fusca</i> ssp. <i>uninervia</i>           | 1–112  | – |
|             | mucronate sprangletop     | LEPAB  | <i>Leptochloa panicea</i> ssp. <i>brachiata</i>         | 1–112  | – |
|             | Mexican panicgrass        | PAHI5  | <i>Panicum hirticaule</i>                               | 0–56   | – |
|             | Arizona signalgrass       | URAR   | <i>Urochloa arizonica</i>                               | 0–56   | – |
|             | sixweeks fescue           | VUOC   | <i>Vulpia octoflora</i>                                 | 1–56   | – |
|             | tapertip cupgrass         | ERACA  | <i>Eriochloa acuminata</i> var. <i>acuminata</i>        | 0–28   | – |
|             | sticky sprangletop        | LEVI5  | <i>Leptochloa viscida</i>                               | 0–28   | – |
|             | Arizona brome             | BRAR4  | <i>Bromus arizonicus</i>                                | 0–22   | – |
|             | prairie threeawn          | AROL   | <i>Aristida oligantha</i>                               | 0–11   | – |
|             | needle grama              | BOAR   | <i>Bouteloua aristidoides</i>                           | 0–6    | – |
|             | sixweeks grama            | BOBA2  | <i>Bouteloua barbata</i>                                | 0–6    | – |
|             | delicate muhly            | MUFR   | <i>Muhlenbergia fragilis</i>                            | 0–6    | – |
|             | littleseed muhly          | MUMI   | <i>Muhlenbergia microsperma</i>                         | 0–6    | – |
|             | witchgrass                | PACA6  | <i>Panicum capillare</i>                                | 0–6    | – |
|             | sixweeks threeawn         | ARAD   | <i>Aristida adscensionis</i>                            | 0–6    | – |
|             | Mexican lovegrass         | ERME   | <i>Eragrostis mexicana</i>                              | 0–6    | – |
|             | desert lovegrass          | ERPEM  | <i>Eragrostis pectinacea</i> var. <i>miserrima</i>      | 0–6    | – |
|             | Bigelow's bluegrass       | POBI   | <i>Poa bigelovii</i>                                    | 0–6    | – |
| <b>Forb</b> |                           |        |   |        |   |
| 5           | <b>Perennial Forbs</b>    |        |   | 11–56  |   |
|             | Missouri gourd            | CUFO   | <i>Cucurbita foetidissima</i>                           | 0–28   | – |
|             | Cooley's bundleflower     | DECO2  | <i>Desmanthus cooleyi</i>                               | 0–28   | – |
|             | desert globemallow        | SPAM2  | <i>Sphaeralcea ambigua</i>                              | 0–28   | – |
|             | Indian rushpea            | HOGL2  | <i>Hoffmannseggia glauca</i>                            | 1–22   | – |
|             | Lewis flax                | LILE3  | <i>Linum lewisii</i>                                    | 0–22   | – |
|             | dwarf desertpeony         | ACNA2  | <i>Acourtia nana</i>                                    | 0–22   | – |
|             | spear globemallow         | SPHA   | <i>Sphaeralcea hastulata</i>                            | 1–22   | – |
|             | wealeaf bur ragweed       | AMCO3  | <i>Ambrosia confertiflora</i>                           | 1–17   | – |
|             | bluedicks                 | DICA14 | <i>Dichelostemma capitatum</i>                          | 1–17   | – |
|             | spreading fleabane        | ERDI4  | <i>Erigeron divergens</i>                               | 0–11   | – |
|             | scarlet spiderling        | BOCO   | <i>Boerhavia coccinea</i>                               | 0–11   | – |
|             | small matweed             | GUDE   | <i>Guilleminea densa</i>                                | 0–11   | – |
|             | largeflower onion         | ALMA4  | <i>Allium macropetalum</i>                              | 0–6    | – |
|             | Wright's cudweed          | PSCAC2 | <i>Pseudognaphalium canescens</i> ssp. <i>canescens</i> | 0–6    | – |
|             | New Mexico fanpetals      | SINE   | <i>Sida neomexicana</i>                                 | 0–6    | – |
|             | silverleaf nightshade     | SOEL   | <i>Solanum elaeagnifolium</i>                           | 0–6    | – |
|             | Wright's deervetch        | LOWR   | <i>Lotus wrightii</i>                                   | 0–6    | – |
|             | brownfoot                 | ACWR5  | <i>Acourtia wrightii</i>                                | 0–6    | – |
|             | southwestern mock vervain | GLGO   | <i>Glandularia gooddingii</i>                           | 0–6    | – |

|   |                              |        |  |        |   |
|---|------------------------------|--------|--|--------|---|
|   | fingerleaf gourd             | CUDI   | <i>Cucurbita digitata</i>                              | 0–6    | – |
|   | white prairie aster          | SYFAC  | <i>Symphytotrichum falcatum</i> var. <i>commutatum</i> | 0–6    | – |
|   | American vetch               | VIAM   | <i>Vicia americana</i>                                 | 0–6    | – |
|   | Louisiana vetch              | VILUL2 | <i>Vicia ludoviciana</i> ssp. <i>ludoviciana</i>       | 0–6    | – |
|   | coyote gourd                 | CUPA   | <i>Cucurbita palmata</i>                               | 0–6    | – |
|   | whitemouth dayflower         | COER   | <i>Commelina erecta</i>                                | 0–6    | – |
|   | leatherweed                  | CRPO5  | <i>Croton pottsii</i>                                  | 0–6    | – |
|   | ivyleaf groundcherry         | PHHE4  | <i>Physalis hederifolia</i>                            | 0–3    | – |
|   | tuber anemone                | ANTU   | <i>Anemone tuberosa</i>                                | 0–3    | – |
|   | twinleaf senna               | SEBA3  | <i>Senna bauhinioides</i>                              | 0–3    | – |
|   | brownplume wirelettuce       | STPA4  | <i>Stephanomeria pauciflora</i>                        | 0–2    | – |
|   | variableleaf bushbean        | MAGI2  | <i>Macroptilium gibbosifolium</i>                      | 0–2    | – |
|   | slimleaf bean                | PHAN3  | <i>Phaseolus angustissimus</i>                         | 0–2    | – |
|   | orange fameflower            | PHAU13 | <i>Phemeranthus aurantiacus</i>                        | 0–2    | – |
|   | Greenman's biscuitroot       | LOGR2  | <i>Lomatium greenmanii</i>                             | 0–2    | – |
|   | Greene's bird's-foot trefoil | LOGR4  | <i>Lotus greenei</i>                                   | 0–2    | – |
|   | southwestern pricklypoppy    | ARPL3  | <i>Argemone pleiacantha</i>                            | 0–2    | – |
|   | lyreleaf greeneyes           | BELY   | <i>Berlandiera lyrata</i>                              | 0–2    | – |
|   | trailing windmills           | ALIN   | <i>Allionia incarnata</i>                              | 0–2    | – |
|   | desert mariposa lily         | CAKE   | <i>Calochortus kennedyi</i>                            | 0–2    | – |
|   | sego lily                    | CANU3  | <i>Calochortus nuttallii</i>                           | 0–2    | – |
| 6 | <b>Annual Forbs</b>          |        |  | 22–112 |   |
|   | common sunflower             | HEAN3  | <i>Helianthus annuus</i>                               | 1–112  | – |
|   | longleaf false goldeneye     | HELOA2 | <i>Heliomeris longifolia</i> var. <i>annua</i>         | 1–56   | – |
|   | camphorweed                  | HESU3  | <i>Heterotheca subaxillaris</i>                        | 1–56   | – |
|   | sensitive partridge pea      | CHNI2  | <i>Chamaecrista nictitans</i>                          | 1–56   | – |
|   | carelessweed                 | AMPA   | <i>Amaranthus palmeri</i>                              | 1–45   | – |
|   | morning-glory                | IPOMO  | <i>Ipomoea</i>   | 0–28   | – |
|   | spreading fanpetals          | SIAB   | <i>Sida abutifolia</i>                                 | 1–28   | – |
|   | tanseyleaf tansyaster        | MATA2  | <i>Machaeranthera tanacetifolia</i>                    | 1–28   | – |
|   | Nuttall's povertyweed        | MONU   | <i>Monolepis nuttalliana</i>                           | 0–28   | – |
|   | Arizona popcornflower        | PLAR   | <i>Plagiobothrys arizonicus</i>                        | 0–28   | – |
|   | intermediate pepperweed      | LEVIM  | <i>Lepidium virginicum</i> var. <i>medium</i>          | 0–22   | – |
|   | goosefoot                    | CHENO  | <i>Chenopodium</i>                                     | 1–22   | – |
|   | wheelscale saltbush          | ATEL   | <i>Atriplex elegans</i>                                | 0–17   | – |
|   | crestrib morning-glory       | IPCO2  | <i>Ipomoea costellata</i>                              | 0–17   | – |
|   | slender goldenweed           | MAGR10 | <i>Machaeranthera gracilis</i>                         | 1–17   | – |
|   | woolly plantain              | PLPA2  | <i>Plantago patagonica</i>                             | 0–17   | – |
|   | woolly tidestromia           | TILA2  | <i>Tidestromia lanuginosa</i>                          | 0–11   | – |
|   | western tansvmustard         | DEPI   | <i>Descurainia pinnata</i>                             | 1–11   | – |



|  |                             |        |  |      |   |
|--|-----------------------------|--------|--|------|---|
|  | shaggyfruit pepperweed      | LELA   | <i>Lepidium lasiocarpum</i>                          | 0–11 | – |
|  | Arizona poppy               | KAGR   | <i>Kallstroemia grandiflora</i>                      | 0–11 | – |
|  | Coulter's spiderling        | BOCO2  | <i>Boerhavia coulteri</i>                            | 0–11 | – |
|  | bristly fiddleneck          | AMTE3  | <i>Amsinckia tessellata</i>                          | 0–11 | – |
|  | milkvetch                   | ASTRA  | <i>Astragalus</i>                                    | 0–11 | – |
|  | scrambled eggs              | COAU2  | <i>Corydalis aurea</i>                               | 0–6  | – |
|  | hoary bowlesia              | BOIN3  | <i>Bowlesia incana</i>                               | 0–6  | – |
|  | fringed redmaids            | CACI2  | <i>Calandrinia ciliata</i>                           | 0–6  | – |
|  | New Mexico copperleaf       | ACNE   | <i>Acalypha neomexicana</i>                          | 0–6  | – |
|  | California poppy            | ESCAM  | <i>Eschscholzia californica</i> ssp. <i>mexicana</i> | 0–6  | – |
|  | spurge                      | EUPHO  | <i>Euphorbia</i>                                     | 1–6  | – |
|  | Lemmon's linanthus          | LELE29 | <i>Leptosiphon lemmonii</i>                          | 0–6  | – |
|  | wedgeleaf draba             | DRCU   | <i>Draba cuneifolia</i>                              | 0–6  | – |
|  | miniature woollystar        | ERDI2  | <i>Eriastrum diffusum</i>                            | 0–6  | – |
|  | spreading fleabane          | ERDI4  | <i>Erigeron divergens</i>                            | 0–6  | – |
|  | sorrel buckwheat            | ERPO4  | <i>Eriogonum polycladon</i>                          | 0–6  | – |
|  | golden crownbeard           | VEEN   | <i>Verbesina encelioides</i>                         | 0–6  | – |
|  | sleepy silene               | SIAN2  | <i>Silene antirrhina</i>                             | 0–6  | – |
|  | sawtooth sage               | SASU7  | <i>Salvia subincisa</i>                              | 0–6  | – |
|  | ragwort                     | SENEC  | <i>Senecio</i>                                       | 0–6  | – |
|  | doubleclaw                  | PRPA2  | <i>Proboscidea parviflora</i>                        | 0–6  | – |
|  | star gilia                  | GIST   | <i>Gilia stellata</i>                                | 0–6  | – |
|  | desert Indianwheat          | PLOV   | <i>Plantago ovata</i>                                | 0–6  | – |
|  | green carpetweed            | MOVE   | <i>Mollugo verticillata</i>                          | 0–6  | – |
|  | foothill deervetch          | LOHU2  | <i>Lotus humistratus</i>                             | 0–6  | – |
|  | coastal bird's-foot trefoil | LOSAB  | <i>Lotus salsuginosus</i> var. <i>brevivexillus</i>  | 0–6  | – |
|  | Arizona lupine              | LUAR4  | <i>Lupinus arizonicus</i>                            | 0–6  | – |
|  | Coulter's lupine            | LUSP2  | <i>Lupinus sparsiflorus</i>                          | 0–6  | – |
|  | hollowleaf annual lupine    | LUSU3  | <i>Lupinus succulentus</i>                           | 0–6  | – |
|  | American wild carrot        | DAPU3  | <i>Daucus pusillus</i>                               | 0–4  | – |
|  | Arizona blanketflower       | GAAR2  | <i>Gaillardia arizonica</i>                          | 0–3  | – |
|  | Goodding's bladderpod       | LEGO2  | <i>Lesquerella gooddingii</i>                        | 0–2  | – |
|  | plains flax                 | LIPU4  | <i>Linum puberulum</i>                               | 0–2  | – |
|  | Texas stork's bill          | ERTE13 | <i>Erodium texanum</i>                               | 0–2  | – |
|  | sacred thorn-apple          | DAWR2  | <i>Datura wrightii</i>                               | 0–2  | – |
|  | manybristle chinchweed      | PEPA2  | <i>Pectis papposa</i>                                | 0–2  | – |
|  | New Mexico plumeseed        | RANE   | <i>Rafinesquia neomexicana</i>                       | 0–2  | – |
|  | desert unicorn-plant        | PRAL4  | <i>Proboscidea althaeifolia</i>                      | 0–2  | – |
|  | Fendler's desertdandelion   | MAFE   | <i>Malacothrix fendleri</i>                          | 0–1  | – |

Shrub/Vine

|   |                             |       |  |      |   |
|---|-----------------------------|-------|--|------|---|
| 7 | <b>Miscellaneous shrubs</b> |       |  | 0–45 |   |
|   | western honey mesquite      | PRGLT | <i>Prosopis glandulosa</i> var. <i>torreyana</i>   | 0–22 | – |
|   | velvet mesquite             | PRVE  | <i>Prosopis velutina</i>                           | 0–22 | – |
|   | fourwing saltbush           | ATCA2 | <i>Atriplex canescens</i>                          | 0–11 | – |
|   | whitethorn acacia           | ACCO2 | <i>Acacia constricta</i>                           | 0–11 | – |
|   | pale desert-thorn           | LYPA  | <i>Lycium pallidum</i>                             | 0–11 | – |
|   | catclaw mimosa              | MIACB | <i>Mimosa aculeaticarpa</i> var. <i>biuncifera</i> | 0–11 | – |
|   | catclaw acacia              | ACGR  | <i>Acacia greggii</i>                              | 0–6  | – |
|   | knifeleaf condalia          | COSP3 | <i>Condalia spathulata</i>                         | 0–6  | – |
|   | littleleaf sumac            | RHMI3 | <i>Rhus microphylla</i>                            | 0–6  | – |
|   | Warnock's snakewood         | COWA  | <i>Condalia warnockii</i>                          | 0–3  | – |
|   | American tarwort            | FLCE  | <i>Flourensia cernua</i>                           | 0–2  | – |
|   | winterfat                   | KRLA2 | <i>Krascheninnikovia lanata</i>                    | 0–2  | – |
|   | lotebush                    | ZIOB  | <i>Ziziphus obtusifolia</i>                        | 0–2  | – |
| 8 | <b>Half shrubs</b>          |       |  | 0–56 |   |
|   | broom snakeweed             | GUSA2 | <i>Gutierrezia sarothrae</i>                       | 0–22 | – |
|   | burroweed                   | ISTE2 | <i>Isocoma tenuisecta</i>                          | 0–22 | – |
|   | bastardsage                 | ERWR  | <i>Eriogonum wrightii</i>                          | 0–17 | – |
|   | yerba de pasmo              | BAPT  | <i>Baccharis pteronioides</i>                      | 0–11 | – |
|   | fairyduster                 | CAER  | <i>Calliandra eriophylla</i>                       | 0–6  | – |
|   | threadleaf snakeweed        | GUMI  | <i>Gutierrezia microcephala</i>                    | 0–6  | – |
| 9 | <b>Succulents</b>           |       |  | 0–45 |   |
|   | dollarjoint pricklypear     | OPCH  | <i>Opuntia chlorotica</i>                          | 0–17 | – |
|   | cactus apple                | OPEN3 | <i>Opuntia engelmannii</i>                         | 0–17 | – |
|   | tulip pricklypear           | OPPH  | <i>Opuntia phaeacantha</i>                         | 0–11 | – |
|   | Christmas cactus            | CYLE8 | <i>Cylindropuntia leptocaulis</i>                  | 0–11 | – |
|   | walkingstick cactus         | CYSP8 | <i>Cylindropuntia spinosior</i>                    | 0–11 | – |
|   | banana yucca                | YUBA  | <i>Yucca baccata</i>                               | 0–6  | – |
|   | soaptree yucca              | YUEL  | <i>Yucca elata</i>                                 | 0–6  | – |
|   | candy barrelcactus          | FEWI  | <i>Ferocactus wislizeni</i>                        | 0–2  | – |
|   | sacahuista                  | NOMI  | <i>Nolina microcarpa</i>                           | 0–2  | – |
|   | spinystar                   | ESVI2 | <i>Escobaria vivipara</i>                          | 0–1  | – |

## Animal community

Herbaceous forage produced on this site is best used in the summer rainy season when tobosa is green and growing. Large areas of the site should be fenced exclusively to best manage the forage resource. Care must be taken to avoid overgrazing of more palatable species associated with tobosa on the site. Burning or mowing can be used to freshen old growth tobosa grass. Burning should be done in years with good winter-spring rainfall and, then in late February or March. Spring regrowth should be rested until the onset of summer rains. Tobosa can be cut and baled for fair quality hay. Summer growth should be cut in full flower, left to dry one day, and baled the next day for best quality.

Dormant tobosa is very unpalatable.

This site is mainly a foraging area for large wildlife species. Free water is usually available in the summer rainy season in natural charcos and discontinued gullies. Being open grassland, the site is home to a variety of small

herbivores and their associated predators.

## Hydrological functions

Due to severe soil cracking and churning (producing rough and porous surfaces), this site has very high infiltration rates when dry. Vertic soil properties eliminate most surface compaction each year as long as stocking rates are moderate and heavy stocking is not persistent during times of the year when soils are moist.

## Recreational uses

Hunting, hiking, horseback riding, photography and bird-watching.

## Wood products

Mesquite is shrubby on this site due to clayey soils. Invaded areas may have limited fuelwood but nothing big enough for posts or stays.

## Other products

Clay

## Inventory data references

Range 417s include 3 in excellent condition and 1 in good condition.

## Type locality

|                                |  |
|--------------------------------|--|
| Location 1: Cochise County, AZ |  |
| Township/Range/Section         | T17S R27E S5   |
| Location 2: Pima County, AZ    |  |
| Township/Range/Section         | T19S R17E S29  |
| General legal description      | Enzenberg Pasture, Empire Ranch, Empire-Cienega National Conservation Area |

## Contributors

Dan Robinett  
Larry D. Ellicott

## Approval

Curtis Talbot, 4/09/2021

## 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                     | 05/12/2025 |

|   |                   |
|---|-------------------|
| Approved by                                 | Curtis Talbot     |
| 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:**
-