# Ecological site R038XA117AZ
# Volcanic Hills 12-16" p.z. Clayey

Accessed: 05/18/2024

## 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.

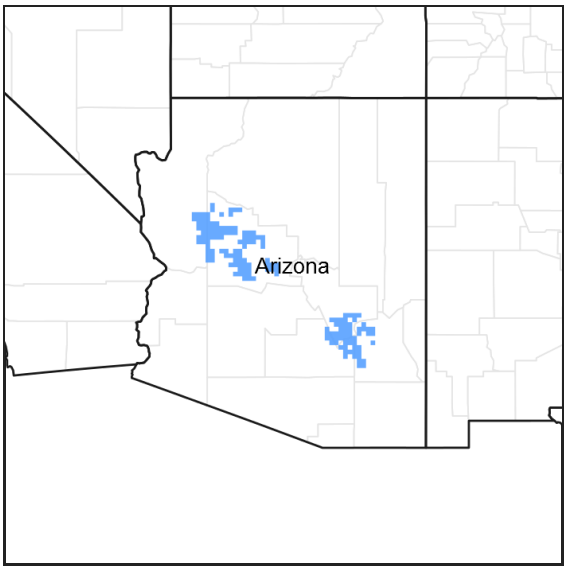



**Figure 1. Mapped extent**

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): 038X–Mogollon Transition South

AZ 38.1 – Lower Mogollon Transition

Elevations range from 3000 to 4500 feet and precipitation averages 12 to 16 inches per year. Vegetation includes canotia, one-seed juniper, mesquite, catclaw acacia, jojoba, turbinella oak, ratany, shrubby buckwheat, algerita, skunkbush, tobosa, vine mesquite, bottlebrush squirreltail, grama species, curly mesquite, desert needlegrass and New Mexico feathergrass. The soil temperature regime is thermic and the soil moisture regime is ustic aridic. This unit occurs within the Transition Zone Physiographic Province and is characterized by canyons and structural troughs or valleys. Igneous, metamorphic and sedimentary rock classes occur on rough mountainous terrain in association with less extensive sediment filled valleys exhibiting little integrated drainage.

## Classification relationships

Similar site to TES (Terrestrial Ecosystem site)map unit numbers 378 and 428, on the Prescott national Forest in Yavapai county in central Arizona.

## Associated sites

| | |
|---|---|
| R038XA102AZ | **Clayey Upland 12-16" p.z.** |
| R038XA103AZ | **Clay Loam Upland 12-16" p.z.** |

## Similar sites

| | |
|---|---|
| R041XC301AZ | **Basalt Hills 12-16" p.z.** |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | (1) *Canotia*<br>(2) *Parkinsonia* |
| Shrub | (1) *Simmondsia chinensis*<br>(2) *Opuntia engelmannii var. engelmannii* |
| Herbaceous | (1) *Pleuraphis mutica*<br>(2) *Bouteloua curtipendula* |

## Physiographic features

This site occurs in the lower elevations of the interior chaparral zone, south of the Mogollon Rim in central Arizona. This site occurs in an upland position. It occurs on rugged mountain slopes, ridge-tops and mesa sides. Elevations range from 3200 to 4600 feet. Slopes are from 15 to 70%.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Mountain<br>(2) Mountain slope<br>(3) Ridge |
| Flooding frequency | None |
| Elevation | 945–1,402 m |
| Slope | 15–70% |
| Aspect | N, E, S |

## Climatic features

Precipitation in this common resource area averages 12 to 16 inches annually. The winter-summer rainfall ratio ranges from about 60/40% in the northwest part of the area to 50/50% in the southeast part. Summer rains fall; July through September, and are from high-intensity, convective, thunderstorms. This moisture originates primarily from the Gulf of Mexico, but can come from the remnants of Pacific hurricanes in September. Winter moisture is frontal, originates in the north Pacific, and falls as rain or snow in widespread storms of low intensity and long duration. Snowfall ranges from a trace to 10 inches per year and can occur from November through March. Snow seldom persists for more than a day except on north aspects. May and June are the driest months of the year. Humidity is generally low all year. Average annual air temperatures range from 59 to 70 degrees F (thermic temperature regime). Daytime temperatures in the summer are commonly in the high 90’s. Freezing temperatures are common from October through April, usually during the night or early morning hours. The actual precipitation, available moisture and temperature vary, depending on, region, elevation, rain shadow effect and aspect.

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (average) | 230 days |
| Freeze-free period (average) | 285 days |
| Precipitation total (average) | 406 mm |

## Influencing water features

There are no water features associated with this site.

## Soil features

These soils are shallow (10 to 20 inches) and dark colored. They are clayey throughout (smectitic) and well drained. They have formed in residuum and slope alluvium from basalt, andesite and related volcanic tuffs and ash. The surface textures are clayloam to clay. Surfaces are well covered by dark colored; gravels, cobbles and stones. The effective rooting depth is limited by hard bedrock at 10 to 20 inches. Runoff is moderate to high on moist soils. The erosion hazard is slight due to gravel, cobble and rock covers. The soils mapped on this site include: from SSA-627 Mohave County Southern Part MU's Gonzales-49 & 87, Courthouse family-40 & 41, Graham-55, Lampshire-75; SSA-637 Yavapai County Western Part MU's Faraway GrVL, CbVL, GrVSL, CbVSL-FlE, FlF, Venezia StVL-VrF, VtE, Luzena-FlE, LwD, LxD, FlF; SSA-675 San Carlos IR Area MU's Eskiminzin-535 & 565, Brewster-315, Cammerman-650, Woodcutter-315, SSA-697 Mohave County Central Part MU's Gonzales-42 & Graham-46.

**Table 4. Representative soil features**

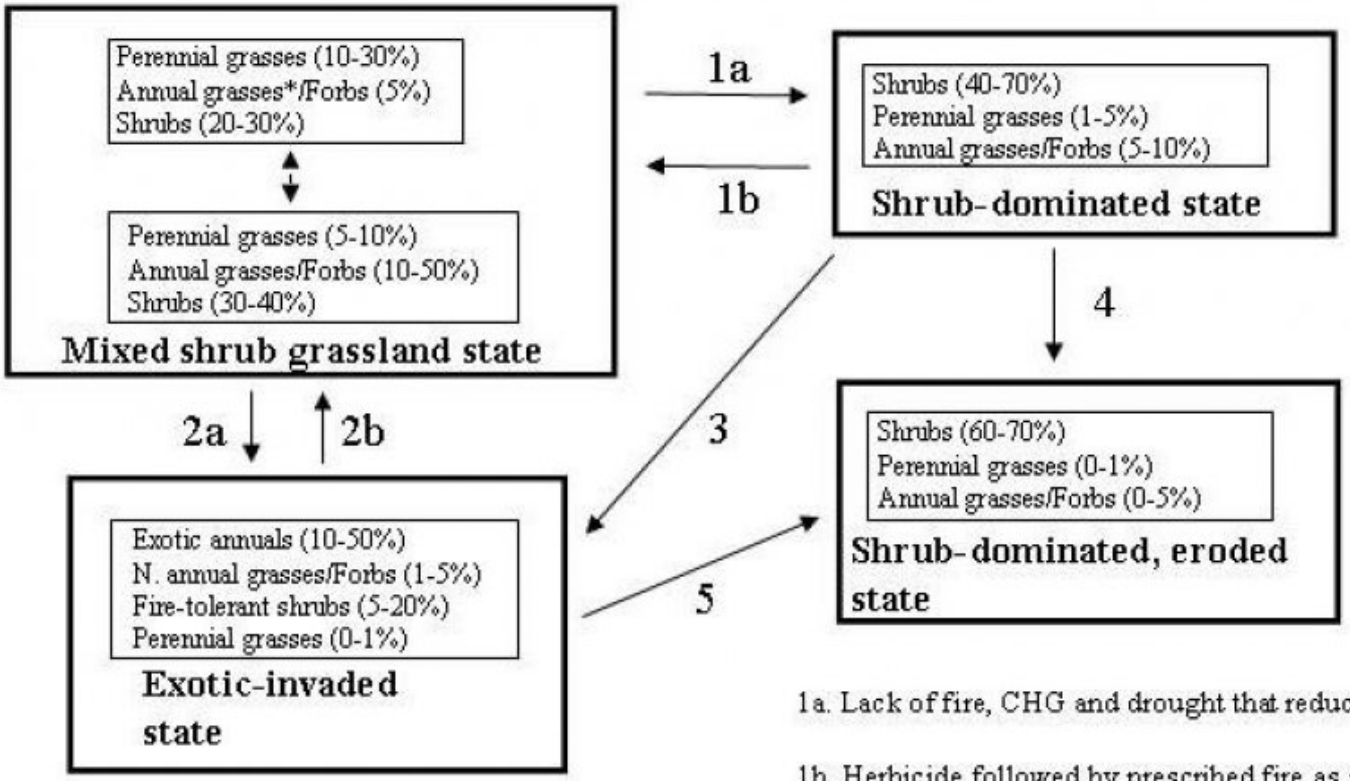
| | |
|---|---|
| Parent material | (1) Residuum–basalt<br>(2) Slope alluvium–andesite |
| Surface texture | (1) Very cobbly clay loam<br>(2) Cobbly clay |
| Family particle size | (1) Clayey |
| Drainage class | Moderately well drained to well drained |
| Permeability class | Moderately slow to slow |
| Soil depth | 25–51 cm |
| Surface fragment cover <=3" | 25–50% |
| Surface fragment cover >3" | 5–12% |
| Available water capacity (0-101.6cm) | 2.03–6.1 cm |
| Calcium carbonate equivalent (0-101.6cm) | 0–5% |
| 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) | 6.6–8.4 |
| Subsurface fragment volume <=3" (Depth not specified) | 15–45% |
| Subsurface fragment volume >3" (Depth not specified) | 1–10% |

## Ecological dynamics

The historic native plant community is a diverse mixture of desert trees, shrubs, succulents, forbs and grasses. This includes a diverse flora of native annual grasses and forbs of both the winter and summer seasons. Periodic wildfires occurred at moderate intervals (15 to 30 years) and helped maintain a balance between herbs and shrubs. In the absence of fire for longer periods, shrubby species and cacti can become dominant. The interactions of drought, fire and continuous livestock grazing can, over time, result in the loss of palatable grasses, half shrubs and suffrutescent forbs. In some situations non-native annuals can dominate the site. These species can, over time, diminish the soil seed-bank of native annual species. Non-native annuals can act to increase the fire frequency of areas of the site near roads and urban areas, where the incidence of man-made fires is high.

## State and transition model

# MLRA 38.1 (12-16"), Volcanic Hills, clayey




1a. Lack of fire, CHG and drought that reduced fuel loads. Patchy erosion.

1b. Herbicide followed by prescribed fire as maintenance

2a. Introduction of seed source, increased fire frequency (every 5 years)

2b. Unknown

3. Introduction of seed source, El Nino type event, catastrophic fire.

4, 5. Accelerated soil erosion may occur where herbaceous patches are absent.

*Annual grasses include natives and non-natives

**Figure 4. State & Transition, Volcanic Hills, clayey 12-16"**

## State 1
## Mixed Shrub-Grass State

## Community 1.1
## Historic Native Plant Community

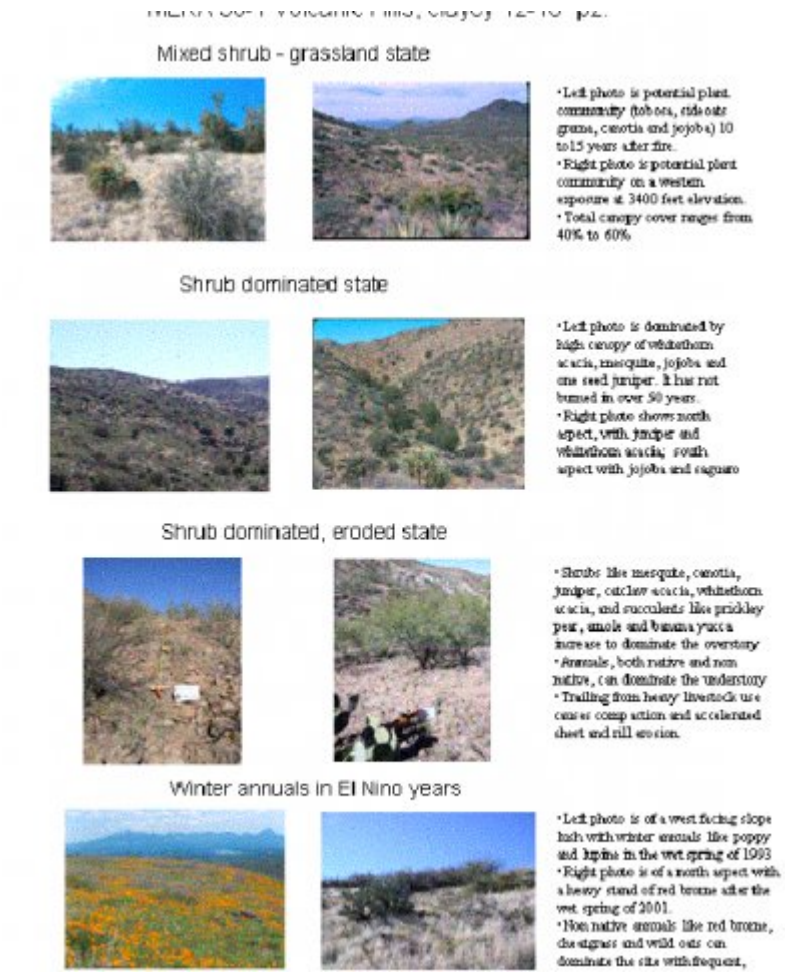



**Figure 5. Volcanic Hills, clayey 12-16" pz. photos**

The historic native plant community is a diverse mixture of perennial grasses, suffrutescent forbs, shrubs, succulents and desert trees. A rich flora of native annual forbs and grasses, of both the winter and summer seasons, exist in the plant community. Periodic, naturally occurring, wildfires were important in maintaining the potential plant community. Northern exposures have a higher percentage of mid-grasses and some cool season grasses that will not occur on south slopes. North slopes will also be more likely to experience tree increases especially juniper species, mesquite and canotia. Southern exposures will have a higher percentage of shrubs and succulents in the plant community. More xeric grasses will dominate southern exposures (tanglehead). At elevations near precipitation zone upper boundaries the northern slopes will look more like the plant community of the 16 to 20 inch precipitation zone in MLRA 38. At lower precipitation zone boundaries southern exposures will look more like the plant community of the site in the 10 to 13 inch zone of MLRA 40 (Upper Sonoran).

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

| Plant Type | Low (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|---|---|---|---|
| Grass/Grasslike | 437 | 785 | 1177 |
| Shrub/Vine | 235 | 364 | 560 |
| Forb | 56 | 168 | 392 |
| Tree | 22 | 56 | 112 |
| **Total** | **750** | **1373** | **2241** |

**Table 6. Ground cover**

| | |
|---|---|
| Tree foliar cover | 0-1% |
| Shrub/vine/liana foliar cover | 2-5% |
| Grass/grasslike foliar cover | 3-6% |
| Forb foliar cover | 0-1% |
| Non-vascular plants | 0-1% |
| Biological crusts | 0-2% |
| Litter | 10-45% |
| Surface fragments >0.25" and <=3" | 25-50% |
| Surface fragments >3" | 5-15% |
| Bedrock | 5-25% |
| Water | 0% |
| Bare ground | 5-20% |

**Table 7. Canopy structure (% cover)**

| Height Above Ground (M) | Tree | Shrub/Vine | Grass/ Grasslike | Forb |
|---|---|---|---|---|
| <0.15 | – | – | 0-5% | 0-1% |
| >0.15 <= 0.3 | – | 0-2% | 2-10% | 1-5% |
| >0.3 <= 0.6 | – | 1-10% | 20-30% | 0-1% |
| >0.6 <= 1.4 | – | 10-15% | – | – |
| >1.4 <= 4 | 0-10% | 1-5% | – | – |
| >4 <= 12 | 0-5% | – | – | – |
| >12 <= 24 | – | – | – | – |
| >24 <= 37 | – | – | – | – |
| >37 | – | – | – | – |

**Figure 7. Plant community growth curve (percent production by month). AZ3811, 38.1 12-16" p.z. all sites. Growth begins in the spring, most growth occurs in the summer..**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 1 | 7 | 15 | 20 | 22 | 20 | 10 | 5 | 0 | 0 |

## State 2
## Shrub Dominated State

## Community 2.1
## Shrub Dominated Plant Community

Perennial grass canopy cover is reduced due to the interactions of drought, grazing and / or fire. Desert shrubs and cacti dominate the plant community. Shrub cover exceeds 30%. Annuals, both native and non-native, dominate the under-story. Fire frequency is reduced but the site can still burn, especially after "El Nino" years produce heavy fuel loads of annual grasses and forbs.

## State 3
## Exotic Invaded State

### Community 3.1
### Exotic Forb and Grass Invaded Plant Community

Non-native annual grasses and forbs like; red brome, cheatgrass, and wild oats, can invade and dominate areas of the site with very low perennial grass cover. These species can, over time, reduce the seed-bank of native annual grasses and forbs. Their presence can increase the fire frequency (of man made fires) especially where roads and urban areas are adjacent to areas of the site.

## State 4
## Shrub Dominated, Eroded State

### Community 4.1
### Shrub Dominated, Eroded Plant Community

Shrubs like; whitethorn acacia, mesquite, wait a bit mimosa and catclaw acacia; and succulents like; prickly pear, cholla and banana yucca increase to dominate the site in the absence of fire for very long periods of time. Native and non-native annual forbs and grasses dominate the under-story. In "El Nino" years, herbaceous fuels can be sufficient to carry fire through the heavy canopy of shrubs. The major woody shrubs are, however, fire resistant once established. Such fires would remove less tolerant species like cacti and leave intact the sprouting woody plants to become more and more dominant. Extreme rainfall events coupled with the fire, drought and grazing interaction, can lead to rilling of steep slopes.

## Additional community tables

**Table 8. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Kg/Hectare) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | **mid grasses** | | | 224–504 | |
| | sideoats grama | BOCU | *Bouteloua curtipendula* | 112–280 | – |
| | tobosagrass | PLMU3 | *Pleuraphis mutica* | 56–224 | – |
| | tanglehead | HECO10 | *Heteropogon contortus* | 28–112 | – |
| 2 | **cool season grasses** | | | 17–112 | |
| | desert needlegrass | ACSP12 | *Achnatherum speciosum* | 0–56 | – |
| | squirreltail | ELEL5 | *Elymus elymoides* | 6–56 | – |
| | prairie Junegrass | KOMA | *Koeleria macrantha* | 0–28 | – |
| | muttongrass | POFE | *Poa fendleriana* | 0–22 | – |
| 3 | **misc. perennial grasses** | | | 168–224 | |
| | spidergrass | ARTE3 | *Aristida ternipes* | 11–56 | – |
| | cane bluestem | BOBA3 | *Bothriochloa barbinodis* | 0–56 | – |
| | black grama | BOER4 | *Bouteloua eriopoda* | 11–56 | – |
| | vine mesquite | PAOB | *Panicum obtusum* | 0–56 | – |
| | big galleta | PLRI3 | *Pleuraphis rigida* | 0–28 | – |
| | plains bristlegrass | SEVU2 | *Setaria vulpiseta* | 0–28 | |

| | | | | | |
|---|---|---|---|---|---|
| | plains bristlegrass | SEVU2 | *Setaria vulpiseta* | 0–28 | – |
| | bush muhly | MUPO2 | *Muhlenbergia porteri* | 0–28 | – |
| | spidergrass | ARTEG | *Aristida ternipes var. gentilis* | 0–28 | – |
| | purple threeawn | ARPUP6 | *Aristida purpurea var. purpurea* | 0–28 | – |
| | Arizona cottontop | DICA8 | *Digitaria californica* | 0–22 | – |
| | southwestern bristlegrass | SESC2 | *Setaria scheelei* | 0–22 | – |
| | green sprangletop | LEDU | *Leptochloa dubia* | 0–22 | – |
| | common wolfstail | LYPH | *Lycurus phleoides* | 0–17 | – |
| | sand dropseed | SPCR | *Sporobolus cryptandrus* | 0–17 | – |
| | plains lovegrass | ERIN | *Eragrostis intermedia* | 0–17 | – |
| | nineawn pappusgrass | ENDE | *Enneapogon desvauxii* | 0–11 | – |
| | blue threeawn | ARPUN | *Aristida purpurea var. nealleyi* | 0–11 | – |
| | Parish's threeawn | ARPUP5 | *Aristida purpurea var. parishii* | 0–11 | – |
| | bullgrass | MUEM | *Muhlenbergia emersleyi* | 0–11 | – |
| | Fendler threeawn | ARPUL | *Aristida purpurea var. longiseta* | 0–6 | – |
| | low woollygrass | DAPU7 | *Dasyochloa pulchella* | 0–6 | – |
| 4 | **short grasses** | | | 28–168 | |
| | curly-mesquite | HIBE | *Hilaria belangeri* | 6–56 | – |
| | Hall's panicgrass | PAHA | *Panicum hallii* | 1–56 | – |
| | slender grama | BORE2 | *Bouteloua repens* | 6–56 | – |
| | red grama | BOTR2 | *Bouteloua trifida* | 0–28 | – |
| | slim tridens | TRMU | *Tridens muticus* | 0–28 | – |
| | hairy grama | BOHI2 | *Bouteloua hirsuta* | 0–28 | – |
| | sprucetop grama | BOCH | *Bouteloua chondrosioides* | 0–11 | – |
| 5 | **annual grasses** | | | 28–224 | |
| | sixweeks threeawn | ARAD | *Aristida adscensionis* | 0–112 | – |
| | prairie threeawn | AROL | *Aristida oligantha* | 0–112 | – |
| | needle grama | BOAR | *Bouteloua aristidoides* | 0–112 | – |
| | Mexican sprangletop | LEFUU | *Leptochloa fusca ssp. uninervia* | 22–112 | – |
| | mucronate sprangeltop | LEPAB | *Leptochloa panicea ssp. brachiata* | 22–112 | – |
| | Mexican panicgrass | PAHI5 | *Panicum hirticaule* | 0–112 | – |
| | sticky sprangletop | LEVI5 | *Leptochloa viscida* | 0–56 | – |
| | witchgrass | PACA6 | *Panicum capillare* | 0–56 | – |
| | small fescue | VUMI | *Vulpia microstachys* | 0–56 | – |
| | Eastwood fescue | VUMIC | *Vulpia microstachys var. ciliata* | 0–56 | – |
| | sixweeks fescue | VUOC | *Vulpia octoflora* | 0–56 | – |
| | sixweeks grama | BOBA2 | *Bouteloua barbata* | 0–56 | – |
| | Arizona brome | BRAR4 | *Bromus arizonicus* | 0–56 | – |
| | feather fingergrass | CHVI4 | *Chloris virgata* | 0–56 | – |
| | little barley | HOPU | *Hordeum pusillum* | 0–34 | – |
| | delicate muhly | MUFR | *Muhlenbergia fragilis* | 0–28 | – |
| | littleseed muhly | MUMI | *Muhlenbergia microsperma* | 0–28 | – |
| | canyon cupgrass | ERLE7 | *Eriochloa lemmonii* | 0–28 | – |
| | tufted lovegrass | ERPE | *Eragrostis pectinacea* | 0–28 | |

| | | | | | |
|---|---|---|---|---|---|
| | tufted lovegrass | ERPE | *Eragrostis pectinacea* | 0–28 | – |
| | desert lovegrass | ERPEM | *Eragrostis pectinacea var. miserrima* | 0–28 | – |
| | Bigelow's bluegrass | POBI | *Poa bigelovii* | 0–28 | – |
| | Arizona signalgrass | URAR | *Urochloa arizonica* | 0–28 | – |
| **Forb** | | | | | |
| 6 | **perennial forbs** | | | 28–56 | |
| | largeflower onion | ALMA4 | *Allium macropetalum* | 0–17 | – |
| | weakleaf bur ragweed | AMCO3 | *Ambrosia confertiflora* | 1–17 | – |
| | bluedicks | DICA14 | *Dichelostemma capitatum* | 2–17 | – |
| | Indian rushpea | HOGL2 | *Hoffmannseggia glauca* | 1–17 | – |
| | desert globemallow | SPAM2 | *Sphaeralcea ambigua* | 1–17 | – |
| | brownplume wirelettuce | STPA4 | *Stephanomeria pauciflora* | 0–17 | – |
| | longflower tube tongue | JULO3 | *Justicia longii* | 0–11 | – |
| | shrubby deervetch | LORI3 | *Lotus rigidus* | 0–11 | – |
| | Wright's deervetch | LOWR | *Lotus wrightii* | 0–11 | – |
| | lacy tansyaster | MAPI | *Machaeranthera pinnatifida* | 1–11 | – |
| | wishbone-bush | MILAV | *Mirabilis laevis var. villosa* | 1–11 | – |
| | scarlet spiderling | BOCO | *Boerhavia coccinea* | 0–11 | – |
| | Arizona wrightwort | CAAR7 | *Carlowrightia arizonica* | 0–11 | – |
| | white sagebrush | ARLUM2 | *Artemisia ludoviciana ssp. mexicana* | 1–11 | – |
| | Braun's rockcress | ARPE3 | *Arabis perstellata* | 0–6 | – |
| | tuber anemone | ANTU | *Anemone tuberosa* | 0–6 | – |
| | Forb, perennial | 2FP | *Forb, perennial* | 0–6 | – |
| | dwarf Indian mallow | ABPA3 | *Abutilon parvulum* | 0–6 | – |
| | brownfoot | ACWR5 | *Acourtia wrightii* | 0–6 | – |
| | San Felipe dogweed | ADPO | *Adenophyllum porophylloides* | 1–6 | – |
| | fleabane | ERIGE2 | *Erigeron* | 1–6 | – |
| | Cooley's bundleflower | DECO2 | *Desmanthus cooleyi* | 0–6 | – |
| | plains blackfoot | MELE2 | *Melampodium leucanthum* | 0–6 | – |
| | Parry's beardtongue | PEPA24 | *Penstemon parryi* | 0–6 | – |
| | canaigre dock | RUHY | *Rumex hymenosepalus* | 0–6 | – |
| | twinleaf senna | SEBA3 | *Senna bauhinioides* | 0–6 | – |
| | Coues' cassia | SECO10 | *Senna covesii* | 0–6 | – |
| | Lemmon's ragwort | SELE8 | *Senecio lemmonii* | 0–6 | – |
| | branched noseburn | TRRA5 | *Tragia ramosa* | 0–6 | – |
| | vetch | VICIA | *Vicia* | 0–6 | – |
| | orange fameflower | PHAU13 | *Phemeranthus aurantiacus* | 0–6 | – |
| | slender poreleaf | POGR5 | *Porophyllum gracile* | 0–6 | – |
| | southwestern mock vervain | GLGO | *Glandularia gooddingii* | 0–6 | – |
| | ragged nettlespurge | JAMA | *Jatropha macrorhiza* | 0–2 | – |
| | New Mexico groundsel | PANE7 | *Packera neomexicana* | 0–2 | – |
| | desert larkspur | DEPA | *Delphinium parishii* | 0–2 | – |
| | tall mountain larkspur | DESC | *Delphinium scaposum* | 0–2 | – |
| | Mojave spurge | EUSC6 | *Euphorbia schizolepis* | 0–2 | |

| | | | | | |
|---|---|---|---|---|---|
| | Mojave spurge | EUSC6 | *Euphorbia schizoloba* | 0–2 | – |
| | sego lily | CANU3 | *Calochortus nuttallii* | 0–2 | – |
| | wavyleaf Indian paintbrush | CAAPM | *Castilleja applegatei ssp. martinii* | 0–2 | – |
| | Oak Creek ragwort | PAQU8 | *Packera quercetorum* | 0–1 | – |
| | toadflax penstemon | PELI2 | *Penstemon linarioides* | 0–1 | – |
| | desert penstemon | PEPS | *Penstemon pseudospectabilis* | 0–1 | – |
| | scurfpea | PSORA2 | *Psoralidium* | 0–1 | – |
| 7 | **annual forbs** | | | 28–336 | |
| | bristly fiddleneck | AMTE3 | *Amsinckia tessellata* | 0–84 | – |
| | California poppy | ESCAM | *Eschscholzia californica ssp. mexicana* | 0–84 | – |
| | trefoil | LOTUS | *Lotus* | 0–56 | – |
| | Arizona lupine | LUAR4 | *Lupinus arizonicus* | 0–56 | – |
| | longleaf false goldeneye | HELOA2 | *Heliomeris longifolia var. annua* | 0–56 | – |
| | crestrib morning-glory | IPCO2 | *Ipomoea costellata* | 0–56 | – |
| | milkvetch | ASTRA | *Astragalus* | 0–56 | – |
| | carelessweed | AMPA | *Amaranthus palmeri* | 0–56 | – |
| | Forb, annual | 2FA | *Forb, annual* | 0–56 | – |
| | slender goldenweed | MAGR10 | *Machaeranthera gracilis* | 0–56 | – |
| | tanseyleaf tansyaster | MATA2 | *Machaeranthera tanacetifolia* | 0–56 | – |
| | Coulter's lupine | LUSP2 | *Lupinus sparsiflorus* | 0–56 | – |
| | manybristle chinchweed | PEPA2 | *Pectis papposa* | 0–56 | – |
| | Arizona popcornflower | PLAR | *Plagiobothrys arizonicus* | 6–56 | – |
| | creamcups | PLCA5 | *Platystemon californicus* | 0–56 | – |
| | desert Indianwheat | PLOV | *Plantago ovata* | 1–56 | – |
| | woolly plantain | PLPA2 | *Plantago patagonica* | 1–56 | – |
| | purslane | PORTU | *Portulaca* | 0–28 | – |
| | New Mexico plumeseed | RANE | *Rafinesquia neomexicana* | 0–28 | – |
| | phacelia | PHACE | *Phacelia* | 0–28 | – |
| | hollowleaf annual lupine | LUSU3 | *Lupinus succulentus* | 0–28 | – |
| | Coulter's spiderling | BOCO2 | *Boerhavia coulteri* | 0–28 | – |
| | fivewing spiderling | BOIN | *Boerhavia intermedia* | 0–28 | – |
| | hoary bowlesia | BOIN3 | *Bowlesia incana* | 0–28 | – |
| | New Mexico thistle | CINE | *Cirsium neomexicanum* | 0–28 | – |
| | western tansymustard | DEPI | *Descurainia pinnata* | 0–28 | – |
| | miniature woollystar | ERDI2 | *Eriastrum diffusum* | 0–28 | – |
| | spreading fleabane | ERDI4 | *Erigeron divergens* | 0–28 | – |
| | California goldfields | LACA7 | *Lasthenia californica* | 0–28 | – |
| | Goodding's bladderpod | LEGO2 | *Lesquerella gooddingii* | 0–28 | – |
| | shaggyfruit pepperweed | LELA | *Lepidium lasiocarpum* | 0–28 | – |
| | Thurber's pepperweed | LETH2 | *Lepidium thurberi* | 0–28 | – |

| | | | | | |
|---|---|---|---|---|---|
| | foothill deervetch | LOHU2 | *Lotus humistratus* | 0–28 | – |
| | miniature lupine | LUBI | *Lupinus bicolor* | 0–28 | – |
| | coastal bird's-foot trefoil | LOSA | *Lotus salsuginosus* | 0–28 | – |
| | spurge | EUPHO | *Euphorbia* | 0–28 | – |
| | cryptantha | CRYPT | *Cryptantha* | 0–28 | – |
| | American wild carrot | DAPU3 | *Daucus pusillus* | 0–17 | – |
| | scrambled eggs | COAU2 | *Corydalis aurea* | 0–17 | – |
| | sorrel buckwheat | ERPO4 | *Eriogonum polycladon* | 0–17 | – |
| | green carpetweed | MOVE | *Mollugo verticillata* | 0–17 | – |
| | evening primrose | OENOT | *Oenothera* | 0–17 | – |
| | Florida pellitory | PAFL3 | *Parietaria floridana* | 0–17 | – |
| | ragwort | SENEC | *Senecio* | 0–17 | – |
| | spreading fanpetals | SIAB | *Sida abutifolia* | 0–17 | – |
| | sleepy silene | SIAN2 | *Silene antirrhina* | 0–17 | – |
| | New Mexico fanpetals | SINE | *Sida neomexicana* | 0–17 | – |
| | sand fringepod | THCU | *Thysanocarpus curvipes* | 0–17 | – |
| | desert unicorn-plant | PRAL4 | *Proboscidea althaeifolia* | 0–17 | – |
| | doubleclaw | PRPA2 | *Proboscidea parviflora* | 0–17 | – |
| | annual agoseris | AGHE2 | *Agoseris heterophylla* | 0–11 | – |
| | miner's lettuce | CLPEP | *Claytonia perfoliata ssp. perfoliata* | 0–6 | – |
| | desertparsley | LOMAT | *Lomatium* | 0–6 | – |
| **Shrub/Vine** | | | | | |
| 8 | **shrubs** | | | 112–224 | |
| | jojoba | SICH | *Simmondsia chinensis* | 6–168 | – |
| | ocotillo | FOSP2 | *Fouquieria splendens* | 6–56 | – |
| | whitethorn acacia | ACCO2 | *Acacia constricta* | 6–56 | – |
| | catclaw acacia | ACGR | *Acacia greggii* | 6–28 | – |
| | Wright's beebrush | ALWR | *Aloysia wrightii* | 1–28 | – |
| | snapdragon penstemon | KEANM | *Keckiella antirrhinoides ssp. microphylla* | 0–28 | – |
| | Sonoran scrub oak | QUTU2 | *Quercus turbinella* | 0–17 | – |
| | fourwing saltbush | ATCA2 | *Atriplex canescens* | 1–17 | – |
| | desert sweet | CHMI2 | *Chamaebatiaria millefolium* | 0–17 | – |
| | Warnock's snakewood | COWA | *Condalia warnockii* | 0–17 | – |
| | Florida hopbush | DOVI | *Dodonaea viscosa* | 0–17 | – |
| | Nevada jointfir | EPNE | *Ephedra nevadensis* | 0–17 | – |
| | desert ceanothus | CEGR | *Ceanothus greggii* | 0–11 | – |
| | Arizona necklacepod | SOAR3 | *Sophora arizonica* | 0–11 | – |
| | Mexican bladdersage | SAME | *Salazaria mexicana* | 0–11 | – |
| | ambrosia leaf bur ragweed | AMAM2 | *Ambrosia ambrosioides* | 0–11 | – |
| | Thurber's desert honeysuckle | ANTH2 | *Anisacanthus thurberi* | 0–11 | – |
| | catclaw mimosa | MIACB | *Mimosa aculeaticarpa var. biuncifera* | 0–6 | – |
| | skunkbush sumac | RHTR | *Rhus trilobata* | 0–6 | – |
| | lotebush | ZIOBC | *Ziziphus obtusifolia var. canescens* | 0–6 | – |

| | | | | | |
|---|---|---|---|---|---|
| | winterfat | KRLA2 | *Krascheninnikovia lanata* | 0–6 | – |
| | spiny hackberry | CEEH | *Celtis ehrenbergiana* | 0–6 | – |
| | pale desert-thorn | LYPA | *Lycium pallidum* | 0–2 | – |
| | algerita | MATR3 | *Mahonia trifoliolata* | 0–2 | – |
| | redberry buckthorn | RHCR | *Rhamnus crocea* | 0–1 | – |
| | littleleaf sumac | RHMI3 | *Rhus microphylla* | 0–1 | – |
| | red barberry | MAHA4 | *Mahonia haematocarpa* | 0–1 | – |
| 9 | **half shrubs** | | | 0–56 | |
| | bastardsage | ERWR | *Eriogonum wrightii* | 0–56 | – |
| | rough menodora | MESC | *Menodora scabra* | 2–56 | – |
| | Eastern Mojave buckwheat | ERFA2 | *Eriogonum fasciculatum* | 0–28 | – |
| | slender janusia | JAGR | *Janusia gracilis* | 2–17 | – |
| | littleleaf ratany | KRER | *Krameria erecta* | 0–17 | – |
| | sweetbush | BEJU | *Bebbia juncea* | 0–17 | – |
| | Coulter's brickellbush | BRCO | *Brickellia coulteri* | 0–17 | – |
| | Parish's goldeneye | VIPA14 | *Viguiera parishii* | 0–17 | – |
| | longleaf phlox | PHLO2 | *Phlox longifolia* | 0–11 | – |
| | fairyduster | CAER | *Calliandra eriophylla* | 0–11 | – |
| | ragged rockflower | CRBI2 | *Crossosoma bigelovii* | 0–11 | – |
| | shortleaf baccharis | BABR | *Baccharis brachyphylla* | 0–11 | – |
| | Goodding's tansyaster | MAPIG2 | *Machaeranthera pinnatifida ssp. gooddingii var. gooddingii* | 0–11 | – |
| | starry bedstraw | GAST | *Galium stellatum* | 0–11 | – |
| | yerba de pasmo | BAPT | *Baccharis pteronioides* | 0–6 | – |
| 10 | **succulents** | | | 56–112 | |
| | Schott's century plant | AGSC3 | *Agave schottii* | 0–56 | – |
| | cactus apple | OPEN3 | *Opuntia engelmannii* | 6–56 | – |
| | buck-horn cholla | CYAC8 | *Cylindropuntia acanthocarpa* | 0–28 | – |
| | walkingstick cactus | CYSP8 | *Cylindropuntia spinosior* | 0–28 | – |
| | sacahuista | NOMI | *Nolina microcarpa* | 0–28 | – |
| | tulip pricklypear | OPPH | *Opuntia phaeacantha* | 0–22 | – |
| | banana yucca | YUBA | *Yucca baccata* | 1–22 | – |
| | goldenflower century plant | AGCH2 | *Agave chrysantha* | 0–17 | – |
| | Whipple cholla | CYWH | *Cylindropuntia whipplei* | 0–11 | – |
| | candy barrelcactus | FEWI | *Ferocactus wislizeni* | 1–11 | – |
| | dollarjoint pricklypear | OPCH | *Opuntia chlorotica* | 0–11 | – |
| | Graham's nipple cactus | MAGR9 | *Mammillaria grahamii* | 1–6 | – |
| | Christmas cactus | CYLE8 | *Cylindropuntia leptocaulis* | 0–6 | – |
| | common sotol | DAWH2 | *Dasylirion wheeleri* | 0–6 | – |
| | Arizona hedgehog cactus | ECCOA | *Echinocereus coccineus var. arizonicus* | 0–6 | – |
| | Engelmann's hedgehog cactus | ECEN | *Echinocereus engelmannii* | 0–2 | – |

| | | | | | |
|---|---|---|---|---|---|
| | pinkflower hedgehog cactus | ECFE | *Echinocereus fendleri* | 0–2 | – |
| | spinystar | ESVI2 | *Escobaria vivipara* | 0–1 | – |
| 11 | **increaser half-shrubs** | | | 11–112 | |
| | broom snakeweed | GUSA2 | *Gutierrezia sarothrae* | 1–34 | – |
| | brittlebush | ENFA | *Encelia farinosa* | 0–28 | – |
| | button brittlebush | ENFR | *Encelia frutescens* | 0–17 | – |
| | turpentine bush | ERLA12 | *Ericameria laricifolia* | 0–17 | – |
| | burroweed | ISTE2 | *Isocoma tenuisecta* | 0–17 | – |
| | rayless goldenhead | ACSP | *Acamptopappus sphaerocephalus* | 0–17 | – |
| | narrowleaf goldenbush | ERLI6 | *Ericameria linearifolia* | 0–11 | – |
| | threadleaf snakeweed | GUMI | *Gutierrezia microcephala* | 0–6 | – |
| | whitestem paperflower | PSCO2 | *Psilostrophe cooperi* | 0–6 | – |
| | turpentinebroom | THMO | *Thamnosma montana* | 0–6 | – |
| **Tree** | | | | | |
| 12 | **desert trees** | | | 22–112 | |
| | crucifixion thorn | CAHO3 | *Canotia holacantha* | 0–56 | – |
| | redberry juniper | JUCO11 | *Juniperus coahuilensis* | 0–56 | – |
| | oneseed juniper | JUMO | *Juniperus monosperma* | 0–56 | – |
| | Utah juniper | JUOS | *Juniperus osteosperma* | 0–28 | – |
| | blue paloverde | PAFL6 | *Parkinsonia florida* | 0–28 | – |
| | yellow paloverde | PAMI5 | *Parkinsonia microphylla* | 0–28 | – |
| | saguaro | CAGI10 | *Carnegiea gigantea* | 0–28 | – |
| | netleaf hackberry | CELAR | *Celtis laevigata var. reticulata* | 0–17 | – |

## Animal community

This site is suitable for grazing year round, but is not easily traversed by livestock. Livestock grazing use is concentrated on south slopes, canyon bottoms and ridge-tops. North slopes are little used. Slopes greater than 50% and areas with very cobbly surfaces limit grazing use by cattle. Areas of rock outcrop and rock slides form barriers to livestock movement. The site is susceptible to erosion in overgrazed areas like bed-grounds, livestock trails and lower slopes adjacent to water.
The site has good habitat diversity for a great variety of desert and grassland wildlife species.

## Hydrological functions

This site has very rough surfaces, due to a high cover of gravels, cobbles and stones, which act to hold water on the site. When the soils are dry, it produces little runoff. It produces significant runoff only when heavy rain falls on snow or moist soils.

## Recreational uses

Hunting, camping, horseback riding, backpacking, rock hounding, photography.

## Wood products

Limited harvest of fuel-wood, fence posts and stays from mesquite, juniper and saguaro.

## Other products

There is some native harvest of food plants like; wild onions, grass nuts, thistle, prickly pear tunas and mescal.

## 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) | Globe ESS, Dan Robinett, Wilma Renken |
| Contact for lead author | USDA NRCS Globe Soil Survey Office |
| Date | 07/01/2014 |
| Approved by | Byron Lambeth |
| Approval date | |
| Composition (Indicators 10 and 12) based on | Annual Production |

## Indicators

1. **Number and extent of rills:** A few natural rills are present and seem to follow fault lines or bedding planes of the volcanic parent material.

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2. **Presence of water flow patterns:** Water flow patterns occupy about 10% of the area. They are very short (2-5 ft.) in length and discontinuous where gravel/rock cover is high (>35%). They are terminated by cobble cover and / or terracettes of perennial grasses, shrubs and cacti. They are longer (10-15 ft.) where gravel/rock covers are low (< 20%).

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3. **Number and height of erosional pedestals or terracettes:** Erosional pedestals are very uncommon. High cover values of gravel, cobble and stones result in surface stability. Terracettes are common, cover less than 10% of the area and usually are formed by a combination of cobbles, perennial grasses, cacti and shrubs. They are from 10 to 30 feet apart and have elevation differences of 2 to 4 inches.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 1 to 15% (from cover estimates in 10, 9.6 sq.ft. frames). Bare, non-vegetated, areas are large, not connected.

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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:** None

7. **Amount of litter movement (describe size and distance expected to travel):** All litter is staying in place, except in water flow patterns where herbaceous litter moves a few feet.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface has high organic content both under plant canopies and in pockets of bare soil surrounded by cobbles (slake values 4-6).

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is granular to sub-angular blocky. The A horizon is 1-3 inches thick and is very dark colored (10YR 3/2).

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Cover of perennial grasses range from 20-30%, cover of shrubs and cacti range from 10-25%. Basal cover of perennial plants ranges from 3-6%. Covers of gravels, cobbles and stones range from 40 to 85%. The cover of all plant species is well-distributed across the area.

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

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Perennial grasses >= shrubs

    Sub-dominant: annual forbs and grasses > succulents > perennial forbs

    Other:

    Additional: in “El Nino” years, annuals exceed all other groups

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Less than 1% of shrubs and perennial mid-grasses show signs of mortality. Curly mesquite and slender grama on warm exposures can lose up to 75% of their basal cover during several years of drought.

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):** From ecological site description annual production is; 700 lbs/ac(drought), 1000 lbs/ac(average year), 2000 lbs/ac (wet year).

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:** whitethorn acacia, mesquite, one-seed juniper, snakeweed, prickley pear, red brome, cheatgrass, wild oats, canotia

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17. **Perennial plant reproductive capability:** Not impaired in any way for shrubs and mid-grasses. Short grasses growing on warm exposures will not produce seed during several years of severe drought.

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