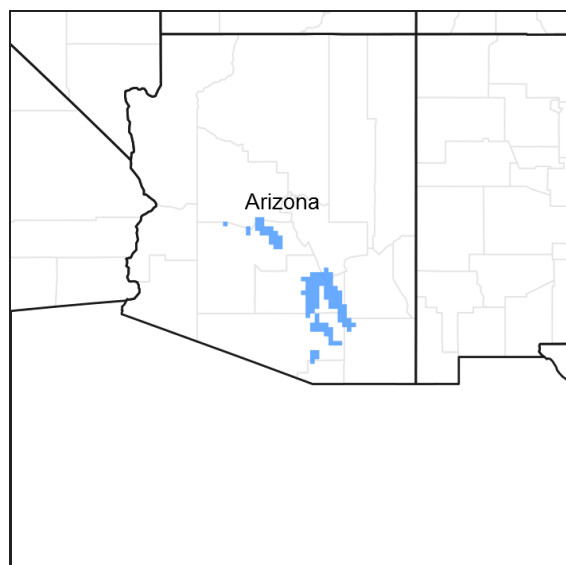


## **Ecological site R040XA110AZ** **Limy Slopes 10"-13" p.z.**

Accessed: 05/11/2025

### **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): 040X–Sonoran Basin and Range

AZ 40.1 – Upper Sonoran Desert

Elevations range from 2000 to 3200 feet and precipitation averages 10 to 13 inches per year. Vegetation includes saguaro, palo verde, mesquite, creosotebush, triangle bursage, prickly pear, cholla, limberbush, wolfberry, bush muhly, threeawns, ocotillo, and globe mallow. The soil temperature regime is thermic and the soil moisture regime is typic aridic. 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**

R040XA106AZ	<b>Limy Upland, Deep 10"-13" p.z.</b>
R040XA111AZ	<b>Limy Upland 10"-13" p.z.</b>
R040XA114AZ	<b>Loamy Upland 10"-13" p.z.</b>
R040XA115AZ	<b>Sandy Wash 10"-13" p.z.</b>

## Similar sites

R041XB207AZ	Limy Slopes 8-12" p.z.
R041XC308AZ	Limy Slopes 12-16" p.z.
R040XB209AZ	Limy Slopes 7"-10" p.z.

Table 1. Dominant plant species

Tree	(1) <i>Parkinsonia microphylla</i>
Shrub	(1) <i>Larrea tridentata</i> (2) <i>Fouquieria splendens</i>
Herbaceous	(1) <i>Dasyochloa pulchella</i> (2) <i>Bouteloua eriopoda</i>

## Physiographic features

This site occurs in the upper elevations of the Sonoran Desert in southern Arizona. It occurs on hill-slopes and ridge-tops.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Ballena
Flooding frequency	None
Ponding frequency	None
Elevation	2,200–3,600 ft
Slope	15–45%
Aspect	N, E, S

## Climatic features

Precipitation in the sub resource area ranges from 10 to 13 inches in the southern part, along the Mexican border with elevations from about 1900 to 3200 feet. Precipitation in the northern part of the resource area ranges from 11 to 14 inches with elevations from about 1700 to 3500 feet. Winter-summer rainfall ratios range from 40%-60% in the southern portions of the land resource unit, to 50%-50% in the central portions, to 60%-40% in the northern part of the land resource unit. As one moves from east to west in this resource area rains become slightly more unpredictable and variable with Coefficients of Variation of annual rainfall equal to 29% at Tucson and 36% at Carefree. Summer rains fall July through Sept., originate in the Gulf of Mexico, and are convective, usually brief, intense thunderstorms. Cool season moisture tends to be frontal, originating in the Pacific and Gulf of California. This winter precipitation falls in widespread storms with long duration and low intensity. Snow is rare and seldom lasts more than an hour or two. May and June are the driest months of the year. Humidity is generally very low.

Winter temperatures are mild, with very few days recording freezing temperatures in the morning. Summer temperatures are warm to hot, with several days in June and July exceeding 105 degrees F.

Both the spring and the summer growing seasons are equally important for perennial grass, forb and shrub growth. Cool and warm season annual forbs and grasses can be common in their respective seasons with above average rainfall. Perennial forage species can remain green throughout the year with available moisture.

Table 3. Representative climatic features

Frost-free period (average)	265 days
Freeze-free period (average)	0 days

Precipitation total (average)	13 in
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### Influencing water features

There are no water features associated with this site.

### Soil features

These soils are deep and moderately deep soils formed in limy and gravelly loamy alluvium or colluvium of mixed origin. They are calcareous throughout. Some soil series have lime cemented layers at moderate depths (20-40 inches). Soil surfaces are well covered with rocks and gravels. Plant-soil moisture relationships are fair.

Soils mapped on this site include:

SSA-627 Southern Mohave County MU's Stagecoach-110, 111 & 115, Topowah family-115;

SSA-645 Aguila-Carefree area MU's Nickel-65, 93 & 94;

SSA-661 Eastern Pinal-Southern Gila Counties MU's Haplogypsids-525, Rillino-870;

SSA-666 Northwest Cochise County MU's Redo-247, Redington-475, Stagecoach-490;

SSA-669 Eastern Pima County MU's Stagecoach-61, Redington-66 & Redo-67.

Table 4. Representative soil features

Surface texture	(1) Gravelly sandy loam (2) Very gravelly sandy loam (3) Cobbly sandy loam
Family particle size	(1) Loamy
Drainage class	Somewhat excessively drained to well drained
Permeability class	Rapid to moderately rapid
Soil depth	20–60 in
Surface fragment cover <=3"	20–85%
Surface fragment cover >3"	0–15%
Available water capacity (0-40in)	2.1–5 in
Calcium carbonate equivalent (0-40in)	5–30%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	7.8–8.4
Subsurface fragment volume <=3" (Depth not specified)	15–65%
Subsurface fragment volume >3" (Depth not specified)	0–20%

### 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 the 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.

## **State and transition model**

## MLRA 40-1 (10-13"), Limy Slopes

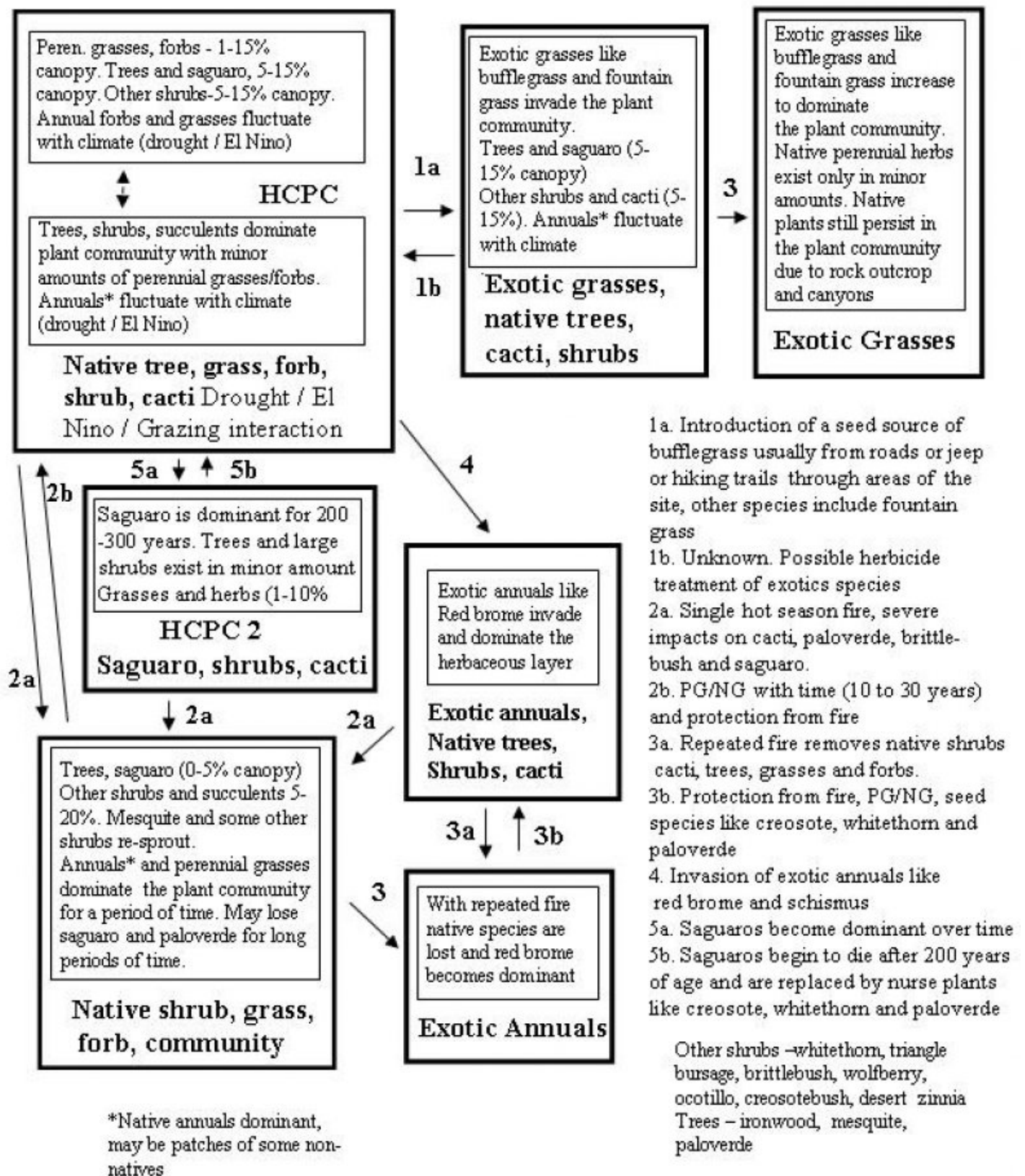


Figure 4. State and Transition model, Limy Slopes 10-13" pz.

### State 1

#### Historical Climax Plant Community

### Community 1.1

#### Historical Climax Plant Community

The potential plant community is a diverse community of desert trees, shrubs, cacti, and perennial forbs and grasses. With continuous heavy grazing, herbaceous and suffrutescent forage species are replaced by increases in shrubs, cacti and trees. Well developed gravel covers help protect the soil from erosion. Northern exposures will have more perennial grasses and shrubs like false mesquite, mint bush and janusia. South slopes will be shrubbier and have more sub shrubs like bursage, brittlebush and desert zinnia. This site has a cycle of dominance by saguaro, alternating with large shrubs and trees that act as nurse plants for the giant cacti. This cycle takes approximately 300 years and starts from exceptionally wet years (El Nino) where saguaro establishes in large numbers.

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

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	11	100	330
Shrub/Vine	85	200	305
Tree	15	100	150
Forb	26	100	150
<b>Total</b>	<b>137</b>	<b>500</b>	<b>935</b>

**Table 6. Soil surface cover**

Tree basal cover	0-1%
Shrub/vine/liana basal cover	1-5%
Grass/grasslike basal cover	0-1%
Forb basal cover	0-1%
Non-vascular plants	0%
Biological crusts	1-15%
Litter	5-45%
Surface fragments >0.25" and <=3"	20-85%
Surface fragments >3"	0-15%
Bedrock	0%
Water	0%
Bare ground	5-45%

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

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	—	0-1%	1-10%	1-15%
>0.5 <= 1	—	0-2%	1-10%	1-10%
>1 <= 2	—	1-5%	0-2%	0-5%
>2 <= 4.5	0-1%	1-15%	0-1%	0-1%
>4.5 <= 13	1-10%	0-2%	—	—
>13 <= 40	0-1%	—	—	—
>40 <= 80	—	—	—	—
>80 <= 120	—	—	—	—
>120	—	—	—	—

**Figure 6. Plant community growth curve (percent production by month).**  
**AZ4013, 40.1 10-13" p.z. other sites.** Growth begins in the late winter, goes semi-dormant in the drought period of late May through early July, growth

continues in the summer through early fall..

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

## **State 2**

### **Exotic perennial grasses with natives**

#### **Community 2.1**

##### **Exotic perennial grasses with natives**

This community occurs where buffleggrass and / or fountain grass invade the native plant community. These species occupy the niches of low shrubs like desert zinnia, brittlebush and grasses like black grama, red grama and slim tridens.

## **State 3**

### **Exotic perennial grasses and fire**

#### **Community 3.1**

##### **Exotic perennial grasses and fire**

This community occurs where a native plant community that has been invaded by buffleggrass or fountain grass has burned one or more times. Increasing amounts of buffleggrass leads to more uniform fine fuels. In areas adjacent to roads and urban areas the risk of repeated fires will increase. As fire frequency increases the dominance of the exotic grasses increase.

## **State 4**

### **Native trees, cacti, shrubs and fire**

#### **Community 4.1**

##### **Native trees, cacti, shrubs and fire**

This plant community occurs as a result of a single hot season fire. Creosotebush, whitethorn, paloverde and saguaro can be severely impacted and may take long periods of time (30-50 years) to recover to pre-fire levels. Perennial and annual grasses and forbs dominate the community for some time until shrubs like ocotillo, whitethorn and jojoba can recover. This plant community can produce enough herbaceous fuel from native species of grasses and / or forbs to carry fire in El Nino years or after unusually wet summers. The natural incidence of fire in this MLRA is very low and fires are much more common from man-made ignitions. Areas of the site close to urban zones or along heavily travelled roads and highways will experience a higher rate of fires.

## **State 5**

### **Native plant community with exotic annuals**

#### **Community 5.1**

##### **Native plant community with exotic annuals**

This plant community occurs where the native community has been invaded by species like red brome and / or schismus. Red brome occupies the niche of the native winter annual forbs and grasses. This exotic annual grass will fluctuate from nearly nothing in a dry winter to dominance of the understory plant community in a El Nino winter.

## **State 6**

### **Exotic annuals and fire**

#### **Community 6.1**

##### **Exotic annuals and fire**

This plant community occurs where a native plant community which has been invaded by red brome and / or schismus, and has burned repeatedly. As fires become more frequent the native trees, shrubs and succulents are removed from the plant community and red brome becomes dominant. In areas of the site near urban areas and along heavily travelled roads this will be a more common occurrence due to an increased source of ignitions.

## State 7 HCPC 2 - Saguaro state

### Community 7.1 HCPC 2 - Saguaro state

There is a 300 year cycle on this site that swings between dominance of native trees and large shrubs (that serve as nurse plants) and mature saguaro forest. Saguaro establishes wholesale in very favorable years (El Nino years like 1979 and 1983) only in the presence of plentiful nurse plants like paloverde, mesquite, whitethorn and creosote. As saguaro plants top their nurse plants (40-60 years) the trees and shrubs begin to die. Saguaro stands reach maturity at 150 to 200 years and begin to diminish over the next 100 years as the large shrubs and trees come back into the plant community.

### Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Suffrutescent grasses</b>			5–125	
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	25–50	–
	black grama	BOER4	<i>Bouteloua eriopoda</i>	10–25	–
2	<b>Subdominant perennial grasses</b>			5–75	
	slim tridens	TRMU	<i>Tridens muticus</i>	1–30	–
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	1–25	–
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	1–20	–
	blue threeawn	ARPUN	<i>Aristida purpurea</i> var. <i>nealleyi</i>	0–20	–
	red grama	BOTR2	<i>Bouteloua trifida</i>	0–20	–
	nineawn pappusgrass	ENDE	<i>Enneapogon desvauxii</i>	0–10	–
	Hall's panicgrass	PAHA	<i>Panicum hallii</i>	0–5	–
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	0–3	–
3	<b>Misc. perennial grasses</b>			0–30	
	spidergrass	ARTE3	<i>Aristida ternipes</i>	0–20	–
	spidergrass	ARTEG	<i>Aristida ternipes</i> var. <i>gentilis</i>	0–15	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0–15	–
	Parish's threeawn	ARPUP5	<i>Aristida purpurea</i> var. <i>parishii</i>	0–10	–
	Arizona cottontop	DICA8	<i>Digitaria californica</i>	0–5	–
	tanglehead	HECO10	<i>Heteropogon contortus</i>	0–5	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	0–5	–
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	0–5	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–5	–
	mesa dropseed	SPFL2	<i>Sporobolus flexuosus</i>	0–5	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0–2	–
	desert needlegrass	ACSP12	<i>Achnatherum speciosum</i>	0–2	–



	cotta grass	COPA13	<i>Cottea pappophoroides</i>	0–1	–
4	<b>Annual grasses</b>			1–100	
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	1–50	–
	Mexican panicgrass	PAHI5	<i>Panicum hirticaule</i>	0–15	–
	sixweeks threeawn	ARAD	<i>Aristida adscensionis</i>	0–15	–
	prairie threeawn	AROL	<i>Aristida oligantha</i>	0–15	–
	needle grama	BOAR	<i>Bouteloua aristidoides</i>	0–15	–
	mucronate sprangeltop	LEPAB	<i>Leptochloa panicea</i> ssp. <i>brachiata</i>	0–10	–
	Bigelow's bluegrass	POBI	<i>Poa bigelovii</i>	0–5	–
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	0–5	–
	Rothrock's grama	BORO2	<i>Bouteloua rothrockii</i>	0–5	–
	desert lovegrass	ERPEM	<i>Eragrostis pectinacea</i> var. <i>miserrima</i>	0–5	–
	tufted lovegrass	ERPEP2	<i>Eragrostis pectinacea</i> var. <i>pectinacea</i>	0–2	–
	feather fingergrass	CHVI4	<i>Chloris virgata</i>	0–2	–
	Arizona brome	BRAR4	<i>Bromus arizonicus</i>	0–1	–
	Arizona signalgrass	URAR	<i>Urochloa arizonica</i>	0–1	–
	delicate muhly	MUFR	<i>Muhlenbergia fragilis</i>	0–1	–
	littleseed muhly	MUMI	<i>Muhlenbergia microsperma</i>	0–1	–
<b>Forb</b>					
5	<b>Perennial forbs</b>			5–50	
	paleface	HIDE	<i>Hibiscus denudatus</i>	1–15	–
	slender janusia	JAGR	<i>Janusia gracilis</i>	1–15	–
	lacy tansyaster	MAPIP4	<i>Machaeranthera pinnatifida</i> ssp. <i>pinnatifida</i> var. <i>pinnatifida</i>	1–10	–
	red-gland spurge	CHME5	<i>Chamaesyce melanadenia</i>	1–10	–
	leatherweed	CRPOP	<i>Croton pottsii</i> var. <i>pottsii</i>	0–5	–
	trailing windmills	ALIN	<i>Allionia incarnata</i>	1–5	–
	dense ayenia	AYMI	<i>Ayenia microphylla</i>	0–5	–
	hairyseed bahia	BAAB	<i>Bahia absinthifolia</i>	0–5	–
	desert marigold	BAMU	<i>Baileya multiradiata</i>	0–5	–
	Coues' cassia	SECO10	<i>Senna covesii</i>	0–5	–
	Parry's false prairie-clover	MAPA7	<i>Marina parryi</i>	1–5	–
	desert globemallow	SPAM2	<i>Sphaeralcea ambigua</i>	0–5	–
	California fagonbush	FALA	<i>Fagonia laevis</i>	0–2	–
	slender poreleaf	POGR5	<i>Porophyllum gracile</i>	0–2	–
	plains blackfoot	MELE2	<i>Melampodium leucanthum</i>	0–2	–
	weakleaf bur ragweed	AMCO3	<i>Ambrosia confertiflora</i>	0–2	–
	dwarf desertpeony	ACNA2	<i>Acourtia nana</i>	0–2	–
	hairy five eyes	CHSO	<i>Chamaesaracha sordida</i>	0–2	–
	desert trumpet	ERIN4	<i>Eriogonum inflatum</i>	0–2	–
	wild dwarf morning-glory	EVAR	<i>Evolvulus arizonicus</i>	0–1	–
	desert larkspur	DEPA	<i>Delphinium parishii</i>	0–1	–
	tall mountain larkspur	DESC	<i>Delphinium scaposum</i>	0–1	–

	bluedicks	DICA14	<i>Dichelostemma capitatum</i>	0–1	–
	spreading fleabane	ERDI4	<i>Erigeron divergens</i>	0–1	–
	brownfoot	ACWR5	<i>Acourtia wrightii</i>	0–1	–
	San Felipe dogweed	ADPO	<i>Adenophyllum porophylloides</i>	0–1	–
	narrowleaf silverbush	ARLA12	<i>Argythamnia lanceolata</i>	0–1	–
	climbing wartclub	BOSC	<i>Boerhavia scandens</i>	0–1	–
	desert mariposa lily	CAKE	<i>Calochortus kennedyi</i>	0–1	–
	naked mariposa lily	CANU2	<i>Calochortus nudus</i>	0–1	–
	wishbone-bush	MILAV	<i>Mirabilis laevis</i> var. <i>villosa</i>	0–1	–
	desert tobacco	NIOBO	<i>Nicotiana obtusifolia</i> var. <i>obtusifolia</i>	0–1	–
	Parry's beardtongue	PEPA24	<i>Penstemon parryi</i>	0–1	–
	orange fameflower	PHAU13	<i>Phemeranthus aurantiacus</i>	0–1	–
	mesquite mistletoe	PHCA8	<i>Phoradendron californicum</i>	0–1	–
	glandleaf milkwort	POMA7	<i>Polygala macradenia</i>	0–1	–
	spreading fanpetals	SIAB	<i>Sida abutifolia</i>	0–1	–
	fringed twinevine	FUCYC	<i>Funastrum cynanchoides</i> ssp. <i>cynanchoides</i>	0–1	–
	Davis Mountain mock vervain	GLBIC	<i>Glandularia bipinnatifida</i> var. <i>ciliata</i>	0–1	–
	desert rosemallow	HICO	<i>Hibiscus coulteri</i>	0–1	–
	spearleaf	MAPA9	<i>Matelea parvifolia</i>	0–1	–
	caliche globemallow	SPLA	<i>Sphaeralcea laxa</i>	0–1	–
	brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	0–1	–
	Coulter's wrinklefruit	TECO	<i>Tetradlea coulteri</i>	0–1	–
	rue of the mountains	THTE2	<i>Thamnosma texana</i>	0–1	–
6	<b>Annual forbs</b>			1–100	
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	1–25	–
	lyreleaf jewelflower	STCAA	<i>Streptanthus carinatus</i> ssp. <i>arizonicus</i>	0–25	–
	bristly fiddleneck	AMTE3	<i>Amsinckia tessellata</i>	0–25	–
	California poppy	ESCAM	<i>Eschscholzia californica</i> ssp. <i>mexicana</i>	0–25	–
	Arizona phacelia	PHAR13	<i>Phacelia arizonica</i>	0–25	–
	cleftleaf wildheliotrope	PHCR	<i>Phacelia crenulata</i>	0–25	–
	Coulter's lupine	LUSP2	<i>Lupinus sparsiflorus</i>	0–20	–
	foothill deervetch	LOHU2	<i>Lotus humistratus</i>	0–15	–
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	0–15	–
	flatcrown buckwheat	ERDE6	<i>Eriogonum deflexum</i>	0–15	–
	exserted Indian paintbrush	CAEXE	<i>Castilleja exserta</i> ssp. <i>exserta</i>	0–15	–
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	0–15	–
	thelypody	THELY	<i>Thelypodium</i>	0–15	–
	woolly tidestromia	TILA2	<i>Tidestromia lanuginosa</i>	0–10	–
	chia	SACO6	<i>Salvia columbariae</i>	0–10	–
	yellow tackstem	CAPA7	<i>Calycoseris parryi</i>	0–10	–
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	0–10	–
	white tackstem	CAWR	<i>Calycoseris wrightii</i>	0–10	–
	Coulter's bladderpod	LECO	<i>Lesquerella coulteri</i>	0–10	–

	Gordon's bladderpod	LEGO	<i>Lesquerella gordonii</i>	0-10	-
	shaggyfruit pepperweed	LELA	<i>Lepidium lasiocarpum</i>	0-10	-
	coastal bird's-foot trefoil	LOSAB	<i>Lotus salsuginosus</i> var. <i>brevivexillus</i>	0-5	-
	Arizona lupine	LUAR4	<i>Lupinus arizonicus</i>	0-5	-
	slender goldenweed	MAGR10	<i>Machaeranthera gracilis</i>	0-5	-
	mesa tansyaster	MATA	<i>Machaeranthera tagetina</i>	0-5	-
	tanseyleaf tansyaster	MATA2	<i>Machaeranthera tanacetifolia</i>	0-5	-
	miniature woollystar	ERDI2	<i>Eriastrum diffusum</i>	0-5	-
	Texas stork's bill	ERTE13	<i>Erodium texanum</i>	0-5	-
	Arizona poppy	KAGR	<i>Kallstroemia grandiflora</i>	0-5	-
	California goldfields	LACAC2	<i>Lasthenia californica</i> ssp. <i>californica</i>	0-5	-
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	0-5	-
	pitseed goosefoot	CHBE4	<i>Chenopodium berlandieri</i>	0-5	-
	brittle spineflower	CHBR	<i>Chorizanthe brevicornu</i>	0-5	-
	pincushion flower	CHFR	<i>Chaenactis fremontii</i>	0-5	-
	smallflowered milkvetch	ASNU4	<i>Astragalus nuttallianus</i>	0-5	-
	wheelscale saltbush	ATEL	<i>Atriplex elegans</i>	0-5	-
	New Mexico plumeseed	RANE	<i>Rafinesquia neomexicana</i>	0-5	-
	combseed	PECTO	<i>Pectocarya</i>	0-5	-
	manybristle chinchweed	PEPA2	<i>Pectis papposa</i>	0-5	-
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	0-2	-
	Louisiana vetch	VILU	<i>Vicia ludoviciana</i>	0-2	-
	Arizona popcornflower	PLAR	<i>Plagiobothrys arizonicus</i>	0-2	-
	white easterbonnets	ANLA7	<i>Antheropeas lanosum</i>	0-2	-
	hyssopleaf sandmat	CHHY3	<i>Chamaesyce hyssopifolia</i>	0-2	-
	Esteve's pincushion	CHST	<i>Chaenactis stevioides</i>	0-2	-
	buckwheat	ERIOG	<i>Eriogonum</i>	0-2	-
	glandular threadplant	NEGL	<i>Nemacladus glanduliferus</i>	0-2	-
	distant phacelia	PHDI	<i>Phacelia distans</i>	0-2	-
	fringed amaranth	AMFI	<i>Amaranthus fimbriatus</i>	0-2	-
	slimjim bean	PHFI3	<i>Phaseolus filiformis</i>	0-1	-
	desert evening primrose	OEPR	<i>Oenothera primiveris</i>	0-1	-
	Florida pellitory	PAFL3	<i>Parietaria floridana</i>	0-1	-
	California desertdandelion	MACA6	<i>Malacothrix californica</i>	0-1	-
	whitestem blazingstar	MEAL6	<i>Mentzelia albicaulis</i>	0-1	-
	Lindley's silverpuffs	MILI5	<i>Microseris lindleyi</i>	0-1	-
	Nuttall's povertyweed	MONU	<i>Monolepis nuttalliana</i>	0-1	-
	bristly nama	NAHI	<i>Nama hispidum</i>	0-1	-
	Arizona cottonrose	LOAR12	<i>Logfia arizonica</i>	0-1	-
	Abert's buckwheat	ERAB2	<i>Eriogonum abertianum</i>	0-1	-
	flatspine stickseed	LAOCO	<i>Lappula occidentalis</i> var. <i>occidentalis</i>	0-1	-
	Thurber's buckwheat	ERTH3	<i>Eriogonum thurberi</i>	0-1	-
	Mexican fireplant	EUHE4	<i>Euphorbia heterophylla</i>	0-1	-
	delicate desert bidens	EUHE4	<i>Euphorbia heterophylla</i>	0-1	-

	dainty desert mideseed	EUMIZ	<i>Eucrypta micrantha</i>	0–1	–
	spring pygmycudweed	EVVE	<i>Evax verna</i>	0–1	–
	limestone bedstraw	GAPR	<i>Galium proliferum</i>	0–1	–
	hairy desertsunflower	GECA2	<i>Geraea canescens</i>	0–1	–
	star gilia	GIST	<i>Gilia stellata</i>	0–1	–
	California mustard	GULA4	<i>Guillenia lasiophylla</i>	0–1	–
	New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	0–1	–
	sand pygmyweed	CRCOC	<i>Crassula connata</i> var. <i>connata</i>	0–1	–
	cryptantha	CRYPT	<i>Cryptantha</i>	0–1	–
	hairy prairie clover	DAMO	<i>Dalea mollis</i>	0–1	–
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	0–1	–
	whitemargin sandmat	CHAL11	<i>Chamaesyce albomarginata</i>	0–1	–
	Sonoran sandmat	CHMI7	<i>Chamaesyce micromera</i>	0–1	–
	devil's spineflower	CHRI	<i>Chorizanthe rigida</i>	0–1	–
	lipfern	CHEIL	<i>Cheilanthes</i>	0–1	–
	Chiricahua Mountain sandmat	CHFL3	<i>Chamaesyce florida</i>	0–1	–
	wild cabbage	CAULA	<i>Caulanthus</i>	0–1	–
	hoary bowlesia	BOIN3	<i>Bowlesia incana</i>	0–1	–
	California suncup	CACA32	<i>Camissonia californica</i>	0–1	–
	browneyes	CACL4	<i>Camissonia claviformis</i>	0–1	–
	false carrot	YAMI	<i>Yabea microcarpa</i>	0–1	–
	bristly scaleseed	SPEC2	<i>Spermolepis echinata</i>	0–1	–
	woollyhead neststraw	STMI2	<i>Stylocline micropoides</i>	0–1	–
	sand fringe pod	THCU	<i>Thysanocarpus curvipes</i>	0–1	–

#### Shrub/Vine

7	<b>Dominant large shrubs</b>			10–110	
	creosote bush	LATRT	<i>Larrea tridentata</i> var. <i>tridentata</i>	5–100	–
	ocotillo	FOSP2	<i>Fouquieria splendens</i>	0–25	–
8	<b>Dominant half shrubs</b>			25–100	
	desert zinnia	ZIAC	<i>Zinnia acerosa</i>	20–50	–
	triangle bur ragweed	AMDE4	<i>Ambrosia deltoidea</i>	0–25	–
	brittlebush	ENFA	<i>Encelia farinosa</i>	0–20	–
	littleleaf ratany	KRER	<i>Krameria erecta</i>	1–20	–
	rough menodora	MESC	<i>Menodora scabra</i>	0–20	–
	fairyduster	CAER	<i>Calliandra eriophylla</i>	1–15	–
	white ratany	KRGR	<i>Krameria grayi</i>	0–10	–
	button brittlebush	ENFR	<i>Encelia frutescens</i>	0–10	–
	whitestem paperflower	PSCO2	<i>Psilostrophe cooperi</i>	1–10	–
	woody crinklemat	TICAC	<i>Tiquilia canescens</i> var. <i>canescens</i>	0–10	–
	American threefold	TRCA8	<i>Trixis californica</i>	0–5	–
	Mexican bladdersage	SAME	<i>Salazaria mexicana</i>	0–5	–
	pricklyleaf dogweed	THAC	<i>Thymophylla acerosa</i>	0–5	–
	burrobush	AMDU2	<i>Ambrosia dumosa</i>	0–5	–

	slender blackfoot	MELE2	<i>Melampyrum leucanthum</i>	0–5	–
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	plains blackroot	MELEZ	<i>Meibomia leucanthum</i>	0-3	-
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0-5	-
	Coulter's brickellbush	BRCO	<i>Brickellia coulteri</i>	0-2	-
	threadleaf snakeweed	GUMI	<i>Gutierrezia microcephala</i>	0-2	-
	pelotazo	ABIN	<i>Abutilon incanum</i>	0-2	-
9	<b>Miscellaneous shrubs</b>			5-50	
	jojoba	SICH	<i>Simmondsia chinensis</i>	0-25	-
	Parish's goldeneye	VIPA14	<i>Viguiera parishii</i>	0-5	-
	Wright's beebrush	ALWR	<i>Aloysia wrightii</i>	0-5	-
	javelina bush	COER5	<i>Condalia ericoides</i>	0-5	-
	knifeleaf condalia	COSP3	<i>Condalia spathulata</i>	0-5	-
	Warnock's snakewood	COWA	<i>Condalia warnockii</i>	0-5	-
	Berlandier's wolfberry	LYBE	<i>Lycium berlandieri</i>	1-5	-
	mariola	PAIN2	<i>Parthenium incanum</i>	0-5	-
	San Felipe dogweed	ADPO	<i>Adenophyllum porophylloides</i>	0-2	-
	Eastern Mojave buckwheat	ERFA2	<i>Eriogonum fasciculatum</i>	0-2	-
	desert yellow fleabane	ERLI	<i>Erigeron linearis</i>	0-2	-
	sangre de cristo	JACA2	<i>Jatropha cardiophylla</i>	0-2	-
	slender janusia	JAGR	<i>Janusia gracilis</i>	0-2	-
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0-2	-
	common sotol	DAWH2	<i>Dasylirion wheeleri</i>	0-2	-
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	0-2	-
	whitethorn acacia	ACCO2	<i>Acacia constricta</i>	0-2	-
	catclaw acacia	ACGR	<i>Acacia greggii</i>	0-2	-
	banana yucca	YUBA	<i>Yucca baccata</i>	0-2	-
	Joshua tree	YUBR	<i>Yucca brevifolia</i>	0-2	-
	turpentinebroom	THMO	<i>Thamnosma montana</i>	0-2	-
	toothleaf goldeneye	VIDE3	<i>Viguiera dentata</i>	0-2	-
	soaptree yucca	YUEL	<i>Yucca elata</i>	0-1	-
	lotebush	ZIOB	<i>Ziziphus obtusifolia</i>	0-1	-
	rayless goldenhead	ACSP	<i>Acamptopappus sphaerocephalus</i>	0-1	-
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	0-1	-
	water jacket	LYAN	<i>Lycium andersonii</i>	0-1	-
	Arizona desert-thorn	LYEX	<i>Lycium exsertum</i>	0-1	-
10	<b>Succulents</b>			5-45	
	saguaro	CAGI10	<i>Carnegiea gigantea</i>	0-20	-
	cactus apple	OPEN3	<i>Opuntia engelmannii</i>	1-10	-
	purple pricklypear	OPMA8	<i>Opuntia macrocentra</i>	0-5	-
	tulip pricklypear	OPPH	<i>Opuntia phaeacantha</i>	1-5	-
	teddybear cholla	CYBI9	<i>Cylindropuntia bigelovii</i>	0-5	-
	walkingstick cactus	CYSP8	<i>Cylindropuntia spinosior</i>	1-5	-
	staghorn cholla	CYVE3	<i>Cylindropuntia versicolor</i>	1-5	-
	jumping cholla	CYFU10	<i>Cylindropuntia fulgida</i>	0-3	-

	OCOLUO	FOSPZ	<i>Fouquieria splendens</i>	0–3	–
	Christmas cactus	CYLE8	<i>Cylindropuntia leptocaulis</i>	0–3	–
	candy barrelcactus	FEWI	<i>Ferocactus wislizeni</i>	0–2	–
	buck-horn cholla	CYAC8	<i>Cylindropuntia acanthocarpa</i>	0–2	–
	Arizona pencil cholla	CYAR14	<i>Cylindropuntia arbuscula</i>	0–2	–
	desert agave	AGDE	<i>Agave deserti</i>	0–2	–
	candle cholla	CYKL	<i>Cylindropuntia kleiniae</i>	0–1	–
	Engelmann's hedgehog cactus	ECEN	<i>Echinocereus engelmannii</i>	0–1	–
	redspine fishhook cactus	ECER2	<i>Echinomastus erectocentrus</i>	0–1	–
	pinkflower hedgehog cactus	ECFA	<i>Echinocereus fasciculatus</i>	0–1	–
	Nichol's echinocactus	ECHON	<i>Echinocactus horizonthalonius var. nicholii</i>	0–1	–
	spiny star	ESVIV	<i>Escobaria vivipara var. vivipara</i>	0–1	–
	Scheer's beehive cactus	COROS	<i>Coryphantha robustispina ssp. scheeri</i>	0–1	–
	devil's cholla	GRKU	<i>Grusonia kunzei</i>	0–1	–
	Graham's nipple cactus	MAGR9	<i>Mammillaria grahamii</i>	0–1	–
	Thornber's nipple cactus	MATH	<i>Mammillaria thornberi</i>	0–1	–
	beavertail pricklypear	OPBA2	<i>Opuntia basilaris</i>	0–1	–
<b>Tree</b>					
11	<b>Trees</b>			15–150	
	yellow paloverde	PAMI5	<i>Parkinsonia microphylla</i>	15–100	–
	velvet mesquite	PRVE	<i>Prosopis velutina</i>	0–20	–
	desert ironwood	OLTE	<i>Oleña tesota</i>	0–20	–
	crucifixion thorn	CAHO3	<i>Canotia holacantha</i>	0–10	–
	oneseed juniper	JUMO	<i>Juniperus monosperma</i>	0–5	–
	blue paloverde	PAFL6	<i>Parkinsonia florida</i>	0–5	–

## Animal community

The plant community on this site is suitable for grazing by all classes of cattle at any season. Forage species grow year-round with available moisture. High pH due to lime may tie up soil nutrients and influence grass palatability in the summer growing season. The variety of palatable, evergreen low shrubs in the plant community make it especially valuable for winter grazing.

Water developments are very important to wildlife species on this site. Vegetative cover, topography and forage diversity are good enough for a variety of wildlife species including the large mammals.

## Hydrological functions

This site has deep coarse textured soils and even with moderate to steep slopes is not a good producer of runoff.

## Recreational uses

Hunting, hiking, horseback riding, camping, photography, birdwatching

## Wood products

Limited firewood from mesquite, whitethorn and paloverde for camp fires and branding fires.

## Other products

Cactus fruits from saguaro, prickly pear and cholla, jojoba nuts and mesquite beans. Saguaro ribs and ocotillo canes.

## Inventory data references

Range 417s include 4 in good condition.

## Type locality

Location 1: Pima County, AZ	
Township/Range/Section	T8S R17E S25
General legal description	Tucson FO - Campstool Ranch NE 1/4 sec. 25
Location 2: Pima County, AZ	
Township/Range/Section	T10S R2E S3
General legal description	Sells FO - Vekol Mine area NW 1/4 sec. 3
Location 3: Pima County, AZ	
Township/Range/Section	T17S R9E S36
General legal description	Palo Alto Ranch, Soldier Well pasture, At transect # 22.
Location 4: Pima County, AZ	
Township/Range/Section	T18S R14E S30
General legal description	Santa Rita Experimental Range, Gravelly Ridge enclosure. Steep side slopes in southern end of fenced area. Fence built in 1937.
Location 5: Cochise County, AZ	
Township/Range/Section	T13S R19E S23
General legal description	Cascabel Community Center, Southern aspect (3200 ft. elev.), ungrazed 30 years.

## Other references

The Changing Mile - Revisited. Ray Turner, Robert Webb, University of Arizona Press, Tucson, Arizona, 2003.  
Photo Station 62

## 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)	Dan Robinett, Don Decker
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Contact for lead author	NRCS Tucson Area Office
Date	04/29/2003
Approved by	S. Cassady
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** None  

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2. **Presence of water flow patterns:** Paths are 15 feet apart and sinuous due to terracettes on shrubs and grasses. They are well armored with gravels and cobbles.  

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are uncommon on grasses and gravels. Terracettes are common on long-lived shrubs and perennial grasses like bush muhly and black grama. They cover 10-15% of the area.  

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground on this site is 10-15% (with 75% gravel and cobble cover).  

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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  

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7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter moves only in water flow paths 10-15 feet and is deposited in terracettes at curves in flow paths. Woody litter remains in place under shrub canopies.  

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** No slake test done. Expect ratings of 4-6 under shrub and grass canopies, and 1-3 in openings. High gravel/cobble cover provides good resistance to erosion.  

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface is brown gravelly sandy loam 6-8 inches thick over lighter colored, very gravelly, calcareous subsoils. There has been some historic loss of soil surface.  

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Large shrubs (whitethorn #1, mesquite #2, creosote #3 and palo verde) have a



20% canopy cover, shrublike grasses (bush muhly #1, glack grama #2) have a 15% canopy cover, sug-shrubs including desert zinnia, burroweed, snakeweed and paper flower have a %5 canopy cover and succulents like prickley pear, agave and barrel cactus have a 2-3% canopy.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** Soil surface (1/2 inch) has a platy structure due to overland water flow and some raindrop impact. There is no subsurface soil compaction.
- 

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: large shrubs > shrub-like grasses > sub-shrubs > other perennial grasses > annual forbs and grasses > succulents > perennial forbs > cryptogams

Sub-dominant:

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Severe drought last 4 years resulted in 100% mortality on short perennial grasses (tridens and threeawns), 50% mortality on bush muhly, 75% mortality on sub-shrubs and 10-15% mortality on large shrubs.
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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):** 137 lbs per acre in year with below average rainfall (2002 about 7 inches and 2003 to date 3 inches) 500 lbs/ac normal precipitation, 935 lbs/ac favorable precipitation.
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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Whitethorn acacia, mesquite, burroweed, snakeweed
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17. **Perennial plant reproductive capability:** Impaired by severe drought.
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