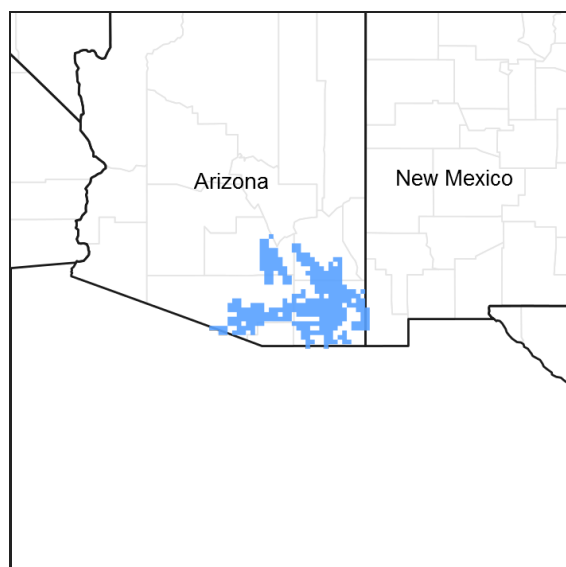


## **Ecological site R041XC318AZ** **Sandy Loam 12-16" p.z. Deep**

Last updated: 7/21/2020  
 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): 041X–Madrean Archipelago

AZ 41.3 – Chihuahuan – Sonoran Semidesert Grasslands

Elevations range from 3200 to 5000 feet and precipitation ranges from 12 to 16 inches per year. Vegetation includes mesquite, catclaw acacia, netleaf hackberry, palo verde, false mesquite, range ratany, fourwing saltbush, tarbush, littleleaf sumac, sideoats grama, black grama, plains lovegrass, cane beardgrass, tobosa, vine mesquite, threeawns, Arizona cottontop and bush muhly. The soil temperature regime is thermic and the soil moisture regime is ustic 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**

R041XC306AZ	<b>Shallow Hills 12-16" p.z.</b>
R041XC319AZ	<b>Sandy Loam Upland 12-16" p.z.</b>
R041XC322AZ	<b>Shallow Upland 12-16" p.z.</b>

## Similar sites

R040XA117AZ	<b>Sandy Loam Upland, Deep 10"-13" p.z.</b>
R041XA110AZ	<b>Sandy Loam Upland 16-20" p.z.</b>

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	(1) <i>eriogonum wrightii</i>
Herbaceous	(1) <i>bouteloua curtipendula</i> (2) <i>digitaria californica</i>

## Physiographic features

This site occurs in the middle elevations of the Madrean Basin and Range province in southeastern Arizona. This site occurs on fan terraces and stream terraces. It is always in an upland position. Slopes are mainly 1-3%, but may range as high as 8%.

**Table 2. Representative physiographic features**

Landforms	(1) Terrace (2) Fan piedmont (3) Plain
Flooding frequency	None
Ponding frequency	None
Elevation	1,006–1,524 m
Slope	1–8%
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, originates 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 recent sandy alluvium, usually, of granitic origin. They are sandy loam throughout at least to moderate depths (40 inches). Surface textures range from loamy sand to gravelly sandyloam. Soil surfaces are thick and dark colored. Plant-soil moisture relationships are good.

Soil series mapped on this site include: SSA-661 Eastern Pinal & Southern Gila counties MU's 21 Mallet, 23 & 71 Combate; SSA-664 San Simon area MU 12 Comoro; SSA-665 Willcox area MU's CmA, CnA & CnC Comoro, Cs Cowan, SnA, SnB & SoA Sonoita; SSA-666 Cochise county Northwest part MU's 25 & 26 Combate, 38 Durazo, 59 Mallet & Hooks; SSA-667 Santa Cruz area MU's An Anthony and Ao Anthony GrV; SSA-669 Pima county Eastern part MU's 18 Combate and 37 Keesto; SSA-671 Cochise county Douglas-Tombstone part MU's 1 Altar & Mallet, 5 Combate, 32 Combate LS, 105 Mallet, 112 Ruins thick surface, 120 Perilla, 137 Swisshelm SL and 138 Swisshelm SL saline-sodic; SSA-703 Tohono O'odham Nation MU's 5 & 14 Combate.

**Table 4. Representative soil features**

Parent material	(1) Alluvium–granite
Surface texture	(1) Loamy sand (2) Sandy loam (3) Gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid to rapid
Soil depth	102–152 cm
Surface fragment cover <=3"	1–20%
Surface fragment cover >3"	0–2%
Available water capacity (0-101.6cm)	12.19–19.81 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)	2–20%
Subsurface fragment volume >3" (Depth not specified)	0–2%

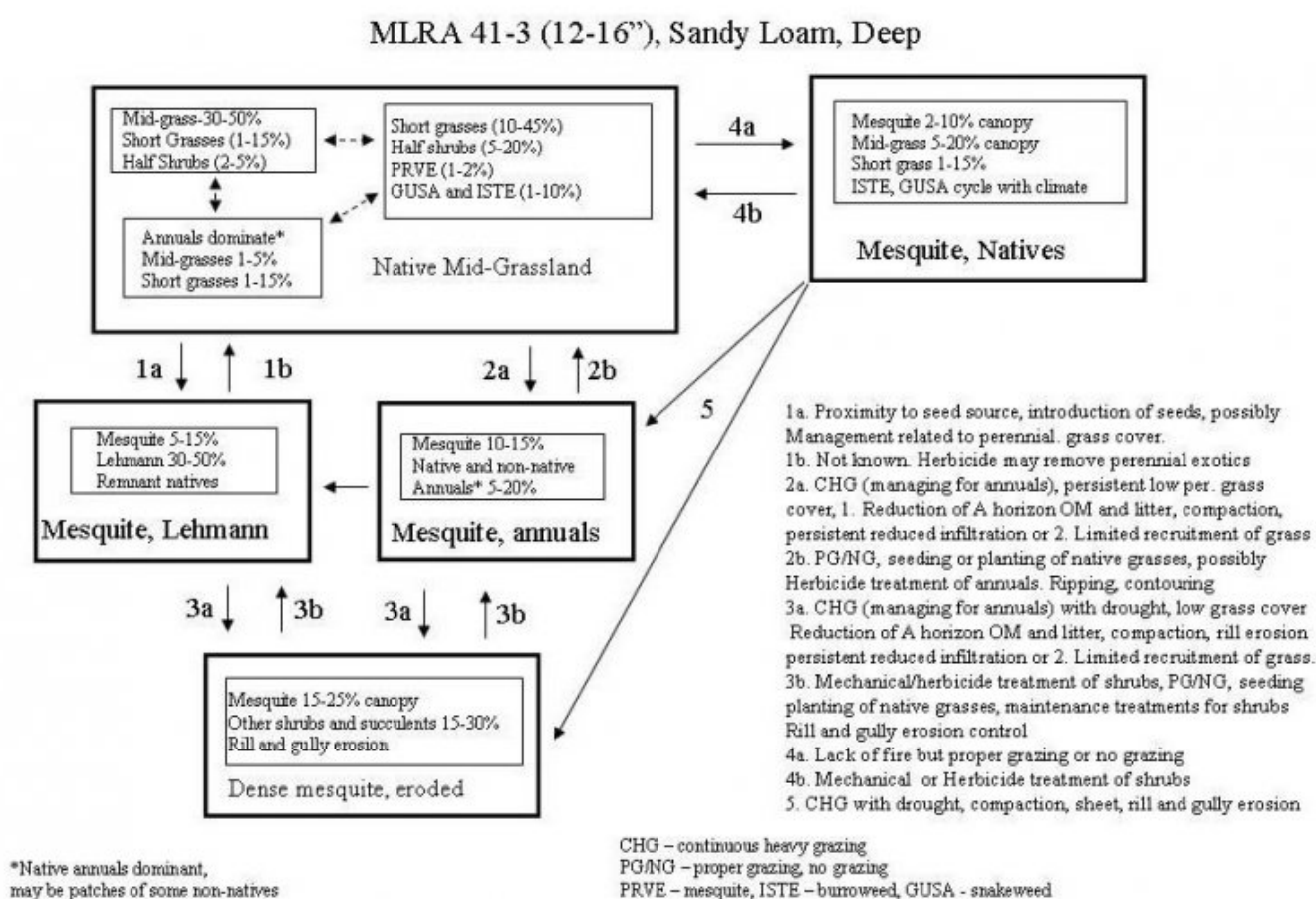
## Ecological dynamics

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 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 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



## State 1 Historic Climax Plant Community

### Community 1.1 Historic Climax Plant Community



Figure 4. Sandy Loam Deep 12-16" pz.

The potential plant community on this site is dominated by warm season perennial grasses. The major perennial grass species on the site tend to be well dispersed throughout the plant community. Several species of half-shrubs are well represented in the plant community. The aspect is grassland with occasional clumps of desert hackberry, catclaw acacia or mesquite. With continuous heavy grazing, palatable perennial grasses are removed from the potential plant community and species such as Rothrock grama, mesa threeawn, and spidergrass increase. In areas where burrowweed dominates the plant community the potential production of perennial mid-grasses is equal to the present production of burrowweed once it is removed from the plant community. Even with low plant cover, these soils produce very little runoff and have very low erosion rates. Some soils are sandy textured but have enough coarse fragments that they are not subject to wind erosion. Naturally occurring wildfires (June through August) were important in the development of the potential plant community, and helped maintain a grassland aspect. Hydrologic relationships are good with very little runoff in most years due to coarse textured soils, high plant and litter cover and low soil bulk densities.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	488	953	1491
Shrub/Vine	63	112	291
Forb	34	56	280
Tree	—	6	17
<b>Total</b>	<b>585</b>	<b>1127</b>	<b>2079</b>

Table 6. Soil surface cover

Tree basal cover	0-1%
Shrub/vine/liana basal cover	0-1%
Grass/grasslike basal cover	6-15%
Forb basal cover	0-1%
Non-vascular plants	0-1%
Biological crusts	0-5%
Litter	30-75%
Surface fragments >0.25" and <=3"	5-20%
Surface fragments >3"	0-2%
Bedrock	0%
Water	0%
Bare ground	10-25%

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

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	0-5%	0-10%	0-5%
>0.15 <= 0.3	–	2-10%	10-20%	1-5%
>0.3 <= 0.6	–	0-10%	20-40%	0-5%
>0.6 <= 1.4	–	0-1%	0-10%	–
>1.4 <= 4	0-1%	0-1%	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

**Figure 6. Plant community growth curve (percent production by month).**  
**AZ4134, 41.3 12-16" p.z. other sites. Growth begins in the spring, semi-dormancy occurs during the May through June drought, most growth occurs during the summer rains..**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	10	0	0	30	35	15	5	0	0

## State 2

### Mesquite, native grass

#### Community 2.1

##### Mesquite, native grass



**Figure 7. Sandy Loam Deep 12-16" pz. Combate soils**

Mesquite increases in the absence of fire for long periods of time. Native perennial grasses maintain dominance, with good grazing management, and mesquite canopy levels up to 10%. Burrowweed fluctuates in the plant community with climate, but never becomes dominant. Cholla and prickly pear can cycle through the plant community. Some soil compaction has occurred due to livestock traffic, but hydrologic relationships have not been impaired.

## State 3

### Mesquite, annual grass and forb state

#### Community 3.1

##### Mesquite, annual grass and forb state





**Figure 8. Sandy Loam Deep 12-16" pz. mesquite, annuals**

Mesquite is dominant with canopy levels of 10 to 15%. Native and non-native annual forbs and grasses, both cool and warm season, dominate the under-story. Burroweed and snakeweed cycle with climate, but are always important in the under-story. Native perennial grasses are gone due to the interactions of drought, fire and continuous heavy grazing. Usually, soil compaction and the loss of herbaceous cover have resulted in sheet, rill and gully erosion on the site. Hydrologic relationships have changed to increase the amount of runoff.

## **State 4**

### **Mesquite, Lehmann lovegrass**

#### **Community 4.1**

##### **Mesquite, Lehmann lovegrass**



**Figure 9. Sandy Loam Deep 12-16" pz. Lehmann invasion**

Mesquite has increased in the absence of fires for long periods of time to canopy levels of 10%. Lehmann lovegrass has invaded from seeded areas and is dominant in the under-story. Remnant native perennial grasses diminish over time. Native annual forbs and grasses diminish in the soil seed-bank over time. Fire may act to increase dominance of lehmann lovegrass at the expense of native perennial grasses, but may allow native annual species a chance to make seed and persist in the seed-bank. Some soil compaction has occurred due to livestock traffic, but hydrologic relationships have not been impaired.

## **State 5**

### **Dense mesquite and other shrubs, succulents**

#### **Community 5.1**

##### **Dense mesquite and other shrubs, succulents**



**Figure 10. Sandy Loam Deep 12-16" pz. dense mesquite, eroded**

Mesquite continues to increase in the absence of fire up to canopy levels of 25%. Other shrubs and succulents like prickly pear and cholla, dominate the under-story. Remnant perennial grasses exist only in the protection of cacti and shrubs. Occasional fires may burn after extremely wet seasons, but mesquite is well established and sprouts back to a thorn-scrub stage. Soil compaction and reduced herbaceous cover has resulted in sheet, rill and gully erosion on the site. Hydrologic relationships have been impaired and runoff is increased.

### **Transition T1A**

#### **State 1 to 2**

Lack of fire but proper grazing or no grazing

### **Transition T1B**

#### **State 1 to 3**

Continuous Heavy Grazing (managing for annuals), persistent low perennial grass cover.

### **Transition T1C**

#### **State 1 to 4**

Proximity to seed source, introduction of seeds, possibly management related to perennial grass cover.

### **Restoration pathway R2A**

#### **State 2 to 1**

Brush management, prescribed grazing

### **Transition T2A**

#### **State 2 to 3**

Continuous Heavy Grazing with drought, compaction, sheet, rill and gully erosion

### **Transition T2B**

#### **State 2 to 5**

Continuous Heavy Grazing with drought, compaction, sheet, rill and gully erosion

### **Restoration pathway R3A**

#### **State 3 to 1**

Prescribed Grazing/No Grazing, seeding or planting of native grasses, possibly herbicide treatment of annuals, brush management, mechanical land treatment. Transition to State 4 most likely result.



## Restoration pathway R3B

### State 3 to 4

Prescribed Grazing/No Grazing, with or without seeding non-native grasses, possibly herbicide treatment of annuals, brush management, mechanical land treatment.

## Transition T3A

### State 3 to 5

Continuous Heavy Grazing (managing for annuals) with drought, low grass cover

## Restoration pathway R1A

### State 4 to 1

None known

## Transition T4A

### State 4 to 5

Continuous Heavy Grazing (managing for annuals) with drought, low grass cover

## Restoration pathway R5A

### State 5 to 3

Brush management, range seeding, rill and gully erosion control, Prescribed Grazing/No Grazing. Transition to State 4 (restoration pathway R5B) is likely outcome due to prevalence of non-native perennial seedbank throughout the LRU.

## Restoration pathway R5B

### State 5 to 4

Brush management, range seeding, rill and gully erosion control, Prescribed Grazing/No Grazing.

## Additional community tables

Table 8. 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>			224–504	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	112–392	–
	Arizona cottontop	DICA8	<i>Digitaria californica</i>	112–392	–
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	56–168	–
2	<b>subdom mid-grasses</b>			56–224	
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	22–112	–
	tanglehead	HECO10	<i>Heteropogon contortus</i>	28–112	–
	green sprangletop	LEDU	<i>Leptochloa dubia</i>	0–112	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	6–56	–
3	<b>suffrutescent grasses</b>			123–258	
	black grama	BOER4	<i>Bouteloua eriopoda</i>	56–146	–
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	56–146	–
	Santa Rita threeawn	ARCAG	<i>Aristida californica</i> var. <i>glabrata</i>	11–112	–

4	<b>short lived grasses</b>			39–168	
	Rothrock's grama	BORO2	<i>Bouteloua rothrockii</i>	11–168	–
	slender grama	BORE2	<i>Bouteloua repens</i>	28–112	–
5	<b>miscellaneous perennial grasses</b>			11–112	
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	6–90	–
	mesa dropseed	SPFL2	<i>Sporobolus flexuosus</i>	0–56	–
	plains lovegrass	ERIN	<i>Eragrostis intermedia</i>	0–45	–
	whiplash pappusgrass	PAVA2	<i>Pappophorum vaginatum</i>	0–45	–
	fall witchgrass	DICO6	<i>Digitaria cognata</i>	0–28	–
	squirreltail	ELELE	<i>Elymus elymoides</i> ssp. <i>elymoides</i>	6–28	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–28	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	0–22	–
	slim tridens	TRMU	<i>Tridens muticus</i>	0–22	–
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	0–17	–
	Arizona muhly	MUAR3	<i>Muhlenbergia arizonica</i>	0–17	–
	Hall's panicgrass	PAHA	<i>Panicum hallii</i>	0–17	–
	nineawn pappusgrass	ENDE	<i>Enneapogon desvauxii</i>	0–11	–
	curly-mesquite	HIBE	<i>Hilaria belangeri</i>	0–6	–
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	0–6	–
6	<b>perennial threeawns</b>			11–90	
	spidergrass	ARTE3	<i>Aristida ternipes</i>	11–56	–
	spidergrass	ARTEG	<i>Aristida ternipes</i> var. <i>gentilis</i>	0–28	–
	Parish's threeawn	ARPUP5	<i>Aristida purpurea</i> var. <i>parishii</i>	0–28	–
	Orcutt's threeawn	ARSCO	<i>Aristida schiedeana</i> var. <i>orcuttiana</i>	0–11	–
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	0–11	–
	Fendler threeawn	ARPUL	<i>Aristida purpurea</i> var. <i>longiseta</i>	0–6	–
	blue threeawn	ARPUN	<i>Aristida purpurea</i> var. <i>nealleyi</i>	0–6	–
	poverty threeawn	ARDI5	<i>Aristida divaricata</i>	0–6	–
	Havard's threeawn	ARHA3	<i>Aristida havardii</i>	0–6	–
	Wooton's threeawn	ARPA9	<i>Aristida pansa</i>	0–6	–
7	<b>annual grasses</b>			11–168	
	Parry's grama	BOPA2	<i>Bouteloua parryi</i>	0–84	–
	prairie threeawn	AROL	<i>Aristida oligantha</i>	0–56	–
	needle grama	BOAR	<i>Bouteloua aristidoides</i>	0–56	–
	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>	0–56	–
	tapertip cupgrass	ERACA	<i>Eriochloa acuminata</i> var. <i>acuminata</i>	0–56	–
	canyon cupgrass	ERLE7	<i>Eriochloa lemmonii</i>	0–28	–
	desert lovegrass	ERPEM	<i>Eragrostis pectinacea</i> var. <i>miserrima</i>	0–28	–
	tufted lovegrass	ERPEP2	<i>Eragrostis pectinacea</i> var. <i>pectinacea</i>	0–28	–
	sixweeks threeawn	ARAD	<i>Aristida adscensionis</i>	0–28	–
	Bigelow's bluegrass	POBI	<i>Poa bigelovii</i>	0–28	–
	feather fingergrass	CHVI4	<i>Chloris virgata</i>	0–28	–

	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	0–28	–
	Mexican sprangletop	LEFUU	<i>Leptochloa fusca ssp. uninervia</i>	0–22	–
	mucronate sprangletop	LEPAB	<i>Leptochloa panicea ssp. brachiata</i>	0–22	–
	witchgrass	PACA6	<i>Panicum capillare</i>	0–22	–
	Arizona brome	BRAR4	<i>Bromus arizonicus</i>	0–17	–
	delicate muhly	MUFR	<i>Muhlenbergia fragilis</i>	0–11	–
	littleseed muhly	MUMI	<i>Muhlenbergia microsperma</i>	0–11	–
<b>Forb</b>					
8	<b>perennial forbs</b>			22–112	
	wealeaf bur ragweed	AMCO3	<i>Ambrosia confertiflora</i>	1–28	–
	desert marigold	BAMU	<i>Baileya multiradiata</i>	1–28	–
	fingerleaf gourd	CUDI	<i>Cucurbita digitata</i>	0–28	–
	coyote gourd	CUPA	<i>Cucurbita palmata</i>	0–28	–
	scarlet spiderling	BOCO	<i>Boerhavia coccinea</i>	1–28	–
	Arizona foldwing	DIRE4	<i>Dicliptera resupinata</i>	0–28	–
	spreading fleabane	ERDI4	<i>Erigeron divergens</i>	0–28	–
	wild dwarf morning-glory	EVAR	<i>Evolvulus arizonicus</i>	1–28	–
	southwestern mock vervain	GLGO	<i>Glandularia gooddingii</i>	0–28	–
	Wright's deervetch	LOWR	<i>Lotus wrightii</i>	0–28	–
	lacy tansyaster	MAPI	<i>Machaeranthera pinnatifida</i>	0–28	–
	canaigre dock	RUHY	<i>Rumex hymenosepalus</i>	1–28	–
	desert globemallow	SPAM2	<i>Sphaeralcea ambigua</i>	0–28	–
	brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	1–28	–
	hairy fourwort	TENE	<i>Tetramerium nervosum</i>	0–28	–
	New Mexico fanpetals	SINE	<i>Sida neomexicana</i>	0–22	–
	Wright's cudweed	PSCAC2	<i>Pseudognaphalium canescens ssp. canescens</i>	0–22	–
	New Mexico silverbush	ARNE2	<i>Argythamnia neomexicana</i>	0–22	–
	Watson's dutchman's pipe	ARWA	<i>Aristolochia watsonii</i>	0–17	–
	trailing windmills	ALIN	<i>Allionia incarnata</i>	0–17	–
	Arizona wrightwort	CAAR7	<i>Carlowrightia arizonica</i>	0–17	–
	Greene's bird's-foot trefoil	LOGR4	<i>Lotus greenei</i>	0–11	–
	slender poreleaf	POGR5	<i>Porophyllum gracile</i>	0–6	–
	Lemmon's ragwort	SELE8	<i>Senecio lemmonii</i>	0–6	–
	Rocky Mountain zinnia	ZIGR	<i>Zinnia grandiflora</i>	0–6	–
	Cooley's bundleflower	DECO2	<i>Desmanthus cooleyi</i>	0–6	–
	brownfoot	ACWR5	<i>Acourtia wrightii</i>	0–6	–
	variableleaf bushbean	MAGI2	<i>Macroptilium gibbosifolium</i>	0–6	–
	tufted evening primrose	OECA10	<i>Oenothera caespitosa</i>	0–6	–
	slimleaf bean	PHAN3	<i>Phaseolus angustissimus</i>	0–6	–
	orange fameflower	PHAU13	<i>Phemeranthus aurantiacus</i>	0–6	–
	whitemouth dayflower	COER	<i>Commelina erecta</i>	0–6	–

	bluedicks	DICA14	<i>Dichelostemma capitatum</i>	0–2	–
	climbing wartclub	BOSC	<i>Boerhavia scandens</i>	0–2	–
	small matweed	GUDE	<i>Guilleminea densa</i>	0–2	–
	Wright's thimblehead	HYWR	<i>Hymenothrix wrightii</i>	0–2	–
	ivyleaf groundcherry	PHHE4	<i>Physalis hederifolia</i>	0–2	–
	wishbone-bush	MILAV	<i>Mirabilis laevis</i> var. <i>villosa</i>	0–2	–
	desert tobacco	NIOB	<i>Nicotiana obtusifolia</i>	0–2	–
	San Felipe dogweed	ADPO	<i>Adenophyllum porophylloides</i>	0–2	–
	dwarf desertpeony	ACNA2	<i>Acourtia nana</i>	0–2	–
	Louisiana vetch	VILU	<i>Vicia ludoviciana</i>	0–2	–
	silverleaf nightshade	SOEL	<i>Solanum elaeagnifolium</i>	0–2	–
	shrubby purslane	POSU3	<i>Portulaca suffrutescens</i>	0–2	–
	Coulter's wrinklefruit	TECO	<i>Tetraclea coulteri</i>	0–2	–
	white prairie aster	SYFAC	<i>Symphyotrichum falcatum</i> var. <i>commutatum</i>	0–1	–
	jewels of Opar	TAPA2	<i>Talinum paniculatum</i>	0–1	–
	lyreleaf greeneyes	BELY	<i>Berlandiera lyrata</i>	0–1	–
	desert larkspur	DEPA	<i>Delphinium parishii</i>	0–1	–
	desert mariposa lily	CAKE	<i>Calochortus kennedyi</i>	0–1	–
	sego lily	CANU3	<i>Calochortus nuttallii</i>	0–1	–
	rose heath	CHER2	<i>Chaetopappa ericoides</i>	0–1	–
9	<b>annual forbs</b>			11–168	
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	6–112	–
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	0–62	–
	bristly fiddleneck	AMTE3	<i>Amsinckia tessellata</i>	0–62	–
	New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	1–62	–
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	1–62	–
	miniature woollystar	ERDI2	<i>Eriastrum diffusum</i>	1–62	–
	combseed	PECTO	<i>Pectocarya</i>	1–62	–
	Arizona popcornflower	PLAR	<i>Plagiobothrys arizonicus</i>	1–62	–
	California poppy	ESCAM	<i>Eschscholzia californica</i> ssp. <i>mexicana</i>	1–56	–
	Arizona poppy	KAGR	<i>Kallstroemia grandiflora</i>	1–39	–
	shaggyfruit pepperweed	LELA	<i>Lepidium lasiocarpum</i>	0–28	–
	longleaf false goldeneye	HELOA2	<i>Heliomeris longifolia</i> var. <i>annua</i>	0–28	–
	camphorweed	HESU3	<i>Heterotheca subaxillaris</i>	0–28	–
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	1–28	–
	Coulter's lupine	LUSP2	<i>Lupinus sparsiflorus</i>	0–28	–
	hollowleaf annual lupine	LUSU3	<i>Lupinus succulentus</i>	0–28	–
	intermediate pepperweed	LEVIM	<i>Lepidium virginicum</i> var. <i>medium</i>	0–28	–
	coastal bird's-foot trefoil	LOSA	<i>Lotus salsuginosus</i>	0–28	–
	slender goldenweed	MAGR10	<i>Machaeranthera gracilis</i>	0–28	–
	tanseyleaf tansyaster	MATA2	<i>Machaeranthera tanacetifolia</i>	0–28	–
	whitestem blazingstar	MEAL6	<i>Mentzelia albicaulis</i>	0–28	–

	New Mexico plumeseed	RANE	<i>Ratnesquia neomexicana</i>	0–28	–
	sacred thorn-apple	DAWR2	<i>Datura wrightii</i>	0–28	–
	goosefoot	CHENO	<i>Chenopodium</i>	0–28	–
	sensitive partridge pea	CHNI2	<i>Chamaecrista nictitans</i>	1–28	–
	aster	ASTER	<i>Aster</i>	0–28	–
	milkvetch	ASTRA	<i>Astragalus</i>	0–28	–
	wheelscale saltbush	ATEL	<i>Atriplex elegans</i>	0–17	–
	desert unicorn-plant	PRAL4	<i>Proboscidea althaeifolia</i>	0–17	–
	desert evening primrose	OEPR	<i>Oenothera primiveris</i>	0–17	–
	spreading fanpetals	SIAB	<i>Sida abutifolia</i>	0–17	–
	woolly tidesstromia	TILA2	<i>Tidestromia lanuginosa</i>	0–17	–
	Arizona lupine	LUAR4	<i>Lupinus arizonicus</i>	0–17	–
	foothill deervetch	LOHU2	<i>Lotus humistratus</i>	0–17	–
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	0–17	–
	crestrib morning-glory	IPCO2	<i>Ipomoea costellata</i>	0–17	–
	sorrel buckwheat	ERPO4	<i>Eriogonum polycladon</i>	0–17	–
	Palmer's spectaclepod	DICA31	<i>Dimorphocarpa candicans</i>	1–17	–
	spurge	EUPHO	<i>Euphorbia</i>	1–17	–
	Thurber's morning-glory	IPTH	<i>Ipomoea thurberi</i>	0–11	–
	Gordon's bladderpod	LEGO	<i>Lesquerella gordonii</i>	0–11	–
	Lemmon's linanthus	LELE29	<i>Leptosiphon lemmonii</i>	0–6	–
	blanketflower	GAILL	<i>Gaillardia</i>	0–6	–
	spreading snakeherb	DYSCD	<i>Dyschoriste schiedeana</i> var. <i>decumbens</i>	0–6	–
	redstar	IPCO3	<i>Ipomoea coccinea</i>	0–6	–
	purslane	PORTU	<i>Portulaca</i>	0–6	–
	phacelia	PHACE	<i>Phacelia</i>	1–6	–
	phlox	PHLOX	<i>Phlox</i>	0–6	–
	green carpetweed	MOVE	<i>Mollugo verticillata</i>	0–6	–
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	0–6	–
	sawtooth sage	SASU7	<i>Salvia subincisa</i>	0–6	–
	doubleclaw	PRPA2	<i>Proboscidea parviflora</i>	0–6	–
	hairyseed bahia	BAAB	<i>Bahia absinthifolia</i>	0–6	–
	hoary bowlesia	BOIN3	<i>Bowlesia incana</i>	0–6	–
	fringed redmaids	CACI2	<i>Calandrinia ciliata</i>	0–6	–
	Paiute suncup	CASCM	<i>Camissonia scapoidea</i> ssp. <i>macrocarpa</i>	0–6	–
	croton	CRHE4	<i>Croton heterocarpus</i>	0–6	–
	cryptantha	CRYPT	<i>Cryptantha</i>	0–6	–
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	0–6	–
	New Mexico copperleaf	ACNE	<i>Acalypha neomexicana</i>	0–6	–
	chia	SACO6	<i>Salvia columbariae</i>	0–2	–
	golden crownbeard	VEEN	<i>Verbesina encelioides</i>	0–2	–
	Fendler's desertdandelion	MAFE	<i>Malacothrix fendleri</i>	0–2	–

	warty caltrop	KAPA	<i>Kallstroemia parviflora</i>	0–2	–
<b>Shrub/Vine</b>					
10	<b>half shrubs</b>			34–123	
	bastardsage	ERWR	<i>Eriogonum wrightii</i>	28–112	–
	shortleaf baccharis	BABR	<i>Baccharis brachyphylla</i>	6–45	–
	fairyduster	CAER	<i>Calliandra eriophylla</i>	6–45	–
	Parish's goldeneye	VIPA14	<i>Viguiera parishii</i>	0–34	–
	desert zinnia	ZIAC	<i>Zinnia acerosa</i>	0–28	–
	Thurber's penstemon	PETH3	<i>Penstemon thurberi</i>	0–11	–
11	<b>large shrubs</b>			28–67	
	spiny hackberry	CEEH	<i>Celtis ehrenbergiana</i>	22–56	–
	longleaf jointfir	EPTR	<i>Ephedra trifurca</i>	6–34	–
	soaptree yucca	YUEL	<i>Yucca elata</i>	0–34	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	0–22	–
	catclaw acacia	ACGR	<i>Acacia greggii</i>	0–17	–
12	<b>miscellaneous shrubs</b>			0–45	
	littleleaf ratany	KRER	<i>Krameria erecta</i>	0–17	–
	whitethorn acacia	ACCO2	<i>Acacia constricta</i>	1–11	–
	Thurber's desert honeysuckle	ANTH2	<i>Anisacanthus thurberi</i>	0–6	–
	yerba de pasmo	BAPT	<i>Baccharis pteronioides</i>	0–6	–
	beehive cactus	CORYP	<i>Coryphantha</i>	0–6	–
	jumping cholla	CYFU10	<i>Cylindropuntia fulgida</i>	0–6	–
	candle cholla	CYKL	<i>Cylindropuntia kleiniae</i>	0–6	–
	walkingstick cactus	CYSP8	<i>Cylindropuntia spinosior</i>	0–6	–
	staghorn cholla	CYVE3	<i>Cylindropuntia versicolor</i>	0–6	–
	common sotol	DAWH2	<i>Dasylirion wheeleri</i>	0–6	–
	hedghehog cactus	ECHIN3	<i>Echinocereus</i>	0–6	–
	candy barrelcactus	FEWI	<i>Ferocactus wislizeni</i>	0–6	–
	desert-thorn	LYCIU	<i>Lycium</i>	0–6	–
	catclaw mimosa	MIACB	<i>Mimosa aculeaticarpa</i> var. <i>biuncifera</i>	0–6	–
	velvetpod mimosa	MIDY	<i>Mimosa dysocarpa</i>	0–6	–
	sacahuista	NOMI	<i>Nolina microcarpa</i>	0–6	–
	cactus apple	OPEN3	<i>Opuntia engelmannii</i>	0–6	–
	purple pricklypear	OPMAM	<i>Opuntia macrocentra</i> var. <i>macrocentra</i>	0–6	–
	Santa Rita pricklypear	OPSA	<i>Opuntia santa-rita</i>	0–6	–
	lotebush	ZIOB	<i>Ziziphus obtusifolia</i>	0–6	–
13	<b>increaser half shrubs</b>			1–56	
	burroweed	ISTE2	<i>Isocoma tenuisecta</i>	1–56	–
	turpentine bush	ERLA12	<i>Ericameria laricifolia</i>	0–28	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0–28	–
<b>Tree</b>					
14	<b>trees</b>			0–17	
	western honey mesquite	PRGLT	<i>Prosopis glandulosa</i> var. <i>torreyana</i>	0–11	–



	velvet mesquite	PRVE	<i>Prosopis velutina</i>	0–11	–
	Jerusalem thorn	PAAC3	<i>Parkinsonia aculeata</i>	0–6	–
	blue paloverde	PAFL6	<i>Parkinsonia florida</i>	0–6	–

## Animal community

The plant community on this site is suitable for grazing by all classes of cattle at any season. The summer green season for forage species is moderate due to coarse textured, somewhat droughty soils. Shallow rooted grasses are severely affected by drought on this site. Management should be designed to maintain deeper rooted mid-grasses on the site. The plant community on the site includes a variety of browse and many perennial forbs, providing good forage in the spring and fall. Herbaceous forage is deficient in protein in the winter.

Water developments are very important to wildlife species on this site. Being grassland, the site is home to a number of small herbivores and their predators. Larger wildlife species use the site mainly as a foraging area.

## Hydrological functions

Hydrologic relationships are very good. Coarse textured soils, high plant and litter cover and low bulk densities result in very little runoff in most years.

## Recreational uses

Hunting, hiking, horseback riding, photography

## Wood products

Where mesquite has increased and grown to tree size, it provides both fuel-wood and posts.

## Inventory data references

Six 417's are from Enclosure # 22 on the Santa Rita Experimental Range.

## Type locality

Location 1: Pima County, AZ	
Township/Range/Section	T18S R8E S9
General legal description	Anvil Ranch - Redondo Camp
Location 2: Pima County, AZ	
Township/Range/Section	T21S R8E S17
General legal description	Buenos Aires NWR - Bailey Wash terrace
Location 3: Cochise County, AZ	
Township/Range/Section	T21S R20E S4
General legal description	Fort Huachuca - South Range
Location 4: Pima County, AZ	
Township/Range/Section	T18S R15E S16
General legal description	Enclosure # 22 and Eriopoda enclosures on the Santa Rita Experimental Range.

## Contributors

Dan Robinett  
Larry D. Ellicott  
Steve Barker

## Approval

Scott Woodall, 7/21/2020

### 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)	Dave Womack, Dan Robinett, Tom Reis
Contact for lead author	NRCS Tucson Area Office
Date	02/08/2005
Approved by	Scott Woodall
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

### Indicators

1. **Number and extent of rills:** None present on this site.

- 
2. **Presence of water flow patterns:** Water flow paths occupy 10-15% of the area; short (3-5 feet) in length and discontinuous.

- 
3. **Number and height of erosional pedestals or terracettes:** Pedestals are infrequent on long-lived perennial grasses. Approximately 10% of perennial grass plants have pedestals no more than 1 inch above surrounding soil surface. Black grama dominated areas have formed terracettes 2-5 feet apart with a 1-inch elevation difference from above to below the terracette. Bunchgrass dominated areas have formed terracettes 10-15 feet apart with a 1-inch elevation difference from above to below the terracette.

- 
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Estimated in 20, 9.6 ft square frames at 22%. Note: this is following several years of regional drought.

- 
5. **Number of gullies and erosion associated with gullies:** None present on this site.

- 
6. **Extent of wind scoured, blowouts and/or depositional areas:** None present on this site.

- 
7. **Amount of litter movement (describe size and distance expected to travel):** All litter size classes are staying in place and mask water flow patterns.

- 
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 shrubs and grass canopies and in openings.
- 
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Weak granular; color is 10YR3/2 Dry, 10YR2/2 Moist; thickness to 10+ inches. Lab data from Combate soil series from SRER soil inventory was around 2-3% organic carbon.
- 
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Cover estimated in 20, 9.6 ft square frames: Canopy 31%, basal 6%, litter 76%, and gravel 5%. 75-80% of canopy cover is perennial grasses and 5-10% is trees and shrubs. Cover is well dispersed throughout the site.
- 
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None present on this site. Penetrometer tests with weight drop distance from top of weight to top of impact ring = 2.24 feet were: average = 3.55 inches, sd = 0.59 inches. Tests outside enclosure on SRER were: average = 1.84, s.d. = 0.22, tests off SRER to east of Enclosure 22 were: average = 1.35m s,d, = 0.24.
- 
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 mid-grasses (tanglehead, sideoats grama, bush muhly, black grama) > annual forbs & grasses > shrubs > succulents > short grasses (slender grama, Rothrock grama).
- Sub-dominant:
- Other:
- Additional:
- 
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Some. Approximately 50% basal cover of midgrass species and 75-80% basal cover of short grass species has been lost due to prolonged 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):** 600 lbs/ac unfavorable precipitation, 1100 lbs/ac normal precipitation, 1800 lbs/ac favorable precipitation
- 
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: Mesquite, Lehmann lovegrass and prickly pear

---

17. **Perennial plant reproductive capability:** No affected even following several years of prolonged drought period for region. Black grama producing stolons, all other species produce seed.
-