

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

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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	Shallow Hills 12-16" p.z.
R041XC319AZ	Sandy Loam Upland 12-16" p.z.
R041XC322AZ	Shallow Upland 12-16" p.z.

Similar sites

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

Table 1. Dominant plant species

Tree	Not specified			
Shrub	(1) eriogonum wrightii			
Herbaceous	 bouteloua curtipendula digitaria californica 			

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%.

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

Table 2. Representative physiographic features

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



MLRA 41-3 (12-16"), Sandy Loam, Deep

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 burroweed dominates the plant community the potential production of perennial mid-grasses is equal to the present production of burroweed 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.

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
Total	585	1127	2079

Table 5. Annual production by plant type

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

4	short lived grasses			39–168	
	Rothrock's grama	BORO2	Bouteloua rothrockii	11–168	_
	slender grama	BORE2	Bouteloua repens	28–112	_
5	miscellaneous perennia	l grasses		11–112	
	sand dropseed	SPCR	Sporobolus cryptandrus	6–90	_
	mesa dropseed	SPFL2	Sporobolus flexuosus	0–56	_
	plains lovegrass	ERIN	Eragrostis intermedia	0–45	-
	whiplash pappusgrass	PAVA2	Pappophorum vaginatum	0–45	-
	fall witchgrass	DICO6	Digitaria cognata	0–28	-
	squirreltail	ELELE	Elymus elymoides ssp. elymoides	6–28	-
	blue grama	BOGR2	Bouteloua gracilis	0–28	-
	hairy grama	BOHI2	Bouteloua hirsuta	0–22	-
	slim tridens	TRMU	Tridens muticus	0–22	-
	common wolfstail	LYPH	Lycurus phleoides	0–17	-
	Arizona muhly	MUAR3	Muhlenbergia arizonica	0–17	-
	Hall's panicgrass	PAHA	Panicum hallii	0–17	-
	nineawn pappusgrass	ENDE	Enneapogon desvauxii	0–11	_
	curly-mesquite	HIBE	Hilaria belangeri	0–6	_
	low woollygrass	DAPU7	Dasyochloa pulchella	0–6	_
6	perennial threeawns			11–90	
	spidergrass	ARTE3	Aristida ternipes	11–56	_
	spidergrass	ARTEG	Aristida ternipes var. gentilis	0–28	_
	Parish's threeawn	ARPUP5	Aristida purpurea var. parishii	0–28	-
	Orcutt's threeawn	ARSCO	Aristida schiedeana var. orcuttiana	0–11	-
	purple threeawn	ARPU9	Aristida purpurea	0–11	_
	Fendler threeawn	ARPUL	Aristida purpurea var. longiseta	0–6	-
	blue threeawn	ARPUN	Aristida purpurea var. nealleyi	0–6	_
	poverty threeawn	ARDI5	Aristida divaricata	0–6	-
	Havard's threeawn	ARHA3	Aristida havardii	0–6	-
	Wooton's threeawn	ARPA9	Aristida pansa	0–6	-
7	annual grasses	-		11–168	
	Parry's grama	BOPA2	Bouteloua parryi	0–84	_
	prairie threeawn	AROL	Aristida oligantha	0–56	_
	needle grama	BOAR	Bouteloua aristidoides	0–56	_
	Mexican panicgrass	PAHI5	Panicum hirticaule	0–56	-
	Arizona signalgrass	URAR	Urochloa arizonica	0–56	-
	sixweeks fescue	VUOC	Vulpia octoflora	0–56	-
	tapertip cupgrass	ERACA	Eriochloa acuminata var. acuminata	0–56	-
	canyon cupgrass	ERLE7	Eriochloa lemmonii	0–28	_
	desert lovegrass	ERPEM	Eragrostis pectinacea var. miserrima	0–28	_
	tufted lovegrass	ERPEP2	Eragrostis pectinacea var. pectinacea	0–28	_
	sixweeks threeawn	ARAD	Aristida adscensionis	0–28	_
	Bigelow's bluegrass	POBI	Poa bigelovii	0–28	_
	feather fingergrass	CHVI4	Chloris virgata	0–28	_

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

	bluedicks	DICA14	Dichelostemma capitatum	0–2	
	climbing wartclub	BOSC	Boerhavia scandens	0–2	_
	small matweed	GUDE	Guilleminea densa	0–2	_
	Wright's thimblehead	HYWR	Hymenothrix wrightii	0–2	
	ivyleaf groundcherry	PHHE4	Physalis hederifolia	0–2	
	wishbone-bush	MILAV	Mirabilis laevis var. villosa	0–2	_
	desert tobacco	NIOB	Nicotiana obtusifolia	0–2	
	San Felipe dogweed	ADPO	Adenophyllum porophylloides	0–2	_
	dwarf desertpeony	ACNA2	Acourtia nana	0–2	
	Louisiana vetch	VILU	Vicia Iudoviciana	0–2	_
	silverleaf nightshade	SOEL	Solanum elaeagnifolium	0–2	_
	shrubby purslane	POSU3	Portulaca suffrutescens	0–2	_
	Coulter's wrinklefruit	TECO	Tetraclea coulteri	0–2	_
	white prairie aster	SYFAC	Symphyotrichum falcatum var. commutatum	0–1	-
	jewels of Opar	TAPA2	Talinum paniculatum	0–1	_
	lyreleaf greeneyes	BELY	Berlandiera lyrata	0–1	_
	desert larkspur	DEPA	Delphinium parishii	0–1	_
	desert mariposa lily	CAKE	Calochortus kennedyi	0–1	_
	sego lily	CANU3	Calochortus nuttallii	0–1	_
	rose heath	CHER2	Chaetopappa ericoides	0–1	_
9	annual forbs			11–168	
	Coulter's spiderling	BOCO2	Boerhavia coulteri	6–112	_
	carelessweed	AMPA	Amaranthus palmeri	0–62	_
	bristly fiddleneck	AMTE3	Amsinckia tessellata	0–62	_
	New Mexico thistle	CINE	Cirsium neomexicanum	1–62	_
	western tansymustard	DEPI	Descurainia pinnata	1–62	_
	miniature woollystar	ERDI2	Eriastrum diffusum	1–62	_
	combseed	PECTO	Pectocarya	1–62	_
	Arizona popcornflower	PLAR	Plagiobothrys arizonicus	1–62	_
	California poppy	ESCAM	Eschscholzia californica ssp. mexicana	1–56	_
	Arizona poppy	KAGR	Kallstroemia grandiflora	1–39	_
	shaggyfruit pepperweed	LELA	Lepidium lasiocarpum	0–28	_
	longleaf false goldeneye	HELOA2	Heliomeris longifolia var. annua	0–28	_
	camphorweed	HESU3	Heterotheca subaxillaris	0–28	_
	woolly plantain	PLPA2	Plantago patagonica	1–28	_
	Coulter's lupine	LUSP2	Lupinus sparsiflorus	0–28	_
	hollowleaf annual lupine	LUSU3	Lupinus succulentus	0–28	_
	intermediate pepperweed	LEVIM	Lepidium virginicum var. medium	0–28	_
	coastal bird's-foot trefoil	LOSA	Lotus salsuginosus	0–28	_
	slender goldenweed	MAGR10	Machaeranthera gracilis	0–28	
	tanseyleaf tansyaster	MATA2	Machaeranthera tanacetifolia	0–28	_
	whitestem blazingstar	MEAL6	Mentzelia albicaulis	0–28	
	KI KA 1 I I	DANE		0.00	

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

	warty caltrop	KAPA	Kallstroemia parviflora	0–2	–
Shrub/Vine					
10	half shrubs			34–123	
	bastardsage	ERWR	Eriogonum wrightii	28–112	_
	shortleaf baccharis	BABR	Baccharis brachyphylla	6–45	_
	fairyduster	CAER	Calliandra eriophylla	6–45	_
	Parish's goldeneye	VIPA14	Viguiera parishii	0–34	_
	desert zinnia	ZIAC	Zinnia acerosa	0–28	_
	Thurber's penstemon	PETH3	Penstemon thurberi	0–11	-
11	large shrubs			28–67	
	spiny hackberry	CEEH	Celtis ehrenbergiana	22–56	-
	longleaf jointfir	EPTR	Ephedra trifurca	6–34	-
	soaptree yucca	YUEL	Yucca elata	0–34	-
	fourwing saltbush	ATCA2	Atriplex canescens	0–22	-
	catclaw acacia	ACGR	Acacia greggii	0–17	-
12	miscellaneous shrubs	-		0–45	
	littleleaf ratany	KRER	Krameria erecta	0–17	-
	whitethorn acacia	ACCO2	Acacia constricta	1–11	_
	Thurber's desert honeysuckle	ANTH2	Anisacanthus thurberi	0–6	_
	yerba de pasmo	BAPT	Baccharis pteronioides	0–6	-
	beehive cactus	CORYP	Coryphantha	0–6	-
	jumping cholla	CYFU10	Cylindropuntia fulgida	0–6	-
	candle cholla	CYKL	Cylindropuntia kleiniae	0–6	١
	walkingstick cactus	CYSP8	Cylindropuntia spinosior	0–6	I
	staghorn cholla	CYVE3	Cylindropuntia versicolor	0–6	Ι
	common sotol	DAWH2	Dasylirion wheeleri	0–6	_
	hedgehog cactus	ECHIN3	Echinocereus	0–6	_
	candy barrelcactus	FEWI	Ferocactus wislizeni	0–6	_
	desert-thorn	LYCIU	Lycium	0–6	_
	catclaw mimosa	MIACB	Mimosa aculeaticarpa var. biuncifera	0–6	_
	velvetpod mimosa	MIDY	Mimosa dysocarpa	0–6	
	sacahuista	NOMI	Nolina microcarpa	0–6	
	cactus apple	OPEN3	Opuntia engelmannii	0–6	
	purple pricklypear	OPMAM	Opuntia macrocentra var. macrocentra	0–6	
	Santa Rita pricklypear	OPSA	Opuntia santa-rita	0–6	_
	lotebush	ZIOB	Ziziphus obtusifolia	0–6	_
13	increaser half shrubs	•		1–56	
	burroweed	ISTE2	Isocoma tenuisecta	1–56	
	turpentine bush	ERLA12	Ericameria laricifolia	0–28	_
	broom snakeweed	GUSA2	Gutierrezia sarothrae	0–28	
Tree					
14	trees			0–17	
	western honey mesquite	PRGLT	Prosopis glandulosa var. torreyana	0–11	-

velvet mesquite	PRVE	Prosopis velutina	0–11	-
Jerusalem thorn	PAAC3	Parkinsonia aculeata	0–6	-
blue paloverde	PAFL6	Parkinsonia florida	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				
Location 3: Cochise Cour	ity, AZ			
Township/Range/Section	ty, AZ T21S R20E S4			
Township/Range/Section General legal description	ity, AZ T21S R20E S4 Fort Huachuca - South Range			
Township/Range/Section General legal description Location 4: Pima County,	ty, AZ T21S R20E S4 Fort Huachuca - South Range AZ			
Township/Range/Section General legal description Location 4: Pima County, Township/Range/Section	ty, AZ T21S R20E S4 Fort Huachuca - South Range AZ T18S R15E S16			

Contributors

Dan Robinett Larry D. Ellicott Steve Barker Unknown

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 ilter size classes are staying in pace 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.
- 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.
- 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 Exclosure 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:

- 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 annualproduction): 600 lbs/ac unfavorable precipitation, 1100 lbs/ac normal precipitation, 1800 lbs/ac faborable 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 prickley 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.