USDA Natural Resources
Conservation Service

Ecological site R041XC334AZ
Limy Upland 12-16" p.z. Gypsum

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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.

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.

Ecological site concept

Limy Upland, Gypsum, ecological site is found on an upland landscape position, generally on pediments or fan piedmonts. All moisture for the plant community is received from precipitation. Terrain is gently sloping. Soils are shallow to a root-restricting layer (often a petrocalcic pan aka caliche). Soils are calcareous with gypsum present. Gyspum (calcium sulfate) is highly soluble making soil extremely vulnerable to accelerated erosion. It can be found either throughout the soil profile or within sub-surface horizons. Representative soil series representative are: Bella, Graveyard, Gulch, Kaboom, Reeup, Vana, and Whitecliff.

Associated sites

R041XC305AZ	**Clay Loam Upland 12-16" p.z.**
R041XC308AZ	**Limy Slopes 12-16" p.z.**
R041XC313AZ	**Loamy Upland 12"-16" p.z.**

Similar sites

R041XA105AZ	**Limy Upland 16-20" p.z.**
R041XB208AZ	**Limy Upland 8-12" p.z.**
R040XA111AZ	**Limy Upland 10"-13" p.z.**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *larrea tridentata* (2) *acacia constricta*
Herbaceous	(1) *muhlenbergia porteri* (2) *aristida*

Physiographic features

This site occurs in the middle elevations of the Madrean Basin and Range province in southeastern Arizona. It occurs on pediments, fan terraces and hill-slopes. Slope aspect is not site differentiating.

Table 2. Representative physiographic features

Landforms	(1) Pediment (2) Fan piedmont (3) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	975–1,524 m
Slope	1–40%
Aspect	N, E, S

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

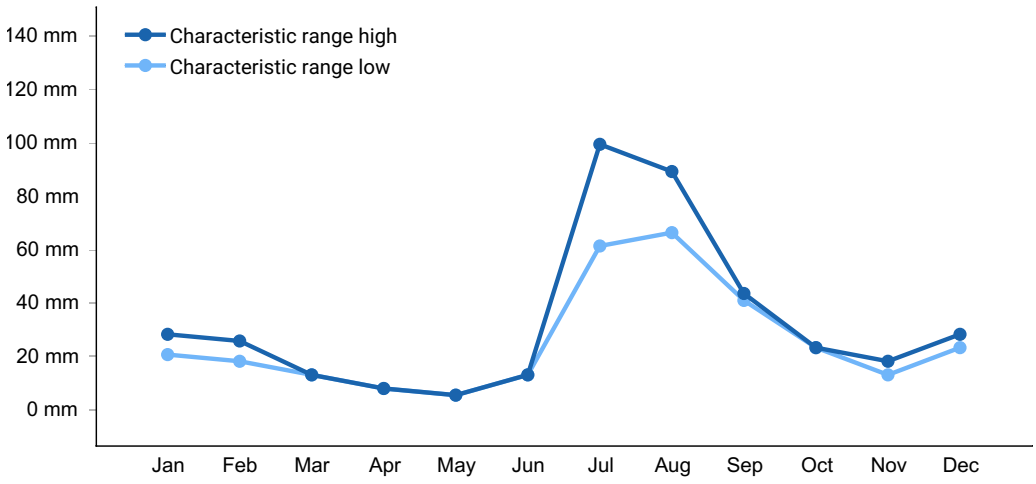


Figure 1. Monthly precipitation range

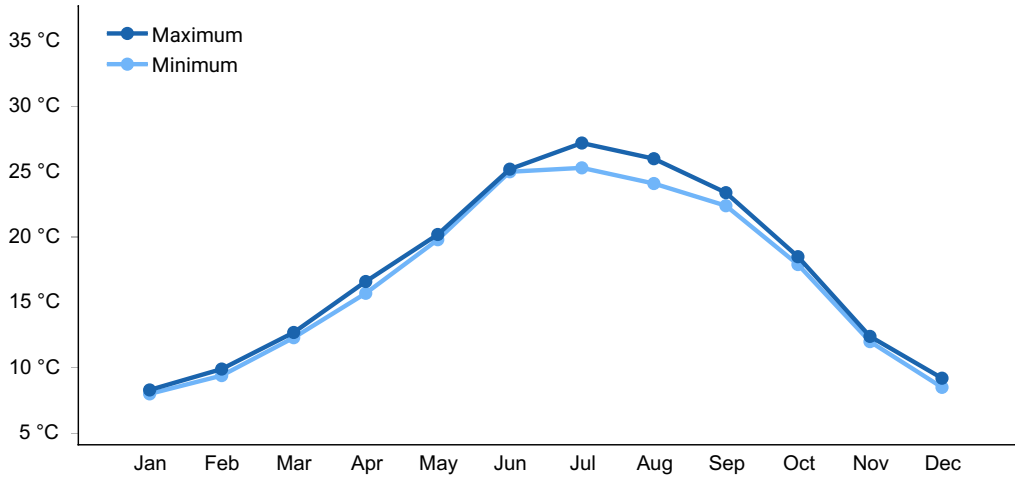


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no water features associated with this site.

Soil features

Soils on this site are variable. They are all calcareous throughout, light colored in the surface and low in organic matter. They formed on mixed gravelly and/or loamy alluvium and conglomerate. Some soils are deep; some soils have cemented lime pans or conglomerate at shallow depths. Soil surfaces are usually well covered with gravels or pan fragments. Plant-soil moisture relationships are poor.

Soil series mapped on this site include: SSA-661 Eastern Pinal & Southern Gila counties MU's 57 Kimrose, 77 Kimrose family, 88 Stonghold; SSA-664 San Simon area MU's 11 Cave & Durorthids, 19 & 30 Kimbrough; SSA-665 Willcox area MU's Ca Cave, Ka Karro, KbE Kimbrough, KhE Kimbrough variant; SSA-666 Cochise county Northwest part MU's 6 Blakeney family, 6 & 56 Luckyhills, 11 Andrada, 33 Courthouse & Perilla, 55 Gulch and 64 Pedregosa; SSA-667 Santa Cruz area MU's Ca calciorthids, Cn Cave GrSL, KbC Kimbrough; SSA-669 Pima county Eastern part MU 65 Kimrose family; SSA-671 Cochise county Douglas-Tombstone part MU's 7 Bella FSL, 8 Blakeney & Luckyhills, 18 Andrada, 21 Buntline CL, 76 Graveyard, Grizzle CoSL, 89 Kaboom & Reeup, 91 Zapalote, 97 Gulch, 98 Luckyhills SL, 99 Luckyhills & Mcneal, 104 Major FSL, Mcneal GrSL, 110 Mcneal Grsl saline-sodic, 113 Buntline, 118 Pedregosa GrVFSL, 119 Pedregosa & Tombstone, 135 Surge, 136 Mule & Southerland, 142 Tombstone GrVFSL, 149 Vana FSL and 150 Vana; SSA-703 Tohono O'odham Nation MU 7 Kimrose.

Table 4. Representative soil features

Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid to moderate

Soil depth	25–152 cm
Surface fragment cover <=3"	5–45%
Surface fragment cover >3"	0–8%
Available water capacity (0-101.6cm)	1.78–10.67 cm
Calcium carbonate equivalent (0-101.6cm)	10–45%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–45%
Subsurface fragment volume >3" (Depth not specified)	0–8%

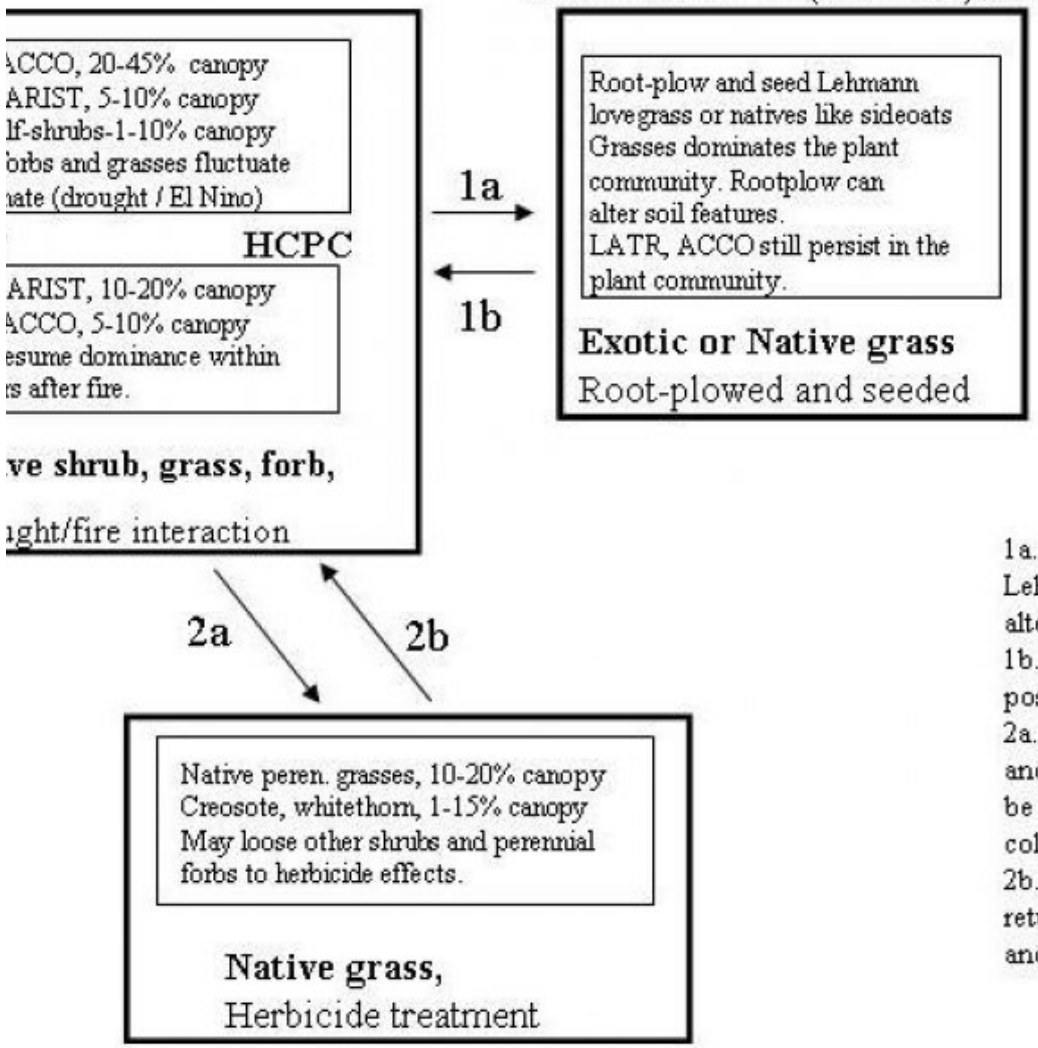
Ecological dynamics

Desert Shrub-Grassland State: Reference plant community aspect is shrubland. Shrubs (creosote, white-thorn acacia, and tarbush) and subshrubs (ratany and mariola) dominate the plant community. The herbaceous understory is mostly perennial grasses (three-awns, black grama, bush muhly). A diverse mixture of succulents, perennial forbs and annuals are also well represented. Natural fires limit shrub dominance by periodically top-killing them. Shrub canopy returns to dominate the community within a ten years of fire. Unmanaged grazing will restrict perennial grasses to the protection of shrub canopy.

Grassland State: Chemical brush management will remove shrubs and succulents from plant community; non-native perennial mid-grasses (Lehmann lovegrass) will assume dominance. Native perennial grasses may remain within community but will be rapidly grazed out if not managed.

Eroded State: Plant community is absent due to adverse changes in soil hydrology (limited infiltration, excessive run-off). Soil disturbance will trigger unstoppable erosion. Mechanical soil disturbances can include brush management, mechanical land treatments (ie, ripping), cultivation, road cuts, construction, heavy use zone by cattle (ie, supplement or water trough site), trenching, recreational vehicle use.

MLRA 41-3 (12-16"), Limy Upland



1a. Rootplow, introduction of a seed source, or direct seeding of Lehmann / Boer lovegrass or natives like sideoats grama. Plow may alter soil horizons by breaking cemented layers. PG/NG
1b. Unknown. CHG over time will return to near HCPC with possibly more production and still dominated by LATR and ACCO.
2a. Herbicide treatment to control creosote bush, tarbush and whitethorn acacia. Other shrubs and succulents can be removed from the plant community. Perennial native grasses colonize areas without shrub competition. PG/NG
2b. Unknown, CHG and shrubs like creosote and whitethorn will return to dominate the plant community. Will loose other shrubs and perennial forbs from the community.

*Native annuals dominant, may be patches of some non-natives

CHG – continuous heavy grazing
PG/NG – proper grazing, no grazing
LATR–creosotebush, ATCO–whitethorn acacia
MUPO– bush muhly, ARIST– threeawns

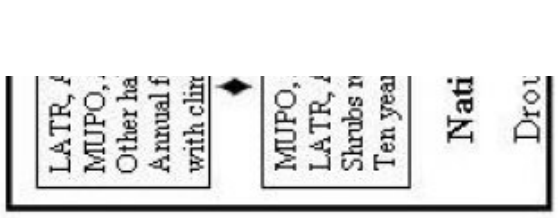


Figure 3. State and Transition, Limy Upland 12-16" p.z.

State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

Figure 4. Limy Upland 12-16" pz. HCPC

The potential plant community on this site is a diverse mixture of desert shrubs, half shrubs and perennial grasses and forbs. Most of the major perennial grasses on the site are well dispersed throughout the plant community. Black grama occurs in patches which are small in size and appear to be well dispersed over large areas of the site. The aspect is shrub-land. Cryptogam cover (moss, lichen) can be considerable in the plant community, but diminishes as the surface cover of gravel increases. With continuous heavy grazing, the palatable perennial grasses and forbs are replaced by increases in the large woody perennials (creosote bush, white thorn, and tar bush). Natural fire may have been important in maintaining a balance between herbaceous and woody species on the site, but fire free intervals were much greater than those of more productive sites, due to the length of time needed for fuels to accumulate. Also, fuel continuity is poor in areas of this site due to slope and aspect. In addition, the major perennial grasses; bush muhly and black grama, have shrub-like characteristics (perennial culms and branching), and accumulate much old dead material and may take several years to recover to pre-fire conditions. North aspects have more perennial grass than south aspects. Shrubs will resume dominance within ten years after fire.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	252	420	549
Grass/Grasslike	78	196	336
Forb	12	34	179
Tree	–	–	11
Total	**342**	**650**	**1075**

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	2-3%
Grass/grasslike basal cover	1-3%
Forb basal cover	0-1%
Non-vascular plants	0%
Biological crusts	1-25%
Litter	10-20%
Surface fragments >0.25" and <=3"	5-45%
Surface fragments >3"	0-8%
Bedrock	0-1%
Water	0%
Bare ground	15-55%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	0-5%	0-3%	0-1%
>0.15 <= 0.3	–	1-5%	1-5%	1-5%
>0.3 <= 0.6	–	5-10%	5-15%	0-5%
>0.6 <= 1.4	–	10-30%	0-5%	–
>1.4 <= 4	0-1%	1-10%	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

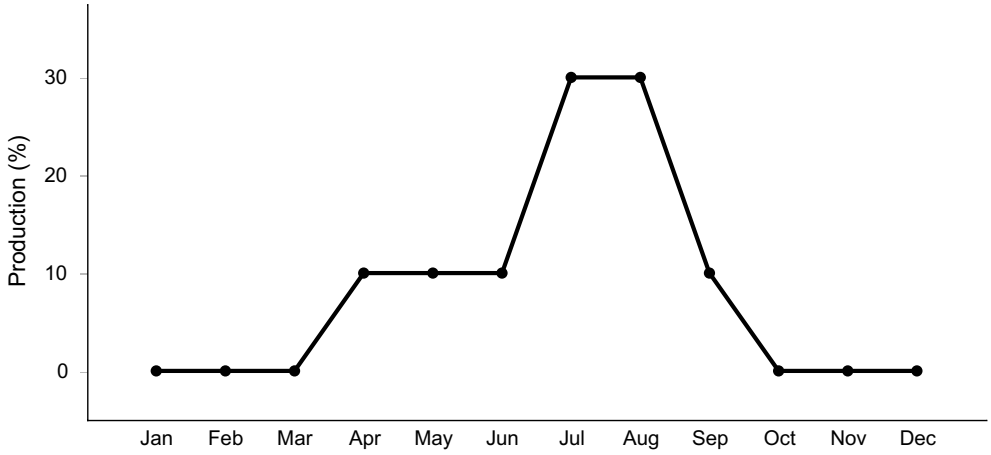


Figure 6. Plant community growth curve (percent production by month). AZ4133, 41.3 12-16" p.z. limy upland and limy fan sites. Growth begins in the spring and continues through the summer, most growth occurs during the summer rainy season..

State 2
Perennial grass, root-plowed

Community 2.1
Perennial grass, root-plowed

This state occurs where the site has been root-plowed and seeded to Lehmann, Boer lovegrass or native species like sideoats grama. On some soils, root-plowing can breakup subsurface cemented pans and increase rooting depth. This treatment will usually results in grass dominance for 10 to 15 years with proper grazing or no grazing. With continuous grazing shrubs will resume dominance within 5 or 6 years. In nearly all cases the large shrubs will resume dominance but some species of native perennial herbs and half shrubs will be lost and non-native species can invade the site.

State 3
Native perennial grass, herbicide

Community 3.1
Native perennial grass, herbicide

This state occurs where the site has been treated with a herbicide to kill creosote, tarbush and whitethorn. Native perennial grasses will become dominant with proper grazing or no grazing and persist for 10 to 15 years. With continuous grazing shrubs will resume dominance in 5 to 6 years. In most cases the herbicides will remove native half shrubs and perennial forbs from the plant community. The large shrubs will reinvade from seed and quickly resume dominance of the plant community. The treatment may allow invasion of non-native species if a seed source is present.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant suffrutescent grasses**			34–135	
	bush muhly	MUPO2	*Muhlenbergia porteri*	22–112	–
	black grama	BOER4	*Bouteloua eriopoda*	11–90	–
2	**Dominant short grasses**			11–56	
	slim tridens	TRMU	*Tridens muticus*	11–34	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	11–34	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–22	–
	nineawn pappusgrass	ENDE	*Enneapogon desvauxii*	1–11	–
	Hall's panicgrass	PAHA	*Panicum hallii*	0–11	–
	red grama	BOTR2	*Bouteloua trifida*	0–11	–
3	**Perennial threeawns**			22–56	
	blue threeawn	ARPUN	*Aristida purpurea var. nealleyi*	11–45	–
	spidergrass	ARTE3	*Aristida ternipes*	1–17	–
	spidergrass	ARTEG	*Aristida ternipes var. gentilis*	0–11	–
	purple threeawn	ARPU9	*Aristida purpurea*	0–11	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	0–11	–
	Parish's threeawn	ARPUP5	*Aristida purpurea var. parishii*	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	–
4	**Miscellaneous perennial grasses**			6–34	
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–17	–
	Rothrock's grama	BORO2	*Bouteloua rothrockii*	0–11	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	0–11	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	0–11	–
	burrograss	SCBR2	*Scleropogon brevifolius*	0–6	–
	spike dropseed	SPCO4	*Sporobolus contractus*	0–6	–
	slim tridens	TRMUE	*Tridens muticus var. elongatus*	0–6	–

	Arizona cottontop	DICA8	*Digitaria californica*	0–6	–
	fall witchgrass	DICO6	*Digitaria cognata*	0–6	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	0–6	–
	tanglehead	HECO10	*Heteropogon contortus*	0–6	–
	Arizona muhly	MUAR3	*Muhlenbergia arizonica*	0–6	–
	whiplash pappusgrass	PAVA2	*Pappophorum vaginatum*	0–6	–
	southwestern needlegrass	ACEM4	*Achnatherum eminens*	0–6	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	0–6	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	0–2	–
	alkali sacaton	SPAI	*Sporobolus airoides*	0–2	–
	big sacaton	SPWR2	*Sporobolus wrightii*	0–1	–
5	**Annual grasses**			6–56	
	sixweeks threeawn	ARAD	*Aristida adscensionis*	1–22	–
	prairie threeawn	AROL	*Aristida oligantha*	1–22	–
	mucronate sprangeltop	LEPAB	*Leptochloa panicea ssp. brachiata*	0–22	–
	Mexican panicgrass	PAHI5	*Panicum hirticaule*	0–22	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	0–11	–
	needle grama	BOAR	*Bouteloua aristidoides*	0–11	–
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–11	–
	Mexican sprangletop	LEFUU	*Leptochloa fusca ssp. uninervia*	0–11	–
	Arizona brome	BRAR4	*Bromus arizonicus*	0–6	–
	feather fingergrass	CHVI4	*Chloris virgata*	0–6	–
	prairie false oat	TRIN5	*Trisetum interruptum*	0–6	–
	Arizona signalgrass	URAR	*Urochloa arizonica*	0–6	–
	delicate muhly	MUFR	*Muhlenbergia fragilis*	0–6	–
	littleseed muhly	MUMI	*Muhlenbergia microsperma*	0–6	–
	witchgrass	PACA6	*Panicum capillare*	0–6	–
	Bigelow's bluegrass	POBI	*Poa bigelovii*	0–2	–

	tapertip cupgrass	ERACA	*Eriochloa acuminata var. acuminata*	0–2	–
	Mexican lovegrass	ERME	*Eragrostis mexicana*	0–2	–
	desert lovegrass	ERPEM	*Eragrostis pectinacea var. miserrima*	0–2	–
	tufted lovegrass	ERPEP2	*Eragrostis pectinacea var. pectinacea*	0–2	–
Forb					
6	**Perennial Forbs**			11–67	
	leatherweed	CRPOP	*Croton pottsii var. pottsii*	6–22	–
	pricklyleaf dogweed	THAC	*Thymophylla acerosa*	6–22	–
	rue of the mountains	THTE2	*Thamnosma texana*	6–22	–
	clammy groundcherry	PHHE5	*Physalis heterophylla*	1–17	–
	lacy tansyaster	MAPI	*Machaeranthera pinnatifida*	0–11	–
	paleface	HIDE	*Hibiscus denudatus*	0–11	–
	weakleaf bur ragweed	AMCO3	*Ambrosia confertiflora*	1–11	–
	dwarf desertpeony	ACNA2	*Acourtia nana*	1–11	–
	hairyseed bahia	BAAB	*Bahia absinthifolia*	6–11	–
	desert marigold	BAMU	*Baileya multiradiata*	0–11	–
	trailing windmills	ALIN	*Allionia incarnata*	1–6	–
	Fendler's bladderpod	LEFE	*Lesquerella fendleri*	0–6	–
	ivyleaf groundcherry	PHHE4	*Physalis hederifolia*	0–6	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	0–6	–
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	0–6	–
	Rocky Mountain zinnia	ZIGR	*Zinnia grandiflora*	0–2	–
	twinleaf senna	SEBA3	*Senna bauhinioides*	0–2	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	0–2	–
	perennial	ARPE2	*Arabis perennans*	0–2	

	perennial rockcress	ARPE2	*Arabis perennans*	0–2	–
	orange fameflower	PHAU13	*Phemeranthus aurantiacus*	0–2	–
	brownfoot	ACWR5	*Acourtia wrightii*	0–2	–
	Arizona wrightwort	CAAR7	*Carlowrightia arizonica*	0–2	–
	spreading fleabane	ERDI4	*Erigeron divergens*	0–2	–
	wild dwarf morning-glory	EVAR	*Evolvulus arizonicus*	0–2	–
	southwestern mock vervain	GLGO	*Glandularia gooddingii*	0–2	–
	tuber anemone	ANTU	*Anemone tuberosa*	0–1	–
	New Mexico silverbush	ARNE2	*Argythamnia neomexicana*	0–1	–
	desert larkspur	DEPA	*Delphinium parishii*	0–1	–
	bluedicks	DICA14	*Dichelostemma capitatum*	0–1	–
	spreading snakeherb	DYSCD	*Dyschoriste schiedeana var. decumbens*	0–1	–
	desert mariposa lily	CAKE	*Calochortus kennedyi*	0–1	–
	sego lily	CANU3	*Calochortus nuttallii*	0–1	–
	Palmer's Indian mallow	ABPA	*Abutilon palmeri*	0–1	–
	velvetseed milkwort	POOB	*Polygala obscura*	0–1	–
	ragged nettlespurge	JAMA	*Jatropha macrorhiza*	0–1	–
	shrubby purslane	POSU3	*Portulaca suffrutescens*	0–1	–
	New Mexico fanpetals	SINE	*Sida neomexicana*	0–1	–
	American vetch	VIAM	*Vicia americana*	0–1	–
	copper zephyrlily	ZELO	*Zephyranthes longifolia*	0–1	–
7	**Annual forbs**			1–112	
	Gordon's bladderpod	LEGO	*Lesquerella gordonii*	0–34	–
	slender goldenweed	MAGR10	*Machaeranthera gracilis*	1–34	–
	shaggyfruit pepperweed	LELA	*Lepidium lasiocarpum*	0–22	–

	pepperweed				
	intermediate pepperweed	LEVIM	*Lepidium virginicum var. medium*	0–22	–
	phacelia	PHACE	*Phacelia*	1–22	–
	staggerweed	STAR	*Stachys arvensis*	0–22	–
	lyreleaf jewelflower	STCAA	*Streptanthus carinatus ssp. arizonicus*	0–22	–
	flatcrown buckwheat	ERDE6	*Eriogonum deflexum*	0–22	–
	manybristle chinchweed	PEPA2	*Pectis papposa*	0–17	–
	woolly tidestromia	TILA2	*Tidestromia lanuginosa*	0–11	–
	tanseyleaf tansyaster	MATA2	*Machaeranthera tanacetifolia*	1–11	–
	combseed	PECTO	*Pectocarya*	0–11	–
	desert Indianwheat	PLOV	*Plantago ovata*	0–11	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–11	–
	western tansymustard	DEPI	*Descurainia pinnata*	0–11	–
	bristly fiddleneck	AMTE3	*Amsinckia tessellata*	0–11	–
	cryptantha	CRYPT	*Cryptantha*	0–11	–
	sorrel buckwheat	ERPO4	*Eriogonum polycladon*	0–11	–
	crestrib morning-glory	IPCO2	*Ipomoea costellata*	0–11	–
	Coulter's spiderling	BOCO2	*Boerhavia coulteri*	0–11	–
	exserted Indian paintbrush	CAEXE	*Castilleja exserta ssp. exserta*	0–11	–
	goosefoot	CHENO	*Chenopodium*	0–6	–
	Arizona poppy	KAGR	*Kallstroemia grandiflora*	0–6	–
	spurge	EUPHO	*Euphorbia*	0–6	–
	wedgeleaf draba	DRCU	*Draba cuneifolia*	0–6	–
	miniature woollystar	ERDI2	*Eriastrum diffusum*	0–6	–
	carelessweed	AMPA	*Amaranthus palmeri*	0–6	–
	Coulter's lupine	LUSP2	*Lupinus sparsiflorus*	0–6	–
	green carpetweed	MOVE	*Mollugo verticillata*	0–6	–
	chia	SACO6	*Salvia columbariae*	0–6	–

	chia	SASC6	*Salvia columbariae*	0–6	–
	sawtooth sage	SASU7	*Salvia subincisa*	0–6	–
	spreading fanpetals	SIAB	*Sida abutifolia*	0–6	–
	sleepy silene	SIAN2	*Silene antirrhina*	0–2	–
	Arizona popcornflower	PLAR	*Plagiobothrys arizonicus*	0–2	–
	bristly nama	NAHI	*Nama hispidum*	0–2	–
	desert evening primrose	OEPR	*Oenothera primiveris*	0–2	–
	plains flax	LIPU4	*Linum puberulum*	0–2	–
	foothill deervetch	LOHU2	*Lotus humistratus*	0–2	–
	coastal bird's-foot trefoil	LOSAB	*Lotus salsuginosus var. brevivexillus*	0–2	–
	Arizona lupine	LUAR4	*Lupinus arizonicus*	0–2	–
	desert unicorn-plant	PRAL4	*Proboscidea althaeifolia*	0–2	–
	doubleclaw	PRPA2	*Proboscidea parviflora*	0–2	–
	New Mexico plumeseed	RANE	*Rafinesquia neomexicana*	0–2	–
	manystem woolly sunflower	ERMU6	*Eriophyllum multicaule*	0–2	–
	sanddune wallflower	ERCA14	*Erysimum capitatum*	0–2	–
	American wild carrot	DAPU3	*Daucus pusillus*	0–2	–
	southwestern pricklypoppy	ARPL3	*Argemone pleiacantha*	0–2	–
	wheelscale saltbush	ATEL	*Atriplex elegans*	0–2	–
	Texas stork's bill	ERTE13	*Erodium texanum*	0–2	–
	California poppy	ESCAM	*Eschscholzia californica ssp. mexicana*	0–2	–
	warty caltrop	KAPA	*Kallstroemia parviflora*	0–2	–
	star gilia	GIST	*Gilia stellata*	0–2	–
	longleaf false goldeneye	HELOA2	*Heliomeris longifolia var. annua*	0–2	–
	sensitive partridge pea	CHNI2	*Chamaecrista nictitans*	0–2	–
	scrambled eggs	COAU2	*Corydalis aurea*	0–2	–

	New Mexico copperleaf	ACNE	*Acalypha neomexicana*	0–2	–
	Arizona blanketflower	GAAR2	*Gaillardia arizonica*	0–1	–
	Fendler's desertdandelion	MAFE	*Malacothrix fendleri*	0–1	–
Shrub/Vine					
8	**Dominant shrubs**			168–336	
	whitethorn acacia	ACCOC	*Acacia constricta var. constricta*	22–224	–
	whitethorn acacia	ACCOP9	*Acacia constricta var. paucispina*	11–224	–
	creosote bush	LATRT	*Larrea tridentata var. tridentata*	45–224	–
	viscid acacia	ACNE4	*Acacia neovernicosa*	0–112	–
	American tarwort	FLCE	*Flourensia cernua*	0–112	–
9	**Dominant half shrubs**			56–112	
	desert zinnia	ZIAC	*Zinnia acerosa*	22–67	–
	rough menodora	MESC	*Menodora scabra*	11–56	–
	littleleaf ratany	KRER	*Krameria erecta*	11–56	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–39	–
	woody crinklemat	TICAC	*Tiquilia canescens var. canescens*	0–34	–
	fairyduster	CAER	*Calliandra eriophylla*	0–34	–
	featherplume	DAFO	*Dalea formosa*	0–34	–
	mariola	PAIN2	*Parthenium incanum*	6–28	–
	trailing krameria	KRLA	*Krameria lanceolata*	0–17	–
	whitestem paperflower	PSCO2	*Psilostrophe cooperi*	1–11	–
10	**Sub dominant large shrubs**			22–67	
	Rio Grande saddlebush	MOSC	*Mortonia scabrella*	0–22	–
	littleleaf sumac	RHMI3	*Rhus microphylla*	6–22	–
	ocotillo	FOSP2	*Fouquieria splendens*	0–17	–
	banana yucca	YUBA	*Yucca baccata*	0–17	–
	crown of thorns	KOSP	*Koeberlinia spinosa*	1–11	–
	sacahuista	NOMI	*Nolina microcarpa*	0–11	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–11	–

	knifeleaf condalia	COSP3	*Condalia spathulata*	0–11	–
	Warnock's snakewood	COWA	*Condalia warnockii*	0–11	–
	longleaf jointfir	EPTR	*Ephedra trifurca*	1–11	–
	Wislizenus' senna	SEWI3	*Senna wislizeni*	0–11	–
11	**Miscellaneous shrubs**			6–34	
	Wright's beebrush	ALWR	*Aloysia wrightii*	0–11	–
	devil's cholla	GRKU	*Grusonia kunzei*	0–11	–
	cactus apple	OPEN3	*Opuntia engelmannii*	0–11	–
	purple pricklypear	OPMAM	*Opuntia macrocentra var. macrocentra*	0–6	–
	Santa Rita pricklypear	OPSA	*Opuntia santa-rita*	0–6	–
	desert-thorn	LYCIU	*Lycium*	0–6	–
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	0–6	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–6	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	0–6	–
	desertbroom	BASA2	*Baccharis sarothroides*	0–6	–
	spiny hackberry	CEEH	*Celtis ehrenbergiana*	0–6	–
	javelina bush	COER5	*Condalia ericoides*	0–6	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0–6	–
	walkingstick cactus	CYSP8	*Cylindropuntia spinosior*	0–6	–
	common sotol	DAWH2	*Dasylirion wheeleri*	0–6	–
	Engelmann's hedgehog cactus	ECEN	*Echinocereus engelmannii*	0–6	–
	Utah fendlerbush	FEUTC	*Fendlerella utahensis var. cymosa*	0–6	–
	candy barrelcactus	FEWI	*Ferocactus wislizeni*	0–6	–
	pinkflower hedgehog cactus	ECFA	*Echinocereus fasciculatus*	0–6	–
	brittlebush	ENFA	*Encelia farinosa*	0–6	–
	bastardsage	ERWR	*Eriogonum wrightii*	0–6	–
	rayless goldenhead	ACSPS2	*Acamptopappus sphaerocephalus var.*	0–6	–

	goldenhead		*sphaerocephalus var. sphaerocephalus*		
	Palmer's century plant	AGPA3	*Agave palmeri*	0–6	–
	Kearney's sumac	RHKE	*Rhus kearneyi*	0–6	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–6	–
	soaptree yucca	YUEL	*Yucca elata*	0–6	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	0–2	–
	Arizona necklacepod	SOAR3	*Sophora arizonica*	0–2	–
	nightblooming cereus	PEGR3	*Peniocereus greggii*	0–2	–
	Parry's agave	AGPA4	*Agave parryi*	0–2	–
	redspine fishhook cactus	ECER2	*Echinomastus erectocentrus*	0–2	–
	burroweed	ISTE2	*Isocoma tenuisecta*	0–2	–
	Graham's nipple cactus	MAGR9	*Mammillaria grahamii*	0–2	–
	little nipple cactus	MAHE2	*Mammillaria heyderi*	0–1	–
	Scheer's beehive cactus	COROS	*Coryphantha robustispina ssp. scheeri*	0–1	–
	Bisbee spinystar	ESVIB	*Escobaria vivipara var. bisbeeana*	0–1	–
Tree					
12	**Trees**			0–11	
	velvet mesquite	PRVE	*Prosopis velutina*	0–11	–
	oneseed juniper	JUMO	*Juniperus monosperma*	0–11	–
	western honey mesquite	PRGLT	*Prosopis glandulosa var. torreyana*	0–6	–

Animal community

Droughty and calcareous soils make for a short green season for warm season forage species. High soil pH may make essential nutrients less available for plant growth. Bush muhly and black grama retain perennial culms and form clumps or thatch which contains green through the winter. These species plus several shrubby browse species make the site suitable for use in the cool season. Except for the brief green period in the summer rainy season, the forage quality will be lacking for cows with calves. Areas of this site in complex with non-calcareous sites will not receive any appreciable grazing use until the areas of other sites are overused. In these cases, fences and grazing systems are needed to adequately manage such areas.

This site produces little in the way of wildlife forage. It is mainly home to small herbivores and a foraging area to other species which live on associated bottom sites. Water developments are very important to wildlife on the site.

Hydrological functions

These soils are coarse textured, but may have lime cemented layers at shallow depths which limit infiltration.

Recreational uses

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

Wood products

none

Inventory data references

Range 417s include 9 in excellent condition, 11 in good condition and 7 in fair condition.

Type locality

Location 1: Pima County, AZ	
Township/Range/Section	T17S R17E S11
General legal description	Empirita Ranch
Location 2: Pinal County, AZ	
Township/Range/Section	T8S R18E S20
General legal description	Campstool Ranch
Location 3: Cochise County, AZ	
Township/Range/Section	T19S R22E S29
General legal description	Tombstone - Fairbanks Highway ROW
Location 4: Cochise County, AZ	
Township/Range/Section	T17S R22E S17
General legal description	Fourr Ranch

Contributors

Wilma J Renken

Approval

Curtis Talbot, 4/12/2021

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Dave Womack, Dan Robinett, Emilio Carillo
Contact for lead author	NRCS Tucson Area Office
Date	03/04/2005
Approved by	Curtis Talbot
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:** Flow paths common at least 10% of the area; 30-40 feet long, discontinuous.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals common on all shrubs. Terracettes uncommon

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 10-50%

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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 in vicinity of flow paths moves in flow paths.

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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):** Expect balues 1-3 in bare areas and 4-6 in grass and shrub canopies.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Weak granular; color is 7.5YR4/4 dry, 7.5YR3/3 moist; thickness to 11 inches.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Canopy 15-25%, basal 5-10%, litter 5-20%,; 50-60% of canopy cover is shrubs, 10-20% is subshrubs, 10-20% is perennial grasses. Cover is well dispersed throughout the site.

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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):** None

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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 > perennial grasses > subshrubs > perennial forbs > annually grasses & forbs > succulents

    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):** 75-80% mortality of desert zinnia.

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 350 lbs/ac unfavorable precipitation; 600 lbs/ac normal precipitation; 900 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:** Lehmann lovegrass, creosote, whitethorn, mesquite, prickly pear, burroweed, wait-a-bit.

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17. **Perennial plant reproductive capability:** Not affected due to regional prolonged drought.
