

Ecological site R041XC307AZ

Limestone Hills 12-16" p.z.

Accessed: 05/09/2024

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.

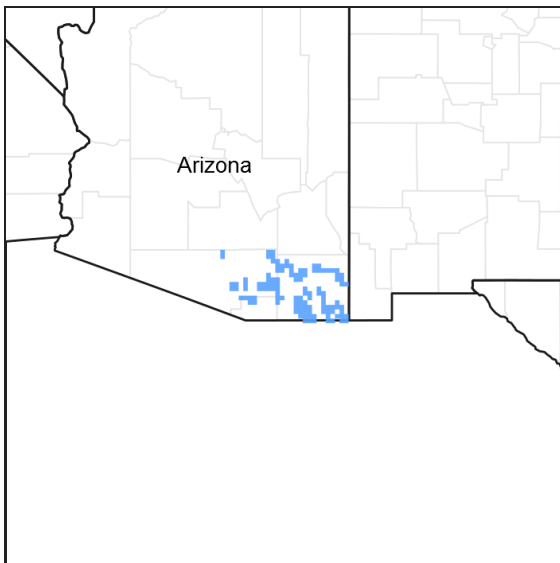


Figure 1. Mapped extent

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	Shallow Hills 12-16" p.z.
R041XC322AZ	Shallow Upland 12-16" p.z.
R041XC323AZ	Volcanic Hills 12-16" p.z. Loamy

R041XC330AZ	Volcanic Hills 12-16" p.z. Clayey
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Similar sites

R040XA107AZ	Limestone Hills 10"-13" p.z.
R041XA103AZ	Limestone Hills 16-20 p.z.
R041XB220AZ	Limestone Hills 8-12" p.z.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>dalea formosa</i> (2) <i>fouquieria splendens</i>
Herbaceous	(1) <i>bouteloua curtipendula</i> (2) <i>hesperostipa neomexicana</i>

Physiographic features

This site is in the middle elevations of the Madrean Basin and Range province in southeastern Arizona. It occurs on hill-slopes and ridge-tops. Slope aspect is site differentiating at elevations near land resource area boundaries.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	1,067–1,676 m
Slope	8–70%
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)	0 days

Precipitation total (average)	406 mm
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Influencing water features

There are no water features associated with this site.

Soil features

These are shallow soils formed on limestone and related sedimentary and metamorphic bedrock. Parent material is carbonatic. Soils are dark colored gravelly and stony loams, very calcareous, and have well-developed covers of limestone gravels and cobbles. Large areas of rock outcrop occur intermingled with soil areas. Plant-soil moisture relationships are poor to fair. Surface fragments are larger than stone size.

Soils mapped on this site include: SSA-661 Eastern Pinal & Southern Gila counties MU 62 Mabray; SSA-664 San Simon area MU 31 Mabray; SSA-666 Cochise county Northwest part MU's 46 Grizzle, 57 Mabray, 61 Paisano; SSA-667 Santa Cruz area MU McF Mabray; SSA-669 Pima county Eastern part MU 42 Mabray; SSA-671 Cochise county Douglas-Tombstone part MU's 101 & 102 Mabray.

Table 4. Representative soil features

Parent material	(1) Slope alluvium–limestone
Surface texture	(1) Very gravelly sandy loam (2) Cobbly sandy loam (3) Very gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Rapid to moderately rapid
Soil depth	25–51 cm
Surface fragment cover <=3"	25–50%
Surface fragment cover >3"	0–8%
Available water capacity (0-101.6cm)	1.52–4.06 cm
Calcium carbonate equivalent (0-101.6cm)	35–50%
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)	25–50%
Subsurface fragment volume >3" (Depth not specified)	0–8%

Ecological dynamics

The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The Historical Climax Plant Community represents the natural potential plant communities found on relict or relatively undisturbed sites. Other plant communities described here represent plant communities that are known to occur when the site is disturbed by factors such as fire, grazing, or drought.

Production data provided in this site description is standardized to air dry weight at the end of the summer growing season. The plant communities described in this site description are based on near normal rainfall years.

NRCS uses a Similarity Index to compare existing plant communities to the plant communities described here. Similarity index is determined by comparing the production and composition of a plant community to the production and composition of a plant community described in this site description. To determine Similarity index, compare the production (air dry weight) of each species to that shown in the plant community description. For each species, count no more than the maximum amount shown for the species, and for each group, count no more than the maximum amount shown for that group. Divide the resulting total by the total normal year production shown in the plant community description. If the rainfall has been significantly above or below normal, use the total production shown for above or below normal years. If field data is not collected at the end of the summer growing season, then the field data must be corrected to the end of the year production before comparing it to the site description. The growth curve can be used as a guide for estimating production at the end of the summer growing season.

The historic native state includes the native plant communities that occur on the site, including the historic climax plant community. This state includes other plant communities that naturally occupy the site following fire, drought, flooding, herbivores, and other natural disturbances. The historic climax plant community represents the natural climax community that eventually will re-occupy the site with proper management.

State and transition model

1-3 (12-16"), Limestone Hills

- 1 a. Shrubs like ocotillo, whitethorn, sandpaper bush, mariola and succulents like sotol, shin dagger, prickly pear and agave increase to high canopy levels in the absence of fire for long periods of time.
- 1 b. Herbicide treatment of shrub species.
- 2 a. Lehmann lovegrass seeds are introduced to the area usually via roads and jeep trails through the site. Repeated fire will usually result in increased dominance by Lehmann.
- 2 b. Unknown

2b

Lehmann lovegrass invades native community. Native shrubs and succulents and herbs exist in trace amounts. With repeated fire, Lehmann lovegrass becomes more dominant.

Lehmann lovegrass state

- CHG - continuous heavy grazing
- PGNG - proper grazing, no grazing
- FOSP - ocotillo, ATCO - whitethorn acacia
- MOSC - sandpaper bush
- CAER - false mesquite, DAFO - feather dalea

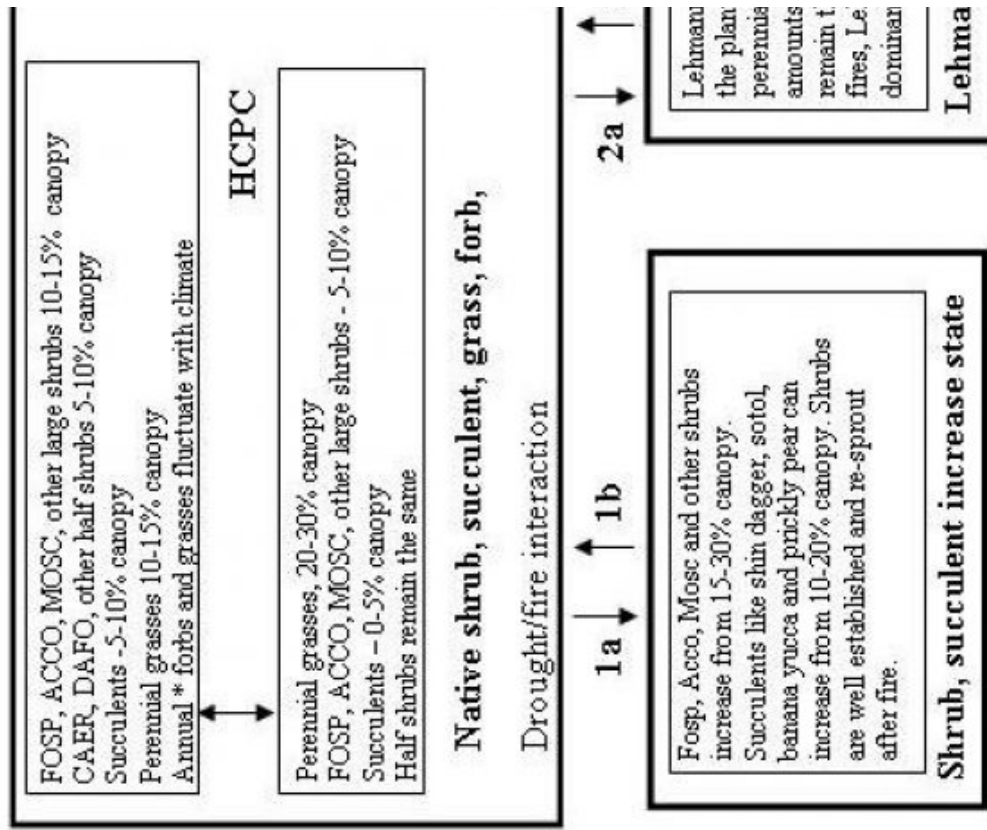


Figure 4. State and Transition, Limestone Hills 12-16" p.z.

State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

*Native annuals dominant, may be patches of some non



Figure 5. Limestone Hills 12-16" pz. HCPC

The potential plant community on this site is dominated by warm season perennial grasses. Several species of shrubs are well represented on the site. Shrubs can be in concentrations at the edges of rock outcrops and in canyon bottoms. Most of the grass and shrub species are well dispersed throughout the plant community. A few species (black grama, New Mexico feathergrass, amole, sandpaper bush and mariola) grow in patches which vary in size and are not well dispersed over larger areas of the site. In the absence of wildfire and/or with overgrazing, shrubs increase to dominate the plant community. Well-developed gravel and cobble covers protect the soil from erosion and help protect forage species from heavy utilization. The large amount of rock outcrop on the site tends to magnify water received by adjacent soil areas. Natural fire was a factor in the development of the potential plant community. The frequency of natural fire on this site was about once every ten years. Fires burned May through August.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	303	448	695
Shrub/Vine	140	392	560
Forb	22	56	135
Tree	–	11	39
Total	465	907	1429

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	2-5%
Grass/grasslike basal cover	2-5%
Forb basal cover	0-1%

Non-vascular plants	0-1%
Biological crusts	0-1%
Litter	10-25%
Surface fragments >0.25" and <=3"	25-50%
Surface fragments >3"	0-8%
Bedrock	0-15%
Water	0%
Bare ground	5-60%

Table 7. Canopy structure (% cover)

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

Figure 7. Plant community growth curve (percent production by month). AZ4131, 41.3 12-16" p.z. hill sites. Growth begins in the spring, semi-dormancy occurs during the June drought, most growth occurs during the summer rainy season..

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

State 2

Shrub and succulent increase state

Community 2.1

Shrub and succulent increase state



Figure 8. Limestone Hills 12-16" pz. shrubby state

This state occurs where shrubs like whitethorn, mesquite, creosote bush, ocotillo, sandpaper bush, and mariola have increased to dominate the community in the absence of fire for long periods of time. Succulents like shin dagger, sotol, agave and prickly pear can also increase on the site. Although the site may burn after an exceptionally wet summer the shrubs are well established and some species re-sprout and re-assume dominance.

State 3 Lehmann lovegrass state

Community 3.1 Lehmann lovegrass state

This state occurs where Lehmann lovegrass has invaded the site, usually from a seed source brought in along roads and jeep trails. As fires burn this state Lehmann usually increases in dominance.

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 warm season grasses			168–224	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	112–224	–
	black grama	BOER4	<i>Bouteloua eriopoda</i>	56–112	–
	plains lovegrass	ERIN	<i>Eragrostis intermedia</i>	0–112	–
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	11–112	–
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	22–112	–

2	Dominant cool season grasses			22–135	
	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	11–112	–
	southwestern needlegrass	ACEM4	<i>Achnatherum eminens</i>	11–56	–
	woolyspike balsamscale	ELBA	<i>Elionurus barbiculmis</i>	0–56	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–28	–
	squirreltail	ELELE	<i>Elymus elymoides</i> ssp. <i>elymoides</i>	0–22	–
3	Perennial threeawns			56–112	
	blue threeawn	ARPUN	<i>Aristida purpurea</i> var. <i>nealleyi</i>	22–112	–
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	0–34	–
	spidergrass	ARTE3	<i>Aristida ternipes</i>	6–34	–
	spidergrass	ARTEG	<i>Aristida ternipes</i> var. <i>gentilis</i>	0–22	–
	Orcutt's threeawn	ARSCO	<i>Aristida schiedeana</i> var. <i>orcuttiana</i>	0–17	–
	poverty threeawn	ARDI5	<i>Aristida divaricata</i>	0–17	–
	Fendler threeawn	ARPUL	<i>Aristida purpurea</i> var. <i>longiseta</i>	0–11	–
	Parish's threeawn	ARPUP5	<i>Aristida purpurea</i> var. <i>parishii</i>	0–11	–
	Havard's threeawn	ARHA3	<i>Aristida havardii</i>	0–6	–
	Wooton's threeawn	ARPA9	<i>Aristida pansa</i>	0–6	–
4	Sub dominant short grasses			50–112	
	slim tridens	TRMU	<i>Tridens muticus</i>	17–78	–
	Hall's panicgrass	PAHA	<i>Panicum hallii</i>	11–56	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	6–56	–
	red grama	BOTR2	<i>Bouteloua trifida</i>	0–56	–
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	6–34	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	6–34	–
	slender grama	BORE2	<i>Bouteloua repens</i>	0–28	–
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	6–28	–
	slim tridens	TRMUE	<i>Tridens muticus</i> var. <i>elongatus</i>	0–22	–
	shortleaf woollygrass	ERAV	<i>Erioneuron avenaceum</i>	1–17	–
	fall witchgrass	DICO6	<i>Digitaria cognata</i>	1–11	–
	purple grama	BORA	<i>Bouteloua radicata</i>	0–11	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–11	–
	curly-mesquite	HIBE	<i>Hilaria belangeri</i>	0–6	–
	Arizona muhly	MUAR3	<i>Muhlenbergia arizonica</i>	0–6	–
5	Annual grasses			6–112	
	mucronate sprangeltop	LEPAB	<i>Leptochloa panicea</i> ssp. <i>brachiata</i>	0–28	–
	Mexican panicgrass	PAHI5	<i>Panicum hirticaule</i>	1–28	–
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	1–28	–
	Mexican sprangletop	LEFUU	<i>Leptochloa fusca</i> ssp. <i>uninervia</i>	0–17	–
	Eastwood fescue	VUMIC	<i>Vulpia microstachys</i> var. <i>ciliata</i>	0–17	–
	desert fescue	VUMIM	<i>Vulpia microstachys</i> var. <i>microstachys</i>	0–17	–
	sixweeks threeawn	ARAD	<i>Aristida adscensionis</i>	1–17	–
	prairie threeawn	AROL	<i>Aristida oligantha</i>	1–17	–
	needle grama	BOAR	<i>Bouteloua aristidoides</i>	0–11	–

	fragilegrass	AETE	<i>Aegopogon tenellus</i>	0–6	–
	delicate muhly	MUFR	<i>Muhlenbergia fragilis</i>	0–6	–
	littleseed muhly	MUMI	<i>Muhlenbergia microsperma</i>	0–6	–
	witchgrass	PACA6	<i>Panicum capillare</i>	0–6	–
	Arizona brome	BRAR4	<i>Bromus arizonicus</i>	0–6	–
	feather fingergrass	CHVI4	<i>Chloris virgata</i>	0–6	–
	tapertip cupgrass	ERACA	<i>Eriochloa acuminata</i> var. <i>acuminata</i>	0–6	–
	Mexican lovegrass	ERME	<i>Eragrostis mexicana</i>	0–6	–
	Mexican lovegrass	ERMEM	<i>Eragrostis mexicana</i> ssp. <i>mexicana</i>	0–6	–
	tufted lovegrass	ERPEP2	<i>Eragrostis pectinacea</i> var. <i>pectinacea</i>	0–6	–
	Bigelow's bluegrass	POBI	<i>Poa bigelovii</i>	0–6	–
	prairie false oat	TRIN5	<i>Trisetum interruptum</i>	0–6	–
	Arizona signalgrass	URAR	<i>Urochloa arizonica</i>	0–6	–
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	0–2	–
6	Miscellaneous grasses			0–39	
	tanglehead	HECO10	<i>Heteropogon contortus</i>	6–28	–
	green sprangletop	LEDU	<i>Leptochloa dubia</i>	0–28	–
	Rothrock's grama	BORO2	<i>Bouteloua rothrockii</i>	0–17	–
	bullgrass	MUEM	<i>Muhlenbergia emersleyi</i>	0–17	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	0–17	–
	nineawn pappusgrass	ENDE	<i>Enneapogon desvauxii</i>	1–17	–
	silver bluestem	BOSA	<i>Bothriochloa saccharoides</i>	0–11	–
	sprucetop grama	BOCH	<i>Bouteloua chondrosioides</i>	0–6	–
	plains muhly	MUCU3	<i>Muhlenbergia cuspidata</i>	0–6	–
	bamboo muhly	MUDU3	<i>Muhlenbergia dumosa</i>	0–6	–
	lovegrass tridens	TRER	<i>Tridens eragrostoides</i>	0–6	–
	spiked crinkleawn	TRSP12	<i>Trachypogon spicatus</i>	0–6	–
	desert muhly	MUGL2	<i>Muhlenbergia glauca</i>	0–6	–
	New Mexico muhly	MUPA2	<i>Muhlenbergia pauciflora</i>	0–6	–
	purple muhly	MURI3	<i>Muhlenbergia rigida</i>	0–6	–
	slender muhly	MUTE4	<i>Muhlenbergia tenuifolia</i>	0–6	–
	Texas bluestem	SCCI2	<i>Schizachyrium cirratum</i>	0–6	–
Forb					
7	Perennial Forbs			56–67	
	leatherweed	CRPO5	<i>Croton pottsii</i>	6–22	–
	desert globemallow	SPAM2	<i>Sphaeralcea ambigua</i>	6–22	–
	slender janusia	JAGR	<i>Janusia gracilis</i>	0–17	–
	Fendler's bladderpod	LEFE	<i>Lesquerella fendleri</i>	1–17	–
	Trans-Pecos thimblehead	HYWI	<i>Hymenothrix wislizeni</i>	0–17	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	1–17	–
	hairyseed bahia	BAAB	<i>Bahia absinthifolia</i>	1–11	–
	trailing windmills	ALIN	<i>Allionia incarnata</i>	1–11	–
	southwestern mock	GI GO	<i>Glandularia gooddingii</i>	1–11	–

Common name	Code	Scientific name	Height (m)	Notes
Thurber's cotton	GOTH	<i>Gossypium thurberi</i>	0–11	–
lacy tansyaster	MAPI	<i>Machaeranthera pinnatifida</i>	0–11	–
plains blackfoot	MELE2	<i>Melampodium leucanthum</i>	1–11	–
caliche globemallow	SPLA	<i>Sphaeralcea laxa</i>	6–11	–
pricklyleaf dogweed	THAC	<i>Thymophylla acerosa</i>	1–11	–
rue of the mountains	THTE2	<i>Thamnosma texana</i>	1–11	–
branched noseburn	TRRA5	<i>Tragia ramosa</i>	1–6	–
brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	1–6	–
slender poreleaf	POGR5	<i>Porophyllum gracile</i>	0–6	–
velvetseed milkwort	POOB	<i>Polygala obscura</i>	0–6	–
wishbone-bush	MILAV	<i>Mirabilis laevis</i> var. <i>villosa</i>	1–6	–
desert tobacco	NIOB	<i>Nicotiana obtusifolia</i>	0–6	–
Parry's beardtongue	PEPA24	<i>Penstemon parryi</i>	1–6	–
Lewis flax	LILE3	<i>Linum lewisii</i>	0–6	–
Greene's bird's-foot trefoil	LOGR4	<i>Lotus greenei</i>	0–6	–
Wright's deervetch	LOWR	<i>Lotus wrightii</i>	0–6	–
desert rosemallow	HICO	<i>Hibiscus coulteri</i>	0–6	–
paleface	HIDE	<i>Hibiscus denudatus</i>	0–6	–
fineleaf hymenopappus	HYFIL	<i>Hymenopappus filifolius</i> var. <i>lugens</i>	0–6	–
beeblossom	GAURA	<i>Gaura</i>	0–6	–
Gregg's prairie clover	DAGR2	<i>Dalea greggii</i>	1–6	–
spreading fleabane	ERDI4	<i>Erigeron divergens</i>	0–6	–
brownfoot	ACWR5	<i>Acourtia wrightii</i>	0–6	–
San Felipe dogweed	ADPO	<i>Adenophyllum porophylloides</i>	0–6	–
weakleaf bur ragweed	AMCO3	<i>Ambrosia confertiflora</i>	1–6	–
tuber anemone	ANTU	<i>Anemone tuberosa</i>	0–6	–
tarragon	ARDR4	<i>Artemisia dracunculus</i>	0–6	–
sandwort	ARENA	<i>Arenaria</i>	0–6	–
desert marigold	BAMU	<i>Baileya multiradiata</i>	0–6	–
scarlet spiderling	BOCO	<i>Boerhavia coccinea</i>	0–6	–
climbing wartclub	BOSC	<i>Boerhavia scandens</i>	0–6	–
Arizona wrightwort	CAAR7	<i>Carlowrightia arizonica</i>	0–6	–
perennial rockcress	ARPE2	<i>Arabis perennans</i>	1–6	–
dense ayenia	AYMI	<i>Ayenia microphylla</i>	1–6	–
New Mexico silverbush	ARNE2	<i>Argythamnia neomexicana</i>	0–2	–
largeflower onion	ALMA4	<i>Allium macropetalum</i>	0–2	–
Indian paintbrush	CASTI2	<i>Castilleja</i>	0–2	–
whitemouth dayflower	COER	<i>Commelina erecta</i>	0–2	–
bluedicks	DICA14	<i>Dichelostemma capitatum</i>	0–2	–
El Paso skyrocket	IPTH2	<i>Ipomopsis thurberi</i>	0–2	–
variableleaf bushbean	MAGI2	<i>Macroptilium gibbosifolium</i>	0–2	–
shrubby purslane	POSU3	<i>Portulaca suffrutescens</i>	0–2	–
American vetch	VIAM	<i>Vicia americana</i>	0–2	–

	Louisiana vetch	VILU	<i>Vicia ludoviciana</i>	0–2	–
	ivyleaf groundcherry	PHHE4	<i>Physalis hederifolia</i>	0–2	–
	twinleaf senna	SEBA3	<i>Senna bauhinoides</i>	0–1	–
	Lemmon's ragwort	SELE8	<i>Senecio lemmonii</i>	0–1	–
	New Mexico fanpetals	SINE	<i>Sida neomexicana</i>	0–1	–
	jewels of Opar	TAPA2	<i>Talinum paniculatum</i>	0–1	–
	orange fameflower	PHAU13	<i>Phemeranthus aurantiacus</i>	0–1	–
	wild dwarf morning-glory	EVAR	<i>Evolvulus arizonicus</i>	0–1	–
	James' prairie clover	DAJA	<i>Dalea jamesii</i>	0–1	–
	Cooley's bundleflower	DECO2	<i>Desmanthus cooleyi</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	–
8	Annual forbs			6–56	
	longleaf false goldeneye	HELOA2	<i>Heliomeris longifolia</i> var. <i>annua</i>	1–56	–
	slender goldenweed	MAGR10	<i>Machaeranthera gracilis</i>	1–22	–
	tanseyleaf tansyaster	MATA2	<i>Machaeranthera tanacetifolia</i>	1–22	–
	sweet four o'clock	MILO2	<i>Mirabilis longiflora</i>	0–17	–
	phacelia	PHACE	<i>Phacelia</i>	1–17	–
	sawtooth sage	SASU7	<i>Salvia subincisa</i>	0–17	–
	New Mexico copperleaf	ACNE	<i>Acalypha neomexicana</i>	0–17	–
	cryptantha	CRYPT	<i>Cryptantha</i>	0–17	–
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	1–17	–
	wedgeleaf draba	DRCU	<i>Draba cuneifolia</i>	0–11	–
	goosefoot	CHENO	<i>Chenopodium</i>	0–11	–
	fewflower beggarticks	BILE	<i>Bidens leptcephala</i>	1–11	–
	chia	SACO6	<i>Salvia columbariae</i>	0–11	–
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	0–11	–
	lyreleaf jewelflower	STCAA	<i>Streptanthus carinatus</i> ssp. <i>arizonicus</i>	0–11	–
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	1–11	–
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	0–11	–
	sorrel buckwheat	ERPO4	<i>Eriogonum polycladon</i>	0–11	–
	miniature woollystar	ERDI2	<i>Eriastrum diffusum</i>	0–6	–
	crestrub morning-glory	IPCO2	<i>Ipomoea costellata</i>	0–6	–
	flaxflowered ipomopsis	IPLO2	<i>Ipomopsis longiflora</i>	0–6	–
	Gordon's bladderpod	LEGO	<i>Lesquerella gordonii</i>	0–6	–
	shaggyfruit pepperweed	LELA	<i>Lepidium lasiocarpum</i>	0–6	–
	intermediate pepperweed	LEVIM	<i>Lepidium virginicum</i> var. <i>medium</i>	0–6	–
	combseed	PECTO	<i>Pectocarya</i>	0–6	–
	Arizona poppy	KAGR	<i>Kallstroemia grandiflora</i>	0–6	–
	foothill deervetch	LOHU2	<i>Lotus humistratus</i>	0–6	–
	coastal bird's-foot trefoil	LOSA	<i>Lotus salsuginosus</i>	0–6	–
	Arizona lunine	LIUAR4	<i>Luninus arizonicus</i>	0–6	–

	Coulter's lupine	LUSP2	<i>Lupinus sparsiflorus</i>	0–6	–
	woolly tidestromia	TILA2	<i>Tidestromia lanuginosa</i>	0–6	–
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	0–6	–
	hoary bowlesia	BOIN3	<i>Bowlesia incana</i>	0–6	–
	exserted Indian paintbrush	CAEXE	<i>Castilleja exserta</i> ssp. <i>exserta</i>	0–6	–
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	0–6	–
	sensitive partridge pea	CHNI2	<i>Chamaecrista nictitans</i>	0–6	–
	New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	0–6	–
	hairy prairie clover	DAMO	<i>Dalea mollis</i>	0–6	–
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	1–6	–
	sanddune wallflower	ERCA14	<i>Erysimum capitatum</i>	0–2	–
	scrambled eggs	COAU2	<i>Corydalis aurea</i>	0–2	–
	spreading fanpetals	SIAB	<i>Sida abutifolia</i>	0–2	–
	minerslettuce	MONT1	<i>Montia</i>	0–2	–
	desert evening primrose	OEPR	<i>Oenothera primiveris</i>	0–2	–
	star gilia	GIST	<i>Gilia stellata</i>	0–2	–
	California poppy	ESCAM	<i>Eschscholzia californica</i> ssp. <i>mexicana</i>	0–2	–
	spurge	EUPHO	<i>Euphorbia</i>	0–2	–
	Arizona blanketflower	GAAR2	<i>Gaillardia arizonica</i>	0–1	–
	manystem woolly sunflower	ERMU6	<i>Eriophyllum multicaule</i>	0–1	–
	Texas stork's bill	ERTE13	<i>Erodium texanum</i>	0–1	–
	plains flax	LIPU4	<i>Linum puberulum</i>	0–1	–
	Thurber's morning-glory	IPTH	<i>Ipomoea thurberi</i>	0–1	–
	manybristle chinchweed	PEPA2	<i>Pectis papposa</i>	0–1	–
	New Mexico plumeseed	RANE	<i>Rafinesquia neomexicana</i>	0–1	–
	Arizona popcornflower	PLAR	<i>Plagiobothrys arizonicus</i>	0–1	–
	warty caltrop	KAPA	<i>Kallstroemia parviflora</i>	0–1	–
	whitestem blazingstar	MEAL6	<i>Mentzelia albicaulis</i>	0–1	–
9	Perennial ferns			11–28	
	spikemoss	SELAG	<i>Selaginella</i>	0–17	–
	lipfern	CHEIL	<i>Cheilanthes</i>	1–17	–
	cloak fern	NOTHO	<i>Notholaena</i>	0–11	–
	cliffbrake	PELLA	<i>Pellaea</i>	1–11	–
Shrub/Vine					
10	Dominant half shrubs			56–168	
	fairyduster	CAER	<i>Calliandra eriophylla</i>	17–56	–
	mariola	PAIN2	<i>Parthenium incanum</i>	11–39	–
	rough menodora	MESC	<i>Menodora scabra</i>	11–34	–
	featherplume	DAFO	<i>Dalea formosa</i>	11–34	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0–28	–
	littleleaf ratany	KRER	<i>Krameria erecta</i>	6–22	–

	desert zinnia	ZIAC	<i>Zinnia acerosa</i>	6–22	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	1–17	–
	trailing krameria	KRLA	<i>Krameria lanceolata</i>	0–11	–
	woody crinklemat	TICAC	<i>Tiquilia canescens</i> var. <i>canescens</i>	0–11	–
	Utah fendlerbush	FEUTC	<i>Fendlerella utahensis</i> var. <i>cymosa</i>	0–11	–
11	Dominant large shrubs			39–168	
	desert ceanothus	CEGR	<i>Ceanothus greggii</i>	6–39	–
	ocotillo	FOSP2	<i>Fouquieria splendens</i>	6–39	–
	Rio Grande saddlebush	MOSC	<i>Mortonia scabrella</i>	0–34	–
	Tahitian kidneywood	EYOR	<i>Eysenhardtia orthocarpa</i>	0–28	–
	Wright's beebrush	ALWR	<i>Aloysia wrightii</i>	6–22	–
	creosote bush	LART	<i>Larrea tridentata</i> var. <i>tridentata</i>	0–22	–
	littleleaf sumac	RHMI3	<i>Rhus microphylla</i>	0–22	–
	whitethorn acacia	ACCOC	<i>Acacia constricta</i> var. <i>constricta</i>	0–22	–
	whitethorn acacia	ACCOP9	<i>Acacia constricta</i> var. <i>paucispina</i>	0–17	–
	evergreen sumac	RHVIC	<i>Rhus virens</i> var. <i>choriophylla</i>	0–17	–
	Kearney's sumac	RHKE	<i>Rhus kearneyi</i>	0–17	–
	catclaw acacia	ACGR	<i>Acacia greggii</i>	0–11	–
	pelotazo	ABIN	<i>Abutilon incanum</i>	0–11	–
	knifeleaf condalia	COSP3	<i>Condalia spathulata</i>	0–11	–
	Warnock's snakewood	COWA	<i>Condalia warnockii</i>	0–11	–
	Kearney's snakewood	COWAK	<i>Condalia warnockii</i> var. <i>kearneyana</i>	0–6	–
12	Succulents			34–146	
	Schott's century plant	AGSC3	<i>Agave schottii</i>	11–45	–
	sacahuista	NOMI	<i>Nolina microcarpa</i>	6–34	–
	common sotol	DAWH2	<i>Dasyllirion wheeleri</i>	6–22	–
	banana yucca	YUBA	<i>Yucca baccata</i>	6–22	–
	cactus apple	OPEN3	<i>Opuntia engelmannii</i>	1–22	–
	Palmer's century plant	AGPA3	<i>Agave palmeri</i>	0–17	–
	Parry's agave	AGPA4	<i>Agave parryi</i>	0–11	–
	saguaro	CAGI10	<i>Carnegiea gigantea</i>	0–11	–
	staghorn cholla	CYVE3	<i>Cylindropuntia versicolor</i>	0–11	–
	walkingstick cactus	CYSP8	<i>Cylindropuntia spinosior</i>	0–6	–
	dollarjoint pricklypear	OPCH	<i>Opuntia chlorotica</i>	1–6	–
	candy barrelcactus	FEWI	<i>Ferocactus wislizeni</i>	1–6	–
	hedgehog cactus	ECHIN3	<i>Echinocereus</i>	0–6	–
	rainbow cactus	ECPE	<i>Echinocereus pectinatus</i>	1–6	–
	purple pricklypear	OPMAM	<i>Opuntia macrocentra</i> var. <i>macrocentra</i>	0–6	–
	tulip pricklypear	OPPH	<i>Opuntia phaeacantha</i>	0–6	–
	desert agave	AGDE	<i>Agave deserti</i>	0–6	–
	Cochise foxtail cactus	ESRO	<i>Escobaria robbinsiorum</i>	0–1	–
	spiny star	ESVI2	<i>Escobaria vivipara</i>	0–1	–
	white fishhook cactus	ECIN2	<i>Echinomastus intertextus</i>	0–1	–

	Graham's nipple cactus	MAGR9	<i>Mammillaria grahamii</i>	0-1	-
	little nipple cactus	MAHE2	<i>Mammillaria heyderi</i>	0-1	-
	redspine fishhook cactus	ECER2	<i>Echinomastus erectocentrus</i>	0-1	-
	Christmas cactus	CYLE8	<i>Cylindropuntia leptocaulis</i>	0-1	-
13	Miscellaneous shrubs			11-67	
	Coulter's brickellbush	BRCO	<i>Brickellia coulteri</i>	1-17	-
	pelotazo	ABIN	<i>Abutilon incanum</i>	0-17	-
	alderleaf mountain mahogany	CEMO2	<i>Cercocarpus montanus</i>	0-17	-
	hairy mountain mahogany	CEMOP	<i>Cercocarpus montanus var. paucidentatus</i>	0-17	-
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0-17	-
		QUPA4	<i>Quercus xpauciloba</i>	0-17	-
	pungent oak	QUPU	<i>Quercus pungens</i>	0-17	-
	Sonoran scrub oak	QUTU2	<i>Quercus turbinella</i>	0-11	-
	jojoba	SICH	<i>Simmondsia chinensis</i>	0-11	-
	spiny hackberry	CEEH	<i>Celtis ehrenbergiana</i>	0-11	-
	yerba de pasmo	BAPT	<i>Baccharis pteronioides</i>	0-6	-
	javelina bush	COER5	<i>Condalia ericoides</i>	0-6	-
	button brittlebush	ENFR	<i>Encelia frutescens</i>	0-6	-
	longleaf jointfir	EPTR	<i>Ephedra trifurca</i>	0-6	-
	turpentine bush	ERLA12	<i>Ericameria laricifolia</i>	0-6	-
	bastardsage	ERWR	<i>Eriogonum wrightii</i>	0-6	-
	American tarwort	FLCE	<i>Flourensia cernua</i>	0-6	-
	burweed	ISTE2	<i>Isocoma tenuisecta</i>	0-6	-
	Arizona necklacepod	SOAR3	<i>Sophora arizonica</i>	0-6	-
	yellow trumpetbush	TEST	<i>Tecoma stans</i>	0-6	-
	American threefold	TRCA8	<i>Trixis californica</i>	0-6	-
	Parish's goldeneye	VIPA14	<i>Viguiera parishii</i>	0-6	-
	lotebush	ZIOB	<i>Ziziphus obtusifolia</i>	0-6	-
	desert-thorn	LYCIU	<i>Lycium</i>	0-6	-
	catclaw mimosa	MIACB	<i>Mimosa aculeaticarpa var. biuncifera</i>	0-6	-
	velvetpod mimosa	MIDY	<i>Mimosa dysocarpa</i>	0-6	-
	blue paloverde	PAFL6	<i>Parkinsonia florida</i>	0-6	-
	yellow paloverde	PAMI5	<i>Parkinsonia microphylla</i>	0-6	-
	whitestem paperflower	PSCO2	<i>Psilostrophe cooperi</i>	0-6	-
	Mexican cliffrose	PUME	<i>Purshia mexicana</i>	0-6	-
	evergreen sumac	RHVIC	<i>Rhus virens var. choriophylla</i>	0-6	-
	rock sage	SAPI2	<i>Salvia pinguifolia</i>	0-6	-
	Wislizenus' senna	SEWI3	<i>Senna wislizeni</i>	0-6	-
	crown of thorns	KOSP	<i>Koeberlinia spinosa</i>	0-2	-
	desertbroom	BASA2	<i>Baccharis sarothroides</i>	0-1	-
Tree					
14	Trees			0-39	
	Arizona rosewood	VACA5	<i>Vauquelinia californica</i>	0-22	-

	oneseed juniper	JUMO	<i>Juniperus monosperma</i>	0–22	–
	western honey mesquite	PRGLT	<i>Prosopis glandulosa var. torreyana</i>	0–11	–
	velvet mesquite	PRVE	<i>Prosopis velutina</i>	0–11	–
	Arizona rosewood	VACAP	<i>Vauquelinia californica ssp. pauciflora</i>	0–11	–

Animal community

Herbaceous forage produced on this site is less palatable than that on other hill sites for two reasons. The soils are droughty and calcareous and plants have a very short green season, and high pH may make essential plant nutrients less available. With a fair percentage of cool season grass and a variety of low evergreen browse species, this site is most useable in late spring and fall. Cow-calf pairs will use only 300–400 feet up or down in elevation from water in midsummer. Dry cows will use double that distance in the cool season. Yearling calves will make good use of the site in all seasons. Slope aspect affects both the intensity of use, as well as seasonal use patterns. North-south trending slopes will be used fairly well even in summer as the west slope is shady in the morning and the east slope is shady in the afternoon. South facing slopes are used more in the spring due to warmth from cold weather and early green-up of forage species. North slopes, being shaded and cooler, are used more in the summer, but are never used as much as warmer exposures. The site tends to be very dry even in the winter when other hill-sites have canyon water.

Livestock water developments are very important to wildlife on this site. Although not a high producer of forage, the variety of plants is unique to the site and the number of evergreen browse species make the site home to a diverse fauna.

Hydrological functions

Coarse textured soils and porous bedrock make this site an important site for capture of water and recharge of southeastern Arizona stream systems.

Recreational uses

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

Wood products

Limited hobby woods like Arizona rosewood.

Other products

Fossils, gold, silver, turquoise and limestone and crushed marble for decorative rock.

Inventory data references

Range 417s include 5 in excellent condition, 20 in good condition and 3 in fair condition.

Type locality

Location 1: Santa Cruz County, AZ	
Township/Range/Section	T20 R18 S10
General legal description	Rose Tree Ranch
Location 2: Pima County, AZ	
Township/Range/Section	T17S R17E S32
General legal description	Andrade Ranch

Location 3: Cochise County, AZ	
Township/Range/Section	T23S R24E S2
General legal description	Dixie Canyon Ranch - Mexican Canyon

Contributors

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 Unknown

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, Emilion Carrillo, Dan Robinett
Contact for lead author	NRCS Tucson Area Office
Date	03/07/2005
Approved by	S. Cassady
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

2. **Presence of water flow patterns:** Uncommon; probably cover no more than 10% of area; discontinuous, very short, usually less than 1-3 feet in length.
-

3. **Number and height of erosional pedestals or terracettes:** Pedestals are uncommon on perennial grass and shrubs. Terracettes are uncommon.
-

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 0-5%
-

5. **Number of gullies and erosion associated with gullies:** None
-

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

7. **Amount of litter movement (describe size and distance expected to travel):** All litter size classes staying in place.
-
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Expect values of 1-3 in canopy interspaces, and 4-6 under plant canopies.
-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** weak granular; color is 7.5YR4/2 dry; 5YR3/2 Moist; 2-8 inches.
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Canopy 30-40%, basal 5%, litter 20-55%; 40-50% of canopy cover is perennial grasses, 5% perennial forbs, 40-45% shrubs and trees, 5% succulents. Cover is well dispersed throughout site.
-
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None
-
12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**
- Dominant: perennial grass > subshrubs > annual grasses & forbs > shrubs succulents = perennial forbs
- Sub-dominant:
- Other:
- Additional:
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** 50% of basal cover of perennial grasses has likely been lost in recent 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):** 500 lbs/ac unfavorable precipitation; 700 lbs/ac normal precipitation; 1000 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:** Whitethorn, mesquite, prickly pear, cane cholla, & ocotillo may increase. Red brome and wild oats.

17. **Perennial plant reproductive capability:** Not affected even following several years of prolonged drought period for the region.
