

Ecological site R040XA106AZ Limy Upland, Deep 10"-13" p.z.

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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.

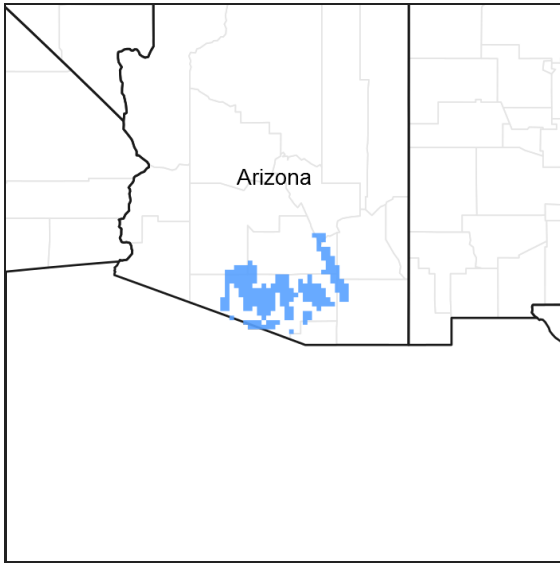


Figure 1. Mapped extent

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): 040X–Sonoran Basin and Range

AZ 40.1 – Upper Sonoran Desert

Elevations range from 2000 to 3200 feet and precipitation averages 10 to 13 inches per year. Vegetation includes saguaro, palo verde, mesquite, creosotebush, triangle bursage, prickly pear, cholla, limberbush, wolfberry, bush muhly, threeawns, ocotillo, and globe mallow. The soil temperature regime is thermic and the soil moisture regime is typic aridic. This unit occurs within the Basin and Range Physiographic Province and is characterized by numerous mountain ranges that rise abruptly from broad, plain-like valleys and basins. Igneous and metamorphic rock classes dominate the mountain ranges and sediments filling the basins represent combinations of fluvial, lacustrine, colluvial and alluvial deposits.

Associated sites

R040XA110AZ	Limy Slopes 10"-13" p.z.
R040XA111AZ	Limy Upland 10"-13" p.z.
R040XA114AZ	Loamy Upland 10"-13" p.z.
R040XA115AZ	Sandy Wash 10"-13" p.z.

Similar sites

R040XB208AZ	Limy Upland, Deep 7"-10" p.z.
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Table 1. Dominant plant species

Tree	(1) <i>Parkinsonia microphylla</i>
Shrub	(1) <i>Larrea tridentata</i> (2) <i>Zinnia acerosa</i>
Herbaceous	(1) <i>Dasyochloa pulchella</i>

Physiographic features

This site occurs in the upper elevations of the Sonoran Desert in southern Arizona. It occurs on fan terraces, old stream terraces and ridge-tops.

Table 2. Representative physiographic features

Landforms	(1) Fan piedmont (2) Terrace
Flooding frequency	None
Ponding frequency	None
Elevation	671–1,097 m
Slope	1–15%
Aspect	Aspect is not a significant factor

Climatic features

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

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

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

Table 3. Representative climatic features

Frost-free period (average)	265 days
Freeze-free period (average)	0 days
Precipitation total (average)	330 mm

Influencing water features

There are no water features associated with this site.

Soil features

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

Soils mapped on this site include: SSA-661 Eastern Pinal-Southern Gila Counties MU' Stagecoach-490 & 665; SSA-666 Northwest Cochise County MU's Stagecoach-423 & Rillino-423; SSA669 Eastern Pima County MU's Stagecoach-22, 49, 60 & 78; SSA-703 Tohono O'odham area MU's Stagecoach-16 & 45, Vado-31 & 60.

Table 4. Representative soil features

Surface texture	(1) Gravelly sandy loam (2) Very gravelly sandy loam (3) Cobbly sandy loam
Family particle size	(1) Loamy
Drainage class	Somewhat excessively drained to well drained
Permeability class	Rapid to moderately rapid
Soil depth	51–152 cm
Surface fragment cover <=3"	20–85%
Surface fragment cover >3"	0–15%
Available water capacity (0-101.6cm)	5.33–12.7 cm
Calcium carbonate equivalent (0-101.6cm)	5–30%
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)	7.8–8.4
Subsurface fragment volume <=3" (Depth not specified)	15–65%
Subsurface fragment volume >3" (Depth not specified)	0–20%

Ecological dynamics

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

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

NRCS uses a Similarity Index to compare existing plant communities to the plant communities described here. Similarity Index is determined by comparing the production and composition of a plant community to the production and composition of a plant community described in this site description. To determine Similarity Index, compare the production (air dry weight) of each species to that shown in the plant community description. For each species,

count no more than the maximum amount shown for the species, and for each group, count no more than the maximum amount shown for the group. Divide the resulting total by the total normal year production shown in the plant community description. If the rainfall has been significantly above or below normal, use the total production shown for above or below normal years. If field data is not collected at the end of the summer growing season, then the field data must be corrected to the end of the year production before comparing it to the site description. The growth curve can be used as a guide for estimating production at the end of the summer growing season.

State and transition model

MLRA 40-1 (10-13"), Limy upland, deep

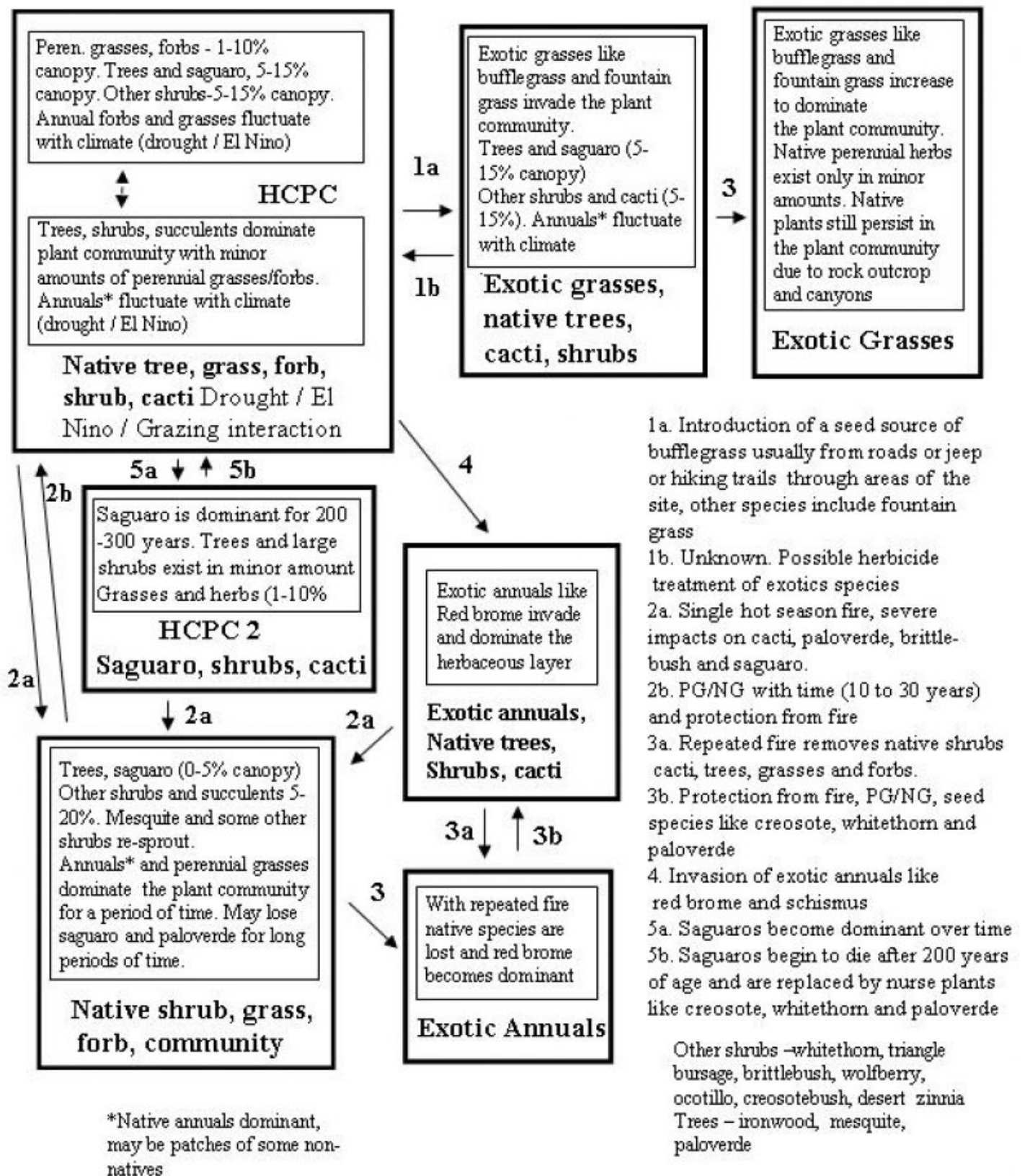


Figure 4. State and Transition, Limy Upland, deep 10-13" pz.

State 1
Historical Climax Plant Community

Community 1.1
Historical Climax Plant Community

The potential plant community is a diverse community of desert trees, shrubs, cacti, and perennial forbs and grasses. With continuous heavy grazing, herbaceous and suffrutescent forage species are replaced by increases in shrubs, cacti and trees. Well developed gravel covers help protect the soil from erosion. This site has a cycle of dominance by saguaro, alternating with large shrubs and trees that act as nurse plants for the giant cacti. This cycle takes approximately 300 years and starts from exceptionally wet years (El Nino) where saguaro establishes in large numbers.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	90	280	420
Grass/Grasslike	12	56	247
Forb	3	56	140
Tree	6	56	112
Total	111	448	919

Table 6. Soil surface cover

Tree basal cover	0-1%
Shrub/vine/liana basal cover	1-3%
Grass/grasslike basal cover	0-1%
Forb basal cover	0-1%
Non-vascular plants	0%
Biological crusts	5-25%
Litter	5-45%
Surface fragments >0.25" and <=3"	20-85%
Surface fragments >3"	0-15%
Bedrock	0%
Water	0%
Bare ground	5-45%

Table 7. Canopy structure (% cover)

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

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

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

State 2

Exotic perennial grasses with natives

Community 2.1

Exotic perennial grasses with natives

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

State 3

Exotic perennial grasses and fire

Community 3.1

Exotic perennial grasses and fire

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

State 4

Native trees, cacti, shrubs and fire

Community 4.1

Native trees, cacti, shrubs and fire

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

State 5

Native plant community with exotic annuals

Community 5.1

Native plant community with exotic annuals

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

State 6

Exotic annuals and fire

Community 6.1

Exotic annuals and fire

This plant community occurs where a native plant community which has been invaded by red brome and / or

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

State 7

HCPC 2 - Saguaro state

Community 7.1

HCPC 2 - Saguaro state

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

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Suffrutescent grasses			6–56	
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	6–56	–
	black grama	BOER4	<i>Bouteloua eriopoda</i>	0–17	–
2	Subdominant perennial grasses			6–56	
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	1–28	–
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	0–22	–
	blue threeawn	ARPUN	<i>Aristida purpurea var. nealleyi</i>	0–22	–
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	0–17	–
	slim tridens	TRMU	<i>Tridens muticus</i>	0–11	–
	red grama	BOTR2	<i>Bouteloua trifida</i>	0–11	–
	nineawn pappusgrass	ENDE	<i>Enneapogon desvauxii</i>	0–11	–
	Hall's panicgrass	PAHA	<i>Panicum hallii</i>	0–6	–
3	Misc. perennial grasses			0–22	
	spidergrass	ARTE3	<i>Aristida ternipes</i>	0–22	–
	spidergrass	ARTEG	<i>Aristida ternipes var. gentilis</i>	0–17	–
	Parish's threeawn	ARPUP5	<i>Aristida purpurea var. parishii</i>	0–11	–
	desert needlegrass	ACSP12	<i>Achnatherum speciosum</i>	0–8	–
	hairy woollygrass	ERPI5	<i>Erioneuron pilosum</i>	0–8	–
	tanglehead	HECO10	<i>Heteropogon contortus</i>	0–1	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	0–1	–
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	0–1	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–1	–
	mesa dropseed	SPFL2	<i>Sporobolus flexuosus</i>	0–1	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0–1	–
	Arizona cottontop	DICA8	<i>Digitaria californica</i>	0–1	–
4	Annual grasses			1–112	

	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	1-56	-
	Mexican panicgrass	PAHI5	<i>Panicum hirticaule</i>	0-17	-
	sixweeks threeawn	ARAD	<i>Aristida adscensionis</i>	0-17	-
	prairie threeawn	AROL	<i>Aristida oligantha</i>	0-17	-
	needle grama	BOAR	<i>Bouteloua aristidoides</i>	0-17	-
	mucronate sprangeltop	LEPAB	<i>Leptochloa panicea ssp. brachiata</i>	0-11	-
	Bigelow's bluegrass	POBI	<i>Poa bigelovii</i>	0-6	-
	desert lovegrass	ERPEM	<i>Eragrostis pectinacea var. miserrima</i>	0-6	-
	Rothrock's grama	BORO2	<i>Bouteloua rothrockii</i>	0-6	-
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	0-6	-
	tufted lovegrass	ERPEP2	<i>Eragrostis pectinacea var. pectinacea</i>	0-2	-
	feather fingergrass	CHVI4	<i>Chloris virgata</i>	0-2	-
	Arizona signalgrass	URAR	<i>Urochloa arizonica</i>	0-1	-
	delicate muhly	MUFR	<i>Muhlenbergia fragilis</i>	0-1	-
	littleseed muhly	MUMI	<i>Muhlenbergia microsperma</i>	0-1	-
	Arizona brome	BRAR4	<i>Bromus arizonicus</i>	0-1	-
Forb					
5	Perennial forbs			2-28	
	paleface	HIDE	<i>Hibiscus denudatus</i>	0-11	-
	slender janusia	JAGR	<i>Janusia gracilis</i>	0-11	-
	lacy tansyaster	MAPIP4	<i>Machaeranthera pinnatifida ssp. pinnatifida var. pinnatifida</i>	1-11	-
	Coues' cassia	SECO10	<i>Senna covesii</i>	0-6	-
	Parry's false prairie-clover	MAPA7	<i>Marina parryi</i>	0-6	-
	trailing windmills	ALIN	<i>Allionia incarnata</i>	1-6	-
	dense ayenia	AYMI	<i>Ayenia microphylla</i>	0-6	-
	hairyseed bahia	BAAB	<i>Bahia absinthifolia</i>	0-6	-
	desert marigold	BAMU	<i>Baileya multiradiata</i>	0-6	-
	leatherweed	CRPOP	<i>Croton pottsii var. pottsii</i>	0-6	-
	red-gland spurge	CHME5	<i>Chamaesyce melanadenia</i>	0-6	-
	desert globemallow	SPAM2	<i>Sphaeralcea ambigua</i>	0-6	-
	Mojave woodyaster	XYTOT	<i>Xylorhiza tortifolia var. tortifolia</i>	0-2	-
	hairy five eyes	CHSO	<i>Chamaesaracha sordida</i>	0-2	-
	desert trumpet	ERIN4	<i>Eriogonum inflatum</i>	0-2	-
	weakleaf bur ragweed	AMCO3	<i>Ambrosia confertiflora</i>	0-2	-
	dwarf desertpeony	ACNA2	<i>Acourtia nana</i>	0-2	-
	California fagonbush	FALA	<i>Fagonia laevis</i>	0-2	-
	slender poreleaf	POGR5	<i>Porophyllum gracile</i>	0-2	-
	plains blackfoot	MELE2	<i>Melampodium leucanthum</i>	0-2	-
	wishbone-bush	MILAV	<i>Mirabilis laevis var. villosa</i>	0-1	-
	desert tobacco	NIOBO	<i>Nicotiana obtusifolia var. obtusifolia</i>	0-1	-
	Parry's beardtongue	PEPA24	<i>Penstemon parryi</i>	0-1	-
	orange fameflower	PHAU13	<i>Phemeranthus aurantiacus</i>	0-1	-

	mesquite mistletoe	PHCA8	<i>Phoradendron californicum</i>	0-1	-
	glandleaf milkwort	POMA7	<i>Polygala macradenia</i>	0-1	-
	spreading fanpetals	SIAB	<i>Sida abutifolia</i>	0-1	-
	fringed twinevine	FUCYC	<i>Funastrum cynanchoides</i> ssp. <i>cynanchoides</i>	0-1	-
	Davis Mountain mock vervain	GLBIC	<i>Glandularia bipinnatifida</i> var. <i>ciliata</i>	0-1	-
	desert rosemallow	HICO	<i>Hibiscus coulteri</i>	0-1	-
	spearleaf	MAPA9	<i>Matelea parvifolia</i>	0-1	-
	brownfoot	ACWR5	<i>Acourtia wrightii</i>	0-1	-
	San Felipe dogweed	ADPO	<i>Adenophyllum porophylloides</i>	0-1	-
	narrowleaf silverbush	ARLA12	<i>Argythamnia lanceolata</i>	0-1	-
	climbing wartclub	BOSC	<i>Boerhavia scandens</i>	0-1	-
	desert mariposa lily	CAKE	<i>Calochortus kennedyi</i>	0-1	-
	naked mariposa lily	CANU2	<i>Calochortus nudus</i>	0-1	-
	wild dwarf morning- glory	EVAR	<i>Evolvulus arizonicus</i>	0-1	-
	desert larkspur	DEPA	<i>Delphinium parishii</i>	0-1	-
	tall mountain larkspur	DESC	<i>Delphinium scaposum</i>	0-1	-
	bluedicks	DICA14	<i>Dichelostemma capitatum</i>	0-1	-
	spreading fleabane	ERDI4	<i>Erigeron divergens</i>	0-1	-
	caliche globemallow	SPLA	<i>Sphaeralcea laxa</i>	0-1	-
	brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	0-1	-
	Coulter's wrinklefruit	TECO	<i>Tetradlea coulteri</i>	0-1	-
	rue of the mountains	THTE2	<i>Thamnosma texana</i>	0-1	-
6	Annual forbs			1-112	
	bristly fiddleneck	AMTE3	<i>Amsinckia tessellata</i>	0-28	-
	cleftleaf wildheliotrope	PHCR	<i>Phacelia crenulata</i>	0-28	-
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	1-28	-
	lyreleaf jewelflower	STCAA	<i>Streptanthus carinatus</i> ssp. <i>arizonicus</i>	0-28	-
	California poppy	ESCAM	<i>Eschscholzia californica</i> ssp. <i>mexicana</i>	0-28	-
	Arizona phacelia	PHAR13	<i>Phacelia arizonica</i>	0-28	-
	Coulter's lupine	LUSP2	<i>Lupinus sparsiflorus</i>	0-22	-
	thelypody	THELY	<i>Thelypodium</i>	0-17	-
	exserted Indian paintbrush	CAEXE	<i>Castilleja exserta</i> ssp. <i>exserta</i>	0-17	-
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	0-17	-
	flatcrown buckwheat	ERDE6	<i>Eriogonum deflexum</i>	0-17	-
	Sonoran sandmat	CHMI7	<i>Chamaesyce micromera</i>	0-11	-
	smallflowered milkvetch	ASNU4	<i>Astragalus nuttallianus</i>	0-11	-
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	0-11	-
	woolly tidestromia	TILA2	<i>Tidestromia lanuginosa</i>	0-11	-
	chia	SACO6	<i>Salvia columbariae</i>	0-11	-
	Gordon's bladderpod	LEGO	<i>Lesquerella gordonii</i>	0-11	-
	shaggyfruit pepperweed	LELA	<i>Lepidium lasiocarpum</i>	0-11	-

	foothill deervetch	LOHU2	<i>Lotus humistratus</i>	0-11	-
	coastal bird's-foot trefoil	LOSAB	<i>Lotus salsuginosus</i> var. <i>brevivexillus</i>	0-6	-
	Arizona lupine	LUAR4	<i>Lupinus arizonicus</i>	0-6	-
	Texas stork's bill	ERTE13	<i>Erodium texanum</i>	0-6	-
	Arizona poppy	KAGR	<i>Kallstroemia grandiflora</i>	0-6	-
	California goldfields	LACAC2	<i>Lasthenia californica</i> ssp. <i>californica</i>	0-6	-
	combseed	PECTO	<i>Pectocarya</i>	0-6	-
	manybristle chinchweed	PEPA2	<i>Pectis papposa</i>	0-6	-
	slender goldenweed	MAGR10	<i>Machaeranthera gracilis</i>	0-6	-
	mesa tansyaster	MATA	<i>Machaeranthera tagetina</i>	0-6	-
	tanseyleaf tansyaster	MATA2	<i>Machaeranthera tanacetifolia</i>	0-6	-
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	0-6	-
	New Mexico plumeseed	RANE	<i>Rafinesquia neomexicana</i>	0-6	-
	wheelscale saltbush	ATEL	<i>Atriplex elegans</i>	0-6	-
	pincushion flower	CHFR	<i>Chaenactis fremontii</i>	0-6	-
	pitseed goosefoot	CHBE4	<i>Chenopodium berlandieri</i>	0-6	-
	brittle spineflower	CHBR	<i>Chorizanthe brevicornu</i>	0-6	-
	miniature woollystar	ERDI2	<i>Eriastrum diffusum</i>	0-6	-
	buckwheat	ERIOG	<i>Eriogonum</i>	0-2	-
	hyssopleaf sandmat	CHHY3	<i>Chamaesyce hyssopifolia</i>	0-2	-
	Arizona popcornflower	PLAR	<i>Plagiobothrys arizonicus</i>	0-2	-
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	0-2	-
	glandular threadplant	NEGL	<i>Nemacladus glanduliferus</i>	0-2	-
	desert evening primrose	OEPR	<i>Oenothera primiveris</i>	0-1	-
	Florida pellitory	PAFL3	<i>Parietaria floridana</i>	0-1	-
	California deserdandelion	MACA6	<i>Malacothrix californica</i>	0-1	-
	mesquite mistletoe	PHCA8	<i>Phoradendron californicum</i>	0-1	-
	whitestem blazingstar	MEAL6	<i>Mentzelia albicaulis</i>	0-1	-
	Lindley's silverpuffs	MILI5	<i>Microseris lindleyi</i>	0-1	-
	Mojave desertstar	MOBE2	<i>Monoptilon bellioides</i>	0-1	-
	Nuttall's povertyweed	MONU	<i>Monolepis nuttalliana</i>	0-1	-
	bristly nama	NAHI	<i>Nama hispidum</i>	0-1	-
	flatspine stickseed	LAOCO	<i>Lappula occidentalis</i> var. <i>occidentalis</i>	0-1	-
	Thurber's buckwheat	ERTH3	<i>Eriogonum thurberi</i>	0-1	-
	Arizona cottonrose	LOAR12	<i>Logfia arizonica</i>	0-1	-
	Mexican fireplant	EUHE4	<i>Euphorbia heterophylla</i>	0-1	-
	dainty desert hideseed	EUMI2	<i>Eucrypta micrantha</i>	0-1	-
	spring pygmycudweed	EVVE	<i>Evax verna</i>	0-1	-
	hairy desertsunflower	GECA2	<i>Geraea canescens</i>	0-1	-
	star gilia	GIST	<i>Gilia stellata</i>	0-1	-
	California mustard	GULA4	<i>Guillenia lasiophylla</i>	0-1	-

	Palmer's grapplinghook	HAPA7	<i>Harpagonella palmeri</i>	0-1	-
	bristly scaleseed	SPEC2	<i>Spermolepis echinata</i>	0-1	-
	woollyhead neststraw	STMI2	<i>Stylocline micropoides</i>	0-1	-
	sand fringe pod	THCU	<i>Thysanocarpus curvipes</i>	0-1	-
	Louisiana vetch	VILU	<i>Vicia ludoviciana</i>	0-1	-
	false carrot	YAMI	<i>Yabea microcarpa</i>	0-1	-
	distant phacelia	PHDI	<i>Phacelia distans</i>	0-1	-
	slimjim bean	PHFI3	<i>Phaseolus filiformis</i>	0-1	-
	Lemmon's ragwort	SELE8	<i>Senecio lemmonii</i>	0-1	-
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	0-1	-
	lipfern	CHEIL	<i>Cheilanthes</i>	0-1	-
	Chiricahua Mountain sandmat	CHFL3	<i>Chamaesyce florida</i>	0-1	-
	wedgeleaf draba	DRCU	<i>Draba cuneifolia</i>	0-1	-
	Abert's buckwheat	ERAB2	<i>Eriogonum abertianum</i>	0-1	-
	devil's spineflower	CHRI	<i>Chorizanthe rigida</i>	0-1	-
	Esteve's pincushion	CHST	<i>Chaenactis stevioides</i>	0-1	-
	New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	0-1	-
	sand pygmyweed	CRCO	<i>Crassula connata var. connata</i>	0-1	-
	cryptantha	CRYPT	<i>Cryptantha</i>	0-1	-
	hairy prairie clover	DAMO	<i>Dalea mollis</i>	0-1	-
	hoary bowlesia	BOIN3	<i>Bowlesia incana</i>	0-1	-
	California suncup	CACA32	<i>Camissonia californica</i>	0-1	-
	browneyes	CACL4	<i>Camissonia claviformis</i>	0-1	-
	yellow tackstem	CAPA7	<i>Calycoseris parryi</i>	0-1	-
	white tackstem	CAWR	<i>Calycoseris wrightii</i>	0-1	-
	whitemargin sandmat	CHAL11	<i>Chamaesyce albomarginata</i>	0-1	-
	white easterbonnets	ANLA7	<i>Antheropeas lanosum</i>	0-1	-
	fringed amaranth	AMFI	<i>Amaranthus fimbriatus</i>	0-1	-
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	0-1	-

Shrub/Vine

7	Dominant large shrubs			56-224	
	creosote bush	LATRT	<i>Larrea tridentata var. tridentata</i>	56-202	-
	whitethorn acacia	ACCO2	<i>Acacia constricta</i>	0-112	-
	ocotillo	FOSP2	<i>Fouquieria splendens</i>	0-28	-
8	Dominant half shrubs			28-112	
	desert zinnia	ZIAC	<i>Zinnia acerosa</i>	22-56	-
	triangle bur ragweed	AMDE4	<i>Ambrosia deltoidea</i>	0-28	-
	brittlebush	ENFA	<i>Encelia farinosa</i>	0-22	-
	littleleaf ratany	KRER	<i>Krameria erecta</i>	1-22	-
	rough menodora	MESC	<i>Menodora scabra</i>	0-22	-
	whitestem paperflower	PSCO2	<i>Psilostrophe cooperi</i>	1-11	-
	woody crinkle mat	TICAC	<i>Tiquilia canescens var. canescens</i>	0-11	-
	white ratany	KRGR	<i>Krameria grayi</i>	0-11	-

	button brittlebush	ENFR	<i>Encelia frutescens</i>	0-11	-
	burrobush	AMDU2	<i>Ambrosia dumosa</i>	0-6	-
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0-6	-
	pricklyleaf dogweed	THAC	<i>Thymophylla acerosa</i>	0-6	-
	threadleaf snakeweed	GUMI	<i>Gutierrezia microcephala</i>	0-2	-
9	Miscellaneous shrubs			0-34	
	Warnock's snakewood	COWA	<i>Condalia warnockii</i>	0-6	-
	mariola	PAIN2	<i>Parthenium incanum</i>	0-6	-
	jojoba	SICH	<i>Simmondsia chinensis</i>	0-6	-
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0-3	-
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	0-3	-
	plains blackfoot	MELE2	<i>Melampodium leucanthum</i>	0-3	-
	common sotol	DAWH2	<i>Dasyllirion wheeleri</i>	0-2	-
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	0-2	-
	banana yucca	YUBA	<i>Yucca baccata</i>	0-2	-
	Joshua tree	YUBR	<i>Yucca brevifolia</i>	0-2	-
	Eastern Mojave buckwheat	ERFA2	<i>Eriogonum fasciculatum</i>	0-2	-
	sangre de cristo	JACA2	<i>Jatropha cardiophylla</i>	0-2	-
	catclaw acacia	ACGR	<i>Acacia greggii</i>	0-2	-
	rayless goldenhead	ACSP	<i>Acamptopappus sphaerocephalus</i>	0-1	-
	Wright's beebrush	ALWR	<i>Aloysia wrightii</i>	0-1	-
	pelotazo	ABIN	<i>Abutilon incanum</i>	0-1	-
	soaptree yucca	YUEL	<i>Yucca elata</i>	0-1	-
	lotebush	ZIOB	<i>Ziziphus obtusifolia</i>	0-1	-
	Coulter's brickellbush	BRCO	<i>Brickellia coulteri</i>	0-1	-
	fairyduster	CAER	<i>Calliandra eriophylla</i>	0-1	-
	knifeleaf condalia	COSP3	<i>Condalia spathulata</i>	0-1	-
	longleaf jointfir	EPTR	<i>Ephedra trifurca</i>	0-1	-
	water jacket	LYAN	<i>Lycium andersonii</i>	0-1	-
	Berlandier's wolfberry	LYBE	<i>Lycium berlandieri</i>	0-1	-
	Arizona desert-thorn	LYEX	<i>Lycium exsertum</i>	0-1	-
	American threefold	TRCA8	<i>Trixis californica</i>	0-1	-
	Parish's goldeneye	VIPA14	<i>Viguiera parishii</i>	0-1	-
10	Succulents			6-50	
	saguaro	CAG10	<i>Carnegiea gigantea</i>	0-22	-
	cactus apple	OPEN3	<i>Opuntia engelmannii</i>	1-11	-
	purple pricklypear	OPMA8	<i>Opuntia macrocentra</i>	0-6	-
	tulip pricklypear	OPPH	<i>Opuntia phaeacantha</i>	1-6	-
	teddybear cholla	CYBI9	<i>Cylindropuntia bigelovii</i>	0-6	-
	walkingstick cactus	CYSP8	<i>Cylindropuntia spinosior</i>	0-6	-
	staghorn cholla	CYVE3	<i>Cylindropuntia versicolor</i>	1-6	-
	jumping cholla	CYFU10	<i>Cylindropuntia fulgida</i>	0-3	-
	Christmas cactus	CYLE8	<i>Cylindropuntia leptocaulis</i>	0-3	-

	candy barrelcactus	FEWI	<i>Ferocactus wislizeni</i>	0–2	–
	buck-horn cholla	CYAC8	<i>Cylindropuntia acanthocarpa</i>	0–2	–
	Arizona pencil cholla	CYAR14	<i>Cylindropuntia arbuscula</i>	0–2	–
	candle cholla	CYKL	<i>Cylindropuntia kleiniae</i>	0–1	–
	Engelmann's hedgehog cactus	ECEN	<i>Echinocereus engelmannii</i>	0–1	–
	redspine fishhook cactus	ECER2	<i>Echinomastus erectocentrus</i>	0–1	–
	pinkflower hedgehog cactus	ECFA	<i>Echinocereus fasciculatus</i>	0–1	–
	Nichol's echinocactus	ECHON	<i>Echinocactus horizonthalonius var. nicholii</i>	0–1	–
	spiny star	ESVIV	<i>Escobaria vivipara var. vivipara</i>	0–1	–
	Scheer's beehive cactus	COROS	<i>Coryphantha robustispina ssp. scheeri</i>	0–1	–
	desert agave	AGDE	<i>Agave deserti</i>	0–1	–
	devil's cholla	GRKU	<i>Grusonia kunzei</i>	0–1	–
	Graham's nipple cactus	MAGR9	<i>Mammillaria grahamii</i>	0–1	–
	Thornber's nipple cactus	MATH	<i>Mammillaria thornberi</i>	0–1	–
	beavertail pricklypear	OPBA2	<i>Opuntia basilaris</i>	0–1	–
Tree					
11	Trees			6–112	
	yellow paloverde	PAMI5	<i>Parkinsonia microphylla</i>	6–112	–
	velvet mesquite	PRVE	<i>Prosopis velutina</i>	0–22	–
	desert ironwood	OLTE	<i>Olneya tesota</i>	0–22	–
	crucifixion thorn	CAHO3	<i>Canotia holacantha</i>	0–11	–

Animal community

The plant community on this site is suitable for grazing by cattle primarily in the spring and / or summer growing seasons when annual forbs and grasses are available. Forage species can grow year-round with available moisture. High pH due to lime may tie up soil nutrients and influence forage species palatability.

Water developments are very important to wildlife species on this site. Vegetative cover and forage diversity are suitable for a variety of small desert mammals and birds and their predators.

Hydrological functions

This site has deep coarse textured soils and moderate to gentle slopes making it a poor producer of runoff.

Recreational uses

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

Wood products

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

Other products

Cactus fruits from saguaro, prickly pear and cholla. Saguaro ribs and ocotillo canes.

Creosote used medicinally.

Inventory data references

Range 417s include 4 in good condition.

Type locality

Location 1: Pima County, AZ	
Township/Range/Section	T18S R14E S30
General legal description	Santa Rita Experimental Range, Gravelly Ridge enclosure. Northern end of fenced area. Fence built in 1937.
Location 2: Pima County, AZ	
Township/Range/Section	T14S R10E S34
General legal description	La Tortuga Ranch, Yodi Pasture at transect # 37. Concrete dam nearby in canyon. Was ungrazed for 20 years.
Location 3: Pima County, AZ	
Township/Range/Section	T14S R13E S16
General legal description	Tumamoc Hill Reserve, Desert Laboratory UA, Northwest corner.

Other references

The Changing Mile - Revisited. Ray Turner, Robert Webb, University of Arizona Press, Tucson, Arizona, 2003.
Photo Station 81

Contributors

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Rangeland health reference sheet

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

Author(s)/participant(s)	Dave Womack, Dan Robinett, Emilio Carrillo
Contact for lead author	NRCS Tucson Area Office
Date	03/08/2005
Approved by	S. Cassady
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are common and continuous in absence of high gravel cover.
-

2. **Presence of water flow patterns:** Water flow patterns are common, continuous, occupy 15-20% of area.
-
3. **Number and height of erosional pedestals or terracettes:** Accumulated pedestals on most perennial plants, not so much so in high gravel cover areas, 2-5 inches high. Erosional pedestals not present on most perennial plants.
-
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 10-60% (low values in high gravel cover areas and/or El Nino years).
-
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):** Woody litter mostly stays under plant canopy, herbaceous litter can travel long distances.
-
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface resistance to erosion is good under shrub canopies to moderate in interspaces due to crusts formed by raindrop impact.
-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Weak thin platy to weak granular; color is 7.5-10YR6-2-4 dry, 7.5-10YR4/4 moist; thickness to 4 inches
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Canopy 20-25%; basal 1-2%; 50-60% canopy cover is shrubs, 15-20% trees, and 15-20% succulents. 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
-
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: shrubs > sub shrubs > trees > succulents > forbs = perennial grasses (In ""El Nino"" years, the production of winter annuals can exceed all other plants.
- Sub-dominant:
- Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** 10-50% canopy mortality.
-

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):** 99 lbs/ac unfavorable precipitation; 400 lbs/ac normal precipitation; 820 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:** schismus, filaree, malta starthistle
-

17. **Perennial plant reproductive capability:** Not impaired for shrubs, drought impaired for perennial grasses and forbs.
-