USDA Natural Resources Conservation Service

Ecological site R040XA129AZ
Limy Hills 10"-13" p.z.

Accessed: 05/17/2024

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): 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.**
R040XA123AZ	**Volcanic Hills 10"-13" P.Z.**

Similar sites

R040XB219AZ	**Schist Hills 7"-10" p.z.**
R038XA118AZ	**Basalt / Sandstone Hills 12-16" p.z.**

Table 1. Dominant plant species

Tree	(1) *Parkinsonia microphylla* (2) *Carnegia gigantea*
Shrub	(1) *Encelia farinosa* (2) *Larrea tridentata*
Herbaceous	(1) *Aristida purpurea* (2) *muhlenbergia porteri*

Physiographic features

This site occurs in the upper elevations of the Sonoran Desert in southern Arizona. Slope aspect is site differentiating at elevations near common resource area boundaries. It occurs on moderately steep hill-slopes and ridge-tops.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	671–1,128 m
Slope	15–45%
Aspect	N, E, S

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 are shallow soils formed on metamorphic and volcanic rock, breccia and agglomerates. Bedrock is cracked and weathered offering good opportunity for root growth. Soils are calcareous and have lime accumulations in the fractures of the bedrock material. Soil surfaces have very well developed covers of gravels and cobbles. Areas of rock outcrop range from 1 to 10%. Talus areas or rock slides can make up 5 to 10% of the area. Plant-soil moisture relationships are fair.
Soils mapped on this site include:
SSA-661 Eastern Pinal and Southern Gila Counties MU's 48 & 74 Pantano.

Table 4. Representative soil features

Surface texture	(1) Gravelly sandy loam (2) Very gravelly sandy loam (3) Channery sandy loam
Family particle size	(1) Loamy
Drainage class	Excessively drained to well drained
Permeability class	Rapid to moderately rapid
Soil depth	13–51 cm
Surface fragment cover <=3"	40–80%
Surface fragment cover >3"	5–20%
Available water capacity (0-101.6cm)	1.02–3.81 cm
Calcium carbonate equivalent (0-101.6cm)	5–15%
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)	35–60%
Subsurface fragment volume >3" (Depth not specified)	0–10%

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

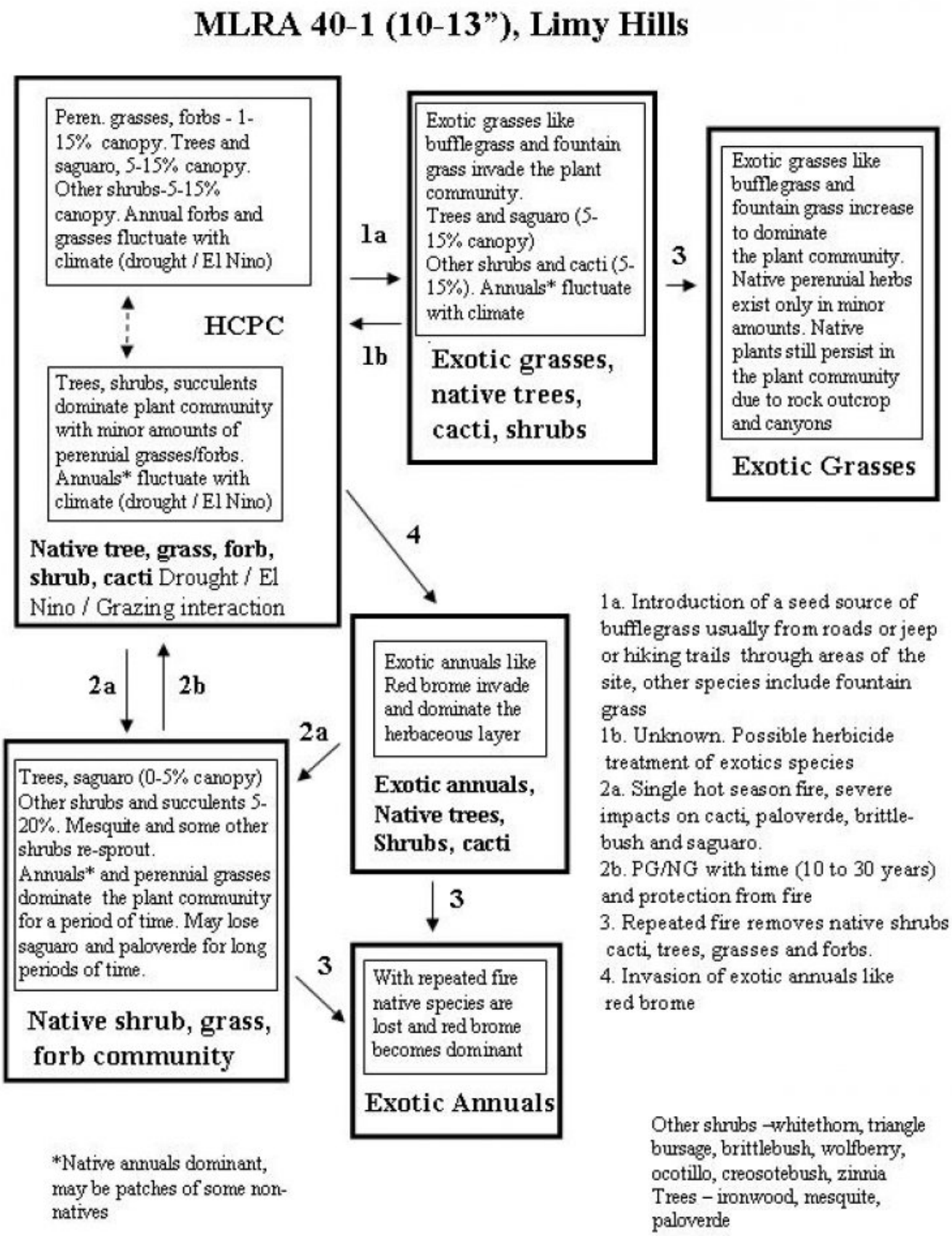

Figure 4. State and Transition model, Limy Hills 10-13" pz.

State 1
Historical Climax Plant Community

Community 1.1
Historical Climax Plant Community

The potential plant community is a diverse mixture of desert shrubs, trees, cacti, and perennial grasses and forbs. The aspect is shrubland. With continuous, heavy grazing, herbaceous forage species and palatable half shrubs are removed from the plant community and replaced by increases in shrubby species like littleleaf paloverde, white brittlebush, creosotebush, ocotillo, triangle bursage, and cholla. Gravel and cobble covers are continuous but lack the size necessary to prevent erosion on steep slopes if the plant cover has been depleted. This site lacks stone or large cobble covers to protect forage speices from heavy utilization. Plant populations of major shrubs range from 50 to 100 per acre for littleaf paloverde, 10 to 100 for ocotillo, 50 to 150 for creosotebush, 75 to 150 for large shrubs including jojoba and wolfberry, 10 to 50 for mormon tea, and 50 to 200 plants per acre for the brittlebush and bursage group. North exposures have a higher percentage cover of perennial grasses and suffrutescent forbs than warm exposures. Grass canopy cover ranges from 0-5% on north slopes and 0-1% on south slopes. Forb cover ranges from 1-15% on north slopes and 0-2% on south slopes. Warm exposures have a higher percentage of trees and succulents than north slopes. The half shrub community on north slopes is dominated by species like calliandra, goldeneye, flatop buckwheat and mormon tea while on south slopes brittlebush, white ratany and bursage are dominant. Jojoba will have its higher cover on north aspects while southern aspects will have more ocotillo, creosotebush, whitethorn and wolfberry. The percent of annual forbs and grasses in the plant community can range from 1% in dry years to nearly 50% in very wet winters or summers. The yearly production of annuals ranges from 2 lbs per acre to over 400 lbs. per acre (from dry year to wet year). Severe drought can reduce the cover of perennial grasses and suffrutescent forbs to less than 1%. Drought can also reduce the cover of sub-shrubs like brittlebush and bursage. The dynamics of Saguaro on this site is unlike the 200-300 year cycle found on deep upland sites in the Upper Sonoran desert. Saguaro recruitment can occur in any favorable year due to numerous rocky habitats favorable for establishment. Saguaro populations tend to be multi-aged and persistent on this site although very favorable years for establishment may result in very heavy stands on some slopes many years later.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	135	291	426
Forb	22	112	303
Grass/Grasslike	8	84	224
Tree	45	112	168
Total	**210**	**599**	**1121**

Table 6. Soil surface cover

Tree basal cover	0-1%
Shrub/vine/liana basal cover	1-2%
Grass/grasslike basal cover	0-1%
Forb basal cover	0-1%
Non-vascular plants	0%
Biological crusts	0-5%
Litter	5-45%
Surface fragments >0.25" and <=3"	40-60%
Surface fragments >3"	5-20%
Bedrock	1-10%
Water	0%
Bare ground	5-20%

Table 7. Canopy structure (% cover)

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

Figure 6. Plant community growth curve (percent production by month). AZ4011, 40.1 10-13" p.z. hill 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	15	20	5	5	10	15	15	5	5	0

State 2
Native trees, cacti, shrubs and fire

Community 2.1
Native trees, cacti, shrubs and fire

This plant community occurs as a result of a single hot season fire. Paloverde, ironwood 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, wolfberry and whitethorn 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 3
Exotic perennial grasses with natives

Community 3.1
Exotic perennial grasses with natives

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

State 4
Exotic perennial grasses and fire

Community 4.1
Exotic perennial grasses and fire

This community occurs where a native plant community that has been invaded by bufflegrass or fountain grass has burned one or more times. Increasing amounts of bufflegrass 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 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 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 occurence due to an increased source of ignitions.

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 perennial grasses**			6–78	
	bush muhly	MUPO2	*Muhlenbergia porteri*	6–34	–
	slim tridens	TRMU	*Tridens muticus*	6–22	–
	purple threeawn	ARPU9	*Aristida purpurea*	1–22	–
	Parish's threeawn	ARPUP5	*Aristida purpurea var. parishii*	0–22	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	1–17	–
	blue threeawn	ARPUN	*Aristida purpurea var. nealleyi*	0–11	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	0–11	–
	nineawn pappusgrass	ENDE	*Enneapogon desvauxii*	0–6	–
2	**Miscellaneous perennial grasses**			0–34	
	spidergrass	ARTE3	*Aristida ternipes*	0–11	–
	black grama	BOER4	*Bouteloua eriopoda*	0–11	–
	slender grama	BORE2	*Bouteloua repens*	0–6	–
	red grama	BOTR2	*Bouteloua trifida*	0–6	–
	tanglehead	HECO10	*Heteropogon contortus*	0–6	–
	curly-mesquite	HIBE	*Hilaria belangeri*	0–6	–
	Hall's panicgrass	PAHA	*Panicum hallii*	0–6	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	0–2	–
	big galleta	PLRI3	*Pleuraphis rigida*	0–2	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	0–2	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–2	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–2	–

	cane bluestem	BOBA3	*Bothriochloa barbinodis*	0–1	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	0–1	–
	Arizona cottontop	DICA8	*Digitaria californica*	0–1	–
	fall witchgrass	DICO6	*Digitaria cognata*	0–1	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	0–1	–
3	**Annual grasses**			2–112	
	mucronate sprangeltop	LEPAB	*Leptochloa panicea ssp. brachiata*	1–22	–
	sixweeks threeawn	ARAD	*Aristida adscensionis*	1–22	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	1–22	–
	Mexican panicgrass	PAHI5	*Panicum hirticaule*	0–17	–
	Mexican sprangletop	LEFUU	*Leptochloa fusca ssp. uninervia*	0–11	–
	prairie threeawn	AROL	*Aristida oligantha*	0–6	–
	Rothrock's grama	BORO2	*Bouteloua rothrockii*	0–6	–
	Eastwood fescue	VUMIC	*Vulpia microstachys var. ciliata*	0–6	–
	Pacific fescue	VUMIP	*Vulpia microstachys var. pauciflora*	0–6	–
	needle grama	BOAR	*Bouteloua aristidoides*	0–2	–
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–2	–
	Bigelow's bluegrass	POBI	*Poa bigelovii*	0–2	–
	delicate muhly	MUFR	*Muhlenbergia fragilis*	0–2	–
	littleseed muhly	MUMI	*Muhlenbergia microsperma*	0–2	–
	witchgrass	PACA6	*Panicum capillare*	0–2	–
	Madagascar dropseed	SPPY2	*Sporobolus pyramidatus*	0–1	–
	Arizona brome	BRAR4	*Bromus arizonicus*	0–1	–
	canyon cupgrass	ERLE7	*Eriochloa lemmonii*	0–1	–
	desert lovegrass	ERPEM	*Eragrostis pectinacea var. miserrima*	0–1	–
	tufted lovegrass	ERPEP2	*Eragrostis pectinacea var. pectinacea*	0–1	–
Forb					
4	**Ferns and fern allies**			2–17	
	cliffbrake	PELLA	*Pellaea*	1–6	–
	Arizona spikemoss	SEAR2	*Selaginella arizonica*	0–6	–
	lipfern	CHEIL	*Cheilanthes*	1–6	–
	cloak fern	NOTHO	*Notholaena*	0–1	–
5	**Perennial forbs**			17–84	
	slender janusia	JAGR	*Janusia gracilis*	6–11	–
	Coues' cassia	SECO10	*Senna covesii*	1–11	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	1–11	–
	lacy tansyaster	MAPIP4	*Machaeranthera pinnatifida ssp. pinnatifida var. pinnatifida*	6–11	–
	rough menodora	MESC	*Menodora scabra*	0–11	–
	slender poreleaf	POGR5	*Porophyllum gracile*	0–6	–
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	0–6	–
	Parry's false prairie-clover	MAPA7	*Marina parryi*	1–6	–
	San Felipe dogweed	ADPO	*Adenophyllum porophylloides*	0–6	–

	weakleaf bur ragweed	AMCO3	*Ambrosia confertiflora*	0–6	–
	narrowleaf silverbush	ARLA12	*Argythamnia lanceolata*	0–6	–
	wishbone-bush	MILAV	*Mirabilis laevis var. villosa*	0–2	–
6	**Annual forbs and minor perennials**			3–202	
	California poppy	ESCAM	*Eschscholzia californica ssp. mexicana*	0–45	–
	Coulter's lupine	LUSP2	*Lupinus sparsiflorus*	0–45	–
	phacelia	PHACE	*Phacelia*	0–34	–
	desert Indianwheat	PLOV	*Plantago ovata*	0–28	–
	bristly fiddleneck	AMTE3	*Amsinckia tessellata*	0–28	–
	exserted Indian paintbrush	CAEXE	*Castilleja exserta ssp. exserta*	0–22	–
	western tansymustard	DEPI	*Descurainia pinnata*	0–17	–
	shaggyfruit pepperweed	LELA	*Lepidium lasiocarpum*	0–11	–
	coastal bird's-foot trefoil	LOSAB	*Lotus salsuginosus var. brevivexillus*	0–11	–
	thelypody	THELY	*Thelypodium*	0–11	–
	woolly tidestromia	TILA2	*Tidestromia lanuginosa*	0–11	–
	Coulter's spiderling	BOCO2	*Boerhavia coulteri*	0–11	–
	cryptantha	CRYPT	*Cryptantha*	0–6	–
	combseed	PECTO	*Pectocarya*	0–6	–
	lyreleaf jewelflower	STCA5	*Streptanthus carinatus*	0–6	–
	sleepy silene	SIAN2	*Silene antirrhina*	0–6	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	0–6	–
	flatcrown buckwheat	ERDE6	*Eriogonum deflexum*	1–2	–
	trailing windmills	ALIN	*Allionia incarnata*	1–2	–
	largeflower onion	ALMA4	*Allium macropetalum*	0–1	–
	weakleaf bur ragweed	AMCO3	*Ambrosia confertiflora*	0–1	–
	carelessweed	AMPA	*Amaranthus palmeri*	0–1	–
	brownfoot	ACWR5	*Acourtia wrightii*	0–1	–
	bigseed alfalfa dodder	CUIN	*Cuscuta indecora*	0–1	–
	American wild carrot	DAPU3	*Daucus pusillus*	0–1	–
	desert larkspur	DEPA	*Delphinium parishii*	0–1	–
	whitemargin sandmat	CHAL11	*Chamaesyce albomarginata*	0–1	–
	brittle spineflower	CHBR	*Chorizanthe brevicornu*	0–1	–
	lipfern	CHEIL	*Cheilanthes*	0–1	–
	goosefoot	CHENO	*Chenopodium*	0–1	–
	New Mexico thistle	CINE	*Cirsium neomexicanum*	0–1	–
	hoary bowlesia	BOIN3	*Bowlesia incana*	0–1	–
	Tucson Mountain spiderling	BOME	*Boerhavia megaptera*	0–1	–
	Arizona wrightwort	CAAR7	*Carlowrightia arizonica*	0–1	–
	fringed redmaids	CACI2	*Calandrinia ciliata*	0–1	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–1	–
	New Mexico silverbush	ARNE2	*Argythamnia neomexicana*	0–1	–
	perennial rockcress	ARPE2	*Arabis perennans*	0–1	–

	aster	ASTER	*Aster*	0–1	–
	desert marigold	BAMU	*Baileya multiradiata*	0–1	–
	scarlet spiderling	BOCO	*Boerhavia coccinea*	0–1	–
	miniature woollystar	ERDI2	*Eriastrum diffusum*	0–1	–
	spreading fleabane	ERDI4	*Erigeron divergens*	0–1	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–1	–
	buckwheat	ERIOG	*Eriogonum*	0–1	–
	tall mountain larkspur	DESC	*Delphinium scaposum*	0–1	–
	green carpetweed	MOVE	*Mollugo verticillata*	0–1	–
	bristly nama	NAHI	*Nama hispidum*	0–1	–
	glandular threadplant	NEGL	*Nemacladus glanduliferus*	0–1	–
	evening primrose	OENOT	*Oenothera*	0–1	–
	Florida pellitory	PAFL3	*Parietaria floridana*	0–1	–
	shrubby deervetch	LORI3	*Lotus rigidus*	0–1	–
	Coulter's globemallow	SPCO2	*Sphaeralcea coulteri*	0–1	–
	glandleaf milkwort	POMA7	*Polygala macradenia*	0–1	–
	chia	SACO6	*Salvia columbariae*	0–1	–
	Arizona popcornflower	PLAR	*Plagiobothrys arizonicus*	0–1	–
	Coulter's lyrepod	LYCO4	*Lyrocarpa coulteri*	0–1	–
	whitestem blazingstar	MEAL6	*Mentzelia albicaulis*	0–1	–
	woollyhead neststraw	STMI2	*Stylocline micropoides*	0–1	–
	sand fringepod	THCU	*Thysanocarpus curvipes*	0–1	–
	noseburn	TRAGI	*Tragia*	0–1	–
	vervain	VERBE	*Verbena*	0–1	–
Shrub/Vine					
7	**Dominant half shrubs**			34–112	
	triangle bur ragweed	AMDE4	*Ambrosia deltoidea*	11–56	–
	brittlebush	ENFA	*Encelia farinosa*	11–56	–
	desert zinnia	ZIAC	*Zinnia acerosa*	6–28	–
	whitestem paperflower	PSCO2	*Psilostrophe cooperi*	1–17	–
	littleleaf ratany	KRER	*Krameria erecta*	1–11	–
	fairyduster	CAER	*Calliandra eriophylla*	0–11	–
	white ratany	KRGR	*Krameria grayi*	1–6	–
	sangre de cristo	JACA2	*Jatropha cardiophylla*	1–6	–
8	**Dominant large shrubs**			73–179	
	ocotillo	FOSP2	*Fouquieria splendens*	28–56	–
	creosote bush	LATRT	*Larrea tridentata var. tridentata*	28–56	–
	jojoba	SICH	*Simmondsia chinensis*	1–56	–
	whitethorn acacia	ACCO2	*Acacia constricta*	6–22	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	0–11	–
	Berlandier's wolfberry	LYBE	*Lycium berlandieri*	1–11	–
	water jacket	LYAN	*Lycium andersonii*	0–6	–
	catclaw acacia	ACGR	*Acacia greggii*	0–6	–
9	**Miscellaneous shrubs**			1–22	

	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–6	–
	Warnock's snakewood	COWA	*Condalia warnockii*	0–2	–
	Sonoran croton	CRSO	*Croton sonorae*	0–1	–
	Eastern Mojave buckwheat	ERFA2	*Eriogonum fasciculatum*	0–1	–
	bastardsage	ERWR	*Eriogonum wrightii*	0–1	–
	starry bedstraw	GAST	*Galium stellatum*	0–1	–
	desert lavender	HYEM	*Hyptis emoryi*	0–1	–
	crown of thorns	KOSP	*Koeberlinia spinosa*	0–1	–
	Arizona desert-thorn	LYEX	*Lycium exsertum*	0–1	–
	Arizona mimosa	MIDIL	*Mimosa distachya var. laxiflora*	0–1	–
	mariola	PAIN2	*Parthenium incanum*	0–1	–
	arrow poision plant	SEBI9	*Sebastiania bilocularis*	0–1	–
	woody crinklemat	TICAC	*Tiquilia canescens var. canescens*	0–1	–
	American threefold	TRCA8	*Trixis californica*	0–1	–
	Parish's goldeneye	VIPA14	*Viguiera parishii*	0–1	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	0–1	–
	pelotazo	ABIN	*Abutilon incanum*	0–1	–
	California copperleaf	ACCA3	*Acalypha californica*	0–1	–
	rayless goldenhead	ACSP	*Acamptopappus sphaerocephalus*	0–1	–
	Wright's beebrush	ALWR	*Aloysia wrightii*	0–1	–
	spiny hackberry	CEEH	*Celtis ehrenbergiana*	0–1	–
	rosary babybonnets	COGL8	*Coursetia glandulosa*	0–1	–
	knifeleaf condalia	COSP3	*Condalia spathulata*	0–1	–
10	**Succulents**			28–112	
	saguaro	CAGI10	*Carnegiea gigantea*	6–45	–
	cactus apple	OPEN3	*Opuntia engelmannii*	11–34	–
	buck-horn cholla	CYAC8	*Cylindropuntia acanthocarpa*	11–22	–
	teddybear cholla	CYBI9	*Cylindropuntia bigelovii*	1–11	–
	jumping cholla	CYFU10	*Cylindropuntia fulgida*	1–11	–
	tulip pricklypear	OPPH	*Opuntia phaeacantha*	1–11	–
	organpipe cactus	STTH3	*Stenocereus thurberi*	0–11	–
	banana yucca	YUBA	*Yucca baccata*	0–6	–
	purple pricklypear	OPMA8	*Opuntia macrocentra*	0–6	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	1–6	–
	staghorn cholla	CYVE3	*Cylindropuntia versicolor*	0–6	–
	common sotol	DAWH2	*Dasylirion wheeleri*	0–2	–
	candy barrelcactus	FEWI	*Ferocactus wislizeni*	1–2	–
	redspine fishhook cactus	ECER2	*Echinomastus erectocentrus*	0–2	–
	dollarjoint pricklypear	OPCH	*Opuntia chlorotica*	0–2	–
	pinkflower hedgehog cactus	ECFE	*Echinocereus fendleri*	0–1	–
	rainbow cactus	ECPE	*Echinocereus pectinatus*	0–1	–
	spinystar	ESVIV	*Escobaria vivipara var. vivipara*	0–1	

	spinystar	ESVIV	*Escobaria vivipara var. vivipara*	0–1	–
	California barrel cactus	FECY	*Ferocactus cylindraceus*	0–1	–
	Emory's barrel cactus	FEEM	*Ferocactus emoryi*	0–1	–
	Graham's nipple cactus	MAGR9	*Mammillaria grahamii*	0–1	–
	Thornber's nipple cactus	MATH	*Mammillaria thornberi*	0–1	–
	Scheer's beehive cactus	COROS	*Coryphantha robustispina ssp. scheeri*	0–1	–
	Engelmann's hedgehog cactus	ECEN	*Echinocereus engelmannii*	0–1	–
	desert agave	AGDE	*Agave deserti*	0–1	–
Tree					
11	**Trees**			45–168	
	yellow paloverde	PAMI5	*Parkinsonia microphylla*	45–157	–
	desert ironwood	OLTE	*Olneya tesota*	1–22	–
	crucifixion thorn	CAHO3	*Canotia holacantha*	0–17	–
	velvet mesquite	PRVE	*Prosopis velutina*	0–17	–

Animal community

Steep slopes and gravelly surfaces somewhat hinder livestock distribution, but this is the easiest of the hillsites for cattle to traverse and the hillslopes trail easily. The site is not well suited to grazing by cows in the hot season but in areas where ridges trend north-south, distribution will be good even in summer as the west aspects are shady in the morning and the eastern exposures shady in the afternoon. Stocker cattle are best suited to use areas of this site. South aspects are used more in the winter due to warm temperatures and early greenup. North exposures, being shady and cooler, are used more in the fall due to longer green season. The plant community has a good variety of evergreen browse species making it especially good for winter-spring grazing. This site tends to be very dry, even in winter-spring when other hillsites have canyon and seep water.

Water developments are very important to wildlife species on this site. Cover, forage diversity, and topography are good enough for a variety of desert wildlife including the large mammals.

Hydrological functions

This site is a fair producer of runoff due to moderately steep slopes and shallow soils. Very gravelly and cobbly soil surfaces tend to hold water on the site.

Recreational uses

Hunting, hiking, bird watching, photography, horseback riding, rock hounding.

Wood products

Some paloverde, ironwood and mesquite for camp-fires and branding fires.

Other products

Stones and cobbles; decomposed gravels. Saguaro ribs, cholla skeletons and ocotillo canes. Tradtional foods like saguaro fruits, prickly pear tunas, cactus flower buds and jojoba nuts. Traditional herbs like coyote tobacco, mint bush, limberbush and creosotebush.

Inventory data references

Range 417s include 1 in good condition.

Type locality

Location 1: Gila County, AZ	
Township/Range/Section	T5S R16E S13
General legal description	San Carlos Field Office - Mineral Strip
Location 2: Pima County, AZ	
Township/Range/Section	T14S R12E S15
General legal description	Saguaro Nat. Park, Gates Pass. elevation 3100 ft.
Location 3: Pima County, AZ	
Township/Range/Section	T16S R5E S5
General legal description	1 mile SE of Ko Vaya village on the Tohono O'odham Indian Nation. South Comobabi Mountains.

Contributors

Dan Robinett
Larry D. Ellicott

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)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

   _____

2. **Presence of water flow patterns:**

   _____

3. **Number and height of erosional pedestals or terracettes:**

   _____

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

   _____

5. **Number of gullies and erosion associated with gullies:**

---

6. **Extent of wind scoured, blowouts and/or depositional areas:**

---

7. **Amount of litter movement (describe size and distance expected to travel):**

---

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

---

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

---

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:

    Sub-dominant:

    Other:

    Additional:

---

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

---

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):**

---

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:

---

17. **Perennial plant reproductive capability:**
