USDA Natural Resources Conservation Service

Ecological site R040XA105AZ
Shallow Hills 10"-13" p.z.

Accessed: 05/20/2025

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.

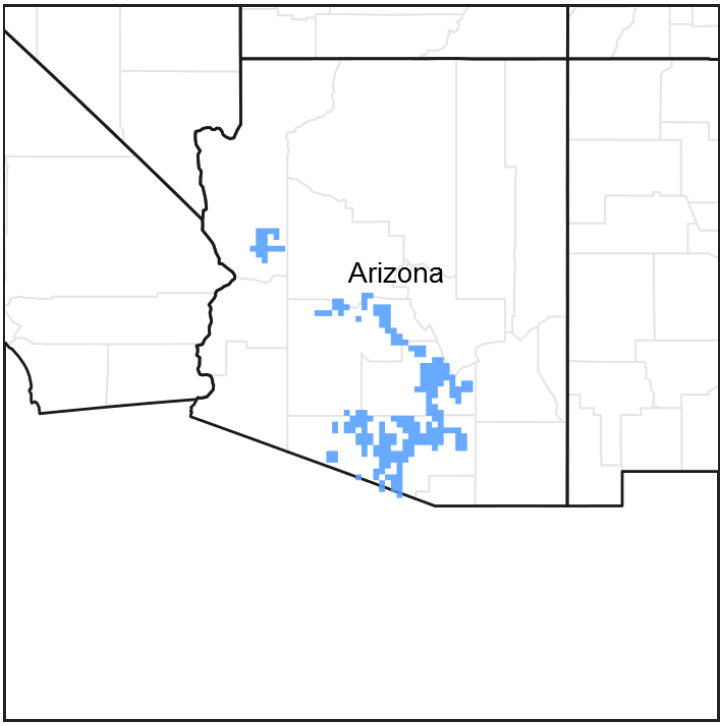


Figure 1. Mapped extent

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.

Classification relationships

This site is similar to TES map unit 365 (southern exposures) on the Prescott National Forest. It is also similar to TES map units 211, 242 and 250 on the Tonto National Forest.

Associated sites

R040XA119AZ	**Schist Hills 10"-13" p.z.**
R040XA121AZ	**Granitic Upland 10"-13" p.z.**
R040XA123AZ	**Volcanic Hills 10"-13" P.Z.**

Similar sites

R041XC306AZ	**Shallow Hills 12-16" p.z.**
R040XB206AZ	**Shallow Hills 7"-10" p.z.**
R038XA104AZ	**Granitic Hills 12-16" p.z.**
R040XA121AZ	**Granitic Upland 10"-13" p.z.**

Table 1. Dominant plant species

Tree	(1) *Parkinsonia microphylla* (2) *Carnegia gigantea*
Shrub	(1) *Ambrosia deltoidea*
Herbaceous	(1) *Selaginella* (2) *Janusia gracilis*

Physiographic features

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

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	671–1,219 m
Slope	15–60%
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 acid igneous parent material (granite, rhyolite) or quartzite, arkose, schist, and gneiss. Bedrock is usually slightly weathered into grus material at the soil juncture. They are non-calcareous, coarse textured, and have well developed covers of gravels and cobbles. Rock and gravel covers are light colored. Numerous areas of rock outcrop occur intermingled with soil areas. Outcrops can be as high as 25% of the area. Plant-soil moisture relationships are fair. Soils mapped on this site include: SSA-627 Southern Mohave County MU Topock-27; SSA-645 Aguila-Carefree MU's Gran-63 & Wickenburg-63; SSA-659 Western Pinal County MU Cellar-6; SSA-661 MU's Anklam-260, Cellar-250, 260, 865, Fig family-400, Gran-245 & Topock-400; SSA-669 Eastern Pima County MU's Anklam-2, Cellar-2, 13, 14 & 15 & Chimenea-15; SSA-703 Tohono O'odham MU's Anklam-2, Cellar-2 & Granolite-32.

Table 4. Representative soil features

Surface texture	(1) Very gravelly sandy loam (2) Gravelly sandy loam (3) Very cobbly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid to moderate
Soil depth	13–51 cm
Surface fragment cover <=3"	30–60%
Surface fragment cover >3"	5–25%
Available water capacity (0-101.6cm)	1.52–5.59 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	7.4–8
Subsurface fragment volume <=3" (Depth not specified)	35–65%

Subsurface fragment volume >3" (Depth not specified)	0–20%

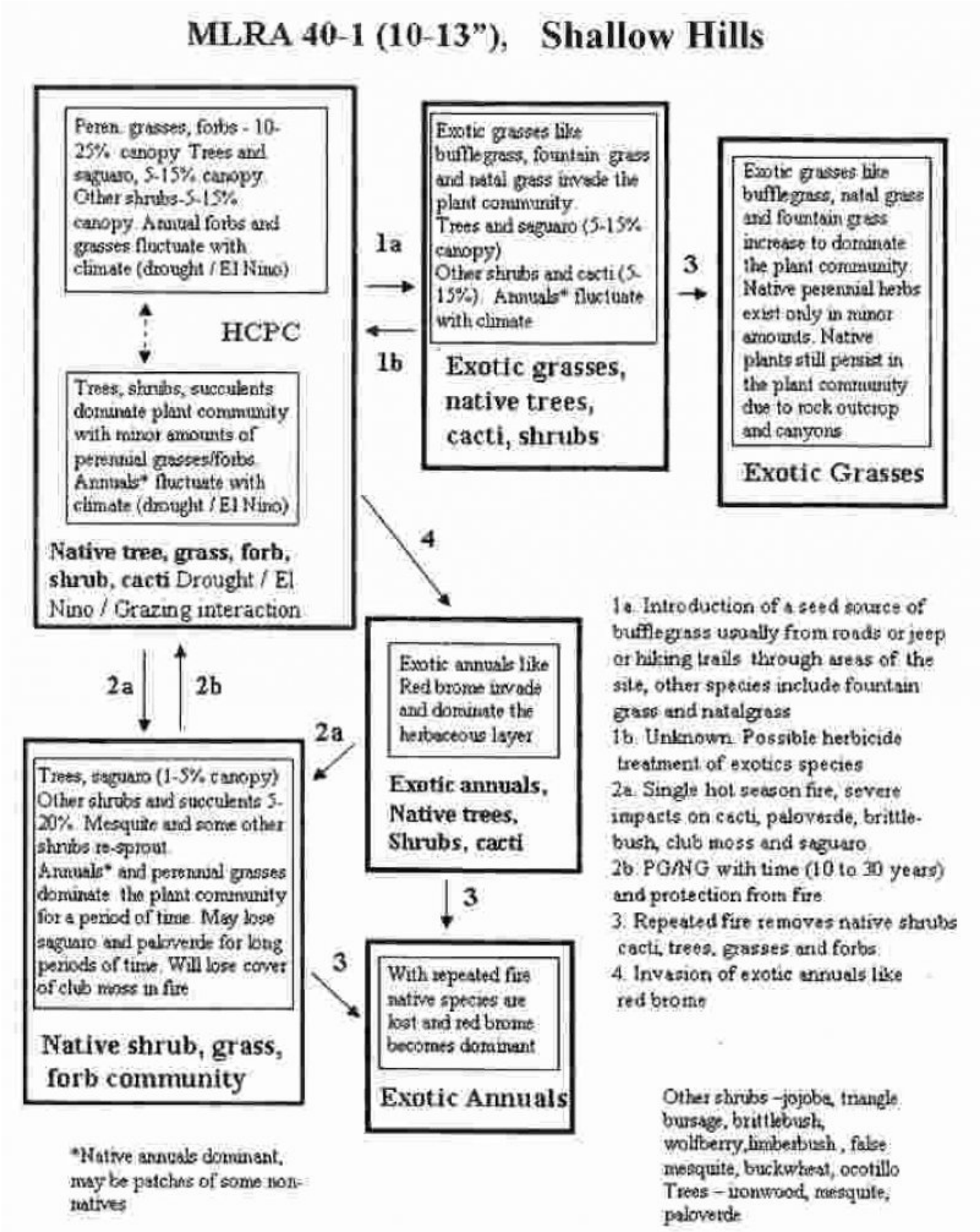
Ecological dynamics

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



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, perennial grasses, woody forbs, and clubmoss and ferns. The aspect is shrubland. With continuous, heavy grazing, herbaceous forage species are removed from the plant community and replaced by increases in shrubby species like triangle bursage, littleleaf paloverde, white brittlebrush, and cholla. Stone and gravel covers are continuous but size may be lacking to protect forage species from heavy utilization. Cover of club moss (SEAR2) ranges from 2 to 55% being heaviest on the cooler aspects and provides a great deal of soil stability on very steep slopes. Plant populations of major shrubs range from 200 to 800 per acre for jojoba; 10 to 100 per acre for littleleaf paloverde; 50 to 150 for ocotillo; and 650 to 1000 for the major half shrubs like brittlebush, flattop buckwheat, false mesquite, and triangle goldeneye. North exposures have a higher percentage cover of perennial grasses and forbs than warm exposures. Grass cover ranges from 0-5% on north slopes and 0-2% on south slopes. Suffrutescent forb cover ranges from 1-20% on north slopes and 0-5% 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, eriogonum, goldeneye and mormon tea while on south slopes brittlebush, ratany, limberbush and bursage are dominant. Jojoba will have higher cover on north aspects while southern aspects will have more ocotillo, whitethorn and wolfberry. The percent of annual forbs and grasses in the plant community can range from 5% in dry years to nearly 70% in very wet winters or summers. The yearly production of annuals ranges from 10 lbs per acre to over 1200 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, eriogonum 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	146	448	639
Grass/Grasslike	15	129	616
Forb	24	140	538
Tree	62	168	224
Total	**247**	**885**	**2017**

Table 6. Soil surface cover

Tree basal cover	1%
Shrub/vine/liana basal cover	1-5%
Grass/grasslike basal cover	0-1%
Forb basal cover	0-1%
Non-vascular plants	0%
Biological crusts	0-5%
Litter	5-60%
Surface fragments >0.25" and <=3"	30-60%
Surface fragments >3"	5-25%
Bedrock	1-10%
Water	0%
Bare ground	5-25%

Table 7. Canopy structure (% cover)

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

Figure 5. 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 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 bursage and brittlebush 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, natal grass or fountain grass invade the native plant community. These species occupy the niches of low shrubs like brittlebush or triangle bursage and woody forbs like janusia and twinberry.

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. 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 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**			6–112	
	bush muhly	MUPO2	*Muhlenbergia porteri*	1–34	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	1–28	–
	tanglehead	HECO10	*Heteropogon contortus*	1–28	–
	big galleta	PLRI3	*Pleuraphis rigida*	0–22	–
	Arizona cottontop	DICA8	*Digitaria californica*	0–17	–
2	**Short perennial grasses**			6–151	
	slender grama	BORE2	*Bouteloua repens*	2–129	–
	slim tridens	TRMU	*Tridens muticus*	1–22	–
3	**Miscellaneous perennial grasses**			2–67	
	spidergrass	ARTE3	*Aristida ternipes*	1–28	–
	curly-mesquite	HIBE	*Hilaria belangeri*	0–17	–
	Hall's panicgrass	PAHA	*Panicum hallii*	0–11	–
	spidergrass	ARTEG	*Aristida ternipes var. gentilis*	0–11	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	0–11	–
	purple threeawn	ARPU9	*Aristida purpurea*	0–11	–
	Parish's threeawn	ARPUP5	*Aristida purpurea var. parishii*	1–11	–

	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	0–11	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	0–6	–
	black grama	BOER4	*Bouteloua eriopoda*	0–6	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–6	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	0–6	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–6	–
	mesa dropseed	SPFL2	*Sporobolus flexuosus*	0–6	–
	green sprangletop	LEDU	*Leptochloa dubia*	0–2	–
	fall witchgrass	DICO6	*Digitaria cognata*	0–2	–
	nineawn pappusgrass	ENDE	*Enneapogon desvauxii*	0–2	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	0–1	–
4	**Annual grasses**			1–398	
	Mexican panicgrass	PAHI5	*Panicum hirticaule*	0–112	–
	sixweeks threeawn	ARAD	*Aristida adscensionis*	1–112	–
	mucronate sprangeltop	LEPAB	*Leptochloa panicea ssp. brachiata*	0–56	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	1–56	–
	prairie threeawn	AROL	*Aristida oligantha*	0–28	–
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–28	–
	Rothrock's grama	BORO2	*Bouteloua rothrockii*	0–22	–
	Bigelow's bluegrass	POBI	*Poa bigelovii*	0–22	–
	Eastwood fescue	VUMIC	*Vulpia microstachys var. ciliata*	0–17	–
	needle grama	BOAR	*Bouteloua aristidoides*	0–17	–
	delicate muhly	MUFR	*Muhlenbergia fragilis*	0–11	–
	littleseed muhly	MUMI	*Muhlenbergia microsperma*	0–11	–
	Pacific fescue	VUMIP	*Vulpia microstachys var. pauciflora*	0–11	–
	witchgrass	PACA6	*Panicum capillare*	0–6	–
	Mexican sprangletop	LEFUU	*Leptochloa fusca ssp. uninervia*	0–6	–
	Arizona brome	BRAR4	*Bromus arizonicus*	0–2	–

	feather fingergrass	CHVI4	*Chloris virgata*	0–2	–
	tapertip cupgrass	ERACA	*Eriochloa acuminata var. acuminata*	0–2	–
	bearded cupgrass	ERAR5	*Eriochloa aristata*	0–2	–
	desert lovegrass	ERPEM	*Eragrostis pectinacea var. miserrima*	0–2	–
	tufted lovegrass	ERPEP2	*Eragrostis pectinacea var. pectinacea*	0–2	–
	Grisebach's bristlegrass	SEGR6	*Setaria grisebachii*	0–2	–
	Arizona signalgrass	URAR	*Urochloa arizonica*	0–2	–
Forb					
5	**Ferns and fern allies**			11–123	
	Arizona spikemoss	SEAR2	*Selaginella arizonica*	11–112	–
	lipfern	CHEIL	*Cheilanthes*	1–6	–
	cliffbrake	PELLA	*Pellaea*	0–6	–
	cloak fern	NOTHO	*Notholaena*	0–1	–
6	**Perennial forbs**			11–67	
	slender janusia	JAGR	*Janusia gracilis*	6–45	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	6–22	–
	shrubby deervetch	LORI3	*Lotus rigidus*	0–11	–
	rough menodora	MESC	*Menodora scabra*	0–11	–
	slender poreleaf	POGR5	*Porophyllum gracile*	0–11	–
	wishbone-bush	MILAV	*Mirabilis laevis var. villosa*	0–6	–
	Parry's false prairie-clover	MAPA7	*Marina parryi*	0–6	–
	brownfoot	ACWR5	*Acourtia wrightii*	0–6	–
	weakleaf bur ragweed	AMCO3	*Ambrosia confertiflora*	1–6	–
	narrowleaf silverbush	ARLA12	*Argythamnia lanceolata*	0–6	–
	Arizona wrightwort	CAAR7	*Carlowrightia arizonica*	0–6	–

	desert rosemallow	HICO	*Hibiscus coulteri*	0–2	–
	San Felipe dogweed	ADPO	*Adenophyllum porophylloides*	0–2	–
7	**Annual forbs and minor perennials**			1–684	
	bristly fiddleneck	AMTE3	*Amsinckia tessellata*	0–112	–
	California poppy	ESCAM	*Eschscholzia californica ssp. mexicana*	0–112	–
	Coulter's lupine	LUSP2	*Lupinus sparsiflorus*	0–112	–
	goosefoot	CHENO	*Chenopodium*	0–56	–
	cryptantha	CRYPT	*Cryptantha*	0–56	–
	western tansymustard	DEPI	*Descurainia pinnata*	0–56	–
	desert Indianwheat	PLOV	*Plantago ovata*	0–56	–
	phacelia	PHACE	*Phacelia*	0–28	–
	milkvetch	ASTRA	*Astragalus*	0–28	–
	Coulter's spiderling	BOCO2	*Boerhavia coulteri*	0–17	–
	coastal bird's-foot trefoil	LOSA	*Lotus salsuginosus*	0–17	–
	woolly tidestromia	TILA2	*Tidestromia lanuginosa*	0–17	–
	thelypody	THELY	*Thelypodium*	0–11	–
	combseed	PECTO	*Pectocarya*	0–11	–
	coastal bird's-foot trefoil	LOSAB	*Lotus salsuginosus var. brevivexillus*	0–11	–
	American wild carrot	DAPU3	*Daucus pusillus*	0–11	–
	miniature woollystar	ERDI2	*Eriastrum diffusum*	0–11	–
	carelessweed	AMPA	*Amaranthus palmeri*	0–6	–
	shaggyfruit pepperweed	LELA	*Lepidium lasiocarpum*	0–6	–
	desert marigold	BAMU	*Baileya multiradiata*	0–6	–
	scarlet spiderling	BOCO	*Boerhavia coccinea*	0–6	–
	Tucson Mountain spiderling	BOME	*Boerhavia megaptera*	0–6	–
	New Mexico plumeseed	RANE	*Rafinesquia neomexicana*	0–6	–

	Coues' cassia	SECO10	*Senna covesii*	0–6	–
	sleepy silene	SIAN2	*Silene antirrhina*	0–6	–
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	0–6	–
	bluedicks	DICAC5	*Dichelostemma capitatum ssp. capitatum*	0–3	–
	Gordon's bladderpod	LEGO	*Lesquerella gordonii*	0–2	–
	lacy tansyaster	MAPIP4	*Machaeranthera pinnatifida ssp. pinnatifida var. pinnatifida*	0–2	–
	bean	PHASE	*Phaseolus*	0–2	–
	orange fameflower	PHAU13	*Phemeranthus aurantiacus*	0–2	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	0–2	–
	blazingstar	MENTZ	*Mentzelia*	0–2	–
	green carpetweed	MOVE	*Mollugo verticillata*	0–2	–
	bristly nama	NAHI	*Nama hispidum*	0–2	–
	desert tobacco	NIOBO	*Nicotiana obtusifolia var. obtusifolia*	0–2	–
	evening primrose	OENOT	*Oenothera*	0–2	–
	Florida pellitory	PAFL3	*Parietaria floridana*	0–2	–
	spreading fleabane	ERDI4	*Erigeron divergens*	0–2	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–2	–
	buckwheat	ERIOG	*Eriogonum*	0–2	–
	moleplant	EULA4	*Euphorbia lathyris*	0–2	–
	wild dwarf morning-glory	EVAR	*Evolvulus arizonicus*	0–2	–
	California fagonbush	FALA	*Fagonia laevis*	0–2	–
	desert larkspur	DEPA	*Delphinium parishii*	0–2	–
	tall mountain larkspur	DESC	*Delphinium scaposum*	0–2	–
	bigseed alfalfa dodder	CUIN	*Cuscuta indecora*	0–2	–
	hairy prairie clover	DAMO	*Dalea mollis*	0–2	–
	hyssopleaf sandmat	CHHY3	*Chamaesyce hyssopifolia*	0–2	–

	sandmat				
	New Mexico thistle	CINE	*Cirsium neomexicanum*	0–2	–
	climbing wartclub	BOSC	*Boerhavia scandens*	0–2	–
	fringed redmaids	CACI2	*Calandrinia ciliata*	0–2	–
	hoary bowlesia	BOIN3	*Bowlesia incana*	0–2	–
	dense ayenia	AYMI	*Ayenia microphylla*	0–2	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–2	–
	New Mexico silverbush	ARNE2	*Argythamnia neomexicana*	0–2	–
	jewels of Opar	TAPA2	*Talinum paniculatum*	0–2	–
	woollyhead neststraw	STMI2	*Stylocline micropoides*	0–2	–
	branched noseburn	TRRA5	*Tragia ramosa*	0–2	–
	Lemmon's ragwort	SELE8	*Senecio lemmonii*	0–2	–
	spreading fanpetals	SIAB	*Sida abutifolia*	0–2	–
	Parry's beardtongue	PEPA24	*Penstemon parryi*	0–2	–
	chia	SACO6	*Salvia columbariae*	0–1	–
	lyreleaf jewelflower	STCA5	*Streptanthus carinatus*	0–1	–
	Louisiana vetch	VILUL2	*Vicia ludoviciana ssp. ludoviciana*	0–1	–
	dwarf owl's-clover	TRPU16	*Triphysaria pusilla*	0–1	–
	sand fringepod	THCU	*Thysanocarpus curvipes*	0–1	–
	perennial rockcress	ARPE2	*Arabis perennans*	0–1	–
	tuber anemone	ANTU	*Anemone tuberosa*	0–1	–
	brittle spineflower	CHBR	*Chorizanthe brevicornu*	0–1	–
	Sonoran Indian mallow	ABMO2	*Abutilon mollicomum*	0–1	–
	Palmer's Indian mallow	ABPA	*Abutilon palmeri*	0–1	–
	trailing windmills	ALIN	*Allionia incarnata*	0–1	–
	largeflower onion	ALMA4	*Allium macropetalum*	0–1	–
	Davis Mountain mock vervain	GLBIC	*Glandularia bipinnatifida var. ciliata*	0–1	–

	mock vervain		*ciliata*		
	Newberry's velvetmallow	HONE	*Horsfordia newberryi*	0–1	–
	Arizona popcornflower	PLAR	*Plagiobothrys arizonicus*	0–1	–
	whitestem blazingstar	MEAL6	*Mentzelia albicaulis*	0–1	–
Shrub/Vine					
8	**Dominant small shrubs**			84–336	
	triangle bur ragweed	AMDE4	*Ambrosia deltoidea*	56–168	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	6–56	–
	brittlebush	ENFA	*Encelia farinosa*	11–56	–
	Eastern Mojave buckwheat	ERFA2	*Eriogonum fasciculatum*	1–45	–
	fairyduster	CAER	*Calliandra eriophylla*	6–45	–
	pelotazo	ABIN	*Abutilon incanum*	1–17	–
	Parish's goldeneye	VIPA14	*Viguiera parishii*	1–17	–
	bastardsage	ERWR	*Eriogonum wrightii*	1–17	–
9	**Miscellaneous shrubs**			34–135	
	jojoba	SICH	*Simmondsia chinensis*	22–67	–
	littleleaf ratany	KRER	*Krameria erecta*	0–11	–
	white ratany	KRGR	*Krameria grayi*	0–11	–
	Berlandier's wolfberry	LYBE	*Lycium berlandieri*	2–11	–
	Arizona desert-thorn	LYEX	*Lycium exsertum*	1–6	–
	American threefold	TRCA8	*Trixis californica*	0–6	–
	sangre de cristo	JACA2	*Jatropha cardiophylla*	0–6	–
	water jacket	LYAN	*Lycium andersonii*	0–6	–
	catclaw acacia	ACGR	*Acacia greggii*	1–6	–
	Wright's beebrush	ALWR	*Aloysia wrightii*	0–6	–
	pelotazo	ABIN	*Abutilon incanum*	0–6	–
	Florida hopbush	DOVI	*Dodonaea viscosa*	0–4	–
	California	ACCA3	*Acalypha californica*	0–3	–

	copperleaf				
	whitethorn acacia	ACCO2	*Acacia constricta*	0–2	–
	sweetbush	BEJU	*Bebbia juncea*	0–2	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	0–2	–
	rosary babybonnets	COGL8	*Coursetia glandulosa*	0–2	–
	ragged rockflower	CRBI2	*Crossosoma bigelovii*	0–2	–
	desert zinnia	ZIAC	*Zinnia acerosa*	0–2	–
	Arizona mimosa	MIDIL	*Mimosa distachya var. laxiflora*	0–2	–
	Schott's yellowhood	NISC	*Nissolia schottii*	0–2	–
	rock sage	SAPI2	*Salvia pinguifolia*	0–2	–
	arrow poision plant	SEBI9	*Sebastiania bilocularis*	0–2	–
	starry bedstraw	GAST	*Galium stellatum*	0–2	–
	creosote bush	LATRT	*Larrea tridentata var. tridentata*	0–1	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	0–1	–
	Arizona rosewood	VACA5	*Vauquelinia californica*	0–1	–
	Sonoran croton	CRSO	*Croton sonorae*	0–1	–
	Gray's prairie clover	DAGR	*Dalea grayi*	0–1	–
	knifeleaf condalia	COSP3	*Condalia spathulata*	0–1	–
	cliff goldenbush	ERCUC	*Ericameria cuneata var. cuneata*	0–1	–
	turpentine bush	ERLA12	*Ericameria laricifolia*	0–1	–
	Tahitian kidneywood	EYOR	*Eysenhardtia orthocarpa*	0–1	–
	desert olive	FOSH	*Forestiera shrevei*	0–1	–
	spiny hackberry	CEEH	*Celtis ehrenbergiana*	0–1	–
	desertbroom	BASA2	*Baccharis sarothroides*	0–1	–
	prairie acacia	ACANH	*Acacia angustissima var. hirta*	0–1	–
10	**Succulents**			28–168	
	saguaro	CAGI10	*Carnegiea gigantea*	11–112	–
	cactus apple	OPEN3	*Opuntia engelmannii*	11–34	–
	jumping cholla	CYFU10	*Cylindropuntia fulgida*	0–22	–
	staghorn cholla	CYVE3	*Cylindropuntia versicolor*	1–22	–

	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0–11	–
	buck-horn cholla	CYAC8	*Cylindropuntia acanthocarpa*	0–11	–
	teddybear cholla	CYBI9	*Cylindropuntia bigelovii*	0–11	–
	tulip pricklypear	OPPH	*Opuntia phaeacantha*	1–11	–
	Santa Rita pricklypear	OPSA	*Opuntia santa-rita*	0–11	–
	organpipe cactus	STTH3	*Stenocereus thurberi*	0–6	–
	banana yucca	YUBA	*Yucca baccata*	0–6	–
	candy barrelcactus	FEWI	*Ferocactus wislizeni*	1–6	–
	common sotol	DAWH2	*Dasylirion wheeleri*	0–6	–
	dollarjoint pricklypear	OPCH	*Opuntia chlorotica*	0–2	–
	purple pricklypear	OPMA8	*Opuntia macrocentra*	0–2	–
	Engelmann's hedgehog cactus	ECEN	*Echinocereus engelmannii*	0–1	–
	pinkflower hedgehog cactus	ECFA	*Echinocereus fasciculatus*	0–1	–
	rainbow cactus	ECPE	*Echinocereus pectinatus*	0–1	–
	spinystar	ESVIV	*Escobaria vivipara var. vivipara*	0–1	–
	globe cactus	MAMMI	*Mammillaria*	0–1	–
	soaptree yucca	YUEL	*Yucca elata*	0–1	–
	desert agave	AGDE	*Agave deserti*	0–1	–
	Schott's century plant	AGSC3	*Agave schottii*	0–1	–
Tree					
11	**Dominant trees**			62–224	
	yellow paloverde	PAMI5	*Parkinsonia microphylla*	56–168	–
	desert ironwood	OLTE	*Olneya tesota*	6–56	–
	velvet mesquite	PRVE	*Prosopis velutina*	0–22	–

Animal community

Steep slopes and gravelly, cobbly surfaces hinder livestock distribution. This site is not well suited to grazing by cows in the hot season except in the areas where ridges trend north and south and western exposures are shady in the morning and eastern aspects in the afternoon. In such cases, distribution will be fairly good even in the summer. Stocker cattle are best adapted to use areas of this site. South facing slopes are used more in the

winter due to warm temperatures and early spring greenup. North exposures, being shady and cooler, are used more in the fall due to a longer green season. The plant community has an excellent variety of browse and perennial grasses and forbs and will provide adequate nutrition throughout the year. Seep and canyon water may be available for short times in the winter and summer rainy seasons, but fractured bedrock makes this feature short-lived. Bluff and rimrock in Gneiss areas can form natural fencing with minimal actual fence construction.

Water developments are very important to wildlife species on this site. Cover, forage diversity, and topography are good enough for a great variety of wildlife including the larger desert mammals. In areas where the parent material is Gneiss, high percentages of bluff and rimrock outcrop make such areas favored by desert bighorn sheep. Desert tortoises den on very cobbly southern exposures in the winter time.

Hydrological functions

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

Recreational uses

Hunting, hiking, birdwatching, photography, horseback riding, rock hounding, recreational mining

Wood products

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

Other products

Stones and cobbles, decomposed granite, saguaro ribs, cholla skeletons. Tradtional foods like saguaro fruits, prickly pear tunas, cactus flower buds and jojoba nuts. Traditional herbs like coyote tobacco, mint bush, club moss, globe mallow and limberbush.

Inventory data references

Range 417s include 5 in excellent condition and 2 in good condition.

Type locality

Location 1: Pima County, AZ	
General legal description	Sells Field Office - North Comobabi Mtns. (unsurveyed) 32 8' long. X 111 47' latitude Brownell Mtns. (unsurveyed) 32 11' long. X 112 7' latitude

Location 2: Pima County, AZ	
General legal description	Sells Field Office - Sierra Blanca Mtns. 32 11' X 112 14' Quijotoa Mnts. 32 7' X 112 10'
Location 3: Pima County, AZ	
Township/Range/Section	T8S R13E S29
General legal description	Tucson Field Office - Rancho Nuevo - Antelope Peak
Location 4: Gila County, AZ	
Township/Range/Section	T4S R17E S5
General legal description	San Carlos Field Office - Mineral Strip, Granite Basin

Contributors

C.Michaels
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)	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:** Follow faults and bedding planes in parent material.

2. **Presence of water flow patterns:** Discontinuous, 10-15 feet in length. Will see shorter flow paths with high surface coarse fragments.

---

3. **Number and height of erosional pedestals or terracettes:** No accumulated or erosional pedestals.

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 1-15% (low values due to high rock and gravel cover)

---

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):** Most litter size classes stay in place due to high rock and gravel cover.

---

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Expect ratings of 1-3 in perennial plant interspaces, 4-5 under shrub canopies.

---

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 7.5-10YR5/4 dry, 7.5-10YR4/4 moist; thickness to 2 nches.

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Canopy 15-20%; 50% shrubs, 10-15% subshrubs, 5-10% trees, 5-10% succulents, 5-10@ forbs and 2-% perennial grasses. 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 > subshrubs > trees > succulents > annual forbs & grasses > perennial forbs > perennial grasses

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** 20-50% tree & shrub canopy mortlity, 75-90% mortality of perennial grasses.

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):** 219 lbs/ac unfavorable precipitation, 790 lbs/ac normal precipitation, 1800 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:** triangle brsage,

littleleaf palverde, wite brittlebush, cholla, bufflegrass, fountain grass

---

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