

Ecological site R040XB206AZ

Shallow Hills

7"-10" p.z.

Accessed: 08/28/2026

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 040X–Sonoran Basin and Range

AZ 40.2 – Middle Sonoran Desert Elevations range from 1200 to 2000 feet and precipitation averages 7 to 10 inches per year. Vegetation includes saguaro, palo verde, creosotebush, triangle bursage, brittlebush, prickly pear, cholla, desert saltbush, wolfberry bush muhly, threeawns, and big galleta. The soil temperature regime is hyperthermic 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.

Table 1. Dominant plant species

Tree	(1) <i>Parkinsonia microphylla</i>
Shrub	(1) <i>Ambrosia deltoidea</i> (2) <i>Encelia farinosa</i>
Herbaceous	(1) <i>Muhlenbergia porteri</i> (2) <i>Tridens muticus</i>

Physiographic features

This site occurs on hillslopes and ridgetops. Slopes range from 15 to 65%. Elevations are from 1000 to 2500 feet. Slope aspect is site differentiating at elevations near land resource area boundaries.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge
Elevation	310 – 760 m
Slope	20 – 70 %

Climatic features

Precipitation in the sub-resource area ranges from 7 to 10 inches. Elevations range from 900 to 2050 feet. Winter-summer rainfall ratios range from 40% to 60% in the southern part along the international boundary, to 60% to 40% in the central and northern parts of the sub-resource area. As one moves from east to west in this resource area rains become more unpredictable and variable with Coefficients of Variation of annual rainfall equal to 38% at Florence and 46% at Aguila. Summer rains fall July- September, originate in the Gulf of Mexico, and are convective, usually brief, intense thunderstorms. Summer precipitation is extremely erratic and undependable in this area. Cool season moisture tends to be frontal, originates in the Pacific and Gulf of California, and falls in widespread storms with long duration and low intensity. This is the dependable moisture supply for vegetation in the area. Snow is very rare and usually melts on contact. May-June is the driest time of the year. Humidity is very low.

Winter temperatures are very mild with very few days recording freezing for short periods of time. Summertime temperatures are hot to very hot with many days in June-July exceeding 105 degrees F. Frost-free days range from 280 at stations in major river valleys with cold air drainage to 320 to 350 days at upland stations.

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)	350 days
Freeze-free period (average)	0 days
Precipitation total (average)	250 mm

Influencing water features

Soil features

These are shallow soils formed on acid igneous materials; granite and rhyolite, or on quartzite, arkose, shist, and gneiss. Parent material includes schist & 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. Bedrock usually has some lime in the fractures. Large areas of rock outcrop and boulders 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: in
SSA-645 Aguila-Carefree area MU's Quilotosa & Vaiva-100;
SSA-653 Gila Bend-Ajo area MU Quilotosa-54;
SSA-658 Gila River Indian Reservation MU's Quilotosa & Vaiva-27;
SSA-703 Tohono O'odham area MU's Chiuchu-12, Gachado non STV phase & Lomitas non calcareous-23, Quilotosa & Vaiva-51.

Table 4. Representative soil features

Surface texture	(1) Gravelly sandy loam (2) Very gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid

Soil depth	10 – 50 cm
Surface fragment cover <=3"	40 – 70 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	0.51 – 4.06 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	40 – 70 %
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

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1				11-28	
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	0-6	–
	Parish's threeawn	ARPUP5	<i>Aristida purpurea</i> var. <i>parishii</i>	0-3	–
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	0-3	–
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	0-2	–
	slim tridens	TRMU	<i>Tridens muticus</i>	0-2	–
	blue threeawn	ARPUN	<i>Aristida purpurea</i> var. <i>nealleyi</i>	0-2	–
	Wright's threeawn	ARPUW	<i>Aristida purpurea</i> var. <i>wrightii</i>	0-1	–
	spidergrass	ARTE3	<i>Aristida ternipes</i>	0-1	–
	spidergrass	ARTEG	<i>Aristida ternipes</i> var. <i>gentilis</i>	0-1	–
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	0-1	–
	Arizona cottontop	DICA8	<i>Digitaria californica</i>	0-1	–
	nineawn pappusgrass	ENDE	<i>Enneapogon desvauxii</i>	0-1	–
	tanglehead	HECO10	<i>Heteropogon contortus</i>	0-1	–
	Fendler's threeawn	ARPUF	<i>Aristida purpurea</i> var. <i>fendleriana</i>	0-1	–
2	Annuals			6-56	
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	0-11	–
	Eastwood fescue	VUMIC	<i>Vulpia microstachys</i> var. <i>ciliata</i>	0-6	–
	Pacific fescue	VUMIP	<i>Vulpia microstachys</i> var. <i>pauciflora</i>	0-6	–
	sixweeks threeawn	ARAD	<i>Aristida adscensionis</i>	0-6	–
	prairie threeawn	AROL	<i>Aristida oligantha</i>	0-6	–
	needle grama	BOAR	<i>Bouteloua aristoides</i>	0-6	–
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	0-6	–
	Rothrock's grama	BORO2	<i>Bouteloua rothrockii</i>	0-6	–
	Arizona brome	BRAR4	<i>Bromus arizonicus</i>	0-1	–
	Mexican sprangletop	LEFUU	<i>Leptochloa fusca</i> ssp. <i>uninervia</i>	0-1	–
	mucronate sprangletop	LEPA6	<i>Leptochloa panicea</i>	0-1	–
	delicate muhly	MUFR	<i>Muhlenbergia fragilis</i>	0-1	–
	littleseed muhly	MUMI	<i>Muhlenbergia microsperma</i>	0-1	–
	witchgrass	PACA6	<i>Panicum capillare</i>	0-1	–
	Bigelow's bluegrass	POBI	<i>Poa bigelovii</i>	0-1	–
Forb					
3				11-28	
	desert globemallow	SPAM2	<i>Sphaeralcea ambigua</i>	0-6	–
	brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	0-3	–

	desert trumpet	ERIN4	<i>Eriogonum inflatum</i>	0-3	–
	narrowleaf silverbush	ARLA12	<i>Argythamnia lanceolata</i>	0-3	–
	slender poreleaf	POGR5	<i>Porophyllum gracile</i>	0-3	–
	slender janusia	JAGR	<i>Janusia gracilis</i>	0-2	–
	lacy tansyaster	MAPIP4	<i>Machaeranthera pinnatifida ssp. pinnatifida var. pinnatifida</i>	0-1	–
	rough menodora	MESC	<i>Menodora scabra</i>	0-1	–
	New Mexico silverbush	ARNE2	<i>Argythamnia neomexicana</i>	0-1	–
	whitemargin sandmat	CHAL11	<i>Chamaesyce albomarginata</i>	0-1	–
	California fagonbush	FALA	<i>Fagonia laevis</i>	0-1	–
	desert rosemallow	HICO	<i>Hibiscus coulteri</i>	0-1	–
	Newberry's velvetmallow	HONE	<i>Horsfordia newberryi</i>	0-1	–
	poreleaf dogweed	ADPO2	<i>Adenophyllum porophyllum</i>	0-1	–
4				6-84	
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	0-11	–
	combseed	PECTO	<i>Pectocarya</i>	0-6	–
	common fiddleneck	AMMEI2	<i>Amsinckia menziesii var. intermedia</i>	0-6	–
	green carpetweed	MOVE	<i>Mollugo verticillata</i>	0-3	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	0-3	–
	woolly tidestromia	TILA2	<i>Tidestromia lanuginosa</i>	0-1	–
	bristly nama	NAHI	<i>Nama hispidum</i>	0-1	–
	glandular threadplant	NEGL	<i>Nemacladus glanduliferus</i>	0-1	–
	desert tobacco	NIOB	<i>Nicotiana obtusifolia</i>	0-1	–
	cloak fern	NOTHO	<i>Notholaena</i>	0-1	–
	evening primrose	OENOT	<i>Oenothera</i>	0-1	–
	Florida pellitory	PAFL3	<i>Parietaria floridana</i>	0-1	–
	Emory's rockdaisy	PEEM	<i>Perityle emoryi</i>	0-1	–
	cliffbrake	PELLA	<i>Pellaea</i>	0-1	–
	manybristle chinchweed	PEPA2	<i>Pectis papposa</i>	0-1	–
	phacelia	PHACE	<i>Phacelia</i>	0-1	–
	brownfoot	ACWR5	<i>Acourtia wrightii</i>	0-1	–
	trailing windmills	ALIN	<i>Allionia incarnata</i>	0-1	–
	New Mexico plumeseed	RANE	<i>Rafinesquia neomexicana</i>	0-1	–
	chia	SACO6	<i>Salvia columbariae</i>	0-1	–
	Arizona spikemoss	SEAR2	<i>Selaginella arizonica</i>	0-1	–
	Coues' cassia	SECO10	<i>Senna covesii</i>	0-1	–
	ragwort	SENEC	<i>Senecio</i>	0-1	–
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	0-1	–
	Coulter's globemallow	SPCO2	<i>Sphaeralcea coulteri</i>	0-1	–
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	0-1	–
	rockcress	ARABI2	<i>Arabis</i>	0-1	–
	milkvetch	ASTRA	<i>Astragalus</i>	0-1	–
	spiderling	BOERH2	<i>Boerhavia</i>	0-1	–
	hoary bowlesia	BOIN3	<i>Bowlesia incana</i>	0-1	–
	exserted Indian paintbrush	CAEXE	<i>Castilleja exserta ssp. exserta</i>	0-1	–
	yellow tackstem	CAPA7	<i>Calycoseris parryi</i>	0-1	–
	white tackstem	CAWR	<i>Calycoseris wrightii</i>	0-1	–

	brittle spineflower	CHBR	<i>Chorizanthe brevicornu</i>	0-1	–
	lipfern	CHEIL	<i>Cheilanthes</i>	0-1	–
	hyssopleaf sandmat	CHHY3	<i>Chamaesyce hyssopifolia</i>	0-1	–
	New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	0-1	–
	cryptantha	CRYPT	<i>Cryptantha</i>	0-1	–
	bigseed alfalfa dodder	CUIN	<i>Cuscuta indecora</i>	0-1	–
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	0-1	–
	desert larkspur	DEPA	<i>Delphinium parishii</i>	0-1	–
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	0-1	–
	tall mountain larkspur	DESC	<i>Delphinium scaposum</i>	0-1	–
	bluedicks	DICA14	<i>Dichelostemma capitatum</i>	0-1	–
	flatcrown buckwheat	ERDE6	<i>Eriogonum deflexum</i>	0-1	–
	miniature woollystar	ERDI2	<i>Eriastrum diffusum</i>	0-1	–
	erigenia	ERIGE	<i>Erigenia</i>	0-1	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0-1	–
	common woolly sunflower	ERLA6	<i>Eriophyllum lanatum</i>	0-1	–
	California poppy	ESCAM	<i>Eschscholzia californica ssp. mexicana</i>	0-1	–
	desert poppy	ESGL	<i>Eschscholzia glyptosperma</i>	0-1	–
	pygmy poppy	ESMI	<i>Eschscholzia minutiflora</i>	0-1	–
	gilia	GILIA	<i>Gilia</i>	0-1	–
	Gordon's bladderpod	LEGO	<i>Lesquerella gordonii</i>	0-1	–
	shaggyfruit pepperweed	LELA	<i>Lepidium lasiocarpum</i>	0-1	–
	Bigelow's linanthus	LIBI2	<i>Linanthus bigelovii</i>	0-1	–
	shrubby deervetch	LORI3	<i>Lotus rigidus</i>	0-1	–
	coastal bird's-foot trefoil	LOSA	<i>Lotus salsuginosus</i>	0-1	–
	Coulter's lupine	LUSP2	<i>Lupinus sparsiflorus</i>	0-1	–
	tansyaster	MACHA	<i>Machaeranthera</i>	0-1	–
	Parry's false prairie-clover	MAPA7	<i>Marina parryi</i>	0-1	–
	blazingstar	MENTZ	<i>Mentzelia</i>	0-1	–

Shrub/Vine

5				28-84	
6				6-28	
	organpipe cactus	STTH3	<i>Stenocereus thurberi</i>	0-6	–
	beavertail pricklypear	OPBA2	<i>Opuntia basilaris</i>	0-2	–
	Leconte's barrel cactus	FECYL	<i>Ferocactus cylindraceus var. lecontei</i>	0-2	–
	candy barrelcactus	FEWI	<i>Ferocactus wislizeni</i>	0-2	–
	Engelmann's hedgehog cactus	ECEN	<i>Echinocereus engelmannii</i>	0-1	–
	senita cactus	PASC14	<i>Pachycereus schottii</i>	0-1	–
7				140-196	
	triangle bur ragweed	AMDE4	<i>Ambrosia deltoidea</i>	84-140	–
	brittlebush	ENFA	<i>Encelia farinosa</i>	28-56	–
8				56-84	
	Mexican bladdersage	SAME	<i>Salazaria mexicana</i>	0-11	–
	Parish's goldeneye	VIPA14	<i>Viguiera parishii</i>	0-6	–
	white ratany	KRGR	<i>Krameria grayi</i>	0-6	–
	rush milkweed	ASSU	<i>Asclepias subulata</i>	0-6	–

	elephant tree	BUMI	<i>Bursera microphylla</i>	0-6	–
	fairyduster	CAER	<i>Calliandra eriophylla</i>	0-3	–
	starry bedstraw	GASTE2	<i>Galium stellatum ssp. eremicum</i>	0-3	–
	sangre de cristo	JACA2	<i>Jatropha cardiophylla</i>	0-3	–
	littleleaf ratany	KRER	<i>Krameria erecta</i>	0-2	–
	creosote bush	LATR2	<i>Larrea tridentata</i>	0-2	–
	singlewhorl burrobrush	HYMO	<i>Hymenoclea monogyra</i>	0-2	–
	Sonoran croton	CRSO	<i>Croton sonorae</i>	0-2	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	0-2	–
	Eastern Mojave buckwheat	ERFA2	<i>Eriogonum fasciculatum</i>	0-2	–
	bastardsage	ERWR	<i>Eriogonum wrightii</i>	0-2	–
	sweetbush	BEJU	<i>Bebbia juncea</i>	0-2	–
	Coulter's brickellbush	BRCO	<i>Brickellia coulteri</i>	0-2	–
	Wright's beebrush	ALWR	<i>Aloysia wrightii</i>	0-2	–
	burrobush	AMDU2	<i>Ambrosia dumosa</i>	0-2	–
	California copperleaf	ACCA3	<i>Acalypha californica</i>	0-2	–
	catclaw acacia	ACGR	<i>Acacia greggii</i>	0-1	–
	arrow poison plant	SEBI9	<i>Sebastiania bilocularis</i>	0-1	–
	American threefold	TRCA8	<i>Trixis californica</i>	0-1	–
	water jacket	LYAN	<i>Lycium andersonii</i>	0-1	–
	Fremont's desert-thorn	LYFR	<i>Lycium fremontii</i>	0-1	–
	desert lavender	HYEM	<i>Hyptis emoryi</i>	0-1	–
9				84-168	
	ocotillo	FOSP2	<i>Fouquieria splendens</i>	67-135	–
	desert ironwood	OLTE	<i>Olneya tesota</i>	67-135	–
	yellow paloverde	PAMI5	<i>Parkinsonia microphylla</i>	67-135	–
	yellow paloverde	PAMI5	<i>Parkinsonia microphylla</i>	34-56	–
	ocotillo	FOSP2	<i>Fouquieria splendens</i>	22-45	–
	saguaro	CAGI10	<i>Carnegiea gigantea</i>	11-34	–
	desert ironwood	OLTE	<i>Olneya tesota</i>	0-22	–

Animal community

Steep slopes and very cobbly to stony surfaces hinder livestock distribution. Stocker cattle are best adapted to use this site. The plant community provides limited amounts of useable forage in the winter-spring season. Natural water is unavailable on this site. Water developments are very important to wildlife species on this site. Cover, diversity, and topography make areas of this site home to a variety of desert animals. Large mammals use the site seasonally unless permanent water supplies exist in the area. Desert tortoises den on cobble or stony slopes. Javalina bed on north aspects in paloverde thickets.

Other information

T&E: Leptonycteris cursoae yerbe buena (Lesser long-nosed bat)

Type locality

Location 1: Maricopa County, AZ	
Township/Range/Section	T3S R2E S33

General legal description	Chandler FO - Gila River Indian Community, Sierra Estrella Mountains
Location 2: Pima County, AZ	
Township/Range/Section	T9S R4E S11
General legal description	Sells FO - Tat Momolikat Mountains
Location 3: Maricopa County, AZ	
Township/Range/Section	T6S R1W S16
General legal description	Buckeye FO - Maricopa Mountains, Ryff Ranch
Location 4: Pinal County, AZ	
Township/Range/Section	T7S R2E S5
General legal description	Casa Grande FO - Ak Ranch, Antelope Peak
Location 5: Maricopa County, AZ	
Township/Range/Section	T4N R6W S32
General legal description	Phoenix FO - Belmont Mountains
Location 6: Pima County, AZ	
Township/Range/Section	T17S R1E S26
General legal description	Sells FO - Pisinemo District Kupk Hills

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, Byron Lambeth, Dan Robinett, Emilio Carrillo
Contact for lead author	NRCS Tucson Area Office
Date	03/02/2005
Approved by	
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 materials.

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): No slake test done. 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 granular; color is 7.5-10YR6/3 dry, 7.5-1-YR5/4 moist, thickness to 2 inches.

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: canopy 15-20%; 50% shrubs, 23% trees, 25% succulents and 1-2% 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 and 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 mortality, 75-90% perennial grass 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): 300 lbs/ac unfavorable precipitation, 500 lbs/ac normal precipitation, 800 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: Sahara mustard, London Rocket

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