

Ecological site R040XC305AZ
Paralithic Hills 3"-7" 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 40.3 – Colorado Sonoran Desert

Elevations range from 300 to 1200 feet and precipitation averages 3 to 7 inches per year. Vegetation includes creosotebush, white bursage, brittlebush, Mormon tea, teddybear cholla, elephant tree, smoke tree, ocotillo, 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>Olneya tesota</i> (2) <i>Larrea tridentata</i> var. <i>tridentata</i>
Herbaceous	(1) <i>Muhlenbergia porteri</i> (2) <i>Tridens muticus</i>

Physiographic features

This range site occurs on steep to very steep granite, gneiss and schist hills and mountains. It benefits from runoff of the rock outcrop that occurs as the ridges and crests of the mountains. This site suffers excessively from runoff.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain
Elevation	122–610 m
Slope	15–75%

Climatic features

Precipitation in this common resource area ranges from 3-7 inches yearly. Despite historical averages in rainfall amounts, 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 44% at Gila Bend and 65% at Mohawk. Winter-Summer rainfall ratios are 40-60%. Summer rains fall July-September, originate in the Gulf of Mexico and are convective, usually brief intense thunderstorms. Summer thunderstorms usually form over the mountains in the afternoon and spread to the valleys and plains in the evening. The intensity of this precipitation is moderate to heavy, but rarely lasts more than half an hour. Many times these storms produce little more than gusty winds and light showers. Cool season moisture tends to be frontal, originate in the Pacific and Gulf of California and falls in widespread storms with long duration and low intensity. Snow is very rare and falls normally only in the higher mountains.

Mean temperature for the hottest month (Jul) is 93 F; the coldest month (Jan) is 53 F. Extreme temperatures of 125 F and 10 F have been recorded. Long periods of little or no effective moisture occur frequently.

The winter-spring precipitation is the most dependable on the site. Perennial grasses, though classed as warm season growers, grow actively year-round when moisture is available. Shrubs and trees generally respond to seasonal moisture. The two rainy periods bring about their respective production of either winter or summer annual grasses and forbs.

Table 3. Representative climatic features

Frost-free period (average)	363 days
Freeze-free period (average)	0 days
Precipitation total (average)	178 mm

Influencing water features

Soil features

Soils are shallow to moderately deep over bedrock. Parent material is slope alluvium and residuum. Surface soils are 3-6 inches thick, with a mixture of extremely gravelly loam. Underlying layers have moderate permeability that can absorb and hold all the moisture the climate provides. Soluble salt accumulations are low; pH is 7.9-8.4. With good vegetation cover, infiltration rates are moderate. Stability against erosion processes is moderate. Plant-soil moisture relationships are fair. Coarse fragments occur throughout the soil and are generally more than 35% of the total soil volume.

Soils mapped on this site include: in SSA-649 Yuma-Wellton area MU Laposa-20; SSA-653 Gila Bend-Ajo area MU's Quilotosa StxSL-62 & Vaiva StxSL-62 and SSA-656 Colorado River Indian Reservation MU Laposa-23.

Table 4. Representative soil features

Parent material	(1) Slope alluvium–granite (2) Residuuum–gneiss
Surface texture	(1) Extremely gravelly loam (2) Very gravelly fine sandy loam (3) Cobbly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid to rapid
Soil depth	10–102 cm
Surface fragment cover <=3"	15–45%
Surface fragment cover >3"	3–10%
Available water capacity (0-101.6cm)	0.81–11.18 cm
Calcium carbonate equivalent (0-101.6cm)	1–10%
Electrical conductivity (0-101.6cm)	0–1 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	15–45%
Subsurface fragment volume >3" (Depth not specified)	3–10%

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 each 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 Historic Climax Plant Community

Community 1.1 Historic Climax Plant Community

This site is predominantly a shrub site with an understory of perennial and annual grasses and forbs. Palatable plant species have a wide diversity in both time of production and seasonal availability to grazing animals. Forage species on this site grow actively in the spring when the most dependable moisture comes. Continued grazing use at this time of year leads to replacement of these plants with less palatable species such as brittlebush, triangle bursage and cacti.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	129	182	235
Grass/Grasslike	22	36	50
Forb	17	28	39
Tree	9	13	18
Total	177	259	342

Figure 5. Plant community growth curve (percent production by month). AZ4041, 40.3 3-7" p.z. all sites. Most growth occurs in the winter to early spring, plants are dormant May through October..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
5	20	40	25	0	0	0	0	0	0	5	5

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Misc. Grasses			22–45	
	littleseed muhly	MUMI	<i>Muhlenbergia microsperma</i>	3–11	–
	slim tridens	TRMU	<i>Tridens muticus</i>	3–8	–
	nineawn pappusgrass	ENDE	<i>Enneapogon desvauxii</i>	3–8	–
	cliff muhly	MUPO	<i>Muhlenbergia polycaulis</i>	3–6	–
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	3–6	–
	Parish's threeawn	ARPUP5	<i>Aristida purpurea</i> var. <i>parishii</i>	3–6	–
	needle grama	BOAR	<i>Bouteloua aristoides</i>	3–6	–
2	Annual Grasses			1–6	
	threeawn	ARIST	<i>Aristida</i>	1–6	–
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	1–6	–
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	1–6	–
Forb					
3	Misc. Forbs			12–26	
	pelotazo	ABIN	<i>Abutilon incanum</i>	1–2	–
	New Mexico silverbush	ARNE2	<i>Argythamnia neomexicana</i>	1–2	–
	California fagonbush	FALA	<i>Fagonia laevis</i>	1–2	–
	Newberry's velvetmallow	HONE	<i>Horsfordia newberryi</i>	1–2	–
	shrubby deervetch	LORI3	<i>Lotus rigidus</i>	1–2	–
	wishbone-bush	MILAV	<i>Mirabilis laevis</i> var. <i>villosa</i>	1–2	–
	slender poreleaf	POGR5	<i>Porophyllum gracile</i>	1–2	–
	desert globemallow	SPAM2	<i>Sphaeralcea ambigua</i>	1–2	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	1–2	–
	brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	1–2	–
4	Other Forbs			2–12	
	brownfoot	ACWR5	<i>Acourtia wrightii</i>	0–1	–
	trailing windmills	ALIN	<i>Allionia incarnata</i>	0–1	–
	whitestem milkweed	ASAL	<i>Asclepias albicans</i>	0–1	–
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	0–1	–
	flatcrown buckwheat	ERDE6	<i>Eriogonum deflexum</i>	0–1	–
	desert trumpet	ERIN4	<i>Eriogonum inflatum</i>	0–1	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0–1	–
	spurge	EUPHO	<i>Euphorbia</i>	0–1	–
	pepperweed	LEPID	<i>Lepidium</i>	0–1	–
	Parry's false prairie-	MAPA7	<i>Marina parryi</i>	0–1	–

	clover				
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	0–1	–
	Coues' cassia	SECO10	<i>Senna covesii</i>	0–1	–
	Coulter's globemallow	SPCO2	<i>Sphaeralcea coulteri</i>	0–1	–
Shrub/Vine					
5	Dominant Shrubs			50–101	
	burrobush	AMDU2	<i>Ambrosia dumosa</i>	12–38	–
	desert ironwood	OLTE	<i>Olneya tesota</i>	26–38	–
	creosote bush	LATRT	<i>Larrea tridentata</i> var. <i>tridentata</i>	12–26	–
6	Misc. Shrubs			34–56	
	narrowleaf silverbush	ARLA12	<i>Argythamnia lanceolata</i>	3–6	–
	brittlebush	ENFA	<i>Encelia farinosa</i>	3–6	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	3–6	–
	slender janusia	JAGR	<i>Janusia gracilis</i>	3–6	–
	littleleaf ratany	KRER	<i>Krameria erecta</i>	3–6	–
	white ratany	KRGR	<i>Krameria grayi</i>	3–6	–
	desert-thorn	LYCIU	<i>Lycium</i>	3–6	–
	American threefold	TRCA8	<i>Trixis californica</i>	3–6	–
	toothleaf goldeneye	VIDE3	<i>Viguiera dentata</i>	3–6	–
7	Other Shrubs			34–56	
	pelotazo	ABIN	<i>Abutilon incanum</i>	2–4	–
	Indian mallow	ABUTI	<i>Abutilon</i>	2–4	–
	catclaw acacia	ACGR	<i>Acacia greggii</i>	2–4	–
	San Felipe dogweed	ADPO	<i>Adenophyllum porophylloides</i>	2–4	–
	Wright's beebrush	ALWR	<i>Aloysia wrightii</i>	2–4	–
	sweetbush	BEJU	<i>Bebbia juncea</i>	2–4	–
	spearleaf brickellbush	BRAT	<i>Brickellia atractyloides</i>	2–4	–
	Coulter's brickellbush	BRCO	<i>Brickellia coulteri</i>	2–4	–
	elephant tree	BUMI	<i>Bursera microphylla</i>	2–4	–
	Eastern Mojave buckwheat	ERFA2	<i>Eriogonum fasciculatum</i>	2–4	–
	California fagonbush	FALA	<i>Fagonia laevis</i>	2–4	–
	starry bedstraw	GAST	<i>Galium stellatum</i>	2–4	–
	desert lavender	HYEM	<i>Hyptis emoryi</i>	2–4	–
	lacy tansyaster	MAPIP4	<i>Machaeranthera pinnatifida</i> ssp. <i>pinnatifida</i> var. <i>pinnatifida</i>	2–4	–
	Schott's pygmycedar	PESC4	<i>Peucephyllum schottii</i>	2–4	–
	Mexican bladdersage	SAME	<i>Salazaria mexicana</i>	2–4	–
	woody crinklemat	TICAC	<i>Tiquilia canescens</i> var. <i>canescens</i>	2–4	–
	Palmer's crinklemat	TIPA	<i>Tiquilia palmeri</i>	2–4	–
8	Succulents			11–22	
	saguaro	CAGI10	<i>Carnegiea gigantea</i>	2–3	–
	ocotillo	FOSP2	<i>Fouquieria splendens</i>	2–3	–
	beavertail pricklypear	OPBA2	<i>Opuntia basilaris</i>	2–3	–
	globe cactus	MAMMI	<i>Mammillaria</i>	1–2	–

	buckhorn cholla	CYACA2	<i>Cylindropuntia acanthocarpa</i> var. <i>acanthocarpa</i>	1–2	–
	Arizona pencil cholla	CYAR14	<i>Cylindropuntia arbuscula</i>	1–2	–
	teddybear cholla	CYBI9	<i>Cylindropuntia bigelovii</i>	1–2	–
	Engelmann's hedgehog cactus	ECEN	<i>Echinocereus engelmannii</i>	1–2	–
	candy barrelcactus	FEWI	<i>Ferocactus wislizeni</i>	1–2	–
Tree					
9	Tree			9–18	
	yellow paloverde	PAMI5	<i>Parkinsonia microphylla</i>	9–18	–

Animal community

Steep slopes limit use on this site, however, fencing to restrict use and water developments will improve livestock distribution. Though forage is available for yearlong use by cows and calves, stocker cattle will work the steep slopes better. This site responds fairly rapidly to a grazing system with alternating deferment in the various growing seasons.

Natural water is scarce on the site. Stockwater developments are very important to wildlife in these areas. Forage diversity is good and the many drainages and canyons offer ample cover for large desert mammals. Small resident numbers of these animals (such as mule deer and desert bighorn sheep) occur on the site where drinking water is accessible.

Recreational uses

The site is located on steep, low hills and mountains. It has a rugged appearance. The wide variety of cacti and other desert shrubs provides good aesthetic appeal. In winters with above average precipitation, brittlebush and spring forbs flower and lend color to the site. Very few days in the fall, winter, or spring are too uncomfortable to enjoy outdoor activities. Afternoon heat restricts activity during Jun-Aug. Horseback riding, wildlife observation, hunting, hiking, picnicking, camping and photography are activities suited to the site.

Other information

Large and small mining in localized areas is among the other uses of the site.

T&E Species: The elephant tree (*Bursera microphylla* - rare) is locally abundant near telegraph pass, Interstate 8 in the Gila Mountains.

Type locality

Location 1: Maricopa County, AZ	
General legal description	Typical pedon of Vaiva GrXSL is in unsectionized area about 14,100 feet North and 15,400 feet west of SouthEast corner of T2S, R9W.
Location 2: Maricopa County, AZ	
Township/Range/Section	T4S R3W S25
General legal description	Typical pedon of Quilotosa StXCoSL is about 1,000 feet east and 850 feet south of northwest corner of Section 25 Township 4 South, Range 3 West.

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	03/02/2005
Approved by	Steve Cassady
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- 1. Number and extent of rills:** Naturally occurring rills are infrequent on this site and seem to follow fractures, faults and the bedding planes of parent materials.

- 2. Presence of water flow patterns:** Common on this site in areas lacking surface covers of cobbles and rocks. They are uncommon and hort in areas with well developed surface covers of coarse fragments.

- 3. Number and height of erosional pedestals or terracettes:** None

- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 1-20%

- 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 stays in place under shrubs; herbaceous litter moves primarily by wind but also in occasional high rainfall events in water flow paths.

- 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 on the site.

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

platy to granular; color is 7.5-10YR5/4 dry, 7.5-10YR4/4 moist; thickness to 3 inches.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Canopy 5-10%; 65-75% shrubs, 15-25% subshrubs, 1-5% trees.
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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 > forbs = perennial grasses (note: annual forbs and grasses may be greater than shrubs in El Nino years).

Sub-dominant:

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** 15-20% canopy mortality of trees and shrubs.
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14. **Average percent litter cover (%) and depth (in):**
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 158 lbs/ac unfavorable precipitation; 232 lbs/ac normal precipitation; 306 lbs/ac favorable precipitation.
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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, schismus
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17. **Perennial plant reproductive capability:** Not impaired for shrubs and trees.
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