

Ecological site R040XB229AZ Sandy Loam Drainage 7"-10" 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.

MLRA notes

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

Major Land Resource Area (MLRA) 40 is the portion of Sonoran Desert that extends from northwest Mexico into southwestern Arizona and southeastern California. This MLRA is hot desert characterized by bimodal precipitation coupled with hot summers and mild winters. These conditions give rise to a rich biological diversity visually dominated by columnar cactus (saguaro) and leguminous trees (palo verde). 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 basin sediments are combinations of fluvial, lacustrine, colluvial and alluvial deposits.

LRU notes

Land Resource Unit (LRU) 40-2, Middle Sonoran Desert, is characterized by desert scrub vegetation on relict fan remnants with a moderate amount of desert pavement. Trees are common in washes, bottoms and hillslopes. 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.

Classification relationships

USDA-NRCS Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin: Western Range and Irrigated Region D Major Land Resource Area 40 - Sonoran Basin and Range Land Resource Unit 2 - Middle Sonoran Desert Ecological Site Sandy Loam Drainage, 7"-10" p.z.

U.S. Environmental Protection Agency, Ecological Regions of North America: Level I, Region 10 North American Deserts Level II, 10.2 Warm Deserts Level III, Ecoregion 81, Sonoran Basin and Range Level IV, 81l, 81n, 81o

USDA-USFS Ecological Subregions: Sections of the Conterminous United States Section 322 American Semidesert and Desert Province Section 322B, Sonoran Desert

Ecological site concept

Sandy Loam Drainage, 7"-10" p.z., is a bottom position ecological site threading throughout Limy Upland, Deep, 7"-10" p.z., and Desert Pavement, 7"-10" p.z., ecological sites. Terrain is flat to very gently sloping, and active water flow paths are less than 4' wide. Water flows are ephemeral, but run-on water from surrounding landscapes support a productive shrubland community. Soil is sandy to sandy loam in texture. Aspect is desert shrubland.

Associated sites

R040XB208AZ	Limy Upland, Deep 7"-10" p.z. surrounding uplands
R040XB230AZ	Desert Pavement 7"-10" p.z. surrounding uplands
R040XB207AZ	Limy Fan 7"-10" p.z. surrounding uplands

Similar sites

R040XC330AZ	Sandy Loam Drainage 3"-7" p.z. Elevations 300' - 1,200'
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Table 1. Dominant plant species

Tree	(1) <i>Parkinsonia microphylla</i> (2) <i>Olneya tesota</i>
Shrub	(1) <i>Ambrosia dumosa</i> (2) <i>Salazaria mexicana</i>
Herbaceous	(1) <i>Pleuraphis rigida</i>

Physiographic features

This site occurs on floodplains and alluvial fans and receives extra moisture from overbank flooding or run-on from adjacent sites on a regular basis. Slopes range from 0%–3% and elevations range from 1200 to 2000 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Flood plain
Slope	0–3%

Climatic features

Annual precipitation ranges from 7 to 10 inches. Annual rainfall is bimodal, with distinct rainy seasons occurring from December to March (winter) and July to September (summer). Rainfall ratios range from 40:60 (winter:summer) in the southern part, and 60:40 in the central and northern parts. Rainfall intensity differs between rainfall seasons. Winter frontal storms develop in the Pacific Ocean and Gulf of California, producing widespread, low-intensity and long duration precipitation events. Winter precipitation is the most dependable water source for vegetation, and snowfall is very rare. During summer months, atmospheric activity in the Gulf of Mexico produces convective thunderstorms when crossing over the mountains in the afternoon. These storms travel across the plains and valleys, producing precipitation of short duration, usually less than 30 minutes, but of moderate to heavy intensity. Between these two seasons, little to no effective precipitation can occur for several months at a time. May and June are the driest months, and overall humidity is very low.

Overall, average annual rainfall is variable, but increases in variability from east to west across the region. For long-term precipitation data, the coefficient of variation, the ratio of the standard deviation to the mean expressed as a percentage, increases from 38% at Florence (east) to 46% at Aguila (west).

Winter temperatures are very mild, with very few days having short periods of freezing temperatures. Summertime temperatures are hot to very hot, with many days in June and July exceeding 105°F. The number of frost-free days ranges from 280 in major river valleys with cold air drainage to between 320 and 350 in upland areas.

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

Table 3. Representative climatic features

Frost-free period (average)	291 days
Freeze-free period (average)	344 days
Precipitation total (average)	9 in

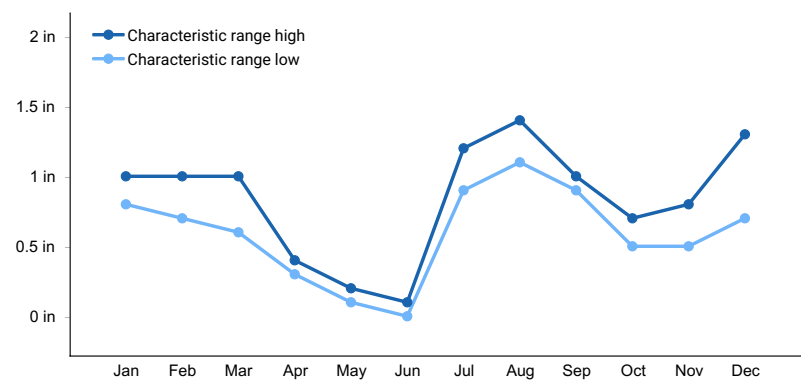


Figure 1. Monthly precipitation range

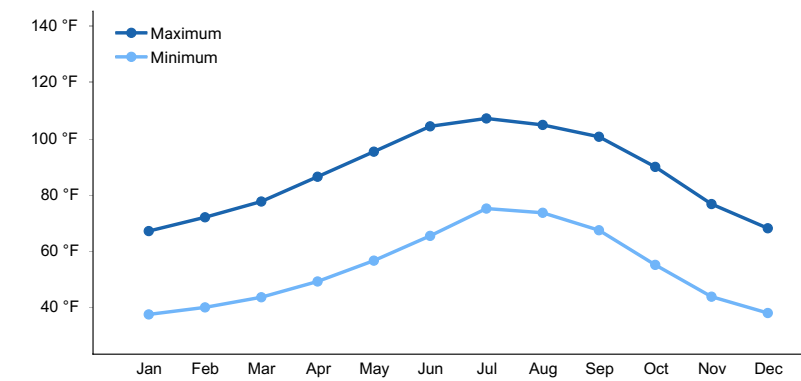


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

Soil features

These very young soils develop in gravelly and sandy alluvium of mixed origin. Textures range from sandy loam to very cobbly sand, and coarse loamy textures can occur in subsurface layers. They are deep, excessively well drained, and have very good plant-soil moisture relationships due to the extra water from run-on and flooding events. Soils may or may not be calcareous.

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Very gravelly loamy sand (3) Sandy loam
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Moderately rapid to very rapid
Soil depth	60 in
Surface fragment cover <=3"	5–45%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	2.4–7.2 in

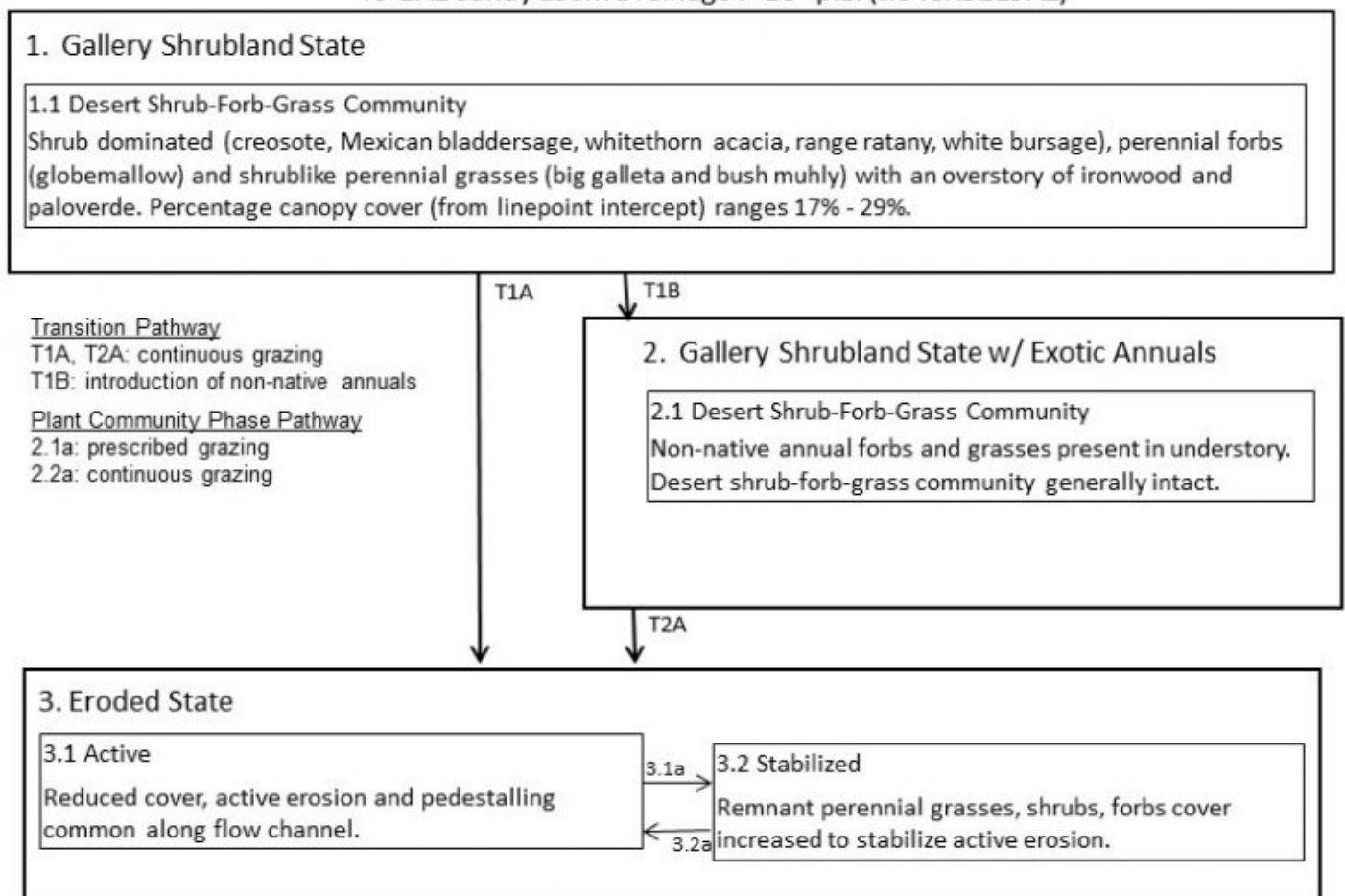
Calcium carbonate equivalent (0-40in)	1–10%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–45%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Sandy Loam Drainage, 7"-10" p.z., supports a highly diverse and productive shrubland with additions of run-on rainfall from adjacent landscapes. The site has three states: State 1 - Gallery Shrubland (Reference); State 2 - Gallery Shrubland with Exotic Annuals; and State 3 - Eroded. i. Transition from Gallery Shrubland to Gallery Shrubland with Exotic Annuals is driven by introducing non-native annual forbs and grasses. Transitions from Gallery Shrubland or Gallery Shrubland with Exotic Annuals to Eroded are driven by long-term, unmanaged livestock grazing. Aspect is gallery shrubland.

State and transition model

40-2AZ Sandy Loam Drainage 7-10" p.z. (R040XB229AZ)



State 1

Gallery Shrubland (Reference)

Community 1.1

Mixed Desert Shrub



Figure 3. Sandy Loam Drainage, 7"-10" p.z. photo

The Gallery Shrubland community typically has a diverse mixture of desert trees, shrubs, vines and perennial and annual grasses and forbs. Annual production values and community composition change in relation to the quantity of run-on water present in different sections of the drainage system. In the upper portion of a drainage, with less run-on water contribution, the plant community is open and simple. Toward the end of the drainage, a larger run-off source area contributes more water, which supports a denser and more complex plant community.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	34	73	315
Tree	7	80	189
Shrub/Vine	1	24	90
Forb	1	3	5
Total	43	180	599

Table 6. Soil surface cover

Tree basal cover	0-7%
Shrub/vine/liana basal cover	0-8%
Grass/grasslike basal cover	1-10%

Forb basal cover	0-1%
Non-vascular plants	0-1%
Biological crusts	0-10%
Litter	7-34%
Surface fragments >0.25" and <=3"	11-48%
Surface fragments >3"	0-1%
Bedrock	0%
Water	0%
Bare ground	30-55%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	—	—	—	—
>0.5 <= 1	—	—	0-6%	—
>1 <= 2	—	0-8%	0-4%	—
>2 <= 4.5	—	0-3%	—	—
>4.5 <= 13	0-7%	0-6%	—	—
>13 <= 40	—	—	—	—
>40 <= 80	—	—	—	—
>80 <= 120	—	—	—	—
>120	—	—	—	—

State 2

Gallery Shrubland State w/ Exotic Annuals

Community 2.1

Desert Shrub-Forb-Grass w/ Non-Native Annuals

Non-native annual forbs and grasses are present in the understory. The desert shrub, forb and grass community remains relatively intact.

State 3

Eroded

Community 3.1

Active



The Sandy Loam Drainage site supports a relatively lush plant community in an otherwise relatively sparse resource zone. The lush vegetation attracts and concentrates livestock activity. Long-term, unmanaged grazing reduces plant community diversity. Perennial grass and subshrub cover is deeply reduced, with remnant perennial grasses persisting only within the protective canopy of cactus or shrubs. Soils exhibit active pedestaling. Water flow channels can become entrenched, resulting in increased discharge rates, low infiltration rates, and impaired plant-soil relationships.

Community 3.2 Stabilized

When grazing pressure is removed the plant community will begin to recover. With continued reduced grazing, remnant perennial grasses may expand into open areas. Flood waters will slow with increased woody litter and rock cover, stabilizing the active flow channel.

Pathway P3.1a Community 3.1 to 3.2

Prescribed grazing, removal of yearlong grazing pressure.

Pathway P3.2a Community 3.2 to 3.1

Yearlong grazing/unmanaged grazing.

Transition T1A State 1 to 2

Introduction of non-native annual forbs and grasses.

Transition T1B

State 1 to 3

Yearlong grazing.

Transition T2A

State 2 to 3

Yearlong grazing.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	Dominant Perennial Grasses			34–315	
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	8–315	–
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	0–73	–
2	Perennial Three-awns			0–5	
3	Annual Grasses			1–49	
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	1–9	–
	Arizona brome	BRAR4	<i>Bromus arizonicus</i>	1–9	–
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	1–7	–
	sixweeks threeawn	ARAD	<i>Aristida adscensionis</i>	1–5	–
	needle grama	BOAR	<i>Bouteloua aristidoides</i>	1–5	–
	mucronate sprangletop	LEPA6	<i>Leptochloa panicea</i>	0–1	–
Forb					
4	Perennial Forbs			1–5	
	brownfoot	ACWR5	<i>Acourtia wrightii</i>	0–3	–
	Parry's beardtongue	PEPA24	<i>Penstemon parryi</i>	0–3	–
	brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	0–3	–
	Coulter's lyrepod	LYCO4	<i>Lyrocarpa coulteri</i>	0–3	–
	trailing windmills	ALIN	<i>Allionia incarnata</i>	0–3	–
	narrowleaf silverbush	ARLA12	<i>Argythamnia lanceolata</i>	0–3	–
	desert marigold	BAMU	<i>Baileya multiradiata</i>	0–3	–
	climbing wartclub	BOSC	<i>Boerhavia scandens</i>	0–3	–
	whitemargin sandmat	CHAL11	<i>Chamaesyce albomarginata</i>	0–3	–
	desert trumpet	ERIN4	<i>Eriogonum inflatum</i>	0–3	–
	Parry's false prairie-clover	MAPA7	<i>Marina parryi</i>	0–3	–
	lacy tansyaster	MAPIP4	<i>Machaeranthera pinnatifida</i> ssp. <i>pinnatifida</i> var. <i>pinnatifida</i>	0–3	–
	desert tobacco	NIOB	<i>Nicotiana obtusifolia</i>	0–3	–
	desert evening primrose	OEPR	<i>Oenothera primiveris</i>	0–3	–
	desert globemallow	SPAM2	<i>Sphaeralcea ambigua</i>	0–3	–

	slender poreleaf	POGR5	<i>Porophyllum gracile</i>	0–3	–
5	Annual Forbs			75–150	
	woolly tidesstromia	TILA2	<i>Tidestromia lanuginosa</i>	0–1	–
	coastal bird's-foot trefoil	LOSAB	<i>Lotus salsuginosus</i> var. <i>brevivexillus</i>	0–1	–
	devil's spineflower	CHRI	<i>Chorizanthe rigida</i>	0–1	–
	brittle spineflower	CHBR	<i>Chorizanthe brevicornu</i>	0–1	–
	aridland goosefoot	CHDE	<i>Chenopodium desiccatum</i>	0–1	–
	common fiddleneck	AMMEI2	<i>Amsinckia menziesii</i> var. <i>intermedia</i>	0–1	–
	bristly nama	NAHI	<i>Nama hispidum</i>	0–1	–
	Gila manroot	MAGI	<i>Marah gilensis</i>	0–1	–
	blazingstar	MENTZ	<i>Mentzelia</i>	0–1	–
	glandular threadplant	NEGL	<i>Nemacladus glanduliferus</i>	0–1	–
	lineleaf whitepuff	OLLI	<i>Oligomeris linifolia</i>	0–1	–
	Florida pellitory	PAFL3	<i>Parietaria floridana</i>	0–1	–
	combseed	PECTO	<i>Pectocarya</i>	0–1	–
	hideseed	EUCRY	<i>Eucrypta</i>	0–1	–
	phacelia	PHACE	<i>Phacelia</i>	0–1	–
	chia	SACO6	<i>Salvia columbariae</i>	0–1	–
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	0–1	–
	Coulter's globemallow	SPCO2	<i>Sphaeralcea coulteri</i>	0–1	–
	woollyhead neststraw	STMI2	<i>Stylocline micropoides</i>	0–1	–
	spurge	EUPHO	<i>Euphorbia</i>	0–1	–
	fringed twinevine	FUCY	<i>Funastrum cynanchoides</i>	0–1	–
	hairy desertsunflower	GECA2	<i>Geraea canescens</i>	0–1	–
	gilia	GILIA	<i>Gilia</i>	0–1	–
	shaggyfruit pepperweed	LELA	<i>Lepidium lasiocarpum</i>	0–1	–
	smallflowered milkvetch	ASNU4	<i>Astragalus nuttallianus</i>	0–1	–
	catnip noseburn	TRNE	<i>Tragia nepetifolia</i>	0–1	–
	Arizona poppy	KAGR	<i>Kallstroemia grandiflora</i>	0–1	–
	Gordon's bladderpod	LEGO	<i>Lesquerella gordonii</i>	0–1	–
	pygmy poppy	ESMI	<i>Eschscholzia minutiflora</i>	0–1	–
	weakleaf bur ragweed	AMCO3	<i>Ambrosia confertiflora</i>	0–1	–
	fringed amaranth	AMFI	<i>Amaranthus fimbriatus</i>	0–1	–
	Arizona lupine	LUAR4	<i>Lupinus arizonicus</i>	0–1	–
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	0–1	–
	bristly fiddleneck	AMTE3	<i>Amsinckia tessellata</i>	0–1	–
	scarlet spiderling	BOCO	<i>Boerhavia coccinea</i>	0–1	–
	yellow tackstem	CAPA7	<i>Calycoseris parryi</i>	0–1	–
	hoary bowlesia	BOIN3	<i>Bowlesia incana</i>	0–1	–
	New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	0–1	–
	sand pygmyweed	CRCOC	<i>Crassula connata</i> var. <i>connata</i>	0–1	–

	hairy prairie clover	DAMO	<i>Dalea mollis</i>	0–1	–
	manybristle chinchweed	PEPA2	<i>Pectis papposa</i>	0–1	–
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	0–1	–
	doubleclaw	PRPA2	<i>Proboscidea parviflora</i>	0–1	–
	New Mexico plumeseed	RANE	<i>Rafinesquia neomexicana</i>	0–1	–
	white tackstem	CAWR	<i>Calycoseris wrightii</i>	0–1	–
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	0–1	–
	flax	LINUM	<i>Linum</i>	0–1	–
	cryptantha	CRYPT	<i>Cryptantha</i>	0–1	–
	fingerleaf gourd	CUDI	<i>Cucurbita digitata</i>	0–1	–
	exserted Indian paintbrush	CAEXE	<i>Castilleja exserta</i> ssp. <i>exserta</i>	0–1	–
	desert thorn-apple	DADI2	<i>Datura discolor</i>	0–1	–
	pricklyburr	DAIN2	<i>Datura inoxia</i>	0–1	–
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	0–1	–
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	0–1	–
	touristplant	DIWI2	<i>Dimorphocarpa wislizeni</i>	0–1	–
	whisperingbells	EMPE	<i>Emmenanthe penduliflora</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	–
	woolly sunflower	ERIOP2	<i>Eriophyllum</i>	0–1	–
	Texas stork's bill	ERTE13	<i>Erodium texanum</i>	0–1	–
	California poppy	ESCAM	<i>Eschscholzia californica</i> ssp. <i>mexicana</i>	0–1	–
	Coulter's lupine	LUSP2	<i>Lupinus sparsiflorus</i>	0–1	–
Tree					
6	Dominant Trees			7–189	
	desert ironwood	OLTE	<i>Olneya tesota</i>	24–189	–
	yellow paloverde	PAMI5	<i>Parkinsonia microphylla</i>	26–142	–
	blue paloverde	PAFL6	<i>Parkinsonia florida</i>	26–142	–
	catclaw acacia	ACGR	<i>Acacia greggii</i>	3–28	–
	velvet mesquite	PRVE	<i>Prosopis velutina</i>	3–28	–
Shrub/Vine					
7	Large Shrubs			1–66	
	creosote bush	LATR2	<i>Larrea tridentata</i>	1–65	–
	whitethorn acacia	VACO9	<i>Vachellia constricta</i>	3–28	–
	water jacket	LYAN	<i>Lycium andersonii</i>	1–5	–
	Arizona desert-thorn	LYEX	<i>Lycium exsertum</i>	1–5	–
	desert wolfberry	LYMA	<i>Lycium macrodon</i>	1–5	–
	Fremont's desert-thorn	LYFR	<i>Lycium fremontii</i>	1–5	–
	Berlandier's wolfberry	LYBE	<i>Lycium berlandieri</i>	1–5	–
	Intehush	ZIOR	<i>Ziziphus obtusifolia</i>	0–5	–

	Common Name	Code	Scientific Name	Height	Notes
	ocotillo	FOSP2	<i>Fouquieria splendens</i>	0–2	–
	longleaf jointfir	EPTR	<i>Ephedra trifurca</i>	0–2	–
	fringed twinevine	FUCY	<i>Funastrum cynanchoides</i>	0–2	–
8	Sub-Shrubs			7–14	
	burrobush	AMDU2	<i>Ambrosia dumosa</i>	5–45	–
	white ratany	KRGR	<i>Krameria grayi</i>	5–45	–
	littleleaf ratany	KRER	<i>Krameria erecta</i>	5–45	–
	triangle bur ragweed	AMDE4	<i>Ambrosia deltoidea</i>	0–7	–
	hollywood	GUSA	<i>Guaiacum sanctum</i>	0–7	–
	alkali goldenbush	ISACA2	<i>Isocoma acradenia</i> var. <i>acradenia</i>	0–7	–
	burroweed	ISTE2	<i>Isocoma tenuisecta</i>	0–7	–
	whitestem paperflower	PSCO2	<i>Psilostrophe cooperi</i>	0–2	–
	brittlebush	ENFA	<i>Encelia farinosa</i>	0–2	–
	beloperone	JUCA8	<i>Justicia californica</i>	0–2	–
	Arizona water-willow	JUCA9	<i>Justicia candicans</i>	0–2	–
9	Cactus and Succulents			36–71	
	Christmas cactus	CYLE8	<i>Cylindropuntia leptocaulis</i>	1–38	–
	branched pencil cholla	CYRA9	<i>Cylindropuntia ramosissima</i>	1–38	–
	Arizona pencil cholla	CYAR14	<i>Cylindropuntia arbuscula</i>	0–5	–
	teddybear cholla	CYBI9	<i>Cylindropuntia bigelovii</i>	0–5	–
	jumping cholla	CYFU10	<i>Cylindropuntia fulgida</i>	0–5	–
	walkingstick cactus	CYSP8	<i>Cylindropuntia spinosior</i>	0–5	–
	staghorn cholla	CYVE3	<i>Cylindropuntia versicolor</i>	0–5	–
	nightblooming cereus	PEGR3	<i>Peniocereus greggii</i>	0–5	–
	candy barrelcactus	FEWI	<i>Ferocactus wislizeni</i>	0–3	–
	buck-horn cholla	CYAC8	<i>Cylindropuntia acanthocarpa</i>	0–3	–
10	Misc. Shrubs			7–36	
	rayless goldenhead	ACSP	<i>Acamptopappus sphaerocephalus</i>	0–7	–
	poreleaf dogweed	ADPO2	<i>Adenophyllum porophyllum</i>	0–7	–
	ambrosia leaf bur ragweed	AMAM2	<i>Ambrosia ambrosioides</i>	0–7	–
	Tucson bur ragweed	AMCO4	<i>Ambrosia cordifolia</i>	0–7	–
	woolly fruit bur ragweed	AMER	<i>Ambrosia eriocentra</i>	0–7	–
	horsetail milkweed	ASSU2	<i>Asclepias subverticillata</i>	0–7	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	0–7	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	0–7	–
	Eastern Mojave buckwheat	ERFA2	<i>Eriogonum fasciculatum</i>	0–7	–
	desert lavender	HYEM	<i>Hyptis emoryi</i>	0–7	–
	sangre de cristo	JACA2	<i>Jatropha cardiophylla</i>	0–7	–
	Arizona nettlespurge	JACI	<i>Jatropha cinerea</i>	0–7	–
	slender janusia	JAGR	<i>Janusia gracilis</i>	0–7	–

	rough menodora	MESC	<i>Menodora scabra</i>	0–7	–
	desertbroom	BASA2	<i>Baccharis sarothroides</i>	0–7	–
	sweetbush	BEJU	<i>Bebbia juncea</i>	0–7	–
	Coulter's brickellbush	BRCO	<i>Brickellia coulteri</i>	0–7	–
	crucifixion thorn	CAEM4	<i>Castela emoryi</i>	0–7	–
	fairyduster	CAER	<i>Calliandra eriophylla</i>	0–7	–
	slender poreleaf	POGR5	<i>Porophyllum gracile</i>	0–7	–
	Thurber's sandpaper plant	PETH4	<i>Petalonyx thurberi</i>	0–7	–
	arrow poision plant	SEBI9	<i>Sebastiania bilocularis</i>	0–7	–
	jojoba	SICH	<i>Simmondsia chinensis</i>	0–7	–
	Hall's shrubby-spurge	TEHA	<i>Tetracoccus hallii</i>	0–7	–
	American threefold	TRCA8	<i>Trixis californica</i>	0–7	–
	Parish's goldeneye	VIPA14	<i>Viguiera parishii</i>	0–7	–
	cattle saltbush	ATPO	<i>Atriplex polycarpa</i>	0–7	–
	shortleaf baccharis	BABR	<i>Baccharis brachyphylla</i>	0–7	–

Other references

Griffith, G.E., Omernik, J.M., Johnson, C.B., and Turner, D.S., 2014, Ecoregions of Arizona (poster): U.S. Geological Survey Open-File Report 2014-1141, with map, scale 1:1,325,000, <https://dx.doi.org/10.3133/ofr20141141>. ISSN 2331-1258 (online)

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Contributors

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Approval

Kendra Moseley, 10/17/2024

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	12/03/2024
Approved by	Kendra Moseley
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:**
