USDA Natural Resources Conservation Service

Ecological site R038XA104AZ
Granitic Hills 12-16" p.z.

Accessed: 05/14/2025

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.

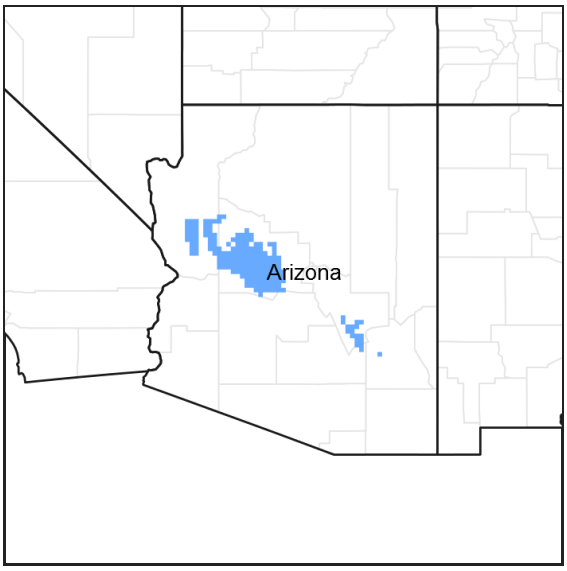


Figure 1. Mapped extent

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): 038X–Mogollon Transition South

AZ 38.1 – Lower Mogollon Transition

Elevations range from 3000 to 4500 feet and precipitation averages 12 to 16 inches per year. Vegetation includes canotia, one-seed juniper, mesquite, catclaw acacia, jojoba, turbinella oak, ratany, shrubby buckwheat, algerita, skunkbush, tobosa, vine mesquite, bottlebrush squirreltail, grama species, curly mesquite, desert needlegrass and New Mexico feathergrass. The soil temperature regime is thermic and the soil moisture regime is ustic aridic. This unit occurs within the Transition Zone Physiographic Province and is characterized by canyons and structural troughs or valleys. Igneous, metamorphic and sedimentary rock classes occur on rough mountainous terrain in association with less extensive sediment filled valleys exhibiting little integrated drainage.

Classification relationships

This site is similar to TE Site # 365 on the Prescott National Forest.

Associated sites

R038XA105AZ	**Limestone Hills 12-16" p.z.**

R038XA117AZ	**Volcanic Hills 12-16" p.z. Clayey**
R038XA134AZ	**Granitic/Schist Hills 12-16" p.z. Paralithic**
R038XA135AZ	**Diabase Hills 12-16" p.z.**

Similar sites

R041XC306AZ	**Shallow Hills 12-16" p.z.**
R038XB204AZ	**Granitic Hills 16-20" p.z.**
R040XA105AZ	**Shallow Hills 10"-13" p.z.**

Table 1. Dominant plant species

Tree	(1) *Parkinsonia microphylla*
Shrub	(1) *Simmondsia chinensis* (2) *eriogonum fasciculatum*
Herbaceous	(1) *aristida* (2) *achnatherum speciosum*

Physiographic features

This site occurs at the lowest elevations of the interior chaparral zone in the Mogollon Transition area. This site occurs in an upland position. It occurs on hill-slopes, ridge-tops and mountains.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain slope (3) Ridge
Flooding frequency	None
Elevation	945–1,402 m
Slope	15–65%
Aspect	N, E, S

Climatic features

Precipitation in this common resource area averages 12 to 16 inches annually. The winter-summer rainfall ratio ranges from about 60/40% in the northwest part of the area to 50/50% in the southeast part. Summer rains fall July through September; are from high-intensity, convective thunderstorms. This moisture originates primarily from the Gulf of Mexico, but can come from the remnants of Pacific hurricanes in September. Winter moisture is frontal, originates in the north Pacific, and falls as rain or snow in widespread storms of low intensity and long duration. Snowfall ranges from a trace to 10 inches per year and can occur from November through March. Snow seldom persists for more than a day except on north aspects. May and June are the driest months of the year. Humidity is generally low all year. Average annual air temperatures range from 59 to 70 degrees F (thermic temperature regime). Daytime temperatures in the summer are commonly in the high 90’s. Freezing temperatures are common from October through April, usually during the night or early morning hours. The actual precipitation, available moisture and temperature vary, depending on, region, elevation, rain shadow effect and aspect.

Table 3. Representative climatic features

Frost-free period (average)	230 days
Freeze-free period (average)	285 days
Precipitation total (average)	406 mm

Influencing water features

There are no water features associated with this site.

Soil features

These soils are shallow (10 to 20 inches) and dark colored. They are loamy textured, non-calcareous and well drained. These soils range from lacking any development to thin argillic horizons. They have formed in residuum and colluvium from granite, rhyolite, gneiss and related conglomerates. Soil surfaces are well covered by light colored gravels, cobbles and/or stones. The effective rooting depth is limited by slightly weathered bedrock at 10 to 20 inches. Runoff is moderate to high on moist soils. The erosion hazard is slight due to gravel, cobble and rock covers. Rock outcrop and can be as high as 15%.
Soils mapped to date on this site include: SSA-627 Mjohave County Southern Part MU's Cellar-25 & 27, Lampshire-74 & 107, Romero-106 & 107, Chiricahua-106; SSA-637 Yavapai County Western Part MU's Barkerville-BmF, BnD, BoF, Moano-AxD, MgD, MkF, MoD, MrC; SSA-639 Black-Hills Sedona Area MU Lampshire-445; SSA-675 San Carlos Indian Reservation MU's Oracle-670 & 671, Romero-670 & 671; SSA-697 Mohave County Central Part MU's Chiricahua-129, Lampshire-130, Romero-129 & 130; SSA-645 Aquila-Carefree Area MU Cellar-16.

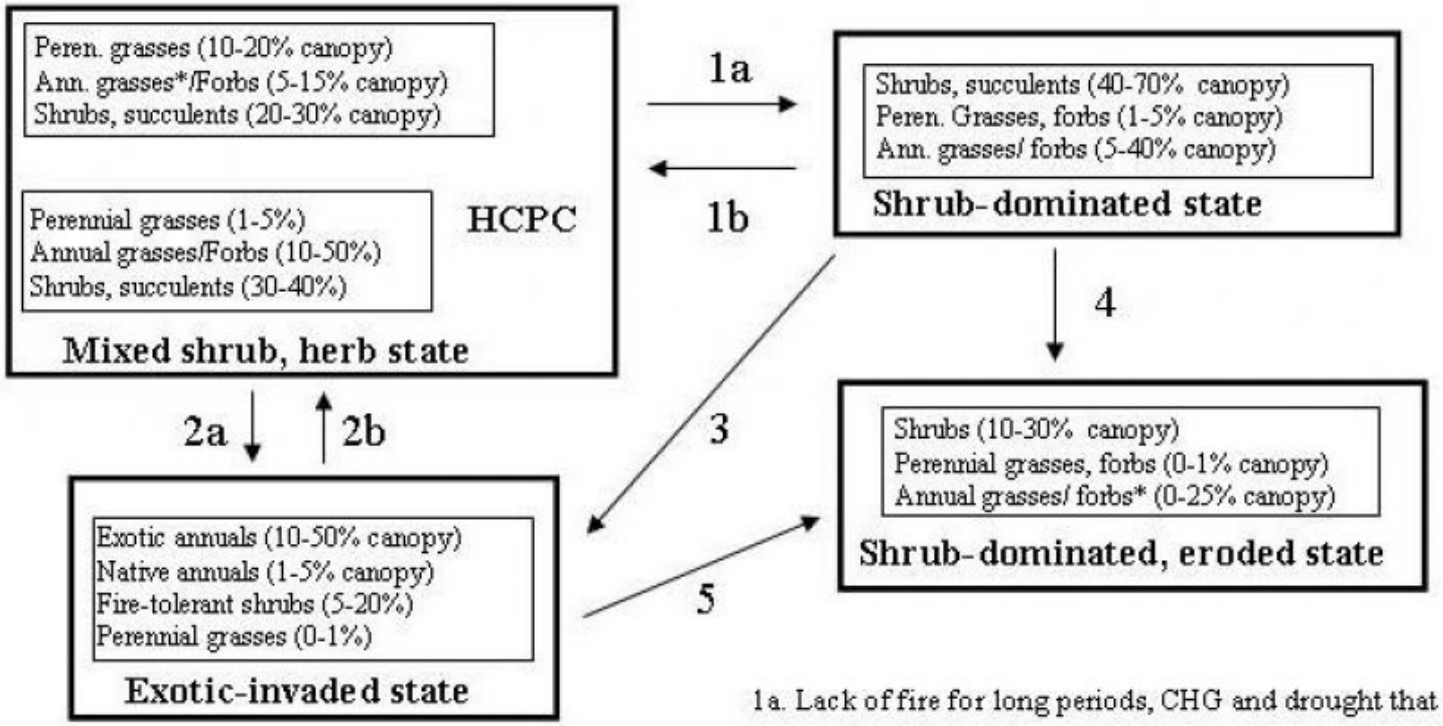
Table 4. Representative soil features

Surface texture	(1) Very gravelly loam (2) Very gravelly sandy loam (3) Gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately slow
Soil depth	25–51 cm
Surface fragment cover <=3"	25–50%
Surface fragment cover >3"	1–15%
Available water capacity (0-101.6cm)	2.03–5.59 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)	6.8–7.6
Subsurface fragment volume <=3" (Depth not specified)	10–35%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

The historic native plant community is a diverse mixture of desert trees, shrubs, succulents, forbs and grasses. This includes a diverse flora of native annual grasses and forbs of both the winter and summer seasons. Periodic wildfires occurred at moderate intervals (15 to 30 years) and helped maintain a balance between herbs and shrubs. In the absence of fire for longer periods, shrubby species and cacti can become dominant. The interactions of drought, fire and continuous livestock grazing can, over time, result in the loss of palatable grasses, half shrubs and suffrutescent forbs. In some situations non-native annuals can dominate the site. These species can, over time, diminish the soil seed-bank of native annual species. Non-native annuals can act to increase the fire frequency of areas of the site near roads and urban areas, where the incidence of man-made fires is high.

MLRA 38-1 (12-16"), Granitic Hills



*Annual grasses include natives and non-natives

1a. Lack of fire for long periods, CHG and drought that reduced fuel loads.

1b. Unknown, possible herbicide followed by prescribed fire as maintenance.

2a. Introduction of seed source of exotic annuals like red brome, wild oats plus increased fire frequency (every 5-10 years)

2b. Unknown

3. Introduction of seed source of exotic annuals, El Nino type event, catastrophic fire.

4, 5. Accelerated soil erosion may occur where vegetation is absent. Repeated fires may remove most perennial vegetation. Slopes are trailed, soils are compacted and rill erosion occurs.

Figure 4. State and Transition, Granitic Hills 12-16" p.z.

State 1
Mixed Shrub-Grass State

Community 1.1
Historic Climax Plant Community

The historic, native, plant community is a diverse mixture of perennial grasses, suffrutescent forbs, shrubs, succulents and desert trees. A rich flora of native annual forbs and grasses, of both the winter and summer seasons, exist in the plant community. Periodic, naturally occurring, wildfires were important in maintaining the potential plant community. North slopes have a chaparral of evergreen shrubs like jojoba, turbinella oak and flatop buckwheat. Southern exposures will have a higher percentage of desert shrubs, trees and succulents in the plant community. More xeric grasses will dominate southern exposures (aristida, tanglehead). Grasses on cooler aspects include desert stipa and sideoats grama.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	123	336	773
Shrub/Vine	235	392	706
Forb	11	56	224
Tree	6	22	112
Total	**375**	**806**	**1815**

Table 6. Soil surface cover

Tree basal cover	0-1%
Shrub/vine/liana basal cover	1-2%
Grass/grasslike basal cover	2-5%
Forb basal cover	1-2%
Non-vascular plants	0%
Biological crusts	0-1%
Litter	20-50%
Surface fragments >0.25" and <=3"	25-50%
Surface fragments >3"	1-15%
Bedrock	1-15%
Water	0%
Bare ground	10-50%

Table 7. Canopy structure (% cover)

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

Figure 6. Plant community growth curve (percent production by month). AZ3811, 38.1 12-16" p.z. all sites. Growth begins in the spring, most growth occurs in the summer..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	1	7	15	20	22	20	10	5	0	0

State 2
Shrub Dominated State

Community 2.1
Shrub Dominated Plant Community

Perennial grass canopy cover is reduced due to the interactions of drought, grazing and fire. Desert shrubs and cacti dominate the plant community. Shrub cover exceeds 40%. Annuals, both native and non-native, dominate the under-story. Fire frequency is reduced but the site can still burn, especially after "El Nino" years produce heavy fuel loads of annual grasses and forbs.

State 3
Shrub Dominated and Eroded State

Community 3.1
Shrub Dominated and Eroded Plant Community

Shrubs like jojoba, paloverde, mesquite, mimosa and ocotillo and succulents like prickly pear, cholla and banana yucca can increase to dominate the site in the absence of fire for very long periods of time. Native and non-native annual forbs and grasses dominate the under-story. In "El Nino" years, herbaceous fuels can be sufficient to carry fire through the heavy canopy of shrubs. The major woody shrubs are, however, fire resistant once established. Such fires would remove less tolerant species like cacti and leave intact the sprouting woody plants to become more and more dominant. Extreme rainfall events coupled with; the fire, drought and grazing interaction, can lead to rilling of steep slopes. Compaction of soils can occur with heavy trailing from continuous livestock use. Loss of plant cover after repeated fire can lead to accelerated rill erosion under these circumstances.

State 4
Exotic forb and grass invaded state

Community 4.1
Exotic Annuals Invaded Plant Community

Non-native annual grasses and forbs like; red brome, cheatgrass and wild oats, can invade and dominate areas of the site. These species can, over time, reduce the seed-bank of native annual grasses and forbs. Their presence can increase the fire frequency (of man made fires) especially where roads and urban areas are adjacent to areas

of the site. Repeated fires tend to remove fire sensitive species like paloverde, cacti and buckwheat, and leave fire tolerant species like turbinella oak, mesquite, whitethorn and jojoba.

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**			78–392	
	sideoats grama	BOCU	*Bouteloua curtipendula*	34–112	–
	black grama	BOER4	*Bouteloua eriopoda*	11–67	–
	slender grama	BORE2	*Bouteloua repens*	6–56	–
	tanglehead	HECO10	*Heteropogon contortus*	6–56	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	6–56	–
	purple threeawn	ARPU9	*Aristida purpurea*	1–56	–
	Parish's threeawn	ARPUP5	*Aristida purpurea var. parishii*	1–34	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	1–34	–
	Arizona cottontop	DICA8	*Digitaria californica*	1–34	–
2	**Cool season grasses**			11–112	
	desert needlegrass	ACSP12	*Achnatherum speciosum*	11–112	–
	squirreltail	ELEL5	*Elymus elymoides*	0–22	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–22	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	0–11	–
	needle and thread	HECO26	*Hesperostipa comata*	0–6	–
3	**Misc. perennial grasses**			11–112	
	big galleta	PLRI3	*Pleuraphis rigida*	0–28	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–22	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	0–17	–
	spidergrass	ARTE3	*Aristida ternipes*	0–17	–
	spidergrass	ARTEG	*Aristida ternipes var. gentilis*	0–17	–
	Hall's panicgrass	PAHA	*Panicum hallii*	0–11	–
	curly-mesquite	HIBE	*Hilaria belangeri*	0–11	–
	green sprangletop	LEDU	*Leptochloa dubia*	0–11	–
	southwestern bristlegrass	SESC2	*Setaria scheelei*	0–6	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	0–6	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–6	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	0–6	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	0–6	–
	blue threeawn	ARPUN	*Aristida purpurea var. nealleyi*	0–6	–
	red grama	BOTR2	*Bouteloua trifida*	0–1	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–1	–
	nineawn pappusgrass	ENDE	*Enneapogon desvauxii*	0–1	–
	slim tridens	TRMU	*Tridens muticus*	0–1	–
	slim tridens	TRMUE	*Tridens muticus var. elongatus*	0–1	–
	bullgrass	MUEM	*Muhlenbergia emersleyi*	0–1	–

	bullgrass	MUEM	*Muhlenbergia emersleyi*	0–1	–
	vine mesquite	PAOB	*Panicum obtusum*	0–1	–
	Texas bluestem	SCCI2	*Schizachyrium cirratum*	0–1	–
4	**Annual grasses**			6–168	
	sixweeks threeawn	ARAD	*Aristida adscensionis*	1–34	–
	mucronate sprangeltop	LEPAB	*Leptochloa panicea ssp. brachiata*	1–28	–
	Mexican panicgrass	PAHI5	*Panicum hirticaule*	0–22	–
	Arizona signalgrass	URAR	*Urochloa arizonica*	1–22	–
	small fescue	VUMI	*Vulpia microstachys*	1–22	–
	Eastwood fescue	VUMIC	*Vulpia microstachys var. ciliata*	1–22	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	1–22	–
	prairie threeawn	AROL	*Aristida oligantha*	0–11	–
	needle grama	BOAR	*Bouteloua aristidoides*	0–6	–
	Rothrock's grama	BORO2	*Bouteloua rothrockii*	0–6	–
	Arizona brome	BRAR4	*Bromus arizonicus*	0–2	–
	delicate muhly	MUFR	*Muhlenbergia fragilis*	0–2	–
	littleseed muhly	MUMI	*Muhlenbergia microsperma*	0–2	–
	witchgrass	PACA6	*Panicum capillare*	0–1	–
	Bigelow's bluegrass	POBI	*Poa bigelovii*	0–1	–
	feather fingergrass	CHVI4	*Chloris virgata*	0–1	–
	canyon cupgrass	ERLE7	*Eriochloa lemmonii*	0–1	–
	tufted lovegrass	ERPE	*Eragrostis pectinacea*	0–1	–
	desert lovegrass	ERPEM	*Eragrostis pectinacea var. miserrima*	0–1	–
	little barley	HOPU	*Hordeum pusillum*	0–1	–
	Mexican sprangletop	LEFUU	*Leptochloa fusca ssp. uninervia*	0–1	–
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–1	–
Forb					
5	**Perennial forbs**			6–56	
	shrubby deervetch	LORI3	*Lotus rigidus*	1–22	–
	slender janusia	JAGR	*Janusia gracilis*	1–17	–
	spikemoss	SELAG	*Selaginella*	1–17	–
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	0–11	–
	climbing wartclub	BOSC	*Boerhavia scandens*	0–6	–
	perennial rockcress	ARPE2	*Arabis perennans*	1–6	–
	weakleaf bur ragweed	AMCO3	*Ambrosia confertiflora*	1–6	–
	southwestern mock vervain	GLGO	*Glandularia gooddingii*	0–6	–
	lipfern	CHEIL	*Cheilanthes*	0–6	–
	bluedicks	DICA14	*Dichelostemma capitatum*	0–6	–
	Coues' cassia	SECO10	*Senna covesii*	0–6	–
	slender poreleaf	POGR5	*Porophyllum gracile*	0–6	–
	lacy tansyaster	MAPI	*Machaeranthera pinnatifida*	0–6	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	0–6	–

	wishbone-bush	MILAV	*Mirabilis laevis var. villosa*	1–6	–
	cliffbrake	PELLA	*Pellaea*	0–6	–
	Parry's beardtongue	PEPA24	*Penstemon parryi*	0–6	–
	desert penstemon	PEPS	*Penstemon pseudospectabilis*	0–6	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	0–6	–
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	1–6	–
	sego lily	CANU3	*Calochortus nuttallii*	0–2	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–2	–
	desert rosemallow	HICO	*Hibiscus coulteri*	0–2	–
	paleface	HIDE	*Hibiscus denudatus*	0–1	–
	Indian rushpea	HOGL2	*Hoffmannseggia glauca*	0–1	–
	ragged nettlespurge	JAMA	*Jatropha macrorhiza*	0–1	–
	longflower tube tongue	JULO3	*Justicia longii*	0–1	–
	Wright's deervetch	LOWR	*Lotus wrightii*	0–1	–
	Parry's false prairie-clover	MAPA7	*Marina parryi*	0–1	–
	Mojave spurge	EUSC6	*Euphorbia schizoloba*	0–1	–
	fleabane	ERIGE2	*Erigeron*	0–1	–
	Cooley's bundleflower	DECO2	*Desmanthus cooleyi*	0–1	–
	desert larkspur	DEPA	*Delphinium parishii*	0–1	–
	tall mountain larkspur	DESC	*Delphinium scaposum*	0–1	–
	tuber anemone	ANTU	*Anemone tuberosa*	0–1	–
	narrowleaf silverbush	ARLA12	*Argythamnia lanceolata*	0–1	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–1	–
	dwarf desertpeony	ACNA2	*Acourtia nana*	0–1	–
	brownfoot	ACWR5	*Acourtia wrightii*	0–1	–
	San Felipe dogweed	ADPO	*Adenophyllum porophylloides*	0–1	–
	trailing windmills	ALIN	*Allionia incarnata*	0–1	–
	largeflower onion	ALMA4	*Allium macropetalum*	0–1	–
	dense ayenia	AYMI	*Ayenia microphylla*	0–1	–
	desert marigold	BAMU	*Baileya multiradiata*	0–1	–
	scarlet spiderling	BOCO	*Boerhavia coccinea*	0–1	–
	wavyleaf Indian paintbrush	CAAPM	*Castilleja applegatei ssp. martinii*	0–1	–
	Arizona wrightwort	CAAR7	*Carlowrightia arizonica*	0–1	–
	New Mexico silverbush	ARNE2	*Argythamnia neomexicana*	0–1	–
	Lemmon's ragwort	SELE8	*Senecio lemmonii*	0–1	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	0–1	–
	glandleaf milkwort	POMA7	*Polygala macradenia*	0–1	–
	canaigre dock	RUHY	*Rumex hymenosepalus*	0–1	–
	twinleaf senna	SEBA3	*Senna bauhinioides*	0–1	–
	orange fameflower	PHAU13	*Phemeranthus aurantiacus*	0–1	–
	desert tobacco	NIOB	*Nicotiana obtusifolia*	0–1	–
	New Mexico groundsel	PANE7	*Packera neomexicana*	0–1	–
	Oak Creek ragwort	PAQU8	*Packera quercetorum*	0–1	–
	toadflax penstemon	PELI2	*Penstemon linarioides*	0–1	–

	turpentinebroom	THMO	*Thamnosma montana*	0–1	–
	branched noseburn	TRRA5	*Tragia ramosa*	0–1	–
	Louisiana vetch	VILUL2	*Vicia ludoviciana ssp. ludoviciana*	0–1	–
6	**Annual forbs**			6–168	
	bristly fiddleneck	AMTE3	*Amsinckia tessellata*	0–28	–
	pitseed goosefoot	CHBE4	*Chenopodium berlandieri*	0–28	–
	California poppy	ESCAM	*Eschscholzia californica ssp. mexicana*	0–28	–
	western tansymustard	DEPI	*Descurainia pinnata*	0–22	–
	Coulter's lupine	LUSP2	*Lupinus sparsiflorus*	0–22	–
	phacelia	PHACE	*Phacelia*	0–17	–
	exserted Indian paintbrush	CAEXE	*Castilleja exserta ssp. exserta*	0–17	–
	Coulter's spiderling	BOCO2	*Boerhavia coulteri*	0–17	–
	slender goldenweed	MAGR10	*Machaeranthera gracilis*	0–11	–
	tanseyleaf tansyaster	MATA2	*Machaeranthera tanacetifolia*	0–11	–
	longleaf false goldeneye	HELOA2	*Heliomeris longifolia var. annua*	0–11	–
	Arizona poppy	KAGR	*Kallstroemia grandiflora*	0–6	–
	flatcrown buckwheat	ERDE6	*Eriogonum deflexum*	0–6	–
	combseed	PECTO	*Pectocarya*	0–6	–
	shaggyfruit pepperweed	LELA	*Lepidium lasiocarpum*	0–6	–
	foothill deervetch	LOHU2	*Lotus humistratus*	0–6	–
	coastal bird's-foot trefoil	LOSA	*Lotus salsuginosus*	0–6	–
	Arizona lupine	LUAR4	*Lupinus arizonicus*	0–6	–
	thelypody	THELY	*Thelypodium*	0–6	–
	woolly tidestromia	TILA2	*Tidestromia lanuginosa*	0–6	–
	desert Indianwheat	PLOV	*Plantago ovata*	1–6	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–6	–
	fivewing spiderling	BOIN	*Boerhavia intermedia*	0–6	–
	milkvetch	ASTRA	*Astragalus*	0–6	–
	miner's lettuce	CLPEP	*Claytonia perfoliata ssp. perfoliata*	0–6	–
	cryptantha	CRYPT	*Cryptantha*	0–2	–
	purslane	PORTU	*Portulaca*	0–2	–
	New Mexico plumeseed	RANE	*Rafinesquia neomexicana*	0–2	–
	Arizona popcornflower	PLAR	*Plagiobothrys arizonicus*	0–2	–
	sleepy silene	SIAN2	*Silene antirrhina*	0–2	–
	sand fringepod	THCU	*Thysanocarpus curvipes*	0–2	–
	miniature lupine	LUBI	*Lupinus bicolor*	0–2	–
	Thurber's pepperweed	LETH2	*Lepidium thurberi*	0–2	–
	New Mexico thistle	CINE	*Cirsium neomexicanum*	0–2	–
	Gordon's bladderpod	LEGO	*Lesquerella gordonii*	0–2	–
	miniature woollystar	ERDI2	*Eriastrum diffusum*	0–2	–
	spreading fleabane	ERDI4	*Erigeron divergens*	0–2	–
	sorrel buckwheat	ERPO4	*Eriogonum polycladon*	0–2	–
	wedgeleaf draba	DRCU	*Draba cuneifolia*	0–2	–

	American wild carrot	DAPU3	*Daucus pusillus*	0–2	–
	spurge	EUPHO	*Euphorbia*	0–2	–
	crestrib morning-glory	IPCO2	*Ipomoea costellata*	0–2	–
	redstar	IPCO3	*Ipomoea coccinea*	0–1	–
	ivyleaf morning-glory	IPHE	*Ipomoea hederacea*	0–1	–
	star gilia	GIST	*Gilia stellata*	0–1	–
	California goldfields	LACA7	*Lasthenia californica*	0–1	–
	sacred thorn-apple	DAWR2	*Datura wrightii*	0–1	–
	Texas stork's bill	ERTE13	*Erodium texanum*	0–1	–
	manybristle chinchweed	PEPA2	*Pectis papposa*	0–1	–
	Fendler's desertdandelion	MAFE	*Malacothrix fendleri*	0–1	–
	whitestem blazingstar	MEAL6	*Mentzelia albicaulis*	0–1	–
	green carpetweed	MOVE	*Mollugo verticillata*	0–1	–
	desert evening primrose	OEPR	*Oenothera primiveris*	0–1	–
	Florida pellitory	PAFL3	*Parietaria floridana*	0–1	–
	lyreleaf jewelflower	STCA5	*Streptanthus carinatus*	0–1	–
	woollyhead neststraw	STMI2	*Stylocline micropoides*	0–1	–
	creamcups	PLCA5	*Platystemon californicus*	0–1	–
	chia	SACO6	*Salvia columbariae*	0–1	–
	sawtooth sage	SASU7	*Salvia subincisa*	0–1	–
	ragwort	SENEC	*Senecio*	0–1	–
	spreading fanpetals	SIAB	*Sida abutifolia*	0–1	–
	desert unicorn-plant	PRAL4	*Proboscidea althaeifolia*	0–1	–
	doubleclaw	PRPA2	*Proboscidea parviflora*	0–1	–
	hairy prairie clover	DAMO	*Dalea mollis*	0–1	–
	scrambled eggs	COAU2	*Corydalis aurea*	0–1	–
	yellow tackstem	CAPA7	*Calycoseris parryi*	0–1	–
	white tackstem	CAWR	*Calycoseris wrightii*	0–1	–
	brittle spineflower	CHBR	*Chorizanthe brevicornu*	0–1	–
	Esteve's pincushion	CHST	*Chaenactis stevioides*	0–1	–
	hoary bowlesia	BOIN3	*Bowlesia incana*	0–1	–
	annual agoseris	AGHE2	*Agoseris heterophylla*	0–1	–
	carelessweed	AMPA	*Amaranthus palmeri*	0–1	–
Shrub/Vine					
7	**Evergreen shrubs**			168–336	
	jojoba	SICH	*Simmondsia chinensis*	112–280	–
	Sonoran scrub oak	QUTU2	*Quercus turbinella*	0–168	–
	desert ceanothus	CEGR	*Ceanothus greggii*	0–56	–
	alderleaf mountain mahogany	CEMOM4	*Cercocarpus montanus var. montanus*	0–34	–
	hairy mountain mahogany	CEMOP	*Cercocarpus montanus var. paucidentatus*	0–11	–
	algerita	MATR3	*Mahonia trifoliolata*	0–11	–
	snapdragon penstemon	KEANM	*Keckiella antirrhinoides ssp. microphylla*	0–6	–

	red barberry	MAHA4	*Mahonia haematocarpa*	0–6	–
	sugar sumac	RHOV	*Rhus ovata*	0–6	–
	redberry buckthorn	RHCR	*Rhamnus crocea*	0–2	–
	Wright's silktassel	GAWR3	*Garrya wrightii*	0–2	–
	pointleaf manzanita	ARPU5	*Arctostaphylos pungens*	0–2	–
8	**Large shrubs**			17–67	
	ocotillo	FOSP2	*Fouquieria splendens*	1–22	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	0–11	–
	catclaw acacia	ACGR	*Acacia greggii*	1–11	–
	Wright's beebrush	ALWR	*Aloysia wrightii*	0–11	–
	desert sweet	CHMI2	*Chamaebatiaria millefolium*	0–6	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–6	–
	Berlandier's wolfberry	LYBE	*Lycium berlandieri*	1–6	–
	Arizona desert-thorn	LYEX	*Lycium exsertum*	0–6	–
	Florida hopbush	DOVI	*Dodonaea viscosa*	0–2	–
	Mexican bladdersage	SAME	*Salazaria mexicana*	0–2	–
	Arizona necklacepod	SOAR3	*Sophora arizonica*	0–2	–
	spiny hackberry	CEEH	*Celtis ehrenbergiana*	0–2	–
	whitethorn acacia	ACCO2	*Acacia constricta*	0–2	–
	Warnock's snakewood	COWA	*Condalia warnockii*	0–1	–
	ambrosia leaf bur ragweed	AMAM2	*Ambrosia ambrosioides*	0–1	–
	Thurber's desert honeysuckle	ANTH2	*Anisacanthus thurberi*	0–1	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–1	–
	desertbroom	BASA2	*Baccharis sarothroides*	0–1	–
	California brickellbush	BRCA3	*Brickellia californica*	0–1	–
	lotebush	ZIOBC	*Ziziphus obtusifolia var. canescens*	0–1	–
	mariola	PAIN2	*Parthenium incanum*	0–1	–
	littleleaf sumac	RHMI3	*Rhus microphylla*	0–1	–
	pale desert-thorn	LYPA	*Lycium pallidum*	0–1	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–1	–
	creosote bush	LATR2	*Larrea tridentata*	0–1	–
9	**Dominant half shrubs**			39–168	
	fairyduster	CAER	*Calliandra eriophylla*	17–56	–
	Eastern Mojave buckwheat	ERFA2	*Eriogonum fasciculatum*	6–56	–
	bastardsage	ERWR	*Eriogonum wrightii*	6–56	–
	littleleaf ratany	KRER	*Krameria erecta*	6–17	–
	Gregg's prairie clover	DAGR2	*Dalea greggii*	0–17	–
	Parish's goldeneye	VIPA14	*Viguiera parishii*	0–11	–
	rough menodora	MESC	*Menodora scabra*	0–11	–
	longleaf phlox	PHLO2	*Phlox longifolia*	0–6	–
	American threefold	TRCA8	*Trixis californica*	0–6	–
	Coulter's brickellbush	BRCO	*Brickellia coulteri*	0–6	–

	Coulter's brickellbush	BRCO	*Brickellia coulteri*	0–6	–
	pelotazo	ABIN	*Abutilon incanum*	0–6	–
	ragged rockflower	CRBI2	*Crossosoma bigelovii*	0–2	–
	starry bedstraw	GAST	*Galium stellatum*	0–1	–
	desert zinnia	ZIAC	*Zinnia acerosa*	0–1	–
	shortleaf baccharis	BABR	*Baccharis brachyphylla*	0–1	–
	yerba de pasmo	BAPT	*Baccharis pteronioides*	0–1	–
	sweetbush	BEJU	*Bebbia juncea*	0–1	–
10	**Succulents**			6–78	
	banana yucca	YUBA	*Yucca baccata*	1–22	–
	cactus apple	OPEN3	*Opuntia engelmannii*	6–17	–
	buck-horn cholla	CYAC8	*Cylindropuntia acanthocarpa*	0–17	–
	tulip pricklypear	OPPH	*Opuntia phaeacantha*	1–11	–
	sacahuista	NOMI	*Nolina microcarpa*	0–11	–
	saguaro	CAGI10	*Carnegiea gigantea*	0–6	–
	common sotol	DAWH2	*Dasylirion wheeleri*	1–6	–
	walkingstick cactus	CYSP8	*Cylindropuntia spinosior*	0–2	–
	goldenflower century plant	AGCH2	*Agave chrysantha*	0–2	–
	Palmer's century plant	AGPA3	*Agave palmeri*	0–2	–
	dollarjoint pricklypear	OPCH	*Opuntia chlorotica*	0–2	–
	candy barrelcactus	FEWI	*Ferocactus wislizeni*	0–2	–
	Graham's nipple cactus	MAGR9	*Mammillaria grahamii*	0–1	–
	soaptree yucca	YUEL	*Yucca elata*	0–1	–
	Schott's century plant	AGSC3	*Agave schottii*	0–1	–
	teddybear cholla	CYBI9	*Cylindropuntia bigelovii*	0–1	–
	jumping cholla	CYFU10	*Cylindropuntia fulgida*	0–1	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0–1	–
	Whipple cholla	CYWH	*Cylindropuntia whipplei*	0–1	–
	pinkflower hedgehog cactus	ECBO2	*Echinocereus bonkerae*	0–1	–
	Arizona hedgehog cactus	ECCOA	*Echinocereus coccineus var. arizonicus*	0–1	–
	Engelmann's hedgehog cactus	ECEN	*Echinocereus engelmannii*	0–1	–
	redspine fishhook cactus	ECER2	*Echinomastus erectocentrus*	0–1	–
	pinkflower hedgehog cactus	ECFA	*Echinocereus fasciculatus*	0–1	–
	spinystar	ESVI2	*Escobaria vivipara*	0–1	–
11	**Increaser half-shrubs**			1–56	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	1–22	–
	turpentine bush	ERLA12	*Ericameria laricifolia*	0–11	–
	narrowleaf goldenbush	ERLI6	*Ericameria linearifolia*	0–6	–
	brittlebush	ENFA	*Encelia farinosa*	0–6	–
	button brittlebush	ENFR	*Encelia frutescens*	0–6	–
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	0–1	–
	burroweed	ISTE2	*Isocoma tenuisecta*	0–1	–

	burroweed	ISTE2	*Isocoma tenuisecta*	0–1	
Tree					
12	**Trees**			6–112	
	crucifixion thorn	CAHO3	*Canotia holacantha*	0–22	–
	redberry juniper	JUCO11	*Juniperus coahuilensis*	0–17	–
	oneseed juniper	JUMO	*Juniperus monosperma*	0–17	–
	yellow paloverde	PAMI5	*Parkinsonia microphylla*	1–17	–
	western honey mesquite	PRGLT	*Prosopis glandulosa var. torreyana*	0–6	–
	velvet mesquite	PRVE	*Prosopis velutina*	0–6	–
	blue paloverde	PAFL6	*Parkinsonia florida*	0–6	–

Animal community

This site is suitable for grazing year round, but is not easily traversed by livestock. Livestock grazing use is concentrated on south slopes, canyon bottoms and ridge-tops. North slopes may be little used. Slopes greater than 50% and areas with very cobbly surfaces limit grazing use by cattle. Areas of rock outcrop can form barriers to livestock movement. The site is susceptible to erosion in overgrazed areas like bed-grounds, livestock trails and lower slopes adjacent to water.
The site has good habitat diversity for a great variety of desert wildlife species. Water developments are very important to both livestock and wildlife on this site.

Hydrological functions

This site has rough surfaces, due to a high cover of gravels, cobbles and stones, which act to hold water on the site. When the soils are dry, it produces little runoff. It produces significant runoff only when heavy rain falls on snow or moist soils.

Recreational uses

Hunting, camping, horseback riding, backpacking, rock hounding, photography.

Wood products

Limited harvest of fuel-wood, fence posts and stays from mesquite, juniper and saguaro.

Other products

There is some native harvest of food plants like grass nuts, thistle, prickly pear tunas, jojoba nuts and mescal. There is some harvest of herbs like herbaceous sage, terragon and deer weed.

Type locality

Location 1: Graham County, AZ	
Township/Range/Section	T8S R22E S6
General legal description	Eureka Springs Ranch, near Cedar Springs

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

Indicators

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

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

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

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

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

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

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

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

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

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

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

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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:

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

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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):**

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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:**

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17. **Perennial plant reproductive capability:**
