USDA Natural Resources
Conservation Service

Ecological site R038XA118AZ
Basalt / Sandstone Hills 12-16" p.z.

Accessed: 06/30/2024

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.

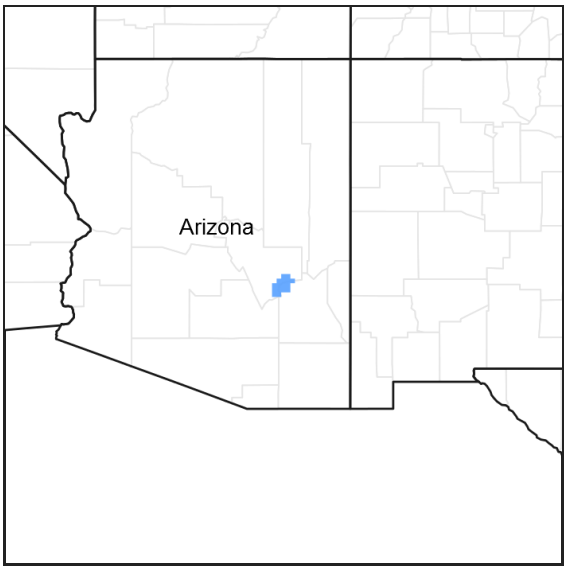


Figure 1. Mapped extent

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.

Associated sites

R038XA102AZ	**Clayey Upland 12-16" p.z.**
R038XA117AZ	**Volcanic Hills 12-16" p.z. Clayey**

Table 1. Dominant plant species

Tree	(1) *Canotia*
Shrub	(1) *Simmondsia chinensis* (2) *eriogonum fasciculatum*
Herbaceous	(1) *bouteloua eriopoda* (2) *aristida*

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 steep hill-slopes, ridge-tops, mesa sides and scarps.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Scarp slope (3) Ridge
Flooding frequency	None
Elevation	3,100–4,600 ft
Slope	15–75%
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)	16 in

Influencing water features

There are no water features associated with this site.

Soil features

These soils are shallow (10 to 20 inches) and light colored. They are loamy textured, calcareous in the subsurface and well drained. They have formed in residuum and slope alluvium resulting from inter-bedded basalt, volcanic ash and lakebed sediments. Soil surfaces are well covered by dark colored gravels, cobbles and stones. The effective rooting depth is limited by hard 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 vertical scarps can be as high as 25%.

Soils mapped on this site include: from SSA-675 San Carlos IR Area MU's Argic petrocalcids-635 & Torriorthents-635.

Table 4. Representative soil features

Parent material	(1) Residuum–basalt (2) Slope alluvium–volcanic breccia
Surface texture	(1) Cobbly sandy loam (2) Very gravelly sandy loam (3) Gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	10–20 in
Surface fragment cover <=3"	25–50%
Surface fragment cover >3"	1–15%
Available water capacity (0-40in)	0.6–2.1 in
Calcium carbonate equivalent (0-40in)	1–10%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	10–45%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

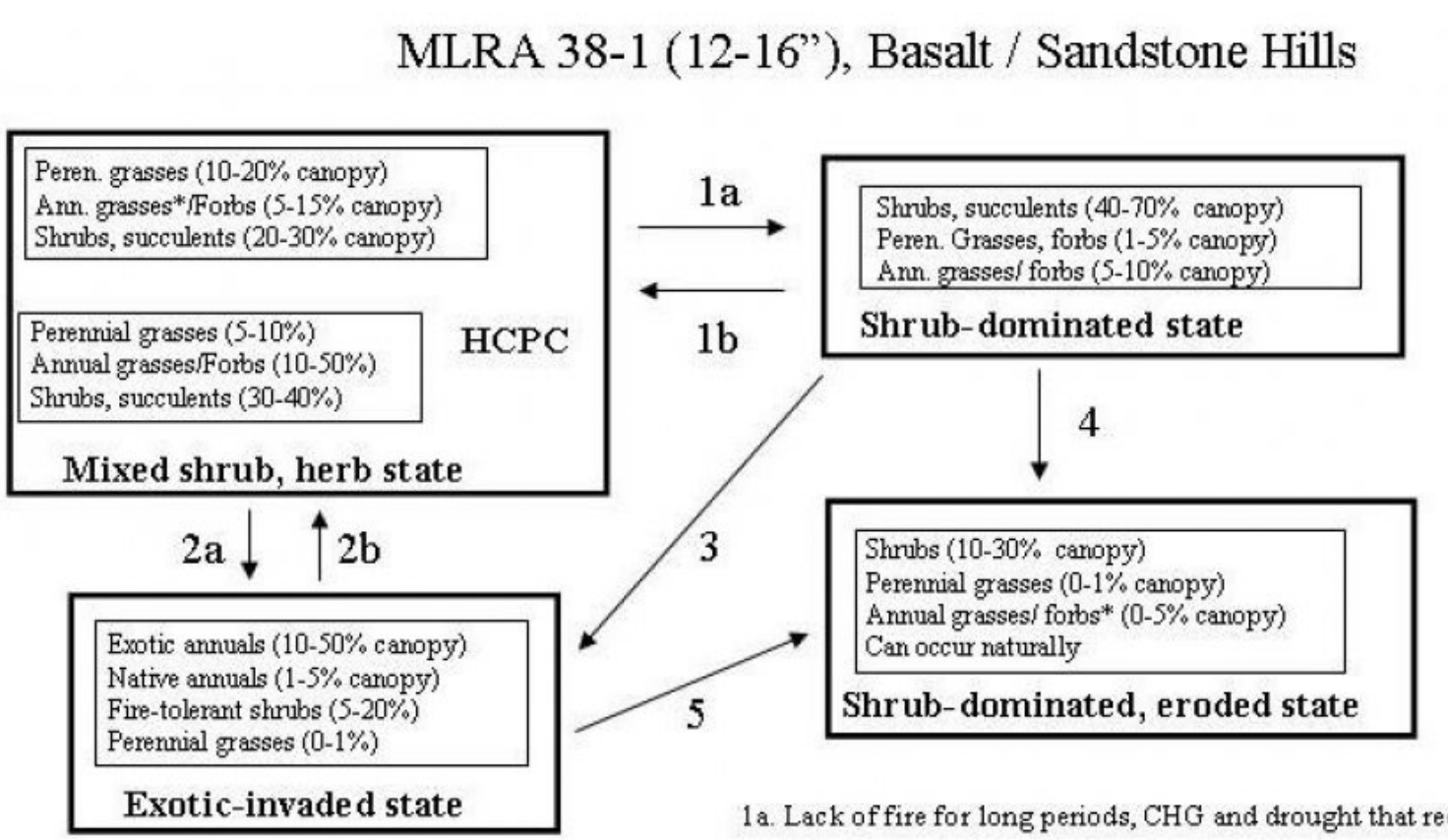
The historic native plant community is a diverse mixture of desert trees, shrubs, succulents, forbs and grasses. This includes a diverse flora of native annual grasses and forbs of both the winter and summer seasons. Periodic wildfires occurred at moderate intervals (15 to 30 years) and helped maintain a balance between herbs and shrubs, but large areas of rock outcrop and vertical scarps prevented large, contiguous fires. 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.

State and transition model

State 1
Mixed Shrub - Herbaceous State

Community 1.1

Figure 4. State & Transition, Basalt/Sandstone Hills 12-16"



*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 maintenar

2a. Introduction of seed source of exotic annuals like red brome, wild oats plus increased fire frequency (every 5 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 herbaceous patches are absent. This state also occurs naturally where very steep scarps exist in the lakebeds or in layers of volcanic ash.

Historic Native Plant Community

Figure 5. Basalt / Sandstone Hills 12-16" pz.

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 occuring, wildfires were important in maintaining the potential plant community. Northern exposures have a higher percentage of perennial grasses than will occur on south slopes. North slopes will also be more likely to experience tree increases especially juniper species, mesquite and canotia. Southern exposures will have a higher percentage of shrubs and succulents in the plant community. More xeric grasses will dominate southern exposures (aristida, tanglehead).

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	70	200	420
Shrub/Vine	140	220	400
Forb	25	60	250
Tree	10	30	70
Total	**245**	**510**	**1140**

Table 6. Soil surface cover

Tree basal cover	0-1%
Shrub/vine/liana basal cover	1-2%
Grass/grasslike basal cover	0-1%
Forb basal cover	0-1%
Non-vascular plants	0-1%
Biological crusts	0-5%
Litter	5-20%
Surface fragments >0.25" and <=3"	25-50%
Surface fragments >3"	5-15%
Bedrock	5-25%
Water	0%
Bare ground	10-60%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	0-2%	0-5%	0-10%
>0.5 <= 1	–	1-5%	1-10%	1-5%
>1 <= 2	–	5-10%	2-10%	1-5%
>2 <= 4.5	–	5-15%	0-2%	0-1%
>4.5 <= 13	0-3%	1-5%	–	–
>13 <= 40	1-3%	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Figure 7. 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

Figure 8. Basalt / Limestone Hills 12-16" pz., shrubby

Perennial grass canopy cover is reduced due to the interactions of drought, grazing and / or fire. Desert shrubs and

cacti dominate the plant community. Shrub cover exceeds 30%. 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. This state can also occur naturally. The layered rock outcrop and vertical scarps of lakebed sediments, that break up fuel continuity, can cause islands of this state that have not burned in very long periods.

State 3
Shrub Dominated, Eroded State

Community 3.1
Shrub Dominated, Eroded Plant Community

Shrubs like whitethorn acacia, mesquite, ocotillo, creosotebush and canotia, 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. This state can also occur naturally. It exists where a large percentage of the area is rock outcrop and vertical scarps of lakebed sediments which concentrate runoff onto vegetated areas causing rilling.

State 4
Exotic Invaded state

Community 4.1
Exotic Invaded Plant Community

Non-native annual grasses and forbs like; red brome, cheatgrass, and wild oats, can invade and dominate areas of the site with very low perennial grass cover. 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.

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**			50–200	
	black grama	BOER4	*Bouteloua eriopoda*	20–100	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	10–40	–
	slim tridens	TRMU	*Tridens muticus*	10–30	–
	purple threeawn	ARPU9	*Aristida purpurea*	5–30	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	5–30	–
	Parish's threeawn	ARPUP5	*Aristida purpurea var. parishii*	0–20	–
2	**Cool season grasses**			0–40	
	desert needlegrass	ACSP12	*Achnatherum speciosum*	0–30	–
	squirreltail	ELEL5	*Elymus elymoides*	0–20	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–5	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	0–1	–
3	**Misc. perennial grasses**			15–100	
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–25	–

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	big galleta	PLRI3	*Pleuraphis rigida*	0–25	–
	Hall's panicgrass	PAHA	*Panicum hallii*	5–25	–
	tanglehead	HECO10	*Heteropogon contortus*	0–20	–
	slender grama	BORE2	*Bouteloua repens*	5–15	–
	nineawn pappusgrass	ENDE	*Enneapogon desvauxii*	1–10	–
	curly-mesquite	HIBE	*Hilaria belangeri*	0–10	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	0–10	–
	blue threeawn	ARPUN	*Aristida purpurea var. nealleyi*	0–10	–
	spidergrass	ARTE3	*Aristida ternipes*	0–10	–
	spidergrass	ARTEG	*Aristida ternipes var. gentilis*	0–5	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	0–5	–
	red grama	BOTR2	*Bouteloua trifida*	0–5	–
	southwestern bristlegrass	SESC2	*Setaria scheelei*	0–5	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	0–5	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–5	–
	Arizona cottontop	DICA8	*Digitaria californica*	0–2	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–2	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	0–1	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	0–1	–
	green sprangletop	LEDU	*Leptochloa dubia*	0–1	–
	vine mesquite	PAOB	*Panicum obtusum*	0–1	–
4	**Annual grasses**			2–80	
	mucronate sprangeltop	LEPAB	*Leptochloa panicea ssp. brachiata*	1–25	–
	Mexican panicgrass	PAHI5	*Panicum hirticaule*	0–10	–
	Arizona signalgrass	URAR	*Urochloa arizonica*	0–10	–
	small fescue	VUMI	*Vulpia microstachys*	0–10	–
	Eastwood fescue	VUMIC	*Vulpia microstachys var. ciliata*	0–10	–
	sixweeks threeawn	ARAD	*Aristida adscensionis*	1–10	–
	prairie threeawn	AROL	*Aristida oligantha*	0–10	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	0–10	–
	needle grama	BOAR	*Bouteloua aristidoides*	0–5	–
	Mexican sprangletop	LEFUU	*Leptochloa fusca ssp. uninervia*	0–5	–
	witchgrass	PACA6	*Panicum capillare*	0–5	–
	delicate muhly	MUFR	*Muhlenbergia fragilis*	0–2	–
	littleseed muhly	MUMI	*Muhlenbergia microsperma*	0–2	–
	Arizona brome	BRAR4	*Bromus arizonicus*	0–2	–
	feather fingergrass	CHVI4	*Chloris virgata*	0–2	–
	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	–
	Bigelow's bluegrass	POBI	*Poa bigelovii*	0–1	–
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–1	–

	sixweeks grama	BOBA2	*Bouteloua barbata*	0–1	
Forb					
5	**Perennial forbs**			20–100	
	slender janusia	JAGR	*Janusia gracilis*	1–20	–
	trailing windmills	ALIN	*Allionia incarnata*	1–15	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	1–15	–
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	0–10	–
	Coues' cassia	SECO10	*Senna covesii*	1–10	–
	longflower tube tongue	JULO3	*Justicia longii*	0–10	–
	shrubby deervetch	LORI3	*Lotus rigidus*	1–10	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	1–10	–
	lacy tansyaster	MAPI	*Machaeranthera pinnatifida*	1–10	–
	wishbone-bush	MILAV	*Mirabilis laevis var. villosa*	1–10	–
	weakleaf bur ragweed	AMCO3	*Ambrosia confertiflora*	1–10	–
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	1–10	–
	bluedicks	DICA14	*Dichelostemma capitatum*	1–5	–
	Parry's false prairie-clover	MAPA7	*Marina parryi*	1–5	–
	slender poreleaf	POGR5	*Porophyllum gracile*	0–5	–
	glandleaf milkwort	POMA7	*Polygala macradenia*	0–5	–
	Parry's beardtongue	PEPA24	*Penstemon parryi*	0–5	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	0–2	–
	New Mexico groundsel	PANE7	*Packera neomexicana*	0–2	–
	Mojave spurge	EUSC6	*Euphorbia schizoloba*	0–2	–
	southwestern mock vervain	GLGO	*Glandularia gooddingii*	0–2	–
	desert rosemallow	HICO	*Hibiscus coulteri*	0–2	–
	ragged nettlespurge	JAMA	*Jatropha macrorhiza*	0–2	–
	sego lily	CANU3	*Calochortus nuttallii*	0–2	–
	perennial rockcress	ARPE2	*Arabis perennans*	0–2	–
	dense ayenia	AYMI	*Ayenia microphylla*	0–1	–
	hairyseed bahia	BAAB	*Bahia absinthifolia*	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	–
	tuber anemone	ANTU	*Anemone tuberosa*	0–1	–
	narrowleaf silverbush	ARLA12	*Argythamnia lanceolata*	0–1	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–1	–
	leatherweed	CRPO5	*Croton pottsii*	0–1	–
	purplenerve springparsley	CYMU2	*Cymopterus multinervatus*	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	–
	fleabane	ERIGE2	*Erigeron*	0–1	–
	New Mexico silverbush	ARNE2	*Argythamnia neomexicana*	0–1	–

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	Wright's deervetch	LOWR	*Lotus wrightii*	0–1	–
	paleface	HIDE	*Hibiscus denudatus*	0–1	–
	Indian rushpea	HOGL2	*Hoffmannseggia glauca*	0–1	–
	Oak Creek ragwort	PAQU8	*Packera quercetorum*	0–1	–
	toadflax penstemon	PELI2	*Penstemon linarioides*	0–1	–
	desert tobacco	NIOB	*Nicotiana obtusifolia*	0–1	–
	largeflower onion	ALMA4	*Allium macropetalum*	0–1	–
	dwarf desertpeony	ACNA2	*Acourtia nana*	0–1	–
	brownfoot	ACWR5	*Acourtia wrightii*	0–1	–
	San Felipe dogweed	ADPO	*Adenophyllum porophylloides*	0–1	–
	desert penstemon	PEPS	*Penstemon pseudospectabilis*	0–1	–
	orange fameflower	PHAU13	*Phemeranthus aurantiacus*	0–1	–
	Lemmon's ragwort	SELE8	*Senecio lemmonii*	0–1	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	0–1	–
	scurfpea	PSORA2	*Psoralidium*	0–1	–
	canaigre dock	RUHY	*Rumex hymenosepalus*	0–1	–
	twinleaf senna	SEBA3	*Senna bauhinioides*	0–1	–
	pricklyleaf dogweed	THAC	*Thymophylla acerosa*	0–1	–
	turpentinebroom	THMO	*Thamnosma montana*	0–1	–
	rue of the mountains	THTE2	*Thamnosma texana*	0–1	–
	branched noseburn	TRRA5	*Tragia ramosa*	0–1	–
	Louisiana vetch	VILUL2	*Vicia ludoviciana ssp. ludoviciana*	0–1	–
6	**Annual forbs**			5–150	
	bristly fiddleneck	AMTE3	*Amsinckia tessellata*	0–25	–
	Coulter's spiderling	BOCO2	*Boerhavia coulteri*	0–25	–
	fivewing spiderling	BOIN	*Boerhavia intermedia*	0–25	–
	purslane	PORTU	*Portulaca*	0–25	–
	California poppy	ESCAM	*Eschscholzia californica ssp. mexicana*	0–25	–
	Coulter's lupine	LUSP2	*Lupinus sparsiflorus*	0–20	–
	western tansymustard	DEPI	*Descurainia pinnata*	0–20	–
	longleaf false goldeneye	HELOA2	*Heliomeris longifolia var. annua*	0–20	–
	phacelia	PHACE	*Phacelia*	0–15	–
	slender goldenweed	MAGR10	*Machaeranthera gracilis*	0–10	–
	tanseyleaf tansyaster	MATA2	*Machaeranthera tanacetifolia*	0–10	–
	pitseed goosefoot	CHBE4	*Chenopodium berlandieri*	0–10	–
	exserted Indian paintbrush	CAEXE	*Castilleja exserta ssp. exserta*	0–5	–
	milkvetch	ASTRA	*Astragalus*	0–5	–
	carelessweed	AMPA	*Amaranthus palmeri*	0–5	–
	shaggyfruit pepperweed	LELA	*Lepidium lasiocarpum*	0–5	–
	Arizona poppy	KAGR	*Kallstroemia grandiflora*	0–5	–
	foothill deervetch	LOHU2	*Lotus humistratus*	0–5	–
	desertparsley	LOMAT	*Lomatium*	0–5	–
	coastal bird's-foot trefoil	LOSA	*Lotus salsuginosus*	0–5	–

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	Arizona lupine	LUAR4	*Lupinus arizonicus*	0–5	–
	flatcrown buckwheat	ERDE6	*Eriogonum deflexum*	0–5	–
	sorrel buckwheat	ERPO4	*Eriogonum polycladon*	0–5	–
	American wild carrot	DAPU3	*Daucus pusillus*	0–5	–
	cryptantha	CRYPT	*Cryptantha*	0–5	–
	Arizona popcornflower	PLAR	*Plagiobothrys arizonicus*	0–5	–
	desert Indianwheat	PLOV	*Plantago ovata*	1–5	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–5	–
	combseed	PECTO	*Pectocarya*	0–5	–
	sleepy silene	SIAN2	*Silene antirrhina*	0–5	–
	lyreleaf jewelflower	STCA5	*Streptanthus carinatus*	0–5	–
	New Mexico plumeseed	RANE	*Rafinesquia neomexicana*	0–5	–
	thelypody	THELY	*Thelypodium*	0–5	–
	woolly tidestromia	TILA2	*Tidestromia lanuginosa*	0–5	–
	Gordon's bladderpod	LEGO	*Lesquerella gordonii*	0–2	–
	Florida pellitory	PAFL3	*Parietaria floridana*	0–2	–
	creamcups	PLCA5	*Platystemon californicus*	0–2	–
	New Mexico thistle	CINE	*Cirsium neomexicanum*	0–2	–
	miner's lettuce	CLPEP	*Claytonia perfoliata ssp. perfoliata*	0–2	–
	wedgeleaf draba	DRCU	*Draba cuneifolia*	0–2	–
	miniature woollystar	ERDI2	*Eriastrum diffusum*	0–2	–
	spreading fleabane	ERDI4	*Erigeron divergens*	0–2	–
	crestrib morning-glory	IPCO2	*Ipomoea costellata*	0–2	–
	miniature lupine	LUBI	*Lupinus bicolor*	0–2	–
	spurge	EUPHO	*Euphorbia*	0–2	–
	Thurber's pepperweed	LETH2	*Lepidium thurberi*	0–2	–
	hollowleaf annual lupine	LUSU3	*Lupinus succulentus*	0–2	–
	sand fringepod	THCU	*Thysanocarpus curvipes*	0–2	–
	annual agoseris	AGHE2	*Agoseris heterophylla*	0–2	–
	hoary bowlesia	BOIN3	*Bowlesia incana*	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	–
	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	–
	star gilia	GIST	*Gilia stellata*	0–1	–
	California goldfields	LACA7	*Lasthenia californica*	0–1	–
	redstar	IPCO3	*Ipomoea coccinea*	0–1	–
	ivyleaf morning-glory	IPHE	*Ipomoea hederacea*	0–1	–
	Texas stork's bill	ERTE13	*Erodium texanum*	0–1	–

	sacred thorn-apple	DAWR2	*Datura wrightii*	0–1	–
	scrambled eggs	COAU2	*Corydalis aurea*	0–1	–
	hairy prairie clover	DAMO	*Dalea mollis*	0–1	–
	manybristle chinchweed	PEPA2	*Pectis papposa*	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	–
	woollyhead neststraw	STMI2	*Stylocline micropoides*	0–1	–
	desert unicorn-plant	PRAL4	*Proboscidea althaeifolia*	0–1	–
	doubleclaw	PRPA2	*Proboscidea parviflora*	0–1	–
Shrub/Vine					
7	**Dominant shrubs**			100–200	
	jojoba	SICH	*Simmondsia chinensis*	25–100	–
	creosote bush	LATR2	*Larrea tridentata*	0–25	–
	ocotillo	FOSP2	*Fouquieria splendens*	0–20	–
	Wright's beebrush	ALWR	*Aloysia wrightii*	1–20	–
	mariola	PAIN2	*Parthenium incanum*	0–15	–
	catclaw acacia	ACGR	*Acacia greggii*	1–15	–
	whitethorn acacia	ACCO2	*Acacia constricta*	1–10	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–5	–
	spiny hackberry	CEEH	*Celtis ehrenbergiana*	0–5	–
	desert sweet	CHMI2	*Chamaebatiaria millefolium*	0–5	–
	Warnock's snakewood	COWA	*Condalia warnockii*	0–5	–
	snapdragon penstemon	KEANM	*Keckiella antirrhinoides ssp. microphylla*	0–5	–
	water jacket	LYAN	*Lycium andersonii*	0–5	–
	Berlandier's wolfberry	LYBE	*Lycium berlandieri*	1–5	–
	Arizona desert-thorn	LYEX	*Lycium exsertum*	0–5	–
	Mexican bladdersage	SAME	*Salazaria mexicana*	0–5	–
	Sonoran scrub oak	QUTU2	*Quercus turbinella*	0–5	–
	Arizona necklacepod	SOAR3	*Sophora arizonica*	0–2	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	0–2	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–2	–
	Florida hopbush	DOVI	*Dodonaea viscosa*	0–2	–
	desert ceanothus	CEGR	*Ceanothus greggii*	0–1	–
	ambrosia leaf bur ragweed	AMAM2	*Ambrosia ambrosioides*	0–1	–
	Thurber's desert honeysuckle	ANTH2	*Anisacanthus thurberi*	0–1	–
	longleaf jointfir	EPTR	*Ephedra trifurca*	0–1	–
	pale desert-thorn	LYPA	*Lycium pallidum*	0–1	–
	red barberry	MAHA4	*Mahonia haematocarpa*	0–1	–
	algerita	MATR3	*Mahonia trifoliolata*	0–1	–
	lotebush	ZIOBC	*Ziziphus obtusifolia var. canescens*	0–1	–

	littleleaf sumac	RHMI3	*Rhus microphylla*	0–1	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–1	–
8	**Dominant half shrubs**			25–50	
	Eastern Mojave buckwheat	ERFA2	*Eriogonum fasciculatum*	20–50	–
	rough menodora	MESC	*Menodora scabra*	1–20	–
	desert zinnia	ZIAC	*Zinnia acerosa*	1–15	–
	Coulter's brickellbush	BRCO	*Brickellia coulteri*	1–15	–
	littleleaf ratany	KRER	*Krameria erecta*	0–10	–
	Parish's goldeneye	VIPA14	*Viguiera parishii*	0–10	–
	fairyduster	CAER	*Calliandra eriophylla*	0–10	–
	ragged rockflower	CRBI2	*Crossosoma bigelovii*	0–5	–
	featherplume	DAFO	*Dalea formosa*	0–5	–
	bastardsage	ERWR	*Eriogonum wrightii*	0–5	–
	longleaf phlox	PHLO2	*Phlox longifolia*	0–5	–
	shortleaf baccharis	BABR	*Baccharis brachyphylla*	0–5	–
	sweetbush	BEJU	*Bebbia juncea*	0–2	–
	starry bedstraw	GAST	*Galium stellatum*	0–2	–
	yerba de pasmo	BAPT	*Baccharis pteronioides*	0–1	–
9	**Succulents**			10–100	
	cactus apple	OPEN3	*Opuntia engelmannii*	5–30	–
	buck-horn cholla	CYAC8	*Cylindropuntia acanthocarpa*	0–25	–
	tulip pricklypear	OPPH	*Opuntia phaeacantha*	0–20	–
	banana yucca	YUBA	*Yucca baccata*	1–20	–
	Schott's century plant	AGSC3	*Agave schottii*	0–20	–
	walkingstick cactus	CYSP8	*Cylindropuntia spinosior*	0–10	–
	Whipple cholla	CYWH	*Cylindropuntia whipplei*	0–10	–
	dollarjoint pricklypear	OPCH	*Opuntia chlorotica*	0–10	–
	common sotol	DAWH2	*Dasylirion wheeleri*	1–5	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0–5	–
	candy barrelcactus	FEWI	*Ferocactus wislizeni*	1–5	–
	saguaro	CAGI10	*Carnegiea gigantea*	0–5	–
	goldenflower century plant	AGCH2	*Agave chrysantha*	0–5	–
	Graham's nipple cactus	MAGR9	*Mammillaria grahamii*	1–2	–
	pinkflower hedgehog cactus	ECFA	*Echinocereus fasciculatus*	0–2	–
	spinystar	ESVI2	*Escobaria vivipara*	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	–
	sacahuista	NOMI	*Nolina microcarpa*	0–1	–
10	**Half-shrubs**			1–50	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	1–20	–
	brittlebush	ENFA	*Encelia farinosa*	0–15	–

	narrowleaf goldenbush	ERLI6	*Ericameria linearifolia*	0–10	–
	whitestem paperflower	PSCO2	*Psilostrophe cooperi*	0–5	–
	button brittlebush	ENFR	*Encelia frutescens*	0–5	–
	turpentine bush	ERLA12	*Ericameria laricifolia*	0–5	–
	rayless goldenhead	ACSP	*Acamptopappus sphaerocephalus*	0–5	–
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	0–1	–
	burroweed	ISTE2	*Isocoma tenuisecta*	0–1	–
Tree					
11	**Desert trees**			10–70	
	crucifixion thorn	CAHO3	*Canotia holacantha*	10–50	–
	redberry juniper	JUCO11	*Juniperus coahuilensis*	0–5	–
	oneseed juniper	JUMO	*Juniperus monosperma*	0–5	–
	blue paloverde	PAFL6	*Parkinsonia florida*	0–5	–
	yellow paloverde	PAMI5	*Parkinsonia microphylla*	0–5	–
	netleaf hackberry	CELAR	*Celtis laevigata var. reticulata*	0–1	–

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 are little used. Slopes greater than 50% and areas with very cobbly surfaces limit grazing use by cattle. Areas of rock outcrop and steep scarps 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.

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 canotia, mesquite, juniper and saguaro.

Other products

There is some native harvest of food plants like grass nuts, thistle, prickly pear tunas and mescal.

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:**
