USDA Natural Resources
Conservation Service

Ecological site R038XA133AZ
Volcanic/Metamorphic Hills 12-16" p.z.

Accessed: 05/13/2025

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.

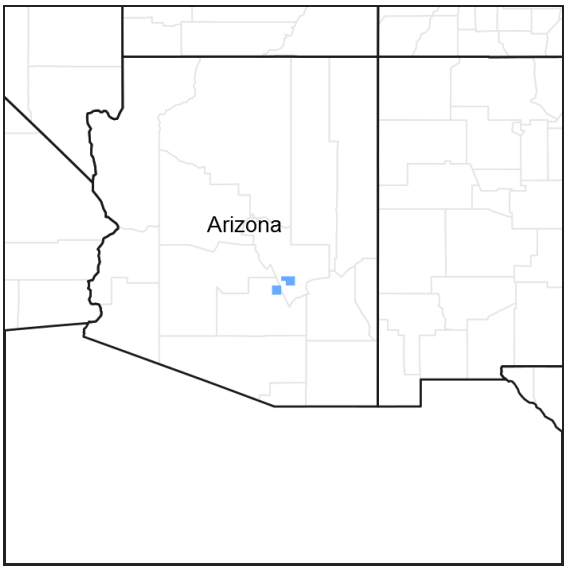


Figure 1. Mapped extent

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.

Associated sites

R038XA104AZ	**Granitic Hills 12-16" p.z.**
R038XA105AZ	**Limestone Hills 12-16" p.z.**
R038XA117AZ	**Volcanic Hills 12-16" p.z. Clayey**

Similar sites

R040XA105AZ	**Shallow Hills 10"-13" p.z.**
R040XA123AZ	**Volcanic Hills 10"-13" P.Z.**

Table 1. Dominant plant species

Tree	(1) *Parkinsonia*
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	15–75%
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)	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 having weak argillic horizons. They have formed in residuum and colluvium from andesite, dacite, diorite and related conglomerates and metamorphic parent materials. Soil surfaces are well covered by dark 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: from SSA-661 East Pinal&South Gila Counties MU Lampshire-885.

Table 4. Representative soil features

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	Moderately rapid to moderate
Soil depth	25–51 cm
Surface fragment cover <=3"	25–50%
Surface fragment cover >3"	1–15%
Available water capacity (0-101.6cm)	1.52–5.59 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)	10–45%
Subsurface fragment volume >3" (Depth not specified)	0–10%

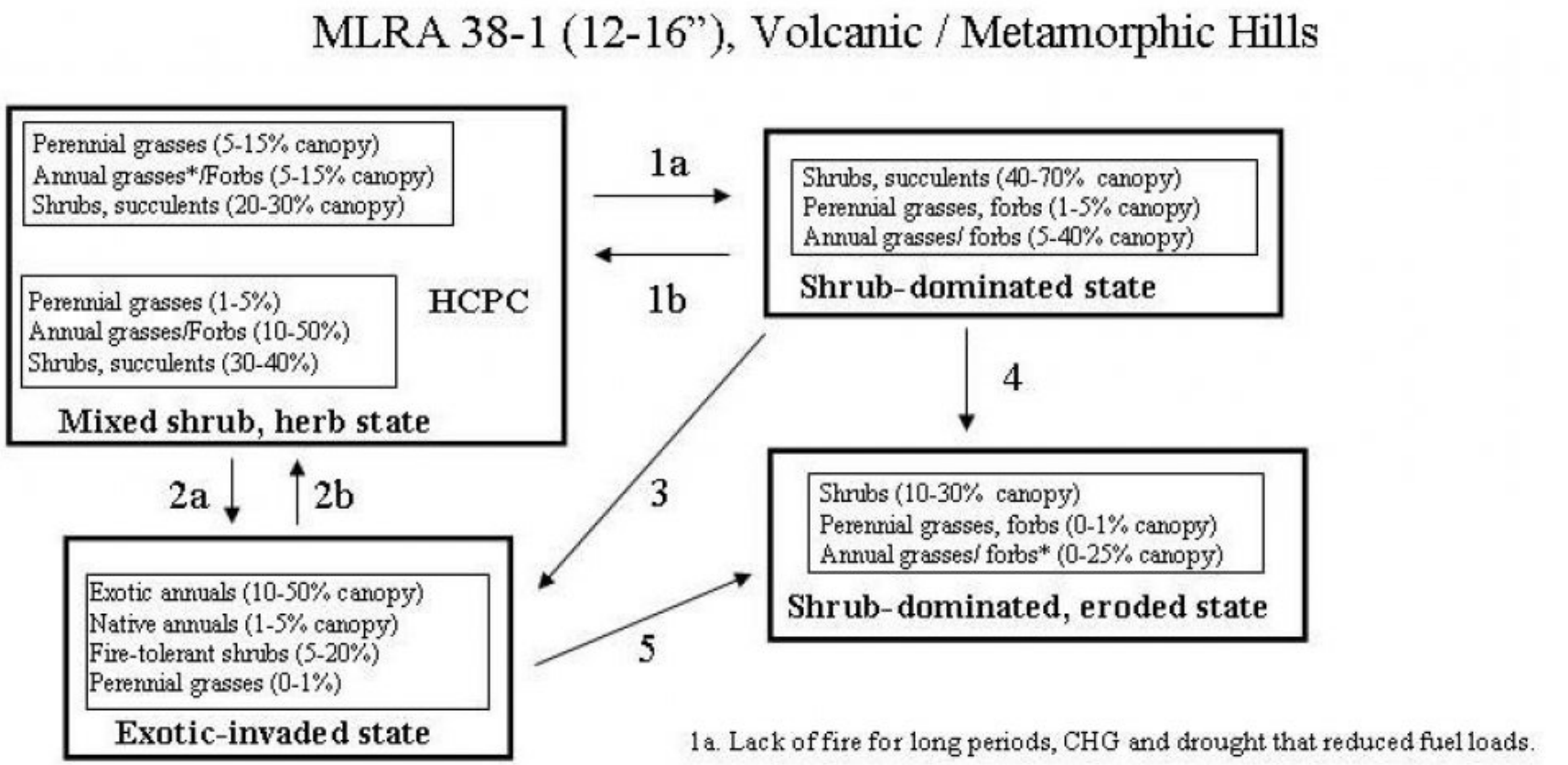
Ecological dynamics

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. 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

Figure 4. State & Transition, Volcanic/Metamorphic Hills 12-



*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.

Community 1.1
Historic Native Plant Community

Figure 5. Volcanic / Metamorphic Hills 12-16" pz. HCPC

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)
Shrub/Vine	224	392	706
Grass/Grasslike	84	224	616
Forb	28	112	280
Tree	6	22	112
Total	**342**	**750**	**1714**

Table 6. Soil surface cover

Tree basal cover	0-1%
Shrub/vine/liana basal cover	2-5%
Grass/grasslike basal cover	1-2%
Forb basal cover	0-1%
Non-vascular plants	0-1%
Biological crusts	0-5%
Litter	15-45%
Surface fragments >0.25" and <=3"	20-50%
Surface fragments >3"	1-15%
Bedrock	1-5%
Water	0%
Bare ground	10-60%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	0-1%	0-10%	1-10%
>0.15 <= 0.3	–	1-5%	1-10%	1-5%
>0.3 <= 0.6	–	5-10%	2-10%	1-5%
>0.6 <= 1.4	–	15-25%	1-3%	0-1%
>1.4 <= 4	1-5%	1-10%	–	–
>4 <= 12	1-10%	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

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

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 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.

State 3
Exotic Invaded State

Community 3.1
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. 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 canotia, and leave fire tolerant species like turbinella oak, mesquite, whitethorn and jojoba.

State 4
Shrub Dominated and Eroded State

Community 4.1
Shrub Dominated, Eroded Plant Community

Shrubs like jojoba, whitethorn acacia, mesquite, ocotillo 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. 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.

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**			56–224	
	sideoats grama	BOCU	*Bouteloua curtipendula*	11–112	–
	purple threeawn	ARPU9	*Aristida purpurea*	6–56	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	11–56	–
	tanglehead	HECO10	*Heteropogon contortus*	1–34	–
	Parish's threeawn	ARPUP5	*Aristida purpurea var. parishii*	0–34	–
	spidergrass	ARTE3	*Aristida ternipes*	1–34	–
	spidergrass	ARTEG	*Aristida ternipes var. gentilis*	1–34	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	1–34	–
	black grama	BOER4	*Bouteloua eriopoda*	0–34	–
	Arizona cottontop	DICA8	*Digitaria californica*	0–22	–
2	**Cool season grasses**			11–112	
	desert needlegrass	ACSP12	*Achnatherum speciosum*	11–90	–
	squirreltail	ELEL5	*Elymus elymoides*	0–22	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–22	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–6	–
3	**Misc. perennial grasses**			11–112	
	slender grama	BORE2	*Bouteloua repens*	6–56	–
	Hall's panicgrass	PAHA	*Panicum hallii*	0–28	–
	big galleta	PLRI3	*Pleuraphis rigida*	0–28	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–22	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	0–11	–
	curly-mesquite	HIBE	*Hilaria belangeri*	0–11	–
	red grama	BOTR2	*Bouteloua trifida*	0–6	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	0–6	–
	blue threeawn	ARPUN	*Aristida purpurea var. nealleyi*	0–6	–
	southwestern bristlegrass	SESC2	*Setaria scheelei*	0–6	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	0–6	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–6	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–2	–
	nineawn pappusgrass	ENDE	*Enneapogon desvauxii*	0–2	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	0–1	–
	green sprangletop	LEDU	*Leptochloa dubia*	0–1	–
	vine mesquite	PAOB	*Panicum obtusum*	0–1	–
4	**Annual grasses**			6–168	
	sixweeks threeawn	ARAD	*Aristida adscensionis*	1–34	–
	mucronate sprangeltop	LEPAB	*Leptochloa panicea ssp. brachiata*	1–28	–

	mucronate sprangletop	LEPAB	*Leptochloa panicea ssp. brachiata*	1–20	–
	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	–
	Mexican panicgrass	PAHI5	*Panicum hirticaule*	0–22	–
	prairie threeawn	AROL	*Aristida oligantha*	0–11	–
	needle grama	BOAR	*Bouteloua aristidoides*	0–6	–
	Mexican sprangletop	LEFUU	*Leptochloa fusca ssp. uninervia*	0–6	–
	witchgrass	PACA6	*Panicum capillare*	0–6	–
	delicate muhly	MUFR	*Muhlenbergia fragilis*	0–2	–
	littleseed muhly	MUMI	*Muhlenbergia microsperma*	0–2	–
	Rothrock's grama	BORO2	*Bouteloua rothrockii*	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	–
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–1	–
	Bigelow's bluegrass	POBI	*Poa bigelovii*	0–1	–
Forb					
5	**Perennial forbs**			22–112	
	slender janusia	JAGR	*Janusia gracilis*	1–22	–
	bluedicks	DICA14	*Dichelostemma capitatum*	1–17	–
	shrubby deervetch	LORI3	*Lotus rigidus*	1–17	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	1–17	–
	spikemoss	SELAG	*Selaginella*	0–17	–
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	1–11	–
	longflower tube tongue	JULO3	*Justicia longii*	0–11	–
	lacy tansyaster	MAPI	*Machaeranthera pinnatifida*	1–11	–
	wishbone-bush	MILAV	*Mirabilis laevis var. villosa*	1–11	–
	Coues' cassia	SECO10	*Senna covesii*	1–11	–
	weakleaf bur ragweed	AMCO3	*Ambrosia confertiflora*	1–11	–
	perennial rockcress	ARPE2	*Arabis perennans*	1–11	–
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	1–11	–
	climbing wartclub	BOSC	*Boerhavia scandens*	0–6	–
	brownfoot	ACWR5	*Acourtia wrightii*	1–6	–
	San Felipe dogweed	ADPO	*Adenophyllum porophylloides*	0–6	–
	trailing windmills	ALIN	*Allionia incarnata*	0–6	–
	Parry's false prairie-clover	MAPA7	*Marina parryi*	1–6	–
	slender poreleaf	POGR5	*Porophyllum gracile*	0–6	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	0–6	–

	cliffbrake	PELLA	*Pellaea*	0–6	–
	Parry's beardtongue	PEPA24	*Penstemon parryi*	0–6	–
	desert penstemon	PEPS	*Penstemon pseudospectabilis*	0–6	–
	lipfern	CHEIL	*Cheilanthes*	0–6	–
	Arizona wrightwort	CAAR7	*Carlowrightia arizonica*	0–6	–
	sego lily	CANU3	*Calochortus nuttallii*	0–2	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–2	–
	Mojave spurge	EUSC6	*Euphorbia schizoloba*	0–2	–
	southwestern mock vervain	GLGO	*Glandularia gooddingii*	0–2	–
	desert rosemallow	HICO	*Hibiscus coulteri*	0–2	–
	New Mexico groundsel	PANE7	*Packera neomexicana*	0–2	–
	Oak Creek ragwort	PAQU8	*Packera quercetorum*	0–1	–
	toadflax penstemon	PELI2	*Penstemon linarioides*	0–1	–
	glandleaf milkwort	POMA7	*Polygala macradenia*	0–1	–
	scurfpea	PSORA2	*Psoralidium*	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	–
	paleface	HIDE	*Hibiscus denudatus*	0–1	–
	Indian rushpea	HOGL2	*Hoffmannseggia glauca*	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	–
	wavyleaf Indian paintbrush	CAAPM	*Castilleja applegatei ssp. martinii*	0–1	–
	Wright's deervetch	LOWR	*Lotus wrightii*	0–1	–
	fleabane	ERIGE2	*Erigeron*	0–1	–
	ragged nettlespurge	JAMA	*Jatropha macrorhiza*	0–1	–
	turpentinebroom	THMO	*Thamnosma montana*	0–1	–
	branched noseburn	TRRA5	*Tragia ramosa*	0–1	–
	Louisiana vetch	VILUL2	*Vicia ludoviciana ssp. ludoviciana*	0–1	–
	Lemmon's ragwort	SELE8	*Senecio lemmonii*	0–1	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	0–1	–
	largeflower onion	ALMA4	*Allium macropetalum*	0–1	–
	tuber anemone	ANTU	*Anemone tuberosa*	0–1	–
	narrowleaf silverbush	ARLA12	*Argythamnia lanceolata*	0–1	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–1	–
	dense ayenia	AYMI	*Ayenia microphylla*	0–1	–
	desert marigold	BAMU	*Baileya multiradiata*	0–1	–
	scarlet spiderling	BOCO	*Boerhavia coccinea*	0–1	–
	New Mexico silverbush	ARNE2	*Argythamnia neomexicana*	0–1	–
	dwarf desertpeony	ACNA2	*Acourtia nana*	0–1	–
6	**Annual forbs**			6–168	
	bristly fiddleneck	AMTE3	*Amsinckia tessellata*	0–28	–

	bristly fiddleneck	AMTE3	*Amsinckia tessellata*	0–28	–
	Coulter's spiderling	BOCO2	*Boerhavia coulteri*	0–28	–
	fivewing spiderling	BOIN	*Boerhavia intermedia*	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	–
	pitseed goosefoot	CHBE4	*Chenopodium berlandieri*	0–11	–
	longleaf false goldeneye	HELOA2	*Heliomeris longifolia var. annua*	0–11	–
	slender goldenweed	MAGR10	*Machaeranthera gracilis*	0–11	–
	tanseyleaf tansyaster	MATA2	*Machaeranthera tanacetifolia*	0–11	–
	combseed	PECTO	*Pectocarya*	0–6	–
	desert Indianwheat	PLOV	*Plantago ovata*	1–6	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–6	–
	coastal bird's-foot trefoil	LOSA	*Lotus salsuginosus*	0–6	–
	Arizona lupine	LUAR4	*Lupinus arizonicus*	0–6	–
	Arizona popcornflower	PLAR	*Plagiobothrys arizonicus*	0–6	–
	sleepy silene	SIAN2	*Silene antirrhina*	0–6	–
	lyreleaf jewelflower	STCA5	*Streptanthus carinatus*	0–6	–
	New Mexico plumeseed	RANE	*Rafinesquia neomexicana*	0–6	–
	thelypody	THELY	*Thelypodium*	0–6	–
	woolly tidestromia	TILA2	*Tidestromia lanuginosa*	0–6	–
	flatcrown buckwheat	ERDE6	*Eriogonum deflexum*	0–6	–
	sorrel buckwheat	ERPO4	*Eriogonum polycladon*	0–6	–
	American wild carrot	DAPU3	*Daucus pusillus*	0–6	–
	miner's lettuce	CLPEP	*Claytonia perfoliata ssp. perfoliata*	0–6	–
	cryptantha	CRYPT	*Cryptantha*	0–6	–
	carelessweed	AMPA	*Amaranthus palmeri*	0–6	–
	milkvetch	ASTRA	*Astragalus*	0–6	–
	Arizona poppy	KAGR	*Kallstroemia grandiflora*	0–6	–
	shaggyfruit pepperweed	LELA	*Lepidium lasiocarpum*	0–6	–
	foothill deervetch	LOHU2	*Lotus humistratus*	0–6	–
	desertparsley	LOMAT	*Lomatium*	0–6	–
	Thurber's pepperweed	LETH2	*Lepidium thurberi*	0–2	–
	spurge	EUPHO	*Euphorbia*	0–2	–
	Gordon's bladderpod	LEGO	*Lesquerella gordonii*	0–2	–
	annual agoseris	AGHE2	*Agoseris heterophylla*	0–2	–
	New Mexico thistle	CINE	*Cirsium neomexicanum*	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	–
	creamcups	PLCA5	*Platystemon californicus*	0–2	–

	creamcups	PLCA6	*Platystemon californicus*	0–2	–
	sand fringepod	THCU	*Thysanocarpus curvipes*	0–2	–
	miniature lupine	LUBI	*Lupinus bicolor*	0–2	–
	purslane	PORTU	*Portulaca*	0–2	–
	Florida pellitory	PAFL3	*Parietaria floridana*	0–2	–
	hollowleaf annual lupine	LUSU3	*Lupinus succulentus*	0–2	–
	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	–
	manybristle chinchweed	PEPA2	*Pectis papposa*	0–1	–
	desert unicorn-plant	PRAL4	*Proboscidea althaeifolia*	0–1	–
	doubleclaw	PRPA2	*Proboscidea parviflora*	0–1	–
	woollyhead neststraw	STMI2	*Stylocline micropoides*	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	–
	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	–
	hairy prairie clover	DAMO	*Dalea mollis*	0–1	–
	scrambled eggs	COAU2	*Corydalis aurea*	0–1	–
	brittle spineflower	CHBR	*Chorizanthe brevicornu*	0–1	–
	Esteve's pincushion	CHST	*Chaenactis stevioides*	0–1	–
	yellow tackstem	CAPA7	*Calycoseris parryi*	0–1	–
	white tackstem	CAWR	*Calycoseris wrightii*	0–1	–
	hoary bowlesia	BOIN3	*Bowlesia incana*	0–1	–
	star gilia	GIST	*Gilia stellata*	0–1	–
	California goldfields	LACA7	*Lasthenia californica*	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*	0–90	–
	snapdragon penstemon	KEANM	*Keckiella antirrhinoides ssp. microphylla*	0–22	–
	algerita	MATR3	*Mahonia trifoliolata*	0–11	–
	sugar sumac	RHOV	*Rhus ovata*	0–6	–
	redberry buckthorn	RHCR	*Rhamnus crocea*	0–1	–
	red barberry	MAHA4	*Mahonia haematocarpa*	0–1	–
8	**Large shrubs**			17–67	
	Wright's beebrush	ALWR	*Aloysia wrightii*	1–22	–
	ocotillo	FOSP2	*Fouquieria splendens*	1–22	–

	ocotillo	FOSP2	*Fouquieria splendens*	1–22	
	whitethorn acacia	ACCO2	*Acacia constricta*	0–11	–
	catclaw acacia	ACGR	*Acacia greggii*	1–11	–
	desert sweet	CHMI2	*Chamaebatiaria millefolium*	0–6	–
	water jacket	LYAN	*Lycium andersonii*	0–6	–
	Berlandier's wolfberry	LYBE	*Lycium berlandieri*	1–6	–
	Arizona desert-thorn	LYEX	*Lycium exsertum*	0–6	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–2	–
	creosote bush	LATR2	*Larrea tridentata*	0–2	–
	spiny hackberry	CEEH	*Celtis ehrenbergiana*	0–2	–
	Florida hopbush	DOVI	*Dodonaea viscosa*	0–2	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	0–2	–
	Mexican bladdersage	SAME	*Salazaria mexicana*	0–2	–
	Arizona necklacepod	SOAR3	*Sophora arizonica*	0–2	–
	lotebush	ZIOBC	*Ziziphus obtusifolia var. canescens*	0–1	–
	mariola	PAIN2	*Parthenium incanum*	0–1	–
	littleleaf sumac	RHMI3	*Rhus microphylla*	0–1	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–1	–
	pale desert-thorn	LYPA	*Lycium pallidum*	0–1	–
	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	–
9	**Dominant half shrubs**			39–168	
	Eastern Mojave buckwheat	ERFA2	*Eriogonum fasciculatum*	22–112	–
	bastardsage	ERWR	*Eriogonum wrightii*	1–28	–
	American threefold	TRCA8	*Trixis californica*	1–28	–
	rough menodora	MESC	*Menodora scabra*	1–22	–
	Coulter's brickellbush	BRCO	*Brickellia coulteri*	1–17	–
	fairyduster	CAER	*Calliandra eriophylla*	1–17	–
	Parish's goldeneye	VIPA14	*Viguiera parishii*	0–11	–
	littleleaf ratany	KRER	*Krameria erecta*	0–11	–
	longleaf phlox	PHLO2	*Phlox longifolia*	0–6	–
	ragged rockflower	CRBI2	*Crossosoma bigelovii*	0–6	–
	starry bedstraw	GAST	*Galium stellatum*	0–2	–
	desert zinnia	ZIAC	*Zinnia acerosa*	0–2	–
	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	–
	buck-horn cholla	CYAC8	*Cylindropuntia acanthocarpa*	0–17	–
	walkingstick cactus	CYSP8	*Cylindropuntia spinosior*	0–11	–

	Whipple cholla	CYWH	*Cylindropuntia whipplei*	0–11	–
	cactus apple	OPEN3	*Opuntia engelmannii*	1–11	–
	tulip pricklypear	OPPH	*Opuntia phaeacantha*	0–11	–
	common sotol	DAWH2	*Dasylirion wheeleri*	1–6	–
	saguaro	CAGI10	*Carnegiea gigantea*	0–6	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0–6	–
	goldenflower century plant	AGCH2	*Agave chrysantha*	0–6	–
	Schott's century plant	AGSC3	*Agave schottii*	0–2	–
	dollarjoint pricklypear	OPCH	*Opuntia chlorotica*	0–2	–
	candy barrelcactus	FEWI	*Ferocactus wislizeni*	0–2	–
	teddybear cholla	CYBI9	*Cylindropuntia bigelovii*	0–2	–
	jumping cholla	CYFU10	*Cylindropuntia fulgida*	0–2	–
	pinkflower hedgehog cactus	ECFA	*Echinocereus fasciculatus*	0–2	–
	spinystar	ESVI2	*Escobaria vivipara*	0–1	–
	Graham's nipple cactus	MAGR9	*Mammillaria grahamii*	0–1	–
	sacahuista	NOMI	*Nolina microcarpa*	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	–
	soaptree yucca	YUEL	*Yucca elata*	0–1	–
11	**Increaser half-shrubs**			1–56	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	1–22	–
	brittlebush	ENFA	*Encelia farinosa*	0–17	–
	button brittlebush	ENFR	*Encelia frutescens*	0–6	–
	turpentine bush	ERLA12	*Ericameria laricifolia*	0–6	–
	narrowleaf goldenbush	ERLI6	*Ericameria linearifolia*	0–6	–
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	0–1	–
	burroweed	ISTE2	*Isocoma tenuisecta*	0–1	–
Tree					
12	**Trees**			6–112	
	crucifixion thorn	CAHO3	*Canotia holacantha*	1–56	–
	yellow paloverde	PAMI5	*Parkinsonia microphylla*	1–17	–
	western honey mesquite	PRGLT	*Prosopis glandulosa var. torreyana*	0–6	–
	velvet mesquite	PRVE	*Prosopis velutina*	0–6	–
	redberry juniper	JUCO11	*Juniperus coahuilensis*	0–6	–
	oneseed juniper	JUMO	*Juniperus monosperma*	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.

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:**

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

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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):**

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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:**
