Ecological site R038XA106AZ
Limy Upland 12-16" p.z.

Accessed: 05/19/2024

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.

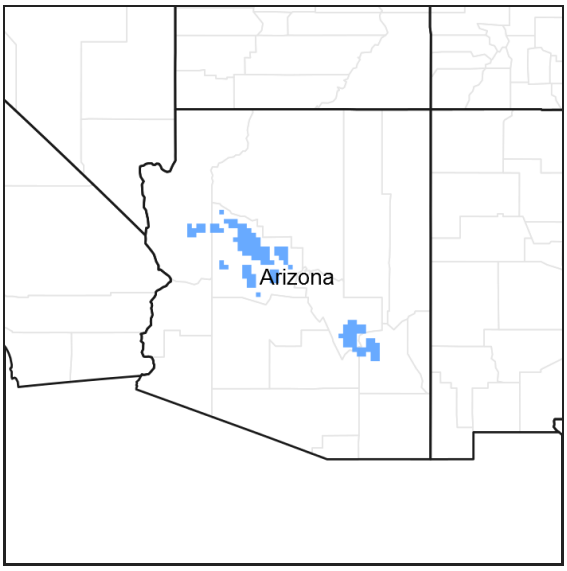


Figure 1. Mapped extent

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

R038XA105AZ	**Limestone Hills 12-16" p.z.**
R038XA108AZ	**Clayey Slopes 12-16" p.z.**
R038XA126AZ	**Limy Slopes 12-16" p.z.**

Similar sites

R040XA111AZ	**Limy Upland 10"-13" p.z.**
R041XC309AZ	**Limy Upland 12-16" p.z.**
R041XB208AZ	**Limy Upland 8-12" p.z.**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *larrea tridentata*
Herbaceous	(1) *aristida purpurea var. nealleyi* (2) *muhlenbergia porteri*

Physiographic features

This site occurs at the lowest elevations of the interior chaparral zone in the Mogollon Transition area. It occurs in an upland position; on fan terraces, ridge-tops and mesa tops.

Table 2. Representative physiographic features

Landforms	(1) Fan piedmont (2) Mesa (3) Ridge
Flooding frequency	None
Elevation	945–1,402 m
Slope	5–15%
Aspect	Aspect is not a significant factor

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 in the surface (3 to 6 inches). They are loamy textured, very calcareous and well drained. They have formed in alluvium and colluvium from limestone and related limy conglomerates. Soil surfaces are well covered by light colored gravels, cobbles and/or stones. The effective rooting depth is limited by hard, cemented lime-pans at 10 to 20 inches. The erosion hazard is slight due to gravel, cobble and rock covers. Soils mapped to date on this site include: SSA-627 Mohave County Southern Part MU's Bartmus-11, Tombstone-118, Caralampi-118; SSA-637 Yavapai County Western Part MU's Abra-AaB, AbB, AeB, AlC, AlD, AmC, AnC, LpB, LrD, Wn, Pasture-LsC; SSA-639 Black Hills-Sedona area MU's Bilgray-431, 432, Tuzigoot-433, 633, Monterosa family-427, 439, Stronghold-438, 538, Tombstone-438, 538, Blancoverde-439; SSA-675 San Carlos Indian Reservation MU's Bigtoe-505 and Pedrogosa-595.

Table 4. Representative soil features

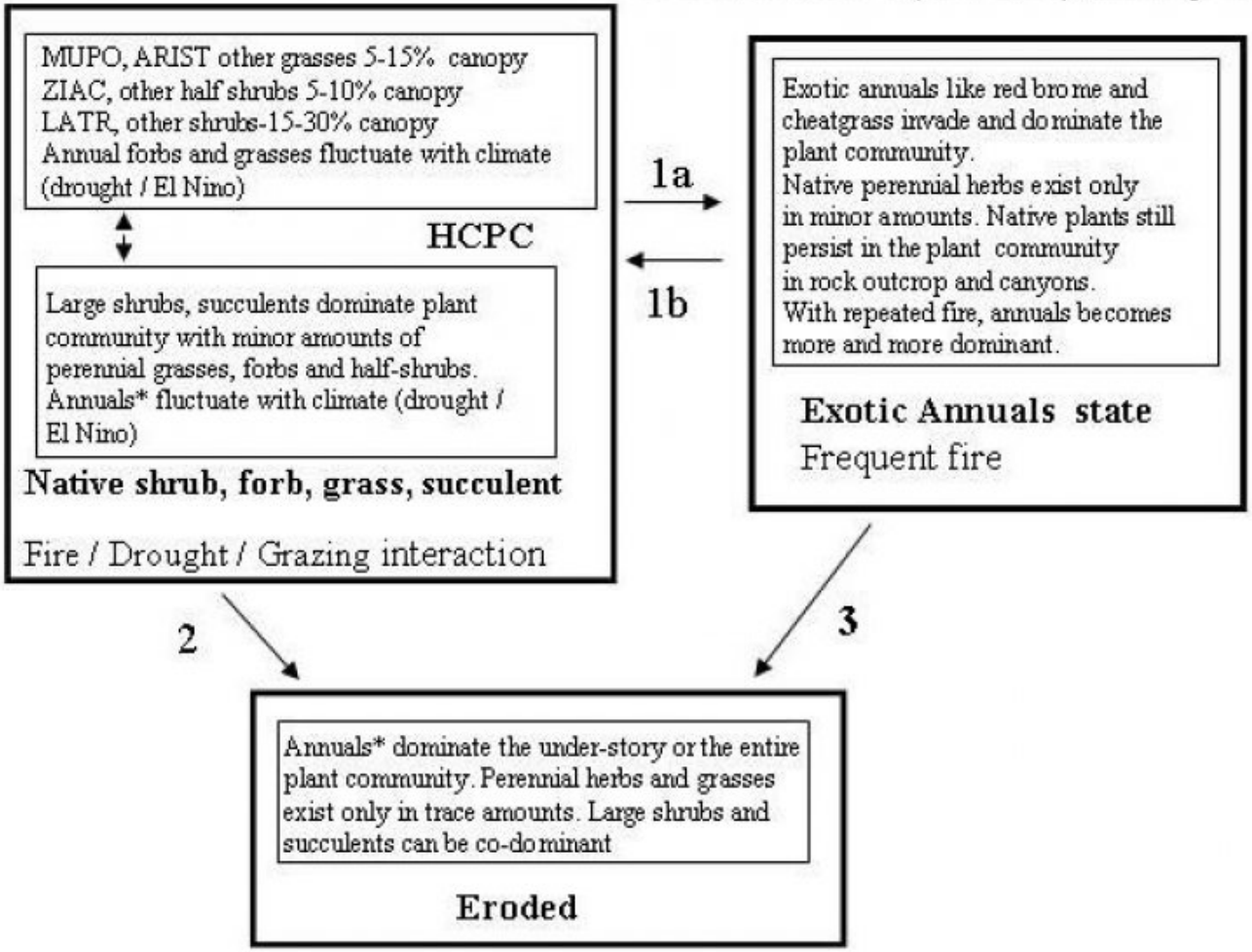
Parent material	(1) Alluvium–limestone (2) Colluvium–conglomerate
Surface texture	(1) Gravelly sandy loam (2) Very gravelly sandy loam (3) Very gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid to moderate
Soil depth	13–51 cm
Surface fragment cover <=3"	35–60%
Surface fragment cover >3"	1–10%
Available water capacity (0-101.6cm)	1.02–3.56 cm
Calcium carbonate equivalent (0-101.6cm)	10–35%
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)	7.8–8.6
Subsurface fragment volume <=3" (Depth not specified)	35–65%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

The historic native plant community is a mixture of desert shrubs, half shrubs, succulents, forbs and grasses. This includes a flora of native annual grasses and forbs of both the winter and summer seasons. Periodic wildfires which occurred at moderate intervals (15 to 30 years) in this region may not have burned areas of this site as frequently due to poor fine fuel continuity. The interactions of drought, fire and continuous livestock grazing can, over time, result in the loss of palatable grasses, half shrubs and suffrutescent forbs on this site. 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

MLRA 38-1(12-16"), Limy Upland



1a. CHG, introduction of a seed source of exotic annuals like red brome and cheatgrass; usually from roads or jeep trails through areas of the site.
1b. Unknown. Possible herbicide treatment of exotics species and seeding of native species.
2. CHG with drought, climatic warming. Increase by creosotebush, whitethorn, prickly pear, yucca, others. Increase in soil compaction and sheet and rill erosion.
3. Loss of shrub and grass cover due to increase in frequency of fires from exotic annual grasses, leads to severe sheet and rill erosion on hill-slopes and ridge-tops.

CHG – continuous heavy grazing
PG/NG – proper grazing, no grazing
LATR- creosotebush, ZIAC, desert zinnia
MUPO, bush muhly, ARIST, threeawn

*Native annuals dominant,
may be patches of some non-natives

Figure 4. State and Transition, Limy Upland 12-16" p.z.

State 1
Native Shrub-Grass State

Community 1.1
Historic Native Plant Community

The historic native plant community is a mixture of desert shrubs, half-shrubs, perennial grasses, suffrutescent forbs and succulents. A rich flora of native annual forbs and grasses, of both the winter and summer seasons, exist in the plant community. Natural fires, which burned at moderate intervals in this region, may not have occurred as often on areas of this site due to poor continuity of fine fuels and sparse covers of shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	224	336	460
Grass/Grasslike	45	196	325
Forb	6	28	168
Tree	–	1	11
Total	**275**	**561**	**964**

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	2-3%
Grass/grasslike basal cover	1-3%
Forb basal cover	0-1%
Non-vascular plants	0%
Biological crusts	1-15%
Litter	10-30%
Surface fragments >0.25" and <=3"	35-60%
Surface fragments >3"	1-10%
Bedrock	0%
Water	0%
Bare ground	10-50%

Table 7. Canopy structure (% cover)

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

Community 2.1
Exotic Annual Invaded Plant Community

Non-native annual grasses like red brome and cheatgrass 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 the native shrub, grass and forb canopy.

State 3
Eroded State

Community 3.1
Eroded Plant Community

Shrubs like creosotebush and whitethorn acacia and succulents like prickly pear and banana yucca can increase to dominate the site. Non-native annual forbs and grasses dominate the under-story. In "El Nino" years herbaceous fuels are sufficient for burning and repeat fires are especially common in areas close to residential zones and roads. 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**			39–168	
	black grama	BOER4	*Bouteloua eriopoda*	6–56	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	28–56	–
	blue threeawn	ARPUN	*Aristida purpurea var. neallevi*	1–45	–

	slim tridens	TRMU	*Tridens muticus*	1–22	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–11	–
2	**Cool season grasses**			0–34	
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	0–17	–
	needle and thread	HECO26	*Hesperostipa comata*	0–6	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–6	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	0–6	–
	squirreltail	ELEL5	*Elymus elymoides*	0–1	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–1	–
3	**Misc. perennial grasses**			6–67	
	low woollygrass	DAPU7	*Dasyochloa pulchella*	6–22	–
	red grama	BOTR2	*Bouteloua trifida*	0–17	–
	nineawn pappusgrass	ENDE	*Enneapogon desvauxii*	1–11	–
	Parish's threeawn	ARPUP5	*Aristida purpurea var. parishii*	0–6	–
	spidergrass	ARTE3	*Aristida ternipes*	0–6	–
	purple threeawn	ARPU9	*Aristida purpurea*	0–6	–
	Hall's panicgrass	PAHA	*Panicum hallii*	0–6	–
	big galleta	PLRI3	*Pleuraphis rigida*	0–6	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	0–6	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–6	–
	slim tridens	TRMUE	*Tridens muticus var. elongatus*	0–1	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	0–1	–
	fall witchgrass	DICO6	*Digitaria cognata*	0–1	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	0–1	–
	spidergrass	ARTEG	*Aristida ternipes var. gentilis*	0–1	–
	slender grama	BORE2	*Bouteloua repens*	0–1	–
	shortleaf woollygrass	ERAV	*Erioneuron avenaceum*	0–1	–
	tanglehead	HECO10	*Heteropogon contortus*	0–1	–
	curly-mesquite	HIBE	*Hilaria belangeri*	0–1	–
4	**Annual grasses**			1–56	
	small fescue	VUMI	*Vulpia microstachys*	0–11	–
	Eastwood fescue	VUMIC	*Vulpia microstachys var. ciliata*	0–11	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	0–11	–
	Mexican panicgrass	PAHI5	*Panicum hirticaule*	0–11	–
	sixweeks threeawn	ARAD	*Aristida adscensionis*	1–11	–
	prairie threeawn	AROL	*Aristida oligantha*	0–6	–
	witchgrass	PACA6	*Panicum capillare*	0–6	–
	mucronate sprangeltop	LEPAB	*Leptochloa panicea ssp. brachiata*	0–6	–
	Arizona signalgrass	URAR	*Urochloa arizonica*	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	–
	Mexican sprangletop	LEFUU	*Leptochloa fusca ssp. uninervia*	0–1	–
	needle grama	BOAR	*Bouteloua aristidoides*	0–1	–
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–1	–
	Bigelow's bluegrass	POBI	*Poa bigelovii*	0–1	–
Forb					
5	**Perennial forbs**			2–28	
	trailing windmills	ALIN	*Allionia incarnata*	1–6	–
	weakleaf bur ragweed	AMCO3	*Ambrosia confertiflora*	1–6	–
	hairyseed bahia	BAAB	*Bahia absinthifolia*	0–6	–
	leatherweed	CRPO5	*Croton pottsii*	0–6	–
	glandleaf milkwort	POMA7	*Polygala macradenia*	0–6	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	1–6	–
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	1–6	–
	Coues' cassia	SECO10	*Senna covesii*	0–2	–
	Fendler's bladderpod	LEFE	*Lesquerella fendleri*	0–2	–
	Parry's false prairie-clover	MAPA7	*Marina parryi*	0–2	–
	lacy tansyaster	MAPI	*Machaeranthera pinnatifida*	0–2	–
	wishbone-bush	MILAV	*Mirabilis laevis var. villosa*	0–2	–
	rue of the mountains	THTE2	*Thamnosma texana*	0–2	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–2	–
	paleface	HIDE	*Hibiscus denudatus*	0–2	–
	slender janusia	JAGR	*Janusia gracilis*	0–1	–
	ragged nettlespurge	JAMA	*Jatropha macrorhiza*	0–1	–
	longflower tube tongue	JULO3	*Justicia longii*	0–1	–
	Mojave spurge	EUSC6	*Euphorbia schizoloba*	0–1	–
	southwestern mock vervain	GLGO	*Glandularia gooddingii*	0–1	–
	desert rosemallow	HICO	*Hibiscus coulteri*	0–1	–
	purplenerve springparsley	CYMU2	*Cymopterus multinervatus*	0–1	–
	Gregg's prairie clover	DAGR2	*Dalea greggii*	0–1	–
	James' prairie clover	DAJA	*Dalea jamesii*	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	–
	bluedicks	DICA14	*Dichelostemma capitatum*	0–1	–
	fleabane	ERIGE2	*Erigeron*	0–1	–
	desert marigold	BAMU	*Baileya multiradiata*	0–1	–
	scarlet spiderling	BOCO	*Boerhavia coccinea*	0–1	–
	climbing wartclub	BOSC	*Boerhavia scandens*	0–1	–

	wavyleaf Indian paintbrush	CAAPM	*Castilleja applegatei ssp. martinii*	0–1	–
	Arizona wrightwort	CAAR7	*Carlowrightia arizonica*	0–1	–
	desert mariposa lily	CAKE	*Calochortus kennedyi*	0–1	–
	sego lily	CANU3	*Calochortus nuttallii*	0–1	–
	tuber anemone	ANTU	*Anemone tuberosa*	0–1	–
	narrowleaf silverbush	ARLA12	*Argythamnia lanceolata*	0–1	–
	white sagebrush	ARLUM2	*Artemisia ludoviciana ssp. mexicana*	0–1	–
	New Mexico silverbush	ARNE2	*Argythamnia neomexicana*	0–1	–
	perennial rockcress	ARPE2	*Arabis perennans*	0–1	–
	dense ayenia	AYMI	*Ayenia microphylla*	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	–
	branched noseburn	TRRA5	*Tragia ramosa*	0–1	–
	Louisiana vetch	VILUL2	*Vicia ludoviciana ssp. ludoviciana*	0–1	–
	desert tobacco	NIOB	*Nicotiana obtusifolia*	0–1	–
	toadflax penstemon	PELI2	*Penstemon linarioides*	0–1	–
	Parry's beardtongue	PEPA24	*Penstemon parryi*	0–1	–
	desert penstemon	PEPS	*Penstemon pseudospectabilis*	0–1	–
	orange fameflower	PHAU13	*Phemeranthus aurantiacus*	0–1	–
	slender poreleaf	POGR5	*Porophyllum gracile*	0–1	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	0–1	–
	Lemmon's ragwort	SELE8	*Senecio lemmonii*	0–1	–
	New Mexico fanpetals	SINE	*Sida neomexicana*	0–1	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	0–1	–
	turpentinebroom	THMO	*Thamnosma montana*	0–1	–
	canaigre dock	RUHY	*Rumex hymenosepalus*	0–1	–
	twinleaf senna	SEBA3	*Senna bauhinioides*	0–1	–
6	**Annual forbs**			2–140	
	lyreleaf jewelflower	STCA5	*Streptanthus carinatus*	0–17	–
	flatcrown buckwheat	ERDE6	*Eriogonum deflexum*	0–17	–
	cryptantha	CRYPT	*Cryptantha*	0–11	–
	thelypody	THELY	*Thelypodium*	0–11	–
	phacelia	PHACE	*Phacelia*	0–11	–
	bristly fiddleneck	AMTE3	*Amsinckia tessellata*	0–11	–
	exserted Indian paintbrush	CAEXE	*Castilleja exserta ssp. exserta*	0–11	–
	pitseed goosefoot	CHBE4	*Chenopodium berlandieri*	0–6	–
	Coulter's spiderling	BOCO2	*Boerhavia coulteri*	0–6	–
	fivewing spiderling	BOIN	*Boerhavia intermedia*	0–6	–
	chia	SACO6	*Salvia columbariae*	0–6	–
	desert Indianwheat	PLOV	*Plantago ovata*	0–6	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–6	–

	woolly tidestromia	TILA2	*Tidestromia lanuginosa*	0–6	–
	western tansymustard	DEPI	*Descurainia pinnata*	0–6	–
	California poppy	ESCAM	*Eschscholzia californica ssp. mexicana*	0–6	–
	Gordon's bladderpod	LEGO	*Lesquerella gordonii*	0–6	–
	shaggyfruit pepperweed	LELA	*Lepidium lasiocarpum*	0–6	–
	foothill deervetch	LOHU2	*Lotus humistratus*	0–6	–
	desertparsley	LOMAT	*Lomatium*	0–6	–
	coastal bird's-foot trefoil	LOSA	*Lotus salsuginosus*	0–6	–
	slender goldenweed	MAGR10	*Machaeranthera gracilis*	0–6	–
	Coulter's lupine	LUSP2	*Lupinus sparsiflorus*	0–6	–
	combseed	PECTO	*Pectocarya*	0–6	–
	tanseyleaf tansyaster	MATA2	*Machaeranthera tanacetifolia*	0–2	–
	Thurber's pepperweed	LETH2	*Lepidium thurberi*	0–2	–
	sorrel buckwheat	ERPO4	*Eriogonum polycladon*	0–2	–
	spurge	EUPHO	*Euphorbia*	0–2	–
	crestrib morning-glory	IPCO2	*Ipomoea costellata*	0–2	–
	wedgeleaf draba	DRCU	*Draba cuneifolia*	0–2	–
	hairy prairie clover	DAMO	*Dalea mollis*	0–2	–
	American wild carrot	DAPU3	*Daucus pusillus*	0–2	–
	purslane	PORTU	*Portulaca*	0–2	–
	sleepy silene	SIAN2	*Silene antirrhina*	0–2	–
	hyssopleaf sandmat	CHHY3	*Chamaesyce hyssopifolia*	0–2	–
	New Mexico thistle	CINE	*Cirsium neomexicanum*	0–2	–
	miner's lettuce	CLPEP	*Claytonia perfoliata ssp. perfoliata*	0–1	–
	scrambled eggs	COAU2	*Corydalis aurea*	0–1	–
	Esteve's pincushion	CHST	*Chaenactis stevioides*	0–1	–
	brittle spineflower	CHBR	*Chorizanthe brevicornu*	0–1	–
	yellow tackstem	CAPA7	*Calycoseris parryi*	0–1	–
	white tackstem	CAWR	*Calycoseris wrightii*	0–1	–
	hoary bowlesia	BOIN3	*Bowlesia incana*	0–1	–
	milkvetch	ASTRA	*Astragalus*	0–1	–
	annual agoseris	AGHE2	*Agoseris heterophylla*	0–1	–
	carelessweed	AMPA	*Amaranthus palmeri*	0–1	–
	desert unicorn-plant	PRAL4	*Proboscidea althaeifolia*	0–1	–
	doubleclaw	PRPA2	*Proboscidea parviflora*	0–1	–
	New Mexico plumeseed	RANE	*Rafinesquia neomexicana*	0–1	–
	sawtooth sage	SASU7	*Salvia subincisa*	0–1	–
	spreading fanpetals	SIAB	*Sida abutifolia*	0–1	–
	Arizona popcornflower	PLAR	*Plagiobothrys arizonicus*	0–1	–
	creamcups	PLCA5	*Platystemon californicus*	0–1	–
	woollyhead neststraw	STMI2	*Stylocline micropoides*	0–1	–
	sand fringepod	THCU	*Thysanocarpus curvipes*	0–1	–
	sacred thorn-apple	DAWR2	*Datura wrightii*	0–1	–

	miniature woollystar	ERDI2	*Eriastrum diffusum*	0–1	–
	spreading fleabane	ERDI4	*Erigeron divergens*	0–1	–
	redstar	IPCO3	*Ipomoea coccinea*	0–1	–
	ivyleaf morning-glory	IPHE	*Ipomoea hederacea*	0–1	–
	Arizona poppy	KAGR	*Kallstroemia grandiflora*	0–1	–
	California goldfields	LACA7	*Lasthenia californica*	0–1	–
	star gilia	GIST	*Gilia stellata*	0–1	–
	longleaf false goldeneye	HELOA2	*Heliomeris longifolia var. annua*	0–1	–
	Texas stork's bill	ERTE13	*Erodium texanum*	0–1	–
	Arizona lupine	LUAR4	*Lupinus arizonicus*	0–1	–
	miniature lupine	LUBI	*Lupinus bicolor*	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	–
	manybristle chinchweed	PEPA2	*Pectis papposa*	0–1	–
	Fendler's desertdandelion	MAFE	*Malacothrix fendleri*	0–1	–
Shrub/Vine					
7	**Dominant large shrubs**			224–336	
	creosote bush	LATR2	*Larrea tridentata*	224–336	–
	whitethorn acacia	ACCO2	*Acacia constricta*	0–56	–
	whitethorn acacia	ACCOP9	*Acacia constricta var. paucispina*	0–11	–
8	**Miscellaneous large shrubs**			0–17	
	ocotillo	FOSP2	*Fouquieria splendens*	0–2	–
	crown of thorns	KOSP	*Koeberlinia spinosa*	0–2	–
	Wright's beebrush	ALWR	*Aloysia wrightii*	0–2	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–1	–
	desert sweet	CHMI2	*Chamaebatiaria millefolium*	0–1	–
	Warnock's snakewood	COWA	*Condalia warnockii*	0–1	–
	water jacket	LYAN	*Lycium andersonii*	0–1	–
	Berlandier's wolfberry	LYBE	*Lycium berlandieri*	0–1	–
	Arizona desert-thorn	LYEX	*Lycium exsertum*	0–1	–
	red barberry	MAHA4	*Mahonia haematocarpa*	0–1	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	0–1	–
	littleleaf sumac	RHMI3	*Rhus microphylla*	0–1	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–1	–
	Wright's mock buckthorn	SAWR	*Sageretia wrightii*	0–1	–
	jojoba	SICH	*Simmondsia chinensis*	0–1	–
	Arizona necklacepod	SOAR3	*Sophora arizonica*	0–1	–
	lotebush	ZIOBC	*Ziziphus obtusifolia var. canescens*	0–1	–
	longleaf jointfir	EPTR	*Ephedra trifurca*	0–1	–
	catclaw acacia	ACGR	*Acacia greggii*	0–1	–
9	**Dominant half shrubs**			6–67	

	mariola	PAIN2	*Parthenium incanum*	0–17	–
	desert zinnia	ZIAC	*Zinnia acerosa*	1–17	–
	rough menodora	MESC	*Menodora scabra*	1–11	–
	littleleaf ratany	KRER	*Krameria erecta*	0–6	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–6	–
	woody crinklemat	TICA3	*Tiquilia canescens*	0–6	–
	fairyduster	CAER	*Calliandra eriophylla*	0–6	–
	featherplume	DAFO	*Dalea formosa*	0–2	–
	Eastern Mojave buckwheat	ERFA2	*Eriogonum fasciculatum*	0–1	–
	bastardsage	ERWR	*Eriogonum wrightii*	0–1	–
	Coulter's brickellbush	BRCO	*Brickellia coulteri*	0–1	–
	longleaf phlox	PHLO2	*Phlox longifolia*	0–1	–
	purple sage	SADOM	*Salvia dorrii ssp. mearnsii*	0–1	–
10	**Succulents**			6–28	
	buck-horn cholla	CYAC8	*Cylindropuntia acanthocarpa*	1–11	–
	banana yucca	YUBA	*Yucca baccata*	1–11	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0–6	–
	cactus apple	OPEN3	*Opuntia engelmannii*	0–6	–
	purple pricklypear	OPMA8	*Opuntia macrocentra*	0–6	–
	saguaro	CAGI10	*Carnegiea gigantea*	0–6	–
	tulip pricklypear	OPPH	*Opuntia phaeacantha*	0–2	–
	common sotol	DAWH2	*Dasylirion wheeleri*	0–2	–
	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	–
	candy barrelcactus	FEWI	*Ferocactus wislizeni*	0–1	–
	devil's cholla	GRKU	*Grusonia kunzei*	0–1	–
	Graham's nipple cactus	MAGR9	*Mammillaria grahamii*	0–1	–
	sacahuista	NOMI	*Nolina microcarpa*	0–1	–
	walkingstick cactus	CYSP8	*Cylindropuntia spinosior*	0–1	–
	soaptree yucca	YUEL	*Yucca elata*	0–1	–
	teddybear cholla	CYBI9	*Cylindropuntia bigelovii*	0–1	–
	jumping cholla	CYFU10	*Cylindropuntia fulgida*	0–1	–
	goldenflower century plant	AGCH2	*Agave chrysantha*	0–1	–
	Parry's agave	AGPA4	*Agave parryi*	0–1	–
	Schott's century plant	AGSC3	*Agave schottii*	0–1	–
11	**Increaser half-shrubs**			0–17	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–11	–

	whitestem paperflower	PSCO2	*Psilostrophe cooperi*	0–6	–
	burroweed	ISTE2	*Isocoma tenuisecta*	0–1	–
	rayless goldenhead	ACSP	*Acamptopappus sphaerocephalus*	0–1	–
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	0–1	–
Tree					
12	**Trees**			0–11	
	crucifixion thorn	CAHO3	*Canotia holacantha*	0–6	–
	redberry juniper	JUCO11	*Juniperus coahuilensis*	0–1	–
	oneseed juniper	JUMO	*Juniperus monosperma*	0–1	–
	blue paloverde	PAFL6	*Parkinsonia florida*	0–1	–
	western honey mesquite	PRGLT	*Prosopis glandulosa var. torreyana*	0–1	–
	velvet mesquite	PRVE	*Prosopis velutina*	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 and ridge-tops. The site is susceptible to erosion in overgrazed areas like bed-grounds, livestock trails and lower slopes adjacent to water.
The site has poor habitat diversity for most desert wildlife species. It is home mainly to rodents and rabbits and their predators. 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 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, fossil hunting, photography.

Wood products

None

Other products

There is some harvest of food plants like prickly pear tunas, jojoba nuts and mescal. There is limited harvest of medicinal plants like mormon tea and creosote bush.

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)	Karlynn Huling
Contact for lead author	NRCS Flagstaff Area Office
Date	05/18/2007
Approved by	S. Cassady
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** A few rills may form due to loamy textures, slow permeability, and medium to rapid runoff. Rills may be more common on shallow soils and steeper slopes; less common on deeper soils, gentler slopes, and soils with a lot of rock fragment armor on the surface and within the surface horizon.

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2. **Presence of water flow patterns:** Water flow patterns may be common due to slow permeability and medium to rapid runoff. Water flow patterns will be more common on steeper slopes and shallow soils.

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3. **Number and height of erosional pedestals or terracettes:** Some pedestals and terracettes may form, but they should be very short.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** One area had 30% bare ground. If a wet winter and spring produces a flush of annuals, there will be less bare ground. This site has an average available water capacity of 7 inches, so it has a low (shallow soils) to moderate (deep soils) potential to produce plant cover. Areas with a higher cover of rock fragments have less bare ground. Drought may cause an increase in bare ground.

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5. **Number of gullies and erosion associated with gullies:** None

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None

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7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous and fine woody litter will be transported in water flow pathways. Coarse woody litter will remain under shrub and tree canopies.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability values average 4 both under plant canopy and in the interspaces. Soil surface textures are mostly sandy loam, loam, and fine sandy loam. The surface horizon may have no rock fragments or it may be very gravelly. When well vegetated, the soils have a moderate to high resistance to water erosion and a moderate resistance to wind erosion.

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

structure can be granular (weak to moderate, very fine to fine), platy (weak to moderate, medium to moderately thick), or subangular blocky (weak to moderate, fine). Surface thickness ranges from 1-5 inches. Color is variable depending upon parent material.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** This site is characterized by a relatively even distribution of mostly grasses with some shrubs and a few forbs. There may be up to 25% tree cover in higher elevations with very shallow to shallow soils. Canopy cover on one shallow area was 60% (40$ grass, 2% forbs, 2% shrubs, and 20% trees). Basal cover was 13% (all grass). Both canopy and basal cover values decrease during a prolonged drought. This type of plant community is moderately effective at capturing and storing precipitation.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Due to sandy loam, loam, and fine sandy loam surface textures, the soils may be easily compacted if there are no coarse fragments within the surface horizon. Some surface horizons, however, are naturally platy.

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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: none

    Sub-dominant: warm season colonizing grasses = warm season bunchgrasses > decieuous or persistent shrubs > cool season bunchgrasses >

    Other: minor: forbs > evergreen shrubs >
    Trace: Agave family > cacti = trees > annual grasses

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** All plant functional groups are adapted to survival in all years except during the most severe droughts. Severe winter droughts affect shrubs and trees the most. Severe summer droughts affect grasses the most.

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14. **Average percent litter cover (%) and depth (in):** Mostly herbaceous litter with some woody litter. Litter amounts increase during the first few years fo drought, then decrease in later years.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 450-575 pounds per acre (dry weight) during drought years; 575-800 pounds per acre during median years; 800-900 pounds per acre during wet years.

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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: Broom snakeweed is native to the site, but has the potential to increase and dominate the area after heavy grazing. Juniper is native to the site, but can also increase after heavy grazing and fire exclusion. This site includes shallow soils, however, which can support a moderate amount of trees (up to 25% cover). Rubber rabbitbrush is a native plant that may invade and dominate the site after soil disturbance, overgrazing, or fire. Portulaca (purslane) and Amaranthus (pigweed) are native or exotic forbs that may invade and dominate the site after soil disturbance, overgrazing or fire.

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17. **Perennial plant reproductive capability:** All plants native to the site are adapted to the climate and are capable of producint seeds, stolons, and rhizomes in most years except during the most severe droughts.
