

Ecological site R038XA117AZ Volcanic Hills 12-16" p.z. Clayey

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

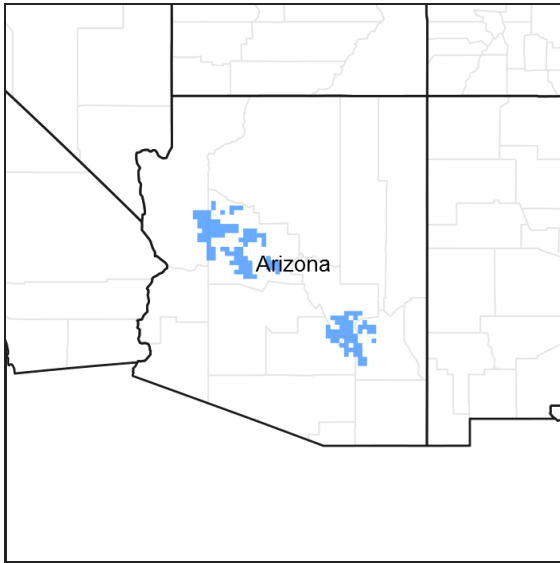


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 038X–Mogollon Transition South

AZ 38.1 – Lower Mogollon Transition

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

Classification relationships

Similar site to TES (Terrestrial Ecosystem site) map unit numbers 378 and 428, on the Prescott national Forest in Yavapai county in central Arizona.

Associated sites

R038XA102AZ	Clayey Upland 12-16" p.z.
R038XA103AZ	Clay Loam Upland 12-16" p.z.

Similar sites

R041XC301AZ	Basalt Hills 12-16" p.z.
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Table 1. Dominant plant species

Tree	(1) <i>Canotia</i> (2) <i>Parkinsonia</i>
Shrub	(1) <i>Simmondsia chinensis</i> (2) <i>Opuntia engelmannii</i> var. <i>engelmannii</i>
Herbaceous	(1) <i>Pleuraphis mutica</i> (2) <i>Bouteloua curtipendula</i>

Physiographic features

This site occurs in the lower elevations of the interior chaparral zone, south of the Mogollon Rim in central Arizona. This site occurs in an upland position. It occurs on rugged mountain slopes, ridge-tops and mesa sides. Elevations range from 3200 to 4600 feet. Slopes are from 15 to 70%.

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Mountain slope (3) Ridge
Flooding frequency	None
Elevation	3,100–4,600 ft
Slope	15–70%
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, and 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 dark colored. They are clayey throughout (smectitic) and well drained. They have formed in residuum and slope alluvium from basalt, andesite and related volcanic tuffs and ash. The surface textures are clayloam to clay. 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. The soils mapped on this site include: from SSA-627 Mohave County Southern Part MU's Gonzales-49 & 87, Courthouse family-40 & 41, Graham-55, Lampshire-75; SSA-637 Yavapai County Western Part MU's Faraway GrVL, CbVL, GrVSL, CbVSL-FIE, FIF, Venezia StVL-VrF, VtE, Luzena-FIE, LwD, LxD, FIF; SSA-675 San Carlos IR Area MU's Eskiminzin-535 & 565, Brewster-315, Cammerman-650, Woodcutter-315, SSA-697 Mohave County Central Part MU's Gonzales-42 & Graham-46.

Table 4. Representative soil features

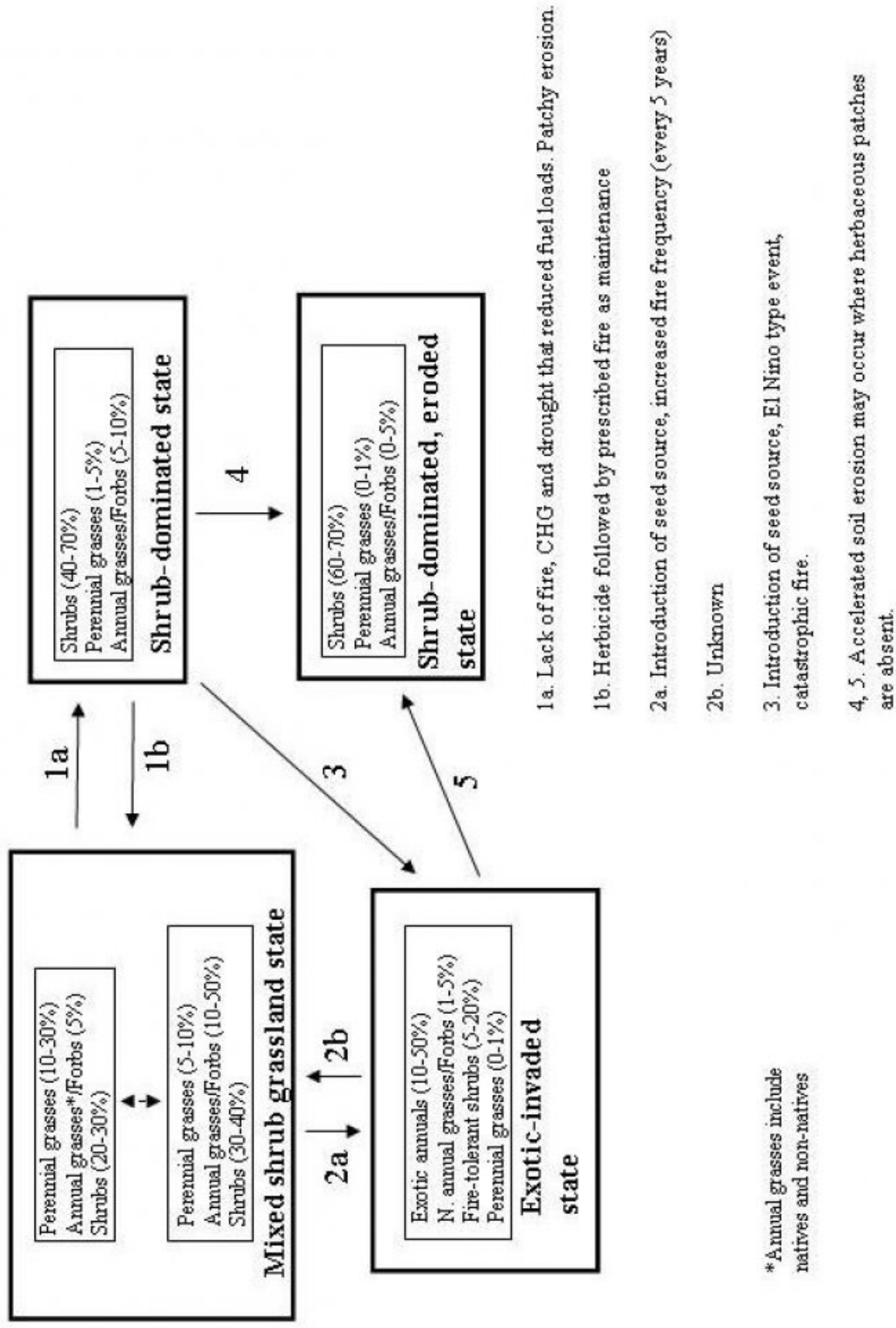
Parent material	(1) Residuum–basalt (2) Slope alluvium–andesite
Surface texture	(1) Very cobbly clay loam (2) Cobbly clay
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to slow
Soil depth	10–20 in
Surface fragment cover <=3"	25–50%
Surface fragment cover >3"	5–12%
Available water capacity (0-40in)	0.8–2.4 in
Calcium carbonate equivalent (0-40in)	0–5%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	15–45%
Subsurface fragment volume >3" (Depth not specified)	1–10%

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

MLRA 38.1 (12-16''), Volcanic Hills, clayey



* Annual grasses include natives and non-natives

Figure 4. State & Transition, Volcanic Hills, clayey 12-16"

**State 1
Mixed Shrub-Grass State**

**Community 1.1
Historic Native Plant Community**

MIXED SHRUB - VOLCANIC HILLS, CLAYEY 12-16" PZ.

Mixed shrub - grassland state



- Left photo is potential plant community (toboes, side oats grama, canotia and jojoba) 10 to 15 years after fire.
- Right photo is potential plant community on a western exposure at 3400 feet elevation.
- Total canopy cover ranges from 40% to 60%.

Shrub dominated state



- Left photo is dominated by high canopy of whitethorn acacia, mesquite, jojoba and one seed juniper. It has not burned in over 50 years.
- Right photo shows north aspect with juniper and whitethorn acacia; south aspect with jojoba and saguaro.

Shrub dominated, eroded state



- Shrubs like mesquite, canotia, juniper, ocotillo, acacia, whitethorn acacia, and succulents like prickly pear, amole and banana yucca increase to dominate the overstory.
- Animals, both native and non native, can dominate the understory.
- Trailing from heavy livestock use causes compaction and accelerated sheet and rill erosion.

Winter annuals in El Nino years



- Left photo is of a west facing slope lush with winter annuals like poppy and lupine in the wet spring of 1993.
- Right photo is of a north aspect with a heavy stand of red brome after the wet spring of 2001.
- Non native annuals like red brome, cheatgrass and wild oats can dominate the site with frequent,

Figure 5. Volcanic Hills, clayey 12-16" pz. photos

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. Northern exposures have a higher percentage of mid-grasses and some cool season grasses that will not 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 (tanglehead). At elevations near precipitation zone upper boundaries the northern slopes will look more like the plant community of the 16 to 20 inch precipitation zone in MLRA 38. At lower precipitation zone boundaries southern exposures will look more like the plant community of the site in the 10 to 13 inch zone of MLRA 40 (Upper Sonoran).

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	390	700	1050
Shrub/Vine	210	325	500
Forb	50	150	350
Tree	20	50	100
Total	670	1225	2000

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	2-5%
Grass/grasslike foliar cover	3-6%
Forb foliar cover	0-1%
Non-vascular plants	0-1%
Biological crusts	0-2%
Litter	10-45%
Surface fragments >0.25" and <=3"	25-50%
Surface fragments >3"	5-15%
Bedrock	5-25%
Water	0%
Bare ground	5-20%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/Grasslike	Forb
<0.5	–	–	0-5%	0-1%
>0.5 <= 1	–	0-2%	2-10%	1-5%
>1 <= 2	–	1-10%	20-30%	0-1%
>2 <= 4.5	–	10-15%	–	–
>4.5 <= 13	0-10%	1-5%	–	–
>13 <= 40	0-5%	–	–	–
>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

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.

State 3 Exotic Invaded State

Community 3.1 Exotic Forb and Grass 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.

State 4 Shrub Dominated, Eroded State

Community 4.1 Shrub Dominated, Eroded Plant Community

Shrubs like; whitethorn acacia, mesquite, wait a bit mimosa and catclaw acacia; and succulents like; prickly pear, cholla and banana yucca 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.

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	mid grasses			200–450	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	100–250	–
	tobosagrass	PLMU3	<i>Pleuraphis mutica</i>	50–200	–
	tanglehead	HECO10	<i>Heteropogon contortus</i>	25–100	–
2	cool season grasses			15–100	
	desert needlegrass	ACSP12	<i>Achnatherum speciosum</i>	0–50	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	5–50	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–25	–
	muttongrass	POFE	<i>Poa fendleriana</i>	0–20	–
3	misc. perennial grasses			150–200	
	spidergrass	ARTE3	<i>Aristida ternipes</i>	10–50	–
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	0–50	–
	black grama	BOER4	<i>Bouteloua eriopoda</i>	10–50	–
	vine mesquite	PAOB	<i>Panicum obtusum</i>	0–50	–
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	0–25	–

	plains bristleglass	SEVOZ	<i>Setaria vupiseta</i>	0-25	-
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	0-25	-
	spidergrass	ARTEG	<i>Aristida ternipes var. gentilis</i>	0-25	-
	purple threeawn	ARPUP6	<i>Aristida purpurea var. purpurea</i>	0-25	-
	Arizona cottontop	DICA8	<i>Digitaria californica</i>	0-20	-
	southwestern bristlegrass	SESC2	<i>Setaria scheelei</i>	0-20	-
	green sprangletop	LEDU	<i>Leptochloa dubia</i>	0-20	-
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	0-15	-
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0-15	-
	plains lovegrass	ERIN	<i>Eragrostis intermedia</i>	0-15	-
	nineawn pappusgrass	ENDE	<i>Enneapogon desvauxii</i>	0-10	-
	blue threeawn	ARPUN	<i>Aristida purpurea var. nealleyi</i>	0-10	-
	Parish's threeawn	ARPUP5	<i>Aristida purpurea var. parishii</i>	0-10	-
	bullgrass	MUEM	<i>Muhlenbergia emersleyi</i>	0-10	-
	Fendler threeawn	ARPUL	<i>Aristida purpurea var. longiseta</i>	0-5	-
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	0-5	-
4	short grasses			25-150	
	curly-mesquite	HIBE	<i>Hilaria belangeri</i>	5-50	-
	Hall's panicgrass	PAHA	<i>Panicum hallii</i>	1-50	-
	slender grama	BORE2	<i>Bouteloua repens</i>	5-50	-
	red grama	BOTR2	<i>Bouteloua trifida</i>	0-25	-
	slim tridens	TRMU	<i>Tridens muticus</i>	0-25	-
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	0-25	-
	sprucetop grama	BOCH	<i>Bouteloua chondrosioides</i>	0-10	-
5	annual grasses			25-200	
	sixweeks threeawn	ARAD	<i>Aristida adscensionis</i>	0-100	-
	prairie threeawn	AROL	<i>Aristida oligantha</i>	0-100	-
	needle grama	BOAR	<i>Bouteloua aristidoides</i>	0-100	-
	Mexican sprangletop	LEFUU	<i>Leptochloa fusca ssp. uninervia</i>	20-100	-
	mucronate sprangletop	LEPAB	<i>Leptochloa panicea ssp. brachiata</i>	20-100	-
	Mexican panicgrass	PAHI5	<i>Panicum hirticaule</i>	0-100	-
	sticky sprangletop	LEVI5	<i>Leptochloa viscida</i>	0-50	-
	witchgrass	PACA6	<i>Panicum capillare</i>	0-50	-
	small fescue	VUMI	<i>Vulpia microstachys</i>	0-50	-
	Eastwood fescue	VUMIC	<i>Vulpia microstachys var. ciliata</i>	0-50	-
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	0-50	-
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	0-50	-
	Arizona brome	BRAR4	<i>Bromus arizonicus</i>	0-50	-
	feather fingergrass	CHVI4	<i>Chloris virgata</i>	0-50	-
	little barley	HOPU	<i>Hordeum pusillum</i>	0-30	-
	delicate muhly	MUFR	<i>Muhlenbergia fragilis</i>	0-25	-
	littleseed muhly	MUMI	<i>Muhlenbergia microsperma</i>	0-25	-
	canyon cupgrass	ERLE7	<i>Eriochloa lemmonii</i>	0-25	-
	tufted lovegrass	ERDE	<i>Eragrostis nuttalliana</i>	0-25	-

	tufted lovegrass	ERPE	<i>Eragrostis pectinacea</i>	0-25	-
	desert lovegrass	ERPEM	<i>Eragrostis pectinacea</i> var. <i>miserrima</i>	0-25	-
	Bigelow's bluegrass	POBI	<i>Poa bigelovii</i>	0-25	-
	Arizona signalgrass	URAR	<i>Urochloa arizonica</i>	0-25	-
Forb					
6	perennial forbs			25-50	
	largeflower onion	ALMA4	<i>Allium macropetalum</i>	0-15	-
	weakleaf bur ragweed	AMCO3	<i>Ambrosia confertiflora</i>	1-15	-
	bluedicks	DICA14	<i>Dichelostemma capitatum</i>	2-15	-
	Indian rushpea	HOGL2	<i>Hoffmannseggia glauca</i>	1-15	-
	desert globemallow	SPAM2	<i>Sphaeralcea ambigua</i>	1-15	-
	brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	0-15	-
	longflower tube tongue	JULO3	<i>Justicia longii</i>	0-10	-
	shrubby deervetch	LORI3	<i>Lotus rigidus</i>	0-10	-
	Wright's deervetch	LOWR	<i>Lotus wrightii</i>	0-10	-
	lacy tansyaster	MAPI	<i>Machaeranthera pinnatifida</i>	1-10	-
	wishbone-bush	MILAV	<i>Mirabilis laevis</i> var. <i>villosa</i>	1-10	-
	scarlet spiderling	BOCO	<i>Boerhavia coccinea</i>	0-10	-
	Arizona wrightwort	CAAR7	<i>Carlowrightia arizonica</i>	0-10	-
	white sagebrush	ARLUM2	<i>Artemisia ludoviciana</i> ssp. <i>mexicana</i>	1-10	-
	Braun's rockcress	ARPE3	<i>Arabis perstellata</i>	0-5	-
	tuber anemone	ANTU	<i>Anemone tuberosa</i>	0-5	-
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-5	-
	dwarf Indian mallow	ABPA3	<i>Abutilon parvulum</i>	0-5	-
	brownfoot	ACWR5	<i>Acourtia wrightii</i>	0-5	-
	San Felipe dogweed	ADPO	<i>Adenophyllum porophylloides</i>	1-5	-
	fleabane	ERIGE2	<i>Erigeron</i>	1-5	-
	Cooley's bundleflower	DECO2	<i>Desmanthus cooleyi</i>	0-5	-
	plains blackfoot	MELE2	<i>Melampodium leucanthum</i>	0-5	-
	Parry's beardtongue	PEPA24	<i>Penstemon parryi</i>	0-5	-
	canaigre dock	RUHY	<i>Rumex hymenosepalus</i>	0-5	-
	twinleaf senna	SEBA3	<i>Senna bauhinioides</i>	0-5	-
	Coues' cassia	SECO10	<i>Senna covesii</i>	0-5	-
	Lemmon's ragwort	SELE8	<i>Senecio lemmonii</i>	0-5	-
	branched noseburn	TRRA5	<i>Tragia ramosa</i>	0-5	-
	vetch	VICIA	<i>Vicia</i>	0-5	-
	orange fameflower	PHAU13	<i>Phemeranthus aurantiacus</i>	0-5	-
	slender poreleaf	POGR5	<i>Porophyllum gracile</i>	0-5	-
	southwestern mock vervain	GLGO	<i>Glandularia gooddingii</i>	0-5	-
	ragged nettlespurge	JAMA	<i>Jatropha macrorhiza</i>	0-2	-
	New Mexico groundsel	PANE7	<i>Packera neomexicana</i>	0-2	-
	desert larkspur	DEPA	<i>Delphinium parishii</i>	0-2	-
	tall mountain larkspur	DESC	<i>Delphinium scaposum</i>	0-2	-
	Mojave evening primrose	FUCOC	<i>Euphorbia eschimbata</i>	0-2	-

	mojave spurge	EUSC6	<i>Eupriordia scriizoida</i>	0-2	-
	sego lily	CANU3	<i>Calochortus nuttallii</i>	0-2	-
	wavyleaf Indian paintbrush	CAAPM	<i>Castilleja applegatei</i> ssp. <i>martinii</i>	0-2	-
	Oak Creek ragwort	PAQU8	<i>Packera quercetorum</i>	0-1	-
	toadflax penstemon	PELI2	<i>Penstemon linarioides</i>	0-1	-
	desert penstemon	PEPS	<i>Penstemon pseudospectabilis</i>	0-1	-
	scurfpea	PSORA2	<i>Psoraleidum</i>	0-1	-
7	annual forbs			25-300	
	bristly fiddleneck	AMTE3	<i>Amsinckia tessellata</i>	0-75	-
	California poppy	ESCAM	<i>Eschscholzia californica</i> ssp. <i>mexicana</i>	0-75	-
	trefoil	LOTUS	<i>Lotus</i>	0-50	-
	Arizona lupine	LUAR4	<i>Lupinus arizonicus</i>	0-50	-
	longleaf false goldeneye	HELOA2	<i>Heliomeris longifolia</i> var. <i>annua</i>	0-50	-
	crestrib morning-glory	IPCO2	<i>Ipomoea costellata</i>	0-50	-
	milkvetch	ASTRA	<i>Astragalus</i>	0-50	-
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	0-50	-
	Forb, annual	2FA	<i>Forb, annual</i>	0-50	-
	slender goldenweed	MAGR10	<i>Machaeranthera gracilis</i>	0-50	-
	tanseyleaf tansyaster	MATA2	<i>Machaeranthera tanacetifolia</i>	0-50	-
	Coulter's lupine	LUSP2	<i>Lupinus sparsiflorus</i>	0-50	-
	manybristle chinchweed	PEPA2	<i>Pectis papposa</i>	0-50	-
	Arizona popcornflower	PLAR	<i>Plagiobothrys arizonicus</i>	5-50	-
	creamcups	PLCA5	<i>Platystemon californicus</i>	0-50	-
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	1-50	-
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	1-50	-
	purslane	PORTU	<i>Portulaca</i>	0-25	-
	New Mexico plumeseed	RANE	<i>Rafinesquia neomexicana</i>	0-25	-
	phacelia	PHACE	<i>Phacelia</i>	0-25	-
	hollowleaf annual lupine	LUSU3	<i>Lupinus succulentus</i>	0-25	-
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	0-25	-
	fiwewing spiderling	BOIN	<i>Boerhavia intermedia</i>	0-25	-
	hoary bowlesia	BOIN3	<i>Bowlesia incana</i>	0-25	-
	New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	0-25	-
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	0-25	-
	miniature woollystar	ERDI2	<i>Eriastrum diffusum</i>	0-25	-
	spreading fleabane	ERDI4	<i>Erigeron divergens</i>	0-25	-
	California goldfields	LACA7	<i>Lasthenia californica</i>	0-25	-
	Goodding's bladderpod	LEGO2	<i>Lesquerella gooddingii</i>	0-25	-
	shaggyfruit pepperweed	LELA	<i>Lepidium lasiocarpum</i>	0-25	-
	Thurber's pepperweed	LETH2	<i>Lepidium thurberi</i>	0-25	-
	foothill deervetch	LOHU2	<i>Lotus humistratus</i>	0-25	-
	miniature lupine	LUBI	<i>Lupinus bicolor</i>	0-25	-
	coastal bird's-foot trefoil	LOSA	<i>Lotus salsuginosus</i>	0-25	-

	spurge	EUPHU	<i>Euphorbia</i>	0-25	-
	cryptantha	CRYPT	<i>Cryptantha</i>	0-25	-
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	0-15	-
	scrambled eggs	COAU2	<i>Corydalis aurea</i>	0-15	-
	sorrel buckwheat	ERPO4	<i>Eriogonum polycladon</i>	0-15	-
	green carpetweed	MOVE	<i>Mollugo verticillata</i>	0-15	-
	evening primrose	OENOT	<i>Oenothera</i>	0-15	-
	Florida pellitory	PAFL3	<i>Parietaria floridana</i>	0-15	-
	ragwort	SENEC	<i>Senecio</i>	0-15	-
	spreading fanpetals	SIAB	<i>Sida abutifolia</i>	0-15	-
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	0-15	-
	New Mexico fanpetals	SINE	<i>Sida neomexicana</i>	0-15	-
	sand fringe-pod	THCU	<i>Thysanocarpus curvipes</i>	0-15	-
	desert unicorn-plant	PRAL4	<i>Proboscidea althaeifolia</i>	0-15	-
	doubleclaw	PRPA2	<i>Proboscidea parviflora</i>	0-15	-
	annual agoseris	AGHE2	<i>Agoseris heterophylla</i>	0-10	-
	miner's lettuce	CLPEP	<i>Claytonia perfoliata ssp. perfoliata</i>	0-5	-
	desertparsley	LOMAT	<i>Lomatium</i>	0-5	-
Shrub/Vine					
8	shrubs			100-200	
	jojoba	SICH	<i>Simmondsia chinensis</i>	5-150	-
	ocotillo	FOSP2	<i>Fouquieria splendens</i>	5-50	-
	whitethorn acacia	ACCO2	<i>Acacia constricta</i>	5-50	-
	catclaw acacia	ACGR	<i>Acacia greggii</i>	5-25	-
	Wright's beebrush	ALWR	<i>Aloysia wrightii</i>	1-25	-
	snapdragon penstemon	KEANM	<i>Keckiella antirrhinoides ssp. microphylla</i>	0-25	-
	Sonoran scrub oak	QUTU2	<i>Quercus turbinella</i>	0-15	-
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	1-15	-
	desert sweet	CHMI2	<i>Chamaebatiaria millefolium</i>	0-15	-
	Warnock's snakewood	COWA	<i>Condalia warnockii</i>	0-15	-
	Florida hopbush	DOVI	<i>Dodonaea viscosa</i>	0-15	-
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	0-15	-
	desert ceanothus	CEGR	<i>Ceanothus greggii</i>	0-10	-
	Arizona necklacepod	SOAR3	<i>Sophora arizonica</i>	0-10	-
	Mexican bladdersage	SAME	<i>Salazaria mexicana</i>	0-10	-
	ambrosia leaf bur ragweed	AMAM2	<i>Ambrosia ambrosioides</i>	0-10	-
	Thurber's desert honeysuckle	ANTH2	<i>Anisacanthus thurberi</i>	0-10	-
	catclaw mimosa	MIACB	<i>Mimosa aculeaticarpa var. biuncifera</i>	0-5	-
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0-5	-
	lotebush	ZIOBC	<i>Ziziphus obtusifolia var. canescens</i>	0-5	-
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0-5	-
	spiny hackberry	CEEH	<i>Celtis ehrenbergiana</i>	0-5	-
	pale desert-thorn	LYPA	<i>Lycium pallidum</i>	0-2	-

	algerita	MATR3	<i>Mahonia trifoliolata</i>	0–2	–
	redberry buckthorn	RHCR	<i>Rhamnus crocea</i>	0–1	–
	littleleaf sumac	RHMI3	<i>Rhus microphylla</i>	0–1	–
	red barberry	MAHA4	<i>Mahonia haematocarpa</i>	0–1	–
9	half shrubs			0–50	
	bastardsage	ERWR	<i>Eriogonum wrightii</i>	0–50	–
	rough menodora	MESC	<i>Menodora scabra</i>	2–50	–
	Eastern Mojave buckwheat	ERFA2	<i>Eriogonum fasciculatum</i>	0–25	–
	slender janusia	JAGR	<i>Janusia gracilis</i>	2–15	–
	littleleaf ratany	KRER	<i>Krameria erecta</i>	0–15	–
	sweetbush	BEJU	<i>Bebbia juncea</i>	0–15	–
	Coulter's brickellbush	BRCO	<i>Brickellia coulteri</i>	0–15	–
	Parish's goldeneye	VIPA14	<i>Viguiera parishii</i>	0–15	–
	longleaf phlox	PHLO2	<i>Phlox longifolia</i>	0–10	–
	fairyduster	CAER	<i>Calliandra eriophylla</i>	0–10	–
	ragged rockflower	CRBI2	<i>Crossosoma bigelovii</i>	0–10	–
	shortleaf baccharis	BABR	<i>Baccharis brachyphylla</i>	0–10	–
	Goodding's tansyaster	MAPIG2	<i>Machaeranthera pinnatifida</i> ssp. <i>gooddingii</i> var. <i>gooddingii</i>	0–10	–
	starry bedstraw	GAST	<i>Galium stellatum</i>	0–10	–
	yerba de pasmo	BAPT	<i>Baccharis pteronioides</i>	0–5	–
10	succulents			50–100	
	Schott's century plant	AGSC3	<i>Agave schottii</i>	0–50	–
	cactus apple	OPEN3	<i>Opuntia engelmannii</i>	5–50	–
	buck-horn cholla	CYAC8	<i>Cylindropuntia acanthocarpa</i>	0–25	–
	walkingstick cactus	CYSP8	<i>Cylindropuntia spinosior</i>	0–25	–
	sacahuista	NOMI	<i>Nolina microcarpa</i>	0–25	–
	tulip pricklypear	OPPH	<i>Opuntia phaeacantha</i>	0–20	–
	banana yucca	YUBA	<i>Yucca baccata</i>	1–20	–
	goldenflower century plant	AGCH2	<i>Agave chrysantha</i>	0–15	–
	Whipple cholla	CYWH	<i>Cylindropuntia whipplei</i>	0–10	–
	candy barrelcactus	FEWI	<i>Ferocactus wislizeni</i>	1–10	–
	dollarjoint pricklypear	OPCH	<i>Opuntia chlorotica</i>	0–10	–
	Graham's nipple cactus	MAGR9	<i>Mammillaria grahamii</i>	1–5	–
	Christmas cactus	CYLE8	<i>Cylindropuntia leptocaulis</i>	0–5	–
	common sotol	DAWH2	<i>Dasyllirion wheeleri</i>	0–5	–
	Arizona hedgehog cactus	ECCOA	<i>Echinocereus coccineus</i> var. <i>arizonicus</i>	0–5	–
	Engelmann's hedgehog cactus	ECEN	<i>Echinocereus engelmannii</i>	0–2	–
	pinkflower hedgehog cactus	ECFE	<i>Echinocereus fendleri</i>	0–2	–
	spiny star	ESVI2	<i>Escobaria vivipara</i>	0–1	–
11	increaser half-shrubs			10–100	

	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	1–30	–
	brittlebush	ENFA	<i>Encelia farinosa</i>	0–25	–
	button brittlebush	ENFR	<i>Encelia frutescens</i>	0–15	–
	turpentine bush	ERLA12	<i>Ericameria laricifolia</i>	0–15	–
	burroweed	ISTE2	<i>Isocoma tenuisecta</i>	0–15	–
	rayless goldenhead	ACSP	<i>Acamptopappus sphaerocephalus</i>	0–15	–
	narrowleaf goldenbush	ERLI6	<i>Ericameria linearifolia</i>	0–10	–
	threadleaf snakeweed	GUMI	<i>Gutierrezia microcephala</i>	0–5	–
	whitestem paperflower	PSCO2	<i>Psilostrophe cooperi</i>	0–5	–
	turpentinebroom	THMO	<i>Thamnosma montana</i>	0–5	–

Tree

12	desert trees			20–100	
	crucifixion thorn	CAHO3	<i>Canotia holacantha</i>	0–50	–
	redberry juniper	JUCO11	<i>Juniperus coahuilensis</i>	0–50	–
	oneseed juniper	JUMO	<i>Juniperus monosperma</i>	0–50	–
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	0–25	–
	blue paloverde	PAFL6	<i>Parkinsonia florida</i>	0–25	–
	yellow paloverde	PAMI5	<i>Parkinsonia microphylla</i>	0–25	–
	saguaro	CAGI10	<i>Carnegiea gigantea</i>	0–25	–
	netleaf hackberry	CELAR	<i>Celtis laevigata var. reticulata</i>	0–15	–

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 rock slides 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 and grassland wildlife species.

Hydrological functions

This site has very 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; wild onions, 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)	Globe ESS, Dan Robinett, Wilma Renken
Contact for lead author	USDA NRCS Globe Soil Survey Office
Date	07/01/2014
Approved by	Byron Lambeth
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- 1. Number and extent of rills:** A few natural rills are present and seem to follow fault lines or bedding planes of the volcanic parent material.

- 2. Presence of water flow patterns:** Water flow patterns occupy about 10% of the area. They are very short (2-5 ft.) in length and discontinuous where gravel/rock cover is high (>35%). They are terminated by cobble cover and / or terracettes of perennial grasses, shrubs and cacti. They are longer (10-15 ft.) where gravel/rock covers are low (< 20%).

- 3. Number and height of erosional pedestals or terracettes:** Erosional pedestals are very uncommon. High cover values of gravel, cobble and stones result in surface stability. Terracettes are common, cover less than 10% of the area and usually are formed by a combination of cobbles, perennial grasses, cacti and shrubs. They are from 10 to 30 feet apart and have elevation differences of 2 to 4 inches.

- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 1 to 15% (from cover estimates in 10, 9.6 sq.ft. frames). Bare, non-vegetated, areas are large, not connected.

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

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

- 7. Amount of litter movement (describe size and distance expected to travel):** All litter is staying in place, except in

water flow patterns where herbaceous litter moves a few feet.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface has high organic content both under plant canopies and in pockets of bare soil surrounded by cobbles (slake values 4-6).
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is granular to sub-angular blocky. The A horizon is 1-3 inches thick and is very dark colored (10YR 3/2).
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Cover of perennial grasses range from 20-30%, cover of shrubs and cacti range from 10-25%. Basal cover of perennial plants ranges from 3-6%. Covers of gravels, cobbles and stones range from 40 to 85%. The cover of all plant species is well-distributed across the area.
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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.
-

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: Perennial grasses >= shrubs

Sub-dominant: annual forbs and grasses > succulents > perennial forbs

Other:

Additional: in "El Nino" years, annuals exceed all other groups

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Less than 1% of shrubs and perennial mid-grasses show signs of mortality. Curly mesquite and slender grama on warm exposures can lose up to 75% of their basal cover during several years of drought.
-

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):** From ecological site description annual production is; 700 lbs/ac(drought), 1000 lbs/ac(average year), 2000 lbs/ac (wet year).
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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: whitethorn acacia, mesquite, one-seed juniper, snakeweed, prickly pear, red brome, cheatgrass, wild oats, canotia

17. **Perennial plant reproductive capability:** Not impaired in any way for shrubs and mid-grasses. Short grasses growing on warm exposures will not produce seed during several years of severe drought.
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