USDA Natural Resources Conservation Service

Ecological site R041XA117AZ
Shallow Upland 16-20" p.z.

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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.

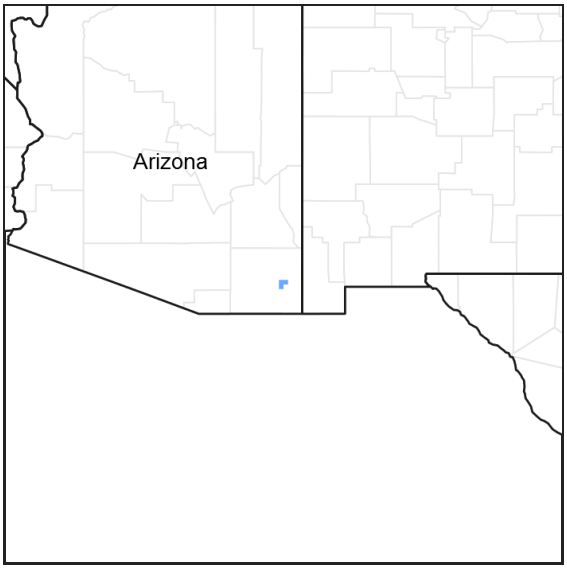


Figure 1. Mapped extent

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): 041X–Madrean Archipelago

AZ 41.1 – Mexican Oak-Pine Forest and Oak Savannah

Elevations range from 4500 to 10,700 feet and precipitation ranges from 16 to 30 inches. Vegetation includes Emory oak, Mexican blue oak, Arizona white oak, one-seed juniper, alligator juniper, sacahuista, California bricklebush, skunkbush sumac, Arizona rosewood, wait-a-bit mimosa, sideoats grama, blue grama, purple grama, wooly bunchgrass, plains lovegrass, squirreltail, and pinyon ricegrass. The soil temperature regime ranges from thermic to mesic and the soil moisture regime ranges from aridic ustic to typic ustic. This unit occurs within the Basin and Range Physiographic Province and is characterized by numerous mountain ranges that rise abruptly from broad, plain-like valleys and basins. Igneous and metamorphic rock classes dominate the mountain ranges and sediments filling the basins represent combinations of fluvial, lacustrine, colluvial and alluvial deposits.

Associated sites

F041XA112AZ	**Sandy Wash 16-20" p.z. woodland**
F041XA113AZ	**Sandy Bottom 16-20" p.z. woodland**
R041XA102AZ	**Shallow Hills 16-20" p.z.**

R041XA108AZ	**Loamy Upland 16-20" p.z.**

Similar sites

R041XC322AZ	**Shallow Upland 12-16" p.z.**

Table 1. Dominant plant species

Tree	(1) *quercus emoryi*
Shrub	(1) *calliandra eriophylla* (2) *fouquieria splendens*
Herbaceous	(1) *bouteloua chondrosioides* (2) *bouteloua hirsuta*

Physiographic features

This site occurs in the middle elevations of the Madrean Basin and Range province in southeastern Arizona, southwestern New Mexico and Chihuahua and Sonora, Mexico. It occurs on gently sloping to moderately steep pediments which flank mountain areas. Numerous small areas of rock outcrop occur throughout areas of this site.

Table 2. Representative physiographic features

Landforms	(1) Mountain valley (2) Pediment
Flooding frequency	None
Ponding frequency	None
Elevation	4,500–5,500 ft
Slope	1–15%
Aspect	N, E, S

Climatic features

Precipitation in this zone of the common resource area ranges from 16-20 inches per year with elevations from 4700-5500 feet. Approximately 40% of this moisture comes as gentle rain or snow during the winter-spring (Oct-Apr) season; originates in the north Pacific and Gulf of California and comes as frontal storms with long duration and low intensity. The remaining 60% falls in the summer season (May-Sep.); originates in the Gulf of Mexico and are convective, usually brief, intense thunderstorms. Snow is common Dec.-March, averaging 5-15 inches per year, but rarely lasts more than a week. May and June are the driest months. Humidity is low.

Temperatures are mild. Freezing temperatures are common at night from Oct-May, but daytime temperatures are almost always over 40 F. Below 0 F temperatures can occur Dec-Feb. Daytime summer highs rarely exceed 95 F.

Species like plains lovegrass, false mesquite, shrubby buckwheat and spreading ratany begin growth in late March to April. Warm season grasses begin growth in July or August with receipt of the first summer rains.

Table 3. Representative climatic features

Frost-free period (average)	200 days
Freeze-free period (average)	
Precipitation total (average)	20 in

Influencing water features

There are no water features associated with this site.

Soil features

These soils have developed in place on various types of acid igneous, metamorphic and sedimentary parent materials like granite, rhyolite, gneiss, sandstone and schist. They are shallow and non-calcareous. In very old parent materials (pre-cambrian) the underlying bedrock is fractured and deeply (40-60 inches) weathered. Soil surfaces are well covered by gravels and small stones. Plant-soil moisture relationships are fair. Soils mapped in these areas include Turquoise and Nugget. In younger parent materials the bedrock is only slightly weathered (4-10 inches).

Soils mapped in these areas include: SSA-671 Cochise county Douglas-Tombstone part MU 103 Magoffin.

Table 4. Representative soil features

Parent material	(1) Slope alluvium–dacite
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 moderately slow
Soil depth	10–20 in
Surface fragment cover <=3"	15–55%
Surface fragment cover >3"	3–10%
Available water capacity (0-40in)	0.7–2.4 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	6.1–7.8
Subsurface fragment volume <=3" (Depth not specified)	10–45%
Subsurface fragment volume >3" (Depth not specified)	3–10%

Ecological dynamics

The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The Historical Climax Plant Community represents the natural potential plant communities found on relict or relatively undisturbed sites. Other plant communities described here represent plant communities that are known to occur when the site is disturbed by factors such as fire, grazing, or drought.

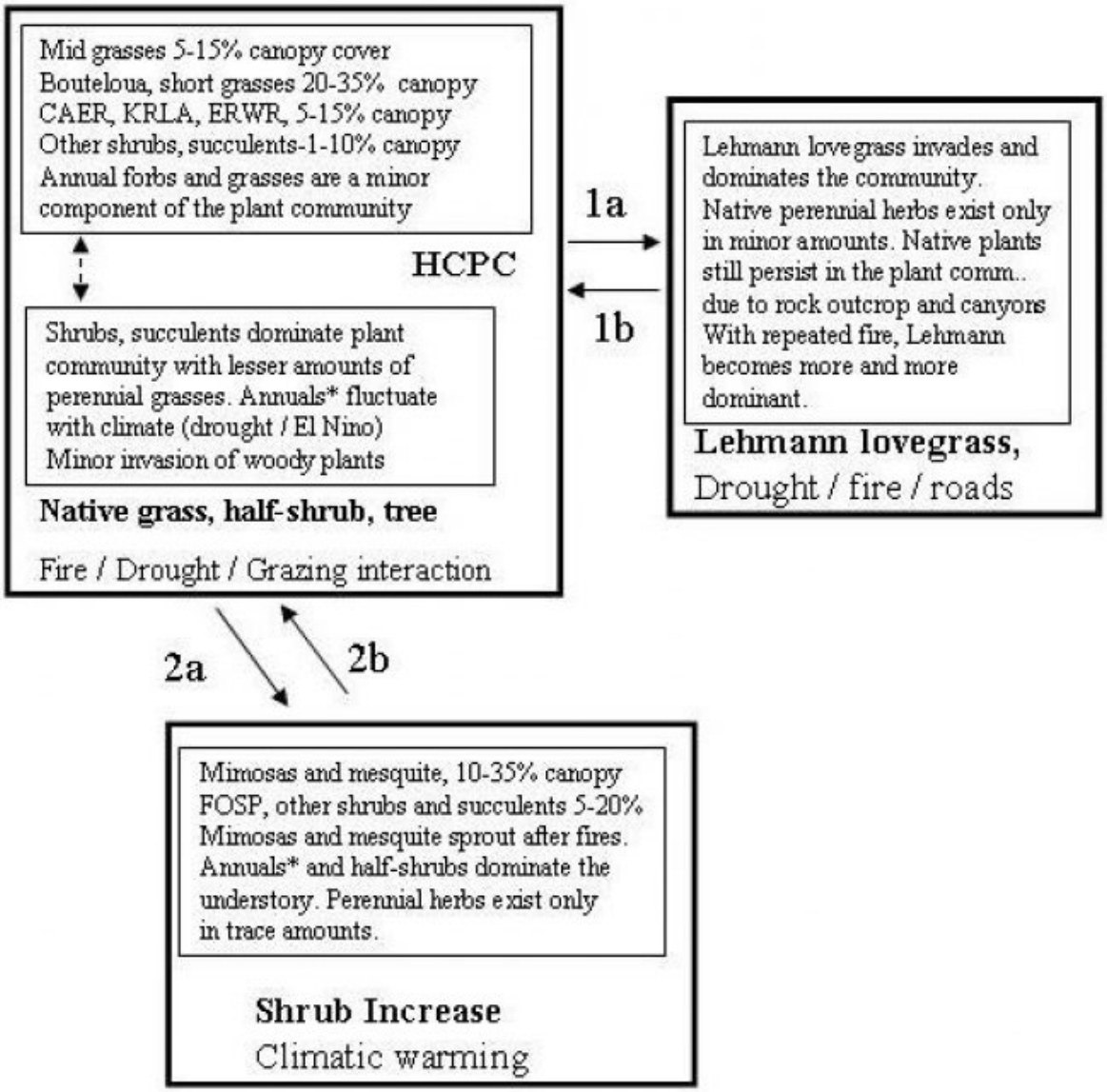
Production data provided in this site description is standardized to air dry weight at the end of the summer growing season. The plant communities described in this site description are based on near normal rainfall years.

NRCS uses a Similarity Index to compare existing plant communities to the plant communities described here. Similarity index is determined by comparing the production and composition of a plant community to the production

of a plant community described in this site description. To determine Similarity Index, compare the production (air dry weight) of each species to that shown in the plant community description. For each species, count no more than the maximum amount shown for the species, and for each group, count no more than the maximum amount shown for the group. Divide the resulting total by the total normal year production shown in the plant community description. If rainfall has been significantly above or below normal, use the total production shown for above or below normal years. If field data is not collected at the end of the summer growing season, then the field data must be corrected to the end of the year production before comparing it to the site description. The growth curve can be used as a guide for estimating production at the end of the summer growing season.

State and transition model

MLRA 41-1 (16-20"), Granitic Upland



1a. CHG, introduction of a seed source of Lehmann lovegrass usually from roads or jeep trails through areas of the site.
1b. Unknown. Possible herbicide treatment of exotics species and seeding of native grasses.
2a. CHG with drought, climatic warming. Increase by mimosas and / or mesquite. Other shrubs and succulents can increase also. Shrubs quickly re-sprout after fire. Remnant perennial grasses cannot re-colonize areas with shrub competition.
2b. Unknown, PG/NG with herbicide shrub control. Possible seeding of native grasses, maintenance treatments for shrubs (fire, herbicide).

CHG – continuous heavy grazing
PG/NG – proper grazing, no grazing
CAER – false mesquite, ERWR– shrub buckwheat
KRLA – spreading ratany, FOSP - ocotillo
Bouteloua – black, slender, Santa Rita, sprucetop, purple and hairy gramas

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

Figure 4. State and Transition, Granitic Upland 16-20" p.z.

State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

This site includes plant communities that naturally occupy the site following fire, drought, flooding, herbivores, and other natural disturbances. The historic climax plant community represents the natural climax community that eventually reoccupies the site with proper management. The potential plant community on this site is dominated by warm season perennial grasses and several species of low shrubs. Perennial forbs and annuals are of minor importance on this site. Emory oak and Mexican blue oak trees can occur up to 5% canopy on the site. The aspect is savannah to grassland. All of the major perennial grasses and shrubs on the site are well dispersed throughout the plant community. Drought and or fire can open up the grass community for a few years, but the major species of perennial grasses will quickly recover. The dominant half shrubs on the site are vigorous sprouters after fire. Shrubby buckwheat and plains lovegrass can diminish in severe drought. Species like mimosa, ocotillo, mesquite and manzanita can increase to dominate the site. Lehmann lovegrass can invade and increase to dominate the plant community.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	376	650	925
Shrub/Vine	57	100	175
Tree	0	10	100
Forb	5	15	40
Total	**438**	**775**	**1240**

Table 6. Soil surface cover

Tree basal cover	0-1%
Shrub/vine/liana basal cover	1-3%
Grass/grasslike basal cover	4-12%
Forb basal cover	0-1%
Non-vascular plants	0-1%
Biological crusts	0-1%
Litter	20-70%
Surface fragments >0.25" and <=3"	25-65%
Surface fragments >3"	0-10%
Bedrock	1-10%
Water	0%
Bare ground	5-40%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	1-5%	5-10%	0-2%
>0.5 <= 1	–	5-10%	10-20%	0-5%
>1 <= 2	–	1-5%	10-15%	0-2%
>2 <= 4.5	–	0-5%	1-10%	0-1%
>4.5 <= 13	0-2%	0-2%	–	–
>13 <= 40	0-5%	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Figure 6. Plant community growth curve (percent production by month). AZ4111, 41.1 16-30. Growth begins in the spring, semi-dormancy occurs during the June drought, most growth occurs during the summer rainy season..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	10	0	15	45	20	5	0	0

State 2
Lehmann lovegrass invaded

Community 2.1
Lehmann lovegrass invaded

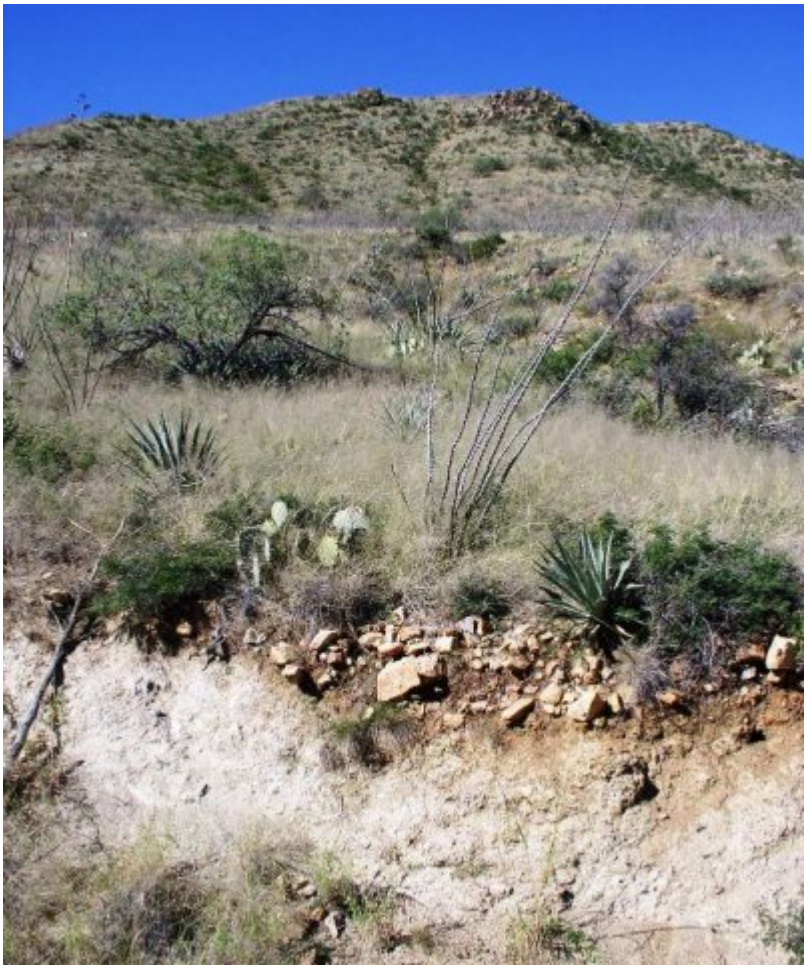


Figure 7. Granitic Upland 16-20" pz. Lehmann lovegrass

This state occurs where Lehmann lovegrass has invaded from existing stands along roads, trails and rights of ways through areas of the site. As Lehmann lovegrass increases in dominance the amounts of native grasses and herbs diminish both in diversity and density. The dominant half shrubs seem to be able to persist in the plant community with Lehmann lovegrass. Above ground biomass production is higher on sites dominated by Lehmann lovegrass. As fires and droughts cause openings in the plant community, Lehmann lovegrass quickly assumes dominance.

State 3
Shrub increased

Community 3.1
Shrub increased

Figure 8. Granitic Upland 16-20" pz. Shrubby

In the absence of fires for long periods of time shrubs like mesquite, mimosa, ocotillo, manzanita and succulents like prickly pear and agave can increase to dominate the plant community. Climatic warming may be driving the increase in wait-a-bit and velvet-pod mimosas. Mature shrubs are fire tolerant and sprout back vigorously after being top killed. As canopy levels approach 25% the site can no longer support much in the herbaceous layer; further limiting the effect and incidence of fire on the plant community.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant Perennial Short Grasses**			300–600	
	black grama	BOER4	*Bouteloua eriopoda*	65–150	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	50–150	–
	purple grama	BORA	*Bouteloua radicosa*	10–100	–
	blue grama	BOGR2	*Bouteloua gracilis*	50–100	–
	sprucetop grama	BOCH	*Bouteloua chondrosioides*	50–100	–
	Santa Rita Mountain grama	BOEL	*Bouteloua eludens*	20–100	–
	slender grama	BORE2	*Bouteloua repens*	5–50	–
	common wolfstail	LYPH	*Lycurus phleoides*	5–50	–
	Hall's panicgrass	PAHA	*Panicum hallii*	0–50	–
	Arizona muhly	MUAR3	*Muhlenbergia arizonica*	0–30	–
2	**Dominant Perennial Mid Grasses**			70–250	
	sideoats grama	BOCU	*Bouteloua curtipendula*	50–100	–

	plains lovegrass	ERIN	*Eragrostis intermedia*	10–100	–
	tanglehead	HECO10	*Heteropogon contortus*	0–50	–
	green sprangletop	LEDU	*Leptochloa dubia*	0–50	–
	spiked crinkleawn	TRSP12	*Trachypogon spicatus*	10–50	–
	Texas bluestem	SCCI2	*Schizachyrium cirratum*	0–25	–
	woolyspike balsamscale	ELBA	*Elionurus barbiculmis*	0–25	–
	Arizona cottontop	DICA8	*Digitaria californica*	0–20	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	0–20	–
3	**Miscellaneous Perennial Grasses**			0–20	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–10	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	0–10	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	0–5	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	0–5	–
	vine mesquite	PAOB	*Panicum obtusum*	0–5	–
	Rothrock's grama	BORO2	*Bouteloua rothrockii*	0–5	–
	sedge	CAREX	*Carex*	0–5	–
	squirreltail	ELEL5	*Elymus elymoides*	0–5	–
	nineawn pappusgrass	ENDE	*Enneapogon desvauxii*	0–2	–
	Kunth's smallgrass	MIKU	*Microchloa kunthii*	0–2	–
	slim tridens	TRMU	*Tridens muticus*	0–2	–
	slim tridens	TRMUE	*Tridens muticus var. elongatus*	0–2	–
4	**Perennial Threeawns**			5–35	
	Orcutt's threeawn	ARSCO	*Aristida schiedeana var. orcuttiana*	5–25	–
	spidergrass	ARTE3	*Aristida ternipes*	0–5	–
	spidergrass	ARTEG	*Aristida ternipes var. gentilis*	0–5	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	0–5	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	0–2	–
	Havard's threeawn	ARHA3	*Aristida havardii*	0–2	–
	Wooton's threeawn	ARPA9	*Aristida pansa*	0–2	–
	poverty threeawn	ARDI5	*Aristida divaricata*	0–1	–
5	**Annual Grasses**			1–20	
	sweet tanglehead	HEME	*Heteropogon melanocarpus*	0–10	–
	prairie threeawn	AROL	*Aristida oligantha*	1–5	–
	Arizona signalgrass	URAR	*Urochloa arizonica*	0–5	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	0–2	–
	littleseed muhly	MUMI	*Muhlenbergia microsperma*	0–2	–
	delicate muhly	MUFR	*Muhlenbergia fragilis*	0–2	–
	Mexican sprangletop	LEFUU	*Leptochloa fusca ssp. uninervia*	0–1	–
	mucronate sprangeltop	LEPAB	*Leptochloa panicea ssp. brachiata*	0–1	–
	needle grama	BOAR	*Bouteloua aristidoides*	0–1	–
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–1	–
	Parry's grama	BOPA2	*Bouteloua parryi*	0–1	–
	matted grama	BOSI2	*Bouteloua simplex*	0–1	–
	feather fingergrass	CHVI4	*Chloris virgata*	0–1	–

	tapertip cupgrass	ERACA	*Eriochloa acuminata var. acuminata*	0–1	–
	Mexican lovegrass	ERME	*Eragrostis mexicana*	0–1	–
	tufted lovegrass	ERPEP2	*Eragrostis pectinacea var. pectinacea*	0–1	–
	pitscale grass	HAGR3	*Hackelochloa granularis*	0–1	–
	sixweeks threeawn	ARAD	*Aristida adscensionis*	0–1	–
	witchgrass	PACA6	*Panicum capillare*	0–1	–
	Mexican panicgrass	PAHI5	*Panicum hirticaule*	0–1	–
	poverty dropseed	SPVA	*Sporobolus vaginiflorus*	0–1	–
	prairie false oat	TRIN5	*Trisetum interruptum*	0–1	–
	Eastwood fescue	VUMIC	*Vulpia microstachys var. ciliata*	0–1	–
	desert fescue	VUMIM	*Vulpia microstachys var. microstachys*	0–1	–
Forb					
6	**Perennial Forbs**			5–20	
	lipfern	CHEIL	*Cheilanthes*	0–5	–
	trailing windmills	ALIN	*Allionia incarnata*	0–5	–
	weakleaf bur ragweed	AMCO3	*Ambrosia confertiflora*	0–5	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–5	–
	wild dwarf morning-glory	EVAR	*Evolvulus arizonicus*	0–5	–
	cliffbrake	PELLA	*Pellaea*	0–5	–
	Lewis flax	LILE3	*Linum lewisii*	0–2	–
	Arizona cudweed	PSAR12	*Pseudognaphalium arizonicum*	0–2	–
	Arizona spikemoss	SEAR2	*Selaginella arizonica*	0–2	–
	Thurber's cotton	GOTH	*Gossypium thurberi*	0–2	–
	Palmer's Indian mallow	ABPA	*Abutilon palmeri*	0–2	–
	Cooley's bundleflower	DECO2	*Desmanthus cooleyi*	0–2	–
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	0–2	–
	Rocky Mountain zinnia	ZIGR	*Zinnia grandiflora*	0–2	–
	hairy fournwort	TENE	*Tetramerium nervosum*	0–1	–
	longstalk greenthread	THLO	*Thelesperma longipes*	0–1	–
	branched noseburn	TRRA5	*Tragia ramosa*	0–1	–
	Fort Huachuca vervain	VEGR2	*Verbena gracilis*	0–1	–
	bluedicks	DICA14	*Dichelostemma capitatum*	0–1	–
	winged buckwheat	ERAL4	*Eriogonum alatum*	0–1	–
	spreading fleabane	ERDI4	*Erigeron divergens*	0–1	–
	rose heath	CHER2	*Chaetopappa ericoides*	0–1	–
	mala mujer	CNAN	*Cnidoscolus angustidens*	0–1	–
	whitemouth dayflower	COER	*Commelina erecta*	0–1	–
	palmleaf thoroughwort	COGR10	*Conoclinium greggii*	0–1	–
	leatherweed	CRPO5	*Croton pottsii*	0–1	–
	whiteflower prairie clover	DAAL	*Dalea albiflora*	0–1	–
	James' prairie clover	DAJA	*Dalea jamesii*	0–1	–
	dwarf desertpeony	ACNA2	*Acourtia nana*	0–1	–
	brownfoot	ACWR5	*Acourtia wrightii*	0–1	–
	San Feline dogweed	ADBO	*Adenophyllum porophylloides*	0–1	

	San Felipe dogweed	ADPO	*Adenophyllum porophylloides*	0–1	–
	Santa Rita mountain yellowshow	AMGO	*Amoreuxia gonzalezii*	0–1	–
	tarragon	ARDR4	*Artemisia dracunculus*	0–1	–
	New Mexico silverbush	ARNE2	*Argythamnia neomexicana*	0–1	–
	perennial rockcress	ARPE2	*Arabis perennans*	0–1	–
	Watson's dutchman's pipe	ARWA	*Aristolochia watsonii*	0–1	–
	chaparral asphead	ASHI3	*Aspicarpa hirtella*	0–1	–
	dense ayenia	AYMI	*Ayenia microphylla*	0–1	–
	hairyseed bahia	BAAB	*Bahia absinthifolia*	0–1	–
	desert marigold	BAMU	*Baileya multiradiata*	0–1	–
	scarlet spiderling	BOCO	*Boerhavia coccinea*	0–1	–
	climbing wartclub	BOSC	*Boerhavia scandens*	0–1	–
	Arizona wrightwort	CAAR7	*Carlowrightia arizonica*	0–1	–
	dwarf stickpea	CAHUR	*Calliandra humilis var. reticulata*	0–1	–
	wholeleaf Indian paintbrush	CAIN14	*Castilleja integra*	0–1	–
	pepper	CAPSI	*Capsicum*	0–1	–
	Indian paintbrush	CASTI2	*Castilleja*	0–1	–
	lacy tansyaster	MAPI	*Machaeranthera pinnatifida*	0–1	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	0–1	–
	Mexican star	MIBI2	*Milla biflora*	0–1	–
	wishbone-bush	MILAV	*Mirabilis laevis var. villosa*	0–1	–
	desert tobacco	NIOB	*Nicotiana obtusifolia*	0–1	–
	Schott's yellowhood	NISC	*Nissolia schottii*	0–1	–
	tufted evening primrose	OECA10	*Oenothera caespitosa*	0–1	–
	Oak Creek ragwort	PAQU8	*Packera quercetorum*	0–1	–
	desert rosemallow	HICO	*Hibiscus coulteri*	0–1	–
	pinkthroat morning-glory	IPLO	*Ipomoea longifolia*	0–1	–
	slender janusia	JAGR	*Janusia gracilis*	0–1	–
	ragged nettlespurge	JAMA	*Jatropha macrorhiza*	0–1	–
	longflower tube tongue	JULO3	*Justicia longii*	0–1	–
	narrowleaf stoneseed	LIIN2	*Lithospermum incisum*	0–1	–
	shaggy dwarf morning-glory	EVNU	*Evolvulus nuttallianus*	0–1	–
	silver dwarf morning-glory	EVSE	*Evolvulus sericeus*	0–1	–
	Arizona snakecotton	FRAR2	*Froelichia arizonica*	0–1	–
	fringed twinevine	FUCYC	*Funastrum cynanchoides ssp. cynanchoides*	0–1	–
	southwestern mock vervain	GLGO	*Glandularia gooddingii*	0–1	–
	pearly globe amaranth	GONI	*Gomphrena nitida*	0–1	–
	twinleaf senna	SEBA3	*Senna bauhinioides*	0–1	–
	velvet leaf senna	SELI4	*Senna lindheimeriana*	0–1	–
	New Mexico fanpetals	SINE	*Sida neomexicana*	0–1	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	0–1	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	0–1	–

	gooseberryleaf globemallow	SPGR2	*Sphaeralcea grossulariifolia*	0–1	–
	slimflower scurfpea	PSTE5	*Psoralidium tenuiflorum*	0–1	–
	Texas snoutbean	RHSET	*Rhynchosia senna var. texana*	0–1	–
	slimleaf plainsmustard	SCLI12	*Schoenocrambe linearifolia*	0–1	–
	Wright's deervetch	LOWR	*Lotus wrightii*	0–1	–
	longstalk chinchweed	PELO	*Pectis longipes*	0–1	–
	Parry's beardtongue	PEPA24	*Penstemon parryi*	0–1	–
	orange fameflower	PHAU13	*Phemeranthus aurantiacus*	0–1	–
	velvetseed milkwort	POOB	*Polygala obscura*	0–1	–
	shrubby purslane	POSU3	*Portulaca suffrutescens*	0–1	–
7	**Annual Forbs**			0–20	
	sensitive partridge pea	CHNI2	*Chamaecrista nictitans*	0–5	–
	pitseed goosefoot	CHBE4	*Chenopodium berlandieri*	0–5	–
	longleaf false goldeneye	HELOA2	*Heliomeris longifolia var. annua*	0–5	–
	Arizona poppy	KAGR	*Kallstroemia grandiflora*	0–2	–
	crestrib morning-glory	IPCO2	*Ipomoea costellata*	0–2	–
	wedgeleaf draba	DRCU	*Draba cuneifolia*	0–2	–
	miniature woollystar	ERDI2	*Eriastrum diffusum*	0–2	–
	sorrel buckwheat	ERPO4	*Eriogonum polycladon*	0–2	–
	California poppy	ESCAM	*Eschscholzia californica ssp. mexicana*	0–2	–
	fewflower beggarticks	BILE	*Bidens leptocephala*	0–2	–
	Coulter's spiderling	BOCO2	*Boerhavia coulteri*	0–2	–
	New Mexico copperleaf	ACNE	*Acalypha neomexicana*	0–2	–
	carelessweed	AMPA	*Amaranthus palmeri*	0–2	–
	sawtooth sage	SASU7	*Salvia subincisa*	0–2	–
	spreading fanpetals	SIAB	*Sida abutifolia*	0–2	–
	intermediate pepperweed	LEVIM	*Lepidium virginicum var. medium*	0–2	–
	Arizona popcornflower	PLAR	*Plagiobothrys arizonicus*	0–2	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–2	–
	fringed redmaids	CACI2	*Calandrinia ciliata*	0–2	–
	yerba porosa	PORU6	*Porophyllum ruderale*	0–1	–
	shrubby purslane	POSU3	*Portulaca suffrutescens*	0–1	–
	desert unicorn-plant	PRAL4	*Proboscidea althaeifolia*	0–1	–
	doubleclaw	PRPA2	*Proboscidea parviflora*	0–1	–
	Wright's cudweed	PSCAC2	*Pseudognaphalium canescens ssp. canescens*	0–1	–
	Abert's creeping zinnia	SAAB	*Sanvitalia abertii*	0–1	–
	plains flax	LIPU4	*Linum puberulum*	0–1	–
	foothill deervetch	LOHU2	*Lotus humistratus*	0–1	–
	coastal bird's-foot trefoil	LOSAB	*Lotus salsuginosus var. brevivexillus*	0–1	–
	shortstem lupine	LUBR2	*Lupinus brevicaulis*	0–1	–
	bajada lupine	LUCOC	*Lupinus concinnus ssp. concinnus*	0–1	–
	slender goldenweed	MAGR10	*Machaeranthera gracilis*	0–1	–
	tansyleaf tansyaster	MATA2	*Machaeranthera tanacetifolia*	0–1	–

	tansyleaf tansyaster	MATA2	*Machaeranthera tanacetifolia*	0–1	
	sweet four o'clock	MILO2	*Mirabilis longiflora*	0–1	–
	green carpetweed	MOVE	*Mollugo verticillata*	0–1	–
	desert evening primrose	OEPR	*Oenothera primiveris*	0–1	–
	Arizona phacelia	PHAR13	*Phacelia arizonica*	0–1	–
	sleepy silene	SIAN2	*Silene antirrhina*	0–1	–
	sand fringepod	THCU	*Thysanocarpus curvipes*	0–1	–
	southwestern pricklypoppy	ARPL3	*Argemone pleiacantha*	0–1	–
	smallflowered milkvetch	ASNU4	*Astragalus nuttallianus*	0–1	–
	erect spiderling	BOER	*Boerhavia erecta*	0–1	–
	purple spiderling	BOPU	*Boerhavia purpurascens*	0–1	–
	New Mexico thistle	CINE	*Cirsium neomexicanum*	0–1	–
	scrambled eggs	COAU2	*Corydalis aurea*	0–1	–
	Chihuahuan prairie clover	DAEX2	*Dalea exigua*	0–1	–
	American wild carrot	DAPU3	*Daucus pusillus*	0–1	–
	sacred thorn-apple	DAWR2	*Datura wrightii*	0–1	–
	El Paso gilia	GIME	*Gilia mexicana*	0–1	–
	Dakota mock vervain	GLBIB	*Glandularia bipinnatifida var. bipinnatifida*	0–1	–
	Abert's buckwheat	ERAB2	*Eriogonum abertianum*	0–1	–
	sanddune wallflower	ERCA14	*Erysimum capitatum*	0–1	–
	hyssopleaf sandmat	CHHY3	*Chamaesyce hyssopifolia*	0–1	–
	redstar	IPCO3	*Ipomoea coccinea*	0–1	–
	ivyleaf morning-glory	IPHE	*Ipomoea hederacea*	0–1	–
	flaxflowered ipomopsis	IPLOL	*Ipomopsis longiflora ssp. longiflora*	0–1	–
	Thurber's morning-glory	IPTH	*Ipomoea thurberi*	0–1	–
	El Paso skyrocket	IPTH2	*Ipomopsis thurberi*	0–1	–
	warty caltrop	KAPA	*Kallstroemia parviflora*	0–1	–
	shaggyfruit pepperweed	LELA	*Lepidium lasiocarpum*	0–1	–
	camphorweed	HESU3	*Heterotheca subaxillaris*	0–1	–
Shrub/Vine					
8	**Dominant Half Shrubs**			50–100	
	fairyduster	CAER	*Calliandra eriophylla*	25–75	–
	Gregg's prairie clover	DAGR2	*Dalea greggii*	5–25	–
	bastardsage	ERWR	*Eriogonum wrightii*	5–25	–
	trailing krameria	KRLA	*Krameria lanceolata*	1–15	–
	Schott's stickpea	ZAFOS	*Zapoteca formosa var. schottii*	0–10	–
	yerba de pasmo	BAPT	*Baccharis pteronioides*	1–10	–
	prairie acacia	ACAN	*Acacia angustissima*	1–10	–
	Bigelow's false willow	BABI	*Baccharis bigelovii*	0–5	–
	shortleaf baccharis	BABR	*Baccharis brachyphylla*	0–5	–
	Sonoran indigo	INSP	*Indigofera sphaerocarpa*	0–5	–
	false boneset	BREU	*Brickellia eupatorioides*	0–5	–
	Bigelow's bristlehead	CABI6	*Carphochaete bigelovii*	0–5	–
	cliff goldenbush	ERCUS	*Ericameria cuneata var. spathulata*	0–5	–

	cliff goldenbush	ERCU3	*Ericameria cuneata var. spathulata*	0–2	
	turpentine bush	ERLA12	*Ericameria laricifolia*	0–2	–
	California brickellbush	BRCA3	*Brickellia californica*	0–2	–
9	**Miscellaneous Shrubs**			5–35	
	ocotillo	FOSP2	*Fouquieria splendens*	0–10	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	0–10	–
	Sonoran scrub oak	QUTU2	*Quercus turbinella*	0–10	–
	velvetpod mimosa	MIDY	*Mimosa dysocarpa*	0–5	–
	littleleaf sumac	RHMI3	*Rhus microphylla*	0–5	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–5	–
	algerita	MATR3	*Mahonia trifoliolata*	0–5	–
	coralbean	ERFL7	*Erythrina flabelliformis*	0–5	–
	pointleaf manzanita	ARPU5	*Arctostaphylos pungens*	0–5	–
	desert ceanothus	CEGR	*Ceanothus greggii*	0–5	–
	catclaw acacia	ACGR	*Acacia greggii*	0–2	–
	evergreen sumac	RHVIC	*Rhus virens var. choriophylla*	0–2	–
	toothleaf goldeneye	VIDE3	*Viguiera dentata*	0–2	–
	red barberry	MAHA4	*Mahonia haematocarpa*	0–2	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–2	–
	Arizona water-willow	JUCA9	*Justicia candicans*	0–1	–
	redberry buckthorn	RHCR	*Rhamnus crocea*	0–1	–
	threadleaf ragwort	SEFLF	*Senecio flaccidus var. flaccidus*	0–1	–
	yellow trumpetbush	TEST	*Tecoma stans*	0–1	–
	heartleaf goldeneye	VICO	*Viguiera cordifolia*	0–1	–
	milfoil wattle	ACMI	*Acacia millefolia*	0–1	–
	Wright's beebrush	ALWR	*Aloysia wrightii*	0–1	–
	Thurber's desert honeysuckle	ANTH2	*Anisacanthus thurberi*	0–1	–
	Warnock's snakewood	COWA	*Condalia warnockii*	0–1	–
	Kearney's snakewood	COWAK	*Condalia warnockii var. kearneyana*	0–1	–
	Florida hopbush	DOVI	*Dodonaea viscosa*	0–1	–
	longleaf jointfir	EPTR	*Ephedra trifurca*	0–1	–
	Tahitian kidneywood	EYOR	*Eysenhardtia orthocarpa*	0–1	–
	cliff fendlerbush	FERU	*Fendlera rupicola*	0–1	–
	desert olive	FOSH	*Forestiera shrevei*	0–1	–
	Wright's silktassel	GAWR3	*Garrya wrightii*	0–1	–
	pelotazo	ABIN	*Abutilon incanum*	0–1	–
10	**Succulents**			2–40	
	sacahuista	NOMI	*Nolina microcarpa*	1–15	–
	Palmer's century plant	AGPA3	*Agave palmeri*	1–10	–
	smallflower century plant	AGPA5	*Agave parviflora*	0–5	–
	Schott's century plant	AGSC3	*Agave schottii*	0–5	–
	common sotol	DAWH2	*Dasylirion wheeleri*	0–5	–
	banana yucca	YUBA	*Yucca baccata*	0–2	–
	Schott's yucca	YUSC	*Yucca xschottii*	0–2	–

	Schott's yucca	YUSC	*Yucca schottii*	0–2	
	dollarjoint pricklypear	OPCH	*Opuntia chlorotica*	0–1	–
	cactus apple	OPEN3	*Opuntia engelmannii*	0–1	–
	pinkflower hedgehog cactus	ECBO2	*Echinocereus bonkerae*	0–1	–
	pinkflower hedgehog cactus	ECFE	*Echinocereus fendleri*	0–1	–
	white fishhook cactus	ECIN2	*Echinomastus intertextus*	0–1	–
	rainbow cactus	ECPEP	*Echinocereus pectinatus var. pectinatus*	0–1	–
	spinystar	ESVI2	*Escobaria vivipara*	0–1	–
	candy barrelcactus	FEWI	*Ferocactus wislizeni*	0–1	–
	Graham's nipple cactus	MAGR9	*Mammillaria grahamii*	0–1	–
	little nipple cactus	MAHE2	*Mammillaria heyderi*	0–1	–
	walkingstick cactus	CYSP8	*Cylindropuntia spinosior*	0–1	–
	Parry's agave	AGPA4	*Agave parryi*	0–1	–
Tree					
11	**Trees**			0–100	
	Emory oak	QUEM	*Quercus emoryi*	0–50	–
	Mexican blue oak	QUOB	*Quercus oblongifolia*	0–50	–
	Arizona white oak	QUAR	*Quercus arizonica*	0–25	–
	alligator juniper	JUDE2	*Juniperus deppeana*	0–5	–
	oneseed juniper	JUMO	*Juniperus monosperma*	0–5	–
	Mexican pinyon	PICE	*Pinus cembroides*	0–5	–
	border pinyon	PIDI3	*Pinus discolor*	0–5	–
	velvet mesquite	PRVE	*Prosopis velutina*	0–2	–

Animal community

The site is useable for livestock grazing at any season of the year. Forage species are low in digestable protein in the winter months and phosphorous is lacking year-round except in the summer growing season. Water developments are very important to wildlife on the site. The site produces a diverse mixture of low shrubs and perennial grasses, with scattered trees. It is a poor producer of annual grasses and annual and perennial forbs. It is home to a variety of grassland wildlife species. Larger mammals like deer use the site mainly as a foraging area.

Hydrological functions

Shallow soil and bedrock outcrops with moderate slopes make this site a producer of runoff in large storm events.

Recreational uses

Hunting, hiking, horseback riding, bird-watching, camping, photography, rock-hounding, prospecting.

Wood products

Limited oak, juniper, mesquite fire wood for campfires. Manzanita and algerita for hobby woods.

Other products

Gold, silver, turquoise, decomposed granite.
Acorns for food. Medicinal herbs like yerba de pasmo and herbaceous sage.

Contributors

Dan Robinett
Larry D. Ellicott

Approval

Curtis Talbot, 4/09/2021

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	05/11/2025
Approved by	Curtis Talbot
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

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

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

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

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

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

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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):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**
