

Ecological site R041XB215AZ Sandy Loam Upland 8-12" 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.

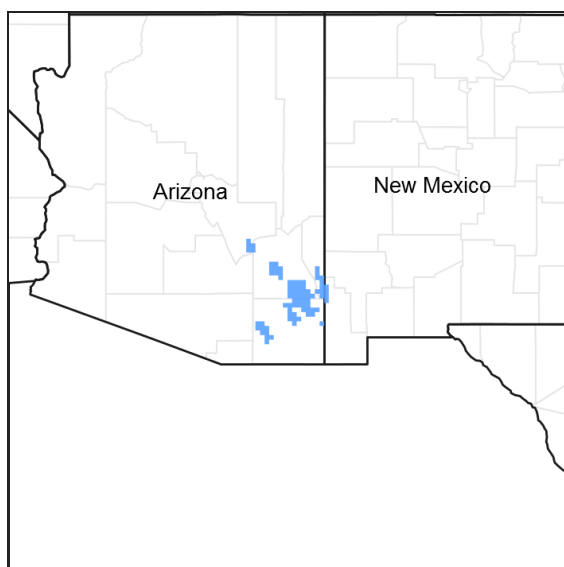


Figure 1. Mapped extent

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

Major Land Resource Area (MLRA) 41 represents the most northern extent of the Sierra Madre Occidental, or in English, the “mother mountains of the west.” The Sierra Madre Occidental is a massive, rugged mountain system that runs northwest from the Rio Grande de Santiago, in the state of Jalisco, Mexico, through the states of Sonora and Chihuahua, and ending in Arizona and New Mexico. Through Mexico, this mountain system runs parallel to the Pacific coast and, as it crosses into the United States and confronts the tectonic folding and rifting of the Basin and Range Physiographic Province, the land mass geographically breaks into smaller, isolated mountain ranges, called “sky islands.” The centralizing theme for this MLRA can be summed up as a series of inland islands extending from their mainland, the Sierra Madre Occidental, surrounded by a sea of desert grassland. To the west, the Madrean Archipelago bounds the Sonoran Basin and Range where several sky islands in southern Arizona grade into Sonoran Desert basins; to the north it bounds the contiguous mountains and geology of the Mogollon Transition area; and to the east, in New Mexico, it bounds the geology of the Rio Grande Rift. MLRA 41 is primarily a rangeland subdivision with small amounts of irrigated cropland. It encompasses approximately 13M acres.

LRU notes

Land Resource Unit 41-2, Chihuahuan-Sonoran Desert Shrubs. Elevations range from 2600 to 4000 feet and precipitation ranges from 8 to 12 inches per year. Vegetation includes mesquite, palo verde, catclaw acacia,

soaptree yucca, creosotebush, whitethorn, staghorn cholla, desert saltbush, Mormon tea, burroweed, snakeweed, tobosa, black grama, threeawns, bush muhly, dropseed, and burrograss. The soil temperature regime is thermic and the soil moisture regime is typic aridic.

Classification relationships

USDA-NRCS Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin: Western Range and Irrigated Region D; Major Land Resource Area 41, Southeastern Arizona Basin and Range; Land Resource Unit 41-3, Semi-Desert Grassland; Ecological Site Sandy Loam Upland, 8"-12" p.z.

U.S. Environmental Protection Agency, Ecological Regions of North America: Level I, Region 12, Southern Semi-Arid Highlands; Level II, 12.1 Western Sierra Madre Piedmont, Level III, Ecoregion 79 Madrean Archipelago, 79a, Apachian Valleys and Low Hills.

USDA-USFS Ecological Subregions: Sections of the Conterminous United States: Section 321 Basin and Range; Section 321A, Basin and Range Section.

Ecological site concept

Sandy Loam Upland, 8"-12" p.z., ecological site is found on gently sloping uplands with deep soils. An argillic horizon is below 4"-16" of sandy loam textured soils. While surface soils are non-calcareous (upper 10 inches), calcic horizons may be found below the argillic horizon.

Associated sites

R041XB210AZ	Loamy Upland 8-12" p.z.
R041XB205AZ	Shallow Hills 8-12" p.z.

Similar sites

R040XA118AZ	Sandy Loam Upland 10"-13" p.z.
R041XC319AZ	Sandy Loam Upland 12-16" p.z.

Table 1. Dominant plant species

Tree	(1) <i>Prosopis glandulosa</i> var. <i>torreyana</i>
Shrub	(1) <i>yucca elata</i> (2) <i>ephedra fasciculata</i>
Herbaceous	(1) <i>muhlenbergia porteri</i> (2) <i>bouteloua eriopoda</i>

Physiographic features

This site occurs in the lowest elevations of the Madrean Basin and Range province in southeastern Arizona. It occurs on fan terraces and gently sloping uplands.

Table 2. Representative physiographic features

Landforms	(1) Valley (2) Fan piedmont
Flooding frequency	None
Ponding frequency	None
Elevation	792–1,219 m
Slope	1–15%

Aspect	Aspect is not a significant factor
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Climatic features

Precipitation ranges from 8-12 inches annually. More than half falls during Jul-Sep in brief, but often heavy, thunderstorms. The rest of the moisture comes as light rain or snow that falls slowly for a day or more, but rarely lasts more than a day. May and June are normally the driest months. Humidity is generally very low.

Temperatures are mild throughout most of the year. Freezing temperatures are common at night Dec-Feb; brief 0 F may be observed some nights. During June, July & August, some days may exceed 100 F.

In years of average or greater winter precipitation, annual grasses and forbs occur abundantly in the interspaces.

Table 3. Representative climatic features

Frost-free period (characteristic range)	164-185 days
Freeze-free period (characteristic range)	191-226 days
Precipitation total (characteristic range)	279-305 mm
Frost-free period (actual range)	151-186 days
Freeze-free period (actual range)	172-228 days
Precipitation total (actual range)	254-330 mm
Frost-free period (average)	172 days
Freeze-free period (average)	203 days
Precipitation total (average)	279 mm

Climate stations used

- (1) FT THOMAS 2 SW [USC00023150], Pima, AZ
- (2) SAFFORD AGRICULTRL CTR [USC00027390], Safford, AZ
- (3) SAN SIMON [USC00027560], San Simon, AZ
- (4) BOWIE [USC00020958], San Simon, AZ

Influencing water features

There are no water features associated with this site.

Soil features

These soils are deep and loamy textured. They have thick (4-16 inch) surface horizons that are sandyloam in texture, over an argillic horizon. Surface soils (10 inches) are non-calcareous, but some soils have calcic horizons below the argillic horizon. Although several soil series are correlated in map unit components to this ecological site, Bucklebar soil series is most representative of Sandy Loam Upland, 8-12" p.z..

Table 4. Representative soil features

Surface texture	(1) Sandy loam (2) Very gravelly sandy loam (3) Gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately slow
Soil depth	152 cm

Surface fragment cover <=3"	5–40%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	16.51–20.83 cm
Calcium carbonate equivalent (0-101.6cm)	0–25%
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)	7–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–55%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

Sandy Loam Upland, 8"-12" pz, ecological site is a mixed shrubland with a perennial grass understory. Plant community variation occurs both along the precipitation gradient (from low end of the precipitation zone to the high) and with depth to argillic horizon. Perennial grass composition, basal cover, and distribution are affected. At the lower end of the precipitation gradient (and with thin surface horizon over argillic), bare areas increase in diameter and connectivity, tobosa grass dominates perennial grasses; while at the high end of the precipitation gradient (and with increased depth to argillic), bush muhly and black grama dominate and bare areas are less commonly connected. Several species of perennial grasses, sand dropseed and three-awns for example, come in and out of the plant community as weather patterns fluctuate between wet and dry cycles. Drought is the primary natural disturbance on this ecological site. As human-driven disturbances disrupt this site, 3 alternative states arise: State 2, Non-native Grass; State 3, Large Shrub-Annuals, and State 4, Large Shrub-Eroded.

State and transition model

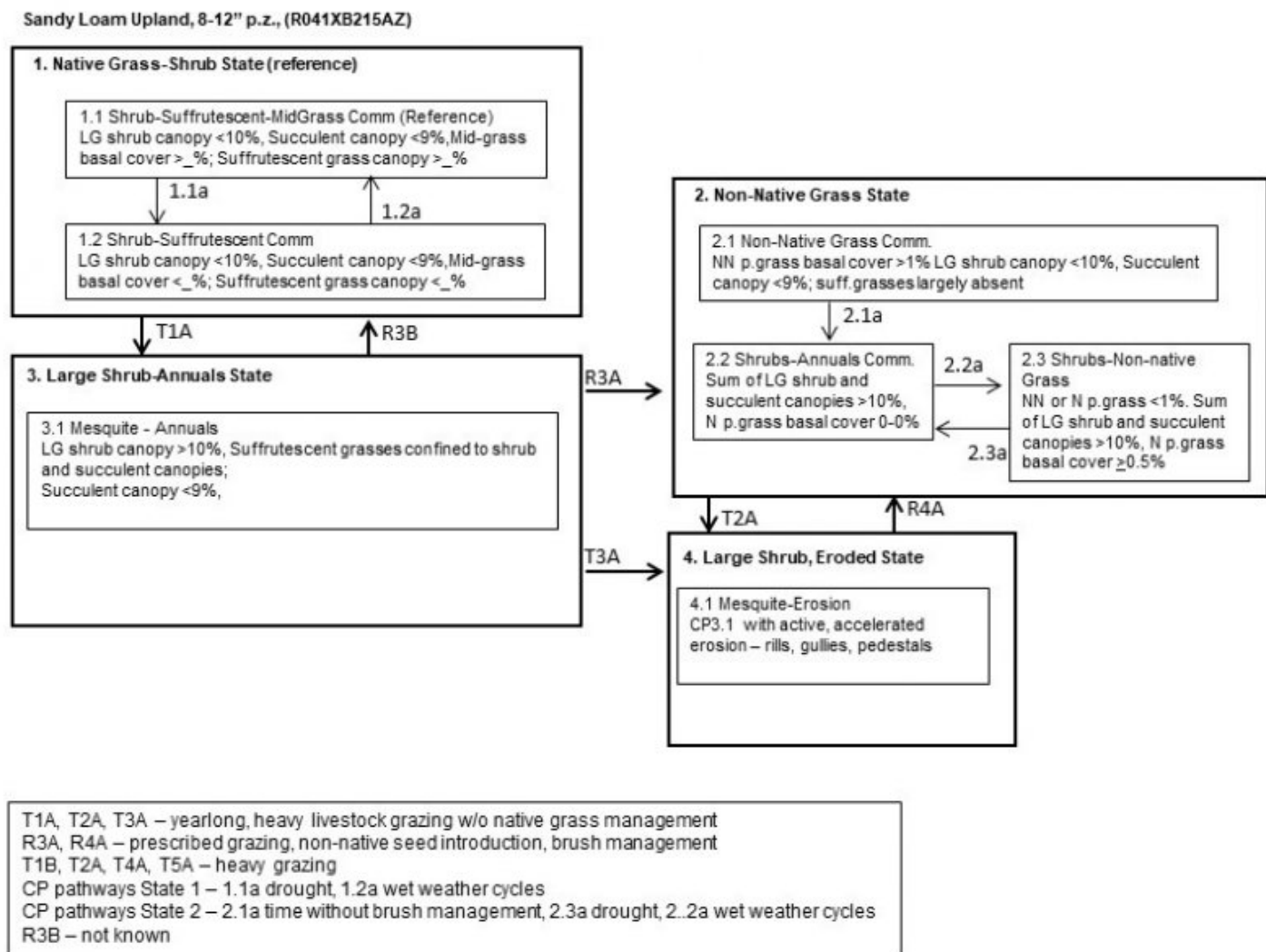


Figure 8. State and Transition Model, Sandy Loam Upland, 8"-12" p.z.

State 1 Native Grass-Shrub

Native Grass-Shrub State has two Community Phases that fluctuate with dry/wet weather cycling. The Reference Plant Community (CP1.1) is an open community of perennial grasses and desert shrubs and cacti. Annual forbs and grasses, of both the winter and summer wet seasons, are very important in the plant community in their respective (wet) seasons. Tobosa, black grama and bush muhly are the dominant perennial grasses, with lesser amounts of perennial mid-grasses such as threeawns and dropseeds. The cover of some shallow rooted grass species, like curly mesquite and Rothrock grama fluctuate widely from wet to dry years. Climate fluctuations, cycling of wet winters, favors shrub growth thus allowing the shrub dominance in CP1.1; extended drought will contract both perennial grass and shrub canopy covers, transitioning the community phase to CP1.2. Natural fire may occasionally occur in this LRU but is not thought to have recurred with a frequency to shape this plant community.

Community 1.1 Historic Climax Plant Community

The native potential plant community on this site is a mixture of perennial grasses and desert shrubs and cacti. Annual forbs and grasses, of both the winter and summer seasons, are very important in the plant community in their respective (wet) seasons. Black grama and bush muhly are the dominant perennial grasses, with lesser amounts of threeawns. The cover of shallow rooted grass species, like Rothrock grama fluctuate widely from wet to dry years. Lehmann lovegrass can invade and persist in this plant community, but will fluctuate (in amounts) with climate and not become dominant.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	168	308	734
Forb	8	45	191
Shrub/Vine	50	112	157
Tree	17	39	112
Total	243	504	1194

Table 6. Soil surface cover

Tree basal cover	1%
Shrub/vine/liana basal cover	1-2%
Grass/grasslike basal cover	1-2%
Forb basal cover	1-2%
Non-vascular plants	0%
Biological crusts	1-5%
Litter	15-65%
Surface fragments >0.25" and <=3"	5-35%
Surface fragments >3"	0-5%
Bedrock	0%
Water	0%
Bare ground	10-80%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	1-5%	1-15%	1-15%
>0.15 <= 0.3	–	5-10%	5-20%	1-10%
>0.3 <= 0.6	–	1-5%	5-10%	0-5%
>0.6 <= 1.4	–	1-5%	0-2%	0-1%
>1.4 <= 4	1-5%	0-2%	–	–
>4 <= 12	0-2%	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Community 1.2

Shrub-Suffrutescent Grass

State 2

Non-Native Grass

Non-Native Grass State, is a cyclic large shrub-annual forbs / large shrub-Lehmann lovegrass plant community. Community Phase 2.1 persists for about 10 years following brush management combined with range seeding. The restoration from State 3, prescribed grazing without brush management, will result in CP 2.2 with Lehmann lovegrass in the soil seedbank. The prevalence of Lehmann lovegrass within the soil seedbank no longer requires range seeding. Once a soil seedbank is established, LL will persist in the plant community while its basal cover varies widely with climate, elevation, depth of surface soil over argillic. Lehmann lovegrass only dominates the

entire plant community in CP 2.1, after brush management and seeding, but it will dominate the herbaceous layer of the plant community once established. Lehmann lovegrass production does not exceed 400# / ac during Non-Native lovegrass cycles.

Community 2.1

Non-Native Grass

This state occurs where Lehmann, and in some cases Boers, lovegrass has been seeded; usually in combination with mechanical mesquite control. The cover of Lehmann lovegrass varies widely with climate, ranging from 1-5% canopy in dry years up to 20-40% canopy in years with wet summers. Lehmann never dominates the plant community on this site but does dominate the herbaceous layer of the plant community once established.

Community 2.2

Shrubs-Annuals



Figure 10. Sandyloam Upland 8-12" pz.

This state occurs where mesquite has increased from 2 to 10% canopy and, with other shrubs, dominates the plant community. Native perennial grasses (suffrutescent) and forbs are absent from the plant community. Native and non-native annuals are very important in the plant community in their respective (wet) seasons.

Community 2.3

Shrubs-Non-Native Grass

State 3

Large Shrub-Annuals

Large Shrubs-Annuals, comes about after years of heavy grazing. Suffrutescent grasses are confined to tightly protected areas within shrub and cactus canopies leaving large bare areas as inter-shrub spaces.

Community 3.1

Mesquite, Lehmann lovegrass

This state occurs where Lehmann, and in some cases, Boer lovegrass has been seeded. This usually occurs in combination with mechanical control of mesquite. Lehmann lovegrass ranges from about 5% cover in dry years to 40% cover in wet summers. It never dominates the plant community but will dominate the herbaceous layer.

State 4

Large Shrub, Eroded

Large Shrubs, Eroded, has active, accelerated erosion. This state occurs where mesquite canopy is heavy (15-25%) and the interaction of drought and continuous grazing has resulted in severe sheet, rill and, in some cases, gully erosion on the site. These areas are usually near historic watering locations and are characterized by soil compaction due to trailing and heavy livestock traffic.

Community 4.1

Mesquite, annuals

This state occurs where mesquite and other shrubs dominate the plant community and native and non-native annuals dominate the herbaceous layer of the plant community. Native perennial grasses and forbs have been removed from the plant community. Repeated fires can develop this plant community.

State 5

Mesquite, erosion

Community 5.1

Mesquite, erosion

This state occurs where mesquite canopy ranges from 15-25% and severe sheet, rill and, in some cases, gully erosion has occurred. This state usually occurs near historic water locations and is characterized by soil compaction due to trailing and heavy livestock traffic.

Transition T1A

State 1 to 3

yearlong, heavy livestock grazing without native grass management

Transition T2A

State 2 to 4

yearlong, heavy livestock grazing

Restoration pathway R3B

State 3 to 1

None known

Restoration pathway R3A

State 3 to 2

prescribed grazing, non-native seed introduction, brush management

Transition T3A

State 3 to 4

yearlong, heavy livestock grazing without native grass management

Restoration pathway R4A

State 4 to 2

brush management, mechanical land treatment, seeding, prescribed grazing

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			112–336	
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	28–140	–

	black grama	BOER4	<i>Bouteloua eriopoda</i>	28–112	–
	Arizona cottontop	DICA8	<i>Digitaria californica</i>	1–56	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	1–28	–
2	Miscellaneous Perennial Grasses			17–84	
	whiplash pappusgrass	PAVA2	<i>Pappophorum vaginatum</i>	0–28	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	1–22	–
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	1–17	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	1–17	–
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	1–17	–
	mesa dropseed	SPFL2	<i>Sporobolus flexuosus</i>	0–11	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–11	–
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	1–11	–
	tanglehead	HECO10	<i>Heteropogon contortus</i>	0–11	–
	sand muhly	MUAR2	<i>Muhlenbergia arenicola</i>	0–11	–
	curly-mesquite	HIBE	<i>Hilaria belangeri</i>	0–6	–
	green sprangletop	LEDU	<i>Leptochloa dubia</i>	0–6	–
	tobosagrass	PLMU3	<i>Pleuraphis mutica</i>	0–6	–
	burrograss	SCBR2	<i>Scleropogon brevifolius</i>	0–6	–
	Hall's panicgrass	PAHA	<i>Panicum hallii</i>	0–6	–
	vine mesquite	PAOB	<i>Panicum obtusum</i>	0–6	–
	false Rhodes grass	TRCR9	<i>Trichloris crinita</i>	0–6	–
	Arizona muhly	MUAR3	<i>Muhlenbergia arizonica</i>	0–2	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0–2	–
	big sacaton	SPWR2	<i>Sporobolus wrightii</i>	0–1	–
3	Perennial threeawns			22–146	
	Santa Rita threeawn	ARCAG	<i>Aristida californica</i> var. <i>glabrata</i>	6–56	–
	spidergrass	ARTE3	<i>Aristida ternipes</i>	6–56	–
	spidergrass	ARTEG	<i>Aristida ternipes</i> var. <i>gentilis</i>	1–28	–
	Parish's threeawn	ARPUP5	<i>Aristida purpurea</i> var. <i>parishii</i>	0–28	–
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	1–28	–
	Fendler threeawn	ARPUL	<i>Aristida purpurea</i> var. <i>longiseta</i>	0–6	–
	blue threeawn	ARPUN	<i>Aristida purpurea</i> var. <i>nealleyi</i>	0–6	–
	poverty threeawn	ARDI5	<i>Aristida divaricata</i>	0–6	–
4	Annual grasses			17–168	
	prairie threeawn	AROL	<i>Aristida oligantha</i>	1–56	–
	needle grama	BOAR	<i>Bouteloua aristidoides</i>	6–56	–
	Rothrock's grama	BORO2	<i>Bouteloua rothrockii</i>	6–56	–
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	1–28	–
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	0–22	–
	Mexican panicgrass	PAHI5	<i>Panicum hirticaule</i>	1–22	–
	Arizona signalgrass	URAR	<i>Urochloa arizonica</i>	1–22	–
	sixweeks threeawn	ARAD	<i>Aristida adscensionis</i>	1–17	–
	feather fingergrass	CHVI4	<i>Chloris virgata</i>	0–17	–
	witchgrass	PACA6	<i>Panicum canillare</i>	0–11	–

	Bigelow's bluegrass	POBI	<i>Poa bigelovii</i>	0–6	–
	Arizona brome	BRAR4	<i>Bromus arizonicus</i>	0–6	–
	tapertip cupgrass	ERACA	<i>Eriochloa acuminata</i> var. <i>acuminata</i>	0–6	–
	desert lovegrass	ERPEM	<i>Eragrostis pectinacea</i> var. <i>miserrima</i>	0–6	–
	tufted lovegrass	ERPEP2	<i>Eragrostis pectinacea</i> var. <i>pectinacea</i>	0–6	–
	Mexican sprangletop	LEFUU	<i>Leptochloa fusca</i> ssp. <i>uninervia</i>	0–6	–
	mucronate sprangeltop	LEPAB	<i>Leptochloa panicea</i> ssp. <i>brachiata</i>	0–6	–
	delicate muhly	MUFR	<i>Muhlenbergia fragilis</i>	0–2	–
	littleseed muhly	MUMI	<i>Muhlenbergia microsperma</i>	0–2	–

Forb

5	Perennial forbs			2–22	
	dwarf desertpeony	ACNA2	<i>Acourtia nana</i>	1–6	–
	weakleaf bur ragweed	AMCO3	<i>Ambrosia confertiflora</i>	1–6	–
	desert marigold	BAMU	<i>Baileya multiradiata</i>	1–6	–
	slender poreleaf	POGR5	<i>Porophyllum gracile</i>	0–6	–
	desert globemallow	SPAM2	<i>Sphaeralcea ambigua</i>	1–6	–
	bluedicks	DICA14	<i>Dichelostemma capitatum</i>	0–2	–
	slender janusia	JAGR	<i>Janusia gracilis</i>	0–2	–
	ragged nettlespurge	JAMA	<i>Jatropha macrorhiza</i>	0–1	–
	Parry's false prairie-clover	MAPA7	<i>Marina parryi</i>	0–1	–
	lacy tansyaster	MAPIP4	<i>Machaeranthera pinnatifida</i> ssp. <i>pinnatifida</i> var. <i>pinnatifida</i>	0–1	–
	plains blackfoot	MELE2	<i>Melampodium leucanthum</i>	0–1	–
	wishbone-bush	MILAV	<i>Mirabilis laevis</i> var. <i>villosa</i>	0–1	–
	desert tobacco	NIOB	<i>Nicotiana obtusifolia</i>	0–1	–
	spreading fleabane	ERDI4	<i>Erigeron divergens</i>	0–1	–
	desert trumpet	ERIN4	<i>Eriogonum inflatum</i>	0–1	–
	southwestern mock vervain	GLGO	<i>Glandularia gooddingii</i>	0–1	–
	brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	0–1	–
	pricklyleaf dogweed	THAC	<i>Thymophylla acerosa</i>	0–1	–
	Rocky Mountain zinnia	ZIGR	<i>Zinnia grandiflora</i>	0–1	–
	canaigre dock	RUHY	<i>Rumex hymenosepalus</i>	0–1	–
	twinleaf senna	SEBA3	<i>Senna bauhinioides</i>	0–1	–
	Coues' cassia	SECO10	<i>Senna covesii</i>	0–1	–
	silverleaf nightshade	SOEL	<i>Solanum elaeagnifolium</i>	0–1	–
	scarlet spiderling	BOCO	<i>Boerhavia coccinea</i>	0–1	–
	desert mariposa lily	CAKE	<i>Calochortus kennedyi</i>	0–1	–
	sego lily	CANU3	<i>Calochortus nuttallii</i>	0–1	–
	whitemargin sandmat	CHAL11	<i>Chamaesyce albomarginata</i>	0–1	–
	leatherweed	CRPO5	<i>Croton pottsii</i>	0–1	–
	fingerleaf gourd	CUDI	<i>Cucurbita digitata</i>	0–1	–
	coyote gourd	CUPA	<i>Cucurbita palmata</i>	0–1	–

	tuber anemone	ANIU	<i>Anemone tuberosa</i>	0-1	-
	narrowleaf silverbush	ARLA12	<i>Argythamnia lanceolata</i>	0-1	-
	New Mexico silverbush	ARNE2	<i>Argythamnia neomexicana</i>	0-1	-
	perennial rockcress	ARPE2	<i>Arabis perennans</i>	0-1	-
	dense ayenia	AYMI	<i>Ayenia microphylla</i>	0-1	-
	hairyseed bahia	BAAB	<i>Bahia absinthifolia</i>	0-1	-
	brownfoot	ACWR5	<i>Acourtia wrightii</i>	0-1	-
	poreleaf dogweed	ADPO2	<i>Adenophyllum porophyllum</i>	0-1	-
	trailing windmills	ALIN	<i>Allionia incarnata</i>	0-1	-
	largeflower onion	ALMA4	<i>Allium macropetalum</i>	0-1	-
6	Annual forbs			6-168	
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	0-28	-
	California poppy	ESCAM	<i>Eschscholzia californica</i> ssp. <i>mexicana</i>	0-28	-
	Coulter's lupine	LUSP2	<i>Lupinus sparsiflorus</i>	0-28	-
	Arizona popcornflower	PLAR	<i>Plagiobothrys arizonicus</i>	0-22	-
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	0-22	-
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	0-22	-
	Arizona poppy	KAGR	<i>Kallstroemia grandiflora</i>	0-22	-
	combseed	PECTO	<i>Pectocarya</i>	0-22	-
	shaggyfruit pepperweed	LELA	<i>Lepidium lasiocarpum</i>	0-17	-
	intermediate pepperweed	LEVIM	<i>Lepidium virginicum</i> var. <i>medium</i>	0-17	-
	tanseyleaf tansyaster	MATA2	<i>Machaeranthera tanacetifolia</i>	0-17	-
	wheelscale saltbush	ATEL	<i>Atriplex elegans</i>	0-17	-
	bristly fiddleneck	AMTE3	<i>Amsinckia tessellata</i>	0-17	-
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	0-11	-
	Esteve's pincushion	CHST	<i>Chaenactis stevioides</i>	0-11	-
	whitestem blazingstar	MEAL6	<i>Mentzelia albicaulis</i>	0-11	-
	miniature woollystar	ERDI2	<i>Eriastrum diffusum</i>	0-11	-
	sorrel buckwheat	ERPO4	<i>Eriogonum polycladon</i>	0-11	-
	manybristle chinchweed	PEPA2	<i>Pectis papposa</i>	0-11	-
	New Mexico plumeseed	RANE	<i>Rafinesquia neomexicana</i>	0-6	-
	thelypod	THELY	<i>Thelypodium</i>	0-6	-
	Texas stork's bill	ERTE13	<i>Erodium texanum</i>	0-6	-
	wedgeleaf draba	DRCU	<i>Draba cuneifolia</i>	0-6	-
	flatcrown buckwheat	ERDE6	<i>Eriogonum deflexum</i>	0-6	-
	redstar	IPCO3	<i>Ipomoea coccinea</i>	0-6	-
	ivyleaf morning-glory	IPHE	<i>Ipomoea hederacea</i>	0-6	-
	Nuttall's povertyweed	MONU	<i>Monolepis nuttalliana</i>	0-6	-
	foothill deervetch	LOHU2	<i>Lotus humistratus</i>	0-6	-
	coastal bird's-foot trefoil	LOSAB	<i>Lotus salsuginosus</i> var. <i>brevivexillus</i>	0-6	-
	slender goldenweed	MAGR10	<i>Machaeranthera gracilis</i>	0-6	-
	craynthe	CRVBT	<i>Craynthe</i>	0-6	-

	Cryptantha	CRTP1	Cryptantha	0-0	-
	milkvetch	ASTRA	<i>Astragalus</i>	0-6	-
	Gordon's bladderpod	LEGO	<i>Lesquerella gordonii</i>	0-6	-
	hairy prairie clover	DAMO	<i>Dalea mollis</i>	0-2	-
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	0-2	-
	fringed redmaids	CACI2	<i>Calandrinia ciliata</i>	0-2	-
	white tackstem	CAWR	<i>Calycoseris wrightii</i>	0-2	-
	brittle spineflower	CHBR	<i>Chorizanthe brevicornu</i>	0-2	-
	hyssopleaf sandmat	CHHY3	<i>Chamaesyce hyssopifolia</i>	0-2	-
	desert evening primrose	OEPR	<i>Oenothera primiveris</i>	0-2	-
	Florida pellitory	PAFL3	<i>Parietaria floridana</i>	0-2	-
	Arizona lupine	LUAR4	<i>Lupinus arizonicus</i>	0-2	-
	green carpetweed	MOVE	<i>Mollugo verticillata</i>	0-2	-
	warty caltrop	KAPA	<i>Kallstroemia parviflora</i>	0-2	-
	hairy desertsunflower	GECA2	<i>Geraea canescens</i>	0-2	-
	star gilia	GIST	<i>Gilia stellata</i>	0-2	-
	woolly tidestromia	TILA2	<i>Tidestromia lanuginosa</i>	0-2	-
	woollyhead neststraw	STMI2	<i>Stylocline micropoides</i>	0-2	-
	phacelia	PHACE	<i>Phacelia</i>	0-2	-
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	0-2	-
	Coulter's globemallow	SPCO2	<i>Sphaeralcea coulteri</i>	0-1	-
	chia	SACO6	<i>Salvia columbariae</i>	0-1	-
	sawtooth sage	SASU7	<i>Salvia subincisa</i>	0-1	-
	spreading fanpetals	SIAB	<i>Sida abutifolia</i>	0-1	-
	sand fringe pod	THCU	<i>Thysanocarpus curvipes</i>	0-1	-
	southwestern mock vervain	GLGO	<i>Glandularia gooddingii</i>	0-1	-
	crestrub morning-glory	IPCO2	<i>Ipomoea costellata</i>	0-1	-
	common woolly sunflower	ERLA6	<i>Eriophyllum lanatum</i>	0-1	-
	Mexican fireplant	EUHE4	<i>Euphorbia heterophylla</i>	0-1	-
	bristly nama	NAHI	<i>Nama hispidum</i>	0-1	-
	glandular threadplant	NEGL	<i>Nemacladus glanduliferus</i>	0-1	-
	desert unicorn-plant	PRAL4	<i>Proboscidea althaeifolia</i>	0-1	-
	doubleclaw	PRPA2	<i>Proboscidea parviflora</i>	0-1	-
	exserted Indian paintbrush	CAEXE	<i>Castilleja exserta</i> ssp. <i>exserta</i>	0-1	-
	yellow tackstem	CAPA7	<i>Calycoseris parryi</i>	0-1	-
	scrambled eggs	COAU2	<i>Corydalis aurea</i>	0-1	-
	hoary bowlesia	BOIN3	<i>Bowlesia incana</i>	0-1	-
	southwestern pricklypoppy	ARPL3	<i>Argemone pleiacantha</i>	0-1	-
	annual agoseris	AGHE2	<i>Agoseris heterophylla</i>	0-1	-
Shrub/Vine					
7	Dominant shrubs			8-56	

	catclaw acacia	ACGR	<i>Acacia greggii</i>	6–17	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	1–17	–
	whitethorn acacia	ACCO2	<i>Acacia constricta</i>	0–11	–
	creosote bush	LATR2	<i>Larrea tridentata</i>	0–11	–
	littleleaf sumac	RHMI3	<i>Rhus microphylla</i>	0–11	–
	whitethorn acacia	ACCOP9	<i>Acacia constricta</i> var. <i>paucispina</i>	0–6	–
	longleaf jointfir	EPTR	<i>Ephedra trifurca</i>	0–6	–
8	Miscellaneous shrubs			0–11	
	Wright's beebrush	ALWR	<i>Aloysia wrightii</i>	0–1	–
	crucifixion thorn	CAHO3	<i>Canotia holacantha</i>	0–1	–
	spiny hackberry	CEEH	<i>Celtis ehrenbergiana</i>	0–1	–
	American tarwort	FLCE	<i>Flourensia cernua</i>	0–1	–
	ocotillo	FOSP2	<i>Fouquieria splendens</i>	0–1	–
	water jacket	LYAN	<i>Lycium andersonii</i>	0–1	–
	Berlandier's wolfberry	LYBE	<i>Lycium berlandieri</i>	0–1	–
	pale desert-thorn	LYPA	<i>Lycium pallidum</i>	0–1	–
	catclaw mimosa	MIACB	<i>Mimosa aculeaticarpa</i> var. <i>biuncifera</i>	0–1	–
	Gray's feverfew	PACO11	<i>Parthenium confertum</i>	0–1	–
	lotebush	ZIOB	<i>Ziziphus obtusifolia</i>	0–1	–
9	Half shrubs			13–56	
	desert zinnia	ZIAC	<i>Zinnia acerosa</i>	11–45	–
	shortleaf baccharis	BABR	<i>Baccharis brachyphylla</i>	6–17	–
	fairyduster	CAER	<i>Calliandra eriophylla</i>	0–11	–
	bastardsage	ERWR	<i>Eriogonum wrightii</i>	1–11	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	1–11	–
	burroweed	ISTE2	<i>Isocoma tenuisecta</i>	1–11	–
	littleleaf ratany	KRER	<i>Krameria erecta</i>	0–6	–
	whitestem paperflower	PSCO2	<i>Psilostrophe cooperi</i>	0–6	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0–1	–
	rough menodora	MESC	<i>Menodora scabra</i>	0–1	–
	threadleaf snakeweed	GUMI	<i>Gutierrezia microcephala</i>	0–1	–
	turpentine bush	ERLA12	<i>Ericameria laricifolia</i>	0–1	–
	rayless goldenhead	ACSP	<i>Acamptopappus sphaerocephalus</i>	0–1	–
10	Succulents			12–34	
	walkingstick cactus	CYSP8	<i>Cylindropuntia spinosior</i>	6–17	–
	soaptree yucca	YUEL	<i>Yucca elata</i>	6–17	–
	tulip pricklypear	OPPH	<i>Opuntia phaeacantha</i>	1–6	–
	candy barrelcactus	FEWI	<i>Ferocactus wislizeni</i>	0–2	–
	cactus apple	OPEN3	<i>Opuntia engelmannii</i>	0–2	–
	purple pricklypear	OPMA8	<i>Opuntia macrocentra</i>	0–2	–
	devil's cholla	GRKU	<i>Grusonia kunzei</i>	0–1	–
	Graham's nipple cactus	MAGR9	<i>Mammillaria grahamii</i>	0–1	–
	Engelmann's hedgehog cactus	ECEN	<i>Echinocereus engelmannii</i>	0–1	–

	pinkflower hedgehog cactus	ECFA	<i>Echinocereus fasciculatus</i>	0–1	–
	buck-horn cholla	CYAC8	<i>Cylindropuntia acanthocarpa</i>	0–1	–
	Christmas cactus	CYLE8	<i>Cylindropuntia leptocaulis</i>	0–1	–
	banana yucca	YUBA	<i>Yucca baccata</i>	0–1	–
Tree					
11	Dominant trees			17–112	
	western honey mesquite	PRGLT	<i>Prosopis glandulosa var. torreyana</i>	17–56	–
	velvet mesquite	PRVE	<i>Prosopis velutina</i>	1–56	–

Animal community

This site produces some perennial forage for livestock. It wet (El Nino) winters it produces a tremendous amount of annual forbs and grasses, all of which are excellent forage. The site is home to a variety of small mammals and birds and their associated predators. It is mainly a foraging area for larger mammals like mule deer and javalina.

Hydrological functions

These soils are coarse to medium textured and poor producers of runoff.

Recreational uses

Hunting, horseback riding, hiking, wildlife observation, photography, rock hounding and bird watching.

Wood products

Limited mesquite wood for campfires and firewood.

Contributors

Dan Robinett
Larry D. Ellicott

Approval

Curtis Talbot, 4/12/2021

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)	Wilma Renken, Dan Robinett, Larry Humphrey
Contact for lead author	USDA-NRCS Tucson MLRA Soil Survey Office
Date	12/12/2012
Approved by	Curtis Talbot
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills have formed out of water flow paths in recent past. They are 10-30 feet in length and continuous with flow paths.

2. **Presence of water flow patterns:** Water flow paths occupy 10% of the surface area. Steeper sections have flow paths which are continuous and smaller flow paths are discontinuous and 10-20 feet in length.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are common on all longer lived grasses and sub-shrubs and are from 1-2 inches in height. Terracettes are uncommon on the site except in water flow paths where they occur at 10-20 foot intervals in smaller flow paths.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare soil is 10-80%, gravel ranges from 5-35% and basal cover of live perennial grasses is 1-2%. Bare areas are 3-5' in diameter and generally 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):** Both fine and coarse litter size-classes are moving moderate distances (10-20 feet) in water flow paths, between vegetation patches, and on areas with increased slope. All litter size-classes are staying in place within vegetation patches and flat areas.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Values from a soil slake test ratings were 2-3s from outside canopy and were 4-6s from under canopy.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A horizon is 7 inches thick with a weak sub-angular blocky structure. Colors are 7.5 YR 5/4 dry and 7.5 YR 3/4 moist.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial grass canopy cover ranges from 3-20%; sub-shrub cover 1-5%; tree cover 5-7%; succulents 1-2%; annuals are highly variable. The patch-distribution of perennial grass cover plays the primary role in slowing sheet flow run-off coming from bare areas and allowing infiltration. As tree cover increases on the site, surface water flow becomes more continuous, therefore, resulting in decreased infiltration.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None present, average depth of penetration from an ARS field penetrometer

with a 2.2 kg. sliding hammer is 8.5 cm. The argillic horizon could be mistaken for compacted layer.

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: Dom.Per.grasses (black grama, bush muhly) > Per.3-awns > Misc.Per.Grasses = Ann.Grass >>

Sub-dominant: Dom.Trees > Half Shrubs = Succulents = Dom.Shrubs (4-wing saltbush, catclaw) = Forbs >>
Misc.Shrubs.

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Plant mortality strongly affected by weather patterns; >20% mortality on perennial grasses and sub-shrubs can occur during short-term drought. Mortality on trees (<10%) is steady.
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14. **Average percent litter cover (%) and depth (in):** From the ESD, litter cover can be from 15-65% on this site.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 217 lbs/ac. in a below average year; 550 lbs/ac. in an average year; 1065 lbs/ac. in an above average 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:** Mesquite (mesquite canopy should be less than 5% on this site). Other invasive species present include both Lehmann and Boer lovegrass.
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17. **Perennial plant reproductive capability:** Moderately impaired by drought on perennial grass and sub-shrub species.
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