USDA Natural Resources Conservation Service

Ecological site R041XB210AZ
Loamy 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.

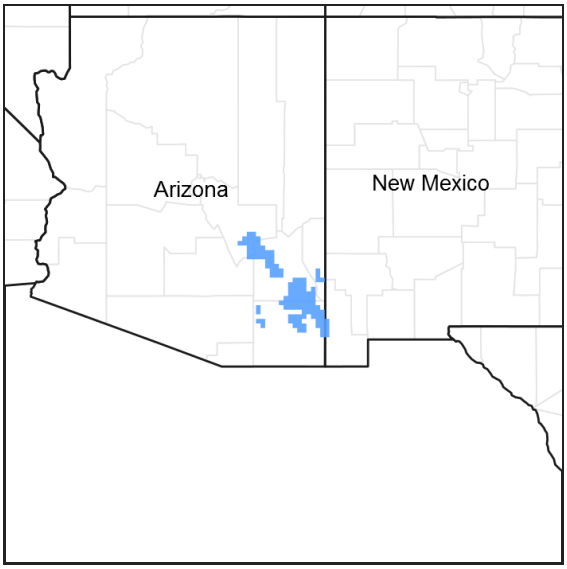


Figure 1. Mapped extent

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 Shrub. 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 41-2, Chihuahuan-Sonoran Desert Shrub; Ecological Site Loamy 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

Loamy Upland, 8"-12" p.z., is found on gently sloping uplands with deep soils. Surface soils are non-calcareous sandy loam to loam with an underlying argillic horizon. When the soil above the argillic is sandy loam textured, it is less than 4" thick.

Associated sites

R041XB204AZ	**Clay Loam Upland 8-12" p.z.** adjacent, lacking sandy loam (loam) surface horizon, clays exhibit vertic (shrink-swell) properties
R041XB208AZ	**Limy Upland 8-12" p.z.** adjacent, shallow soil, calcareous to surface
R041XB203AZ	**Clayey Upland 8-12" p.z.** adjacent, lacking sandy loam (loam) surface horizon

Similar sites

R040XA114AZ	**Loamy Upland 10"-13" p.z.** elevation range 4,500-6,500 ft., precipitation zone 16-20 inches
R041XC313AZ	**Loamy Upland 12"-16" p.z.** elevation range 3,200-4,500 ft., precipitation zone 12-16 inches

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Prosopis glandulosa var. torreyana* (2) *ephedra fasciculata*
Herbaceous	(1) *Pleuraphis mutica* (2) *aristida*

Physiographic features

This site occurs in the lowest elevations of the Madrean Basin and Range province in southeastern Arizona. It occurs on rolling low ridges, fan terraces, mesas and gently sloping uplands; generally below the hills and above the plains.

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Fan piedmont (3) Mesa
Flooding frequency	None
Ponding frequency	None
Elevation	792–1,219 m
Slope	1–15%
Aspect	Aspect is not a significant factor

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)	160-185 days
Freeze-free period (characteristic range)	185-227 days
Precipitation total (characteristic range)	279-305 mm
Frost-free period (actual range)	149-186 days
Freeze-free period (actual range)	171-228 days
Precipitation total (actual range)	254-305 mm
Frost-free period (average)	172 days
Freeze-free period (average)	204 days
Precipitation total (average)	279 mm

Climate stations used

- (1) SAN SIMON [USC00027560], San Simon, AZ
- (2) BOWIE [USC00020958], San Simon, AZ
- (3) DUNCAN [USC00022754], Duncan, AZ
- (4) SAFFORD AGRICULTRL CTR [USC00027390], Safford, AZ

Influencing water features

There are no water features associated with this site.

Soil features

These soils are moderately deep to deep and loamy textured. They have thin (2-4 inch) surface horizons that range from sandyloam to loam in texture, over an argillic horizon. Surface soils (10 inches) are non-calcareous, while some soils have calcic horizons below the argillic horizon. Some soil series have a lime or silica cemented pan at moderate depths. Although several soil series are correlated in map unit components to this ecological site, Bucklebar soil series is most representative of Loamy Upland, 8-12” p.z..

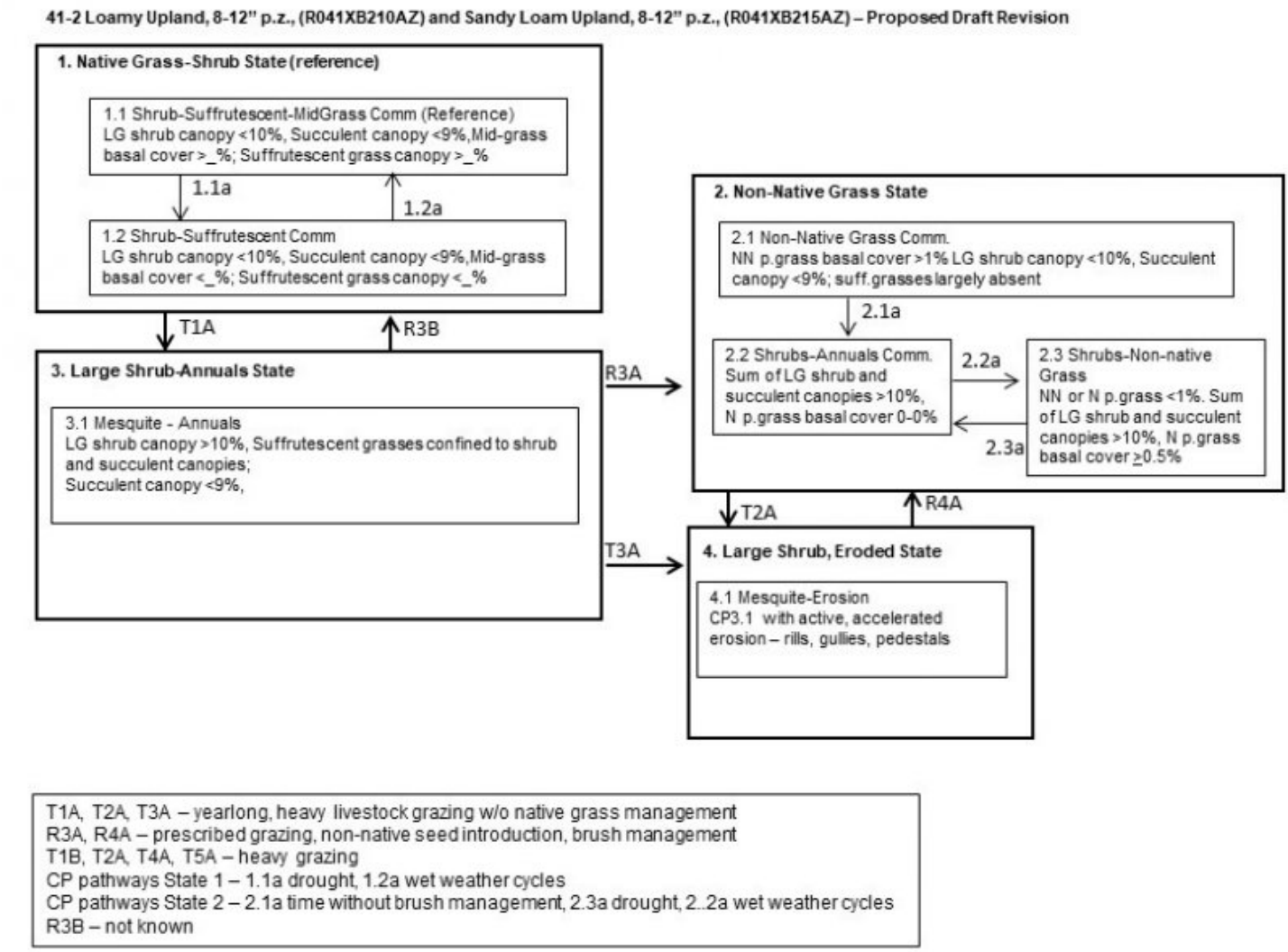
Table 4. Representative soil features

Surface texture	(1) Sandy loam (2) Very gravelly sandy loam (3) Gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to slow
Soil depth	152 cm
Surface fragment cover <=3"	5–50%
Surface fragment cover >3"	0–10%
Available water capacity (0-101.6cm)	12.7–25.65 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)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–65%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

Loamy 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



State 1
Native Grass-Shrubland

State 1. Native Grass-Shrub State has two Community Phases that fluctuate with dry/wet weather cycling. The Reference Plant Community (CP1.1) is a 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
Shrub-Suffrutescent-MidGrass

Figure 8. Loamy Upland 8-12" pz. soils pit

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. Tobosa, black grama and bush muhly are the dominant perennial grasses, with lesser amounts of threeawns. The cover of some shallow rooted grass species, like curly mesquite and Rothrock grama fluctuate widely from wet to dry years.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	112	280	588
Forb	3	56	191
Shrub/Vine	50	112	146
Total	**165**	**448**	**925**

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	1-2%
Grass/grasslike basal cover	1-2%
Forb basal cover	1-2%
Non-vascular plants	0%
Biological crusts	5-15%
Litter	10-55%
Surface fragments >0.25" and <=3"	15-50%

Surface fragments >3"	0-15%
Bedrock	0%
Water	0%
Bare ground	5-70%

Table 7. Canopy structure (% cover)

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

Community 1.2
Shrub-Suffutescent

During periods of drought, short-rooted grasses and mid-grasses diminish in basal cover; half-shrub mortality occurs after consecutive dry winters.

State 2
Non-Native Grass

State 2, Non-Native Grass State, predominantly cycles between two Community Phases: large shrub-annual forbs (CP2.2) / large shrub-Lehmann lovegrass (CP2.3). Community Phase 2.1 persists for about 10 years after brush management before shrub dominance resumes. Restoration from State 3, prescribed grazing without brush management, will result in CP 2.2. The prevalence of Lehamnn lovegrass within the soil seedbank no longer requires range seeding. Once a soil seedbank is established, LL persists in the plant community while its basal cover varies with climate, elevation, and 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

Community 2.2
Shrubs-Annuals

This state occurs where mesquite has increased from between 2 and 10% canopy cover and some cover of native perennial (suffrutescent) grasses and forbs remains. Other shrubs and succulents exist in minor amounts. Annual forbs and grasses (both native and non-native) are very important in their respective (wet) seasons.

Community 2.3
Shrubs-NonNative Grass

State 3

Large Shrub-Annuals

State 3, 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, annuals

Figure 10. Loamy Upland 8-12" pz., mesquite, annuals

This state occurs where mesquite and other shrubs (creosotebush) and cacti dominate the plant community. Native perennial grasses and forbs have been removed from the plant community and native and non-native annual species dominate the herbaceous layer.

State 4
Large Shrub, Eroded

State 4, 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, 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.

Transition T1A
State 1 to 3

Heavy, continuous livestock grazing

Transition T2A
State 2 to 4

heavy, continuous grazing

Restoration pathway R3B
State 3 to 1

None known

Restoration pathway R3A
State 3 to 2

Prescribed grazing, introduction of non-native lovegrass, brush management, mechanical land treatment

Transition T3A
State 3 to 4

heavy, continuous grazing

Restoration pathway R4A
State 4 to 2

brush management, mechanical land treatment, range planting, 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**			90–224	
	tobosagrass	PLMU3	*Pleuraphis mutica*	34–112	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	28–84	–
	black grama	BOER4	*Bouteloua eriopoda*	28–56	–
2	**Miscellaneous Perennial Grasses**			6–84	
	curly-mesquite	HIBE	*Hilaria belangeri*	1–56	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	1–22	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	1–22	–
	Arizona cottontop	DICA8	*Digitaria californica*	0–22	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	0–17	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–11	–
	green sprangletop	LEDU	*Leptochloa dubia*	0–11	–
	Hall's panicgrass	PAHA	*Panicum hallii*	0–11	–
	burrograss	SCBR2	*Scleropogon brevifolius*	0–11	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	0–11	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–6	–
	vine mesquite	PAOB	*Panicum obtusum*	0–6	–
	Arizona muhly	MUAR3	*Muhlenbergia arizonica*	0–2	–
	squirreltail	ELEL5	*Elymus elymoides*	0–2	–
	tanglehead	HECO10	*Heteropogon contortus*	0–2	–
	big sacaton	SPWR2	*Sporobolus wrightii*	0–1	–
3	**Perennial threeawns**			11–112	
	purple threeawn	ARPU9	*Aristida purpurea*	6–56	–
	Parish's threeawn	ARPUP5	*Aristida purpurea var. parishii*	0–28	–
	spidergrass	ARTE3	*Aristida ternipes*	6–28	–
	spidergrass	ARTEG	*Aristida ternipes var. gentilis*	0–17	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	0–17	–

	blue threeawn	ARPUN	*Aristida purpurea var. nealleyi*	0–6	–
	poverty threeawn	ARDI5	*Aristida divaricata*	0–6	–
4	**Annual grasses**			1–168	
	needle grama	BOAR	*Bouteloua aristidoides*	0–56	–
	Rothrock's grama	BORO2	*Bouteloua rothrockii*	0–56	–
	mucronate sprangeltop	LEPAB	*Leptochloa panicea ssp. brachiata*	0–28	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	1–28	–
	sixweeks threeawn	ARAD	*Aristida adscensionis*	1–28	–
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–22	–
	Arizona signalgrass	URAR	*Urochloa arizonica*	0–22	–
	feather fingergrass	CHVI4	*Chloris virgata*	0–17	–
	witchgrass	PACA6	*Panicum capillare*	0–11	–
	Mexican panicgrass	PAHI5	*Panicum hirticaule*	0–11	–
	prairie threeawn	AROL	*Aristida oligantha*	1–11	–
	Bigelow's bluegrass	POBI	*Poa bigelovii*	0–6	–
	tapertip cupgrass	ERACA	*Eriochloa acuminata var. acuminata*	0–6	–
	desert lovegrass	ERPEM	*Eragrostis pectinacea var. miserrima*	0–6	–
	tufted lovegrass	ERPEP2	*Eragrostis pectinacea var. pectinacea*	0–6	–
	Mexican sprangletop	LEFUU	*Leptochloa fusca ssp. uninervia*	0–6	–
	Arizona brome	BRAR4	*Bromus arizonicus*	0–6	–
	delicate muhly	MUFR	*Muhlenbergia fragilis*	0–2	–
	littleseed muhly	MUMI	*Muhlenbergia microsperma*	0–2	–
Forb					
5	**Perennial Forbs**			2–22	
	dwarf desertpeony	ACNA2	*Acourtia nana*	1–11	–
	weakleaf bur ragweed	AMCO3	*Ambrosia confertiflora*	1–6	–
	slender poreleaf	POGR5	*Porophyllum gracile*	0–6	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	1–6	–
	Indian rushpea	HOGL2	*Hoffmannseggia glauca*	0–2	–
	slender janusia	JAGR	*Janusia gracilis*	0–2	–
	bluedicks	DICA14	*Dichelostemma capitatum*	0–2	–
	spreading fleabane	ERDI4	*Erigeron divergens*	0–1	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–1	–
	southwestern mock vervain	GLGO	*Glandularia gooddingii*	0–1	–
	brownfoot	ACWR5	*Acourtia wrightii*	0–1	–
	poreleaf dogweed	ADPO2	*Adenophyllum porophyllum*	0–1	–
	trailing windmills	ALIN	*Allionia incarnata*	0–1	–
	largeflower onion	ALMA4	*Allium macropetalum*	0–1	–
	tuber anemone	ANTU	*Anemone tuberosa*	0–1	–
	narrowleaf silverbush	ARLA12	*Argythamnia lanceolata*	0–1	–
	New Mexico silverbush	ARNE2	*Argythamnia neomexicana*	0–1	–
	perennial rockcress	ARPE2	*Arabis perennans*	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	–
	desert mariposa lily	CAKE	*Calochortus kennedyi*	0–1	–
	sego lily	CANU3	*Calochortus nuttallii*	0–1	–
	whitemargin sandmat	CHAL11	*Chamaesyce albomarginata*	0–1	–
	leatherweed	CRPO5	*Croton pottsii*	0–1	–
	fingerleaf gourd	CUDI	*Cucurbita digitata*	0–1	–
	coyote gourd	CUPA	*Cucurbita palmata*	0–1	–
	ragged nettlespurge	JAMA	*Jatropha macrorhiza*	0–1	–
	Parry's false prairie-clover	MAPA7	*Marina parryi*	0–1	–
	lacy tansyaster	MAPIP4	*Machaeranthera pinnatifida ssp. pinnatifida var. pinnatifida*	0–1	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	0–1	–
	wishbone-bush	MILAV	*Mirabilis laevis var. villosa*	0–1	–
	desert tobacco	NIOB	*Nicotiana obtusifolia*	0–1	–
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	0–1	–
	pricklyleaf dogweed	THAC	*Thymophylla acerosa*	0–1	–
	Rocky Mountain zinnia	ZIGR	*Zinnia grandiflora*	0–1	–
	canaigre dock	RUHY	*Rumex hymenosepalus*	0–1	–
	twinleaf senna	SEBA3	*Senna bauhinioides*	0–1	–
	Coues' cassia	SECO10	*Senna covesii*	0–1	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	0–1	–
6	**Annual forbs**			1–168	
	tanseyleaf tansyaster	MATA2	*Machaeranthera tanacetifolia*	0–56	–
	California poppy	ESCAM	*Eschscholzia californica ssp. mexicana*	0–28	–
	Coulter's lupine	LUSP2	*Lupinus sparsiflorus*	0–28	–
	western tansymustard	DEPI	*Descurainia pinnata*	0–22	–
	combseed	PECTO	*Pectocarya*	0–22	–
	Arizona popcornflower	PLAR	*Plagiobothrys arizonicus*	0–22	–
	desert Indianwheat	PLOV	*Plantago ovata*	0–22	–
	bristly fiddleneck	AMTE3	*Amsinckia tessellata*	0–17	–
	coastal bird's-foot trefoil	LOSAB	*Lotus salsuginosus var. brevivexillus*	0–17	–
	shaggyfruit pepperweed	LELA	*Lepidium lasiocarpum*	0–17	–
	intermediate pepperweed	LEVIM	*Lepidium virginicum var. medium*	0–17	–
	Arizona poppy	KAGR	*Kallstroemia grandiflora*	0–11	–
	miniature woollystar	ERDI2	*Eriastrum diffusum*	0–11	–
	manybristle chinchweed	PEPA2	*Pectis papposa*	0–11	–
	New Mexico plumeseed	RANE	*Rafinesquia neomexicana*	0–6	–
	Nuttall's povertyweed	MONU	*Monolepis nuttalliana*	0–6	–
	carelessweed	AMPA	*Amaranthus palmeri*	0–6	–

	sorrel buckwheat	ERPO4	*Eriogonum polycladon*	0–6	–
	Texas stork's bill	ERTE13	*Erodium texanum*	0–6	–
	Gordon's bladderpod	LEGO	*Lesquerella gordonii*	0–6	–
	foothill deervetch	LOHU2	*Lotus humistratus*	0–6	–
	slender goldenweed	MAGR10	*Machaeranthera gracilis*	0–6	–
	milkvetch	ASTRA	*Astragalus*	0–6	–
	wheelscale saltbush	ATEL	*Atriplex elegans*	0–6	–
	Coulter's spiderling	BOCO2	*Boerhavia coulteri*	0–6	–
	wedgeleaf draba	DRCU	*Draba cuneifolia*	0–6	–
	flatcrown buckwheat	ERDE6	*Eriogonum deflexum*	0–6	–
	cryptantha	CRYPT	*Cryptantha*	0–6	–
	hairy prairie clover	DAMO	*Dalea mollis*	0–2	–
	American wild carrot	DAPU3	*Daucus pusillus*	0–2	–
	white tackstem	CAWR	*Calycoseris wrightii*	0–2	–
	brittle spineflower	CHBR	*Chorizanthe brevicornu*	0–2	–
	hyssopleaf sandmat	CHHY3	*Chamaesyce hyssopifolia*	0–2	–
	Esteve's pincushion	CHST	*Chaenactis stevioides*	0–2	–
	fringed redmaids	CACI2	*Calandrinia ciliata*	0–2	–
	Arizona lupine	LUAR4	*Lupinus arizonicus*	0–2	–
	hairy desertsunflower	GECA2	*Geraea canescens*	0–2	–
	star gilia	GIST	*Gilia stellata*	0–2	–
	woolly tidestromia	TILA2	*Tidestromia lanuginosa*	0–2	–
	sleepy silene	SIAN2	*Silene antirrhina*	0–2	–
	woollyhead neststraw	STMI2	*Stylocline micropoides*	0–2	–
	green carpetweed	MOVE	*Mollugo verticillata*	0–2	–
	desert evening primrose	OEPR	*Oenothera primiveris*	0–2	–
	Florida pellitory	PAFL3	*Parietaria floridana*	0–2	–
	phacelia	PHACE	*Phacelia*	0–2	–
	doubleclaw	PRPA2	*Proboscidea parviflora*	0–1	–
	chia	SACO6	*Salvia columbariae*	0–1	–
	sawtooth sage	SASU7	*Salvia subincisa*	0–1	–
	spreading fanpetals	SIAB	*Sida abutifolia*	0–1	–
	whitestem blazingstar	MEAL6	*Mentzelia albicaulis*	0–1	–
	bristly nama	NAHI	*Nama hispidum*	0–1	–
	glandular threadplant	NEGL	*Nemacladus glanduliferus*	0–1	–
	sand fringepod	THCU	*Thysanocarpus curvipes*	0–1	–
	tumblemustard	THELY3	*Thelypodiopsis*	0–1	–
	Coulter's globemallow	SPCO2	*Sphaeralcea coulteri*	0–1	–
	crestrib morning-glory	IPCO2	*Ipomoea costellata*	0–1	–
	Mexican fireplant	EUHE4	*Euphorbia heterophylla*	0–1	–
	common woolly sunflower	ERLA6	*Eriophyllum lanatum*	0–1	–
	exserted Indian paintbrush	CAEXE	*Castilleja exserta ssp. exserta*	0–1	–

	yellow tackstem	CAPA7	*Calycoseris parryi*	0–1	–
	southwestern pricklypoppy	ARPL3	*Argemone pleiacantha*	0–1	–
	hoary bowlesia	BOIN3	*Bowlesia incana*	0–1	–
	scrambled eggs	COAU2	*Corydalis aurea*	0–1	–
	annual agoseris	AGHE2	*Agoseris heterophylla*	0–1	–
Shrub/Vine					
7	**Dominant shrubs**			8–78	
	western honey mesquite	PRGLT	*Prosopis glandulosa var. torreyana*	17–34	–
	jojoba	SICH	*Simmondsia chinensis*	0–22	–
	creosote bush	LATR2	*Larrea tridentata*	0–17	–
	catclaw acacia	ACGR	*Acacia greggii*	6–17	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	1–11	–
	whitethorn acacia	ACCO2	*Acacia constricta*	0–11	–
	longleaf jointfir	EPTR	*Ephedra trifurca*	0–6	–
8	**Miscellaneous shrubs**			0–11	
	Wright's beebrush	ALWR	*Aloysia wrightii*	0–1	–
	crucifixion thorn	CAHO3	*Canotia holacantha*	0–1	–
	spiny hackberry	CEEH	*Celtis ehrenbergiana*	0–1	–
	American tarwort	FLCE	*Flourensia cernua*	0–1	–
	ocotillo	FOSP2	*Fouquieria splendens*	0–1	–
	water jacket	LYAN	*Lycium andersonii*	0–1	–
	Berlandier's wolfberry	LYBE	*Lycium berlandieri*	0–1	–
	pale desert-thorn	LYPA	*Lycium pallidum*	0–1	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	0–1	–
	blue paloverde	PAFL6	*Parkinsonia florida*	0–1	–
	yellow paloverde	PAMI5	*Parkinsonia microphylla*	0–1	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	0–1	–
9	**Half shrubs**			6–34	
	fairyduster	CAER	*Calliandra eriophylla*	1–17	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–11	–
	bastardsage	ERWR	*Eriogonum wrightii*	1–11	–
	desert zinnia	ZIAC	*Zinnia acerosa*	1–11	–
	shortleaf baccharis	BABR	*Baccharis brachyphylla*	1–11	–
	rough menodora	MESC	*Menodora scabra*	0–6	–
	burroweed	ISTE2	*Isocoma tenuisecta*	0–6	–
	littleleaf ratany	KRER	*Krameria erecta*	1–6	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–1	–
	turpentine bush	ERLA12	*Ericameria laricifolia*	0–1	–
	rayless goldenhead	ACSP	*Acamptopappus sphaerocephalus*	0–1	–
	whitestem paperflower	PSCO2	*Psilostrophe cooperi*	0–1	–
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	0–1	–
10	**Succulents**			6–22	

	devil's cholla	GRKU	*Grusonia kunzei*	0–6	–
	cactus apple	OPEN3	*Opuntia engelmannii*	0–6	–
	tulip pricklypear	OPPH	*Opuntia phaeacantha*	1–6	–
	soaptree yucca	YUEL	*Yucca elata*	1–6	–
	banana yucca	YUBA	*Yucca baccata*	0–2	–
	purple pricklypear	OPMA8	*Opuntia macrocentra*	0–2	–
	saguaro	CAGI10	*Carnegiea gigantea*	0–2	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0–2	–
	walkingstick cactus	CYSP8	*Cylindropuntia spinosior*	0–1	–
	Engelmann's hedgehog cactus	ECEN	*Echinocereus engelmannii*	0–1	–
	pinkflower hedgehog cactus	ECFA	*Echinocereus fasciculatus*	0–1	–
	candy barrelcactus	FEWI	*Ferocactus wislizeni*	0–1	–
	buck-horn cholla	CYAC8	*Cylindropuntia acanthocarpa*	0–1	–
	Graham's nipple cactus	MAGR9	*Mammillaria grahamii*	0–1	–

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 medium textured and fair producers of runoff.

Recreational uses

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

Wood products

Limited mesquite wood for campfires.

Other references

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Contributors

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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:** None

2. **Presence of water flow patterns:** Water flow paths occupy less than 5% of the surface area. Sheet flow predominates as a process on this site. Sheet flow lengths are less than 5 feet.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are infrequent on all longer lived grasses and sub-shrubs. Terracettes are common on the site only in black grama areas.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Twenty-three percent (23%) bare ground. Ground cover was collected as point cover data concurrently with pace frequency method (300 pts). Bare areas are up to 3’ in diameter, somewhat connected, and evenly distributed.

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):** Fine litter size classes are moving less than a foot. Coarse litter staying in place.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Slake test values range from 4-6 across site.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A horizon is a gravelly sandyloam 3 inches thick with a weak subangular 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 grasses dominate the site, are well-distributed across the site, and play an important role in the infiltration/hydrologic functioning by interrupting, slowing, overland sheet-flow of water. Black grama canopy is 17% and spidergrass canopy is 29% on this site. Only cane cholla and prickly pear have increased on the site.

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 4.9 cm. The clayey argillic horizon at 3 inches can feel like a 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 = Per.Three-Awns >

    Sub-dominant: Dom.Shrubs > Misc.Per.Grasses = Half Shrubs = Succulents = Per.Forbs > Annuals

    Other:

    Additional: Annual grasses and forbs can fluctuate within the ranking based on seasonal precipitation.

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Mortality due to drought (2009 and very dry winter spring of 2011) is significant only on cane cholla. All other species show only natural rates of mortality.

14. **Average percent litter cover (%) and depth (in):** Litter cover can vary widely due to annual grass and forb production fluctuating with rainfall cycles.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 148 lbs/ac. in a below average year; 400 lbs/ac. in an average year; 825 lbs/ac. in an above average year. Annual grass and forb production can exceed expected values based on recent weather patterns.

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:** Cholla and prickly pear are to natural to this site and expand to 9% canopy (about 200

plants/ac.) Mesquite and catclaw acacia are natural to this site and appears to exist in normal amounts at 8% canopy cover and with a density of 40 plants/ac. Other invasive species present include both Lehmann lovegrass and Boer lovegrass.

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17. **Perennial plant reproductive capability:** Not impaired by drought on any species.
