

# Ecological site R041XC305AZ Clay Loam Upland 12-16" 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 41-3, Southern Arizona Semidesert Grassland. Elevations range from 3200 to 5000 feet and precipitation ranges from 12 to 16 inches per year. Vegetation includes mesquite, catclaw acacia, netleaf hackberry,

palo verde, false mesquite, range ratany, fourwing saltbush, tarbush, littleleaf sumac, sideoats grama, black grama, plains lovegrass, cane beardgrass, tobosa, vine mesquite, threeawns, Arizona cottontop and bush muhly. The soil temperature regime is thermic and the soil moisture regime is ustic 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 Clay Loam Upland, 12"-16" 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**

Clay Loam Upland, 16"-20" p.z., ecological site is found on gently sloping uplands with deep soils. An argillic or clay cambic horizon is below a clay loam textured surface soil. Soil does not exhibit shrink-swell characteristics typical of vertic soils.

### **Associated sites**

R041XC304AZ	Clayey Upland 12-16" p.z.
R041XC313AZ	Loamy Upland 12"-16" p.z.

#### **Similar sites**

R041XB204AZ	Clay Loam Upland 8-12" p.z.
R040XA120AZ	Clay Loam Upland 10"-13" p.z.
R041XA109AZ	Clay Loam Upland 16-20" p.z.

#### Table 1. Dominant plant species

Tree	Not specified				
Shrub	(1) calliandra eriophylla				
Herbaceous	<ul><li>(1) pleuraphis mutica</li><li>(2) bouteloua curtipendula</li></ul>				

### **Physiographic features**

This site occurs in the middle elevations of the Madrean Basin and Range province in southeastern Arizona. It occurs on old fan terraces and old stream terraces. It is always in an upland position.

Table 2. Representative physiographic features

Landforms	<ul><li>(1) Fan piedmont</li><li>(2) Stream terrace</li><li>(3) Plain</li></ul>
Flooding frequency	None
Ponding frequency	None
Elevation	975–1,524 m

Slope	1–15%
Aspect	Aspect is not a significant factor

# **Climatic features**

Precipitation in this land resource unit ranges from 12-16 inches yearly in the eastern part with elevations from 3600-5000 feet, and 13-17 inches in the western part where elevations are 3300-4500 feet. Winter-Summer rainfall ratios are 40-60% in the west and 30-70% in the east. Summer rains fall July-September, originate in the Gulf of Mexico and are convective, usually brief, intense thunderstorms. Cool season moisture tends to be frontal, originate in the Pacific and Gulf of California, and falls in widespread storms with long duration and low intensity. Snow rarely lasts more than one day. May and June are the driest months of the year. Humidity is generally very low.

Temperatures are mild. Freezing temperatures are common at night from December-April; however temperatures during the day are frequently above 50 F. Occasionally in December-February, brief 0 F temperatures may be experienced some nights. During June, July and August, some days may exceed 100 F.

Cool season plants start growth in early spring and mature in early summer. Warm season plants take advantage of summer rains and are growing and nutritious July-September. Warm season grasses may remain green throughout the year.

#### Table 3. Representative climatic features

Frost-free period (average)	220 days
Freeze-free period (average)	
Precipitation total (average)	406 mm

#### Influencing water features

There are no water features associated with this site.

### **Soil features**

These are deep soils that have formed in clayey alluvium of mixed origin. Surface textures range from gravelly sandy-loam (less than one inch thick over an argillic horizon) to clay loam. Sub-soils are clayey, with mixed minerology, and lack vertic properties (soil cracking and churning). They are not calcareous in the upper 15 inches. They can have calcic horizons at moderate depths (20 to 40 inches). Plant-soil moisture relationships are fair to good. Soil surfaces are dark colored.

Soils mapped on this site include: SSA-661 Eastern Pinal & Southern Gila counties MU 91 Saddlebrook; SSA-663 Gila-Duncan area MU 37 Selevin; SSA-664 San Simon area MU's 19 Forrest & Whitehouse, 37 Signal, 45 Whitehouse; SSA-665 Willcox area MU's FrA & FrB Forrest, TwA Tubac; SSA-666 Cochise county Northwest part MU's 39 Eloma & 79 Elgin; SSA-667 Santa Cruz area MU's BhD Bernadino, EbC Eba GrVSL, SnD Signal; SSA-669 Pima county Eastern part MU 4 Arivaca; SSA-671 Cochise county Douglas-Tombstone part MU's 6 Banshee, 13 Forrest, 57 Elgin, 59 Eloma SL, 60 Eloma and 97 Libby; SSA-703 Tohono O'odham Nation MU 7 Selevin.

Surface texture	<ul><li>(1) Very gravelly clay loam</li><li>(2) Clay loam</li><li>(3) Gravelly sandy loam</li></ul>
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Moderate to slow
Soil depth	152 cm

#### Table 4. Representative soil features

Surface fragment cover <=3"	5–45%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	12.19–24.38 cm
Calcium carbonate equivalent (0-101.6cm)	1–25%
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)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–45%
Subsurface fragment volume >3" (Depth not specified)	0–5%

# **Ecological dynamics**

Clay Loam Upland, 12"-16" p.z., is dominated by warm season perennial grasses. Most of the major perennial grass species on the site are well dispersed throughout their plant community. However, tobosa, vine mesquite, and curly mesquite tend to occur in patches on this site. These patches appear to be well dispersed and are variable in size. Perennial forbs are well represented on the site, as well as a few species of low shrubs. Natural fire was important in the development of the potential plant community. The aspect is open grassland.

Four alternate states are identified for this ecological site. State 2, Mesqute, Natives, comes about from years of yearlong livestock grazing at light-moderate intensity; livestock preferences for certain perennial grasses over others impact preferred species and removal of fine fuel extends natural fire intervals. State 3, Mesquite, Annuals, arises from years of high intensity livestock grazing; perennial native grasses are removed from plant community. State 4, Dense Mesquite, comes about from intense livestock grazing coupled with drought. State 5, Cultivated Non-Natives, is a restoration state following a combination of conservation practices; this state must be maintained with prescribed grazing and periodic brush management. Heavy livestock grazing will remove the seeded species and return the project area to State 3 or State 4.

# State and transition model

# MLRA 41-3 (12-16"), Clayloam Upland 12-16" p.z.



# State 1 Native Mid-Grassland

### Community 1.1 Historical Climax Plant Community

The historic native state includes the native plant communities that occur on the site, including the historic climax plant community. This state includes other 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 the site is dominated by warm season perennial grasses. Most of the major perennial grass species on the site are well dispersed throughout their plant community. However, tobosa, vine mesquite, and curly mesquite tend to occur in patches on this site. These patches appear to be well dispersed and are variable in size. Perennial forbs are well represented on the site, as well as a few species of low shrubs. The aspect is open grassland.

#### Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	516	841	1177
Forb	36	56	247
Shrub/Vine	11	67	157
Tree	-	6	17
Total	563	970	1598

#### Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	1-2%
Grass/grasslike basal cover	6-25%
Forb basal cover	0-1%
Non-vascular plants	0-1%
Biological crusts	1-10%
Litter	10-60%
Surface fragments >0.25" and <=3"	5-45%
Surface fragments >3"	0-5%
Bedrock	0%
Water	0%
Bare ground	15-25%

#### Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	-	1-5%	10-30%	0-5%
>0.15 <= 0.3	-	1-5%	10-20%	0-2%
>0.3 <= 0.6	-	0-3%	10-20%	0-2%
>0.6 <= 1.4	-	0-1%	1-5%	-
>1.4 <= 4	0-1%	-	-	-
>4 <= 12	-	-	-	-
>12 <= 24	-	-	-	-
>24 <= 37	-	_	_	_
>37	_	_	_	_

Figure 5. Plant community growth curve (percent production by month). AZ4134, 41.3 12-16" p.z. other sites. Growth begins in the spring, semidormancy occurs during the May through June drought, most growth occurs during the summer rains..

Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	10	0	0	30	35	15	5	0	0

Community 1.2 Shrub-Grass

Community 1.3 Annuals-Grass

Pathway P1.1a Community 1.1 to 1.2

drought

Pathway P1.1b Community 1.1 to 1.3

# Pathway P2.1a Community 1.2 to 1.1

above average rain period

# Pathway P1.2b Community 1.2 to 1.3

fire

Pathway P1.3a Community 1.3 to 1.1

average rainfall, wet summers

# Pathway P1.3b Community 1.3 to 1.2

average rainfall, wet winters

# State 2 Mesquite, native grass

With continuous grazing, palatable perennial grasses like plains lovegrass, blue, black and sideoats grama decrease and species like tobosa and curly mesquite increase. Severe drought can reduce short grasses to very low levels. Drought - fire combinations can reduce perennial grass cover and allow annual herbs to become dominant for a short time (2-4 years) until grasses can recover. Due to heavy surface soil textures, this site can be a inefficient user of intense summer rainfall when the perennial grass cover has been removed or greatly reduced. Mesquite, when present on the site, tends to be shrubby due to the presence of clay horizons at shallow depths.

Community 2.1 Mesquite, native grass



Figure 6. Clayloam Upland 12-16" pz. mesquite, tobosa

Mesquite increases in the absence of fire for long periods of time. Native perennial grasses maintain dominance with good grazing management, and with mesquite canopy levels from 2 to 10%. Tobosa, curly mesquite and blue grama are dominant and the site remains stable as long as basal cover does not drop below 7 or 8%. Snakeweed and burroweed cycle with climate but never gain dominance. Lehmann lovegrass can invade the site in this state, but is not well adapted to the heavy soil textures and will not dominate the under-story. It will seldom exceed 5 to 15% canopy levels and will die during severe drought on this site. Some soil compaction has occurred due to livestock traffic, but hydrologic processes are not impaired.

# State 3 Mesquite, annual grasses and forbs

# Community 3.1 Mesquite, annual grasses and forbs



Figure 7. Clayloam Upland 12-16" pz. mesquite, shrubs, annua

Mesquite and other large shrubs have increased and are dominant with canopies from 10 to 15%. Native and nonnative annual grasses and forbs, cool and warm season, dominate the under-story. Snakeweed and burroweed cycle with climate but remain co-dominant with annual species. Native perennial grasses are largely gone due to the interactions of drought, fire and continuous heavy grazing pressure. Tobosa may remain in remnant amounts but cover is very low and not well enough dispersed to recover. Usually soil compaction, from livestock traffic, and the loss of herbaceous cover has resulted in sheet and rill erosion on this site. Hydrologic relationships have changed to increase the ratio of runoff to infiltration.

## State 4 Dense mesquite, cacti and other shrubs

# Community 4.1 Dense mesquite, cacti and other shrubs

Mesquite continues to increase up to canopy levels of 25%. Other shrubs and succulents, especially prickly pear, dominate the under-story. Soil compaction, due to heavy livestock traffic, and loss of herbaceous cover has resulted in sheet, rill and gully erosion. Hydrologic relationships have changed to greatly increase the ratio of runoff to infiltration. In severe situations, cool season moisture is able to infiltrate the soil and the plant community is made up of mostly cool season plant species and cacti.

# State 5 Cultivated, non-native perennial grasses

# Community 5.1 Cultivated, non-native perennial grasses

This is a man made pasture of various introduced grasses including old world bluestems like, yellow, turkistan and King Ranch; and African lovegrasses like, Boer, Lehmann, Wilman and Cochise. It can be created from any of the mesquite states. Mesquite and other shrubs are bulldozed; brush is placed in rills and gullies, and non-native grasses are seeded. Root plowed areas are rough enough to eliminate most runoff for long periods of time (15 to 20 years) depending on grazing management. The African lovegrasses will not persist for long periods of time on this site and will die out in drought. The yellow bluestems appear to be more persistent on the site. Mesquite will reinvade areas of this state and will need maintenance treatments (every 10 to 15 years) of herbicides or mechanical methods to maintain a grassland aspect.

# Transition T1A State 1 to 2

seed introduction/proximity

# Transition T1B State 1 to 3

yearlong, heavy grazing

# Restoration pathway R2A State 2 to 1

brush management, prescribed grazing

# Transition T2A State 2 to 3

yearlong heavy grazing coupled with drought or burning

**Transition T2B** 

# State 2 to 4

yearlong heavy grazing with drought or fire

# Restoration pathway R3B State 3 to 1

none known; see R3A

### Transition T3A State 3 to 4

yearlong heavy grazing

# Restoration pathway R3A State 3 to 5

non-native seed introduction, brush management, prescribed grazing

# Restoration pathway R4A State 4 to 5

brush management, mechanical land treatment, seeding, prescribed grazing

#### Transition T5A State 5 to 3

yearlong heavy grazing, mortality of seeded species, absence of brush management maintenance

#### Transition T5B State 5 to 4

yearlong, heavy grazing with drought

# 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	mid grasses			392–560	
	sideoats grama	BOCU	Bouteloua curtipendula	202–314	_
	tobosagrass	PLMU3	Pleuraphis mutica	157–235	_
	cane bluestem	BOBA3	Bothriochloa barbinodis	22–168	-
	plains lovegrass	ERIN	Eragrostis intermedia	11–112	_
2	short grasses			78–224	
	blue grama	BOGR2	Bouteloua gracilis	22–168	_
	curly-mesquite	HIBE	Hilaria belangeri	22–112	-
	sprucetop grama	BOCH	Bouteloua chondrosioides	11–112	-
	black grama	BOER4	Bouteloua eriopoda	22–84	-
	hairy grama	BOHI2	Bouteloua hirsuta	0–56	-
	vine mesquite	PAOB	Panicum obtusum	0–56	_
	common wolfstail	LYPH	Lycurus phleoides	0–28	_

3	miscellaneous perennial grasses		11–112		
	whiplash pappusgrass	PAVA2	Pappophorum vaginatum	0–56	_
	squirreltail	ELEL5	Elymus elymoides	1–39	_
	green sprangletop	LEDU	Leptochloa dubia	0–34	_
	sand dropseed	SPCR	Sporobolus cryptandrus	0–34	_
	plains bristlegrass	SEVU2	Setaria vulpiseta	0–34	_
	Hall's panicgrass	PAHA	Panicum hallii	0–34	_
	big sacaton	SPWR2	Sporobolus wrightii	0–28	_
	burrograss	SCBR2	Scleropogon brevifolius	0–28	_
	bush muhly	MUPO2	Muhlenbergia porteri	0–28	_
	Rothrock's grama	BORO2	Bouteloua rothrockii	1–28	_
	tanglehead	HECO10	Heteropogon contortus	0–22	_
	Arizona cottontop	DICA8	Digitaria californica	0–22	_
	fall witchgrass	DICO6	Digitaria cognata	0–22	_
	slender grama	BORE2	Bouteloua repens	0–17	_
	Arizona muhly	MUAR3	Muhlenbergia arizonica	0–11	_
	purple grama	BORA	Bouteloua radicosa	0–11	_
	creeping muhly	MURE	Muhlenbergia repens	0–11	_
	slim tridens	TRMU	Tridens muticus	0–11	_
	low woollygrass	DAPU7	Dasyochloa pulchella	0–6	_
	nineawn pappusgrass	ENDE	Enneapogon desvauxii	0–6	_
	alkali sacaton	SPAI	Sporobolus airoides	0–6	_
4	perennial threeawns			18–112	
	Fendler threeawn	ARPUL	Aristida purpurea var. longiseta	6–39	_
	poverty threeawn	ARDI5	Aristida divaricata	6–39	_
	spidergrass	ARTE3	Aristida ternipes	6–39	_
	spidergrass	ARTEG	Aristida ternipes var. gentilis	1–28	_
	purple threeawn	ARPU9	Aristida purpurea	0–28	_
	Parish's threeawn	ARPUP5	Aristida purpurea var. parishii	0–17	_
	Havard's threeawn	ARHA3	Aristida havardii	0–17	_
	Wooton's threeawn	ARPA9	Aristida pansa	0–17	_
	blue threeawn	ARPUN	Aristida purpurea var. nealleyi	0–11	_
5	annual grasses	•		19–168	
	little barley	HOPU	Hordeum pusillum	0–39	_
	Mexican sprangletop	LEFUU	Leptochloa fusca ssp. uninervia	1–39	_
	mucronate sprangeltop	LEPAB	Leptochloa panicea ssp. brachiata	1–39	_
	sixweeks threeawn	ARAD	Aristida adscensionis	6–39	_
	prairie threeawn	AROL	Aristida oligantha	6–39	_
	needle grama	BOAR	Bouteloua aristidoides	1–39	_
	Arizona signalgrass	URAR	Urochloa arizonica	1–39	_
	sixweeks fescue	VUOC	Vulpia octoflora	1–39	_
	tapertip cupgrass	ERACA	Eriochloa acuminata var. acuminata	0–28	_
	Mexican panicgrass	PAHI5	Panicum hirticaule	1–28	_
	Mexican lovegrass	ERME	Eragrostis mexicana	0–17	_

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	tufted lovegrass	ERPE	Eragrostis pectinacea	0–17	_
	desert lovegrass	ERPEM	Eragrostis pectinacea var. miserrima	0–17	_
	sticky sprangletop	LEVI5	Leptochloa viscida	0–17	_
	sixweeks grama	BOBA2	Bouteloua barbata	0–17	_
	Arizona brome	BRAR4	Bromus arizonicus	0–17	_
	feather fingergrass	CHVI4	Chloris virgata	1–17	_
	witchgrass	PACA6	Panicum capillare	0–11	_
	Bigelow's bluegrass	POBI	Poa bigelovii	0–11	_
	delicate muhly	MUFR	Muhlenbergia fragilis	0–6	_
	littleseed muhly	MUMI	Muhlenbergia microsperma	0–6	_
Forb					
6	perennial Forbs			17–78	
	desert globemallow	SPAM2	Sphaeralcea ambigua	6–22	_
	brownplume wirelettuce	STPA4	Stephanomeria pauciflora	0–17	_
	Lewis flax	LILE3	Linum lewisii	0–17	_
	lacy tansyaster	MAPI	Machaeranthera pinnatifida	0–17	_
	largeflower onion	ALMA4	Allium macropetalum	0–17	_
	weakleaf bur ragweed	AMCO3	Ambrosia confertiflora	1–17	_
	scarlet spiderling	BOCO	Boerhavia coccinea	0–17	_
	leatherweed	CRPO5	Croton pottsii	0–17	-
	bluedicks	DICA14	Dichelostemma capitatum	1–17	_
	spreading fleabane	ERDI4	Erigeron divergens	1–17	-
	wild dwarf morning- glory	EVAR	Evolvulus arizonicus	1–11	-
	Indian rushpea	HOGL2	Hoffmannseggia glauca	1–11	-
	spreading snakeherb	DYSCD	Dyschoriste schiedeana var. decumbens	1–11	-
	tufted evening primrose	OECA10	Oenothera caespitosa	1–11	-
	slimleaf bean	PHAN3	Phaseolus angustissimus	0–11	_
	Wright's cudweed	PSCAC2	Pseudognaphalium canescens ssp. canescens	0–11	-
	New Mexico fanpetals	SINE	Sida neomexicana	1–11	-
	American vetch	VIAM	Vicia americana	0–6	_
	Louisiana vetch	VILU	Vicia Iudoviciana	0–6	_
	Rocky Mountain zinnia	ZIGR	Zinnia grandiflora	1–6	_
	slender poreleaf	POGR5	Porophyllum gracile	0–6	_
	Greene's bird's-foot trefoil	LOGR4	Lotus greenei	0–6	-
	Wright's deervetch	LOWR	Lotus wrightii	0–6	_
	variableleaf bushbean	MAGI2	Macroptilium gibbosifolium	0–6	
	lyreleaf greeneyes	BELY	Berlandiera lyrata	0–6	
	whitemouth dayflower	COER	Commelina erecta	0–6	_
	fingerleaf gourd	CUDI	Cucurbita digitata	0–6	
	coyote gourd	CUPA	Cucurbita palmata	0–6	
	Cooley's bundleflower	DECO2	Desmanthus cooleyi	0–6	_

1			11	
southwestern mock vervain	GLGO	Glandularia gooddingii	0–6	-
small matweed	GUDE	Guilleminea densa	1–6	_
Arizona snakecotton	FRAR2	Froelichia arizonica	0–6	_
Arizona wrightwort	CAAR7	Carlowrightia arizonica	0–6	_
desert mariposa lily	CAKE	Calochortus kennedyi	0–6	_
sego lily	CANU3	Calochortus nuttallii	0–6	_
perennial rockcress	ARPE2	Arabis perennans	0–6	_
dwarf desertpeony	ACNA2	Acourtia nana	0–6	_
ragged nettlespurge	JAMA	Jatropha macrorhiza	0–3	_
wishbone-bush	MILAV	Mirabilis laevis var. villosa	0–2	_
desert tobacco	NIOB	Nicotiana obtusifolia	0–2	_
velvetseed milkwort	POOB	Polygala obscura	0–2	_
orange fameflower	PHAU13	Phemeranthus aurantiacus	0–2	_
ivyleaf groundcherry	PHHE4	Physalis hederifolia	0–2	_
silverleaf nightshade	SOEL	Solanum elaeagnifolium	0–2	_
hairy fournwort	TENE	Tetramerium nervosum	0–2	_
slimflower scurfpea	PSTE5	Psoralidium tenuiflorum	0–2	_
canaigre dock	RUHY	Rumex hymenosepalus	0–2	_
twinleaf senna	SEBA3	Senna bauhinioides	0–2	_
Lemmon's ragwort	SELE8	Senecio lemmonii	0–2	_
brownfoot	ACWR5	Acourtia wrightii	0–2	_
San Felipe dogweed	ADPO	Adenophyllum porophylloides	0–2	_
trailing windmills	ALIN	Allionia incarnata	0–2	_
tuber anemone	ANTU	Anemone tuberosa	0–2	_
New Mexico silverbush	ARNE2	Argythamnia neomexicana	0–2	_
southwestern pricklypoppy	ARPL3	Argemone pleiacantha	0–2	_
Watson's dutchman's pipe	ARWA	Aristolochia watsonii	0–2	-
dense ayenia	AYMI	Ayenia microphylla	0–2	_
hairyseed bahia	BAAB	Bahia absinthifolia	0–2	_
desert marigold	BAMU	Baileya multiradiata	0–2	_
rose heath	CHER2	Chaetopappa ericoides	0–2	_
beeblossom	GAURA	Gaura	0–2	_
Trans-Pecos thimblehead	HYWI	Hymenothrix wislizeni	0–2	_
Wright's thimblehead	HYWR	Hymenothrix wrightii	0–2	_
branched noseburn	TRRA5	Tragia ramosa	0–2	-
desert larkspur	DEPA	Delphinium parishii	0–1	_
jewels of Opar	TAPA2	Talinum paniculatum	0–1	_
Coulter's wrinklefruit	TECO	Tetraclea coulteri	0–1	-
pricklyleaf dogweed	THAC	Thymophylla acerosa	0–1	_
copper zephyrlily	ZELO	Zephyranthes longifolia	0–1	_
shrubby purslane	POSU3	Portulaca suffrutescens	0–1	_

	false springparsley	PSEUD4	Pseudocymopterus	0–1	_
	San Pedro daisy	LAPO4	Lasianthaea podocephala	0–1	_
	narrowleaf stoneseed	LIIN2	Lithospermum incisum	0–1	_
7	annual forbs			19–168	
	tanseyleaf tansyaster	MATA2	Machaeranthera tanacetifolia	1–56	_
	intermediate pepperweed	LEVIM	Lepidium virginicum var. medium	1–39	_
	slender goldenweed	MAGR10	Machaeranthera gracilis	1–39	_
	Coulter's spiderling	BOCO2	Boerhavia coulteri	1–39	_
	carelessweed	AMPA	Amaranthus palmeri	1–39	_
	goosefoot	CHENO	Chenopodium	1–39	-
	sensitive partridge pea	CHNI2	Chamaecrista nictitans	1–39	-
	western tansymustard	DEPI	Descurainia pinnata	1–39	-
	longleaf false goldeneye	HELOA2	Heliomeris longifolia var. annua	1–39	-
	sprucetop grama	BOCH	Bouteloua chondrosioides	8–39	_
	black grama	BOER4	Bouteloua eriopoda	8–39	-
	hairy grama	BOHI2	Bouteloua hirsuta	8–39	-
	purple grama	BORA	Bouteloua radicosa	8–39	_
	Rothrock's grama	BORO2	Bouteloua rothrockii	8–39	_
	squirreltail	ELELE	Elymus elymoides ssp. elymoides	8–39	_
	common wolfstail	LYPH	Lycurus phleoides	8–39	-
	bush muhly	MUPO2	Muhlenbergia porteri	8–39	_
	creeping muhly	MURE	Muhlenbergia repens	8–39	_
	Hall's panicgrass	PAHA	Panicum hallii	8–39	_
	whiplash pappusgrass	PAVA2	Pappophorum vaginatum	8–39	_
	burrograss	SCBR2	Scleropogon brevifolius	8–39	_
	spike dropseed	SPCO4	Sporobolus contractus	8–39	_
	sand dropseed	SPCR	Sporobolus cryptandrus	8–39	_
	big sacaton	SPWR2	Sporobolus wrightii	8–39	_
	Texas fluffgrass	TRTE2	Tridens texanus	8–39	_
	Arizona poppy	KAGR	Kallstroemia grandiflora	1–28	_
	shaggyfruit pepperweed	LELA	Lepidium lasiocarpum	1–28	-
	desert Indianwheat	PLOV	Plantago ovata	1–28	-
	woolly plantain	PLPA2	Plantago patagonica	0–28	_
	purslane	PORTU	Portulaca	1–28	_
	spreading fanpetals	SIAB	Sida abutifolia	1–17	_
	woolly tidestromia	TILA2	Tidestromia lanuginosa	0–17	_
	Gordon's bladderpod	LEGO	Lesquerella gordonii	0–17	_
	foothill deervetch	LOHU2	Lotus humistratus	0–17	_
	coastal bird's-foot trefoil	LOSAB	Lotus salsuginosus var. brevivexillus	0–17	_
	whitestem blazingstar	MEAL6	Mentzelia albicaulis	0–17	_
	Nuttall's povertyweed	MONU	Monolepis nuttalliana	0–17	_
	green carpetweed	MOVE	Mollugo verticillata	0–17	_

1	1		-		
	combseed	PECTO	Pectocarya	0–17	_
	manybristle chinchweed	PEPA2	Pectis papposa	0–17	_
	curlytop gumweed	GRNUA	Grindelia nuda var. aphanactis	0–17	-
	camphorweed	HESU3	Heterotheca subaxillaris	0–17	_
	manystem woolly sunflower	ERMU6	Eriophyllum multicaule	0–17	_
	sorrel buckwheat	ERPO4	Eriogonum polycladon	1–17	_
	California poppy	ESCAM	Eschscholzia californica ssp. mexicana	0–17	-
	New Mexico thistle	CINE	Cirsium neomexicanum	1–17	_
	milkvetch	ASTRA	Astragalus	0–17	_
	wheelscale saltbush	ATEL	Atriplex elegans	0–17	-
	fringed redmaids	CACI2	Calandrinia ciliata	0–17	-
	miner's lettuce	CLPEP	Claytonia perfoliata ssp. perfoliata	0–11	-
	scrambled eggs	COAU2	Corydalis aurea	0–6	-
	cryptantha	CRYPT	Cryptantha	0–6	-
	American wild carrot	DAPU3	Daucus pusillus	0–6	_
	fivewing spiderling	BOIN	Boerhavia intermedia	0–6	_
	hoary bowlesia	BOIN3	Bowlesia incana	0–6	_
	bristly fiddleneck	AMTE3	Amsinckia tessellata	0–6	-
	aster	ASTER	Aster	0–6	-
	spurge	EUPHO	Euphorbia	1–6	_
	star gilia	GIST	Gilia stellata	0–6	_
	pearly globe amaranth	GONI	Gomphrena nitida	1–6	_
	Texas stork's bill	ERTE13	Erodium texanum	0–6	_
	wedgeleaf draba	DRCU	Draba cuneifolia	0–6	_
	crestrib morning-glory	IPCO2	Ipomoea costellata	0–6	_
	flatcrown buckwheat	ERDE6	Eriogonum deflexum	0–6	_
	phacelia	PHACE	Phacelia	0–6	-
	phlox	PHLOX	Phlox	0–6	-
	Arizona popcornflower	PLAR	Plagiobothrys arizonicus	0–6	-
	Arizona lupine	LUAR4	Lupinus arizonicus	0–6	_
	Coulter's lupine	LUSP2	Lupinus sparsiflorus	0–6	_
	hollowleaf annual lupine	LUSU3	Lupinus succulentus	0–6	_
	Thurber's morning-glory	IPTH	Ipomoea thurberi	0–6	_
	plains flax	LIPU4	Linum puberulum	0–6	
	sawtooth sage	SASU7	Salvia subincisa	0–6	-
	oneseed bur cucumber	SIAN	Sicyos angulatus	0–6	
	sleepy silene	SIAN2	Silene antirrhina	0–6	_
	New Mexico copperleaf	ACNE	Acalypha neomexicana	0–6	_
	desert unicorn-plant	PRAL4	Proboscidea althaeifolia	0–2	
	doubleclaw	PRPA2	Proboscidea parviflora	0–2	
	New Mexico plumeseed	RANE	Rafinesquia neomexicana	0–2	_

	golden crownbeard	VEEN	Verbesina encelioides	0–2	-
	warty caltrop	KAPA	Kallstroemia parviflora	0–2	_
	redstar	IPCO3	Ipomoea coccinea	0–2	-
	Arizona blanketflower	GAAR2	Gaillardia arizonica	0–2	-
	sacred thorn-apple	DAWR2	Datura wrightii	0–2	_
	sanddune wallflower	ERCA14	Erysimum capitatum	0–1	
	Fendler's desertdandelion	MAFE	Malacothrix fendleri	0–1	-
Shru	b/Vine	•	•	•	
8	dominant half shrubs			6–62	
	fairyduster	CAER	Calliandra eriophylla	6–39	_
	bastardsage	ERWR	Eriogonum wrightii	0–17	-
	littleleaf ratany	KRER	Krameria erecta	0–17	-
	trailing krameria	KRLA	Krameria lanceolata	0–6	_
	yerba de pasmo	BAPT	Baccharis pteronioides	0–6	_
9	succulent shrubs	ł	•	2–39	
	cactus apple	OPEN3	Opuntia engelmannii	1–11	-
	purple pricklypear	OPMAM	Opuntia macrocentra var. macrocentra	0–11	_
	banana yucca	YUBA	Yucca baccata	0–11	-
	soaptree yucca	YUEL	Yucca elata	1–11	_
	Palmer's century plant	AGPA3	Agave palmeri	0–11	_
	Parry's agave	AGPA4	Agave parryi	0–11	_
	candy barrelcactus	FEWI	Ferocactus wislizeni	0–11	_
	staghorn cholla	CYVE3	Cylindropuntia versicolor	0–11	_
	Arizona pencil cholla	CYAR14	Cylindropuntia arbuscula	0–6	_
	jumping cholla	CYFU10	Cylindropuntia fulgida	0–6	_
	Christmas cactus	CYLE8	Cylindropuntia leptocaulis	0–6	-
	walkingstick cactus	CYSP8	Cylindropuntia spinosior	0–6	_
	tulip pricklypear	OPPH	Opuntia phaeacantha	0–6	-
	Santa Rita pricklypear	OPSA	Opuntia santa-rita	0–6	-
	sacahuista	NOMI	Nolina microcarpa	0–2	-
	beehive cactus	CORYP	Coryphantha	0–2	-
	hedgehog cactus	ECHIN3	Echinocereus	0–2	-
	rainbow cactus	ECPEP	Echinocereus pectinatus var. pectinatus	0–1	-
	spinystar	ESVI2	Escobaria vivipara	0–1	-
	little nipple cactus	MAHE2	Mammillaria heyderi	0–1	-
10	increaser half shrubs			2–28	
	broom snakeweed	GUSA2	Gutierrezia sarothrae	1–22	-
	burroweed	ISTE2	Isocoma tenuisecta	1–22	-
	turpentine bush	ERLA12	Ericameria laricifolia	0–11	-
	threadleaf snakeweed	GUMI	Gutierrezia microcephala	0–11	-
11	miscellaneous shrubs			0–28	
	catclaw acacia	ACGR	Acacia greggii	0–11	-

	pale desert-thorn	LYPA	Lycium pallidum	0–11	_
	catclaw mimosa	MIACB	Mimosa aculeaticarpa var. biuncifera	0–11	_
	velvetpod mimosa	MIDY	Mimosa dysocarpa	0–11	_
	longleaf jointfir	EPTR	Ephedra trifurca	0–6	_
	ocotillo	FOSP2	Fouquieria splendens	0–6	_
	littleleaf sumac	RHMI3	Rhus microphylla	0–6	_
	fourwing saltbush	ATCA2	Atriplex canescens	0–6	_
	yerba de pasmo	BAPT	Baccharis pteronioides	0–6	-
	spiny hackberry	CEEH	Celtis ehrenbergiana	0–6	-
	knifeleaf condalia	COSP3	Condalia spathulata	0–6	-
	whitethorn acacia	ACCO2	Acacia constricta	0–6	_
	Warnock's snakewood	COWA	Condalia warnockii	0–2	_
	ragwort	SENEC	Senecio	0–2	_
	desert zinnia	ZIAC	Zinnia acerosa	0–2	_
	whitestem paperflower	PSCO2	Psilostrophe cooperi	0–2	_
	winterfat	KRLA2	Krascheninnikovia lanata	0–1	_
	desert-thorn	LYCIU	Lycium	0–1	_
	American tarwort	FLCE	Flourensia cernua	0–1	_
	lotebush	ZIOB	Ziziphus obtusifolia	0–1	_
Tree	•	-			
12	trees			0–17	
	western honey mesquite	PRGLT	Prosopis glandulosa var. torreyana	0–11	_
	velvet mesquite	PRVE	Prosopis velutina	0–6	_
	oneseed juniper	JUMO	Juniperus monosperma	0–6	_

# Animal community

The plant community on this site is suitable for grazing at any season by all classes of cattle. Clayey soils release moisture to plants slowly making for a long summer green season. Care must be taken to avoid overuse of palatable perennial grasses in attempts to utilize tobosa grass on the site. Areas of this site are often associated with large areas of Clayey Upland ecological site, dominated by tobosa grass. In these situations, livestock concentrate on areas of this site before using tobosa areas. Fencing and grazing systems are needed to adequately manage the plant community which consists of nearly equal amounts of palatable perennial grasses and the very unpalatable, tobosa grass. Dark colored soils with good organic matter and quantities of exchangeable bases produce good quality herbaceous forage. Protein will be deficient in the winter on this site.

Water developments are very important to wildlife species on this site. Being open grassland, this site is home to a variety of small herbivores, birds, and their associated predators. With the exception of antelope, larger wildlife species use this site mainly as a foraging area.

# Hydrological functions

Heavy soil textures at the surface reduce the infiltration of high intensity, summer rainfall. The site is very sensitive to loss of perennial grass cover and runoff greatly increases under these circumstances. These soils can compact easily when moist and further reduce the effectiveness of warm season moisture in penetrating the soil.

### **Recreational uses**

Hunting, hiking, horseback riding, photography and bird-watching.

# Wood products

Mesquite remains shrubby on this site due to clayey soil textures at the surface. Mesquite offers little more than fuel wood for campfires or branding fires and nothing big enough for posts or stays.

## Inventory data references

Range 417s include 3 in excellent condition, 8 in good condition and 8 in fair condition.

## **Type locality**

Location 1: Cochise County, AZ					
Township/Range/Section	T23S R27E S4				
General legal description	Douglas International Airport				
Location 2: Cochise County, AZ					
Township/Range/Section	T13S R22E S33				
Concret logal description	Markerset Devel				

# Contributors

Dan Robinett Larry D. Ellicott Steve Barker Unknown

# 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, Dave Womack, Dan Robinett, Emilio Carrillo
Contact for lead author	USDA-NRCS Tucson MLRA Soil Survey Office
Date	07/22/2013
Approved by	Curtis Talbot
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

#### Indicators

1. Number and extent of rills: None present on this site.

- Number and height of erosional pedestals or terracettes: Accumulated pedestals are 1 inch tall and are common on perennial grass plants. The presence of terracettes depends on slope; terrecettes are very uncommon on low slopes (1-2%) and become common, with heights between 1-2 inches, as slopes increase (3-6%).
- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground): Estimated from 200 points at 55%. This site is characterized by perennial grass patches alternating with bare areas 10-20 feet in diameter.
- 5. Number of gullies and erosion associated with gullies: None present on this site.
- 6. Extent of wind scoured, blowouts and/or depositional areas: None present on this site.
- 7. Amount of litter movement (describe size and distance expected to travel): All litter size classes staying in place.
- Soil surface (top few mm) resistance to erosion (stability values are averages most sites will show a range of values): No slake test done; expect values of 1-2 in bare ground areas and 4-6 in canopy areas.
- 9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Thin (1/8 inch) rain drop compacted laminar layer, weak granular; Color is 10YR5/4 Dry, 10YR3/4 Moist; A horizon to 2 inches.
- 10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Cover estimated from 200 points was: Canopy 9%, Basal 9%, Litter 8%, and Gravel 18%; 85% of canopy cover is perennial grasses and 13% is subshrubs and 2% shrubs & succulents. Cover is relatively well dispersed throughout site, with bare patches 10-20 feet wide dispersed throughout site. Bare areas tend to shed water into the grassy areas.
- 11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): None present on this site. Penetrometer tests with weight dropped 5 times at a distance from top of weight to top of impact ring = 2.24 feet were: average = 2.91 inches, s.d = 0.40 inches. Subsurface argillic horizon may be mistaken for compaction.
- 12. Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):

Dominant: Perennial grass >>

Sub-dominant: subshrubs > annual forbs > shrubs > perennial

forbs > succulents

Other:

Additional:

- 13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): 20% basal mortality (prior years mortality not well evidenced).
- 14. Average percent litter cover (%) and depth ( in):
- 15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annualproduction): 600 lbs/acre unfavorable precipitation, 1,000 lbs/acre normal precipitation, 1,500 lbs/acre favorable precipitation.
- 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: Snakeweed, burroweed
- 17. **Perennial plant reproductive capability:** Not affected even following several years of prolonged drought period for region.