USDA Natural Resources Conservation Service

Ecological site R041XC313AZ
Loamy 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.

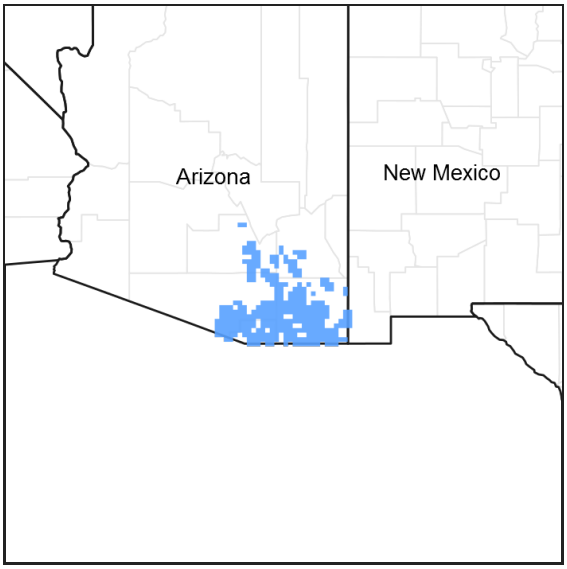


Figure 1. Mapped extent

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, Chihuahuan – Sonoran Semidesert Grasslands. 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 Loamy 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

Loamy Upland, 12"-16" p.z., is found on upland landscapes with deep soils with an argillic horizon underlying loam textured soil or, when the soil above the argillic is sandy loam textured, it is less than 4" thick.

Associated sites

R041XC318AZ	**Sandy Loam 12-16" p.z. Deep** gently sloping areas with thicker sandy loam surface over argillic subsurface
R041XC314AZ	**Loamy Slopes 12-16" p.z.** adjacent slopes with deep, non-calcareous soils

Similar sites

R041XA108AZ	**Loamy Upland 16-20" p.z.** elevation range 4,500-6,500 ft.; precipitation zone 16-20"
R041XB210AZ	**Loamy Upland 8-12" p.z.** elevation range 2,600-4,500 ft.; precipitation zone 8-12"

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *calliandra eriophylla* (2) *krameria erecta*
Herbaceous	(1) *bouteloua curtipendula* (2) *bouteloua chondrosioides*

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.

Table 2. Representative physiographic features

Landforms	(1) Fan piedmont (2) Stream terrace (3) Plain
Flooding frequency	None
Ponding frequency	None

Elevation	3,200–5,000 ft
Slope	1–15%
Aspect	Aspect is not a significant factor

Climatic features

Precipitation in this common resource area 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, originates 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 (characteristic range)	164-189 days
Freeze-free period (characteristic range)	193-213 days
Precipitation total (characteristic range)	13-15 in
Frost-free period (actual range)	163-199 days
Freeze-free period (actual range)	192-237 days
Precipitation total (actual range)	13-17 in
Frost-free period (average)	178 days
Freeze-free period (average)	207 days
Precipitation total (average)	15 in

Climate stations used

- (1) DOUGLAS [USC00022659], Douglas, AZ
- (2) TOMBSTONE [USC00028619], Tombstone, AZ
- (3) WILLCOX [USC00029334], Willcox, AZ
- (4) NOGALES 6 N [USC00025924], Rio Rico, AZ
- (5) PEARCE - SUNSITES [USC00026353], Pearce, AZ

Influencing water features

There are no water features associated with this site.

Soil features

These soils are deep soils which have formed in loamy alluvium of mixed origin. Soil surfaces range from very gravelly sandy loam to loam. Sandy loam surfaces can be no thicker than four inches (eight inches for GRV-SL) and not less than one inch. They are not calcareous in the upper 20 inches. These soils have argillic horizons near the surface. They may have calcic horizons at moderate depths (20 to 40 inches). Plant-soil moisture relationships are fair to good. Soil surfaces are dark colored. Soil series representative of this ecological site are Whitehouse and

McAllister; several other series have been correlated to 41-3 Loamy Upland, 12-16” p.z., including among others, Sasabe, Wampoo, Chiricahua, Continental, and Whitehouse GrL.

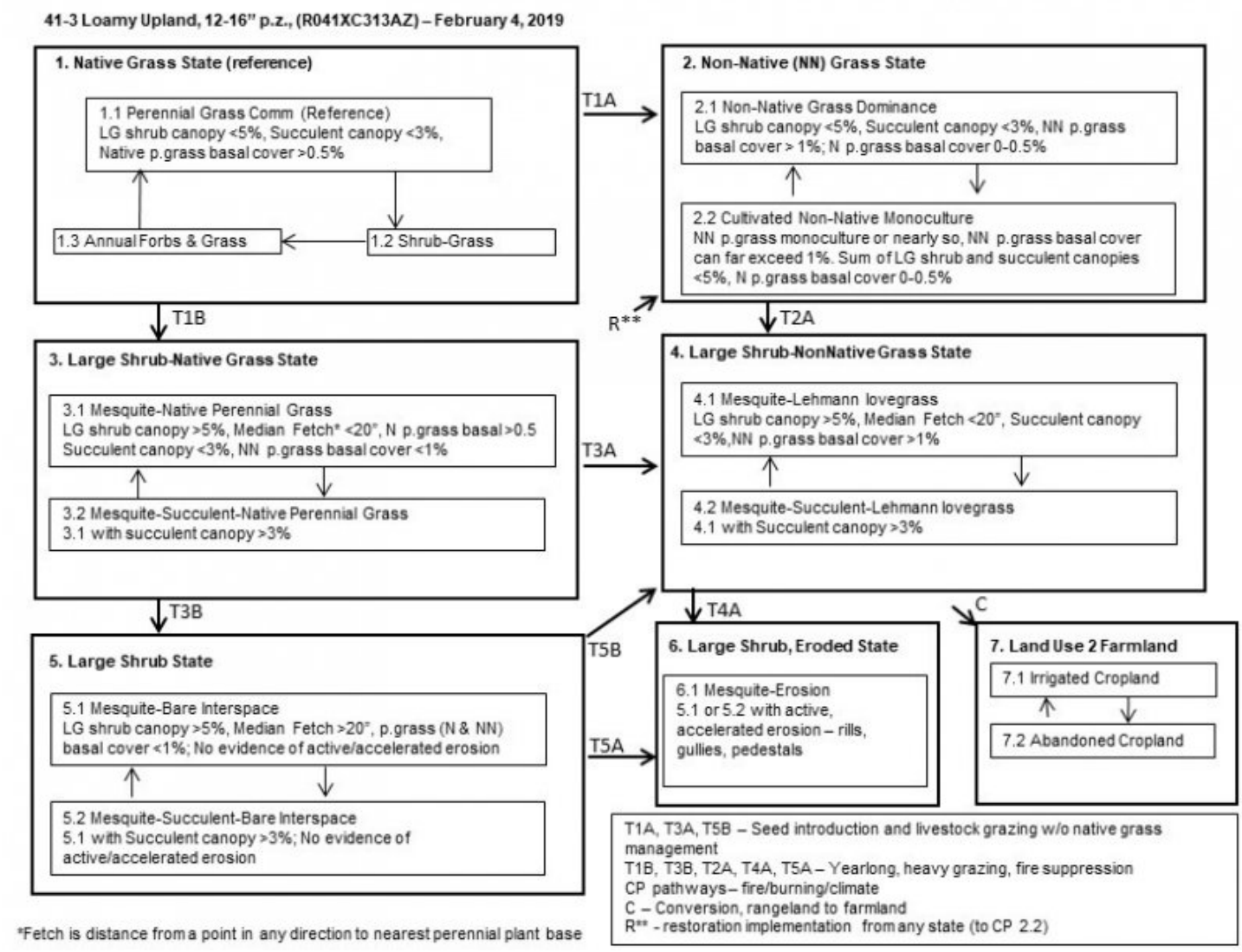
Table 4. Representative soil features

Parent material	(1) Alluvium–igneous, metamorphic and sedimentary rock
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	60 in
Surface fragment cover <=3"	5–40%
Surface fragment cover >3"	0–15%
Available water capacity (0-40in)	4.8–9.6 in
Calcium carbonate equivalent (0-40in)	1–25%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–40%
Subsurface fragment volume >3" (Depth not specified)	0–15%

Ecological dynamics

Loamy Upland, 12"-16" pz, ecological site is a desert grassland. Plant community variation occurs along the precipitation gradient 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), patches of short-grasses dominate over mid-grasses; while at the high end of the precipitation gradient (and with increased depth to argillic), mid-grasses dominate and bare areas diminish. Fire dynamically maintains the grassland aspect by killing seedling mesquite, other small shrubs, and half shrubs. Larger mesquite and other re-sprouting species are top-killed. Fire effects on perennial grasses will be variable with species, season of burning, and fire intensity. Alternate states arise from removal of fuel and introduction of non-native lovegrasses. Aspect is open grassland.

State and transition model



Land use 1
Rangeland

Rangeland uses of Loamy Upland, 12-16" pz., are most commonly livestock grazing, wildlife management and recreation; environmental services are many. Natural disturbances are fire, weather events, natural climatic cycling, and wildlife.

State 1.1
Native Grass (Reference)

The Native Grass (Reference) State is characterized by the open grassland aspect, with a wide variety of native perennial grasses dominating the plant community.

Characteristics and indicators. Native perennial grass basal cover ≥ 0.5%, large shrub (mesquite) canopy <5%, and succulent canopy <3%.

Dominant plant species

- velvet mesquite (*Prosopis velutina*), shrub
- fairyduster (*Calliandra eriophylla*), shrub
- ratany (*Krameria*), shrub
- broom snakeweed (*Gutierrezia sarothrae*), shrub
- blue grama (*Bouteloua gracilis*), grass
- sideoats grama (*Bouteloua curtipendula*), grass
- curly-mesquite (*Hilaria belangeri*), grass
- cane bluestem (*Bothriochloa barbinodis*), grass

Community 1.1.1
Native Perennial Grass (Reference)

Figure 8. Loamy Upland 12-16" pz. Dos Cabezas Cemetary

The potential plant community on this site is dominated by warm season perennial grasses. All the major perennial grass species on the site are well dispersed throughout the plant community. Perennial forbs and a few species of low shrubs are well represented on the site. The aspect is open grassland. With continuous heavy grazing, palatable perennial grasses like blue, hairy, sprucetop and sideoats gramas decrease. Increasers under such circumstances include curly mesquite, threeawns and, in places, false mesquite. With severe deterioration, shrubby species increase to dominate. Loss of porous surface soil causes a reduction in the site's ability to effectively use intense summer rainfall. Natural fire was important in the development of the potential plant community. Stable areas of the site can produce effective herbaceous covers with up to 5% canopy cover of mesquite. In areas where half-shrubs dominate the under-story, the potential production of perennial grass is about the same as the present production of half-shrubs once they are removed from the plant community by fire or brush management.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	546	850	1350
Forb	20	45	225
Shrub/Vine	53	100	210
Tree	0	5	15
Total	**619**	**1000**	**1800**

Table 6. Soil surface cover

Tree basal cover	0-1%
Shrub/vine/liana basal cover	1-5%
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"	5-40%
Surface fragments >3"	0-15%
Bedrock	0%
Water	0%

Bare ground	15-25%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	1-10%	10-25%	0-5%
>0.5 <= 1	–	1-10%	10-25%	0-2%
>1 <= 2	–	0-5%	10-15%	0-2%
>2 <= 4.5	–	0-1%	1-5%	–
>4.5 <= 13	0-1%	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Figure 10. Plant community growth curve (percent production by month). AZ4134, 41.3 12-16" p.z. other sites. Growth begins in the spring, semi-dormancy occurs during the May through June drought, most growth occurs during the summer rains..

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

Community 1.1.2
Small Shrub-Native Grass

The small shrub, decadent grass community phase occurs after several fire-free years and average or above average rainfall period. Perennial grass litter accumulates and live basal cover may contract. Small shrub population reflects winter moisture dynamics with a flourish of germination and increase canopy cover following wet winters.

Community 1.1.3
Annual Forbs and Grasses

Annual forbs and annual grasses dominate this plant community phase while perennial grasses and half shrubs are diminished after fire or extended drought. This CP is extremely vulnerable to non-native perennial grass germination from a latent soil seedbank.

Pathway P1.1a
Community 1.1.1 to 1.1.2

Disturbance free plant growth and decadence.

Pathway P1.2a
Community 1.1.2 to 1.1.3

Fire

Pathway P1.3a
Community 1.1.3 to 1.1.1

Post-fire regrowth

State 1.2

Non-Native Grass

Non-native lovegrass basal cover is more than 1% within the plant community; native perennial grass basal cover is diminished. Large shrubs are scattered with less than 5% canopy cover. Fire may act to increase exotic lovegrass at the expense of native perennial grasses, but may allow native annual species a chance to make seed and persist in the seed-bank. Some soil compaction has occurred due to livestock traffic, but hydrologic relationships have not been impaired

Characteristics and indicators. Large shrub canopy <5%; succulent canopy <3%; Non-native perennial grass basal cover >1%; native perennial grass basal cover 0-5%

Dominant plant species

- fairyduster (*Calliandra eriophylla*), shrub
- littleleaf ratany (*Krameria erecta*), shrub
- Lehmann lovegrass (*Eragrostis lehmanniana*), grass
- weeping lovegrass (*Eragrostis curvula*), grass

Dominant resource concerns

- Plant productivity and health
- Plant structure and composition
- Feed and forage imbalance
- Inadequate livestock shelter
- Inadequate livestock water quantity, quality, and distribution

Community 1.2.1
Lehmann Lovegrass

A suite of African lovegrasses can become entrenched on this ecological site; Lehmann lovegrass is the most common and has been seen to persist in the plant community once its basal cover exceeds 1%. The native perennial grasses can remain until a disturbance, such as drought, fire, yearlong or heavy growing season grazing, depletes vigor or causes perennial grass mortality. Large shrub and succulent canopy percentages are similar to State 1.

Community 1.2.2
Cultivated non-native grass monoculture

Non-native perennial grasses prevail across this LRU, with a seedbank that may or may not be readily apparent on site. A non-native perennial grass monoculture results from application several restoration practices applied to any of Loamy Upland States. Most commonly, brush management or mechanical land treament (ripping) is applied to remove mesquite dominance and reduce erosion (from States 4 or 5, for example). While species like Lehmann, Boer, Wilman and Cochise lovegrass may be seeded, non-native perennial grasses will likely invade the site regardless because of their overwhelming presence across this LRU. With good grazing management, hydrologic relationships are good and non-native grass productivity remains high (although protein and nutrient values of LL are negligible). Treated areas typically have reduced runoff for long periods of time, depending on grazing management. Mesquite and other shrubs will re-invade these areas making brush management maintenance treatment necessary within 10-15 years.

State 1.3
Large Shrub, Native Grass

The open aspect is interrupted by large shrubs. The perennial grass community is diminished in diversity and basal cover.

Characteristics and indicators. Large shrub canopy >5%, median fetch* <20”, native perennial grass basal cover 0.5%, NN p.grass basal cover <1%; succulents may or may not be dominant, see CPs. *Fetch is distance from a point in any direction to nearest perennial plant base

Dominant plant species

- velvet mesquite (*Prosopis velutina*), shrub
- blue grama (*Bouteloua gracilis*), grass
- curly-mesquite (*Hilaria belangeri*), grass

Dominant resource concerns

- Feed and forage imbalance
- Inadequate livestock water quantity, quality, and distribution

Community 1.3.1
Mesquite, Native Perennial Grass

Mesquite increases in the absence of fire for long periods of time. Native perennial grasses maintain dominance with good grazing management; mesquite canopy levels are from 5 to 10%. Short gramas and curly mesquite are dominant and the site remains stable as long as their basal cover does not drop below 6 or 7%. Snakeweed and burroweed cycle with climate but never gain dominance. Some soil compaction has occurred due to livestock traffic, but hydrologic relationships are not impaired.

Community 1.3.2
Mesquite, Succulent, Native Perennial Grass

Succulents, once established within the plant community, expand in canopy coverage until removed by fire.

Pathway P3.1a
Community 1.3.1 to 1.3.2

Fire-free period

Pathway P3.2a
Community 1.3.2 to 1.3.1

Prescribed burning and prescribed grazing.

State 1.4

Large Shrub, Non-native Grass

Large shrubs and non-native lovegrasses are co-dominant. Native perennial grasses may remain intact, generally under large shrub canopies. Non-native perennial grasses include African lovegrasses (most commonly Lehmann and Cochise lovegrasses) and, at the low and high elevations of this LRU, bufflegrass and yellow bluestem, respectively. The large shrubs are resistant to fire mortality and burning will not affect their removal from the plant community. Repeated burning or heavy grazing negatively affects the perennial grasses and puts the site at risk of excessive soil erosion. In these areas, mechanical brush management will likely result in transitioning the site to State 2, with a loss of native grasses, both their productivity and diversity.

Characteristics and indicators. Large shrub canopy >5%, median fetch* <20”, NN p.grass basal cover >1%; succulent canopy fluctuates, see CPs. Native perennial grass basal cover 0-5%. *Fetch is distance from a point in any direction to nearest perennial plant base

Dominant plant species

- velvet mesquite (*Prosopis velutina*), shrub
- Lehmann lovegrass (*Eragrostis lehmanniana*), grass
- weeping lovegrass (*Eragrostis curvula*), grass
- yellow bluestem (*Bothriochloa ischaemum*), grass

Community 1.4.1
Mesquite, Lehmann lovegrass

Community 1.4.2
Mesquite, Succulents, Lehmann lovegrass

State 1.5
Large Shrub

Mesquite and other large shrubs have increased and are dominant with canopies greater than 5%. Native and non-native annual forbs and grasses, both cool and warm season, dominate the under-story. Snakeweed and burroweed cycle with climate, but both remain important in the plant community. Native perennial grasses are largely gone, due to the interactions of drought, fire and continuous, heavy grazing. Areas located close to mountains usually have higher soil cover of cobbles and gravel, thus, exhibit inherent soil and site stability. Hydrologic relationships have changed to increase the amount of runoff. Loamy upland in this State is at risk to transition to State 6 (Large Shrub, Eroded).

Characteristics and indicators. Large shrub canopy >5%, Median Fetch* >20”, perennial grass basal cover <1%, no evidence of active, accelerated erosion *Fetch is distance from a point in any direction to nearest perennial plant base

Dominant plant species

- velvet mesquite (*Prosopis velutina*), shrub

- burroweed (*Isocoma tenuisecta*), shrub
- broom snakeweed (*Gutierrezia sarothrae*), shrub

Dominant resource concerns

- Plant productivity and health
- Plant structure and composition
- Feed and forage imbalance
- Inadequate livestock water quantity, quality, and distribution

Community 1.5.1
Mesquite, bare interspace

The Mesquite-Bare Interspace Plant community is dominated by mesquite and other large shrubs with and understory of half-shrubs, snakeweed and burroweed; miscellaneous perennial forbs and annuals occur within the confines of the shrubs. Interspaces are open, herbaceous litter is moved by wind and water until obstructed. Remnant perennial grasses, such as bush muhly and plains bristlegrass, may occur well within protection of shrubs and indicate a seed source. Succulents are not dominant in this community phase.

Community 1.5.2
Mesquite, succulent, bare

The Mesquite-Succulent-Bare Interspace Plant community is dominated by mesquite and other large shrubs with and understory of half-shrubs and succulents (prickly pear and cane cholla). Interspaces are open, herbaceous litter is moved by wind and water until obstructed. Remnant perennial grasses, such as bush muhly and plains bristlegrass, may occur well within protection of shrubs and indicate a seed source. Succulents will continue growth until fine fuels accumulate to carry fire, such as after extremely wet spring flourish of annual forbs.

State 1.6
Large Shrub, Eroded

The Large Shrub, Eroded State is very similar in structure to States 4 and 5 (mesquite dominated, half-shrub understory), however, the soil erosion threshold has been crossed; active, extreme soil loss (exposed argillic horizon, rills, pedestals, gullies) is occurring. Snakeweed and burroweed cycle with climate, but both remain important in the plant community. Native perennial grasses are largely gone, due to the interactions of drought, fire and continuous, heavy grazing. Remnant non-native lovegrasses may be present. Hydrologic relationships are permanently altered. Restoration practices can be applied to slow erosion rates and trap sediments; paired with prescribed grazing, non-native lovegrasses will colonize the site resulting in Plant Community 2.2, Cultivated Lehmann lovegrass Community.

Characteristics and indicators. Large shrub canopy >5%, Median Fetch* >20”, perennial grass basal cover <1%, active, accelerated erosion as indicted by water flow patterns, litter dams, and rills *Fetch is distance from a point in any direction to nearest perennial plant base

Dominant resource concerns

- Sheet and rill erosion
- Plant productivity and health
- Plant structure and composition
- Feed and forage imbalance
- Inadequate livestock water quantity, quality, and distribution

Community 1.6.1
Mesquite, erosion

Mesquite dominates with active soil erosion in most interspaces (rills, exposed argillic horizon, gullies). Soil surface horizon is largely absent. Annual forbs and grasses are confined to shrubs. This plant community will not produce continuous fine fuels to carry fire.

Transition T1A
State 1.1 to 1.2

Seed introduction and livestock grazing w/o native grass management or spontaneous flourish of Lehmann lovegrass establishing from unknown seed bank following fire/drought.

Transition T1B
State 1.1 to 1.3

Extended fire-free interval (removal of fire fuel) and community composition changes by heavy, repeated or yearlong livestock grazing.

Transition T2A
State 1.2 to 1.4

Extended fire-free interval (removal of fire fuel) and community composition changes by yearlong or heavy livestock grazing.

Restoration pathway R**
State 1.3 to 1.2

From any Loamy Upland State, restoration practices applied to remove large shrub dominance or arrest accelerated erosion result in non-native perennial grass (Lehmann lovegrass) dominance.

Conservation practices

Brush Management
Prescribed Burning
Pond
Fence
Livestock Pipeline
Pond Sealing or Lining, Flexible Membrane
Pond Sealing or Lining, Soil Dispersant
Pond Sealing or Lining, Bentonite Sealant
Prescribed Grazing
Pumping Plant
Grazing Land Mechanical Treatment
Range Planting
Trails and Walkways
Spring Development
Animal Trails and Walkways
Watering Facility
Vegetated Treatment Area
Water Harvesting Catchment
Water Well
Upland Wildlife Habitat Management
Livestock Use Area Protection
Prescribed Grazing

Transition T3A
State 1.3 to 1.4

Seed introduction and livestock grazing w/o native grass management.

Transition T4A
State 1.4 to 1.6

Yearlong, heavy grazing, fire suppression

Transition T5B
State 1.5 to 1.4

Seed introduction and livestock grazing w/o native grass management

Transition T5A
State 1.5 to 1.6

Yearlong, heavy grazing, fire suppression

Land use 2
Cropland

Cropland includes areas used for the production of adapted crops for harvest. Two subcategories of cropland are recognized: cultivated and non-cultivated. Cultivated cropland comprises land in row crops or close-grown crops and also other cultivated cropland, for example, hay land or pastureland that is in a rotation with row or close-grown crops. Non-cultivated cropland includes permanent hay land and horticultural cropland. In this MLRA-LRU, cultivated cropland is the more common category of use; all cropland is irrigated. Several row crops and close-grown crops are grown including cotton, corn, chili, and small grains. Hay land crops, alfalfa and bermudagrass, are rotated on a 3-5 year cycle. When cropping and irrigation are suspended, annual forbs and annual grasses will dominate the newly barren field. Common annuals first to come in include Russian thistle, careless weed, and brome. Over time, shrubs and sub-shrubs will establish, initially in low-lying areas and eventually may come to dominate. Native perennial grasses will be largely absent; bermudagrass patches may establish in low-lying areas. Farm field maintenance, periodic tillage, will sustain the barren field with annual forbs and grasses. After farming, the site may be restored to an area suitable to a grazing use. However, long-lasting changes in soil structure, hydrology, and nutrient availability prevent the site from returning to the Rangeland State and Transition Model. Restoration practices may be implemented to attain achieve land use goals such as increased forage availability. A desired plant community that will persist without continued watering may seeded before cessation of irrigation.

Dominant resource concerns

- Sheet and rill erosion
- Wind erosion
- Ephemeral gully erosion
- Classic gully erosion
- Bank erosion from streams, shorelines, or water conveyance channels
- Subsidence
- Compaction
- Organic matter depletion
- Concentration of salts or other chemicals
- Aggregate instability
- Ponding and flooding
- Seasonal high water table
- Ground water depletion
- Naturally available moisture use
- Inefficient irrigation water use
- Nutrients transported to surface water
- Nutrients transported to ground water

- Pesticides transported to surface water
- Pesticides transported to ground water
- Pathogens and chemicals from manure, biosolids, or compost applications transported to surface water
- Pathogens and chemicals from manure, biosolids, or compost applications transported to ground water
- Salts transported to surface water
- Salts transported to ground water
- Petroleum, heavy metals, and other pollutants transported to surface water
- Petroleum, heavy metals, and other pollutants transported to ground water
- Sediment transported to surface water
- Elevated water temperature
- Emissions of particulate matter (PM) and PM precursors
- Emissions of greenhouse gases (GHGs)
- Emissions of ozone precursors
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates
- Feed and forage imbalance
- Inadequate livestock shelter
- Inadequate livestock water quantity, quality, and distribution
- Energy efficiency of equipment and facilities
- Energy efficiency of farming/ranching practices and field operations

Conversion C
Land use 1 to 2

Conversion from rangeland to cropland, requires extensive input into field and irrigation development.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant Mid Grasses**			300–500	
	sideoats grama	BOCU	*Bouteloua curtipendula*	200–500	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	50–200	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	50–200	–
2	**Dominant Short Grasses**			150–300	
	blue grama	BOGR2	*Bouteloua gracilis*	50–250	–
	sprucetop grama	BOCH	*Bouteloua chondrosioides*	50–100	–
	black grama	BOER4	*Bouteloua eriopoda*	50–100	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–50	–
	slender grama	BORE2	*Bouteloua repens*	0–50	–
	common wolfstail	LYPH	*Lycurus phleoides*	0–50	–
3	**Shortlived Grasses**			20–150	
	Rothrock's grama	BORO2	*Bouteloua rothrockii*	10–50	–
	curly-mesquite	HIBE	*Hilaria belangeri*	10–50	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–50	–
	Arizona muhly	MUAR3	*Muhlenbergia arizonica*	0–25	–
4	**Subdominant Mid Grasses**			10–150	
	Arizona cottontop	DICA8	*Digitaria californica*	5–50	–

	Arizona cottontop	BYCA3	*Digitaria californica*	0–50	
	bush muhly	MUPO2	*Muhlenbergia porteri*	0–50	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	5–50	–
	tanglehead	HECO10	*Heteropogon contortus*	0–40	–
5	**Perennial Threeawns**			50–100	
	spidergrass	ARTE3	*Aristida ternipes*	5–50	–
	spidergrass	ARTEG	*Aristida ternipes var. gentilis*	5–50	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	5–50	–
	poverty threeawn	ARDI5	*Aristida divaricata*	5–30	–
	purple threeawn	ARPU9	*Aristida purpurea*	0–25	–
	Parish's threeawn	ARPUP5	*Aristida purpurea var. parishii*	0–25	–
	Santa Rita threeawn	ARCAG	*Aristida californica var. glabrata*	0–15	–
	Havard's threeawn	ARHA3	*Aristida havardii*	0–10	–
	Wooton's threeawn	ARPA9	*Aristida pansa*	0–10	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	0–10	–
6	**Miscellaneous Grasses**			6–50	
	squirreltail	ELEL5	*Elymus elymoides*	5–50	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	0–25	–
	green sprangletop	LEDU	*Leptochloa dubia*	0–20	–
	vine mesquite	PAOB	*Panicum obtusum*	0–20	–
	whiplash pappusgrass	PAVA2	*Pappophorum vaginatum*	0–20	–
	purple grama	BORA	*Bouteloua radicosa*	0–20	–
	fall witchgrass	DICO6	*Digitaria cognata*	1–20	–
	red grama	BOTR2	*Bouteloua trifida*	0–10	–
	burrograss	SCBR2	*Scleropogon brevifolius*	0–10	–
	spike dropseed	SPCO4	*Sporobolus contractus*	0–5	–
	slim tridens	TRMU	*Tridens muticus*	0–5	–
	Hall's panicgrass	PAHA	*Panicum hallii*	0–5	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–5	–
	nineawn pappusgrass	ENDE	*Enneapogon desvauxii*	0–5	–
7	**Annual Grasses**			10–100	
	sixweeks threeawn	ARAD	*Aristida adscensionis*	1–50	–
	feather fingergrass	CHVI4	*Chloris virgata*	0–50	–
	needle grama	BOAR	*Bouteloua aristidoides*	1–50	–
	Mexican panicgrass	PAHI5	*Panicum hirticaule*	0–50	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	1–50	–
	mucronate sprangeltop	LEPAB	*Leptochloa panicea ssp. brachiata*	0–25	–
	sixweeks grama	BOBA2	*Bouteloua barbata*	1–25	–
	tapertip cupgrass	ERACA	*Eriochloa acuminata var. acuminata*	0–25	–
	prairie threeawn	AROL	*Aristida oligantha*	1–20	–
	tufted lovegrass	ERPE	*Eragrostis pectinacea*	0–20	–
	desert lovegrass	ERPEM	*Eragrostis pectinacea var. miserrima*	0–20	–
	Mexican sprangletop	LEFUU	*Leptochloa fusca ssp. uninervia*	0–20	–
	Arizona signalgrass	URAR	*Urochloa arizonica*	0–20	–

	Mexican lovegrass	ERME	*Eragrostis mexicana*	0–15	–
	littleseed muhly	MUMI	*Muhlenbergia microsperma*	0–10	–
	witchgrass	PACA6	*Panicum capillare*	0–10	–
	Parry's grama	BOPA2	*Bouteloua parryi*	0–10	–
	Arizona brome	BRAR4	*Bromus arizonicus*	0–5	–
	Bigelow's bluegrass	POBI	*Poa bigelovii*	0–5	–
	delicate muhly	MUFR	*Muhlenbergia fragilis*	0–5	–
Forb					
8	**Perennial Forbs**			5–75	
	weakleaf bur ragweed	AMCO3	*Ambrosia confertiflora*	1–25	–
	bluedicks	DICA14	*Dichelostemma capitatum*	1–20	–
	spreading fleabane	ERDI4	*Erigeron divergens*	1–20	–
	lacy tansyaster	MAPI	*Machaeranthera pinnatifida*	1–20	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	1–20	–
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	1–20	–
	New Mexico fanpetals	SINE	*Sida neomexicana*	0–10	–
	Rocky Mountain zinnia	ZIGR	*Zinnia grandiflora*	1–10	–
	Wright's deervetch	LOWR	*Lotus wrightii*	1–10	–
	Indian rushpea	HOGL2	*Hoffmannseggia glauca*	0–10	–
	slender janusia	JAGR	*Janusia gracilis*	0–10	–
	wild dwarf morning-glory	EVAR	*Evolvulus arizonicus*	1–10	–
	spreading snakeherb	DYSCD	*Dyschoriste schiedeana var. decumbens*	0–10	–
	dense ayenia	AYMI	*Ayenia microphylla*	0–10	–
	leatherweed	CRPO5	*Croton pottsii*	0–10	–
	Cooley's bundleflower	DECO2	*Desmanthus cooleyi*	0–5	–
	trailing windmills	ALIN	*Allionia incarnata*	0–5	–
	Arizona wrightwort	CAAR7	*Carlowrightia arizonica*	0–5	–
	hairyseed bahia	BAAB	*Bahia absinthifolia*	0–5	–
	desert marigold	BAMU	*Baileya multiradiata*	0–5	–
	dwarf desertpeony	ACNA2	*Acourtia nana*	0–5	–
	brownfoot	ACWR5	*Acourtia wrightii*	0–5	–
	fetid marigold	DYPA	*Dyssodia papposa*	0–5	–
	Arizona snakecotton	FRAR2	*Froelichia arizonica*	0–5	–
	beeblossom	GAURA	*Gaura*	0–5	–
	small matweed	GUDE	*Guilleminea densa*	0–5	–
	ragged nettlespurge	JAMA	*Jatropha macrorhiza*	0–5	–
	Greene's bird's-foot trefoil	LOGR4	*Lotus greenei*	0–5	–
	Gila manroot	MAGI	*Marah gilensis*	0–5	–
	variableleaf bushbean	MAGI2	*Macroptilium gibbosifolium*	0–5	–
	American vetch	VIAM	*Vicia americana*	0–5	–
	Louisiana vetch	VILU	*Vicia ludoviciana*	0–5	–
	silverleaf nightshade	SOEL	*Solanum elaeagnifolium*	0–5	–
	Coulter's wrinklefruit	TECO	*Tetraclea coulteri*	0–5	–

	Coulter's wrinkled fruit	TECO	*Tetracoca coulteri*	0–5	
	pricklyleaf dogweed	THAC	*Thymophylla acerosa*	0–5	–
	tufted evening primrose	OECA10	*Oenothera caespitosa*	0–5	–
	orange fameflower	PHAU13	*Phemeranthus aurantiacus*	0–5	–
	slender poreleaf	POGR5	*Porophyllum gracile*	0–5	–
	velvetseed milkwort	POOB	*Polygala obscura*	0–5	–
	Arizona cudweed	PSAR12	*Pseudognaphalium arizonicum*	0–5	–
	Wright's cudweed	PSCAC2	*Pseudognaphalium canescens ssp. canescens*	0–5	–
	twinleaf senna	SEBA3	*Senna bauhinioides*	0–5	–
	Leiberg stonecrop	SELE	*Sedum leibergii*	0–5	–
	Lemmon's ragwort	SELE8	*Senecio lemmonii*	0–5	–
	anoda	ANODA	*Anoda*	0–5	–
	tuber anemone	ANTU	*Anemone tuberosa*	0–5	–
	rockcress	ARABI2	*Arabis*	0–5	–
	New Mexico silverbush	ARNE2	*Argythamnia neomexicana*	0–5	–
	pioneer rockcress	ARPL	*Arabis platysperma*	0–5	–
	southwestern pricklypoppy	ARPL3	*Argemone pleiacantha*	0–5	–
	Watson's dutchman's pipe	ARWA	*Aristolochia watsonii*	0–5	–
	spiny milkwort	POSU2	*Polygala subspinosa*	0–2	–
	shrubby purslane	POSU3	*Portulaca suffrutescens*	0–2	–
	branched noseburn	TRRA5	*Tragia ramosa*	0–2	–
	jewels of Opar	TAPA2	*Talinum paniculatum*	0–2	–
	gooseberryleaf globemallow	SPGR2	*Sphaeralcea grossulariifolia*	0–2	–
	canaigre dock	RUHY	*Rumex hymenosepalus*	0–2	–
	rose heath	CHER2	*Chaetopappa ericoides*	0–2	–
	San Felipe dogweed	ADPO	*Adenophyllum porophylloides*	0–2	–
	lyreleaf greeneyes	BELY	*Berlandiera lyrata*	0–2	–
	climbing wartclub	BOSC	*Boerhavia scandens*	0–2	–
	fingerleaf gourd	CUDI	*Cucurbita digitata*	0–2	–
	coyote gourd	CUPA	*Cucurbita palmata*	0–2	–
	desert larkspur	DEPA	*Delphinium parishii*	0–1	–
	Indian paintbrush	CASTI2	*Castilleja*	0–1	–
	desert tobacco	NIOB	*Nicotiana obtusifolia*	0–1	–
	copper zephyrlily	ZELO	*Zephyranthes longifolia*	0–1	–
	slimflower scurfpea	PSTE5	*Psoralidium tenuiflorum*	0–1	–
9	**Annual forbs**			15–150	
	sensitive partridge pea	CHNI2	*Chamaecrista nictitans*	1–50	–
	longleaf false goldeneye	HELOA2	*Heliomeris longifolia var. annua*	1–50	–
	camphorweed	HESU3	*Heterotheca subaxillaris*	0–25	–
	Arizona poppy	KAGR	*Kallstroemia grandiflora*	0–25	–
	slender goldenweed	MAGR10	*Machaeranthera gracilis*	1–25	–
	tanseyleaf tansyaster	MATA2	*Machaeranthera tanacetifolia*	1–25	–

	woolly plantain	PLPA2	*Plantago patagonica*	1–25	–
	Arizona popcornflower	PLAR	*Plagiobothrys arizonicus*	1–25	–
	desert Indianwheat	PLOV	*Plantago ovata*	1–20	–
	hollowleaf annual lupine	LUSU3	*Lupinus succulentus*	0–20	–
	crestrib morning-glory	IPCO2	*Ipomoea costellata*	1–20	–
	western tansymustard	DEPI	*Descurainia pinnata*	1–20	–
	lambsquarters	CHAL7	*Chenopodium album*	1–20	–
	Coulter's spiderling	BOCO2	*Boerhavia coulteri*	1–20	–
	carelessweed	AMPA	*Amaranthus palmeri*	1–20	–
	milkvetch	ASTRA	*Astragalus*	1–20	–
	wheelscale saltbush	ATEL	*Atriplex elegans*	0–15	–
	New Mexico thistle	CINE	*Cirsium neomexicanum*	1–15	–
	California poppy	ESCAM	*Eschscholzia californica ssp. mexicana*	0–15	–
	shaggyfruit pepperweed	LELA	*Lepidium lasiocarpum*	0–15	–
	foothill deervetch	LOHU2	*Lotus humistratus*	0–15	–
	coastal bird's-foot trefoil	LOSAB	*Lotus salsuginosus var. brevivexillus*	0–15	–
	spreading fanpetals	SIAB	*Sida abutifolia*	1–15	–
	woolly tidestromia	TILA2	*Tidestromia lanuginosa*	0–10	–
	purslane	PORTU	*Portulaca*	0–10	–
	manybristle chinchweed	PEPA2	*Pectis papposa*	0–10	–
	tepary bean	PHAC	*Phaseolus acutifolius*	0–10	–
	sorrel buckwheat	ERPO4	*Eriogonum polycladon*	1–10	–
	scrambled eggs	COAU2	*Corydalis aurea*	0–10	–
	fringed redmaids	CACI2	*Calandrinia ciliata*	0–10	–
	suncup	CAMIS	*Camissonia*	0–5	–
	hoary bowlesia	BOIN3	*Bowlesia incana*	0–5	–
	miner's lettuce	CLPEP	*Claytonia perfoliata ssp. perfoliata*	0–5	–
	bristly fiddleneck	AMTE3	*Amsinckia tessellata*	0–5	–
	New Mexico copperleaf	ACNE	*Acalypha neomexicana*	0–5	–
	cryptantha	CRYPT	*Cryptantha*	0–5	–
	American wild carrot	DAPU3	*Daucus pusillus*	1–5	–
	Wright's prairie clover	DAWR	*Dalea wrightii*	0–5	–
	sacred thorn-apple	DAWR2	*Datura wrightii*	0–5	–
	Texas stork's bill	ERTE13	*Erodium texanum*	0–5	–
	wedgeleaf draba	DRCU	*Draba cuneifolia*	0–5	–
	spurge	EUPHO	*Euphorbia*	0–5	–
	Arizona blanketflower	GAAR2	*Gaillardia arizonica*	0–5	–
	star gilia	GIST	*Gilia stellata*	0–5	–
	southwestern mock vervain	GLGO	*Glandularia gooddingii*	0–5	–
	pearly globe amaranth	GONI	*Gomphrena nitida*	0–5	–
	Arizona gumweed	GRAR2	*Grindelia arizonica*	0–5	–
	Arizona lupine	LUAR4	*Lupinus arizonicus*	0–5	–
	Coulter's lupine	LUSP2	*Lupinus sparsiflorus*	0–5	–

	miniature woollystar	ERDI2	*Eriastrum diffusum*	0–5	–
	Thurber's morning-glory	IPTH	*Ipomoea thurberi*	0–5	–
	intermediate pepperweed	LEVIM	*Lepidium virginicum var. medium*	0–5	–
	Lewis flax	LILE3	*Linum lewisii*	0–5	–
	whitestem blazingstar	MEAL6	*Mentzelia albicaulis*	0–5	–
	Nuttall's povertyweed	MONU	*Monolepis nuttalliana*	0–5	–
	combseed	PECTO	*Pectocarya*	0–5	–
	phacelia	PHACE	*Phacelia*	0–5	–
	phlox	PHLOX	*Phlox*	0–5	–
	groundcherry	PHYSA	*Physalis*	0–5	–
	desert unicorn-plant	PRAL4	*Proboscidea althaeifolia*	0–5	–
	doubleclaw	PRPA2	*Proboscidea parviflora*	0–5	–
	New Mexico plumeseed	RANE	*Rafinesquia neomexicana*	0–5	–
	golden crownbeard	VEEN	*Verbesina encelioides*	0–5	–
	sleepy silene	SIAN2	*Silene antirrhina*	0–5	–
	Gordon's bladderpod	LEGO	*Lesquerella gordonii*	0–5	–
	sawtooth sage	SASU7	*Salvia subincisa*	1–5	–
	chia	SACO6	*Salvia columbariae*	0–2	–
	Fendler's desertdandelion	MAFE	*Malacothrix fendleri*	0–2	–
	warty caltrop	KAPA	*Kallstroemia parviflora*	0–2	–
	redstar	IPCO3	*Ipomoea coccinea*	0–2	–
	sanddune wallflower	ERCA14	*Erysimum capitatum*	0–2	–
	southwestern pricklypoppy	ARPL3	*Argemone pleiacantha*	0–2	–
	fewflower beggarticks	BILE	*Bidens leptocephala*	0–2	–
	sego lily	CANU3	*Calochortus nuttallii*	1–2	–
Shrub/Vine					
10	**Dominant Half-shrubs**			50–100	
	fairyduster	CAER	*Calliandra eriophylla*	20–100	–
	bastardsage	ERWR	*Eriogonum wrightii*	10–50	–
	littleleaf ratany	KRER	*Krameria erecta*	20–50	–
	trailing krameria	KRLA	*Krameria lanceolata*	0–50	–
	desert zinnia	ZIAC	*Zinnia acerosa*	0–50	–
11	**Increaser Half-shrubs**			1–40	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	1–30	–
	burroweed	ISTE2	*Isocoma tenuisecta*	0–30	–
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	0–20	–
	turpentine bush	ERLA12	*Ericameria laricifolia*	0–10	–
12	**Miscellaneous Shrubs**			0–20	
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–10	–
	spiny hackberry	CEEH	*Celtis ehrenbergiana*	0–10	–
	knifeleaf condalia	COSP3	*Condalia spathulata*	0–5	–
	whitethorn acacia	ACCOP9	*Acacia constricta var. paucispina*	0–5	

	whitethorn acacia	ACCOP9	*Acacia constricta var. paucispina*	0–5	–
	catclaw acacia	ACGRG3	*Acacia greggii var. greggii*	0–5	–
	rough menodora	MESC	*Menodora scabra*	0–5	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	0–5	–
	sacahuista	NOMI	*Nolina microcarpa*	0–5	–
	velvetpod mimosa	MIDY	*Mimosa dysocarpa*	0–2	–
	longleaf jointfir	EPTR	*Ephedra trifurca*	0–2	–
	American tarwort	FLCE	*Flourensia cernua*	0–2	–
	ocotillo	FOSP2	*Fouquieria splendens*	0–2	–
	desert-thorn	LYCIU	*Lycium*	0–2	–
	yerba de pasmo	BAPT	*Baccharis pteronioides*	0–2	–
	Warnock's snakewood	COWA	*Condalia warnockii*	0–2	–
	Kearney's snakewood	COWAK	*Condalia warnockii var. kearneyana*	0–2	–
	whitethorn acacia	ACCO2	*Acacia constricta*	0–2	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	0–2	–
	button brittlebush	ENFR	*Encelia frutescens*	0–1	–
	whitestem paperflower	PSCO2	*Psilostrophe cooperi*	0–1	–
	threadleaf ragwort	SEFL3	*Senecio flaccidus*	0–1	–
13	**Succulents**			2–50	
	Palmer's century plant	AGPA3	*Agave palmeri*	0–5	–
	beehive cactus	CORYP	*Coryphantha*	0–5	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0–5	–
	walkingstick cactus	CYSP8	*Cylindropuntia spinosior*	0–5	–
	staghorn cholla	CYVE3	*Cylindropuntia versicolor*	0–5	–
	hedgehog cactus	ECHIN3	*Echinocereus*	0–5	–
	candy barrelcactus	FEWI	*Ferocactus wislizeni*	1–5	–
	globe cactus	MAMMI	*Mammillaria*	0–5	–
	cactus apple	OPEN3	*Opuntia engelmannii*	1–5	–
	purple pricklypear	OPMAM	*Opuntia macrocentra var. macrocentra*	0–5	–
	tulip pricklypear	OPPH	*Opuntia phaeacantha*	0–5	–
	banana yucca	YUBA	*Yucca baccata*	0–5	–
	soaptree yucca	YUEL	*Yucca elata*	0–5	–
	jumping cholla	CYFU10	*Cylindropuntia fulgida*	0–5	–
	candle cholla	CYKL	*Cylindropuntia kleiniae*	0–2	–
	Santa Rita pricklypear	OPSA	*Opuntia santa-rita*	0–2	–
	Arizona pencil cholla	CYAR14	*Cylindropuntia arbuscula*	0–2	–
	rainbow cactus	ECPEP	*Echinocereus pectinatus var. pectinatus*	0–1	–
	spinystar	ESVI2	*Escobaria vivipara*	0–1	–
Tree					
14	**Trees**			0–15	
	western honey mesquite	PRGLT	*Prosopis glandulosa var. torreyana*	0–5	–
	velvet mesquite	PRVE	*Prosopis velutina*	0–5	–
	oneseed juniper	JUMO	*Juniperus monosperma*	0–2	–
	Jerusalem thorn	PAAC3	*Parkinsonia aculeata*	0–2	–

	blue paloverde	PAFL6	*Parkinsonia florida*	0–2	–

Animal community

With continuous heavy grazing, palatable perennial grasses like blue, hairy, sprucetop and sideoats grammas and plains lovegrass decrease. Increasers under such circumstances include curly mesquite, threeawns and, in some areas, false mesquite. With severe deterioration, shrubby species increase to dominate. Mesquite forms the over-story with snakeweed and lesser amounts of burroweed in the under-story. Cholla and prickly pear can also increase on the site. Water developments are very important to wildlife on the site. Being open grassland, this site is home to a variety of small herbivores, birds and their associated predators. With the exception of the antelope, the site is mainly a forage area for larger wildlife species.

Hydrological functions

Thin, coarse textured, soil surfaces capture some of the intense summer rainfall on the site. Natural rates of runoff are as high as 30% for this site. Very shallow argillic (clayey) horizons keep soil moisture high in the soil profile and available to shallow rooted plants. Rainfall simulator studies, conducted by ARS in southern Arizona, offer the some insight into how the ratio of infiltration to runoff changes under different ecological conditions and with different thickness of soil surface horizon. Two inches of rain was applied to wet soils, in a one hour time period. A site with vegetation in high ecological condition and 4 inches of A horizon, had a ratio of 27/73%, runoff to infiltration. A site with vegetation in fair ecological condition and 1 and 1/2 inches of A horizon, had a ratio of 44/56%, runoff to infiltration. And the last site with vegetation in poor ecological condition and with only 1/2 inch of A horizon had a ratio of 85/15%, runoff to infiltration.

Recreational uses

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

Wood products

Mesquite remains shrubby on this site due to very thin soil surfaces over clayey sub-soils. Established mesquite offers little more than fuel-wood for campfires, and nothing large enough for post or stay.

Inventory data references

Range 417s include 10 in excellent condition, 15 in good condition and 15 in fair condition.

Type locality

Location 1: Pinal County, AZ	
Township/Range/Section	T10S R13E S2
General legal description	Tom Mix Hwy ROW
Location 2: Cochise County, AZ	
Township/Range/Section	T18S R28E S2
General legal description	Oak Ranch
Location 3: Cochise County, AZ	
Township/Range/Section	T21S R19E S17
General legal description	Un-surveyed. Ft. Huachuca
Location 4: Pima County, AZ	
Township/Range/Section	T19S R14E S16

General legal description	Enclosure # 41 on the Santa Rita Experimental Range. On the Whitehouse fan at 3575 feet elevation.

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.

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Date	12/01/2007
Approved by	Curtis Talbot
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None, these sites generally occur on low slopes not prone to rill formation

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2. **Presence of water flow patterns:** They cover about 15% of the area, are discontinuous, sinuous, uniformly distributed and range in length from 2 to 20 feet and width is generally < 1ft

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3. **Number and height of erosional pedestals or terracettes:** Very slight pedastalling on longer-lived plants. Terracettes are infrequent, 5 to 20 feet apart and with elevation differences of 1 - 2 in.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 20-25% bare ground, (20-30% gravel on some soil series), bare patch size averages 1-3 ft, connectivity is very low

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5. **Number of gullies and erosion associated with gullies:** None, these sites generally occur on low slopes not prone to gully formation

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Litter is all fine, herbaceous and litter movement in steeper areas is from 1 to 2 feet. Litter is not moving in flatter areas. No loss of litter from the site

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface is 3 to 4 inches of dark colored gravelly sandyloam over clayloam and clay. Soil surface resistance to erosion is good across the site with little variability, aggregate stability test averages > 5

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface has moderate to strong fine granular structure, with common to many fine roots. Surface horizon is 3 to 4 inches thick and dark colored and OM present throughout site

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial mid-grasses have a canopy of 30%, half-shrubs a canopy of 5%, shor grasses a canopy of 5%, and large shrubs and succulents a canopy of 2%. All species are uniformly dispersed with no reduction in basal area affecting infiltration and runoff (basal area: >12-15%)

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No surface soil compaction. Soil surface is loose as you walk across it in some areas. An abrupt textural change at 3 to 4 inches from sandyloam to heavy clayloam or clay has the feel of being compacted but is not.

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

    Dominant: Warm season perennial mid-grasses >> half-shrubs > warm season perennial short grasses = annual forbs > perennial forbs = succulents > large shrubs and trees

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Good age class distribution of dominant perennial grasses. Some mortality and loss of live basal meristem during severe drought conditions. Litter and senescent vegetation comprise a large amount of the total biomass

14. **Average percent litter cover (%) and depth (in):** Litter is roughly 20-25% of ground cover (predominantly from mid-grasses) and is uniformly distributed throughout site, depth (1/8 to 1 in)

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Production in lbs/acre based on annual rainfall: High- >1150 lbs/ac, Norm- >1040 lbs/ac, Low- >930 lbs/ac

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, whitethorn, burroweed, prickly pear, Lehmann lovegrass

17. **Perennial plant reproductive capability:** Not impaired in any way; good age class distribution of perennial grasses, recruitment is evident throughout site