USDA Natural Resources Conservation Service

Ecological site R041XB206AZ
Limy Fan 8-12" p.z.

Last updated: 7/28/2020
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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

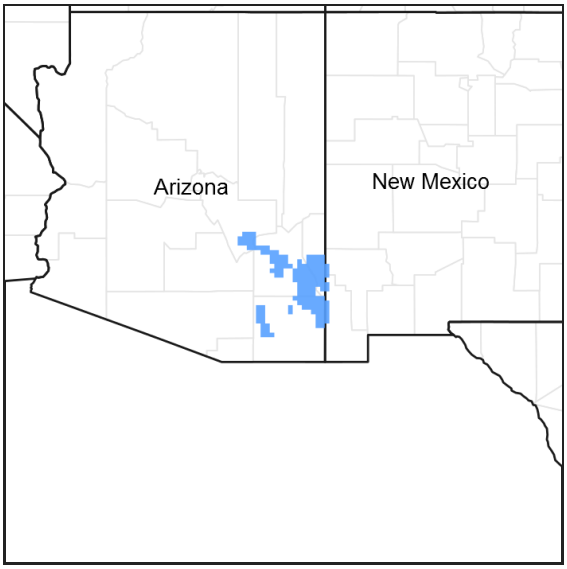

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 041X–Madrean Archipelago

AZ 41.2 – Chihuahuan – Sonoran Desert Shrubs

Elevations range from 2600 to 4000 feet and precipitation ranges from 8 to 12 inches per year. Vegetation includes mesquite, palo verde, catclaw acacia, soaptree yucca, creosotebush, whitethorn, staghorn cholla, desert saltbush, Mormon tea, burroweed, snakeweed, tobosa, black grama, threeawns, bush muhly, dropseed, and burrograss. The soil temperature regime is thermic and the soil moisture regime is typic aridic. This unit occurs within the Basin and Range Physiographic Province and is characterized by numerous mountain ranges that rise abruptly from broad, plain-like valleys and basins. Igneous and metamorphic rock classes dominate the mountain ranges and sediments filling the basins represent combinations of fluvial, lacustrine, colluvial and alluvial deposits.

Associated sites

R041XB208AZ	**Limy Upland 8-12" p.z.**
R041XB210AZ	**Loamy Upland 8-12" p.z.**
R041XB213AZ	**Sandy Wash 8-12" p.z.**

Similar sites

R040XA108AZ	**Limy Fan 10"-13" p.z.**
R041XC320AZ	**Limy Fan 12-16" p.z.**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *larrea tridentata*
Herbaceous	(1) *muhlenbergia porteri*

Physiographic features

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

Table 2. Representative physiographic features

Landforms	(1) Fan piedmont (2) Terrace (3) Alluvial fan
Flooding frequency	None
Ponding frequency	None
Elevation	792–1,219 m
Slope	1–5%
Aspect	Aspect is not a significant factor

Climatic features

Precipitation ranges from 8-12 inches annually. More than half falls during July-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 (average)	240 days
Freeze-free period (average)	
Precipitation total (average)	

Influencing water features

There are no water features associated with this site.

Soil features

These are deep, loamy soils; calcareous to the surface. Plant-soil moisture relationships are fair.

Soil series mapped to date on this site include: SSA-662 Safford area MU's CsB & GcB Gila, ThC Tres Hermanos;

SSA-663 Gila-Duncan area MU's 9 Dona Ana, 29 43 & 45 Tres Hermanos; SSA-664 San Simon area MU's 14 & 15 Dona Ana, 40 Tres Hermanos; SSA-666 Cochise county Northwest part MU 1 Agustin & Kokan; SSA-671 Cochise county Douglas-Tombstone part MU's 36 Ugyp, 111 Ugyp, alluvial fans; SSA-675 San Carlos IR area MU's 1 Agustin, 5 Gila, 92 Agustin.

Table 4. Representative soil features

Surface texture	(1) Sandy loam (2) Fine sandy loam (3) Gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid to moderate
Soil depth	152 cm
Surface fragment cover <=3"	0–30%
Surface fragment cover >3"	0–2%
Available water capacity (0-101.6cm)	12.7–17.78 cm
Calcium carbonate equivalent (0-101.6cm)	5–30%
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)	0–30%
Subsurface fragment volume >3" (Depth not specified)	0–2%

Ecological dynamics

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

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

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

State and transition model

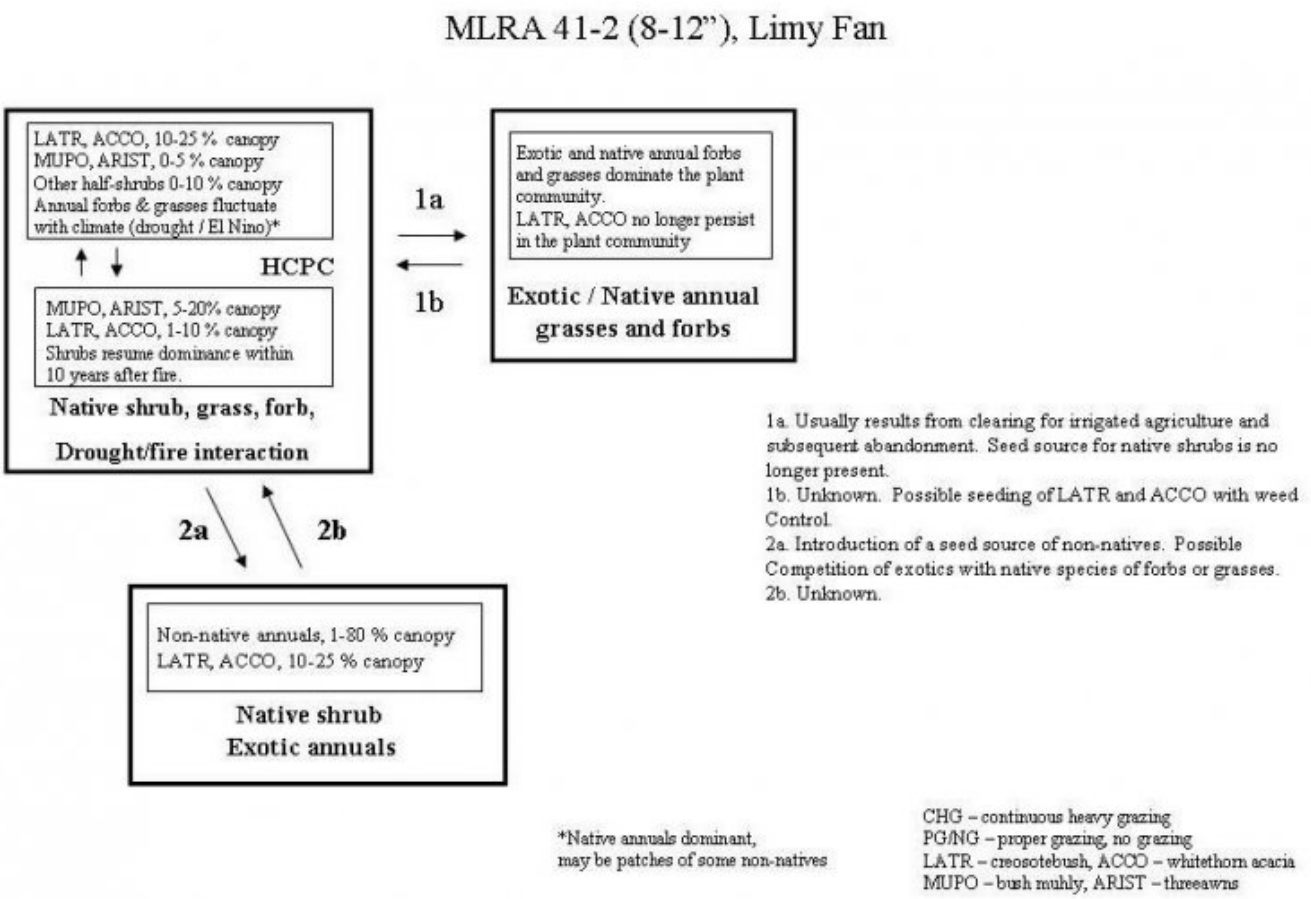

Figure 4. State and Transition Model, Limy Fan, 8"-12" p.z

State 1
Historical Climax Plant Community

Community 1.1
Historical Climax Plant Community

Figure 5. Limy Fan 8-12" pz

The potential plant community is a shrub-land dominated by creosotebush. Annual forbs and grasses are very important in the plant community on this site. Cryptogams (lichens, mosses) and blue-green algae are also important in the plant communities on this site. With continuous heavy grazing, bush muhly is removed from the plant community and creosotebush increases. Areas of this site mapped in alluvial fan positions are very susceptible to rill and gully erosion.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	78	168	280
Grass/Grasslike	11	34	191
Forb	1	22	123
Total	**90**	**224**	**594**

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	1%
Grass/grasslike basal cover	0-2%
Forb basal cover	0-2%
Non-vascular plants	0%
Biological crusts	5-15%
Litter	5-60%
Surface fragments >0.25" and <=3"	0-15%
Surface fragments >3"	0-5%
Bedrock	0%
Water	0%
Bare ground	20-90%

Table 7. Canopy structure (% cover)

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

State 2
Annuals

Community 2.1
Annuals

This state occurs where the plant community is dominated by native and non-native annual forbs and grasses. The causes can include repeated burning, which removes the native shrub cover (creosote), and cultivation for irrigation and subsequent abandonment.

State 3

Shrubs, exotic annuals

Community 3.1
Shrubs, exotic annuals

This state occurs where the creosote cover is still intact but the herbaceous layer of the plant community is dominated by non-native annuals. These can include, filaree, mediterranean grass, Sahara mustard, malta starthistle and red brome.

Transition T1A
State 1 to 2

Usually results from clearing for irrigated agriculture and subsequent abandonment. Seed source for native shrubs is no longer present.

Transition T1B
State 1 to 3

Introduction of a seed source of non-natives. Possible competition of exotics with native species of forbs or grasses.

Restoration pathway R2A
State 2 to 1

Unknown. Possible seeding of creosote bush and white-thorn acacia with weed control.

Restoration pathway R3A
State 3 to 1

Unknown

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**			11–67	
	bush muhly	MUPO2	*Muhlenbergia porteri*	11–45	–
	whiplash pappusgrass	PAVA2	*Pappophorum vaginatum*	0–45	–
	false Rhodes grass	TRCR9	*Trichloris crinita*	0–22	–
	Parish's threeawn	ARPUP5	*Aristida purpurea var. parishii*	0–22	–
	spike dropseed	SPCO4	*Sporobolus contractus*	0–11	–
2	**Misc. perennial grasses**			0–11	
	purple threeawn	ARPU9	*Aristida purpurea*	0–11	–
	spidergrass	ARTE3	*Aristida ternipes*	0–11	–
	tobosagrass	PLMU3	*Pleuraphis mutica*	0–11	–
	spidergrass	ARTEG	*Aristida ternipes var. gentilis*	0–6	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–2	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–2	–
	mesa dropseed	SPFL2	*Sporobolus flexuosus*	0–2	–
	poverty threeawn	ARDI5	*Aristida divaricata*	0–2	–
	Havard's threeawn	ARHA3	*Aristida havardii*	0–2	–

	Arizona cottontop	DICA8	*Digitaria californica*	0–1	–
	nineawn pappusgrass	ENDE	*Enneapogon desvauxii*	0–1	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	0–1	–
3	**Annual grasses**			0–112	
	needle grama	BOAR	*Bouteloua aristidoides*	0–56	–
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–56	–
	Rothrock's grama	BORO2	*Bouteloua rothrockii*	0–22	–
	desert lovegrass	ERPEM	*Eragrostis pectinacea var. miserrima*	0–22	–
	tufted lovegrass	ERPEP2	*Eragrostis pectinacea var. pectinacea*	0–22	–
	Arizona signalgrass	URAR	*Urochloa arizonica*	0–22	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	0–22	–
	sixweeks threeawn	ARAD	*Aristida adscensionis*	0–22	–
	prairie threeawn	AROL	*Aristida oligantha*	0–22	–
	mucronate sprangeltop	LEPAB	*Leptochloa panicea ssp. brachiata*	0–22	–
	Bigelow's bluegrass	POBI	*Poa bigelovii*	0–11	–
	Mexican sprangletop	LEFUU	*Leptochloa fusca ssp. uninervia*	0–11	–
	Arizona brome	BRAR4	*Bromus arizonicus*	0–6	–
	canyon cupgrass	ERLE7	*Eriochloa lemmonii*	0–6	–
	delicate muhly	MUFR	*Muhlenbergia fragilis*	0–2	–
	littleseed muhly	MUMI	*Muhlenbergia microsperma*	0–2	–
Forb					
4	**Perennial forbs**			1–11	
	dwarf desertpeony	ACNA2	*Acourtia nana*	0–11	–
	trailing windmills	ALIN	*Allionia incarnata*	0–6	–
	lacy tansyaster	MAPIP4	*Machaeranthera pinnatifida ssp. pinnatifida var. pinnatifida*	0–6	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	0–6	–
	weakleaf bur ragweed	AMCO3	*Ambrosia confertiflora*	0–2	–
	hairyseed bahia	BAAB	*Bahia absinthifolia*	0–1	–
	desert marigold	BAMU	*Baileya multiradiata*	0–1	–
	whitemargin sandmat	CHAL11	*Chamaesyce albomarginata*	0–1	–
	Coues' cassia	SECO10	*Senna covesii*	0–1	–
5	**Annual forbs**			0–112	
	bristly fiddleneck	AMTE3	*Amsinckia tessellata*	0–28	–
	Coulter's spiderling	BOCO2	*Boerhavia coulteri*	0–22	–
	Esteve's pincushion	CHST	*Chaenactis stevioides*	0–22	–
	flatcrown buckwheat	ERDE6	*Eriogonum deflexum*	0–22	–
	California poppy	ESCAM	*Eschscholzia californica ssp. mexicana*	0–22	–
	Gordon's bladderpod	LEGO	*Lesquerella gordonii*	0–22	–
	tanseyleaf tansyaster	MATA2	*Machaeranthera tanacetifolia*	0–22	–
	combseed	PECTO	*Pectocarya*	0–22	–
	woolly tidestromia	TILA2	*Tidestromia lanuginosa*	0–22	–
	wheelscale saltbush	ATEL	*Atriplex elegans*	0–17	–
	milkvetch	ASTRA	*Astragalus*	0–11	–

	carelessweed	AMPA	*Amaranthus palmeri*	0–11	–
	manybristle chinchweed	PEPA2	*Pectis papposa*	0–11	–
	desert Indianwheat	PLOV	*Plantago ovata*	0–11	–
	shaggyfruit pepperweed	LELA	*Lepidium lasiocarpum*	0–11	–
	miniature woollystar	ERDI2	*Eriastrum diffusum*	0–11	–
	cryptantha	CRYPT	*Cryptantha*	0–11	–
	American wild carrot	DAPU3	*Daucus pusillus*	0–11	–
	western tansymustard	DEPI	*Descurainia pinnata*	0–11	–
	Coulter's globemallow	SPCO2	*Sphaeralcea coulteri*	0–11	–
	intermediate pepperweed	LEVIM	*Lepidium virginicum var. medium*	0–6	–
	coastal bird's-foot trefoil	LOSAB	*Lotus salsuginosus var. brevivexillus*	0–6	–
	New Mexico plumeseed	RANE	*Rafinesquia neomexicana*	0–6	–
	sleepy silene	SIAN2	*Silene antirrhina*	0–6	–
	phacelia	PHACE	*Phacelia*	0–6	–
	Arizona popcornflower	PLAR	*Plagiobothrys arizonicus*	0–6	–
	Nuttall's povertyweed	MONU	*Monolepis nuttalliana*	0–6	–
	slender goldenweed	MAGR10	*Machaeranthera gracilis*	0–6	–
	exserted Indian paintbrush	CAEXE	*Castilleja exserta ssp. exserta*	0–6	–
	yellow tackstem	CAPA7	*Calycoseris parryi*	0–6	–
	white tackstem	CAWR	*Calycoseris wrightii*	0–6	–
	brittle spineflower	CHBR	*Chorizanthe brevicornu*	0–2	–
	hyssopleaf sandmat	CHHY3	*Chamaesyce hyssopifolia*	0–2	–
	fringed redmaids	CACI2	*Calandrinia ciliata*	0–2	–
	desert evening primrose	OEPR	*Oenothera primiveris*	0–2	–
	Florida pellitory	PAFL3	*Parietaria floridana*	0–2	–
	green carpetweed	MOVE	*Mollugo verticillata*	0–2	–
	Coulter's lupine	LUSP2	*Lupinus sparsiflorus*	0–2	–
	hairy desertsunflower	GECA2	*Geraea canescens*	0–2	–
	star gilia	GIST	*Gilia stellata*	0–2	–
	Arizona poppy	KAGR	*Kallstroemia grandiflora*	0–2	–
	hairy prairie clover	DAMO	*Dalea mollis*	0–2	–
	sorrel buckwheat	ERPO4	*Eriogonum polycladon*	0–2	–
	Texas stork's bill	ERTE13	*Erodium texanum*	0–2	–
	woollyhead neststraw	STMI2	*Stylocline micropoides*	0–2	–
	common woolly sunflower	ERLA6	*Eriophyllum lanatum*	0–1	–
	Mexican fireplant	EUHE4	*Euphorbia heterophylla*	0–1	–
	bristly nama	NAHI	*Nama hispidum*	0–1	–
	glandular threadplant	NEGL	*Nemacladus glanduliferus*	0–1	–
	doubleclaw	PRPA2	*Proboscidea parviflora*	0–1	–

	hoary bowlesia	BOIN3	*Bowlesia incana*	0–1	–
Shrub/Vine					
6	**Dominant shrub**			78–224	
	creosote bush	LATRT	*Larrea tridentata var. tridentata*	78–224	–
7	**Miscellaneous shrubs**			0–17	
	whitethorn acacia	ACCO2	*Acacia constricta*	0–11	–
	cattle saltbush	ATPO	*Atriplex polycarpa*	0–11	–
	longleaf jointfir	EPTR	*Ephedra trifurca*	0–6	–
	burrobush	AMDU2	*Ambrosia dumosa*	0–2	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–2	–
	mound saltbush	ATOB	*Atriplex obovata*	0–2	–
	burroweed	ISTE2	*Isocoma tenuisecta*	0–1	–
	water jacket	LYAN	*Lycium andersonii*	0–1	–
	pale desert-thorn	LYPA	*Lycium pallidum*	0–1	–
	western honey mesquite	PRGLT	*Prosopis glandulosa var. torreyana*	0–1	–
	soaptree yucca	YUEL	*Yucca elata*	0–1	–
	lotebush	ZIOB	*Ziziphus obtusifolia*	0–1	–
8	**Half shrubs**			0–22	
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	0–11	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–11	–
	whitestem paperflower	PSCO2	*Psilostrophe cooperi*	0–11	–
	desert zinnia	ZIAC	*Zinnia acerosa*	0–11	–
	littleleaf ratany	KRER	*Krameria erecta*	0–6	–
	rayless goldenhead	ACSP	*Acamptopappus sphaerocephalus*	0–2	–
9	**Succulents**			0–17	
	devil's cholla	GRKU	*Grusonia kunzei*	0–3	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0–2	–
	tulip pricklypear	OPPH	*Opuntia phaeacantha*	0–2	–
	nightblooming cereus	PEGR3	*Peniocereus greggii*	0–1	–
	walkingstick cactus	CYSP8	*Cylindropuntia spinosior*	0–1	–
	Engelmann's hedgehog cactus	ECEN	*Echinocereus engelmannii*	0–1	–
	candy barrelcactus	FEWI	*Ferocactus wislizeni*	0–1	–
	cactus apple	OPEN3	*Opuntia engelmannii*	0–1	–
	buck-horn cholla	CYAC8	*Cylindropuntia acanthocarpa*	0–1	–

Animal community

This site is more suitable for seasonal rather than year-long use as most of the forage produced consists of either winter or summer annual grasses and forbs in average or above average years. Perennial forage species can grow year round with available moisture but are in limited amounts in the plant community. Forage production on the site in dry years is very low. Bush muhly is shrub-like in character and plants supported by creosotebush should be utilized as browse plants.

Vegetative cover and forage diversity are lacking for large desert mammals on this site. It is home mainly to small, burrowing animals and rabbits.

Hydrological functions

These soils are medium textured and usually poor producers of runoff.

Recreational uses

Hunting, horseback riding, hiking, four wheeling.

Contributors

Dan Robinett
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Approval

Scott Woodall, 7/28/2020

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, Gwen Dominguez, Emilio Carrillo
Contact for lead author	Tucson MLRA Soil Survey Office
Date	08/08/2013
Approved by	Scott Woodall
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None

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2. **Presence of water flow patterns:** Water flow paths occupy less than 30-40% of the surface area. Flow paths are poorly defined and dominated by limited sheet flow among the hummocks among creosote.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are common on all longer lived grasses (bush muhly) and subshrubs (zinnia) and are from 1-2 inches in height. Pedestals on creosote bush are from 4-8 inches tall and symmetrical. They are well stabilized and most have rodent activity. Terracettes are uncommon on the site but when they occur they are large (approx. 3-5’ diam x 4-8” ht) and bridged by the mounds of creosote bush.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare soil is 50-70%, gravel ranges from 7-10% and basal cover of live perennial grasses is 1%. Bare

areas are 4-8 feet in diameter, well dispersed and generally connected.

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5. **Number of gullies and erosion associated with gullies:** None

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Possible wind capture of dust around the bases of creosote bush. No wind scour. Deposition under creosote bush has symmetrical mounds.

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7. **Amount of litter movement (describe size and distance expected to travel):** Fine and coarse litter size classes are moving short distances (1-2 feet) from water in open spaces and concentrating in dams. Under large shrubs, all litter classes are staying in place.

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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):** Values from soil slake test ratings were 2-4s under canopy and 1-2's from open spaces.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Shrub canopy cover is 25-30%, annual forb and grass canopy is <15%, and perennial grass canopy is <5%. Perennial grasses are largely confined within creosote bush mounds. Shrubs are evenly distributed. Shrub canopy cover and soil texture (sandyloam) allow infiltration and limit run-off.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** None present, average depth of penetration from an ARS field penetrometer with a 2.2 kg. sliding hammer is 12.8 cm.

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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):** none

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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: large shrubs

    Sub-dominant: annual grass= annual forbs> perennial grasses = sub shrubs >> succulents

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Plant mortality is affected by recent droughty weather patterns; 10% mortality on perennial grasses and 30% on sub-shrubs. Some creosote canopy died back. Large crown-of-thorn shrubs have about 20% mortality.

14. **Average percent litter cover (%) and depth (in):** Litter is absent from water flow patterns and bare areas.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 80 lbs/ac. in a below average year; 200 lbs/ac. in an average year; 530 lbs/ac. in an above average year.

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:** Tumbleweed, Lehmann lovegrass in wet years

17. **Perennial plant reproductive capability:** Not impaired for any perennial species.