

Ecological site R041XA115AZ **Loamy Swale 16-20" 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.

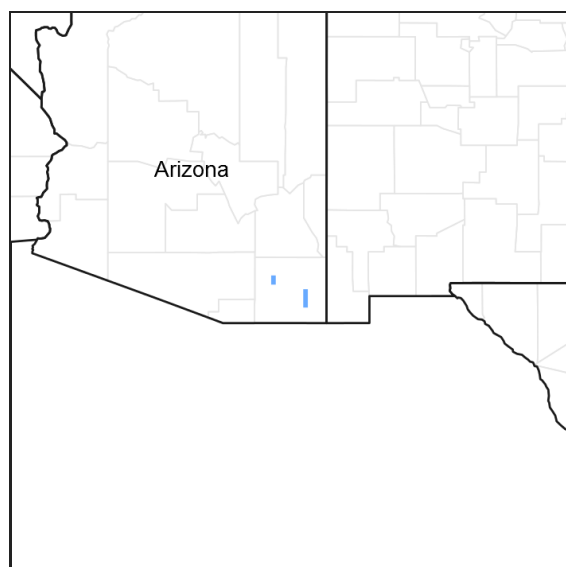


Figure 1. Mapped extent

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

AZ 41.1 – Mexican Oak-Pine Forest and Oak Savannah

Elevations range from 4500 to 10,700 feet and precipitation ranges from 16 to 30 inches. Vegetation includes Emory oak, Mexican blue oak, Arizona white oak, one-seed juniper, alligator juniper, sacahuista, California bricklebrush, skunkbush sumac, Arizona rosewood, wait-a-bit mimosa, sideoats grama, blue grama, purple grama, wooly bunchgrass, plains lovegrass, squirreltail, and pinyon ricegrass. The soil temperature regime ranges from thermic to mesic and the soil moisture regime ranges from aridic ustic to typic ustic. 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

R041XA108AZ	Loamy Upland 16-20" p.z.
R041XA114AZ	Loamy Bottom 16-20" p.z.
R041XA104AZ	Limy Slopes 16-20" p.z.

R041XA107AZ	Loamy Slopes 16-20" p.z.
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Similar sites

R041XA114AZ	Loamy Bottom 16-20" p.z.
R041XC311AZ	Loamy Swale 12-16" p.z.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>bouteloua gracilis</i> (2) <i>bouteloua curtipendula</i>

Physiographic features

This site occurs in the middle elevations of the Madrean Basin and Range province in southeastern Arizona. It occurs in headwater areas; on floodplains of minor tributaries and in swales. It benefits on a regular basis from extra moisture received as runoff from adjacent upland sites. It does not benefit from any kind of water table.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Alluvial fan (3) Swale
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	Occasional to frequent
Ponding duration	Very brief (4 to 48 hours)
Ponding frequency	None to rare
Elevation	4,700–5,500 ft
Slope	0–3%
Aspect	Aspect is not a significant factor

Climatic features

Precipitation in this zone of the common resource area ranges from 16-20 inches per year with elevations from 4700-5500 feet. Approximately 40% of this moisture comes as gentle rain or snow during the winter-spring (Oct-Apr) season; originates in the north Pacific and Gulf of California and comes as frontal storms with long duration and low intensity. The remaining 60% falls in the summer season (May-Sep); originates in the Gulf of Mexico and are convective, usually brief, intense thunderstorms. Snow is common Dec-Mar, averaging 5-15 inches per year, but rarely lasts more than a week. May and June are the driest months. Humidity is low.

Temperatures are mild. Freezing temperatures are common at night from Oct-May, but daytime temperatures are almost always over 40 F. Below 0 F temperatures can occur Dec-Feb. Daytime summer highs rarely exceed 95 F.

Species like plains lovegrass, bottlebrush squirreltail, false mesquite, shrubby buckwheat and ratany begin growth in late March to April. Warm season grasses begin growth in July or August with receipt of the first summer rains.

Table 3. Representative climatic features

Frost-free period (average)	200 days
Freeze-free period (average)	
Precipitation total (average)	20 in

Influencing water features

There are no water features associated with this site.

Soil features

These are young soils on loamy to clayey alluvium of mixed origin. They are deep and dark colored. They do not have vertic properties. Plant-soil moisture relationships are excellent.

Soils mapped on this site include: SSA-666 Cochise county Northwestern part MU 54 Lanque; SSA-671 Cochise county Douglas-Tombstone part MU 4 Stanford & 96 Stanford.

Table 4. Representative soil features

Surface texture	(1) Sandy loam (2) Loam (3) Clay loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately slow
Soil depth	60 in
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0–1%
Available water capacity (0-40in)	9.2–12.6 in
Calcium carbonate equivalent (0-40in)	0–20%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0–1%

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.

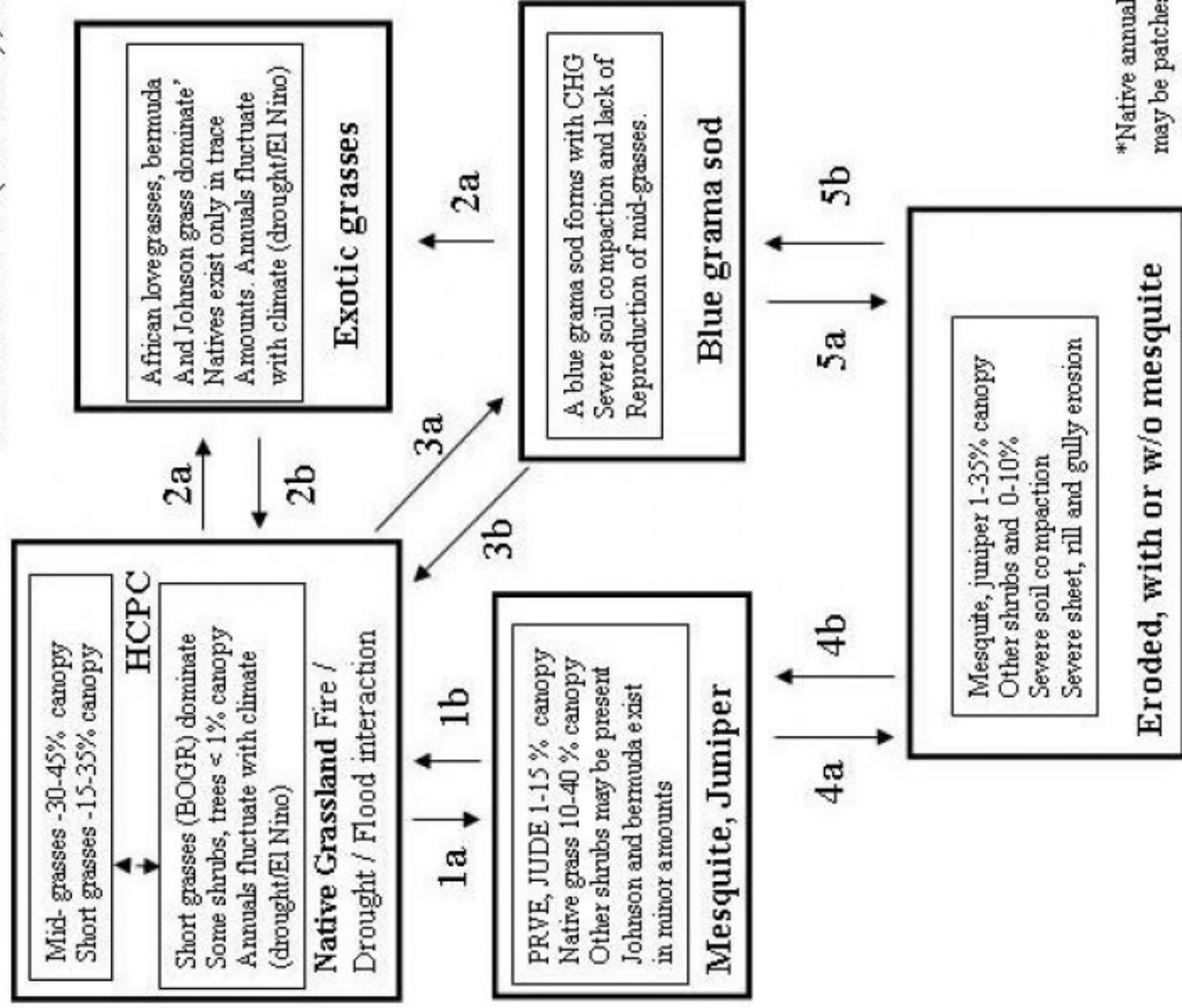
Production data provided in this site description is standardized to air dry weight at the end of the summer growing season. The plant communities described in this site description are based on near normal rainfall years.

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 each 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. The site is dominated by warm season perennial grasses. Occasional clumps of trees and shrubs occur in the plant community. Fire was very important in the development of this plant community. The site is very susceptible to gully erosion. Base level changes in large watersheds can lead to erosion of these minor tributaries over time. Woody species like mesquite and juniper can invade and increase to dominate the site in the absence of fire for long periods. Johnson grass and bermuda grass are exotic species that occur on many areas of the site and may become dominant.

State and transition model

MLRA 41-1 (16-20''), Loamy Swale



*Native annuals dominant,
may be patches of some non-natives

- 1a. CHG to open up grass cover. Proximity to seed source of Mesquite, juniper. Lack of fire for long periods of time.
- 1b. Herbicide or mechanical means to remove shrubs. PG/NG
- 2a. CHG, introduction of a seed source, or direct seeding of exotic African lovegrasses, bermuda, yellow bluestem or Johnson grass.
- 2b. Unk. Herbicide treatment of exotics, Seeding of native grasses
- 3a. CHG, burning plus CHG. Hay mowing, vehicle traffic
- Reduction of A horizon OM and litter, severe soil compaction, greatly reduced infiltration, increased runoff.
- 3b. PG/NG, seeding or planting of native perennial grasses.
- Soil ripping, contouring and / or mulching
- 4a. CHG coupled with drought, persistent low grass cover.
- Reduction of A horizon OM and litter, compaction, sheet, rill and gully erosion. Persistent reduced infiltration, greatly increased runoff, and very limited recruitment of perennial grasses. Base level change in main stream causes down-cutting in swales.
- 4b. Mechanical/herbicide treatment of shrubs, PG/NG, seeding planting of native grasses, maintenance treatments for shrubs, Mechanical control of sheet, rill and gully erosion.
- 5a. CHG, interruption of overland flow, diversion of runoff, severe soil compaction from traffic (livestock or equipment)
- Base level changes in main stream causes down-cutting in swales.
- 5b. Mechanical control of rills and gullies. PG/NG, seeding of native grasses.

CHG - continuous heavy grazing
PG/NG - proper grazing, no grazing
BOGR - blue grama, PRVE - mesquite
JUDE - juniper, Unk - unknown

Figure 4. State and Transition, Loamy Swale 16-20" pz.

State 1
Historical Climax Plant Community

Community 1.1
Historical Climax Plant Community



Figure 5. Loamy Swale 16-20" pz., HCPC



Figure 6. Loamy Swale 16-20" pz., HCPC

The historical 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 is dominated by warm season perennial grasses. Occasional trees and shrubs occur in the plant community. The major perennial grasses like blue grama, sideoats grama, tobosa, creeping muhly and vine mesquite, occur in large patches throughout the plant community. Giant sacaton can occur at about 10% cover in the plant community. Annual forbs and grasses can produce heavy stands in wet seasons following drought and/or fire. With continuous grazing, tall and mid grasses are replaced by short grasses like blue grama and creeping muhly. With grazing management the mid to tall species can resume dominance in the plant community. The aspect is grassland.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1040	2000	3100
Forb	15	50	150
Tree	0	5	50
Shrub/Vine	1	5	20
Total	1056	2060	3320

Table 6. Soil surface cover

Tree basal cover	0-1%
Shrub/vine/liana basal cover	0-1%
Grass/grasslike basal cover	10-25%
Forb basal cover	0-1%
Non-vascular plants	0-1%
Biological crusts	0-5%
Litter	25-65%
Surface fragments >0.25" and <=3"	0-5%
Surface fragments >3"	0-1%
Bedrock	0%
Water	0%
Bare ground	10-20%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	—	—	1-10%	0-2%
>0.5 <= 1	—	0-1%	10-20%	1-5%
>1 <= 2	—	0-5%	20-40%	1-10%
>2 <= 4.5	—	0-1%	10-20%	0-10%
>4.5 <= 13	0-1%	0-1%	0-10%	—
>13 <= 40	0-5%	—	—	—
>40 <= 80	—	—	—	—
>80 <= 120	—	—	—	—
>120	—	—	—	—

Figure 8. Plant community growth curve (percent production by month).
AZ4111, 41.1 16-30. Growth begins in the spring, semi-dormancy occurs during the June drought, most growth occurs during the summer rainy season..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	10	0	15	45	20	5	0	0

State 2 Exotic grasses

Community 2.1

Exotic grasses

This state occurs where the native plant community has been replaced by non-native warm season perennial grasses like Lehmann, Boer, Weeping and Cochise lovegrass; and / or Johnson grass, yellow bluestem and bermuda grass. These species either were directly seeded or invaded areas of this site. In areas the natural flooding regime has been altered by diversions, ROWs, and drainage ditches, leaving the native plant community open to invasion by exotics.

State 3

Blue grama sod

Community 3.1

Blue grama sod

In some areas the interaction of continuous heavy grazing with drought, flood and fire has removed native perennial mid-grass species from the plant community. Blue grama persists as a low growing sod with good basal cover but low production compared to the Native plant community. Native and non-native annual forbs and grasses are common in this state the site. Other perennial grasses are limited to threeawns and short lived natives like Rothrock grama.

State 4

Mesquite, juniper invaded

Community 4.1

Mesquite, juniper invaded



Figure 9. Loamy Swales 16-20" pz. Mesquite

Mesquite and / or juniper has invaded the site in the absence of fire for long periods of time. Shrub canopy ranges from 2 to 15%. Native perennial grasses dominate the under-story. Annuals fluctuate with climate (drought / El Nino). Sediment accumulation around the base of trees protects them from the heat of fires. Non-native perennial grasses like bermuda and Johnson grass can exist in minor amounts.

State 5

Eroded with or w/o mesquite

Community 5.1

Eroded with or w/o mesquite



Figure 10. Loamy Swale 16-20" pz., gullied

The interaction of continuous heavy grazing with drought, flood and fire; with or without shrub invasion, can lead to gully formation. Other areas of this state are caused by head-ward gully erosion coming from the down-cutting of major stream systems. The site no longer holds the flood water it receives from adjacent upland areas. The under-story deteriorates to annual forbs and grasses. Other shrubs and cacti can grow in the under-story. Mesquite, juniper canopy ranges from 1 to 35%.

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			500–1500	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	300–600	–
	big sacaton	SPWR2	<i>Sporobolus wrightii</i>	0–400	–
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	50–300	–
	Arizona cottontop	DICA8	<i>Digitaria californica</i>	50–300	–
	green sprangletop	LEDU	<i>Leptochloa dubia</i>	10–200	–
	silver bluestem	BOSA	<i>Bothriochloa saccharoides</i>	0–100	–
2	Dominant short grasses			500–1000	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	400–800	–
	creeping muhly	MURE	<i>Muhlenbergia repens</i>	10–300	–
	mat muhly	MURI	<i>Muhlenbergia richardsonis</i>	0–200	–
	vine mesquite	PAOB	<i>Panicum obtusum</i>	50–200	–
	tobosagrass	PLMU3	<i>Pleuraphis mutica</i>	0–100	–
3	Misc. perennial grasses			20–200	
	Orcutt's threeawn	ARSCO	<i>Aristida schiedeana</i> var. <i>orcuttiana</i>	1–50	–
	spidergrass	ARTE3	<i>Aristida ternipes</i>	10–50	–
	spidergrass	ARTEG	<i>Aristida ternipes</i> var. <i>gentilis</i>	0–50	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0–50	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	0–50	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	0–50	–
	plains lovegrass	ERIN	<i>Eragrostis intermedia</i>	0–25	–
	tanglehead	HECO10	<i>Heteropogon contortus</i>	0–25	–
	spiny mesquite	LIPE	<i>Hilaria belangeri</i>	0–20	–

	chury-mesquite	NIDE	<i>Pinaria delarigieri</i>	0-20	—
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	0-20	—
	bullgrass	MUEM	<i>Muhlenbergia emersleyi</i>	0-20	—
	deergrass	MURI2	<i>Muhlenbergia rigens</i>	0-20	—
	purple muhly	MURI3	<i>Muhlenbergia rigida</i>	0-20	—
	sprucetop grama	BOCH	<i>Bouteloua chondrosioides</i>	0-20	—
	Rothrock's grama	BORO2	<i>Bouteloua rothrockii</i>	0-20	—
	flatsedge	CYPER	<i>Cyperus</i>	0-20	—
	fall witchgrass	DICO6	<i>Digitaria cognata</i>	0-20	—
	woolyspike balsamscale	ELBA	<i>Elionurus barbiculmis</i>	0-20	—
	Texas bluestem	SCCI2	<i>Schizachyrium cirratum</i>	0-20	—
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	0-20	—
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0-20	—
	spiked crinkleawn	TRSP12	<i>Trachypogon spicatus</i>	0-20	—
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	0-15	—
	Parish's threeawn	ARPUP5	<i>Aristida purpurea</i> var. <i>parishii</i>	0-10	—
	sedge	CAREX	<i>Carex</i>	0-10	—
	slender grama	BORE2	<i>Bouteloua repens</i>	0-10	—
	poverty threeawn	ARDI5	<i>Aristida divaricata</i>	0-10	—
	Fendler threeawn	ARPUL	<i>Aristida purpurea</i> var. <i>longiseta</i>	0-5	—
	Hall's panicgrass	PAHA	<i>Panicum hallii</i>	0-5	—
4	Annual grasses			10-400	
	prairie threeawn	AROL	<i>Aristida oligantha</i>	1-100	—
	feather fingergrass	CHVI4	<i>Chloris virgata</i>	1-100	—
	tapertip cupgrass	ERACA	<i>Eriochloa acuminata</i> var. <i>acuminata</i>	0-100	—
	bearded sprangletop	LEFUF	<i>Leptochloa fusca</i> ssp. <i>fascicularis</i>	1-100	—
	Mexican sprangletop	LEFUU	<i>Leptochloa fusca</i> ssp. <i>uninervia</i>	0-100	—
	mucronate sprangletop	LEPAB	<i>Leptochloa panicea</i> ssp. <i>brachiata</i>	0-100	—
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	0-100	—
	sticky sprangletop	LEVI5	<i>Leptochloa viscida</i>	0-50	—
	Mexican panicgrass	PAHI5	<i>Panicum hirticaule</i>	0-50	—
	Arizona signalgrass	URAR	<i>Urochloa arizonica</i>	0-50	—
	needle grama	BOAR	<i>Bouteloua aristidoides</i>	0-50	—
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	0-25	—
	sixweeks threeawn	ARAD	<i>Aristida adscensionis</i>	0-25	—
	Bigelow's bluegrass	POBI	<i>Poa bigelovii</i>	0-25	—
	witchgrass	PACA6	<i>Panicum capillare</i>	0-25	—
	Arizona brome	BRAR4	<i>Bromus arizonicus</i>	0-20	—
	Mexican lovegrass	ERME	<i>Eragrostis mexicana</i>	0-20	—
	desert lovegrass	ERPEM	<i>Eragrostis pectinacea</i> var. <i>miserrima</i>	0-20	—
	tufted lovegrass	ERPEP2	<i>Eragrostis pectinacea</i> var. <i>pectinacea</i>	0-20	—
	delicate muhly	MUFR	<i>Muhlenbergia fragilis</i>	0-10	—
	littleseed muhly	MUMI	<i>Muhlenbergia microsperma</i>	0-10	—
	matted grama	BOSI2	<i>Bouteloua simplex</i>	0-10	—

	pitscale grass	HAGR3	<i>Hackelochloa granularis</i>	0–5	–
	poverty dropseed	SPVA	<i>Sporobolus vaginiflorus</i>	0–1	–
	prairie false oat	TRIN5	<i>Trisetum interruptum</i>	0–1	–
	Eastwood fescue	VUMIC	<i>Vulpia microstachys</i> var. <i>ciliata</i>	0–1	–
	desert fescue	VUMIM	<i>Vulpia microstachys</i> var. <i>microstachys</i>	0–1	–
Forb					
5	Perennial forbs			10–50	
	fingerleaf gourd	CUDI	<i>Cucurbita digitata</i>	0–25	–
	Missouri gourd	CUFO	<i>Cucurbita foetidissima</i>	0–25	–
	coyote gourd	CUPA	<i>Cucurbita palmata</i>	0–25	–
	Cooley's bundleflower	DECO2	<i>Desmanthus cooleyi</i>	0–25	–
	gooseberryleaf globemallow	SPGR2	<i>Sphaeralcea grossulariifolia</i>	1–25	–
	white prairie aster	SYFAC	<i>Symphytotrichum falcatum</i> var. <i>commutatum</i>	1–25	–
	wealeaf bur ragweed	AMCO3	<i>Ambrosia confertiflora</i>	1–20	–
	Texas bindweed	COEQ	<i>Convolvulus equitans</i>	1–15	–
	spreading fleabane	ERDI4	<i>Erigeron divergens</i>	0–15	–
	spear globemallow	SPHA	<i>Sphaeralcea hastulata</i>	0–15	–
	brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	0–15	–
	silverleaf nightshade	SOEL	<i>Solanum elaeagnifolium</i>	1–10	–
	Wright's cudweed	PSCAC2	<i>Pseudognaphalium canescens</i> ssp. <i>canescens</i>	0–10	–
	canaigre dock	RUHY	<i>Rumex hymenosepalus</i>	0–10	–
	whitemargin sandmat	CHAL11	<i>Chamaesyce albomarginata</i>	0–10	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0–10	–
	melon loco	APUN	<i>Apodanthera undulata</i>	0–10	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0–10	–
	southwestern pricklypoppy	ARPL3	<i>Argemone pleiacantha</i>	0–5	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	0–5	–
	desert marigold	BAMU	<i>Baileya multiradiata</i>	0–5	–
	lyreleaf greeneyes	BELY	<i>Berlandiera lyrata</i>	0–5	–
	scarlet spiderling	BOCO	<i>Boerhavia coccinea</i>	0–5	–
	dwarf stickpea	CAHUR	<i>Calliandra humilis</i> var. <i>reticulata</i>	0–5	–
	whitemouth dayflower	COER	<i>Commelina erecta</i>	0–5	–
	bluedicks	DICA14	<i>Dichelostemma capitatum</i>	0–5	–
	spreading snakeherb	DYSCD	<i>Dyschoriste schiedeana</i> var. <i>decumbens</i>	0–5	–
	whiteflower prairie clover	DAAL	<i>Dalea albiflora</i>	0–5	–
	velvet leaf senna	SELI4	<i>Senna lindheimeriana</i>	0–5	–
	New Mexico fanpetals	SINE	<i>Sida neomexicana</i>	0–5	–
	shrubby purslane	POSU3	<i>Portulaca suffrutescens</i>	0–5	–
	lemon beebalm	MOCIA	<i>Monarda citriodora</i> ssp. <i>austromontana</i>	0–5	–
	tufted evening primrose	OECA10	<i>Oenothera caespitosa</i>	0–5	–
	woodsorrel	OXAI1	<i>Oxalis</i>	0–5	–

	Common Name	Symbol	Scientific Name	Life Span	Notes
	slimleaf bean	PHAN3	<i>Phaseolus angustissimus</i>	0–5	–
	wild dwarf morning-glory	EVAR	<i>Evolvulus arizonicus</i>	0–5	–
	ivyleaf groundcherry	PHHE4	<i>Physalis hederifolia</i>	0–5	–
	scarlet beeblossom	GACO5	<i>Gaura coccinea</i>	0–5	–
	Indian rushpea	HOGL2	<i>Hoffmannseggia glauca</i>	0–5	–
	Trans-Pecos thimblehead	HYWI	<i>Hymenothrix wislizeni</i>	0–5	–
	Lewis flax	LILE3	<i>Linum lewisii</i>	0–5	–
	Greene's bird's-foot trefoil	LOGR4	<i>Lotus greenei</i>	0–5	–
	Wright's deervetch	LOWR	<i>Lotus wrightii</i>	0–5	–
	Sonoita noseburn	TRLA	<i>Tragia laciniata</i>	0–5	–
	American vetch	VIAM	<i>Vicia americana</i>	0–5	–
	Louisiana vetch	VILUL2	<i>Vicia ludoviciana</i> ssp. <i>ludoviciana</i>	0–5	–
	desert globemallow	SPAM2	<i>Sphaeralcea ambigua</i>	0–5	–
	Missouri goldenrod	SOMI2	<i>Solidago missouriensis</i>	0–2	–
	jewels of Opar	TAPA2	<i>Talinum paniculatum</i>	0–2	–
	Coulter's wrinklefruit	TECO	<i>Tetradlea coulteri</i>	0–2	–
	ragged nettlespurge	JAMA	<i>Jatropha macrorhiza</i>	0–2	–
	southwestern mock vervain	GLGO	<i>Glandularia gooddingii</i>	0–2	–
	trailing fleabane	ERFL	<i>Erigeron flagellaris</i>	0–2	–
	New Mexico fleabane	ERNE3	<i>Erigeron neomexicanus</i>	0–2	–
	velvetseed milkwort	POOB	<i>Polygala obscura</i>	0–2	–
	Arizona snakecotton	FRAR2	<i>Froelichia arizonica</i>	0–2	–
	orange fameflower	PHAU13	<i>Phemeranthus aurantiacus</i>	0–2	–
	birdbill dayflower	CODI4	<i>Commelina dianthifolia</i>	0–2	–
	desert mariposa lily	CAKE	<i>Calochortus kennedyi</i>	0–2	–
	sego lily	CANU3	<i>Calochortus nuttallii</i>	0–2	–
	brownfoot	ACWR5	<i>Acourtia wrightii</i>	0–2	–
	trailing windmills	ALIN	<i>Allionia incarnata</i>	0–2	–
	largeflower onion	ALMA4	<i>Allium macropetalum</i>	0–2	–
	tuber anemone	ANTU	<i>Anemone tuberosa</i>	0–2	–
	Watson's dutchman's pipe	ARWA	<i>Aristolochia watsonii</i>	0–2	–
	Arizona milkvetch	ASAR6	<i>Astragalus arizonicus</i>	0–1	–
	spider milkweed	ASAS	<i>Asclepias asperula</i>	0–1	–
	chaparral asphead	ASHI3	<i>Aspicarpa hirtella</i>	0–1	–
	broadleaf milkweed	ASLA4	<i>Asclepias latifolia</i>	0–1	–
	woolly locoweed	ASMOB	<i>Astragalus mollissimus</i> var. <i>bigelovii</i>	0–1	–
	sheep milkvetch	ASNO3	<i>Astragalus nothoxys</i>	0–1	–
	horsetail milkweed	ASSU2	<i>Asclepias subverticillata</i>	0–1	–
	Indianhemp	APCA	<i>Apocynum cannabinum</i>	0–1	–
	rose heath	CHER2	<i>Chaetopappa ericoides</i>	0–1	–
	wholeleaf Indian	CAIN14	<i>Castilleja integra</i>	0–1	–

	paintbrush				
	slimflower scurfpea	PSTE5	<i>Psoralidium tenuiflorum</i>	0–1	–
	slimleaf plainsmustard	SCLI12	<i>Schoenocrambe linearifolia</i>	0–1	–
	Lemmon's ragwort	SELE8	<i>Senecio lemmonii</i>	0–1	–
	Mexican fireplant	EUHE4	<i>Euphorbia heterophylla</i>	0–1	–
	pearly globe amaranth	GONI	<i>Gomphrena nitida</i>	0–1	–
	small matweed	GUDED	<i>Guilleminea densa</i> var. <i>densa</i>	0–1	–
	San Pedro daisy	LAPO4	<i>Lasianthaea podocephala</i>	0–1	–
	narrowleaf stoneseed	LIIN2	<i>Lithospermum incisum</i>	0–1	–
	variableleaf bushbean	MAGI2	<i>Macroptilium gibbosifolium</i>	0–1	–
	lacy tansyaster	MAPI	<i>Machaeranthera pinnatifida</i>	0–1	–
	Mexican star	MIBI2	<i>Milla biflora</i>	0–1	–
	longstalk greenthread	THLO	<i>Thelesperma longipes</i>	0–1	–
	Hopi tea greenthread	THME	<i>Thelesperma megapotamicum</i>	0–1	–
6	Annual forbs			5–100	
	sensitive partridge pea	CHNI2	<i>Chamaecrista nictitans</i>	1–50	–
	common sunflower	HEAN3	<i>Helianthus annuus</i>	1–50	–
	longleaf false goldeneye	HELOA2	<i>Helimeris longifolia</i> var. <i>annua</i>	1–50	–
	camphorweed	HESU3	<i>Heterotheca subaxillaris</i>	1–50	–
	San Pedro matchweed	XAGY	<i>Xanthocephalum gymnospermoides</i>	1–50	–
	longleaf false goldeneye	HELOL	<i>Helimeris longifolia</i> var. <i>longifolia</i>	0–25	–
	sorrel buckwheat	ERPO4	<i>Eriogonum polycladon</i>	1–25	–
	fewflower beggarticks	BILE	<i>Bidens leptcephala</i>	1–25	–
	New Mexico copperleaf	ACNE	<i>Acalypha neomexicana</i>	0–25	–
	redstar	IPCO3	<i>Ipomoea coccinea</i>	0–20	–
	crestrib morning-glory	IPCO2	<i>Ipomoea costellata</i>	0–15	–
	coastal bird's-foot trefoil	LOSAB	<i>Lotus salsuginosus</i> var. <i>brevivexillus</i>	0–15	–
	California poppy	ESCAM	<i>Eschscholzia californica</i> ssp. <i>mexicana</i>	0–15	–
	Arizona gumweed	GRAR2	<i>Grindelia arizonica</i>	0–15	–
	New Mexico goosefoot	CHNE3	<i>Chenopodium neomexicanum</i>	0–15	–
	wheelscale saltbush	ATEL	<i>Atriplex elegans</i>	0–15	–
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	0–15	–
	scrambled eggs	COAU2	<i>Corydalis aurea</i>	0–15	–
	horseweed	CONYZ	<i>Conyza</i>	0–15	–
	spreading fanpetals	SIAB	<i>Sida abutifolia</i>	0–15	–
	Arizona popcornflower	PLAR	<i>Plagiobothrys arizonicus</i>	0–15	–
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	0–15	–
	purslane	PORTU	<i>Portulaca</i>	0–10	–
	Arizona poppy	KAGR	<i>Kallstroemia grandiflora</i>	0–10	–
	foothill deervetch	LOHU2	<i>Lotus humistratus</i>	0–10	–
	doubleclaw	PRPA2	<i>Proboscidea parviflora</i>	0–10	–
	New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	1–10	–
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	1–10	–
	sacred thorn-apple	DAWR2	<i>Datura wrightii</i>	0–10	–

	western tansymustard	DEPI	<i>Descurainia pinnata</i>	1–10	–
	Thurber's morning-glory	IPTH	<i>Ipomoea thurberi</i>	0–10	–
	Gordon's bladderpod	LEGO	<i>Lesquerella gordonii</i>	0–10	–
	shaggyfruit pepperweed	LELA	<i>Lepidium lasiocarpum</i>	0–5	–
	intermediate pepperweed	LEVIM	<i>Lepidium virginicum</i> var. <i>medium</i>	0–5	–
	shortstem lupine	LUBR2	<i>Lupinus brevicaulis</i>	0–5	–
	bajada lupine	LUCOC	<i>Lupinus concinnus</i> ssp. <i>concinnus</i>	0–5	–
	slender goldenweed	MAGR10	<i>Machaeranthera gracilis</i>	0–5	–
	mesa tansyaster	MATA	<i>Machaeranthera tagetina</i>	0–5	–
	tanseyleaf tansyaster	MATA2	<i>Machaeranthera tanacetifolia</i>	0–5	–
	whitestem blazingstar	MEAL6	<i>Mentzelia albicaulis</i>	0–5	–
	poorjoe	DITE2	<i>Diodia teres</i>	0–5	–
	wedgeleaf draba	DRCU	<i>Draba cuneifolia</i>	0–5	–
	blanketflower	GAILL	<i>Gaillardia</i>	0–5	–
	miniature woollystar	ERD12	<i>Eriastrum diffusum</i>	0–5	–
	star gilia	GIST	<i>Gilia stellata</i>	0–5	–
	pearly globe amaranth	GONI	<i>Gomphrena nitida</i>	0–5	–
	halfmoon milkvetch	ASAL6	<i>Astragalus allochrous</i>	0–5	–
	smallflowered milkvetch	ASNU4	<i>Astragalus nuttallianus</i>	0–5	–
	Thurber's milkvetch	ASTH	<i>Astragalus thurberi</i>	0–5	–
	fringed redmaids	CAC12	<i>Calandrinia ciliata</i>	0–5	–
	pitseed goosefoot	CHBE4	<i>Chenopodium berlandieri</i>	0–5	–
	hyssopleaf sandmat	CHHY3	<i>Chamaesyce hyssopifolia</i>	0–5	–
	cryptantha	CRYPT	<i>Cryptantha</i>	0–5	–
	sawtooth sage	SASU7	<i>Salvia subincisa</i>	0–5	–
	desert unicorn-plant	PRAL4	<i>Proboscidea althaeifolia</i>	0–5	–
	warty caltrop	KAPA	<i>Kallstroemia parviflora</i>	0–5	–
	green carpetweed	MOVE	<i>Mollugo verticillata</i>	0–5	–
	desert evening primrose	OEPR	<i>Oenothera primiveris</i>	0–5	–
	Florida pellitory	PAFL3	<i>Parietaria floridana</i>	0–5	–
	Mexican passionflower	PAME2	<i>Passiflora mexicana</i>	0–5	–
	phacelia	PHACE	<i>Phacelia</i>	0–2	–
	rough cocklebur	XAST	<i>Xanthium strumarium</i>	0–2	–
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	0–2	–
	golden crownbeard	VEEN	<i>Verbesina encelioides</i>	0–2	–
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	0–2	–
	erect spiderling	BOER	<i>Boerhavia erecta</i>	0–2	–
	purple spiderling	BOPU	<i>Boerhavia purpurascens</i>	0–2	–
	crested anoda	ANCR2	<i>Anoda cristata</i>	0–2	–
	Abert's buckwheat	ERAB2	<i>Eriogonum abertianum</i>	0–2	–
	plains flax	LIPU4	<i>Linum puberulum</i>	0–2	–
	El Paso skyrocket	IPTH2	<i>Ipomopsis thurberi</i>	0–1	–
	sweet four o'clock	MILO2	<i>Mirabilis longiflora</i>	0–1	–

	Fendler's desertdandelion	MAFE	<i>Malacothrix tendleri</i>	0–1	–
	lesser yellowthroat gilia	GIFL	<i>Gilia flavocincta</i>	0–1	–
	El Paso gilia	GIME	<i>Gilia mexicana</i>	0–1	–
	Dakota mock vervain	GLBIB	<i>Glandularia bipinnatifida</i> var. <i>bipinnatifida</i>	0–1	–
	threadstem sandmat	CHRE4	<i>Chamaesyce revoluta</i>	0–1	–
	thymeleaf sandmat	CHSE6	<i>Chamaesyce serpyllifolia</i>	0–1	–
	slimseed sandmat	CHST8	<i>Chamaesyce stictospora</i>	0–1	–
	miner's lettuce	CLPEP	<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	0–1	–
	Abert's creeping zinnia	SAAB	<i>Sanvitalia abertii</i>	0–1	–
	Arizona phacelia	PHAR13	<i>Phacelia arizonica</i>	0–1	–
	Mangas Spring phacelia	PHBO4	<i>Phacelia bombycina</i>	0–1	–
	yerba porosa	PORU6	<i>Porophyllum ruderale</i>	0–1	–

Shrub/Vine

7	Miscellaneous shrubs			1–20	
	yerba de pasmo	BAPT	<i>Baccharis pteronioides</i>	0–10	–
	bastardsage	ERWR	<i>Eriogonum wrightii</i>	0–10	–
	Apache plume	FAPA	<i>Fallugia paradoxa</i>	0–10	–
	catclaw mimosa	MIACB	<i>Mimosa aculeaticarpa</i> var. <i>biuncifera</i>	0–5	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0–5	–
	soaptree yucca	YUEL	<i>Yucca elata</i>	0–2	–
	threadleaf ragwort	SEFLF	<i>Senecio flaccidus</i> var. <i>flaccidus</i>	0–1	–
	velvetpod mimosa	MIDY	<i>Mimosa dysocarpa</i>	0–1	–
	sacahuista	NOMI	<i>Nolina microcarpa</i>	0–1	–
	cactus apple	OPEN3	<i>Opuntia engelmannii</i>	0–1	–
	twistspine pricklypear	OPMA2	<i>Opuntia macrorhiza</i>	0–1	–
	fringed twinevine	FUCYC	<i>Funastrum cynanchoides</i> ssp. <i>cynanchoides</i>	0–1	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0–1	–
	burroweed	ISTE2	<i>Isocoma tenuisecta</i>	0–1	–
	trailing krameria	KRLA	<i>Krameria lanceolata</i>	0–1	–
	pale desert-thorn	LYPA	<i>Lycium pallidum</i>	0–1	–
	Drummond's clematis	CLDR	<i>Clematis drummondii</i>	0–1	–
	walkingstick cactus	CYSP8	<i>Cylindropuntia spinosior</i>	0–1	–
	longleaf jointfir	EPTR	<i>Ephedra trifurca</i>	0–1	–
	prairie acacia	ACAN	<i>Acacia angustissima</i>	0–1	–
	catclaw acacia	ACGR	<i>Acacia greggii</i>	0–1	–
	Thurber's desert honeysuckle	ANTH2	<i>Anisacanthus thurberi</i>	0–1	–
	pointleaf manzanita	ARPU5	<i>Arctostaphylos pungens</i>	0–1	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	0–1	–

Tree

8	Trees			0–50	
	Arizona white oak	QUAR	<i>Quercus arizonica</i>	0–10	–
	Emery oak	QUEM	<i>Quercus emeryi</i>	0–10	–

	Emory oak	QOEM	<i>Quercus emoryi</i>	0–10	–
	western soapberry	SASAD	<i>Sapindus saponaria</i> var. <i>drummondii</i>	0–5	–
	Arizona walnut	JUMA	<i>Juglans major</i>	0–5	–
	velvet mesquite	PRVE	<i>Prosopis velutina</i>	0–5	–
	netleaf hackberry	CELAR	<i>Celtis laevigata</i> var. <i>reticulata</i>	0–5	–
	desert willow	CHLI2	<i>Chilopsis linearis</i>	0–5	–
	velvet ash	FRVE2	<i>Fraxinus velutina</i>	0–5	–
	alligator juniper	JUDE2	<i>Juniperus deppeana</i>	0–1	–

Animal community

This site is suitable for grazing by domestic livestock at any time of the year. This site has a long green season, during and after the summer rainy season, has occasional free water in potholes and will often be overused before proper use is made of adjacent upland areas. Shade is lacking unless mesquite has increased on the site. The plant community is excellent habitat for a wide variety of native wildlife species of desert grasslands. Nesting cover for ground nesting birds is usually very good.

Hydrological functions

These small floodplains receive and hold flood water from adjacent upland areas for short periods of time (1-2 days). They are important in the hydrology of major streams by trapping sediment eroding from uplands and retaining flood waters for slower release to the larger stream system. Gullied swales pass large flood events in less than one day.

Recreational uses

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

Wood products

Swales that are invaded by mesquite or juniper furnish good quantities of fuel-wood and limited quantities of posts.

Other products

Grass seed, medicinal plants like yerba de pasmo and herbs like wild oregano (monarda).

Inventory data references

Range 417s include 1 in excellent condition and 1 in good condition.

Type locality

Location 1: Santa Cruz County, AZ	
Township/Range/Section	T21S R18E S23
General legal description	Research Ranch
Location 2: Pima County, AZ	
Township/Range/Section	T20S R17E S15
General legal description	Empire ranch at KA 14 in the Davis Pasture.
Location 3: Santa Cruz County, AZ	
Township/Range/Section	T20S R17E S33
General legal description	Babocomari Ranch, Encinos pasture, headwaters swale of Cienega Creek, KA #7.

Contributors

Dan Robinett
Larry D. Ellicott

Approval

Curtis Talbot, 4/09/2021

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Wilma Renken, Dan Robinett, Larry Humphrey, Linda Kennedy
Contact for lead author	USDA-NRCS Tucson MLRA Soil Survey Office
Date	05/01/2014
Approved by	Curtis Talbot
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

2. **Presence of water flow patterns:** Shallow channels 2-3 ft wide, 50-100 ft in length are present.

3. **Number and height of erosional pedestals or terracettes:** Pedestals common on perennial grasses (1/2" height). No terracettes.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground ranges from 10-50%, with higher values following fire. Bare ground diminishes to low values within 5 years. Non-vegetated areas are very small (<1 ft diam).

5. **Number of gullies and erosion associated with gullies:** Infrequent gullies, short (<100 ft in length) with active headcuts showing little movement.

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

7. **Amount of litter movement (describe size and distance expected to travel):** All litter size classes stay in place.

-
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Slake test values taken from under perennial grass and shrub cover were "5" and "6"; values from outside canopy ranged from "4" to "6".
-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface horizon was gravelly sandy loam, 0-6" depth, with granular structure. Color 10YR 3/4 moist.
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial grass basal cover (15%) was evenly dispersed across site. Post-burn values for basal cover were lower (8%), recovering within five years.
-
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction. Soil penetrometer depth averaged 11.4 cm. No underlying soil feature that can 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: Mid-grasses
- Sub-dominant: perennial forbs > short-grasses
- Other: annual grasses and annual forbs
- Additional:
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very little decadence or mortality.
-
14. **Average percent litter cover (%) and depth (in):** Litter cover ranges from 40-75%, increasing with time after burning.
-
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1056 lbs/ac. in a below average year; 2060 lbs/ac. in an average year; 3320 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: Lehmann lovegrass, Boer lovegrass, yellow bluestem, coastal bermudagrass, Johnsongrass, velvet mesquite, cocklebur

17. **Perennial plant reproductive capability:** Not impaired.
