

Ecological site R041XA104AZ Limy Slopes 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.

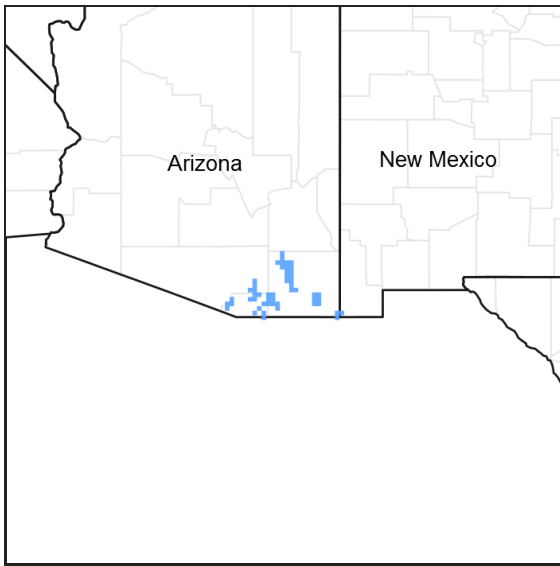


Figure 1. Mapped extent

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 5500 feet and precipitation ranges from 16 to 20 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, woolly 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.

Ecological site concept

Limy Slopes ecological site occurs on steep uplands, all moisture is received from precipitation without additional moisture inputs from on-site surface flow. Slopes are steep, exceeding 15 percent. The calcareous soils are moderately deep to deep (20 – 60+ inches). The surface soils are dark colored, 10YR 4/2, in the first 5 inches.

Associated sites

R041XA103AZ	Limestone Hills 16-20 p.z.
R041XA105AZ	Limy Upland 16-20" p.z.
R041XA107AZ	Loamy Slopes 16-20" p.z.
R041XA108AZ	Loamy Upland 16-20" p.z.
R041XA114AZ	Loamy Bottom 16-20" p.z.
R041XA115AZ	Loamy Swale 16-20" p.z.

Similar sites

R041XA105AZ	Limy Upland 16-20" p.z.
R041XC308AZ	Limy Slopes 12-16" p.z.
R041XC309AZ	Limy Upland 12-16" p.z.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>krameria erecta</i> (2) <i>dalea formosa</i>
Herbaceous	(1) <i>bouteloua eriopoda</i> (2) <i>hesperostipa neomexicana</i>

Physiographic features

This site occurs in the middle elevations of the Madrean Basin and Range province in southeastern Arizona. It occurs on hill-slopes, ridge-tops and fan terraces. Slope aspect is site differentiating at elevations near common resource area boundaries.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Fan piedmont
Flooding frequency	None
Ponding frequency	None
Elevation	1,433–1,676 m
Slope	3–40%
Aspect	N, E, S

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. These winter rains originate in the north Pacific and Gulf of California and come as frontal storms with long duration and low intensity. The remaining 60% falls in the summer season (Jun-Sep). The summer rainy season is known locally as the monsoon. The moisture for the monsoon originates in the Gulf of Mexico. Summer storms 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.

Table 3. Representative climatic features

Frost-free period (average)	221 days
Freeze-free period (average)	255 days
Precipitation total (average)	508 mm

Influencing water features

There are no water features associated with this site.

Soil features

These moderately deep to deep soils are calcareous throughout their profile. They developed from calcareous alluvium or conglomerate and fanglomerate parent material. Soil surface texture ranges from very cobbly sandy loam to gravelly loam. Surface soil is very dark colored and well-protected by covers of rocks, cobbles, and gravels. Plant-soil moisture relationships are fair. Soil series characteristic of this site include Hathaway and Pyeatt.

Table 4. Representative soil features

Surface texture	(1) Very gravelly sandy loam (2) Very gravelly loam (3) Cobbly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid to moderate
Soil depth	102–152 cm
Surface fragment cover ≤3"	10–45%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	9.14–21.34 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)	7.8–8.4
Subsurface fragment volume ≤3" (Depth not specified)	10–45%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

The potential plant community, the Reference Plant Community (RPC, see State and Transition Model below) of the 41-1AZ Limy Slopes ecological site is dominated by perennial grasses with well-dispersed half shrubs, cacti, and yucca-like succulents. Scattered trees can be present. More trees are found on north-facing slopes; more succulents are found on south-facing slopes. Fire shapes the plant community phases in the Reference State by reducing shrub dominance and killing many woody plant seedlings. Between fires, shrub growth continues unimpeded. The continuity of perennial grasses provides fine-fuel to carry fire. Natural fire-free periods are 10-20 years in length.

Seasonal rainfall affects the amount and composition of annual plant production. After a wet winter, cool season plants (species like New Mexico feathergrass, woolly bunchgrass, false mesquite, shrubby dalea and ratany) begin active growth in March or April. The months of May and June present a period of little to no active plant growth. Warm season species, mostly perennial grasses, begin active growth after the onset of the summer rainy season, usually in July; peak annual production occurs in October.

Steep slopes can make this ecological site somewhat vulnerable to long-term disturbances. As disturbances increase in intensity, repetition or duration, the effects they have on the site are compounded by slope. The site's hydrology, biotic integrity and soil stability are impacted. The changes, especially to the plant community, can become long-lasting. If non-native perennial bunchgrass seed is present or brought onto this ecological site, repeated disturbance (fire or unmanaged grazing) may result in a monoculture of non-native lovegrass (Exotic Grass State). The aspect remains similar to RPC; however, the lovegrasses do not offer adequate wildlife food and cover.

If the disturbance is not managed, the productivity of the site ultimately declines as hydrology, soil stability and the biotic community all function differently from that in the Reference State. Continuous, unmanaged grazing removes fire fuel and reduces perennial bunchgrass vigor. In the absence of fire, whether from fire suppression or lack of fuel, the site will transition to a plant community that is dominated by shrubs with less perennial grass cover (Shrub Dominated State). Run-off and erosion is much higher in this state than either the Reference or the Exotic Grass states.

Unmanaged grazing continued for 50+ years can severely impact soil and plant community functioning from the Shrub Dominated State; the effects can be accelerated when coupled with fire or drought. Soil loss can be detrimental and the resulting Eroded State has severe erosion and lower potential productivity.

Periodic droughts occur in this precipitation and cause significant grass mortality. Droughts in the early 30s, mid-50s, 1975-76, 1988-89, 95-96 and 2002 resulted in the loss of much of the grass cover on this site. The RPC recovers rapidly from drought, however, because gravel and cobbles covers slow rainfall run-off and the prevailing climate is generally favorable.

State and transition model

41.1 Limy Slopes 16-20" p.z. (R041XA104AZ)

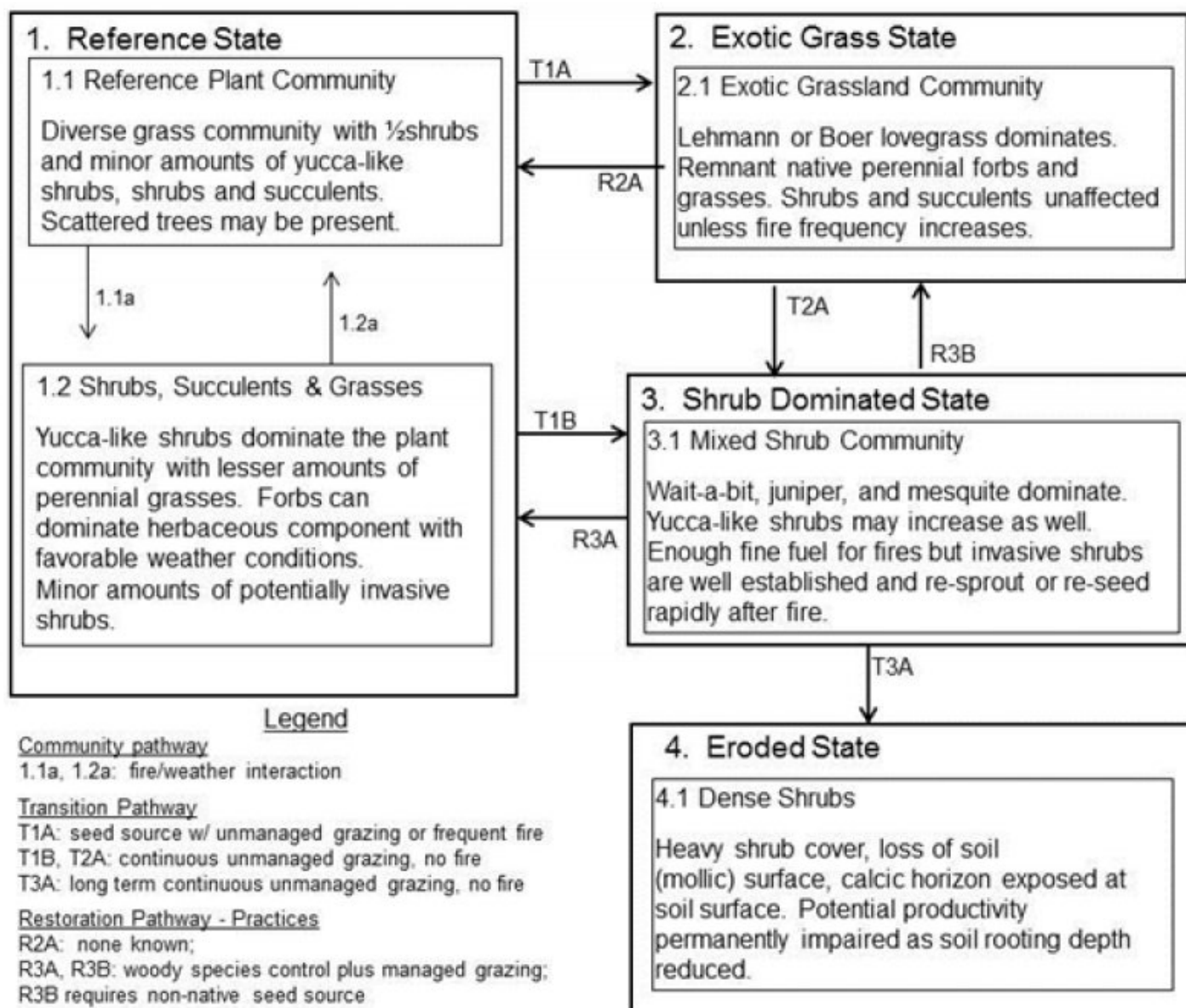


Figure 4. 41-1AZ Limy Slopes State and Transition Model

State 1 Reference

Community 1.1 Reference Plant Community



Figure 5. Limy Slopes 16-20" pz. Reference Plant Community

The potential plant community on this site is dominated by warm season perennial grasses with a fair component of cool season perennial grasses and half shrubs. Cool season grasses tend to be clumped on the site and not evenly dispersed in the community. Several species of shrubs, cacti, other succulents and forbs are represented in the plant community. Cool season grasses and preferred warm season mid-grasses can be removed from the plant community by repeated selective grazing or continuous heavy grazing. Less desirable species like red and blue three-awns will then dominate the grass community. Without periodic disturbance, like grazing or fire, perennial mid-grasses can become decadent; then, with less live perennial grass cover, forbs like herbaceous sage and cudweed can increase to dominate the plant community. The aspect is open grassland or savanna when scattered trees are present.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	651	1233	1541
Forb	78	157	235
Shrub/Vine	22	50	84
Tree	–	6	28
Total	751	1446	1888

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	1-5%
Grass/grasslike basal cover	8-20%
Forb basal cover	0-1%
Non-vascular plants	0-1%
Biological crusts	1-10%
Litter	30-60%
Surface fragments >0.25" and <=3"	10-45%
Surface fragments >3"	0-5%
Bedrock	0%
Water	0%
Bare ground	5-20%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	1-5%	1-5%	0-2%
>0.15 <= 0.3	–	1-5%	15-30%	1-5%
>0.3 <= 0.6	–	1-5%	15-30%	0-2%
>0.6 <= 1.4	–	1-5%	0-10%	–
>1.4 <= 4	0-1%	0-1%	–	–
>4 <= 12	0-2%	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 7. 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

Community 1.2 Shrubs, Succulents and Grasses

Shrubs and succulents dominate the plant community with lesser amounts of perennial grasses. Forbs fluctuate with climate with seasonal rainfall amounts. Minor invasion of other woody plants.

Pathway 1.1a Community 1.1 to 1.2

Fire-free period. Shrub growth extends above grass canopy, perennial grass plant vigor may decline.

Conservation practices

Prescribed Burning
Upland Wildlife Habitat Management
Prescribed Grazing

Pathway 1.2a Community 1.2 to 1.1

Fire removes shrub canopy, perennial grasses resume vigorous growth with average rainfall.

Conservation practices

Prescribed Burning
Upland Wildlife Habitat Management
Prescribed Grazing

State 2 Exotic Grass

Community 2.1

Exotic grassland



Figure 8. Limy Slopes 16-20" pz. Boer lovegrass

This state occurs where Lehmann or Boer lovegrass has been seeded or has moved onto the site from a nearby seed source. Lehmann can increase to dominate the plant community. Native perennial grasses and forbs are reduced to minor amounts and removed by unmanaged grazing or repeated fire. Herbaceous production in this state can exceed that of the RPC; however, exotic lovegrasses are low in nutritional value (low protein, high indigestible carbohydrates). Also, these lovegrasses are generally less palatable to livestock than native perennial grasses. Livestock grazing use will be minimal with livestock concentrating grazing use on less steep, adjacent sites considering the steeper slopes; livestock will use the non-natives on south slopes during early spring green-up. Exotic lovegrass seed is very fine making it unavailable as a food for wildlife and a monoculture stand can become too dense for small wildlife movement. This state is very stable. The aspect is grassland or savannah when scattered trees are present.

State 3 Shrub Dominated

Community 3.1 Mixed Shrubs



Figure 9. Limy Slopes 16-20" pz. juniper invaded

This state occurs where shrubs like wait-a-bit, one seed juniper and mesquite increase in the absence of fire for long periods of time. Mesquite, whitethorn acacia and Lehmann lovegrass will increase to dominate if their seed is introduced. Yucca like shrubs including sotol, beargrass and soapweed yucca can also increase. Sufficient fine fuels may exist to carry fire but the major shrubs are well established and will re-sprout after fire and quickly assume dominance. The aspect is shrubland.

State 4 Eroded

Community 4.1 Dense Shrub

This state exists where accelerated sheet and rill erosion has occurred due severe trailing and soil compaction. In some areas road construction has resulted in this condition. As the dark colored soil surface horizon is lost, soil depth is lost, in some areas it can be eroded down to subsurface calcic horizons. Site potential is reduced to somewhat resemble Limy Upland ecological site (R041XA105AZ).

Transition T1A State 1 to 2

Non-native bunchgrass seed source (wind-blown or mechanical transport) paired with a native perennial grass community disturbance such as fire or unmanaged grazing.

Transition T1B State 1 to 3

In the absence of fire, shrub growth is unchecked. Juniper, mesquite and other shrubs, including yucca-like shrub, increase in size and number. Remnant native perennial grasses cannot re-colonize with shrub competition. Fire suppression or long-term unmanaged grazing with or without drought/fire interaction reduces perennial grass vigor and removes fine fuels from carrying fire.

Restoration pathway R2A State 2 to 1

No restoration pathway known at this time. Perhaps future development of herbicide or biological treatment to remove perennial exotic lovegrasses will occur. Fire will maintain open aspect.

Conservation practices

Prescribed Grazing

Transition T2A State 2 to 3

Long-term unmanaged grazing repeatedly removes perennial grass canopy, reduces fire fuel load and prevents fire. Shrubs out-compete perennial grasses for resources. Juniper, mesquite and other shrubs not found in the RPC are inadvertently introduced to the site by animal transport. Once established shrubs increase in size and number. Remnant native perennial grasses cannot re-colonize areas with shrub competition.

Restoration pathway R3A State 3 to 1

Chemical brush management, range planting (as needed) supported by prescribed grazing. Shrub control needs to be maintained with herbicide treatment or prescribed burning. Chemical brush management is preferred since the steep slope limits the use of machinery.

Conservation practices

Brush Management
Prescribed Burning
Range Planting
Upland Wildlife Habitat Management
Prescribed Grazing

Restoration pathway R3B

State 3 to 2

Restoration practices conducted when a non-native seed bank is present along trails, roads or in disturbed areas can result in an exotic grassland community. Range planting with native grasses may enhance the native grass component. Practices are chemical brush management, range planting (as needed) supported by prescribed grazing. Shrub control maintained with herbicide will favor the native grasses while prescribed burning favors non-natives. Burning the mixed shrub community with a non-native grass seed source present can result in an exotic grassland co-dominant with shrubs.

Conservation practices

Brush Management
Prescribed Burning
Range Planting
Upland Wildlife Habitat Management
Prescribed Grazing

Transition T3A

State 3 to 4

Long-term unmanaged grazing has removed the herbaceous plant community. The absence of perennial grasses affects soil site stability and hydrologic functioning. Animal trampling and soil surface compaction compound the effect of plant community changes (increased shrub/decreased perennial grass community) to increase surface water runoff rather than infiltration. Over time (50-100+ years) the mollic A horizon can be lost leaving the site with a reduction in potential productivity.

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 mid grasses			336–673	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	336–448	–
	spiked crinkleawn	TRSP12	<i>Trachypogon spicatus</i>	0–336	–
	woolyspike balsamscale	ELBA	<i>Elionurus barbiculmis</i>	0–224	–
	purple muhly	MURI3	<i>Muhlenbergia rigida</i>	0–56	–
2	Dominant cool season grasses			22–168	
	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	22–168	–
	southwestern needlegrass	ACEM4	<i>Achnatherum eminens</i>	0–112	–
	squirreltail	ELELE	<i>Elymus elymoides</i> ssp. <i>elymoides</i>	0–17	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–11	–
	pinyon ricegrass	PIFI	<i>Piptochaetium fimbriatum</i>	0–11	–
3	Dominant short grasses			280–504	
	black grama	BOER4	<i>Bouteloua eriopoda</i>	224–448	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	0–112	–
	Hall's panicgrass	PAHA	<i>Panicum hallii</i>	6–112	–
	slim tridens	TRMU	<i>Tridens muticus</i>	1–56	–

	slim tridens	TRMUE	<i>Tridens muticus</i> var. <i>elongatus</i>	1–56	–
	fall witchgrass	DICO6	<i>Digitaria cognata</i>	0–56	–
	shortleaf woollygrass	ERAV	<i>Erioneuron avenaceum</i>	1–56	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–56	–
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	0–34	–
4	Perennial threeawns			11–112	
	blue threeawn	ARPUN	<i>Aristida purpurea</i> var. <i>nealleyi</i>	11–112	–
	Orcutt's threeawn	ARSCO	<i>Aristida schiedeana</i> var. <i>orcuttiana</i>	0–22	–
	Fendler threeawn	ARPUL	<i>Aristida purpurea</i> var. <i>longiseta</i>	0–17	–
	Wright's threeawn	ARPUW	<i>Aristida purpurea</i> var. <i>wrightii</i>	0–17	–
	spidergrass	ARTE3	<i>Aristida ternipes</i>	0–11	–
	spidergrass	ARTEG	<i>Aristida ternipes</i> var. <i>gentilis</i>	0–11	–
	poverty threeawn	ARDI5	<i>Aristida divaricata</i>	0–6	–
5	Miscellaneous perennial grasses			1–56	
	bullgrass	MUEM	<i>Muhlenbergia emersleyi</i>	0–22	–
	plains lovegrass	ERIN	<i>Eragrostis intermedia</i>	0–17	–
	tanglehead	HECO10	<i>Heteropogon contortus</i>	0–17	–
	Texas bluestem	SCCI2	<i>Schizachyrium cirratum</i>	0–11	–
	desert muhly	MUGL2	<i>Muhlenbergia glauca</i>	0–11	–
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	0–11	–
	slender muhly	MUTE4	<i>Muhlenbergia tenuifolia</i>	0–11	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–11	–
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	0–11	–
	green sprangletop	LEDU	<i>Leptochloa dubia</i>	0–11	–
	purple grama	BORA	<i>Bouteloua radicata</i>	0–6	–
	slender grama	BORE2	<i>Bouteloua repens</i>	0–6	–
	silver bluestem	BOSA	<i>Bothriochloa saccharoides</i>	0–6	–
	Arizona cottontop	DICA8	<i>Digitaria californica</i>	0–6	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	0–6	–
	curly-mesquite	HIBE	<i>Hilaria belangeri</i>	0–1	–
	nineawn pappusgrass	ENDE	<i>Enneapogon desvauxii</i>	0–1	–
	vine mesquite	PAOB	<i>Panicum obtusum</i>	0–1	–
	densetuft hairsedge	BUCA2	<i>Bulbostylis capillaris</i>	0–1	–
	sedge	CAREX	<i>Carex</i>	0–1	–
	flatsedge	CYPER	<i>Cyperus</i>	0–1	–
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	0–1	–
	Rothrock's grama	BORO2	<i>Bouteloua rothrockii</i>	0–1	–
6	Annual grasses			0–28	
	sixweeks threeawn	ARAD	<i>Aristida adscensionis</i>	0–11	–
	prairie threeawn	AROL	<i>Aristida oligantha</i>	0–6	–
	Mexican sprangletop	LEFUU	<i>Leptochloa fusca</i> ssp. <i>uninervia</i>	0–6	–
	mucronate sprangletop	LEPAB	<i>Leptochloa panicea</i> ssp. <i>brachiata</i>	0–6	–
	witchgrass	PACA6	<i>Panicum capillare</i>	0–6	–

	Mexican panicgrass	PAHI5	<i>Panicum hirticaule</i>	0-6	-
	Arizona signalgrass	URAR	<i>Urochloa arizonica</i>	0-2	-
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	0-2	-
	delicate muhly	MUFR	<i>Muhlenbergia fragilis</i>	0-2	-
	littleseed muhly	MUMI	<i>Muhlenbergia microsperma</i>	0-2	-
	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	-
	poverty dropseed	SPVA	<i>Sporobolus vaginiflorus</i>	0-1	-
	prairie false oat	TRIN5	<i>Trisetum interruptum</i>	0-1	-
	needle grama	BOAR	<i>Bouteloua aristidoides</i>	0-1	-
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	0-1	-
	matted grama	BOSI2	<i>Bouteloua simplex</i>	0-1	-
	Arizona brome	BRAR4	<i>Bromus arizonicus</i>	0-1	-
	feather fingergrass	CHVI4	<i>Chloris virgata</i>	0-1	-
	tapertip cupgrass	ERACA	<i>Eriochloa acuminata</i> var. <i>acuminata</i>	0-1	-
	Mexican lovegrass	ERME	<i>Eragrostis mexicana</i>	0-1	-
	tufted lovegrass	ERPEP2	<i>Eragrostis pectinacea</i> var. <i>pectinacea</i>	0-1	-
	pitscale grass	HAGR3	<i>Hackelochloa granularis</i>	0-1	-

Forb

7	Perennial Forbs			11-62	
	trailing windmills	ALIN	<i>Allionia incarnata</i>	1-11	-
	Thurber's milkvetch	ASTH	<i>Astragalus thurberi</i>	0-11	-
	smallflowered milkvetch	ASNU4	<i>Astragalus nuttallianus</i>	0-11	-
	pitseed goosefoot	CHBE4	<i>Chenopodium berlandieri</i>	0-11	-
	leatherweed	CRPO5	<i>Croton pottsii</i>	1-11	-
	slimflower scurfpea	PSTE5	<i>Psoraleidium tenuiflorum</i>	0-11	-
	bluedicks	DICA14	<i>Dichelostemma capitatum</i>	1-6	-
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	0-6	-
	shrubby copperleaf	ACPH3	<i>Acalypha phleoides</i>	0-2	-
	weakleaf bur ragweed	AMCO3	<i>Ambrosia confertiflora</i>	1-2	-
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0-2	-
	purplenerve springparsley	CYMU2	<i>Cymopterus multinervatus</i>	0-2	-
	tuber anemone	ANTU	<i>Anemone tuberosa</i>	0-2	-
	rose heath	CHER2	<i>Chaetopappa ericoides</i>	0-2	-
	spreading fleabane	ERDI4	<i>Erigeron divergens</i>	0-2	-
	trailing fleabane	ERFL	<i>Erigeron flagellaris</i>	0-2	-
	fineleaf hymenopappus	HYFI	<i>Hymenopappus filifolius</i>	0-2	-
	spreading snakeherb	DYSCD	<i>Dyschoriste schiedeana</i> var. <i>decumbens</i>	0-2	-
	bastard toadflax	COUM	<i>Comandra umbellata</i>	0-2	-
	Cooley's bundleflower	DECO2	<i>Desmanthus cooleyi</i>	0-2	-
	Wright's deervetch	LOWR	<i>Lotus wrightii</i>	0-2	-
	tufted evening primrose	OECA10	<i>Oenothera caespitosa</i>	0-2	-
	Texas snoutbean	RHSET	<i>Rhynchosia senna</i> var. <i>texana</i>	0-2	-

brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	0-2	-
Rocky Mountain zinnia	ZIGR	<i>Zinnia grandiflora</i>	0-2	-
shrubby purslane	POSU3	<i>Portulaca suffrutescens</i>	0-2	-
buffpetal	RHPH2	<i>Rhynchosida physocalyx</i>	0-1	-
jewels of Opar	TAPA2	<i>Talinum paniculatum</i>	0-1	-
Coulter's wrinklefruit	TECO	<i>Tetradlea coulteri</i>	0-1	-
hairy fourwort	TENE	<i>Tetramerium nervosum</i>	0-1	-
longstalk greenthread	THLO	<i>Thelesperma longipes</i>	0-1	-
Hopi tea greenthread	THME	<i>Thelesperma megapotamicum</i>	0-1	-
pinewoods spiderwort	TRPI	<i>Tradescantia pinetorum</i>	0-1	-
branched noseburn	TRRA5	<i>Tragia ramosa</i>	0-1	-
Fort Huachuca vervain	VEGR2	<i>Verbena gracilis</i>	0-1	-
American vetch	VIAM	<i>Vicia americana</i>	0-1	-
Louisiana vetch	VILUL2	<i>Vicia ludoviciana ssp. ludoviciana</i>	0-1	-
copper zephyrlily	ZELO	<i>Zephyranthes longifolia</i>	0-1	-
slimleaf plainsmustard	SCLI12	<i>Schoenocrambe linearifolia</i>	0-1	-
twinleaf senna	SEBA3	<i>Senna bauhinioides</i>	0-1	-
Lemmon's ragwort	SELE8	<i>Senecio lemmonii</i>	0-1	-
salt spring checkerbloom	SINE3	<i>Sidalcea neomexicana</i>	0-1	-
silverleaf nightshade	SOEL	<i>Solanum elaeagnifolium</i>	0-1	-
copper globemallow	SPAN3	<i>Sphaeralcea angustifolia</i>	0-1	-
gooseberryleaf globemallow	SPGR2	<i>Sphaeralcea grossulariifolia</i>	0-1	-
locoweed	OXYTR	<i>Oxytropis</i>	0-1	-
beardlip penstemon	PEBA2	<i>Penstemon barbatus</i>	0-1	-
Cochise beardtongue	PEDA	<i>Penstemon dasyphyllus</i>	0-1	-
longstalk chinchweed	PELO	<i>Pectis longipes</i>	0-1	-
Parry's beardtongue	PEPA24	<i>Penstemon parryi</i>	0-1	-
slimleaf bean	PHAN3	<i>Phaseolus angustissimus</i>	0-1	-
orange fameflower	PHAU13	<i>Phemeranthus aurantiacus</i>	0-1	-
ivyleaf groundcherry	PHHE4	<i>Physalis hederifolia</i>	0-1	-
white milkwort	POAL4	<i>Polygala alba</i>	0-1	-
velvetseed milkwort	POOB	<i>Polygala obscura</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	-
lemon beebalm	MOCIA	<i>Monarda citriodora ssp. austromontana</i>	0-1	-
Torrey's craglily	ECFL	<i>Echeandia flavescens</i>	0-1	-
babyslippers	HYVE	<i>Hybanthus verticillatus</i>	0-1	-
ragged nettlespurge	JAMA	<i>Jatropha macrorhiza</i>	0-1	-
San Pedro daisy	LAPO4	<i>Lasianthaea podocephala</i>	0-1	-
Fendler's bladderpod	LEFE	<i>Lesquerella fendleri</i>	0-1	-
narrowleaf stoneseed	LIIN2	<i>Lithospermum incisum</i>	0-1	-

Lewis flax	LILE3	<i>Linum lewisii</i>	0-1	-
Greene's bird's-foot trefoil	LOGR4	<i>Lotus greenei</i>	0-1	-
Mexican fireplant	EUHE4	<i>Euphorbia heterophylla</i>	0-1	-
sun spurge	EUR2	<i>Euphorbia radicans</i>	0-1	-
wild dwarf morning-glory	EVAR	<i>Evolvulus arizonicus</i>	0-1	-
shaggy dwarf morning-glory	EVNU	<i>Evolvulus nuttallianus</i>	0-1	-
silver dwarf morning-glory	EVSE	<i>Evolvulus sericeus</i>	0-1	-
Arizona snakecotton	FRAR2	<i>Froelichia arizonica</i>	0-1	-
scarlet beeblossom	GACO5	<i>Gaura coccinea</i>	0-1	-
pearly globe amaranth	GONI	<i>Gomphrena nitida</i>	0-1	-
small matweed	GUDE	<i>Guilleminea densa</i>	0-1	-
red bluet	HORU	<i>Houstonia rubra</i>	0-1	-
pillpod sandmat	CHHI3	<i>Chamaesyce hirta</i>	0-1	-
birdbill dayflower	CODI4	<i>Commelina dianthifolia</i>	0-1	-
Texas bindweed	COEQ	<i>Convolvulus equitans</i>	0-1	-
whitemouth dayflower	COER	<i>Commelina erecta</i>	0-1	-
melon loco	APUN	<i>Apodanthera undulata</i>	0-1	-
horsetail milkweed	ASSU2	<i>Asclepias subverticillata</i>	0-1	-
whiteflower prairie clover	DAAL	<i>Dalea albiflora</i>	0-1	-
James' prairie clover	DAJA	<i>Dalea jamesii</i>	0-1	-
dwarf prairie clover	DANA	<i>Dalea nana</i>	0-1	-
downy prairie clover	DANE	<i>Dalea neomexicana</i>	0-1	-
fingerleaf gourd	CUDI	<i>Cucurbita digitata</i>	0-1	-
coyote gourd	CUPA	<i>Cucurbita palmata</i>	0-1	-
royal sandmat	CHDI5	<i>Chamaesyce dioica</i>	0-1	-
perennial rockcress	ARPE2	<i>Arabis perennans</i>	0-1	-
southwestern pricklypoppy	ARPL3	<i>Argemone pleiakantha</i>	0-1	-
Watson's dutchman's pipe	ARWA	<i>Aristolochia watsonii</i>	0-1	-
halfmoon milkvetch	ASAL6	<i>Astragalus allochrous</i>	0-1	-
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 var. bigelovii</i>	0-1	-
sheep milkvetch	ASNO3	<i>Astragalus nothoxys</i>	0-1	-
largeflower onion	ALMA4	<i>Allium macropetalum</i>	0-1	-
Mexican yellowshow	AMPA3	<i>Amoreuxia palmatifida</i>	0-1	-
Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0-1	-
crested anoda	ANCR2	<i>Anoda cristata</i>	0-1	-

	wheelscale saltbush	ATEL	<i>Atriplex elegans</i>	0-1	-
	dense ayenia	AYMI	<i>Ayenia microphylla</i>	0-1	-
	hairyseed bahia	BAAB	<i>Bahia absinthifolia</i>	0-1	-
	lyreleaf greeneyes	BELY	<i>Berlandiera lyrata</i>	0-1	-
	fewflower beggarticks	BILE	<i>Bidens leptocephala</i>	0-1	-
	scarlet spiderling	BOCO	<i>Boerhavia coccinea</i>	0-1	-
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	0-1	-
	erect spiderling	BOER	<i>Boerhavia erecta</i>	0-1	-
	hoary bowlesia	BOIN3	<i>Bowlesia incana</i>	0-1	-
	purple spiderling	BOPU	<i>Boerhavia purpurascens</i>	0-1	-
	fringed redmaids	CACI2	<i>Calandrinia ciliata</i>	0-1	-
	dwarf stickpea	CAHUR	<i>Calliandra humilis var. reticulata</i>	0-1	-
	wholeleaf Indian paintbrush	CAIN14	<i>Castilleja integra</i>	0-1	-
	desert mariposa lily	CAKE	<i>Calochortus kennedyi</i>	0-1	-
	sego lily	CANU3	<i>Calochortus nuttallii</i>	0-1	-
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0-1	-
	whitemargin sandmat	CHAL11	<i>Chamaesyce albomarginata</i>	0-1	-
8	Annual Forbs			1-56	
	longleaf false goldeneye	HELOA2	<i>Heliomeris longifolia var. annua</i>	0-17	-
	pitseed goosefoot	CHBE4	<i>Chenopodium berlandieri</i>	0-11	-
	smallflowered milkvetch	ASNU4	<i>Astragalus nuttallianus</i>	0-11	-
	Thurber's milkvetch	ASTH	<i>Astragalus thurberi</i>	0-11	-
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	0-6	-
	New Mexico goosefoot	CHNE3	<i>Chenopodium neomexicanum</i>	0-3	-
	sensitive partridge pea	CHNI2	<i>Chamaecrista nictitans</i>	0-3	-
	New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	0-2	-
	scrambled eggs	COAU2	<i>Corydalis aurea</i>	0-2	-
	Wright's bird's beak	COWR2	<i>Cordylanthus wrightii</i>	0-2	-
	New Mexico copperleaf	ACNE	<i>Acalypha neomexicana</i>	0-2	-
	slender goldenweed	MAGR10	<i>Machaeranthera gracilis</i>	0-2	-
	tanseyleaf tansyaster	MATA2	<i>Machaeranthera tanacetifolia</i>	0-2	-
	wedgeleaf draba	DRCU	<i>Draba cuneifolia</i>	0-2	-
	Arizona poppy	KAGR	<i>Kallstroemia grandiflora</i>	0-2	-
	redstar	IPCO3	<i>Ipomoea coccinea</i>	0-2	-
	Thurber's morning-glory	IPTH	<i>Ipomoea thurberi</i>	0-2	-
	spreading fanpetals	SIAB	<i>Sida abutifolia</i>	0-2	-
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	0-1	-
	El Paso skyrocket	IPTH2	<i>Ipomopsis thurberi</i>	0-1	-
	flaxflowered ipomopsis	IPLOL	<i>Ipomopsis longiflora ssp. longiflora</i>	0-1	-
	camphorweed	HESU3	<i>Heterotheca subaxillaris</i>	0-1	-
	crestrub morning-glory	IPCO2	<i>Ipomoea costellata</i>	0-1	-
	warty caltrop	KAPA	<i>Kallstroemia parviflora</i>	0-1	-
	Gordon's bladderpod	LEGO	<i>Lesauerella aordonii</i>	0-1	-

	broadleaved pepperweed	LELA2	<i>Lepidium latifolium</i>	0-1	-
	intermediate pepperweed	LEVIM	<i>Lepidium virginicum var. medium</i>	0-1	-
	dotted blazing star	LIPU	<i>Liatris punctata</i>	0-1	-
	plains flax	LIPU4	<i>Linum puberulum</i>	0-1	-
	foothill deervetch	LOHU2	<i>Lotus humistratus</i>	0-1	-
	coastal bird's-foot trefoil	LOSAB	<i>Lotus salsuginosus var. brevivexillus</i>	0-1	-
	shortstem lupine	LUBR2	<i>Lupinus brevicaulis</i>	0-1	-
	bajada lupine	LUCOC	<i>Lupinus concinnus ssp. concinnus</i>	0-1	-
	Fendler's desertdandelion	MAFE	<i>Malacothrix fendleri</i>	0-1	-
	Abert's buckwheat	ERAB2	<i>Eriogonum abertianum</i>	0-1	-
	sanddune wallflower	ERCA14	<i>Erysimum capitatum</i>	0-1	-
	miniature woollystar	ERDI2	<i>Eriastrum diffusum</i>	0-1	-
	spreading fleabane	ERDI4	<i>Erigeron divergens</i>	0-1	-
	sorrel buckwheat	ERPO4	<i>Eriogonum polycladon</i>	0-1	-
	California poppy	ESCAM	<i>Eschscholzia californica ssp. mexicana</i>	0-1	-
	Arizona blanketflower	GAAR2	<i>Gaillardia arizonica</i>	0-1	-
	red dome blanketflower	GAPI	<i>Gaillardia pinnatifida</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 var. bipinnatifida</i>	0-1	-
	curlytop gumweed	GRNUA	<i>Grindelia nuda var. aphanactis</i>	0-1	-
	whitestem blazingstar	MEAL6	<i>Mentzelia albicaulis</i>	0-1	-
	sweet four o'clock	MILO2	<i>Mirabilis longiflora</i>	0-1	-
	desert evening primrose	OEPR	<i>Oenothera primiveris</i>	0-1	-
	Arizona phacelia	PHAR13	<i>Phacelia arizonica</i>	0-1	-
	Mangas Spring phacelia	PHBO4	<i>Phacelia bombycina</i>	0-1	-
	Arizona popcornflower	PLAR	<i>Plagiobothrys arizonicus</i>	0-1	-
	purslane	PORTU	<i>Portulaca</i>	0-1	-
	yerba porosa	PORU6	<i>Porophyllum ruderale</i>	0-1	-
	desert unicorn-plant	PRAL4	<i>Proboscidea althaeifolia</i>	0-1	-
	doubleclaw	PRPA2	<i>Proboscidea parviflora</i>	0-1	-
	Wright's cudweed	PSCAC2	<i>Pseudognaphalium canescens ssp. canescens</i>	0-1	-
	Abert's creeping zinnia	SAAB	<i>Sanvitalia abertii</i>	0-1	-
	sawtooth sage	SASU7	<i>Salvia subincisa</i>	0-1	-
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	0-1	-
	crested anoda	ANCR2	<i>Anoda cristata</i>	0-1	-
	southwestern pricklypoppy	ARPL3	<i>Argemone pleiacantha</i>	0-1	-
	halfmoon milkvetch	ASAL6	<i>Astragalus allochrous</i>	0-1	-

	royal sandmat	CHDI5	<i>Chamaesyce dioica</i>	0-1	-
	pillpod sandmat	CHHI3	<i>Chamaesyce hirta</i>	0-1	-
	hyssopleaf sandmat	CHHY3	<i>Chamaesyce hyssopifolia</i>	0-1	-
	wheelscale saltbush	ATEL	<i>Atriplex elegans</i>	0-1	-
	fewflower beggarticks	BILE	<i>Bidens leptocephala</i>	0-1	-
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	0-1	-
	erect spiderling	BOER	<i>Boerhavia erecta</i>	0-1	-
	hoary bowlesia	BOIN3	<i>Bowlesia incana</i>	0-1	-
	purple spiderling	BOPU	<i>Boerhavia purpurascens</i>	0-1	-
	fringed redmaids	CACI2	<i>Calandrinia ciliata</i>	0-1	-
	cryptantha	CRYPT	<i>Cryptantha</i>	0-1	-
	Chihuahuan prairie clover	DAEX2	<i>Dalea exigua</i>	0-1	-
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	0-1	-
	sacred thorn-apple	DAWR2	<i>Datura wrightii</i>	0-1	-
	New Mexico ticktrefoil	DENE	<i>Desmodium neomexicanum</i>	0-1	-
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	0-1	-
	western trailing ticktrefoil	DEPR2	<i>Desmodium procumbens</i>	0-1	-
	poorjoe	DITE2	<i>Diodia teres</i>	0-1	-
	miner's lettuce	CLPEP	<i>Claytonia perfoliata ssp. perfoliata</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	-

Shrub/Vine

9	Yucca like plants			34-168	
	sacahuista	NOMI	<i>Nolina microcarpa</i>	11-168	-
	soaptree yucca	YUEL	<i>Yucca elata</i>	6-112	-
	common sotol	DAWH2	<i>Dasyilirion wheeleri</i>	0-22	-
	Schott's yucca	YUSC	<i>Yucca ×schottii</i>	0-17	-
	goldenhead	ACAMP	<i>Acamptopappus</i>	1-16	-
	trailing windmills	ALIN	<i>Allionia incarnata</i>	1-16	-
	chaparral asphed	ASHI3	<i>Aspicarpa hirtella</i>	1-16	-
	dense ayenia	AYMI	<i>Ayenia microphylla</i>	1-16	-
	hairyseed bahia	BAAB	<i>Bahia absinthifolia</i>	1-16	-
	field bindweed	COAR4	<i>Convolvulus arvensis</i>	1-16	-
	whitemouth dayflower	COER	<i>Commelina erecta</i>	1-16	-
	leatherweed	CRPO5	<i>Croton pottsii</i>	1-16	-
	spreading fleabane	ERDI4	<i>Erigeron divergens</i>	1-16	-
	trailing fleabane	ERFL	<i>Erigeron flagellaris</i>	1-16	-
	New Mexico fleabane	ERNE3	<i>Erigeron neomexicanus</i>	1-16	-
	wild dwarf morning-glory	EVAR	<i>Evolvulus arizonicus</i>	1-16	-
	Arizona snakecotton	FRAR2	<i>Froelichia arizonica</i>	1-16	-
	small matweed	GUDED	<i>Guilleminea densa var. densa</i>	1-16	-

	Wright's deervetch	LOWR	<i>Lotus wrightii</i>	1-16	-
	variableleaf bushbean	MAGI2	<i>Macroptilium gibbosifolium</i>	1-16	-
	rough menodora	MESC	<i>Menodora scabra</i>	1-16	-
	Cochise beardtongue	PEDA	<i>Penstemon dasyphyllus</i>	1-16	-
	Parry's beardtongue	PEPA24	<i>Penstemon parryi</i>	1-16	-
	Palmer's penstemon	PEPA8	<i>Penstemon palmeri</i>	1-16	-
	thinleaf goldenhead	PYLI2	<i>Pyrocoma linearis</i>	1-16	-
	Texas snoutbean	RHSET	<i>Rhynchosia senna var. texana</i>	1-16	-
	spreading fanpetals	SIAB	<i>Sida abutifolia</i>	1-16	-
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	1-16	-
	brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	1-16	-
	Eureka dunegrass	SWAL	<i>Swallenia alexandrae</i>	1-16	-
	Hopi tea greenthread	THME	<i>Thelesperma megapotamicum</i>	1-16	-
	Palmer's crinklemat	TIPA	<i>Tiquilia palmeri</i>	1-16	-
	banana yucca	YUBA	<i>Yucca baccata</i>	0-11	-
10	Dominant half shrubs			22-56	
	New Mexico copperleaf	ACNE	<i>Acalypha neomexicana</i>	8-24	-
	onion	ALLIU	<i>Allium</i>	8-24	-
	pigweed	AMARA	<i>Amaranthus</i>	8-24	-
	ragweed	AMBRO	<i>Ambrosia</i>	8-24	-
	tuber anemone	ANTU	<i>Anemone tuberosa</i>	8-24	-
	rockcross	ARABI2	<i>Arabis</i>	8-24	-
	Watson's dutchman's pipe	ARWA	<i>Aristolochia watsonii</i>	8-24	-
	phacelia	PHACE	<i>Phacelia</i>	8-24	-
	ivyleaf groundcherry	PHHE4	<i>Physalis hederifolia</i>	8-24	-
	phlox	PHLOX	<i>Phlox</i>	8-24	-
	Arizona popcornflower	PLAR	<i>Plagiobothrys arizonicus</i>	8-24	-
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	8-24	-
	white milkwort	POAL4	<i>Polygala alba</i>	8-24	-
	little hogweed	POOL	<i>Portulaca oleracea</i>	8-24	-
	slimflower scurfpea	PSTE5	<i>Psoraleidum tenuiflorum</i>	8-24	-
	chia	SACO6	<i>Salvia columbariae</i>	8-24	-
	twinleaf senna	SEBA3	<i>Senna bauhinioides</i>	8-24	-
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	8-24	-
	silverleaf nightshade	SOEL	<i>Solanum elaeagnifolium</i>	8-24	-
	pinewoods spiderwort	TRPI	<i>Tradescantia pinetorum</i>	8-24	-
	branched noseburn	TRRA5	<i>Tragia ramosa</i>	8-24	-
	Fort Huachuca vervain	VEGR2	<i>Verbena gracilis</i>	8-24	-
	American vetch	VIAM	<i>Vicia americana</i>	8-24	-
	Rocky Mountain zinnia	ZIGR	<i>Zinnia grandiflora</i>	8-24	-
	fairyduster	CAER	<i>Calliandra eriophylla</i>	1-22	-
	featherplume	DAFO	<i>Dalea formosa</i>	1-22	-
	Utah fendlerbush	FEUTC	<i>Fendlerella utahensis var. cymosa</i>	0-22	-

littleleaf ratany	KRER	<i>Krameria erecta</i>	1-17	-
trailing krameria	KRLA	<i>Krameria lanceolata</i>	0-17	-
yerba de pasmo	BAPT	<i>Baccharis pteronioides</i>	1-17	-
bastardsage	ERWR	<i>Eriogonum wrightii</i>	0-11	-
winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0-11	-
desert zinnia	ZIAC	<i>Zinnia acerosa</i>	0-11	-
prairie acacia	ACAN	<i>Acacia angustissima</i>	0-6	-
false boneset	BREU	<i>Brickellia eupatorioides</i>	0-2	-
milkvetch	ASTRA	<i>Astragalus</i>	1-2	-
lyreleaf greeneyes	BELY	<i>Berlandiera lyrata</i>	1-2	-
fringed redmaids	CACI2	<i>Calandrinia ciliata</i>	1-2	-
exserted Indian paintbrush	CAEXE	<i>Castilleja exserta ssp. exserta</i>	1-2	-
mariposa lily	CALOC	<i>Calochortus</i>	1-2	-
Indian paintbrush	CASTI2	<i>Castilleja</i>	1-2	-
lambsquarters	CHAL7	<i>Chenopodium album</i>	1-2	-
hyssopleaf sandmat	CHHY3	<i>Chamaesyce hyssopifolia</i>	1-2	-
New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	1-2	-
mala mujer	CNAN	<i>Cnidoscolus angustidens</i>	1-2	-
nodding bird's-beak	COLA4	<i>Cordylanthus laxiflorus</i>	1-2	-
James' prairie clover	DAJA	<i>Dalea jamesii</i>	1-2	-
American wild carrot	DAPU3	<i>Daucus pusillus</i>	1-2	-
New Mexico ticktrefoil	DENE	<i>Desmodium neomexicanum</i>	1-2	-
western tansymustard	DEPI	<i>Descurainia pinnata</i>	1-2	-
miniature woollystar	ERDI2	<i>Eriastrum diffusum</i>	1-2	-
buckwheat	ERIOG	<i>Eriogonum</i>	1-2	-
shaggy dwarf morning-glory	EVNU	<i>Evolvulus nuttallianus</i>	1-2	-
longleaf false goldeneye	HELOA2	<i>Heliomeris longifolia var. annua</i>	1-2	-
Parry's dwarf-sunflower	HEPA	<i>Helianthella parryi</i>	1-2	-
red bluet	HORU	<i>Houstonia rubra</i>	1-2	-
ragged nettlespurge	JAMA	<i>Jatropha macrorhiza</i>	1-2	-
Arizona poppy	KAGR	<i>Kallstroemia grandiflora</i>	1-2	-
Coulter's horseweed	LACO13	<i>Laennecia coulteri</i>	1-2	-
Fendler's bladderpod	LEFE	<i>Lesquerella fendleri</i>	1-2	-
Goodding's bladderpod	LEGO2	<i>Lesquerella gooddingii</i>	1-2	-
intermediate pepperweed	LEVIM	<i>Lepidium virginicum var. medium</i>	1-2	-
Lewis flax	LILE3	<i>Linum lewisii</i>	1-2	-
plains flax	LIPU4	<i>Linum puberulum</i>	1-2	-
woodland-star	LITHO2	<i>Lithophragma</i>	1-2	-
Greene's bird's-foot trefoil	LOGR4	<i>Lotus greenei</i>	1-2	-
foothill deervetch	LOHU2	<i>Lotus humistratus</i>	1-2	-
coastal bird's-foot trefoil	LOSAR	<i>Lotus salicinus var. brevivillus</i>	1-2	-

	coastal bird's-foot trefoil	ECOR4	<i>Lotus sarcocollis</i> var. <i>brevivexillus</i>	1-2	-
	lupine	LUPIN	<i>Lupinus</i>	1-2	-
	hoary tansyaster	MACA2	<i>Machaeranthera canescens</i>	1-2	-
	whitestem blazingstar	MEAL6	<i>Mentzelia albicaulis</i>	1-2	-
	green carpetweed	MOVE	<i>Mollugo verticillata</i>	1-2	-
	Drummond's woodsorrel	OXDR	<i>Oxalis drummondii</i>	1-2	-
	locoweed	OXYTR	<i>Oxytropis</i>	1-2	-
	wild parsnip	PASA2	<i>Pastinaca sativa</i>	1-2	-
	longstalk chinchweed	PELO	<i>Pectis longipes</i>	1-2	-
11	Miscellaneous shrubs			0-22	
	desert ceanothus	CEGR	<i>Ceanothus greggii</i>	0-6	-
	hairy mountain mahogany	CEMOP	<i>Cercocarpus montanus</i> var. <i>paucidentatus</i>	0-6	-
	Warnock's snakewood	COWA	<i>Condalia warnockii</i>	0-6	-
	Kearney's snakewood	COWAK	<i>Condalia warnockii</i> var. <i>kearneyana</i>	0-6	-
	longleaf jointfir	EPTR	<i>Ephedra trifurca</i>	0-6	-
	ocotillo	FOSP2	<i>Fouquieria splendens</i>	0-6	-
	Mexican cliffrose	PUME	<i>Purshia mexicana</i>	0-6	-
	littleleaf sumac	RHMI3	<i>Rhus microphylla</i>	0-6	-
	catclaw mimosa	MIACB	<i>Mimosa aculeaticarpa</i> var. <i>biuncifera</i>	0-6	-
	mariola	PAIN2	<i>Parthenium incanum</i>	0-2	-
	catclaw acacia	ACGR	<i>Acacia greggii</i>	0-2	-
	Wright's beebrush	ALWR	<i>Aloysia wrightii</i>	0-2	-
	evergreen sumac	RHVIC	<i>Rhus virens</i> var. <i>choriophylla</i>	0-2	-
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0-2	-
	whitethorn acacia	ACCO2	<i>Acacia constricta</i>	0-1	-
	heartleaf goldeneye	VICO	<i>Viguiera cordifolia</i>	0-1	-
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0-1	-
12	Succulents			0-6	
	Parry's agave	AGPAP5	<i>Agave parryi</i> ssp. <i>parryi</i>	0-6	-
	Palmer's century plant	AGPA3	<i>Agave palmeri</i>	0-2	-
	Parry's agave	AGPA4	<i>Agave parryi</i>	0-2	-
	Schott's century plant	AGSC3	<i>Agave schottii</i>	0-1	-
	Scheer's beehive cactus	COROS	<i>Coryphantha robustispina</i> ssp. <i>scheeri</i>	0-1	-
	walkingstick cactus	CYSP8	<i>Cylindropuntia spinosior</i>	0-1	-
	pinkflower hedgehog cactus	ECFEF3	<i>Echinocereus fendleri</i> ssp. <i>fendleri</i>	0-1	-
	white fishhook cactus	ECIN2	<i>Echinomastus intertextus</i>	0-1	-
	rainbow hedgehog cactus	ECRI3	<i>Echinocereus rigidissimus</i>	0-1	-
	spinystar	ESVI2	<i>Escobaria vivipara</i>	0-1	-
	Graham's nipple cactus	MAGR9	<i>Mammillaria grahamii</i>	0-1	-
	Macdougal's nipple cactus	MAHEM	<i>Mammillaria heyderi</i> var. <i>macdougalii</i>	0-1	-
	White's nipple cactus	MAWDR	<i>Mammillaria whitei</i>	0-1	-

	wright's nipple cactus	MAVRK2	<i>Mammillaria wrightii</i>	0-1	-
	cactus apple	OPEN3	<i>Opuntia engelmannii</i>	0-1	-
	twistspine pricklypear	OPMA2	<i>Opuntia macrorhiza</i>	0-1	-
	purple pricklypear	OPMA8	<i>Opuntia macrocentra</i>	0-1	-
	tulip pricklypear	OPPH	<i>Opuntia phaeacantha</i>	0-1	-
Tree					
13	Trees			0-28	
	Mexican blue oak	QUOB	<i>Quercus oblongifolia</i>	0-28	-
	Arizona white oak	QUAR	<i>Quercus arizonica</i>	0-22	-
	Emory oak	QUEM	<i>Quercus emoryi</i>	0-22	-
	oneseed juniper	JUMO	<i>Juniperus monosperma</i>	0-6	-
	alligator juniper	JUDE2	<i>Juniperus deppeana</i>	0-2	-

Animal community

This plant community is suitable for grazing by all classes of livestock at any season. High soil pH can limit the availability of some essential plant nutrients and soil water, reducing the forage quality, quantity and length of green season compared to adjacent non-limy sites. Due to the abundance of cool-season grasses and several shrubby browse species on the site, the plant community provides adequate nutrition throughout the year. Steep slopes, very gravelly/cobbly surfaces and the differences in forage palatability limit grazing distribution on this site. Large areas should be fenced separately from non-limy hills and uplands to effectively manage the forage resources.

This site has enough topography and/or tree cover to be home to both mule deer and Coues whitetail. It is also habitat for pronghorn antelope. The potential plant community is rich in both grass and forb species, making the site home to a variety of insect, bird, small mammal and reptile species. Natural water is lacking in areas of the site and water developments are very important to large mammals and many species of birds and small mammals using this habitat.

Hydrological functions

These soils are very coarse textured and are poor producers of runoff.

Recreational uses

Hunting, hiking, horseback riding, photography, camping and picnicking

Wood products

Minor amounts of oak or juniper may be present on north aspects.

Other products

Beargrass is harvested for fibers by Mexican companies operating out of Agua Prieta, Sonora. Beargrass fibers and soap tree yucca fibers are also harvested by Native Americans like the Tohono O'odham for use in making baskets and other arts and crafts. Medicinal plants like yerba de pasmo, Hopi tea and mormon tea are harvested locally.

Inventory data references

Range 417s include 3 in excellent condition and 2 in good condition.

Type locality

Location 1: Cochise County, AZ

Township/Range/Section	T21S R19E S19
General legal description	Fort Huachuca, west range
Location 2: Santa Cruz County, AZ	
Township/Range/Section	T21S R18E S23
General legal description	Audubon Research Ranch, West facing slopes out of Turkey Creek.
Location 3: Pima County, AZ	
Township/Range/Section	T20S R18E S11
General legal description	Empire Ranch, Davis pasture, KA #15
Location 4: Cochise County, AZ	
Latitude	32° 23' 13"
Longitude	110° 0' 78"
General legal description	Un-grazed (sub-divided) area just south of Driagoon, Az.

Other references

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Contributors

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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 Robinnett, Larry Humphrey, Linda Kennedy
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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.

Note: When evaluating range health on this ecological site, aspect and slope affect expected reference conditions and should be factored into evaluation. Reference conditions described were north- and south-facing aspects with 40% slope. Fire disturbance history for the site was that the north slope was 11 growing seasons post-burn; the south slope was 4 growing seasons since last fire (it also burned 11 years prior to this reference observation).

2. **Presence of water flow patterns:**

North aspect: Short, discontinuous water flow patterns.

South aspect: Numerous, short (4-6 ft. in length), discontinuous.

3. **Number and height of erosional pedestals or terracettes:**

North aspect: 1" pedestals common on perennial grasses. Terracettes are common, 1-2 ft. apart, and well-vegetated.

South aspect: Pedestals uncommon. Terracettes common, 1-3 ft. apart with 2-4" elevation difference.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

North aspect: Bare ground observed at 30% following fire and decreases to 10%-20% within one year after burning.

Non-vegetated areas are scarce.

South aspect: Bare ground observed at 30% following fire and decreases to 10%-20% within one year after burning.

Non-vegetated areas are very small (<1 ft diameter) and well-dispersed.

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

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

7. **Amount of litter movement (describe size and distance expected to travel):** North and South aspects: Fine litter generally moving along water flow patterns and accumulates on terracettes.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** North and South aspects: Slake test values of all samples collected under canopy of perennial grasses and shrubs rated as "6". Samples with no canopy protection ranged from "3" to "6" (40% of no canopy samples were "3"s).

-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** North and South aspects: Soil surface horizon was a gravelly sandy clay loam, 0-5" depth, color 10YR 3/3 moist, weak subangular block structure immediately below a weak platy surface.
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**
North aspect: Perennial mid-grasses dominant with evenly dispersed succulents (desert spoon) and scattered oak trees. Basal cover of perennial grasses ranged 4-10%, well-dispersed; tree and succulent canopy cover is 5-10%. Perennial grass basal cover is generally lower during the first five years following fire. Well-dispersed perennial grasses slow rainfall run-off allowing infiltration. The slowing of run-off around perennial grass bases also causes sediment to accumulate on the upslope side of the plants, forming terracettes.
South aspects: Perennial suffrutescent grasses dominant with an evenly dispersed perennial grass community. Basal cover of perennial grasses ranged 4-10%, well-dispersed. Perennial grass basal cover is generally lower during the first five years following fire. Well-dispersed perennial grasses slow rainfall run-off allowing infiltration. The slowing of run-off around perennial grass bases also causes sediment to accumulate on the upslope side of the plants, forming terracettes.
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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):** North and South aspects: No compaction. Average depth of penetration from an ARS field penetrometer with a 2.2 kg. sliding hammer was 8.8 cm.
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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:
North aspect: mid-grasses > succulents.
South aspect: suffrutescent grasses = perennial mid-grasses

Sub-dominant:
North aspect: trees > large shrubs.
South aspect: perennial short-grasses > subshrubs > perennial forbs

Other: perennial forbs present on north aspects and succulents present on south aspects

Additional: Annual forbs and annual grasses fluctuate with precipitation and can flourish post-burning.
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** North and South aspects: Very little mortality or decadence during the first five years after burning. Expect increases in decadence with 10+ years after burning. Mortality from fire depends upon season and intensity of burn.
-
14. **Average percent litter cover (%) and depth (in):** North and South aspects: 15-30% litter cover with fire dynamic from 10 years of monitoring data encompassing 2 burns. Litter cover on the low end of the range is expected immediately post-burn and increases with favorable weather and time.
-
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-**

production): 671 lbs/ac. in a below average year; 1290 lbs/ac. in an average year; 1685 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, mesquite, wait-a-bit, yellow bluestem, white-thorn acacia
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17. **Perennial plant reproductive capability:** Not impaired. Warm season perennial grass seed production highly dependent upon the amount and timing of summer monsoons.
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