

Ecological site R040XA111AZ Limy Upland 10"-13" 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.

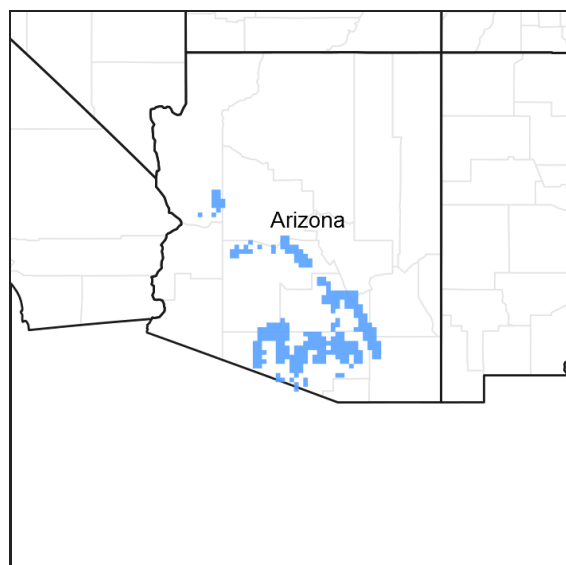


Figure 1. Mapped extent

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): 040X–Sonoran Basin and Range

AZ 40.1 – Upper Sonoran Desert

Elevations range from 2000 to 3200 feet and precipitation averages 10 to 13 inches per year. Vegetation includes saguaro, palo verde, mesquite, creosotebush, triangle bursage, prickly pear, cholla, limberbush, wolfberry, bush muhly, threeawns, ocotillo, and globe mallow. 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

R040XA101AZ	Basalt Hills 10"-13" p.z.
R040XA106AZ	Limy Upland, Deep 10"-13" p.z.
R040XA110AZ	Limy Slopes 10"-13" p.z.

Similar sites

R040XB210AZ	Limy Upland 7"-10" p.z.
R041XB208AZ	Limy Upland 8-12" p.z.
R041XC309AZ	Limy Upland 12-16" p.z.

Table 1. Dominant plant species

Tree	(1) <i>Parkinsonia microphylla</i>
Shrub	(1) <i>Larrea tridentata</i> (2) <i>Zinnia acerosa</i>
Herbaceous	(1) <i>Dasyochloa pulchella</i>

Physiographic features

This site occurs in the upper elevations of the Sonoran Desert in southern Arizona. It occurs on fan terraces, old stream terraces and ridge-tops.

Table 2. Representative physiographic features

Landforms	(1) Fan piedmont (2) Terrace
Flooding frequency	None
Ponding frequency	None
Elevation	671–1,097 m
Slope	1–15%
Aspect	Aspect is not a significant factor

Climatic features

Precipitation in the sub resource area ranges from 10 to 13 inches in the southern part, along the Mexican border with elevations from about 1900 to 3200 feet. Precipitation in the northern part of the resource area ranges from 11 to 14 inches with elevations from about 1700 to 3500 feet. Winter-summer rainfall ratios range from 40%-60% in the southern portions of the land resource unit, to 50%-50% in the central portions, to 60%-40% in the northern part of the land resource unit. As one moves from east to west in this resource area rains become slightly more unpredictable and variable with Coefficients of Variation of annual rainfall equal to 29% at Tucson and 36% at Carefree. Summer rains fall July through Sept., originate in the Gulf of Mexico, and are convective, usually brief, intense thunderstorms. Cool season moisture tends to be frontal, originating in the Pacific and Gulf of California. This winter precipitation falls in widespread storms with long duration and low intensity. Snow is rare and seldom lasts more than an hour or two. May and June are the driest months of the year. Humidity is generally very low.

Winter temperatures are mild, with very few days recording freezing temperatures in the morning. Summer temperatures are warm to hot, with several days in June and July exceeding 105 degrees F.

Both the spring and the summer growing seasons are equally important for perennial grass, forb and shrub growth. Cool and warm season annual forbs and grasses can be common in their respective seasons with above average rainfall. Perennial forage species can remain green throughout the year with available moisture.

Table 3. Representative climatic features

Frost-free period (average)	265 days
Freeze-free period (average)	0 days
Precipitation total (average)	330 mm

Influencing water features

There are no water features associated with this site.

Soil features

These are shallow soils formed in limy and gravelly loamy alluvium or colluvium of mixed origin. They are calcareous throughout. They have lime cemented layers at shallow depths (10-20 inches). Soil surfaces are well covered with rocks and gravels. Plant-soil moisture relationships are fair. Soils mapped on this site include: SSA-627 Southern Mohave County MU's Cave-23, 24, Cline-32, Stagecoach-113; SSA-645 Aguila-Carefree area MU's Cave-37, 38, 93 & 94, Greyeagle-65 & 66, Suncity variant-66; SSA-661 Eastern Pinal-Southern Gila Counties MU's Cave-840, Delnorte-490, 650, Haplogypsids-490; SSA-666 Northwest Cochise County MU Delnorte-423; SSA-668 Tucson-Avra Valley area MU's Cave-CaB & CIC; SSA-669 Eastern Pima County MU's Cave-11, Delnorte-22, Jaynes-54, Pantano-58; SSA-703 Tohono O'odham area MU's Delnorte-16 & Pantano-48.

Table 4. Representative soil features

Surface texture	(1) Gravelly sandy loam (2) Very gravelly sandy loam (3) Cobbly sandy loam
Family particle size	(1) Loamy
Drainage class	Somewhat excessively drained to well drained
Permeability class	Rapid to moderately rapid
Soil depth	13–51 cm
Surface fragment cover <=3"	20–85%
Surface fragment cover >3"	0–15%
Available water capacity (0-101.6cm)	1.27–5.08 cm
Calcium carbonate equivalent (0-101.6cm)	10–30%
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)	15–65%
Subsurface fragment volume >3" (Depth not specified)	0–20%

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

MLRA 40-1 (10-13"), Limy Upland

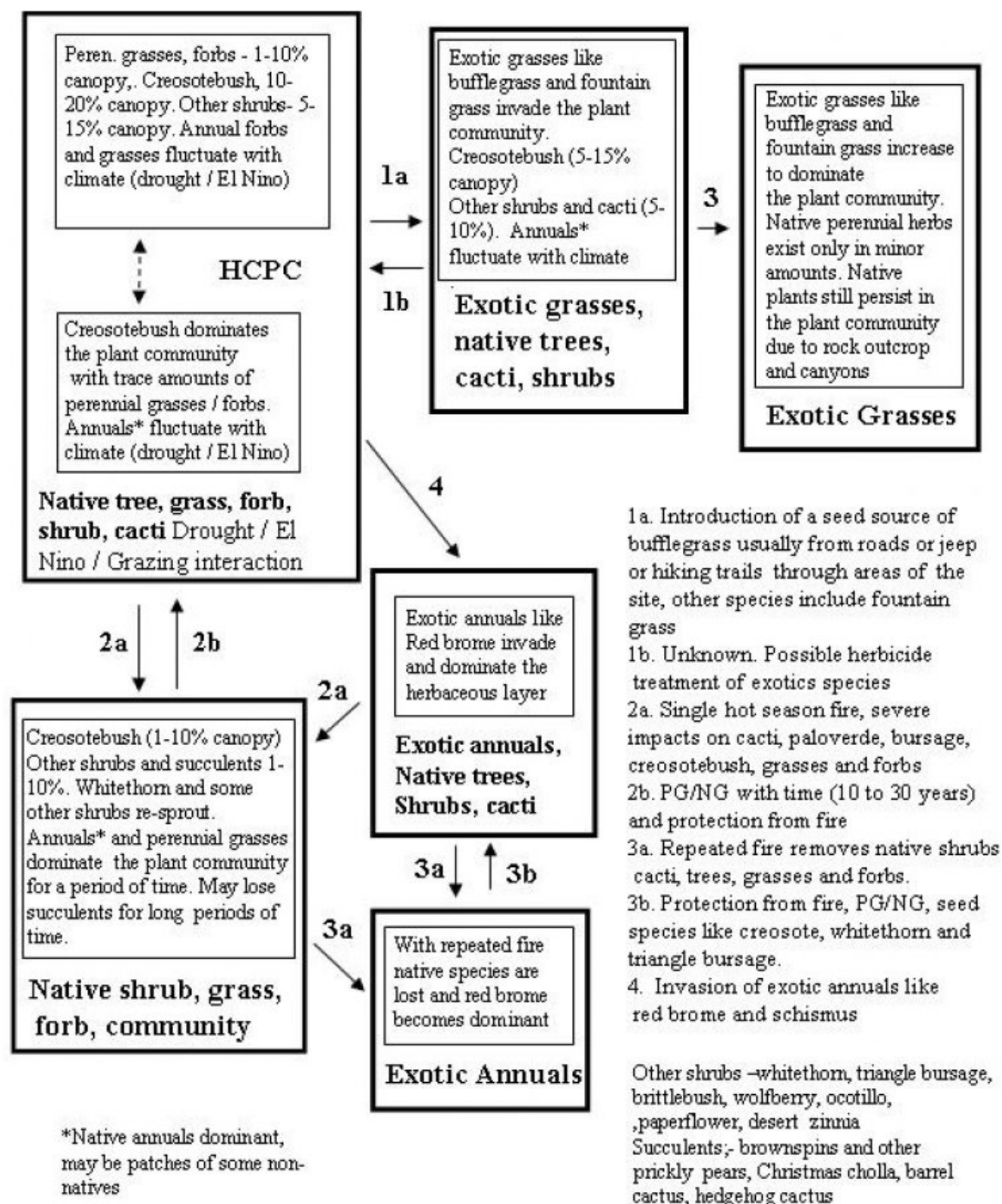


Figure 4. State and Transition model, Limy Upland 10-13" pz.

State 1

Historical Climax Plant Community

Community 1.1

Historical Climax Plant Community

The potential plant community is a diverse community of desert trees, shrubs, cacti, and perennial forbs and grasses. With continuous heavy grazing, herbaceous and suffrutescent forage species are replaced by increases in shrubs, cacti and trees. Well developed gravel covers help protect the soil from erosion. This site has a cycle of dominance by saguaro, alternating with large shrubs and trees that act as nurse plants for the giant cacti. This cycle takes approximately 300 years and starts from exceptionally wet years (El Nino) where saguaro establishes in large numbers.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	67	224	319
Grass/Grasslike	12	56	179
Forb	2	28	73
Tree	—	11	56
Total	81	319	627

Table 6. Soil surface cover

Tree basal cover	0-1%
Shrub/vine/liana basal cover	1-3%
Grass/grasslike basal cover	0-1%
Forb basal cover	0-1%
Non-vascular plants	0%
Biological crusts	5-25%
Litter	5-45%
Surface fragments >0.25" and <=3"	20-85%
Surface fragments >3"	0-15%
Bedrock	0%
Water	0%
Bare ground	5-45%

Table 7. Canopy structure (% cover)

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

Figure 6. Plant community growth curve (percent production by month).
AZ4013, 40.1 10-13" p.z. other sites. Growth begins in the late winter, goes semi-dormant in the drought period of late May through early July, growth continues in the summer through early fall..

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

State 2

Exotic perennial grasses with natives

Community 2.1

Exotic perennial grasses with natives

This community occurs where buffleggrass and / or fountain grass invade the native plant community. These species occupy the niches of low shrubs like desert zinnia, brittlebush, mariola and grasses like bush muhly, fluffgrass and slim tridens.

State 3

Exotic perennial grasses and fire

Community 3.1

Exotic perennial grasses and fire

This community occurs where a native plant community that has been invaded by buffleggrass or fountain grass has burned one or more times. Increasing amounts of buffleggrass leads to more uniform fine fuels. In areas adjacent to roads and urban areas the risk of repeated fires will increase. As fire frequency increases the dominance of the exotic grasses increase.

State 4

Native trees, cacti, shrubs and fire

Community 4.1

Native trees, cacti, shrubs and fire

This plant community occurs as a result of a single hot season fire. Creosotebush, whitethorn, paloverde and cacti can be severely impacted and may take long periods of time (30-50 years) to recover to pre-fire levels. Perennial and annual grasses and forbs dominate the community for some time until shrubs like ocotillo, whitethorn and creosote can recover. This plant community can produce enough herbaceous fuel from native species of grasses and / or forbs to carry fire in El Nino years or after unusually wet summers. The natural incidence of fire in this MLRA is very low and fires are much more common from man-made ignitions. Areas of the site close to urban zones or along heavily travelled roads and highways will experience a higher rate of fires.

State 5

Native plant community with exotic annuals

Community 5.1

Native plant community with exotic annuals

This plant community occurs where the native community has been invaded by species like filaree, red brome and schismus. Red brome and schismus occupy the niche of the native winter annual forbs and grasses. These exotic annual grasses will fluctuate from nearly nothing in a dry winter to dominance of the understory plant community in a El Nino winter.

State 6

Exotic annuals and fire

Community 6.1

Exotic annuals and fire

This plant community occurs where a native plant community which has been invaded by red brome and / or schismus, and has burned repeatedly. As fires become more frequent the native trees, shrubs and succulents are removed from the plant community and annuals like red brome become dominant. In areas of the site near urban areas and along heavily travelled roads this will be a more common occurrence due to an increased source of ignitions.

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	Suffrutescent grasses			6–56	
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	6–56	–
	black grama	BOER4	<i>Bouteloua eriopoda</i>	0–17	–
2	Subdominant perennial grasses			6–56	
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	1–56	–
	nineawn pappusgrass	ENDE	<i>Enneapogon desvauxii</i>	0–28	–
	blue threeawn	ARPUN	<i>Aristida purpurea</i> var. <i>nealleyi</i>	0–11	–
	red grama	BOTR2	<i>Bouteloua trifida</i>	0–11	–
	slim tridens	TRMU	<i>Tridens muticus</i>	0–11	–
	desert needlegrass	ACSP12	<i>Achnatherum speciosum</i>	0–8	–
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	0–6	–
	cotta grass	COPA13	<i>Cottea pappophoroides</i>	0–6	–
	Hall's panicgrass	PAHA	<i>Panicum hallii</i>	0–6	–
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	0–6	–
3	Misc. perennial grasses			0–11	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0–6	–
	spidergrass	ARTE3	<i>Aristida ternipes</i>	0–6	–
	spidergrass	ARTEG	<i>Aristida ternipes</i> var. <i>gentilis</i>	0–6	–
	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	0–6	–
	hairy woollygrass	ERPI5	<i>Erioneuron pilosum</i>	0–3	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0–1	–
	Arizona cottontop	DICA8	<i>Digitaria californica</i>	0–1	–
	Parish's threeawn	ARPUP5	<i>Aristida purpurea</i> var. <i>parishii</i>	0–1	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	0–1	–
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	0–1	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–1	–
	mesa dropseed	SPFL2	<i>Sporobolus flexuosus</i>	0–1	–
	tanglehead	HECO10	<i>Heteropogon contortus</i>	0–1	–
4	Annual grasses			1–56	
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	1–56	–
	Rothrock's grama	BORO2	<i>Bouteloua rothrockii</i>	0–6	–
	sixweeks threeawn	ARAD	<i>Aristida adscensionis</i>	0–6	–
	prairie threeawn	AROL	<i>Aristida oligantha</i>	0–6	–

	needle grama	BOAR	<i>Bouteloua aristidoides</i>	0–6	–
	mucronate sprangeltop	LEPAB	<i>Leptochloa panicea</i> ssp. <i>brachiata</i>	0–6	–
	Mexican panicgrass	PAHI5	<i>Panicum hirticaule</i>	0–6	–
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	0–6	–
	Bigelow's bluegrass	POBI	<i>Poa bigelovii</i>	0–1	–
	Arizona signalgrass	URAR	<i>Urochloa arizonica</i>	0–1	–
	delicate muhly	MUFR	<i>Muhlenbergia fragilis</i>	0–1	–
	littleseed muhly	MUMI	<i>Muhlenbergia microsperma</i>	0–1	–
	Arizona brome	BRAR4	<i>Bromus arizonicus</i>	0–1	–
	feather fingergrass	CHVI4	<i>Chloris virgata</i>	0–1	–
	desert lovegrass	ERPEM	<i>Eragrostis pectinacea</i> var. <i>miserrima</i>	0–1	–
	tufted lovegrass	ERPEP2	<i>Eragrostis pectinacea</i> var. <i>pectinacea</i>	0–1	–

Forb

5	Perennial forbs			1–17	
	paleface	HIDE	<i>Hibiscus denudatus</i>	0–6	–
	trailing windmills	ALIN	<i>Allionia incarnata</i>	1–6	–
	hairyseed bahia	BAAB	<i>Bahia absinthifolia</i>	0–6	–
	leatherweed	CRPOP	<i>Croton pottsii</i> var. <i>pottsii</i>	0–6	–
	lacy tansyaster	MAPIP4	<i>Machaeranthera pinnatifida</i> ssp. <i>pinnatifida</i> var. <i>pinnatifida</i>	1–6	–
	Coues' cassia	SECO10	<i>Senna covesii</i>	0–6	–
	California fagonbush	FALA	<i>Fagonia laevis</i>	0–2	–
	slender janusia	JAGR	<i>Janusia gracilis</i>	0–2	–
	Parry's false prairie-clover	MAPA7	<i>Marina parryi</i>	0–2	–
	dwarf desertpeony	ACNA2	<i>Acourtia nana</i>	0–2	–
	hairy five eyes	CHSO	<i>Chamaesaracha sordida</i>	0–2	–
	brownfoot	ACWR5	<i>Acourtia wrightii</i>	0–1	–
	San Felipe dogweed	ADPO	<i>Adenophyllum porophylloides</i>	0–1	–
	spearleaf	MAPA9	<i>Matelea parvifolia</i>	0–1	–
	fringed twinevine	FUCYC	<i>Funastrum cynanchoides</i> ssp. <i>cynanchoides</i>	0–1	–
	Davis Mountain mock vervain	GLBIC	<i>Glandularia bipinnatifida</i> var. <i>ciliata</i>	0–1	–
	desert rosemallow	HICO	<i>Hibiscus coulteri</i>	0–1	–
	desert larkspur	DEPA	<i>Delphinium parishii</i>	0–1	–
	tall mountain larkspur	DESC	<i>Delphinium scaposum</i>	0–1	–
	bluedicks	DICA14	<i>Dichelostemma capitatum</i>	0–1	–
	spreading fleabane	ERDI4	<i>Erigeron divergens</i>	0–1	–
	desert trumpet	ERIN4	<i>Eriogonum inflatum</i>	0–1	–
	wild dwarf morning-glory	EVAR	<i>Evolvulus arizonicus</i>	0–1	–
	desert marigold	BAMU	<i>Baileya multiradiata</i>	0–1	–
	climbing wartclub	BOSC	<i>Boerhavia scandens</i>	0–1	–
	desert mariposa lily	CAKE	<i>Calochortus kennedyi</i>	0–1	–
	naked mariposa lily	CANU2	<i>Calochortus nudus</i>	0–1	–

	red-gland spurge	CHME5	<i>Chamaesyce melanadenia</i>	0–1	–
	wealeaf bur ragweed	AMCO3	<i>Ambrosia confertiflora</i>	0–1	–
	narrowleaf silverbush	ARLA12	<i>Argythamnia lanceolata</i>	0–1	–
	dense ayenia	AYMI	<i>Ayenia microphylla</i>	0–1	–
	spreading fanpetals	SIAB	<i>Sida abutifolia</i>	0–1	–
	desert globemallow	SPAM2	<i>Sphaeralcea ambigua</i>	0–1	–
	caliche globemallow	SPLA	<i>Sphaeralcea laxa</i>	0–1	–
	brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	0–1	–
	Coulter's wrinklefruit	TECO	<i>Tetradlea coulteri</i>	0–1	–
	rue of the mountains	THTE2	<i>Thamnosma texana</i>	0–1	–
	plains blackfoot	MELE2	<i>Melampodium leucanthum</i>	0–1	–
	wishbone-bush	MILAV	<i>Mirabilis laevis</i> var. <i>villosa</i>	0–1	–
	desert tobacco	NIOBO	<i>Nicotiana obtusifolia</i> var. <i>obtusifolia</i>	0–1	–
	Parry's beardtongue	PEPA24	<i>Penstemon parryi</i>	0–1	–
	orange fameflower	PHAU13	<i>Phemeranthus aurantiacus</i>	0–1	–
	mesquite mistletoe	PHCA8	<i>Phoradendron californicum</i>	0–1	–
	slender poreleaf	POGR5	<i>Porophyllum gracile</i>	0–1	–
	glandleaf milkwort	POMA7	<i>Polygala macradenia</i>	0–1	–
6	Annual forbs			1–56	
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	1–17	–
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	0–17	–
	flatcrown buckwheat	ERDE6	<i>Eriogonum deflexum</i>	0–17	–
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	0–17	–
	Gordon's bladderpod	LEGO	<i>Lesquerella gordonii</i>	0–11	–
	shaggyfruit pepperweed	LELA	<i>Lepidium lasiocarpum</i>	0–11	–
	chia	SACO6	<i>Salvia columbariae</i>	0–11	–
	lyreleaf jewelflower	STCAA	<i>Streptanthus carinatus</i> ssp. <i>arizonicus</i>	0–11	–
	thelypody	THELY	<i>Thelypodium</i>	0–6	–
	woolly tidestromia	TILA2	<i>Tidestromia lanuginosa</i>	0–6	–
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	0–6	–
	combseed	PECTO	<i>Pectocarya</i>	0–6	–
	manybristle chinchweed	PEPA2	<i>Pectis papposa</i>	0–6	–
	Arizona phacelia	PHAR13	<i>Phacelia arizonica</i>	0–6	–
	cleftleaf wildheliotrope	PHCR	<i>Phacelia crenulata</i>	0–6	–
	slender goldenweed	MAGR10	<i>Machaeranthera gracilis</i>	0–6	–
	mesa tansyaster	MATA	<i>Machaeranthera tagetina</i>	0–6	–
	miniature woollystar	ERDI2	<i>Eriastrum diffusum</i>	0–6	–
	Sonoran sandmat	CHMI7	<i>Chamaesyce micromera</i>	0–6	–
	California poppy	ESCAM	<i>Eschscholzia californica</i> ssp. <i>mexicana</i>	0–6	–
	bristly fiddleneck	AMTE3	<i>Amsinckia tessellata</i>	0–6	–
	wheelscale saltbush	ATEL	<i>Atriplex elegans</i>	0–6	–
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	0–6	–

	exserted Indian paintbrush	CAEXE	<i>Castilleja exserta ssp. exserta</i>	0–6	–
	brittle spineflower	CHBR	<i>Chorizanthe brevicornu</i>	0–6	–
	pincushion flower	CHFR	<i>Chaenactis fremontii</i>	0–6	–
	hyssopleaf sandmat	CHHY3	<i>Chamaesyce hyssopifolia</i>	0–2	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0–2	–
	Coulter's lupine	LUSP2	<i>Lupinus sparsiflorus</i>	0–2	–
	glandular threadplant	NEGL	<i>Nemacladus glanduliferus</i>	0–2	–
	Arizona popcornflower	PLAR	<i>Plagiobothrys arizonicus</i>	0–2	–
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	0–2	–
	bristly scaleseed	SPEC2	<i>Spermolepis echinata</i>	0–1	–
	Lemmon's ragwort	SELE8	<i>Senecio lemmonii</i>	0–1	–
	New Mexico plumeseed	RANE	<i>Rafinesquia neomexicana</i>	0–1	–
	desert evening primrose	OEPR	<i>Oenothera primiveris</i>	0–1	–
	Florida pellitory	PAFL3	<i>Parietaria floridana</i>	0–1	–
	distant phacelia	PHDI	<i>Phacelia distans</i>	0–1	–
	slimjim bean	PHFI3	<i>Phaseolus filiformis</i>	0–1	–
	mesquite mistletoe	PHCA8	<i>Phoradendron californicum</i>	0–1	–
	Louisiana vetch	VILU	<i>Vicia ludoviciana</i>	0–1	–
	false carrot	YAMI	<i>Yabea microcarpa</i>	0–1	–
	woollyhead neststraw	STMI2	<i>Stylocline micropoides</i>	0–1	–
	sand fringe pod	THCU	<i>Thysanocarpus curvipes</i>	0–1	–
	California desert dandelion	MACA6	<i>Malacothrix californica</i>	0–1	–
	wedgeleaf draba	DRCU	<i>Draba cuneifolia</i>	0–1	–
	Abert's buckwheat	ERAB2	<i>Eriogonum abertianum</i>	0–1	–
	Arizona cottonrose	LOAR12	<i>Logfia arizonica</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	–
	Arizona lupine	LUAR4	<i>Lupinus arizonicus</i>	0–1	–
	tanseyleaf tansyaster	MATA2	<i>Machaeranthera tanacetifolia</i>	0–1	–
	whitestem blazingstar	MEAL6	<i>Mentzelia albicaulis</i>	0–1	–
	Lindley's silverpuffs	MILI5	<i>Microseris lindleyi</i>	0–1	–
	Mojave desertstar	MOBE2	<i>Monoptilon bellioides</i>	0–1	–
	Nuttall's povertyweed	MONU	<i>Monolepis nuttalliana</i>	0–1	–
	bristly nama	NAHI	<i>Nama hispidum</i>	0–1	–
	Texas stork's bill	ERTE13	<i>Erodium texanum</i>	0–1	–
	Thurber's buckwheat	ERTH3	<i>Eriogonum thurberi</i>	0–1	–
	devil's spineflower	CHRI	<i>Chorizanthe rigida</i>	0–1	–
	Esteve's pincushion	CHST	<i>Chaenactis stevioides</i>	0–1	–
	New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	0–1	–
	sand pygmyweed	CRCOC	<i>Crassula connata var. connata</i>	0–1	–
	cryptantha	CRYPT	<i>Cryptantha</i>	0–1	–

	hairy prairie clover	DAMO	<i>Dalea mollis</i>	0–1	–
	Mexican fireplant	EUHE4	<i>Euphorbia heterophylla</i>	0–1	–
	dainty desert hideseed	EUMI2	<i>Eucrypta micrantha</i>	0–1	–
	spring pygmycudweed	EVVE	<i>Evax verna</i>	0–1	–
	hairy desertsunflower	GECA2	<i>Geraea canescens</i>	0–1	–
	star gilia	GIST	<i>Gilia stellata</i>	0–1	–
	California mustard	GULA4	<i>Guillenia lasiophylla</i>	0–1	–
	Palmer's grapplinghook	HAPA7	<i>Harpagonella palmeri</i>	0–1	–
	Arizona poppy	KAGR	<i>Kallstroemia grandiflora</i>	0–1	–
	California goldfields	LACAC2	<i>Lasthenia californica</i> ssp. <i>californica</i>	0–1	–
	flatspine stickseed	LAOCO	<i>Lappula occidentalis</i> var. <i>occidentalis</i>	0–1	–
	lipfern	CHEIL	<i>Cheilanthes</i>	0–1	–
	Chiricahua Mountain sandmat	CHFL3	<i>Chamaesyce florida</i>	0–1	–
	yellow tackstem	CAPA7	<i>Calycoseris parryi</i>	0–1	–
	white tackstem	CAWR	<i>Calycoseris wrightii</i>	0–1	–
	whitemargin sandmat	CHAL11	<i>Chamaesyce albomarginata</i>	0–1	–
	pitseed goosefoot	CHBE4	<i>Chenopodium berlandieri</i>	0–1	–
	hoary bowlesia	BOIN3	<i>Bowlesia incana</i>	0–1	–
	California suncup	CACA32	<i>Camissonia californica</i>	0–1	–
	browneyes	CACL4	<i>Camissonia claviformis</i>	0–1	–
	white easterbonnets	ANLA7	<i>Antheropeas lanosum</i>	0–1	–
	smallflowered milkvetch	ASNU4	<i>Astragalus nuttallianus</i>	0–1	–
	fringed amaranth	AMFI	<i>Amaranthus fimbriatus</i>	0–1	–
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	0–1	–

Shrub/Vine

7	Dominant large shrubs			56–224	
	creosote bush	LATRT	<i>Larrea tridentata</i> var. <i>tridentata</i>	112–224	–
	whitethorn acacia	ACCO2	<i>Acacia constricta</i>	0–56	–
	ocotillo	FOSP2	<i>Fouquieria splendens</i>	0–28	–
8	Dominant half shrubs			6–56	
	littleleaf ratany	KRER	<i>Krameria erecta</i>	1–22	–
	white ratany	KRGR	<i>Krameria grayi</i>	1–22	–
	desert zinnia	ZIAC	<i>Zinnia acerosa</i>	1–22	–
	rough menodora	MESC	<i>Menodora scabra</i>	0–11	–
	whitestem paperflower	PSCO2	<i>Psilostrophe cooperi</i>	0–11	–
	triangle bur ragweed	AMDE4	<i>Ambrosia deltoidea</i>	0–11	–
	brittlebush	ENFA	<i>Encelia farinosa</i>	0–11	–
	pricklyleaf dogweed	THAC	<i>Thymophylla acerosa</i>	0–6	–
	desert yellow fleabane	ERLI	<i>Erigeron linearis</i>	0–2	–
	toothleaf goldeneye	VIDE3	<i>Viguiera dentata</i>	0–2	–
	threadleaf snakeweed	GUMI	<i>Gutierrezia microcephala</i>	0–1	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0–1	–
	woody crinklemat	TICAC	<i>Tiquilia canescens</i> var. <i>canescens</i>	0–1	–

	button brittlebush	ENFR	<i>Encelia frutescens</i>	0–1	–
9	Miscellaneous shrubs			0–11	
	Warnock's snakewood	COWA	<i>Condalia warnockii</i>	0–6	–
	mariola	PAIN2	<i>Parthenium incanum</i>	0–6	–
	jojoba	SICH	<i>Simmondsia chinensis</i>	0–6	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	0–3	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0–3	–
	crucifixion thorn	CAHO3	<i>Canotia holacantha</i>	0–3	–
	triangle bur ragweed	AMDE4	<i>Ambrosia deltoidea</i>	0–3	–
	burrobush	AMDU2	<i>Ambrosia dumosa</i>	0–3	–
	San Felipe dogweed	ADPO	<i>Adenophyllum porophylloides</i>	0–2	–
	turpentinebroom	THMO	<i>Thamnosma montana</i>	0–2	–
	Mexican bladdersage	SAME	<i>Salazaria mexicana</i>	0–2	–
	slender janusia	JAGR	<i>Janusia gracilis</i>	0–2	–
	banana yucca	YUBA	<i>Yucca baccata</i>	0–2	–
	Joshua tree	YUBR	<i>Yucca brevifolia</i>	0–2	–
	Mojave yucca	YUSC2	<i>Yucca schidigera</i>	0–2	–
	plains blackfoot	MELE2	<i>Melampodium leucanthum</i>	0–2	–
	lotebush	ZIOB	<i>Ziziphus obtusifolia</i>	0–1	–
	soaptree yucca	YUEL	<i>Yucca elata</i>	0–1	–
	American threefold	TRCA8	<i>Trixis californica</i>	0–1	–
	Parish's goldeneye	VIPA14	<i>Viguiera parishii</i>	0–1	–
	water jacket	LYAN	<i>Lycium andersonii</i>	0–1	–
	Berlandier's wolfberry	LYBE	<i>Lycium berlandieri</i>	0–1	–
	Arizona desert-thorn	LYEX	<i>Lycium exsertum</i>	0–1	–
	longleaf jointfir	EPTR	<i>Ephedra trifurca</i>	0–1	–
	Eastern Mojave buckwheat	ERFA2	<i>Eriogonum fasciculatum</i>	0–1	–
	sangre de cristo	JACA2	<i>Jatropha cardiophylla</i>	0–1	–
	Wright's beebrush	ALWR	<i>Aloysia wrightii</i>	0–1	–
	pelotazo	ABIN	<i>Abutilon incanum</i>	0–1	–
	catclaw acacia	ACGR	<i>Acacia greggii</i>	0–1	–
	rayless goldenhead	ACSP	<i>Acamptopappus sphaerocephalus</i>	0–1	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	0–1	–
	Coulter's brickellbush	BRCO	<i>Brickellia coulteri</i>	0–1	–
	fairyduster	CAER	<i>Calliandra eriophylla</i>	0–1	–
	knifeleaf condalia	COSP3	<i>Condalia spathulata</i>	0–1	–
	common sotol	DAWH2	<i>Dasyllirion wheeleri</i>	0–1	–
10	Succulents			2–28	
	saguaro	CAGI10	<i>Carnegiea gigantea</i>	0–11	–
	cactus apple	OPEN3	<i>Opuntia engelmannii</i>	0–11	–
	purple pricklypear	OPMA8	<i>Opuntia macrocentra</i>	0–6	–
	tulip pricklypear	OPPH	<i>Opuntia phaeacantha</i>	1–6	–
	teddybear cholla	CYBI9	<i>Cylindropuntia bigelovii</i>	0–6	–

	walkingstick cactus	CYSP8	<i>Cylindropuntia spinosior</i>	0–6	–
	staghorn cholla	CYVE3	<i>Cylindropuntia versicolor</i>	1–6	–
	jumping cholla	CYFU10	<i>Cylindropuntia fulgida</i>	0–3	–
	Christmas cactus	CYLE8	<i>Cylindropuntia leptocaulis</i>	0–3	–
	buck-horn cholla	CYAC8	<i>Cylindropuntia acanthocarpa</i>	0–2	–
	Arizona pencil cholla	CYAR14	<i>Cylindropuntia arbuscula</i>	0–2	–
	candy barrelcactus	FEWI	<i>Ferocactus wislizeni</i>	0–2	–
	devil's cholla	GRKU	<i>Grusonia kunzei</i>	0–1	–
	Graham's nipple cactus	MAGR9	<i>Mammillaria grahamii</i>	0–1	–
	Thornber's nipple cactus	MATH	<i>Mammillaria thornberi</i>	0–1	–
	beavertail pricklypear	OPBA2	<i>Opuntia basilaris</i>	0–1	–
	pinkflower hedgehog cactus	ECFA	<i>Echinocereus fasciculatus</i>	0–1	–
	Nichol's echinocactus	ECHON	<i>Echinocactus horizonthalonius var. nicholii</i>	0–1	–
	spiny star	ESVIV	<i>Escobaria vivipara var. vivipara</i>	0–1	–
	Scheer's beehive cactus	COROS	<i>Coryphantha robustispina ssp. scheeri</i>	0–1	–
	desert agave	AGDE	<i>Agave deserti</i>	0–1	–
	candle cholla	CYKL	<i>Cylindropuntia kleiniae</i>	0–1	–
	Engelmann's hedgehog cactus	ECEN	<i>Echinocereus engelmannii</i>	0–1	–
	redspine fishhook cactus	ECER2	<i>Echinomastus erectocentrus</i>	0–1	–
Tree					
11	Trees			0–56	
	yellow paloverde	PAMI5	<i>Parkinsonia microphylla</i>	0–56	–
	velvet mesquite	PRVE	<i>Prosopis velutina</i>	0–6	–
	desert ironwood	OLTE	<i>Olneya tesota</i>	0–6	–

Animal community

The plant community on this site is suitable for grazing by cattle primarily in the spring and / or summer growing seasons when annual forbs and grasses are available. Forage species can grow year-round with available moisture. High pH due to lime may tie up soil nutrients and influence forage species palatability.

Water developments are very important to wildlife species on this site. Vegetative cover and forage diversity are suitable for a variety of small desert mammals and birds and their predators.

Hydrological functions

This site has coarse textured soils and moderate to gentle slopes making it a poor producer of runoff.

Recreational uses

Hunting, hiking, horseback riding, camping, photography, birdwatching

Wood products

Limited firewood from whitethorn, mesquite and paloverde for camp fires and branding fires.

Other products

Cactus fruits from prickly pear and cholla. Ocotillo canes and creosote used medicinally.

Inventory data references

Range 417s include 1 in good condition.

Type locality

Location 1: Pima County, AZ	
Township/Range/Section	T15S R9E S9
General legal description	La Tortuga Ranch, Tortuga Pasture at transect # 23. One and a half mile south of Tortuga well. Was ungrazed for 20 years.
Location 2: Pima County, AZ	
Township/Range/Section	T14S R13E S15
General legal description	Tumamoc Hill Reserve, Desert Laboratory UA, North side of Tumamoc hill on footslope just south of Anklam Road.

Other references

The Changing Mile - Revisited. Ray Turner, Robert Webb, University of Arizona Press, Tucson, Arizona, 2003. Photo Station 81 and 82.

Contributors

Dan Robinett
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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)	Dan Robinett, Jeff Herrick, Dave Pyke, Josh Garcia
Contact for lead author	NRCS/ARS Tucson, AZ
Date	08/02/2002
Approved by	S. Cassady
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Waterflow patterns will often generate weakly-defined rills due to low cover on the site. May be continuous from top to bottom of slope.
2. **Presence of water flow patterns:** Common and widespread, covering up to 35% of bare ground on the site. Gravel

armoring helps protect site and limit evidence of waterflow patterns.

3. **Number and height of erosional pedestals or terracettes:** Pedestals will be common at the base of long-lived perennial grasses and shrubs. Exposed roots should be very rare, and the root-shoot interface should still be protected by the soil.
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 30-40%. Will be lower on sites with high rock cover (needs to be verified). Most areas that have low rock cover on this site will have corresponding higher lichen cover.
5. **Number of gullies and erosion associated with gullies:** none
6. **Extent of wind scoured, blowouts and/or depositional areas:** none due to high gravel content
7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous and fine woody material may move 1 meter downslope in rills and waterflow patterns. Coarser woody material (>1 cm in diameter) should move little if at all, and only in concentrated waterflow patterns and rills.
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Average 5-6 under shrub and grass canopies, and 4.5-5.5 in plant interspaces due to high microbiotic crust cover (including cyanobacteria) on these sandy loam - fine sandy loam surface textured soils with high carbonate content.
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Weak, fine granular structure in interspaces and weak to moderate fine granular under perennial canopies. Very limited evidence of A horizon development except under perennial canopies.
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Limited perennial grass basal cover and litter/soil accumulation under shrubs should increase flow path length and infiltration. Higher plant density and cover often associated with the rills, allowing greater retention of water than would otherwise occur on this site.
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Will see approximately 1-2 cm. surface crusting in interspaces.
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: Long-lived large shrubs (creosote, bursage) > [short-lived subshrubs < > succulents <> shrub-like perennial

grasses with above-ground growing points (e.g. bush muhly and black grama) <> long-lived perennial bunchgrasses (e.g. *Aristida* sp.)) >> (annual and perennial forbs, short-lived perennial grasses (fluffgrass) , annual grasses, trees, and tree-like shrubs.

Sub-dominant:

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Would normally expect to see some mortality in all functional groups in response to drought, especially short-lived perennial grasses and some of the bunchgrasses. Creosote and bursage will lose some branches during drought, and there may be limited die-back of subshrubs, however, there should not be widespread mortality, even during drought, on this drought-adaped site, except for short-lived perennial grasses (fluffgrass).
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14. **Average percent litter cover (%) and depth (in):** Near 0% in interspaces, and 10-90% under canopies, depending on time since significant production on the site. This site is extremely dynamic due to high rates of removal in runoff, and high decomposition rates associated with favorable conditions and termite activity.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 73 lbs/ac unfavorable precipitation; 285 lbs/ac normal precipitation; 560 lbs/ac favorable precipitation.
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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:** None. May want to watch malta starthistle and bluffgrass, but unlikely to move onto this droughty site.
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17. **Perennial plant reproductive capability:** Will only see reproduction during favorable years. Significant reproduction will only occur for most perennial species during 10-15 of every 50 years.
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