USDA Natural Resources
Conservation Service

Ecological site R038XA102AZ
Clayey Upland 12-16" p.z.

Accessed: 05/12/2025

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.

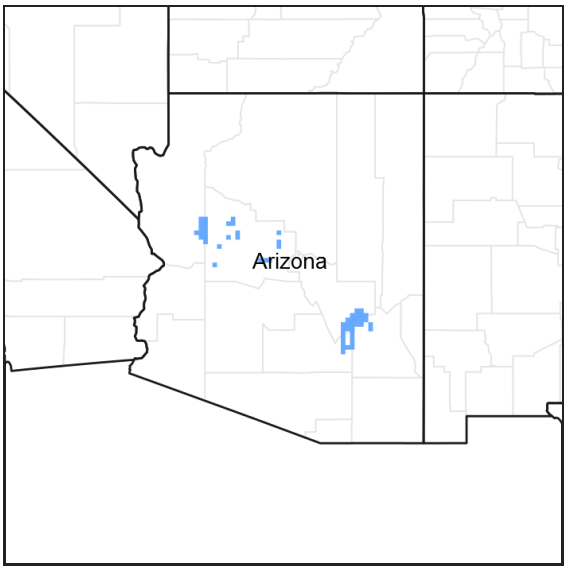


Figure 1. Mapped extent

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): 038X–Mogollon Transition South

AZ 38.1 – Lower Interior Chaparral

Elevations range from 3000 to 4500 feet and precipitation averages 12 to 16 inches per year. Vegetation includes canotia, one-seed juniper, mesquite, catclaw acacia, jojoba, turbinella oak, ratany, shrubby buckwheat, algerita, skunkbush, tobosa, vine mesquite, bottlebrush squirreltail, grama species, curly mesquite, desert needlegrass and New Mexico feathergrass. The soil temperature regime is thermic and the soil moisture regime is ustic aridic. This unit occurs within the Transition Zone Physiographic Province and is characterized by canyons and structural troughs or valleys. Igneous, metamorphic and sedimentary rock classes occur on rough mountainous terrain in association with less extensive sediment filled valleys exhibiting little integrated drainage.

Classification relationships

Similar site to TES (terrestrial ecosystem sites) map units nos. 372, 413, 427, 439, 471 and 472 on the Prescott National Forest in Yavapai county in central Arizona

Associated sites

R038XA103AZ	**Clay Loam Upland 12-16" p.z.**
R038XA117AZ	**Volcanic Hills 12-16" p.z. Clayey**

Similar sites

R038XA115AZ	**Volcanic Upland 12-16" p.z.**
R041XC304AZ	**Clayey Upland 12-16" p.z.**
R038XB202AZ	**Clayey Upland 16-20" p.z.**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Eriogonum wrightii* (2) *Acacia greggii*
Herbaceous	(1) *Pleuraphis mutica* (2) *Panicum obtusum*

Physiographic features

This site occurs in the lower elevations of the Mogollon Transition zone south of the rim in central Arizona. This site occurs in an upland position. It occurs on gently sloping valley fill plains, basalt flows and mesa tops.

Table 2. Representative physiographic features

Landforms	(1) Alluvial flat (2) Lava flow (3) Mesa
Flooding frequency	None
Ponding frequency	None
Elevation	975–1,402 m
Slope	0–8%
Ponding depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

Precipitation in this common resource area averages 12 to 16 inches. The winter-summer rainfall ratio ranges from about 60-40% in the northwest portion of the Land Resource Unit to about 50-50% in the southeast region. Summer rains fall July through September from high-intensity convective thunderstorms. This moisture originates primarily from the Gulf of Mexico, but can come from the remnants of Pacific hurricanes in September. Winter moisture is frontal, originates in the northern Pacific, and falls as rain or snow in widespread storms of low intensity and long duration. Snowfall ranges from a trace to 10 inches per year and can occur from November through March. At the lower elevations, snow seldom persists longer than a day. May and June are the driest months of the year. Humidity is generally low all year. Average annual air temperatures range from 59 to 70 degrees F., a thermic temperature regime. Daytime temperatures in summer are commonly in the 90's. Freezing temperatures are common from October through April, usually during the night or early morning hours. The actual precipitation, available moisture, and temperature varies depending upon region, elevation, rain shadow effect, and aspect.

Table 3. Representative climatic features

Frost-free period (average)	205 days
Freeze-free period (average)	270 days
Precipitation total (average)	356 mm

Influencing water features

There are no water features associated with this site.

Soil features

These soils are moderately deep to deep (30 to over 60 inches), clayey throughout and well drained. They have formed in alluvium from basalt, andesite and related volcanic tuff and ash. The surface textures are clay and silty clay except that granular silty clay loam or heavy clay loam are at the surface in some places. These soils have vertic properties and crack and churn with wetting and drying. The effective rooting depth is 30 to 60. Runoff is slow on dry soils due to cracks and holes, but is moderate to high on moist soils. The erosion hazard is slight unless heavy traffic causes trailing and compaction. Typical taxonomic units mapped on this site include: SSA-627 Mohave County Southern Part MU's Bonita family-12 & 13; SSA-637 Yavapai County Western Part MU Springerville-VsC; SSA-639 Black Hills-Sedona Area MU's Guest-426 & 626; SSA-675 San Carlos Indian Reservation Area MU's Sontag-40 & 65.

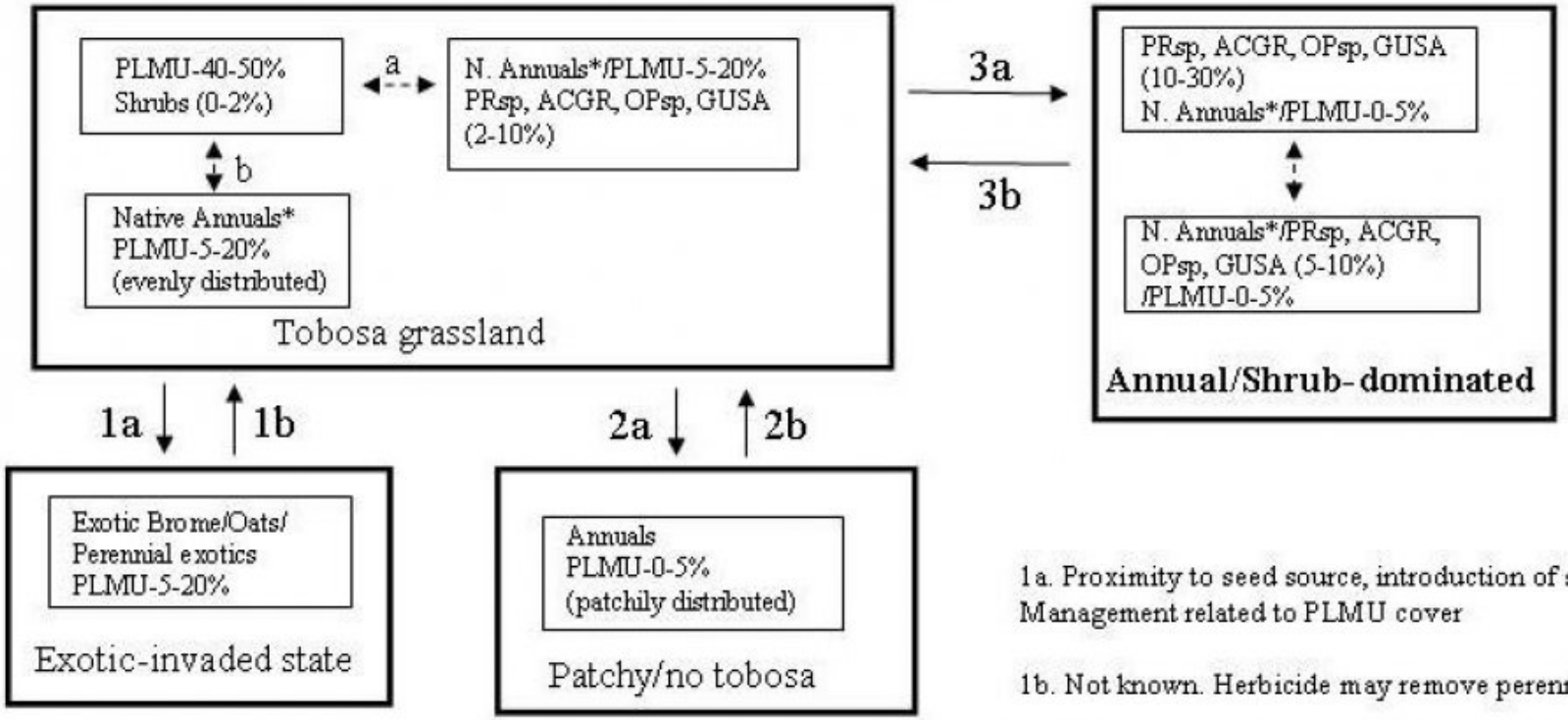
Table 4. Representative soil features

Surface texture	(1) Cobbly clay (2) Gravelly silty clay (3) Silty clay loam
Family particle size	(1) Clayey
Drainage class	Well drained to moderately well drained
Permeability class	Moderate to slow
Soil depth	76–152 cm
Surface fragment cover <=3"	5–20%
Surface fragment cover >3"	0–10%
Available water capacity (0-101.6cm)	9.14–18.29 cm
Calcium carbonate equivalent (0-101.6cm)	1–15%
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)	7–8.2
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

The historic native plant community is a tobosa grassland (canopy cover of 40 to 65%)with a diverse flora of native annual grasses and forbs of both the winter and summer season. Periodic wildfires occurred every 15 years; June thru August, and controlled shrubs and succulents encroaching from adjacent areas of shallow soils. In the absence of fire for long periods shrubs and cacti can become dominant. The interactions of drought, grazing and fire can result in loss of tobosa cover. If tobosa canopy cover is reduced to less than 5% and is patchy in distribution; it may not be able to re-colonize large areas. In these situations, annual species, both native and non-native can dominate the plant community. Non-native annuals may, over time, diminish the soil seed-bank of native annual species.

MLRA 38.1 (12-16"), Clayey Upland



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

1a. Proximity to seed source, introduction of seeds, possibly Management related to PLMU cover

1b. Not known. Herbicide may remove perennial exotics

2a. CHG (managing for annuals), persistent low tobosa cover, 1. Reduction of A horizon OM and litter, persistent reduced infiltration or 2. Limited recruitment of tobosa

2b. PG/NG, seeding or planting of tobosa, possibly herbicide of annuals

3a. CHG (managing for annuals), persistent low tobosa cover, 1. Reduction of A horizon OM and litter, persistent reduced infiltration or 2. Limited recruitment of tobosa

3b. Mechanical/herbicide treatment of shrubs, PG/NG, seeding or planting of tobosa, maintenance treatments for shrubs

Figure 6. State & Transition, Clayey Upland 12-16" p.z.

State 1
Reference State

Community 1.1
Tobosa Grassland (HCPC)

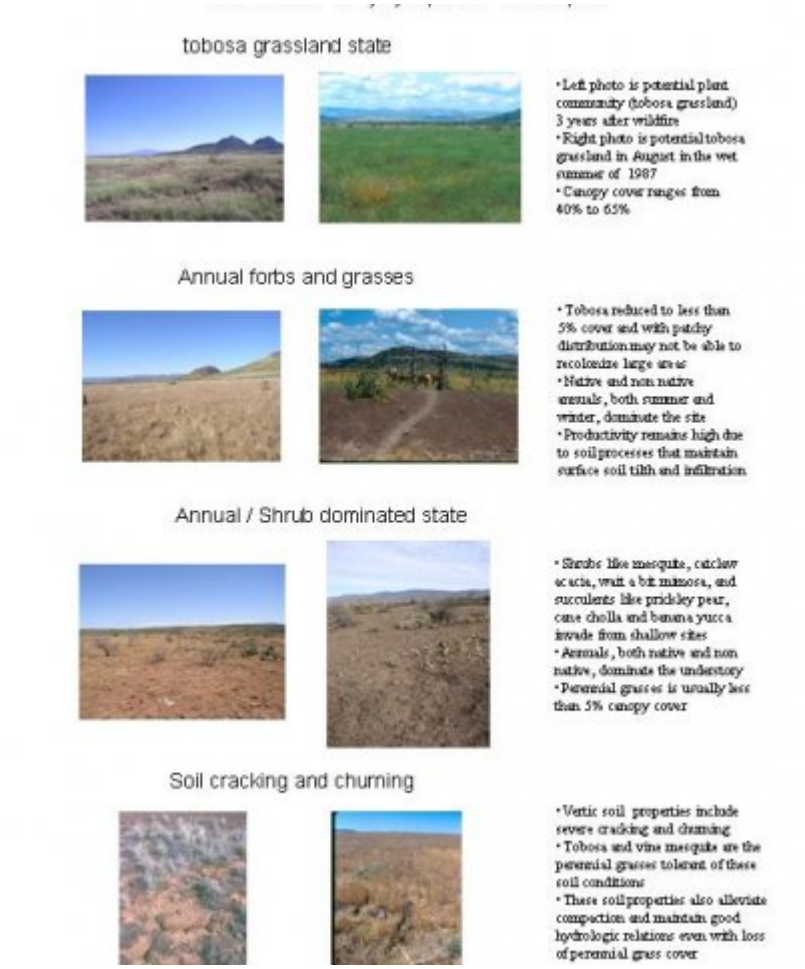


Figure 7. Clayey Upland 12-16" pz. photos

Figure 8. Tobosa grassland

The historic, native, plant community is a grassland dominated by tobosa grass with lesser amounts of vine mesquite and bottlebrush squirreltail. A rich flora of native annual forbs and grasses, of both the winter and summer

seasons, exist in the plant community. Periodic, naturally occuring, wildfires were important in maintaining the potential plant community.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	616	1121	1681
Forb	34	336	560
Shrub/Vine	–	28	112
Total	**650**	**1485**	**2353**

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	0-1%
Grass/grasslike foliar cover	8-15%
Forb foliar cover	0-1%
Non-vascular plants	0-1%
Biological crusts	1-5%
Litter	25-45%
Surface fragments >0.25" and <=3"	0-15%
Surface fragments >3"	0-10%
Bedrock	0%
Water	0%
Bare ground	15-25%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	0-5%	1-5%
>0.15 <= 0.3	–	0-2%	2-15%	2-15%
>0.3 <= 0.6	–	0-5%	35-55%	0-1%
>0.6 <= 1.4	–	0-5%	–	–
>1.4 <= 4	–	0-5%	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 10. Plant community growth curve (percent production by month). AZ3811, 38.1 12-16" p.z. all sites. Growth begins in the spring, most growth occurs in the summer..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	1	7	15	20	22	20	10	5	0	0

Community 1.2
Grassland with Native Annuals/ Shrubs

Tobosa cover has been reduced through drought, grazing and/or a lack of fire. As Tobosa grass declines native annuals and shrubs increase. Native Annual grasses, forbs and shrubs are dominate with scattered distribution of Tobosa grass and lesser amounts of other perennial grasses.

Community 1.3
Grassland with Native Annuals

Tobosa cover has been reduced through drought, grazing and/or fire. With a reduced canopy of tobosa annuals are able to increase across the site. This creates an even distribution of tobosa and annuals with lesser amounts of perennial grasses and shrubs.

State 2
Native Shrub and Annuals State

Community 2.1
Shrub and Annuals Dominated

Shrubs like; whitethorn acacia, mesquite, wait a bit mimosa and catclaw acacia; and succulents like; prickly pear, cholla and banana yucca , invade from adjacent shallow soil areas to dominate the site in the absence of fire. Native and non-native annual forbs and grasses dominate the under-story. In "El Nino" years, herbaceous fuels can be sufficient to carry fire through the heavy canopy of shrubs. The major woody shrubs are, however, fire resistant once established. Tobosa cannot re-colonize large areas with low canopy cover levels and patchy distribution.

Community 2.2
Annual Forbs and Grasses Dominated

Tobosa canopy cover is reduced due to the interactions of drought, grazing and/or fire. Native forbs and grasses dominate the plant community. Tobosa canopy cover is poor and patchy in distribution. Tobosa may not be able to re-colonize large areas because of very poor seed production and no seed-bank. Vertic soil properties maintain good, surface, soil tilth and good infiltration rates when soils are dry. Plant production is high, even with the lack of perennial grass cover, due to soil cracking and churning.

State 3
Native Annual Forbs and Grassland State

Community 3.1
Annual Forbs and Grassland

Tobosa canopy cover is reduced due to the interactions of drought, grazing and / or fire. Native and non-native annual forbs and grasses dominate the plant community. Tobosa canopy cover is less than 5% and patchy in distribution. Tobosa may not be able to re-colonize large areas because of very poor seed production and no seed-bank. Vertic soil properties maintain good, surface, soil tilth and good infiltration rates when soils are dry. Plant production is high, even with the lack of perennial grass cover, due to soil cracking and churning.

State 4
Invaded Exotic Forb and Grass State

Community 4.1
Exotic Forbs and Grass Dominated

Non-native annual grasses and forbs like; red brome, cheatgrass, tumble mustard, wild oats and filaree, can invade and dominate areas of the site with very low tobosa cover. These species can, over time, reduce the seed-bank of native annual grasses and forbs. Their presence can increase the fire frequency (of man made fires) especially where roads and urban areas are adjacent to areas of the site.

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	**mid grasses**			560–1121	
	tobosagrass	PLMU3	*Pleuraphis mutica*	560–1121	–
2	**cool season grasses**			11–224	
	squirreltail	ELEL5	*Elymus elymoides*	11–224	–
3	**misc. perennial grasses**			11–112	
	curly-mesquite	HIBE	*Hilaria belangeri*	0–112	–
	vine mesquite	PAOB	*Panicum obtusum*	0–56	–
	threeawn	ARIST	*Aristida*	0–56	–
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	0–56	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–56	–
4	**annual grasses**			28–336	
	little barley	HOPU	*Hordeum pusillum*	22–336	–
	Mexican sprangletop	LEFUU	*Leptochloa fusca ssp. uninervia*	22–336	–
	mucronate sprangeltop	LEPAB	*Leptochloa panicea ssp. brachiata*	22–336	–
	Mexican panicgrass	PAHI5	*Panicum hirticaule*	0–112	–
	sixweeks threeawn	ARAD	*Aristida adscensionis*	0–112	–
	prairie threeawn	AROL	*Aristida oligantha*	0–112	–
	needle grama	BOAR	*Bouteloua aristidoides*	0–112	–
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–56	–
	Arizona brome	BRAR4	*Bromus arizonicus*	0–56	–
	feather fingergrass	CHVI4	*Chloris virgata*	0–56	–
	sticky sprangletop	LEVI5	*Leptochloa viscida*	0–56	–
	small fescue	VUMI	*Vulpia microstachys*	0–56	–
	Eastwood fescue	VUMIC	*Vulpia microstachys var. ciliata*	0–56	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	0–56	–
	witchgrass	PACA6	*Panicum capillare*	0–56	–
	delicate muhly	MUFR	*Muhlenbergia fragilis*	0–28	–
	littleseed muhly	MUMI	*Muhlenbergia microsperma*	0–28	–
	Bigelow's bluegrass	POBI	*Poa bigelovii*	0–28	–
	Arizona signalgrass	URAR	*Urochloa arizonica*	0–28	–
	canyon cupgrass	ERLE7	*Eriochloa lemmonii*	0–28	–
	tufted lovegrass	ERPE	*Eragrostis pectinacea*	0–28	–
	desert lovegrass	ERPEM	*Eragrostis pectinacea var. miserrima*	0–28	–
Forb					
5	**perennial forbs**			11–56	
	largeflower onion	ALMA4	*Allium macropetalum*	0–17	–
	weakleaf bur ragweed	AMCO3	*Ambrosia confertiflora*	1–17	–
	bluedicks	DICA14	*Dichelostemma capitatum*	2–17	–

	Indian rushpea	HOGL2	*Hoffmannseggia glauca*	1–17	–
	Wright's deervetch	LOWR	*Lotus wrightii*	0–17	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	1–17	–
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	0–17	–
	scarlet spiderling	BOCO	*Boerhavia coccinea*	0–11	–
	vetch	VICIA	*Vicia*	0–6	–
	Parry's beardtongue	PEPA24	*Penstemon parryi*	0–6	–
	orange fameflower	PHAU13	*Phemeranthus aurantiacus*	0–6	–
	canaigre dock	RUHY	*Rumex hymenosepalus*	0–6	–
	twinleaf senna	SEBA3	*Senna bauhinioides*	0–6	–
	Coues' cassia	SECO10	*Senna covesii*	0–6	–
	southwestern mock vervain	GLGO	*Glandularia gooddingii*	0–6	–
	Forb, perennial	2FP	*Forb, perennial*	0–6	–
	brownfoot	ACWR5	*Acourtia wrightii*	0–6	–
	tuber anemone	ANTU	*Anemone tuberosa*	0–6	–
	Braun's rockcress	ARPE3	*Arabis perstellata*	0–6	–
6	**annual forbs**			28–560	
	bristly fiddleneck	AMTE3	*Amsinckia tessellata*	0–84	–
	California poppy	ESCAM	*Eschscholzia californica ssp. mexicana*	0–84	–
	trefoil	LOTUS	*Lotus*	0–56	–
	Arizona lupine	LUAR4	*Lupinus arizonicus*	0–56	–
	slender goldenweed	MAGR10	*Machaeranthera gracilis*	0–56	–
	tanseyleaf tansyaster	MATA2	*Machaeranthera tanacetifolia*	0–56	–
	Coulter's lupine	LUSP2	*Lupinus sparsiflorus*	0–56	–
	manybristle chinchweed	PEPA2	*Pectis papposa*	0–56	–
	Arizona popcornflower	PLAR	*Plagiobothrys arizonicus*	6–56	–
	creamcups	PLCA5	*Platystemon californicus*	0–56	–
	desert Indianwheat	PLOV	*Plantago ovata*	1–56	–
	woolly plantain	PLPA2	*Plantago patagonica*	1–56	–
	milkvetch	ASTRA	*Astragalus*	0–56	–
	carelessweed	AMPA	*Amaranthus palmeri*	0–56	–
	crestrib morning-glory	IPCO2	*Ipomoea costellata*	0–56	–
	Forb, annual	2FA	*Forb, annual*	0–56	–
	California goldfields	LACA7	*Lasthenia californica*	0–28	–
	Goodding's bladderpod	LEGO2	*Lesquerella gooddingii*	0–28	–
	shaggyfruit pepperweed	LELA	*Lepidium lasiocarpum*	0–28	–
	Thurber's pepperweed	LETH2	*Lepidium thurberi*	0–28	–
	foothill deervetch	LOHU2	*Lotus humistratus*	0–28	–
	coastal bird's-foot trefoil	LOSA	*Lotus salsuginosus*	0–28	–
	western tansymustard	DEPI	*Descurainia pinnata*	0–28	–
	miniature woollystar	ERDI2	*Eriastrum diffusum*	0–28	–
	spreading fleabane	ERDI4	*Erigeron divergens*	0–28	–
	cryptantha	CRYPT	*Cryptantha*	0–28	–

	Coulter's spiderling	BOCO2	*Boerhavia coulteri*	0–28	–
	fivewing spiderling	BOIN	*Boerhavia intermedia*	0–28	–
	hoary bowlesia	BOIN3	*Bowlesia incana*	0–28	–
	New Mexico thistle	CINE	*Cirsium neomexicanum*	0–28	–
	purslane	PORTU	*Portulaca*	0–28	–
	phacelia	PHACE	*Phacelia*	0–28	–
	hollowleaf annual lupine	LUSU3	*Lupinus succulentus*	0–28	–
	miniature lupine	LUBI	*Lupinus bicolor*	0–28	–
	spurge	EUPHO	*Euphorbia*	0–28	–
	longleaf false goldeneye	HELOA2	*Heliomeris longifolia var. annua*	0–28	–
	New Mexico plumeseed	RANE	*Rafinesquia neomexicana*	0–28	–
	ragwort	SENEC	*Senecio*	0–17	–
	spreading fanpetals	SIAB	*Sida abutifolia*	0–17	–
	sleepy silene	SIAN2	*Silene antirrhina*	0–17	–
	New Mexico fanpetals	SINE	*Sida neomexicana*	0–17	–
	sand fringepod	THCU	*Thysanocarpus curvipes*	0–17	–
	green carpetweed	MOVE	*Mollugo verticillata*	0–17	–
	evening primrose	OENOT	*Oenothera*	0–17	–
	Florida pellitory	PAFL3	*Parietaria floridana*	0–17	–
	desert unicorn-plant	PRAL4	*Proboscidea althaeifolia*	0–17	–
	doubleclaw	PRPA2	*Proboscidea parviflora*	0–17	–
	scrambled eggs	COAU2	*Corydalis aurea*	0–17	–
	American wild carrot	DAPU3	*Daucus pusillus*	0–17	–
	sorrel buckwheat	ERPO4	*Eriogonum polycladon*	0–17	–
	annual agoseris	AGHE2	*Agoseris heterophylla*	0–17	–
Shrub/Vine					
7	**shrubs**			0–56	
	catclaw acacia	ACGR	*Acacia greggii*	0–28	–
	velvet mesquite	PRVE	*Prosopis velutina*	0–11	–
	jojoba	SICH	*Simmondsia chinensis*	0–6	–
	lotebush	ZIOBC	*Ziziphus obtusifolia var. canescens*	0–6	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–6	–
	spiny hackberry	CEEH	*Celtis ehrenbergiana*	0–6	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–6	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	0–6	–
	blue paloverde	PAFL6	*Parkinsonia florida*	0–6	–
	whitethorn acacia	ACCO2	*Acacia constricta*	0–6	–
	pale desert-thorn	LYPA	*Lycium pallidum*	0–2	–
	algerita	MATR3	*Mahonia trifoliolata*	0–2	–
8	**half shrubs**			0–56	
	bastardsage	ERWR	*Eriogonum wrightii*	0–56	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–28	–
	burroweed	ISTE2	*Isocoma tenuisecta*	0–17	

	burroweed	ISTE2	*Isocoma tenuisecta*	0–17	–
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	0–11	–
	fairyduster	CAER	*Calliandra eriophylla*	0–11	–
	yerba de pasmo	BAPT	*Baccharis pteronioides*	0–6	–
9	**succulents**			0–56	
	walkingstick cactus	CYSP8	*Cylindropuntia spinosior*	0–28	–
	cactus apple	OPEN3	*Opuntia engelmannii*	0–28	–
	tulip pricklypear	OPPH	*Opuntia phaeacantha*	0–11	–
	banana yucca	YUBA	*Yucca baccata*	0–11	–
	dollarjoint pricklypear	OPCH	*Opuntia chlorotica*	0–11	–
	Whipple cholla	CYWH	*Cylindropuntia whipplei*	0–11	–
	common sotol	DAWH2	*Dasylirion wheeleri*	0–6	–
	buck-horn cholla	CYAC8	*Cylindropuntia acanthocarpa*	0–6	–
	Christmas cactus	CYLE8	*Cylindropuntia leptocaulis*	0–6	–
	candy barrelcactus	FEWI	*Ferocactus wislizeni*	0–6	–
	sacahuista	NOMI	*Nolina microcarpa*	0–6	–
	Engelmann's hedgehog cactus	ECEN	*Echinocereus engelmannii*	0–2	–
	pinkflower hedgehog cactus	ECFE	*Echinocereus fendleri*	0–2	–
	goldenflower century plant	AGCH2	*Agave chrysantha*	0–2	–
	Schott's century plant	AGSC3	*Agave schottii*	0–2	–
	spinystar	ESVI2	*Escobaria vivipara*	0–1	–

Animal community

This site is suitable for grazing year round and is easily traversed by all classes of livestock. The site is susceptible to erosion only in overgrazed areas, old roads, cattle trails and concentration areas like bed grounds, water-lots and salt grounds.

This site has good habitat diversity for grassland wildlife species. As shrubby species and annuals become dominant, grassland species diminish and desert wildlife species increase.

Hydrological functions

Due to severe cracking and churning (producing rough and porous surfaces), this site has very high, initial, infiltration rates. It produces runoff only when rain falls or snow melts, and the soils are moist.

Recreational uses

Climate is characterized by warm summers and cold winters. Recreation activities include hunting, hiking, camping, photography, bird watching and backpacking.

Wood products

There are no significant wood products produced on this site.

Other products

There is some native harvest of food plants like wild onions, grassnuts and thistle. Clay for pot making.

Contributors

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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)	Ken Gishi, Dan Robinett, Wilma Renken
Contact for lead author	Globe MLRA Soil Survey Office
Date	07/01/2014
Approved by	Byron Lambeth
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:** Water flow patterns occupy less than 10% of the area. They are very short (2-5 ft.) in length and discontinuous.

3. **Number and height of erosional pedestals or terracettes:** Erosional pedestals and terracettes are very uncommon. Vertic soil activity (cracking and churning) continually disturb the soil surface and preclude development of erosional features like these.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 10 to 15% (from pace transect)

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

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 is staying in place.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil slake test values of 4, 5 and 6's across the area. Soil surface has high organic content both under plant canopies and in interspaces.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is granular. A horizon is thick (3-5 inches), has high organic carbon (4-5%) and is very dark colored (10YR 3/2).

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Canopy cover of tobosa is 45% (after several years of drought) and well distributed across the landscape. Basal cover ranges from 8 to 15%.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None

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

    Dominant: perennial mid-grass (tobosa)

    Sub-dominant: annual forbs and grasses> cool season grasses> perennial forbs> misc. grasses

    Other: sub-shrubs> succulents> shrubs

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** 50% drought mortality on tobosa plants after severe drought from 1996 thru 2004.

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14. **Average percent litter cover (%) and depth (in):** Litter is nearly all herbaceous.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** From ecological site description average annual production is 580 lbs/ac (drought), 1325 lbs/ac (normal year), 2100 lbs/ac (wet year)

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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:** mesquite, prickley pear, cane cholla, catclaw acacia, wild oats, red brome, cheatgrass

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