

Ecological site R040XA116AZ Sandy 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.

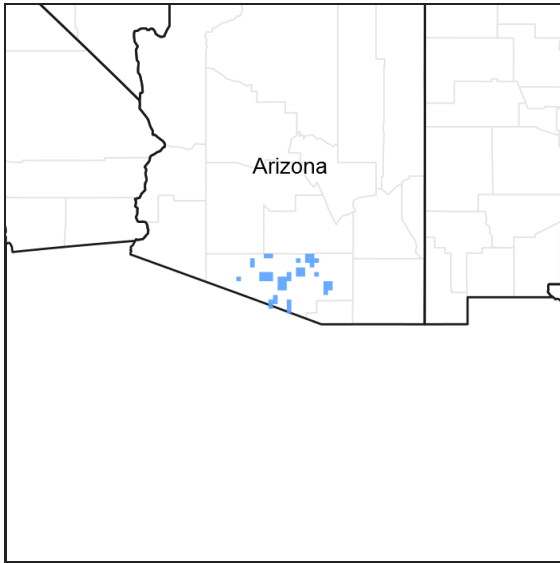


Figure 1. Mapped extent

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.

Table 1. Dominant plant species

Tree	(1) <i>Parkinsonia microphylla</i>
Shrub	(1) <i>Hymenoclea monogyra</i>
Herbaceous	(1) <i>Muhlenbergia porteri</i> (2) <i>Aristida californica</i> Var. <i>glabrata</i>

Physiographic features

This site occurs in the upper elevations of the Sonoran Desert in southern Arizona. Slopes are mainly from 1 to 3%, but can range as high as 10%.

Table 2. Representative physiographic features

Landforms	(1) Fan (2) Terrace (3) Stream terrace
Elevation	579–975 m
Slope	1–10%

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

Soil features

These are deep soils which have formed in very recent sandy, gravelly alluvium of mixed origin. They are sandy throughout to at least moderate depths (30 inches). Plant-soil moisture relationships are good. Soils may be mild calcareous in the surface.

Soils mapped on this site include: in

SSA-668 Tucson-Avra Valley area MU's Cowan-CsA, CsB & CvB and Vinton-VsB;

SSA-703 Tohono O'odham area MU Arizo-4.

Table 4. Representative soil features

Surface texture	(1) Very gravelly sandy loam (2) Very gravelly loamy sand
Family particle size	(1) Sandy

Drainage class	Somewhat excessively drained
Permeability class	Very rapid
Soil depth	152 cm
Surface fragment cover <=3"	20–70%
Surface fragment cover >3"	0–1%
Available water capacity (0-101.6cm)	5.08–12.7 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	35–65%
Subsurface fragment volume >3" (Depth not specified)	0–5%

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



State 1
Historical Climax Plant Community

Community 1.1
Historical Climax Plant Community

The potential plant community on this site is a diverse mixture of large and small shrubs, trees and perennial grasses and forbs. The major perennial grass and forb species tend to grow in patches and are not well dispersed throughout the community although on a larger scale, the patches are. The aspect is shrubland. With continuous, heavy grazing, perennial grass species are removed from the plant community. Shrubs like triangle bursage, white brittlebush, burroweed, and white burrobush can increase to dominate the understory. Trees grow to near maximum size on these deep, coarse textured soils. Up to 10% tree canopy is important on this site to provide diversity in the plant community. Even without herbaceous cover, these soils produce very little runoff and have very low water erosion rates. Most of these soils have enough coarse fragments that they are not subject to wind erosion but in places blowing can occur if the woody cover is removed or disturbed.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	328	–	401
Shrub/Vine	230	–	279
Forb	37	–	108
Tree	26	–	49
Total	621	–	837

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				56–73	
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	34–45	–
	black grama	BOER4	<i>Bouteloua eriopoda</i>	22–28	–
2				56–73	
	Santa Rita threeawn	ARCAG	<i>Aristida californica</i> var. <i>glabrata</i>	27–37	–
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	28–36	–
3				3–18	
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	2–13	–
	mesa dropseed	SPFL2	<i>Sporobolus flexuosus</i>	1–4	–
4				3–18	
	blue threeawn	ARPUN	<i>Aristida purpurea</i> var. <i>nealleyi</i>	1–2	–
	Parish's threeawn	ARPUP5	<i>Aristida purpurea</i> var. <i>parishii</i>	1–2	–
	spidergrass	ARTE3	<i>Aristida ternipes</i>	1–2	–
	spidergrass	ARTEG	<i>Aristida ternipes</i> var. <i>gentilis</i>	0–1	–
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	0–1	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0–1	–
	Arizona cottontop	DICA8	<i>Digitaria californica</i>	0–1	–
	squirreltail	ELELE	<i>Elymus elymoides</i> ssp. <i>elymoides</i>	0–1	–
	tanglehead	HECO10	<i>Heteropogon contortus</i>	0–1	–
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	0–1	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	0–1	–
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	0–1	–
5				37–55	
	Rothrock's grama	BORO2	<i>Bouteloua rothrockii</i>	6–11	–
	needle grama	BOAR	<i>Bouteloua aristidoides</i>	1–4	–
	sixweeks threeawn	ARAD	<i>Aristida adscensionis</i>	1–3	–
	Arizona brome	BRAR4	<i>Bromus arizonicus</i>	1–2	–
	villous lipfern	CHVI	<i>Cheilanthes villosa</i>	1–2	–
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	1–2	–
	nineawn pappusgrass	ENDE	<i>Enneapogon desvauxii</i>	1–2	–
	canyon cupgrass	ERLE7	<i>Eriochloa lemmonii</i>	1–2	–

	desert lovegrass	ERPEM	<i>Eragrostis pectinacea</i> var. <i>miserrima</i>	1-2	-
	tufted lovegrass	ERPEP2	<i>Eragrostis pectinacea</i> var. <i>pectinacea</i>	1-2	-
	mucronate sprangeltop	LEPAB	<i>Leptochloa panicea</i> ssp. <i>brachiata</i>	1-2	-
	delicate muhly	MUFR	<i>Muhlenbergia fragilis</i>	1-2	-
	littleseed muhly	MUMI	<i>Muhlenbergia microsperma</i>	1-2	-
	witchgrass	PACA6	<i>Panicum capillare</i>	1-2	-
	Bigelow's bluegrass	POBI	<i>Poa bigelovii</i>	1-2	-
	Arizona signalgrass	URAR	<i>Urochloa arizonica</i>	1-2	-
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	1-2	-
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	1-2	-
Forb					
6				3-17	
	desert globemallow	SPAM2	<i>Sphaeralcea ambigua</i>	1-6	-
	trailing windmills	ALIN	<i>Allionia incarnata</i>	1-2	-
	Yuma silverbush	ARSE7	<i>Argythamnia serrata</i>	0-1	-
	desert marigold	BAMU	<i>Baileya multiradiata</i>	0-1	-
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	0-1	-
	whitemargin sandmat	CHAL11	<i>Chamaesyce albomarginata</i>	0-1	-
	lacy tansyaster	MAPIP4	<i>Machaeranthera pinnatifida</i> ssp. <i>pinnatifida</i> var. <i>pinnatifida</i>	0-1	-
	desert tobacco	NIOBO	<i>Nicotiana obtusifolia</i> var. <i>obtusifolia</i>	0-1	-
	canaigre dock	RUHY	<i>Rumex hymenosepalus</i>	0-1	-
	smooth threadleaf ragwort	SEFLM	<i>Senecio flaccidus</i> var. <i>monoensis</i>	0-1	-
7				0-56	
	desert sand verbena	ABVI	<i>Abronia villosa</i>	0-1	-
	brownfoot	ACWR5	<i>Acourtia wrightii</i>	0-1	-
	weakleaf bur ragweed	AMCO3	<i>Ambrosia confertiflora</i>	0-1	-
	carelessweed	AMPA	<i>Amaranthus palmeri</i>	0-1	-
	bristly fiddleneck	AMTE3	<i>Amsinckia tessellata</i>	0-1	-
	aster	ASTER	<i>Aster</i>	0-1	-
	milkvetch	ASTRA	<i>Astragalus</i>	0-1	-
	Coulter's spiderling	BOCO2	<i>Boerhavia coulteri</i>	0-1	-
	hoary bowlesia	BOIN3	<i>Bowlesia incana</i>	0-1	-
	Tucson Mountain spiderling	BOME	<i>Boerhavia megaptera</i>	0-1	-
	Arizona wrightwort	CAAR7	<i>Carlwrightia arizonica</i>	0-1	-
	hyssopleaf sandmat	CHHY3	<i>Chamaesyce hyssopifolia</i>	0-1	-
	New Mexico thistle	CINE	<i>Cirsium neomexicanum</i>	0-1	-
	cryptantha	CRYPT	<i>Cryptantha</i>	0-1	-
	coyote gourd	CUPA	<i>Cucurbita palmata</i>	0-1	-
	pricklyburr	DAIN2	<i>Datura inoxia</i>	0-1	-
	American wild carrot	DAPU3	<i>Daucus pusillus</i>	0-1	-
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	0-1	-
	Palmer's spectaclepod	DICA31	<i>Dimorphocarpa candicans</i>	0-1	-

	flatcrown buckwheat	ERDE6	<i>Eriogonum deflexum</i>	0-1	-
	miniature woollystar	ERDI2	<i>Eriastrum diffusum</i>	0-1	-
	spreading fleabane	ERDI4	<i>Erigeron divergens</i>	0-1	-
	buckwheat	ERIOG	<i>Eriogonum</i>	0-1	-
	Texas stork's bill	ERTE13	<i>Erodium texanum</i>	0-1	-
	California poppy	ESCAM	<i>Eschscholzia californica ssp. mexicana</i>	0-1	-
	Mexican fireplant	EUHE4	<i>Euphorbia heterophylla</i>	0-1	-
	hairy desertsunflower	GECA2	<i>Geraea canescens</i>	0-1	-
	Arizona poppy	KAGR	<i>Kallstroemia grandiflora</i>	0-1	-
	Gordon's bladderpod	LEGO	<i>Lesquerella gordonii</i>	0-1	-
	shaggyfruit pepperweed	LELA	<i>Lepidium lasiocarpum</i>	0-1	-
	coastal bird's-foot trefoil	LOSAB	<i>Lotus salsuginosus var. brevivexillus</i>	0-1	-
	Coulter's lupine	LUSP2	<i>Lupinus sparsiflorus</i>	0-1	-
	green carpetweed	MOVE	<i>Mollugo verticillata</i>	0-1	-
	evening primrose	OENOT	<i>Oenothera</i>	0-1	-
	combseed	PECTO	<i>Pectocarya</i>	0-1	-
	manybristle chinchweed	PEPA2	<i>Pectis papposa</i>	0-1	-
	phacelia	PHACE	<i>Phacelia</i>	0-1	-
	slimjim bean	PHFI3	<i>Phaseolus filiformis</i>	0-1	-
	Arizona popcornflower	PLAR	<i>Plagiobothrys arizonicus</i>	0-1	-
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	0-1	-
	purslane	PORTU	<i>Portulaca</i>	0-1	-
	doubleclaw	PRPA2	<i>Proboscidea parviflora</i>	0-1	-
	twinleaf senna	SEBA3	<i>Senna bauhinioides</i>	0-1	-
	Coues' cassia	SECO10	<i>Senna covesii</i>	0-1	-
	ragwort	SENEC	<i>Senecio</i>	0-1	-
	sleepy silene	SIAN2	<i>Silene antirrhina</i>	0-1	-
	Coulter's globemallow	SPCO2	<i>Sphaeralcea coulteri</i>	0-1	-
	brownplume wirelettuce	STPA4	<i>Stephanomeria pauciflora</i>	0-1	-
	woolly tidestromia	TILA2	<i>Tidestromia lanuginosa</i>	0-1	-
Tree					
8				62-112	
	yellow paloverde	PAMI5	<i>Parkinsonia microphylla</i>	34-56	-
	desert ironwood	OLTE	<i>Olneya tesota</i>	11-22	-
	blue paloverde	PAFL6	<i>Parkinsonia florida</i>	11-22	-
	honey mesquite	PRGLG	<i>Prosopis glandulosa var. glandulosa</i>	6-11	-
Shrub/Vine					
9				34-73	
	spiny hackberry	CEEH	<i>Celtis ehrenbergiana</i>	17-39	-
	catclaw acacia	ACGR	<i>Acacia greggii</i>	11-22	-
	water jacket	LYAN	<i>Lycium andersonii</i>	6-11	-
10				0-34	

	creosote bush	LATRT	<i>Larrea tridentata</i> var. <i>tridentata</i>	6–17	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	0–9	–
	longleaf jointfir	EPTR	<i>Ephedra trifurca</i>	0–8	–
11				11–34	
	burrobrush	HYSA	<i>Hymenoclea salsola</i>	6–15	–
	triangle bur ragweed	AMDE4	<i>Ambrosia deltoidea</i>	6–13	–
	whitestem paperflower	PSCO2	<i>Psilostrophe cooperi</i>	1–6	–
	burweed	ISTE2	<i>Isocoma tenuisecta</i>	1–2	–
12				34–73	
	shortleaf baccharis	BABR	<i>Baccharis brachyphylla</i>	17–28	–
	brittlebush	ENFA	<i>Encelia farinosa</i>	11–17	–
	desert zinnia	ZIAC	<i>Zinnia acerosa</i>	11–17	–
	toothleaf goldeneye	VIDE3	<i>Viguiera dentata</i>	1–6	–
	fairyduster	CAER	<i>Calliandra eriophylla</i>	1–6	–
	Thurber's penstemon	PETH3	<i>Penstemon thurberi</i>	1–2	–
13				6–45	
	slender janusia	JAGR	<i>Janusia gracilis</i>	3–6	–
	slender poreleaf	POGR5	<i>Porophyllum gracile</i>	3–6	–
	littleleaf ratany	KRER	<i>Krameria erecta</i>	3–6	–
	jojoba	SICH	<i>Simmondsia chinensis</i>	1–2	–
	Jerusalem thorn	PAAC3	<i>Parkinsonia aculeata</i>	1–2	–
	beloperone	JUCA8	<i>Justicia californica</i>	1–2	–
	whitethorn acacia	ACCO2	<i>Acacia constricta</i>	1–2	–
	ambrosia leaf bur ragweed	AMAM2	<i>Ambrosia ambrosioides</i>	1–2	–
	Thurber's desert honeysuckle	ANTH2	<i>Anisacanthus thurberi</i>	1–2	–
	Coulter's brickellbush	BRCO	<i>Brickellia coulteri</i>	1–2	–
	ocotillo	FOSP2	<i>Fouquieria splendens</i>	1–2	–
	hollywood	GUSA	<i>Guaiacum sanctum</i>	1–2	–
	sangre de cristo	JACA2	<i>Jatropha cardiophylla</i>	0–1	–
	San Felipe dogweed	ADPO	<i>Adenophyllum porophylloides</i>	0–1	–
	American threefold	TRCA8	<i>Trixis californica</i>	0–1	–
	soaptree yucca	YUEL	<i>Yucca elata</i>	0–1	–
	lotebush	ZIOB	<i>Ziziphus obtusifolia</i>	0–1	–
	desert-thorn	LYCIU	<i>Lycium</i>	0–1	–
	Arizona desert-thorn	LYEX	<i>Lycium exsertum</i>	0–1	–
14				6–34	
	Engelmann's hedgehog cactus	ECEN	<i>Echinocereus engelmannii</i>	1–2	–
	candy barrelcactus	FEWI	<i>Ferocactus wislizeni</i>	1–2	–
	limestone adderstongue	OPEN	<i>Ophioglossum engelmannii</i>	0–1	–

Animal community

The plant community on this site is suitable for grazing by all classes of cattle in any season. Forage species grow year round with available moisture. Shallow rooted grasses are severely affected by drought on this site. Management should be designed to maintain deeper rooted grasses like bush muhly, and black grama and palatable shrubs like fourwing saltbush, shortleaf baccharis, desert zinnia, and goldeneye on the site. The plant community on this site provides adequate nutrition for livestock throughout the year.

Water developments are very important to wildlife species on this site. This site is a host to a great variety of burrowing, desert mammals, and reptiles. Vegetation structure, cover and forage diversity are very good on this site and allow for diverse wildlife including the large mammals.

Type locality

Location 1: Pima County, AZ	
Township/Range/Section	T8S R12E S8
General legal description	Tucson Field Office - Tom Mix Highway ROW
Location 2: Pima County, AZ	
Township/Range/Section	T15S R6E S15
General legal description	Sells Field Office - Shuck Toak Dist.

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)	Dave Womack, Dan Robinett, Emilio Carrillo
Contact for lead author	NRCS Tucson Area Office
Date	03/08/2005
Approved by	S. Cassady
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- Number and extent of rills:** None present due to high infiltration rates.

- Presence of water flow patterns:** Water flow patterns are uncommon due to high infiltration rates.

- Number and height of erosional pedestals or terracettes:** All shrubs have symmetrical mounds 2-5 inches tall formed by combined action of splash, erosion and rodents. There are no pedestals on rock or gravel fragments and no terracettes are present.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 50-60%
-
5. **Number of gullies and erosion associated with gullies:** noen
-
6. **Extent of wind scoured, blowouts and/or depositional areas:** Minor evidence of soil movement by wind.
-
7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter can move by wind. Woody litter remains under shrub canopies.
-
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface resistance to erosion is good under shrub canopies to moderate in interspaces due to high infiltration rates.
-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Weak thin platy to single grain; 7.5-10YR5/6 dry, 7.5-10YR4/4 Moist, to 18 inches thick.
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Canopy 15-25%. Herbaceous litter is present in some years and absent in others. Large shrubs with large coppice mounds with high infiltration rates. Subshrubs with small mounds with high infiltration rates.
-
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None
-
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 grass = shrubs & trees > winter annuals > summer annuals > succulents = perennial forbs
- Sub-dominant:
- Other:
- Additional:
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** 0-50% canopy mortality, 90-100% mortality on perennial grasses.

14. **Average percent litter cover (%) and depth (in):** Herbaceous litter is not persistent on the site.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 554 lbs/ac unfavorable precipitation; 650 lbs/ac normal precipitation; 747 lbs/ac favorable precipitation

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:** triangle bursage, white brittlebush, borroweed, bufflegress

17. **Perennial plant reproductive capability:** Not impaired for shrubs, drought impaired for perennial grasses and forbs.
