

Ecological site R081BY348TX

Steep Adobe

23-31 PZ

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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.

MLRA notes

Major Land Resource Area (MLRA): 081B—Edwards Plateau, Central Part

This area is entirely in south-central Texas. It makes up about 11,125 square miles (28,825 square kilometers). The towns of Fredericksburg, Junction, Menard, Rocksprings, and Sonora are in this MLRA. Interstate 10 crosses the middle part of the area. A few State parks and State historic sites are in this MLRA.

Classification relationships

USDA-Natural Resources Conservation Service, 2006. -Major Land Resource Area (MLRA) 81B

Ecological site concept

Steep Adobe sites are located on uplands with greater than 20 percent slope. They have soils less than 20 inches deep over the Glenrose Formation.

Associated sites

R081BY320TX	Adobe 23-31 PZ The Adobe site are on slopes less than 20 percent.
R081BY328TX	Deep Redland 23-31 PZ The Deep Redland site has deeper soils on slopes less than 20 percent with red subsoil and Post oak trees.
R081BY340TX	Redland 23-31 PZ The Redland site has slopes less than 20 percent with red subsoil and Post oak trees.

Similar sites

R081BY350TX	Steep Rocky 23-31 PZ The Steep Rocky site has the same slopes but has more gravels, cobbles, and stones on the surface and in the soil.
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R081BY320TX	Adobe 23-31 PZ The Adobe site are the same soils but on slopes less than 20 percent.
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Table 1. Dominant plant species

Tree	(1) <i>Quercus virginiana</i> (2) <i>Quercus buckleyi</i>
Shrub	Not specified
Herbaceous	(1) <i>Schizachyrium scoparium</i> (2) <i>Sorghastrum nutans</i>

Physiographic features

The Steep Adobe site is found on steep upland ridges and foothills. Slopes are complex and range from 20 to 50 percent. This site is found primarily along the base of limestone hills that slope toward rivers or larger permanent or ephemeral creeks. Areas are irregular in shape and range from a few to several hundred acres. Runoff is medium to high and the potential erosion is high. The elevation ranges from 1,000 to 2,500 feet.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Ridge
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	310 – 760 m
Slope	20 – 50 %
Aspect	Aspect is not a significant factor

Climatic features

The climate in the MLRA 81B is subtropical subhumid on the eastern portion and subtropical steppe on the western portion of the MLRA. Winters are dry, and the summers are hot and humid. The precipitation increases from west to east and the temperatures increase from north to south. The area usually receives 65 to 70 percent sunshine each year. The majority of the rainfall occurs during the warm months of April to October. Most precipitation comes from thunderstorms that vary in the amount of water received and the areas covered. Spring is characterized by fluctuating patterns, but mild temperatures prevail. July and August are relatively dry and hot with little weather variability day-to-day. As summer progresses through fall, an increase of precipitation usually occurs in the eastern portions while a decrease of precipitation occurs to the west. Winter temperatures are mild, but polar Canadian air masses bring rapid drops in temperature. These cold spells last 2 or 3 days. Prevailing winds are southerly with March and April the windiest months.

Table 3 Representative climatic features

Frost-free period (characteristic range)	210-270 days
Freeze-free period (characteristic range)	240-290 days
Precipitation total (characteristic range)	640-710 mm
Frost-free period (actual range)	210-270 days
Freeze-free period (actual range)	240-290 days
Precipitation total (actual range)	610-760 mm
Frost-free period (average)	230 days
Freeze-free period (average)	270 days
Precipitation total (average)	690 mm

- (1) BRADY [USC00411017], Brady, TX
- (2) EDEN [USC00412741], Eden, TX
- (3) FREDERICKSBURG [USC00413329], Fredericksburg, TX
- (4) FT MCKAVETT [USC00413257], Fort Mc Kavett, TX
- (5) HUNT 10 W [USC00414375], Hunt, TX
- (6) JUNCTION KIMBLE CO AP [USW00013973], Junction, TX
- (7) JUNCTION 4SSW [USC00414670], Junction, TX
- (8) MENARD [USC00415822], Menard, TX
- (9) ROCKSPRINGS 1S [USC00417706], Rocksprings, TX
- (10) SAN SABA [USC00417992], San Saba, TX

Influencing water features

This is an upland site and is not influenced by water from a wetland or stream.

Wetland description

N/A

Soil features

The soils are very shallow, shallow, and moderately deep on steep upland ridges and foothills. They are moderately alkaline grayish brown gravelly clay loam to pale brown gravelly loam, 8 to 40 inches deep. Underlying layers vary from weakly cemented platy limestone that becomes chalky and marly with depth to weakly cemented limestone fragments to very pale clay loam that has rock-like structure. These soils have low natural fertility. They are well drained. Permeability is moderate and water capacity is very low. The root zone is shallow. The hazard of water erosion is severe, and the hazard of soil blowing is moderate. The soils are not suitable for cultivation. Soil series correlated to this site include: Brackett, Kerrville, Real, and Stilskin.

Table 4. Representative soil features

Parent material	(1) Residuum – limestone
Surface texture	(1) Gravelly loam (2) Gravelly clay loam
Family particle size	(1) Loamy-skeletal (2) Loamy
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	20 – 100 cm
Soil depth	20 – 100 cm
Surface fragment cover <=3"	0 – 30 %
Surface fragment cover >3"	0 – 30 %
Available water capacity (0-101.6cm)	1.52 – 10.92 cm
Calcium carbonate equivalent (0-101.6cm)	40 – 90 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 8.4

Subsurface fragment volume <=3" (10.2-101.6cm)	10 – 50 %
Subsurface fragment volume >3" (10.2-101.6cm)	0 – 20 %

Table 5. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Slow to moderate
Depth to restrictive layer	Not specified
Soil depth	Not specified
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	Not specified
Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	Not specified

Subsurface fragment volume <=3" (10.2-101.6cm)	Not specified
Subsurface fragment volume >3" (10.2-101.6cm)	Not specified

Ecological dynamics

The Steep Adobe site was most likely a mid and tallgrass savannah. Slope and geologic structure has a strong influence on the composition of the plant community. Slopes below about 20 percent, usually with deeper soils and more soil moisture, normally produced more grass cover. The higher production was not only valuable for forage and erosion control but provided fuel for periodic fires. Caused by lightning or set by Native Americans, fire helped keep the woody species suppressed. Slopes ranging from 20 to 50 percent tended to be rockier, drouhtier, less productive and more varied in topography, thus experiencing less intensive and spottier fires. This created a more mosaic pattern of herbaceous and woody vegetation. On average, fires occurred every 7 to 12 years.

Besides fire and climate, including extended periods of drought, grazing greatly influenced the plant community. Although preferring more open country, resident herds of pronghorn could forage on the lower, flatter slopes. Populations of white-tailed deer made use of the browse and forbs available. Bison grazing was intermittent. The large resident herds ranged to the north and west, but the area was visited periodically by bison when conditions were favorable. Furbearers, quail, dove, and songbirds fed on seeds and fruit produced, as did Rio Grande turkey. This interaction between herbivores and plants helped maintain the reference community.

Extremes in climate exerted tremendous influence on the site long before European man arrived. Geologic formations, archeological findings and rainfall records since the mid-1900's show wide variations in precipitation, with cycles of long, dry periods going back thousands of years. Reference community plants developed ways to withstand periods of drought. The grasses and forbs shaded the ground, reduced soil temperature, improved infiltration and maintained soil moisture. Roots of midgrass, tallgrass, and perennial forbs reached deeper into the soil, utilizing deep soil moisture no longer available to short-rooted plants. In extreme periods of drought, many species could go virtually dormant, preserving the energy stored in underground bases and roots until wetter weather arrived. Their seeds could stay viable in the soil for long periods, sprouting when conditions improved.

While periodic grazing is a natural component of this ecosystem, overstocking and thus overgrazing by domesticated animals has had a tremendous impact. Arriving in numbers in the 1840's and 50's, most early settlers were accustomed to ranching in more temperate zones of the eastern United States or even Europe and misjudged the capacity of the site for sustainable production, expecting more than the land could deliver. Overgrazing, usually in the form of heavy continuous grazing by cattle, sheep, and goats, and fire suppression disrupted ecological processes that took hundreds or thousands of years to develop. Instead of grazing and moving on, domestic livestock was present on the site most of the time. Steep Adobe is often in close proximity to streams and so was particularly hard-hit by livestock traveling to and from water, bedding down, or just being held close to water during roundups. The arrival of barbed wire fencing in the late 1870's could have been used as a conservation tool, but for the most part, was just used to contain livestock. Another influence on grazing patterns was the advent of windmills during the same period. The windmills allowed large areas to be grazed that were previously unused by livestock due to lack of natural surface water.

As cattle fed primarily on grasses and the forbs and browse were prime forage for sheep, goats, and deer, the more palatable plants such as little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorghastrum nutans*), cane bluestem (*Bothriochloa barbinodis*), sideoats grama (*Bouteloua curtipendula*), awnless bushsunflower (*Simsia calva*) and orange zexmenia (*Wedelia hispida*) were selected repeatedly and eventually began to disappear. These were replaced by lower successional, less palatable and productive species such as slim tridens (*Tridens muticus*), silver bluestem (*Bothriochloa laguroides* ssp. *torreyana*), hairy grama (*Bouteloua hirsuta*), Wright's three-awn (*Aristida purpurea* var. *purpurea*), Queen's delight (*Stillingia sylvatica* ssp. *sylvatica*), and annual forbs. As overgrazing continued, overall production of grasses and forbs declined, more bare ground appeared, soil erosion increased and woody and succulent increasers such as Texas oak (*Quercus buckleyi*), Ashe juniper (*Juniperus ashei*), cenizo (*Leucophyllum frutescens*), agarito (*Mahonia trifoliolata*), yucca (*Yucca* spp.), catclaw mimosa (*Mimosa biuncifera*), catclaw acacia (*Acacia greggii*), and mesquite (*Prosopis glandulosa*) began to multiply. The elimination of fire due to the lack of fine fuel or by human interference assisted the rapid encroachment by herbaceous and woody increasers/invasers with a concurrent reduction of usable forage and growing danger from toxic plants.

State and transition model

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Grass/Grasslike					
1	Tallgrass			465-869	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	465-869	–
2	Tallgrass			95-280	
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	95-280	–
3	Midgrasses			185-448	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	185-448	–
	silver beardgrass	BOLAT	<i>Bothriochloa laguroides ssp. torreyana</i>	185-448	–
	plains lovegrass	ERIN	<i>Eragrostis intermedia</i>	185-448	–
	green sprangletop	LEDU	<i>Leptochloa dubia</i>	185-448	–
	composite dropseed	SPCOC2	<i>Sporobolus compositus var. compositus</i>	185-448	–
	dropseed	SPORO	<i>Sporobolus</i>	185-448	–
4	Midgrasses			39-151	
	tall grama	BOHIP	<i>Bouteloua hirsuta var. pectinata</i>	39-146	–
	Drummond's dropseed	SPCOD3	<i>Sporobolus compositus var. drummondii</i>	39-146	–
5	Midgrasses			39-146	
	hairy grama	BOHIH	<i>Bouteloua hirsuta var. hirsuta</i>	39-146	–
	muhly	MUIN	<i>Muhlenbergia ×involuta</i>	39-146	–
	Lindheimer's muhly	MULI	<i>Muhlenbergia lindheimeri</i>	39-146	–
	seep muhly	MURE2	<i>Muhlenbergia reverchonii</i>	39-146	–
6	Midgrasses			39-146	
	threeawn	ARIST	<i>Aristida</i>	39-146	–
	Wright's threeawn	ARPUW	<i>Aristida purpurea var. wrightii</i>	39-146	–
	fall witchgrass	DICO6	<i>Digitaria cognata</i>	39-146	–
	slim tridens	TRMU	<i>Tridens muticus</i>	39-146	–
	slim tridens	TRMUE	<i>Tridens muticus var. elongatus</i>	39-146	–
7	Cool Season Grasses			39-146	
	cedar sedge	CAPL3	<i>Carex planostachys</i>	39-146	–
	Texas wintergrass	NALE3	<i>Nassella leucotricha</i>	39-146	–
8	Shortgrasses			6-39	
	Grass, annual	2GA	<i>Grass, annual</i>	6-39	–
	red grama	BOTR2	<i>Bouteloua trifida</i>	6-39	–
	hairy woollygrass	ERPI5	<i>Erioneuron pilosum</i>	6-39	–
Forb					
9	Forbs			56-146	
	velvet bundleflower	DEVE2	<i>Desmanthus velutinus</i>	56-146	–
	Engelmann's daisy	ENPE4	<i>Engelmannia peristenia</i>	56-146	–
	milkpea	GALAC	<i>Galactia</i>	56-146	–
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	56-146	–
	Chalk Hill hymenopappus	HYTE2	<i>Hymenopappus tenuifolius</i>	56-146	–
	trailing krameria	KRLA	<i>Krameria lanceolata</i>	56-146	–
	dotted blazing star	LIPU	<i>Liatris punctata</i>	56-146	–
	hoary blackfoot	MECIH	<i>Melampodium cinereum var. hirtellum</i>	56-146	–
	showy menodora	MELO2	<i>Menodora longiflora</i>	56-146	–
	Nuttall's sensitive-briar	MINU6	<i>Mimosa nuttallii</i>	56-146	–
	smartweed leaf-flower	PHPO3	<i>Phyllanthus polygonoides</i>	56-146	–

	awnless bushsunflower	SICA7	<i>Simsia calva</i>	56-146	–
	queen's-delight	STSY	<i>Stillingia sylvatica</i>	56-146	–
	creepingoxeye	WEDEL	<i>Wedelia</i>	56-146	–
10	Annual Forbs			6-34	
	Forb, annual	2FA	<i>Forb, annual</i>	6-34	–
Shrub/Vine					
11	Shrubs/Vines			56-146	
	Texas kidneywood	EYTE	<i>Eysenhardtia texana</i>	56-146	–
	stretchberry	FOPU2	<i>Forestiera pubescens</i>	56-146	–
	Texas barometer bush	LEFR3	<i>Leucophyllum frutescens</i>	56-146	–
	winged sumac	RHCO	<i>Rhus copallinum</i>	56-146	–
	littleleaf sumac	RHMI3	<i>Rhus microphylla</i>	56-146	–
	evergreen sumac	RHVI3	<i>Rhus virens</i>	56-146	–
	bully	SIDER2	<i>Sideroxylon</i>	56-146	–
Tree					
12	Trees			95-426	
	Texas madrone	ARXA80	<i>Arbutus xalapensis</i>	95-426	–
	Texas redbud	CECAT	<i>Cercis canadensis var. texensis</i>	95-426	–
	littleleaf leadtree	LERE5	<i>Leucaena retusa</i>	95-426	–
	Texas red oak	QUBU2	<i>Quercus buckleyi</i>	95-426	–
	Lacey oak	QULA	<i>Quercus laceyi</i>	95-426	–
	live oak	QUVI	<i>Quercus virginiana</i>	95-426	–
	blackhaw	VIPR	<i>Viburnum prunifolium</i>	95-426	–
13	Tree			11-22	
	Ashe's juniper	JUAS	<i>Juniperus ashei</i>	11-22	–

Table 7. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Animal community

This site is used to produce domestic livestock and to provide habitat for native wildlife. Cow-calf operations are the primary livestock enterprise, although stocker cattle are also grazed. Sheep, Angora goats, and Spanish goats were formerly raised in large numbers. Sheep are still present in reduced numbers, while meat goats are now present in fairly high numbers. Boer goats have been introduced, either purebred or crossed with Spanish goats, to obtain a larger meat animal. Reports indicate that Boers do not browse as heavily as earlier breeds. Sustainable stocking rates have declined drastically over the past 100 years due to deterioration of the reference plant community. An assessment of vegetation is needed to determine the site's current carrying capacity. Calculations used to determine livestock stocking rate should be based on forage production remaining after determining use by resident wildlife, then refined by frequent careful observation of the plant community's response to animal foraging. A large diversity of wildlife is native to this site. In the reference plant community, migrating bison, grazing primarily during wetter periods, pronghorn, white-tailed deer and turkey were the more predominant herbivore species. With the subsequent transformation of the plant community, due primarily to the influence of man and climate change, the kind and proportion of wildlife species have been altered. Except for a few domestic herds, bison have been eliminated. With the eradication of the screwworm fly, increase in woody vegetation and man-suppressed natural predation, deer numbers have increased and are often in excess of carrying capacity. Where deer numbers are excessive, overbrowsing and overuse of preferred forbs causes deterioration of the plant community. Progressive management of deer populations through hunting can keep populations in balance and provide an economically important ranching enterprise. Achieving a balance between brushy cover and more open plant communities on this and adjacent sites is important to deer management. Competition among deer, sheep, and goats must be a consideration in livestock and wildlife management to prevent damage to the plant community. Various species of exotic wildlife have been introduced on the site, including deer such as axis, sika, fallow, and red; antelope such as sable, oryx, blackbuck, and nilgai, and sheep such as barbados (mouflon) and aoudad with various degrees of success. Their numbers must be included along with livestock

and native wildlife, primarily white-tailed deer, in any management plan. Feral hogs may feed on the site. They can be damaging to the plant community if their numbers are not managed. Smaller mammals include many kinds of rodents, jackrabbit, cottontail, raccoon, ringtail, skunk, and armadillo. Mammalian predators include coyote, red fox, gray fox, bobcat, and mountain lion. Wolves were common in earlier times, bears resided in some areas, and an occasional jaguar or ocelot was encountered. Many species of snakes and lizards are native to the site. Many species of birds are found on this site including game birds, songbirds, and birds of prey. Major game birds that are economically important are turkey, bobwhite quail, scaled (blue) quail and mourning dove. Turkeys prefer plant communities with substantial amounts of shrubs and trees interspersed with grassland. Quail prefer a combination of low shrubs, bunch grass (critical for nesting cover), bare ground, and low successional forbs. The different species of songbirds vary in their habitat preferences. Habitat on this site that provides a large diversity of grasses, forbs, and shrubs will support a good variety and abundance of songbirds. Birds of prey are important to keep the numbers of rodents, rabbits, and snakes in balance. Different species of raptors benefit from a diverse plant community as well.

Hydrological functions

The soils on this site are well drained with slow/very slow permeability and low/very low water holding capacity. Combined with the slopes of the site, they experience very rapid surface runoff. Water erosion potential is severe. The existing plant community and its management are essential to the hydrological function of this site. The water cycle functions most effectively when mid and tall bunchgrasses dominate. This condition promotes good soil structure, high organic matter, good porosity and rapid infiltration of water into the soil. Water that does run off will be high quality and erosion and sedimentation will be low. Loss or reduction of mid and tallgrasses, most frequently through heavy grazing, impairs the water cycle. Ground cover is poor, organic matter is low, soil structure breaks down and the surface becomes capped. Infiltration decreases and runoff increases. Erosion and sedimentation are accelerated. Given the excessive slopes of the site, in this condition it can contribute to increased frequency and flooding within a watershed yet remain droughty between heavy rainfall events.

Recreational uses

With its rugged landscape and diverse foliage the site can be quite scenic, particularly in the fall. Many plants native to the site, such as Texas oak, have been incorporated into home or park landscapes. The site supports a wide variety of wildlife. The area is heavily used for hunting various native and introduced game animals and birds. Other popular uses are hiking, birding, photography, and related eco-tourism enterprises.

Wood products

Oaks and Ashe juniper may be used for fencing, firewood, or in the specialty wood industry. Oils can be extracted from Ashe juniper for commercial uses.

Inventory data references

Information presented here is derived from literature, limited NRCS clipping data (417s), field observations, and personal contacts with range-trained personnel.

Other references

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Approval

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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.

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Date	12/02/2005
Approved by	
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 are common and follow old stream meanders. Deposition or erosion is uncommon for normal rainfall but may occur during intense rainfall events.

3. **Number and height of erosional pedestals or terracettes:** Pedestals or terracettes would have been uncommon for this site when occupied by the natural reference plant community.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Expect no more than 40 percent bare ground randomly distributed throughout.

5. **Number of gullies and erosion associated with gullies:** Some gullies may be present on side drains into perennial and intermittent streams. Gullies should be vegetated and stable.

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

7. Amount of litter movement (describe size and distance expected to travel): Under normal rainfall, little litter movement should be minimal and short; however, litter of all sizes may move long distances.

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values): Soil surface under reference conditions is not resistant to erosion. Available water capacity is low. Severe water erosion hazard is expected.

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Soils are 0 to 6 inches of light, yellowish-brown clay with a moderate fine subangular blocky structure. Limestone bedrock occurs at 10 to 20 inches. SOM is approximately 1 to 6 percent.

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: The savannah of tallgrasses, midgrasses, and forbs having adequate litter and little bare ground can provide for maximum infiltration and little runoff under normal rainfall events.

11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): No evidence of compaction.

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

Dominant:

Sub-dominant: Warm-season tallgrasses Warm-season midgrasses Warm-season shortgrasses Cool-season grasses Forbs Shrubs Trees

Other:

Additional:

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): Minimal and mortality or decadence is expected.

14. Average percent litter cover (%) and depth (in):

15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production): 1,000 pounds per acre for years with below average rainfall and 3,500 pounds per acre for years with above average rainfall.

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: Ashe juniper, honey mesquite, pricklypear, bermudagrass, johnsongrass, and King Ranch bluestem.
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17. **Perennial plant reproductive capability:** All perennial plants should be capable of reproducing, except during periods of prolonged drought conditions, heavy natural herbivory, and/or extense wildfires.
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