Ecological site R086AY011TX
Southern Blackland

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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): 086A–Texas Blackland Prairie, Northern Part

MLRA 86A, The Northern Part of Texas Blackland Prairie is entirely in Texas. It makes up about 15,110 square miles (39,150 square kilometers). The cities of Austin, Dallas, San Antonio, San Marcos, Temple, and Waco are located within the boundaries. Interstate 35, a major thoroughfare for commerce and travel, traverses the length of the MLRA from San Antonio to Dallas. The area supports tall and mid-grass prairies, but improved pasture, croplands, and urban development account for the majority of the acreage.

Classification relationships

USDA-Natural Resources Conservation Service, 2006. -Major Land Resource Area (MLRA) 86A

Ecological site concept

The Blackland ecological site is a true tallgrass prairie. Reference sites show an intact grass community with small clumped dispersal of woody species. The soils are moderately deep to very deep, richly black in color, and characterized by their shrink-swell nature. The sites are widely distributed across the uplands and terraces throughout the region.

Associated sites

R086AY002TX	**Southern Chalky Ridge** The Chalky Ridge site is often upslope from the Blackland. It differs from the site by having shallow soils and low soil fertility.
R086AY004TX	**Southern Claypan Prairie** The Claypan Prairie site is often adjacent to the Blackland. It differs from the site by having a fine sandy loam surface soil layer over clay subsoils.
R086AY009TX	**Southern Eroded Blackland** The Eroded Blackland site is often adjacent to the Blackland site. It differs from the site by having extensive erosion indicated by a partial or lost A horizon, active rills and/or gullies, and lower production.
R086AY012TX	**Loamy Bottomland** The Southern Blackland site is often upslope from the Loamy Bottomland site. It differs from the Loamy Bottomland site by its position on uplands, high shrink-swell properties, and having clay soils and higher runoff.

R086AY013TX	**Clayey Bottomland** The Southern Blackland site is often upslope from the Clayey Bottomland site. It differs from the Clayey Bottomland site by its position on uplands, lack of high shrink-swell and hydric soil properties, and having clay soils and higher runoff.

Similar sites

R086AY009TX	**Southern Eroded Blackland** The Eroded Blackland site is similar to the Blackland site by having similar soil types and topography. It differs from the site by having extensive erosion indicated by a partial or lost A horizon, active rills and/or gullies, and lower production.
R086AY010TX	**Northern Blackland** The Northern Blackland site is similar to the Southern Blackland site by having similar physiographic features and representative soil features. It differs from the site by receiving more effective precipitation.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Andropogon gerardii* (2) *Tripsacum dactyloides*

Physiographic features

These are uplands and terraces with nearly level to moderate slopes. Slope gradients range from 0 to 8 percent but are usually less than 5 percent. There is no flooding or ponding with a low to high runoff, greatly depending on soil saturation and slope.

Table 2. Representative physiographic features

Landforms	(1) Plains > Terrace (2) Plains > Ridge > Gilgai
Runoff class	Low to high
Flooding frequency	None
Ponding frequency	None
Elevation	90 – 180 m

Slope	0 – 10 %
Water table depth	150 – 200 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	Not specified
Slope	0 – 10 %
Water table depth	Not specified

Climatic features

The climate for MLRA 86A is humid subtropical and is characterized by hot summers, especially in July and August, and relatively mild winters. Tropical maritime air controls the climate during spring, summer and fall. In winter and early spring, frequent surges of Polar Canadian air cause sudden drops in temperatures and add considerable variety to the daily weather. When these cold air masses stagnate and are overrun by moist air from the south, several days of cold, cloudy, and rainy weather follow. Generally, these occasional cold spells are of short duration with rapid clearing following cold frontal passages. The summer months have little variation in day-to-day weather except for occasional thunderstorms that dissipate the afternoon heat. The moderate temperatures in spring and fall are characterized by long periods of sunny skies, mild days, and cool nights. The average relative humidity in mid-afternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 75 percent of the time during the summer and 50 percent in winter. The prevailing wind direction is from the south and highest wind speeds occur during the spring months. Rainfall during the spring and summer months generally falls during thunderstorms, and fairly large amounts of rain may fall in a short time. High-intensity rains of short duration are likely to produce rapid runoff almost anytime during the year. The predominantly anticyclonic atmospheric circulation over Texas in summer and the exclusion of cold fronts from North Central Texas result in a decrease in rainfall during midsummer. The amount of rain that falls varies considerably from month-to-month and from year-to-year.

Table 4 Representative climatic features

Frost-free period (average)	240 days
Freeze-free period (average)	280 days
Precipitation total (average)	910 mm

- (1) LULING [USC00415429], Luling, TX

- (2) TAYLOR 1NW [USC00418862], Taylor, TX
- (3) TEMPLE [USC00418910], Temple, TX
- (4) CAMERON [USC00411348], Cameron, TX
- (5) CEDAR CREEK 5 S [USC00411541], Cedar Creek, TX
- (6) GRANGER DAM [USC00413686], Granger, TX
- (7) RED ROCK [USC00417497], Red Rock, TX
- (8) SAN ANTONIO INTL AP [USW00012921], San Antonio, TX
- (9) AUSTIN BERGSTROM AP [USW00013904], Austin, TX
- (10) SAN MARCOS [USC00417983], San Marcos, TX
- (11) AUSTIN-CAMP MABRY [USW00013958], Austin, TX
- (12) NEW BRAUNFELS [USC00416276], New Braunfels, TX
- (13) SAN ANTONIO 8NNE [USC00417947], San Antonio, TX
- (14) WACO DAM [USC00419417], Waco, TX

Influencing water features

The site has a water table that can exist at a depth of 60 inches in the soil profile.

Wetland description

Wetlands are not associated with this site.

Soil features

The site consists of moderately deep to very deep, moderately well to well drained soils that are slow to very slowly permeable. The upland soils formed in calcareous marl and marine sediments, high in smectitic clays. The terrace soils formed in clayey alluvial sediments. A few of the upland soils may have weathered and soft bedrock at a depth of more than 24 inches below the soil surface. The majority of this site is used for cropland due to the very deep, highly productive soils. There are some areas that are used for pasture or rangeland.

In a representative profile, the surface layer is black clay about 24 inches thick. The clay extends below 24 inches and to depths of more than 80 inches. The subsoil is clay that grades from very dark gray to light olive brown as depth increases. Available water capacity to a depth of 60 inches is moderate, and shrink swell potential is very high.

The dominant associated soil series for the Blackland ecological site includes: Barbarosa, Behring, Branyon, Burleson, Fairlie, Greenvine, Heiden, and Houston Black.

Table 5. Representative soil features

Parent material	(1) Residuum – mudstone (2) Alluvium – mudstone
Surface texture	(1) Clay (2) Gravelly clay (3) Stony clay
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Slow to very slow
Soil depth	60 – 200 cm

Surface fragment cover <=3"	0 – 40 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	12.7 – 27.94 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 60 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	5.6 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 – 30 %
Subsurface fragment volume >3" (Depth not specified)	0 – 20 %

Ecological dynamics

Introduction – The Northern Blackland Prairies are a temperate grassland ecoregion contained wholly in Texas, running from the Red River in North Texas to San Antonio in the south. The region was historically a true tallgrass prairie named after the rich dark soils it was formed in. Other vegetation included deciduous bottomland woodlands along rivers and creeks.

Background – Natural vegetation on the uplands is predominantly tall warm-season perennial bunchgrasses with lesser amounts of midgrasses. This tallgrass prairie was historically dominated by big bluestem (Andropogon gerardii), Indiangrass (Sorghastrum nutans), switchgrass (Panicum virgatum), eastern gamagrass (Tripsacum dactyloides), and little bluestem (Schizachyrium scoparium). Midgrasses such as sideoats grama (Bouteloua curtipendula), Virginia wildrye (Elymus virginicus), Florida paspalum (Paspalum floridanum), Texas wintergrass (Nassella leucotricha), hairy grama (Bouteloua hirsuta), and dropseeds (Sporobolus spp.) are also abundant in the region. A wide variety of forbs add to the diverse native plant community. Mottes of live oak (Quercus virginiana) and hackberry (Celtis spp.) trees are also native to the region. In some areas, cedar elm (Ulmus crassifolia), eastern red cedar (Juniperus virginiana), and honey locust (Gleditsia triacanthos) are abundant. In the Northern Blackland Prairie oaks (Quercus spp.) are common increasers, but in the Southern Blackland Prairie oaks are less prevalent. Junipers are common invaders, particularly in the northern part of the region.

During the first half of the nineteenth century, row crop agriculture lead to over 80 percent of the original vegetation lost. During the second half, urban development has caused even an even greater decline in the remaining prairie. Today, less than one percent of the original tallgrass prairie remains. The known remaining blocks of intact prairie range from 10 to 2,400 acres. Some areas are public, but

many are privately owned and have conservation easements.

Current State – Much of the area is classified as prime farmland and has been converted to cropland. Most areas where native prairie remains have histories of long-term management as native hay pastures. Tallgrasses remain dominant when haying of warm-season grasses is done during the dormant season or before growing points are elevated, meadows are not cut more than once, and the cut area is deferred from grazing until frost.

Due to the current-widespread farming, the Northern Blackland Prairie is still relatively free from the invasion of brush that has occurred in other parts of Texas. In contrast, many of the more sloping have experienced heavy brush encroachment, and the continued increase of brush encroachment is a concern. The shrink-swell and soil cracking characteristics of the soils favor brush species with tolerance for soil movement.

Current Management – Rangeland and pastureland are grazed primarily by beef cattle. Horse numbers are increasing rapidly in the region, and in recent years goat numbers have increased significantly. There are some areas where dairy cattle, poultry, goats, and sheep are locally important. Whitetail deer, wild turkey, bobwhite quail, and dove are the major wildlife species, and hunting leases are a major source of income for many landowners in this area.

Introduced pasture has been established on many acres of old cropland and in areas with deeper soils. Coastal bermudagrass (Cynodon dactylon) and kleingrass (Panicum coloratum) are by far the most frequently used introduced grasses for forage and hay. Hay has also been harvested from a majority of the prairie remnants, where long-term mowing at the same time of year has possibly changed the relationships of the native species. Cropland is found in the valleys, bottomlands, and deeper upland soils. Wheat (Triticum spp.), oats (Avena spp.), forage and grain sorghum (Sorghum spp.), cotton (Gossypium spp.), and corn (Zea mays) are the major crops in the region.

Fire Regimes – The prairies were a disturbance-maintained system. Prior to European settlement (pre-1825), fire and infrequent, but intense, short-duration grazing by large herbivores (mainly bison and to a lesser extent pronghorn antelope) were important natural landscape-scale disturbances that suppressed woody species and invigorated herbaceous species (Eidson and Smeins 1999). The herbaceous prairie species adapted to fire and grazing disturbances by maintaining below-ground penetrating tissues. Wright and Bailey (1982) report that there are no reliable records of fire frequency occurring in the Great Plains grasslands because there are no trees to carry fire scars from which to estimate fire frequency. Because prairie grassland is typically of level or rolling topography, a natural fire frequency of 5 to 10 years seems reasonable.

Disturbance Regimes - Precipitation patterns are highly variable. Long-term droughts, occurring three to four times per century, cause shifts in species composition by causing die-off of seedlings, less drought-tolerant species, and some woody species. Droughts also reduce biomass production and create open space, which is colonized by opportunistic species when precipitation increases. Wet periods allow tallgrasses to increase in dominance. These natural disturbances cause shifts in the states and communities of the ecological sites.

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 (%)
Grass/Grasslike					
1	**Tallgrasses**			2242-3923	
	big bluestem	ANGE	*Andropogon gerardii*	560-3082	–
	eastern gamagrass	TRDA3	*Tripsacum dactyloides*	560-3082	–
	switchgrass	PAVI2	*Panicum virgatum*	280-1961	–
	Indiangrass	SONU2	*Sorghastrum nutans*	280-1961	–
	little bluestem	SCSC	*Schizachyrium scoparium*	280-1793	–
	Florida paspalum	PAFL4	*Paspalum floridanum*	280-1233	–
2	**Tall/Midgrasses**			1345-2354	
	sideoats grama	BOCU	*Bouteloua curtipendula*	224-1793	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	112-1233	–
	Virginia wildrye	ELVI3	*Elymus virginicus*	112-1233	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	56-897	–
	Texas cupgrass	ERSE5	*Eriochloa sericea*	56-897	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	56-897	–

	Texas wintergrass	NALE3	*Nassella leucotricha*	112-897	–
	panicgrass	PANIC	*Panicum*	56-897	–
	vine mesquite	PAOB	*Panicum obtusum*	56-897	–
	marsh bristlegrass	SEPA10	*Setaria parviflora*	56-897	–
	Drummond's dropseed	SPCOD3	*Sporobolus compositus var. drummondii*	56-897	–
	Silveus' dropseed	SPSI2	*Sporobolus silveanus*	56-897	–
	white tridens	TRAL2	*Tridens albescens*	56-897	–
	longspike tridens	TRST2	*Tridens strictus*	56-897	–
	sedge	CAREX	*Carex*	56-897	–
	cylinder jointtail grass	COCY	*Coelorachis cylindrica*	56-897	–
	fall witchgrass	DICO6	*Digitaria cognata*	56-897	–
	purple threeawn	ARPU9	*Aristida purpurea*	56-897	–
Forb					
3	**Forbs**			673-1177	
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	0-1009	–
	beardtongue	PENST	*Penstemon*	0-1009	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	0-1009	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	0-1009	–
	button eryngo	ERYU	*Eryngium yuccifolium*	0-1009	–
	prairie clover	DALEA	*Dalea*	0-841	–
	larkspur	DELPH	*Delphinium*	0-841	–
	bundleflower	DESMA	*Desmanthus*	0-841	–
	ticktrefoil	DESMO	*Desmodium*	0-841	–
	prairie acacia	ACANH	*Acacia angustissima var. hirta*	0-841	–
	yellow sundrops	CASE12	*Calylophus serrulatus*	0-841	–
	Indian paintbrush	CASTI2	*Castilleja*	0-841	–
	American star-thistle	CEAM2	*Centaurea americana*	0-841	–
	partridge pea	CHFA2	*Chamaecrista fasciculata*	0-841	–
	coastal indigo	INMI	*Indigofera miniata*	0-841	–
	dotted blazing star	LIPU	*Liatris punctata*	0-841	–
	sensitive plant	MIMOS	*Mimosa*	0-841	–
	yellow puff	NELU2	*Neptunia lutea*	0-841	–
	beeblossom	GAURA	*Gaura*	0-841	–
	vetch	VICIA	*Vicia*	0-841	–
	scurfpea	PSORA2	*Psoralidium*	0-841	–
	snoutbean	RHYNC2	*Rhynchosia*	0-841	–
	fuzzybean	STROP	*Strophostyles*	0-841	–
	vervain	VERBE	*Verbena*	0-560	–
	skullcap	SCUTE	*Scutellaria*	0-560	–
	prairie parsley	POLYT	*Polytaenia*	0-560	–
	Chalk Hill hymenopappus	HYTE2	*Hymenopappus tenuifolius*	0-560	–
	croton	CROTO	*Croton*	0-560	–
	ragweed	AMBRO	*Ambrosia*	0-560	–
	milkweed	ASCLE	*Asclepias*	0-560	–
	purple poppymallow	CAIN2	*Callirhoe involucrata*	0-560	–
	snow on the prairie	EUBI2	*Euphorbia bicolor*	0-560	–

Shrub/Vine					
4	**Shrubs and Trees**			224-392	
	live oak	QUVI	*Quercus virginiana*	0-392	–
	elm	ULMUS	*Ulmus*	0-336	–
	common hackberry	CEOC	*Celtis occidentalis*	0-336	–
	gum bully	SILA20	*Sideroxylon lanuginosum*	0-196	–
	coralberry	SYOR	*Symphoricarpos orbiculatus*	0-196	–

Table 7. Community 1.2 plant community composition

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

Table 8. Community 2.1 plant community composition

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

Table 9. Community 2.2 plant community composition

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

Table 10. Community 2.3 plant community composition

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

Table 11. Community 3.1 plant community composition

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

Table 12. Community 3.2 plant community composition

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

Animal community

The animal community in the Blackland differs depending on what state the site is currently in. Northern Bobwhite prefer the reference state. They require dense bunchgrasses for nesting and cover. As the site transitions into State 2, white-tailed deer will become more prevalent. Deer are woodland and edge species, with their primary diet consisting of browse. Mourning dove need open areas with semi-clear ground and forbs with desirable seed sources. Go-back land and communities with shortgrasses and forbs provide the best habitat for dove.

Hydrological functions

Rills and gullies are rare in the reference state. This site has potential for gullies to heal when in functioning condition. Drainage ways should be vegetated and stable. Water flow patterns are very short (less than two feet) if visible. Pedestals or terracettes do not occur in the reference community. Bare ground is essentially non-existent. Soils on this site are permeable when dry, infiltration is rapid, and runoff is slight. When soils are wet and have sealed over, soils are impermeable, infiltration is slow to very slow, and runoff is likely. Soils on this site have high shrink-swell values. This site has slowly permeable soils. Due to density of vegetation, even on sloping sites, small to medium-sized litter will move very little during intense storms. The soil surface under reference conditions is highly resistant to erosion; the soil stability class range is expected to be 6. This prairie site is dominated by tallgrasses and forbs having adequate litter and little bare ground which can provide for maximum infiltration and little runoff under normal rainfall events. The nearly level areas have a microrelief of knolls and depressions called gilgai. Sloping soils also have gilgai, which create microridges and valleys extending up and down the slopes. Soil erosion is very low if the tall grasses and the water trapping gilgai are present. Gilgai develops pools of standing water during wet weather. As much as six inches of water can be temporarily trapped in these gilgai microreliefs before runoff begins.

Recreational uses

Recreational uses include recreational hunting, hiking, camping, equestrian, and bird watching.

Wood products

Honey mesquite, eastern red cedar, and some oak are used for posts, firewood, charcoal, and other specialty wood products.

Other products

Jams and jellies are made from many fruit-bearing species, such as agarito. Seeds are harvested from many reference plants for commercial sale. Many grasses and forbs are harvested by the dried-plant industry for sale in dried flower arrangements. Honeybees are utilized to harvest honey from many flowering plants.

Inventory data references

These site descriptions were developed as part a Provisional Ecological Site project using historic soil survey manuscripts, available site descriptions, and low intensity field traverse sampling. Future work to validate the information is needed. This will include field activities to collect low, medium, and high-intensity sampling, soil correlations, and analysis of that data. A final field review, peer review, quality control, and quality assurance review of the will be needed to produce the final document.

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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	05/01/2008
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** **None**

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2. **Presence of water flow patterns:** **Some water flow patterns are normal for this site due to landscape position and slope but should be vegetated and stable. Water flow patterns are very short (less than two feet) if visible.**

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3. **Number and height of erosional pedestals or terracettes:** **None.**

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

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5. **Number of gullies and erosion associated with gullies:** **No gullies should be present. Drainage ways should be stable and covered with vegetation.**

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

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7. **Amount of litter movement (describe size and distance expected to travel):** This site has slowly permeable soils. On sloping sites, small to medium-size litter will move short distances during intense storms.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface is resistant to erosion. Stability class range is expected to be 5 to 6.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface is greater than 60 inches in depth. Colors range from black to very dark brown and moderately fine to medium subangular blocky structure. SOM is 1 to 3 percent.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** This prairie site is dominated by tallgrasses and forbs having adequate litter and little bare ground which can provide for maximum infiltration and little runoff under normal rainfall events.

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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: Warm-season tallgrasses >>

    Sub-dominant: Warm-season midgrasses > Forbs

    Other: Cool-season grasses > Trees > Shrubs/Vines

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Grasses and forbs due to their growth habit will exhibit some mortality and decadence, though very slight. Open spaces from disturbance are quickly filled by new plants through seedlings and reproductive reproduction (tillering).

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 4,000 pounds per acre for below average moisture to 7,000 pounds per acre for above average moisture.

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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: Potential invasives for this site include yellow bluestems, Bermudagrass, mesquite, elm, huisache and eastern red cedar.**

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17. **Perennial plant reproductive capability: All perennial plants should be capable of producing except during periods of prolonged drought conditions, heavy natural herbivory and intense wildfires.**
