USDA Natural Resources Conservation Service

Ecological site R087AY008TX
Very Deep Sand

Last updated: 5/06/2020
Accessed: 05/03/2024

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.

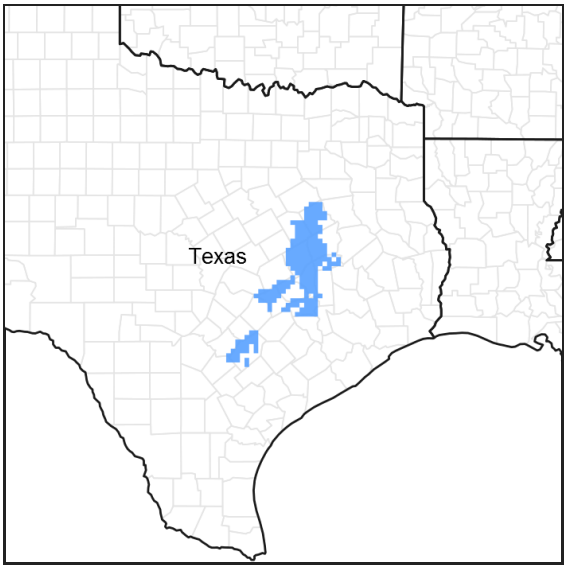


Figure 1. Mapped extent

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): 087A–Texas Claypan Area, Southern Part

This area is entirely in south-central Texas. It makes up about 10,535 square miles (27,295 square kilometers). The towns of Bastrop, Bryan, Centerville, College Station, Ennis, Fairfield, Franklin, Giddings, Gonzales, Groesbeck, La Grange, Madisonville, and Rockdale are in this MLRA. Interstate 45 crosses the northern part of the area, and Interstate 10 crosses the southern part. A number of State Parks are located throughout this area. The parks are commonly associated with reservoirs.

Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 87A

Ecological site concept

The site is characterized by structureless sands greater than 80 inches. Due to the nature of the sandy soils, they are vegetatively unproductive compared to other sites within the area.

Associated sites

R087AY007TX	**Deep Sand** Deep Sand
R087AY009TX	**Wet Sandy Draw** Wet Sandy Draw
R087AY004TX	**Deep Redland** Deep Redland
R087AY006TX	**Sandy** Sandy

Similar sites

R087AY006TX	**Sandy** Sandy
R087AY007TX	**Deep Sand** Deep Sand

Table 1. Dominant plant species

Tree	(1) *Quercus incana* (2) *Quercus marilandica*
Shrub	(1) *Ilex vomitoria* (2) *Vaccinium arboreum*
Herbaceous	(1) *Schizachyrium scoparium* (2) *Sorghastrum elliottii*

Physiographic features

These gently to strongly sloping soils occur on summits and shoulders of interfluves of broad ridges on inland dissected coastal plain. Slopes range from 1 to 12 percent.

Table 2. Representative physiographic features

Landforms	(1) Saddle
Flooding frequency	None
Ponding frequency	None
Elevation	61–229 m
Slope	1–12%
Aspect	Aspect is not a significant factor

Climatic features

The climate for MLRA 87A is humid subtropical and is characterized by hot summers, especially in July and August, and relatively mild winters. 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 mild days and cool nights. The average annual precipitation in this area is 41 inches. Most of the rainfall occurs in spring and fall. The freeze-free period averages about 276 days and the frost-free period 241 days.

Table 3. Representative climatic features

Frost-free period (average)	241 days
Freeze-free period (average)	276 days
Precipitation total (average)	1,041 mm

Climate stations used

- (1) CROCKETT [USC00412114], Crockett, TX
- (2) FAIRFIELD 3W [USC00413047], Fairfield, TX
- (3) GONZALES 1N [USC00413622], Gonzales, TX
- (4) COLLEGE STN [USW00003904], College Station, TX
- (5) BARDWELL DAM [USC00410518], Ennis, TX
- (6) ELGIN [USC00412820], Elgin, TX
- (7) FRANKLIN [USC00413321], Franklin, TX
- (8) SOMERVILLE DAM [USC00418446], Somerville, TX
- (9) BELLVILLE 6NNE [USC00410655], Bellville, TX
- (10) LA GRANGE [USC00414903], La Grange, TX
- (11) MADISONVILLE [USC00415477], Madisonville, TX
- (12) SMITHVILLE [USC00418415], Smithville, TX

Influencing water features

Streams or wetlands do not influence the plant community of this site. Lack of water is typically the problem, due the droughty nature of the very deep sandy soils.

Soil features

These soils consists of very deep, somewhat excessively drained, rapidly permeable soils that formed in residuum weathered from Eocene age sandstone of the Claiborne Group. They are loose and structureless to a depth of 80 inches or more. Moisture enters the soil rapidly and quickly passes through and out of the root zone. Because moisture holding capacity and inherent fertility are low, this is one of the lowest producing sites in the MLRA. Water erosion on this site is generally not a problem but the site is susceptible to wind erosion. Arenosa is the only soil correlated to the site. The taxonomic classification is a thermic, uncoated Ustic Quartzipsamment.

Table 4. Representative soil features

Parent material	(1) Residuum–sandstone and shale
Surface texture	(1) Fine sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Rapid
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	5.08 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	4.5–6.5

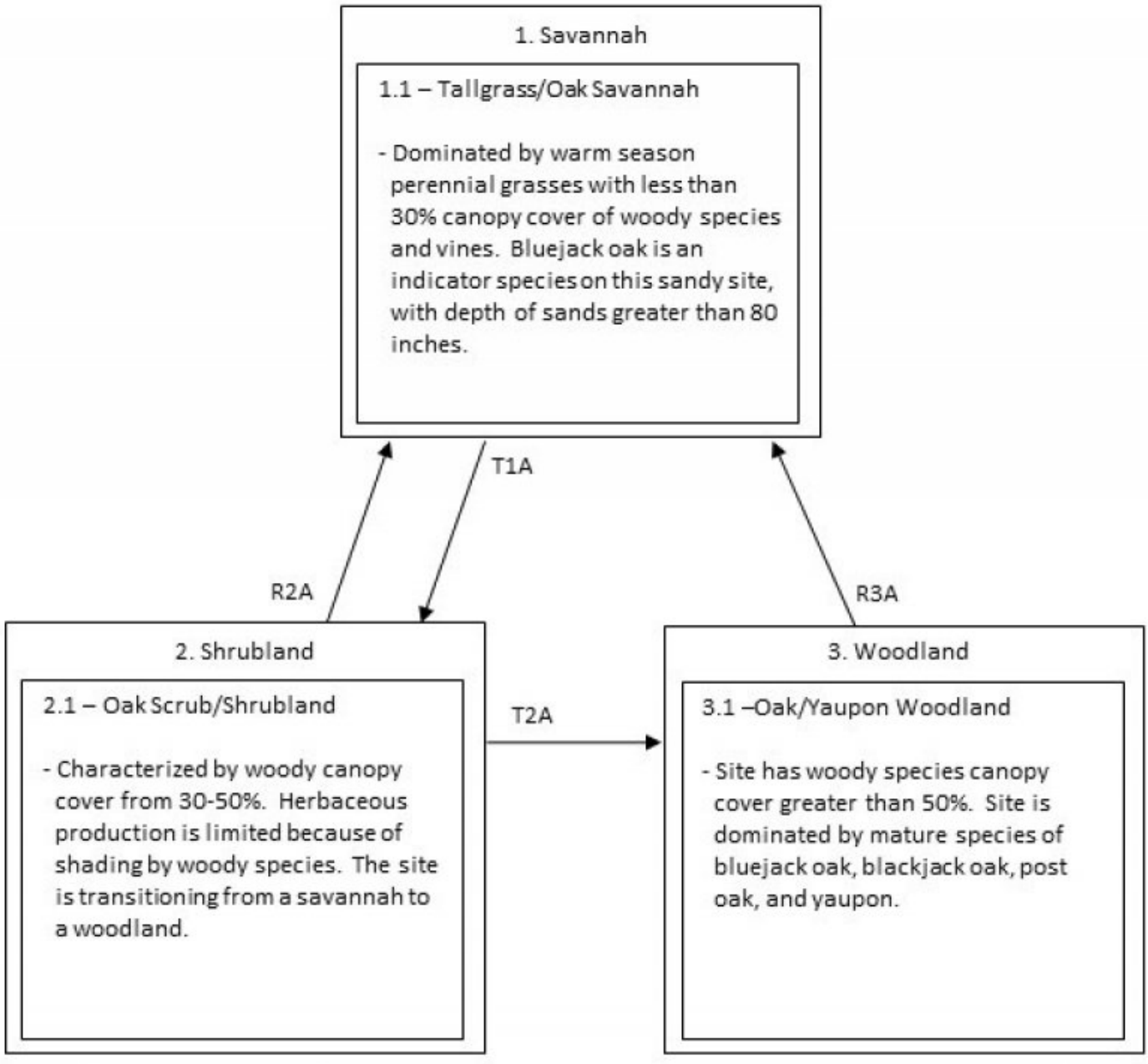
Subsurface fragment volume <=3" (Depth not specified)	0–2%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The Very Deep Sand site evolved and was maintained by the grazing and herding effects of native wild large ungulates, periodic fires, and extreme climatic fluctuations. Continuous grazing by domestic livestock and the suppression of fire removes little bluestem (*Schizachyrium scoparium*), slender Indiangrass (*Sorghastrum elliottii*), switchgrass (*Panicum virgatum*), and desirable forbs. Less productive perennial and annual grasses and forbs will replace these plants.

Years of continuous grazing generally lead to periods of prolonged rest for recovery of the perennial herbaceous plant component. These prolonged rest perionds with no fire or brush management lead toward a commuity dominated by woody species such as winged elm (*Ulmus alata*), yaupon (*Ilex vomitoria*), post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), and bluejack oak (*Quercus incana*).

State and transition model



Code	Practice
T1A, T2A	Abandonment, no fire, and/or no grazing management
R2A	Prescribed grazing, fire, and/or brush management
R3A	Extensive brush management and/or herbicide applications

Figure 6. STM

State 1
Savannah

One community exists in the Savannah State, the 1.1 Tallgrass/Oak Savannah Community. The State is dominated by warm season perennial grasses and the overstory canopy cover is less than 30 percent.

Community 1.1
Tallgrass/Oak Savannah

The characteristic plant community of this site is the reference plant community. This site is an open savannah of bluejack oak, post oak, and blackjack oak trees that shade up to 30 percent of the ground. Yaupon shrubs are associated with the trees. The herbaceous component is tall and mid-grasses and is dominated by little bluestem, Indiangrass (*Sorghastrum nutans*), slender Indiangrass, and brownseed paspalum (*Paspalum plicatulum*) which usually make up to 50 to 75 percent of the total annual production. A thin stand of purple lovegrass (*Eragrostis spectabilis*), red lovegrass (*Eragrostis secundiflora*), woolly sheath threeawn (*Aristida lanosa*), Hall's panicum (*Panicum hallii*), and thin paspalum (*Paspalum setaceum*) occupy spaces between the tallgrass bunches. Grazing prescriptions that permit acceptable grazing periods and allow for adequate rest periods along with prescribed fire every five to seven years are important in the maintenance of the reference plant community and the savannah landscape structure. Continuous overgrazing or over rest and the absence of fire tend to allow a vegetative shift towards woody species. Without corrective measures, this shift will continue to the Shrubland State.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1905	2102	2298
Tree	392	448	504
Shrub/Vine	112	140	168
Forb	112	140	168
Total	**2521**	**2830**	**3138**

State 2
Shrubland

One community exists in the Shrubland State, the 2.1 Oak Scrub/Shrubland Community. The herbaceous production is not as great compared to the Savannah State, and overstory canopy has increased between 30 and 50 percent.

Community 2.1
Oak Scrub/Shrubland

This plant community is a transitional community between the Savannah and Woodland States. It develops in the absence of fire or mechanical or chemical treatments for brush control. It is usually the result of abandonment or yearly continuous grazing. Trees and shrubs begin to encroach into pastureland or replace the grassland component of the Savannah State. In addition to the naturally occurring bluejack oak, blackjack oak, and post oak - yaupon increases in density and canopy coverage (30 to 50 percent). Remnants of little bluestem and Indiangrass may still occur but the herbaceous component of the community becomes dominated by lesser producing grasses and forbs. Woollysheath threeawn (*Aristida lanosa*), sand dropseed (*Sporobolus cryptandrus*), arrowfeather threeawn (*Aristida purpurascens*), Scribner's dichanthelium (Dicanthelium oliganthes), thin paspalum (*Paspalum setaceum*), wild buckwheat (Eriogonum spp.), and Texas croton (*Croton texensis*) commonly occur. Prescribed burning on a five to seven year interval in conjunction with prescribed grazing may be a viable option for returning

this site to a Tallgrass/Oak Savannah providing woody canopy cover is less than 50 percent and adequate herbaceous fine fuel exists. When this threshold is exceeded, mechanical or chemical brush control becomes necessary to move this transitional community back towards the Savannah State. While these treatment methods may remove the woody species, re-establishment of the herbaceous component is very difficult due to the droughty nature of the soils.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1149	1289	1401
Tree	757	841	953
Shrub/Vine	504	532	560
Forb	112	140	168
Total	**2522**	**2802**	**3082**

State 3
Woodland

One community exists in the Woodland State, the Oak/Yaupon Woodland Community. The site is characterized by little herbaceous production. The overstory canopy is over 50 percent and shrubs also limit light to the surface.

Community 3.1
Oak/Yaupon Woodland

This plant community is a closed overstory (50 to 80 percent) woodland dominated by bluejack oak, blackjack oak, and post oak. Yaupon is the dominant understory shrub. Woody vines also occur and include greenbriar (Smilax spp.), grape (Vitis spp.), and poison ivy (*Toxicodendron radicans*). A herbaceous understory is almost nonexistent but shade tolerant species including longleaf woodoats (*Chasmanthium sessiliflorum*) and cedar sedge (*Carex planostachys*) may occur in small amounts. Prescribed burning in conjunction with prescribed grazing may be used to convert this site back to a Savannah State, but generally will take many consecutive years of burning due to light fine fuel loads comprised mainly of hardwood leaves. Chemical brush control on a large scale is not a viable treatment option on this site due to the resistance of yaupon to broadcast herbicide applications. Individual plant treatment with herbicides on small acreages may be a viable treatment option. The low water holding capacity and low fertility of this site makes re-establishment of herbaceous species difficult.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	1653	1821	1990
Grass/Grasslike	504	560	616
Shrub/Vine	252	280	308
Forb	112	140	168
Total	**2521**	**2801**	**3082**

Transition T1A
State 1 to 2

The Savannah State will transition to the Shrubland State when continued heavy grazing pressure, no brush management, and/or field abandonment continues. The transition is evident when woody species canopy cover exceeds 30 percent and grasses shift composition to more shade-tolerant species.

Restoration pathway R2A
State 2 to 1

Restoration back to the Savannah State requires brush management, prescribed grazing and/or prescribed fire. Mechanical or chemical controls can be used to remove the woody overstory species and shrubs. Prescribed grazing may require destocking and/or deferment.

Transition T2A
State 2 to 3

The Shrubland State will transition to the Woodland State when continued heavy grazing pressure, no brush management, and/or field abandonment continues. The transition is evident when woody species canopy cover exceeds 50 percent and grasses shift composition to more shade-tolerant species.

Restoration pathway R3A
State 3 to 1

Restoration back to the Savannah State requires substantial energy inputs. Brush management and prescribed grazing will be need to shift the community back. Mechanical or chemical controls can be used to remove the woody overstory species back below 30 percent. Prescribed grazing may require destocking and/or deferment to manage the understory grasses back to those found in the reference community. Prescribed fire may be a viable option if enough fine fuel still exists in the understory. More frequent than natural burns may be required to initiate a burning schedule.

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	**Tallgrass**			953–1149	
	little bluestem	SCSC	*Schizachyrium scoparium*	953–1149	–
2	**Tall/Midgrasses**			504–588	
	longleaf woodoats	CHSE2	*Chasmanthium sessiliflorum*	504–588	–
	brownseed paspalum	PAPL3	*Paspalum plicatulum*	504–588	–
	switchgrass	PAVI2	*Panicum virgatum*	504–588	–
	slender Indiangrass	SOEL3	*Sorghastrum elliottii*	504–588	–
	Indiangrass	SONU2	*Sorghastrum nutans*	504–588	

	indiangrass	SONU2	*Sorghastrum nutans*	504–588	–
	purpletop tridens	TRFL2	*Tridens flavus*	504–588	–
3	**Midgrasses**			280–336	
	woollysheath threeawn	ARLA6	*Aristida lanosa*	280–336	–
	red lovegrass	ERSE	*Eragrostis secundiflora*	280–336	–
	purple lovegrass	ERSP	*Eragrostis spectabilis*	280–336	–
	sand lovegrass	ERTR3	*Eragrostis trichodes*	280–336	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	280–336	–
4	**Midgrasses**			168–224	
	splitbeard bluestem	ANTE2	*Andropogon ternarius*	168–224	–
	sedge	CAREX	*Carex*	168–224	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	168–224	–
Forb					
5	**Forbs**			84–112	
	partridge pea	CHFA2	*Chamaecrista fasciculata*	84–112	–
	Atlantic pigeonwings	CLMA4	*Clitoria mariana*	84–112	–
	Virginia dayflower	COVI3	*Commelina virginica*	84–112	–
	ticktrefoil	DESMO	*Desmodium*	84–112	–
	lespedeza	LESPE	*Lespedeza*	84–112	–
	snoutbean	RHYNC2	*Rhynchosia*	84–112	–
	fuzzybean	STROP	*Strophostyles*	84–112	–
	prairie spiderwort	TROC	*Tradescantia occidentalis*	84–112	–
6	**Forbs**			28–56	
	Texas bullnettle	CNTE	*Cnidoscolus texanus*	28–56	–
	hogwort	CRCA6	*Croton capitatus*	28–56	–
	yankeeweed	EUCO7	*Eupatorium compositifolium*	28–56	–
	plains snakecotton	FRFL	*Froelichia floridana*	28–56	–
Shrub/Vine					
7	**Shrubs/Vines**			112–168	
	American beautyberry	CAAM2	*Callicarpa americana*	112–168	–
	parsley hawthorn	CRMA5	*Crataegus marshallii*	112–168	–
	yaupon	ILVO	*Ilex vomitoria*	112–168	–
	twistspine pricklypear	OPMA2	*Opuntia macrorhiza*	112–168	–
	southern dewberry	RUTR	*Rubus trivialis*	112–168	–
	cat greenbrier	SMGL	*Smilax glauca*	112–168	–
	muscadine	VIRO3	*Vitis rotundifolia*	112–168	–
	Arkansas yucca	YUAR2	*Yucca arkansana*	112–168	–
Tree					
8	**Trees**			392–504	
	bluejack oak	QUIN	*Quercus incana*	392–504	–
	blackjack oak	QUMA3	*Quercus marilandica*	392–504	–
	post oak	QUST	*Quercus stellata*	392–504	–

Animal community

The historic savannah provided habitat to bison, deer, turkey, migratory birds and large predators such as wolves, coyotes, mountain lions, and black bear. White-tailed deer, turkey, coyotes, bobcats, and resident and migratory birds find suitable habitat in these savannahs today. Domestic livestock and exotic ungulates are the dominant grazers and browsers of this site. As the savannah transitions through the various vegetative states towards woodlands, the quality of the habitat may improve for some species and decline for others. Management must be applied to maintain a vegetative state in optimum habitat quality for the desired species.

Hydrological functions

Peak rainfall periods occur in May and June from frontal passage thunderstorms and in September and October from tropical systems as well as frontal passages. Rainfall amounts may be high (three to five inches per event) and events may be intense. Extended periods of little to no rainfall during the growing season are common. Because of the gently sloping to sloping topography with rapid intake rate of the surface sands and very rapid permeability of the soils, there is usually little to no runoff from this site. Water from these somewhat excessively drained soils provides groundwater recharge. In some places, seeps and springs occur at the base of the site. They provide a continuing flow of high quality water for downstream use and sub-irrigation for vegetation on adjacent sites.

Recreational uses

Hunting, camping, bird watching, and equestrian are common activities.

Wood products

Oaks are used for firewood. Yaupon is used for landscaping.

Other products

Fruit from dewberry and grapes are available for harvest.

Inventory data references

Information presented was derived from NRCS clipping data, literature, field observations and personal contacts with range-trained personnel.

Other references

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Approval

David Kraft, 5/06/2020

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)	Mike Stellbauer, David Polk, and Bill Deauman
Contact for lead author	Mike Stellbauer, Zone RMS, NRCS, Bryan, Texas
Date	05/17/2005
Approved by	David Kraft
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:** Water flow patterns are uncommon for this site.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals or terracettes are uncommon for this site when occupied by the reference community.

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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 in small patches.

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5. **Number of gullies and erosion associated with gullies:** No gullies should be present.

6. **Extent of wind scoured, blowouts and/or depositional areas:** Blowouts or dunes could occur but should be uncommon under reference community.

7. **Amount of litter movement (describe size and distance expected to travel):** This site has very highly permeable soils with very high infiltration rates. Only small-sized litter will move short distances with intense storms.

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.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is greater than 80 inches thick with colors from pale brown fine sand to pale brown fine sand and generally single grain structures. SOM is less than one percent.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The savannah of trees, shrubs, vines, grasses, and forbs, along with adequate litter and little bare ground, provides 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):** 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: Warm-season tallgrasses >>

    Sub-dominant: Warm-season midgrasses >

    Other: Trees > Shrubs/Vines > Forbs

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** There should be little mortality or decadence for any functional groups.

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

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 2,250 pounds per acre for below average moisture years to 2,800 pounds per acre for above average

moisture years.

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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 invasive species include post oak, bluejack oak, blackjack oak, yaupon, and elm.

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