USDA Natural Resources Conservation Service

Ecological site R087AY005TX
Sandy Loam

Last updated: 9/21/2023
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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.

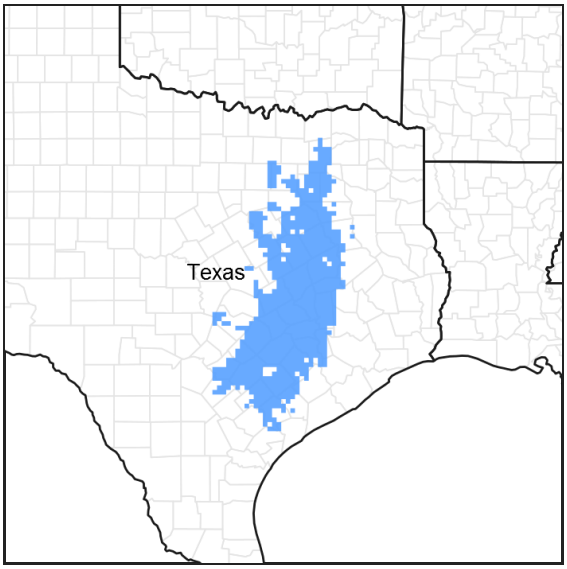


Figure 1. Mapped extent

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): 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 Sandy Loam site are upland sites with sandy surface soils over loamy subsoils. The surface soils are usually less than 10 inches deep. The site is one of most vegetatively productive uplands sites in the MLRA.

Associated sites

R087AY002TX	**Sandstone Hill** Sandstone Hill
R087AY003TX	**Claypan Savannah** Claypan Savannah
R087AY006TX	**Sandy** Sandy
R087AY011TX	**Loamy Bottomland** Loamy Bottomland
R087AY012TX	**Clayey Bottomland** Clayey Bottomland

Similar sites

R087AY003TX	**Claypan Savannah** Claypan Savannah
R087AY004TX	**Deep Redland** Deep Redland
R087BY003TX	**Sandy Loam** Different MLRA.

Table 1. Dominant plant species

Tree	(1) *Quercus stellata* (2) *Ulmus alata*
Shrub	(1) *Ilex vomitoria* (2) *Callicarpa americana*
Herbaceous	(1) *Schizachyrium scoparium* (2) *Sorghastrum nutans*

Physiographic features

The topography of this site is nearly level to undulating with slopes ranging from 0 to 15 percent, but are mainly 1 to 8 percent.

Table 2. Representative physiographic features

Landforms	(1) Plains > Stream terrace (2) Plains > Ridge
Runoff class	Low to very high
Flooding frequency	None
Ponding frequency	None
Elevation	61–229 m
Slope	1–8%
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	0–15%

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

Influencing water features

The plant community of this site is not influenced by a stream.

Wetland description

Wetlands are not associated with this site.

Soil features

The soils are moderately deep to very deep fine sandy loams and loamy fine sands with a minimum thickness of 10 inches. The sandy surface is underlain by clay, clay loam, or sandy clay loam subsoil. Moisture from light showers is readily absorbed by the surface soil, and the subsoil takes in water moderately well. Fertility and water holding capacity are moderate in the surface and high in the subsoil. Air, water, and plant roots move through the soil readily. The soils give up water generously to growing plants. Surface crusts, slower water intake, and increased runoff are characteristics of the soils in a deteriorated condition. Soils correlated to this site include: Alum, Bastrop, Bigbrown, Blum, variant, Chaney, Chazos, Chickasha, Dubina, Freestone, Garcitas, Gasil, Gause, Gholson, Gibbonscreek, Gibbonscreek, variant, Gredge, Groesbeck, Hammond, Hearne, Inez, Jedd, Konawa, Lavender, Marquez, Menard, variant, Minerva, Minwells, Personville, Rader, Rosanky, Rutersville, Shiro, Silawa, Smithville, Spiller, Straber, Tabor, Travis, and Windthorst.

Table 5. Representative soil features

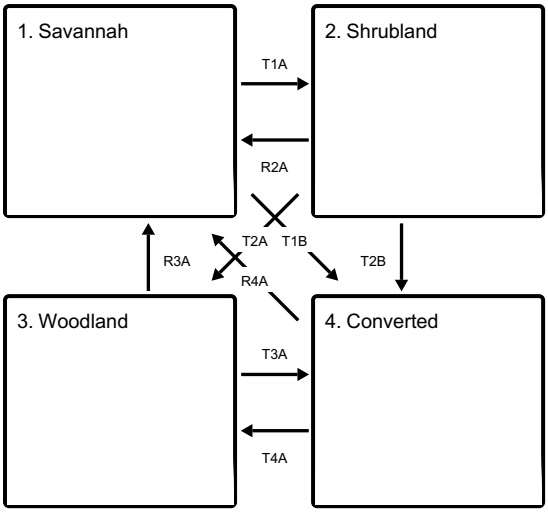
Parent material	(1) Residuum–sandstone and shale (2) Alluvium–mudstone
Surface texture	(1) Fine sandy loam (2) Loamy fine sand (3) Very fine sandy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to very slow
Soil depth	76–203 cm
Surface fragment cover <=3"	0–8%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	7.62–15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0–10%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–10
Soil reaction (1:1 water) (0-101.6cm)	4.5–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–20%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

The sandy loam site evolved and was maintained by the grazing and herding of native wild large ungulates, periodic fires, and climatic fluctuations. Conversion of this site to cropland and the subsequent abandonment of cropping removed the native vegetation, organic matter and fertility, and allowed woody species to dominate the site. Continuous grazing by domestic livestock and the suppression of fire on non-cropland sites removes little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), and preferred forbs such as Engelmann daisy (Engelmannia pinnitifida) and gayfeather (Liatris spp.). Less productive perennial grasses, annual grasses, and forbs will replace these plants. Years of continuous grazing generally lead to periods of prolonged rest or recovery of the perennial herbaceous plant component. These prolonged rest periods with no fire or brush management lead toward a community dominated by woody species such as winged elm (*Ulmus alata*), eastern persimmon (*Diospyros virginiana*), mesquite (*Prosopis glandulosa*), yaupon (*Ilex vomitoria*), post oak (Querus stellata), and eastern red cedar (*Juniperus virginiana*).

State and transition model

Ecosystem states



T1A - Heavy continuous grazing, no brush management, abandonment

T1B - Brush management, crop cultivation, pasture planting

R2A - Brush management, prescribed grazing, prescribed burning

T2A - Heavy continuous grazing, no brush management, abandonment

T2B - Brush management, crop cultivation, pasture planting

R3A - Brush management, range planting, prescribed grazing

T3A - Brush management, crop cultivation, pasture planting

R4A - Range planting, prescribed grazing, prescribed burning

T4A - Heavy continuous grazing, no brush management, abandonment

State 1 submodel, plant communities

1.1. Tallgrass/Oak Savannah

State 2 submodel, plant communities

2.1. Oak Scrub/Shrubland

State 3 submodel, plant communities

3.1. Post Oak/Elm Woodland

State 4 submodel, plant communities

4.1. Converted Land

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 20 percent.

Community 1.1
Tallgrass/Oak Savannah

The interpretive plant community of this site is the reference plant community. This site is a fire-driven savannah of post oak and blackjack oak (*Quercus marilandica*) trees that shade 15 to 20 percent of the ground. The herbaceous component of tall and midgrasses and is dominated by little bluestem, Indiangrass, and brownseed paspalum (*Paspalum plicatulum*), which usually make up 50 to 75 percent of the total annual yield. Purpletop tridens (*Tridens flavus*), Florida paspalum (*Paspalum floridanum*), switchgrass, tall dropseed (*Sporobolus compositus*), and thin paspalum (*Paspalum setaceum*) also occur. Cool season plants occuring on the site include Canada wildrye (*Elymus canadensis*), Engelmann's daisy (Engelmannia pinnatifida), and sedges (Carex spp.). A variety of shrubs, vines, and forbs occur in this community. Grazing prescriptions that permit acceptable grazing periods and allow adequate rest periods along with prescribed fire every three to five years are important in the maintenance of the reference herbaceous plant community and the savannah landscape structure. Continuous overgrazing, over rest, and the absence of fire tend to allow a vegetative shift towards woody species such as eastern persimmon (*Diospyros virginiana*), eastern red cedar (*Juniperus virginiana*), and winged elm (*Ulmus alata*). Without corrective measures, this shift will continue to the Shrubland State.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	3138	4035	4932
Tree	392	504	616
Shrub/Vine	196	252	308
Forb	196	252	308
Total	**3922**	**5043**	**6164**

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 20 and 50 percent.

Community 2.1
Oak Scrub/Shrubland

This plant community is a transitional community between the Savannah and Woodland State. It develops in the absence of fire or brush control treatments. It is usually the result of abandonment following cropping or yearly continuous grazing. Trees and shrubs begin to replace the grassland component of the savannah community. In addition to the naturally occuring post oak and blackjack oak - winged elm, water oak (*Quercus nigra*), mesquite (*Prosopis glandulosa*), eastern persimmon, bumelia (*Sideroxylon lanuginosum*), eastern red cedar, yaupon (*Ilex vomitoria*), and greenbriar (Smilax spp.) increase in density and canopy coverage (20 to 50 percent). Species whose seed is windblown (elm) or animal dispersed (persimmon, mesquite, eastern red cedar, bumelia) are the first to colonize and dominate the site. Remnants of little bluestem and Indiangrass may still occur but the herbaceous component of the community becomes dominated by lesser producing grasses and forbs. Silver bluestem (*Bothriochloa laguroides*), tall dropseed, arrowfeather threeawn (*Aristida purpurascens*), Scribner's panicum (Dicanthelium oliganthes), thin paspalum, Hall's panicum (*Panicum hallii*), western ragweed (*Ambrosia psilostachya*), croton (Croton spp.), and narrowleaf sumpweed (*Iva angustifolia*) commonly occur. Prescribed burning on a three to five year interval in conjunction with prescribed grazing is a viable option for returning this site to a community that resembles the reference community, provided the 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.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1255	1614	1973
Tree	628	807	986
Shrub/Vine	532	673	841
Forb	258	336	404
Total	**2673**	**3430**	**4204**

State 3
Woodland

One community exists in the Woodland State, the Post Oak/Elm 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
Post Oak/Elm Woodland

This plant community is a closed overstory (50 to 80 percent) woodland dominated by post oak, winged elm, blackjack oak, black hickory (*Carya texana*), eastern red cedar, and water oak. Understory shrubs and sub-shrubs include yaupon, farkleberry (*Vaccinium arboreum*), possumhaw (*Ilex decidua*), and American beautyberry (*Callicarpa americana*). Woody vines also occur including, Alabama supplejack (*Berchemia scandens*), poison ivy (Toxicondendron radicans), grape (Vitis spp.), greenbriar (Smilax spp.), trumpet creeper (*Campsis radicans*), Virginia creeper (*Parthenocissus quinquefolia*), and peppervine (Ampelopsis arborea). An herbaceous understory is almost nonexistent but shade-tolerant species including longleaf woodoats (*Chasmanthium sessiliflorum*), broadleaf woodoats (*Chasmanthium latifolium*), cedar sedge (*Carex planostachys*), ironweed (Veronia baldwinii), and goldenrod (Solidago spp.) may occur in small amounts. Prescribed fire may be used to convert this community back to the tallgrass savannah but may take many consecutive years of burning due to light fine fuel loads. Chemical brush control on a large scale is usually not a treatment option on this site due to the herbicide resistance of yaupon. Individual plant treatment with herbicides on small acreage may be a viable option. Mechanical treatment of this site, along with seeding, is the most viable option for reversion back to the reference community. Although, the economic feasibility of this option is questionable.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	2197	2825	3475
Shrub/Vine	336	560	785
Grass/Grasslike	112	280	448
Forb	112	168	224
Total	**2757**	**3833**	**4932**

State 4
Converted

The Converted Land State contains one community, the 4.1 Converted Land Community. The state is characterized by the land manager farming crops or planted grasses.

Community 4.1
Converted Land

Conversion of this site to cropland occurred from the middle 1800's to the early 1900's. Some remains in cropland today, typically cotton (Gossypium spp.), corn (*Zea mays*), sorghum (Sorghum spp.), and soybeans (*Glycine max*). Ditching, land leveling, and levee construction has significantly changed the topography and hydrology on many acres of this site. While restoration of this site to a semblance of the reference plant community is possible with seeding and prescribed grazing, complete restoration of the reference community in a reasonable time is very unlikely. Following crop production, this site is often planted to native or introduced grasses and legumes for livestock grazing or hay production. Typical species planted include improved Bermudagrass varieties, bahiagrass, switchgrass, dallisgrass, eastern gamagrass, annual ryegrass (Lolium multiflorum), and white clover. Many of the introduced species (bahiagrass, Bermudagrass, and dallisgrass) are invasive-moving by wind, water, and animals. Once established, they are extremely difficult to remove and will hinder the reestablishment of native species. The establishment and maintenance of these species requires cultivation, fertilization, weed control, and prescribed grazing management.

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 20 percent and grasses shift composition to more shade-tolerant species.

Transition T1B
State 1 to 4

The transition to the Converted State occurs when the site is plowed for planting crops or pasture. The driver for the transition is the land manager's decision to farm the site.

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.

Transition T2B
State 2 to 4

The transition to the Converted State occurs when the site is plowed for planting crops or pasture. The driver for the transition is the land manager's decision to farm the site.

Restoration pathway R3A
State 3 to 1

Restoration back to the Savannah State requires substantial energy inputs. Brush management and prescribed grazing will be needed to shift the community back to the reference state. Mechanical or chemical controls can be used to remove the woody overstory species back below 20 percent. Prescribed grazing may require destocking and/or deferment to manage the understory grasses back to those found in the reference community. Fire may be an option, but only if adequate amounts of fine fuel exist in the understory.

Transition T3A
State 3 to 4

The transition to the Converted State occurs when the site is plowed for planting crops or pasture. The driver for the transition is the land manager's decision to farm the site.

Restoration pathway R4A
State 4 to 1

The restoration to State 1 can occur when the land manager ceases agronomic practices. Range planting of native species found in the reference community will be required to bring back a similar community as the State 1 plant composition. The extent of previous soil disturbances will determine how much seedbed preparation will be needed, as well as the ability to be restored. Proper grazing and brush management will be required to ensure success.

Transition T4A
State 4 to 3

The Converted Land 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.

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Tallgrass**			1569–2466	
	little bluestem	SCSC	*Schizachyrium scoparium*	1569–2466	–
2	**Tallgrasses**			785–1233	
	big bluestem	ANGE	*Andropogon gerardii*	785–1233	–
	Florida paspalum	PAFL4	*Paspalum floridanum*	785–1233	–
	switchgrass	PAVI2	*Panicum virgatum*	785–1233	–
	Indiangrass	SONU2	*Sorghastrum nutans*	785–1233	–
3	**Midgrasses**			471–740	
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	471–740	–
	longleaf woodoats	CHSE2	*Chasmanthium sessiliflorum*	471–740	–
	Canada wildrye	ELCA4	*Elymus canadensis*	471–740	–
	beaked panicgrass	PAAN	*Panicum anceps*	471–740	–
	brownseed paspalum	PAPL3	*Paspalum plicatulum*	471–740	–

	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	471–740	–
	purpletop tridens	TRFL2	*Tridens flavus*	471–740	–
4	**Shortgrasses**			314–493	
	arrowfeather threeawn	ARPU8	*Aristida purpurascens*	314–493	–
	sedge	CAREX	*Carex*	314–493	–
	fall witchgrass	DICO6	*Digitaria cognata*	314–493	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	314–493	–
	Hall's panicgrass	PAHA	*Panicum hallii*	314–493	–
	thin paspalum	PASE5	*Paspalum setaceum*	314–493	–
Forb					
5	**Forbs**			196–308	
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	196–308	–
	ticktrefoil	DESMO	*Desmodium*	196–308	–
	Engelmann's daisy	ENPE4	*Engelmannia peristenia*	196–308	–
	lespedeza	LESPE	*Lespedeza*	196–308	–
	pinkscale blazing star	LIEL	*Liatris elegans*	196–308	–
	littleleaf sensitive-briar	MIMI22	*Mimosa microphylla*	196–308	–
	yellow puff	NELU2	*Neptunia lutea*	196–308	–
	prairie snoutbean	RHLA5	*Rhynchosia latifolia*	196–308	–
	fuzzybean	STROP	*Strophostyles*	196–308	–
	multibloom hoarypea	TEON	*Tephrosia onobrychoides*	196–308	–
	prairie spiderwort	TROC	*Tradescantia occidentalis*	196–308	–
	Atlantic pigeonwings	CLMA4	*Clitoria mariana*	196–308	–
	Virginia dayflower	COVI3	*Commelina virginica*	196–308	–
	croton	CROTO	*Croton*	0–17	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–17	–
	partridge pea	CHFA2	*Chamaecrista fasciculata*	0–17	–
Shrub/Vine					
6	**Shrubs/Vines**			196–308	
	Alabama supplejack	BESC	*Berchemia scandens*	196–308	–
	American beautyberry	CAAM2	*Callicarpa americana*	196–308	–
	parsley hawthorn	CRMA5	*Crataegus marshallii*	196–308	–
	yaupon	ILVO	*Ilex vomitoria*	196–308	–
	winged sumac	RHCO	*Rhus copallinum*	196–308	–
	southern dewberry	RUTR	*Rubus trivialis*	196–308	–
	cat greenbrier	SMGL	*Smilax glauca*	196–308	–
	muscadine	VIRO3	*Vitis rotundifolia*	196–308	–
Tree					
7	**Trees**			392–616	
	black hickory	CATE9	*Carya texana*	392–616	–
	blackjack oak	QUMA3	*Quercus marilandica*	392–616	

	blackjack oak	QUMA3	*Quercus marilandica*	392–616	–
	water oak	QUNI	*Quercus nigra*	392–616	–
	post oak	QUST	*Quercus stellata*	392–616	–
	gum bully	SILAL3	*Sideroxylon lanuginosum ssp. lanuginosum*	392–616	–
	winged elm	ULAL	*Ulmus alata*	392–616	–
	Alabama supplejack	BESC	*Berchemia scandens*	196–308	–
	American beautyberry	CAAM2	*Callicarpa americana*	196–308	–
	parsley hawthorn	CRMA5	*Crataegus marshallii*	196–308	–
	yaupon	ILVO	*Ilex vomitoria*	196–308	–
	winged sumac	RHCO	*Rhus copallinum*	196–308	–
	southern dewberry	RUTR	*Rubus trivialis*	196–308	–
	cat greenbrier	SMGL	*Smilax glauca*	196–308	–
	muscadine	VIRO3	*Vitis rotundifolia*	196–308	–

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 fine 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 oak 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 animal species.

Hydrological functions

Peak rainfall periods occur in May and June from frontal passage thunderstorms and in September and October from tropical weather systems as well as frontal passages. Rainfall amounts may be high (three to five inches per envent) and events may be intense. The site is subject to erosion where adequate herbaceous cover is not maintaned and on heavy use areas such as roads and livestock trails. Extended periods (60 days) of little to no rainfall during the growing season are common. The hydrology of this site may be manipulated through management to yield higher runoff volumes or greater infiltration to groundwater. Management for less herbaceous cover will favor higher surface runoff while dense herbaceous cover and litter will favor ground water recharge. Potential pollution from sediment, pesticides, and both organic and inorganic fertilizers should always be considered when managing for higher volumes of surface runoff.

Recreational uses

Hunting, hiking, camping, equestrian, bird watching, and off road vehicle use such as atv, dirt bikes, and mountain biking are common activities.

Wood products

Oaks are used for firewood. Hickory and mesquite are used for barbecue wood. Eastern red cedar is used for posts. Yaupon is used for landscaping.

Other products

Fruits from dewberries, grapes, and plums are harvested.

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.

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	06/08/2004
Approved by	Bryan Christensen
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:** Some water flow patterns may be present on this site due to landscape position and slopes.

3. **Number and height of erosional pedestals or terracettes:** Pedestals or terracettes are uncommon for this site when occupied by the reference 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 20 percent bare ground randomly distributed in small patches.

5. **Number of gullies and erosion associated with gullies:** Some gullies associated with seeps, springs and intermittent streams may be present. Head and side slopes 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):** This site has slowly permeable subsoils. Small to medium-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. Soil Stability class range is expected to be 3 to 5.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is less than 10 inches thick with colors from brown fine sandy loam to dark brown loamy fine sand and generally weak fine granular structure. 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, vines, shrubs, grasses, and forbs, along with adequate

litter and little bare ground, provides 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 >

    Other: Trees > Shrubs/Vines > Forbs

    Additional:

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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.

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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):** 3,500 pounds per acre for below average moisture years to 5,500 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 bahiagrass, common Bermudagrass, yellow bluestem, elm, post oak, yaupon, huisache, mesquite, eastern persimmon, and eastern red cedar.

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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.
