USDA Natural Resources
Conservation Service

Ecological site R078CY098TX
Deep Sand 23-30" 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.

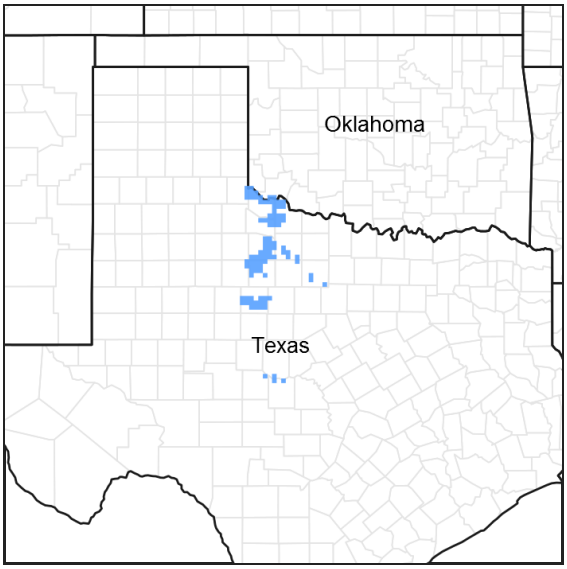


Figure 1. Mapped extent

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): 078C–Central Rolling Red Plains, Eastern Part

MLRA 78C is characterized by moderately dissected, rolling plains with prominent ridges and valleys and numerous terraces adjacent to dissecting streams. Loamy and clayey soils are generally deep, well drained, and developed in calcareous and gypsiferous sediments of Permian age.

LRU notes

NA

Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA Ag Handbook 296.

Ecological site concept

These sites occur on deep sandy soils in the southern portion of MLRA 78C. The reference vegetation consists of tallgrasses and forbs with a scattered overstory of post oak and blackjack oak. This plant community evolved under

periodic grazing and fire events. If periodic fire is removed from the ecosystem, woody species may increase in abundance and canopy cover and begin to dominate ecological functions. Under continuous abusive grazing, the more palatable tallgrass species will begin to decline and midgrasses and annual forbs may increase as a result.

Associated sites

R078CY105TX	**Loamy Sand 23-31" PZ** Both are located on similar terrain. Loamy Sand Prairie has higher annual production due to soil texture. Limited oak canopy however.

Similar sites

R078CY107TX	**Sand Hills 23-31" PZ** Both have deep sandy soils. Deep Sand is more acidic.
R078CY105TX	**Loamy Sand 23-31" PZ** Both sites have deep sandy soils. The Sand Hills site has deeper, more excessively drained and more acid soils.

Table 1. Dominant plant species

Tree	(1) *Quercus stellata* (2) *Quercus marilandica*
Shrub	Not specified
Herbaceous	(1) *Andropogon hallii* (2) *Sorghastrum nutans*

Physiographic features

The Deep Sand Ecological Site 23-30” PZ was formed in sandy sediments of Pleistocene age. These soils are on nearly level to undulating, hummocky or dune terraces. Slopes range from 0 to 15 percent. Elevation is 700 to 1700 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Sand sheet (2) Alluvial plain > Terrace
Runoff class	Negligible to very low
Flooding frequency	None
Ponding frequency	None
Elevation	213–518 m
Slope	0–15%
Water table depth	183–203 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 78C lies within the subtropical sub-humid climate regime, which typically has dry winters with hot and not as humid summers. This regime is characterized by rapid changes in temperature; marked extremes, both daily and annual; and rather erratic rainfall.

This region lies in the path of polar air masses that move down from the north during the winter. With the passage of cold fronts during the fall and winter, abrupt temperature drops sometimes occur. While the area is subject to a wide range of temperature, winters are generally mild. Low humidity and good wind movements characterize the summers.

Wind speeds average more than eleven miles an hour with prevailing southern winds. Rather strong winds can occur in all months of the year. While strong gusty winds occur, severe dust storms are rare.

Normal rainfall averages 23 to 30 inches a year but distribution of rainfall patterns are so erratic short dry periods are common. The majority of the rainfall occurs as showers, rather than general rain events between March and November. Dry periods of three to four weeks can be expected during this time as well. Even if these dry conditions occur, complete crop failures seldom results.

May is the wettest month and December is the driest. Effective precipitation is low due to high temperatures, amounts received and intensity.

Table 3. Representative climatic features

Frost-free period (characteristic range)	197-200 days
Freeze-free period (characteristic range)	217-222 days
Precipitation total (characteristic range)	660-737 mm
Frost-free period (actual range)	195-200 days
Freeze-free period (actual range)	216-223 days
Precipitation total (actual range)	660-787 mm
Frost-free period (average)	198 days
Freeze-free period (average)	220 days
Precipitation total (average)	711 mm

Climate stations used

- (1) ABILENE 2 [USC00410013], Abilene, TX
- (2) ANSON 3ESE [USC00410268], Anson, TX
- (3) MUNDAY [USC00416146], Munday, TX
- (4) VERNON [USC00419346], Vernon, TX
- (5) OLNEY [USC00416636], Olney, TX

Influencing water features

None.

Wetland description

NA

Soil features

Soils are mapped for each county within the MLRA. Mapunits are representations of the major soil series component(s) and named accordingly. Each Mapunit is spatially represented on a digital soils map as polygons of different shapes and sizes. Within these Mapunits, there are often minor soil series components included. These minor components are soils that occur within a Mapunit polygon but are of small extent (15% or less of the Mapunit area). However, it is difficult to separate these minor soils spatially due to the scale of soil mapping.

Ecological sites are correlated at the component level of the soil survey. Therefore, a single Mapunit may contain multiple Ecological Sites just as it may contain multiple soil components. This is important to understand when investigating soils and Ecological Sites. A soil survey Mapunit may be correlated to a single Ecological Site based on the major component; however, there may be inclusional areas of additional Ecological Sites which are correlated to the minor components of that particular soil Mapunit.

Representative soil components for this site include:

Eufaula

The Eufaula series consists of very deep, somewhat excessively drained, rapidly permeable upland soils. The solum is more than 72 inches thick.

Table 4. Representative soil features

Parent material	(1) Eolian sands–quartzite
Surface texture	(1) Loamy fine sand (2) Fine sand
Family particle size	(1) Sandy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	152–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	5.08–11.68 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5.1–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–1%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The information contained in the State and Transition Diagram (STD) and the Ecological Site Description was developed using archeological and historical data, professional experience, and scientific studies. The information presented is representative of a very complex set of plant communities. Not all scenarios or plants are included. Key indicator plants, animals and ecological processes are described to inform land management decisions.

Soils of the Deep Sand 23-30” PZ Ecological Site formed on sandy eolian sediments of Pleistocene age. The site is found on gently sloping and sometimes hummocky fine sands in the Central Rolling Red Plains. The reference plant community of the Deep Sand Ecological Site is thought to have been a Tallgrass-Oak Savannah Plant Community (1.1) . It is assumed that the vegetation on the site consisted mostly of warm-season bunchgrasses with scattered motts of post oak and blackjack oak and associated woody species. Grass density was sparse due to the low water holding capacity and low soil fertility. Tallgrasses dominated the grassland portions, contributing as much as 75 to 80 percent of the plant annual production. The most characteristic grasses were sand bluestem , Indiangrass, switchgrass, cane bluestem, and purpletop tridens. Common midgrasses were sideoats grama, silver bluestem, sand lovegrass and fringed paspalum. Post oak and blackjack oak occurred in motts as well as individual trees, and along with associated woody species, produced from 20 to 25 percent of annual production. See the Species Composition List and Annual Production Table below for estimated composition and production of the species estimated in the reference community.

Pre-settlement disturbances included grazing or browsing by endemic, deer, pronghorn antelope and migratory bison, re-occurring droughts and frequent fires. Before European settlement wildfires re-occurred at frequent

intervals (Frost 1998) suppressing woody species and forbs. Since settlement in the late 1800s, continuous overgrazing by livestock, and possibly climate change (Milchunas 2006), have interacted with reduced fire frequency and intensity to give the competitive advantage to woody plant species. Although continued overgrazing is most likely the major cause, the interaction of these disturbances has changed the composition and structure of the reference community dramatically on most areas of this site. Most areas of the site are now dominated by post oak and blackjack oak unless brush management practices or prescribed burning have been applied. Those areas that were once cultivated and not re-vegetated properly are generally covered with weedy grass and forb species.

Continuous overgrazing of the Tallgrass/Oak Savannah Community (1.1) causes a reduction of more palatable species, such as Indiangrass, switchgrass and the bluestems, a decline in soil cover and organic matter and reduction in fire intensity. The grassland portion of the community shifts from a tallgrass dominated grassland to a mixed-grass grassland that is being invaded by woody species from the oak motts and adjacent sites. The oaks within the motts, and the associated shrubs and vines, increase in density and production. The result is a Mixed-grass/Oak Complex Plant Community (1.2). Grasses still dominate annual herbage production in this plant type but the proportion of woody plant production has increased significantly.

With continued abusive grazing, and the reduction of the frequency and intensity of fires, the Mixed-grass/Oak Complex Community (1.2) continues transitions toward a Woodland State (2). During the transition, the more grazing resistant grasses such as perennial three-awn, sand dropseed, tumble windmillgrass, gummy lovegrass, red lovegrass fringed signalgrass and less palatable forbs begin replacing the tall and midgrasses. As the grass cover declines, litter, mulch and soil organic matter decline and bare ground, erosion and other desertification processes increase. The site is particularly susceptible to wind erosion during this transition. The trend toward woodland can be reversed, or at least slowed under the present climate, with proper stocking and brush suppression practices, such as prescribed fire or individual plant treatments (IPT). However, when the woody plant community exceeds 45 percent canopy on this site and/or the woody plants in the grassland portion reach fire resistant age (two years), rest from grazing will generally not restore the grassland community. The Mixed-grass/Oak Complex Community (1.2) transitions into a Post Oak-Blackjack Oak Woodland Community (2.1) when this threshold is reached. Once the threshold is passed reversal of this transition is not possible without high cost brush control and management practices.

In early stages of retrogression (<45% woody plant cover) the woody species can be reversed with relatively inexpensive brush control practices along with good grazing management. Generally, prescribed burning is not an option once this site has reached this threshold. The lack of fine fuel and poor grass continuity will limit the effectiveness of prescribed burning. The high possibility of wind erosion generally excludes mechanical brush control treatments, but herbicide treatments can be effective. If these practices are not applied and overgrazing continues, the woody species will continue to increase in dominance. Woody plants, particularly post oak and blackjack oak, increase until the woody canopy is almost solid. Havard oak which was present in only minor amounts in the reference community, if present, may increase to form dense understory layer. Mesquite invades the site throughout the MLRA and can eventually dominate once it invades and is not controlled. Annual production for the herbaceous species is limited to shade tolerant forbs, shortgrasses and annuals. Eventually the Post Oak-Blackjack Oak Woodland Community (2.1) becomes stable woodland, dominated by either mesquite or oak. Reversal of this plant type requires extensive reclamation practices.

Many areas of the Deep Sand site are currently cultivated, or have been cultivated, for cash crops. When cropping ceases (3) the site should be re-seeded. If let go back to native species naturally the site is subject to wind erosion and generally supports mostly annuals such as camphorweed, prairie senna and wild buckwheat. It will also be quickly invaded by species from adjacent sites. Wind erosion may cause hummocks during the re-vegetation process.

State and Transition Diagram:
A State and Transition Diagram for the Deep Sand (R078CY098TX) site is depicted below. Thorough descriptions of each state, transition, and pathway follow the model. Experts base this model on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases.
Plant communities will differ across the MLRA because of the natural variability in weather, soils, and aspect. The Reference Plant Community is not necessarily the management goal; other vegetative states may be desired plant communities as long as the Range Health assessments are in the moderate and above category.

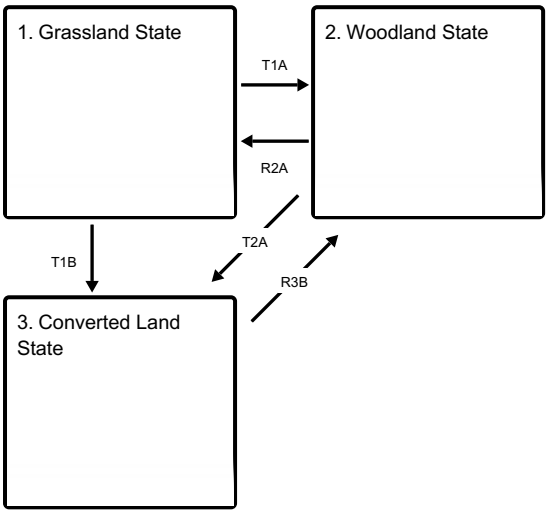
The biological processes on this site are complex. Therefore, representative values are presented in a land management context. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

Composition by dry weight and percent canopy cover are provided to describing the functional groups. Most observers find it easier to visualize or estimate percent canopy for woody species (trees and shrubs).

The following diagram suggests some pathways that the vegetation on this site might take. There may be other states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances. It does not mean that this would happen the same way in every instance. Local professional guidance should always be sought before pursuing a treatment scenario.

State and transition model

Ecosystem states



T1A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

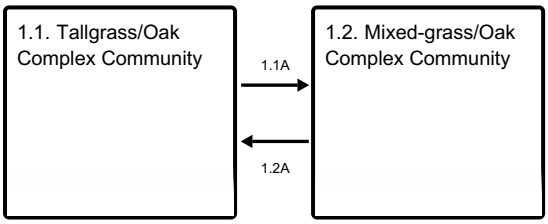
T1B - Extensive soil disturbance followed by seeding

R2A - Adequate rest from defoliation and removal of woody canopy, followed by reintroduction of historic disturbance regimes

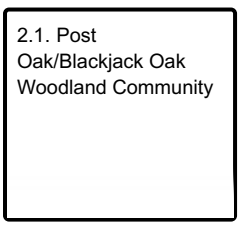
T2A - Extensive soil disturbance followed by seeding

R3B - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities

3.1. Converted Land Community

State 1
Grassland State

The Tallgrass-Oak Complex Community is believed to have been a tallgrass prairie interspersed with a 20 to 25 percent woody canopy of oaks and associated shrubs and vines. Indiangrass, switchgrass, sand bluestem, and purple tridens were characteristic tallgrasses. Midgrasses included sand lovegrass, cane bluestem, sideoats grama and silver bluestem. Post oak and blackjack oak occurred as motts in areas protected from fires. Havard oak, skunkbush sumac, prickly-ash, bumelia, greenbriar, and sand plum were common understory shrubs and vines in the motts. The woody species were apparently kept at low levels because of frequent wildfires and occasional long droughts. Forbs such as prairie clover, yellow Neptune, evening primrose, trailing wildbean, dayflower, and catclaw sensitivebriar thrived in the sandy soils. The Tallgrass/Oak Savannah Community (1.1) produced 3,000 pounds to 4,000 pounds herbage in years with good moisture and as little as 500 to 2,000 pounds in unfavorable years. The Mixed-grass/Oak Complex Community (1.2) composition of the Mixed-grass/Oak Complex Community on this site varies with time and intensity of grazing. Most reference community species are present but the dominant tallgrasses are being displaced by increases in sand lovegrass, fringed signalgrass, tumble windmillgrass, gummy lovegrass, red lovegrass and weedy forbs. Havard oak, littleleaf sumac, yucca, plum, prickly-ash, greenbriar, poison ivy and sand sagebrush increase in and around the original oak motts. Litter and soil organic matter are lower than in reference condition and some wind erosion might occur during this plant phase. Most reference forbs such as gaura, bundleflower, prairie clover, wildbean, lespedeza, evening primrose, dayflower, senna, catclaw sensitivebriar, and wild buckwheat persist in the Mixed-grass/Oak Complex Community phase. Annual yields range from 1500 to 3500 pounds.

Community 1.1
Tallgrass/Oak Complex Community

Figure 8. 1.1 Tallgrass/Oak Complex Community

The interpretive or reference plant community for this site is a Tallgrass-Oak Complex Community (1.1). It is believed to have been a tallgrass prairie interspersed with a 20 to 25 percent canopy of oaks and associated shrubs and vines. Indiangrass, switchgrass, sand bluestem and purple tridens were characteristic tallgrasses. Midgrasses included sand lovegrass, cane bluestem, sideoats grama and silver bluestem. Fall witchgrass, hooded windmillgrass, sand dropseed, sand paspalum, Scribner’s panicum and perennial threeawns were characteristic shortgrasses. Post oak and blackjack oak, with a characteristic understory of shrubs and vines, occurred as motts in areas protected from fires. Havard oak, skunkbush sumac, prickly-ash, bumelia, greenbriar, hawthorn, ivy treebine, poison ivy, and sand plum were common understory shrubs and vines in the motts. The woody species were apparently kept at low levels because of frequent wildfires and occasional long droughts. Forbs such as prairie

clover, yellow Neptune, prairie senna, evening primrose, wild buckwheat, trailing wildbean, dayflower, lespedeza, and catclaw sensitivebriar thrived in the sandy soils. It is estimated that the Tallgrass-Oak Complex Community (1.1) produced 3000 pounds to 4000 pounds herbage in years with good moisture and as little as 500 to 2000 pounds in unfavorable years. Grasses and forbs contributed up to 80 to 85 percent of the total annual production in reference condition. The tallgrasses aided in the infiltration of rainfall and reduced runoff. Little runoff is thought to have occurred under normal rainfall conditions. Litter and organic matter buildup was limited by the dry climate and low production, but ground cover is presumed to have been sufficient to prevent wind or water erosion under normal conditions. The Tallgrass-Oak Complex Community (1.1) furnished good forage for grazing or browsing type animals such as bison, deer and antelope before settlement and for horses, sheep and cattle after settlement. It was excellent habitat for deer, quail, dove, prairie chicken and other wildlife. Near reference conditions can be maintained with proper stocking, prescribed grazing and frequent prescribed burning. The site is responsive to good management, but the deep sandy soils with low water holding capacity and the presence of nearby woodland species for invasion require good management. Proper stocking and flexibility in animal numbers is important because of the nature of the soil and the need for plant cover to guard against wind erosion. Stocking rates must consider the kind of livestock and balance their numbers with current annual forage production and competition from other herbivores. Livestock overgrazing or a decrease in intensity and frequency of fires and no brush management will allow this plant community to transition into a Mixed-grass/Oak Complex Community (1.2), with the oak motts increasing in size and woody species encroaching the grassland portion.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1569	2354	3138
Tree	336	504	673
Shrub/Vine	224	336	448
Forb	112	168	224
Total	**2241**	**3362**	**4483**

Figure 10. Plant community growth curve (percent production by month). TX2293, Tallgrass Savannah Community. Tallgrass prairie with few cool-season grasses and tree/shrubs..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	2	5	15	25	20	5	5	15	6	2	0

Community 1.2
Mixed-grass/Oak Complex Community

Figure 11. 1.2 Mixed-grass/Oak Complex Community

The Mixed-grass/Oak Complex Community (1.2) is the result of the interaction of long-term overgrazing, reduction in intensity and frequency of fires and possibly climate change (Milchunas 2006). The reduction in vegetative structure and ground cover resulting from continued overgrazing reduces the competitive advantage of grasses and

allows increases in endogenous shrubs and invasion of less palatable shrubs, grasses and forbs from adjacent sites. Reduction in fire frequency and intensity allows the shrubs to become established. Continued overgrazing allows the less palatable grasses and forbs, or more grazing resistant species, to replace the more palatable tall and midgrasses. The composition of the Mixed-grass/Oak Complex on this site varies with time and intensity of grazing. Most reference community species are present but the dominant tallgrasses are being displaced by increases in sand lovegrass, fringed signalgrass, tumble windmillgrass, gummy lovegrass, red lovegrass and weedy forbs. Havard oak, littleleaf sumac, yucca, plum, prickly-ash, greenbriar, poison ivy and sand sagebrush increase in and around the original oak motts. Litter and soil organic matter are lower than in climax condition and some wind erosion might occur during this plant phase. Most climax forbs such as gaura, bundleflower, prairie clover, wildbean, lespedeza, evening primrose, dayflower, senna, catclaw sensitivebriar, and wild buckwheat persist in the Mixed-grass/Oak Complex phase. Annual yields range from 1500 to 3500 pounds. Total herbage production is slightly reduced, due primarily to fertility loss, but the proportionate production by woody species and unpalatable forbs increases as their percentage composition increases. The Mixed-grass/Oak Complex Community on the Deep Sand Ecological Site provides fair grazing for grazers, such as cattle and good habitat for browsing animals, such as deer and goats. It can be maintained and retrogression toward dense woodland reversed by proper grazing, minimal brush management and periodic prescribed burning. With continued overgrazing by livestock and no brush management, however, the shrub component of the grassland portion increases and oak motts grow in size and plant density. Concurrently, shortgrasses and weedy forbs continue to replace the tall and midgrasses. When woody plant cover reaches about 45 percent and/or the shrubs in the grassland portion become resistant to fire this community transitions into a Post Oak-Blackjack Oak Woodland (2.1) community type. Once this threshold is reached grazing management and prescribed burning will generally not be effective in maintaining the community. More costly, accelerated brush control practices will be required to reverse the trend toward dense woodland.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	757	1261	1765
Tree	420	701	981
Shrub/Vine	336	560	785
Forb	168	280	392
Total	**1681**	**2802**	**3923**

Figure 13. Plant community growth curve (percent production by month). TX2294, Mixedgrass/Oak Complex Community. Mixedgrasses with oak complex community..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	7	12	25	20	5	5	15	5	2	1

Pathway 1.1A
Community 1.1 to 1.2

Tallgrass/Oak Complex Community

Mixed-grass/Oak Complex Community

Livestock overgrazing or a decrease in intensity and frequency of fires and no brush management will allow this plant community to transition into a Mixed-grass/Oak Complex Community (1.2), with the oak motts increasing in size and woody species encroaching the grassland portion.

Pathway 1.2A
Community 1.2 to 1.1

Mixed-grass/Oak Complex Community

Tallgrass/Oak Complex Community

The Mixed-grass/Oak Complex can be maintained and restored to Tallgrass/Oak Complex Community by proper grazing and periodic prescribed burning.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Woodland State

The Post Oak/Blackjack Oak Woodland Community is a woodland community composed of post oak and blackjack oak which are usually the dominant overstory but mesquite and western soapberry can also be present. With continued heavy grazing and no brush control, the trees and shrubs can approach 85 to 90 percent or more ground cover. A dense understory of shrubs often forms to crowd out herbaceous species. Only shade-tolerant species exist in the dense woodland areas. Shortgrasses and low seral stage annual and perennial forbs occupy the woody plant interspaces. Grasses and forbs make up 30 percent or less of the annual herbage production.

Community 2.1
Post Oak/Blackjack Oak Woodland Community

Figure 14. 2.1 Post Oak/Blackjack Oak Woodland Community

The Post Oak-Blackjack Oak Woodland Community on the Deep Sand Ecological Site in MLRA 78C is a woodland resulting from many years of overgrazing, lack of periodic fires and little brush management. Post oak and blackjack oak are usually the dominant overstory but mesquite and western soapberry can be present. With continued heavy grazing and no brush control, the trees and shrubs can approach 85 to 90 percent or more ground cover. A dense understory of shrubs often forms to crowd out herbaceous species. Sand sagebrush, yucca, skunkbush sumac, littleleaf sumac, prickly-ash and sand plums are common shrubs although Havard oak may also be present. Only shade tolerant species exist in the dense woodland areas. Shortgrasses and low seral stage annual and perennial forbs occupy the woody plant interspaces. Characteristic grasses in woodland openings are threeawn, fringed signalgrass, tumble windmillgrass, gummy lovegrass, fringed paspalum, sand dropseed and red lovegrass. Forbs commonly found in this community include gaura, camphorweed, prairie clover, senna, wildbean and wild buckwheat. Numerous annual grasses and forbs may be present. Grasses and forbs make up 30 percent or less of the annual herbage production. The Post Oak/Blackjack Oak Woodland Community provides good cover for wildlife, but limited preferred forage, or browse for deer and livestock. It does produce considerable mast for turkey, quail, deer and non-game animals. Major high cost and high energy accelerating practices are required to restore

the Post Oak/Blackjack Oak Woodland Community (2.1) back to the grassland state. Generally, brush management practices such as aerial herbicide application, along with other conservation practices such as range planting, grazing deferment, prescribed grazing and prescribed burning are necessary to return the shrubland state the grassland state. In practice this may not be practical or desirable depending on objectives of the land manager.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	841	1401	1961
Shrub/Vine	504	841	1177
Grass/Grasslike	252	420	588
Forb	84	140	196
Total	**1681**	**2802**	**3922**

Figure 16. Plant community growth curve (percent production by month). TX2295, Post oak/Blackjack oak Woodland Community. Peak growth of trees, grasses, shrubs and annuals during spring and fall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	6	10	20	22	6	8	12	10	2	1

State 3
Converted Land State

The Converted Land State is cropped annually with forage, fiber, grain, or wildlife food plots. This state can also be cleared, plowed, and planted into native or exotic pasture grass species. The community may be left abandoned and let ‘go back’ to the native species. Various stages of secondary succession prevail until the oak woodland forms.

Community 3.1
Converted Land Community

Figure 17. 3.1 Converted Land Community

The Deep Sand Ecological Site is often cultivated and planted to crops and native/introduced pasture grass species. This leads to the Converted Land Community. Technical advice as to adapted crops, cropping systems, production, and cultivation practices are available from local NRCS or Extension Service offices. When abandoned from cropping, the site should be re-vegetated with adapted native plant mixtures, which include historic climax species. Cultivation and erosion may have reduced soil productivity but near historic forage production may be obtained with a native plant mix that approximates reference species composition. Introduced species often require more care, but can also be productive. In any case brush management is required to prevent brush invasion from adjacent areas. If fields are abandoned and left to re-vegetate naturally, weedy grasses, forbs and shrubs will be the first species in secondary succession. Even without grazing, woody species will encroach and eventually

dominate unless brush management practices such as individual plant treatments (IPT) and prescribed burning are applied.

Transition T1A
State 1 to 2

With continued overgrazing by livestock and no brush management, however, the shrub component of the grassland portion increases and oak motts grow in size and plant density. Once this threshold is reached grazing management and prescribed burning will generally not be effective in maintaining the community. More costly, accelerated brush control practices will be required to reverse the trend toward dense woodland.

Transition T1B
State 1 to 3

brush removal practices, crop cultivation, plowing, pasture planting, pest management and nutrient management, the Grassland State can be converted into the Converted Land State.

Restoration pathway R2A
State 2 to 1

Major high cost and high energy accelerating practices are required to restore the Post Oak/Blackjack Oak Woodland Community (2.1) back to a grassland state. Generally, brush management practices such as aerial herbicide application, along with other conservation practices such as range planting, grazing deferment, prescribed grazing and prescribed burning are necessary to return the shrubland state the grassland state.

Conservation practices

Brush Management
Prescribed Burning
Range Planting
Prescribed Grazing

Transition T2A
State 2 to 3

With brush removal practices, crop cultivation, plowing, pasture planting, pest management and nutrient management, the Woodland State can be converted into the Converted Land State.

Restoration pathway R3B
State 3 to 2

With land abandonment, no brush management, heavy continuous grazing, brush invasion, no pest management, and no nutrient management, the Converted Land Community can be shifted to the Woodland State.

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	**Tallgrasses**			1121–2242	
	Indiangrass	SONU2	*Sorghastrum nutans*	280–897	–
	sand bluestem	ANHA	*Andropogon hallii*	280–897	–
	switchgrass	PAVI2	*Panicum virgatum*	280–560	–
	purpletop tridens	TRFL2	*Tridens flavus*	280–560	

	purpletop tridens	TRFL2	*Tridens flavus*	280–560	–
2	**Midgrasses**			224–448	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	56–112	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	56–112	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	56–112	–
	sand lovegrass	ERTR3	*Eragrostis trichodes*	56–112	–
3	**Shortgrasses**			112–224	
	purple threeawn	ARPU9	*Aristida purpurea*	11–22	–
	Wright's threeawn	ARPUW	*Aristida purpurea var. wrightii*	11–22	–
	hooded windmill grass	CHCU2	*Chloris cucullata*	11–22	–
	fall witchgrass	DICO6	*Digitaria cognata*	11–22	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	11–22	–
	thin paspalum	PASE5	*Paspalum setaceum*	11–22	–
	crowngrass	PASPA2	*Paspalum*	11–22	–
	tumblegrass	SCPA	*Schedonnardus paniculatus*	11–22	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	11–22	–
	fringed signalgrass	URCI	*Urochloa ciliatissima*	11–22	–
Forb					
4	**Forbs**			224–448	
	whitemouth dayflower	COER	*Commelina erecta*	20–56	–
	prairie clover	DALEA	*Dalea*	20–56	–
	bundleflower	DESMA	*Desmanthus*	20–56	–
	buckwheat	ERIOG	*Eriogonum*	20–56	–
	beeblossom	GAURA	*Gaura*	20–56	–
	lespedeza	LESPE	*Lespedeza*	20–56	–
	littleleaf sensitive-briar	MIMI22	*Mimosa microphylla*	20–56	–
	yellow puff	NELU2	*Neptunia lutea*	20–56	–
	evening primrose	OENOT	*Oenothera*	20–56	–
	senna	SENNA	*Senna*	20–56	–
	fuzzybean	STROP	*Strophostyles*	20–56	–
Shrub/Vine					
5	**Shrubs/Vines**			224–448	
	sand sagebrush	ARFI2	*Artemisia filifolia*	15–45	–
	sorrelvine	CITR2	*Cissus trifoliata*	15–45	–
	Carolina coralbead	COCA	*Cocculus carolinus*	15–45	–
	hawthorn	CRATA	*Crataegus*	15–45	–
	prairie clover	DALEA	*Dalea*	15–45	–
	plum	PRUNU	*Prunus*	15–45	–
	Havard oak	QUHA3	*Quercus havardii*	15–45	–
	fragrant sumac	RHAR4	*Rhus aromatica*	15–45	–
	littleleaf sumac	RHMI3	*Rhus microphylla*	15–45	–
	saffron plum	SICE2	*Sideroxylon celastrinum*	15–45	–

	[illegible]	[illegible]	[illegible]	[illegible]	
	greenbrier	SMILA2	*Smilax*	15–45	–
	eastern poison ivy	TORA2	*Toxicodendron radicans*	15–45	–
	pricklyash	ZANTH	*Zanthoxylum*	15–45	–
Tree					
6	**Trees**			336–673	
	post oak	QUST	*Quercus stellata*	202–448	–
	western soapberry	SASAD	*Sapindus saponaria var. drummondii*	34–78	–
	American elm	ULAM	*Ulmus americana*	34–78	–
	hackberry	CELTI	*Celtis*	34–78	–
	blackjack oak	QUMA3	*Quercus marilandica*	34–78	–

Animal community

Many types of grassland savannah type reptiles, birds and mammals used the Historic Climax Plant Community of the Deep Sand Ecological Site along with adjacent sites. Small mammals include many kinds of rodents, black-tailed jackrabbit, eastern and desert cottontail, ground squirrel, badger and skunk. Predators include coyote and bobcat. Prairie chicken, quail, doves, songbirds, and birds of prey were indigenous or frequent users. Most are still plentiful. Bison made infrequent migratory use and pronghorn antelope and deer were indigenous. Bison and pronghorns are no longer present, but deer still utilize the Deep Sand site in its various states. Rio Grande turkeys find good habitat requirements in all vegetation states.

The site is suitable for production of many kinds of wildlife and livestock. In the grassland state (1.0) it is primarily suited to grass eaters such as cattle. As livestock caused retrogression occurs and woody plants invade the woodland State (2.0) it becomes better habitat for deer and woodland wildlife because of the browse and forbs. Livestock should be stocked according to the available grass, forb and browse forage, keeping competition for forbs and browse with deer in mind.

Hydrological functions

The Deep Sand Ecological Site is found on gently sloping to nearly level topography which is somewhat excessively drained. The surface soils of the Eufaula series are hummocky, brown fine sands that have continuous bands of sandy clay loam and fine sandy loam at a depth of 44 to 100 inches. Associated Nimrod soils have a surface layer of brown fine sand underlain by a layer of mottled sandy clay loam. The soils are rapidly permeable and have low available water capacity. Natural fertility and organic matter is low. Wind erosion is a hazard where the site is not protected by vegetation. Wind erosion blowouts can occur on areas not protected by vegetation.

In reference condition, the grassland vegetation intercepted and utilized much of the incoming rainfall. Hydrologic functions are representative of a tallgrass savannah. Litter and soil movement is slight except on steeper slopes. Deposition or erosion is uncommon. However, standing plant cover, duff and soil organic matter decrease as the Tallgrass/Oak Savannah Community (1.1) transitions to the Mixed-grass/Oak Complex Community (1.2). During the transition, evaporation and interception losses are higher, resulting in less moisture reaching the soil. Soil erosion plus a loss of fertility may take place. The woody plants compete for moisture with the remaining grasses and forbs further reducing production and ground cover in openings. Once the Post Oak-Blackjack Oak becomes dense woodland the hydrological and ecological processes, nutrient cycling and energy flow, stabilize within the woody plant canopy and woodland type ecological processes dominate (Thurow 1991).

Recreational uses

The site has value from an aesthetic standpoint. The undulating topography and savannah/woodland vegetation make it an interesting site. Hunting, camping, hiking, bird watching, photography and horseback riding are possibilities. Good spring rainfall brings scattered stands of colorful forbs.

Wood products

Oaks may be used for firewood, posts and charcoal.

Other products

Honey is made from flowering plants.

Other information

None.

Inventory data references

Information presented has been derived from the Deep Sand Range Sites PE 33-36 (old area 3 dated 12/1/72), PE 33-36 (old Area 8 dated 3/16/79) and 38-44 (old area 8 dated 6/18/75), literature, personal experience, field observations and personal contacts with range-trained personnel. Photos by: J.L. Schuster.

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Acknowledgments

Site Development and Testing Plan
Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.
Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

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)	Lem Creswell, Zone RMS, NRCS, Weatherford ZO
Contact for lead author	817-596-2865
Date	04/04/2008
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:** 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 HCPC.

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% 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. There may be some old vegetated hummocks.

7. **Amount of litter movement (describe size and distance expected to travel):** Under normal rainfall, little litter movement should be expected, however, litter of all sizes may move long distances depending on obstructions under intense storm events

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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):** 0-40" thick with colors from brown fine sand to reddish yellow fine sand with generally single grained structure. SOM is approximately 1-2%. See soil survey for specific soils information.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The savannah of has warm-season tallgrasses and forbs along with motts of post and blackjack oak. There should be adequate litter and little bare ground which 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):** No evidence of compaction under HCPC.

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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: Trees >

    Other: Warm-season midgrasses > Shrubs = Forbs > Warm-season shortgrasses

    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 group.

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 2000-4000 lbs/ac

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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: Post oak, mesquite, juniper, plum, yucca, western soapberry

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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 or wildfires.
