USDA Natural Resources
Conservation Service

Ecological site R084CY193TX
Sandy 37-43 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.

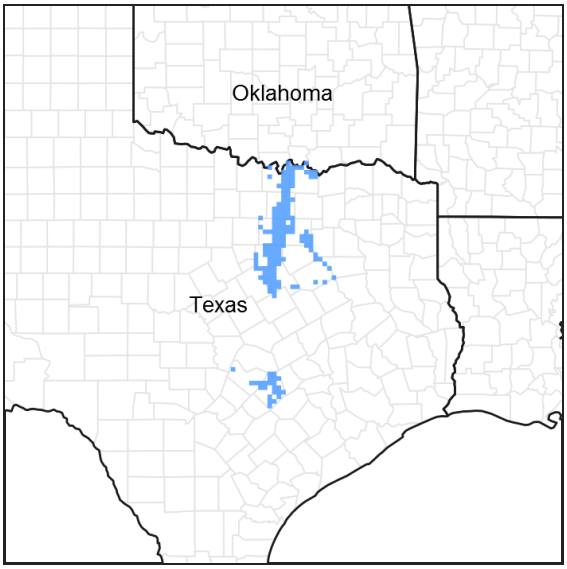


Figure 1. Mapped extent

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): 084C–East Cross Timbers

MLRA 84C is characterized by ridges, hillsides and valleys underlain by interbedded sandstones and shales of Cretaceous age. Most soils support oak savannah vegetation, however much of the area has been subject to fragmentation and urban sprawl.

Classification relationships

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

Ecological site concept

These sites occur over sandy soils on uplands. The reference vegetation includes a mosaic of mid and tallgrasses and oak trees with various forbs and legumes. Without periodic fire or brush management, woody canopy cover will increase and lead to a significant shift in the plant community.

Associated sites

R084CY195TX	**Tight Sandy Loam 37-43 PZ** Savannah site with clayey subsoils.

Similar sites

R084BY172TX	**Sandy 29-33" PZ** Sandy site in Western Cross Timbers.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on nearly level to sloping soils in the East Cross Timbers. This site has a thick sandy surface that takes in water rapidly.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Paleoterrace (3) Ridge (4) Hillslope
Runoff class	Negligible to low
Elevation	400–1,000 ft
Slope	0–8%
Water table depth	20–60 in

Climatic features

The climate is subhumid subtropical and is characterized by hot summers and relatively mild winters. Tropical maritime air controls the climate during spring, summer and fall. In winter and early spring, frequent surges of polar Canadian air cause sudden drops in temperatures and add considerable variety to the daily weather. The average first frost should occur around November 5 and the last freeze of the season should occur around March 19.

The average relative humidity in mid-afternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 75 percent of the time possible during the summer and 50 percent in winter. The prevailing wind direction is from the south and highest wind speeds occur during the spring months.

Approximately two-thirds of annual rainfall occurs during the April to September period. Rainfall during this period generally falls during thunderstorms, and fairly large amounts of rain may fall in a short time. The driest months are usually July and August.

Table 3. Representative climatic features

Frost-free period (characteristic range)	204-217 days
Freeze-free period (characteristic range)	225-246 days
Precipitation total (characteristic range)	37-41 in
Frost-free period (actual range)	203-221 days
Freeze-free period (actual range)	221-258 days
Precipitation total (actual range)	36-43 in

Frost-free period (average)	210 days
Freeze-free period (average)	237 days
Precipitation total (average)	39 in

Climate stations used

- (1) ARLINGTON SIX FLAGS [USC00410337], Arlington, TX
- (2) GAINESVILLE 5 ENE [USC00413420], Gainesville, TX
- (3) GRAPEVINE DAM [USC00413691], Grapevine, TX
- (4) PILOT POINT ISL DU BOI [USC00417028], Pilot Point, TX
- (5) DALLAS FT WORTH AP [USW00003927], Dallas, TX
- (6) DENISON DAM [USC00412394], Cartwright, TX
- (7) WHITNEY DAM [USC00419715], Clifton, TX
- (8) BURLESON [USC00411246], Burleson, TX
- (9) CLEBURNE [USC00411800], Cleburne, TX
- (10) DENTON 2 SE [USC00412404], Denton, TX
- (11) HILLSBORO [USC00414182], Hillsboro, TX

Influencing water features

These upland sites may shed some water via runoff during heavy rain events. The presence of good ground cover and deep rooted grasses can help facilitate infiltration and reduce sediment loss.

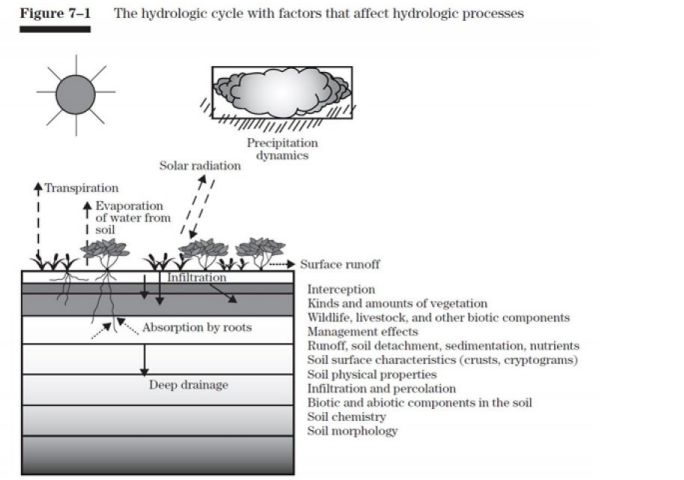


Figure 8.

Soil features

Representative soil components for this ecological site include: Coving, Gasil, Heaton, Konsil, Silawa, and Silstid

The site is characterized by a sandy surface with a high infiltration rate and a loamy subsoil with moderate permeability.

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone (2) Residuum–sandstone
Surface texture	(1) Fine sand (2) Loamy fine sand
Drainage class	Somewhat poorly drained to well drained
Permeability class	Moderate
Soil depth	80 in

Available water capacity (0-40in)	5–8 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	5.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–8%

Ecological dynamics

Like many sites across the Great Plains, changes in disturbance initiated by permanent settlements has had a profound impact on the ecological dynamics of the Sandy ecological site. Historically, the site was influenced by periodic fires during all seasons of growth. These fires were often the result of dry lightning strikes or anthropogenic fires set by Native Americans. The fire frequency during the period prior to settlement is estimated between 2 to 5 years for the southern Great Plains. These frequent fires were often followed by grazing of migratory bison herds attracted to the new growth of grass. This led to a shifting mosaic between burned/grazed and unburned and ungrazed landscapes.

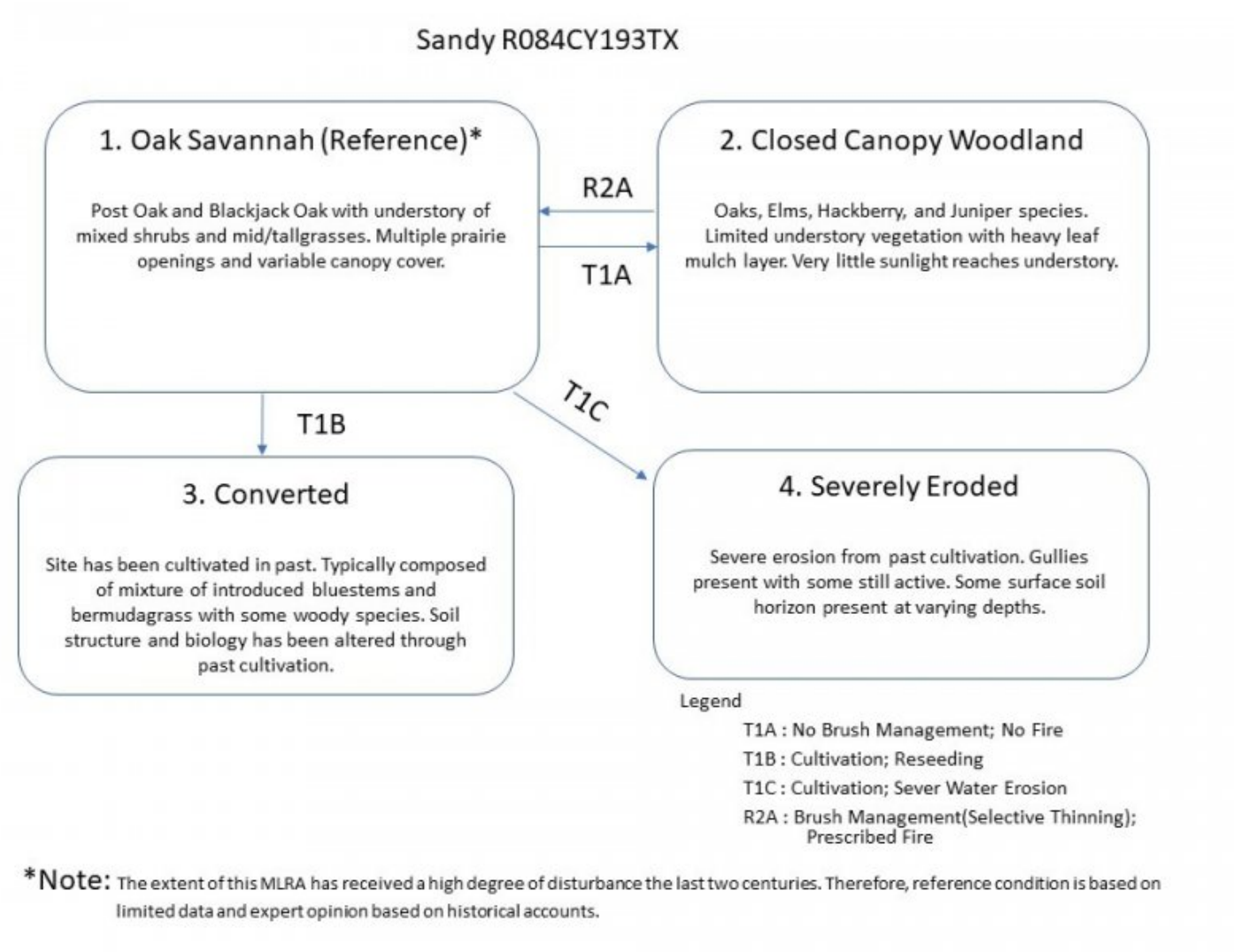
With the removal if fire and the introduction of conventional livestock fencing, the landscape began to change to more homogeneous vegetation patterns and altered plant communities. Gently sloping sites like the Sandy site were often broke out for crop production also. This led to a highly fragmented, highly disturbed landscape we see today across much of MLRA 84C.

While parts of the MLRA are still intact prairie, they often lack the evolutionary fire and grazing interactions that help shape the historic reference plant communities.

State and Transitional Pathways:
The following diagram suggests some pathways that vegetation on the ecological site might take in response to various treatments or natural stimuli over time. There may be other states that are not shown on this diagram. This information identifies the changes in plant communities that occur due to management practices and natural factors. The plant communities described here are commonly observed on this ecological site. The local NRCS field office has information available to assist with planning and development of the plant community for specific purposes.

Changes in plant community makeup may be due to many factors. Change may occur slowly or in some cases, fairly rapidly. As vegetative changes occur, certain thresholds are crossed. A threshold means that once a certain point is reached during the transition of one community to another, a return to the previous state may not be possible without the input of some form of energy. This often means intervention with practices that are not part of natural processes. An example might be the application of herbicide to control some woody species to reduce their population and encourage more grass and forbs growth. Merely adjusting grazing practices would probably not accomplish any significant change in a plant community once certain thresholds are crossed. The amount of energy required to effect change in community would depend on the present vegetative state and the desired change.

State and transition model



State 1
Oak Savannah

This is the reference state for the Sandy ecological site. It represents the historic range of variability in the plant communities with the periodic disturbance of fire and grazing. It is a mosaic of herbaceous plants, oak species and woody understory vines and shrubs. The dominant trees are post oak and black jack oak with a mixture of tall and midgrasses, forbs and shrubs in the understory and canopy interspaces. Dominant herbaceous plants include little bluestem, big bluestem, Indiangrass, switchgrass, beaked panicum, purpletop tridens, sand lovegrass, and wildryes. Other grasses include dropseeds, sedges, and Scribner's panicum. Forbs include Sunflowers, Englemann daisy, tickclover, lespedezas, wildbeans, yellow Neptune, echinacea, and guara. Other woody plants include elms, greenbriar, plums, grapes, hawthorn, American beautyberry, coralberry, and Carolina snailseed. These woody species will increase in ground cover in the absence of fire. These sites are similar in species composition to Sand Loam sites, however, they tend to be less productive and more sensitive to drought conditions. Woody canopy in the reference state is complex with some areas having dense oak canopy mixed with multiple prairie openings. For planning and management purposes, the average woody canopy in reference condition can be described as less than 40%. The Sandy Loam site is estimated to produce between 2,000 – 4,500 pounds of vegetative production per year in reference condition. Tallgrasses = Midgrasses Trees Forbs Shrubs

Community 1.1

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1400	2800	3150
Tree	300	600	675
Forb	200	400	450
Shrub/Vine	100	200	225
Total	**2000**	**4000**	**4500**

State 2
Closed Canopy Woodland

Figure 10. Silstid soils, Hill County, TX

This state represents the shift to a woody dominated plant community with woody canopy exceeding 60 percent. Trees and shrubs dominate the ecological processes on the site and the herbaceous grasses and forbs are limited to shade tolerant species. There is an abundance of leaf litter build up which further limits herbaceous plant germination and production.

State 3
Converted

This state represents a change in land use from rangeland to pastureland. The soil structure and biology has been altered and the site is dominated by introduced species. Management of introduced forages requires more inputs than native grasses. Careful consideration should be taken prior to planting to ensure the result meets the desired use. Ratings for forage yields can be found under the non-irrigated crop yield section in web soil survey. As with any fertility management program, current soil tests should be taken before planting and subsequent fertilization of introduced pastures. The most common forage species on these sites include bermudagrass and Old World bluestems(eg. KR bluestem). Without brush management, woody species such as mesquite, juniper, elm, or honey locust may invade these sites. There may be opportunities to plant native grass species on these sites to restore the reference plant communities. The success of this type of restoration is highly variable and depends on the remaining soil resources and past management. This type of endeavor often requires site specific planning and evaluation. However, the species described in the reference state are a good resource for initial planning of any restoration project.

State 4
Severely Eroded

Cultivation of these sites may lead to severe erosion. Depending on slope and farming practices, a significant amount of the A horizon may be eroded from the soil profile. This soil loss results in the transition to the Severely Eroded State.

Transition T1A
State 1 to 2

Without periodic fire or brush management the reference state will transition to the Closed Canopy Woodland state. Woody species will continue to increase and lead to mesophication of the plant community with increased woody canopy and increase in shade-tolerant species.

Transition T1B
State 1 to 3

Most of these sites were cultivated for crop production during the settlement of the area. Many of them have been planted to monocultures of introduced forage grasses in recent years. When these sites are cultivated, the soil properties are significantly altered from the reference state. Soil structure, hydrology and biology have been impacted and the site is transitioned to the Converted State.

Transition T1C
State 1 to 4

Cultivation of these sites may lead to severe erosion. Depending on slope and farming practices, a significant amount of the A horizon may be eroded from the soil profile. This soil loss results in the transition to the Severely Eroded State.

Restoration pathway R2A
State 2 to 1

At this point it will take significant inputs to remove woody species and restore the savannah state. This will require some selective thinning of woody species and the re-introduction of fire to the ecosystem. This process may take 5 years or more depending on woody canopy and past management. Grazing management including some deferment will be required to help reestablish the herbaceous plant community.

Additional community tables

Animal community

Domestic livestock and white-tail deer are the dominant grazers and browsers of the site. Various songbirds and small mammals may also find use of these areas. As the site changes towards the woody dominated community, 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

These sites occur on uplands and shed water to adjacent sites lower on the landscape. Some sites may also receive some run-on water. The presence of deep-rooted tallgrasses can help facilitate percolation of water into the soil profile.

Inventory data references

Soil Survey Manuscript Tarrant County, TX
Soil Survey Manuscript Denton County, TX

Other references

These site descriptions were developed as part a Provisional ESD project using historic soil survey manuscripts, available range site descriptions, and low intensity field traverse sampling.

Contributors

Colin Walden, Soil Survey Region 9

Approval

David Kraft, 1/17/2019

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)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

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

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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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):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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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):**

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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:

    Sub-dominant:

    Other:

    Additional:

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

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:

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17. **Perennial plant reproductive capability:**
