USDA Natural Resources Conservation Service

Ecological site R086BY007TX
Clayey Bottomland

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.

MLRA notes

Major Land Resource Area (MLRA): 086B–Texas Blackland Prairie, Southern Part

MLRA 86B, the Southern Part of the Texas Blackland Prairie is located in east-central Texas. It makes up about 2,925 square miles (7,585 square kilometers). The towns of Brenham, Caldwell, La Grange, Schulenberg, Hallettsville, and Navasota are in the eastern part while Lincoln, Benchley, and Normangee are in the western part. The area supports tall and mid-grass prairies, but improved pasture, croplands, and urban development account for the majority of the acreage.

Classification relationships

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

Ecological site concept

The Clayey Bottomland has soils that are very deep clays and are associated with flooding regimes. Their heavy-textured soils cause water to drain slowly may potentially pond for many days.

Associated sites

R086BY002TX	**Claypan Prairie** The Claypan Prairie Site occupies large flats and provides runoff water to the Clayey Bottomland Site.
R086BY003TX	**Clay Loam** The Clay Loam site is usually adjacent to the Clayey Bottomland Site. Occupies large flats and provides runoff water to the Clayey Bottomland Site.
R086BY005TX	**Blackland** The Blackland Site occurs at higher elevation in the drainage and provides runoff to the Clayey Bottomland Site.

Similar sites

R086BY006TX	**Loamy Bottomland** The Loamy Bottomland sites occupy floodplains, like the Clayey Bottomland, but the textures are different and do not stay inundated as long.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified

Herbaceous	(1) *Carex* (2) *Elymus virginicus*

Physiographic features

This site is nearly level and occurs along major rivers and their tributaries.

Table 2. Representative physiographic features

Landforms	(1) Valley > Flood plain
Runoff class	Negligible to high
Flooding duration	Brief (2 to 7 days) to very long (more than 30 days)
Flooding frequency	Occasional to frequent
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	100–550 ft
Slope	0–1%
Ponding depth	0–6 in
Water table depth	0–72 in
Aspect	Aspect is not a significant factor

Climatic features

The climate for MLRA 86B is humid subtropical and is characterized by hot summers, especially in July and August, and relatively mild winters. Tropical maritime air controls the climate during spring, summer and fall. In winter and early spring, frequent surges of Polar Canadian air cause sudden drops in temperatures and add considerable variety to the daily weather. When these cold air masses stagnate and are overrun by moist air from the south, several days of cold, cloudy, and rainy weather follow. Generally, these occasional cold spells are of short duration with rapid clearing following cold frontal passages. The summer months have little variation in day-to-day weather except for occasional thunderstorms that dissipate the afternoon heat. The moderate temperatures in spring and fall are characterized by long periods of sunny skies, mild days, and cool nights. Rainfall during the spring and summer months generally falls during thunderstorms, and fairly large amounts of rain may fall in a short time. High intensity rains of short duration are likely to produce rapid runoff almost anytime during the year. The amount of rain that falls varies considerably from month-to-month and from year-to-year.

Table 3. Representative climatic features

Frost-free period (average)	254 days
Freeze-free period (average)	280 days
Precipitation total (average)	42 in

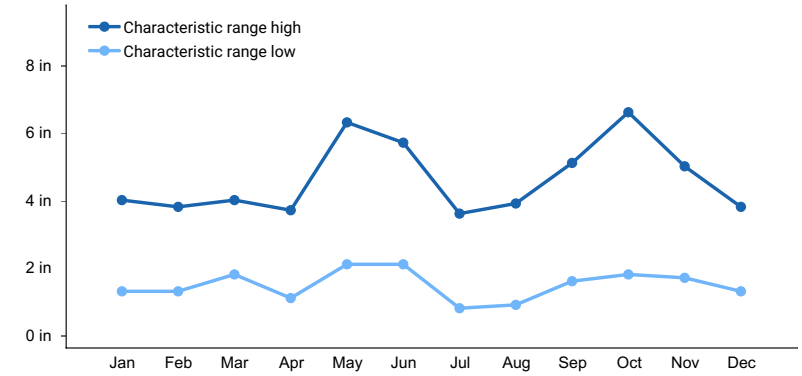


Figure 1. Monthly precipitation range

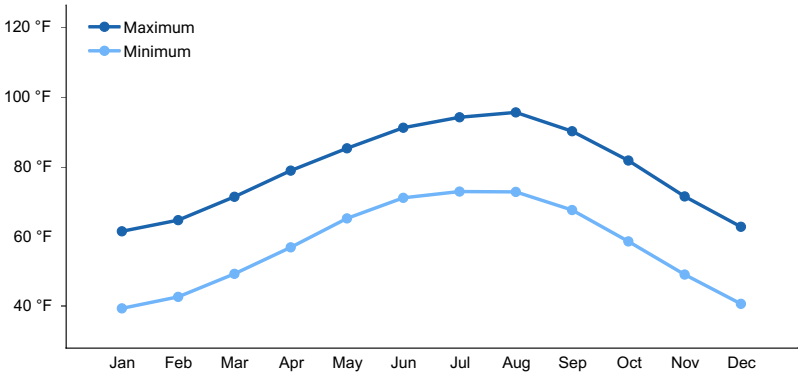


Figure 2. Monthly average minimum and maximum temperature

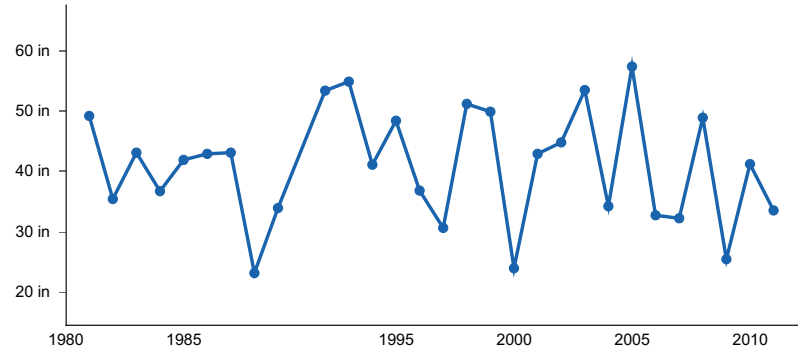


Figure 3. Annual precipitation pattern

Climate stations used

- (1) BRENHAM [USC00411048], Brenham, TX
- (2) HALLETTSVILLE 2 N [USC00413873], Hallettsville, TX
- (3) FLATONIA 4SE [USC00413183], Moulton, TX
- (4) WASHINGTON SP [USC00419491], Navasota, TX
- (5) LEXINGTON [USC00415193], Lexington, TX

Influencing water features

This site is adjacent to rivers and streams. It receives overflow water from these watercourses and runoff from higher adjacent sites.

Wetland description

Some soils in this site are hydric and may be wetlands or the soils may contain inclusions of other hydric soils that usually occur as oxbows or stream meanders.

Soil features

The soils of this site are deep clays. They receive extra water as overflow from watercourses or as runoff from adjacent higher sites. Having high shrink-swell characteristics, the soils crack when dry. In this condition, they take in water rapidly. When the soil becomes wet and the cracks close, permeability becomes very slow. The soils are very fertile and hold large amounts of water for plant use. They have a high wilting point which reduces forage yields in extremely dry years.

Soils correlated include: Belk, Ganado, Gladewater, Kaufman, Navasota, Roetex, Ships, Sumpf, Tinn, Trinity, and Zilaboy.

Table 4. Representative soil features

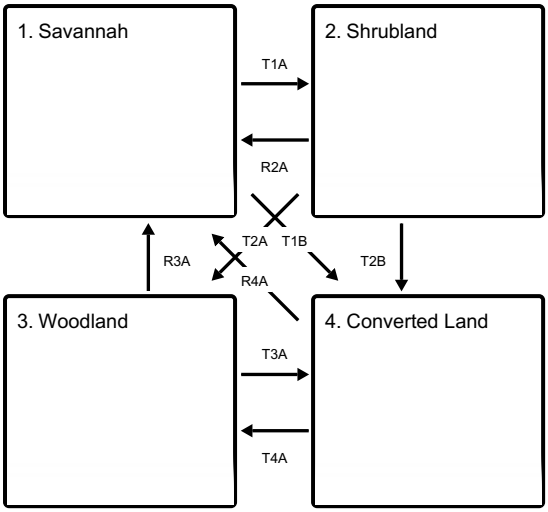
Parent material	(1) Alluvium–mudstone
Surface texture	(1) Clay
Family particle size	(1) Clayey
Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Very slow
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	5–7 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–4
Soil reaction (1:1 water) (0-40in)	5.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–3%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Natural fertility, presence of shade, proximity to water, and nutritious forage make this site a preferred grazing area. The wet nature of the site protects it from grazing at times, but during dry conditions it is often the first site to be overused. Virginia wildrye (*Elymus virginicus*), eastern gamagrass (*Tripsacum dactyloides*), switchcane (*Arundinaria gigantea*), switchgrass (*Panicum virgatum*), and sedges (Carex spp.) decrease in abundance and are replaced by dallisgrass (*Paspalum dilatatum*), common Bermudagrass (*Cynodon dactylon*), and carpetgrass (*Axonopus fissifolius*) as abusive grazing continues. Shrubs and hardwood saplings invade the site in the absence of proper grazing management and brush management. Prolonged mismanagement or abandonment allows the site to become a hardwood forest dominated by water oak (*Quercus nigra*), willow oak (*Quercus phellos*), overcup oak (*Quercus lyrata*), and cedar elm (*Ulmus crassifolia*) on non-calcareous sites. Green ash (*Fraxinus pennsylvanica*), cottonwood (Populus spp.), pecan (*Carya illinoinensis*), cedar elm, and sugarberry (*Celtis laevigata*) grow on calcareous sites.

State and transition model

Ecosystem states



T1A - No brush management, heavy continuous grazing, abandonment

T1B - Brush management, crop cultivation, pasture planting, nutrient management, pest management

R2A - Brush management, prescribed grazing

T2A - No brush management, heavy continuous grazing, abandonment

T2B - Brush management, crop cultivation, pasture planting, nutrient management, pest management

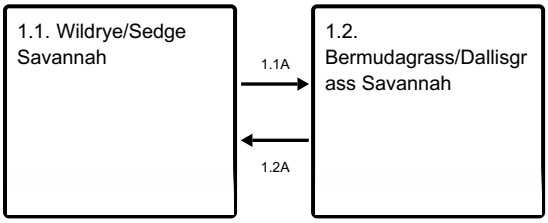
R3A - Brush management, range planting, prescribed grazing

T3A - Brush management, crop cultivation, pasture planting, nutrient management, pest management

R4A - Range planting, prescribed grazing

T4A - No brush management, heavy continuous grazing, abandonment

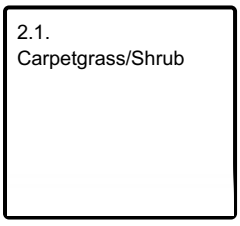
State 1 submodel, plant communities



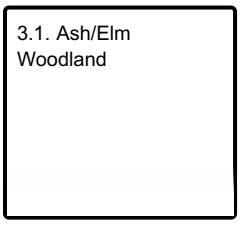
1.1A - Yearly heavy continuous grazing

1.2A - Prescribed grazing

State 2 submodel, plant communities



State 3 submodel, plant communities



State 4 submodel, plant communities

4.1. Converted Land

State 1
Savannah

Two communities exist in the Savannah State: the 1.1 Wildrye/Sedge Savannah Community and the 1.2 Bermudagrass/Dallisgrass Savannah Community. Community 1.1 is characterized by tall and midgrass dominating the understory, with 20 percent woody cover by ash and elm. Community 1.2 is characterized by a replacement in the understory by introduced invasive herbaceous species.

Community 1.1
Wildrye/Sedge Savannah

Figure 5. 1.1 Wildrye/Sedge Savannah Community

The reference plant community of this site is a savannah. Oak, elm, hackberry (Celtis spp.), cottonwood, ash, black willow (*Salix nigra*), pecan, and other large trees provide about a 40 percent canopy. The overstory canopy is denser immediately adjacent to the watercourse. The understory includes hawthorn (Crataegus spp.), greenbriar (Smilax spp.), Alabama supplejack (*Berchemia scandens*), peppervine (Ampelopsis arborea), grape (Vitis spp.), trumpet creeper (Parthenocissus spp.) and honeysuckle (*Lonicera japonica*). Sedges, Virginia wildrye, switchcane, broadleaf woodoats (*Chasmanthium latifolium*), and rustyseed paspalum (*Paspalum langei*) dominate the herbaceous plant community in shaded and wet areas. Various combinations of beaked panicum (*Panicum anceps*), switchgrass, Indiangrass, big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), eastern gamagrass, vine mesquite (*Panicum obtusum*), and Florida paspalum (*Paspalum floridanum*) may dominate drier, open areas. Continuous yearlong grazing for a succession of years will tend to move the reference herbaceous plant community towards a herbaceous community of common bermudagrass, dallisgrass, carpetgrass, giant ragweed (*Ambrosia trifida*), and annual sumpweed (*Iva annua*). Prescribed grazing may shift this herbaceous community back towards the reference herbaceous species. Continuous yearlong grazing with no weed or brush management or abandoning the site for several years will tend to move towards a shrub-sapling community. Once woody shrubs and saplings invade the site, brush management, in some form, must be used to move back toward the savannah state. Prescribed burning is not usually a viable management tool on this site because of high moisture in the fine fuels.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2800	3850	4900
Tree	800	1100	1400
Forb	200	275	350
Shrub/Vine	200	275	350
Total	**4000**	**5500**	**7000**

Community 1.2
Bermudagrass/Dallisgrass Savannah

Figure 7. 1.2 Bermudagrass/Dallisgrass Savannah

The herbaceous community is dominated by common Bermudagrass, dallisgrass, carpetgrass, giant ragweed, and annual sumpweed. White clover (Trifloium repens), vetch (*Vicia sativa*), and annual ryegrass (Lolium multiflorum) may also occur. This community develops from years of heavy continuous grazing. Prescribed grazing may shift this community back towards the Wildrye/Sedge Savannah Community.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2000	2500	3000
Forb	1000	1250	1500
Tree	800	1100	1400
Shrub/Vine	200	275	350
Total	**4000**	**5125**	**6250**

Pathway 1.1A
Community 1.1 to 1.2

Wildrye/Sedge Savannah

Bermudagrass/Dallisgrass Savannah

The Wildrye/Sedge community will transition to the Bermudagrass/Dallisgrass community when continuous, yearlong heavy grazing occurs. The native understory species will begin to be replaced by invasive grasses.

Pathway 1.2A
Community 1.2 to 1.1

Bermudagrass/Dallisgrass Savannah

Wildrye/Sedge Savannah

The transition back to the reference community can occur if prescribed grazing is applied. Invader species may require control to keep from proliferating.

State 2
Shrubland

One community exists in the Shrubland State, the 2.1 Carpetgrass/Shrub Community. It is characterized by an increase in shade tolerant grasses and 20 to 40 percent overstory canopy.

Community 2.1
Carpetgrass/Shrub

Figure 9. 2.1 Carpetgrass/Shrub Community

This plant community is a transitional community between the Savannah and Woodland State. It develops in the absence of proper grazing management and mechanical or chemical 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 occurring cedar elm, water oak, hackberry, pecan, cottonwood, and green ash - honey locust (*Gleditsia triacanthos*), Chinese tallow (*Triadica sebifera*), and eastern persimmon (*Diospyros virginiana*) increase in density and canopy coverage (20 to 40 percent). Species whose seeds are windblown (elm, cottonwood, ash) or animal dispersed (persimmon, pecan, Chinese tallow) are the first to colonize and dominate the site. Remnants of Virginia wildrye and eastern gamagrass may still occur but the herbaceous component of the community becomes dominated by lesser producing grasses and forbs. Shade-tolerant species such as broadleaf woodoats, longleaf woodoats (*Chasmanthium sessiliflorum*), Cherokee sedge (*Carex cherokeensis*), ironweed (Veronia baldwinii), buttercup (Ranunculus spp.), and goldenrod (Solidago spp.) are the most abundant species as canopy cover increases. Prescribed burning is not a viable option for returning this community to a savannah due to the moisture content in and lack of quantity of herbaceous fine fuels. Mechanical or chemical brush control as well as prescribed grazing must be applied to move this vegetative state back towards the reference plant community.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	1300	1750	2250
Grass/Grasslike	1150	1550	1950
Shrub/Vine	300	400	500
Forb	250	350	450
Total	**3000**	**4050**	**5150**

State 3
Woodland

One community exists in the Woodland State, the Ash/Elm Woodland Community. It is characterized by shade tolerant grasses and an overstory canopy of 40 to 80 percent.

Community 3.1
Ash/Elm Woodland

Figure 11. 3.1 Ash/Elm Woodland Community

This plant community is a closed overstory (40 to 80 percent) woodland dominated by green ash, cedar elm, overcup oak, water oak, willow oak, pecan, cottonwood, sycamore (Plantanus occidentalis), and black willow. Understory shrubs and sub-shrubs include yaupon, farkleberry (*Vaccinium arboreum*), possumhaw (*Ilex decidua*), American beautyberry (*Callicarpa americana*), and hawthorn. Woody vines also occur and include Alabama supplejack (*Berchemia scandens*), poison ivy (*Toxicodendron radicans*), grape, greenbrier, trumpet creeper, Virginia creeper (*Parthenocissus quinquefolia*), and peppervine. A herbaceous understory is almost nonexistent but shade tolerant species including longleaf uniola, broadleaf woodoats, sedges, ironweed, ice plant (*Verbesina lindheimeri*), switchcane, eastern gamagrass, and goldenrod may occur in small amounts. Prescribed fire is not a viable treatment option for conversion of this site back to a semblance of the Wildrye/Sedge Savannah. Broadcast chemical brush control is not a treatment option either, however, individual plant treatment with herbicides on small acreages may be a viable option. Mechanical treatment of this site, along with seeding, is the most viable treatment option although probably not economical.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	2800	3850	4900
Shrub/Vine	650	900	1150
Grass/Grasslike	300	400	500
Forb	100	150	200
Total	**3850**	**5300**	**6750**

State 4
Converted Land

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

Figure 13. 4.1 Converted Land Community

Conversion of this site to cropland (primarily cotton) 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.

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	5000	6300	7600
Forb	2000	2750	3500
Total	**7000**	**9050**	**11100**

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 and prescribed grazing. 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 40 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 need 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.

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

Additional community tables

Table 10. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Cool-season grasses**			1435–2450	

1	**Cool-season grasses**			1435–2450	
	sedge	CAREX	*Carex*	1435–2450	–
	Virginia wildrye	ELVI3	*Elymus virginicus*	1435–2450	–
2	**Tallgrasses**			1005–1715	
	beaked panicgrass	PAAN	*Panicum anceps*	1005–1715	–
	rustyseed paspalum	PALA11	*Paspalum langei*	1005–1715	–
	switchgrass	PAVI2	*Panicum virgatum*	1005–1715	–
	eastern gamagrass	TRDA3	*Tripsacum dactyloides*	1005–1715	–
3	**Warm-season grasses**			430–735	
	big bluestem	ANGE	*Andropogon gerardii*	430–735	–
	buffalograss	BODA2	*Bouteloua dactyloides*	430–735	–
	Indian woodoats	CHLA5	*Chasmanthium latifolium*	430–735	–
	longleaf woodoats	CHSE2	*Chasmanthium sessiliflorum*	430–735	–
	cylinder jointtail grass	COCY	*Coelorachis cylindrica*	430–735	–
	deertongue	DICL	*Dichanthelium clandestinum*	430–735	–
	twoflower melicgrass	MEMU	*Melica mutica*	430–735	–
	nimblewill	MUSC	*Muhlenbergia schreberi*	430–735	–
	Florida paspalum	PAFL4	*Paspalum floridanum*	430–735	–
	vine mesquite	PAOB	*Panicum obtusum*	430–735	–
	redtop panicgrass	PARI4	*Panicum rigidulum*	430–735	–
	little bluestem	SCSC	*Schizachyrium scoparium*	430–735	–
	marsh bristlegrass	SEPA10	*Setaria parviflora*	430–735	–
	Indiangrass	SONU2	*Sorghastrum nutans*	430–735	–
	longspike tridens	TRST2	*Tridens strictus*	430–735	–
Forb					
4	**Forbs**			175–300	
	ticktrefoil	DESMO	*Desmodium*	175–300	–
	lespedeza	LESPE	*Lespedeza*	175–300	–
	prairie snoutbean	RHLA5	*Rhynchosia latifolia*	175–300	–
	fuzzybean	STROP	*Strophostyles*	175–300	–
5	**Forbs**			25–50	
	great ragweed	AMTR	*Ambrosia trifida*	25–50	–
	annual marsh elder	IVAN2	*Iva annua*	25–50	–
	giant goldenrod	SOGI	*Solidago gigantea*	25–50	–
	Baldwin's ironweed	VEBA	*Vernonia baldwinii*	25–50	–
	white crownbeard	VEVI3	*Verbesina virginica*	25–50	–
Shrub/Vine					
6	**Shrubs/Vines**			200–350	
	Alabama supplejack	BESC	*Berchemia scandens*	200–350	–
	parsley hawthorn	CRMA5	*Crataegus marshallii*	200–350	–
	possumhaw	ILDE	*Ilex decidua*	200–350	–
	yaupon	ILVO	*Ilex vomitoria*	200–350	–
	oakwoods dewberry	RULA5	*Rubus largus*	200–350	–
	saw greenbrier	SMBO2	*Smilax bona-nox*	200–350	–

	cat greenbrier	SMGL	*Smilax glauca*	200–350	–
Tree					
7	**Trees**			800–1400	
	bitternut hickory	CACO15	*Carya cordiformis*	800–1400	–
	pecan	CAIL2	*Carya illinoinensis*	800–1400	–
	sugarberry	CELAL	*Celtis laevigata var. laevigata*	800–1400	–
	green ash	FRPE	*Fraxinus pennsylvanica*	800–1400	–
	overcup oak	QULY	*Quercus lyrata*	800–1400	–
	water oak	QUNI	*Quercus nigra*	800–1400	–
	willow oak	QUPH	*Quercus phellos*	800–1400	–
	black willow	SANI	*Salix nigra*	800–1400	–
	western soapberry	SASAD	*Sapindus saponaria var. drummondii*	800–1400	–
	bald cypress	TADI2	*Taxodium distichum*	800–1400	–
	cedar elm	ULCR	*Ulmus crassifolia*	800–1400	–

Animal community

As a component of the Southern Blackland Prairie MLRA, the Clayey Bottomland Site provided habitat to bison, deer, turkey, migratory birds and large predators such as wolves, coyotes, mountain lions, and black bear. White-tailed deer, turkey, fox and gray squirrels, coyotes, bobcats, feral hogs, and migratory birds find suitable habitat in these bottomland sites today. The favorable moisture regime of this site attracts many species of wildlife during the hot dry summer months when the quality and quantity of forages on upland sites may be lacking. Where old mast producing oaks and pecan trees are present, this site provides habitat for deer, turkey, squirrels, and ducks, especially during the winter. If the site transitions to the Ash/Elm Woodlands, the quality of the habitat for deer, turkey, squirrels, and migratory birds declines.

Hydrological functions

Peak rainfall periods occur in May and June from frontal passage thunderstorms and in September and October from tropical systems, as well as frontal passages. Rainfall amounts may be high (three to five inches per event) and events may be intense. The site is subject to erosion along adjacent stream banks where adequate herbaceous cover is not maintained 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 site may be periodically inundated from overflow water from adjacent watercourses and may be ponded or saturated for long periods. This site may be a wetland or contain wetland inclusions as oxbows or stream meanders.

Recreational uses

Hunting, camping, bird watching, equestrian.

Wood products

Water oak and willow oak provides material for hardwood flooring, plywood, veneer, and crossties. Green ash is used for bats, tool handles, and furniture. Post oak and water oak are used for firewood. Rattan is used for furniture.

Other products

Blackberries, grapes, plums, and pecans are often 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

Diggs, G.M., B.L. Lipscomb, and R.J. O'Kennon. 1999. Illustrated Flora of North Central Texas Botanical Research Institute of Texas and Austin College, Fort Worth, TX.

Hatch, S.L, K.N. Gandhi, and L.E. Brown. 1990. Checklist of the vascular plants of Texas. Texas Agricultural Experiment Station, College Station, TX.

Contributors

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Approval

Bryan Christensen, 9/21/2023

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	06/23/2005
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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2. **Presence of water flow patterns:** Water flow patterns are common and follow old stream meanders. Deposition or erosion is uncommon for normal rainfall but may occur during intense rainfall events.

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

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Expect no more than 20 percent 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

7. **Amount of litter movement (describe size and distance expected to travel):** This is a floodplain with occasional out-of-bank flow. 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.

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.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface is 0 to 48 inches thick with colors from dark reddish brown clay to very dark gray clay with generally subangular blocky structure. SOM is approximately 1 to 6 percent.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The savannah of trees, shrubs, vines, grasses, and forbs with adequate litter and little bare ground provides for maximum infiltration and little runoff under normal rainfall events.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No evidence.

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 > Cool-season midgrasses >>

    Sub-dominant: trees >

    Other: shrubs/vines > forbs

    Additional:

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

14. **Average percent litter cover (%) and depth (in):** Dominant litter is herbaceous with small to large woody litter common.

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

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 chinese tallow, huisache, honey locust, bois d'arc, elm, ash, McCartney rose, dallisgrass, Bermudagrass, johnsongrass, annual sumpweed, and giant ragweed.

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