



Nacogdoches Comprehensive Plan Update

CHAPTER 4 Environment & Natural Resources

Nestled in the Piney Woods of Deep East Texas, Nacogdoches has many environmental attributes and natural resources which contribute to the community's scenic beauty, uniqueness and local charm. Natural resources found in and around the City, including the piney woods, Lake Nacogdoches, and the many creeks and bayous, serve as valuable recreational, educational, environmental and economic resources to the community. These resources should be preserved to ensure their continued use and enjoyment by present and future generations. Additionally, the area's natural resources require careful management and impose constraints on the type and extent of development and growth Nacogdoches can accommodate.

The purpose of this element is to ensure long-term conservation and protection of the unique and valued environmental attributes of the City. This element also identifies areas where various environmental constraints could limit or influence future growth and development.

The policy considerations and recommendations identified in this element will be coordinated with the actions, growth management tools, development regulations and other strategies relating to land use, parks and recreation, open space conservation and acquisition, drainage, utilities and neighborhood enhancement.

Key Issues

- ◆ **Protecting and Conserving Natural Assets** – Careful planning and management of land uses within Nacogdoches is important to ensure the preservation and protection of valued resources. Future development should be coordinated

with the physical environment, placing a premium upon developing in harmony with existing natural features. Natural resources should be preserved and protected to ensure their continued use and enjoyment by current and future generations. Through land conservation, open space preservation and parkland acquisition, these resources can continue to be valuable assets to the community and provide scenic beauty, enhance the local economy, contribute to floodplain and wildlife management, and provide a variety of recreational and tourism-related opportunities.

- ◆ **Managing Creeks, Bayous and Floodplain Areas** – The creeks and bayous that traverse the community serve as an important natural resource and amenity to Nacogdoches. They are important to floodplain management and provide habitat for a variety of wildlife and plant species. They also contribute to the scenic beauty of the area and provide for recreation opportunities, including hiking and biking. Conservation and sound use of creek and bayou corridors should be balanced with flood management practices and needs. Floodplain areas should not be encroached upon by future development unless such development complies with stringent floodplain management practices. To the extent practicable, floodplains should remain undeveloped or be used for parks and other recreational purposes or for agricultural activities.
- ◆ **Protecting Forested Areas and Critical Species Habitat** – Given its Piney Woods setting, the Nacogdoches area is surrounded by native forest, which primarily includes southern pine and mixed hardwoods. Like other natural amenities in the area, the wooded areas in Nacogdoches are an essential part of the community's character and provide natural areas for wildlife, recreation opportunities and outstanding scenery. Additionally, trees and wooded areas incorporated into site development projects in the City and its extraterritorial jurisdiction (ETJ) provide buffers between uses, appealing developments, and linkages for wildlife to other natural areas. Sensitive development areas, including natural habitats, should be preserved and managed as natural environments whenever possible, while efforts should be made to incorporate and preserve trees and wooded areas into the design of developments in the City.



The protection and management of critical habitat areas is crucial to sustaining the diversity of species in the Nacogdoches area. Critical habitat areas should be protected from encroaching development and other human impacts that would place the survival of a threatened or endangered species in jeopardy or negatively impact its habitat.

- ◆ **Preserving Water Quality** – Maintaining and enhancing the community's water quality is important to the continued safe use of major water bodies for public drinking water, aquatic life and recreational use. The Nacogdoches area is part of the Lower Angelina watershed, with two major water bodies located in the Nacogdoches study area, Lake Nacogdoches and La Nana Creek (also known as La Nana Bayou). Through storm water management, open space preservation, careful land development and best management practices, the water quality of area waterways can be maintained and enhanced to ensure that these water bodies support their designated uses. Maintaining good air quality also yields valuable long-term health and economic competitiveness benefits.

Goals, Objectives & Actions

Protecting and Conserving Natural Assets

Goal: Conservation and protection of valued environmental resources in the Nacogdoches area.

Goal: Development that is compatible with the natural environment.

Objectives

- ◆ Guide future development patterns within the context of the physical environment and natural features of the community.
- ◆ Steer future development away from environmentally sensitive areas and incorporate sustainable design techniques into development plans and programs.
- ◆ Use regulatory and development review procedures to ensure that land development in valued areas does not overwhelm the natural setting, cause significant environmental impacts, or result in sprawling development patterns.
- ◆ Promote safe and sustainable development along steep slopes while minimizing environmental disturbances and protecting views and vistas.

Actions

- Evaluate floodplains, soils, vegetation and other physical and natural features to identify the most appropriate sites for various land uses and development types.
- Encourage compact development that emphasizes design with the natural environment, including maximum preservation of trees and open space.
- Integrate sustainable design concepts into future development plans and programs.
- Establish appropriate design and engineering standards for developments on steep slopes.
- When reviewing proposed developments, consider the land's capacity to handle the type and intensity of proposed development, including topography, soil capability, stability, permeability and other relevant soil characteristics.

- Identify areas not appropriate for significant development as “conservation areas,” including forested and critical habitat areas, areas with extreme topography and/or significant views, and flood-prone areas.
- Protect priority conservation areas through conservation easements, density bonuses or through fee simple acquisition.
- Coordinate with the state, other government agencies, and non-profit organizations in natural resource conservation and protection.

Managing Creeks, Bayous and Floodplain Areas

Goal: Creeks, bayous and floodplain areas that are managed in an environmentally sound manner, ensuring their continued use for floodplain management, wildlife habitat and recreation.

Objectives

- ◆ Promote environmentally sound access to and use of lakes, creeks and bayous.
- ◆ Preserve floodplain areas for use as conservation areas, public open space and linear linkages between neighborhoods.

Actions

- Encourage the development of appropriate, compatible and environmentally sensitive land uses through zoning and other development regulations and guidelines around the City's creeks and bayous.
- Utilize flood-prone areas along the bayous and creeks for trails, open space and greenbelts.
- Ensure development within the floodplain is in conformance with all applicable federal, state, regional and local development regulations.
- Continue preservation of the La Nana and Banita creek corridors through land conservation, open space preservation and land acquisition.
- Continue development of La Nana Creek Trail.
- Use conservation easement techniques for reserving land for long-term preservation and potential public access while maintaining private land ownership.

Protecting Forested Areas and Critical Species Habitat

Goal: Preservation of scenic beauty and natural habitat areas.

Objectives

- ◆ Protect valued natural areas from adverse development impacts.
- ◆ Manage valued natural areas, including forested and/or critical species habitat areas, as environmental preserve or recreational areas.
- ◆ Preserve the natural aesthetic qualities of the community by ensuring that developments incorporate natural features and amenities into their design.

Actions

- Engage in tree preservation and planting efforts along major corridors and at entrances into the community.
- Create and implement a tree preservation ordinance in which trees are conserved and incorporated into the design of new developments.

- Incorporate conservation subdivision design techniques into residential developments, where residential neighborhoods are designed more compactly and unbuildable land area is designated as permanent open space.
- Identify forested areas not suitable for significant development as conservation and/or recreation areas.
- Avoid significant development in or near sensitive habitat areas.
- Obtain conservation easements either through purchase or donation to protect sensitive habitat areas.
- Protect and manage wildlife habitats through the establishment of land leases and cooperative agreements.
- Coordinate with state and federal agencies in the protection of natural areas and habitats.

Preserving Water Quality

Goal: Excellent water quality in the Nacogdoches area.

Objectives

- ◆ Maintain and enhance the condition of area waterways for urban, recreational, and habitat and wildlife use.

Actions

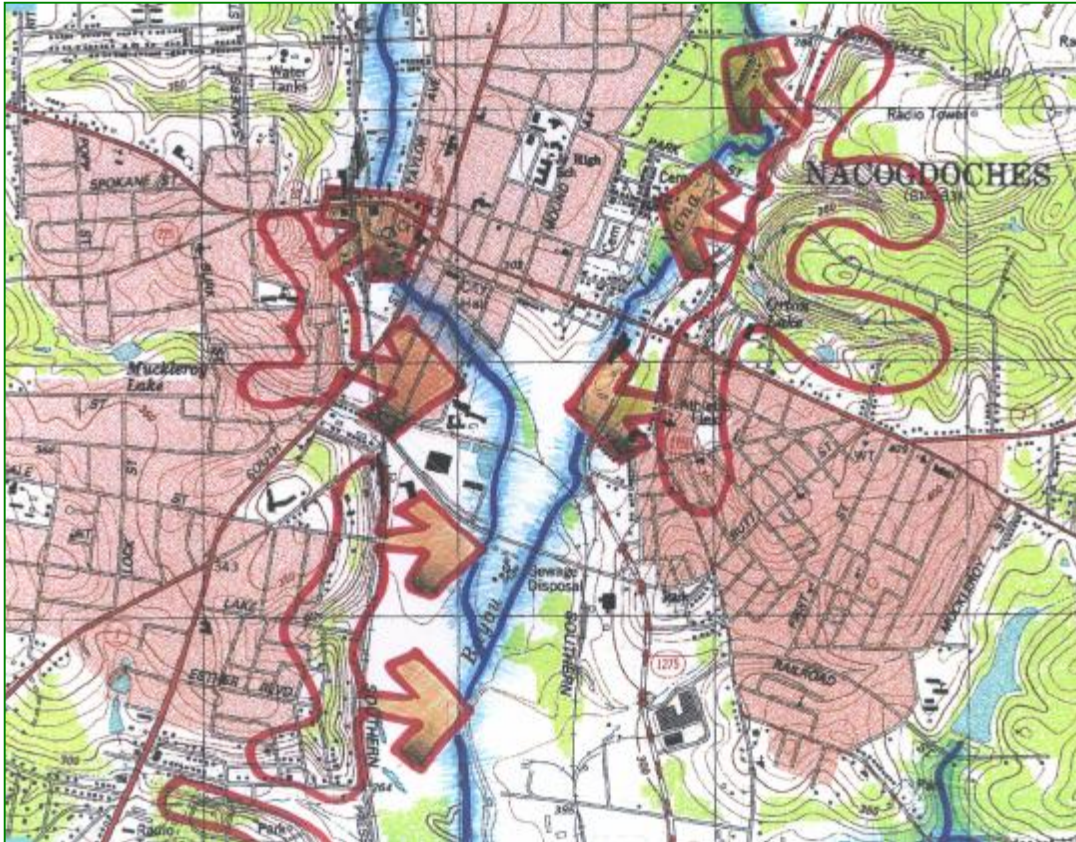
- Monitor the Texas Clean Rivers Program, statewide Water Quality Inventory reports, and other state and federal programs which periodically report on water quality status and trends for La Nana Creek (listed as La Nana Bayou).
- Minimize the impact of commercial and industrial operations on the surrounding environment through best management practices and storm water management requirements.
- Continue strict enforcement of pollution prevention controls at construction sites to minimize contaminated stormwater runoff to area streams.
- Control stormwater runoff by limiting impervious cover, increasing vegetation, and constructing retention and detention ponds.
- Maintain wastewater treatment facilities at the highest standard and address effluent problems expeditiously to limit adverse impacts on area receiving waters.

Sensitive Development Areas/Development Constraints

Valued features of the natural landscape in Nacogdoches, including the creeks and bayous, forested areas, topography and vegetation, offer both opportunities and challenges in land use planning. These natural amenities provide opportunities for parks and recreation development, tourism, and open space and wildlife habitat preservation. However, these natural features, including floodplains, steep slopes and forested areas, also impose constraints on the type and extent of development within the community.

Future development in Nacogdoches should be coordinated with the physical environment, accounting for existing natural features. These natural features in the community require careful management and planning to determine appropriate uses and standards for their development. During the plan development process, a sketch map was prepared highlighting key natural

resources in the Nacogdoches area, including floodplains, steep slopes, forested areas, and creeks and bayous. The map also identifies, in general terms, more sensitive development areas which require careful management and may impose limitations on development due to the presence of several of these natural features. This map was used throughout the comprehensive planning process, particularly for preparing the Future Land Use and Thoroughfare Plan maps, and is on file with the City of Nacogdoches Planning Department.



Excerpt from the Environmental Resources map prepared for the comprehensive planning process (creeks and associated floodplains are highlighted in blue, steep slope areas – and potential scenic views – are indicated in red).

Existing Conditions

Soils

The *Soil Survey for Nacogdoches County*, published by the federal Natural Resource Conservation Service, groups soils into 11 major categories as listed in **Table 4.1**. These categories are based on soil associations, which are landscapes that have a distinct pattern of soils in defined portions. The Nacogdoches area consists primarily of Libert-Darco in the southern part of the planning area, Nacogdoches-Tarwick in the central and northern part of the planning area, and Tuscosso-Hannahatchee soils located around the creeks and bayous.

Libert-Darco soils are sandy, well drained and gently sloping to sloping. These soils are appropriate for urban uses, with their main limitation being their sandy surface. Nacogdoches-Tarwick soils are loamy, well drained, gently sloping to moderately steep soils. These soils are appropriate for pastureland and woodlands and have a medium potential for urban uses. Their main limitations include low strength and steepness of slope. Tuscosso-Hannahatchee soils are

loamy, moderately well drained and frequently flooded soils. These soils are considered not appropriate for urban uses because of flooding. Although the county soil survey indicates limitations and constraints on the suitability of these soils for various types of urban developments, engineering expertise and modern design and construction technology have enabled development to occur throughout Nacogdoches as in other parts of the state and nation where challenging physical and environmental characteristics are found.

Table 4.1
General Soils Association, Nacogdoches County
Nacogdoches Comprehensive Plan Update
Nacogdoches, Texas

Soil	Description	Limitation for Urban Use
Nacogdoches Tarwick	Loamy, well drained, gently sloping to moderately steep soils that have moderately slow permeability	Low strength and steepness
Sacul Suthbert	Loamy, moderately well drained and well drained, gently sloping to moderately steep soils that have slow and moderately slow permeability, found on uplands	Shrink swell potential, steepness
Woodtell-Lacerda	Loamy and clayey, moderately well drained and somewhat poorly drained, nearly level to moderately steep soils that have very slow permeability, found on uplands	Shrink swell potential, wetness, very slow permeability
Sacul-Kirvin	Loamy, moderately well drained and well drained, gently sloping and sloping soils that have slow and moderately slow permeability, found on uplands	Shrink swell potential, low strength
Libert-Darco	Sandy, well drained, gently sloping to sloping soils that have moderately slow and moderate permeability, found on uplands	Sandy surface
Cuthbert-Tenaha	Loamy and sandy, well drained, sloping to moderately steep soils that have moderately slow and moderate permeability, found on uplands	Steep slopes
Tonkawa	Sandy, excessively drained, gently sloping to moderately steep soils that have rapid permeability, found on uplands	Sand surface
Darco-Tenaha	Sandy, well drained, gently sloping to moderately sloping steep soils that have moderate permeability, found on uplands	Steep slopes
Mantachie-Marietta	Loamy, somewhat poorly drained and moderately well drained, frequently flooded soils that have moderate permeability, found on bottom lands	Flooding
Tuscosso-Hannahatchee	Loamy, moderately well drained, frequently flooded soils that have moderately slow and moderate permeability, found on bottom lands	Flooding
Attoyac-Bernaldo-Besner	Loamy, well drained, nearly level to gently sloping soils that have moderate permeability, found on terraces	

Source: *Soil Survey of Nacogdoches County, Texas*, U.S. Department of Agriculture, 1980

Topography

Nacogdoches County is located in the Western Gulf Coastal Plain. The County is bound on the west by the Angelina River, on the east by the Attoyac Bayou, and on the south by the Sam Rayburn Reservoir. The land surface in Nacogdoches County is nearly level to steep, with elevation ranging from 130 feet above sea level in the southeastern part of the county to more than 725 feet in the northwestern part. Steep slopes (slopes greater than 30 percent) are located throughout the Nacogdoches area as generally depicted on the environmental resources map cited earlier in the chapter. Human impact and development on steep slopes can adversely affect the environment and diminish views and scenic quality.

Floodplain

The creeks and bayous in Nacogdoches, including La Nana Creek and Banita Creek, are surrounded by 100-year and 500-year floodplains. The extent of floodplains within the Nacogdoches planning area is shown in the environmental resources map as well as the Future Land Use Plan map. Other portions of the community may also experience periodic flooding, but the floodplain areas are where urban development will be impacted most directly and frequently by rising



waters.

Wetlands

Wetlands are defined as “areas that are inundated by surface or ground water with a frequency to support vegetation or aquatic life that requires saturated or seasonally saturated soil conditions.” Typical wetlands include swamps, bogs, marshes and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats and natural ponds. Ecologically, wetlands are a unique and critical habitat for many species of plants and wildlife. The U.S. Army Corps of Engineers performs field investigations to identify “jurisdictional” wetlands – those considered a part of “waters of the United States.” Permits are required for

activities impacting federally identified wetlands under Section 404 of the Clean Water Act (involving discharges of dredge/fill material) and Section 10 of the Rivers and Harbors Act of 1899. The extent of floodplain areas identified by the Federal Emergency Management Agency (FEMA) also is indicative of where wetlands are more likely to be found, although all floodplain areas are not necessarily considered jurisdictional wetlands.

Based on National Wetland Inventory maps, wetlands are scattered randomly throughout Nacogdoches County. Coordination with the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, the Texas Parks and Wildlife Department and other environmental agencies is recommended during planning for future land development to identify potential wetlands locations that may be impacted by such development. Such coordination should occur for specific project sites on a case-by-case basis. National Wetland Inventory maps for the Nacogdoches planning area were obtained for this Comprehensive Plan Update and are on file with the City of Nacogdoches Planning Department.

Surface Water

The two major surface water bodies in the Nacogdoches area are Lake Nacogdoches and La Nana Creek. Lake Nacogdoches, located 10 miles southwest of the City, is a 2,210 surface acre reservoir and serves as the City's water supply source. The dam and reservoir are located on Loco Creek, a tributary of the Angelina River. In addition to meeting the City's water supply needs, the reservoir provides recreation opportunities and includes two lakeside parks. The Eastside Park is three acres and includes picnic tables, a swimming area and a boat ramp. The Westside Park is 40 acres and includes picnic pavilions, picnic tables, barbecue pits, a swimming area, a nature trail and a boat ramp. According to the Texas Natural Resource Conservation Commission (recently renamed the Texas Commission on Environmental Quality, or TCEQ), Lake Nacogdoches has been classified for the following uses: aquatic life, contact recreation, fish consumption and public water supply.

La Nana Creek (La Nana Bayou) runs from the confluence of the Angelina River south of Nacogdoches to the upstream perennial portion of the stream north of Nacogdoches. The creek is a freshwater stream and has been classified by the TCEQ for aquatic life use, contact recreation use and fish consumption use. A trail is located along the creek from East Austin to Main Street.

Water Quality

The Texas Commission on Environmental Quality (TCEQ) is the lead state agency responsible for monitoring status and trends in water quality statewide. Under the federal Clean Water Act as well as state statutes, the TCEQ must report periodically on water quality conditions and problems needing attention. In particular, the Clean Water Act requires that states annually prepare a list of impaired water bodies that are not supporting, or at risk of not supporting, their designated water uses. Such uses are established through the state surface water quality standards and can include contact and noncontact recreation (involving the degree of bodily exposure to the water); various quality levels of aquatic habitat; public drinking water supply; general use; fish consumption; and, oyster waters use, among other use categories.

The U.S. Environmental Protection Agency (EPA) requires that all water bodies be classified into one of five categories based on how they meet their designated uses. According to the Draft 2002 Texas Water Quality Inventory List, La Nana Bayou is classified as Category 5c, a water body that does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants. Based on 2002 standards, La Nana Bayou does not support contact recreation use due to elevated levels of bacteria. The bayou does fully support its aquatic life use. Lake Nacogdoches is classified as Category 2, with some of the designated uses attained, no use threatened, and insufficient or no data and information available for other attainment determinations. The lake supports its public water supply use. However, it was not assessed for aquatic life, recreation or fish consumption uses.

Depending on the extent and severity of these concerns, next steps could include more focused monitoring and study, possible regulatory action or public advisories, public education efforts, or other water quality management measures. The TCEQ also must indicate whether water quality problems are likely the result of point sources and/or nonpoint sources of pollution. As opposed to obvious "end-of-pipe" locations where industries and cities discharge their treated wastewater, "nonpoint sources" involve numerous urban and agricultural activities scattered across the landscape. These activities can impact water quality when storm runoff carries contaminants into nearby waters. Nonpoint source pollution is now the main cause of degraded water quality in Texas and the U.S. following the dramatic success of federal and state point source regulations since 1970.

Threatened and Endangered Species

Listed in Table 4.2 are the rare species found in Nacogdoches County. Species are listed by their federal and state status and as to whether they are threatened or endangered. A threatened species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. An endangered species is in danger of extinction throughout all or a significant portion of its range.





Environment & Natural Resources

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As shown, there are three federally listed threatened or endangered species in Nacogdoches County: the black bear, red cockaded woodpecker and bald eagle. In addition to these three species, there are 11 species listed as threatened on the state list.

Forested Areas

A significant amount of undeveloped land within the City and ETJ consists of forestland. Large tracts of forested areas are present throughout the City and along creek corridors. Additionally, a majority of the ETJ consists of forestland, with scattered agriculture and urban and rural development.

Table 4.2
Rare Species
 Nacogdoches Comprehensive Plan Update
 Nacogdoches, Texas

AMPHIBIANS	Federal Status	Texas Status
Southern Redback Salamander (<i>Plethodon serratus</i>) - found under rocks, rotten logs, and mosses in forested areas; in dry summer months occurs in and near damp areas; most active in spring and fall		
BIRDS		
Arctic Peregrine Falcon (<i>Falco peregrinus tundrius</i>) - potential migrant	DL	T
Bachman's Sparrow (<i>Aimophila aestivalis</i>) - open pine woods with scattered bushes or understory, brushy or overgrown hillsides, overgrown fields with thickets and brambles, grassy orchards; nests on ground against grass tuft or under low shrub		T
Bald Eagle (<i>Haliaeetus leucocephalus</i>) – found primarily near seacoasts, rivers, and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds	LT-PDL	T
Henslow's Sparrow (<i>Ammodramus henslowii</i>) - wintering individuals (not flocks) found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking		
Red-cockaded Woodpecker (<i>Picoides borealis</i>) - cavity nests in older pine (60+ years); forages in younger pine (30+ years); prefers longleaf, shortleaf, & loblolly	LE	E
Swallow-tailed Kite (<i>Elanoides forficatus</i>) - lowland forested regions, especially swampy areas, ranging into open woodland; marshes, along rivers, lakes, and ponds; nests high in tall tree in clearing or on forest woodland edge, usually in pine, cypress, or various deciduous trees		T
Wood Stork (<i>Mycteria americana</i>) – forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960		T
FISHES		
Creek Chubsucker (<i>Erimyzon oblongus</i>) - small rivers and creeks of various types; seldom in impoundments; prefers headwaters, but seldom occurs in springs; young typically in headwater rivulets or marshes; spawns in river mouths or pools, riffles, lake outlets, upstream creeks		T
Paddlefish (<i>Polyodon spathula</i>) - prefers large, free-flowing rivers, but will frequent impoundments with access to spawning sites; spawns in fast, shallow water over gravel bars; larvae may drift from reservoir to reservoir		T
MAMMALS		
Black Bear (<i>Ursus americanus</i>) - due to similar field characteristics, treat all east Texas black bears as federal and state listed Threatened; bottomland hardwoods and large tracts of inaccessible forested areas	T/SA	T
Louisiana Black Bear (<i>Ursus americanus luteolus</i>) - possible as transient; bottomland hardwoods and large tracts of inaccessible forested areas	LT	T
Plains Spotted Skunk (<i>Spilogale putorius interrupta</i>) – catholic in habitat; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie		

**Table 4.2
Rare Species (Continued)
Nacogdoches Comprehensive Plan Update
Nacogdoches, Texas**

REPTILES	Federal Status	Texas Status
Southeastern Myotis (<i>Myotis austroriparius</i>) - roosts in cavity trees of bottomland hardwoods, concrete culverts, and abandoned man-made structures		
Rafinesque's Big-eared Bat (<i>Corynorhinus rafinesquii</i>) - roosts in cavity trees of bottomland hardwoods, concrete culverts, and abandoned man-made structures		T
Alligator Snapping Turtle (<i>Macrolemys temminckii</i>) - deep water of rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near deep running water; sometimes enters brackish coastal waters; usually in water with mud bottom and abundant aquatic vegetation; may migrate several miles along rivers; active March-October; breeds April-October		T
Louisiana Pine Snake (<i>Pituophis ruthveni</i>) - mixed deciduous-longleaf pine woodlands; breeds April-September	C1	T
Texas Horned Lizard (<i>Phrynosoma cornutum</i>) - most likely introduced; open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September		T
Timber/Canebrake Rattlesnake (<i>Crotalus horridus</i>) - swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland; limestone bluffs, sandy soil or black clay; prefers dense ground cover, i.e. grapevines or palmetto		T
VASCULAR PLANTS		
Southern lady's-slipper (<i>Cypripedium kentuckiense</i>) - the only <i>Cypripedium</i> in east Texas; dry to mesic forests in various topographic positions; flowering April-June		
Texas screwstem (<i>Bartonia texana</i>) - sandy soils in dry mesic pine or mixed pine-oak forests and forest borders; usually in fire-maintained longleaf pine savannas, but also in more mesic habitats; flowering (June-?)		
Barbed rattlesnake-root (<i>Prenanthes barbata</i>)		
Texas trillium (<i>Trillium pusillum</i> var. <i>texanum</i>) - acid hardwood bottoms and lower slopes, often in or downslope from acid sphagneous hillside seeps; flowering March-mid April		

LE, LT - Federally Listed Endangered/Threatened
 PE, PT - Federally Proposed Endangered/Threatened
 E/SA, T/SA - Federally Endangered/Threatened by Similarity of Appearance
 C1 - Federal Candidate, Category 1; information supports proposing to list as endangered/threatened
 DL, PDL - Federally Delisted/Proposed Delisted
 E, T - State Endangered/Threatened
 "Blank" - Rare, but with no regulatory listing status

Source: Texas Parks and Wildlife