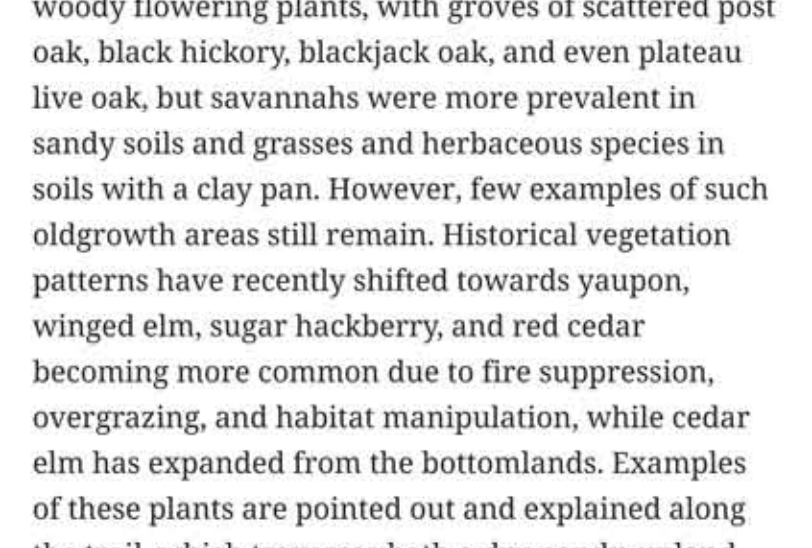


East Texas Arboretum Nature Trail Guide

Carl D. Frentress Hickory Loop

Carl Frentress, as the local Texas Parks and Wildlife wetland and waterfowl biologist, became involved with the arboretum at its inception in the late 1990s to help develop its natural areas for his fellow East Texans. He planned and cleared the original trail, created interpretive information, and improved the lowlands by cutting brush and transplanting bog-adapted plants to establish an open wetland ecosystem. This bronze plaque, which commemorates his contributions, is fastened to a slab of naturally hardened sandstone from the Texas-Arkansas-Oklahoma region.



Note: The original trail loop is about 1.0 mi. in length with a 56' gain in elevation and can be found on AllTrails app (see map at end). A short version (0.2 mi.) follows along the stream and connects between Bob Mac and Two Doug Bridges, or your walk can be extended by adding the Dogwood Loop (~1.0 mi.), which is accessed midway near the bog. Several benches and/or shelters are placed along the way for rest, but you may wish to bring water, especially in hot weather. The natural trails may not be suitable for those with walking difficulties because of exposed roots and wet areas. Be aware of other hazards as well, such as possible encounters with wild hogs, snakes, and biting insects. Dogs are allowed but should be kept on a leash and cleaned up after. Please stay on the trail, for your own safety and for the protection of the environment. Be alert and enjoy the surprises you will find here!

Elements of the Ecosystem – A Landscape Perspective Interpretive Stations

The East Texas Arboretum is located in the middle of the Post Oak Savannah ecoregion, a transitional zone between the Blackland Prairies and Pineywoods. Originally it was dominated by grasses and non-woody flowering plants, with groves of scattered post oak, black hickory, blackjack oak, and even plateau live oak, but savannahs were more prevalent in sandy soils and grasses and herbaceous species in soils with a clay pan. However, few examples of such oldgrowth areas still remain. Historical vegetation patterns have recently shifted towards yaupon, winged elm, sugar hackberry, and red cedar becoming more common due to fire suppression, overgrazing, and habitat manipulation, while cedar elm has expanded from the bottomlands. Examples of these plants are pointed out and explained along the trail, which traverses both a dry, sandy, upland ridge and lowland areas near wetland, seep, and stream. This mainly wooded area now is likely the result of secondary growth after initial clearing by early settlers.

#1. Here is a chunk of the softer crumbly sandstone that underlies our area nearby, in contrast to the harder stone of the memorial plaque. This native rock from Elmwood in Anderson County also contains some streaks of iron ore which imparts the rusty color. Look for a similar native rock naturally embedded in the ground further along this trail by the permanent seep. Although brown iron ore was known from 22 Texas counties, only nine counties in East Texas contained enough iron to be worked profitably from the 1850s to the 1930s.

Elmwood iron ore sandstone



arboretum's iron ore sandstone



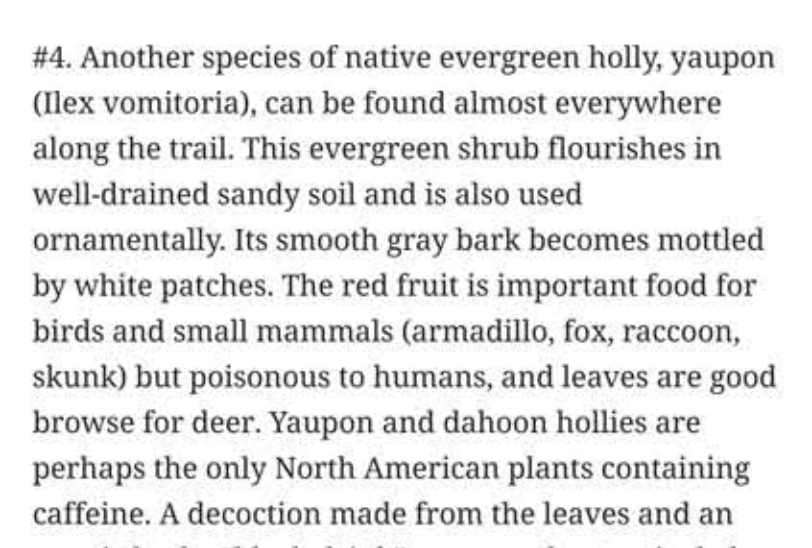
The geologic foundation of East Texas was slowly formed eons ago when layers and layers of sand were laid down on the receding sea floor. Thicker layers farther north exerted more pressure on the sand and in turn hardened it better and longer than that farther south. The underlying geology of an area is one of many factors determining the type of landscapes seen on this nature trail. Other influences include: soil, hydrology, climate, topography, latitude, aspect, and disturbance, which in turn influence vegetation type and animal inhabitants.

#2. Twining up and over many shrubs in several spots along the trail you may notice an evergreen-leaved plant which produces flame-colored trumpets in spring – coral honeysuckle (*Lonicera sempervirens*). This native vine is distinguished by “pierced” leaves just below the blossom; the exotic Japanese honeysuckle (*L. japonica*) with fragrant yellow or white flowers and red or brown stems does not exhibit this characteristic, and has become invasive.

native coral honeysuckle



invasive exotic Japanese honeysuckle



#3. This is a large, beautiful specimen of American holly (*Ilex opaca*), a native broadleaf evergreen tree reaching its western limit of distribution in East Texas. It is found growing wild as an understory tree in moist forests where its thick foliage provides shelter to countless birds, but is also used commercially as an ornamental shrub. The decorative berries are supposedly poisonous to humans, but are eaten by several wildlife species including quail and many songbirds. An additional fine American holly specimen is located near the wetland.

American holly



yaupon bark



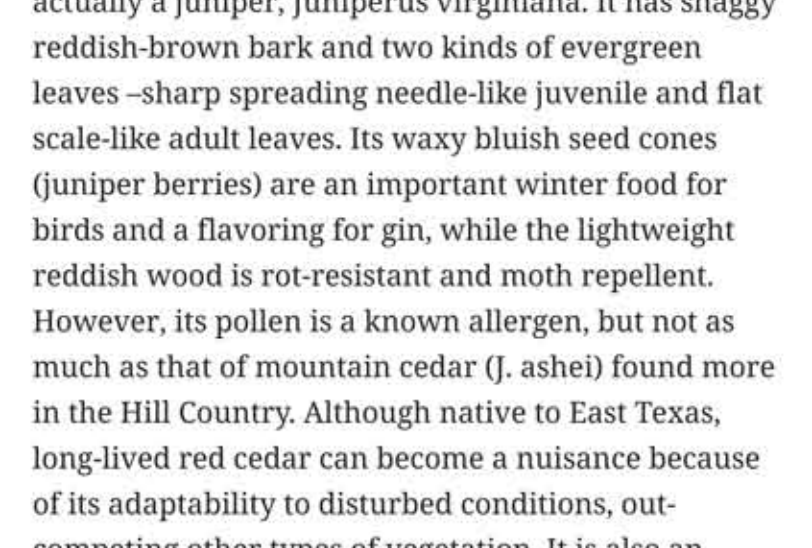
yaupon leaves and berries



#4. Another species of native evergreen holly, yaupon (*Ilex vomitoria*), can be found almost everywhere along the trail. This evergreen shrub flourishes in well-drained sandy soil and is also used ornamentally. Its smooth gray bark becomes mottled by white patches. The red fruit is important food for birds and small mammals (armadillo, fox, raccoon, skunk) but poisonous to humans, and leaves are good browse for deer. Yaupon and dahoon hollies are perhaps the only North American plants containing caffeine. A decoction made from the leaves and an emetic herb – “black drink” – was used extensively by native Caddoan people during ceremonies, and a tea called cassina from roasted yaupon leaves was popular with early settlers as a stimulant.

At this three-way juncture, you can choose to continue left up the hill and past the bog (with access to another trail – Dogwood Loop), or turn right and follow the stream on a shorter path to Two Doug Bridge and back out to the arboretum proper.

sparkleberry fall foliage



#5. Sparkleberry, farkleberry (*Vaccinium arboreum*) is a heath (Ericaceae) by any other name; blueberries, cranberries, rhododendron, and azaleas are also in the same family. It is a shrub that grows throughout the Southeast and deciduous to evergreen depending on the latitude. It produces a dry dark berry when ripe which is marginally edible if used in “huckleberry” pie, although it is relished by various wildlife.

red cedar bark

juvenile & adult cedar foliage

#6. A tree most Texans know as (eastern) red cedar is actually a juniper, *Juniperus virginiana*. It has shaggy reddish-brown bark and two kinds of evergreen leaves – sharp spreading needle-like juvenile and flat scale-like adult leaves. Its waxy bluish seed cones (juniper berries) are an important winter food for birds and a flavoring for gin, while the lightweight reddish wood is rot-resistant and moth repellent. However, its pollen is a known allergen, but not as much as that of mountain cedar (*J. ashei*) found more in the Hill Country. Although native to East Texas, long-lived red cedar can become a nuisance because of its adaptability to disturbed conditions, out-competing other types of vegetation. It is also an alternate host for cedar-apple rust.

#7. A very common type of tree along this trail is oak (genus *Quercus*) in the beech family (Fagaceae). Different species are adapted to either dry upland hardwoods, moist bottomland forests, or sometimes both habitats. Many oak species have large lobed leaves, and may seem to have a simple distinction between two main types by the shape of their lobes – white oaks usually have rounded lobes, while red oaks have pointed lobes with bristle tips.

But within each of these sections are many species, which often hybridize and confound identification. Some of the deciduous species actually hang on to their dried leaves until spring, while live oaks, with serrated to smooth leaf margins, are in fact evergreen. The defining characteristic of *Quercus*, though, is the oak's cupped nuts – acorns. Around here, acorns are the main component of “mast” – the fallen edible fruit of woody plants, produced in annual pulses that often vary dramatically – and are depended on as food by wildlife.

Species of oak that could be found in East Texas include: black (*Q. velutina*), blackjack (*Q. marilandica*), bluejack (*Q. incana*), bur (*Q. macrocarpa*), chinquapin (*Q. muehlenbergii*), dwarf (*Q. prinoides*), sand and swamp laurel (*Q. hemisphaerica*, *laurifolia*), southern and plateau live (*Q. virginiana*, *fusiformis*), Nuttall (*Q. texana*), overcup (*Q. lyrata*), post (*Q. stellata*), Shumard (*Q. shumardii*), Spanish/southern red (*Q. rubra*), Texas red (*Q. buckleyi*), water (*Q. nigra*), willow (*Q. phellos*), and white (*Q. alba*). Different species that are located along the trail will be tagged individually.

bur oak acorn



post oak



blackjack oak bark



water oak



overcup oak acorn



blackjack oak leaves



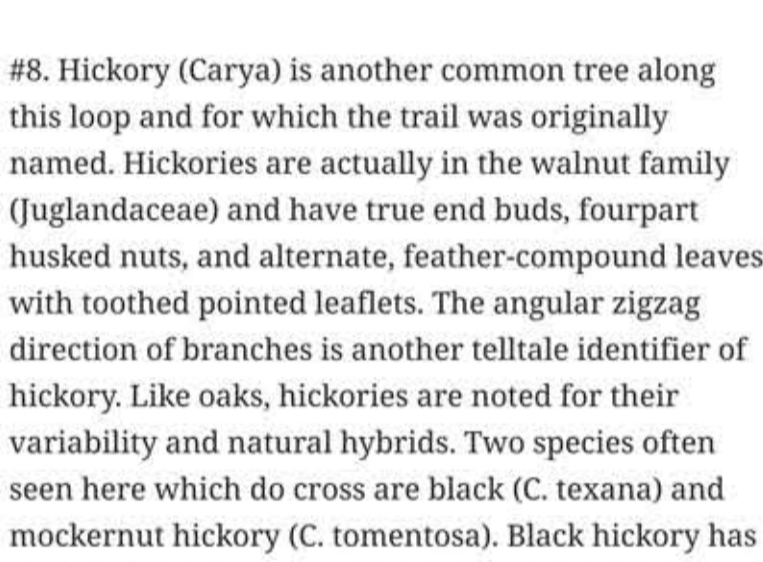
swamp laurel oak



live oak



red oak



#8. Hickory (*Carya*) is another common tree along this loop and for which the trail was originally named. Hickories are actually in the walnut family (Juglandaceae) and have true end buds, fourpart husked nuts, and alternate, feather-compound leaves with toothed pointed leaflets. The angular zigzag direction of branches is another telltale identifier of hickory. Like oaks, hickories are noted for their variability and natural hybrids. Two species often seen here which do cross are black (*C. texana*) and mockernut hickory (*C. tomentosa*). Black hickory has dark bark in a tight diamond pattern, 7 + 2 leaflets, and its twigs, buds, and leaf undersides are rusty-hairy. Mockernut hickory has 7-9 leaflets pale orange-brown beneath with matted-woolly undersides and twigs, tight furrowed dark bark with a network of smooth ridges, large fruits that are mainly husk, and fragrant leaves when crushed. Both are found in dry upland woods. Other species of hickories that could also be found in East Texas include: water (*C. aquatica*), bitternut (*C. cordiformis*), nutmeg (*C. myristiciformis*), red (*C. ovalis*), and shagbark hickories (*C. ovata*), and the pecan (*C. illinoensis*). Hickory nuts are eaten by several types of game as another component of mast, and provided abundant protein to local Native American diets.

black hickory



zigzag branching pattern



mockernut hickory



#9. The low or smooth prickly pear (*Opuntia humifusa*), a clump-forming cactus common all over the US and Texas, can be found in several dry sandy upland areas along this trail. It has yellow flowers in spring which produce reddish edible fruit (tunas), and the greenish pads (nopales) have few to no spines but are covered in clumps of tiny barbed bristles. The pads ‘deflate’ in cold weather and cause the plant to collapse on the ground. Prickly pear, of which there are at least 59 species, is the state plant of Texas.

prickly pear blossoms



‘deflated’ overwinter cactus pads



#10. Rusty blackhaw (*Viburnum rufidulum*) is an understory shrub or small tree related to the elderberry that thrives in sandy loam soils. Its twigs are reddish-brown and the opposite leaf stalks (petioles) are covered in minute, rusty, branched hairs. The tiny white flowers that form a large flat cluster in spring develop into long, oval, waxy, bluish-black berries that are relished by birds in the fall, when the glossy but leathery deciduous leaves turn a variety of warm hues.

rusty blackhaw viburnum



American beautyberry



#12. Several plants along this trail can become lianas – a plant form of long-stemmed woody vines rooted in the ground but that ‘climb’ trees by winding around or attaching for support. The best example here is Alabama supplejack (*Berchemia scandens*) in the buckthorn family, with smooth greenish bark on its stems. The blue-black berries are eaten by wildlife. Sometimes called rattan-vine, the stems were used for wickerwork.

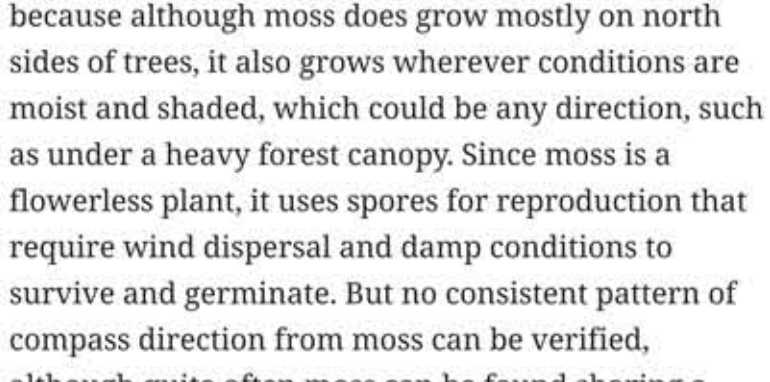
Another genus of plant that can become a liana is wild grape (*Vitis*). Of the three species of wild grapes found in East Texas, summer grape (*V. aestivalis*) is most likely to form a vigorous vine high up into trees. Summer grape prefers dry upland habitat, and while the shape of its large oft-lobed leaves is variable, they are always densely hairy below. Another local wild grape that may not grow as high is mustang (*V. mustangensis*) with fuzzy thicker leaves in two shapes (deeply lobed or curved and almost unlobed) and white velvety undersides, and small tart fruit. Muscadine grape (*V. rotundifolia*) has large round fruits and smooth thin leaves; it has been extensively cultivated. Grapes from all species can be used to make wine, but songbirds, gamebirds, and several mammals enjoy the fruits as well.

Another plant in the grape family, Virginia creeper, and a similar-looking plant, eastern poison ivy, can take the form of lianas as woody deciduous vines. Both are discussed below.

Alabama supplejack



summer grape



by Sonnia Hill*

muscadine grape



#13. One of the old survival tips about navigating in the woods is that moss only grows on the north sides of trees (in the northern hemisphere). Unfortunately, that method of finding direction is unreliable, because although moss does grow mostly on north sides of trees, it also grows wherever conditions are moist and shaded, which could be any direction, such as under a heavy forest canopy. Since moss is a flowerless plant, it uses spores for reproduction that require wind dispersal and damp conditions to survive and germinate. But no consistent pattern of compass direction from moss can be verified, although quite often moss can be found sharing a tree trunk with lichen, as shown below.

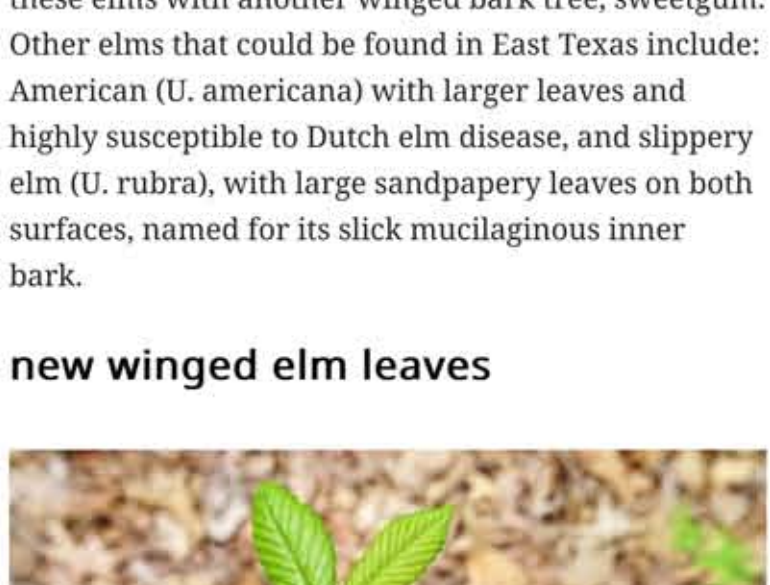
Lichens, on the other hand, are not plants; they are a composite organism of an algae or cyanobacteria living among the filaments of fungi in a mutually beneficial relationship. The latter partner, the fungi, provides protection, anchorage, and moisture retention, while the former partner, the algae/cyanobacteria, provides carbohydrates via photosynthesis. Lichen may also include a yeast in their symbiotic partnerships. Lichen can survive complete dehydration, thus can tolerate sun, heat, and drought, the opposite conditions in which a moss can prosper.

lichen and moss on tree trunk



#14. Resurrection fern (*Pleopeltis michauxiana*) is an evergreen, coarse-textured fern that attaches to its host by a creeping rootstalk (rhizome). Since it is not rooted in the ground, it is considered an air plant (epiphyte), and gets its water and nutrients from material that has collected on bark surfaces. It can survive drought by curling up and drying out, then revive to a bright green color within 24 hours after a rain. This fern reproduces by spores found within sori on the undersides of fronds.

resurrection fern plant

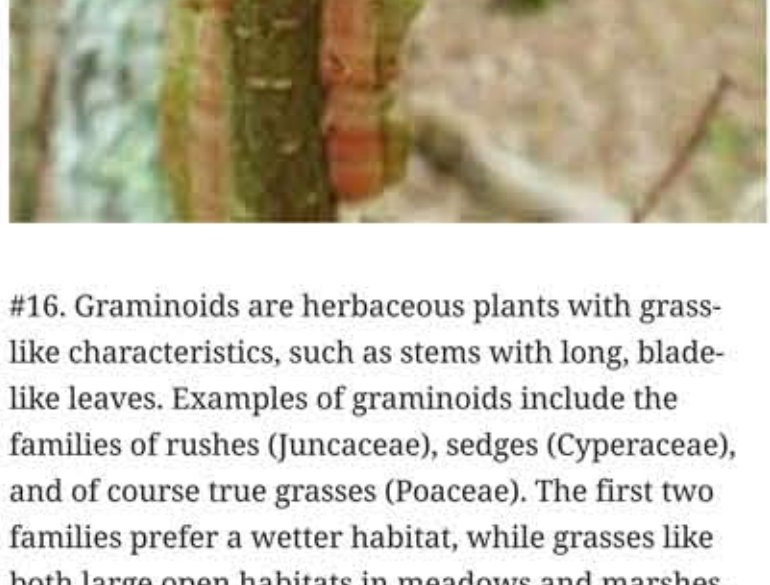


resurrection fern frond with visible sori

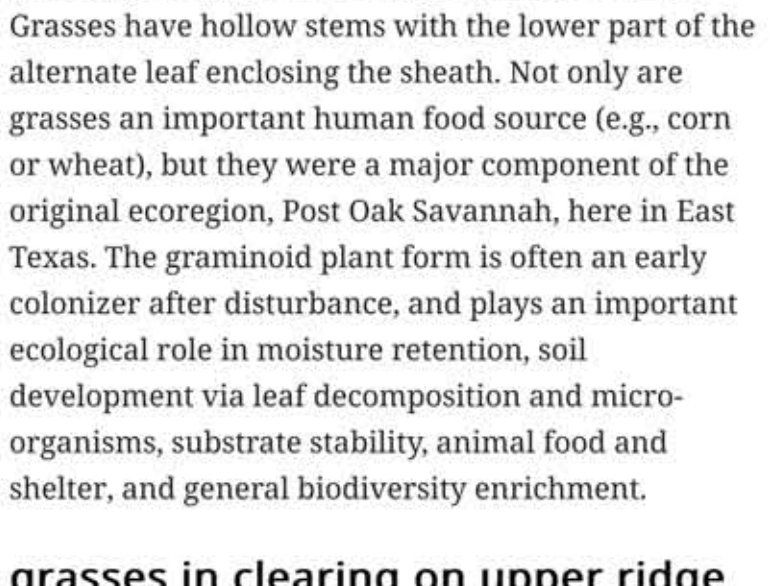


#15. Winged elm (*Ulmus alata*) forms a small-medium deciduous tree with distinctive corky wings on its stems and twigs. It can be distinguished from the other winged elm (cedar) by its slick smooth leaves both top and bottom when rubbed. Winged elm produces seeds (samara) in the spring that readily sprout and contribute to its weediness. The cedar/Texas elm (*U. crassifolia*) is a larger tree which also has winged branches but that effect decreases with age. Cedar elm differs from winged elm in having smaller but thicker, rougher-textured leaves that feel like sandpaper on the upper surface only when rubbed. It produces seeds in the fall. Check the leaf shape to make sure you do not confuse one of these elms with another winged bark tree, sweetgum. Other elms that could be found in East Texas include: American (*U. americana*) with larger leaves and highly susceptible to Dutch elm disease, and slippery elm (*U. rubra*), with large sandpapery leaves on both surfaces, named for its slick mucilaginous inner bark.

new winged elm leaves



corky bark wings

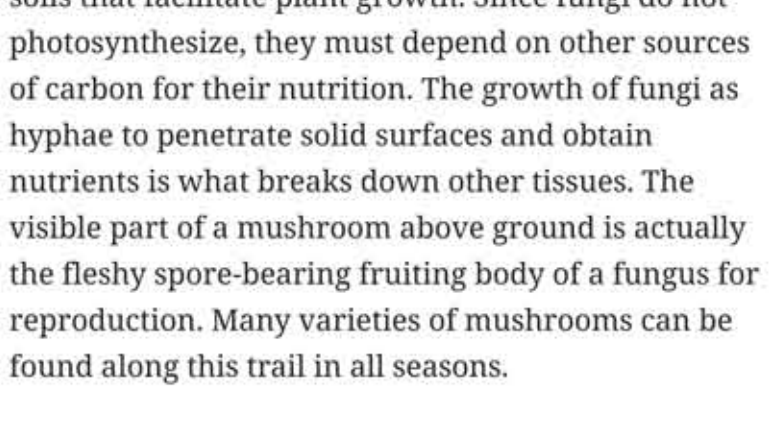


#16. Graminoids are herbaceous plants with grass-like characteristics, such as stems with long, blade-like leaves. Examples of graminoids include the families of rushes (*Juncaceae*), sedges (*Cyperaceae*), and of course true grasses (*Poaceae*). The first two families prefer a wetter habitat, while grasses like both large open habitats in meadows and marshes, or small openings with sunlight in woodlands. Rush leaves arise alternately and are usually evergreen, perennial, and either flat or round. Sedge leaves are spirally arranged and triangular in cross section. Grasses have hollow stems with the lower part of the alternate leaf enclosing the sheath. Not only are grasses an important human food source (e.g., corn or wheat), but they were a major component of the original ecoregion, Post Oak Savannah, here in East Texas. The graminoid plant form is often an early colonizer after disturbance, and plays an important ecological role in moisture retention, soil development via leaf decomposition and microorganisms, substrate stability, animal food and shelter, and general biodiversity enrichment.

grasses in clearing on upper ridge



rush clump by wetland



#17. A whole other realm of the ecosystem present along this trail is the decomposers; they complete the food web by recycling organic material back into nutrients. These decomposers consist of unseen bacteria and oft-visible fungi. Fungi are in a kingdom all their own, separate from plants and animals, and represent yeasts, molds, and mushrooms. Mushrooms are highly visible and intriguing organisms, but other fungi like mycorrhizal symbionts are unseen but critical components of soils that facilitate plant growth. Since fungi do not photosynthesize, they must depend on other sources of carbon for their nutrition. The growth of fungi as hyphae to penetrate solid surfaces and obtain nutrients is what breaks down other tissues. The visible part of a mushroom above ground is actually the fleshy spore-bearing fruiting body of a fungus for reproduction. Many varieties of mushrooms can be found along this trail in all seasons.

purple mushroom (*Laccaria amethystina*)



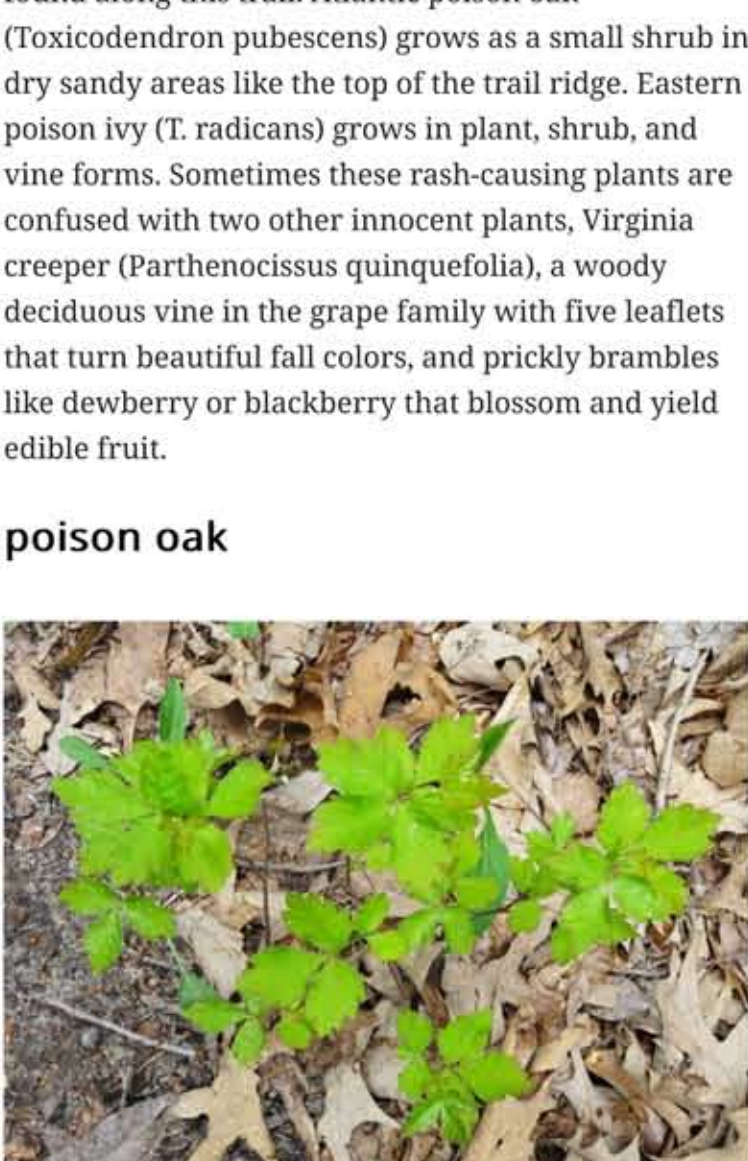
turkey-tail type bracket fungus



shelflike fungus (*Pleurotus* sp.)



snail eating mushroom



brown mushroom



jelly fungus (*Tremella* sp.)

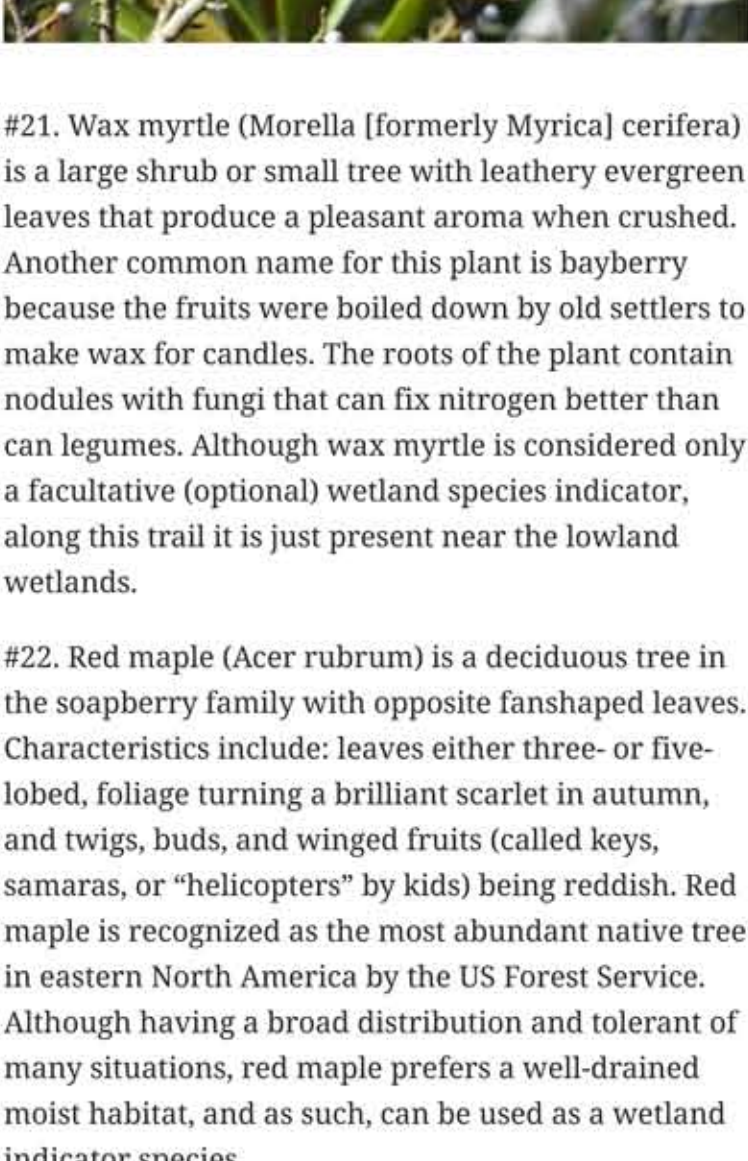


#18. Two allergenic flowering plants in the pistachio/cashew family, both with three leaflets, are found along this trail. Atlantic poison oak (*Toxicodendron pubescens*) grows as a small shrub in dry sandy areas like the top of the trail ridge. Eastern poison ivy (*T. radicans*) grows in-plant, shrub, and vine forms. Sometimes these rash-causing plants are confused with two other innocent plants, Virginia creeper (*Parthenocissus quinquefolia*), a woody deciduous vine in the grape family with five leaflets that turn beautiful fall colors, and prickly brambles like dewberry or blackberry that blossom and yield edible fruit.

poison oak



poison ivy, vine form



Virginia creeper



prickly bramble (black/dewberry)



#19. The third species of holly found along this trail is possumhaw (*Ilex decidua*), a small deciduous tree or shrub that prefers moist soils. Its leaves stay dark green through autumn but then turn yellow and drop over winter. The small red berries along thin gray horizontal twigs provide food for birds and mammals.

possumhaw holly



#20. At the turnoff to Craven's Crossing on the left, you can find Carolina jessamine (*Gelsemium sempervirens*), a twining evergreen vine native to this area but also planted as an ornamental. Everything about this plant is poisonous, including possibly nectar to honeybees. It prefers moist sunny areas in sandy loam, and its bright yellow blossoms are a welcome spring herald.

Carolina jessamine

wax myrtle

#21. Wax myrtle (*Morella* [formerly *Myrica*] *cerifera*) is a large shrub or small tree with leathery evergreen leaves that produce a pleasant aroma when crushed. Another common name for this plant is bayberry because the fruits were boiled down by old settlers to make wax for candles. The roots of the plant contain nodules with fungi that can fix nitrogen better than can legumes. (Although wax myrtle is considered only a facultative (optional) wetland species indicator, along this trail it is just present near the lowland wetlands.)

#22. Red maple (*Acer rubrum*) is a deciduous tree in the soapberry family with opposite fanshaped leaves. Characteristics include: leaves either three- or five-lobed, foliage turning a brilliant scarlet in autumn, and twigs, buds, and winged fruits (called keys, samaras, or "helicopters" by kids) being reddish. Red maple is recognized as the most abundant native tree in eastern North America by the US Forest Service. Although having a broad distribution and tolerant of many situations, red maple prefers a well-drained moist habitat, and as such, can be used as a wetland indicator species.

3-lobed red maple leaf

red maple seeds

5-lobed red maple leaves

#23. Sweetgum (*Liquidambar styraciflua*) is a deciduous tree recognized by its star-shaped leaves usually with five points, intense fall color, hard spiky fruit, and "winged" branches. The tree's resin oozes out of bark when wounded, and was used to make chewing gum and as a balsam medicinally. Because of its propensity to naturally occur in lowlands, it is used as an indicator species to help determine the particular status of land for wetland determination by environmental consultants.

sweetgum leaves, winged bark

sweetgum fall foliage

sweetgum seed pod

#24. Tupelo or black gum (*Nyssa sylvatica*) is a deciduous tree with shiny leaves found near moist woodlands like the seeps along the lower part of this trail. It is one of the last trees to leaf out in the spring and first to start turning color in early fall, promising not only an end to the normally blistering heat of summer, but also that its fruit is available to migrating birds ("foliar fruit flagging"). The fruit is relished by many mammals and larger birds as well. Its flowers are a rich source of nectar for bees in honey production. This species is the longest living non-clonal flowering plant in eastern North America.

black tupelo

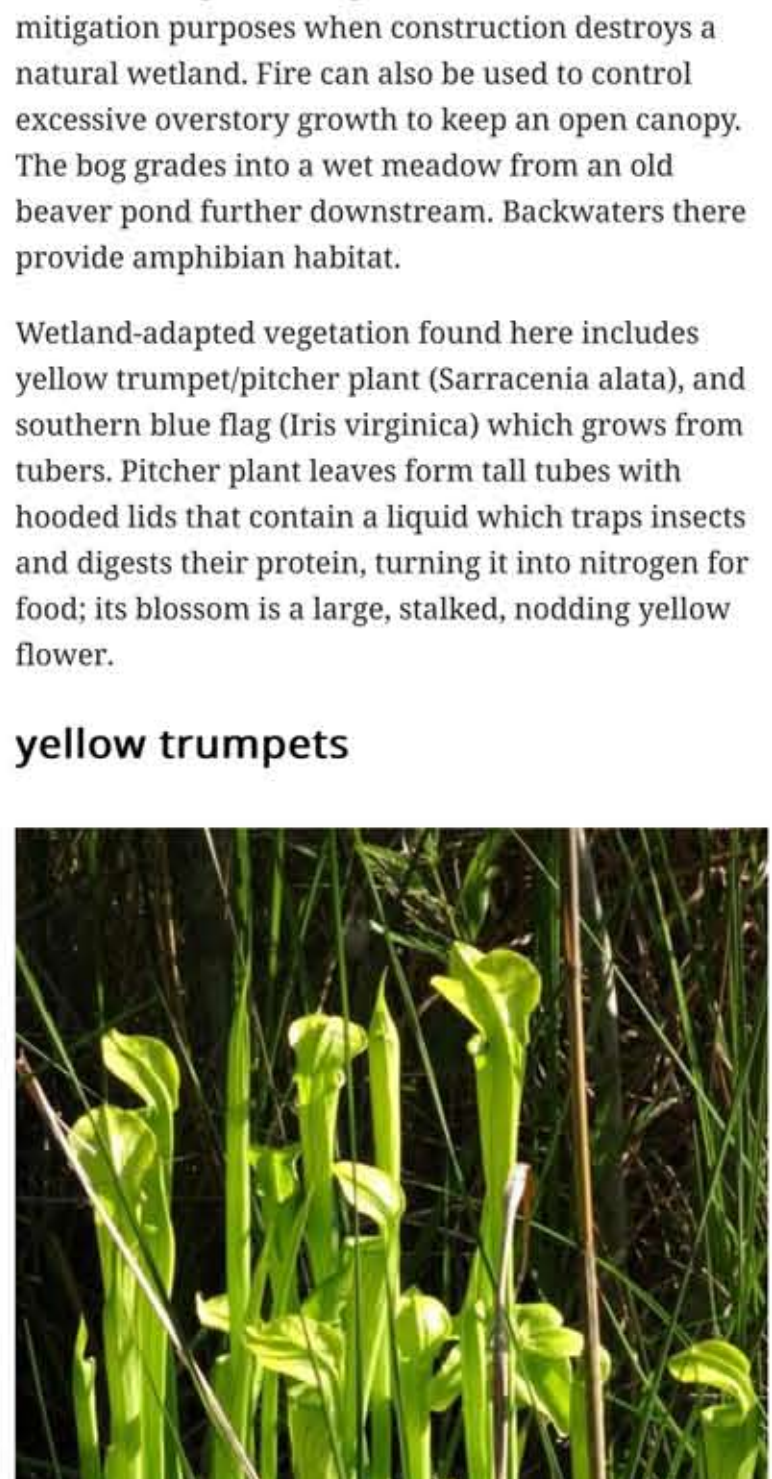


#25. Ferns are vascular plants that have special tissues which conduct water and nutrients like most other plants, but instead of flowering and producing seeds, they use spores to reproduce. They develop coiled fiddleheads which unroll into stemmed leaves, called fronds. Ecologically, ferns are specialists which colonize marginal habitats. Besides the resurrection ferns previously mentioned, several other species of ferns can more usually be found in the wetland habitats along the trail—netted chain fern (*Woodwardia areolata*), American royal fern (*Osmunda spectabilis*), and cinnamon fern (*Osmundastrum cinnamomeum*). The chain fern has two leaf forms—thick sterile and thin fertile. Taller royal ferns have double pinnately compound leaves and also produce sterile and fertile fronds, the top portions of the fertile fronds being reduced and brown when mature. Cinnamon ferns follow a similar dual leaf morphology and reproductive pattern. Other ferns that are native to East Texas include: wood (*Thelypteris kunthii*), sensitive (*Onoclea sensibilis*) which is very similar to chain fern but lacks serrated leaf edges, and southern maidenhair fern (*Adiantum capillus-veneris*) which grows in acidic soils.

netted chain fern



fiddleheads



cinnamon and royal ferns



#26. A wetland is an ecosystem that is flooded by water either seasonally or permanently, and is driven by oxygen-free processes. Different types of wetlands are distinguished by the aquatic plant assemblages that develop on them, depending on the soil type and hydric conditions. A bog is one of four main types of wetlands, and is characterized by an accumulation of decayed plant material (peat), acidity, low nutrients, and plant types such as sedges, rushes, carnivorous plants, Sphagnum moss, and shrubs in the heath family. Bogs are usually distributed in cooler climates where the processes of decomposition are slower, and the inflow and outflow of running water is rather limited.

So technically, our "bog" does not meet these qualifications other than being fed by spring seeps and containing some than being vegetation, albeit transplanted. It was more of a swamp (lowland with trees and shrubs and stream flowthrough), but it has been developed into an open wetland by cutting trees and shrubs and treating stumps to prevent re-growth, which retains the water large plants would otherwise require. This process is sometimes used for mitigation purposes when construction destroys a natural wetland. Fire can also be used to control excessive overstory growth to keep an open canopy. The bog grades into a wet meadow from an old beaver pond further downstream. Backwaters there provide amphibian habitat.

Wetland-adapted vegetation found here includes yellow trumpet/pitcher plant (*Sarracenia alata*), and southern blue flag (*Iris virginica*) which grows from tubers. Pitcher plant leaves form tall tubes with hooded lids that contain a liquid which traps insects and digests their protein, turning it into nitrogen for food; its blossom is a large, stalked, nodding yellow flower.

yellow trumpets



southern blue flag



#27. Greenbriers (*Smilax* spp.) are woody flowering vines often with vicious thorns that can form impenetrable thickets. Three of several species found in Texas can be seen along this trail: common greenbrier (*S. rotundifolia*) with round/heart-shaped leaves that may persist into winter and grows in variety of habitats, catbrier (*S. bona-nox*) with mottled evergreen leaves, and laurel greenbrier (*S. laurifolia*) with long oval evergreen leaves that prefers moist areas.

mottled catbrier leaves



Smilax leaf in fall color



common greenbrier berries



#28. Flowering dogwood (*Cornus florida*) is a native deciduous understory tree with showy inflorescences that are actually blossoms in small clusters surrounded by four showy bracts. They produce red, berry-like, stone fruit bitter to humans but used with twigs as food by birds and animals. Its checkered bark looks like alligator hide. Dogwood leaves add red fall color. Dogwood trees are found at the top of the sandy ridge and overlooking the bog along this trail. Another dogwood species present in East Texas is roughleaf (*C. drummondii*) has reddish twigs, leaves with a sandpapery surface and woolly undersides, and is found in wet areas.

dogwood blossom bracts

dogwood bark

dogwood leaves in fall color

#29. Pines are needle-leaved, evergreen, cone-bearing seed plants. Three species of pine and potentially one hybrid are native to East Texas. All are large, fast-growing, but long-lived trees. Loblolly pine (*Pinus taeda*) is the species found throughout East Texas. It has 5-10" needles usually in bundles of three. Southeast Texas hosts the pine that stretched across the entire South and supports an important ecosystem, the longleaf pine (*P. palustris*); its needles can be 8-18" long, also in bundles of three, and it has an early grass stage. Where ranges overlap, longleaf can sometimes hybridize with loblolly pine; the cross is commonly called Sonderegger or bastard pine and it has intermediate characteristics. Another species that can occur in East Texas is shortleaf pine (*P. echinata*) which has 3-5" needles usually in bundles of two. Cones from all native species have prickles at the tips of the scales but cone size differs proportionally with needle length. Winged pine seeds within the cone scales are an important wildlife food.

loblolly pine trees along trail

#30. Nature is certainly not perfect, but when deformities or anomalies occur, they sometimes provide opportunities not otherwise available. Wildlife learns to take advantage of what occurs naturally, like the four examples below.

perching/sunning opportunity

drinking opportunity

nesting opportunity

hiding opportunity

#31. You probably noticed the muddy spots along the trail after you came down the ridge at Cravey's Crossing Bridge to the bog. These areas are called seeps – moist places where low volume flows of water (groundwater) from an underground source (aquifer) reach the surface. Seeps can create their own mini-wetlands – biodiversity hotspots providing drinking water for wildlife, mud-puddling for butterflies, a cool, moist habitat for amphibians or reptiles like salamanders, frogs, or turtles, and differently adapted flora. Seeps are prevalent in East Texas where a sandy hill covers a clay hardpan. Rainwater soaks through the absorbent sand but then hits the non-porous clay and follows its tilt to exit on top of the clay at the side of the hill.

wet trail from seep



moss near seep



#32. A few examples of vernal (spring) flora can be found before full leaf-out just uphill of the trail near the seep. These include wood violets (*Viola palmata*), spring beauty (*Claytonia virginica*) in the purslane family, and yellow/woolly stargrass (*Hypoxis hirsuta*) in the iris family.

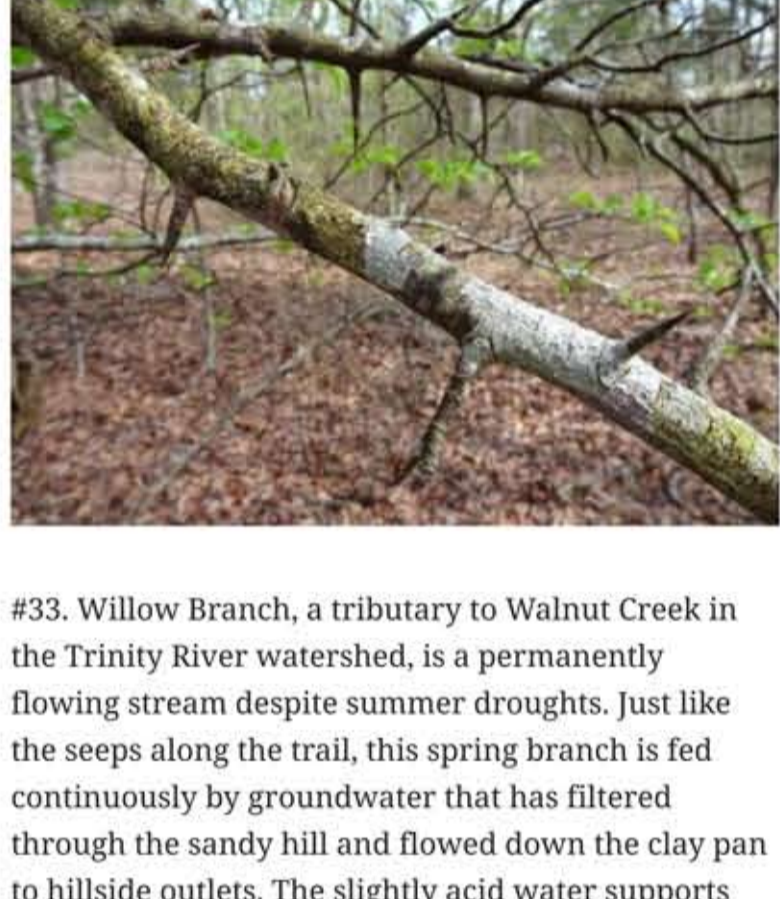
trilobed wood violet



spring beauty



yellow stargrass

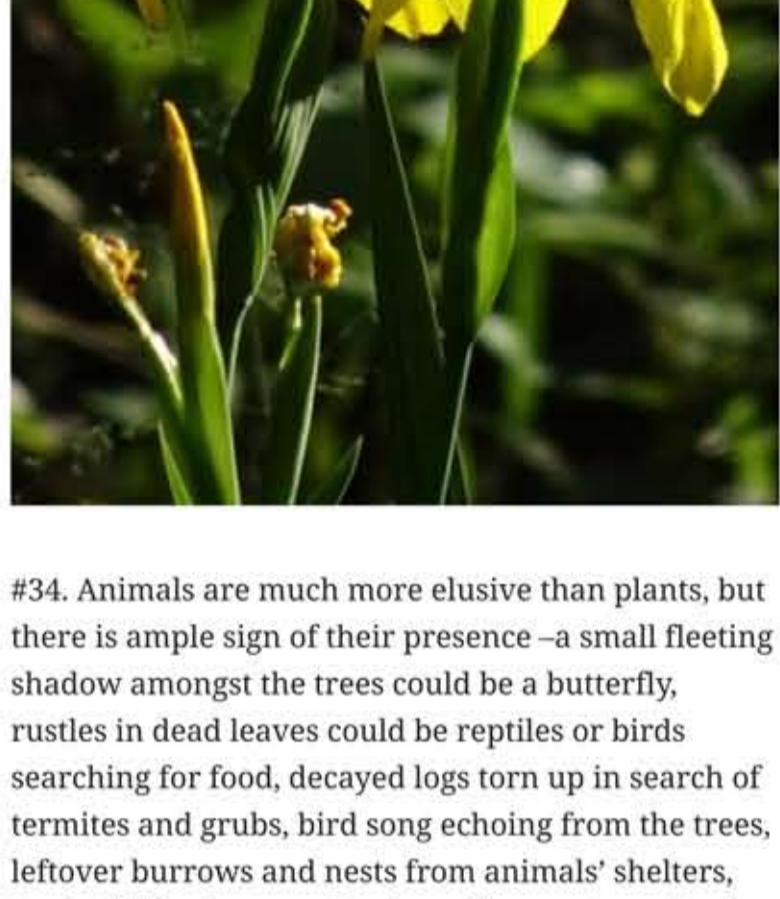


Farther up the slope is a Callery pear (*Pyrus calleryana*), an exotic tree species from China distributed ornamentally as various cultivars like 'Bradford'. Although each cultivar cannot breed with itself, cross-fertilization can occur among cultivars and the resulting fruit is eaten by birds that disperse the seeds, thus becoming invasive. This particular specimen is likely such a mongrel because it has long thorns, only present in cross-cultivar hybrids.

Callery pear blossoms in spring



wicked thorns on invasive pear



#33. Willow Branch, a tributary to Walnut Creek in the Trinity River watershed, is a permanently flowing stream despite summer droughts. Just like the seeps along the trail, this spring branch is fed continuously by groundwater that has filtered through the sandy hill and flowed down the clay pan to hillside outlets. The slightly acid water supports tadpoles, crawdads, and eight species of fish. Unfortunately, the waterway also acts as a conduit introducing invasive exotic vegetation in the bottomland along the shoreline (riparian zone); some are rather pretty like yellow iris and monkeygrass, but others such as privet are unsightly. Although native, cherry laurel (*Prunus caroliniana*) also tends to take over.

Willow Branch at Two Doug Bridge



yellow iris

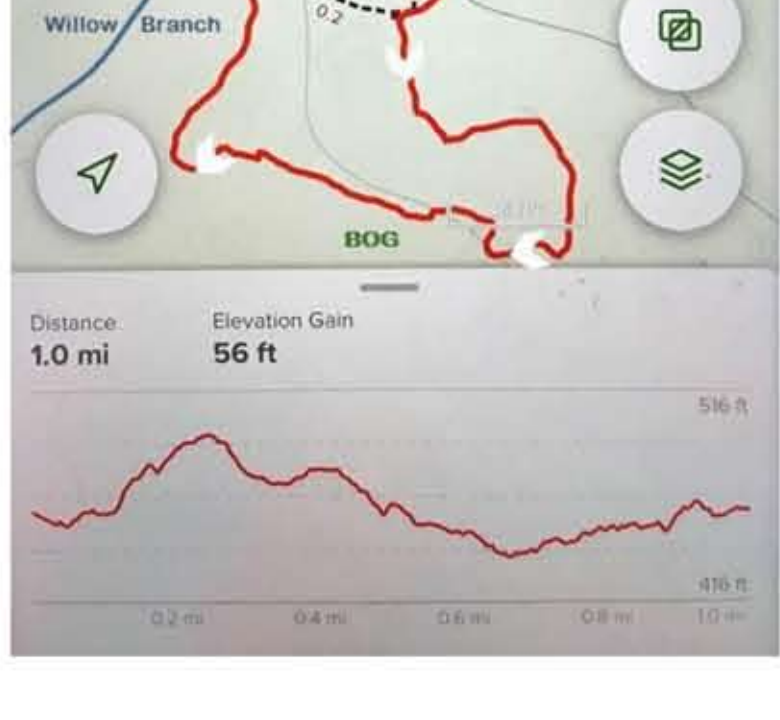


#34. Animals are much more elusive than plants, but there is ample sign of their presence – a small fleeting shadow amongst the trees could be a butterfly, rustles in dead leaves could be reptiles or birds searching for food, decayed logs torn up in search of termites and grubs, bird song echoing from the trees, leftover burrows and nests from animals' shelters, tracks left by larger animals seeking mates or food. See the checklists in the onsite office for a complete listing of birds; mammals; and fish, reptiles, and amphibians, all possible to discover at the East Texas Arboretum.

sapsucker drilling holes



northern fence lizard



wild hog tracks

The Frentress memorial was realized due to invaluable work of ETABS board members Deborah Deas and Roy Clay, the fundraising of First State Bank's Lee Tackett, and many generous donors. Hickory Loop was originally interpreted by Carl Frentress and Lucy Dueck in 1999. This 2020 version of the nature trail interpretation was re-written by Lucy Dueck, Sonnia Hill, and Jim Neal. Iron ore sandstone from Elmwood TX was donated by Clemente Construction. All photos are by Lucy Dueck on this trail (except as noted*).

For those interested in local geology, a complete study of "The brown iron ores of eastern Texas" (1938) by Edwin B. Eckel can be found online, or a copy of pertinent sections is available for reference at the arboretum office. See these links:
<https://www.wildflower.org/magazine/landscapes/natural-accents-and>
https://tpwd.texas.gov/huntwild/wild/wildlife_diversity.html for more detailed information on ecoregions.

"Soaring Spirit"

Murmuration (birds flocking) photo by Daniel Biber*

