

# DRAFT DESCRIPTIONS OF SYSTEMS, MAPPING SUBSYSTEMS, AND VEGETATION TYPES FOR PHASE II

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The following descriptions cover the systems that have been identified for the legend for Phase II of the Ecological Systems Classification and Mapping Project in support of the Texas Comprehensive Wildlife Conservation Strategy for the Texas Parks and Wildlife Department. Many of these descriptions were drafted from System descriptions available from NatureServe (<http://www.natureserve.org/explorer/>). Most System descriptions were modified, and all Vegetation Type descriptions were generated from discussions regarding these cover types. These brief narratives generally focus on ‘typical’ type concepts, and mapped vegetation types often circumscribe more variation on the ground than what is described here. For each system, a number of cover types, or “Vegetation Types” were described. A common name is given for each Vegetation Type, and this name is used in the table of contents and for the map legend. Additionally, a second name is provided which more directly ties the Vegetation Type to the system of which it is a part. A numeric identifier is also provided. This identifier represents the identifier used by NatureServe for the system. For the Vegetation Type, a digit suffix is provided to distinguish the various cover types within the system. In parentheses directly following the common name of the Vegetation Type, a number is provided. This number represents the numeric code used to track the Vegetation Types during the mapping process.

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## Forests, Woodlands and Savannas

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### West Gulf Coastal Plain Pine-Hardwood Forest

**Identifier:** CES203.378

**Geology:** This system is widespread and forms the matrix of the West Gulf Coastal Plain of Texas and therefore occurs on numerous Cenozoic sedimentary formations and some Cretaceous formations of the Mesozoic era. These formations range from sandstone, shale, alluvium, and conglomerate, to marl, with glauconitic formations (Weches) and tuffaceous formations (Catahoula) present.

**Landform:** The system occurs over a wide variety of landforms, with drier expressions occurring on hilltops and ridges. It occupies slopes and lower landscape positions, where conditions are more mesic, and composition of the system varies across these gradients.

**Soils:** Numerous soil types are occupied by this system, but are generally alfisols or ultisols. Soils most commonly encountered are sands and loams.

**Description:** This upland system forms the matrix over much of the West Gulf Coastal Plain, covering approximately 4,550,000 hectares (11,225,000 acres). This is particularly the case outside of the range of *Pinus palustris* (longleaf pine). Within the range of *Pinus palustris*, the historical matrix was often dominated by that species and should be mapped as West Gulf Coastal Plain Upland Longleaf Pine Forest and Woodland (CES203.293). However, given the current patchy distribution of *Pinus palustris* (longleaf pine), the prevalence of plantings of *Pinus taeda* (loblolly pine) and *Pinus elliottii* (slash pine), and the difficulty in identifying the system on the basis of remote-sensing data, we chose to include occurrences of this more restricted system within the West Gulf Coastal Plain Pine-Hardwood Forest. The system occupies a range of topographic and edaphic conditions, replaced by other systems in areas where unique abiotic conditions result in occurrences of other, more restricted, systems. Typical pines that dominate these sites are *Pinus taeda* (loblolly pine) and *Pinus echinata* (shortleaf pine), though *Pinus palustris* (longleaf pine) may also be present to dominant, within its range. Historically, *Pinus echinata* (shortleaf pine) dominated drier sites, especially to the north. *Pinus taeda* (loblolly pine) was less dominant than in the current landscape, and occupied less dry sites and became more conspicuous to the south. Seventy-five percent or more of the canopy of some occurrences may be occupied by pines, often *Pinus taeda* (loblolly pine). Typical deciduous hardwoods conspicuous in this system include *Liquidambar styraciflua* (sweetgum), *Carya texana* (black hickory), *Quercus stellata* (post oak), *Quercus falcata* (southern red oak), *Quercus alba* (white oak), *Quercus nigra* (water oak), *Ulmus alata* (winged elm), *Ulmus crassifolia* (cedar elm), and *Nyssa sylvatica* (blackgum). Some sites may be primarily deciduous, with 75% or more of the canopy cover occupied by hardwoods. *Ilex vomitoria* (yaupon), saplings and seedlings of overstory species, *Callicarpa americana* (American beautyberry), *Morella cerifera* (wax-myrtle), *Vaccinium arboreum* (farkleberry), and *Cornus florida* (flowering dogwood) commonly occupy the shrub layer, which may be well-developed, with understory canopy cover to 40% or more. Woody vines in this system may be conspicuous and often include *Smilax bona-nox* (saw greenbrier), *Vitis* spp. (grape, often *Vitis rotundifolia* (muscadine grape)), *Parthenocissus quinquefolia* (Virginia creeper), and *Toxicodendron radicans* (poison ivy). The

herbaceous layer is generally sparse (often < 20% cover), with *Schizachyrium scoparium* (little bluestem), *Chasmanthium laxum* (slender woodoats), *Chasmanthium sessiliflorum* (narrowleaf woodoats), and *Pteridium aquilinum* (brackenfern) often present to dominant. Forests with dense tree cover (especially evergreen cover), have reduced shrub and herbaceous cover. Herbaceous cover may be additionally limited by dense litter accumulation. Few occurrences of this system can be considered old growth, and much of the system, as it is mapped, constitutes pine plantations or sites recovering from previous logging. *Pinus elliottii* (slash pine) may be used in some plantations.

### **VEGETATION TYPES:**

#### **Pineywoods: Pine Forest or Plantation (16)**

West Gulf Coastal Plain Dry-Mesic Pine Forest

**Identifier:** CES203.378.1    **Phase 2 Code:** 16

**Description:** This represents the typical type for the system where the canopy is dominated by pines. Many sites actually represent pine plantations and managed forests, and discriminating between natural pine forest and plantation is problematic using our mapping methods. More than half of the area mapped for this system is represented by this vegetation type, and *Pinus taeda* (loblolly pine) predominates.

#### **Pineywoods: Pine / Hardwood Forest and Plantation (17)**

West Gulf Coastal Plain Dry-Mesic Pine-Hardwood Mixed Forest

**Identifier:** CES203.378.3    **Phase 2 Code:** 17

**Description:** Less commonly encountered type with mixed evergreen/deciduous canopy cover, not occupying dry landscape positions such as hilltops and ridgetops. This is typically managed forest of *Pinus taeda* (loblolly pine), with various hardwood species co-dominant in the canopy.

#### **Pineywoods: Upland Hardwood Forest (18)**

West Gulf Coastal Plain Dry-Mesic Upland hardwood Forest

**Identifier:** CES203.378.4    **Phase 2 Code:** 18

**Description:** This is a commonly encountered vegetation type of the system, making up about a third of the areal extent of the system. It is dominated by deciduous hardwoods, but may (and often does) have some cover of pine, usually *Pinus taeda* (loblolly pine).

#### **Pineywoods: Dry Pine Forest (19)**

West Gulf Coastal Plain Dry Pine Forest

**Identifier:** CES203.378.11    **Phase 2 Code:** 19

**Description:** This is the pine dominated vegetation type that occupies high landscape positions, such as hilltops and ridgetops. Relative to *Pinus taeda* (loblolly pine), *Pinus echinata* (shortleaf pine) tends to be better represented in this drier landscape position. Hardwood species of drier sites, such as *Quercus stellata* (post oak), *Quercus marilandica* (blackjack oak), *Liquidambar styraciflua* (sweetgum), and/or *Carya texana* (black hickory) may be present.

**Pineywoods: Dry Pine / Hardwood Forest and Plantation (20)**

West Gulf Coastal Plain Dry Pine-Hardwood Mixed Forest

**Identifier:** CES203.378.13 **Phase 2 Code:** 20

**Description:** This vegetation type occupies high landscape positions and has a mixed deciduous/evergreen canopy.

**Pineywoods: Dry Upland Hardwood Forest (21)**

West Gulf Coastal Plain Dry Upland Hardwood Forest

**Identifier:** CES203.378.14 **Phase 2 Code:** 21

**Description:** This vegetation type has a deciduous dominated canopy and occupies high landscape positions.

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**West Gulf Coastal Plain Sandhill Oak and Shortleaf Pine Forest and Woodland**

**Identifier:** CES203.056

**Geology:** Generally associated with Eocene sand formations such as Carrizo, Sparta, and Queen City sands. Also found on sands derived from the Pliocene Willis formation.

**Landform:** Generally found on high, convex landscape positions, such as hilltops and ridgetops.

**Soils:** Deep sands of soils such as the Betis, Darco, Letney, Tehran, Tonkawa, and other grossarenic or psammentic soils.

**Description:** This system occupies deep sands on generally high, convex landforms, and often displays a relatively open overstory canopy. About 34,500 hectares (85,400 acres) of Phase 2 is mapped as this system. It may occur as pine dominated woodlands, with *Pinus palustris* (longleaf pine) dominating some sites within the range of this species, and *Pinus echinata* (shortleaf pine) dominating areas where *Pinus palustris* (longleaf pine) is absent. In the current landscape, *Pinus taeda* (loblolly pine) is a common and sometimes dominant pine species. Pines may co-dominate along with deciduous species, or the canopy may be dominated by oak and other deciduous species such as *Quercus stellata* (post oak), *Quercus marilandica* (blackjack oak), *Quercus incana* (bluejack oak), *Quercus falcata* (southern red oak), *Quercus margarettae* (sand post oak), and *Carya texana* (black hickory). Other deciduous trees present may include *Sassafras albidum* (sassafras), *Liquidambar styraciflua* (sweetgum), and *Quercus nigra* (water oak). The shrub stratum can be fairly well-developed, and includes shorter individuals of canopy species in addition to such species as *Callicarpa americana* (American beautyberry), *Ilex vomitoria* (yaupon), *Vaccinium arboreum* (farkleberry), *Rhus aromatica* (fragrant sumac), *Asimina parviflora* (dwarf pawpaw), *Cornus florida* (flowering dogwood), and *Smilax bona-nox* (saw greenbrier). The herbaceous layer may be quite well-developed or relatively patchy (with areas of bare sandy soil exposed). Commonly encountered species include *Schizachyrium scoparium* (little bluestem), *Pteridium aquilinum* (brackenfern), *Aristida desmantha* (curly threeawn), *Ambrosia psilostachya* (western ragweed), *Cnidoscolus texanus* (Texas bull-nettle), *Rudbeckia hirta* (blackeyed susan), *Dichanthelium dichotomum* (cypress panicgrass), *Pityopsis graminifolia* (narrowleaf silkgrass), *Croton argyranthemus* (silverleaf croton), *Tragia urticifolia* (nettleleaf noseburn), *Froelichia floridana* (Florida snake-cotton), *Matelea cynanchoides* (creeping milkvine), *Opuntia humifusa* (eastern pricklypear), *Sporobolus junceus* (pineywoods dropseed), *Triplasis purpurea* (purple sandgrass), *Bulbostylis ciliatifolia* (capillary hairsedge), *Chamaecrista fasciculata* (partridge pea), *Berlandiera pumila* (soft greeneyes), *Commelina*

*erecta* var. *angustifolia* (narrowleaf dayflower), *Stylisma pickeringii* (bigpod bonamia), *Tradescantia reverchonii* (Reverchon spiderwort), *Rhynchosia* spp. (snoutbeans), *Tephrosia* spp. (tephrosia), and *Yucca louisianensis* (Gulf Coast yucca). Accurate mapping of this system proved problematic, because this system does not occur on all areas where the typical deep sands are mapped. Mapping only areas of high landscape position (the method used in this effort) tended to under-represent the system as it occurs on the landscape.

### **VEGETATION TYPES:**

#### **Pineywoods: Sandhill Pine Woodland (22)**

West Gulf Coastal Plain Sandhill Pine Forest and Woodland

**Identifier:** CES203.056.1    **Phase 2 Code:** 22

**Description:** Occurrences dominated by pines, including *Pinus palustris* (longleaf pine) in the south, *Pinus echinata* (shortleaf pine), and *Pinus taeda* (loblolly pine). *Pinus taeda* (loblolly pine) has become more prevalent in current landscapes. About 46% of the system is mapped as this type.

#### **Pineywoods: Sandhill Oak / Pine Woodland (23)**

West Gulf Coastal Plain Mixed Oak – Pine Forest and Woodland

**Identifier:** CES203.056.3    **Phase 2 Code:** 23

**Description:** Occurrences having a mixed canopy, co-dominated by pines and usually oaks. This is a minor component of the system as mapped.

#### **Pineywoods: Sandhill Oak Woodland (24)**

West Gulf Coastal Plain Sandhill Oak Forest and Woodland

**Identifier:** CES203.056.4    **Phase 2 Code:** 24

**Description:** Canopy usually dominated by oak species, but pine and other canopy species such as *Carya texana* (black hickory) and *Liquidambar styraciflua* (sweetgum) may also be present.

#### **Pineywoods: Sandhill Grassland or Shrubland (24)**

West Gulf Coastal Plain Sandhill Grassland and Shrubland

**Identifier:** CES203.056.7    **Phase 2 Code:** 3207

**Description:** Occurrences where canopy cover is exceedingly sparse, giving rise to an open aspect, with shrub and herbaceous cover dominating. Graminoids such as *Schizachyrium scoparium* (little bluestem) dominate, but the diversity of forbs may be high. About 18% of the system is mapped as this vegetation type.

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### **East-Central Texas Plains Post Oak Savanna and Woodland**

**Identifier:** CES205.679

**Geology:** Typical on sedimentary formations of Eocene age, generally of the Wilcox and Claiborne groups and adjacent formations.

**Landform:** This system occupies gently rolling to hilly topography. It is moderately dissected by drainages.

**Soils:** This system usually occurs on sandy to sandy loam soils, often with a marked clay subsurface horizon. Soils of this system are generally Alfisols, and are typically acidic to neutral. Typical Ecological Sites include Claypan Savannah, Claypan Prairie, Sandy Loam, Sandy, and Deep Sand.

**Description:** This system represents a transition from the woodlands and forests of East Texas to the prairies to the west, specifically the Blackland Prairie. It is mapped on almost 4,000,000 hectares (9,900,000 acres) within Phase 2. Savannas and woodlands are typically dominated by *Quercus stellata* (post oak), *Quercus marilandica* (blackjack oak), and *Carya texana* (black hickory). Other species, such as *Quercus incana* (bluejack oak) (on more xeric sites), *Quercus fusiformis* (plateau live oak), *Ulmus alata* (winged elm), *Ulmus crassifolia* (cedar elm), *Juniperus virginiana* (eastern redcedar), and *Prosopis glandulosa* (honey mesquite), can also be present in the overstory. In some sites, particularly in the south, *Quercus fusiformis* (plateau live oak) may dominate or co-dominate the woodlands. To the east, *Quercus falcata* (southern red oak), *Quercus nigra* (water oak), *Liquidambar styraciflua* (sweetgum), *Pinus echinata* (shortleaf pine), *Pinus taeda* (loblolly pine), and *Carya alba* (mockernut hickory) may be conspicuous in the overstory. Pine dominated sites were typically treated as belonging to Pineywoods: Pine Forest or Plantation, representing westward extensions of that mapped type. Shrubs may attain significant cover in the understory, with species such as *Ilex vomitoria* (yaupon), *Callicarpa americana* (American beautyberry), *Sideroxylon lanuginosum* (gum bumelia), *Crataegus* spp. (hawthorn), *Ilex decidua* (possumhaw), *Toxicodendron radicans* (poison ivy), *Juniperus virginiana* (eastern redcedar), and *Symphoricarpos orbiculatus* (coral-berry). To the east, *Vaccinium arboreum* (farkleberry), *Morella cerifera* (wax-myrtle), *Diospyros virginiana* (common persimmon), and *Cornus florida* (flowering dogwood) may be common components of the understory. On some sites, *Ilex vomitoria* (yaupon) can form a nearly continuous, dense shrub layer. In some cases this tall shrub layer may be nearly impenetrable. Where light penetration is adequate to support herbaceous cover, it is typically dominated by graminoids, including mid- and tallgrass species such as *Schizachyrium scoparium* (little bluestem), *Sorghastrum nutans* (Indiangrass), and *Panicum virgatum* (switchgrass) and *Carex* spp. (caric sedges). Graminoid dominated sites may also form prairie patches within the savanna, particularly on tighter soils. Other grasses present include *Andropogon gerardii* (big bluestem), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Paspalum plicatulum* (brownseed paspalum) (to the south), *Dichanthelium* spp. (rosette grasses), *Aristida* spp. (threeawns), *Nassella leucotricha* (Texas wintergrass), and *Sporobolus cryptandrus* (sand dropseed). Non-native grass species such as *Bothriochloa ischaemum* var. *songarica* (King Ranch bluestem), *Paspalum notatum* (Bahia grass), and *Cynodon dactylon* (Bermudagrass) may dominate some sites.

Drought, grazing, and fire are the primary natural processes that affect this system. Much of this system has been impacted by conversion to improved pasture or crop production. Overgrazing and fire suppression have led to increased woody cover on most extant occurrences and the invasion of some areas by problematic brush species such as *Juniperus virginiana* (eastern redcedar) (to the north) and *Prosopis glandulosa* (honey mesquite) (to the south).

### **VEGETATION TYPES:**

### **Post Oak Savanna: Live Oak Motte and Woodland (1)**

East-central Texas Plains Live Oak Motte and Woodland

**Identifier:** CES205.679.2    **Phase 2 Code:** 1

**Description:** *Quercus fusiformis* or *Quercus virginiana* (live oak) dominate these sites. This type represents less than 1% of the area mapped as this system. *Quercus stellata* (post oak) may be present in these woodlands, but typically only as a minor component of the canopy, or it may be completely absent. These occurrences become more common and may occupy large areas in the southern part of this region. *Ilex vomitoria* (yaupon), *Callicarpa americana* (American beautyberry), *Smilax bona-nox* (saw greenbrier), *Sideroxylon lanuginosum* (gum bumelia), *Toxicodendron radicans* (poison ivy), and *Zanthoxylum clava-herculis* (Hercules-club pricklyash) may be present in the shrub layer. *Schizachyrium scoparium* (little bluestem), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), and *Nassella leucotricha* (Texas wintergrass) are among the many species of grass that may be present in the herbaceous layer.

### **Post Oak Savanna: Post Oak / Redcedar Motte and Woodland (2)**

East-central Texas Plains Post Oak-Eastern Redcedar Motte and Woodland

**Identifier:** CES205.679.3    **Phase 2 Code:** 2

**Description:** Occurrences of this woodland are dominated by *Quercus stellata* (post oak), with *Juniperus virginiana* (eastern redcedar) as either a co-dominant of the overstory or as a conspicuous dominant of the shrub layer. This vegetation type is particularly well represented on disturbed sites, particularly where fire is excluded, but represents a small amount of the system as it is mapped. Dynamics described in Ecological Site Descriptions for Claypan Savannah, Sandy Loam, and Sandy sites in the Post Oak Savanna include this vegetation type in the Oak Scrub-Shrubland Community or the Post Oak - Elm Woodland Community. These communities result from the lack of fire and the presence of heavy continuous grazing. This vegetation type may sometimes be incorrectly mapped as Post Oak / Yaupon Motte and Woodland. Areas mapped as this vegetation type that are adjacent to the pine forests to the east may be co-dominated by *Pinus echinata* (shortleaf pine) and/or *Pinus taeda* (loblolly pine), rather than *Juniperus virginiana* (eastern redcedar). The shrub layer may be dominated by *Juniperus virginiana* (eastern redcedar), but *Ilex vomitoria* (yaupon) may also be conspicuous. The herbaceous layer is often poorly developed, due to the closed nature of the canopy, resulting in the reduced potential for the development of fine fuels and the consequent maintenance of the redcedar dominance through lack of fire.

### **Post Oak Savanna: Post Oak Motte and Woodland (3)**

East-Central Texas Plains Post Oak Motte and Woodland

**Identifier:** CES205.679.4    **Phase 2 Code:** 3

**Description:** This vegetation type generally represents the deciduous woodland component of the system, and makes up about 38% of the system as it is mapped. The typical occurrence is dominated by *Quercus stellata* (post oak), with *Quercus marilandica* (blackjack oak) and/or *Quercus fusiformis* (plateau live oak) (particularly in the south) also present. *Carya texana* (black hickory) may be a significant component of the overstory, particularly on deep sands. Depending on site history and edaphic conditions, other species may be present in the overstory or may be better represented as

shrubs. Such species may include *Diospyros virginiana* (common persimmon), *Juniperus virginiana* (eastern redcedar), *Ulmus alata* (winged elm), and *Ulmus crassifolia* (cedar elm), and as overstory components, are often stunted (< 12 m in height). The shrub layer includes species such as *Callicarpa americana* (American beautyberry), *Ilex decidua* (possumhaw), *Ilex vomitoria* (yaupon), *Sideroxylon lanuginosum* (gum bumelia), *Smilax bona-nox* (saw greenbrier), *Symphoricarpos orbiculatus* (coral-berry), *Vaccinium arboreum* (farkleberry), and *Zanthoxylum clava-herculis* (Hercules-club pricklyash). Herbaceous components are often represented by components of the surrounding prairies, primarily *Schizachyrium scoparium* (little bluestem), but also *Sorghastrum nutans* (Indiangrass), *Andropogon gerardii* (big bluestem), and, to the south and east, *Paspalum plicatulum* (brownseed paspalum). Other grass species may include *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Elymus canadensis* (Canada wildrye), *Panicum virgatum* (switchgrass), *Paspalum floridanum* (Florida paspalum), *Paspalum setaceum* (thin paspalum), *Sporobolus compositus* (tall dropseed), and *Tridens flavus* (purpletop). *Quercus nigra* (water oak) may be co-dominant on some sites, particularly in the eastern portion of Phase 2.

#### **Post Oak Savanna: Post Oak / Yaupon Motte and Woodland (7)**

East-central Texas Plains Post Oak-Yaupon Motte and Woodland

**Identifier:** CES205.679.13    **Phase 2 Code:** 7

**Description:** Many occurrences of this common vegetation type may have an exceedingly dense shrub layer dominated by *Ilex vomitoria* (yaupon). Such occurrences are conspicuous and widespread where lack of fire and heavy continuous grazing have allowed this woody species to dominate. It is, however, makes up about 3% of the system as it is mapped. The overstory is dominated by *Quercus stellata* (post oak). *Juniperus virginiana* (eastern redcedar) or, in southern occurrences *Quercus virginiana* (coastal live oak) may also be present. Dynamics described in Ecological Site Descriptions for Claypan Savannah, Sandy Loam, and Sandy sites in the Post Oak Savanna include this mapping system in the Oak Scrub-Shrubland Community. The dense shrub layer is generally dominated by *Ilex vomitoria* (yaupon), almost to the exclusion of other shrub species, and the closed shrub canopy limits the development of a significant herbaceous layer.

#### **Post Oak Savanna: Savanna Grassland (4)**

East-central Texas Plains Post Oak Savanna Grassland

**Identifier:** CES205.679.7    **Phase 2 Code:** 4

**Description:** This vegetation type represents the herbaceous expression of the overall system, which is a mosaic of woody and herbaceous cover types as suggested by reference to a savanna. It constitutes about 58% of the area mapped as this system. These grasslands are often dominated by mid- and tallgrass species often present in the understory of woody expressions of the system. Dominant species include *Schizachyrium scoparium* (little bluestem), *Sorghastrum nutans* (Indiangrass), and *Panicum virgatum* (switchgrass). Other grasses present include *Andropogon gerardii* (big bluestem), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Paspalum plicatulum* (brownseed paspalum) (to the south), *Nassella leucotricha* (Texas wintergrass), and *Sporobolus cryptandrus* (sand dropseed). Non-native grass species such as *Bothriochloa*

*ischaemum* var. *songarica* (King Ranch bluestem), *Paspalum notatum* (Bahia grass), and *Cynodon dactylon* (Bermudagrass) may, and often do, dominate sites. These grasslands may be difficult to differentiate in areas of transition to Blackland Prairie or Coastal Prairie. Claypan Savannah and Claypan Prairie ecoclasses may support occurrences of this vegetation type, particularly where land management practices including prescribed fire and other forms of brush management are implemented.

**Post Oak Savanna: Redcedar Slope Forest (5)**

East-central Texas Plains Eastern Redcedar Slope Woodland and Forest

**Identifier:** CES205.679.21 **Phase 2 Code:** 5

**Description:** Uncommon, relatively closed canopy woodland or forest on slopes greater than twenty percent and dominated by *Juniperus virginiana* (eastern redcedar).

**Post Oak Savanna: Oak / Redcedar Slope Forest (6)**

East-central Texas Plains Oak – Eastern Redcedar Slope Woodland and Forest

**Identifier:** CES205.679.23 **Phase 2 Code:** 6

**Description:** Uncommon forest on slopes greater than twenty percent with the canopy co-dominated by oak species (such as *Quercus stellata* (post oak), *Quercus marilandica* (blackjack oak), and *Quercus shumardii* (Shumard oak)) and *Juniperus virginiana* (eastern redcedar). *Ulmus crassifolia* (cedar elm) may also be present to common in the canopy. Near the Bastrop Lost Pines region and along the eastern edge of the Post Oak Savanna region, *Pinus taeda* (loblolly pine) may be an important overstory species.

**Post Oak Savanna: Oak / Hardwood Slope Forest (8)**

**Identifier:** CES205.679.24 **Phase 2 Code:** 8

**Description:** This deciduous forest vegetation type is found on slopes greater than twenty percent. Slopes on calcareous substrates along the Red River may be dominated by species such as *Quercus muehlenbergii* (chinkapin oak), *Quercus shumardii* (Shumard oak), *Ulmus americana* (American elm), and *Ulmus crassifolia* (cedar elm). In the south, slopes are generally not on calcareous substrate and *Quercus muehlenbergii* (chinkapin oak) is lacking. On these sites, slopes may be dominated by *Quercus stellata* (post oak), *Ulmus crassifolia* (cedar elm), *Ulmus americana* (American elm), *Quercus marilandica* (blackjack oak) and *Celtis laevigata* (sugar hackberry) and less commonly *Quercus shumardii* (Shumard oak). This vegetation type is poorly understood, and may be compositionally quite similar to surrounding woodlands. The greater topographic relief associated with this system results in more mesic conditions leading to the development of denser overstory canopy.

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**Bastrop Lost Pines Forest and Woodland** (original Name: East-central Texas Plains Pine Forest and Woodland)

**Identifier:** CES205.896

**Geology:** Sandy Eocene formations, such as Carrizo, Sparta, and Queen City formations are most frequently associated with this system, though it may also occur on other Eocene and adjacent formations.

**Landform:** Dissected uplands.

**Soils:** Sandy soils characterize this system with typical Ecological Sites including Deep Sand, Sandy, and Sandy Loam being frequently associated. It may also occupy gravelly sites, associated with more recent geologic strata.

**Description:** This system is mapped on about 3,700 hectares (9,000 acres) within Phase 2, and is dominated by *Pinus taeda* (loblolly pine), often with *Quercus stellata* (post oak) and *Quercus marilandica* (blackjack oak) present to co-dominant. *Quercus incana* (bluejack oak), *Quercus margarettae* (sand post oak), *Carya texana* (black hickory), *Ulmus crassifolia* (cedar elm), *Celtis* spp. (hackberry), and *Juniperus virginiana* (eastern redcedar) may also be present. *Vaccinium arboreum* (farkleberry) is a frequent shrub component of the system. Other shrub and woody vine species that may be present include *Sideroxylon lanuginosum* (gum bumelia), *Callicarpa americana* (American beautyberry), *Ilex vomitoria* (yaupon), *Toxicodendron radicans* (poison-ivy), *Rhus aromatica* (fragrant sumac), *Smilax bona-nox* (saw greenbrier), *Parthenocissus quinquefolia* (Virginia creeper), and *Vitis* spp. (grape). A grassy herbaceous layer may be present with *Schizachyrium scoparium* (little bluestem) commonly encountered, but other species including *Andropogon gerardii* (big bluestem), *Nassella leucotricha* (Texas wintergrass), *Sporobolus junceus* (pineywoods dropseed), *Paspalum plicatulum* (brownseed paspalum), *Paspalum setaceum* (thin paspalum), *Aristida* spp. (threeawn), *Sporobolus clandestinus* (rough dropseed), *Digitaria cognata* (fall witchgrass), *Dichanthelium oligosanthes* var. *scribnerianum* (Scribner panicgrass), and *Dichanthelium oligosanthes* (fewflower panicgrass). Forbs are conspicuous and include *Heterotheca subaxillaris* (camphor weed), *Euphorbia corollata* (flowering spurge), *Monarda citriodora* (lemon beebalm), *Galactia volubilis* (downy milkpea), *Liatris aspera* (rough gayfeather), *Brazoria truncata* (bluntsepal brazoria), *Diodia teres* (rough buttonweed), and many others. Local accumulations of pine needles result in a patchy distribution of herbaceous cover. This system bears some resemblance to pine woodlands and forests further to the east, and may represent a western, more xeric, outlier of these similar systems.

### **VEGETATION TYPES:**

#### **Bastrop Lost Pines: Loblolly Pine Forest (9)**

Bastrop Lost Pines Loblolly Pine Forest and Woodland

**Identifier:** CES205.896.1    **Phase 2 Code:** 9

**Description:** This vegetation type, representing about 40% of the system, has *Pinus taeda* (loblolly pine) as the dominant species. *Vaccinium arboreum* (farkleberry) may form a conspicuous understory, with *Schizachyrium scoparium* (little bluestem) as a common herbaceous dominant. Oak species, such as *Quercus stellata* (post oak) and *Quercus marilandica* (blackjack oak) may be present in the canopy, but pines dominate. In some cases, areas mapped as this vegetation type may be dominated by *Juniperus virginiana* (eastern redcedar).

#### **Bastrop Lost Pines: Loblolly Pine / Oak Forest (10)**

Bastrop Lost Pines Loblolly Pine – Oak Forest and Woodland

**Identifier:** CES205.896.3    **Phase 2 Code:** 10

**Description:** This vegetation type represents about 60% of the system in Phase 2, and is the transition from strictly *Pinus taeda* (loblolly pine) dominated sites to those more characteristic of the surrounding post oak savanna. As such, *Quercus stellata* (post oak), and to a lesser extent, *Quercus marilandica* (blackjack oak) are significant components of the canopy, though *Pinus taeda* (loblolly pine) remains a co-dominant canopy species. *Carya texana* (black hickory), *Ulmus crassifolia* (cedar elm), and *Celtis laevigata* (sugar hackberry) may be conspicuous deciduous elements in the canopy. *Juniperus virginiana* (eastern redcedar) may also be present, co-dominant, or sometimes dominant on sites mapped as this vegetation type.

### **Bastrop Lost Pines: Loblolly Pine / Oak Slope Forest (11)**

Bastrop Lost Pines Loblolly Pine-Oak Slope Forest

**Identifier:** CES205.896.23 **Phase 2 Code:** 11

**Description:** This vegetation type on slopes greater than twenty percent is a minor mapped type in this system. The overstory canopy is co-dominated by the coniferous evergreens *Pinus taeda* (loblolly pine) and/or *Juniperus virginiana* (eastern redcedar) and deciduous oaks such as *Quercus stellata* (post oak) and *Quercus marilandica* (blackjack oak). *Ulmus* spp. (elms) and *Celtis laevigata* (sugar hackberry) are also common components of the overstory. This vegetation type is often found on the Sandstone Hill ecoclass.

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### **West Gulf Coastal Plain Upland Longleaf Pine Forest and Woodland (not mapped)**

**Identifier:** CES 203.293

**Geology:** Found on sedimentary Pleistocene formations (particularly the Bentley formation), to formations of the Tertiary period (particularly the Catahoula and Wilcox formations). Historically, this system was more widely distributed on older, more inland formations of the Eocene and Paleocene epochs.

**Landform:** Occupying topography ranging from rolling uplands, to hills and ridges such as those associated with the Kisatchie Wold (or Kisatche Cuesta) and the Sabine Uplift.

**Soils:** Usually associated with coarse textured, well-drained, ultisols and alfisols, including loams, sandy loams, loamy sands, and sands, though occurrences may also be found to lesser extent on tighter soils such as clay loams.

**Description:** This system once occupied extensive areas of east Texas, but is presently limited in extent and difficult to map using remote-sensing. Small remnants of this once extensive forest type are encountered in Angelina, Jasper, Newton, and other nearby counties in Texas. We did not attempt to map it, and chose to include any occurrences of this system in the West Gulf Coastal Plain Pine-Hardwood Forest. It was characterized by relatively open-canopied woodlands dominated by *Pinus palustris* (longleaf pine) with an herbaceous layer often dominated by graminoids. It often occupied gently rolling uplands with coarse-textured, well-drained soils. *Pinus echinata* (shortleaf pine) may be a significant component of some of the stands. *Quercus stellata* (post oak), *Quercus marilandica* (blackjack oak), *Quercus incana* (bluejack oak), *Pinus taeda* (loblolly pine), *Liquidambar styraciflua* (sweetgum), and *Nyssa sylvatica* (blackgum) may also be common components of the canopy or subcanopy.

Occurrences that are less frequently burned may develop a significant shrub layer with species including *Callicarpa americana* (American beautyberry), *Vaccinium arboreum* (farkleberry), *Vaccinium stamineum* (deerberry), *Morella cerifera* (wax-myrtle), *Ilex vomitoria* (yaupon), *Rhus copallinum* (flameleaf sumac), and *Toxicodendron radicans* (poison ivy). Instances with a more optimal fire return interval will retain a more open understory with a grassy aspect. The herbaceous layer is often dominated by grass species such as *Schizachyrium scoparium* (little bluestem), *Schizachyrium tenerum* (slender bluestem), *Sporobolus junceus* (pineywoods dropseed), *Nassella leucotricha* (Texas wintergrass), *Andropogon ternarius* (splitbeard bluestem), *Dichanthelium* spp. (rosette grasses), *Andropogon virginicus* (broomsedge bluestem). *Pteridium aquilinum* (brackenfern) may be locally abundant, forming a continuous ground cover. Forbs may be diverse in the herbaceous layer, including species such as *Pityopsis graminifolia* (narrowleaf silkgrass), *Solidago odora* (fragrant goldenrod), *Tephrosia* spp. (tephrosias), *Euphorbia corollata* (flowering spurge), *Croton argyranthemus* (silverleaf croton), *Vernonia texana* (Texas ironweed), *Alophia drummondii* (celestials), *Lespedeza virginica* (slender lespedeza), *Aristolochia reticulata* (netleaf pipevine), *Rhynchosia reniformis* (kidneyleaf snoutbean), *Stylosanthes biflora* (pencilflower), *Liatris elegans* (pink-scale gayfeather). With prolonged absence of fire, hardwoods and *Pinus taeda* (loblolly pine) may come to dominate the system.

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### **West Gulf Coastal Plain Mesic Hardwood Forest**

**Identifier:** CES203.280

**Geology:** Distributed on Tertiary formations, from the Willis formation in the south, northward through Eocene formations.

**Landform:** Fairly restricted to rugged landscapes. Often occupies lower slope positions and adjacent steep slopes, where topographic position results in moisture accumulation and lower solar insolation. These sites may occur adjacent to bottomlands, but on more well-drained soils and/or slightly higher topographic positions.

**Soils:** Can occur on various soil textures, from sands to clays. These soils are often characterized by moderate to high fertility and moisture retention. Soil texture, fertility, and acidity may be controlling factors in determining the species composition of occurrences of this system.

**Description:** This system typically occurs in fairly rugged landscapes on ravines, steep slopes and low landscape positions, often near streams. Soils characteristically have relatively high moisture retention. They can be moderately fertile, acidic to circumneutral, loams to sands, or may be more nutrient rich, somewhat calcareous, tighter soils (clays and clay loams). Sites often have significant litter accumulations. Southern expressions of this system may have *Fagus grandifolia* (American beech) and *Magnolia grandiflora* (southern magnolia) as conspicuous to dominant components of the overstory where conditions are more mesic. Northern expressions fall outside of the range of these two species. The overstory canopy is generally dominated by deciduous hardwoods including *Quercus falcata* (southern red oak), *Quercus alba* (white oak), *Nyssa sylvatica* (blackgum), *Liquidambar styraciflua* (sweetgum), and *Quercus nigra* (water oak). *Acer rubrum* (red maple), *Quercus hemisphaerica* (upland laurel oak), *Quercus shumardii* (Shumard oak), *Quercus pagoda* (cherrybark oak), *Acer barbatum* (southern sugar maple), *Fraxinus americana* (white ash), and *Carya alba* (mockernut hickory) may also be conspicuous

in the canopy. *Pinus taeda* (loblolly pine), and to a lesser extent, *Pinus echinata* (shortleaf pine) may be present to co-dominant in the overstory. An understory of species such as *Ilex opaca* (American holly), *Ulmus alata* (winged elm), *Cornus florida* (flowering dogwood), *Ostrya virginiana* (American hop-hornbeam), *Carpinus caroliniana* (American hornbeam), and/or *Acer leucoderme* (chalk maple) is often present. The shrub layer is typically limited, giving the forest an open aspect. Species in the shrub layer may include *Callicarpa americana* (American beautyberry), *Ilex vomitoria* (yaupon), *Arundinaria gigantea* (giant cane), and *Viburnum acerifolium* (maple-leaf viburnum). *Vitis rotundifolia* (muscadine grape), *Smilax* spp. (greenbriers), and *Parthenocissus quinquefolia* (Virginia creeper) are commonly encountered woody vines. Some occurrences on more calcareous substrates lack *Magnolia grandifolia* (southern magnolia) and may contain species such as *Tilia americana* (American basswood) and *Styrax* spp. (snowbells) and may have a rich, more calciphilic, vernal forb flora. Such species as *Podophyllum peltatum* (mayapple), *Arisaema dracontium* (green dragon), *Arisaema triphyllum* (jack-in-the-pulpit), *Sanguinaria canadensis* (bloodroot), *Erythronium* spp. (trout lilies), *Trillium* spp. (trilliums), and *Polygonatum biflorum* (great Solomon's seal) may dominate the aspect of the forest understory in the early spring. Later in the year, these species become inconspicuous and are replaced by species such as *Chasmanthium sessiliflorum* (narrowleaf woodoats), *Mitchella repens* (partridgeberry), *Sanicula canadensis* (Canada snakeroot), *Carex* spp. (caric sedges), and *Dichantheium* spp. (rosette grasses). Ferns, such as *Woodwardia* spp. (chain fern), *Osmunda cinnamomea* (cinnamon fern), *Athyrium filix-femina* ssp. *asplenioides* (Asplenium ladyfern), and *Polystichum acrostichoides* (Christmas fern), may be conspicuous. The mesic nature of sites occupied by this system, along with the topography of the sites, and the limited fine fuel production in the system, results in reduced fire frequency.

### **VEGETATION TYPES:**

#### **Pineywoods: Northern Mesic Pine / Hardwood Forest (12)**

West Gulf Coastal Plain Northern Mesic Pine-Hardwood Mixed Forest

**Identifier:** CES203.280.3    **Phase 2 Code:** 12

**Description:** Approximately 11% of this system is mapped as this mixed deciduous evergreen forest. It occupies areas north of the range of *Fagus grandifolia* (American beech), and is co-dominated by *Pinus taeda* (loblolly pine) and/ or *Pinus echinata* (shortleaf pine) and various deciduous hardwoods including *Quercus alba* (white oak), *Liquidambar styraciflua* (sweetgum), *Nyssa sylvatica* (blackgum), and others as described above.

#### **Pineywoods: Northern Mesic Hardwood Forest (13)**

West Gulf Coastal Plain Northern Mesic Hardwood Forest

**Identifier:** CES203.280.4    **Phase 2 Code:** 13

**Description:** The majority (~62%) of the system is mapped as the primarily deciduous forest type. It occupies areas north of the range of *Fagus grandifolia* (American beech), and is dominated by hardwood species as described above. *Pinus taeda* (loblolly pine) and/or *Pinus echinata* (shortleaf pine) may be present, but do not form conspicuous elements of the canopy.

### **Pineywoods: Southern Mesic Pine / Hardwood Forest (14)**

West Gulf Coastal Plain Southern Mesic Pine-Hardwood Mixed Forest

**Identifier:** CES203.280.13 **Phase 2 Code:** 14

**Description:** About 8% of the system is mapped as this mixed forest type. Occurrences lie within the range of *Fagus grandifolia* (American beech), and it and *Magnolia grandiflora* (southern magnolia) may be present to dominant. *Pinus taeda* (loblolly pine) and/or *Pinus echinata* (shortleaf pine) share dominance with deciduous canopy species as described above.

### **Pineywoods: Southern Mesic Hardwood Forest (15)**

West Gulf Coastal Plain Southern Mesic Hardwood Forest

**Identifier:** CES203.280.14 **Phase 2 Code:** 15

**Description:** About 19% of the system is mapped as this deciduous forest type. Occurrences lie within the range of *Fagus grandifolia* (American beech), and it and *Magnolia grandiflora* (southern magnolia) may be present to dominant. Other deciduous canopy species may dominate some occurrences, and pines may also be present.

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### **West Gulf Coastal Plain Chenier and Upper Texas Coast Fringe Forest and Woodland**

**Identifier:** CES203.466

**Geology:** This system occupies Quaternary deposits associated with migrating shorelines, shell ridges, and coastal salt domes. The Ingleside Barrier strandplain, an ancient barrier ridge composed of deep sands and occurring well inland of the current Gulf shoreline, may have occurrences of this system associated with it.

**Landform:** Most occurrences occupy ridges formed from sediments deposited along ancient shorelines. These ridges, which often parallel the coast and are composed of coarse material such as sand or shell, may be up to 3 meters above mean sea level. Some occurrences occupy coastal salt domes, which may rise 30 meters above the surrounding landscape.

**Soils:** Soils are typically entisols of coarse textured material, either sand or shell. The Ecological Site Description, which may be related to this system, is the Coastal Sand ecoclass.

**Description:** This woodland occupies sand and shell ridges which resulted from ancient abandoned beach ridges. It may also be found on salt domes near the coast. Approximately 20,000 hectares (49,000 acres) of this system were mapped in Phase 2. Typically these forests and woodlands are dominated by *Quercus virginiana* (coastal live oak), however other species such as *Celtis laevigata* (sugar hackberry) and *Quercus nigra* (water oak) may be present to co-dominant in the canopy. Other species such as *Liquidambar styraciflua* (sweetgum), *Carya illinoensis* (pecan), *Diospyros virginiana* (common persimmon), *Fraxinus pennsylvanica* (green ash), and *Magnolia grandiflora* (southern magnolia) may also be present in the canopy. The understory is often patchy but may include species such as *Ilex vomitoria* (yaupon), *Callicarpa americana* (American beautyberry), *Zanthoxylum clava-herculis* (Hercules-club pricklyash), *Crataegus viridis* (green hawthorn), *Sabal minor* (dwarf palmetto), *Morella cerifera* (wax-myrtle), and/or *Sideroxylon lanuginosum* (gum bumelia). Woody vines present in this system include *Vitis mustangensis* (Mustang grape), *Parthenocissus quinquefolia* (Virginia creeper), *Campsis radicans* (trumpet creeper), and *Toxicodendron radicans* (poison ivy). The

two epiphytes, *Tillandsia usneoides* (Spanish moss) and *Pleopeltis polypodioides* (resurrection fern), may be commonly encountered in this system. The herbaceous layer is usually sparse, but may include species such as *Schizachyrium scoparium* (little bluestem), *Sanicula canadensis* (Canada snakeroot), *Malvaviscus arboreus* var. *drummondii* (Drummond turk's cap), *Elephantopus carolinianus* (leafy elephantfoot), and *Oplismenus hirtellus* (basketgrass). Areas that were mapped tended to represent wetter areas than are typical of this type, with species such as *Quercus phellos* (willow oak) and *Quercus laurifolia* (laurel oak) conspicuous in the canopy. *Triadica sebifera* (Chinese tallow) and *Ligustrum sinense* (Chinese privet) may be important non-native invaders into this system.

### **VEGETATION TYPES:**

#### **Chenier Plain: Live Oak Fringe Forest (26)**

West Gulf Coastal Plain Chenier and Upper Texas Coastal Live Oak Fringe Forest and Woodland

**Identifier:** CES203.466.2    **Phase 2 Code:** 26

**Description:** Occurrences of this type are dominated by *Quercus virginiana* (coastal live oak). About 3% of this system was mapped as this type.

#### **Chenier Plain: Mixed Live Oak / Deciduous Hardwood Fringe Forest (27)**

West Gulf Coastal Plain Chenier Upper Texas Coast Mixed Live Oak – Deciduous Fringe Forest and Woodland

**Identifier:** CES203.466.3    **Phase 2 Code:** 27

**Description:** This represents the mixed deciduous – evergreen vegetation type for this system.

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#### **West Gulf Coastal Plain Stream Terrace Sandyland Longleaf Pine Woodland (not mapped)**

**Identifier:** CES203.891

**Geology:** This system is associated with coarse, Quaternary alluvial deposits, in the vicinity of Pleistocene surfaces.

**Landform:** Terraces adjacent to creeks and rivers where thick sand deposits develop.

**Soils:** Deep to very deep sands occurring on stream terraces. This may include psamments or psammentic soils such as the Bienville, Alaga, Turkey, or Tonkawa when they occur on the appropriate landform.

**Description:** This system is relatively xeric vegetation, even though it occurs on terraces adjacent to, or within, floodplains. This is the case because the soils are deep and well-drained sands (often alluvial deposits), with low moisture retention and high permeability. *Pinus palustris* (longleaf pine) may form a discontinuous and sparse overstory, along with species such as *Quercus incana* (bluejack oak), *Quercus stellata* (post oak), *Quercus marilandica* (blackjack oak), *Pinus echinata* (shortleaf pine), and *Carya texana* (black hickory). Where fire is excluded, the oaks become denser. *Pinus palustris* (longleaf pine) is absent from some instances. *Pinus elliottii* (slash pine) and *Pinus taeda* (loblolly pine) may be present to common in the current landscape. Depending on fire history, the shrub layer may be somewhat well-developed with species such as *Vaccinium arboreum* (farkleberry), *Sideroxylon lanuginosa* (gum bumelia),

*Persea borbonia* (redbay), and *Ilex vomitoria* (yaupon). The herbaceous layer is usually sparse, with exposed sand and foliose lichens dominating the aspect of the sites. Species such as *Aristida desmantha* (curly threeawn), *Bulbostylis ciliatifolia* (capillary hairsedge), *Carex tenax* (wire sedge), *Cnidoscolus texanus* (Texas bull-nettle), *Cyperus grayioides* (Illinois flatsedge), *Dichanthelium dichotomum* (cypress panicgrass), *Froelichia floridana* (Florida snake-cotton), *Opuntia humifusa* (eastern pricklypear), *Polanisia erosa* (large clammyweed), *Schizachyrium scoparium* (little bluestem), and *Yucca louisianensis* (Gulf Coast yucca) may be present in the herbaceous layer. *Phlox nivalis* ssp. *texensis* (Texas trailing phlox) and *Gaillardia aestivalis* var. *winkleri* (Winkler's firewheel) are two rare taxa associated with this system. This system is floristically similar to other sandhill longleaf pine systems, but the landform of occurrences makes this system unique.

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## Barrens and Glades

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### South-Central Saline Glade

**Identifier:** CES203.291

**Geology:** In some cases, this system may be associated with inland salt domes when the proximity of such a structure to the surface produces high salinity in the surface soils. Otherwise, surface geology of various formations may contain sufficient alkalinity such that leaching from particular members of these formations gives rise to such conditions.

**Landform:** These sites are often associated with streams or drainages, sometimes occurring on terraces.

**Soils:** Soils are characterized by high levels of exchangeable sodium and low permeability with reduced soil aeration. Some soils may be Glossic Natraqualfs.

**Description:** While apparently not well-represented in Texas, the search for *Geocarpon minima* (tinytim) has led investigators to identify some areas that may be characterized as this system. One area mapped as this system, near Grand Saline in Van Zandt County, may not be a good representative of this system. This site does have alkaline soils and is characterized by halophytic species, and generally lacks woody vegetation. The site appears to more closely resemble an inland salt marsh, with extensive areas dominated by *Distichlis spicata* (saltgrass) and lower, wetter areas dominated by *Schoenoplectus* sp. (bulrush). Shrubs that may occur in patches within this system include *Baccharis halimifolia* (baccharis), *Iva angustifolia* (narrowleaf sumpweed), and *Tamarix* sp. (salt cedar). Some sites may be relatively sparsely vegetated and intermixed as a mosaic with surrounding woodlands containing species such as *Quercus stellata* (post oak), *Quercus similis* (bottomland post oak), *Ulmus crassifolia* (cedar elm), *Quercus nigra* (water oak), and *Pinus taeda* (loblolly pine). Other herbaceous species that may be encountered include *Coreopsis tinctoria* (plains coreopsis), *Sporobolus vaginiflorus* (poverty dropseed), *Distichlis spicata* (saltgrass), *Diodia teres* (rough buttonweed), *Houstonia* spp. (blueets), *Isolepis carinata* (keeled bulrush), *Phemeranthus parviflorus* (prairie flameflower), *Plantago* spp. (plantains), *Krigia occidentalis* (western dwarf dandelion), and *Aristida* spp. (threeawns).

### VEGETATION TYPE:

#### Pineywoods: Saline Glade (83)

South-Central Herbaceous Saline Glade

**Identifier:** CES203.291      **Phase 2 Code:** 4207

**Description:** As described for system.

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### West Gulf Coastal Plain Catahoula Barrens

**Identifier:** CES203.364

**Geology:** Restricted to surface outcrops of the Oligocene Catahoula geologic formation, an often tuffaceous sandstone.

**Landform:** Generally level to gently undulating (but sometimes steep), with surface or near surface exposure of the underlying sandstone bedrock.

**Soils:** Shallow loams, such as Browndell –Rock outcrop. Soils may contain montmorillonitic clays. These thin soils can be extremely xeric during dry periods, but can also be saturated during wetter months.

**Description:** Vegetation associated with thin soils over the tuffaceous sandstone of the Catahoula formation is primarily herbaceous. But where the soil is deeper, or fire is excluded for long periods, it can display significant woody cover, with usually stunted representatives of species such as *Pinus palustris* (longleaf pine), *Pinus taeda* (loblolly pine), *Pinus echinata* (shortleaf pine), *Quercus stellata* (post oak), *Quercus marilandica* (blackjack oak), and *Carya texana* (black hickory) dominating the canopy. Shrubs may form a patchy, discontinuous layer with species such as *Ilex vomitoria* (yaupon), *Morella cerifera* (wax-myrtle), *Vaccinium arboreum* (farkleberry), *Forestiera ligustrina* (elbowbush), *Gelsemium sempervirens* (Carolina jessamine), and *Crataegus* spp. (hawthorns) commonly encountered. Maintenance of fire in the landscape will reduce woody cover in these sites, with herbaceous dominated sites displaying increased species richness. On open sites, there may be exposed patches of bedrock or mineral soils, or areas of patchy cover of foliose and/or fruticose lichens. Open sites may have significant herbaceous cover, usually dominated by graminoid species such as *Schizachyrium scoparium* (little bluestem), *Sporobolus clandestinus* (rough dropseed), *Sporobolus silveanus* (Silveus' dropseed), *Schizachyrium tenerum* (slender bluestem), *Tridens strictus* (longspike tridens), *Scleria* spp. (nutrush), and/or *Aristida* spp. (threeawns). *Bigelovia nuttallii* (Nuttall's rayless golden-rod), *Plantago* spp. (plantains), *Minuartia drummondii* (Drummond sandwort), *Chaetopappa asteroides* (common leastdaisy), *Lechea san-sabeana* (San Saba pinweed), *Sabatia campestris* (meadow pink), *Croton michauxii* (narrowleaf rushfoil), *Croton monanthogynus* (doveweed), *Krameria lanceolata* (trailing ratany), *Selaginella arenicola* ssp. *riddellii* (Riddell's spikemoss), *Phemeranthus parviflorus* (prairie flameflower), and a variety of other herbaceous species may also be present. Several sensitive species are associated with this system, including *Schoenolirion wrightii* (Texas sunnybell), *Spiranthes parksii* (Navasota ladies'-tresses), and *Liatris tenuis* (slender gayfeather). This system typically occurs as small patches and many occurrences were likely missed by the current mapping effort.

## VEGETATION TYPES:

### **Pineywoods: Catahoula Herbaceous Barrens (79)**

West Gulf Coastal Plain Catahoula Herbaceous Barrens

**Identifier:** CES203.365.7    **Phase 2 Code:** 79

**Description:** Sites with no or, more commonly, scattered woody canopy.

### **Pineywoods: Catahoula Woodland or Shrubland Barrens (78)**

West Gulf Coastal Plain Catahoula Wooded Barrens

**Identifier:** CES203.365.5    **Phase 2 Code:** 78

**Description:** These sites have greater woody cover with the tree and shrub species mentioned above. The herbaceous cover of this type is more likely to contain species such as *Chasmanthium sessiliflorum* (narrowleaf woodoats), *Ranunculus fascicularis* (prairie buttercup), and *Piptochaetium avenaceum* (blackseed needlegrass), along with

other herbaceous species common to the system. Lack of fire tends to lead closing of the woody canopy and a reduction in diversity in the herbaceous layer.

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### **West Gulf Coastal Plain Weches Glade**

**Identifier:** CES203.277

**Geology:** Associated with outcrops of glauconitic shales of the Eocene Weches Formation.

**Landform:** Occupies slopes on rolling to relatively steep uplands, sometimes on minor scarp slopes of outcrops.

**Soils:** Frequently associated with the Trawick-Bub complex.

**Description:** Vegetation restricted to outcrops of the Weches Formation in San Augustine, Sabine, and Nacogdoches counties, where it occupies generally shallow soils that oscillate between very dry and saturated (during winter and early spring). These are small patch occurrences and are therefore difficult to map using our methodology. Edaphic constraints tend to restrict the growth of woody species, though as soil depth increases, so does woody plant development. Outcrops may be exposed as a result of natural erosion on slopes or may be a result of human-induced openings. This primarily herbaceous system is characterized by species such as *Sedum pulchellum* (yellow stonecrop), *Clinopodium arkansanum* (Ozark savory), *Minuartia patula* (Pitcher's sandwort), *Minuartia drummondii* (Drummond sandwort), *Valerianella radiata* (beaked cornsalad), *Isoetes butleri* (Butler's quillwort), and *Allium drummondii* (Drummond wild-garlic). Other herbaceous species that may be present include *Erigeron* sp. (fleabane), *Desmanthus illinoensis* (Illinois bundleflower), *Croton monanthogynus* (doveweed), *Dalea* sp. (prairie clover), *Houstonia* spp. (bluets), *Nassella leucotricha* (Texas wintergrass), *Bouteloua curtipendula* (sideoats grama), *Eleocharis* spp. (spikerushes), *Sporobolus vaginiflorus* (poverty dropseed), *Thelesperma filifolium* (slender greenthread), and *Arnoglossum plantagineum* (groovestem Indian plantain). Sites may contain non-native species, including *Cynodon dactylon* (Bermudagrass), *Lolium perenne* (Italian ryegrass), *Schedonorus phoenix* (tall fescue), *Lonicera japonica* (Japanese honeysuckle), and *Trifolium* spp. (clovers). Some woody species that may be present include *Juniperus virginiana* (eastern redcedar), *Pinus taeda* (loblolly pine), *Liquidambar styraciflua* (sweetgum), *Ligustrum sinense* (Chinese privet), *Rosa bracteata* (Macartney rose), *Cornus drummondii* (roughleaf dogwood), *Sideroxylon lanuginosum* (gum bumelia), and other species common to the surrounding landscape. Two rare species, *Lesquerella pallida* (white bladderpod) and *Leavenworthia aurea* var. *texana* (Texas golden gladeaccess), are associated with this system.

#### **VEGETATION TYPES:**

##### **Pineywoods: Weches Shrub Glade (80)**

West Gulf Coastal Plain Weches Shrub Glade

**Identifier:** CES203.277.6     **Phase 2 Code:** 80

**Description:** Sites that have been invaded by woody species as described above.

##### **Pineywoods: Weches Herbaceous Glade (81)**

West Gulf Coastal Plain Weches Herbaceous Glade

**Identifier:** CES203.277.7     **Phase 2 Code:** 81

**Description:** Sites lacking significant woody cover.

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### Upper Texas Coast Beach

**Identifier:** CES203.544

**Geology:** Recent deposits of sand resulting from ongoing coastal sediment transport.

**Landform:** Gently sloping towards the gulf, with some development of foreshore dunes.

Beaches in this part of the Texas coast tend to be eroding and narrow.

**Soils:** Sands.

**Description:** Narrow margin of mostly unvegetated sands receiving frequent inundation, erosion, or sediment deposition from eolian processes. The topography is low, and the substrate is dynamic, leading to reduced vegetation development. Sparse herbaceous cover may be encountered with species such as *Cakile* spp. (searocket), *Distichlis spicata* (saltgrass), *Sesuvium* spp. (sea purslanes), *Spartina patens* (marshhay cordgrass), *Ipomoea pes-caprae* (goat-foot morning-glory), and *Ipomoea imperati* (beach morning-glory).

#### VEGETATION TYPE:

**Gulf Coast: Beach (98)**

**Identifier:** CES203.544

**Phase 2 Code:** 98

**Description:** As described for system.

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## Herbaceous Vegetation

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### Blackland Tallgrass Prairie

**Identifier:** CES205.684

**Geology:** Cretaceous shales, marls and limestones, such as those of the Eagle Ford, Austin, Taylor, and Navarro groups. Also, Miocene formations (Fleming, Oakville Sandstone, and Cook Mountain formations) underlie the southern outlier of Blackland prairie recognized as the Fayette Prairie. Eocene Cook Mountain formation underlies the San Antonio Prairie.

**Landform:** Flat to gently rolling, with the most significant ridges associated with the harder Austin Chalk formation.

**Soils:** Typically Vertisols, but this system may occupy Mollisols or Alfisols in limited parts of its distribution. The system generally occurs on calcareous clays, but may also occur on loams, clay loams, or even sandy clay loams. Soils derived from certain Miocene formations may be slightly acid.

**Description:** Currently, only remnants of this system exist, with most of the historical distribution replaced by crop production or improved pasture. *Schizachyrium scoparium* (little bluestem) is the most ubiquitous component of occurrences of this system. *Andropogon gerardii* (big bluestem) and *Sorghastrum nutans* (Indiangrass) are also common dominants. Other

species commonly encountered include *Bouteloua curtipendula* (sideoats grama), *Carex microdonta* (smalltooth sedge), *Sporobolus compositus* (tall dropseed), *Nassella leucotricha* (Texas wintergrass), *Bothriochloa laguroides* spp. *torreyana* (silver bluestem), *Eriochloa sericea* (silky cupgrass), *Paspalum floridanum* (Florida paspalum), and *Tridens strictus* (longspike tridens). Forbs commonly encountered in this system include *Symphyotrichum ericoides* (heath aster), *Stenaria nigricans* var. *nigricans* (prairie bluets), *Helianthus maximiliani* (Maximilian sunflower), *Rudbeckia hirta* (blackeyed susan), *Bifora americana* (prairie bishop), *Acacia angustissima* var. *hirta* (prairie acacia), *Desmanthus illinoensis* (Illinois bundleflower), and many more. Lowland sites and swales are often dominated by *Tripsacum dactyloides* (eastern gamagrass) and *Panicum virgatum* (switchgrass). A relatively unique type occurring on low pH Alfisols is dominated by *Sporobolus silveanus* (Silveus' dropseed), *Carex meadii* (Mead's sedge), and *Fimbristylis puberula* (hairy fimbry).

Several groups of communities are sufficiently unique to recommend including descriptions of them. Southern Blackland Alfisol Tallgrass Prairies occur on Alfisols at the northern and eastern edges of the Blackland Prairie region. These sites are typically more species-rich than other occurrences of the system. Multiple communities at the association level have been defined for this type including: *Schizachyrium scoparium* (little bluestem) – *Sorghastrum nutans* (Indiangrass) prairies with various associated graminoids and forbs, varying with soil type and landscape position; *Tripsacum dactyloides* (eastern gamagrass) dominated prairies, often with a number of co-dominant forbs and grasses; and, *Sporobolus silveanus* (Silveus' dropseed) – *Carex meadii* (Mead's sedge) – *Tridens strictus* (longspike tridens) prairies associated with low pH Alfisols, known from Fannin, Lamar, and Grayson counties. The more typical communities of the system are Vertisol tallgrass prairies. There are also *Tripsacum dactyloides* (eastern gamagrass) – *Panicum virgatum* (switchgrass) dominated prairies on lowlands, like those that occur at Knight Prairie and Mill Creek Bottom.

## **VEGETATION TYPE:**

### **Blackland Prairie: Disturbance or Tame Grassland (84)**

Blackland Tallgrass Prairie

**Identifier:** CES205.684.9

**Phase 2 Code:** 84

**Description:** Very little intact Blackland prairie remains within the region, so grasslands that are mapped in the region are assumed to primarily consist of disturbance or tame grasslands. Non-native grasses such as *Cynodon dactylon* (Bermudagrass), *Sorghum halepense* (Johnsongrass), and *Bothriochloa ischaemum* var. *songarica* (King Ranch bluestem) are frequently encountered. Weedy forbs such as *Ambrosia psilostachya* (western ragweed) and *Amphiachyris dracunculoides* (common broomweed) are often present. Mesquite (*Prosopis glandulosa*) is often present and may be fairly dense. Important native grasses may include *Schizachyrium scoparium* (little bluestem), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Sorghastrum nutans* (Indiangrass), *Nassella leucotricha* (Texas wintergrass), *Bouteloua hirsuta* (hairy grama), and *Aristida* spp. (threeawn species).

## East-Central Texas Plains Xeric Sandylands

**Identifier:** CES205.897

**Geology:** Associated with Eocene sand formations, particularly Carrizo Sands, but also Queen City and Sparta Sands.

**Landform:** High topographic positions, along with rapidly draining soils, results in conditions that only briefly retain surface moisture.

**Soils:** Deep sands typify this system.

**Description:** This small patch system is typically an open, herbaceous-dominated sand "prairie," sometimes with open, oak-dominated woodlands. Species such as *Quercus incana* (bluejack oak), *Quercus margarettae* (sand post oak), *Quercus stellata* (post oak), and *Carya texana* (black hickory) (often stunted) occur in the usually sparse overstory. Invasion by *Ilex vomitoria* (yaupon) is frequent in the absence of fire. Other woody plants that may be encountered include *Juniperus virginiana* (eastern redcedar), *Rhus aromatica* (fragrant sumac), *Vaccinium arboreum* (farkleberry), *Viburnum rufidulum* (rusty blackhaw), *Rhus copallinum* (flameleaf sumac), and *Cornus florida* (flowering dogwood). The herbaceous layer may be sparse, often with exposed sand, *Cladonia* spp. (foliose lichens), and species such as *Aristida desmantha* (curly threeawn), *Brazoria truncata* (bluntsepal brazoria), *Cladonia* spp. (foliose lichens), *Cnidocolus texanus* (Texas bull-nettle), *Cyperus grayioides* (Illinois flatsedge) in the northeastern part of the region, *Dichanthelium* spp. (rosette grass), *Sporobolus junceus* (pineywoods dropseed), *Froelichia floridana* (Florida snake-cotton), *Hymenopappus artemisiifolius* (old plainsman), *Lechea* spp. (pinweed), *Loeflingia squarrosa* (spreading loeflingia), *Opuntia humifusa* (eastern pricklypear), *Paronychia drummondii* (Drummond nailwort), *Penstemon murrayanus* (cupleaf penstemon), *Polanisia erosa* (large clammyweed), *Schizachyrium scoparium* (little bluestem), *Selaginella arenicola* ssp. *riddellii* (sand spikemoss), *Senecio ampullaceus* (Texas groundsel), *Sorghastrum elliottii* (slender Indiangrass), *Stylisma pickeringii* (bigpod bonamia), *Tetragonotheca ludoviciana* (sawtooth nerve-ray), *Tradescantia reverchonii* (Reverchon spiderwort), *Triplasis purpurea* (purple sandgrass), and *Yucca louisianensis* (Gulf Coast yucca). Texas endemics, such as *Brazoria truncata* var. *pulcherrima* (Centerville brazos-mint), *Rhododon ciliatus* (Texas sandmint), and *Hymenopappus carrizoanus* (Carrizo Sands woollywhite), may be found in this system.

### VEGETATION TYPES:

#### Post Oak Savanna: Sandylands Woodland and Shrubland (85)

East-central Texas Plains Xeric Sandyland Woodland and Shrubland

**Identifier:** CES205.897.6

**Phase 2 Code:** 85

**Description:** As described for the system, but overstory dominated by the woody species described. This may be a common condition, especially where fire is excluded.

#### Post Oak Savanna: Sandylands Grassland (86)

East-central Texas Plains Xeric Sandyland Herbaceous Vegetation

**Identifier:** CES205.897.9

**Phase 2 Code:** 86

**Description:** As described for the system, but lacking significant woody component. This vegetation type is representative of the system in good condition, with a fire cycle more consistent with the presumed natural cycle.

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### **Pineywoods: Disturbance or Tame Grassland (99)**

**Phase 2 Code:** 99

**Description:** This grass dominated vegetation type occurs within a landscape that would naturally be dominated by forest or woodland. Natural occurrences would be short-lived following natural disturbances, such as fire. The predominant cover often consists of non-native grass species such as *Cynodon dactylon* (Bermudagrass), *Paspalum notatum* (Bahia grass), *Lolium perenne* (Italian ryegrass), *Schedonorus phoenix* (tall fescue), and/or *Bromus catharticus* (rescuegrass). However, native grasses such as *Schizachyrium scoparium* (little bluestem) and *Andropogon virginicus* (broomsedge bluestem) may also have significant cover. Various forbs and some woody species may also be present. These sites will develop significant woody cover in the absence of active management.

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### **West Gulf Coastal Plain Southern Calcareous Prairie**

**Identifier:** CES203.379

**Geology:** Primarily associated with the Fleming Formation, a calcareous clay/sandstone of Miocene age. The Cook Mountain Formation, a marly Eocene formation, may also give rise to clays that support this system.

**Landform:** Occurs on upper slopes and broad uplands in gently undulating landscapes.

**Soils:** Circumneutral to moderately alkaline, vertic soils such as Ferris, Houston Black, or Wiergate clays.

**Description:** This graminoid-dominated system occurs within a landscape generally dominated by forest and woodland. It occupies deep vertic soils with circumneutral surface pH, a condition uncommon in the landscape of predominantly acidic, forested soils. Occurrences may reflect a relationship to the blackland prairie further to the west, within the Fayette Prairie, and some consider these small patch prairies to be outliers of the Blackland Tallgrass Prairie. The system may be dominated by species such as *Schizachyrium scoparium* (little bluestem), *Sorghastrum nutans* (Indiangrass), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Bouteloua curtipendula* (sideoats grama), *Andropogon gerardii* (big bluestem), *Nassella leucotricha* (Texas wintergrass), *Paspalum pubiflorum* (hairyseed paspalum), and *Panicum virgatum* (switchgrass). Non-native grasses such as *Bothriochloa ischaemum* var. *songarica* (King Ranch bluestem), *Bromus arvensis* (Japanese brome), *Cynodon dactylon* (Bermudagrass), and/or *Lolium perenne* (Italian ryegrass) may be conspicuous to dominant. Other herbaceous species that may be encountered include *Acacia angustissima* (prairie acacia), *Carex cherokeensis* (Cherokee sedge), *Croton monanthogynus* (doveweed), *Neptunia* sp. (neptunia), *Carex microdonta* (smalltooth sedge), *Grindelia lanceolata* (Gulf gumweed), *Rudbeckia missouriensis* (Missouri coneflower), *Rudbeckia hirta* (blackeyed susan), *Indigofera miniata* (scarlet-pea), *Arnoglossum plantagineum* (groovestem Indian plantain), *Euphorbia bicolor* (snow-on-the-prairie), *Dalea* spp. (prairieclovers), *Coreopsis tinctoria* (plains coreopsis), *Eustoma exaltatum* (tall prairie gentian), and *Symphyotrichum* spp. (asters). Various woody species from the surrounding landscape,

including *Pinus taeda* (loblolly pine), *Ulmus alata* (winged elm), *Liquidambar styraciflua* (sweetgum), *Juniperus virginiana* (eastern redcedar), *Crataegus spathulata* (littlehip hawthorn), *Crataegus crus-galli* (cockspur hawthorn), *Sideroxylon lanuginosum* (gum bumelia), and others, may invade these prairies. Non-native woody species, such as *Rosa bracteata* (Macartney rose), may also invade. This may be a result of long-term fire suppression.

#### **VEGETATION TYPE:**

##### **Pineywoods: Southern Calcareous Mixedgrass Prairie (82)**

West Gulf Coastal Plain Southern Calcareous Prairie

**Identifier:** CES203.379      **Phase 2 Code:** 82

**Description:** As described above.

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#### **Texas-Louisiana Coastal Prairie**

**Identifier:** CES203.550

**Geology:** This system is generally coincident with the distribution of the Pleistocene Beaumont and Lissie Formation in Phase 2.

**Landform:** Usually on level to gently rolling landscapes, with slopes generally less than 5%. Microtopography plays an important role in local variation in the system, with ridges, swales, mounds, depressions, mima (or pimple) mounds, and gilgai leading to a mosaic of drier and wetter plant communities.

**Soils:** Non-saline Vertisols, Alfisols, and (less extensively) Mollisols. Vertisols are often characterized by gilgai, resulting from shrink-swell attributes of the montmorillonitic clays of which they are composed. The Alfisols have a loamy surface with clayey subsoils.

**Description:** This mid- to tallgrass prairie occupies Pleistocene surfaces of the Texas and Louisiana coast, on non-saline soils of level to gently rolling topography. It is dominated by graminoid species, such as *Schizachyrium scoparium* (little bluestem), *Sorghastrum nutans* (Indiangrass), *Paspalum plicatulum* (brownseed paspalum), *Panicum virgatum* (switchgrass), *Andropogon gerardii* (big bluestem), *Sporobolus compositus* (tall dropseed), *Paspalum setaceum* (thin paspalum), *Fimbristylis puberula* (hairy fimbry), *Dichanthelium oligosanthes* (fewflower panicgrass), *Rhynchospora* spp. (beaksedges), *Paspalum floridanum* (Florida paspalum), *Muhlenbergia capillaris* (Gulf muhly), *Tridens strictus* (longspike tridens), *Bouteloua curtipendula* (sideoats grama), *Andropogon glomeratus* (bushy bluestem), and *Tripsacum dactyloides* (eastern gamagrass). *Axonopus* spp. (carpetgrasses), *Sporobolus indicus* (rat-tail smutgrass), *Andropogon virginicus* (broomsedge bluestem), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), and *Nassella leucotricha* (Texas wintergrass) may be particularly noticeable on over-grazed sites. Non-native graminoids that may be conspicuous to dominant components include *Cynodon dactylon* (Bermudagrass), *Cyperus entrerianus* (deep-rooted sedge), *Bothriochloa ischaemum* var. *songarica* (King Ranch bluestem), *Dichanthium* spp. (old world bluestems), *Lolium perenne* (Italian ryegrass), *Schedonorus phoenix* (tall fescue), *Paspalum notatum* (Bahia grass), and *Paspalum dilatatum* (dallisgrass). Forbs that may often be encountered include *Liatris* spp. (gayfeathers), *Sabatia campestris* (meadow pink), *Ambrosia psilostachya* (western ragweed), *Euphorbia bicolor* (snow-on-the-prairie), *Solidago* spp.

(goldenrods), *Rudbeckia hirta* (blackeyed susan), *Ruellia humilis* (low wild petunia), *Asclepias viridis* (green milkweed), *Chamaecrista fasciculata* (partridge pea), *Helianthus angustifolius* (narrowleaf sunflower), *Euthamia* spp. (goldentops), *Ratibida columnifera* (Mexican hat), *Symphotrichum ericoides* (heath aster), *Silphium laciniatum* (compassplant), *Baptisia* spp. (wild indigos), *Iva angustifolia* (narrowleaf sumpweed), *Eryngium yuccifolium* (button snakeroot), *Boltonia diffusa* (smallhead doll's daisy), and *Neptunia lutea* (yellow neptunia). Woody species may invade this typically herbaceous vegetation, including *Rosa bracteata* (Macartney rose), *Acacia farnesiana* (huisache), *Triadica sebifera* (Chinese tallow), *Baccharis halimifolia* (baccharis), *Celtis laevigata* (sugar hackberry), and *Prosopis glandulosa* (honey mesquite).

#### **VEGETATION TYPE:**

##### **Gulf Coast: Coastal Prairie (87)**

Texas-Louisiana Coastal Prairie

**Identifier:** CES203.550      **Phase 2 Code:** 87

**Description:** As described for system.

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##### **Texas Saline Coastal Prairie**

**Identifier:** CES203.543

**Geology:** Principally on the Pleistocene Beaumont Formation.

**Landform:** Mostly level or very gently undulating landform, typically near the coast. These sites may be inundated by saltwater during storm surges.

**Soils:** Very deep, somewhat poorly to poorly drained with high salinity and/or sodicity, at least at some depth. These may be loams or clays. These soils may be saturated from local rainfall or, occasionally from storm surges.

**Description:** This system occupies saline soils, generally near-coast, on level topography of the Beaumont Formation. Sites may be nearly monotypic stands of *Spartina spartinae* (Gulf cordgrass). Other gramimoids that may be present to abundant include *Schizachyrium scoparium* (little bluestem), *Andropogon glomeratus* (bushy bluestem), *Panicum virgatum* (switchgrass), *Muhlenbergia capillaris* (Gulf muhly), or *Sporobolus indicus* (rat-tail smutgrass). *Spartina patens* (marshhay cordgrass), *Paspalum hartwegianum* (Hartweg paspalum), *Sporobolus virginicus* (seashore dropseed), *Paspalum vaginatum* (seashore paspalum), and *Distichlis spicata* (saltgrass) may be common, particularly on lower, somewhat wetter sites. Forbs are generally uncommon, but may include species such as *Borrchia frutescens* (sea ox-eye daisy), *Solidago sempervirens* (seaside goldenrod), *Iva angustifolia* (narrowleaf sumpweed), *Euthamia* spp. (goldentops), or other species more common to the non-saline soils nearby, or the salt marsh that may also be nearby. Shrubby species may invade the prairie, commonly including species such as *Iva frutescens* (bigleaf sumpweed), *Tamarix* sp. (salt cedar), and *Baccharis halimifolia* (baccharis).

#### **VEGETATION TYPES:**

##### **Gulf Coast: Salty Prairie (89)**

Texas Saline Herbaceous Coastal Prairie

**Identifier:** CES203.543.7    **Phase 2 Code:** 89

**Description:** Occurrences of the system lacking significant shrub cover.

**Gulf Coast: Salty Shrubland (88)**

Texas Saline Shrub Coastal Prairie

**Identifier:** CES203.543.6    **Phase 2 Code:** 88

**Description:** Occurrences of the system where shrubs, such as those listed above, have dominated the site.

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**Central and Upper Texas Coast Dune and Coastal Grassland**

**Identifier:** CES203.465

**Geology:** Eolian deep sands.

**Landform:** Primary and secondary dunes, as well as relatively level areas, on the mainland where deep sands are deposited. Significant local topography, in the form of swales, may be present.

**Soils:** Deep sands.

**Description:** This system includes some wetland, as well as upland, grass-dominated vegetation on deep sands. Dunes are often dominated by *Uniola paniculata* (sea oats), with other species such as *Croton punctatus* (Gulf croton), *Panicum amarum* (bitter panicum), *Ipomoea pes-caprae* (goat-foot morning-glory), *Ipomoea imperati* (beach morning-glory), *Tidestromia lanuginosa* (wooly tidestromia), *Cakile* spp. (searocket), and *Sesuvium portulacastrum* (shoreline seapurslane) also present. Local topographic lows, such as in interdunal swales, may be dominated by *Spartina patens* (marshhay cordgrass), with *Fimbristylis* spp. (fimbries), *Eleocharis* spp. (spikerushes), *Hydrocotyle* spp. (pennyworts), *Distichlis spicata* (saltgrass), and/or *Schoenoplectus* spp. (bulrushes) also present. Upland grasslands are often dominated by *Schizachyrium littorale* (seacoast bluestem) and *Paspalum monostachyum* (gulfdune paspalum). Numerous other species, such as *Sorghastrum nutans* (Indiangrass), *Paspalum plicatulum* (brownseed paspalum), *Muhlenbergia capillaris* (Gulf muhly), *Cenchrus spinifex* (common sandbur), *Elionurus tripsacoides* (Pan American balsamscale), *Eragrostis secundiflora* (red lovegrass), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Heteropogon contortus* (tanglehead), and *Dichantheium* spp. (rosette grasses) may also be common. Numerous forbs, including such species as *Heterotheca subaxillaris* (camphor weed), *Croton* spp. (crotons), *Chamaecrista fasciculata* (partridge pea), *Rayjacksonia phyllocephala* (camphor daisy), *Physalis* spp. (groundcherries), *Gaillardia pulchella* (Indian blanket), *Solidago sempervirens* (seaside goldenrod), and *Rudbeckia hirta* (blackeyed susan) are also commonly encountered. Some woody species are found in the system, but typically make up very little cover. Cover of woody species is limited, but may include *Baccharis* spp. (baccharis), stunted *Prosopis glandulosa* (honey mesquite), and *Tamarix* spp. (salt cedars).

**VEGETATION TYPE:**

**Gulf Coast: Dune and Coastal Grassland (90)**

**Identifier:** CES203.465                      **Phase 2 Code:** 90

**Description:** As described for system.



# Woody Wetlands and Riparian

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## Southeastern Great Plains Floodplain Forest

**Identifier:** CES205.710

**Geology:** This system generally occupies Quaternary alluvium.

**Landform:** This floodplain forest occupies relatively broad flats at low topographic positions, along large streams where alluvial deposition dominates. Rivers of the Brazos, Colorado, and upper Trinity River basins within Phase 2.

**Soils:** Bottomland Ecological Sites (including Loamy, Sandy, and Clayey) characterize this system.

**Description:** Dominant communities within this system range from floodplain forests to wet meadows to gravel/sand flats; however, they are linked by underlying soils and the flooding regime. Canopy dominants may include *Carya illinoensis* (pecan), *Fraxinus americana* (white ash), *Quercus nigra* (water oak), *Ulmus crassifolia* (cedar elm), *Celtis laevigata* (sugar hackberry), *Ulmus americana* (American elm), *Quercus fusiformis* or *Q. virginiana* (plateau or coastal live oak), *Platanus occidentalis* (American sycamore), *Acer negundo* (boxelder), *Gleditsia triacanthos* (common honeylocust), *Quercus macrocarpa* (bur oak), *Morus rubra* (red mulberry), *Fraxinus pennsylvanica* (green ash), and *Sapindus saponaria* var. *drummondii* (western soapberry). In this eastern part of the range of the system, *Liquidambar styraciflua* (sweetgum), *Quercus phellos* (willow oak), and *Betula nigra* (river birch) may also be commonly encountered. Seasonally flooded sites, especially within the Trinity River basin, may have *Quercus lyrata* (overcup oak) as an overstory component. Overgrazing and/or overbrowsing may influence recruitment of overstory species and composition of the understory and herbaceous layers. Shrub species may include *Callicarpa americana* (American beautyberry), *Cephalanthus occidentalis* (common buttonbush), *Ilex decidua* (possumhaw), *Ilex vomitoria* (yaupon), *Sideroxylon lanuginosum* (gum bumelia), *Diospyros virginiana* (common persimmon), *Vaccinium arboreum* (farkleberry), *Juniperus virginiana* (eastern redcedar), *Cornus drummondii* (roughleaf dogwood), and *Viburnum rufidulum* (rusty blackhaw), which may occur as dense patches following disturbance, but are otherwise generally fairly sparse. Vines such as *Berchemia scandens* (Alabama supplejack), *Campsis radicans* (trumpet creeper), *Vitis* spp. (grape), *Parthenocissus quinquefolia* (Virginia creeper), *Toxicodendron radicans* (poison ivy), *Smilax bona-nox* (saw greenbrier), and *Ampelopsis arborea* (peppervine) may be conspicuous. Herbaceous cover includes *Elymus virginicus* (Virginia wildrye), *Verbesina virginica* (frostweed), *Chasmanthium latifolium* (creek oats), *Chasmanthium sessiliflorum* (narrowleaf woodoats), *Carex cherokeensis* (Cherokee sedge), *Tripsacum dactyloides* (eastern gamagrass), *Symphotrichum drummondii* var. *texanum* (Drummond's aster), *Geum canadense* (white avens), *Sanicula canadensis* (Canada snakeroot), *Ambrosia trifida* (giant ragweed), *Panicum virgatum* (switchgrass), *Galium* spp. (bedstraw), *Teucrium canadense* (American germander), and *Carex* spp. (caric sedges). Wetter sites may contain species such as *Zizaniopsis miliacea* (marshmillet), *Rhynchospora* spp. (beaksedges), *Eleocharis* spp. (spikerushes), *Nymphaea odorata* (American waterlily), and *Peltandra virginica* (Virginia peltandra). Non-native grasses that may dominate these sites include *Cynodon dactylon* (Bermudagrass) and *Sorghum halepense* (Johnsongrass). Herbaceous cover may be quite high, especially in situations where shrub cover is low.

## **VEGETATION TYPES:**

### **Central Texas: Floodplain Evergreen Forest (29)**

Southeastern Great Plains Floodplain Evergreen Forest and Woodland

**Identifier:** CES205.710.1      **Phase 2 Code:** 29

**Description:** As described for the system, but the canopy is dominated by *Juniper virginiana* (eastern redcedar). In some cases, this mapped type may have *Pinus taeda* (loblolly pine) as the canopy dominant.

### **Central Texas: Floodplain Live Oak Forest (30)**

Southeastern Great Plains Floodplain Live Oak Forest and Woodland

**Identifier:** CES205.710.2      **Phase 2 Code:** 30

**Description:** As described for the system, but dominated by *Quercus fusiformis* (plateau live oak) or *Quercus virginiana* (coastal live oak). Deciduous species can be, and frequently are, common in the canopy, but *Q. fusiformis* (plateau live oak) or *Q. virginiana* (coastal live oak) clearly dominates. *Juniperus virginiana* (eastern redcedar) may also be present.

### **Central Texas: Floodplain Hardwood / Evergreen Forest (31)**

Southeastern Great Plains Floodplain Mixed Deciduous – Evergreen Forest and Woodland

**Identifier:** CES205.710.3      **Phase 2 Code:** 31

**Description:** As described for the system with a mix of evergreen and deciduous species in the canopy.

### **Central Texas: Floodplain Hardwood Forest (32)**

Southeastern Great Plains Floodplain Deciduous Forest and Woodland

**Identifier:** CES205.710.4      **Phase 2 Code:** 32

**Description:** As described for the system, but deciduous species dominating the canopy.

### **Central Texas: Floodplain Evergreen Shrubland (33)**

Southeastern Great Plains Floodplain Evergreen Shrubland

**Identifier:** CES205.710.5      **Phase 2 Code:** 33

**Description:** Shrublands of the floodplains of the region that are dominated by *Juniperus* spp. (juniper) occurring as shrubs, or other evergreen shrubs, such as *Ilex vomitoria* (yaupon). This type may also represent young *Pinus taeda* (loblolly pine) stands

### **Central Texas: Floodplain Deciduous Shrubland (34)**

Southeastern Great Plains Floodplain Deciduous Shrubland

**Identifier:** CES205.710.6      **Phase 2 Code:** 34

**Description:** Shrublands of the floodplains of the region that are dominated by deciduous shrubs such as *Ilex decidua* (possumhaw), *Salix nigra* (black willow), *Cornus drummondii* (roughleaf dogwood), and/or *Cephalanthus occidentalis* (common

buttonbush). This mapped type may also include areas with sparse woodlands composed of typical deciduous overstory species as described above.

### **Central Texas: Floodplain Herbaceous Vegetation (35)**

Southeastern Great Plains Floodplain Herbaceous Vegetation

**Identifier:** CES205.710.7

**Phase 2 Code:** 35

**Description:** Floodplains of the region that lack a significant overstory or shrub canopy, but retain cover in the herbaceous layer. Non-native grass species such as *Cynodon dactylon* (Bermudagrass) and *Sorghum halepense* (Johnsongrass) may frequently dominate this vegetation type.

### **Central Texas: Floodplain Seasonally Flooded Hardwood Forest (37)**

Southeastern Great Plains Floodplain Seasonally Flooded Hardwood Forest

**Identifier:** CES205.710.14

**Phase 2 Code:** 37

**Description:** In this eastern portion of the range of the system, the occurrence of bottomlands that are seasonally flooded becomes more common. These sites may be dominated by species that may be more commonly encountered to the east, such as *Quercus lyrata* (overcup oak) and *Quercus phellos* (willow oak). *Salix nigra* (black willow) may also be commonly encountered within the mapped type. Herbaceous cover is very limited due to the frequency of flooding. Shrubs that can withstand frequent inundation, such as *Cephalanthus occidentalis* (common buttonbush), *Planera aquatica* (water elm), and *Forestiera acuminata* (swamp privet), may be present to dominant.

### **Central Texas: Floodplain Baldcypress Swamp (36)**

Southeastern Great Plains Baldcypress Swamp

**Identifier:** CES205.710.24

**Phase 2 Code:** 36

**Description:** In the eastern portion of the range of the system, baldcypress swamps are more commonly encountered, particularly in the eastern part of the upper Trinity River basin. These sites are dominated by *Taxodium distichum* (baldcypress). Some mapped occurrences may be dominated by *Planera aquatica* (water elm).

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## **Southeastern Great Plains Riparian Forest**

**Identifier:** CES205.709

**Geology:** As defined, this system occupies buffer zones of headwater streams, and soils develop in place over a variety of geologic surfaces

**Landform:** Valleys and drainages along headwater streams of the Brazos and upper Trinity River Basins. Typically in areas with erosional processes dominating over alluvial deposition. In the Trinity River basin, occurrences were mapped upstream of approximately the Leon/Madison County line, near the confluence with Cobb Creek.

**Soils:** By definition, this system is mapped along drainages upstream of the Bottomland Ecoclasses, so they will be mapped on soils of the surrounding uplands.

**Description:** Trees that may be present in stands of this system include *Celtis laevigata* (sugar hackberry), *Ulmus crassifolia* (cedar elm), *Platanus occidentalis* (American sycamore), *Populus deltoides* (eastern cottonwood), *Quercus fusiformis* (plateau live oak), *Quercus nigra* (water

oak), *Quercus phellos* (willow oak), *Sapindus saponaria* var. *drummondii* (western soapberry), *Salix nigra* (black willow), *Fraxinus americana* (white ash), *Fraxinus pennsylvanica* (green ash), *Gleditsia triacanthos* (common honeylocust), and *Carya illinoensis* (pecan). To the east, *Quercus falcata* (southern red oak) and *Liquidambar styraciflua* (sweetgum) may become important components of the overstory. The shrub layer development is variable, sometimes with species such as *Forestiera acuminata* (swamp privet), *Ilex decidua* (possumhaw), *Ilex vomitoria* (yaupon), *Sideroxylon lanuginosum* (gum bumelia), *Juniperus virginiana* (eastern redcedar), *Diospyros virginiana* (common persimmon), *Cornus drummondii* (roughleaf dogwood), and/or *Viburnum rufidulum* (rusty blackhaw). To the east, evergreen dominated occurrences may contain *Pinus taeda* (loblolly pine) or *Pinus echinata* (shortleaf pine), as well as *Juniperus virginiana* (eastern redcedar). Herbaceous cover is also variable, depending on overstory and shrub canopies and recent flooding history. Herbaceous species may include *Elymus virginicus* (Virginia wildrye), *Verbesina virginica* (frostweed), *Chasmanthium latifolium* (creek oats), *Chasmanthium sessiliflorum* (narrowleaf woodoats), *Tripsacum dactyloides* (eastern gamagrass), *Symphotrichum drummondii* var. *texanum* (Drummond's aster), *Amphiachyris dracunculoides* (common broomweed), *Ambrosia psilostachya* (western ragweed), *Geum canadense* (white avens), *Sanicula canadensis* (Canada snakeroot), *Panicum virgatum* (switchgrass), *Galium* spp. (bedstraw), and *Carex* spp. (caric sedges). Upland species such as *Schizachyrium scoparium* (little bluestem), *Nassella leucotricha* (Texas wintergrass), and *Sorghastrum nutans* (Indiangrass) may be common. Woody vines such as *Smilax bona-nox* (saw greenbrier), *Toxicodendron radicans* (poison ivy), *Ampelopsis arborea* (peppervine), and *Vitis* spp. (grapes) may be common. Non-native grass species that may be common to dominant on these sites include *Arundo donax* (giant reed) and *Cynodon dactylon* (Bermudagrass) and *Sorghum halepense* (Johnsongrass). The non-native species, such as *Ligustrum* spp. (privets) and *Triadica sebifera* (Chinese tallow), may be commonly encountered.

### **VEGETATION TYPES:**

#### **Central Texas: Riparian Evergreen Forest (38)**

Southeastern Great Plains Riparian Evergreen Forest and Woodland

**Identifier:** CES205.709.1

**Phase 2 Code:** 38

**Description:** As described for the system, with *Juniperus virginiana* (eastern redcedar) dominating the canopy. On the eastern edge of the range of this system, some occurrences may be dominated by *Pinus taeda* (loblolly pine), or less commonly, *Pinus echinata* (shortleaf pine).

#### **Central Texas: Riparian Live Oak Forest (39)**

Southeastern Great Plains Riparian Live Oak Forest and Woodland

**Identifier:** CES205.709.2

**Phase 2 Code:** 39

**Description:** As described for the system, with *Quercus fusiformis* (plateau live oak) or *Quercus virginiana* (coastal live oak) dominating the canopy. Deciduous species can be, and frequently are, common in the canopy, but *Q. fusiformis* (plateau live oak) or *Quercus virginiana* (coastal live oak) clearly dominates. *Juniperus virginiana* (eastern redcedar) may also be present.

#### **Central Texas: Riparian Hardwood / Evergreen Forest (40)**

Southeastern Great Plains Riparian Mixed Deciduous – Evergreen Forest and Woodland

**Identifier:** CES205.709.3                      **Phase 2 Code:** 40

**Description:** As described for the system, with a mix of evergreen species, including *Juniperus virginiana* (eastern redcedar), *Pinus* spp. (pines), *Quercus fusiformis* (plateau live oak) and/or *Quercus virginiana* (coastal live oak) and deciduous species in the canopy.

#### **Central Texas: Riparian Hardwood Forest (41)**

Southeastern Great Plains Riparian Hardwood Forest and Woodland

**Identifier:** CES205.709.4                      **Phase 2 Code:** 41

**Description:** As described for the system, with deciduous species dominating the canopy.

#### **Central Texas: Riparian Evergreen Shrubland (42)**

Southeastern Great Plains Riparian Evergreen Shrubland

**Identifier:** CES205.709.5                      **Phase 2 Code:** 42

**Description:** Shrublands in riparian sites that are dominated by *Juniperus virginiana* (eastern redcedar), young *Pinus* spp. (pines) or, sometimes broadleaf evergreen shrubs such as *Ilex vomitoria* (yaupon).

#### **Central Texas: Riparian Deciduous Shrubland (43)**

Southeastern Great Plains Riparian Deciduous Shrubland

**Identifier:** CES205.709.6                      **Phase 2 Code:** 43

**Description:** Shrublands in riparian sites that may be dominated by deciduous shrubs such as *Ilex decidua* (possumhaw), *Prosopis glandulosa* (honey mesquite), *Salix nigra* (black willow), *Cornus drummondii* (roughleaf dogwood), and/or *Cephalanthus occidentalis* (common buttonbush). This mapped type may also represent relatively sparse woodlands dominated by overstory species typical of the system.

#### **Central Texas: Riparian Herbaceous Vegetation (44)**

Southeastern Great Plains Riparian Herbaceous Vegetation

**Identifier:** CES205.709.7                      **Phase 2 Code:** 44

**Description:** Riparian sites lacking overstory or shrub canopy but retaining herbaceous cover. Some sites may be dominated by species such as *Schizachyrium scoparium* (little bluestem) or *Sorghastrum nutans* (Indiangrass), more commonly encountered in surrounding uplands. Other sites may be dominated by the non-natives like *Arundo donax* (giant reed) or *Cynodon dactylon* (Bermudagrass).

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#### **Western Gulf Coastal Plain Large River Floodplain Forest**

**Identifier:** CES203.488

**Geology:** Typically occupying Quaternary Alluvium along major rivers including the Trinity (downstream of Cobb Creek), Neches, Angelina, Sabine, Sulphur, and San Jacinto, and a few of their major tributaries.

**Landform:** Broad floodplains with significant development of bottomland soils. These areas include an array of local geomorphic features such as natural levees, point bars, meander scrolls, oxbows, terraces, and sloughs.

**Soils:** This system occupies soils of various textures derived from alluvial processes of the associated rivers. The hydrology of these soils is variable, including temporary, seasonal, semi-permanent flooding regimes.

**Description:** This system is typically represented by forests that vary relative to the flooding regime, which is often controlled by local topographic variation and proximity to the river. Swamps are typically represented by forests of *Taxodium distichum* (baldcypress), with other species such as *Nyssa aquatica* (water tupelo), *Gleditsia aquatica* (water honeylocust), and *Carya aquatica* (water hickory) also present. Some semi-permanently flooded sites may also be dominated by *Planera aquatica* (water elm). Floating aquatics, such as *Lemna minor* (common duckweed), *Potamogeton* spp. (pondweeds), *Ceratophyllum demersum* (coontail), and *Nymphaea odorata* (American waterlily) may also be present at those sites. *Quercus lyrata* (overcup oak) is characteristic of seasonally flooded bottomlands, but numerous other species are also important components of the canopy, including *Taxodium distichum* (baldcypress), *Quercus phellos* (willow oak), *Fraxinus pennsylvanica* (green ash), *Liquidambar styraciflua* (sweetgum), *Nyssa biflora* (swamp tupelo), *Fraxinus caroliniana* (Carolina ash), and *Quercus similis* (bottomland post oak). Commonly encountered, and sometimes dominant, species of temporarily flooded sites include *Liquidambar styraciflua* (sweetgum), *Quercus nigra* (water oak), and *Fraxinus pennsylvanica* (green ash). Numerous other species, such as *Quercus laurifolia* (laurel oak), *Quercus michauxii* (swamp chestnut oak), *Quercus pagoda* (cherrybark oak), *Celtis laevigata* (sugar hackberry), *Acer rubrum* (red maple), *Ulmus crassifolia* (cedar elm), *Ulmus americana* (American elm), and *Carya illinoensis* (pecan) may also be important components of the canopy. *Platanus occidentalis* (American sycamore), *Populus deltoides* (eastern cottonwood), *Betula nigra* (river birch), and *Salix nigra* (black willow) are more conspicuous as early successional species along the riverfront. Understory and shrub cover is variable, but is typically relatively low, particularly in more frequently flooded sites and sites with significant overstory canopy. The understory may have small individuals of the overstory, as well as species such as *Alnus serrulata* (smooth alder), *Arundinaria gigantea* (giant cane), *Carpinus caroliniana* (American hornbeam), *Ilex decidua* (possumhaw), *Ilex opaca* (American holly), *Callicarpa americana* (American beautyberry), *Crataegus viridis* (green hawthorn), *Crataegus marshallii* (parsley hawthorn), *Crataegus opaca* (riverflat hawthorn), *Styrax americanus* (American snowbell), *Ditrysinia fruticosa* (sebastian-bush), *Sambucus nigra* ssp. *canadensis* (common elderberry), *Cephalanthus occidentalis* (common buttonbush), *Forestiera acuminata* (swamp privet), *Planera aquatica* (water elm), and/or *Sabal minor* (dwarf palmetto). Where the overstory canopy is open, *Planera aquatica* (water elm), *Cephalanthus occidentalis* (common buttonbush), or *Forestiera acuminata* (swamp privet) may form dense stands. Woody vines that may be encountered include *Berchemia scandens* (Alabama supplejack), *Smilax bona-nox* (saw greenbrier), *Vitis rotundifolia* (muscadine grape), *Toxicodendron radicans* (poison ivy), and *Campsis radicans* (trumpet creeper). Herbaceous species may include *Boehmeria cylindrica* (false nettle), *Saururus cernuus* (lizard's tail), *Saccharum baldwinii* (narrow plumegrass), *Elymus virginicus* (Virginia wildrye), *Onoclea sensibilis* (sensitive fern), *Carex cherokeensis* (Cherokee sedge), *Carex intumescens* (bladder sedge), *Carex jorii* (cypress swamp sedge), *Carex debilis* (spindlefruit sedge), other *Carex* (sedge) species, *Chasmanthium latifolium* (creek

oats), *Chasmanthium sessiliflorum* (narrowleaf woodoats), *Justicia ovata* (looseflower waterwillow), *Bidens aristosa* (bearded beggarticks), *Panicum hemitomon* (maidencane), *Leersia virginica* (Virginia cutgrass), and numerous others. *Pinus taeda* (loblolly pine) may be found, particularly on some better drained sites, and where it has been planted. *Triadica sebifera* (Chinese tallow) sometimes invades this system.

## **VEGETATION TYPES:**

### **Pineywoods: Bottomland Temporarily Flooded Live Oak Forest (52)**

West Gulf Coastal Plain Large River Floodplain Temporarily Flooded Live Oak Forest

**Identifier:** CES203.488.2                      **Phase 2 Code:** 52

**Description:** This very minor component of the system is dominated by broadleaf evergreen species. However, some cold deciduous species that retain their leaves for extended periods, such as *Quercus nigra* (water oak) and *Quercus laurifolia* (laurel oak), may actually dominate these sites.

### **Pineywoods: Bottomland Temporarily Flooded Mixed Pine / Hardwood Forest (53)**

West Gulf Coastal Plain Large River Floodplain Temporarily Flooded Mixed Evergreen – Deciduous Forest

**Identifier:** CES203.448.3                      **Phase 2 Code:** 53

**Description:** *Pinus taeda* (loblolly pine) forms a significant portion of the canopy in this type. Areas that are clearly dominated by pine, typically *Pinus taeda* (loblolly pine), are mapped as Pine Plantation.

### **Pineywoods: Bottomland Temporarily Flooded Hardwood Forest (54)**

Western Gulf Coastal Plain Large River Floodplain Temporarily Flooded Deciduous Forest

**Identifier:** CES203.448.4                      **Phase 2 Code:** 54

**Description:** This mapped type makes up a significant percentage of the system as it is mapped. The common canopy species are *Liquidambar styraciflua* (sweetgum), *Quercus nigra* (water oak), and *Fraxinus pennsylvanica* (green ash), although numerous other species may be important to dominant components. *Triadica sebifera* (Chinese tallow) may be a canopy dominant within this mapped type.

### **Pineywoods: Bottomland Evergreen Successional Shrubland (55)**

Western Gulf Coastal Plain Large River Floodplain Evergreen Successional Shrubland

**Identifier:** CES203.448.5                      **Phase 2 Code:** 55

**Description:** This minor component of the system represents transitional sites that may be dominated by *Juniperus virginiana* (eastern redcedar), or may be young planted *Pinus taeda* (loblolly pine).

### **Pineywoods: Bottomland Deciduous Successional Shrubland (56)**

Western Gulf Coastal Plain Large River Floodplain Deciduous Successional Shrubland

**Identifier:** CES203.448.6                      **Phase 2 Code:** 56

**Description:** This mapped type may be composed of young trees, especially early successional species such as *Salix nigra* (black willow), *Fraxinus pennsylvanica* (green

ash), *Platanus occidentalis* (American sycamore), *Acer negundo* (boxelder), or others. Shrublands may be dominated by species such as *Cephalanthus occidentalis* (common buttonbush), *Forestiera acuminata* (swamp privet), or *Ilex decidua* (possumhaw).

#### **Pinewoods: Bottomland Herbaceous Wetland (57)**

West Gulf Coastal Plain Large River Floodplain Herbaceous Wetland

**Identifier:** CES203.448.7                      **Phase 2 Code:** 57

**Description:** This mapped type corresponds to marsh landcover that occurs on bottomland soils. Occurrences may consist of graminoids such as *Eleocharis* spp. (spikerushes), *Typha* spp. (cattails), *Rhynchospora* spp. (beaksedges), *Juncus* spp. (rushes), *Scirpus cyperinus* (woolgrass bulrush), *Panicum hemitomon* (maidencane), *Zizaniopsis miliacea* (marshmillet), *Saccharum baldwinii* (narrow plumegrass), and/or *Carex* spp. (caric sedges). *Nymphaea odorata* (American waterlily), *Ludwigia* spp. (primroses), *Polygonum* spp. (smartweeds), *Heteranthera* spp. (mudplantains), *Echinodorus cordifolius* (heartleaf burhead), *Sagittaria* spp. (arrowheads), and other herbaceous wetland plants may also be common. These occurrences tend to be somewhat wetter than Pinewoods: Bottomland Wet Prairie.

#### **Pinewoods: Bottomland Seasonally Flooded Hardwood Forest (58)**

West Gulf Coastal Plain Large River Floodplain Seasonally Flooded Deciduous Forest

**Identifier:** CES203.448.14                      **Phase 2 Code:** 58

**Description:** This mapped type tends to be occupied by species that are better adapted to flooded soil conditions such as *Quercus lyrata* (overcup oak), *Carya aquatica* (water hickory), *Quercus phellos* (willow oak), *Acer rubrum* (red maple), *Quercus laurifolia* (laurel oak), *Salix nigra* (black willow), and *Taxodium distichum* (baldcypress). However, less flood tolerant species or species with broad tolerances may also be present.

#### **Pinewoods: Bottomland Wet Prairie (59)**

West Gulf Coastal Plain Large River Floodplain Wet Prairie

**Identifier:** CES203.448.17                      **Phase 2 Code:** 59

**Description:** This herbaceous dominated mapped type is somewhat less wet than Pinewoods: Bottomland Herbaceous Wetland. Sites may be dominated by non-native species such as *Paspalum notatum* (Bahia grass), *Sorghum halepense* (Johnsongrass), and *Cynodon dactylon* (Bermudagrass). Native species that may dominate these sites include *Schizachyrium scoparium* (little bluestem), *Andropogon glomeratus* (bushy bluestem), *Carex* spp. (caric sedges), *Paspalum floridanum* (Florida paspalum), *Tripsacum dactyloides* (eastern gamagrass), and *Panicum virgatum* (switchgrass).

#### **Pinewoods: Bottomland Baldcypress Swamp (60)**

West Gulf Coastal Plain Large River Floodplain Baldcypress Swamp

**Identifier:** CES203.448.24                      **Phase 2 Code:** 60

**Description:** This mapped type occupies the semi-permanently flooded sites within the system and is typically dominated by *Taxodium distichum* (baldcypress), with lesser amounts of *Nyssa aquatica* (water tupelo), *Nyssa biflora* (swamp tupelo), *Carya aquatica* (water hickory), *Quercus lyrata* (overcup oak), *Fraxinus caroliniana* (Carolina ash),

*Fraxinus pennsylvanica* (green ash), *Quercus phellos* (willow oak), and *Planera aquatica* (water elm).

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## West Gulf Coastal Plain Small Stream and River Forest

**Identifier:** CES203.487

**Geology:** This system largely occurs on Quaternary Alluvium, but may also be found on other mapped geologic surfaces on drainages lacking significant alluvial development.

**Landform:** This system occupies small rivers, streams, creeks, and upland drainages. These sites tend to be higher in the watershed where less depositional activity occurs. The local geomorphological variation tends to be less than in the West Gulf Coastal Plain Large River Floodplain Forest.

**Soils:** This system occupies bottomland soils on small streams. Fewer sites are seasonally or semi-permanently flooded.

**Description:** This system, occupying the bottomlands of small rivers, streams, and creeks, is primarily dominated by hardwood species such as *Liquidambar styraciflua* (sweetgum), *Quercus nigra* (water oak), *Celtis laevigata* (sugar hackberry), *Fraxinus pennsylvanica* (green ash), *Betula nigra* (river birch), *Quercus phellos* (willow oak), *Quercus laurifolia* (laurel oak), *Ulmus americana* (American elm), *Ulmus crassifolia* (cedar elm), *Ulmus alata* (winged elm), *Quercus pagoda* (cherrybark oak), *Quercus falcata* (southern red oak), *Platanus occidentalis* (American sycamore) and *Acer rubrum* (red maple). *Pinus taeda* (loblolly pine), *Pinus elliotii* (slash pine), and/or *Juniperus virginiana* (eastern redcedar) may be present in the canopy, or occur as a sub-canopy stratum. Wetter sites tend to be dominated by more flood-tolerant species such as *Taxodium distichum* (baldcypress), *Nyssa aquatica* (water tupelo), *Gleditsia aquatica* (water honeylocust), *Carya aquatica* (water hickory), *Quercus lyrata* (overcup oak), *Quercus similis* (bottomland post oak), *Planera aquatica* (water elm), and *Quercus phellos* (willow oak). Shrubs may form dense patches with species such as *Cephalanthus occidentalis* (common buttonbush) or *Planera aquatica* (water elm). The understory of forests may be made of species common to the canopy. Other understory and shrub species that may be common include *Carpinus caroliniana* (American hornbeam), *Ostrya virginiana* (American hop-hornbeam), *Morus rubra* (red mulberry), *Ilex decidua* (possumhaw), *Sabal minor* (dwarf palmetto), *Ilex opaca* (American holly), *Ilex vomitoria* (yaupon), *Morella cerifera* (wax-myrtle), *Callicarpa americana* (American beautyberry), *Itea virginica* (Virginia sweetspire), *Arundinaria gigantea* (giant cane), *Alnus serrulata* (smooth alder), and/or *Maclura pomifera* (bois d'arc). Early successional woodlands may be mapped as shrublands, due to reduced woody cover. These sites may be dominated by early successional species such as *Salix nigra* (black willow), *Gleditsia triacanthos* (common honeylocust), *Platanus occidentalis* (American sycamore), or *Ulmus alata* (winged elm). Non-native woody species that may be present include *Triadica sebifera* (Chinese tallow), *Lonicera japonica* (Japanese honeysuckle), and *Ligustrum* spp. (privets). Woody vines may be conspicuous and include *Berchemia scandens* (Alabama supplejack), *Toxicodendron radicans* (poison ivy), *Brunnichia ovata* (eardrop vine), *Smilax bona-nox* (saw greenbrier), and *Ampelopsis arborea* (peppervine). The herbaceous layer may be well developed in some cases. Non-natives such as *Cynodon dactylon* (Bermudagrass), *Lolium perenne* (Italian ryegrass), *Paspalum notatum* (Bahia grass), and *Sorghum halepense* (Johnsongrass) may be dominant. Native herbaceous species of this system include *Chasmanthium laxum* (slender woodoats),

*Chasmanthium latifolium* (creek oats), *Dichantheium* spp. (rosette grasses), *Carex cherokeensis* (Cherokee sedge), *Boehmeria cylindrica* (false nettle), *Polygonum* spp. (smartweeds), *Ambrosia trifida* (giant ragweed), *Xanthium strumarium* (cocklebur), *Paspalum floridanum* (Florida paspalum), *Leersia* spp. (cutgrasses), *Tripsacum dactyloides* (eastern gamagrass), *Panicum virgatum* (switchgrass), *Elymus virginicus* (Virginia wildrye), and *Geum canadense* (white avens).

## **VEGETATION TYPES:**

### **Pineywoods: Small Stream and Riparian Live Oak Temporarily Flooded Forest (4802)**

West Gulf Coastal Plain Small Stream and River Live Oak Temporarily Flooded Forest

**Identifier:** CES203.487.2                      **Phase 2 Code:** 4802

**Description:** This very minor component of the system is dominated by *Quercus virginiana* (coastal live oak). Other deciduous species that retain their leaves for extended periods (and therefore appear as broadleaf evergreen landcover), including *Quercus nigra* (water oak) and *Quercus laurifolia* (laurel oak), may dominate some sites.

### **Pinewoods: Small Stream and Riparian Temporarily Flooded Mixed Forest (62)**

West Gulf Coastal Plain Small Stream and River Temporarily Flooded Evergreen – Deciduous Mixed Forest

**Identifier:** CES203.487.3                      **Phase 2 Code:** 62

**Description:** This mapped type may have significant cover contributed by *Pinus taeda* (loblolly pine), *Pinus elliotii* (slash pine), and/or *Juniperus virginiana* (eastern redcedar). Deciduous species described above share the canopy with these evergreen species.

### **Pineywoods: Small Stream and Riparian Temporarily Flooded Hardwood Forest (63)**

West Gulf Coastal Plain Small Stream and River Temporarily Flooded Deciduous Forest

**Identifier:** CES203.487.4                      **Phase 2 Code:** 63

**Description:** This is the prevalent mapped type for this system, with typical dominant species including *Liquidambar styraciflua* (sweetgum), *Quercus nigra* (water oak), *Celtis laevigata* (sugar hackberry), *Ulmus crassifolia* (cedar elm), and *Fraxinus pennsylvanica* (green ash). Many other hardwood species as mentioned above may be found at these sites.

### **Pineywoods: Small Stream and Riparian Evergreen Successional Shrubland (64)**

West Gulf Coastal Plain Small Stream and River Evergreen Successional Shrubland

**Identifier:** CES203.487.5                      **Phase 2 Code:** 64

**Description:** This minor component of the system likely corresponds to areas dominated by *Juniperus virginiana* (eastern redcedar), or by young *Pinus taeda* (loblolly pine) or *Pinus elliotii* (slash pine).

### **Pineywoods: Small Stream and Riparian Deciduous Successional Shrubland (65)**

West Gulf Coastal Plain Small Stream and River Deciduous Successional Shrubland

**Identifier:** CES203.487.6                      **Phase 2 Code:** 65

**Description:** This minor component of the system often represents young woodlands with reduced woody cover due to disturbance. Species dominating these sites may include *Celtis laevigata* (sugar hackberry), *Betula nigra* (river birch), *Salix nigra* (black willow), *Fraxinus pennsylvanica* (green ash), *Acer negundo* (boxelder), *Platanus occidentalis* (American sycamore), or *Liquidambar styraciflua* (sweetgum). Shrub species may also be conspicuous to dominant, including *Cephalanthus occidentalis* (common buttonbush), *Ilex decidua* (possumhaw), *Ilex vomitoria* (yaupon), or *Alnus serrulata* (smooth alder).

**Pineywoods: Small Stream and Riparian Herbaceous Wetland (66)**

West Gulf Coastal Plain Small Stream and River Herbaceous Wetland

**Identifier:** CES203.487.7                      **Phase 2 Code:** 66

**Description:** This mapped type corresponds to sites that contain marsh landcover along small streams. These sites tend to be wetter than Pineywoods: Small Stream and Riparian Wet Prairie. These sites may be dominated by *Typha* spp. (cattails), *Juncus* spp. (rushes), *Carex* spp. (caric sedges), *Sagittaria* spp. (arrowheads), *Justicia* spp. (water-willows), *Panicum hemitomon* (maidencane), *Ludwigia* spp. (water-primroses), and *Polygonum* spp. (smartweeds).

**Pineywoods: Small Stream and Riparian Seasonally Flooded Hardwood Forest (67)**

West Gulf Coastal Plain Small Stream and River Seasonally Flooded Deciduous Forest

**Identifier:** CES203.487.14                      **Phase 2 Code:** 67

**Description:** This mapped type occupies wetter sites within the system and tends to have significant cover of species more tolerant of frequent flooding, such as *Quercus lyrata* (overcup oak), *Taxodium distichum* (baldcypress), *Quercus phellos* (willow oak), *Nyssa aquatica* (water tupelo), and *Salix nigra* (black willow). *Quercus nigra* (water oak), *Liquidambar styraciflua* (sweetgum), *Ulmus americana* (American elm), and *Fraxinus pennsylvanica* (green ash) are often dominant.

**Pineywoods: Small Stream and Riparian Wet Prairie (68)**

West Gulf Coastal Plain Small Stream and River Wet Prairie

**Identifier:** CES203.487.17                      **Phase 2 Code:** 68

**Description:** This mapped type occupies sites less wet than those occupied by Pineywoods: Small Stream and Riparian Herbaceous Wetland. They may be dominated by non-native species such as *Cynodon dactylon* (Bermudagrass), *Lolium perenne* (Italian ryegrass), *Paspalum notatum* (Bahia grass), and *Sorghum halepense* (Johnsongrass). Native species that may occupy these sites include *Schizachyrium scoparium* (little bluestem), *Panicum virgatum* (switchgrass), *Tripsacum dactyloides* (eastern gamagrass), *Elymus virginicus* (Virginia wildrye), *Chasmanthium* spp. (woodoats), *Dichanthelium* spp. (rosette grasses), *Paspalum floridanum* (Florida paspalum), *Sorghastrum nutans* (Indiangrass), and *Carex* spp. (caric sedges). Forbs such as *Ambrosia psilostachya* (western ragweed), *Ambrosia trifida* (giant ragweed), *Xanthium strumarium* (cocklebur), and *Geum canadense* (white avens) are frequently encountered.

**Pineywoods: Small Stream and Riparian Baldcypress Swamp (69)**

West Gulf Coastal Plain Small Stream and River Baldcypress Swamp

**Identifier:** CES203.487.24

**Phase 2 Code:** 69

**Description:** Swamps are a relatively minor component along these small rivers, streams, and creeks. They are typically dominated by *Taxodium distichum* (baldcypress), but may be dominated or co-dominated by other species including *Planera aquatica* (water elm), *Nyssa aquatica* (water tupelo), *Gleditsia aquatica* (water honeylocust), *Quercus lyrata* (overcup oak), *Salix nigra* (black willow), or *Quercus laurifolia* (laurel oak). *Liquidambar styraciflua* (sweetgum) may also be a conspicuous component.

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### **West Gulf Coastal Plain Near-Coast Large River Swamp**

**Identifier:** CES203.459

**Geology:** Quaternary alluvium deposited within the Beaumont/Deweyville surfaces.

**Landform:** Large river floodplains of the Sabine, Neches, and Trinity Rivers near the coast, often with some tidal influence.

**Soils:** Bottomland soils of the near-coast region.

**Description:** These swamps, usually dominated by *Taxodium distichum* (baldcypress) and/or *Nyssa aquatica* (water tupelo), occur along the Sabine, Neches, and Trinity Rivers as they enter the bays and estuaries and have some tidal influence. These are generally distributed downstream of Interstate Highway 10 (a coincidental landmark for the distribution of this system). On the Neches River, this is nearly coincident with the area downstream of the confluence with Pine Island Bayou. These swamps are typically interspersed with marshes of the coastal region. Other species are usually more minor components of the canopy, including *Fraxinus pennsylvanica* (green ash), *Acer negundo* (boxelder), and *Triadica sebifera* (Chinese tallow).

#### **VEGETATION TYPE:**

##### **Gulf Coast: Near-Coast Baldcypress Swamp (73)**

West Gulf Coastal Plain Near-Coast Large River Swamp

**Identifier:** CES203.459

**Phase 2 Code:** 73

**Description:** As described for system.

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### **Red River Large Floodplain Forest**

**Identifier:** CES203.065

**Geology:** Quaternary alluvial deposits.

**Landform:** Floodplain of the Red River and its major tributaries. Some local topographic variation exists and includes terraces and oxbows.

**Soils:** Bottomland soils.

**Description:** This system is somewhat unique to Red River drainage, but shares many of the species common to the West Gulf Coastal Plain Large River Floodplain. *Platanus occidentalis* (American sycamore), *Populus deltoids* (eastern cottonwood), *Salix nigra* (black willow), *Betula nigra* (river birch), *Acer negundo* (boxelder), and *Fraxinus pennsylvanica* (green ash) tend to occupy riverfront sites and newly exposed or disturbed sites. Seasonally flooded portions of the system do occur, and may contain species such as *Quercus lyrata* (overcup oak), *Carya aquatica*

(water hickory), *Taxodium distichum* (baldcypress), *Nyssa aquatica* (water tupelo), *Nyssa biflora* (swamp tupelo), *Quercus phellos* (willow oak), *Gleditsia aquatica* (water honeylocust), and *Planera aquatica* (water elm). Less frequently flooded areas may be dominated by numerous hardwood species, such as *Liquidambar styraciflua* (sweetgum), *Quercus nigra* (water oak), *Quercus phellos* (willow oak), *Quercus shumardii* (Shumard oak), *Quercus macrocarpa* (bur oak), *Quercus michauxii* (swamp chestnut oak), *Quercus falcata* (southern red oak), *Carya illinoensis* (pecan), *Celtis laevigata* (sugar hackberry), *Ulmus alata* (winged elm), *Ulmus americana* (American elm), *Ulmus crassifolia* (cedar elm), *Ulmus rubra* (slippery elm), *Gleditsia triacanthos* (common honeylocust), *Nyssa sylvatica* (blackgum), and *Fraxinus pennsylvanica* (green ash). *Juniperus virginiana* (eastern redcedar), *Pinus taeda* (loblolly pine), and, to a lesser extent, *Pinus echinata* (shortleaf pine) may be found in the canopy. A mid-story component may include young individuals of the overstory, as well as species such as *Carpinus caroliniana* (American hornbeam), *Ostrya virginiana* (American hop-hornbeam), *Acer rubrum* (red maple), *Sassafras albidum* (sassafras), *Maclura pomifera* (bois d'arc), and *Morus rubra* (red mulberry). *Cephalanthus occidentalis* (common buttonbush) may dominate some open sites within the floodplain. In addition to these species, shrubs such as *Crataegus viridis* (green hawthorn), *Crataegus marshallii* (parsley hawthorn), *Callicarpa americana* (American beautyberry), *Ligustrum sinense* (Chinese privet), and *Arundinaria gigantea* (giant cane) may be found in the understory of forests. Numerous woody vines may be encountered, including *Smilax rotundifolia* (common greenbriar), *Brunnichia ovata* (eardrop vine), *Berchemia scandens* (Alabama supplejack), *Lonicera japonica* (Japanese honeysuckle), *Ampelopsis arborea* (peppervine), and *Toxicodendron radicans* (poison ivy). Herbaceous species may be present in the understory of forest, occur as marshy areas, or occupy herbaceous-dominated sites on areas less frequently flooded. *Saururus cernuus* (lizard's tail), *Nymphaea odorata* (American waterlily), *Rhynchospora* spp. (beaksedges), *Carex* spp. (caric sedges), *Dichanthelium* spp. (rosette grasses), *Chasmanthium* spp. (wodoats), *Juncus* spp. (rushes), *Leersia* sp. (cutgrass), *Geum canadense* (white avens), *Sanicula canadensis* (Canada snakeroot), *Woodwardia areolata* (chain fern), *Mikania scandens* (climbing hemp-weed), and *Polygonum* spp. (smartweeds) are among the herbaceous species that may be commonly encountered in this system.

## **VEGETATION TYPES:**

### **Red River: Floodplain Hardwood / Evergreen Forest (46)**

Red River Large Floodplain Mixed Evergreen – Deciduous Forest and Woodland

**Identifier:** CES203.065.3

**Phase 2 Code:** 46

**Description:** This minor component of the system may represent pine plantations. In the west, these sites have a canopy where *Juniperus virginiana* (eastern redcedar) shares dominance with the hardwoods described for the system.

### **Red River: Floodplain Harwood Forest (45)**

Red River Large Floodplain Deciduous Forest and Woodland

**Identifier:** CES203.065.3

**Phase 2 Code:** 45

**Description:** This mapped type makes up about half of the area mapped as this system. Dominants include the hardwood species mentioned above for areas not seasonally flooded. This type may have a well-developed mid-story, and some shrub cover. Herbaceous cover may be patchy to almost continuous.

**Red River: Floodplain Evergreen Shrubland (47)**

Red River Large River Floodplain Evergreen Shrubland

**Identifier:** CES203.065.5                      **Phase 2 Code:** 47

**Description:** This is a very minor component of the system and may represent young pine plantations or sites dominated by *Juniperus virginiana* (eastern redcedar).

**Red River: Floodplain Deciduous Shrubland (48)**

Red River Large River Floodplain Deciduous Shrubland

**Identifier:** CES203.065.6                      **Phase 2 Code:** 48

**Description:** This mapped type may represent areas of sparse woodland canopy or young forests recovering from disturbance. Such sites may contain species such as *Salix nigra* (black willow), *Ulmus alata* (winged elm), *Celtis laevigata* (sugar hackberry), *Acer negundo* (boxelder), *Fraxinus pennsylvanica* (green ash), or *Liquidambar styraciflua* (sweetgum), among others. This type may also represent shrublands dominated by species such as *Cephalanthus occidentalis* (common buttonbush).

**Red River: Floodplain Herbaceous Wetland (49)**

Red River Large River Floodplain Herbaceous Wetland

**Identifier:** CES203.065.7                      **Phase 2 Code:** 49

**Description:** This relatively minor component of the system represents marsh landcover mapped on bottomland soils of the region. This type tends to be wetter than the Red River: Floodplain Wet Prairie.

**Red River: Floodplain Seasonally Flooded Hardwood Forest (50)**

Red River Large River Floodplain Seasonally Flooded Deciduous Forest and Woodland

**Identifier:** CES203.065.14                      **Phase 2 Code:** 50

**Description:** This mapped type occupies wetter sites that experience frequent flooding and tend to be dominated by more flood-tolerant species such as *Quercus lyrata* (overcup oak), *Taxodium distichum* (baldcypress), and *Quercus phellos* (willow oak).

**Red River: Floodplain Wet Prairie (51)**

Red River Large River Floodplain Wet Prairie

**Identifier:** CES203.065.17                      **Phase 2 Code:** 51

**Description:** This mapped type makes up a significant portion of the area mapped at this system. It represents areas of herbaceous cover, not mapped as marsh landcover, in bottomland soils of the region. It may often represent managed pastures. This type tends to be drier than the Red River: Floodplain Herbaceous Wetland.

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**West Gulf Coastal Plain Seepage Swamp and Baygall**

**Identifier:** CES203.372

**Geology:** May occur on a range of geological formations, including intermediate to high Pleistocene terraces, Eocene sands, the Catahoula Formation, and the Wilcox Formation.

**Landform:** Occupies low landscape positions typically along low gradient creeks, headwaters of drainages, or local depressions, often where underground water flow exits to the surface as a seep.

**Soils:** Typically sandy to loamy soils, often with an impermeable subsurface layer that restricts water percolation. These sites are typically semi-permanently saturated. These are typically soils of medium to strong acidity, with low available nutrients, and significant organic accumulation.

**Description:** This system typically occurs as densely wooded sites, characterized by overstory species such as *Magnolia virginiana* (sweetbay), *Nyssa biflora* (swamp tupelo), and *Acer rubrum* (red maple). Other species in the overstory may include *Fraxinus pennsylvanica* (green ash), *Quercus nigra* (water oak), *Liquidambar styraciflua* (sweetgum), and *Quercus laurifolia* (laurel oak). A well-developed woody understory is often present and includes species such as *Morella caroliniensis* (evergreen bayberry), *Itea virginica* (Virginia sweetspire), *Persea palustris* (swamp redbay), *Rhododendron prinophyllum* (early azalea), *Rhododendron canescens* (mountain azalea), *Ilex decidua* (possumhaw), *Vaccinium fuscatum* (Arkansas blueberry), *Ilex opaca* (American holly), *Toxicodendron vernix* (poison sumac), *Viburnum nudum* (possumhaw viburnum), *Morella cerifera* (wax-myrtle), *Alnus serrulata* (smooth alder), *Smilax laurifolia* (bamboo-vine), and *Vitis rotundifolia* (muscadine grape). Southern expressions of the type may also have *Ilex coriacea* (bay-gall bush) or *Cyrilla racemiflora* (leatherwood). The herbaceous layer is often dominated by ferns such as *Woodwardia areolata* (chain fern), *Osmunda regalis* (royal fern), *Osmunda cinnamomea* (cinnamon fern), and *Athyrium filix-femina* (common ladyfern). *Carex* spp. (caric sedges), *Rhynchospora* spp. (beaksedges), and *Eleocharis* spp. (spikerushes) are also frequently encountered. *Sphagnum* sp. (sphagnum) occurs in patches throughout, and other bryophytes are common. The rare species *Bartonia texana* (Texas screwstem) may be encountered in this system, along with other interesting forbs such as *Burmanna biflora* (northern bluethread) and *Apteria aphylla* (nodding-nixie).

#### **VEGETATION TYPE:**

##### **Pineywoods: Seepage Swamp and Baygall (74)**

West Gulf Coastal Plain Seepage Swamp and Baygall

**Identifier:** CES203.372

**Phase 2 Code:** 74

**Description:** This type is poorly mapped. Local edaphic and geomorphic conditions make applying regional models to existing spatial data difficult.

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##### **West Gulf Coastal Plain Wet Longleaf Pine Savanna and Flatwoods (not mapped)**

**Identifier:** CES203.191

**Geology:** This system is associated with Lissie and upper Beaumont Formations (including the Montgomery, Irene, and Bentley terraces).

**Landform:** Mesic to seasonally saturated low areas and flats, on level to gently rolling uplands. Microtopographic variation is provided by the presence of swales and pimple mounds.

**Soils:** Sandy loams to silty loams that are strongly acid, nutrient poor, and low in organic constituents. Typically these soils are hydric, with seasonal fluctuations between saturation and droughtiness.

**Description:** This system may be characterized as having a sparse canopy (under natural fire cycles) dominated by *Pinus palustris* (longleaf pine). Other species in the canopy include

*Quercus stellata* (post oak), *Quercus marilandica* (blackjack oak), *Nyssa sylvatica* (blackgum), *Quercus laurifolia* (laurel oak), *Quercus falcata* (southern red oak), and *Liquidambar styraciflua* (sweetgum). Shrubs are typically limited in distribution within the system to local topographic highs and include species such as *Morella cerifera* (wax-myrtle), *Ilex vomitoria* (yaupon), *Symplocos tinctoria* (common sweetleaf), *Cyrilla racemiflora* (leatherwood), and others. The herbaceous layer may be highly diverse. Drier sites may be dominated by *Schizachyrium scoparium* (little bluestem), *Schizachyrium tenerum* (slender bluestem), *Eupatorium rotundifolium* (roundleaf eupatorium), and others. Wetter sites may not have species showing a clear dominance. Species such as *Liatris* spp. (gay-feathers), *Xyris* spp. (yellow-eyed grasses), *Rhexia* spp. (meadowbeauties), *Rhynchospora* spp. (beaksedges), *Fuirena* spp. (umbrellasedges), *Marshallia graminifolia* (grassleaf Barbara's buttons), *Aletris aurea* (golden colicroot), and many other species may share dominance in this system. Suppression of fire in this system has led to increased woody dominance. *Pinus taeda* (loblolly pine), *Pinus elliottii* (slash pine), *Liquidambar styraciflua* (sweetgum), *Nyssa sylvatica* (blackgum), and *Acer rubrum* (red maple) may now dominate the canopy of these sites, with a thick understory dominated by *Ilex vomitoria* (yaupon) and *Morella cerifera* (wax-myrtle). Due in part to the difficulty in distinguishing *Pinus palustris* (longleaf pine) dominated sites from sites dominated by other pines, occurrences of this system may be mapped within the system West Gulf Coastal Plain Pine – Hardwood Flatwoods.

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### **West Gulf Coastal Plain Pine – Hardwood Flatwoods**

**Identifier:** CES203.278

**Geology:** High Pleistocene terraces, mapped in the northern portion of Phase 2 as Quaternary Fluvial Terrace (or Tile) Deposits.

**Landform:** Very gently undulating to flat surfaces, with local topographic relief provided by ridges and swales.

**Soils:** Soils tend to be fine-textured. They typically have a somewhat impermeable subsurface horizon, which leads to a perched water table. Saturation results from local rainfall runoff, and alternates with seasonal drying, leading to a xerohydric hydroperiod.

**Description:** This system primarily occurs within the Flatwoods EPA Level IV ecoregion, but is also found associated with the Pleistocene Fluvial Terraces ecoregion in the northern portion of Phase 2. This woodland or forest system is often dominated by more mesic species on interior ridges, including *Pinus taeda* (loblolly pine), *Pinus echinata* (shortleaf pine), *Pinus elliottii* (slash pine), *Quercus stellata* (post oak), *Quercus alba* (white oak), *Quercus falcata* (southern red oak), and *Carya texana* (black hickory). Within the range of *Pinus palustris* (longleaf pine), occurrences that represent West Gulf Coastal Plain Wet Longleaf Pine Savanna and Flatwoods may be mapped as this system. On the somewhat wetter sites of the swales, species such as *Quercus nigra* (water oak), *Quercus phellos* (willow oak), *Quercus laurifolia* (laurel oak), *Nyssa sylvatica* (blackgum), *Liquidambar styraciflua* (sweetgum), and *Fraxinus pennsylvanica* (green ash) may be dominant. Sites that are even wetter would likely be mapped as West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods. *Triadica sebifera* (Chinese tallow) may invade this system. Mid-story species that may be encountered include *Acer rubrum* (red maple), *Ilex opaca* (American holly), *Ulmus alata* (winged elm), and small members of the overstory. *Morella cerifera* (wax-myrtle), *Ilex decidua* (possumhaw), and *Ilex vomitoria* (yaupon) are commonly

encountered shrubs. Herbaceous cover is generally sparse, with species such as *Chasmanthium* spp. (woodoats), *Andropogon glomeratus* (bushy bluestem), and *Gelsemium sempervirens* (Carolina jessamine). Sites dominated by *Pinus taeda* (loblolly pine) or *Pinus elliottii* (slash pine) may often represent plantations or managed forests.

#### **VEGETATION TYPES:**

##### **Pineywoods: Longleaf or Loblolly Pine Flatwoods or Plantation (75)**

West Gulf Coastal Pine Flatwoods Forest and Woodland

**Identifier:** CES203.278.1                      **Phase 2 Code:** 75

**Description:** This mapped type on flatwoods sites are dominated by *Pinus taeda* (loblolly pine), *Pinus elliottii* (slash pine), and to a lesser extent, *Pinus echinata* (shortleaf pine). Within the range of *Pinus palustris* (longleaf pine), this type may represent occurrence of West Gulf Coastal Plain Wet Longleaf Pine Savanna and Flatwoods.

##### **Pineywoods: Longleaf or Loblolly Pine / Hardwood Flatwoods or Plantation (76)**

West Gulf Coastal Plain Pine – Hardwood Flatwoods Forest and Woodland

**Identifier:** CES203.278.3                      **Phase 2 Code:** 76

**Description:** This mapped type has a mix of *Pinus* spp. (pines) and hardwoods in the canopy. This is a fairly minor component of the system.

##### **Pineywoods: Hardwood Flatwoods (77)**

West Gulf Coastal Plain Hardwood Flatwoods Forest and Woodland

**Identifier:** CES203.278.4                      **Phase 2 Code:** 77

**Description:** This mapped type lacks significant evergreen canopy.

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#### **West Gulf Coastal Plain Nonriverine Wet Hardwood Flatwoods**

**Identifier:** CES203.548

**Geology:** Like the West Gulf Coastal Plain Pine – Hardwood Flatwoods, this system is associated with high Pleistocene terraces, of the Lissie and upper Beaumont Formations, as well as the Quaternary Fluvial Terrace Deposits to the north.

**Landform:** This system represents the lowest topographic position within the level to very gently undulating terraces occupied by flatwoods. Hydrology is controlled by local rainfall, not overbank flooding of nearby streams.

**Soils:** Soils are fine-textured, with an impermeable subsurface horizon, which leads to a perched water table. Because of the lower topographic position of these flatwoods, saturated soil conditions tend to occur over extended periods of the year.

**Description:** This system represents the wetter end of the wooded toposequence of the flatwoods and occurs within low positions of swales and other wet circumstances. The canopy is often dominated by *Quercus phellos* (willow oak), *Quercus laurifolia* (laurel oak), *Quercus lyrata* (overcup oak), *Quercus nigra* (water oak), *Quercus michauxii* (swamp chestnut oak), *Ulmus alata* (winged elm), and *Liquidambar styraciflua* (sweetgum). *Pinus taeda* (loblolly pine) may be present in the canopy. *Triadica sebifera* (Chinese tallow) is a commonly encountered non-native

species invading this system. The understory and herbaceous layers of this system are not well-developed, as the canopy tends to be closed.

#### **VEGETATION TYPE:**

**Pineywoods: Wet Hardwood Flatwoods (70)**

**Identifier:** CES203.548

**Phase 2 Code:** 70

**Description:** As described for system.

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## **Herbaceous Wetlands**

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### **West Gulf Coastal Plain Herbaceous Seep and Bog**

**Identifier:** CES203.194

**Geology:** Often associated with Eocene sand formations such as Queen City, Sparta, and particularly Carrizo Sands.

**Landform:** Generally found on slopes, as well as on valley floors and toe slopes where seepage from upslope occurs through the deep sands on site. **Soils:** Deep Sand, Very Deep Sand, or Wet Sandy Draw Ecological Sites are typical of this system and surrounding areas.

**Description:** This small patch system typically presents as an herbaceous wetland, though sometimes significant shrub cover by *Morella cerifera* (wax-myrtle) and/or other species may be conspicuous. The herbaceous layer is dominated by a dense, species-rich, graminoid-forb layer less than 1 m tall with continuous to nearly continuous cover, typically 80-90%. Seepage results from the percolation of water through a porous sand layer until it encounters a more impermeable layer and flows to the surface. Grass species present may include species such as *Andropogon glomeratus* (bushy bluestem), *Dichantherium scoparium* (velvet panicum), *Panicum anceps* (beaked panicum), *Panicum brachyanthum* (pimple panicgrass), *Panicum virgatum* (switchgrass), *Paspalum laeve* (smooth paspalum), *Saccharum giganteum* (sugarcane plumegrass), and *Steinchisma hians* (gaping panicum) [= *Panicum hians*]. Sedges and rushes are well-represented and may include *Cyperus strigosus* (false nutgrass), *Eleocharis acicularis* (needle spikeseedge), *Fuirena squarrosa* (hairy umbrellaseedge), *Juncus dichotomus* (forked rush), *Juncus diffusissimus* (slimpod rush), *Juncus effusus* (common rush), and *Rhynchospora* spp. (beakrushes, including *R. gracilentata*, *R. oligantha*, and/or *R. rariflora*). A diverse forb assemblage is typically present, and may include *Eryngium integrifolium* (simpleleaf eryngo), *Eupatorium perfoliatum* (common boneset), *Habenaria repens* (waterspider false reinorchid), *Hypericum mutilum* (dwarf St. John's-wort), *Ludwigia alternifolia* (bushy seedbox), *Lycopodiella* spp. (clubmoss), *Osmunda cinnamomea* (cinnamon fern), *Osmunda regalis* (royal fern), *Pogonia ophioglossoides* (rose pogonia), *Polygala cruciata* (drumheads), *Rhexia mariana* (Maryland meadowbeauty), *Sarracenia alata* (pitcher-plant), *Symphotrichum dumosum* var. *dumosum* (bushy aster), *Woodwardia* spp. (chainfern), and/or *Xyris* spp. (yellow-eyed grass, *X. ambigua*, *X. baldwiniana*, *X. difformis*, *X. jupicai*, *X. laxifolia*, and/or *X. torta*). Seeps may feed downslope depressional wetlands which may be overtaken by shrub species such as *Morella cerifera* (wax-myrtle), or may be dominated by *Eleocharis* spp. (spikerush), *Juncus* spp. (rush),

*Panicum hemitomon* (maidencane), and/or *Rhynchospora* spp. (beakrush). These bogs can become dominated by woody species such as *Morella cerifera* (wax-myrtle), *Ilex vomitoria* (yaupon), and *Smilax laurifolia* (bamboo-vine). East of the Post Oak Savanna, other woody species such as *Toxicodendron vernix* (poison sumac), *Magnolia virginiana* (sweetbay), *Persea borbonia* (redbay), and *Pinus palustris* (longleaf pine) may form a sparse emergent canopy. Within Phase 2, this system is found southwest to Lee County, though this system is typically mapped further east, particularly in northern Jasper and Newton Counties. Sites east of the Post Oak Savanna may contain broadleaved evergreen woody species such as *Magnolia virginiana* (sweetbay), *Cyrilla racemiflora* (leatherwood), *Morella caroliniensis* (evergreen bayberry), *Persea palustris* (swamp redbay), and *Ilex coriacea* (bay-gall bush). Herbaceous species more characteristic of eastern occurrences include *Gelsemium sempervirens* (Carolina jessamine), *Hypericum galioides* (bedstraw St. John's -wort), *Lachnocaulon anceps* (whitehead bogbutton), *Ludwigia hirtella* (spindleroot), *Marshallia graminifolia* (grassleaf Barbara's buttons), *Rhexia petiolata* (ciliate meadowbeauty), *Rhynchospora inexpansa* (nodding beaksedge), *Rhynchospora plumosa* (plumed beaksedge), *Rudbeckia scabrifolia* (bog coneflower), and *Xyris drummondii* (Drummond's yellow-eyed grass).

#### **VEGETATION TYPE:**

##### **Pineywoods: Herbaceous Seepage Bog (72)**

West Gulf Coastal Plain Herbaceous Seepage Bog

**Identifier:** CES203.194.7    **Phase 2 Code:** 72

**Description:** As described above. Some mapped sites are based directly on field collected locations.

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#### **West Gulf Coastal Plain Flatwoods Pond**

**Identifier:** CES203.547

**Geology:** Pleistocene terraces, including the upper Beaumont Formation, but also mapped on the high Pleistocene terraces in the northern part of Phase 2. These are mapped as Quaternary Fluvial Terrace (Tile) Deposits along the Red, Sulphur, and Sabine Rivers.

**Landform:** Occupy local topographic lows within the flatwoods.

**Soils:** Relatively fine-textured soils with an impermeable subsoil horizon, giving rise to a perched water table and saturated conditions during extended periods of the year.

**Description:** The system as currently described, focuses on those herbaceous dominated wetlands that are embedded within the West Gulf Coastal Plain Longleaf Pine Wet Savanna and Flatwoods. As we mapped this system, it occupies sites with a much broader distribution, including wet, herbaceous dominated sites within the West Gulf Coastal Plain Wet Hardwood Flatwoods or West Gulf Coastal Plain Pine – Hardwood Flatwoods. This mapped system is likely dominated by species such as *Panicum hemitomon* (maidencane), *Carex* spp. (caric sedges), *Rhynchospora* (beaksedges), *Eleocharis* spp. (spikerushes), *Andropogon glomeratus* (bushy bluestem), and *Ludwigia* spp. (water-primroses). On drier sites *Schizachyrium scoparium* (little bluestem) may be present. Some sites may be dominated by the non-native *Cynodon dactylon* (Bermudagrass). A few woody species may occur, including *Nyssa biflora* (swamp tupelo), *Liquidambar styraciflua* (sweetgum), *Quercus nigra* (water oak), *Planera aquatica*

(water elm), and *Cephalanthus occidentalis* (common buttonbush). Flatwood ponds, as described by Bridges and Orzell, represent a more restricted subset of herbaceous-dominated sites with saturated soils resulting from perched water table due to an impermeable subsurface.

#### **VEGETATION TYPES:**

##### **Pineywoods: Herbaceous Flatwoods Pond (71)**

West Gulf Coastal Plain Herbaceous Flatwoods Pond

**Identifier:** CES203.547                      **Phase 2 Code:** 71

**Description:** As described for system.

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##### **Texas-Louisiana Coastal Prairie Pondshore**

**Identifier:** CES203.541

**Geology:** This system occurs on the coastal Pleistocene terraces, including the Beaumont and Lissie Formations.

**Landform:** Local topographic lows such as ponds and swales within the generally level landscape.

**Soils:** Soils tend to be fine-textured, or are characterized by a relatively impermeable subsurface horizon.

**Description:** This system occurs as ponds or swales within the coastal prairie matrix. Soils are poorly drained, and surface water from rainfall and local runoff is retained for much of the year (except for periods of high evapotranspiration). Occurrences are wetter than the *Tripsacum dactyloides* (eastern gamagrass) or *Panicum virgatum* (switchgrass) dominated prairie sites of the Texas-Louisiana Coastal Prairie. These wetlands are primarily herbaceous, sometimes with sparse woody cover, and are composed of various species, such as *Eleocharis quadrangulata* (squarestem spikesedge), *Fuirena squarrosa* (hairy umbrellasedge), *Cyperus haspan* (sheathed umbrellasedge), *Cyperus virens* (green flatsedge), *Rhynchospora* spp. (beaksedges), *Leersia hexandra* (clubhead cutgrass), *Steinchisma hians* (gaping panicum), *Panicum virgatum* (switchgrass), *Andropogon glomeratus* (bushy bluestem), *Xyris jupicai* (Richard's yellow-eyed grass), *Centella erecta* (erect centella), *Sagittaria papillosa* (nipplebract arrowhead), *Sagittaria longiloba* (longlobe arrowhead), *Ludwigia glandulosa* (Torrey water-primrose), *Ludwigia linearis* (narrowleaf water-primrose), *Bacopa* spp. (waterhyssops), *Hydrocotyle* spp. (pennyworts), *Symphyotrichum subulatum* (hierba del marrano), and *Sesbania* spp. (rattleboxes). Large areas of some of the occurrence may be relatively homogeneous, dominated by one or a few species. Areas of open water within the ponds may contain floating and submerged aquatic species, including *Stuckenia pectinata* (sago pondweed), *Ceratophyllum demersum* (coontail), *Brasenia schreberi* (Schreber watershield), *Nymphaoides aquatica* (largeleaf floating heart), and *Nelumbo lutea* (yellow lotus).

#### **VEGETATION TYPE:**

##### **Gulf Coast: Coastal Prairie Pondshore (91)**

**Identifier:** CES203.541                      **Phase 2 Code:** 91

**Description:** As described for system.

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## **Gulf Coast Chenier Plain Fresh and Oligohaline Tidal Marsh**

**Identifier:** CES203.472

**Geology:** This system occupies recent alluvial deposits.

**Landform:** Along bay margins and outlets of coastal rivers where freshwater inflow is sufficient to drive marsh composition. Sites may be interspersed with areas of open water.

**Soils:** Saturated, very deep, mineral soils, often with high organic content, at least at the surface. Ecoclasses (from Ecological Site Descriptions) include various FRESH and INTERMEDIATE MARSH types.

**Descriptions:** This herbaceous system occupies coastal sites with mucky soils and salinities less than 4 ppt. Dominants are graminoids, including *Panicum hemitomon* (maidencane), *Paspalum vaginatum* (seashore paspalum), *Zizaniopsis miliacea* (marshmillet), *Typha latifolia* (common cattail), *Spartina patens* (marshhay cordgrass), *Schoenoplectus* spp. (bulrushes), and *Phragmites australis* (common reed). Other wetland species such as *Sagittaria* spp. (arrowheads), *Ludwigia* spp. (water-primroses), and *Vigna luteola* (cow pea) may also be present. Some occurrences may have some woody cover with species such as *Iva frutescens* (bigleaf sumpweed) or *Baccharis halimifolia* (baccharis).

### **VEGETATION TYPE:**

#### **Chenier Plain: Fresh and Intermediate Tidal Marsh (92)**

Gulf Coast Chenier Fresh and Oligohaline Tidal Marsh

**Identifier:** CES203.541.7                      **Phase 2 Code:** 92

**Description:** As described for system, where woody cover is minor.

#### **Chenier Plain: Fresh and Intermediate Tidal Shrub Wetland (97)**

Gulf Coast Chenier Plain Fresh and Oligohaline Tidal Shrub Wetland

**Identifier:** CES203.541.6                      **Phase 2 Code:** 97

**Description:** Sites with significant cover of woody species such as *Iva frutescens* (bigleaf sumpweed) and/or *Baccharis halimifolia* (baccharis). *Arundo donax* (giant reed) dominated sites may also be mapped as this type.

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## **Gulf Coast Chenier Plain Salt and Brackish Tidal Marsh**

**Identifier:** CES203.468

**Geology:** Recent alluvial deposits.

**Landform:** Coastlines, bay margins, bay inlets, along dredged canals, creeks, and river inlets where tidal influence is adequate to maintain high salinities.

**Soils:** Fine textured soils, sometimes with high organic content at the surface. Ecoclasses (from Ecological Site Descriptions) include BRACKISH and SALTMARSH types.

**Description:** This typically herbaceous dominated system has a composition that varies depending on the salinity of the environment and the depth of frequent tidal flooding. Marshes that are frequently flooded by tides (low marshes) tend to be strongly dominated by *Spartina*

*alterniflora* (smooth cordgrass). Occasionally these sites may have significant cover of *Avicennia germinans* (black mangrove), though freezes tend to reduce the cover of mangrove within Phase 2. Some patches of *Juncus roemerianus* (blackrush) may be interspersed. Higher marshes of saline to brackish sites tend to be somewhat more diverse, with *Spartina patens* (marshhay cordgrass) a common dominant. *Spartina alterniflora* (smooth cordgrass) may be present, but is typically not strongly dominant. Other species that may be present, or sometimes dominant include *Spartina spartinae* (Gulf cordgrass), *Distichlis spicata* (saltgrass), *Batis maritima* (saltwort), *Salicornia* spp. (glasswort), *Schoenoplectus robustus* (sturdy bulrush), *Schoenoplectus americanus* (three-square bulrush), *Paspalum vaginatum* (seashore paspalum), *Sporobolus virginicus* (seashore dropseed), and *Borrchia frutescens* (sea ox-eye daisy). *Iva frutescens* (bigleaf sumpweed) and *Baccharis halimifolia* (baccharis) are commonly encountered woody species.

#### **VEGETATION TYPES:**

##### **Chenier Plain: Salt and Brackish Low Tidal Marsh (94)**

Gulf Coast Chenier Plain Salt and Brackish Regularly Flooded Tidal Marsh

**Identifier:** CES203.468.7                      **Phase 2 Code:** 94

**Description:** Low, regularly flooded tidal marsh, often dominated by *Spartina alterniflora* (smooth cordgrass).

##### **Chenier Plain: Salt and Brackish Low Shrub Tidal Wetland (93)**

Gulf Coast Chenier Plain Salt and Brackish Regularly Flooded Tidal Shrub Wetland

**Identifier:** CES203.468.6                      **Phase 2 Code:** 93

**Description:** Low, regularly flooded tidal marsh with significant cover of woody species such as *Avicennia germinans* (black mangrove), *Iva frutescens* (bigleaf sumpweed), or *Baccharis halimifolia* (baccharis).

##### **Chenier Plain: Salt and Brackish High Tidal Marsh (96)**

Gulf Coast Chenier Plain Salt and Brackish Irregularly Flooded Tidal Marsh

**Identifier:** CES203.468.17                      **Phase 2 Code:** 96

**Description:** Sites with irregular tidal inundation, often dominated by species other than *Spartina alterniflora* (smooth cordgrass), though it may be present.

##### **Chenier Plain: Salt and Brackish High Tidal Shrub Wetland (95)**

Gulf Coast Chenier Plain Salt and Brackish Irregularly Flooded Tidal Shrub Wetland

**Identifier:** CES203.468.16                      **Phase 2 Code:** 95

**Description:** Shrub dominated sites with irregular tidal inundation. Species such as *Iva frutescens* (bigleaf sumpweed) or *Baccharis halimifolia* (baccharis) are often common. Some sites dominated by *Arundo donax* (giant reed) may also be mapped as this type.

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## **Agricultural and other Human-related Mapped Types**

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### **Grass Farm (114)**

**Phase 2 Code:** 114

**Description:** Most areas mapped as this type in Phase 1 are dominated by *Cynodon dactylon* (Bermudagrass) and consist of golf course fairways and greens that are fertilized and irrigated. This type also includes areas of moist soil and fast-growing, highly productive grassland.

### **Pine Plantation 1 to 3 meters tall (116)**

**Phase 2 Code:** 116

**Description:** Young, planted *Pinus taeda* (loblolly pine) stands are most common within this type, which is mapped over moist soils where natural pine stands are not expected to occur. Other species such as *Liquidambar styraciflua* (sweetgum), *Quercus nigra* (water oak), *Ulmus alata* (winged elm), *Ilex vomitoria* (yaupon), and *Rubus trivialis* (southern dewberry) may also be components.

### **Pine Plantation >3 meters tall (115)**

**Phase 2 Code:** 115

**Description:** Dense stands of *Pinus taeda* (loblolly pine) or mixed *Pinus taeda* (loblolly pine) and *Pinus echinata* (shortleaf pine) characterize this type that is mapped over moist soils where natural pine stands are not expected to occur. Plantations of *Pinus elliottii* (slash pine) may also be present. Important components may include *Liquidambar styraciflua* (sweetgum), *Quercus nigra* (water oak), *Nyssa sylvatica* (blackgum), *Quercus falcata* (southern red oak), *Quercus stellata* (post oak), and *Quercus alba* (white oak).

### **Row Crops (113)**

**Phase 2 Code:** 113

**Description:** This type includes all cropland where fields are fallow for some portion of the year. Some fields may rotate into and out of cultivation frequently, and year-round cover crops are generally mapped as grassland.

### **Urban High Intensity (118)**

**Phase 2 Code:** 118

**Description:** This type consists of built-up areas and wide transportation corridors that are dominated by impervious cover.

### **Urban Low Intensity (119)**

**Phase 2 Code:** 119

**Description:** This type includes areas that are built-up but not entirely covered by impervious cover, including most of the area within cities and towns.

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## **Mainly Natural Azonal Mapped Types**

Azonal types are those types that are widespread and not particularly characteristic of any region or naturally occurring vegetation type. This may be due to disturbance, where wide ranging species adapted to disturbed conditions predominate. In other areas, land management may have resulted in invasion of widespread species such as juniper or mesquite. Azonal types may also

be used to refer to general physiognomic types that are not ascribable to particular naturally occurring systems.

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### **Barren (110)**

**Phase 2 Code:** 110

**Description:** This type includes areas where little or no vegetative cover existed at the time of image data collection. Large areas cleared for development are included, as well as rural roads and buildings and associated clearing in primarily rural areas. Stream beds with exposed gravel or bedrock, rock outcrops, quarries, mines and year-round fallow fields are also included.

### **Marsh (108)**

**Phase 2 Code:** 108

**Description:** Areas mapped as marsh are small, and consist of wet or alternately wet and dry soils with herbaceous vegetation. These are often near tanks or ponds, and may contain *Typha* spp. (cattails), *Eleocharis* spp. (spikerushes), other sedges, and grasses such as *Sorghum halepense* (Johnsongrass) or *Cynodon dactylon* (Bermudagrass) as important species.

### **Mud Flat (111)**

**Phase 2 Code:** 111

This mapped type is essentially unvegetated at the time of data collection, but annual variation in storm events and precipitation influence the ability of these low areas to support vegetation.

### **Native Invasive: Baccharis Shrubland (105)**

**Phase 2 Code:** 105

**Description:** This type is mapped on saline or alkaline soils and is dominated by *Baccharis* sp. (baccharis). *Juniperus virginiana* (eastern redcedar) may be present.

### **Native Invasive: Common Reed (104)**

**Phase 2 Code:** 104

**Description:** Areas mapped within this type are often dominated by nearly pure stands of *Phragmites australis* (common reed) on disturbed or formerly disturbed soils.

### **Native Invasive: Deciduous Shrubland (107)**

**Phase 2 Code:** 107

**Description:** A variety of shrubs and generally small or sparse deciduous trees may be important in this successional type that was mapped on non-prairie soils. Important species may include *Celtis laevigata* (sugar hackberry), *Quercus nigra* (water oak), *Prosopis glandulosa* (honey mesquite), *Triadica sebifera* (Chinese tallow, south), *Ilex vomitoria* (yaupon), *Baccharis* sp. (baccharis), *Rubus trivialis* (southern dewberry), *Liquidambar styraciflua* (sweetgum), *Quercus falcata* (southern red oak), *Ulmus alata* (winged elm), or *Ulmus crassifolia* (cedar elm). Small pine trees may be present in young, managed plantations.

### **Native Invasive: Deciduous Woodland (100)**

**Phase 2 Code:** 100

**Description:** This broadly-defined type may have *Celtis laevigata* (sugar hackberry), *Quercus nigra* (water oak), *Ulmus crassifolia* (cedar elm), *Liquidambar styraciflua* (sweetgum), *Ulmus*

*alata* (winged elm), *Ilex vomitoria* (yaupon), or *Prosopis glandulosa* (honey mesquite) among the dominants. *Juniperus virginiana* (eastern redcedar) and *Pinus taeda* (loblolly pine) may also be present.

#### **Native Invasive: Huisache Woodland or Shrubland (106)**

**Phase 2 Code:** 106

**Description:** *Acacia farnesiana* (huisache) along with shrubs and trees such as *Prosopis glandulosa* (honey mesquite), *Celtis laevigata* (sugar hackberry), *Ulmus crassifolia* (cedar elm), *Sideroxylon lanuginosum* (gum bumelia), *Quercus nigra* (water oak), and *Quercus virginiana* (coastal live oak) may be important within this type that was mapped on prairie soils.

#### **Native Invasive: Juniper Shrubland (102)**

**Phase 2 Code:** 102

**Description:** This type is mapped on prairie soils or on disturbance soils and is commonly dominated by *Juniperus virginiana* (eastern redcedar). Other sites mapped as this type may be dominated by *Ilex vomitoria* (yaupon). A variety of deciduous species may also be present, including *Ulmus crassifolia* (cedar elm), *Ulmus alata* (winged elm), *Celtis laevigata* (sugar hackberry), *Liquidambar styraciflua* (sweetgum), *Quercus nigra* (water oak), and *Prosopis glandulosa* (honey mesquite). In the southeast, young *Pinus taeda* (loblolly pine) may be the dominant species.

#### **Native Invasive: Juniper Woodland (101)**

**Phase 2 Code:** 101

**Description:** *Juniperus virginiana* (eastern redcedar) is usually the most important tree within this type, which is generally mapped outside of the typical range of pines. Within the range of pines, over prairie soils, this type may also be mapped. *Pinus taeda* (loblolly pine) plantations may also be included in the south and east, and *Quercus virginiana* (coastal live oak) may be a common component in the south. *Ilex vomitoria* (yaupon) may be a conspicuous component of the understory. Deciduous trees such as *Celtis laevigata* (sugar hackberry), *Ulmus crassifolia* (cedar elm), *Quercus stellata* (post oak), and *Quercus nigra* (water oak) may be present, and *Ilex vomitoria* (yaupon) may also be a component.

#### **Native Invasive: Mesquite Shrubland (103)**

**Phase 2 Code:** 103

**Description:** *Prosopis glandulosa* (honey mesquite) is often the dominant species of this broadly-defined type, but it may occur as a variety of open woodlands to dense shrublands with a variety of other species such as *Celtis laevigata* (sugar hackberry), *Quercus stellata* (post oak), *Quercus marilandica* (blackjack oak), *Ulmus crassifolia* (cedar elm), *Ulmus alata* (winged elm), *Diospyros virginiana* (common persimmon), and/or *Rhus* spp. (sumacs). *Juniperus virginiana* (eastern redcedar) may be commonly encountered in this mapped type.

#### **Non-Native Invasive: Chinese Tallow Forest, Woodland, or Shrubland (117)**

**Phase 2 Code:** 117

**Description:** More or less dense stands of *Triadica sebifera* (Chinese tallow) characterize this type, which is generally mapped over prairie soils. Other component species may include

*Baccharis halimifolia* (baccharis), *Liquidambar styraciflua* (sweetgum), *Quercus nigra* (water oak), *Nyssa sylvatica* (blackgum), *Pinus taeda* (loblolly pine), and *Quercus phellos* (willow oak).

### **Non-riverine Swamp (109)**

**Phase 2 Code:** 109

**Description:** Areas mapped as swamp in Phase 1 are typically forested, wet or alternately wet and dry soils at the upper ends of reservoirs, or on stock tanks or ponds. A variety of species, including *Taxodium distichum* (baldcypress), *Salix nigra* (black willow), and *Quercus nigra* (water oak), *Liquidambar styraciflua* (sweetgum), or *Cephalanthus occidentalis* (common buttonbush) may be present.

### **Open Water (112)**

**Phase 2 Code:** 112

**Description:** Open water in reservoirs, large ponds, the Gulf of Mexico, bay waters, or rivers.

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