

**13720**

## **East Gulf Coastal Plain Interior Shortleaf Pine-Oak Forest**

BpS Model/Description Version: Aug. 2020

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### **Vegetation Type**

Forest and Woodland

### **Map Zones**

46, 99

### **Geographic Range**

This Biophysical Setting (BpS) is found in the East Gulf Coastal Plain of Mississippi and interior Alabama, and occurs most extensively on generally rolling uplands north of the range of *Pinus palustris*.

NatureServe (2006) notes this system within the range of Oak-Pine vegetation (generally equivalent to this system) versus Longleaf-Loblolly-Slash Pines in Shantz and Zon (1924)

### **Biophysical Site Description**

This BpS occurs on slopes and dry to dry-mesic rolling uplands of the east gulf coastal plain. Elevations generally range from 200-500ft above mean sea level within moderately dissected plateau, inter-lowland, and low ridge landforms. The terrain may include undulating to steep slopes of 2-45%, but the predominant terrain is rolling, with slopes of 4-15% common.

Soils are acidic, moderately deep, well drained to slowly or moderately permeable, with sandy clay loam, clay loam, or silty clay loam to clay subsoils. Surface textures range from sandy loam to loamy sand, but do not include deep sands or silts associated with loess deposits.

Surface runoff is typically moderate, but may be significant depending on proximity of the site to marginal topography. Drainage is medium to rapid, but slow to very slow in the lower subsoil, weathered parent shale, and interbedded sandstone.

Moisture gradients, topography, soil characteristics and fire regimes promote a wide variety of mixed pine and pine-hardwood communities across the range of this system. Soils indicating shortleaf pine (site index 70), may also support white oak, blackjack oak, hickory and dogwood associates.

### **Vegetation Description**

This system is primarily composed of forest or woodland vegetation dominated by trees generally up to about 33m (100ft) in height. Individual patches or stands may be predominantly evergreen, predominantly deciduous, or mixed. The canopy will typically be closed (>60% crown closure), but some areas may exhibit lower canopy closures, either as a result of repeated

surface fires or other disturbances. *Pinus echinata* is the most characteristic floristic component of this system (NatureServe 2006).

The actual vegetation composition depends greatly upon local site conditions and disturbance history of an area. Locally, the species that comprise the system are strongly influenced by soil, slope and aspect (Eyre 1980). Examples may be composed of various mixtures of pines and hardwoods. Although the actual amount of *Pinus echinata* present varies based on a number of factors, intact examples of this system often include stands that are dominated by *Pinus echinata* grading into stands with a mixture of upland hardwoods. Where fire is most frequent the system may develop a relatively pure canopy of shortleaf typified by a very open woodland structure with scattered overstory trees and an herbaceous-dominated understory; such examples are rare on the modern landscape (NatureServe 2006). Shortleaf pine (*Pinus echinata*) dominates dryer south and west facing slopes often with white oak (*Quercus alba*), post oaks (*Q. margareta*, *Q. stellata*) and mockernut hickory (*Carya tomentosa*). Red oak (*Quercus falcata*) and black oaks (*Q. velutina*) were more frequent on moister areas like north slopes and sites that burned at a lower intensity due to partial protection from natural landscape features.

Loblolly pine (*Pinus taeda*) is relegated primarily to riparian areas and intrudes into drier sites with lower fire frequency. Many such areas also support *Liquidambar styraciflua*, *Liriodendron tulipifera*, *Acer* spp. and *Nyssa sylvatica*. When these species are prominent in the overstory and midstory it is generally thought to be indicative of fire suppression. *Quercus alba* and *Quercus stellata* are common hardwood components, particularly in later-seral or higher-quality stands, typically combined with *Carya alba*, *Carya pallida*, *Carya glabra*, and other *Carya* spp. Other tree species indicative of recent disturbance and/or fire suppression are *Quercus nigra*, *Quercus hemisphaerica*, *Quercus falcata*, and *Quercus velutina* (NatureServe 2006).

The midstory will typically contain *Cornus florida*, *Oxydendrum arboreum*, *Nyssa sylvatica*, and *Liquidambar styraciflua*. The patchy shrub layer includes *Vaccinium arboreum*, *Vaccinium elliotii*, *Asimina parviflora*, *Aesculus pavia*, *Hamamelis virginiana*, *Callicarpa americana*, *Hypericum hypericoides*, *Gelsemium sempervirens*, *Vitis rotundifolia*, and *Arundinaria gigantea* (NatureServe 2006).

The understory is variable and ranges from open grass and forb dominated areas to sparsely vegetated sites depending on light availability and fire frequency. Herbs include *Cnidioscolus stimulosus*, *Aristolochia serpentaria*, *Piptochaetium avenaceum*, *Chasmanthium sessiliflorum*, *Elephantopus tomentosus*, *Hexastylis arifolia*, *Iris verna*, *Rudbeckia fulgida*, *Solidago odora*, *Euphorbia pubentissima*, *Mitchella repens*, and *Desmodium* spp. (NatureServe Ecology unpubl. Data 2003). Other associates may include *Smilax* spp., *Symphyotrichum* spp., *Coreopsis* spp., *Lespedeza* spp., *Viola pedata*, *Mimosa microphylla*, *Antennaria* spp., *Clitoria mariana*, *Senna* spp., *Chasmanthium latifolium*, *Dichanthelium* spp., *Andropogon* spp., *Schizachyrium scoparium*, and *Carex* spp. (Lawson 1990) (NatureServe 2006).

#### BpS Dominant and Indicator Species

| Symbol | Scientific Name            | Common Name    |
|--------|----------------------------|----------------|
| PIEC2  | <i>Pinus echinata</i>      | Shortleaf pine |
| QUAL   | <i>Quercus alba</i>        | White oak      |
| QUMA3  | <i>Quercus marilandica</i> | Blackjack oak  |

|        |                                |                   |
|--------|--------------------------------|-------------------|
| CAAL27 | <i>Carya alba</i>              | Mockernut hickory |
| CAGL8  | <i>Carya glabra</i>            | Pignut hickory    |
| SCSC   | <i>Schizachyrium scoparium</i> | Little bluestem   |
| VAAR   | <i>Vaccinium arboreum</i>      | Farkleberry       |
| QUST   | <i>Quercus stellata</i>        | Post oak          |

Species names are from the NRCS PLANTS database. Check species codes at <http://plants.usda.gov>.

### Disturbance Description

Fire is possibly the most important natural process affecting the floristic composition and vegetation structure of this system (NatureServe 2006). The presence of frequent surface fire is important in order to support the reproduction of shortleaf pine (*Pinus echinata*), which is a critical species characteristic to the system. *Pinus echinata* is a shade-intolerant species and does not survive or grow well when fire is suppressed. Where fire is most frequent, the system may develop a relatively pure canopy of shortleaf, typified by a very open woodland structure with scattered overstory trees and an herbaceous-dominated understory; such examples are rare on the modern landscape (NatureServe 2006).

The frequency of fire in this system is somewhat in question. However, most agree that the inter-fire interval was relatively short. Based on his studies comparing the current tree species composition to bearing tree records, Brewer (2001) indicates that shortleaf pine and more fire tolerant species such as blackjack oak, black oak, and post oak were prevalent in the landscape, indicating a higher fire frequency. Without a short fire return interval community succession tends to favor upland mixed pine-xeric hardwood forests or hardwood dominated forests. Landers (1989) inferred a fire return interval of 10 times per century for *Pinus echinata*. Outcalt, in his description of the Coastal Plain Pine Oak Hickory system for the LANDFIRE Rapid Assessment (R9OHPI), indicated a 4-8yr fire return interval for surface fires. Fire may have been as frequent as every 2-3yrs. Without such fire frequency intervals (particularly during the introductory phase), community succession exhibits upland mixed pine-xeric hardwood forests or hardwood dominated forests

Lightning fires occurred primarily during the spring dry season (April and May) with a second peak of native American burning during the fall (October and November). Occasionally, during extensive droughts, mixed severity or stand replacement fires did occur, especially on dryer pine dominated sites. Local thunder storms created gaps on a small but continual basis. More extensive regional disturbances included tropical storms during the growing season and ice storms during winter.

Outbreaks of *Dendroctonus frontalis* (southern pine beetle) also play an important role in shaping the dynamics of this system and the balance of pine versus hardwood dominance over time. Soil pathogens also play a role in shaping this system. Young shortleaf pines are generally slower growing and slower to dominate a site than *Pinus taeda* or many hardwood competitors, but they usually will endure competition longer than the common associate, *Pinus taeda*. *Pinus echinata* can maintain dominance on most sites after it overtops competing vegetation, but in general hardwoods cannot be eliminated from pine sites. On very good sites (i.e., with high site index), however, it may not outgrow competing species such as sweetgum and red maple (Lawson 1990).

## Fire Frequency

| Severity         | Avg FI | Percent of All Fires | Min FI | Max FI |
|------------------|--------|----------------------|--------|--------|
| Replacement      | 189    | 4                    | 100    | 300    |
| Moderate (Mixed) | 88     | 8                    | 50     | 150    |
| Low (Surface)    | 8      | 88                   | 4      | 8      |
| All Fires        | 7      | 100                  |        |        |

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

## Scale Description

Surface fire usually covered the entire fire compartment, which ranged in size from 10-500ac. The actual fires however, were much larger. They usually started in the adjacent longleaf or prairie ecosystem and then entered into this vegetation type. Within this vegetation there was considerable patchiness in overstory species composition. Uniform composition varied in size from 1/4 to 5ac. This was related to topography and disturbance. In openings created by windthrow and disease where a single tree or two were lost, regeneration occurred. Larger gaps were created by tropical storms, ice storms or bark beetle outbreaks. These disturbances still resulted in mostly small gap openings of 1/4 to 2ac. Large opening were infrequently created by replacement fires following extensive droughts coupled with severe bark beetle mortality (entire scale description was maintained from the R9OHPI model).

## Adjacency or Identification Concerns

On the southern extent, this system grades into the blackbelt prairie system and longleaf pine-dominated systems, and to the north the range also overlaps with other upland hardwood systems. Many of the currently existing stands have much more loblolly pine than existed prior to European settlement. These stands are also much denser with more midstory hardwoods, including mesic hardwoods like red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), and water oak (*Quercus nigra*), and an understory dominated by woody shrubs and tree seedlings resulting from reduced frequency of surface fires.

NatureServe (2006) notes that the range of this system overlaps with East Gulf Coastal Plain Northern Dry Upland Hardwood Forest (CES203.483 -- BpS1307) in the Fall Line Hills ecoregion (65i) of Alabama and in the Southern Hilly Gulf Coastal Plain ecoregion (65d) of MS and may overlap to some degree with Southern Coastal Plain Dry Upland Hardwood Forest (CES203.560 -- BpS1330) as well. In parts of the overlapping range (including the Oakmulgee Ranger District of the Talladega National Forest), these types occur in a mosaic which is difficult to interpret environmentally and ecologically (A. Schotz pers. comm.). East Gulf Coastal Plain Northern Loess Plain Oak-Hickory Upland (CES203.482--BpS1306) replaces this system along the northern and northwestern boundary in Tennessee.

## Issues or Problems

The former extent of this type is somewhat conjecture based on limited data from a few sites across the region. This system encompasses a broad range of pine or hardwood dominance, depending on site conditions and disturbance regimes.

## Native Uncharacteristic Conditions

## Comments

The description and VDDT model for this BpS is based on the Rapid Assessment model R9OHPI (Coastal Plain Pine Oak Hickory) developed by K. Outcalt and C. Frost. It has been suggested that Steve Brewer review this model. The VDDT model was adopted in its entirety with changes only made to the class ages.

Note that BpS 1330 (Southern Coastal Plain Dry Upland Hardwood Forest CES203.560) modeled by Milo Pyne, was written excluding shortleaf pine. Alternatively, this BpS (1372) includes those stands that are dominated by shortleaf pine.

## Succession Classes

### Mapping Rules

| Upper<br>Layer<br>Lifeform | Height<br>(m) | Canopy Cover (%) |       |       |       |       |       |       |       |       |        |
|----------------------------|---------------|------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
|                            |               | 0-10             | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 | 81-90 | 91-100 |
| Herb                       | 0-0.5         | A                | A     | A     | A     | A     | A     | A     | A     | A     | A      |
| Herb                       | 0.5-1.0       | A                | A     | A     | A     | A     | A     | A     | A     | A     | A      |
| Herb                       | >1.0          | A                | A     | A     | A     | A     | A     | A     | A     | A     | A      |
| Shrub                      | 0-0.5         | A                | A     | A     | A     | A     | A     | A     | A     | A     | A      |
| Shrub                      | 0.5-1.0       | A                | A     | A     | A     | A     | A     | A     | A     | A     | A      |
| Shrub                      | 1.0-3.0       | A                | A     | A     | A     | A     | A     | A     | A     | A     | A      |
| Shrub                      | >3.0          | A                | A     | A     | A     | A     | A     | A     | A     | A     | A      |
| Tree                       | 0-5           | A                | A     | A     | A     | A     | A     | A     | A     | A     | A      |
| Tree                       | 5-10          | C                | C     | C     | C     | C     | C     | B     | B     | B     | B      |
| Tree                       | 10-25         | C                | C     | C     | C     | C     | C     | B     | B     | B     | B      |
| Tree                       | 25-50         | D                | D     | D     | D     | D     | D     | E     | E     | E     | E      |
| Tree                       | >50           | D                | D     | D     | D     | D     | D     | D     | E     | E     | E      |

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

### Description

|                |           |                                             |
|----------------|-----------|---------------------------------------------|
| <b>Class A</b> | <b>12</b> | <b>Early Development 1 - All Structures</b> |
|----------------|-----------|---------------------------------------------|

### Indicator Species

| Symbol | Scientific Name                | Common Name     | Canopy Position |
|--------|--------------------------------|-----------------|-----------------|
| PIEC2  | <i>Pinus echinata</i>          | Shortleaf pine  | Upper           |
| QUAL   | <i>Quercus alba</i>            | White oak       | Upper           |
| VAAR   | <i>Vaccinium arboreum</i>      | Farkleberry     | Low-Mid         |
| SCSC   | <i>Schizachyrium scoparium</i> | Little bluestem | Lower           |

### Description

Maximum Tree Size Class  
Sapling >4.5ft; <5"DBH

| Indicator Species | Symbol | Scientific Name | Common Name | Canopy Position |
|-------------------|--------|-----------------|-------------|-----------------|
|-------------------|--------|-----------------|-------------|-----------------|



|                           |           |            |       |     |     |    |
|---------------------------|-----------|------------|-------|-----|-----|----|
| Alternative Succession    | Mid1:OPN  | Mid1:CLS   | 1     | 1   | Yes | 12 |
| Wind or Weather or Stress | Mid1:OPN  | Early1:ALL | 0.004 | 250 | Yes | 0  |
| Replacement Fire          | Mid1:OPN  | Early1:ALL | 0.005 | 200 | Yes | 0  |
| Surface Fire              | Mid1:OPN  | Mid1:OPN   | 0.17  | 6   | No  | 0  |
| Wind or Weather or Stress | Mid1:CLS  | Early1:ALL | 0.004 | 250 | Yes | 0  |
| Replacement Fire          | Mid1:CLS  | Early1:ALL | 0.005 | 200 | Yes | 0  |
| Mixed Fire                | Mid1:CLS  | Mid1:OPN   | 0.05  | 20  | Yes | 0  |
| Surface Fire              | Mid1:CLS  | Mid1:CLS   | 0.05  | 20  | No  | 0  |
| Alternative Succession    | Late1:OPN | Late1:CLS  | 1     | 1   | Yes | 15 |
| Replacement Fire          | Late1:OPN | Early1:ALL | 0.003 | 333 | Yes | 0  |
| Insects or Disease        | Late1:OPN | Early1:ALL | 0.003 | 333 | Yes | 0  |
| Wind or Weather or Stress | Late1:OPN | Early1:ALL | 0.005 | 200 | Yes | 0  |
| Surface Fire              | Late1:OPN | Late1:OPN  | 0.17  | 6   | No  | 0  |
| Wind or Weather or Stress | Late1:CLS | Early1:ALL | 0.004 | 250 | Yes | 0  |
| Replacement Fire          | Late1:CLS | Early1:ALL | 0.005 | 200 | Yes | 0  |
| Insects or Disease        | Late1:CLS | Early1:ALL | 0.005 | 200 | Yes | 0  |
| Wind or Weather or Stress | Late1:CLS | Late1:OPN  | 0.01  | 100 | Yes | 0  |
| Mixed Fire                | Late1:CLS | Late1:OPN  | 0.01  | 100 | Yes | 0  |
| Surface Fire              | Late1:CLS | Late1:CLS  | 0.05  | 20  | No  | 0  |

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