13300

Southern Coastal Plain Dry Upland Hardwood Forest

BpS Model/Description Version: Aug. 2020

Update: 3/18

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| **Modelers** |  | **Reviewers** |  |
| Milo Pyne | milo\_pyne@natureserve.org | Chris Szell | cszell@tnc.org |
|  |  | Keith Fisher | kfisher@tnc.org |
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Vegetation Type

Forest and Woodland

Map Zones

46, 48, 54, 55, 56, 99

Geographic Range

Within the southeast zone this Biophysical Setting (BpS) is found on dissected landscapes in the Southern Coastal Plain and Southeastern Plains (EPA Level III Ecoregion 75 and parts of 65) of Georgia, Alabama, Mississippi and Florida. It is most prevalent west and north through Alabama and Mississippi. Related types are found in adjoining zones.

Biophysical Site Description

This BpS occurs on upper slopes and drier rolling uplands of the upper (and less frequently lower) coastal plain that are somewhat fire sheltered. Soils are acidic, well drained, and of varying textures but exclusive of deep sands. Elevations generally range from 10-300ft amsl.

Vegetation Description

Vegetation consists of forests dominated by combinations of upland oaks, particularly *Quercus alba* (white oak), *Quercus falcata* (southern red oak), *Quercus stellata* (post oak), *Quercus margarettiae* (scrubby post oak) and other species. There is some variation between the composition of northern versus southern examples in which evergreen species such as *Quercus nigra* (water oak) and *Quercus hemisphaerica* (darlington oak) become more prominent. Hickories (*Carya alba* [mockernut hickory] and *Carya glabra* [pignut hickory]) may be present. There is some variation in composition with aspect and degree of exposure to fire. More mesophytic species such as *Fagus grandifolia* (American beech) and *Magnolia grandiflora* (southern magnolia) are absent or are confined to the understory. *Pinus echinata* (shortleaf pine) may be present in some stands, particularly on drier south- and west-facing slopes but is typically not dominant. *Pinus taeda* (loblolly pine) is sometimes present, but it is unclear if it is a natural component or has entered only as a result of past cutting. In areas where fire was present, the understory would be open and savanna-like, and dominated by grasses and forbs.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PIEC2 | *Pinus echinata* | Shortleaf pine |
| QUAL | *Quercus alba* | White oak |
| CAAL27 | *Carya alba* | Mockernut hickory |
| QUFA | *Quercus falcata* | Southern red oak |
| PITA | *Pinus taeda* | Loblolly pine |
| QUST | *Quercus stellata* | Post oak |
| QUHE2 | *Quercus hemisphaerica* | Quercus hemisphaerica |

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

Disturbance Description

Frequent surface fires occurred on a 4-8yr return interval from both lightning and native American ignitions. These frequent light surface fires maintained the grassy understory and kept more fire tolerant hardwoods and shrubs from capturing the understory and forming a midstory layer. Lightning fires occurred primarily during the spring dry season (April and May) with a secondary peak of native American and settler burning during the fall (October and November).

Occasionally, during extensive droughts, mixed severity or stand replacement fires did occur, especially in drier shortleaf pine dominated stands. 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 (in the northern part of the range). Dense stands of middle to older aged pines (where present) were susceptible to periodic mortality from bark beetle epidemics.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 193 | 4 |  |  |
| Moderate (Mixed) | 96 | 7 |  |  |
| Low (Surface) | 8 | 89 |  |  |
| 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 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.

Adjacency or Identification Concerns

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.

Issues or Problems

The former extent of this type is somewhat conjecture based on limited data from a few sites across the region. Historic fire return intervals however, are much more certain.

Class indicator species (QUAL) found in every class seems odd. Suggestion was made that red oak is more prominent.

Native Uncharacteristic Conditions

Patches dominated by Pin*us taeda* (loblolly pine) are artifacts of past disturbance and succession in the absence of fire.

Comments

Revised: This model is based on R9OHPI from the Rapid Assessment (RA) phase (Outcalt, Frost), but is more restricted in its range (limited to the Gulf Coastal Plain) and in its concept (being primarily hardwood, with limited shortleaf pine). This earlier model replaced R8PIECpi from the Southern Appalachian model zone.

Originally based on model from FRCC (POHS) developed by C. Frost, who needs to review the information contained in this database. In Alabama and Mississippi (north of the range of longleaf) this (pine dominated) equates to CES203.506 of NatureServe classification; hardwood-dominated equates to CES203.560. No real changes to the VDDT model were made by Pyne from the earlier RA version.

This model was reviewed during a model review workshop held 09/19/2006 Tallahassee, FL.

Succession Classes

**Mapping Rules**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Upper Layer Lifeform** | **Height (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 | C | B | B | B |
| Tree | 10-25 | C | C | C | C | C | C | C | B | B | B |
| Tree | 25-50 | D | D | D | D | D | D | D | 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**

Class A 11 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUAL | Quercus alba | White oak | Upper |
| PIEC2 | Pinus echinata | Shortleaf pine | Upper |
| QUHE2 | Quercus hemisphaerica | Quercus hemisphaerica | Upper |
| QUST | Quercus stellata | Post oak | Upper |

Description

Class A is characterized by oak and pine reproduction (up to sapling size) in gaps. It is typically primarily oaks and other hardwoods (including fire-intolerant taxa), but can be mixed oak and shortleaf pine on drier sites, in larger gaps resulting from beetle kills of shortleaf pine, and/or after mixed or replacement fires.

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

Class B 18 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUAL | Quercus alba | White oak | Upper |
| PIEC2 | Pinus echinata | Shortleaf pine | All |
| CAAL27 | Carya alba | Mockernut hickory | Low-Mid |
| COFL2 | Cornus florida | Flowering dogwood | Lower |

Description

Class B has a closed canopy dominated by hardwoods and/or pine, with a midstory of hardwoods (including fire-intolerant taxa) resulting from fire exclusion. Understory herbaceous growth is reduced due to substantial shading from the over- and midstory layers.

Surface fires may occur in Class B, but these are not intense or frequent enough to kill the overstory or thin the midstory. More intense mixed fires, can reduce the overstory and midstory, and drive the system to a more open condition characteristic of the mid development open class.

*Maximum Tree Size Class*  
Medium 9-21"DBH

Class C 37 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUAL | Quercus alba | White oak | Upper |
| PIEC2 | Pinus echinata | Shortleaf pine | Upper |
| QUST | Quercus stellata | Post oak | Upper |

Description

Class C is an open-canopy forest or woodland of oaks (primarily more fire-tolerant ones) and pines (particularly shortleaf pine) with a grass and forb dominated understory.

Severe wind or weather stresses occur.

*Maximum Tree Size Class*  
Medium 9-21"DBH

Class D 22 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUAL | Quercus alba | White oak | Upper |
| PIEC2 | Pinus echinata | Shortleaf pine | Upper |
| QUST | Quercus stellata | Post oak | All |

Description

Class D is an open-canopy forest or woodland with large oaks (primarily more fire-tolerant ones) and pines (particularly shortleaf pine) and an herbaceous dominated understory with a mixture of grasses and forbs.

Rare replacement fires may occur during extremely dry conditions.

*Maximum Tree Size Class*  
Large 21-33"DBH

Class E 12 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUAL | Quercus alba | White oak | Upper |
| QUFA | Quercus falcata | Southern red oak | Upper |
| CAAL27 | Carya alba | Mockernut hickory | Low-Mid |
| COFL2 | Cornus florida | Flowering dogwood | Low-Mid |

Description

Class E is a closed-canopy forest with large oaks (including less fire-tolerant ones) and pines (including loblolly pine), a midstory of fire-intolerant hardwoods, and a sparse understory dominated by shrubs and tree seedlings.

Class E occurs when fire is absent from the system, or when only light surface fires occur. Infrequent mixed fires occurring in Class E will remove the midstory and some of the overstory, and return the system to a more open condition characteristic the late development open class. Rare replacement fires may occur during extreme drought events.

*Maximum Tree Size Class*  
Large 21-33"DBH

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:OPN | 14 |
| Mid1:OPN | 15 | Late1:OPN | 59 |
| Mid1:CLS | 15 | Late1:CLS | 59 |
| Late1:OPN | 60 | Late1:OPN | 460 |
| Late1:CLS | 60 | Late1:CLS | 460 |

Probabilistic Transitions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Disturbance Type** | **Disturbance occurs In** | **Moves vegetation to** | **Disturbance Probability** | **Return Interval (yrs)** | **Reset Age to New Class Start Age After Disturbance?** | **Years Since Last Disturbance** |
| Alternative Succession | Early1:ALL | Mid1:CLS | 1 | 1 | Yes | 13 |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Surface Fire | Early1:ALL | Early1:ALL | 0.14 | 7 | No | 0 |
| 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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