14500

Southern Atlantic Coastal Plain Wet Pine Savanna and Flatwoods

BpS Model/Description Version: Aug. 2020

|  |  |  |  |
| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Kenneth Outcalt | koutcalt@fs.fed.us | Chris Szell | cszell@tnc.org |
|  |  | Keith Fisher | kfisher@tnc.org |
|  |  |  |  |

Vegetation Type

Woody Wetland

Map Zones

55, 58

Geographic Range

Atlantic coastal plain southern pine savannas and flatwoods occur from northeast FL north across the lower coastal plain of GA into southeastern SC (Peet 2006).

Biophysical Site Description

These communities were historically found predominantly on the lower coastal plain and less so in the middle coastal plains on broad flat regions with very little topographic relief. They occupied soils derived from marine and eolian deposits laid down in shallow seas (Stout and Marion 1993). Both communities occurred on seasonally wet to flooded somewhat poorly to poorly drained sites but the flatwoods were the most prevalent because of the large expanse on the sandy soils with dark sandy layers (mostly spodosols) and generally low pH (3-5). Savannas were limited in the region, occupying the more limited finer textured silts and clays (Peet 2006). Although often wet, both flatwoods and savanna have dry periods during seasonal droughts.

Vegetation Description

Flatwoods in this zone are characterized by an open, savanna-like to nearly closed canopy of longleaf pine (*Pinus palustris*), with a component of slash pine (*Pinus elliottii*). In wetter areas where the fire return interval is 3-5yrs, the canopy may be mostly slash pine (Monk 1968). Pond pine (*Pinus serotina)* often dominates the overstory of the wettest and most acid sites (Monk 1968). The understory of flatwoods consists of mostly saw palmetto (*Serenoa repens*) and evergreen shrubs and trees including: lyonia (*Lyonia lucida*, *L. fruiticosa*, *L. ferruginea*, *L. ligustrina*), blueberries (*Vaccinium corymbosum*, *V. darrowii*, *V. myrsinites*, *V. stamenium*), titi (*Cliftonia monophylla*), runner oaks (*Quercus pumila* and *Q. minima*), wax myrtle (*Myrica cerifera*), hollies (*Ilex* spp.), gallberry (*Ilex glabra*), and bays (*Persea* spp.). These are typically of low stature under natural fire regimes. Ground cover species include wiregrasses (*Aristida* spp.), toothache grass (*Ctenium aromaticum*), dropseeds (*Sporobolus* spp.), panic grasses (*Panicum* spp.) and various perennial herbs.

Canopy trees are patchy in distribution, with regeneration in canopy gaps of ¼ acre or less in size. Mid-successional clumps occur in similar sized patches as regeneration. The oldest trees occur as isolated individuals. The reference condition classes are aggregates of numerous patches well dispersed over the landscape. Canopy gaps are created by fire mortality, lightning and wind-throw at the scale of individual to several trees to large stands of relatively even-aged trees following major hurricanes.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PIPA2 | *Pinus palustris* | Longleaf pine |
| PIEL | *Pinus elliottii* | Slash pine |
| SERE2 | *Serenoa repens* | Saw palmetto |
| ARBE7 | *Aristida beyrichiana* | Beyrich threeawn |
| ILGL | *Ilex glabra* | Inkberry |

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

Disturbance Description

Surface fires are frequent, occurring every 1-3yrs (Frost 2006) but with ranges up to five year intervals. These surface fires generally burn most of the above-ground understory vegetation. Fires are usually low to moderate in intensity overall, generally resulting in topkill of the lower and middle layers, but periodically will kill young pine regeneration patches and occasionally individual older trees. Although fire can occur in any season, in pre-European settlement times many lightning fires probably occurred during the dry spring and early summer season, although Native Americans were common in these areas and represented a significant ignition source. This community is subjected to hurricanes which may cause thinning of stands, localized blowdown or uprooting of stands, or blowdowns on larger areas. Flooding may cause vegetation changes at ecotones with wetland types.

Surface fires are extensive in nature while replacement fires are generally local patches of mortality. Both replacement and surface fires can occur in all stages but replacement fire is actually more likely in closed stages because of the extra fuel from pyrogenic palmetto and ericaceous shrubs.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 100 | 3 | 5 | 150 |
| Moderate (Mixed) | 480 | 1 |  |  |
| Low (Surface) | 3 | 96 | 1 | 8 |
| All Fires | 3 | 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

Low intensity fires ranged in size from very small to thousands of acres pre-fragmentation. Replacement fires were mostly localized to less than an acre, but could be as large as hundreds of acres. Hurricane and wind damage may have ranged from single trees, to a few tens of acres scattered in the landscape to large areas after major storms. Flooding disturbance probably was limited to a few acres. Patch size of this type may range from 10ac to thousands of acres, forming the matrix within which other types are imbedded.

Adjacency or Identification Concerns

Flatwoods and savannas exists as matrix in which many other types occur, often due to slight elevation changes, fire shadows or strips parallel to extended elevation gradients between uplands and wetlands. As sites become wetter slash pine flatwoods grade into pond cypress (*Taxodium ascendens*) ponds or strands. Savannas may grade into dry or wet prairie as the tree canopy thins.

Adjacent Ecological Systems indicated by NatureServe (2006) include the Atlantic Coastal Plain Peatland Pocosin and Canebrake (CES203.267) which is represented by BpS 1452.

Issues or Problems

This community has very few reference examples from which to test the model outputs. The relative patchiness and presence of a high percentage of seral class C, represents a hypothesis for how fire and other disturbances maintained this community. The distribution of seral stages in this model should be managed with wide confidence intervals, recognizing the variation of structure in this community on the model landscape and the few glimpses of it in its pre-Columbian condition. It is also important to recognize that there is both a moisture and fire gradient within this type with the driest sites dominated by longleaf pine with a shorter fire return interval of 1-3yrs and the wetter sites dominated by slash pine with a longer 3-8yr fire frequency. Pond pine dominated wetter areas with finer soils and also had a longer period between fires.

Uncharacteristic vegetation types include even-aged canopy stands in which age structure has been homogenized by logging or clearing, often coupled with drainage. Examples include where slash pine have replaced some or all of the longleaf pine. The effects of bedding, even when establishment of planted pine plantation has failed, persist often for many decades. Bedding may not completely drain a site; however, the alteration of micro-topography may affect the spread of fire. Disturbance caused by insects and other pathogens are very rare, except where conversions to dense stands of slash pine have occurred.

Native Uncharacteristic Conditions

Comments

This BpS is based on revision by Kenneth Outcalt of the Rapid Assessment model R9MEFL- Mesic-dry Flatwoods- developed by Dennis Hardin and Kevin Hiers. Sharon Hermann is a suggested reviewer.

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 | A | A | A | A | A | A | A | A | A | A |
| Tree | 10-25 | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf |
| Tree | 10-25 | C con | C con | C con | C con | C con | C con | C con | C con | C con | C con |
| Tree | 10-25 | B mix | B mix | B mix | B mix | B mix | B mix | B mix | B mix | B mix | B mix |
| Tree | 25-50 | D con | D con | D con | D con | D con | D con | D con | D con | D con | D con |
| Tree | 25-50 | E mix | E mix | E mix | E mix | E mix | E mix | E mix | E mix | E mix | E mix |
| Tree | 25-50 | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf |
| Tree | >50 | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf | E brdlf |
| Tree | >50 | E mix | E mix | E mix | E mix | E mix | E mix | E mix | E mix | E mix | E mix |
| Tree | >50 | D con | D con | D con | D con | D con | D con | D con | D con | D con | D con |

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 17 Early Development 1 - All Structures

DBH

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPA2 | Pinus palustris | Longleaf pine | Upper |
| PIEL | Pinus elliottii | Slash pine | Upper |
| ARBE7 | Aristida beyrichiana | Beyrich threeawn | Lower |
| SPORO | Sporobolus | Dropseed | Lower |

Description

Class is a post replacement stage of pine regeneration that occurs within canopy gaps, mostly single tree to quarter acre in size or larger areas after major storms. The native ground cover is dominated by wiregrass and other grasses with interspersed saw palmetto, small statured shrubs and forbs.

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

Class B 6 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPA2 | Pinus palustris | Longleaf pine | Upper |
| PIEL | Pinus elliottii | Slash pine | Upper |
| SERE2 | Serenoa repens | Saw palmetto | Low-Mid |
| MOCE2 | Morella cerifera | Wax myrtle | Low-Mid |

Description

Class is characterized as a mid-seral closed stage with patches, mostly quarter acre or less in size and a substantial component of hardwoods (e.g., red maple, water oak and bays) or other pine species encroaching in the absence of fire.

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

Class C 34 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPA2 | Pinus palustris | Longleaf pine | Upper |
| PIEL | Pinus elliottii | Slash pine | Upper |
| SERE2 | Serenoa repens | Saw palmetto | Low-Mid |
| ARBE7 | Aristida beyrichiana | Beyrich threeawn | Lower |

Description

Class is characterized by a mid-seral open condition with patches, most ¼ acre or less in size, of canopy pines a minimal hardwood component due to frequent fire. The ground cover is grass-dominated, with low shrubs, saw palmetto and forbs.

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

Class D 34 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPA2 | Pinus palustris | Longleaf pine | Upper |
| PIEL | Pinus elliottii | Slash pine | Upper |
| SERE2 | Serenoa repens | Saw palmetto | Low-Mid |
| ARBE7 | Aristida beyrichiana | Beyrich threeawn | Lower |

Description

Class is classified as a late-seral open stage with patches, most ¼ acre or less in size, of canopy pines and a minimal component of hardwoods. The ground cover is grass-dominated, but also contains low shrubs, saw palmetto, and forbs.

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

Class E 9 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUERC | Quercus | Oak | Mid-Upper |
| PIPA2 | Pinus palustris | Longleaf pine | Upper |
| PIEL | Pinus elliottii | Slash pine | Upper |
| MOCE2 | Morella cerifera | Wax myrtle | Low-Mid |

Description

Class is characterized by a late-seral closed stage with patches of canopy pines and a substantial component of hardwoods in either the overstory or midstory. The ground cover is shrubby or palmetto dominated.

*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 | 60 |
| Mid1:CLS | 15 | Late1:CLS | 60 |
| Late1:OPN | 61 | Late1:OPN | 999 |
| Late1:CLS | 61 | Late1:CLS | 999 |

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 | 10 |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.02 | 50 | Yes | 0 |
| Surface Fire | Early1:ALL | Early1:ALL | 0.3 | 3 | No | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 12 |
| Wind or Weather or Stress | Mid1:OPN | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.33 | 3 | No | 0 |
| Wind or Weather or Stress | Mid1:CLS | Mid1:CLS | 0.005 | 200 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.02 | 50 | Yes | 0 |
| Surface Fire | Mid1:CLS | Mid1:CLS | 0.31 | 3 | No | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 12 |
| Insects or Disease | Late1:OPN | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Wind or Weather or Stress | Late1:OPN | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.3 | 3 | No | 0 |
| Wind or Weather or Stress | Late1:CLS | Early1:ALL | 0.0043 | 233 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.01 | 100 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Surface Fire | Late1:CLS | Late1:CLS | 0.31 | 3 | No | 0 |

References

Abrahamson, W.G. and Hartnett, D.C. 1990. Pine flatwoods and dry prairies. Pages 103-149 in: Myers, R.L. and Ewel, J.J., eds. Ecosystems of Florida. Orlando, FL: University of Central Florida Press.

Brown, J.K. and J. Kapler-Smith, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42. vol 2. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station. 257 pp.

Frost, Cecil. 2006. History and future of the longleaf pine ecosystem. Pages 9-42 in: Jose, S., Jokela, E.J., and Miller, D.L. editors. The Longleaf Pine Ecosystem: Ecology, Silviculture, and Restoration. Springer, New York.

Monk, Carl D. 1968. Successional and environmental relationships of the forest vegetation of north central Florida. American Midland Naturalist 79(2): 441-457.

NatureServe. 2006. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 18 July 2006.

Peet, R.K. 2006. Ecological classification of longleaf pine woodlands. Pages 51-94 in: Jose, S., Jokela, E.J., and Miller, D.L. editors. The Longleaf Pine Ecosystem: Ecology, Silviculture, and Restoration. Springer, New York.

Schmidt, K.M., J.P. Menakis, C.C. Hardy, W.J. Hann and D.L. Bunnell. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 41 pp. + CD.

Stout, I. Jack, and Marion, Wayne R. 1993. Pine flatwoods and xeric pine forests of the southern lower coastal plain. Pages 373-446 in: Martin, W.H., Boyce, S.G. and Echternacht, A.C., eds. Biodiversity of the southeastern United States: Lowland Terrestrial Communities. New York, NY: John Wiley and Sons, Inc.

USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (2002, December). Fire Effects Information System, [Online]. Available: http://www.fs.fed.us/database/feis/.