13460

Atlantic Coastal Plain Fall-line Sandhills Longleaf Pine Woodland

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
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Vegetation Type

Forest and Woodland

Map Zones

54, 55, 58

Geographic Range

This system occurs in the Fall-line Sandhills region of central North Carolina extending into central Georgia -- see Ecoregion 65c of EPA 2004 (NatureServe 2006).

Biophysical Site Description

This system predominates its range, covering most of the natural landscape of the region (NatureServe 2006). It occurs on upland sites ranging from gently rolling, broad ridgetops to steeper side slopes, as well as locally in mesic swales and terraces. Most soils are well- to excessively drained. Non-wetland conditions and frequent fire unify this system within the Fall-line Sandhills region. Soil texture appears to be the most important driver of differences among associations within the system, with biogeography also important (NatureServe 2006).

Vegetation Description

The vegetation is naturally dominated by longleaf pine (*Pinus palustris*). Most associations have an understory of scrub oaks (*Quercus laevis*, *Q. marilandica*, *Q. incana*, and *Q. margarettiae*), except maybe the more mesic examples. Low shrubs, most ericaceous, may be abundant. Grasses dominate the well-developed herb layer. Wiregrass (*Aristida stricta* in the north, *A. beyrichiana* in the south) dominates in most of the range, but other grasses dominate where it is absent. For example, in central South Carolina, both species of *Aristida* are absent, and various other grass species dominate. Forbs, including many legumes, are also present (NatureServe 2006). Associations on deep, coarse sands may have low species richness but have a distinct set of xerophytic herbs and dwarf-shrubs (NatureServe 2006).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PIPA2 | *Pinus palustris* | Longleaf pine |
| QULA2 | *Quercus laevis* | Turkey oak |
| QUIN | *Quercus incana* | Bluejack oak |
| QUMA3 | *Quercus marilandica* | Blackjack oak |
| QUMA6 | *Quercus margarettiae* | Runner oak |
| QUST | *Quercus stellata* | Post oak |
| ARBE7 | *Aristida beyrichiana* | Beyrich threeawn |
| ARST5 | *Aristida stricta* | Pineland threeawn |

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

Disturbance Description

Frequent, low-intensity fire provides the dominant natural ecological force. Component communities naturally burned every few years, many averaging as often as every 3yrs. Fires are naturally low to moderate in intensity. They burn above-ground parts of herbs and shrubs but have little effect on the fire-tolerant trees. Vegetation recovers very quickly from fires, with live herbaceous biomass often restored in just a few weeks. Many plants have their flowering triggered by burning. Fire is important in creating the structure of the vegetation. In the absence of fire, less fire-tolerant species increase and others invade the system. The scrub oaks and shrubs, kept to low density and mostly reduced to shrub size, become tall and dense and can suppress tree regeneration. Herb layer density and diversity decline. However, even in the absence of fire, given the poor soil conditions of most sites, it would take a number of years for a hardwood midstory to develop and even then some longleaf regeneration continues to occur.

Canopies are believed to naturally be many-aged, consisting of a fine mosaic of small even-aged groves driven by gap-phase regeneration. Longleaf pine is shade-intolerant and slow to reach reproductive age but is very long-lived. Most plants in these systems appear to be conservative, living a long time and only rarely sexually reproducing or colonizing new sites (NatureServe 2006).

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 134 | 3 |  |  |
| Moderate (Mixed) | 372 | 1 |  |  |
| Low (Surface) | 4 | 96 |  |  |
| All Fires | 4 | 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

The landscape is adequate in size to contain the natural variation in vegetation and disturbance regimes. Topographically, areas could be very large and extend continuously over a large expanse of the landscape or occur as small patches.

This system is naturally a matrix system, covering most of the landscape in its range. Most occurrences now are artificially bounded remnants or naturally small islands. Extensive occurrences usually have embedded wetland systems, especially Atlantic Coastal Plain Streamhead Seepage Swamp, Pocosin, and Baygall (CES203.252 or BpS 1468) (NatureServe 2006).

Natural patches once would have been contiguous over 100s of square miles, covering most of the landscape in the region and broken only by river systems. Most occurrences are now artificially bounded remnants of small to fairly large size. A few landscape matrix areas of 1,000s of acres remain (NatureServe 2006).

Adjacency or Identification Concerns

This system is distinguished from Atlantic Coastal Plain Upland Longleaf Pine Woodland (CES203.281 or Biophysical Setting [BpS] 1347) based on differences in landscape patterns, prevailing associations, and some floristic differences. Dissected topography with much higher relief, predominance of interbedded sands and clays, and the interspersion with seepage wetlands all characterize the Fall-line Sandhills. This is in contrast to the low relief, pure sands or loams, and mosaics containing other wetland types in the rest of the Coastal Plain. Some matrix associations in the Fall-line Sandhills, such as *Pinus palustris*/*Quercus marilandica*/*Gaylussacia dumosa*/*Aristata stricta* Woodland (CEGL003595) are nearly absent in the rest of the Coastal Plain. The abundance of legumes in most Sandhills region associations and their scarcity in most Outer Coastal Plain associations is striking and probably relates to the differences in prevailing soil textures. The abundance of legumes distinguishes this system from Atlantic Coastal Plain Upland Longleaf Pine Woodland (CES203.281 or BpS 1347).

The system does not have a biogeographic break in southern South Carolina, as the Outer Coastal Plain systems do. It includes areas with both forms of *Aristata stricta sensu lato* (*A. stricta*, *sensu stricto*, and *A. beyrichiana*). Gopher tortoises (*Gopherus polyphemus*), absent here, help break this system from the Outer Coastal Plain systems where they serve as a keystone species. The ecological role of saturated wetland conditions in the Atlantic Coastal Plain Northern Wet Longleaf Pine Savanna and Flatwoods (CES203.265 or BpS 1449) distinguishes that system from Fall-line Sandhills.

Adjacent ecological systems include: Atlantic Coastal Plain Sandhill Seep (CES203.253); Atlantic Coastal Plain Small Blackwater River Floodplain Forest (CES203.249, see BpS 1473); and Atlantic Coastal Plain Streamhead Seepage Swamp, Pocosin, and Baygall (CES203.252 or BpS 1468) (NatureServe 2006).

Issues or Problems

Notes taken from the Rapid Assessment Model R9LLSH -- this model includes areas with *Aristida stricta sensu lato* and bluestems dominating the understory. This fall-line sandhill ecosystem may have two distinct xeric communities in the landscape. Longleaf pine-scrub oak sandhills and longleaf pine-turkey oak sandhills can make up this BpS within its geographic range. Also, no insect and disease disturbances were noted during the succession pathway of this BpS. It was suggested that some level of disturbance from a bark beetle infestation be added to this pathway. Most likely Class B and Class D would be where the problem would occur.

In creating this BpS, the bark beetle infestation concern was taken into consideration and is reflected in the VDDT model.

Shortleaf pine was planted in plantation habitats for lumber and pulp. In some of the longleaf areas, shortleaf pine becomes denser; then fire intensity will increase due to the downed/decaying shortleaf pine debris. Hurricanes are to increase, and shortleaf pine has been noticed to be susceptible to being blown down/snapped off due to high winds.

Native Uncharacteristic Conditions

Much of this area of longleaf pine has been fire-suppressed, managed, and farmed to the point that little intact habitat exists.

Comments

This model description was developed from NatureServe (2006) ecological description for CES203.254 and the Rapid Assessment model (R9LLSH). The VDDT model was designed using the Rapid Assessment model (R9LLSH).

This model was reviewed at Durham, NC, model review held 23 January 2007.

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 | B mix | B mix | B mix | B mix | B mix | B mix | B mix | B mix | B mix | B mix |
| Tree | 5-10 | C con | C con | C con | C con | C con | C con | C con | C con | C con | C con |
| Tree | 5-10 | 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 brdlf | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf | B brdlf |
| 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 13 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPA2 | Pinus palustris | Longleaf pine | Upper |
| ARBE7 | Aristida beyrichiana | Beyrich threeawn | Lower |
| ARST5 | Aristida stricta | Pineland threeawn | Lower |
| SCSCS3 | Schizachyrium scoparium var. stoloniferum | Creeping bluestem | LoWERw-Mid |

Description

Canopy gaps, most single tree to one-quarter acre size characterize Class A. Pine regeneration grows here, or site lacks pine regeneration because no mast year has occurred since the gap opened. The native grassy ground cover is dominated by various grasses, with *A. stricta sensu lato* infrequently present in this region.

*Maximum Tree Size Class*  
None

Class B 5 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPA2 | Pinus palustris | Longleaf pine | Upper |
| QULA2 | Quercus laevis | Turkey oak | Mid-Upper |
| RHCO | Rhus copallinum | Flameleaf sumac | Low-Mid |
| SAAL5 | Sassafras albidum | Sassafras | Low-Mid |

Description

Class B is characterized by patches, most one-quarter acre or less, and a substantial component of hardwoods or other pine species encroaching in the absence of fire. Hardwood and encroaching pine cover is increasing.

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

Class C 40 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPA2 | Pinus palustris | Longleaf pine | Upper |
| ARBE7 | Aristida beyrichiana | Beyrich threeawn | Lower |
| ARST5 | Aristida stricta | Pineland threeawn | Lower |
| SCSCS3 | Schizachyrium scoparium var. stoloniferum | Creeping bluestem | Lower |

Description

Class C includes patches, most one-quarter acre or less, and a minimal hardwood component due to frequent fire. The ground cover is dominated by grasses.

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

Class D 40 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPA2 | Pinus palustris | Longleaf pine | Upper |
| ARBE7 | Aristida beyrichiana | Beyrich threeawn | Lower |
| ARST5 | Aristida stricta | Pineland threeawn | Lower |
| SCSCS3 | Schizachyrium scoparium var. stoloniferum | Creeping bluestem | Lower |

Description

Class D includes patches, most one-quarter acre or less, with older canopy pines, and a minimal component of hardwoods. The ground cover is dominated by grasses.

*Maximum Tree Size Class*  
Very Large >33" DBH

Class E 2 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPA2 | Pinus palustris | Longleaf pine | Upper |
| QULA2 | Quercus laevis | Turkey oak | Mid-Upper |
| QUIN | Quercus incana | Bluejack oak | Mid-Upper |
| QUST | Quercus stellata | Post oak | Mid-Upper |

Description

Class E is characterized by patches with older canopy pines and a substantial component of hardwoods or pines other than longleaf in either the overstory or understory. The ground cover is shrubby or sparse.

*Maximum Tree Size Class*  
Very Large >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 | 74 |
| Mid1:CLS | 15 | Late1:CLS | 74 |
| Late1:OPN | 75 | Late1:OPN | 999 |
| Late1:CLS | 75 | 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 | 0.01 | 100 | Yes | 0 |
| Surface Fire | Early1:ALL | Early1:ALL | 0.25 | 4 | No | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 15 |
| Wind or Weather or Stress | Mid1:OPN | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.25 | 4 | No | 0 |
| Wind or Weather or Stress | Mid1:CLS | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Competition or Maintenance | Mid1:CLS | Mid1:CLS | 0.01 | 100 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.05 | 20 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 20 |
| Insects or Disease | Late1:OPN | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Wind or Weather or Stress | Late1:OPN | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Competition or Maintenance | Late1:OPN | Late1:OPN | 0.01 | 100 | No | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.25 | 4 | No | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.01 | 100 | Yes | 0 |
| Competition or Maintenance | Late1:CLS | Late1:CLS | 0.01 | 100 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.01 | 100 | Yes | 0 |

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