14740

Gulf and Atlantic Coastal Plain Small Stream Riparian Systems

BpS Model/Description Version: Aug. 2020

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| **Modelers** |  | **Reviewers** |  |
| Philip E. Hyatt | phyatt@fs.fed.us | Ken Outcalt | koutcalt@fs.fed.us |
| None | None | Mike Schafale | michael.schafale@ncmail.net |
| None | None | None | None |

Vegetation Type

Woody Wetland

Map Zones

46, 47, 48, 55, 56, 58, 60, 99

Geographic Range

Occurs near small streams and includes adjoining floodplains, terraces, and lower slopes affected by small stream flooding. It includes such habitats in both the Gulf and Atlantic coastal plains. This model encompasses the small stream forests of the Atlantic southeast and East Gulf Coastal Plain. It does not include the broad vegetated floodplains of these and similar large, low-gradient rivers, immediate tributaries, and smaller streams nor the high-gradient, narrow, small streams of the Appalachian and Ouachita/Ozark mountains. It also does not include the West Gulf Coastal Plain, which lies west of the Mississippi River.

NatureServe (2006) indicates the range of this aggregated system occurs in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Oklahoma, Tennessee, Texas, and Virginia. This aggregated system includes the following Ecological Systems:

• Atlantic Coastal Plain Blackwater Stream Floodplain Forest (CES203.247)

• Atlantic Coastal Plain Brownwater Stream Floodplain Forest (CES203.248)

• East Gulf Coastal Plain Small Stream and River Floodplain Forest (CES203.559)

• Texas-Louisiana Coastal Prairie Slough (CES203.542)

• West Gulf Coastal Plain Small Stream and River Forest (CES203.487)

Biophysical Site Description

The fluvial features of riverine floodplains occur less frequently along small streams. These features such as river terraces, oxbows, alluvial flats, point bars, and streamside levees occur but on a smaller scale. Fine-scale alluvial floodplain features are abundant. In pre-European settlement forests, community diversity in these streamside systems was much more complex than in the modified landscapes of today. Fire and beaver activity created a mosaic whose elements included canebrake, beaver ponds, and grass-sedge meadows in abandoned beaver clearings, as well as the streamside zones and mixed hardwood and/or pine forests that make up >95% of the cover that exists today. The most prominent evergreen is the shade-intolerant loblolly pine (*Pinus taeda*), which manages to maintain itself by reproducing in larger (multi-tree) treefall gaps.

Vegetation Description

Most of the system is forest vegetation. Either pines, hardwoods, or a mix of the two dominates the canopy. These may include sycamore (*Platanus occidentalis*), river birch (*Betula nigra*), box elder (*Acer negundo*), eastern cottonwood (*Populus deltoides*), sugarberry (*Celtis laevigata*), green ash (*Fraxinus pennsylvanica*), sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), or pines (*Pinus* spp.), especially loblolly pine (*Pinus taeda*). Successional areas are often dominated by sweetgum (*Liquidambar styraciflua*) or tulip tree (*Liriodendron tulipifera*). Sub-canopy species include American holly (*Ilex opaca*), deciduous holly (*Ilex decidua* and *Ilex ambigua*), red mulberry (*Morus rubra*), ironwood (*Carpinus caroliniana*), and hop hornbeam (*Ostrya virginiana*). Shrubs such as spicebush (*Lindera benzoin*), beautyberry (*Callicarpa americana*), yellowroot (*Xanthorhiza simplicissima*), grasses (*Elymus hystrix*, *Elymus canadensis*, and *Chasmanthium latifolium*), and false nettle (*Boehmeria cylindrica*) may be present. Caric sedges, especially *C. lurida*, *C. aureolensis*, *C. typhina*, and *C. digitalis* dominate some areas. Frequently reworked gravel bars may be dominated by young black willow (*Salix nigra*), sycamore (*Platanus occidentalis*), or infrequently, river birch (*Betula nigra*), or they may have sparse vegetation of a wide variety of annual and perennial herbs of weedy habits. Canebrakes occurred in particular locations that had easy access for fire (i.e., bottomlands bordered by upland flats as opposed to steep slopes) and where the uplands experienced frequent fire as the result of a combination of lightning and Native American ignitions. Natural levee forests form on ridges of silt and sand deposited on stream margins during flood conditions. A levee's width is related to the abundance of ground vegetation present to reinforce sediment in future deposition events. They receive more light and may be dominated by stream margin specialists such as sycamore (*Platanus occidentalis*), willows (*Salix nigra*), river birch (*Betula nigra*), box elder (*Acer negundo*), and eastern cottonwood (*Populus deltoides*), with a perfect microhabitat for *Carex abscondita*, a common species often overlooked in the field. Streamside levees are typical habitat for river oats (*Chasmanthium latifolium*) and a diverse flora of other bottomland graminoids and forbs.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PLATA | *Platanus* | Sycamore |
| BENI | *Betula nigra* | River birch |
| ACRU | *Acer rubrum* | Red maple |
| LIQUI | *Liquidambar* | Sweetgum |
| CELA | *Celtis laevigata* | Sugarberry |
| FAGR | *Fagus grandifolia* | American beech |
| FRPE | *Fraxinus pennsylvanica* | Green ash |
| PITA | *Pinus taeda* | Loblolly pine |

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

Disturbance Description

Fire return interval (FRI) varied highly. Except in canebrake, most fires were very light surface fires, creeping in hardwood or pine litter with some thin, patchy cover of bottomland grasses such as *Chasmanthium laxum* and river oats (*Uniola latifolia*). Flame lengths were mostly 6-12in. Even so, fire-scarred trees can be found in most small stream sites except in the wettest microsites. Stand-replacement fires are unknown in this type. Except where Native American burning was involved, fires likely occurred primarily during drought conditions and then often only when fire spread into bottomlands from more pyrophytic uplands. Trees may be partially girdled by fire in duff, followed by bark sloughing. While fire rarely killed the tree, this allowed entry of rot, which, in the moist environment, often resulted in hollow trees, providing nesting and denning habitat for many species of birds and animals. Surface fires occurred on a frequency ranging from ~3-8yrs in streamside canebrake, streamside hardwood/canebrake, or pine to 25yrs+ in hardwood litter. Low areas having a long hydroperiod, islands, and areas protected from fire by backswamps and oxbows were virtually fire-free. Fire effects were largely limited to topkill of shrubs and tree saplings <2in diameter and formation of hollow trees.

Other Disturbance Types. The distinctive dynamics of stream flooding and protected topographic position dominate the forming of the distinctive vegetation of this system. Not all of the factors are well known. Gradients of most of these rivers limit floods to fairly short duration. Flooding is most common in the winter but may occur in other seasons. The sorting of plant communities by depositional landforms of different height suggests that wetness or depth of flood waters has significance. Flood waters have significant energy. Scouring and reworking of sediment make up an important factor in bar and bank communities. In addition to disturbance, floods bring nutrient input, deposit sediment, and disperse plant seeds. Flooding rarely leads to canopy tree mortality. Flooding can impact areas where beavers impounded a channel or along stream banks where a tree might be subject to undercutting in the process of channel migration. The most significant disturbance along small streams was wind.

Winds affect streamside forests because of wet soils, less dense soil, and trees that are shallow-rooted. Canopy tree mortality was limited to tree-by-tree or small-group replacement. Windthrow formed the primary cause of mortality in bottomlands. The frequency of these events equates with major hurricanes occurring at ~20yr intervals. Tornado tracks can be found passing across uplands and bottomlands (see one such indicated on a map of Umstead State Park, Raleigh, NC), leaving narrow swaths of felled trees. The majority of windthrow seems to have been the result of hurricanes and hurricane-spawned tornadoes. Following Hurricane Fran in 1996, even though the Piedmont is removed from the coast by 25-100mi+, extensive windthrow occurred in middle-aged and old-growth trees in Piedmont bottomlands. Bottomland oaks, even though seemingly more sheltered, were much more heavily affected than hardwoods on adjacent uplands. Gaps as large as 1ha were seen intermixed in areas with extensive single tree windthrow. Note that tornados are common outside hurricane events in the western extent of this model zone.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 473 | 14 | 200 | 1000 |
| Moderate (Mixed) | 201 | 34 | 150 | 500 |
| Low (Surface) | 130 | 52 | 50 | 250 |
| All Fires | 68 | 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

Narrow bands or isolated pockets occur along small streams. Width depends strongly on topography. A surprising percentage of the landscape as a whole (up to 45%) can consist of this type.

Adjacency or Identification Concerns

The species present in this type vary considerably from east to west and north to south, due to the large geographic area encompassed. The placement of dams, particularly in the western extent of this model zone, has extensively altered some areas.

Issues or Problems

Hyatt (June 2006) created this model by using the Rapid Assessment model R8FPFOpi as a base. As a result, the style reflects that model. For example, several class indicator species were left unchanged. Hyatt felt the current (June 2006) species list did not reflect the fact that many of these streams do have pine-dominated canopies.

Native Uncharacteristic Conditions

Comments

Models and descriptions for map zones (MZs) 46, 47, 48, 55, 56, 58, and 99 were identified as duplicates in the Biophysical Setting (BpS) review process. MZ60 was also identical with slightly different reported reference conditions due to rounding. Note that the FRIs shown in the description of MZ47 were slightly different, but this was created by rounding as the model parameters were the same according to the query. The description from MZ46 was used for all seven MZs.

Hyatt (June 2006) created this model by using the Rapid Assessment model R8FPFOpi as a base. Hyatt (June 2006) made extensive changes to the general information section of the borrowed model. However, Hyatt did not change class percentage values or fire regime values in his model tracker database, so Szell (5 January 2007) adjusted to reflect the outputs of his VDDT model.

From the earlier model comments: Major review comments related to the possible "east of the mountains" bias of this model. The reviewer indicated that these sites to the west are drier now due to dams, which alters the species mix and mean fire return interval (MFRI). However, since dams are post-European disturbances, their effect should not be included in the model. Also, during the LANDFIRE modeling process, more attention should be placed on the potential species differences between the areas east and west of the mountains. One reviewer indicated that the Optional disturbances were not thoroughly defined, but no changes were made because other reviewer and modeling lead felt that they were described adequately."

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 | 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 16 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ACRU | Acer rubrum | Red maple | All |
| LIST2 | Liquidambar styraciflua | Sweetgum | All |
| FRPE | Fraxinus pennsylvanica | Green ash | All |
| PINUS | Pinus | Pine | All |

Description

Treefall gaps with saplings and small trees up to 30cm DBH. Potential canopy species are typically mixed with sub-canopy species and herbs and an occasionally short-lived early successional species such as willow (*Salix nigra*). This can include areas disturbed by flooding from drained wetlands when beaver dams fail. Also included are other disturbed areas such as windthrow and effects of tornados or hurricanes.

*Maximum Tree Size Class*  
Pole 5-9" DBH

Class B 23 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ACRU | Acer rubrum | Red maple | Upper |
| LIST2 | Liquidambar styraciflua | Sweetgum | Upper |
| BENI | Betula nigra | River birch | Upper |
| CELA | Celtis laevigata | Sugarberry | Upper |

Description

Old treefall gaps and other disturbed areas with closed canopy, ranging from 30-70cm DBH. Shade tolerant species in the understory. Occasionally with a pine-dominated overstory.

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

Class C 4 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PLATA | Platanus | Sycamore | Upper |
| CELA | Celtis laevigata | Sugarberry | Upper |
| FAGR | Fagus grandifolia | American beech | Upper |
| BENI | Betula nigra | River birch | Upper |

Description

Similar overstory as B but more open but without well-developed midstory or understory. Grasses will also be present. Occasionally with a pine-dominated overstory.

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

Class D 24 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PLATA | Platanus | Sycamore | Upper |
| CELA | Celtis laevigata | Sugarberry | Upper |
| FAGR | Fagus grandifolia | American beech | Upper |
| BENI | Betula nigra | River birch | Upper |

Description

More of a closed canopy than C with trees and minimal midstory and understory shrubs and grasses. More shrubs and less grass than C. Occasionally with a pine-dominated overstory.

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

Class E 33 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PLATA | Platanus | Sycamore | Upper |
| CELA | Celtis laevigata | Sugarberry | Upper |
| FAGR | Fagus grandifolia | American beech | Upper |
| BENI | Betula nigra | River birch | Upper |

Description

Closed hardwood canopy. Extensive shade-tolerant shrub understory and midstory. Occasionally with a pine-dominated overstory.

*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:CLS | 19 |
| Mid1:OPN | 20 | Late1:OPN | 69 |
| Mid1:CLS | 20 | Late1:CLS | 69 |
| Late1:OPN | 70 | Late1:OPN | 999 |
| Late1:CLS | 70 | 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** |
| Wind or Weather or Stress | Early1:ALL | Early1:ALL | 0.005 | 200 | No | 0 |
| Mixed Fire | Early1:ALL | Early1:ALL | 0.007 | 143 | No | 0 |
| Surface Fire | Early1:ALL | Early1:ALL | 0.01 | 100 | No | 0 |
| Optional 1 | Early1:ALL | Early1:ALL | 0.04 | 25 | Yes | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 30 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Optional 2 | Mid1:OPN | Early1:ALL | 0.003 | 333 | Yes | 0 |
| Wind or Weather or Stress | Mid1:OPN | Mid1:OPN | 0.007 | 143 | No | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.01 | 100 | No | 0 |
| Optional 1 | Mid1:OPN | Early1:ALL | 0.02 | 50 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.002 | 500 | Yes | 0 |
| Optional 2 | Mid1:CLS | Early1:ALL | 0.003 | 333 | Yes | 0 |
| Surface Fire | Mid1:CLS | Mid1:OPN | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Wind or Weather or Stress | Mid1:CLS | Mid1:OPN | 0.007 | 143 | Yes | 0 |
| Competition or Maintenance | Mid1:CLS | Mid1:CLS | 0.01 | 100 | No | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 50 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Optional 2 | Late1:OPN | Early1:ALL | 0.003 | 333 | Yes | 0 |
| Competition or Maintenance | Late1:OPN | Late1:OPN | 0.005 | 200 | No | 0 |
| Wind or Weather or Stress | Late1:OPN | Late1:OPN | 0.007 | 143 | No | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.02 | 50 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Optional 2 | Late1:CLS | Early1:ALL | 0.003 | 333 | Yes | 0 |
| Competition or Maintenance | Late1:CLS | Late1:CLS | 0.005 | 200 | No | 0 |
| Wind or Weather or Stress | Late1:CLS | Late1:OPN | 0.007 | 143 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.01 | 100 | Yes | 0 |

Optional Disturbances

Optional 1: flooding

Optional 2: hurricane/tornado

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