13790

Northern Atlantic Coastal Plain Maritime Forest

BpS Model/Description Version: Aug. 2020

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| **Modelers** |  | **Reviewers** |  |
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| None | None | None | None |
| None | None | None | None |

Vegetation Type

Forest and Woodland

Map Zones

60, 65

Geographic Range

This system ranges from Virginia Beach northward to the extent of the Atlantic Coastal Plain. US Ecomap regions 221Ab:CCC, 221Ad:CCC, 221An:CCC.

Biophysical Site Description

This biophysical setting occurs on coastal dunes and flats on barrier islands, on mainlands adjacent to salt water marshes, and along fresh and tidewater streams some distance above and especially below the region of fresh/salt water mixing.

Vegetation Description

Oaks scarlet oak (*Quercus coccinea*), black oak (*Q. velutina*), white oak (*Q. alba*) and chestnut oak (*Q. prinus*)) are the dominant species of the coastal forest, with post oak (*Q. stellata*) important in some area. Red maple (*Acer rubrum*), sassafras (*Sassafras albidum*), black cherry (*Prunus serotina*), tupelo (*Nyssa sylvatica*), beech (*Fagus grandifolia*), pitch pine (*Pinus rigida*), and white pine (*Pinus strobus*) commonly occur, usually in low percentages, but occasionally abundant. American Holly (*Ilex opaca*) is a regular associate in the southeastern Massachusetts occurrences of the coastal oak forest (where holly is abundant, the association may be called a coastal oak/holly forest). Redcedar (*Juniperus virginiana*) occurs in low percentages in the forests, and sometimes as a dominant in woodland thickets. A low-shrub heath layer dominated by low bush blueberries (*Vaccinium pallidum, V. angustifolium*) and black huckleberry (*Gaylussacia baccata*) is very characteristic. The herbaceous layer is typically sparse, with Pennsylvania sedge (*Carex pensylvanica*), bracken fern (*Pteridium aquilinum*), wintergreen (*Gaultheria procumbens*) and wild sarsaparilla (*Aralia nudicaulis*) being typical. Sweet pepper-bush (*Clethra alnifolia*), surprisingly, is abundant in many sites. Openings in the canopy produce a greater diversity of the herbaceous layer, where little blue-stem grass (*Schizachyrium scoparius*), Canadian rockrose (*Helianthemum canadense*), bush clovers (*Lespedeza* spp.), milkworts (*Lechea* spp.) and bearberry (*Arctostaphylos uva-ursi*) occur. Most occurrences of coastal forests have many vines on the edges and in openings of the forest. Poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), grape (*Vitis* spp.), and greenbriars (*Smilax* spp.) may make dense curtains along the edges and up the trees. Poison ivy is particularly robust in maritime forests and shrublands (MA NHESP, 2006)

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| QUCO2 | *Quercus coccinea* | Scarlet oak |
| QUVE | *Quercus velutina* | Black oak |
| QUAL | *Quercus alba* | White oak |
| QUPR2 | *Quercus prinus* | Chestnut oak |
| ACRU | *Acer rubrum* | Red maple |
| PRSE2 | *Prunus serotina* | Black cherry |
| ILOP | *Ilex opaca* | American holly |

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

Disturbance Description

Maritime forest and associated communities are classified as Fire Regime Group I, with frequent, light surface fires in marshes and swales with thin grass, and pine needle and evergreen oak litter in maritime forest. The original mean fire return interval (MFRI) ranged widely, from 2-26yrs or more, depending on the topographic situation and ignition source. The fire regime was bimodal, with March-April lightning season fires and October-November fires ignited by Native Americans. Lightning was the dominant ignition source in the largest fire compartments of the coastal plain mainland, producing a 2-3yr fire interval (Frost 2000). On coastal islands and peninsulas, isolated from the frequent fire regime of the mainland, Native American burning became the dominant factor determining when and where fires occurred (Frost 2004). These fires, for hunting purposes, were mostly in the fall. An island of about 2km in size with no Indian burning would have been expected to experience lightning ignition only about every 26yrs. On most of these isolated stands a combination of lightning and Native American burning produced a fire frequency around 5-7yrs (Frost 2004). On smaller islands and small vegetation stands isolated by barren sands on larger islands, longer intervals could be expected.

Most natural stands were influenced by fire. Those with frequent fire (2-5yrs) were bilayered, having a nearly closed tree canopy over a moderately well-developed grassy layer usually dominated by slender woodoats (*Chasmanthium laxum*). With lower fire frequency (5-7yrs), a shrub layer often dominated by yaupon (*Ilex vomitoria*) was found.

There is some impact from hurricanes, mostly in the form of broken branches of laurel oak (*Quercus laurifolia*). Live oak (*Q. virginiana*) is extremely strong and wind-resistant and hurricane blowdown is rare. Tornadoes, particularly those spawned by hurricanes, occasionally created narrow streaks of downed or damaged trees over a small percent of the landscape. Such gaps are filled quickly by loblolly pine (*Pinus taeda*), slash pine (*P. elliottii*) or captured by undamaged subcanopy stems of live oak or laurel oak.

A. Johnson, in her review of this document, indicated that fire may not play a critical role in maintenance of some maritime forests, specifically, those occurring on barrier islands along the Atlantic coast of Florida south of Cape Canaveral. The presence of tropical species that may not recover post fire and the prevalence of onshore easterly winds that would limit the spread of fire on the narrow, north-south oriented islands, is evidence that other factors such as salt spray and storm overwash may control successional dynamics. More research is needed on forest dynamics in these systems to clarify this question.

Pollen core analysis from various locations in the maritime holly forest occurring only on Fire Island, New York, indicate that frequent, destructive fires burned through the maritime holly forest until the late 1700s. Since then there have been few fires. Others have noted fire scars on some old holly trees that may suggest that a few light fires have burned during the past century. Sirkin (1972) analyzed pollen from Maple Bog, a freshwater bog located along the western edge of the bayside of the forest. Based on carbon dating of the lower portions of a sediment core the forest existed more than 250yrs ago. A more detailed study (Backman and Patterson 1986) focused on the history and effects of fire in the Sunken Forest through analysis of charcoal and pollen preserved in peat layers of the marshes and bog. Frequent, destructive (stand-replacing) fires were believed to have burnt the Sunken Forest in the late 1600s and about 1780. Charcoal evidence indicates that prior to the late 1700s large destructive fires were common to the area, but since then fires have become infrequent and localized. It is this absence of destructive fires that has allowed the succession from a *Pinus rigida* forest to the present fire-intolerant, hardwood forest.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 74 | 10 | 100 | 500 |
| Moderate (Mixed) | 159 | 5 | 100 | 500 |
| Low (Surface) | 9 | 85 | 3 | 50 |
| 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

Most original stands of live oak were <1000ac. They occurred as one element in a much more extensive coastal complex consisting of the eight major types listed under the vegetation description above.

Adjacency or Identification Concerns

This model covers four major vegetation community types found in close association with each other: Live oak forest marshes, dune grassland, beach strand vegetation, and interdunal swales.

In coastal environments, live oak maritime forest occurs in a fine-scale mosaic with marshes, dune grasslands, and coastal strand (high beach) vegetation.

On the side bordering saline environments, maritime forest grades into palmetto fringes and sloughs, or into oligohaline, brackish, and salt marsh. On the wetland side bordering freshwater wetlands, it grades into wetland shrubs and saplings on the margins of bald cypress (*Taxodium distichum*) and swamp tupelo (*Myssa sylvatica*) swamps and interdunal pools. On the dry side, it grades into nearly pure live oak canopy on sand dunes exposed to salt spray.

Issues or Problems

Fire suppression and logging has led to conversion of two-layered forest/grass stands with open understories to dense, multistoried woody vegetation. In some places these form nearly impenetrable thickets. Such stands may have abundant greenbriers (*Smilax bona-nox, Smilax glauca, Smilax rotundifolia*), with essentially no herbs. The interface between maritime forest and marsh can be composed of a wall of poison ivy (*Toxicodendron radicans*). Essentially all live oak stands have been logged at least twice for ship timbers beginning in the early 1700s (Wood 1981).

Uncharacteristic vegetation: With exception of Virginia and North Carolina, maritime forests are often impacted by Chinese tallow tree (*Sapium sebiferum*), an invasive species in coastal areas.

Native Uncharacteristic Conditions

Comments

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 | C | C | C | C | C | C | C | C | C | C |
| Shrub | 0.5-1.0 | C | C | C | C | C | C | C | C | C | C |
| Shrub | 1.0-3.0 | C | C | C | C | C | C | C | C | C | C |
| Shrub | >3.0 | C | C | C | C | C | C | C | C | C | C |
| Tree | 0-5 | B | B | B | B | B | B | B | B | B | B |
| Tree | 5-10 | B | B | B | B | B | B | B | B | B | B |
| Tree | 10-25 | D | D | D | UN | UN | UN | UN | E | E | E |
| Tree | 25-50 | D | D | D | UN | UN | UN | UN | E | E | E |
| Tree | >50 | D | D | D | UN | UN | UN | UN | 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 7 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| UNPA | Uniola paniculata | Seaoats | Upper |
| SPPA | Spartina patens | Saltmeadow cordgrass | Upper |
| PAAM2 | Panicum amarum | Bitter panicgrass | Upper |
| IVIM | Iva imbricata | Seacoast marshelder | Middle |

Description

Class A is characterized by early post-fire replacement dune and marsh grasses. It experiences fairly complete replacement after a fire with new grass appearing within two weeks, and most of the cover regrows by the end of the first year. Thickening cover and the accumulation of dead grass-sedge fuel characterizes subsequent years. Common dominant species are sea oats (*Uniola paniculata*, salt marsh cordgrass (*Spartina patens*), and bitter panicum (*Panicum amarum*). Sea elder (*Iva imbricata*) may be the most common forb.

*Maximum Tree Size Class*  
None

Class B 15 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUVI | Quercus virginiana | Live oak | Upper |
| QULA3 | Quercus laurifolia | Laurel oak | Mid-Upper |
| PITA | Pinus taeda | Loblolly pine | Upper |
| PIEL | Pinus elliottii | Slash pine | Upper |

Description

This class is characterized by an early post-fire stand almost entirely composed of woody species, a one-layered community. It includes live oak, laurel oak and loblolly pine reproduction to 15ft. tall. Openings tend to be single tree gaps or narrow streaks in tornado paths. Up to 90% of early growth are sprouts and small tree canopy cover, unless in a small gap the opening may be captured by one or two subcanopy stems. Pines may appear from seed. Closed here refers to the nearly closed layer of shrubby tree sprouts and new growth.

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

Class C 24 Mid Development 2 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| JUVI | Juniperus virginiana | Eastern redcedar | Upper |
| QUVI | Quercus virginiana | Live oak | Upper |
| IVFR | Iva frutescens | Jesuit's bark | Upper |

Description

This class is characterized by early to mid-succession dune and marsh grasses and forbs, with up to 50% cover by shrubs and shrubby trees of species such as redcedar and live oak on dunes, and wax myrtle, marsh elder (*Iva frutescens*), young redcedar and loblolly pine in marsh fringes and sloughs.

Upper Layer Lifeform is not the dominant lifeform. Although woody succession is in progress the dominant species are still the dune and marsh grasses in the large openings between woody patches.

*Maximum Tree Size Class*  
None

Class D 50 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUVI | Quercus virginiana | Live oak | Upper |
| QULA3 | Quercus laurifolia | Laurel oak | Mid-Upper |
| PITA | Pinus taeda | Loblolly pine | Upper |
| CHLA | Chamaecyparis lawsoniana | Port orford cedar | None |

Description

This class is a mature to old growth maritime forest dominated by live oak. "Open" here refers to an open, grassy understory maintained by fire with frequency depending upon location in the landscape and proximity to Native American villages. Under these conditions, the canopy may be closed and still have an open understory.

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

Class E 4 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| QUVI | Quercus virginiana | Live oak | Upper |
| QULA3 | Quercus laurifolia | Laurel oak | Mid-Upper |
| SMRO | Smilax rotundifolia | Roundleaf greenbrier | Lower |

Description

This class is an early to old growth maritime forest with some bald cypress, swamp tupelo (*Myssa sylvatica*) and red maple in associated freshwater interdunal sloughs and pools. The live oak understory may have dense wax myrtle, yaupon, and other shrubs.

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

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid2:ALL | 11 |
| Mid1:CLS | 12 | Late1:CLS | 59 |
| Mid2:ALL | 12 | Late1:OPN | 59 |
| Late1:OPN | 60 | Late1:OPN | 999 |
| Late1:CLS | 60 | 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 | 9 |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.15 | 7 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid2:ALL | 0.04 | 25 | Yes | 0 |
| Surface Fire | Mid1:CLS | Mid1:CLS | 0.04 | 25 | No | 0 |
| Alternative Succession | Mid2:ALL | Mid1:CLS | 1 | 1 | Yes | 20 |
| Replacement Fire | Mid2:ALL | Early1:ALL | 0.003 | 333 | Yes | 0 |
| Surface Fire | Mid2:ALL | Mid2:ALL | 0.15 | 7 | No | 0 |
| Replacement Fire | 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 | 0.15 | 7 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Mid1:CLS | 0.01 | 100 | Yes | 0 |
| Mixed Fire | Late1:CLS | Mid1:CLS | 0.01 | 100 | Yes | 0 |
| Surface Fire | Late1:CLS | Late1:CLS | 0.01 | 100 | No | 0 |

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