Big Shoals State Forest (Hamilton County) Photo by Dan Hipes

Bottomland Forest

Description: Bottomland forest is a deciduous or mixed deciduous/evergreen closed-canopy forest on terraces and levees within riverine floodplains and in shallow depressions. Found in situations intermediate between swamps (which are flooded most of the time) and uplands, the canopy may be quite diverse with both deciduous and evergreen hydrophytic to mesophytic trees. Dominant species include sweetgum (*Liquidambar styraciflua*), spruce pine (*Pinus glabra*), loblolly pine (*Pinus taeda*), sweetbay (*Magnolia virginiana*), swamp laurel oak (*Quercus laurifolia*), water oak (*Q. nigra*), live oak (*Q. virginiana*), swamp chestnut oak (*Q. michauxii*), and sugarberry (*Celtis laevigata*). More flood tolerant species that are often present include American elm (*Ulmus americana*) and red maple (*Acer rubrum*), as well as occasional swamp tupelo (*Nyssa sylvatica* var. *biflora*) and bald cypress (*Taxodium distichum*). Evergreen bay species such as loblolly bay (*Gordonia lasianthus*), and sweetbay are often mixed in the canopy and understory in acidic or seepage systems. Smaller trees and shrubs often include American hornbeam (*Carpinus caroliniana*), swamp dogwood (*Cornus foemina*), possumhaw (*Ilex decidua*), dahoon (*I. cassine*), dwarf palmetto (*Sabal minor*), swamp bay (*Persea palustris*), wax myrtle (*Myrica cerifera*), and highbush blueberry (*Vaccinium corymbosum*). The understory is either dense shrubs with little ground cover, or open, with few shrubs and a groundcover of ferns, herbs, and grasses. In the drier forests of this type, American holly (*Ilex opaca*), Gulf Sebastian bush (*Sebastiania fruticosa*), and sparkleberry (*Vaccinium arboreum*) may be frequent. Ground cover is also variable in composition and abundance, often with species overlap between herbs suited to either mesic or hydric conditions. Characteristic species include witchgrasses (*Dichanthelium* spp.), slender woodoats (*Chasmanthium laxum*), and sedges (*Carex* spp.; species lists

developed in part based on Leitman et al. [1982], Light and Darst [1993], and Darst and Light [2008]).

Situations where bottomland forest occurs include several distinct ecological settings in Florida: along rivers and tributaries, on higher terraces and levees in floodplains, and in somewhat isolated depressions that do not flood frequently. Bottomland forests along smaller streams are prone to periodic flooding attributable to localized rainfall that increases seepage and runoff from surrounding uplands. In floodplains along larger rivers and tributaries, bottomland forests on higher terraces, ridges, and levees are subject to short seasonal floods due to either high relief or quickly drained sandy soils or both. Soils are a mixture of sand, clay, and organic materials. The water table in these forests is high in blackwater or spring-fed floodplains and relatively low in alluvial floodplains (during dry periods). Inundation occurs only during higher floods, regardless of the stream type.

Characteristic Set of Species: water oak, sweetgum, swamp laurel oak, red maple, loblolly pine, spruce pine

Rare Species: Rare plants found in bottomland forest include sweet-shrub (*Calycanthus floridus*), ciliate-leaf tickseed (*Coreopsis integrifolia*), Indian cucumber-root (*Medeola virginiana*), little club-spur orchid (*Platanthera clavellata*), and buckthorn (*Sideroxylon lycioides*).

Rare animals that may be found in bottomland forest include Apalachicola dusky salamander (*Desmognathus apalachicolae*), four-toed salamander (*Hemidactylium scutatum*), copperhead (*Agkistrodon contortrix*), Mississippi green water snake (*Nerodia cyclopion*), yellow-crowned night-heron (*Nyctanassa violacea)*, black-crowned night-heron (*Nycticorax nycticorax)*, Louisiana waterthrush (*Seiurus motacilla*), Rafinesque's big-eared bat (*Corynorhinus rafinesquii*), big brown bat (*Eptesicus fuscus*), southeastern bat (*Myotis austroriparius*), gray bat (*Myotis grisescens*), northern long-eared myotis (*Myotis septentrionalis*), southeastern weasel (*Mustela frenata olivacea*), Florida long-tailed weasel (*Mustela frenata peninsulae)*, and Florida black bear (*Ursus americanus floridanus*).

Range: Bottomland forest is found throughout Florida, associated mostly with blackwater and alluvial floodplains. Where limestone is near the surface, particularly along spring-run streams, hydric hammocks often replace bottomland forest.

Natural Processes: The complex topography formed by alluvial rivers and some larger blackwater rivers such as the Suwannee River creates a mixture of bottomland forest and more frequently flooded alluvial forest and floodplain swamp. Bottomland forest vegetation may be found not only on higher terraces within the floodplain, but also on natural levees and ridges. Levees are formed during high floods when water from the main channel overtops the banks. As flood waters are slowed by the process of spreading across the floodplain surface, sand and other heavy sediments are the first to be deposited along these ridges, and thus levees are gradually built upward (Wharton et al. 1982). Along oxbows that have become isolated from the main channel, levees persist as high ridges. In some cases, these levees and ridges may be quite dry and support upland communities such as mesic or xeric hammock.

Bottomland forest, while not as prone to prolonged growing season inundations as alluvial forest, is nevertheless influenced by high water tables and peak seasonal flooding as well as irregular high flood events (Darst et al. 2002). Variations in seedling establishment are often caused not only by flooding regimes, but also by windthrows and treefall gaps that allow for the establishment of shade intolerant species (Sharitz and Mitsch 1993).

Organic debris from bottomland forests is an important nutrient source for downstream ecosystems. Although annual floods do not always inundate bottomland forest, large scale patterns of high water pulses occurring every 5-7 years along the Apalachicola River are critical in providing nutrients flushed from higher terraces of the floodplain into the Apalachicola Bay and are correlated with a significant increase in commercial fish abundance in the bay (Wharton et al. 1982). Fire is not a significant factor in bottomland forest, and is primarily limited to individual trees affected by lightning strikes (Leitman et al. 1982).

Community Variations: Differences in hydrologic conditions across bottomland forests (high vs. low water table, deep vs. shallow flood depths) lead to highly variable mixtures of species that fluctuate across different floodplains as well as within the same system. The widespread creek or branch swamp type, occurring commonly along blackwater streams and rivers, either borders the stream itself or is directly transitional between floodplain swamp and the surrounding uplands. Along small acidic creeks, these forests often contain a larger percentage of evergreen bay or oak species and may be very narrow with a seepage stream running through the center.

Larger blackwater rivers and alluvial rivers may have bottomland forest occurring in broad terraces, or on higher ridges and levees. High levees bordering the main river channel are often characterized by a dominance of sweetgum, live oak, and water oak, with understory and groundcover species that are adapted to infrequent or short duration floods such as American holly and Gulf Sebastian bush. They may also contain less flood tolerant trees such as loblolly pine and spruce pine, with the specific composition in each case determined by elevation in the floodplain.

Bottomland forest occurring along some blackwater and seepage streams in the western Panhandle are particularly exceptional, being a mixture of various hardwood species, Atlantic white cedar (*Chamaecyparis thyoides*), tuliptree (*Liriodendron tulipifera*), and bay species occurring on low, sandy deposits not introduced by the river. These forests are not subject to the higher amounts of deposition occurring along alluvial or semi-alluvial streams (Clewell 1986); although the shifting river may rapidly move sand along meander loops and periodically overflow its banks (Wharton et al. 1977). Atlantic white cedar trees of the western Panhandle are tolerant of this acidic, disturbance-prone habitat (Conner and Buford 1998).

Associated Communities: Although bottomland forest may flood and even contain occasional tupelo and cypress trees, it is not dominated by these species, as is floodplain swamp. The transition to upland communities is often gradual with much species overlap due to the large range of hydrologic conditions that many bottomland forest species may tolerate; however, upland species such as pignut hickory (*Carya glabra*) and southern magnolia (*Magnolia grandiflora*) are not common in bottomland forest.

Hydric hammock often closely resembles bottomland forest, but the dominance of evergreen oaks and cabbage palm rather than a generalized mix of hydrophytic and mesophytic trees distinguish hydric hammock. Baygall communities are found in areas of high seepage and are dominated by bay species with other hydrophytic trees of secondary importance in the canopy. Bottomland forest and alluvial forest often occur intermixed within a floodplain. In general, bottomland forest is a drier community than alluvial forest, although this distinction may be difficult to draw, particularly when bottomland forest grades into floodplain swamp. Regardless of the mix of hydrophytic trees in various bottomland forests, water hickory, overcup oak, and/or green ash, the set of species characteristic of alluvial forest, are generally not important elements in the canopy.

Management Considerations: Nearly all bottomland forests have suffered from timbering operations, which frequently leave long-lasting scars from soil disturbance. In addition to clearcutting, some bottomland forests have been converted to pine plantations, usually with severe effects on species composition and leaving exposed topsoil that would normally have been bound by tree roots (Wharton et al. 1977). Clearcutting of bottomland forest in the Panhandle often leads to a second growth canopy dominated by loblolly pine and sweetgum (Clewell 1986). Sweetgum is often favored by disturbance due to its ability to sprout following damage to the tree (Sharitz and Mitsch 1993).

Bottomland forest is generally unsuitable for development due to its location on substrates that occasionally are flooded or saturated. Construction that makes use of landfill, such as some road crossings, may be highly detrimental to bottomland forest by effectively acting as dams, backing up floodwater and increasing sedimentation upstream of the landfill (Wharton et al. 1977).

Large mammals such as Florida black bears often rely on long corridors of wetlands, and the development of land in these floodplains leads to population isolation and corresponding negative impacts, including increased highway collisions (Sharitz and Mitsch 1993). Beaver dams along streams may kill bottomland forest canopies and lead to the development of open marshes by raising local water levels (Clewell 1986). Similarly, man-made structures such as dikes which do not allow for adequate drainage of bottomland forest also cause considerable damage to forest canopies which are not adapted to long periods of inundation (Wharton et al. 1977). Invasive exotic plants, particularly Japanese climbing fern (*Lygodium japonicum*), Chinese privet (*Ligustrum sinense*), Chinese tallow (*Sapium sebiferum*), and white-flowered wandering jew (*Tradescantia fluminensis*), may form dense stands in bottomland forest, particularly where the community borders development.

Reference Sites: Blackwater River State Forest (Santa Rosa and Okaloosa Counties), Lake Talquin State Forest (Leon County), San Felasco Preserve State Park (Alachua County), Jennings State Forest (Clay County), Myakka River State Park (Sarasota County)

Global and State Rank: G4/S3

Crosswalk and Synonyms:

Kuchler	113/Southern Floodplain Forest

Davis	8/Swamp Forests, mostly of Hardwoods
SCS	20/Bottomland Hardwoods
Myers and Ewel	Freshwater Swamp Forests - floodplain forests
SAF	82/Loblolly Pine - Hardwood
	88/Willow Oak - Water Oak - Diamondleaf Oak
	91/Swamp Chestnut Oak - Cherrybark Oak
	92/Sweetgum - Willow Oak
	97/Atlantic White Cedar
FLUCCS	615/Stream and Lake Swamps (Bottomland)
	617/Mixed Wetland Hardwoods
	623/Atlantic White Cedar
	630/Wetland Forested Mixed

Other synonyms: high bottomland forest (Darst and Light 2008), blackwater branch or creek swamp, in part (Wharton 1978), bottomland, bottomland forest, river bottom, stream bottom, white cedar swamp, NWTC Zones IV-V, levees, terraces, lowland hardwood forest

References:

Clewell, A.F. 1986. Natural setting and vegetation of the Florida Panhandle - An account of the environments and plant communities of northern Florida west of the Suwannee River. Report No. COESAM/PDEI-86/001. United States Army Corps of Engineers, Mobile District, Alabama.

Conner, W.H., and M.A. Buford. 1998. Southern deepwater swamps. Pages 261-287 in M.G. Messina and W.H. Conner, editors. Southern Forested Wetlands: Ecology and Management. Lewis Publishers/CRC Press, Boca Raton.

Darst, M.R., and H.M. Light. 2008. Drier forest composition associated with hydrologic change in the Apalachicola River floodplain, Florida. Scientific Investigations Report 2008-5062. United States Geological Survey, Reston, Virginia. Available at: http://pubs.usgs.gov/sir/2008/5062/

Darst, M.R., H.M. Light, and L.P. Lewis. 2002. Ground-cover vegetation in wetland forests of the lower Suwannee River floodplain, Florida, and potential impacts of flow reductions. Water-Resources Investigations Report 02-4027. United States Geological Survey, Tallahassee, Florida.

Leitman, H.M., J.E. Sohm, and M.A. Franklin. 1982. Wetland hydrology and tree distribution of the Apalachicola River flood plain, Florida. 2196-A. United States Geological Survey Water Supply, Alexandria.

Light, H.M., and M.R. Darst. 1993. Hydrology, vegetation, and soils of four north Florida river flood plains with an evaluation of state and federal wetland determinations. Water Resources Investigation Report 93-4033. United States Geological Survey, Tallahassee, Florida.

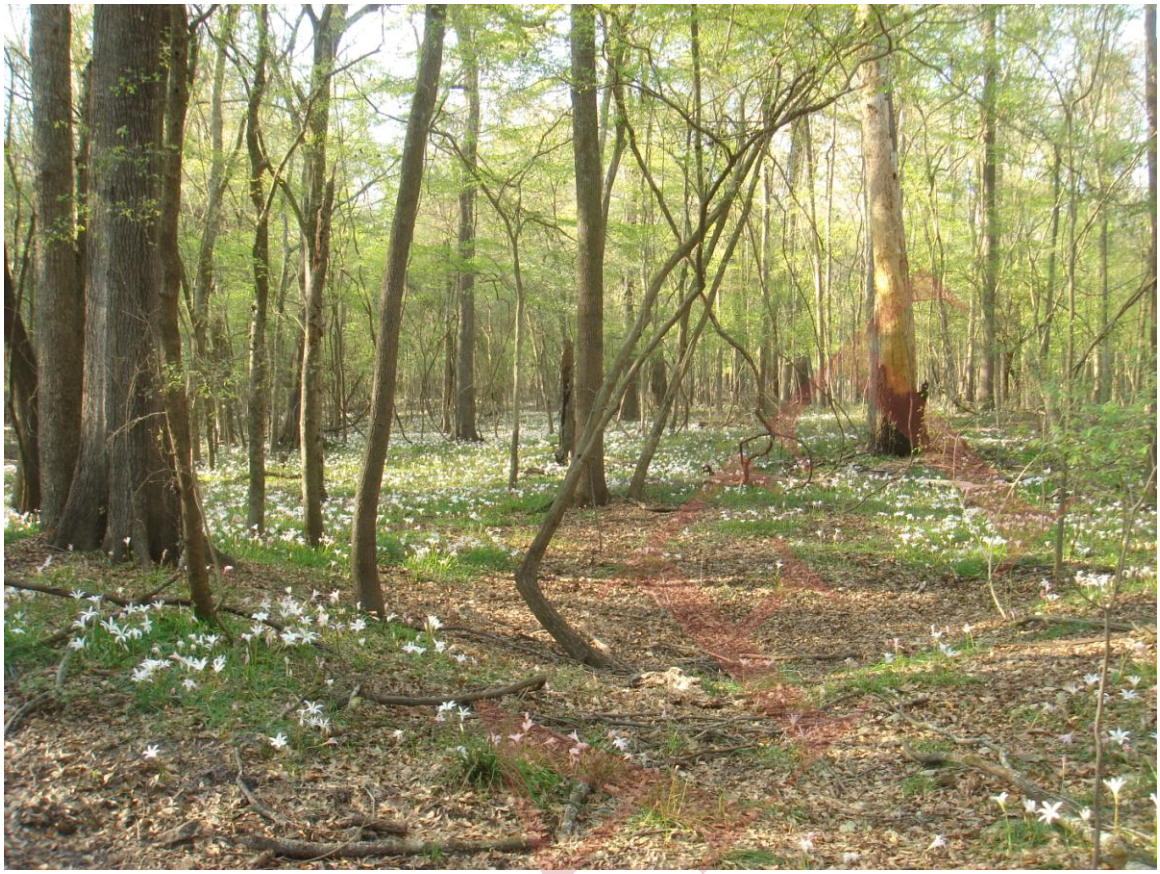
Sharitz, R.R., and W.J. Mitsch. 1993. Southern floodplain forests. Pages 311-372 in W.H. Martin, S.G. Boyce, and A.C. Echternacht, editors. Biodiversity of the Southeastern United States: Lowland Terrestrial Communities. John Wiley and Sons, Inc., New York.

Wharton, C.H. 1978. The Natural Environments of Georgia. Geologic and Water Resources Division and Resource Planning Section, Office of Planning and Research, Georgia Department of Natural Resources, Atlanta.

Wharton, C.H., W.M. Kitchens, E.C. Pendleton, and T.W. Sipe. 1982. The ecology of bottomland hardwood swamps of the southeast: a community profile. FWS/OBS-81/37. United States Fish and Wildlife Service, Biological Service Program, Washington, D.C.

Wharton, C.H., H.T. Odum, K. Ewel, M. Duever, A. Lugo, R. Boyt, J. Bartholomew, E. DeBellevue, S. Brown, M. Brown, and L. Duever. 1977. Forested wetlands of Florida - Their management and use. Final Report to Florida Division of State Planning, DSP-BCP-19-77. Center for Wetlands, University of Florida, Gainesville, Florida.

Atlantic white cedar-dominated bottomland forest along river, Blackwater River State Forest (Santa Rosa County) Photo by Paul Russo



Twin Rivers State Forest (Madison and Hamilton Counties) ` Photo by Mike Heaney