



North Carolina
Forest Service

FORESTRY Leaflets

Focus Series on Bottomland Swamp Forests

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#BF-1

Understanding North Carolina's Bottomland Swamp Forests

History

North Carolina has prime examples of high-quality and productive bottomland swamp forests that contain hardwood and conifer species. These swamps have provided an important source of timber products and wood fiber for more than 200 years and served as a foundation for the development of the forest products industry.

The forests of North Carolina, including hard-to-access bottomland swamps, have been harvested in multiple cycles since settlement in colonial times. Practically-speaking, there is no appreciable, large-scale amount of "old growth" or "virgin" timber remaining in North Carolina's swamp forests, simply due to the numerous harvest cycles that have been conducted through history. However, regardless of the relative age of the swamp forest, these areas remain an important resource and deserve careful planning when undertaking management, harvesting and regeneration.



Technical References

While this leaflet series is intended for woodland owners, below are a few technical references:

Classification of the Natural Communities of North Carolina, Third Approximation.

North Carolina Natural Heritage Program. Authors: M.Schafale and A.Weakley.

<https://files.nc.gov/dncr-nhp/documents/files/Natural-Community-Classification-Third-Approximation-1990.pdf>

Forested Wetlands: Functions, Benefits and the Use of Best Management Practices.

USDA-Forest Service, Northeastern Area. Authors: D.J. Welsch, and others. Publication no. NA-PR-01-95.

www.fs.usda.gov/naspf/publications/forested-wetlands-functions-benefits-and-use-best-management-practices

Silvics of North America: Volume 2, Hardwoods. USDA-Forest Service. Agriculture Handbook 654.

www.srs.fs.usda.gov/pubs/1548

Trees Species of Bottomland Swamp Forests

A diversity of trees and shrubs are adapted to grow in swamps. The species that are most frequently found in North Carolina's bottomlands are listed in the table below (*alphabetically*):

--Atlantic white cedar, <i>Chamaecyparis thyoides</i>	--River birch, <i>Betula nigra</i>
--Bald cypress, <i>Taxodium distichum</i>	--Swamp chestnut oak, <i>Quercus michauxii</i>
--Black willow, <i>Salix nigra</i>	--Swamp cottonwood, <i>Populus heterophylla</i>
--Cherrybark oak, <i>Quercus pagoda</i>	--Swamp tupelo (Swamp blackgum), <i>Nyssa biflora</i>
--Green ash, <i>Fraxinus pennsylvanica</i>	--Sweetbay magnolia, <i>Magnolia virginiana</i>
--Pond cypress, <i>Taxodium ascendens</i>	--Sweetgum, <i>Liquidambar styraciflua</i>
--Pumpkin ash, <i>Fraxinus profunda</i>	--Sycamore, <i>Platanus occidentalis</i>
--Red bay, <i>Persea borbonia</i> , or <i>Pesea palustris</i>	--Water tupelo, <i>Nyssa aquatica</i>
--Red maple, <i>Acer rubrum</i>	--Yellow-poplar, <i>Liriodendron tulipifera</i>

This wide range of species is one reason that regeneration in bottomland swamp forests can be more complicated than upland hardwood or pine forests.

Common Types of Bottomland and Swamp Systems

Not all bottomland swamps are the same. Differences in hydrology, terrain, soils and position on the landscape create a mosaic of different swamp forests across the Atlantic coastal plain region of the U.S. North Carolina's wide range of topography and geology also contribute to a diversity of swamps.

In addition, the state is situated at middle latitudes, meaning that the forests of our state are an assortment of those more often seen in warmer, moist sub-tropical regions, as well as forests that are more common in northern, cooler climates.

There are many methods of describing or labeling different types of swamps. This is important to know because of differences in tree species, hydrology influences and regeneration methods. Below are labels commonly used to distinguish between major swamp forest systems:

Black River Bottom / Black Water Swamp:

Bottomland areas of major river systems that begin in the coastal plain. The term 'black' refers to the tannins and organic matter in the water that is partially decomposed, causing the water to appear dark brown or black, like the color of tea.

Red River Bottom / Red Water Swamp:

Bottomland areas of major river systems that begin in the piedmont or mountains. The term 'red' refers to the red clay soils of the areas where these systems originate. After heavy rainfall, the water appears reddish-brown.

Muck Swamp / Deep Swamp:

Broad, expansive and very-poorly drained areas often with standing water, usually with lots of organic matter in the soil. It may be hard to identify a singular, defined stream channel. This type of swamp is most often found in the far eastern coastal plain.

Smaller forest swamp systems can be broken into the following main types:

Branch Bottom / Slough:

Relatively flat areas along small rivers or large creeks that remain boggy throughout the year, often with black, organic-rich soil.

Piedmont Bottomland:

Upstream sections of a Red River Bottom, often with upland tree species intermixed and more mineral soil.

Pocosin:

Broad, very flat area of the coastal plain located between stream valleys. Due to the historical lack of defined stream flow patterns, organic matter has accumulated over millions of years, resulting in thick peat soils.

Carolina Bay:

Oval-shaped depression in which organic matter has accumulated atop of a deep layer of clay or peat that prevents downward infiltration of water. Some Carolina Bays remain as open water lakes, while others have completely grown-over with vegetation.



The first flush of regrowth is seen in this recently logged swamp.

The timber left standing in the background is the Streamside Management Zone. These trees also provide a long-term source of seed, to supplement reforestation by stump sprouts.

Values and Threats

Bottomland swamp forests contribute many ecological values in addition to the timber resource value that has traditionally been the focus of forestry activities. Swamps often are used by birds and wildlife for nesting, escape zones, feeding and travel corridors. Swamp forests are also important to capture floodwaters, and increasingly are used for outdoor recreational outings, especially by kayak or canoe.

There are multiple threats to the long-term vigor and health of bottomland forests in North Carolina. One of the most noticeable and concerning is the Emerald Ash Borer, an exotic non-native insect that bores into the tree trunk of ash trees. The multiple punctures into the bark and underlying cell tissue eventually leads to the tree's death. There is no natural predator for the Emerald Ash Borer, and no immediate resolution is known. While scientists continue to search for a remedy, it is important to note that ash is frequently found in bottomland swamps of North Carolina. If the ash species is eliminated from these swamps, then alternative methods of reforestation and competition control in swamps may be needed to foster the establishment of a suitable replacement tree species.

Invasive plants can block sunlight from reaching the soil and out-compete native tree seedlings. Examples of problem plants often found in swamps are: Chinese or Japanese privet bush, Japanese stiltgrass (microstegium), honeysuckle vine, Chinese tallowtree, kudzu vine, cat tail, Japanese knotweed bush, and phragmites (Asian bamboo).

In addition, intrusion of brackish water into freshwater coastal swamps has resulted in grassy marshes now growing in some areas where trees historically were located. Trees cannot survive in waters with high salinity. When managing forests along the coastal maritime fringe, it is vital to consider the risk of saltwater impacts on the potential viability of the next generation of forest.

Forest Management of Swamps

Management of a bottomland swamp forest is relatively passive and occurs over a much longer timeframe when compared with pine or upland hardwood forests. This long timeframe is mainly due to the relatively slower regeneration and growth cycle of timber in a swamp. Once the new stand of trees has successfully regenerated in the swamp, there is usually little need for intermediate treatments (such as thinning or burning) that might otherwise be suitable on pine or upland hardwood forests.

Implementing a carefully planned and properly executed swamp timber harvest in a manner that minimizes soil and water impacts has shown to be the most practical and viable prescription for forest management in bottomland swamps. See *Forestry Leaflet #BF-4* for harvesting recommendations.

Forest owners are encouraged to produce and keep records, paperwork, plans, photos and other documentation related to the ownership and management of their forestland, especially for the bottomland swamp areas. Because managing bottomlands occurs over such a long period of time, an individual or outside observer may never actually see management being done, even though the forestland is continuing to be owned and managed for the purposes of sustainable forestry. To comply with the rules governing forestry activities in wetlands, a landowner may need to produce documentation and evidence of ongoing silviculture and timber management, if requested.

Key Points for Woodland Owners

- ✓ Recognize the long-term, multi-generational investment needed to manage, regenerate, and sustain a healthy and productive bottomland swamp forest.
- ✓ Enlist the services of a forester or natural resources professional who is experienced in managing these types of forests.
- ✓ Obtain a forest management plan and follow through with its prescriptions.
- ✓ Keep good records of activity and work associated with the ownership and management of the forest.
- ✓ Work with landowners upstream and downstream to promote natural stream flows and seasonal flood cycles. Minimize altering the landscape or waterways (avoid beaver dams, ditches, wells, berms, ponds, etc.).
- ✓ Learn to recognize invasive plants and control them when possible.

*The N.C. Forest Service is a division of the N.C. Department of Agriculture and Consumer Services. Steve Troxler, Commissioner.
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