

Bottomland and Swamp Forest Indicator Species

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Nomenclature from Radford, Ahles and Bell, Manual to the vascular flora of the Carolinas; modern nomenclature can be found at the USDA Plants Database, or the UNC herbarium (Weakley). I've translated some that have come into more common usage.

NatureServe Ecological systems are tentative. The parenthetical key references are to the "Key to Ecological Systems (and selected Alliances) of the Francis Marion National Forest – 15 Nov 2012".

NATURESERVE ECOLOGICAL SYSTEMS:

2501; CES203.304 (7a and 19a in key) – Southern Atlantic Coastal Plain Nonriverine Swamp and Wet Hardwood Forest (in fact probably associated with cryptic drainages)

2480?; CES203.384 (8b and 21b in key) – Southern Coastal Plain Nonriverine Basin Swamp (in fact probably associated with cryptic drainages)

2480; CES203.240 (22a in key) – Southern Atlantic Coastal Plain Tidal Wooded Swamp

2473**; ??? (23a in key) – Gulf and Atlantic Coastal Plain Floodplain Systems

2474**; ??? (23b in key) – Gulf and Atlantic Coastal Plain Small stream Riparian Systems

GENERAL NOTES on bottomland and swamp forest systems: although NatureServe recognizes 5 separate categories of bottomland and swamp forest, my experience is that the differences in vegetation are less subtle, and more a matter of degree of the landscape covered rather than differences in species. Thus, though I see the value in separating the types based on tidal/non-tidal, size, etc, the common indicator species remain the same.

In addition, LiDAR indicates that basins once considered non-riverine are headwaters for several stream systems and many sloughs that were once considered non-riverine eventually join together to form stream drainages and thus are also headwaters. Again, although I see the value in categorizing these habitats from an ecosystem perspective, the indicator species are the same regardless.

My lists are for streams that drain water all of the time – what I often refer to as flowing wetlands. Wet sloughs, broad interfluves and headwater basins generally end up in cypress savanna or pocosin vegetation. The deepest areas of the Hell Hole basin are in swamp forest. I've never been in Little Wambaw. Truly isolated depressions end up as ponds or pocosins. My lists are for the bottomlands that drain to streams that support bald cypress communities within their floodplains.

GENERAL NOTES on bottomland systems:

As the landscape slopes toward a drainage, ridges (even if subtle) give way to flats that support a bottomland forest community. These bottomlands can flood, but mostly because they are low and accumulate rainfall faster than they drain. Very occasionally they will flood completely to the drain during periods of extremely high rainfall (stream overflow or slow drainage, I do not know). Bottomland soils are generally saturated, gleyed and with an increased organic layer

compared to adjacent upland soils. Bottomland soils are generally more finely textured than adjacent upland soils, having accumulated eroded sediments.

I seldom find what I would call true bottomland forest on the Francis Marion – primarily I find it in the Huger Creek drainage basin and in the I'on Swamp area. I am not familiar with the relatively newly acquired stands in Compartment 214 (Charleywood), but I recall bottomland from the one or two times I've been there. Other systems (Echaw, Wambaw, Wedboo) tend to convert from adjacent upland straight to bald cypress swamp, sometimes with a pocosin edge or pocosin headwaters. When bottomlands separate adjacent uplands from a floodplain swamp forest, the transitions are often very abrupt between all three systems.

Canopy Trees:

Diagnostic indicators

Cherrybark Oak – *Quercus pagodaefolia*

Usually present, but also found in other ecosystems

Spruce pine – *Pinus glabra*

Loblolly pine – *Pinus taeda* (this is one of the few habitats where this species would have been found prior to European settlement)

Laurel oak – *Quercus laurifolia*

Willow oak – *Q. phellos*

Swamp chestnut oak – *Q. michauxii*

Water oak – *Q. nigra* (this is one of the few habitats where this species would have been found prior to European settlement)

Ash – *Fraxinus* spp. (not water ash, *F. caroliniana*, found in swamp forest)

Sweetgum – *Liquidambar styraciflua* (this is one of the few habitats where this species would have been found prior to European settlement)

American holly – *Ilex opaca*

American beech – *Fagus grandifolia* (only in areas with a calcium or calcium-phosphate influence)

Tulip poplar – *Liriodendron tulipifera* (again, only in areas with a calcium or calcium-phosphate influence)

Rare, but usually diagnostic

Nutmeg hickory – *Carya myristiciformis* (only in the calcium-phosphate areas of the Huger Creek drainage basin, though possibly in other Ca-P influenced areas; consult Jeff Glitzenstein)

Sub-canopy Trees:

Diagnostic indicators

Ironwood – *Carpinus caroliniana*

Usually present, but also found in other ecosystems

None in particular

Shrubs and Lianas:

Diagnostic indicators

None in particular

Usually present, but also found in other ecosystems

Dwarf palmetto – *Sabal minor* (also found in maritime systems)

Haws – *Viburnum dentatum* and *V. prunifolium*

Hearts-a-bustin – *Euonymus americanus*

Supplejack – *Berchemia scandens* (also found in floodplains)

Climbing hydrangea – *Decumaria barbara*

Trumpet creeper – *Campsis radicans* (also found as a weedy species in other habitats)

Poison ivy – *Rhus radicans* (in RAB, now *Toxicodendron radicans*) (also found as a weedy species in other habitats)

Muscadine – *Vitis rotundifolia* (also found as a weedy species in other habitats)

Carolina jasmine – *Gelsemium sempervirens*

Uncommon, found elsewhere very uncommonly

None in particular

Herbaceous:

Diagnostic Indicators:

Jack in the pulpit – *Arisaema triphyllum*

Atamasco lily – *Zephyranthes atamasca*

Chain fern – *Woodwardia areolata*

Sensitive fern – *Onoclea sensibilis*

Shadow witch orchid – *Ponthieva racemosa* (very rare, only with calcium influence, possibly from old shell beds)

GENERAL NOTES on swamp forest systems:

Swamp forests in the Francis Marion are either flooded by tidal fresh water or by rainfall.

Almost all but the smallest creeks were used for inland swamp or tidal rice production, and the remnants of the rice banks influence the degree and length of the flooding period. In most cases, drainages on the Francis Marion have narrow or non-existent floodplains, but the larger creeks and the Santee River have very well developed floodplains. Very regular flooding and/or near permanent flowing water are required to form a true bald cypress swamp forest. Shallower drains are often vegetated with pond cypress or pocosin vegetation.

Swamp forest canopies can be extremely diverse, depending on the size of the floodplain, the degree of flooding and the logging history. The Santee River floodplain west of Guilliard Lake is the most diverse that I've ever seen on the Francis Marion; second would be Echaw Creek.

In an intact swamp forest, there is often little vegetation under the main canopy, and most of the sub-canopy species are found along ecotones or in openings. Exceptions are species that bloom before the largely deciduous canopy leaves out, and the many grasses and sedges that don't require a lot of sun to bloom.

Swamp forest soils are saturated, gleyed, highly organic and fine textured from sediment accumulation. This is especially apparent in the Santee River floodplain, where massive amounts of fine textured Piedmont sediments have accumulated. Smaller streams that originate on the Coastal Plain do not show the massive levees that are characteristic of the Santee River bottom in the western part of the Francis Marion, but they share the other soil and vegetation patterns. Most floodplain soils are higher in pH than the surrounding systems, but generally not high enough to support calciphytes.

Canopy Trees:

Diagnostic indicators

- Bald cypress – *Taxodium distichum* (almost never overlaps pond cypress in distribution, and the single most diagnostic species)
- Tupelo gum – *Nyssa aquatica* (found only in deepest swamps)
- Water hickory – *Carya aquatica*
- Water ash – *Fraxinus caroliniana*
- Water locust – *Gleditsia aquatica*
- Sycamore – *Platanus occidentalis*
- Overcup oak – *Quercus lyrata*
- Swamp white oak – *Quercus bicolor*
- American elm – *Ulmus americana* (this otherwise nearly extinct species shows no signs of Dutch elm disease here)
- Cottonwoods – *Populus deltoides* and *P. heterophylla*
- Willows – *Salix caroliniana* and *S. nigra* (occasionally also found in wet ditches)
- Sugarberry – *Celtis laevigata* (drier areas only)
- Water elm – *Planera aquatica* (I've only seen this once on the Francis Marion)
- Silver maple – *Acer saccharinum* (only in the Santee River floodplain east of Guilliard Lake – seeds probably washed down from the Piedmont)

Usually present, but also found in other ecosystems

- Pond gum – *Nyssa biflora*
- Red maple – *Acer rubrum*

Rare, but usually diagnostic

- None in particular

Sub-canopy Trees:

Diagnostic indicators – mostly only found in openings or edges where there is sunlight

- Possum-haw – *Ilex decidua* (at least I've never seen this anywhere else)
- Hawthorn – *Crataegus* spp. (*C. aestivalis*, *C. crus-galli*, *C. flabellata*, *C. marshallii* and *C. viridis* are all present in swamp forests)
- Swamp dogwood – *Cornus stricta*

Usually present, but also found in other ecosystems

- None in particular

Shrubs and Lianas:

Diagnostic indicators – mostly only found in openings or edges where there is sunlight

- Water willow – *Decodon verticillatus*
- Virginia willow – *Itea virginica*
- Buttonbush – *Cephalanthus occidentalis*
- Indigo bush – *Amorpha fruticosa*
- Coral greenbrier – *Smilax walteri* (this is our only climbing *Smilax* with bright red fruits)
- Swamp rose – *Rosa palustris*
- Wisteria – *Wisteria frutescens* (mostly only on very narrow drainages)

Usually present, but also found in other ecosystems

- None in particular

Uncommon, found elsewhere very uncommonly

- None in particular

Herbaceous:

Diagnostic Indicators – mostly only found in openings or edges where there is sunlight

- Three-way sedge – *Dulichium arundinaceum*
- Woolgrass – *Scirpus cyperinus* (also in wet ditches)
- Butterweed – *Senecio glabellus* (annual yellow aster often seen in striking sheets of color)
- Lizard's tail – *Saururus cernuus*
- Blue flag iris – *Iris virginica* (also in wet ditches)
- Pickerelweed – *Pontederia cordata* (also in wet ditches)
- Aquatic milkweed – *Asclepias perennis*
- False nettle – *Boehmeria cylindrica*
- Water primrose – *Ludwigia uruguayensis* (creek banks)
- Purple lobelia – *Lobelia elongata*
- Cardinal flower – *Lobelia cardinalis* (uncommon, creek banks)
- Obedient flower – *Physostegia leptophylla* (uncommon, creek banks)
- Duckweeds – *Spirodela polyrhiza*, *Lemna perpusilla*, *Wolffiella papulifera* and *Wolffiella floridana* (slow moving water only, also found in wet ditches and ponds)
- Floating bladderwort – *Utricularia inflata* (in old rice impoundments, also found in ponds)
- Water hemlock – *Cicuta maculata* (uncommon, very poisonous)
- Pondweed – *Potamogeton pulcher* (uncommon)
- Water spider orchid – *Habenaria repens* (rare)
- Green fly orchid – *Epidendrum conopseum* (epiphytic, rare)
- Goldenclub – *Orontium aquaticum* (rare)
- Spider-lily – *Hymenocallis crassifolia* (rare)
- Carolina birds-in-a-nest – *Macbridea caroliniana* (very rare)