



Torrey State Park (Liberty County)

Photo by Gary Knight

### **Floodplain Swamp**

**Description:** Floodplain swamp is a closed-canopy forest of hydrophytic trees occurring on frequently or permanently flooded hydric soils adjacent to stream and river channels and in depressions and oxbows within floodplains. Trees are often buttressed, and the understory and groundcover are sparse. The canopy is sometimes a pure stand of bald cypress (*Taxodium distichum*), but more commonly bald cypress shares dominance with one or more of the following tupelo species: water tupelo (*Nyssa aquatica*), swamp tupelo (*N. sylvatica* var. *biflora*), or ogeechee tupelo (*N. ogeche*). The “knees” arising from the root systems of both cypress and tupelo are common features in floodplain swamp. Other canopy trees capable of withstanding frequent inundation may be present but rarely dominant, including water hickory (*Carya aquatica*), overcup oak (*Quercus lyrata*), red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), and swamp laurel oak (*Q. laurifolia*). Pond cypress (*T. ascendens*) is sometimes present in backswamps and depressions of the more hydrologically isolated areas of the floodplain. Floodplain swamp can often occur within a complex mixture of communities including alluvial forest, bottomland forest, and baygall. This produces a variable assemblage of canopy and subcanopy species, with less flood tolerant trees and shrubs found on small hummocks and ridges within the swamp. Shrubs and smaller trees such as Carolina ash (*Fraxinus caroliniana*), planer tree (*Planera aquatica*), black willow (*Salix nigra*), titi (*Cyrilla racemiflora*), Virginia willow (*Itea virginica*), common buttonbush (*Cephalanthus occidentalis*), cabbage palm (*Sabal palmetto*), and dahoon (*Ilex cassine*) may be present. A groundcover of flood tolerant ferns and herbs are found in some floodplain swamps, including lizard’s tail (*Saururus cernuus*), false nettle

(*Boehmeria cylindrica*), creeping primrosewillow (*Ludwigia repens*), savannah panicum (*Phanopyrum gymnocarpon*), royal fern (*Osmunda regalis* var. *spectabilis*), dotted smartweed (*Polygonum punctatum*), climbing aster (*Symphotrichum carolinianum*), and string lily (*Crinum americanum*). Swamps with stagnant water typically have a mixture of floating aquatics such as duckweeds (*Lemna* spp.) and Florida mudmidget (*Wolffiella gladiata*). Eastern poison ivy (*Toxicodendron radicans*) is a frequent vine. This species list is developed in part from Leitman et al. (1982) and Darst et al. (2002).

Floodplain swamp is located within floodplains of any permanently moving stream or river. It ranges from narrow strips of cypress along primary and secondary streams to expansive stands along large rivers to tidally influenced freshwater swamps near river mouths. Often, floodplain swamps immediately border the stream or river channel. In many cases, however, floodplain swamps are isolated from the main channel by riverbank levees and restricted to oxbows, overflow channels, old stream beds, and expansive flats commonly called backswamps. Soils are variable mixtures of alluvial and organic materials, sometimes with layers of sand in the subsoil. Inundation is seasonal and usually prolonged, restricting the growth of most shrubs and herbs and leaving most of the ground surface open or thinly mantled with leaf litter.

**Characteristic Set of Species:** bald cypress, pond cypress, water tupelo, swamp tupelo, ogeechee tupelo

**Rare Species:** Rare plants found in floodplain swamp include serviceberry holly (*Ilex amelanchar*), Curtiss' loosestrife (*Lythrum curtissii*), Mexican tear-thumb (*Polygonum meisnerianum* var. *beyrichianum*), pinkroot (*Spigelia loganioides*), Florida willow (*Salix floridana*), and Washington hawthorn (*Crataegus phaenopyrum*). Rare animal species include blackbanded sunfish (*Enneacanthus chaetodon*), lowland topminnow (*Fundulus blairae*), cypress minnow (*Hybognathus hayi*), eastern mudminnow (*Umbra pygmaea*), one-toed amphiuma (*Amphiuma pholeter*), American alligator (*Alligator mississippiensis*), spotted turtle (*Clemmys guttata*), South Florida rainbow snake (*Farancia erythrogramma seminola*), Mississippi green water snake (*Nerodia cyclopion*), Barbour's map turtle (*Graptemys barbouri*), limpkin (*Aramus guarauna*), swallow-tailed kite (*Elanoides forficatus*), wood stork (*Mycteria americana*), yellow-crowned night-heron (*Nyctanassa violacea*), black-crowned night-heron (*Nycticorax nycticorax*), 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:** Floodplain swamp is distributed throughout Florida along river systems and is also widespread in the Southeastern Coastal Plain. South of Lake Okeechobee, however, strand swamp generally replaces floodplain swamp.

**Natural Processes:** Floodplain swamp along channels may be regularly inundated by flowing aerobic water. However, backswamps are flooded with stagnant water for extensive periods of time, resulting in highly anaerobic conditions. The lack of available oxygen inhibits breakdown of leaf litter and leads to considerable peat accumulation. Anaerobic conditions may contribute to increased nutrient release from sediments

through bacterial processes (Wharton et al. 1977). During dry summer months when evapotranspiration rates increase, surface water may be entirely lacking (Conner and Buford 1998).

Floods redistribute detrital accumulations to other portions of the floodplain or into the main river channel. This rich organic debris is essential to the functional integrity of downriver ecosystems such as estuaries, providing a vital source of nutrients. Floodplain swamp may also act as a nutrient sink or transformer depending on local conditions, making these wetlands particularly valuable in disposal of partially treated wastewater (Conner and Buford 1998).

The topography of alluvial forest and floodplain swamp, particularly in larger alluvial river systems, is a result of a seasonal flooding pattern which builds levees and point bars, creates scour channels and depressions, and introduces flowing water into backswamps. Old channels and levees left behind by the changing meander of the river itself become part of the complex mosaic (Wharton et al. 1982). The oxbows and backswamps created by meander processes are important breeding grounds for fish when high water connects them to the river (Conner and Buford 1998).

In floodplain swamps located within tidal influence, flooding patterns, tidal range, and storm events are major driving factors. These swamps are subject to daily freshwater inundation associated with tidal fluctuations (Day et al. 2007). Periodic events such as storms and hurricanes may push saltwater into the normally freshwater swamp. Low river flows during droughts also lead to more saltwater intrusion (Doyle et al. 2007). High river flood stages in the southeastern U.S. usually correspond with low tides in winter and spring, while low river flow occurs at roughly the same time as seasonal high tides in summer and fall. This means that swamps potentially receive more saltwater stress during the growing season, rather than during dormancy when the effects would be minimized (Doyle et al. 2007).

Floodplain swamp is usually too wet to support fire; however, large cypress trees are somewhat fire-resistant, and thus infrequent fires during very dry conditions may contribute to cypress dominance (Conner and Buford 1998). Fires may greatly damage the understory (Wharton et al. 1982).

**Community Variations:** Due to the complex nature of dynamic riverine systems, floodplain swamps are variable in canopy dominance and understory composition depending on their placement in the landscape. Larger rivers with broad floodplains have many features such as levees and oxbows created by a high energy riverine system, and floodplain swamp differs in composition throughout these features. Edges of stream channels that are inundated with flowing water nearly year-round are usually dominated by large bald cypress with tall “knees.” Large backswamps and depression swamps in floodplains are usually a mixture of bald cypress, water tupelo, and/or swamp tupelo, sometimes with less flood-tolerant species present but not dominant in the canopy. Pond cypress is more common in depressional swamps located in peninsular river floodplains. Water tupelo and ogeechee tupelo are mainly limited to northern and Panhandle Florida swamps. Atlantic white cedar (*Chamaecyparis thyoides*) may be present with swamp tupelo and baygall species in some floodplain swamps of the Panhandle and central peninsula.

One commonly occurring variant of floodplain swamp is recognized.

**Variant:** FRESHWATER TIDAL SWAMP – As a river approaches the coast, increasing stresses from daily tidal-driven inundation and occasional saltwater intrusion gradually influence vegetation structure. At the lower end of this gradient, cypress becomes much less dominant, replaced by stunted tupelo, pumpkin ash, and sweetbay. The landward extent of this community is difficult to determine but it is roughly defined as occurring between the head of the tide, where the bottom of the stream channel is higher than the mean tide range, and the point of tide reversal, where water flow is always downstream, even during high tide (Day et al. 2007).

**Associated Communities:** Floodplain swamp is often associated with and grades into alluvial forest, bottomland forest, hydric hammock, and occasionally baygall. Floodplain swamp is often found in a mosaic with bottomland forest and alluvial forest where the ridge and swale topography of the floodplain creates a mixture of habitats including low depressions that hold water most of the year. Oxbows that are permanently flooded with an open treeless center are generally considered to be river floodplain lakes.

Narrow creeks often have either baygall or bottomland forest occurring between a narrow zone of floodplain swamp and adjacent uplands. In both cases, swamps can usually be distinguished by the dominance of cypress and/or tupelo.

The species composition of floodplain swamp is similar to that of dome swamp, basin swamp, and strand swamp. Dome swamp and basin swamp are generally isolated communities within uplands with pond cypress dominant rather than bald cypress. Both basin swamp and floodplain swamp may occur around lakes that are part of or connected to a river floodplain such as the St. John's. In general, lakes occurring as wider portions of the river are bordered by floodplain swamp, while those that are not closely associated with the river and thus not receiving input from flowing water are bordered by basin swamp.

Strand swamp is similar to floodplain swamp, being a linear community that generally has intermittent moving water. In the flat topography of the southern peninsula, slow moving sloughs with associated strand swamps tend to replace the floodplain systems that occur in central and northern Florida. There is some intergradation between sloughs that contain moving water for most of the year and streams that occasionally dry up during droughts, and therefore these swamps may not be easily distinguished.

**Management Considerations:** Floodplain swamp communities provide important wildlife habitat, contribute to flood attenuation, and help protect the overall water quality of streams and rivers. Artificial water impoundments on rivers can severely limit the effects of seasonal flooding that maintain the health of these systems, including the stabilization of deposits and flushing of detritus (Wharton et al. 1982). Alteration of the hydroperiod by impoundments or river diversions and the conversion of floodplain communities to forestry or agriculture uses have devastating consequences to river and

bay systems. The natural hydroperiods of swamps promote their high productivity, and drainage of these systems may greatly reduce biomass (Conner and Buford 1998).

Near the mouth of a river, channel dredging has the effect of lowering the stream bottom in relation to the tide, thereby pushing the head of the tide further upstream and magnifying saltwater intrusion into the surrounding wetlands (Day et al. 2007). During storms, dredged channels and canals can provide a direct conduit for saltwater during storms (Doyle et al. 2007).

Vegetation composition change due to drying conditions in the floodplain can be detected first in swamps even if the remainder of the floodplain is virtually unchanged (Darst and Light 2008). A net increase in flooding or permanent water may also have an adverse affect on cypress and tupelo growth, as these species require some dry periods in order for seedlings to attain the size necessary to withstand flooding (Conner and Buford 1998).

Virtually all cypress/tupelo stands are second growth, having been intensively logged by the first half of the 20<sup>th</sup> century. The damage caused by the removal of millions of trees as well as the physical methods used for extraction is still evident today. Logging generally favors the dominance of tupelo, which can vigorously re-sprout after cutting (Sharitz and Mitsch 1993). Cypress has been re-introduced through planting in both natural and plantation conditions, with subsequent thinning resulting in larger diameter trees (Conner and Buford 1998). Several invasive exotic plants have encroached into floodplain swamp including Japanese climbing fern (*Lygodium japonicum*), old world climbing fern (*Lygodium microphyllum*), alligator weed (*Alternanthera philoxeroides*), water hyacinth (*Eichhornia crassipes*), wetland nightshade (*Solanum tampicense*), Caesar's weed (*Urena lobata*), cat's claw vine (*Macfadyena unguis-cati*), and wild taro (*Colocasia esculenta*).

**Exemplary Sites:** Escambia River, Apalachicola River, Choctawhatchee River, Suwannee River, Holmes Creek, Okalawaha River, Withlacoochee River, and most other rivers and streams in Florida

**Global and State Rank:** G4/S4

**Crosswalk and Synonyms:**

Kuchler	113/Southern Floodplain Forest
Davis	7/Cypress Swamp Forests 8/Swamp Forests, mostly of Hardwoods
SCS	17/Cypress Swamp 21/Swamp Hardwoods
Myers and Ewel	Freshwater Swamp Forests - floodplain forests
SAF	101/Baldcypress 102/Baldcypress - Tupelo 103/Water Tupelo - Swamp Tupelo 104/Sweetbay - Swamp Tupelo - Redbay
FLUCCS	613/Gum Swamp 615/Stream and Lake Swamps 621/Cypress 624/Cypress - Pine - Cabbage Palm

Other synonyms: river swamp, bottomland hardwoods, seasonally flooded basins or flats, oak-gum-cypress, cypress-tupelo, NWTC Zones II-III, tidewater swamp, river mouth swamp, sweetbay-swamp, tupelo-redbay; slough, backswamp, and oxbow features of floodplains treated in Wharton (1982) and others

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Near the Florida River, Apalachicola Water Management Area (Liberty County) Photo by Ann F. Johnson



Cross Florida Greenway (Putnam County)

Photo by Brenda Herring