Goethe State Forest (Levy County) Photo by Paul Russo

Basin Swamp

Description: Basin swamp is a basin wetland vegetated with hydrophytic trees and shrubs that can withstand an extended hydroperiod. Basin swamps are highly variable in size, shape, and species composition. While mixed species canopies are common, the dominant trees are pond cypress (*Taxodium ascendens*) and swamp tupelo (*Nyssa sylvatica* var. *biflora*). Other typical canopy and subcanopy trees include slash pine (*Pinus elliottii*), red maple (*Acer rubrum*), dahoon (*Ilex cassine*), swamp bay (*Persea palustris*), sweetbay (*Magnolia virginiana*), loblolly bay (*Gordonia lasianthus*), swamp laurel oak (*Quercus laurifolia*), sweetgum (*Liquidambar styraciflua*), water oak (*Quercus nigra*), green ash (*Fraxinus pennsylvanica*), American hornbeam (*Carpinus caroliniana*), and American elm (*Ulmus americana*). Depending on the hydrology and fire history, shrubs may be found throughout a basin swamp or they may be concentrated around the perimeter. Common species include Virginia willow (*Itea virginica*), swamp dogwood (*Cornus foemina*), swamp doghobble (*Leucothoe racemosa*), coastal sweetpepperbush (*Clethra alnifolia*), myrtle dahoon (*Ilex cassine* var. *myrtifolia*), fetterbush (*Lyonia lucida*), wax myrtle (*Myrica cerifera*), titi (*Cyrilla racemiflora*), black titi (*Cliftonia monophylla*), and common buttonbush (*Cephalanthus occidentalis*). The herbaceous layer is also variable and includes a wide array of species including maidencane (*Panicum hemitomon*), Virginia chain fern (*Woodwardia virginica*), arrowheads (*Sagittaria* spp.), lizard's tail (*Saururus cernuus*), false nettle (*Boehmeria cylindrica*), beaksedges (*Rhynchospora* spp.), bladderworts (*Utricularia* spp.), and royal fern (*Osmunda regalis* var. *spectabilis*). Sphagnum moss (*Sphagnum* spp.) often occurs in

patches where the soil is saturated but not flooded (Monk and Brown 1965). Vines may be present, particularly coral greenbrier (*Smilax walteri*), laurel greenbrier (*Smilax laurifolia*), and eastern poison ivy (*Toxicodendron radicans*). Epiphytic species such as resurrection fern (*Pleopeltis polypodioides* var. *michauxiana*), Spanish moss (*Tillandsia usneoides*), and Bartram's air-plant (*Tillandsia bartramii*) are common, especially in older, more mature examples of basin swamp.

This natural community typically occurs in any type of large landscape depression such as old lake beds or river basins, or ancient coastal swales and lagoons that existed during higher sea levels. Basin swamps exist around lakes and are sometimes headwater sources for major rivers, such as the Suwannee. Soils are generally acidic, nutrient-poor peats often overlying a clay lens or other impervious layer.

Characteristic Set of Species: pond cypress, swamp tupelo

Rare Species: An epiphytic fern, swamp plume polypody (*Pecluma ptilodon*), thrives in basin swamps throughout the peninsula. Basin swamp provides important foraging and nesting grounds for several rare animals including blackbanded sunfish (*Enneacanthus chaetodon*), frosted flatwoods salamander (*Ambystoma cingulatum*), carpenter frog (*Rana virgatipes*), many-lined salamander (*Stereochilus marginatus*), spotted turtle (*Clemmys guttata*), swallow-tailed kite (*Elanoides forficatus*), wood stork (*Mycteria americana*), southeastern weasel (*Mustela frenata olivacea*), and Florida long-tailed weasel (*Mustela frenata peninsulae*).

Range: Basin swamps occur throughout the Florida Panhandle and peninsula south to the Lake Okeechobee area; they are mostly replaced in South Florida by strand swamp. Similar cypress swamps also occur in large basins throughout the southeastern coastal plain (Casey and Ewel 1998).

Natural Processes: The primary source of water in basin swamps is local rainfall, with additional input from runoff and seepage from the surrounding uplands. A clay lens or other impervious layer often causes a perched water table above that of the adjacent uplands (Monk and Brown 1965). Basin swamps hold standing water for most of the year. Basin swamps are generally still water swamps but can flow during periods of high water. These swamps may contain streams and sloughs that drain the swamp, especially during periods of high rainfall.

Fire intervals are variable and depend on such factors as dominant vegetation, fire exposure, and drought. The interior of basin swamps may go without fire for decades or even centuries while the exposed outer edges can be more susceptible to frequent fire. Basin swamps that are situated within the matrix of a pyrogenic community, such as mesic flatwoods, will likely burn more frequently than basin swamps positioned within a matrix of mesic or hydric hammock. Without fire, bays and hardwoods increase in density and peat accumulates more rapidly. Cypress and pines are tolerant of light surface fires, but muck fires burning into the peat can kill the trees, lower the ground surface, and transform a swamp into a pond, lake, marsh, or shrub bog.

Topographic microsites can be important areas for tree, shrub, and herbaceous seedling recruitment in basin swamps (Huenneke and Sharitz 1986). Raised mats of root fiber and

peat form hummocks at the bases of trees and shrubs, on old tree stumps, or among cypress knees, and often create microsites for mesic species to establish above the water surface (Monk and Brown 1965; Ewel 1990).

Community Variations: Basin swamps are generally large but can occur as small inclusions within non-pyrogenic communities such as hydric hammock. The structure of a basin swamp is variable, depending largely on fire and hydrological history. A mature basin swamp is similar in structure to an old-growth forest with varying tree size classes represented (USFWS 1999). Although pond cypress dominates the canopy of most basin swamps, hardwood trees including red maple, green ash, and swamp laurel oak also may be present. Higher woody plant and herbaceous species diversity is expected around the perimeter of the swamp where the soil is more aerated; fewer species are able to tolerate the longer hydroperiod and more anaerobic conditions of the interior (Ewel 1990). Shrub diversity and density are typically higher around the edges of a basin swamp, particularly in fire excluded examples of this community.

Basin swamps can be encircled by wet prairie or depression marsh especially where they occur within a pyrogenic upland matrix community such as mesic flatwoods. These dense and diverse herbaceous communities serve as a transition from the swamp to the adjacent upland community and can help carry fire into the swamp.

In the northern peninsula, basin swamps can be found within a complicated environment of hydric hammock and mesic hammock or, as in the Okefenokee Swamp, Pinhook Swamp, and San Pedro Bay, can form a complex matrix with basin marsh and shrub bog. The fire exposure for basin swamps is quite different in each of these situations. Basin swamps that occur in and around hydric and mesic hammock have a low exposure to fire while basin swamps associated with basin marsh and shrub bog likely burn much more frequently.

Associated Communities: Basin swamps can be surrounded by various upland communities and can also form complex mosaics with other wetland communities. The species composition of basin swamps overlaps with other swamp communities in Florida, including floodplain swamp, dome swamp, strand swamp, and baygall.

Smaller basin swamps may be difficult to distinguish from large dome swamps as both are cypress-dominated communities that occupy isolated depressions in the landscape. Basin swamps are generally, although not always, larger swamps with a more irregular shape and a higher species richness, lower fire frequency, and deeper peat accumulation than dome swamps. Additionally, basin swamps can be, but are not always, surrounded by pyrogenic communities, whereas dome swamps are always surrounded by a pyrogenic community.

Basin swamp often intergrades with floodplain swamp, especially when they exist near, or within, the floodplain of a river, creek, or lake. Basin swamps are generally isolated and dominated by pond cypress, while floodplain swamps occur along rivers and creeks and are dominated by bald cypress (*Taxodium distichum*). Both swamp communities may occur around lakes that are part of, or connected to, a river floodplain. In general, lakes occurring as wider parts of a river are bordered by floodplain swamps, while lakes

not closely associated with a river and not receiving input from flowing water are bordered by basin swamps.

A roughly linear outline and cypress-dominated canopy are common to basin swamps and strand swamps; however these two community types have different origins. Basin swamps usually develop in basins such as old lakes or former coast-parallel lagoons that were present during times of higher sea level. Strand swamps occupy troughs aligned with bedrock lows in a gently sloping limestone plain. In South Florida, roughly south of Lake Okeechobee, strand swamp more or less replaces basin swamp.

Hydric hammock may occur in close proximity to basin swamp but this hammock community is distinguished by dominance of oaks rather than cypress. Similarly, baygall has a dominant cover of evergreen bay species as opposed to a canopy of pond cypress or swamp tupelo, although cypress logging activity can create confusion where it substantially changes the canopy composition.

Management Considerations: Basin swamps can suffer from anthropogenic alterations such as regional hydrological modifications, logging, nutrient enrichment, pollution from agricultural runoff, and invasive exotic species invasion (USFWS 1999; Fowlkes et al. 2003). Conversion of the adjacent uplands to pasture, development, or agriculture impedes natural fire and alters hydrologic inputs to basin swamps that are left unconverted (Kirkman et al. 1999).

Some basin swamps in Florida have been drained through ditching or have been impounded to alter water levels. It is important to maintain natural hydroperiods and natural (both seasonal and long term) fluctuations in water level in basin swamps. Extended hydroperiods can limit tree growth and prevent reproduction. Shortened hydroperiods can permit the invasion of mesophytic species, allow for increases in shrubs and hardwoods, and can increase fire potential (Ewel 1990).

Basin swamps have long been used for their timber resources. Most cypress trees in the southeast were harvested in the late nineteenth and early twentieth centuries (Brandt and Ewel 1989). Unlike most pine plantations, cypress harvested in Florida generally is cut from natural stands and few areas are ever replanted. Although cypress trees are capable of regenerating, or resprouting from cut stumps, cypress regeneration is usually from seed. It is therefore important that at least a few seed trees be left in place for canopy regeneration. Cypress seeds are water-dispersed and they are infrequently moved from one area to another. The short-lived seeds will not germinate in standing water and seedlings are intolerant of prolonged inundation (Ewel 1990). Young cypress trees are also vulnerable to fire, especially in logged swamps that are undergoing canopy regeneration (Ewel 1995). If cypress saplings and seedlings are destroyed by fire, or if cypress seed trees are removed, coastalplain willow, swamp tupelo, or bay species are likely to dominate the swamp (Gunderson 1984; Ewel 1995).

Silvicultural operations, particularly those including "bedding," have altered many basin swamps throughout Florida. This forestry practice creates rows of mounded soil upon which pine seedlings (typically slash pine) are planted. The root zone of the young trees is raised above any standing water that may be present in troughs between the bedded rows. This practice alters the hydrology and structure of the swamp.

Invasive exotic plant species can be a problem in basin swamps through competition for light and nutrients. Species of particular concern include both species of climbing fern (*Lygodium japonicum* and *L. microphyllum*) and Chinese tallow (*Sapium sebiferum*).

Exemplary Sites: Goethe State Forest (Levy County), Lake Panasofkee (SWFWMD property, Sumter County), Osceola National Forest (Baker County), John M. Bethea State Forest (Baker County)

Global and State Rank: G4/S3

Crosswalk and Synonyms:

Kuchler	113/Southern Floodplain Forest
Davis	7/Cypress Swamp Forests
	8/Swamp forests, mostly of hardwoods
SCS	17/Cypress Swamp
Myers and Ewel	Freshwater Swamp Forests - depression or basin wetlands
SAF	85/Slash Pine - Hardwood
	100/Pondcypress
	103/Water Tupelo - Swamp Tupelo
FLUCCS	613/Gum Swamps
	616/Inland Ponds and Sloughs
	621/Cypress

Other synonyms: gum swamp, bog swamp (Wharton 1978), cypress forest (Wharton 1978)

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