



Avon Park Air Force Range (Polk County) with cutthroat grass (*Panicum abscissum*) understory.
Photo by Katy NeSmith

Wet Flatwoods

Description: Wet flatwoods are pine forests with a sparse or absent midstory and a dense groundcover of hydrophytic grasses, herbs, and low shrubs. The pine canopy typically consists of one or a combination of longleaf pine (*Pinus palustris*), slash pine (*P. elliottii*), pond pine (*P. serotina*), or South Florida slash pine (*P. elliottii* var. *densa*). The subcanopy, if present, consists of scattered sweetbay (*Magnolia virginiana*), swamp bay (*Persea palustris*), loblolly bay (*Gordonia lasianthus*), pond cypress (*Taxodium ascendens*), dahoon (*Ilex cassine*), titi (*Cyrilla racemiflora*), and/or wax myrtle (*Myrica cerifera*). Shrubs include large gallberry (*Ilex coriacea*), fetterbush (*Lyonia lucida*), titi, black titi (*Cliftonia monophylla*), sweet pepperbush (*Clethra alnifolia*), red chokeberry (*Photinia pyrifolia*), and azaleas (*Rhododendron canescens*, *R. viscosum*). Saw palmetto (*Serenoa repens*) and gallberry (*I. glabra*), species also found in mesic flatwoods sites, may be present. On calcareous sites cabbage palm (*Sabal palmetto*) is common, both in the subcanopy and shrub layers. Herbs include wiregrass (*Aristida stricta* var. *beyrichiana*), blue maidencane (*Amphicarpum muhlenbergianum*), and/or hydrophytic species such as toothache grass (*Ctenium aromaticum*), Curtiss' sandgrass (*Calamovilfa curtissii*), cutover muhly (*Muhlenbergia expansa*), coastalplain yellow-eyed grass (*Xyris ambigua*), Carolina redroot (*Lachnanthes carolina*), beaksedges (*Rhynchospora chapmanii*, *R. latifolia*, *R. compressa*), and pitcherplants (*Sarracenia* spp.), among others.

In central Florida in the vicinity of the Lake Wales Ridge, cutthroat grass (*Panicum abscissum*) can be dominant (see Variants).

Wet flatwoods often occur in the ecotones between mesic flatwoods and shrub bogs, wet prairies, dome swamps, or strand swamps. Wet flatwoods also occur in broad, low flatlands, often in a mosaic with these communities.

The relative density of shrubs and herbs varies greatly in wet flatwoods. Shrubs tend to dominate where fire has been absent for a long period or where cool season fires predominate; herbs are more abundant in locations that are frequently burned. Soils and hydrology also influence relative density of shrubs and herbs. Soils of shrubby wet flatwoods are generally poorly to very poorly drained sands and include such series as Rutledge/Osier; these soils generally have a mucky texture in the uppermost horizon (Gilbert et al. 1995). Examples of typical soils in grassy wet flatwoods are loamy sands of the Leefield and Plummer Series (USFS 1984).

Characteristic Set of Species: slash pine, pond pine, large gallberry, fetterbush, sweetbay, wiregrass, toothache grass

Rare Species: Most rare plants are found in grassy wet flatwoods. In the Florida Panhandle these include pine-woods bluestem (*Andropogon arctatus*), southern milkweed (*Asclepias viridula*), Curtiss' sandgrass (*Calamovilfa curtissii*), wiregrass gentian (*Gentiana pennelliana*), Panhandle spiderlily (*Hymenocallis henryae*), white birds-in-a-nest (*Macbridea alba*), bog tupelo (*Nyssa ursina*), Apalachicola dragon-head (*Physostegia godfreyi*), pinewoods wild petunia (*Ruellia pedunculata* ssp. *pinetorum*), and Florida skullcap (*Scutellaria floridana*). In the peninsula of Florida, these include purple honeycomb-head (*Balduina atropurpurea*), Bartram's ixia (*Calydorea coelestina*), hartwrightia (*Hartwrightia floridana*), lake-side sunflower (*Helianthus carnosus*), and cutthroat grass (*Panicum abscissum*). Found in both the Panhandle and peninsula are St. John's blackeyed susan (*Rudbeckia nitida*) and white-flowered wild petunia (*Ruellia noctiflora*).

In Gulf, Liberty, and Gadsden counties, Chapman's rhododendron (*Rhododendron chapmanii*) may be found in shrubby wet flatwoods in ecotones between mesic flatwoods and shrub bogs or basin swamps. In wet flatwoods dominated by cabbage palm, hand fern (*Ophioglossum palmatum*) may be found growing in old leaf bases on cabbage palms and celestial lily (*Nemastylis floridana*) may be evident after recent burns.

Rare animals dependent on this community include three species associated with small wetlands in a flatwoods matrix: the frosted flatwoods salamander (*Ambystoma cingulatum*), found east of the Apalachicola/Flint Rivers, the reticulated flatwoods salamander (*A. bishopi*), found west of these rivers (Pauly et al. 2007), and the Panama City crayfish (*Procambarus econfinae*) found only in Bay County. The latter creates burrows in open, temporarily inundated depressions in wet flatwoods associated with redroot, lesser creeping rush (*Juncus repens*), and yellow-eyed grasses (Keppner, pers. comm. 2008).

Wet flatwoods, like shrub bogs and basin swamps, often occupy large areas of relatively inaccessible land, providing suitable habitat for the Florida black bear (*Ursus americanus*

floridanus). In Lee and Charlotte counties in southwest Florida, red-cockaded woodpecker (*Picoides borealis*) colonies are concentrated in wet flatwoods; the mangrove fox squirrels (*Sciurus niger avicennia*) also use this habitat for foraging and nesting (Beever, III and Dryden 1991).

Range: Wet flatwoods are common throughout most of Florida except at the very southernmost tip in the Everglades and Florida Keys where limestone is near the surface. Outside of Florida, wet flatwoods with similar characteristic species are found in the outer coastal plain from South Carolina to Mississippi (NatureServe 2008), with disjunct occurrences in Louisiana and Texas (Bridges and Orzell 1989).

Natural Processes: The variations of vegetation structure and composition of wet flatwoods in Florida likely reflect variations in soil characteristics, hydrology and fire. The general historic fire frequency in pinelands across the southeastern U.S. coastal plain is estimated to be every 1-3 years (Frost 1998). This interval is frequent enough to maintain grassy wet flatwoods and inhibit invasion by shrubs (Drewa et al. 2002a) and is consistent with management of longleaf pine systems (Landers 1991; Huffman 2006). Wet flatwoods that are naturally shrubbier and dominated by slash pine or pond pine may have had longer fire return intervals, or perhaps a few periods of longer intervals, on the order of 5-7 years (Landers 1991), or up to 5-10 years (Grelen 1980), in order to allow the pines to establish and shrubs to proliferate.

South Florida slash pine seedlings have a grass stage and are more tolerant of frequent fire than slash pine found in central and northern Florida. South Florida winters are considerably warmer and drier than those in North Florida and wet flatwoods in this region alternate between being completely flooded to completely dry on a seasonal basis (Beever, III and Dryden 1991). Wet flatwoods supporting South Florida slash pines burned at intervals of around 4 years (Landers 1991).

Community Variations: In addition to the widespread type of wet flatwoods, there are two variants.

- Variants:
- CUTTHROAT GRASS FLATWOODS – On and near the Lake Wales Ridge cutthroat grass may replace wiregrass as the dominant species in the ground layer.
 - CABBAGE PALM FLATWOODS – In some areas where limestone or calcareous substrates are near the surface, cabbage palm may form an understory to the pine canopy. Loblolly pine may also be present. Herbaceous species may include hairawn muhly, sawgrass (*Cladium jamaicense*), saltmeadow cordgrass (*Spartina patens*), black bogrush (*Schoenus nigricans*), blue maidencane, and sand cordgrass (*Spartina bakeri*). Examples of this type, which is sometimes referred to as “sweet flatwoods” in reference to the less acid soils, can be found in at the St. Marks National Wildlife Refuge in coastal Wakulla County, in the upper St Johns River drainage and in inland areas of Charlotte County, among other areas.

Associated Communities: Shrubby wet flatwoods can be similar to shrub bog, but differs in the having only a thin (< 1 inch) layer of muck, if any, and dominance by shrubs other than titi and black titi. The presence of a more than just a few, scattered pines differentiates grassy wet flatwoods from wet prairie and depression marsh. Wet flatwoods can be distinguished from mesic flatwoods by the presence of hydrophytic herbs (such as coastalplain yellow-eyed grass and redroot), shrubs (such as titi, black titi and sweet pepperbush), and trees (sweetbay, swamp bay, and pond cypress) and the absence or low frequency of saw palmetto.

Management Considerations: Fire suppression policies practiced from the 1930s to the 1960s (Ware et al. 1993) allowed shrubs in wet flatwoods to proliferate and to expand into adjacent wet prairies and depression marshes. Evidence from early aerial photographs, surveyors' notes from the general land office surveys of the mid-1800s, as well as early descriptions in soil surveys, can often help managers determine where shrub and hardwood encroachments have taken place.

Fires at too long intervals (5-10 years) can lead to an increase in woody species cover and decline in grasses and forb cover. It is uncertain whether increased fire frequency alone is adequate to restore areas heavily invaded by shrubs and trees as a result of lack of fire (Drewa et al. 2002b). In some cases physical removal or mowing of woody vegetation may be necessary; however, these actions are much more costly than prescribed fire and can cause damage to soil structure and desirable vegetation, particularly perennial grasses and forbs. Many factors other than frequency of fire, such as season of fire, pre- and post-fire soil moistures, groundwater levels, weather, and plant size or age at the time of fire, can greatly influence tree mortality (Wade and Johansen 1986) and vegetation responses to fire (Bacchus 1995). Fire in the growing season can reduce the stature of woody vegetation, particularly hardwoods (Streng et al. 1993), prevent increases in shrub densities (although it may not reduce stem densities [Drewa et al. 2002b]), and promote flowering of herbaceous groundcover (Platt et al. 1988).

Drainage, either directly by ditching or indirectly by drawdown of the water table, and soil disturbance render wet flatwoods in South Florida vulnerable to invasion by the exotic melaleuca (*Melaleuca quinquenervia*) which may be difficult to control once established since fire and herbicide treatments stimulate its seed release (Jordan 1994). Other invasive species in wet flatwoods include cogon grass (*Imperata cylindrica*) and Brazilian pepper (*Schinus terebinthifolius*).

Exemplary Sites: Bradwell Bay Unit of Apalachicola National Forest (Wakulla County); Post Office Bay Unit of Apalachicola National Forest (Liberty County), St. Marks National Wildlife Refuge (Wakulla County), Tosohatchee Wildlife Management Area (Orange County), Triple N Ranch Wildlife Management Area (Osceola County), Fred C. Babcock-Cecil M. Webb Wildlife Management Area (Charlotte County), Picayune Strand State Forest (Collier County), Jonathan Dickinson State Park (Martin County)

Global and State Rank: G4/S4

Crosswalk:

Kuchler	112/Southern Mixed Forest
Davis	2/Pine Flatwoods
SCS	/South Florida Flatwoods 7/North Florida Flatwoods 8/Cabbage Palm Flatwoods
Myers and Ewel	Flatwoods - wet flatwoods and seepage savannas
SAF	74/Cabbage Palmetto 84/Slash Pine 85/Slash Pine - Hardwood 98/Pond Pine
FLCFC	411/Pine Flatwoods 419/Other Pines 428/Cabbage Palm 622/Pond Pine 624/Cypress - Pine - Cabbage Palm 630/Wetland Forested Mixed

Other synonyms: pine savanna (Clewell 1986), hydric pine flatwoods (Beever, III and Dryden 1991; Gilbert et al. 1995), boggy flatwoods (Clewell 1986), wetland pine savannas (Bridges and Orzell 1989)

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Grass-dominated wet flatwoods, Apalachicola National Forest (Liberty County) Photo by Gary R. Knight



Cabbage palm flatwoods, St Marks National Wildlife Refuge (Wakulla County) Photo by Ann F. Johnson



Shrub-dominated wet flatwoods, Tate's Hell State Forest (Franklin County)
Photo by Carolyn Kindell