



Okaloacoochee Slough State Forest (Hendry County)

Photo by Gary Knight

Slough Marsh

Description: Slough marsh is a primarily herbaceous community growing in a narrow to broad shallow channel with intermittently flowing water in flat sandy landscapes. Grasses, sedges, and emergent herbs dominate the mainly treeless landscape. Vegetation is found in zones based on length of hydroperiod and depth of flooding. Frequently flooded areas of slough marsh are often dominated by species such as bulltongue arrowhead (*Sagittaria lancifolia*), pickerelweed (*Pontederia cordata*), alligatorflag (*Thalia geniculata*), maidencane (*Panicum hemitomon*), sawgrass (*Cladium jamaicense*), and cattails (*Typha* spp.). Drier marsh zones with less peat accumulation often are dominated by sand cordgrass (*Spartina bakeri*), longleaf threeawn (*Aristida palustris*), beaksedges (*Rhynchospora* spp.), Elliott's yellow-eyed grass (*Xyris elliotii*), narrowfruit horned beaksedge (*Rhynchospora inundata*), and blue maidencane (*Amphicarpum muhlenbergianum*). Other common herbs include rushes (*Juncus* spp.), fimbries (*Fimbristylis* spp.), spikerushes (*Eleocharis* spp.), fringed yellow-eyed grass (*Xyris fimbriata*), pipeworts (*Eriocaulon compressum* and *E. decangulare*), lemon bacopa (*Bacopa caroliniana*), water cowbane (*Oxypolis filiformis*), clustered bushmint (*Hyptis alata*), and Piedmont marshelder (*Iva microcephala*). This species list is based, in part, on McPherson and McCoy (1974), Bridges (1998), and Florida Natural Areas Inventory (FNAI 2005). Woody species are generally low in cover and include peelbark St. John's wort (*Hypericum fasciculatum*) and water toothleaf (*Stillingia aquatica*). Patches of coastalplain willow (*Salix caroliniana*), common buttonbush (*Cephalanthus occidentalis*), pond apple (*Annona glabra*), and wax myrtle (*Myrica cerifera*) are often scattered in deeper pockets of peat (FNAI 2005).

Drought conditions can entirely dry out the marsh and associated sloughs, allowing other herbs to temporarily gain importance. These include southern amaranth (*Amaranthus australis*), dogfennel (*Eupatorium capillifolium*), sugarcane plumegrass (*Saccharum giganteum*), bluestems (*Andropogon* spp.), giant bristlegrass (*Setaria magna*), camphorweed (*Pluchea* spp.), thistles (*Cirsium* spp.), asters (*Symphotrichum* spp.), and smartweeds (*Polygonum* spp.).

Slough marsh is found in situations that are frequently flooded with slow moving water from upstream sources and local rainfall. They are found in areas of very flat

topography, particularly the dry prairie regions of south-central Florida, where freshwater marshes may form linear drainageways that provide a conduit for moving water. Slough marshes may be shallow or slightly deeper with a slough in the center (USFWS 1999). They are situated on sand or a layer of accumulated peat over sand and are inundated at least during the late summer and early fall (Davis, Jr. 1943).

Characteristic Set of Species: sawgrass, bulltongue arrowhead, sand cordgrass

Rare Species: There are no rare plant species that are characteristic of slough marsh. Rare animal species that use slough marsh include American alligator (*Alligator mississippiensis*), black rail (*Laterallus jamaicensis*), Florida sandhill crane (*Grus canadensis pratensis*), limpkin (*Aramus guarauna*), numerous species of wading birds, and round-tailed muskrat (*Neofiber alleni*).

Range: Slough marsh is restricted to portions of central and southern Florida where exceptionally flat topography and sandy soils create shallow drainage systems. Shallow, sand-bottomed sloughs are common in the flatlands near Lake Okeechobee (Davis, Jr. 1943).

Natural Processes: As in other wetland communities, the frequency of fire in slough marshes is a function of the fire frequency in the surrounding matrix community, as well as the fire-carrying characteristics of the marsh vegetation itself. Sawgrass is particularly efficient at carrying fire, even during periods of inundation. Fire is usually beneficial, not only promoting sawgrass growth, but also benefiting wildlife (Wade et al. 1980). Several dominant herbaceous plants, particularly maidencane and bulltongue arrowhead, grow vigorously following fire under normal conditions, i.e. when water levels are still near the soil surface (Loveless 1959). It is generally thought that lack of fire in marshes leads to an increase in the shrubby component at the expense of the herbaceous species (Peroni and Abrahamson 1986; Lee et al. 2005).

Community Variations: Species composition varies depending on hydroperiod, depth of flooding, and peat accumulation. Since the range of slough marsh is relatively limited, regional variation is not significant.

Associated Communities: There is often a gradual change from linear wet prairies dominated by wiregrass (*Aristida stricta* var. *beyrichiana*) or Gulf hairawn muhly (*Muhlenbergia sericea*) to slough marsh dominated by sand cordgrass or other marsh species. The deeper drainageways of open water or floating plants that remain underwater nearly all year are classified as sloughs. Small prairie hydric hammocks are frequent in the landscape (Bridges 1998). Slough marshes are differentiated from similar basin marsh and depression marsh by their shape and function. Rather than being a collection basin for local rainfall, slough marshes act as drainageways to conduct surface water from large areas of flatlands to floodplains. In the Everglades basin and Big Cypress, glades marsh replaces slough marsh. A substrate of peat or marl deposited directly on a limestone platform distinguishes glades marsh from the sandy slough marshes of nearby regions.

Management Considerations: Slough marshes are highly susceptible to hydrologic alteration. Drainage ditches that quickly move water rather than allowing a slow sheet

flow through the marsh have a dramatic effect on community structure. In a review of early land records, Bridges (2006), found that sawgrass marsh in the dry prairie region around the Kissimmee has been reduced in recent years. Water table drawn-downs for human consumption have been shown to negatively affect nesting success in sandhill cranes in marshes (Dwyer 1990). Woody species such as wax myrtle, live oak (*Quercus virginiana*), and cabbage palm (*Sabal palmetto*) encroach into artificially drained marshes, especially exploiting the spoil banks along the ditches. In the deeper water of the ditches, the invasive exotic weeds water hyacinth (*Eichhornia crassipes*) and hydrilla (*Hydrilla verticillata*) commonly invade (Bridges 1998). Where possible, efforts should be made to fill in ditches in order to return the marsh to a more natural state.

Fires in surrounding communities should be allowed to burn into marshes and extinguish naturally or burn through them. Expanding cover of shrubs such as coastalplain willow, common buttonbush, wax myrtle, and groundsel tree (*Baccharis halimifolia*) are signs of lack of fire. Complete burns of marsh habitat leaving no patches as refuge areas can extirpate animals, such as black rails and round-tailed muskrats, that are dependent on marsh habitat for foraging and nesting (Miller et al. 1998; Legare et al. 1998). The danger of peat fires is a consideration, although, slough marshes are underlain by sand so that long-lasting peat fires are unlikely.

Hog rooting is a serious problem in many marshes; it destroys native species and may also allow invasive exotic plants to get a foothold; common invaders include torpedo grass (*Panicum repens*), Peruvian primrosewillow (*Ludwigia peruviana*), common water hyacinth (*Eichhornia crassipes*), melaleuca (*Melaleuca quinquenervia*), and Brazilian pepper (*Schinus terebinthifolius*). Drainage, perhaps also aided by cattle trampling, can allow weedy pasture grasses to invade marshes, especially where the surrounding community has been converted to pasture (Winchester et al. 1985). Overgrazing of marshes leads to an increase in cover of carpetgrasses (*Axonopus* spp.) and a decrease of maidencane (Tanner et al. 1982). Other pasture grasses that are often present in grazed marshes include centipede grass (*Eremochloa ophiuroides*), bahiagrass (*Paspalum notatum*), and the invasive exotic West Indian marsh grass (*Hymenachne amplexicaulis*).

Exemplary Sites: Kissimmee Prairie Preserve State Park (Okeechobee County), Okaloacoochee Slough State Forest (Hendry and Collier counties)

Global and State Ranks: G3/S3?

Crosswalk and Synonyms: The term slough is often used in the literature to refer to any broad shallow channel regardless of the dominant vegetation, particularly in the flatlands of the central and southern peninsula. In reference to natural communities, the FNAI classification restricts the term slough to deep water marsh or open water, while slough marsh is an emergent or graminoid dominated marsh in the sense of Davis (1943) who describes “pond and slough marshes outside the Everglades” and associated wet prairies. Other communities that occupy broad shallow channels in this region include glades marsh and strand swamp.

Davis	13/Grasslands of Prairie Type
	16/Fresh Water Marshes
SCS	26/Slough

Myers and Ewel Freshwater Marshes - swale
SAF NA
FLUCCS 641/Freshwater Marshes
 643/Wet Prairies
 644/Emergent Aquatic Vegetation

References:

- Bridges, E.L. 1998. Vegetation mapping and natural community types of Kissimmee Prairie State Preserve. Kissimmee Prairie State Preserve unit management plan. Florida Department of Environmental Protection.
- Bridges, E.L. 2006. Landscape ecology of the Florida dry prairie landscape in the Kissimmee River region. Pages 14-42 in R.F. Noss, editor. Land of Fire and Water: The Florida Dry Prairie Ecosystem. Proceedings of the Florida Dry Prairie Conference. Painter, DeLeon Springs.
- Davis, J.H., Jr. 1943. The natural features of southern Florida, especially the vegetation, and the Everglades. Geological Bulletin No. 25. Florida Geological Survey, Tallahassee, Florida.
- Dwyer, N. 1990. Nesting ecology and nest-site selection of Florida sandhill cranes. Thesis, University of Florida, Gainesville, Florida.
- Florida Natural Areas Inventory FNAI. 2005. Historic natural communities at Okaloacoochee Slough State Forest. Unpublished report to the Florida Department of Agriculture and Consumer Services, Division of Forestry. Florida Natural Areas Inventory, Tallahassee, Florida.
- Lee, M.A.B., K.L. Snyder, P. Valentine-Darby, S.J. Miller, and K.J. Ponzio. 2005. Dormant season prescribed fire as a management tool for the control of *Salix caroliniana* Michx. in a floodplain marsh. *Wetlands Ecology and Management* 13:479-487.
- Legare, M., H. Hill, R. Farinetti, and F.T. Cole. 1998. Marsh bird response during two prescribed fires at the St. Johns National Wildlife Refuge, Brevard County, Florida. Page 114 in T.L. Pruden and L.A. Brennan, editors. *Fire in Ecosystem Management: Shifting the Paradigm from Suppression to Prescription*. Tall Timbers Fire Ecology Conference Proceedings, No. 20. Tall Timbers Research Station, Tallahassee, Florida.
- Loveless, C.M. 1959. A study of the vegetation in the Florida Everglades. *Ecology* 40:1-9.
- McPherson, B.F., and H.J. McCoy. 1974. Physiographic map of the Okaloacoochee Slough in Collier County, Florida. United States Geological Survey Open-File Report FL-74022.

- Miller, S.J., K.J. Ponzio, M.A. Lee, L.W. Keenan, and S.R. Miller. 1998. The use of fire in wetland preservation and restoration: are there risks? Pages 127-139 in T.L. Pruden and L.A. Brennan, editors. *Fire in Ecosystem Management: Shifting the Paradigm from Suppression to Prescription*. Tall Timbers Fire Ecology Conference Proceedings, No. 20. Tall Timbers Research Station, Tallahassee, Florida.
- Peroni, P.A., and W.G. Abrahamson. 1986. Succession in Florida sandridge vegetation: a retrospective study. *Florida Scientist* 49:176-190.
- Tanner, G.W., W.S. Terry, and L.L. Yarlett. 1982. Vegetation dynamics of three freshwater marshes within the Kissimmee River Valley. Final Report submitted to Coordinating Council on the Restoration of the Kissimmee River Valley and Taylor Creek-Nubbin Slough, Tallahassee, Florida. School of Forest Resources and Conservation, University of Florida, Gainesville, Florida.
- United States Fish and Wildlife Service USFWS. 1999. Dry prairie. South Florida multi-species recovery plan - Ecological communities. United States Fish and Wildlife Service. URL:
<http://www.fws.gov/verobeach/images/pdfLibrary/dry%20prairie.pdf>
- Wade, D., J. Ewel, and R. Hofstetter. 1980. Fire in South Florida ecosystems. Forest Service General Technical Report SE-17. Southeastern Forest Experiment Station, Asheville, North Carolina.
- Winchester, B.H., J.S. Bays, J.C. Higman, and R.L. Knight. 1985. Physiography and vegetation zonation of shallow emergent marshes in southwestern Florida. *Wetlands* 5:99-118.