# Some Observations on Fluctuating Water Levels and Seasonal Changes In An Arkansas Cypress Swamp[1]

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In Hempstead County, southwestern Arkansas, a cypress swamp, known as Grassy Lake, provides a biotic community near the margin of its range. It is also of interest as a fine example of the bald cypress forest which is disappearing from some parts of our country. It is located on flat bottomland which receives the overflow flood waters from Little River and Saline River. For some fifty years it has been owned and preserved by the Hempstead County Hunting Club. The members of the club use the area solely for hunting, fishing and recreation.

The swamp is bordered by hills on the east which provide some drainage into the lake. The lowest portion of the remaining border is on the northwest and here the owners some years ago built a levee which serves to retain twelve inches more of the flood waters than was previously possible. At what is considered normal water level, the area covered by water is calculated to be 2600 acres, or 300 acres more than before the levee was built. It is estimated that somewhat less than half of this 2600 acres is covered with cypress trees and the rest by open water.

Summer evaporation from the lake lowers the water level sometimes as much as two feet. No actual record of fluctuating levels has been kept by the members, but it is known that prior to building the levee a few seasons reduced the water to shallow pools in the summer. The summer of 1954 took the water to the lowest level since the levee construction, but the lake was navigable by small hunting boats. It seems clear that the building of the levee by the club, as well as the protection of the trees from cutting is responsible for keeping this area in the bald cypress stage of succession. Otherwise the swamp would have been gradually invaded by the oaks and hickories of the uplands, even if the cypress trees had escaped the saw of the lumberman.

Seasonal changes in the swamp are conspicuous in the tree layer of vegetation since all of the trees are deciduous. *Taxodium distichum* (L.) Richard, bald cypress, forms a dense stand which is inhabited in places by the American egret and the anhinga or "water-turkey". The trees are tall, mostly slightly over 100 feet in height, and range in size up to a large specimen measuring 24 feet in circumference. The light green of new leaves in spring contrasts with the reddish-brown leaves of fall and the bare branches of winter. In summer the overarching cypress branches and foliage create a deep shade below. The only other tree observed in the water is *Acer rubrum* L., red maple, with its red fruits prominent in early spring. A shrub, *Cephalanthus occidentalis* L., buttonbush, is common under the trees, even in dense shade. An amphibious grass, *Zizaniopsis miliacea* (Michx.) Doell and Aschers, southern wild rice, covers extensive open areas between the trees and to a less extent occurs beneath the trees. It is the abundance of wild rice which accounts for the name, Grassy Lake. The mats of this grass are favored habitats for the alligators which are native to this swamp.

The open water portion of the lake also shows seasonal changes. By April masses of blue-green and green algae begin to appear below the surface, enmeshed with such submerged plants as *Utricularia biflora* Lam.[2] bladderwort, and *Ceratophyllum demersum* L., hornwort. In the summer large areas of open water are populated by *Nelumbo lutea* (Willd.) Pers., water chinquapin.

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[2] Identified by vegetative material only.

The open water does not have the heavy growth of phytoplankton which characterizes the water under the trees. Members of the Lemnaceae or duckweeds which can first be found in spring are *Lemna minor* L. and *Lemna perpusilla* Torr., *Wolffia columbiana* Karst., water-meal, *Wolffiella floridana* (J. D. S.) Thompson, and *Spirodela polyrhiza* (L.) Schleid. Also in the phytoplankton are a liverwort, *Ricciocarpus natans* (L.) Corda and water-fern, *Azolla caroliniana* Willd. By summer the surface of the water under the trees is covered by these small individual plants and in the fall it has the appearance of thick green paint.

In addition to the phytoplankton some amphibious spring-flowering plants occur in the shallow water between the cypress trees and between their knees, such as *Ranunculus flabellaris* Raf., yellow water buttercup, and *Hydrocotyle ranunculoides* L., an aquatic umbellifer. An unusual seasonal plant is the winter-annual, *Hottonia inflata* Ell., American featherfoil, a member of the Primulaceae which germinates and grows in fall and winter, and finally reaches the surface and flowers in the spring. In April its dissected leaves and inflated stems make it a curious-appearing, floating plant, but it is short-lived.

Many plants grow as epiphytes in Grassy Lake which are not limited to cypress swamps. Among those at their best in the spring, *Osmunda regalis* L., royal fern, develops large clumps on the cypress knees, and a native climber, *Wisteria macrostachya* Nutt., produces showy flowers hanging several feet above the water. *Polypodium polypodioides* (L.) Watt, resurrection-fern, grows on the branches of the cypress trees in such dense shade that the plants are not evident until late fall.

A view of the cypress trees in late summer shows each large tree circled at the higher water levels by buttonbush and other plants. Moore (1) has suggested that seeds have floated to these locations and germinated when conditions became favorable. The gradual lowering of the water level in the summer months, sometimes continued into the fall, exposes cypress and buttonbush roots without apparent injury. It also produces habitats for plants on logs and on knees which were previously close to or under the surface, and which also develop a heavy growth of flowering plants. Moore (1) has reported a rare southern swamp orchid from this habitat, *Habenaria quinqueseta* (Michx.) Sw. Also growing as epiphytes are cypress seedlings which result from seeds germinating on exposed cypress roots. Having reached the seedling stage, these plants can endure submergence for several months.[3] The finding, in October, 1954, of large numbers of these seedlings still retaining their cotyledons, is evidence that the cypress trees are perpetuating themselves at Grassy Lake.

The author is grateful to the members of Hempstead County Hunting Club for preserving and allowing the study of this fine area, particularly to their president, G. R. Payne, and also to D. M. Moore, University of Arkansas, for his assistance.

[3] Correspondence with D. M. Moore.

(1) Moore, Dwight M., 1950. Grassy Lake: A Biologists' Paradise. Proc. of Ark. Acad. of Sci. III, 41-43.