

# The Big Cypress hydrology program

A proactive approach to establishing effective multiagency partnerships

By DON P. WEEKS AND CHRISTINE J. BATES

**W**HEN ASKED TO IDENTIFY THE national park units in south Florida, many people begin and end with Everglades National Park. A lesser known park unit, which shares a common boundary with Everglades, is Big Cypress National Preserve. At 295,026 ha (729,000 acres) in size, Big Cypress is the 12th largest unit in the national park system in the continental United States. Established in 1974, the preserve is located in southwest Florida within the Big Cypress Swamp physiographic province (fig. 1). This region extends westward from the Everglades to near the west coast of Florida, and southward from the Caloosahatchee River drainage to the estuaries of the Gulf of Mexico.

## The physiographic setting

Water is the basic component of the ecosystems within the Big Cypress Swamp. This water-dependent ecology is a result of the subtropical climate and physiographic setting: the climate provides the hydrologic input; the physiographic setting controls the distribution of that input. The natural topography in the preserve is flat, ranging from near mean sea level (msl) in the south to 5.8 m (19 ft) msl in the northeast. Topographic slopes in the area average less than 9 cm/km (0.5 ft/mile). The preserve has two distinct climatic seasons; a wet season (May-October) and a dry season (November-April) (fig. 2). The annual mean precipitation in the preserve is 143 cm (56.3 in), of which about 75 percent normally falls during the six-month wet season. During this time, as much as 90 percent of the preserve is inundated to depths ranging from a few centimeters to more than one meter. As the dry season begins, generally in October, water levels start to recede. The recession continues until May, when approximately 10 percent of the pre-

serve is covered by water in ponds and sloughs. In this predominantly wetlands habitat, the seasonal inundation of land and depth of inundation are critical for maintaining this delicate ecosystem.

## Water resources management plan

Although the importance of water in the preserve has long been recognized, only limited efforts have been made in the past to document and understand its hydrologic significance. With limited human resources and budget, the preserve had been forced to play a reactive role in the internal and regional water-related issues. Recognizing this as a problem and in response to the increasing multiagency efforts to restore the south Florida ecosystem in the 1990s, the preserve added permanent technical staff and increased funding for the hydrology program. This paved the way for a cooperative effort between the preserve and the NPS Water Resources Division to prepare a Water Resources Management Plan (WRMP) for the preserve. This plan, completed in 1996, provides a review of the current legislation, existing hydrological information, an in-depth analysis of water resources issues, and the development of an action plan (30 project statements) to address both internal and external water-related problems. During the development of the plan, the preserve sought input from the various federal, state,

and county agencies, and American Indian tribes to reinforce the cooperative focus of the National Park Service. The WRMP is proving to be an excellent management tool in the dynamic hydrological and political environment of south Florida.

## Hydrology Program and accomplishments

The preserve's technical staff recognizes the importance of improving the quality, consistency, and efficiency of hydrological data collection to meet the increasing internal and regional management needs. Since cost was the limiting internal factor, the preserve looked outside the Park Service for long-term cooperative support. The hydrological information was not only important to the preserve, but also important to other federal, state, and county agencies in south Florida. The South Florida Water Management District (SFWMD), a state agency, provided this support. A five-year cooperative agreement was executed between the SFWMD and Big Cypress National Preserve in 1995 to combine

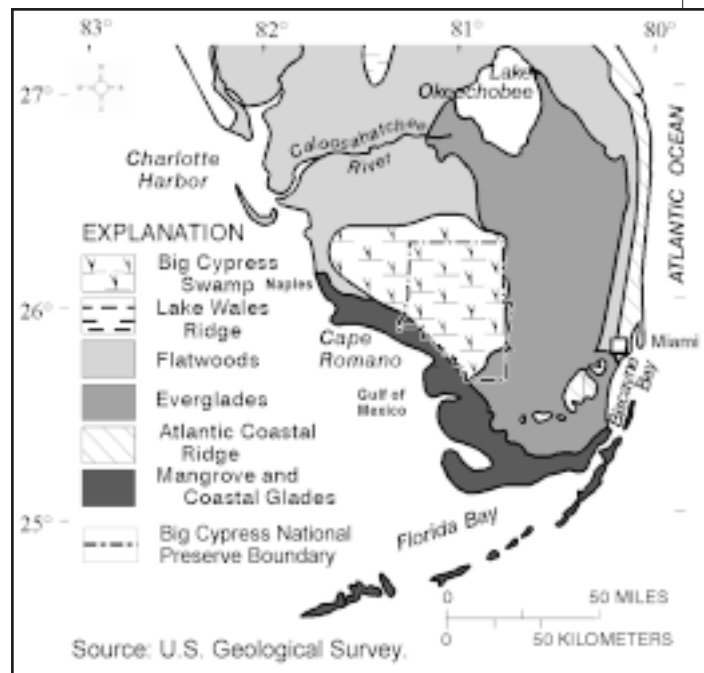
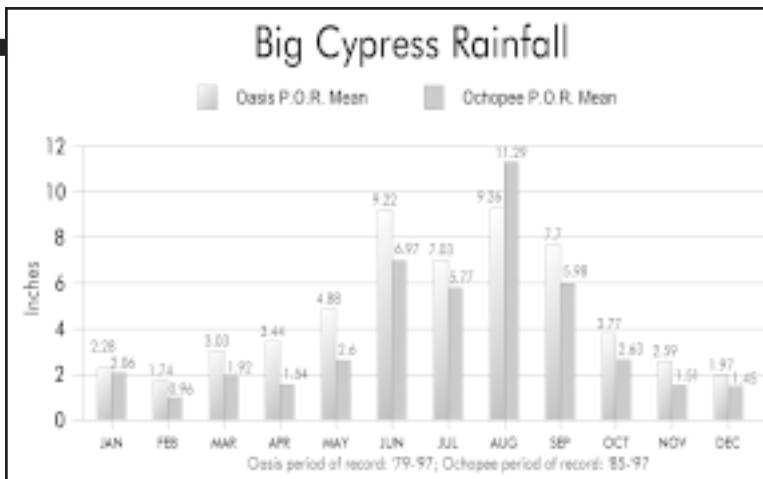


Figure 1. Big Cypress National Preserve lies within the Big Cypress Swamp physiographic region, a large water-dependent ecosystem. Century-long modifications to this delicate system have altered the natural ecology, which the preserve is addressing through its hydrology program.

*The decision to create a technical water resources staff and prepare a water resources management plan helped the preserve define its water resource objectives and forge strong local partnerships*

Figure 2. The preserve is characterized by a six-month dry season during winter, followed by a summer wet season when 75 percent of the annual precipitation occurs. During the wet season, as much as 90 percent of the preserve is inundated.



resources to support and improve the preserve's water stage and water quality monitoring program. Since 1995, the SFWMD has contributed over \$130,000 in field equipment upgrades, water quality analyses, quality assurance/quality control (QA/QC) inspections, data processing, staff support, and training. Under this agreement, the preserve collects continuous water stage data and monthly water quality samples following a strict quality assurance project plan approved by the SFWMD. This hydrological information is stored on the SFWMD regional databases, making the data available to all interested groups.

Given the intent of the WRMP to define the preserve's water resources objectives and the strong support from the SFWMD, the preserve has become more active in the regional scientific efforts. In 1996, under the authority contained in Section 528 of the 1996 Water Resources Development Act, nominations for critical restoration projects in south Florida were solicited. The nomination and prioritization of the critical restoration projects were based on these criteria:

1. the project produces independent, immediate, and substantial restoration, preservation and protection benefits;
2. the project can be initiated prior to September 30, 1999;
3. it is consistent with components of the integrated plan to restore, maintain, and protect the ecosystem, developed by the Florida Governor's Commission for a Sustainable South Florida;
4. the total project cost estimate is less than \$50 million; and
5. a cost sharing partner has been identified.

The preserve has submitted a proposal for consideration as a critical restoration project that addresses a significant hydrological problem identified in the WRMP. The proposal would help to restore a more natural hydropattern to southwest Florida, including the preserve, by improving the conveyance of surface water through U.S. Highway 41 (Tamiami Trail; fig. 3). The Tamiami Trail, constructed in the 1920s, is a two-lane highway that bisects the preserve and connects Miami to Naples. This elevated roadbed impedes the natural north-south "sheet-flow" in the region. The existing bridges and water control structures are inadequate for distributing this sheetflow beneath the Tamiami Trail. This results in the interruption of natural seasonal hydropatterns (quantity, timing, and distribution of surface water flows) for the area.

Over 90 project proposals were submitted and reviewed by the South Florida Ecosystem Restoration Task Force<sup>2</sup>, U.S. Army Corps of Engineers, and Florida's Governor's Commission. After several meetings to prioritize the numerous candidates, the \$15 million proposal submitted by the preserve was ranked second, and was one of five proposals presented in Washington,

<sup>1</sup>A broad expanse of moving water that spreads as a thin, continuous film over a large area, and is not concentrated into well-defined channels.

<sup>2</sup>A federal-state partnership, established in 1993, that is working to coordinate the development of consistent policies, strategies, plans, programs, and priorities for addressing the environmental concerns of the south Florida ecosystem.

D.C., as an example critical restoration project proposal. The preserve has since taken the lead to identify a project management team consisting of representatives from the U.S. Army Corps of Engineers, Florida Department of Transportation, SFWMD, Florida Department of Environmental Protection, and the National Park Service. The Environmental Research Institute of Michigan is currently involved in an EPA-funded project that is evaluating the utility of synthetic aperture radar (SAR) collected by the ERS-1 satellite for monitoring wetland vegetation communities in southwest Florida. This information, currently being reviewed by the project management team, may assist with the project design by identifying appropriate locations for additional water conveyance structures

BIG CYPRESS NATIONAL PRESERVE, CHRISTINE BATES



Figure 3. Built in the 1920s, the two-lane Tamiami Trail interrupts the natural north-south flow of water through Big Cypress National Preserve and Everglades National Park. Improving the conveyance of sheetflow through the highway is a critical aspect of ecological restoration in the preserve.

within the 70 km (43.6 mi) project area of the Tamiami Trail.

The preserve's technical staff has also taken a lead role in a multiagency effort to produce a comprehensive science plan for southwest Florida. At the request of Interior Secretary Bruce Babbitt and the South Florida Ecosystem Restoration Task Force, a science workshop steering committee has been established to initiate the effort. A multiagency effort is currently underway to develop this regional science plan for the Big Cypress Basin. Comprised of public land managers, regional planners, researchers and agricultural landowners, the steering committee's efforts focus on the Big

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Cypress Basin with the goal of accomplishing three tasks: (1) conduct an issues characterization workshop, targeting the scientific community in the Big Cypress Basin to identify, characterize, and prioritize the natural resource issues within the Big Cypress Basin; (2) conduct an inventory of existing research and monitoring information within the Big Cypress Basin; and (3) conduct a second workshop to link priority natural resource issues and science information needs for the development of a Big Cypress Basin science plan.

The issues characterization workshop was conducted in 1997 and was attended by over 70 regional scientists. During this workshop, the participants identified, characterized, and prioritized natural resource issues within the Big Cypress Basin. In March 1998, three workshops were held to prioritize natural resource issues in the Big Cypress Basin, and currently the initial draft of the science plan is being written. Also, the inventory database of monitoring and research projects was completed this year and can be reviewed on the Internet at [http://library.fgcu.edu/big\\_cypress](http://library.fgcu.edu/big_cypress).

Big Cypress National Preserve is beginning to produce successful results for defining, monitoring and managing its water-dominated ecosystem. The approach has been aggressive and the recent results have been rewarding. In the future, the preserve's ability to continuously seek improvement for evaluating and managing its hydrological system will be the key for meeting the dynamic resource management needs within its boundary and south Florida. **P<sub>S</sub>**

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