

EXECUTIVE SUMMARY

2005

SOUTH FLORIDA
ENVIRONMENTAL
REPORT

FEBRUARY 15, 2005

On behalf of Governor Jeb Bush, I am pleased to announce the remarkable progress achieved in 2004 to restore the South Florida ecosystem and the River of Grass. Thanks to committed funding, outstanding performance of pollution control programs, and science-based plans for further improvements in water quality and quantity, Florida is restoring the South Florida ecosystem and America's Everglades. While meeting dozens of legal and reporting requirements under one cover, the *2005 South Florida Environmental Report* (SFER) conveys information vital to environmental restoration and regulation. The 2005 SFER builds on the success of the Everglades Consolidated Reports at fulfilling the information requirements of the Everglades Forever Act and is expanded to include restoration progress for Lake Okeechobee, the Kissimmee River basin, and coastal ecosystems as it highlights numerous accomplishments.

This year was a very good year for Everglades restoration. A quicker pace to achieving restoration was announced by Governor Bush in October 2004 with the commitment to accelerate Everglades restoration efforts. Florida's innovative plan, known as "Acceler8," will improve water quality, restore vast acres of wetlands and help deliver the right amount of water at the right time to the natural system – more than a decade ahead of schedule. The new plan will add 18,000 acres of treatment marsh to improve water quality even further.

To achieve the stringent, science-based water quality standard of 10 parts per billion for phosphorus standard adopted by Florida, the state is treating pollution in water entering the marsh through the largest system of constructed wetlands in the world. Together, the treatment marshes and the agricultural programs have removed an impressive 1,700 metric tons of phosphorus that otherwise

would have entered the River of Grass. The world's largest constructed wetland, STA-3/4, removed a remarkable 40 metric tons of phosphorus this year while treating over 445,000 acre-feet of water to outflow concentrations of just 12 parts per billion through September 2004.

During Fiscal Year 2004, 7,917 acres of land designated for Comprehensive Everglades Restoration Plan (CERP) projects were acquired, bringing the total lands available for CERP to 206,109 acres, which is about 53 percent of the land needed.

Good news on the natural front, as the Kissimmee River restoration project is revitalizing 40 square miles of river and floodplain habitat with more than 40 continuous miles of meandering river channel. In addition, 2004 was one of the best breeding years in decades for wading birds in South Florida with more than 50,000 nests.

The secret to our success is staying focused on first-rate science, engineering, and management. It is a proven formula. We look forward to keeping this positive momentum as we move into a new and exciting phase of restoration efforts.

Sincerely,



Colleen M. Castille
Secretary
Florida Department of Environmental Protection



2005 SOUTH FLORIDA

FOREWORD

sfwmd.gov

The *2005 South Florida Environmental Report* ushers in a new era of consolidated reporting for the South Florida Water Management District. This report is the result of a major consolidation effort, described in the following two pages. As the seventh comprehensive publication authored cooperatively by the South Florida Water Management District and the Florida Department of Environmental Protection, it consists of two volumes, both consolidating multiple reports to provide the public and decision makers with diverse, up-to-date information on the unique South Florida environment.

Volume I, "The South Florida Environment – Water Year 2004," builds upon the success of the former Everglades Consolidated Reports and continues to fulfill its objective of conveying relevant information from a year of scientific and engineering efforts by dozens of outstanding technical professionals. This first volume now brings together information from across the entire District. It satisfies various annual reporting requirements of the Everglades Forever Act, the Lake Okeechobee Protection Act, and other state and federal laws.

Volume II, "Annual Plans and Reports," consolidates eight annual District plans and reports required by the Florida Legislature or the Florida Department of Environmental Protection. The expanded consolidation reflected for the first time in this new product documents progress in plan implementation while it avoids the overlap and duplication of past years' reporting, and streamlines the District's publication process and legislative review. A database developed to support Volume II provides a single source of project-related information and allows for greater efficiency in project reporting, information retrievals, and compilations.

In support of Florida's Government in the Sunshine law, the South Florida Water Management District posted the two-volume, draft 2005 report on the District's Website (www.sfwmd.gov/sfer/) and invited public comment via an interactive WebBoard. A panel of eight independent experts

also reviewed Volume I during a three-day public workshop. The final 2005 report, as well as the 2000–2004 Everglades Consolidated Reports, can be found on the Website and also on the compact disc inside the back cover of this booklet.

The diverse information summarized in the *2005 South Florida Environmental Report* continues to document the scientific soundness and track the strong performance of programs and

projects supporting prudent environmental management and restoration of the region. The South Florida Water Management District, in partnership with the Florida Department of Environmental Protection, remains fully committed to integrating the many research, planning, regulatory, and construction activities leading to sustainable ecosystems in South Florida. The annual publication of this expanded report is a big step forward on the path to sound management and restoration of the South Florida region.



PILOT PROJECT AND LEGISLATIVE RECOMMENDATIONS OVERVIEW

The 2005 South Florida Environmental Report (SFER) is the product of a major consolidation process authorized by the Florida Legislature in Chapter 2004-53, Laws of Florida, on May 12, 2004. This newly established legislation directs the South Florida Water Management District to undertake a pilot project to consolidate mandated plans and reports to the Florida Legislature and Governor. Other non-mandated plans and reports are also addressed in order to improve coordination, efficiency, and effectiveness as part of this effort. A new temporary deadline of February 15, 2005, has been imposed in lieu of other existing statutory deadlines for the submission of multiple plans and reports covered in the 2005 SFER.

Building on the success of the Everglades Consolidated Reports, the 2005 annual consolidated report has been expanded into two volumes. Volume I, "The South Florida Environment – Water Year 2004" provides data summaries and detailed analyses for all major ecosystems in South Florida in a format similar to previous Everglades Consolidated Reports. This information will now support restoration, management, and protection activities associated with Lake Okeechobee, the Kissimmee River, and South Florida's coastal ecosystems, as well as the Everglades.

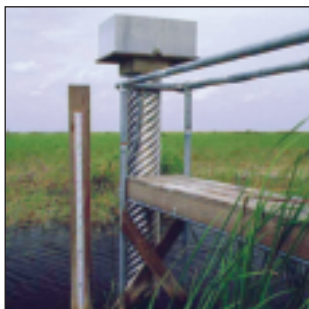
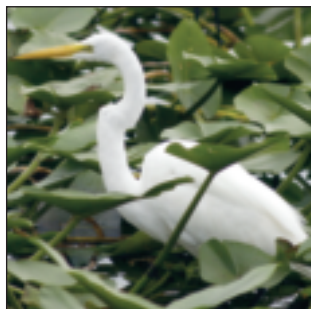
The newly expanded report also includes Volume II, "Annual Plans and Reports," consolidating eight annual reports as well as providing a comprehensive, project-related database. These reports are required from the District, either legislatively or by the Florida Department of Environmental Protection. This information is designed to document progress in plans developed to address key areas of responsibility through the District's 10 programs outlined in its Strategic Plan (available online at www.sfwmd.gov/images/pdfs/stratplan_final51304_40.pdf).

As part of the pilot project, the District is required to provide key findings as a result of this consolidation effort. Overall, these findings include the following:

- Consolidation achieves efficiencies in information gathering, report compiling, review, printing, and distribution.
- Database creation increases the consistency of project-related information and has the advantage of readily retrieving needed data.
- Unifying multiple reports into a single document allows District project managers and other staff to easily share diverse information and evaluate data, providing a more inclusive perspective on District-wide issues.
- Consolidation yields a better, more efficient report, making information more accessible to policymakers, stakeholders, and the public.
- The costs associated with expanded report production are minimized by utilizing existing procedures and are exceeded significantly by the far-reaching benefits.

RECOMMENDATIONS AIM TO SAVE RESOURCES AND YIELD BETTER INFORMATION

As a part of the pilot project, the District is also required to recommend appropriate statutory changes for further reporting consolidation. Based on several recent interagency meetings between the FDEP and all water management districts, the South Florida Water Management District has developed a set of statutory recommendations to be reviewed by the Florida Legislature during the 2005 session.



Overall, the proposed recommendations call for the creation of a single, annual report with a new statutory deadline that would consolidate information from multiple, individual documents, building on the concept of the former Everglades Consolidated Reports. This newly created report would apply statewide to all five water management districts. Based on work undertaken in this pilot project, this statewide requirement is expected to conserve agency resources as well as make information more readily available in a single, consolidated report.

The recommendations also identify several obsolete reports that may be eliminated or modified, as they contain information that is now readily available online. In recognition that further consolidation and efficiencies can be achieved, it is proposed that the water management districts, in conjunction with the FDEP, continue to coordinate and submit additional statutory recommendations, as appropriate, for the 2006 session.

STATEWIDE LEGISLATIVE RECOMMENDATIONS

Based on recent interagency coordination efforts, it is recommended that all water management districts consolidate the following documents into a single, annual report:

- Florida Forever Work Plan Update
- Five-Year Capital Improvements Plan
- Five-Year Water Resource Development Work Program
- Alternative Water Supply Annual Report
- Minimum Flows and Levels Priority List
- Mitigation Donation Report
- District Water Management Plan Annual Report
- Other plans and reports currently under discussion

Each district would submit this comprehensive report to the Florida Legislature, the Governor, and the chair of each applicable county commission annually by March 1, allowing sufficient time for executive and legislative consideration.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT LEGISLATIVE RECOMMENDATIONS

In recognition of South Florida's unique ecosystems, the South Florida Water Management District provides separate annual reporting to the Florida Legislature and Governor, as part of current statutory requirements. Therefore, it is also recommended that the District specifically consolidate the following required documents into the overall annual report:

- Lake Okeechobee Protection Program Annual Report
- Comprehensive Everglades Restoration Plan Annual Report
- Everglades Forever Act Annual Report, a progress report

- Everglades Forever Act Annual Peer-Reviewed Report, a report on research and monitoring
- Everglades Trust Fund Expenditure Report

These documents also would be submitted annually by March 1, as part of the overall annual report.

INFORMATION ON THE INTERNET RENDERS SOME REPORTS OBSOLETE

Besides reviewing opportunities for consolidation, the water management districts and FDEP reviewed whether any mandated reports might be eliminated or modified. It was identified that there are several reports, currently issued by all water management districts, which contain information routinely provided on their respective Websites. For interested parties, the on-line information is likely to be superior to the data provided in these reports, as it is more up-to-date and accessible. Therefore, it is proposed that the following annual reports be eliminated:

- Groundwater Basin Resource Availability Inventory
- Six-Month Hydrologic Report (information required but six-month deadline eliminated)
- Abandoned Artesian Wells Annual Report

COLLABORATIVE EFFORTS WILL CONTINUE TO SEEK MORE EFFICIENCIES

While the current pilot project provides immediate benefit and the recommended statutory changes are promising, the South Florida Water Management District and its partnering agencies agree that the search for more efficient reporting and planning should continue. As a result, it is recommended that the FDEP and the water management districts should meet after the 2005 session and, where appropriate, submit additional proposed changes to the Florida Legislature and Governor for consideration in the 2006 session.

A FINAL NOTE

The recommendations provided in this report are considered to be a starting point for further legislative discussions. Any subsequent legislation filed to enact these proposed recommendations would likely be improved by considering additional statutory changes. In the experience of the District staff working on this pilot project, many future opportunities exist for better consolidation and coordination of water management district planning and reporting.



THE BOTTOM LINE



The *2005 South Florida Environmental Report* efficiently unifies more than 50 individual reports into a single, two-volume document. The key findings on pages 4 and 5 were derived from Volume I, “The South Florida Environment–Water Year 2004.” These findings now cover all District areas including the Kissimmee River basin, Lake Okeechobee, coastal ecosystems, and the Everglades. Page 6 highlights Volume II, “Annual Plans and Reports,” summarizing the Fiscal Year 2004 (FY2004) planning and project status for eight annual reports required under various regulatory mandates.

VOLUME I, THE SOUTH FLORIDA ENVIRONMENT – WATER YEAR 2004

WATER QUALITY IN THE EVERGLADES PROTECTION AREA

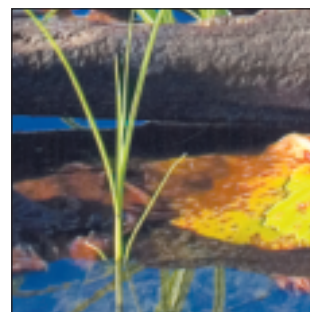
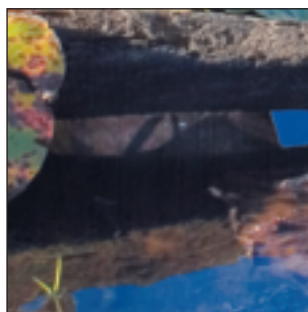
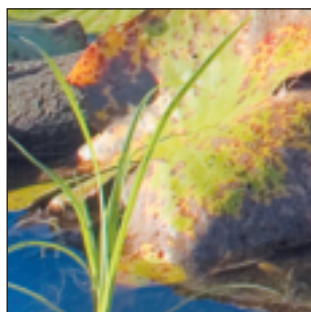
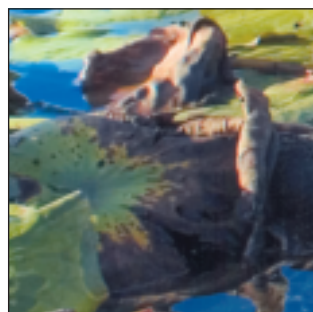
- The Florida Department of Environmental Protection (FDEP) analyzed deviations (excursions) from water quality criteria for Water Year 2004 (WY2004) and reported that Everglades water quality generally meets state numeric criteria. Overall, patterns seen in water quality constituents for WY2004 were very similar to recent years and varied across regions of the Everglades Protection Area (EPA) in association with local environmental conditions and water management activities.
- In 2004, an innovative, site-specific alternative criterion for dissolved oxygen in the EPA was approved by the U.S. Environmental Protection Agency (USEPA).
- On July 8, 2003, Environmental Regulation Commission approved total phosphorus (TP) criterion of 10 parts per billion (ppb) within an eight-part rule for the EPA developed by the FDEP. The TP criterion rule was

subsequently upheld in its entirety in a final order from the Administrative Law Judge on June 17, 2004, and awaits approval by the USEPA before achievement of the criterion is assessed in accordance with the rule.

- TP loads to the Everglades during WY2004 totaled approximately 104 metric tons (excluding atmospheric deposition) and were significantly lower than both the 1979–1988 baseline period and WY2003. In general, the combined performance of Stormwater Treatment Areas (STAs) and agricultural Best Management Practices (BMPs) continues to exceed expectations. Together, these phosphorus-control programs have removed over 1,700 metric tons of phosphorus since 1994 that otherwise would have entered the Everglades.

PERFORMANCE OF THE STORMWATER TREATMENT AREAS

- During WY2004, the STAs received a total of over 778,000 acre-feet of inflow and removed 88 metric tons of TP (a 69-percent reduction in surface water), from an average inflow of 133 ppb to an average outflow of 41 ppb.
- During WY2004, operations began at the 16,543-acre STA-3/4, the largest constructed wetland in the world, and its initial performance was outstanding. During its first 12 months of operation (October 1, 2003, through September 30, 2004), STA-3/4 captured and treated over 445,000 acre-feet of water and removed over 40 metric tons of TP to an average outflow concentration of only 12 ppb.
- Data from STA-1W test cells and the Field-scale Test Facility near STA-2 indicates that the Periphyton-Based Stormwater Treatment Area (PSTA) technology, under optimal conditions, can achieve outflow TP concentrations of about 11 to 15 ppb. The District is constructing a 100-acre PSTA demonstration project in STA-3/4 to directly compare performance with that of submerged aquatic vegetation.



PERFORMANCE OF AGRICULTURAL BEST MANAGEMENT PRACTICES

- BMPs continue to be a very effective tool for reducing phosphorus at its source in the Everglades Agricultural Area (EAA). The area last year showed a 64-percent load reduction, compared to the 25-percent load reduction required by the Everglades Forever Act. In the nine years since the BMP program was initiated, the EAA basin has averaged greater than 50-percent load reduction compared to the pre-BMP base period.
- WY2004 marked the second year of mandatory BMP implementation in the C-139 basin. Increased regulatory and voluntary efforts are ongoing to bring the basin into compliance with the regulatory program requirements.

ECOLOGY AND HYDROLOGY OF SOUTH FLORIDA

- In WY2004, no extreme hydrologic event occurred in South Florida. In the northern areas, Lake Okeechobee inflows and outflows were above the long-term averages and resulted in the St. Lucie and Caloosahatchee estuaries receiving more fresh water than long-term expectations. Farther south, inflows to the Arthur R. Marshall Loxahatchee National Wildlife Refuge were near normal, while outflows were only about 50 percent of historical levels. Inflows to WCA-2 and WCA-3 were within 25 percent of historical levels.
- In 2004, the District reported a total of more than 54,000 wading bird nests in South Florida. This is a 61-percent increase from 2003, and one of the best breeding years in recent decades in terms of total number of nests. However, this is a 21-percent decline on the record year of 2002, which was the best nesting year since the 1940s.
- Biological control offers a cost-effective approach for control of widespread invasive exotic plants in South Florida. Biological control insects are showing promising results in damage to melaleuca stands and are expanding into other areas since their initial releases in 1997 and 2002. Approval for the release of the first *Lygodium*-damaging insect was received in August 2004. District-sponsored research is currently in progress for new releases of the first Brazilian pepper and additional melaleuca-damaging insects.

TRACKING PERFORMANCE OF THE COMPREHENSIVE EVERGLADES RESTORATION PLAN

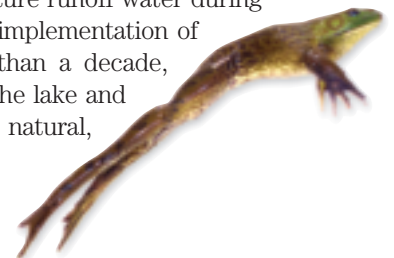
- RECOVER (Restoration Coordination and Verification) uses scientific and technical information to support the Comprehensive Everglades Restoration Plan (CERP).
- RECOVER's Monitoring and Assessment Plan will measure systemwide responses to CERP-related projects, and 34 projects are currently being undertaken to track CERP's performance and to begin gathering data to establish a pre-CERP reference state by 2010.
- CERP implementation will take many years, and adaptive management must accommodate changing conditions, new information, and other factors. The Initial CERP Update is under way to incorporate information gained since the release of the CERP Feasibility Report in 1999. This update will result in a clearer picture of CERP's performance under revised planning conditions.

LONG-TERM PLAN FOR ACHIEVING WATER QUALITY GOALS

- The District began implementation of projects in the "Long-Term Plan for Achieving Water Quality Goals in the Everglades Protection Area" in FY2004. The Long-Term Plan was submitted to the FDEP in December 2003, as required by the Everglades Forever Act, and the first annual public meeting was held in February 2004.
- The Everglades Forever Act requires that revisions to the Long-Term Plan be developed through an adaptive management approach and be approved by the FDEP. The FDEP approved the first requested minor revision to the Long-Term Plan on April 15, 2004.

THE LAKE OKEECHOBEE PROTECTION PLAN

- Excessive phosphorus loads, harmful high water levels, and exotic plants in the lake's littoral zone are being addressed by the Lake Okeechobee Protection Act (LOPA), enacted by the Florida Legislature in 2000.
- Significant progress has been made to control the spread of exotic plants in the lake. Watershed projects have been implemented to reduce phosphorus transport from agricultural lands and capture runoff water during high rainfall periods. Full implementation of LOPA will require more than a decade, and will gradually return the lake and its huge basin to a more natural, sustainable balance.



KISSIMMEE RIVER RESTORATION

- The Kissimmee River Restoration Project is revitalizing 40 square miles of river and floodplain habitat with more than 40 continuous miles of meandering river channel. Land acquisition for the project is more than 80 percent complete with the purchase of 87,004 acres of the 105,095 acres needed. Phase I of the project was completed in February 2001 and has succeeded in returning flow to 15 miles of river channel and restoring frequent inundation of the floodplain.
- Environmental responses in the Phase I restoration area include improvements to water quality, colonization of the floodplain by native wetland vegetation, reductions in floating nuisance vegetation along river channels, increases in river channel sandbar habitats, improvement of the aquatic invertebrate food base, and increases in the numbers of wading birds utilizing the floodplain.

MANAGING COASTAL ECOSYSTEMS

- Estuarine research, monitoring, and modeling of the coastal ecosystems in South Florida have confirmed the need for reestablishing freshwater flows that are similar to the natural volume, timing, distribution, and duration required by healthy estuarine ecosystems. Interim solutions to this need are in progress until CERP is fully implemented.
- Water quality continues to be a major concern in most coastal ecosystems in South Florida, despite progress in implementing multiple stormwater retrofit projects and agricultural and urban BMPs. Field and laboratory investigations and model development are improving understanding of the linkage between water quality and estuarine ecology in South Florida. The District plans to undertake a comparative analysis of key water quality parameters throughout the estuaries to evaluate common trends and conditions.

VOLUME II, ANNUAL PLANS AND REPORTS

- During FY2004, 7,917 acres of land designated for use by CERP projects were acquired. This brings the total lands available for use for CERP projects to 206,109 acres, which is 53 percent of the estimated land needed for CERP implementation. In FY2004, total CERP revenues were \$164 million and total CERP expenditures were \$206 million. The anticipated expenditures for FY2005 are \$285 million.
- Significant progress has been made toward projects specifically required by the Lake Okeechobee Protection Act. Watershed and in-lake implementation projects, together with research efforts and the comprehensive water quality monitoring program for the watershed, all have a role in meeting the Lake Okeechobee Protection Program requirements.

- The District has allocated \$295.6 million in FY2005 to implement its regional water supply plans and make 119.4 million gallons per day (mgd) of additional water available. The District is anticipating spending an estimated \$1.21 billion over the FY2005–FY2009 period on water supply plan implementation. This expenditure is designed to result in 483.9 mgd being made available by FY2009. These estimates include CERP environmental restoration projects with water resource development benefits.
- In FY2005, the District is contributing \$6 million to 28 water supply projects as part of the Alternative Water Supply Funding Program. These projects, when completed, are designed to produce 66.12 mgd.
- The Everglades Construction Project is a major element of the Everglades Restoration Program, and is one of the nation's largest environmental restoration projects. This project is estimated to cost \$836.2 million over 20 years. Florida Bay Restoration Program activities are ongoing, with a projected cost estimate of \$367 million. The District receives funding for both programs from Alligator Alley tolls via the Florida Department of Transportation (FDOT). Since 1997, the FDOT has provided \$14 million, split equally between the two programs.
- In 2004, the District developed a 10-year Strategic Plan, which reinforced the priorities outlined in the District Water Management Plan and organized the agency's mission and mandates into 10 programs. The seven priorities outlined in the Strategic Plan are: build three reservoirs through private/public partnerships; achieve Everglades water quality standards; acquire land for Kissimmee River restoration; reduce phosphorus inputs to Lake Okeechobee; refurbish the regional flood control system; implement water supply plan recommendations; and continue to recognize the value of employees.
- There are 60 projects eligible for Florida Forever funding during FY2005–FY2009. These include CERP projects, Save Our Rivers projects, and water quality and supply initiatives, plans, and studies. The estimated five-year District real estate expenditures to purchase lands for eligible projects is projected to total \$194 million, of which \$36 million is projected to be expended in FY2005.
- The total FY2005 budgeted capital expenditures are \$488.8 million, which is 61.7 percent of the total District FY2005 budget. The largest share of the FY2005 funding in the Capital Improvements Plan is contained within the Surface Water Project category (\$401.2 million, or 82.1 percent). This category includes CERP/Critical Restoration Projects at \$285.0 million, District Everglades Program at \$69.2 million, and the Kissimmee Restoration Program at \$44.1 million.



THE SOUTH FLORIDA ENVIRONMENTAL REPORT
WATER YEAR 2004

VOLUME I

INTRODUCTION TO THE 2005 SOUTH FLORIDA ENVIRONMENTAL REPORT - VOLUME I



This introductory chapter provides the reader with a basic understanding of the governmental, scientific, and legal context behind Volume I of the *2005 South Florida Environmental Report*. Volume I is an expansion of previous Everglades Consolidated Reports (ECRs) published annually between 2000 and 2004. Overall, this newly established report streamlines and consolidates previous reporting efforts by the South Florida Water Management District. It efficiently unifies over 50 individual reports into a single document while fulfilling multiple reporting requirements. The information presented in this report continues to aid in Everglades restoration and now supports restoration, management, and protection activities on Lake Okeechobee, the Kissimmee River, and South Florida's coastal ecosystems. Collectively, this volume addresses numerous research and monitoring projects throughout the District shown in the map on the opposite page. Updates on these projects for the current reporting year, Water Year 2004 (May 1, 2003 through April 30, 2004), are provided throughout this volume.

Similar to the former Everglades Consolidated Reports, the *2005 South Florida Environmental Report – Volume I* was subjected to an intensive review process, including posting the draft report on an interactive WebBoard, three days of public workshops, and peer review by an independent panel of experts. Chapter 1 summarizes this quality assurance process. This scrutiny ensures that the report communicates the best information available in support of the District's programs. This more inclusive report also will continue to be used by the District, the Florida Department of Environmental Protection, and other agencies to support environmental management decisions.



THE EXPANDED REPORT IS NOW TWO VOLUMES AND STREAMLINES THE DISTRICT'S REPORTING

The *2005 South Florida Environment Report* is comprised of Volumes I and II, and the Executive Summary. Volume I, "The South Florida Environment – Water Year 2004" is a technical-based volume organized in a framework of twelve chapters and provides data summaries for all major ecosystems in South Florida in a format similar to the previous ECRs. Chapters 1 through 9 of this volume include all of the topics of the former ECRs and continue the overall objective to summarize available data and findings relating to the Everglades restoration effort, including aspects of the Comprehensive Everglades Restoration Plan. Additionally, in order to provide a more integrated regional perspective on environment management, this year's report has been expanded to include coverage of the Lake Okeechobee Annual Report in Chapter 10, fulfilling the requirement of the Lake Okeechobee Protection Program on the lake and its large watershed. Technical information and project updates on the Kissimmee River and Upper Chain of Lakes (Chapter 11), and coastal ecosystems in South Florida (Chapter 12) are also included. Volume I chapters are supported and enhanced by an extensive amount of appended documentation providing data summaries and detailed analyses for the special-interest reader as well as to comply with various permit requirements. Volume II, "Annual Plans and Reports" summarizes the planning and project status for annual reports required under various mandates (see page 40 for further details).

Southern
Charlotte
Harbor



**LEGEND**

- CANALS
- WATER CONSERVATION AREAS (WCAs)
- STORMWATER TREATMENT AREAS (STAs)
- MICCOSUKEE INDIAN RESERVATION
- SEMINOLE INDIAN RESERVATION
- ROTENBERGER AND HOLEY LAND
- WILDLIFE PRESERVE AREAS

MAJOR AREAS OF THE SOUTH FLORIDA ENVIRONMENT



SOUTH FLORIDA RESTORATION IS UNIQUE IN SCALE AND COMPLEXITY

Globally, environments are dramatically changing due to widespread development, resulting in huge modifications to the hydrology and chemistry of large-scale ecosystems. Unfortunately, the South Florida environment is no exception to these trends. Over the past century, the Kissimmee-Okeechobee-Everglades and coastal ecosystems in South Florida have been altered fundamentally by changes in spatial extent, hydrology, water quality, and ecology.

The Everglades has been reduced to about 50 percent of its original extent, and its water supply has been significantly modified in both quantity and quality. Initiated in the 1950s, the natural Kissimmee River and its floodplain were channelized for flood control improvements, but caused extensive losses of valued wetland habitats. Urban and agricultural lands near Lake Okeechobee pose an ongoing challenge to water management, balancing issues related to water supply and impacts to downstream ecosystems. Throughout South Florida, the quality of surface water inflows, particularly for the nutrient phosphorus, is a critical problem. Also, invasive exotic species are aggressively invading natural habitats and causing displacement of native plants and animals.



The far-reaching impacts of these issues, along with strategies for restoring the ecosystem, are addressed throughout the *2005 South Florida Environmental Report – Volume I*. Chapter 1 also provides an integrative summary of the opportunities and obstacles facing South Florida environmental restoration. This includes an overview of the Everglades restoration strategy, a multifaceted, comprehensive approach that includes interim and long-term plans for achieving water quality goals and for optimizing environmental management. Highlighting the District's broad restoration efforts throughout South Florida, restoration strategies for the Kissimmee River, Lake Okeechobee, and coastal ecosystems are also presented.

STATUS OF WATER QUALITY IN THE EVERGLADES PROTECTION AREA

Information from comprehensive water quality monitoring programs in the Everglades Protection Area (EPA) during Water Year 2004 (WY2004) is evaluated in Chapter 2A of the *2005 South Florida Environmental Report – Volume I*. This chapter assesses water quality parameters that did not meet their state Class III water quality criteria during WY2004 and evaluates conditions affecting water quality in the EPA. These criteria are defined in Section 62-302.530, Florida Administrative Code, and establish enforceable management and societal goals for water quality conditions in the Everglades.

WATER QUALITY IN THE EPA GENERALLY REMAINS IN COMPLIANCE

Most water quality data collected in the EPA continues to meet applicable water quality criteria. However, as in previous years, some concentrations exceeded state criteria (identified as “excursions”). These excursions vary greatly across different EPA regions, as expected considering local environmental conditions and water management activities.

Similar to previous water years, water quality excursions in WY2004 were identified for dissolved oxygen, pH, alkalinity, conductivity, and un-ionized ammonia. Evaluation of these occurrences continues to support the view that localized conditions account for most water quality excursions. Excursions from pH and alkalinity criteria

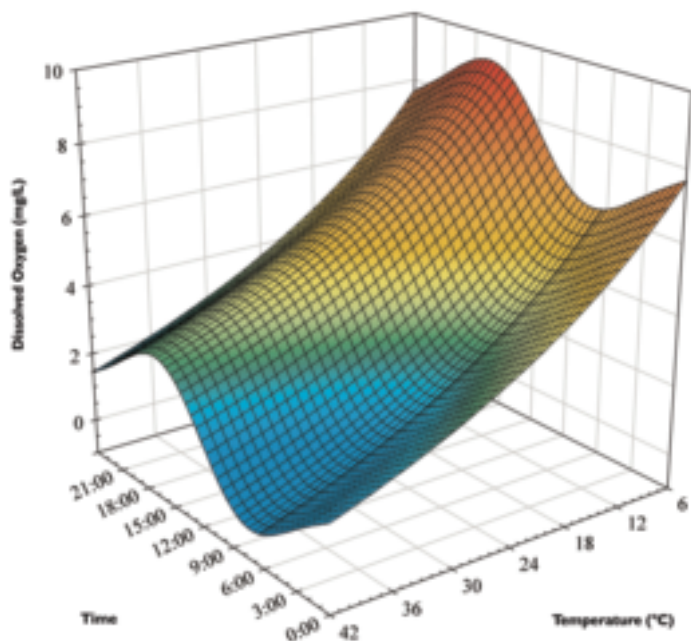
continued to be localized primarily to the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge) and were related to natural conditions within the area. One pesticide, atrazine, which does not have a constituent-specific numeric Class III water quality criterion, was detected at concentrations above its toxicity-based guidelines. Atrazine exceedances occurred at the inflows to all monitoring areas in the EPA except the Refuge.

A SITE-SPECIFIC CRITERION FOR MARSH OXYGEN LEVELS IN THE EPA IS ADOPTED

In January 2004, the Florida Department of Environmental Protection (FDEP) adopted a site-specific alternative criterion (SSAC) for dissolved oxygen (DO) in the EPA. The FDEP demonstrated that the SSAC was a more appropriate criterion for the Everglades than the existing statewide standard of 5.0 parts per million. Subsequently, the DO criterion was approved by the U.S. Environmental Protection Agency as a revision to Florida’s water quality standards. Because a single value criterion does not adequately account for the wide-ranging natural daily fluctuations observed in the marsh, the SSAC provides a mechanism to account for the major factors (e.g., time of day and season) influencing natural background DO variation in the Everglades. Additionally, the SSAC accounts for both seasonal and annual variability in marsh DO concentrations within the EPA.

During WY2004, dissolved oxygen was categorized as either a potential concern or concern for most EPA regions (e.g., Refuge, Water Conservation Area 3) and classes (e.g., inflow, interior). Stations that failed to meet their SSAC for DO were generally influenced either by conditions caused by the construction of canals and operation of water control structures (such as the disturbance of bottom sediments), or by nutrient enrichment. Marsh excursions, primarily in the interior, frequently occurred in areas known to be enriched with phosphorus. Areas with such conditions are expected to remain impaired until phosphorus concentrations in surface water and sediment are reduced and the biological communities recover. When unenriched areas are evaluated separately, DO is generally classified as a minimal concern in the EPA.

THE SITE-SPECIFIC ALTERNATIVE CRITERION MODEL USES TIME OF DAY AND WATER TEMPERATURE TO ESTABLISH REASONABLE DISSOLVED OXYGEN TARGETS FOR SITES IN THE EVERGLADES.



MERCURY MONITORING, RESEARCH AND ENVIRONMENTAL ASSESSMENT IN SOUTH FLORIDA

Mercury remains an important water quality concern in South Florida. The Florida Department of Environmental Protection, with the support of the South Florida Water Management District, continues to lead the South Florida Mercury Science Program, which has as a goal to understand the causes and risks of the mercury problem. Chapter 2B of the *2005 South Florida Environmental Report – Volume I* updates mercury-related findings reported in previous Everglades Consolidated Reports.

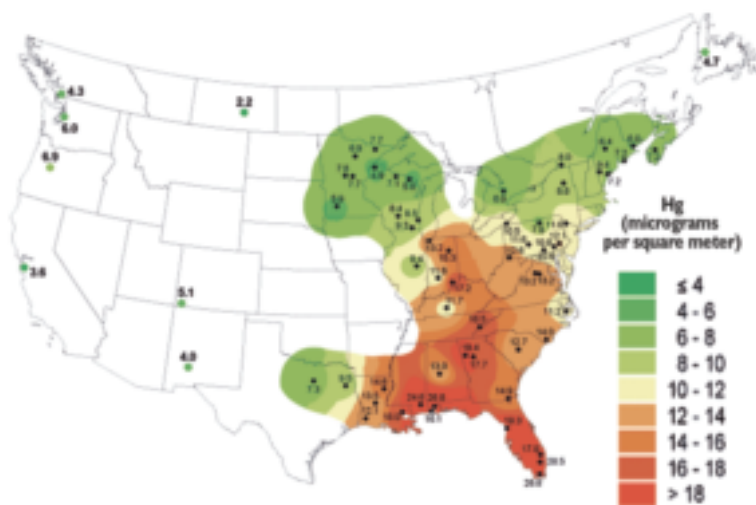
Methylmercury, a highly toxic form of mercury, is produced primarily in sediments by naturally occurring, sulfate-reducing bacteria (SRB). Its production is controlled by the rate of supply of mercury – mercury deposited from the atmosphere being the predominant source to the Everglades (see map at right) – and by sulfur and dissolved organic carbon (DOC) concentrations. Methylmercury accumulates (biomagnifies) at each step of the aquatic food chain and, thus, top predator fish can accumulate as much as 10,000,000 times more methylmercury than found in the surrounding water. Consequently, fish-eating animals (e.g., wading birds) and their predators, notably the Florida panther, may face associated mercury risks.

MERCURY LEVELS CONTINUE TO DECLINE IN THE EVERGLADES

Mercury concentrations in fish and wading birds in the Everglades have declined sharply, with concentrations in largemouth bass in Water Conservation Areas (WCAs) 1, 2, and 3 reduced by about 40 to 80 percent over the past decade. Despite these declines, methylmercury levels in bass remain above the water quality criterion of 0.3 milligrams per kilogram fish tissue proposed by the U.S. Environmental Protection Agency (USEPA). Additionally, mercury concentrations in bass appear to have stabilized at most Everglades sites since 1998.

Notably, methylmercury production at the mercury “hotspot” near site 3A-15 in WCA-3 has dropped substantially since 1993. These reductions are most likely associated with declines in mercury emissions, and sulfate and DOC concentrations in the surface waters at this site. Sulfate continues to be discharged from the Everglades Agricultural Area into the Everglades Protection Area at relatively high rates. However, sulfate concentrations at 3A-15 have declined to a level where they limit methylmercury production by SRB. Hydrological manipulations have caused the mercury hotspot to be relocated from site 3A-15, quite possibly to the Everglades National Park.

TOTAL MERCURY WET DEPOSITION, 2003



National Atmospheric Deposition Program/Mercury Deposition Network

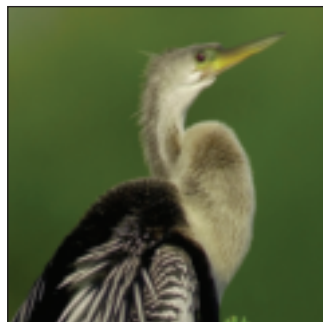
RESEARCH TO CONTINUE TO FOCUS ON LINKS BETWEEN MERCURY EMISSIONS, SULFUR AND DOC CONCENTRATIONS, AND MERCURY IN BIOTA

Anthropogenic emissions of mercury from South Florida are presently calculated to be a small fraction (about 7 percent) of the peak historical levels observed during the late 1980s. However, current mercury emissions throughout South Florida are influenced by numerous, smaller sources, which remain poorly quantified. Some evidence suggests that local sources are no longer declining because the total number of medical waste incinerators in Florida has currently rebounded from a historical record low of two to eighteen statewide, with eight in South Florida. Despite the substantial earlier reductions, more detailed mercury emissions and sulfur loading inventories of South Florida may be required to identify and develop Best Management Practices, if the USEPA's proposed criterion for mercury in fish tissue is to be attained.

STATUS OF NITROGEN AND PHOSPHORUS IN THE EVERGLADES PROTECTION AREA

Research has shown that enrichment of relatively small additions of primary nutrients, phosphorus and nitrogen, can have significant impacts on the natural balance of South Florida's ecosystems. This is especially true for the Everglades ecosystem, which evolved as a highly oligotrophic (nutrient-poor), phosphorus-limited system, and is comprised of natural flora and fauna adapted to successfully exist under these harsh conditions. Chapter 2C of the *2005 South Florida Environmental Report – Volume I* presents an overview of the status of phosphorus and nitrogen levels in the surface waters within the Everglades Protection Area (EPA) during Water Year 2004 (WY2004). This chapter also provides an update regarding the development of a numeric phosphorus criterion for the EPA.

PHOSPHORUS CONCENTRATIONS ACROSS THE EPA CONTINUE TO DECLINE IN WATER YEAR 2004



As documented for previous years, phosphorus concentrations measured during WY2004 decrease from north to south in the EPA regions, with the highest levels present in the inflow to the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge) and Water Conservation Area 2 (WCA-2), and with concentrations decreasing to a minimum within the Everglades National Park (Park). As depicted

on the map on the following page, WY2004 total phosphorus (TP) concentrations in surface water (represented as geometric means in parts per billion, or ppb) moving into ("inflow") and within ("interior") the EPA regions are lower than the previous water year, WY2003.

TP concentrations measured during WY2004 at inflows to all EPA regions were below the levels reported for WY2003 and the historical period (WY1978–WY2002). Monitoring results show that the lower annual geometric mean TP concentrations measured during WY2004 in the

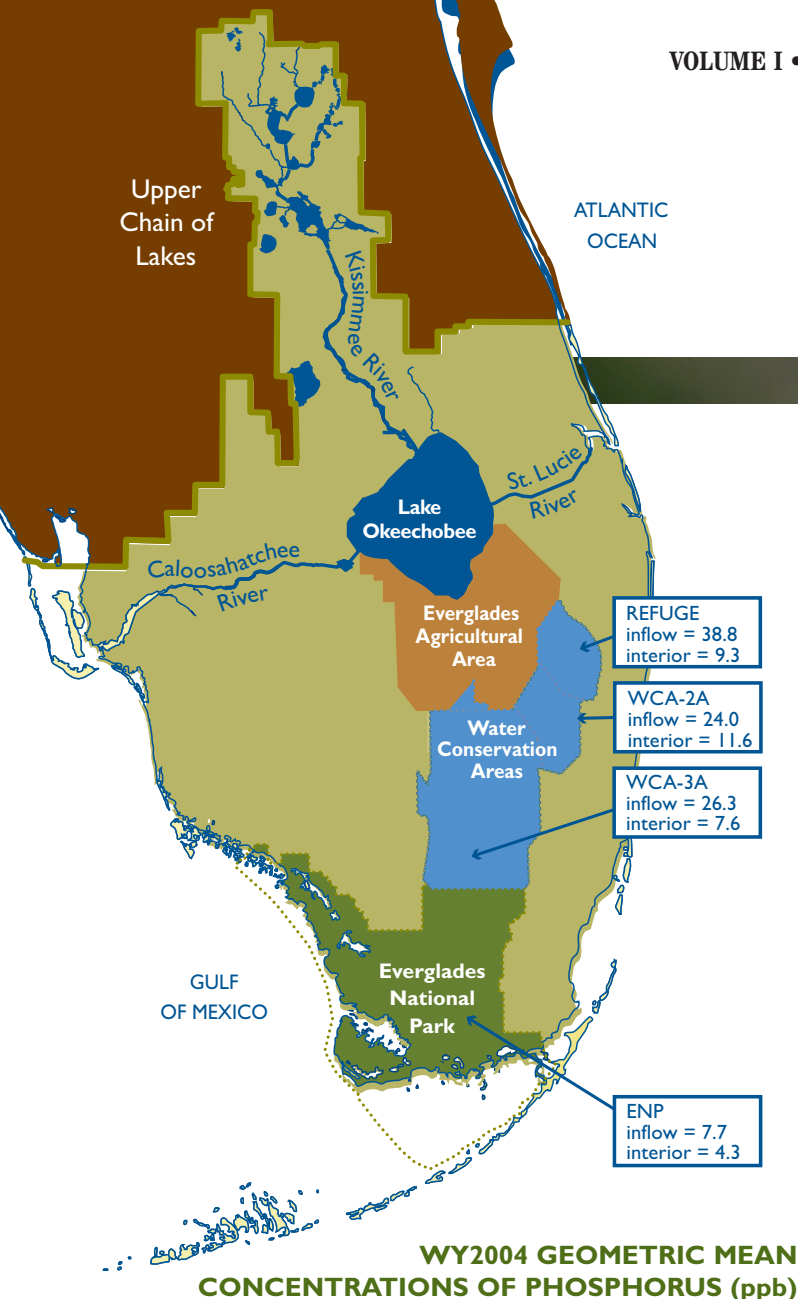
inflows to the Refuge and WCA-2 continue a decreasing trend, which started in the mid-1980s. This decreasing trend is greatest for WCA-2, where WY2004 inflow TP concentrations were 24 and 59 percent lower than WY2003 and historical levels, respectively. During WY2004, inflow TP concentrations for the Refuge were 20 and 43 percent lower than WY2003 and historical levels, respectively. Inflow TP concentrations for WCA-3 and the Park were also the lowest recorded for any of the three reporting periods, with Park inflows continuing to remain well below 10 ppb. Soluble orthophosphate concentrations, the biologically active form of phosphorus, in the inflows to all EPA regions also decreased substantially in WY2004, with an annual geometric mean concentration below 10 ppb for all areas. Overall, these reductions likely reflect efforts to continue the implementation and refinement of Best Management Practices in the upstream agricultural and urban watersheds; and the greater treatment afforded by the increasing number of operating Stormwater Treatment Areas (STAs) and the optimization of existing STAs.

The geometric mean TP concentrations measured across interior marsh stations in all portions of the EPA during WY2004 were also the lowest recorded for any of the three reporting periods. The annual geometric mean TP concentration across interior marsh sites for all EPA regions, except WCA-2, was below the 10-ppb phosphorus criterion. The geometric mean for interior marsh sites in WCA-2, the most phosphorus-enriched portion of the EPA, was slightly above the annual 11-ppb limit. Lower marsh TP levels measured during WY2004 likely reflect the lower inflow concentrations, changes in water management practices, and a general improvement in nutrient conditions in the marsh.

ADMINISTRATIVE LAW JUDGE RULES IN FAVOR OF UPHOLDING THE PROPOSED PHOSPHORUS CRITERION RULE FOR THE EPA

The Florida Department of Environmental Protection (FDEP) has used the results of extensive research to numerically interpret the existing narrative criterion, as directed by the Everglades Forever Act, to propose a





TOTAL PHOSPHORUS CONCENTRATIONS IN THE EVERGLADES PROTECTION AREA

phosphorus criterion of 10 ppb for the EPA. The 10-ppb phosphorus criterion rule was approved by the FDEP's Environmental Regulation Commission during a hearing in July 2003. Following this approval, both environmental and agricultural interest groups filed administrative challenges. Following discussions with the FDEP concerning the application of the rule, all parties except the Miccosukee Tribe of Indians and the Friends of the Everglades withdrew their challenges. To resolve the remaining challenges, an administrative hearing was held during the period from November 2003 through January 2004. In June 2004, a final order was filed by an administrative law judge in favor of the State of Florida upholding all parts of the proposed rule, which was then filed with the Florida Secretary of State by the FDEP. Upon approval by the U.S. Environmental Protection Agency, the required monitoring networks will be established and achievement of the new criterion will be assessed in accordance with the rule.

NITROGEN LEVELS CONTINUE TO SHOW CONSISTENT TRENDS THROUGHOUT THE MONITORING YEARS

Similar to previous monitoring years, water quality results for WY2004 show that nitrogen concentrations decreased from north to south in the EPA regions. Like phosphorus, this gradient likely reflects the higher concentrations in agricultural discharges to the northern portions of the EPA, with levels reducing gradually across the marsh as water flows southward.

Across all EPA regions, total nitrogen (TN) levels measured during WY2004 were similar to or slightly lower than those measured during WY2003 and the historical period (WY1978–WY2002). The highest average TN concentrations were observed in the inflows to the Refuge and WCA-2, with levels decreasing to a minimum in the Park. During WY2004, mean TN concentrations at inflow stations in the EPA regions ranged from 0.9 to 2.5 parts per million (ppm). Similarly, mean TN concentrations at the interior marsh stations ranged from 1.0 to 1.9 ppm.

PHOSPHORUS CONTROLS FOR THE BASINS TRIBUTARY TO THE EVERGLADES PROTECTION AREA

Chapter 3 of the 2005 *South Florida Environmental Report – Volume I* provides an update on the progress of the Everglades Program and permits, as mandated by the Everglades Forever Act (EFA) and the Florida Administrative Code (Chapter 40E-63), for controlling phosphorus in discharges tributary to the Everglades Protection Area (EPA). The South Florida Water Management District is responsible for compliance requirements stipulated in permits issued by the Florida

Department of Environmental Protection (FDEP) that assure that the District complies with the EFA. The District-held permits associated with this program are the Everglades Construction Project (ECP) and non-Everglades Construction Project (non-ECP) permits.

As mandated by the EFA, the ECP permit requires the District to construct, maintain, and operate the Everglades Construction Project in the Everglades Agricultural Area (EAA) and the C-139 basins, the largest tributary sources to the EPA. It also requires the District to provide reasonable assurance that a phosphorus source control program using Best Management Practices (BMPs), known as the Everglades Regulatory Program, has been implemented in the EAA and C-139 basins prior to discharging to the Stormwater Treatment Areas (STAs). Also required by the EFA, the non-ECP permit requires the operation and maintenance of discharge structures within the District's control and that discharge into, within, or from the EPA but are not included in the ECP. In order to meet requirements for both permits, basin-specific water quality data for total phosphorus (TP) were collected by the District during Water Year 2004 (WY2004).

TOTAL PHOSPHORUS LOAD REDUCTION FROM THE EVERGLADES AGRICULTURAL AREA SINCE WATER YEAR 1996

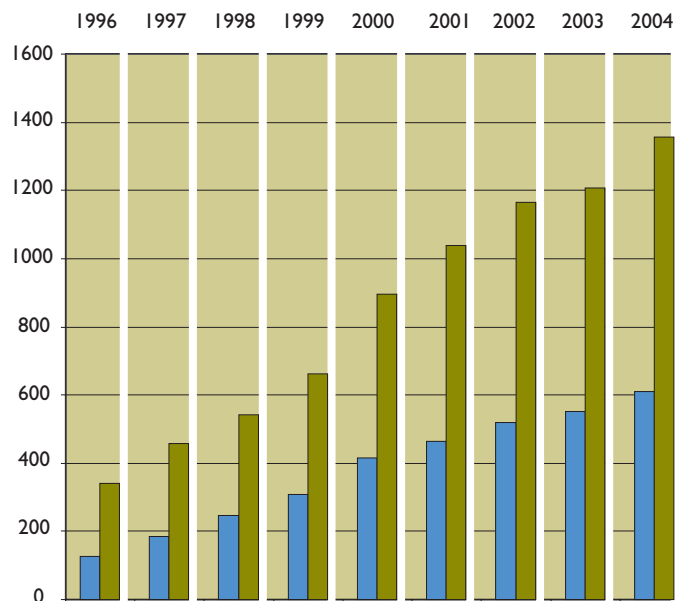
■ Cumulative 25% Reduction ■ Cumulative Observed Reduction

Phosphorus Load Reduction (metric tons)

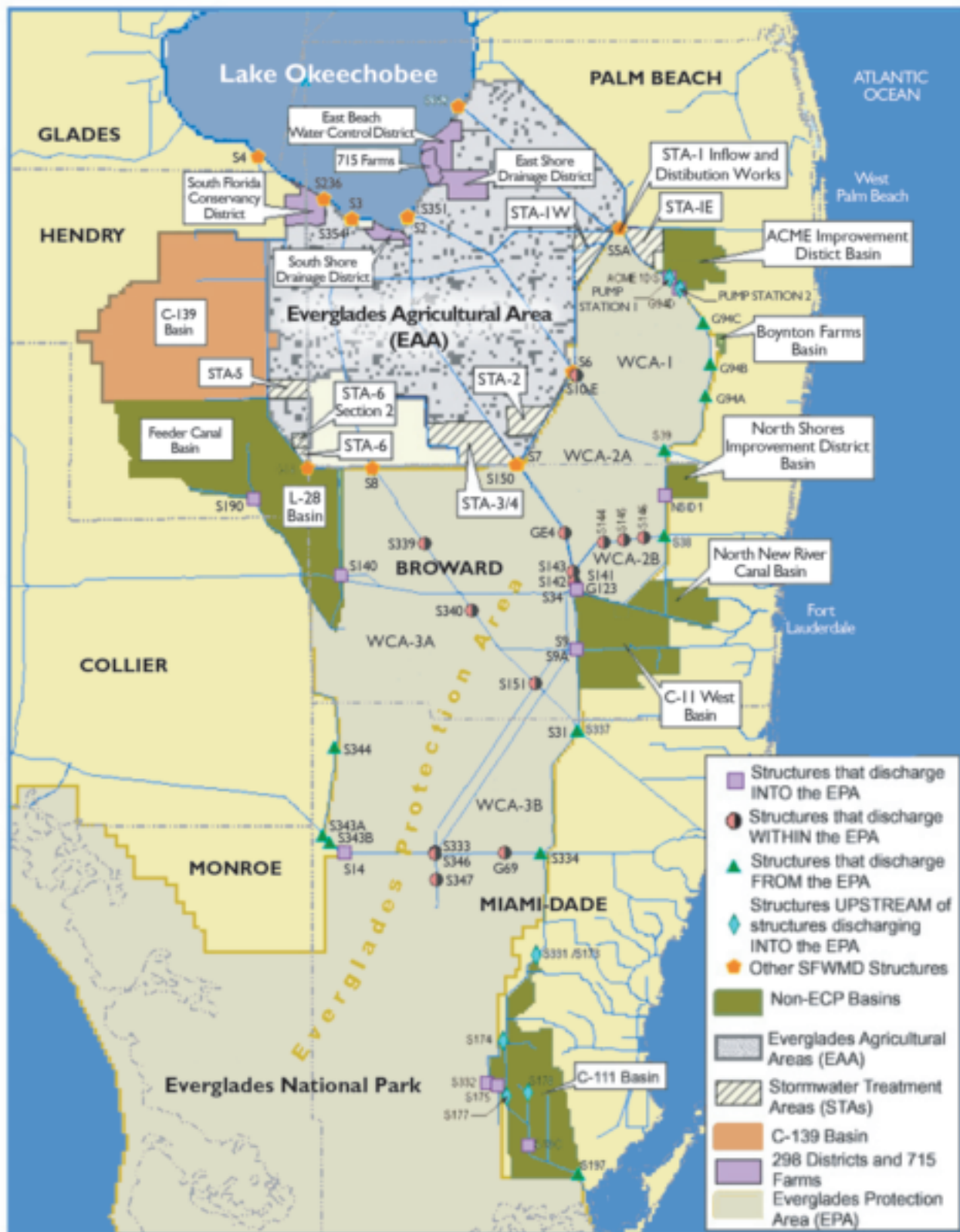
THE BMP REGULATORY PROGRAM CONTINUES TO BE SUCCESSFUL, PREVENTING OVER 1,300 METRIC TONS OF PHOSPHORUS FROM LEAVING THE EVERGLADES AGRICULTURAL AREA

In accordance with ECP permit requirements, the EAA basin is required to reduce TP loads by 25 percent when compared to the 10-year, pre-BMP baseline period (October 1, 1978, through September 30, 1988). As depicted in the figure on this page, the BMP Regulatory Program has prevented over 1,300 metric tons of phosphorus from leaving the EAA in water discharges. The EAA basin also has been in compliance for the ninth consecutive year since the first year of full BMP implementation, as shown on the figure on page 16. The TP load discharged from the EAA basin for WY2004 was 82.3 metric tons, which is considerably lower than the TP load of 229.2 metric tons that was predicted from the baseline period. Overall, the annual percentage load reduction average from the EAA is greater than 50 percent since the BMP Regulatory Program's initiation in WY1996. The implementation of BMPs and STAs combined are responsible for the continued declining trend in TP loads and concentrations attributable to the EAA basin and conveyed to the EPA.

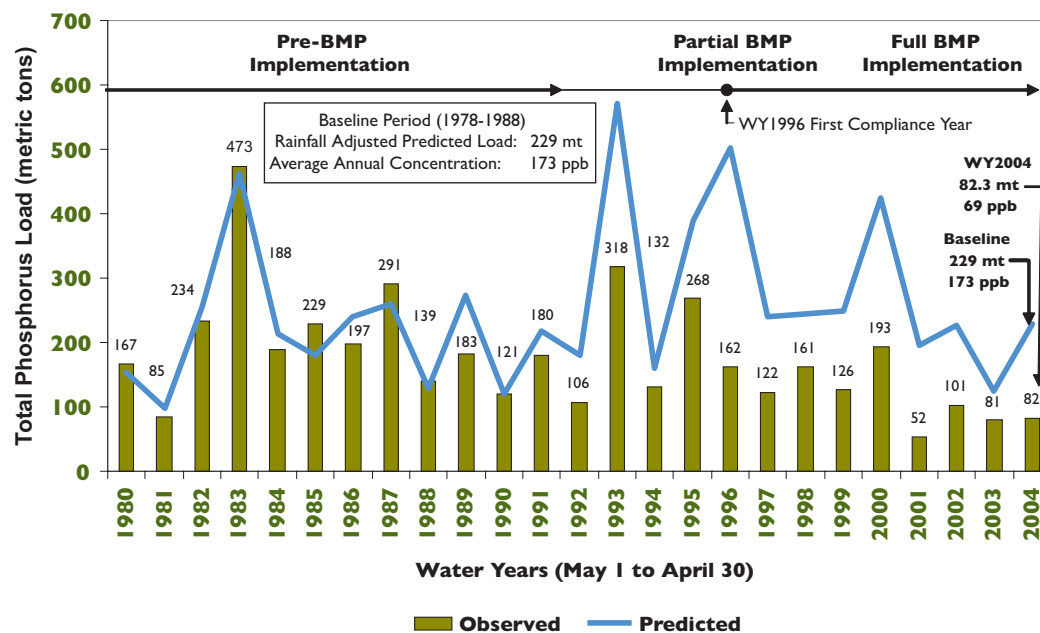
Water Year



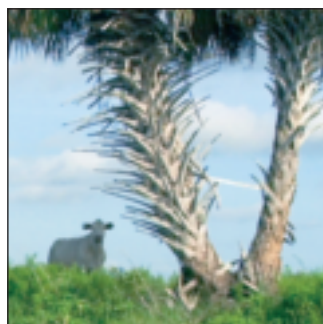
EVERGLADES STORMWATER PROGRAM LOCATIONS



**TOTAL
PHOSPHORUS
LOADS FROM
THE
EVERGLADES
AGRICULTURAL
AREA,
OBSERVED AND
PREDICTED,
SINCE WATER
YEAR 1980**



In addition to the Everglades Regulatory Program, the EFA and the Florida Administrative Code require that EAA landowners, through the Everglades Agricultural Area -

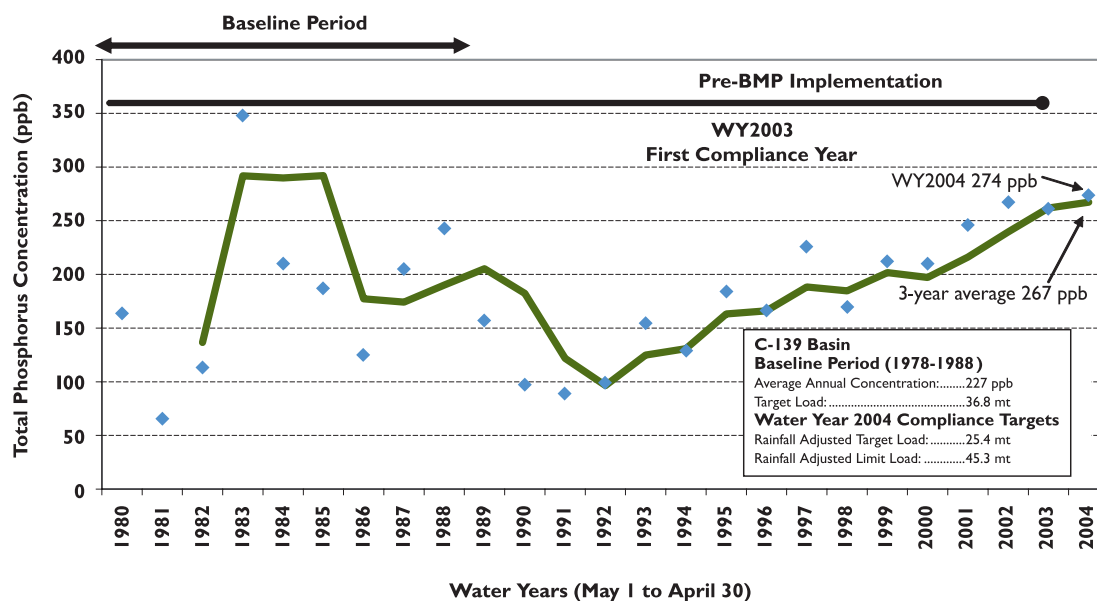


Everglades Protection District, sponsor a program of research, testing, and implementation to monitor the efficacy of established BMPs in the EAA. To date, this has been accomplished through the University of Florida's Institute of Food and Agricultural Sciences BMP farm-scale study. BMP research, monitoring, and education efforts are continuing so that water quality

improvements can be made by applying new information to existing situations and by applying "lessons learned" to other regions that discharge into the EPA. It is expected that future BMP work will continue to be directed at optimizing the effectiveness of existing BMPs through ongoing on-farm research and enhanced uniform BMP implementation.

**A BASIN-SPECIFIC ACTION PLAN WILL
ENHANCE THE NEWLY IMPLEMENTED
BMP REGULATORY PROGRAM IN THE
C-139 BASIN**

Unlike the EAA basin, the goal of the C-139 basin is to maintain TP loads at or below historical baseline levels. As shown on the figure on the next page, the C-139 basin has been determined to be out of compliance since its initial compliance period in WY2003. The TP load discharged from the C-139 basin for WY2004 was 69.0 metric tons. This load exceeds the WY2004 calculated limit (defined as the limit load, which is 45.3 metric tons) and the target load from the baseline period (36.8 metric tons), although it has slightly decreased from levels observed in WY2003 (72.3 metric tons). The impact of BMPs on water quality is not expected to be realized immediately because of the time sequence of regulatory requirements in this basin and given that it is a relatively new program. Also, this area appears to be in a transitional period of changing land uses that are resulting in increasing trends in runoff and phosphorus concentrations. In response, the District has developed an action plan for the C-139 basin to (1) create funding programs that will accelerate the implementation of BMPs on individual farms, (2) provide training to landowners on effective implementation of BMPs, and (3) utilize BMP demonstration projects at the farm and regional levels to ensure a holistic approach to improving water quality.



TOTAL PHOSPHORUS LOADS FROM C-139, MEASURED AND CALCULATED, SINCE WATER YEAR 1980

REGULATORY ACTION STRATEGY HAS RESULTED IN ACTION PLANS FOR ACHIEVING WATER QUALITY COMPLIANCE IN ESP BASINS

The Everglades Stormwater Program (ESP) is responsible for administering the non-ECP permit for eight tributary basins (ESP basins), outside of the ECP. The ESP basins include the ACME Improvement District, North Springs Improvement District, C-11 West, North New River Canal, Feeder Canal, L-28, Boynton Farms, and C-111 basins. Through the program's 10-step plan, known as the Regulatory Action Strategy (RAS), progress continues to be made on strategies to achieve and maintain compliance with state water quality standards. The RAS has provided a thorough assessment of each basin using the available information and data to develop scientifically sound water quality improvement strategies. The initial assessment steps of data collection and evaluation, followed by development of action plans for each basin, have been completed. Action plans for each ESP basin are in place and comprise a combination of voluntary BMPs, requirement and/or modification of permits to include water quality criteria, construction projects, cooperative agreements, basin-specific regulatory programs, and public education. As recommended by the Long-Term Plan, action plans consider integration with congressionally authorized components of the Comprehensive Everglades Restoration Plan and other federal projects.

WATER QUALITY PARAMETERS ASSOCIATED WITH ESP BASINS GENERALLY REMAIN IN COMPLIANCE WITH FLORIDA WATER QUALITY STANDARDS

In accordance with the non-ECP permit requirements, water quality data from non-ECP structures during WY2004, the seventh year of non-ECP data, were evaluated against state water quality standards. Data comparison indicates that the quality of water discharging into the EPA is generally acceptable, with the exception of phosphorus concentrations, dissolved oxygen, and occasional excursions from standards for pH and specific conductance. Similar to WY2003, analysis of TP concentrations in WY2004 revealed significant basin-wide differences, ranging from the lowest levels at the C-111 basin to the highest levels at the ACME Basin B and Feeder Canal basins. Unlike the ECP basins that are required to decrease TP levels in discharges based on historical loads, there is no specific phosphorus requirement established at the point of discharge for the ESP basins. Therefore, water quality data will continue to be tracked for increasing and decreasing trends so that basin-specific action plans may be modified as necessary through an adaptive management process to ensure optimization measures for phosphorus reduction.



STA PERFORMANCE, COMPLIANCE, AND OPTIMIZATION

The 1994 Everglades Forever Act (EFA) mandates a program of construction, research, and regulation projects to improve the quality of all waters discharging into the Everglades Protection Area (EPA). This aggressive and comprehensive restoration program is designed to achieve and maintain compliance with phosphorus and other water quality standards by December 30, 2006. Key components of this effort include the implementation of Best Management Practices (Volume I, Chapter 3) and development of large, constructed wetlands, known as Stormwater Treatment Areas (STAs) under the Everglades Construction Project (ECP). The STAs are located at key sites along the northern boundary of the EPA. The STAs improve the quality of waters flowing into the EPA by accumulating phosphorus in their sediments through biological and chemical wetland processes.

STA PERFORMANCE CONTINUES TO EXCEED EXPECTATIONS, WHILE MEETING REGULATORY COMPLIANCE REQUIREMENTS

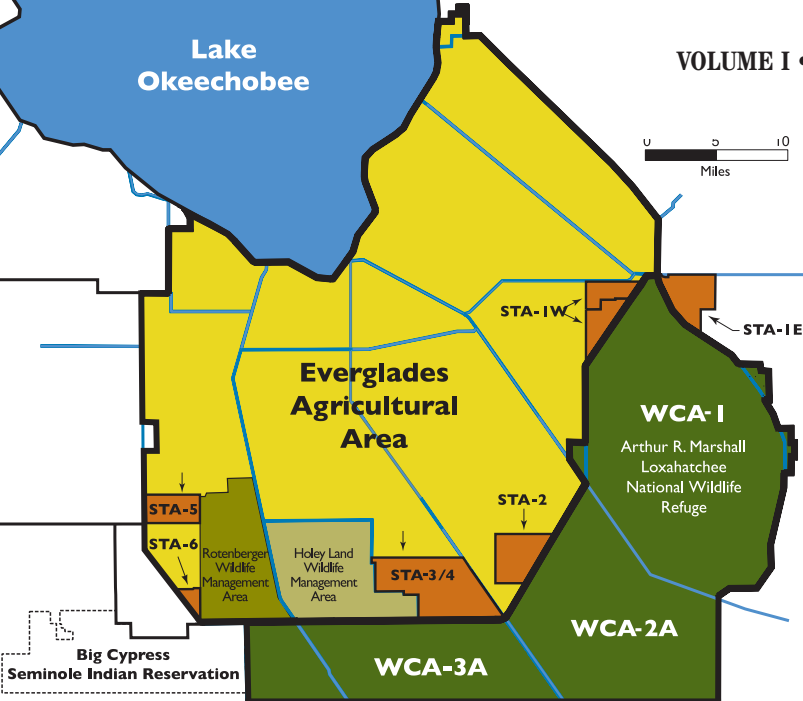
Information on operations, vegetation dynamics, phosphorus levels, and water quality compliance is evaluated annually for each STA. These data are compared with design objectives and with previous years to assess STA performance. Data on nutrients, dissolved oxygen, pesticides, and mercury (Volume I, Chapter 2) for each of the STAs also are summarized to document compliance

with appropriate conditions of the EFA and the U.S. Environmental Protection Agency's National Pollution Discharge Elimination System permits. In accordance with the EFA, the South Florida Water Management District also must conduct research that will help to optimize STA design and operation, and to identify other treatment and management methods that may be superior to STA technology. Chapter 4 of the *2005 South Florida Environmental Report – Volume I* presents an update on all of these findings during Water Year 2004 (WY2004).

As of September 2004, more than 35,000 acres in five STAs have been constructed by the District, as depicted in the map on the opposite page. These STAs were in flow-through operation and removing total phosphorus (TP) that otherwise would have entered into the EPA. During WY2004, Stormwater Treatment Areas 1 West, 2, 3/4, 5, and 6 (Section 1) treated more than 778,000 acre-feet of water and removed more than 88 metric tons of TP. Inflow concentrations averaged 133 parts per billion (ppb), while the outflow concentrations averaged 41 ppb. This resulted in an overall 69-percent removal rate. STA performance varied, with outflow concentrations ranging from 12 to 14 ppb for STA-6 and STA-2, respectively, to almost 100 ppb for STA-5. Notably, since the initiation of STA operations in 1994 through the end of April 2004, the STAs have reduced the TP load by about 427 metric tons. During WY2004, water quality monitoring within and downstream of the STAs demonstrated that these areas are in full compliance with state operating permits.



**PUMP STATIONS
ARE USED TO MOVE
WATER INTO AND
OUT OF THE STAs.**



OVERVIEW OF STORMWATER TREATMENT AREAS

During Water Year 2004:

STA-1E	5,132 acres* Initial flooding in summer, 2004 Enhancements: Establish SAV in emergent marsh cells prior to start-up
STA-1W	6,670 acres Removed 33.7 metric tons TP 66% reduction Inflow TP reduced from 141 ppb to 47 ppb Adaptive management activities initiated Refinement of operational strategies and principles in response to hydraulic overload event
STA-2	Enhancement: Construction of a limerock berm in Cell 5B 6,430 acres Removed 19.2 metric tons TP 79% reduction Inflow TP reduced from 77 ppb to 14 ppb Refinement of operational strategies and principles
STA-3/4	World's largest constructed wetland completed 16,543 acres Better than anticipated phosphorus removal: Removed 0.9 metric tons TP 61% reduction Inflow TP reduced from 49 ppb to 16 ppb Enhancements: Over 60,000 pounds of SAV were successfully transplanted to accelerate vegetation grow-in Grant to evaluate methods for eliminating undesirable vegetation (herbicide, fire, flooding)
STA-5	Construction of full-scale PSTA demonstration project 4,110 acres Removed 31.7 metric tons TP 66% reduction Inflow TP reduced from 255 ppb to 97 ppb
STA-6	870 acres Removed 2.9 metric tons TP 85% reduction Inflow TP reduced from 53 ppb to 12 ppb

*Denotes effective treatment area.

THE WORLD'S LARGEST CONSTRUCTED WETLAND IS PERFORMING EXCEPTIONALLY WELL IN ITS FIRST YEAR

The most significant milestone during this last reporting period was the completion of STA-3/4, the world's largest constructed wetland at more than 16,500 acres. Following start-up operations, the initial 12-month (October 1, 2003 through September 30, 2004) performance of STA-3/4 was exceptional, with more than 445,000 acre-feet of water treated to an average outflow concentration of 12 ppb.

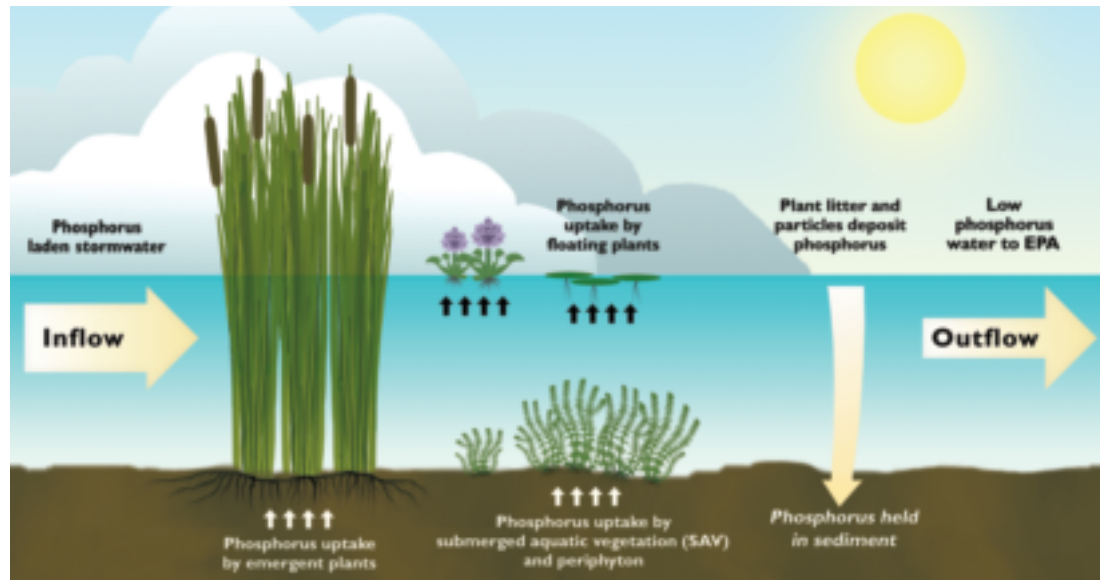
The District has begun the implementation of enhancements to STA-3/4, intended to further lower TP levels. Key components include an additional levee and water control structures, refined operations, and improving vegetation communities, including a 400-acre demonstration Periphyton-Based Stormwater Treatment Area (PSTA) within the footprint of STA-3/4. These enhancements, along with enhancements to the other five STAs, will continue through the end of 2006. Also, the construction of Stormwater Treatment Area 1 East (STA-1E) was substantially completed by the U.S. Army Corps of Engineers in June 2004. Initial flooding of STA-1E began in the summer 2004. A start-up period from about 6 to 18 months is anticipated before STA-1E is expected to discharge to the Arthur R. Marshall Loxahatchee National Wildlife Refuge, depending on growth of the vegetation.



STA PERFORMANCE AND ENHANCEMENT

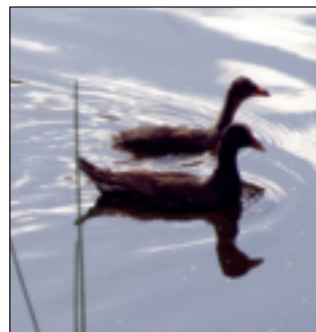
STA ENHANCEMENTS IN SELECT CELLS INCLUDE:

- ADDITIONAL COMPARTMENTALIZATION
- IMPROVEMENT OF FLOW CONTROL
- CONVERSION OF VEGETATION TO SAV



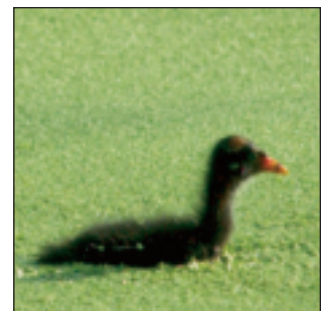
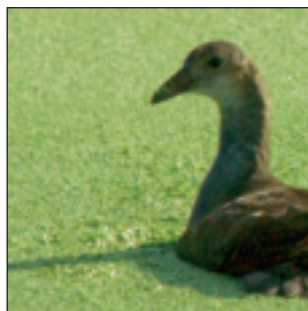
VEGETATION MANAGEMENT IS KEY TO ENHANCING STA PERFORMANCE

Research continues to show that the use of specific types of vegetation, such as submerged aquatic vegetation (SAV), is an effective treatment technology in reducing TP concentrations in the STAs. Herbicides are used to exclude and/or eliminate undesirable vegetation within the treatment cells of the STAs. As part of routine STA operations, vegetation management focuses on keeping floating aquatic vegetation (FAV) at maintenance control levels in all STAs. FAV “shades out” or impedes beneficial submersed and emergent vegetation, which is necessary for proper STA performance. Along with the FAV treatments, emphasis is also placed on controlling expanding emergent vegetation, mainly torpedograss



STAs PROVIDE HABITAT FOR WILDLIFE, SUCH AS THE COMMON MOORHEN (*GALLINULA CHLOROPUS*), AS WELL AS IMPROVE WATER QUALITY.

(*Panicum repens*) and cat-tail (*Typha* spp.), which appears in SAV cells. Available information also indicates that improving STA performance may be achieved by configuring the STAs to contain compartmentalized cells



dominated by emergent vegetation followed by cells dominated by SAV and/or PSTA. The District is continuing analysis of both short and long-term trends in the STAs to provide a basis for improving STA treatment performance.

ADDITIONAL DESIGN ENHANCEMENTS ARE UNDER WAY FOR LONG-TERM OPERATIONS

The Everglades Protection Area Tributary Basins Long-Term Plan for Achieving Water Quality Goals (Volume I, Chapter 8) recommends structural, vegetative, and operational enhancements for each STA. The Long-Term Plan also provides a predicted range of long-term average outflow TP concentrations once the enhancements are completed. Refinement of the operational strategies for the STAs is required to optimize the phosphorus removal performance of the STAs and to ensure that the STAs are not subject to overload from inflow volume or nutrients. In addition, assessment of annual or long-term performance is aided by a comparison of actual loading to the loading that was anticipated during the design of the treatment areas, and the subsequent design of the STA enhancements. In May 2004, a technical paper was issued by the District that outlines the development of the “operational design envelope” for inflow volume and TP loads that are anticipated for each STA, and recommends the methodology for utilizing the resulting information to assist in future strategic operational decisions.

As part of the adaptive implementation process envisioned by the District’s STA optimization program, it is anticipated that further refinements to the recommended water quality improvement measures will be made at the earliest achievable dates as more scientific and engineering information is obtained. Investigations are currently under way for each STA. General principles that are currently followed in the STA operations are to (1) ensure inflows (flows and TP loads) are within the design envelope, (2) avoid dry out and maintain a minimum depth of 15 centimeters, (3) avoid keeping the water stage too deep for too long by limiting depth to a maximum of 137 centimeters for 10 days, (4) maintain target depths between storm events (38 centimeters for emergent vegetation and 45 centimeters for SAV), and (5) perform frequent on-site field observations.



TO ACCELERATE PLANT GROWTH IN STA-3/4, SUBMERGED AQUATIC VEGETATION IS ADDED TO THE TREATMENT AREA.



HYDROLOGY OF THE SOUTH FLORIDA ENVIRONMENT

Most topics presented in the *2005 South Florida Environmental Report – Volume I* are strongly influenced by hydrology in the South Florida region. Given hydrology's significance to the South Florida environmental restoration and water management functions of the South Florida Water Management District, it is presented again as Chapter 5 in this year's report, providing a detailed update on hydrologic data and analysis from the 2004 Everglades Consolidated Report. This chapter also has expanded coverage to address the hydrology of the entire area within the District's boundaries, while providing a more comprehensive overview of South Florida's water management system.

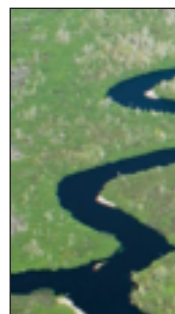
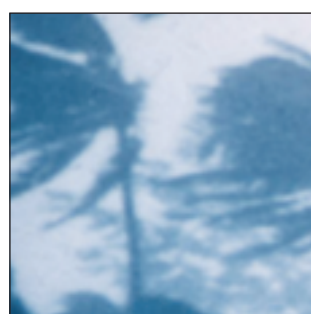
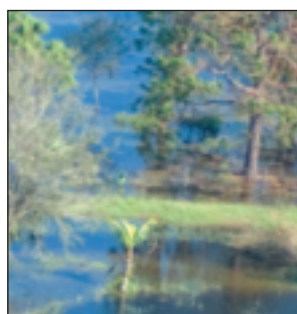
NO UNUSUAL HYDROLOGIC EVENTS OCCURRED IN SOUTH FLORIDA DURING WATERYEAR 2004 (MAY 1, 2003-APRIL 30, 2004)

The South Florida water management system consists of lakes, impoundments, wetlands, and canals that are managed for flood control, water supply, and environmental needs. The general surface water direction is from the north to the south, but there are also water supply and coastal discharges to the east and the west. The major hydrologic components within the District's boundaries are the Upper Kissimmee Chain of Lakes, Lower Kissimmee Basin, Lake Okeechobee, Lake Istokpoga Surface Water Management Basin, Everglades Agricultural Area (EAA), Caloosahatchee Basin, St. Lucie Basin, and Everglades Protection Area (EPA). Overall, Water Year 2004 (WY2004) was representative of near-normal conditions without any extreme hydrologic events (for example, El Niño, La Niña, hurricanes, or drought) in South Florida.

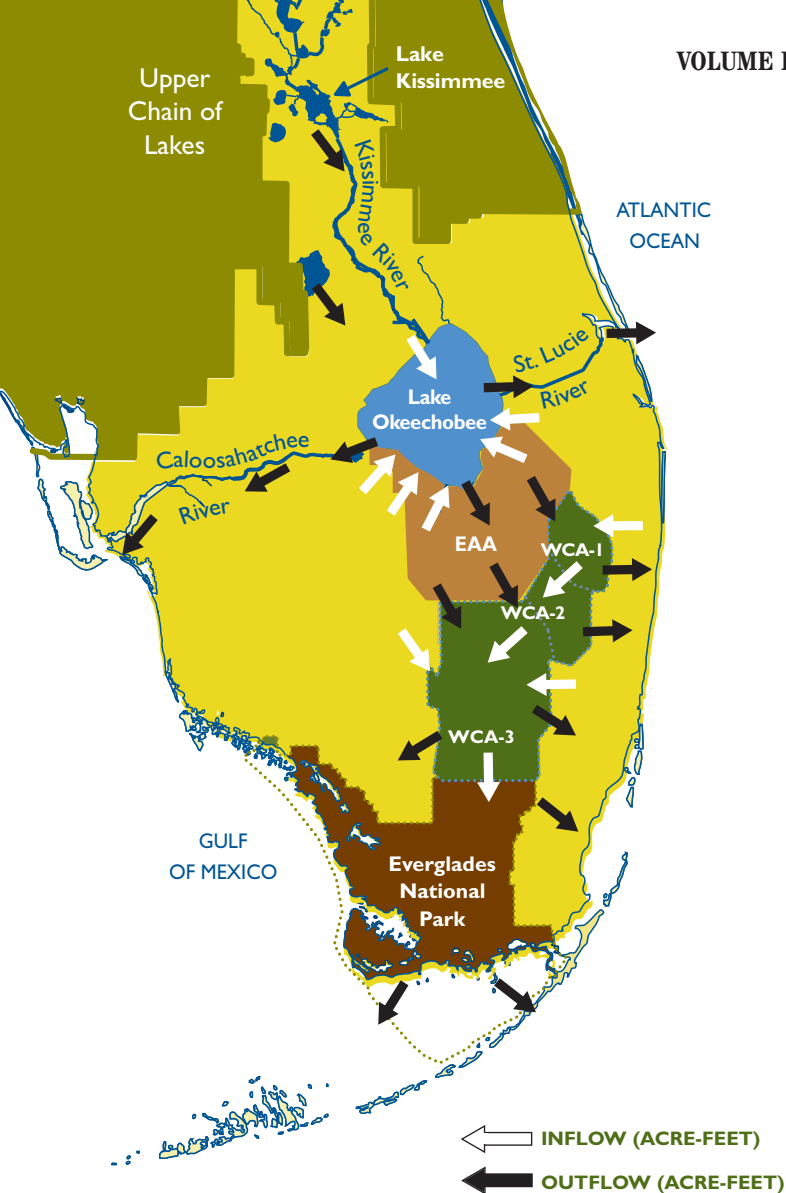
The map on the following page provides an overview of the hydrologic features and water movement in South Florida during WY2004. Although no unusual hydrologic events occurred in South Florida during the current reporting year, there were variations in the water conditions between northern and southern components of the system. In the northern areas, inflows to Lake Okeechobee were 1.4 times the long-term average and the lake's outflow was nearly twice the historical average. This volume had a cascading effect on the St. Lucie and Caloosahatchee estuaries, which received more fresh water in WY2004 than long-term expectations. Farther south, inflows to Water Conservation Area 1 (WCA-1) were near normal, while outflows were only about 50 percent of historical levels. Inflows to WCA-2 and WCA-3 were within 25 percent of historical levels. Such differences in water conditions are not unusual and present an ongoing challenge for restoring and maintaining the South Florida environment.

MONITORING REGIONAL WATER CONDITIONS IS CRUCIAL FOR RESTORATION AND MANAGEMENT IN SOUTH FLORIDA

South Florida is a high-rainfall area often driven by the variability associated with tropical rainfall events. The annual average rainfall for the entire District is 52.8 inches. During WY2004, rainfall in the Upper Kissimmee and Lower Kissimmee areas was close to average, while the EAA, Lake Okeechobee, and Martin-St. Lucie counties had lower than average rainfall. In South Florida, the east coast of South Florida, excluding Broward County and Everglades National Park, had lower than average rainfall,



SOUTH FLORIDA HYDROLOGIC FEATURES INCLUDE FIRES, DROUGHT, FLOODING AND HURRICANES.



Lake Kissimmee Outflows	1,193K	WCA-1 Inflows	335K
Lake Istokpoga Outflows	402K	WCA-1 Outflows	270K
Lake Okeechobee Inflows	2,920K	WCA-2 Inflows	521K
Lake Okeechobee Outflows	2,618K	WCA-2 Outflows	750K
St. Lucie Canal Inflows	569K	WCA-3 Inflows	1,053K
St. Lucie Canal Outflows	689K	WCA-3 Outflows	1,221K
Caloosatchee Inflows	1,322K	ENP Inflows	1,252K
Caloosatchee Outflows	2,442K		

WATER YEAR 2004 INFLOWS AND OUTFLOWS INTO MAJOR HYDROLOGIC COMPONENTS OF SOUTH FLORIDA

whereas the west coast was higher than average. Such spatial variations are quite common in subtropical regions, such as South Florida.

Evapotranspiration, the process by which water is released to the atmosphere by evaporation from water surfaces and transpiration from plants, is primarily related to solar radiation. Both rainfall and evapotranspiration are key hydrologic parameters monitored by the District and their balance in the hydrological system leads to wet or dry conditions. Similar to WY2003, evaporation from lakes, wetlands, and impoundments throughout South Florida was close to the expected District-wide average of 52.6 inches in WY2004.

Throughout South Florida, water levels are most influenced by rainfall, evapotranspiration, seepage, and surface water management. During WY2004, monthly average water levels in most of the lakes in the Upper Kissimmee Chain of Lakes were generally close to WY2003 levels and current regulation schedules, except for Lake Tohopekaliga. In WY2004, drawdown was implemented on Lake Tohopekaliga and deviations were made from the normal regulation schedule. A water level decline of 4.5 feet was observed at this lake from December 2003 through April 2004. Lake Okeechobee water levels in WY2004 were higher than WY2003 and the historical average, while Lake Istokpoga was close to the previous reporting year. In the EPA, water levels during WY2004 were generally higher than both WY2003 and historical averages except in WCA-2A, which had levels slightly lower than the historical average.



ECOLOGY OF THE EVERGLADES PROTECTION AREA

Over the last century, drainage of the Everglades has dramatically changed South Florida's landscape. As a result of this altered hydrology, the Everglades has been reduced to half its original size, water tables have dropped, hydroperiods have been altered, flows have been diverted, wetlands have been impounded, wildlife has been reduced, water quality has been degraded, and habitats have been invaded by nonindigenous plants. It is evident that several important factors – diminished extent of the Everglades and surrounding uplands, changes in the soil and topography, presence of exotic species, and the current system of canals and levees – all constitute constraints on environmental restoration to pre-drainage conditions. The vast challenge facing science and society is determining which key ecological driving forces will be restored to guide future succession in the remaining Everglades. Research efforts are essential to meet this challenge. Chapter 6 of the *2005 South Florida Environmental Report – Volume I* highlights some recent ecological research programs associated with wildlife, plant, ecosystem, and landscape ecology of the Everglades Protection Area that are sponsored by the South Florida Water Management District and other collaborating agencies.

WADING BIRD NESTING WAS VERY ACTIVE IN 2004, CONTINUING STRONG NESTING PATTERNS IN RECENT YEARS

Continued monitoring of wading bird nesting success in South Florida is a coordinated effort between the South Florida Water Management District and other governmental agencies and organizations. Each year, this coordination results in the production of the Annual Wading Bird Report. In 2004, the District reported more than 54,000 wading bird nests in South Florida. This represents a 21-percent decline from the record year of 2002, which was the best nesting year since the 1940s. However, this is a 61-percent increase from 2003, and notably one of the best breeding years in recent decades in terms of the total number of nests. This year's increase can be attributed primarily to greater nesting effort by white ibis (*Eudocimus albus*) in the Water Conservation Areas. During a typical nesting season, numbers of wading bird nests peak in April, then rapidly decrease. This year,

wading birds initiated new nests throughout the entire breeding season, even as late as mid June. This delay may have been due to the many water depth reversals that occurred during the 2004 dry season. This delay, combined with an extended dry season, resulted in an extended period of optimal feeding conditions in the Everglades. This association illustrates the immediate and dramatic effects of hydrology and “Mother Nature” on wildlife.

ONGOING RESEARCH CONTINUES TO FOCUS ON THE RELATIONSHIP BETWEEN TREE ISLANDS AND WATER MANAGEMENT ACTIVITIES

Tree islands are a cornerstone of Everglades ecology. The integrity and overall number of the tree island habitats (often referred to as biodiversity “hotspots”) are crucial for many species that use these sites for mating, nesting, and foraging. Although they possess some inherent resilience to changes in water depth, many of these sites are highly susceptible to degradation and species loss as a result of drought and erratic fluctuations in the duration and frequency of inundation, known as the hydroperiod. The threat to the species that depend on tree islands is worsened by the fact that there are far fewer

tree islands today than in previous years. Consequently, ongoing plant ecology studies on trees islands are being conducted to understand vegetation dynamics in relation to water management activities. In the fall 2003, a greenhouse study was initiated to assess the flood tolerance of first-year seedlings of three tree island species, as depicted in the photo on this page. Life history characteristics (e.g., growth and development) of these seedlings are being observed to determine the effects of varying soil and hydrologic conditions. It is anticipated that this study's results will document the least possible stress on tree island species regeneration capabilities, thereby providing the District with critical information necessary to meet Everglades water needs.



GREENHOUSE STUDY USING FIRST-YEAR SEEDLINGS OF THREE DOMINANT TREE ISLAND SPECIES: POND APPLE (*ANNONA GLABRA*), RED MAPLE, (*ACER RUBRUM*), AND GUMBO LIMBO (*BURSERIA SIMARUBA*).

In 2004, the District assessed the data from a four-year study on litterfall collection in tree islands located at Water Conservation Area 3 (WCA-3). Litterfall is critical to understanding nutrient cycling. These data indicate that litterfall pattern is strongly seasonal with the highest litterfall production occurring during the dry season month of March and that daily litterfall production is significantly higher for tree islands subjected to short hydroperiods. Importantly, root ecology may hold the key to why islands are decreasing and how they can be restored. Scientists hypothesize from the preliminary data that the abundance of oxygen on short hydroperiod islands will increase decomposition rates and cause nutrients to be more available and, therefore, fewer live roots are needed to sustain growth.

IMPROVED WATER CONDITIONS ARE BENEFITING THE ROTENBERGER WILDLIFE MANAGEMENT AREA

Consistent with last year's research findings, hydrologic restoration in the Rotenberger Wildlife Management Area has led to an increase in hydroperiods and water depths and to more desirable plant species. This trend has continued in which there has been a doubling of the mean water depth from 0.4 to 0.8 feet due to inflow restoration and better management of the outflow from this wildlife management area. Additionally, analysis of surface water quality samples collected during the hydrologic restoration period from July 2001 through June 2003 shows that phosphorus concentrations are elevated near the inflow. Future studies will continue to explore the multifaceted biology of both native and invasive plants in relation to current and predicted hydrological and biogeochemical regimes.

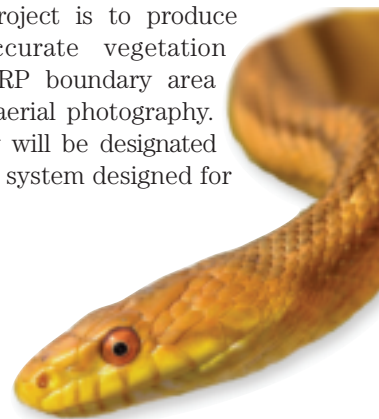
EXPERIMENTAL STUDIES PROVIDE INFORMATION ON PERIPHYTON ASSEMBLAGES IN EVERGLADES ECOSYSTEMS

Historically, the northern Everglades was a softwater peat ecosystem supported largely by periphyton assemblages associated with soft water. With the implementation of the Comprehensive Everglades Restoration Plan (CERP) and future operations of Stormwater Treatment Areas 1 East and West, concern has arisen that hard water may intrude into softwater portions of the Everglades and alter its ecosystem structure and function. In February 2004, the South Florida Water

Management District, U.S. Geological Survey, and U.S. Fish and Wildlife Service performed plant, soil, and water quality surveys in the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge), which confirmed the presence of hardwater intrusion in this area. To address the ecological significance of this finding, the District conducted an experiment to assess changes in periphyton species composition solely as a function of the mineral content in surface waters. The results of this study showed that exposing Refuge periphyton mats to high conductivity marsh water negatively affected many softwater species. Periphyton structural changes were also observed over shorter periods (e.g., less than one month). The consequences of these changes are unknown, but may include primary production, nutrient cycling, and food web dynamics.

DEVELOPMENT OF MAPPING TECHNIQUES CONTINUES TO DETAIL THE EVERGLADES LANDSCAPE

The District continues to observe the Everglades landscape, building upon existing vegetation maps created with specially developed remote sensing and photointerpretation techniques. These mapping techniques are important for impoundments, such as WCA-3, originally designed for flood control and water supply, which are now being recognized for their ecological value in restoring the Everglades. The District has recently developed a complete Geographic Information Systems vegetation database for WCA-3, utilizing 1:24,000 scale color infrared aerial photography and using a single, comprehensive classification system. Notably, until this mapping project was initiated, there had never been a comprehensive detailed vegetation map produced for WCA-3. Sawgrass accounted for the greatest area in WCA-3 (60 percent), while cattail and wet prairie (5 and 27 percent, respectively) were also the most abundant. Also, the District has initiated a new mapping project for CERP. The objective of this project is to produce a spatially and thematically accurate vegetation map for the 4,218-square-mile CERP boundary area using 1:24,000 scale color infrared aerial photography. Each distinct vegetation community will be designated according to a vegetation classification system designed for South Florida's national parks.



UPDATE ON RECOVER IMPLEMENTATION AND MONITORING FOR THE COMPREHENSIVE EVERGLADES RESTORATION PLAN

RECOVER (Restoration Coordination and Verification) is a key component of the Comprehensive Everglades Restoration Plan (CERP), the framework for the restoration, protection, and preservation of the South Florida ecosystem. The role of RECOVER is to organize and to apply scientific and technical information to support the goals and purposes of CERP. RECOVER is made up of interagency, interdisciplinary teams sponsored by the U.S. Army Corps of Engineers and the South Florida Water Management District. Information on the RECOVER monitoring and assessment activities for CERP is presented in Chapter 7 of the *2005 South Florida Environmental Report – Volume I*. The status of projects being implemented through CERP is discussed in Volume II, Chapter 2.



RECOVER PROVIDES TECHNICAL INFORMATION TO TRACK CERP'S OVERALL PERFORMANCE

RECOVER applies science and the technical tools to three broad mission areas: assessment, evaluation, and planning and integration. RECOVER is organized to work effectively in these mission areas to meet its overall objectives to (1) predict and measure CERP's performance, (2) refine and improve CERP during its implementation period, and (3) ensure that a systemwide perspective is maintained throughout the restoration program. RECOVER also evaluates other non-CERP projects that can potentially affect CERP's ability to achieve its goals and purposes. RECOVER will function throughout the entire duration of the CERP process, continuously seeking ways to improve the plan. Evaluation and assessment activities, as well as data from cause-effect research and from new technologies, will shape planning and integration efforts toward this goal.

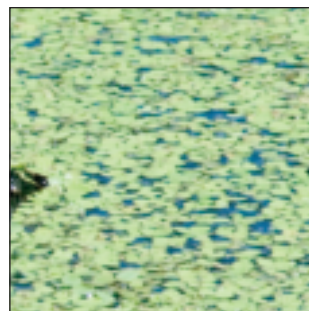
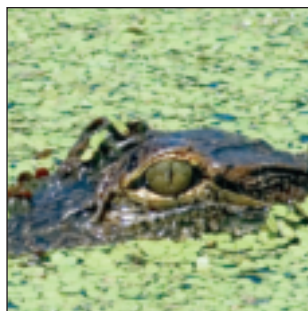
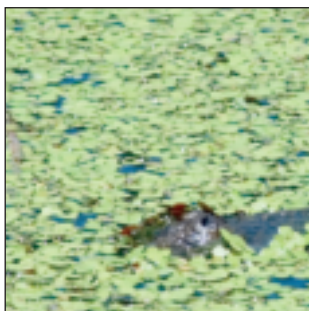
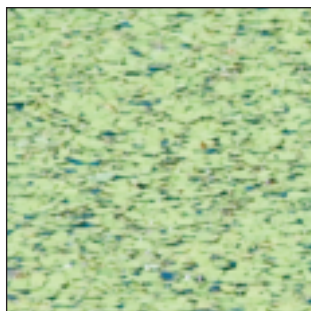
DEVELOPMENT OF AN ADAPTIVE MANAGEMENT PROGRAM IS UNDER WAY TO MEASURE ACHIEVEMENT OF CERP'S DESIRED GOALS

As part of the RECOVER-wide activities, RECOVER continues to develop an Adaptive Management Program that will better prepare CERP to anticipate and respond to future uncertainties. The purpose of this program is to create a set of measurable restoration objectives for CERP that are consistent with its goals and to assess how well CERP meets these objectives during and following its implementation. Four key principles are being incorporated into the Adaptive Management Program: (1) anticipation, (2) learning, (3) communication, and (4) adjustment. The ultimate role of adaptive management in CERP is to have an ongoing, scientifically based process for substantially increasing the probability that the plan will succeed.

CONCEPTUAL ECOLOGICAL MODELS ARE THE FOUNDATION FOR THE DEVELOPMENT AND REFINEMENT OF CERP PERFORMANCE MEASURES

RECOVER-wide activities during 2004 also include the continued development of a Total System Conceptual Ecological Model. This model has been created as a planning tool for selecting the most appropriate set of total system performance measures for CERP. It has been designed to show the key ecosystem stressors working at multi-landscape scales in South Florida and the best biological indicators of these stressors.

RECOVER has begun collecting biological data for key indicator species and their associated habitats (such as the





American oyster in South Florida estuaries) that are critical linkages and attributes in the Total System Conceptual Ecological Model and regional models. It is expected that statistical analysis and results from the first five years of monitoring and associated studies will allow RECOVER to fine-tune the long-term monitoring to be able to best assess CERP's effects on South Florida's ecosystem through 2050.

NEWLY PUBLISHED MONITORING AND ASSESSMENT PLAN WILL MEASURE SYSTEMWIDE RESPONSES TO CERP-RELATED PROJECTS

A total of 34 projects are currently being undertaken by RECOVER to allow tracking of CERP's performance and to begin gathering data to establish a pre-CERP reference state by 2010. Some of these are existing projects being conducted throughout the District, but are now being used in RECOVER's systemwide monitoring and assessment effort. In support of this effort, the CERP Monitoring and Assessment Plan: Part 1 Monitoring and Supporting Research was published in 2004 and is currently being implemented through RECOVER. Integrative assessment protocols are presently being developed and will be published as Part 2. Collectively, this plan establishes the framework for measuring systemwide responses and for assessing how well CERP is meeting its goals and objectives. As part of this process, performance measures and a process for establishing interim goals and interim targets have been developed. Performance measures were published in the Draft CERP Systemwide Performance Measures Report in June 2004 and the final report is expected to be published in 2005.

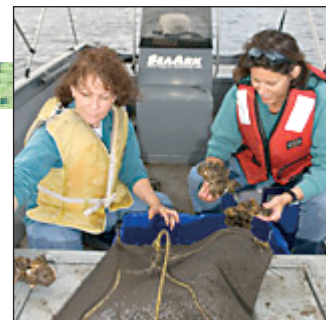
PERFORMANCE REVIEWS ARE A KEYSTONE TO IMPLEMENTING AND REFINING CERP PROJECTS

Development of systemwide performance measures is an important part of establishing the scientific basis for refining and improving CERP during the implementation period. One of the ways that the systemwide perspective can influence the design of CERP components is to review the project-specific performance measures developed by

the project teams. As goals, objectives, and performance measures are prepared for each project, a RECOVER team conducts a review for consistency with systemwide performance measures. RECOVER has been able to form standing teams with members from various agencies and technical disciplines. Orienting each team to a geographic area increases the likelihood that the same team will look at projects that are linked not only by proximity but also share restoration goals. In this way, RECOVER can ensure consistency across projects and increase the opportunities for sharing lessons learned in a timely way. To date, performance reviews have been completed for eight projects and studies. The next step for these projects will be the screening and evaluation of an array of alternatives. RECOVER will contribute to the selection of a project plan by applying RECOVER performance measures to evaluate the systemwide performance and benefits of each alternative.

THE INITIAL CERP UPDATE BRINGS NEW TECHNICAL INFORMATION INTO THE CERP PROCESS

It is projected that CERP implementation will take place over an estimated 30-year period. The magnitude of CERP, as well as direction from the U.S. Congress and the Florida Legislature, necessitate that a process to incorporate changing conditions, new information, and other factors that may affect CERP performance be established. To meet these needs, the Initial CERP Update remains under way to incorporate information on environmental changes and new information gained since the release of the CERP Feasibility Report in 1999. The purpose of the Initial CERP Update is to update the South Florida Water Management Model and to incorporate new information into this model that improves its accuracy (e.g., topography, evapotranspiration, land use, etc.). This update will result in a clearer picture of CERP's performance under revised planning conditions. This information also will be provided to the individual CERP project teams as they begin project-level formulation and evaluation.



DISTRICT STAFF ARE MONITORING THE AMERICAN OYSTER (*CRASSOSTREA VIRGINICA*), WHICH IS A KEY INDICATOR FOR MEASURING RESTORATION SUCCESS.

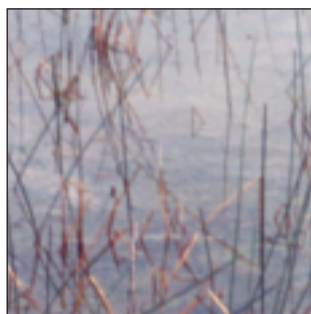
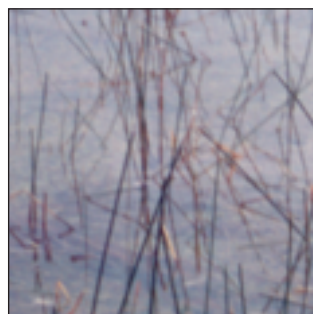
IMPLEMENTATION OF THE LONG-TERM PLAN FOR ACHIEVING WATER QUALITY GOALS IN THE EVERGLADES PROTECTION AREA

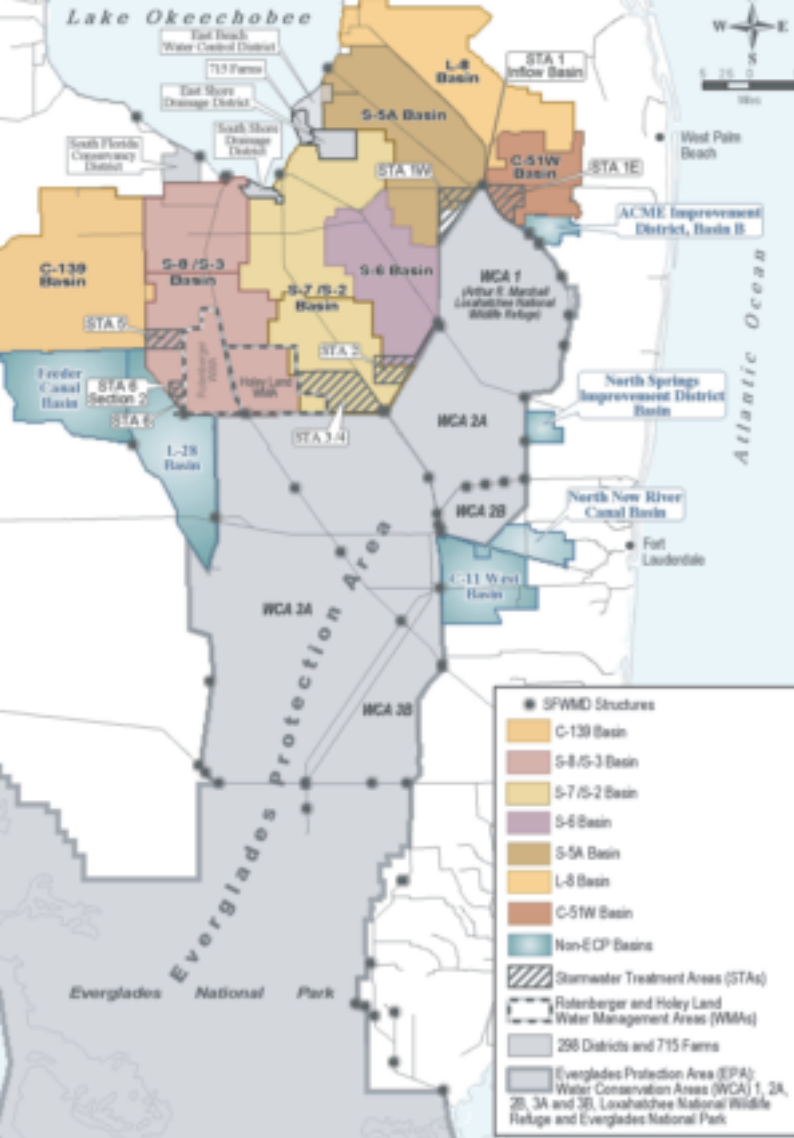
Chapter 8 of the *2005 South Florida Environmental Report – Volume I* presents an update on the progress of the implementation of the “Long-Term Plan for Achieving Water Quality Goals in the Everglades Protection Area,” known as the Long-Term Plan. The diverse activities in the plan are detailed in several chapters of the *2005 South Florida Environmental Report – Volume I*. Projects being executed under the Everglades Stormwater Program to manage inputs from tributary basins are highlighted in Chapter 3. Chapter 4 conveys the set of actions being undertaken to enhance the performance of the Stormwater Treatment Areas (STAs) and summarizes data on their performance to date. Research and other technical activities needed to accelerate recovery of impacted areas in the Everglades Protection Area (EPA) are addressed in Chapter 6.

LONG-TERM PLAN IS RECOGNIZED BY THE FLORIDA LEGISLATURE AS OPTIMAL STRATEGY

Technical representatives of various agencies and other stakeholders used the results of the Basin-Specific Feasibility Studies to develop the Long-Term Plan. This important document was found by the Florida Legislature to be the best available phosphorus reduction technology for the EPA. The 2003 Florida Legislature amended the 1994 Everglades Forever Act to include implementation of the Long-Term Plan as the optimal strategy for achieving the total phosphorus (TP) criterion in the EPA. The District began implementing the Long-Term Plan projects

in Fiscal Year 2004 (FY2004), the period from October 1, 2003, through September 30, 2004. The Long-Term Plan was submitted to the FDEP in December 2003 as part of the long-term permit application required by the Everglades Forever Act. On February 26, 2004, the first annual public meeting for the Long-Term Plan was held to update the public on the status of the projects midway through the first year of implementation and to receive public input on proposed modifications to the Long-Term Plan. The District's first request for a minor revision to the Long-Term Plan was approved by the FDEP on April 15, 2004. This minor revision involved integrating with the Comprehensive Everglades Restoration Plan (CERP) by assisting with the funding of the surveying work of the Bolles and Cross Canal Improvements project. This CERP project will improve the District's ability to balance flows and loads among the STAs which will in turn provide water quality benefits to the EPA.





EVERGLADES PROTECTION AREA TRIBUTARY BASINS ADDRESSED IN THE LONG-TERM PLAN

EVERGLADES FOREVER ACT PROGRAMS CONTINUE TO EXCEED EXPECTATIONS FOR ACHIEVING WATER QUALITY GOALS

Substantial progress toward reducing phosphorus levels discharged into the EPA has been made by the State of Florida and other stakeholders. Since inception and through the end of April 2004, the Everglades Agricultural Area's Best Management Practices and the Stormwater Treatment Areas combined have removed over 1,730 metric tons of TP that otherwise would have entered the Everglades. Of this amount, approximately 230 metric tons of TP were removed during Water Year 2004. Additional source control measures have been implemented in urban and other tributary basins included in the Everglades Stormwater Program (additional details are provided in Volume I, Chapter 3). However, additional measures are necessary to achieve the Everglades water quality goal. The Long-Term Plan contains activities to achieve that goal, and permits the State of Florida and the District to fulfill their obligations under both the Everglades Forever Act and the federal Settlement Agreement (Case No. 88-1886-CIV-MORENO).

THE DISTRICT BEGAN IMPLEMENTATION OF THE LONG-TERM PLAN DURING FISCAL YEAR 2004

The long-term Everglades water quality goal is for all discharges to the Everglades Protection Area to achieve and maintain water quality standards, including compliance with the phosphorus criterion established in Rule 62-302.540, Florida Administrative Code. In order to achieve this goal, in FY2004 the District began implementation of the Long-Term Plan. The EPA tributary basins included in the Long-Term Plan are illustrated in the map on this page.

COMPREHENSIVE REVIEW OF INVASIVE EXOTIC SPECIES IN THE SOUTH FLORIDA ENVIRONMENT

Invasive exotic species are plants or animals that are not naturally found in a region, or nonindigenous. They can aggressively invade habitats and cause multiple ecological changes, such as displacement of native species. Most importantly, invasive species have become one of the most serious and global environmental problems. In the United States alone, these exotics – plants, mammals, birds, amphibians, reptiles, arthropods, and mollusks – are estimated to cost more than \$100 billion annually in damages and associated controls. However, the impact reaches beyond economic concerns. Notably, of the over 600 nationally listed threatened and endangered plant and animal species, about one-third are listed primarily or exclusively due to losses caused by invasive exotic plants.

EXOTIC SPECIES HAVE AN AGGRESSIVE HOLD ON SOUTH FLORIDA ECOSYSTEMS

Chapter 9 of the *2005 South Florida Environmental Report – Volume I* presents a comprehensive view of plant and animal invasive exotic species throughout South

Florida. Florida is not exempt from the impact of invasive exotics, harboring one of the greatest numbers of nonindigenous plants and animals in the country. Recent information shows that invasive exotic species have taken an aggressive hold and that they are continuing to spread at an alarming rate. Currently, more than 31 percent of the plants found in South Florida are non-native, as are more than 26 percent of all animals, giving this region the unfortunate distinction as home to one of the largest,

nonindigenous faunal communities in the world. Overall, losses and costs will inevitably continue to increase, especially if efforts to control these invasions are scattered. Planning, resources, and actions must be integrated effectively in order to turn back the overwhelming spread of numerous invasive species.

MULTIAGENCY TEAMS PURSUE A COMPREHENSIVE APPROACH IN MANAGING INVASIVE EXOTIC SPECIES THROUGHOUT SOUTH FLORIDA

Control of exotic invasive species is a far-reaching issue. The importance of this issue in restoration efforts is demonstrated by the extensive number of plans, reports, statements, and papers that have been written by numerous committees, state and federal agencies, public and private universities, state and federal task forces, and various other organizations. The general consensus of these parties is that control and management of nonindigenous species is a critical component of ecosystem restoration in South Florida. This consensus is shared by the South Florida Ecosystem Restoration Task Force, which established the Noxious and Exotic Weed Task Team (NEWTT) and the Florida Invasive Animal Task Team (FIATT) to focus on South Florida's nonindigenous plants and animals, respectively. In 2002, the NEWTT completed an assessment to characterize current problems and identify the highest priority invasive plant species for control. The NEWTT has also developed a comprehensive, interagency strategic plan for management of invasive exotic plant species. This team is currently working with the U.S. Army Corps of Engineers to develop a report on federal invasive species interests in Florida. Also, the FIATT is developing a status report on invasive exotic animals in South Florida. This report will be used as the basis to determine the extent of the problem, outline agency responsibilities, and identify interagency collaboration opportunities.

In 1996, under the direction of the Everglades Forever Act, the South Florida Water Management District and several other state and federal agencies compiled a list of “priority” invasive exotic plant species that are of the greatest threat to the Everglades. In July 2004, an “all taxa” interagency group meeting, known as the Everglades Invasive Species Summit, was convened to increase discussions among plant and animal specialists. The group presented new information about various species and discussed priorities in South Florida, primarily associated with the Everglades.



BIOLOGICAL CONTROL MEASURES ARE
A NEW FRONTIER FOR MELALEUCA
(*MELALEUCA QUINQUENERVIA*)
TREATMENT IN SOUTH FLORIDA.



PARK RANGER CAPTURES EXOTIC BURMESE PYTHON (*PYTHON MOLURUS*) IN THE EVERGLADES NATIONAL PARK (NATIONAL PARK SERVICE PHOTO BY BOB DeGROSS).

VEGETATION MANAGEMENT EFFORTS CONTINUE TO CONTROL INVASIVE EXOTIC PLANTS, WHILE INVASIVE EXOTIC ANIMALS REQUIRE ADDITIONAL RESEARCH

Since 1990, the South Florida Water Management District, along with other state and federal agencies, has been coordinating all vegetation management efforts in South Florida. Invasive exotic plants, such as melaleuca (*Melaleuca quinquenervia*) and Old World climbing fern (*Lygodium microphyllum*), continue to be a major challenge to vegetation managers because they (1) readily invade natural habitats found throughout South Florida, (2) grow extremely fast, (3) grow thickly and displace native plants, (4) diminish animal habitat, and (5) provide little food for wildlife. In Fiscal Year 2002 (FY2002), Florida was awarded a five-year interagency cooperative grant from the U.S. Department of Agriculture. This cooperative grant is for the Areawide Management and Evaluation Melaleuca Project (TAME Melaleuca), and is the second area-wide grant in the country that has been awarded for an invasive plant. TAME Melaleuca, an interagency demonstration and implementation project, is successfully demonstrating integrated melaleuca management on public and private lands. It is hoped that this project will serve as a successful model for other species-based management plans.

Presently, standardized control methods for exotic animal species are extremely limited and further research efforts are needed in this area. Conversely, many different techniques are used to control exotic invasive plants. Biological controls, herbicides, manual and mechanical controls, and cultural practices (such as prescribed burning and water level manipulation) are all used separately or in conjunction to slow the spread of exotic plants. While these different methods all have their strengths and weaknesses, vegetation managers hope that biological control will offer the most cost-effective, long-term management approach for control of widespread invasive weeds. Biocontrol insects, such as the melaleuca snout beetle and sap-sucking psyllid, are showing damage to

melaleuca stands and are presenting signs of range expansion after their initial releases in 1997 and 2002, respectively. Approval for the release of the first *Lygodium*-damaging insect (Australian moth, *Cataglyphis campylozonale*) was received in August 2004. District-sponsored research is currently in progress for the first Brazilian pepper (*Schinus terebinthifolius*) and additional melaleuca-damaging insects, which may be approved for release in Florida soon. Also, overseas surveys and host-specificity screening for additional biocontrol agents are ongoing.

To complement biocontrol efforts, the District treated approximately 2,872 acres of melaleuca using ground application of herbicides and 5,350 acres using aerial application of herbicides during FY2004. The District also treated 3,250 acres of *Lygodium* and 4,564 acres of Brazilian pepper. In FY2004, the total costs for herbicide treatment in South Florida were approximately \$5 million.

WHERE TO GO NEXT?

In order to have future success with regard to both invasive plant and animal management, there must be commitment to funding and supporting research needs with an emphasis on invasive exotic species, biological controls, integrated management strategies, and the effects of water level fluctuations on the spread of invasive species. Agencies must also continue to fund ongoing invasive species management programs, promote statewide agency coordination, develop comprehensive, species-wide management authorities and regulations, and establish public/private partnerships.

The task of controlling exotic species – both animal and plant – cannot be addressed solely through one method or discipline, regulated by one authority, or controlled by one agency. The attack on invasive exotic species must be implemented through coordinated efforts. Ultimately, control of these species is a necessary component of all aspects of water resource management, whether for flood control, water supply, water quality, or natural resources.

LAKE OKEECHOBEE PROTECTION PROGRAM – STATE OF THE LAKE AND WATERSHED

Although all lakes provide services to nature and society, Lake Okeechobee is probably at the extreme end of the continuum in terms of the number of services that it provides, the diversity of users, and the tremendous economic interest in its health and fate. Lake Okeechobee provides water supply for urban areas, agriculture, and downstream ecosystems. It also provides habitat for migratory water fowl, wading birds, a multi-million dollar recreational and commercial fishery, and the federally endangered Everglades snail kite. Importantly, the lake currently faces three major environmental problems: (1) excessive phosphorus loads; (2) unnaturally high and low water levels; and (3) rapid spread of exotic and nuisance plants in the littoral zone. The South Florida Water Management District, in coordination with other

state and federal agencies, is working cooperatively to address these interconnected issues in order to rehabilitate the lake and enhance the ecosystem services that it provides.

Given the central role of Lake Okeechobee in the regional aquatic ecosystem, and as the central water storage component in the regional flood control project, Chapter 10 of the *2005 South Florida Environment Report – Volume I* focuses on Lake Okeechobee. In accordance with the Lake Okeechobee Protection

Act (LOPA; Section 373.4595, Florida Statutes), an overview of the water quality and habitat conditions in Lake Okeechobee and its watershed, and the status of ongoing programs to address those issues with projects carried out under the Lake Okeechobee Protection Program are summarized in this chapter (see also Volume II, Chapter 3). The Lake Okeechobee Protection Program provides comprehensive water quality monitoring in the lake and watershed, and ecological monitoring in the lake. There also is ongoing research and model development aimed at providing the predictive understanding necessary to effectively manage this important water resource. It is also an adaptive program, meaning that if responses are not occurring as expected, or if research and demonstration elucidates important new information, restoration activities can be modified accordingly to optimize their effectiveness.



THE LAND SURROUNDING LAKE OKEECHOBEE HAS BEEN INTENSIVELY DEVELOPED FOR AGRICULTURE AND OTHER USES.

COLLABORATIVE EFFORTS ARE UNDER WAY TO REDUCE NUTRIENT LOADING INTO LAKE OKEECHOBEE

The excessive phosphorus loads associated with Lake Okeechobee originate from agricultural and urban activities, which now dominate land use in the lake's watershed. Total phosphorus (TP) loading now averages 528 metric tons per year (five-year rolling average, 2000–2004), which is almost four times higher than a recently established Total Maximum Daily Load (TMDL) of 140 metric tons per year considered necessary to achieve the target 40 parts per billion (ppb) in-lake phosphorus concentration.

Although there is a long history of regulatory and other programs to control phosphorus inputs to the lake, there has not been any substantial reduction in loading in the last decade, and the lake displays signs of excessive nutrient enrichment, including blooms of noxious blue-green algae, loss of benthic invertebrate diversity, and spread of cattail in shoreline areas. As a result, the Florida Legislature passed the Lake Okeechobee Protection Act in 2000, mandating that the lake-specific TMDL be met by 2015 and that the District, Florida Department of Environmental Protection (FDEP), and Florida Department of Agriculture and Consumer Services (FDACS) work together to implement an aggressive program to address the issues of excessive TP loads and exotic species expansion. In concert, the District and U.S. Army Corps of Engineers are implementing components of the Comprehensive Everglades Restoration Program (CERP) that will address, in part, the phosphorus issue and provide alternative storage locations so that water levels in the lake can be regulated in a manner that has greater environmental benefits while still supporting water supply and other water resource functions.

In January 2004, the Lake Okeechobee Protection Plan was submitted to the Florida Legislature. This plan was developed by the District, FDEP, and FDACS, laying out the major projects that will address the issues identified in LOPA, as depicted on the figure on the opposite page. These coordinating agencies are aggressively implementing the components of the plan including (1) optimization of existing regulatory and best management programs, (2) development and implementation of new Best Management Practices (BMPs), (3) improvement and restoration of hydrologic functions in natural and managed systems in the watershed, and (4) use of

alternative technologies for nutrient reduction. The Lake Okeechobee Watershed Project under CERP, which will provide substantial amounts of water storage and approximately 38.5 percent of the TP load reduction needed to meet the TMDL, is moving forward on schedule. The District and FDACS have implemented a comprehensive program to monitor water quality in the watershed, which extends beyond the historical network of flow/load monitoring stations at basin outlet structures. Because the Florida Legislature has provided substantial funding for LOPA implementation since 2000, the cooperating agencies have been able to implement a large number of phosphorus reduction projects. These include source control grant programs for agricultural land owners, dairy best available technology pilot projects, soil amendment projects, isolated wetland restoration, remediation of former dairies, and regional public/private partnerships.

WATER QUALITY CONDITIONS ARE A CHALLENGE FOR LAKE REHABILITATION

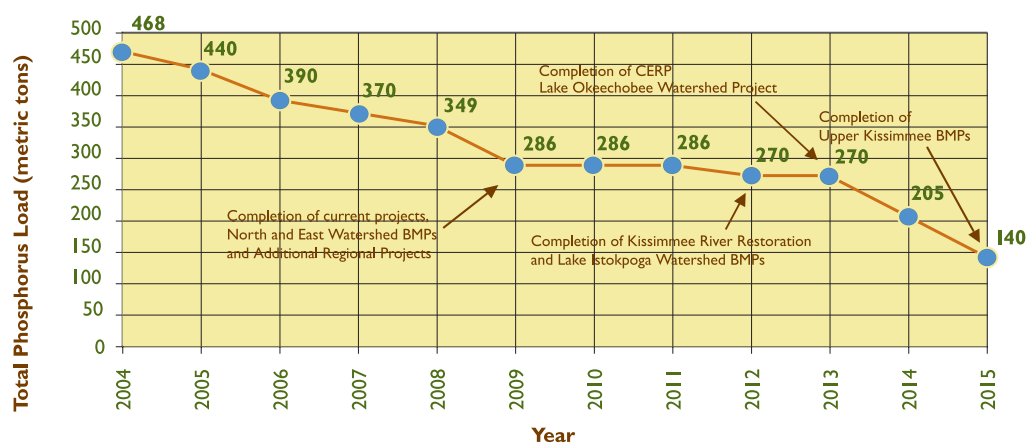
Conditions in Lake Okeechobee related to phosphorus inputs have not changed noticeably in the last decade because external loads have remained high, and the lake sediments contain thousands of tons of phosphorus that buffer changes in water column total phosphorus. The response of the lake to load reductions, when they occur, is expected to take 20 to 30 years due to this internal recycling. Water column total phosphorus now averages approximately 120 pbb, or three times higher than the 40-ppb goal that was used to establish the TMDL. The ratio of total nitrogen to total phosphorus averages 13:1, and the ratio of dissolved inorganic nitrogen to soluble reactive phosphorus averages 5:1. These values favor dominance of blue-green algae, which presently account for most of the algal biomass in the lake. Water clarity goals in shoreline areas are attained approximately 30 percent of the time, and the targeted frequency for algal blooms is exceeded approximately threefold. Despite these problems and the knowledge that the lake response to load reductions will be slow, a multi-year sediment management feasibility

study concluded that large-scale sediment management is not a feasible option for accelerating changes in the lake's water quality. This reflects the large size of the lake and the widespread distribution of a relatively thin layer of phosphorus-rich mud on the bottom, along with associated engineering, economic, and ecological constraints.

LAKE WATER LEVELS ARE BEING MANAGED TO ENHANCE ECOLOGICAL COMMUNITIES WHILE BALANCING REGIONAL WATER SUPPLY NEEDS

During 2002–2004, water levels in the lake generally have been favorable for development of a diverse community of submerged aquatic vegetation in the lake's shoreline areas, where plants were almost completely eliminated by high water in the late 1990s. Along with a resurgence of plants, key species of fish (such as largemouth bass, *Micropterus salmoides*) now are displaying successful recruitment. The District and USACE are in the process of refining the operating schedule for the lake in order to develop release rules that will be more favorable to sustaining these communities in the long-term, while also not impacting downstream ecosystems with large discharges from the lake or impacting water supply. Until there are large alternative storage projects (completed by CERP sometime near 2010 to 2015), this is a difficult balancing act because the lake receives water from a large watershed, it provides the main source of irrigation water in drought, and its major outlets are to estuarine systems that are impacted by large releases of fresh water. The District and USACE demonstrated success in 2003–2004 by using a flexible operating approach and intend to continue to build upon this methodology.

LAKE OKEECHOBEE PROTECTION PLAN, PROJECTED TOTAL PHOSPHORUS LOADS BY PLAN COMPONENT (2004-2015)



KISSIMMEE RIVER RESTORATION AND UPPER BASIN INITIATIVES

Chapter 11 of the *2005 South Florida Environmental Report – Volume I* summarizes the mission-critical activities of the South Florida Water Management District for flood control, water supply, water quality, and natural systems in the Upper and Lower Basins of the Kissimmee watershed. This chapter also highlights the three major projects – Kissimmee River Restoration Project, Kissimmee River Headwaters Revitalization Project, and Kissimmee Chain of Lakes Long-Term Management Plan – currently being implemented in the Kissimmee watershed by the District. Key activities of these projects include (1) ecosystem restoration, (2) restoration evaluation, (3) aquatic plant management, (4) land management, (5) water quality improvement, and (6) water supply planning. These projects will be completed in several phases, with the final phase of construction scheduled for completion in 2012. The final phase of project implementation, restoration evaluation, is expected to be completed in 2017. The Kissimmee Chain of Lakes Long-Term Management Plan is currently under development.

THE DISTRICT IS MOVING TO REESTABLISH HISTORICAL FLOWS AND RESTORE ECOLOGICAL INTEGRITY OF THE KISSIMMEE RIVER

Located in the central portion of Florida, the Kissimmee watershed consists of the Upper and Lower Basins and forms the headwaters of the Kissimmee-Okeechobee-Everglades system. This watershed encompasses a diverse group of wetland and aquatic ecosystems, including more than two dozen lakes, their tributary streams, and the Kissimmee River. Lakes in the Upper Basin were historically connected by meandering creek and slough systems, and were the largest water source for the Kissimmee River. The Lower Basin includes the Kissimmee River and its tributaries, and extends south from Lake Kissimmee to Lake Okeechobee.

In 1954, the U.S. Congress authorized the Kissimmee watershed portion of the Central and Southern Florida Flood Control Project to

provide flood protection to the Upper Basin, drain the river floodplain for agricultural purposes, and reduce flooding. Over the next two decades, the C-38 canal was excavated and water control structures were constructed at the outflows of several lakes of the Upper Basin and along the length of the river. Collectively, these changes reduced the natural variability of lake water stages and transformed the river into a channelized system that functioned as a series of impounded reservoirs. Prior to channelization, the Kissimmee River ecosystem consisted of a mosaic of wetland habitats that supported numerous, diverse plant and animal species. However, the flood control improvements resulted in significant loss of these thriving habitats and their ecosystem functions, thereby causing drastic declines in wading bird, wintering waterfowl, and game fish populations. In 1992, the Kissimmee River Restoration Project was initiated to backfill a portion of the C-38 canal and reestablish Upper and Lower Basin flows that more closely mimic those that existed under historical (pre-channelization) conditions.



AN AERIAL VIEW OF THE PHASE I
RESTORATION AREA OF THE KISSIMMEE RIVER.

THE FIRST MAJOR PHASE OF CANAL BACKFILLING IS COMPLETE AND ECOSYSTEM RESTORATION IS BEING MONITORED

The District is working in partnership with the U.S. Army Corps of Engineers to implement the Kissimmee River Restoration and Kissimmee River Headwaters Revitalization projects. There are three primary goals of these large-scale restoration projects. The first goal is to reestablish the river-floodplain system's ecological integrity, in which species composition, diversity, and functional organization is comparable to that of regional natural habitats. Restoration of ecological integrity requires reconstructing the river's physical form and reestablishing pre-channelization hydrologic characteristics (stage and



discharge). The second goal is to provide the water storage and regulation schedule modifications needed to approximate the historical flow characteristics of the Kissimmee River system. The third goal is to increase the quantity and quality of shoreline habitat in lakes Kissimmee, Hatchineha, Tiger, and Cypress for the benefit of fish and wildlife.

The first major phase (Phase I) of canal backfilling was completed in early 2001. During this initial phase of construction, approximately 7.5 miles of C-38 canal were backfilled, 1.25 miles of new river channel were recarved, and one water control structure (S-65B) was removed, resulting in 15 continuous miles of reconnected river channel. This phase will reclaim approximately 12,000 acres of floodplain habitats. The second major phase (Phase II/III) of canal backfilling is expected to be completed in 2010. The final phase (Phase IV) of canal backfilling is scheduled for completion in 2012. In total, it is expected that this project will restore ecological integrity to approximately 40 square miles of river/floodplain habitat, and more than 40 continuous miles of meandering river channel.

A key element of the river restoration is a comprehensive evaluation program for tracking ecological responses to restoration. In addition to assessing restoration success, the evaluation program will provide scientific information for fine-tuning future project phases and for managing water resources of the recovering and restored ecosystem. To address the goal of ecological integrity, the evaluation program has a broad scope encompassing hydrology, geomorphology, water quality, and major biological communities (e.g., plants, invertebrates, fish, and birds). Prior to restoration efforts, monitoring has been conducted for all of these components to establish a baseline for evaluating future changes. A set of restoration expectations also has been developed to predict changes anticipated to result from restoration. Early responses to Phase I backfilling include increases in dissolved oxygen in river channels, decreases in organic sediments that had accumulated in river channels after channelization, and increased use of the river and floodplain by shore and wading birds and waterfowl. Evaluation of Phase I and future restoration phases will continue through 2017.

LONG-TERM MANAGEMENT PLAN FOCUSES ON RESTORING LAKE ECOSYSTEM HEALTH

In April 2003, the development of the Kissimmee Chain of Lakes (KCOL) Long-Term Management Plan was initiated by the District. Its purpose is to improve and sustain the ecosystem health of the KCOL, while minimizing adverse impacts to downstream ecosystems. The Kissimmee River Headwaters Revitalization Project will provide more natural lake level fluctuations, expanded shoreline habitat for fish and wildlife, and operational flexibility to meet restoration needs. The Long-Term Management Plan builds upon these accomplishments, and will address five goals: (1) hydrologic management, (2) habitat preservation and enhancement, (3) aquatic plant management, (4) water quality improvement, and (5) recreation and public use.

During the last year, a series of interagency planning meetings produced two discrete KCOL work efforts. The first will define and assess ecosystem health within the KCOL. The second is an initiative to model and evaluate alternative water regulations within the Kissimmee watershed. The first effort has evolved into the Long-Term Management Plan and will focus on development of performance measures and assessment of baseline conditions for the KCOL. The latter effort attempts to integrate management projects across the entire watershed to improve water regulation in both lake and river restoration efforts. It will also support water management for flood control, water supply, aquatic plant management, and natural resource operations for the Kissimmee River system and Lake Okeechobee. This effort will be coordinated throughout the District to ensure that the resulting regulation schedules consider the needs of a number of other activities including those associated with aquatic plant management, land management, and water supply planning.

MANAGEMENT AND RESTORATION OF COASTAL ECOSYSTEMS

A variety of stressors impact coastal ecosystems of South Florida. Some of these are localized, such as watershed urbanization, while others, such as sea level rise, are part of a more global disturbance. Moreover, the physical, temporal, geochemical, and biological linkages of subtropical coastal systems present unique challenges to resource management and restoration. Although many questions remain unanswered, it is clear that South Florida's coastal ecosystems are impacted by three major issues: (1) disruption of natural freshwater discharges, (2) increasing input of nutrients and other materials of concern, and (3) continued loss of critical habitats and their biological communities. Together, the cumulative impact of these changes has resulted in altered ecosystem structure and impaired function.

The South Florida Water Management District focuses primarily on managing freshwater discharge to South Florida's estuaries in a way that preserves, protects and, where possible, restores essential estuarine resources. The District collaborates with other agencies to produce a broad range of data and tools that will assist in achieving this goal. When considering the amount of information available and the complexity of management and restoration issues, it becomes apparent that the District and its partners are involved in a challenging, long-term effort.

Tremendous scientific progress has been made in the last decade, and our understanding of the issues and needs of estuarine management and restoration in South Florida has greatly improved. Aspects of this progress and related efforts by the District are presented in Chapter 12 of the *2005 South Florida Environmental Report – Volume I*. As South Florida's estuaries and their watersheds continue to be affected by local and global activities, it is essential to

continue efforts in resource assessment to assure a complete understanding of changes over time. The District is challenged with assuring that sound scientific approaches are utilized in developing management protocols or policy recommendations. This will result in successful restoration and long-term sustainability of our estuaries and near-shore coastal waters.

PRIORITIZATION OF COASTAL RESOURCES ENABLES THE DISTRICT TO EFFECTIVELY FOCUS ITS EFFORTS AND PARTNERSHIP WITH OTHER AGENCIES

South Florida's coastal region is comprised of several major ecosystems within the District. Each ecosystem, informally named by the coastal water body in which it resides, possesses unique hydrologic, biological, and anthropogenic features. These ecosystems are the Southern Indian River Lagoon, including St. Lucie River and Estuary; Loxahatchee River and Estuary; Lake Worth Lagoon; Biscayne Bay; Florida Bay and Florida Keys; Naples Bay; Estero Bay; Caloosahatchee River and Estuary; and Southern Charlotte Harbor (see map on page 9). The District currently has ongoing projects in all of these nine priority coastal ecosystems within its jurisdiction and continues to work closely with other partnering agencies, especially for those areas where the District is not the lead agency.

Importantly, because of the breadth of issues, variety of legal mandates, and the duration of investigations, each ecosystem is at a different stage of science, management, and restoration. Overall, the science has been focused primarily on analyzing the effects of freshwater discharges



COASTAL ECOSYSTEMS POSSESS UNIQUE HYDROLOGIC FEATURES AND DIVERSE BIOLOGICAL COMMUNITIES.

on salinity and the associated seagrasses and oyster beds. These two ecological communities have been chosen because (1) both are stationary and consistent features of South Florida's estuaries with some historical data, (2) they are key indicators of ecosystem health, and (3) much of the subtidal physical structure in South Florida's estuaries is biological (e.g., coral reefs, oyster and seagrass beds). The information developed through these investigations allows the District to work closely with other collaborating agencies to better understand the associations between water management and estuarine habitats.

A VAST AMOUNT OF RESEARCH, MONITORING, AND MODELING FOR COASTAL ECOSYSTEMS IS UNDER WAY IN SOUTH FLORIDA

To date, findings have confirmed the need for reestablishing freshwater flow that more closely mimics the natural volume, timing, distribution, and duration required by healthy estuarine ecosystems. Although the implementation of such efforts is quite difficult and complex, interim solutions are in progress until full implementation of the Comprehensive Everglades Restoration Plan (CERP) is achieved.

Monitoring biological resources and measuring inflow volumes and water quality within South Florida's estuaries provide essential information for effective management and restoration. Substantial water quality data collection is an ongoing, collaborative effort in most coastal ecosystems. Capturing information on the status of biological resources, such as oyster populations and seagrass communities, is also an important interagency effort.

Water quality continues to be a major concern in most estuaries, despite progress on implementing stormwater retrofit projects and agricultural and urban Best Management Practices (BMPs) in the Southern Indian River Lagoon/St. Lucie River and Estuary, and Biscayne and Estero bays. Operation of recently constructed back pumping and conveyance facilities in the next year is expected to reduce sediment discharges into the Lake Worth Lagoon. There has also been steady progress in field

and laboratory investigations and model development focusing on improved understanding of the water quality dynamics between the Everglades system and Florida Bay. The District plans to undertake a comparative analysis of key water quality parameters throughout the estuaries to evaluate common trends and conditions.

HIGHLIGHTS OF MANAGEMENT AND RESTORATION ACTIVITIES FOR COASTAL ECOSYSTEMS IN SOUTH FLORIDA

Southern Indian River Lagoon and St. Lucie River and Estuary

- Adopted (June 2002) the Citrus Best Management Practice Rule to provide incentives for growers to voluntarily implement BMPs on Indian River groves.
- Initiated construction (October 2003) on the Ten-Mile Creek Critical Project, the first stormwater reservoir and treatment cell in the upper east coast service area.
- Water quality model nearly complete to establish Pollutant Loading Reduction Goals (PLRGs) and/or Total Maximum Daily Loads (TMDLs).

Loxahatchee River and Estuary

- Developing a surface water/groundwater model for the Northwest Fork to predict river/floodplain salinity levels and determine the floodplain hydroperiod.
- Initiated the Restoration Plan process for the Northwest Fork to assess ecological health, current conditions, and restoration options.
- Developing the Project Implementation Report for the North Palm Beach County CERP Project – Part 1 to support water supply and management activities.
- Developing an Initial Water Reservation for the Northwest Fork to incorporate into the Minimum Flows and Levels (MFL) rule to protect the floodplain swamp and downstream estuary.

Lake Worth Lagoon

- Recently included in the RECOVER Monitoring and Assessment Plan to support CERP performance measures and to identify long-term restoration goals.
- Developing the Project Implementation Report for the North Palm Beach County CERP Project – Part 1 to evaluate flow redirection, additional stormwater retention, and sediment control technologies for the C-51 basin.
- In 2004, completed canal backpumping and conveyance facilities at the C-51 canal.



Biscayne Bay

- Developing a bay-specific water budget, a hydrodynamic model, and MFL criteria.
- Through funding by Florida's legislative special appropriations, implementing 23 projects for the bay's protection, restoration, and enhancement.
- Collaborated with local municipalities to enhance stormwater management systems, improve water quality, and reduce stormwater runoff to the bay.
- From 1991–2003, phosphorus concentrations have decreased in the canal that discharges to the bay, while nitrogen concentrations, especially nitrate, have generally increased.

Florida Bay and Florida Keys

- Developing bay-specific salinity and ecological models to provide MFL criteria to support management and restoration.
- During Water Year 2004, hydrologic conditions were near long-term averages with regard to rainfall, freshwater flow into the bay, and salinity.
- From 1992–2002, water quality conditions in the bay generally improved. This trend reversed in 2003, yet in 2004, key water quality parameters were below the long-term average. A similar trend of decreasing nutrient concentrations for inflows to the bay also has occurred since 1996.
- Studies of Everglades dissolved organic nutrients in the bay (as part of RECOVER) are assessing the relationship between changing flow and algal blooms. A water quality model also will be used as part of this evaluation.

Naples Bay

- Initiated planning for resource assessment and restoration activities, which are expected to begin in 2005.

Estero Bay

- Established several new studies to support bay-specific MFL development.
- In cooperation with the U.S. Geological Survey, collected water quality data to support development of MFLs and a hydrodynamic/salinity model.

- Mapped oyster beds for the first time, and constructed three new beds as part of bay restoration activities.
- Collaborated with local communities to improve stormwater management through management plans, system upgrades, and restoration of flow-ways.
- In collaboration with other resource agencies, estimated desirable freshwater inflow volumes for selected tributaries to support CERP's Southwest Florida Feasibility Study.

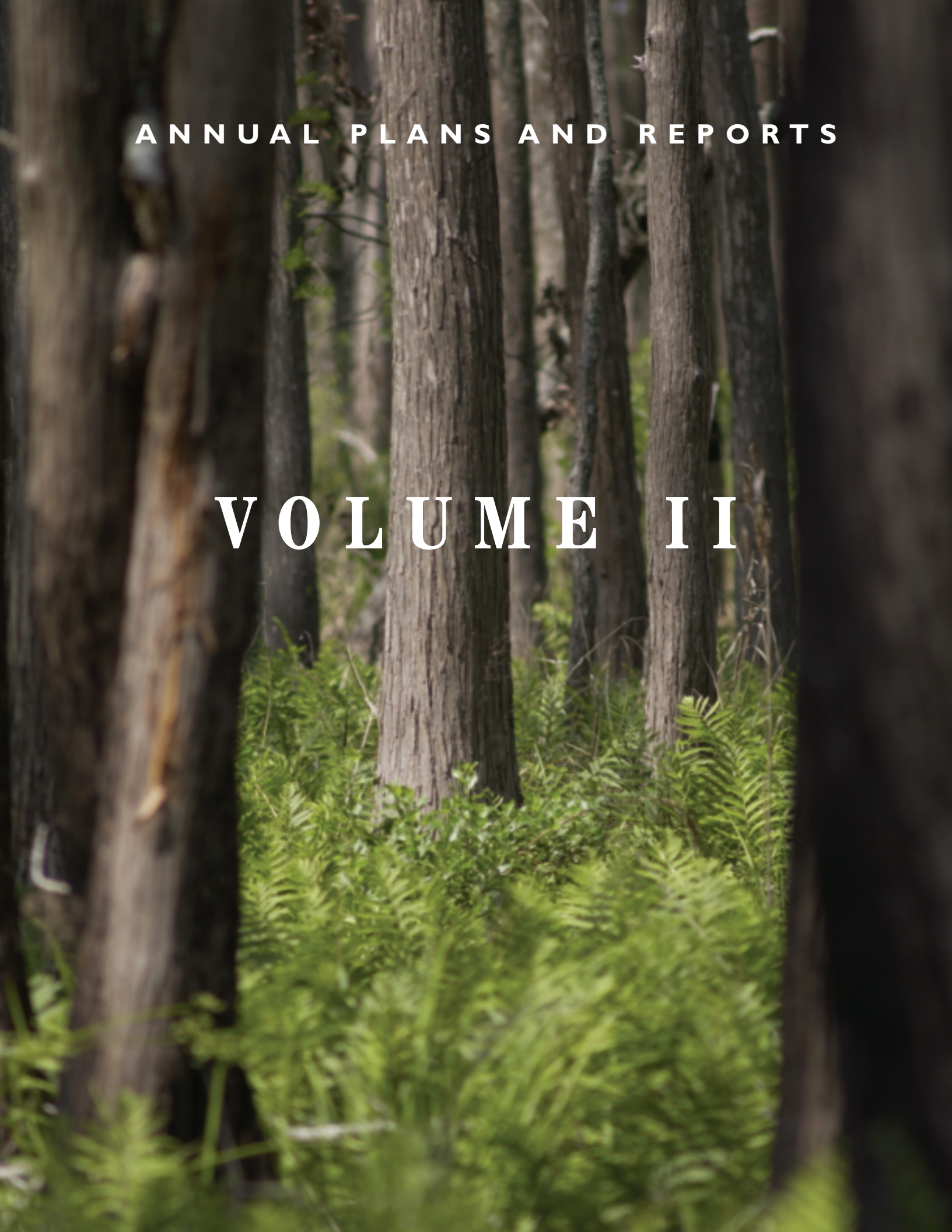
Caloosahatchee River and Estuary

- The MFL salinity criteria were achieved in Water Year 2004. The resulting favorable salinities allowed continued recovery of valuable tape grass beds in the upper estuary.
- Water quality is becoming a concern in the Caloosahatchee River and Estuary, and work continues on developing a water quality target for chlorophyll *a* and a water quality model.
- Collaborated with local communities to improve stormwater management through management plans, system upgrades, and restoration of flow-ways.
- Collaborative monitoring supports development of hydrologic targets for requirements of CERP's Southwest Florida Feasibility Study and C-43 Basin Reservoir Storage Assessment.
- Hydrological and ecological modeling will assess habitats associated with water resource management alternatives.

Southern Charlotte Harbor

- In 2004, the District funded expansion of the Florida Fish and Wildlife Conservation Commission's Fisheries Independent Monitoring Program to Southern Charlotte Harbor to provide much needed information on economically important species.
- Restoration activities include removal of exotic vegetation from the Buffer Preserve, mangrove plantings on Sanibel Island, and the construction of five new oyster reefs.
- Monitoring, identifying flow and water quality targets, and developing a hydrodynamic/salinity model have been extended to incorporate the harbor to support the Charlotte Harbor National Estuarine Program, Surface Water Improvement and Management Program, and CERP.



A photograph of a forest floor with several vertical tree trunks and a dense carpet of green ferns. The text is overlaid on this image.

ANNUAL PLANS AND REPORTS

VOLUME II

INTRODUCTION TO THE 2005 SOUTH FLORIDA ENVIRONMENTAL REPORT - VOLUME II

Chapter 1 of the *2005 South Florida Environmental Report – Volume II* provides an overview of the reporting objectives, as well as a basic understanding of the governmental and legal context behind this volume. It has been prepared as specified by Chapter 2004-53, Laws of Florida, which was passed during the 2004 legislative session. This legislation calls for the South Florida Water Management District to complete a pilot project that consolidates annual plans and reports.

CONSOLIDATION OF EIGHT ANNUAL REPORTS IMPROVES DISTRICT REPORTING

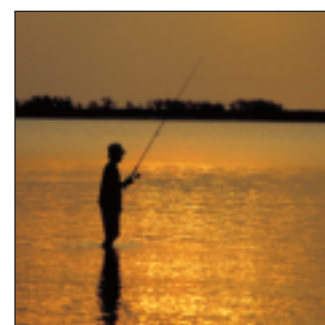
Volume II incorporates several annual plans and reports that describe the District's efforts to protect and restore water resources and natural systems in South Florida. This volume continues to provide the functions of the previous individual reports, while increasing reporting efficiency, quality, and accessibility. It is designed to yield a better, more efficient report, making information more accessible to policymakers, stakeholders, and the public. Under the pilot project, the following eight reports have been consolidated into Volume II:

- Comprehensive Everglades Restoration Plan Annual Report
- Lake Okeechobee Annual Report
- Five-Year Water Resource Development Work Program
- Alternative Water Supply Annual Report
- Everglades Forever Act Annual Financial Report
- District Water Management Plan Annual Report
- Florida Forever Work Plan, 2005 Annual Update
- Five-Year Capital Improvements Plan

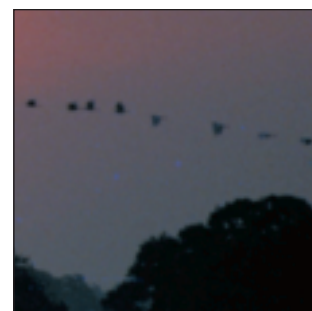
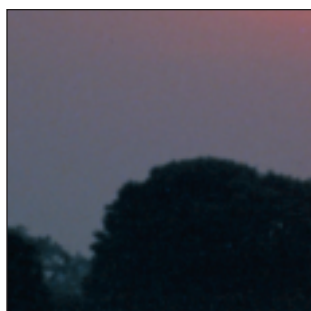
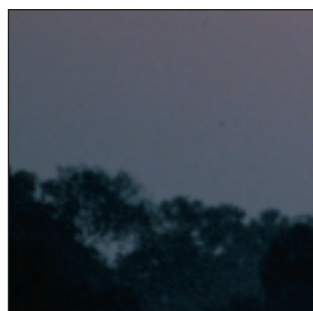
Each of these reports represents a separate chapter in Volume II, enabling reporting requirements to be fulfilled in a single submission, as well as facilitating comparisons to earlier separate reports. The project-related information in this volume is described on a fiscal-year basis (from October 1 through September 30), representing the 12-month period for which the District's annual budget is developed and implemented.

PROJECT DATABASE IMPROVES EFFICIENCY

As part of the consolidation process, the Consolidated Project Report Database has been created by the District. In the eight previous individual annual reports, multifunctional projects (activities with start and end dates) and processes (ongoing activities) were repeatedly described in several reports. The newly established database is designed to uniformly describe projects and processes linked to report-related planning efforts, while providing these descriptions only once rather than multiple times. Storing project/process information in a single database enables rapid data searches and retrieval for efficient information and project management. Future *South Florida Environmental Reports* will update existing information. Further details on the database are provided in the appendices to this chapter.



SUNRISE IN THE INDIAN RIVER LAGOON, ONE OF SOUTH FLORIDA'S KEY WATER RESOURCES.



COMPREHENSIVE EVERGLADES RESTORATION PLAN ANNUAL REPORT

The Comprehensive Everglades Restoration Plan (CERP) is the framework and guide for the restoration, protection, and preservation of the South Florida ecosystem. The goal of CERP is to restore the quantity, quality, timing, and distribution of water to the Everglades ecosystem. It also provides for other water-related needs



GROUND BREAKING FOR THE SOUTHERN
GOLDEN GATE ESTATES (PICAYUNE
STRAND) CERP PROJECT, OCTOBER 2003.

of the region, such as water supply and flood protection. Historically, these needs were met through the Central and Southern Florida Flood Control (C&SF) Project, initiated by the U.S. Army Corps of Engineers (USACE) in the 1950s. CERP comprises over fifty projects that involve structural or operational changes to modify the C&SF Project. Chapter 2 of the *South Florida Environmental Report – Volume II* presents the CERP Annual Report, as required

by Section 373.470(7), Florida Statutes. This report, comprised of three sections, Parts (A) through (C), summarizes the progress of CERP implementation and related financial information for Fiscal Year 2004 (FY2004).

CERP EXPENDITURES EXCEED \$200 MILLION IN FISCAL YEAR 2004 AND \$280 MILLION IN FISCAL YEAR 2005

In Part (A), the South Florida Water Management District and the Florida Department of Environmental Protection (FDEP) jointly identify funding sources and amounts, itemize FY2004 expenditures and fund balances, and provide a schedule of anticipated expenditures for FY2005. In FY2004, total CERP revenues were \$164,000,000 and total CERP expenditures were \$205,652,653. The anticipated expenditures for FY2005 are \$284,998,303.

In Part (B), the FDEP provides a detailed report on all state funds appropriated and expended on current land acquisition projects related to CERP. The amount of expenditures to be credited toward the state's share of funding for executing CERP will be determined in each project's cooperative agreement. FY2004 started with an unencumbered balance of \$206,666,731. For FY2004, total state revenues were \$77,500,000 and total expenditures were \$151,136,338. This resulted in a remaining fiscal year-end (unencumbered) balance of \$131,030,393.

MORE THAN FIFTY PERCENT OF LANDS NEEDED FOR CERP HAVE BEEN ACQUIRED

In Part (C), the District and the FDEP provide a progress report on CERP's implementation. During FY2004, 7,917 acres of land designated for use by CERP projects were acquired for a total cost of \$73.7 million. This brings the total lands available for use for CERP projects to 206,109 acres, which is 53 percent of the estimated land needed. Currently, Florida's share of the restoration is ahead of schedule and under budget. Detailed planning, design, and implementation are progressing for six pilot projects plus a regional study, three feasibility studies, and a number of construction projects. In addition, implementation has continued for seven critical restoration projects that commenced prior to CERP's authorization.

KEY CERP EVERGLADES RESTORATION PROJECTS HAVE BEEN ACCELERATED

There were several key accomplishments through CERP projects in FY2004. The District, in partnership with the USACE, is committed to stepping up the pace for Everglades restoration through project acceleration using innovative design, funding, and construction efforts. Notably, three large reservoir projects have been accelerated so that a major part of the restoration plan will be completed five years ahead of schedule. Project Implementation Reports, defining projects from design to construction, were completed for Picayune Strand (formerly Southern Golden Gate Estates) and Indian River Lagoon-South. Ground breaking took place for the Taylor Creek and Nubbin Slough STAs, as well as the Prairie Canal backfilling at Southern Golden Gate Estates and Ten-Mile Creek critical restoration projects. A notice-to-proceed was issued for the Lake Trafford Restoration, and construction for Phase I of the Tamiami Trail Culverts critical restoration project was initiated. Construction of the S-381 portion of the C-11 Water Quality Improvements critical project neared completion, and the final Pilot Project Design Report and Environmental Impact Statement for three Aquifer Storage and Recovery pilot projects were completed. Exploratory wells were constructed for these pilot projects, and design of the G-161 structure in the North Palm Beach County – Part 1 project was initiated.

LAKE OKEECHOBEE ANNUAL REPORT



LAKE OKEECHOBEE IS THE "LIQUID HEART" OF SOUTH FLORIDA'S INTERCONNECTED ECOSYSTEM, AND PROVIDES MANY VALUES AND BENEFITS TO THE REGION.

Lake Okeechobee, located in South-Central Florida, is the largest freshwater body in the southeastern United States, with a surface area of 730 square miles and an average depth of 8.6 feet. The large watershed of the lake covers approximately 3.5 million acres. Lake Okeechobee functions as the central part of a large ecosystem, provides a vital role in water supply and flood protection, and offers significant habitat for both commercial and protected

species. Lake management is essential to address excessive phosphorus loading, harmful high and low water levels, and rapid expansion of exotic plants. Chapter 3 of the *South Florida Environmental Report – Volume II*, representing the fifth Lake Okeechobee Annual Report, describes the status of the lake and its watershed, including an overview of water quality and habitat conditions and implementation activities during the past year.

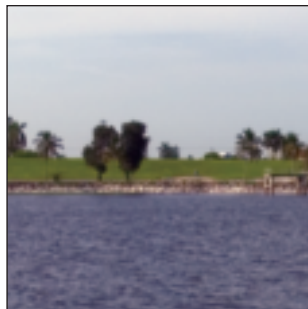
THE COMPREHENSIVE LAKE OKEECHOBEE PROTECTION PROGRAM WILL DRASTICALLY REDUCE PHOSPHORUS INPUTS BY 2015

The Lake Okeechobee Protection Act (LOPA) (Section 373.4595, Florida Statutes) was passed by the 2000 state legislature to revitalize the lake and provide for a sustainable ecosystem through compliance with water quality standards in the lake and its tributaries. This restoration will be done through a watershed-based, comprehensive

protection program (known as the Lake Okeechobee Protection Program) designed to reduce total phosphorus (TP) loads and implement long-term solutions based upon the lake's Total Maximum Daily Load (TMDL) (see Volume I, Chapter 10). LOPA requirements include a formal Lake Okeechobee Protection Plan and annual reports, the Lake Okeechobee Construction Project, a watershed-based phosphorus source control program, and an exotic species control program. The protection plan identifies alternative plans, schedules, and costs to meet the TMDL for TP of 140 metric tons by 2015, as specified in the act. This plan also defines areas requiring future legislative support to successfully protect and restore this resource.

PROGRESS ON PROJECTS IN THE LAKE AND ITS WATERSHED IS A SOLID STEP TOWARDS RESTORATION

To date, significant progress has been made toward projects specifically required by the Lake Okeechobee Protection Act, including the implementation of Best Management Practices to reduce TP discharges from the watershed to the lake by 25 percent. Watershed implementation efforts include Regional Public Works, on-farm treatment technologies, CERP, and regulatory programs. In-lake restoration efforts include the replanting of native pond apples (*Annona glabra*), removal of exotic species, the dredging of phosphorus-laden sediments from marinas, and the hydrologic/habitat restoration of islands through the removal of former agricultural berms. These projects, along with research efforts and the comprehensive water quality monitoring program, all contribute to meeting the Lake Okeechobee Protection Program's objectives.



FIVE-YEAR WATER RESOURCE DEVELOPMENT WORK PROGRAM

Section 373.536(6)(a)4, Florida Statutes, requires each water management district to annually prepare a five-year water resource development work program that projects expenditures to implement regional water supply plans. Chapter 4 of the *2005 South Florida Environmental Report – Volume II* fulfills this requirement and represents the District's sixth annual work program. This chapter provides summaries and updates on the implementation of recommendations made in the South Florida Water Management District's regional water supply plans. Water supply plans for each of the District's four planning areas – the Kissimmee Basin, Upper East Coast, Lower West Coast, and Lower East Coast – are addressed, covering the entire area within the District. The projections presented reflect Fiscal Years 2005–2009 (FY2005–FY2009).

REGIONAL WATER SUPPLY PLANS PROVIDE FOR CURRENT AND FUTURE WATER USE WHILE PROTECTING WATER RESOURCES

The Upper East Coast Water Supply Plan, completed in February 1998, was the District's first water supply plan

to meet the updated (1997) requirements of Chapter 373, Florida Statutes. This was followed by the Kissimmee Basin and Lower West Coast Plans in April 2000, and the Lower East Coast Plan in May 2000. Each plan was prepared to reflect the particular needs of its respective planning area. District staff and advisory committees composed of local, state, and federal agency staff, as well as urban, agricultural, and environmental interests, participated in the development of each plan's recommendations.

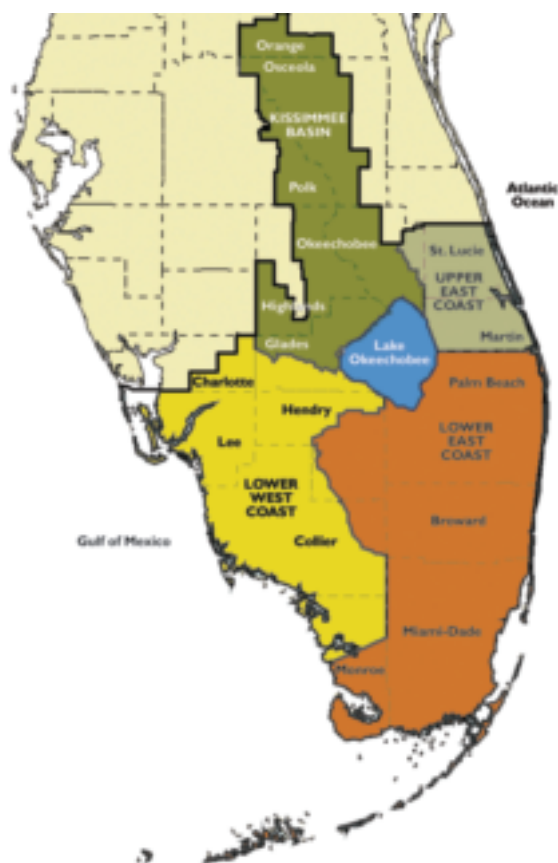
The Upper East Coast Water Supply Plan was updated in June 2004. Water supply plans for the remaining three areas – the Kissimmee Basin, Lower West Coast, and Lower East Coast – are scheduled to be completed in 2005. Changes from existing recommendations are anticipated as plans are updated, and will be reflected in future Five-Year Water Resource Development Work Programs.

WATER TO BE MADE AVAILABLE THROUGH IMPLEMENTATION OF WATER RESOURCE DEVELOPMENT PROJECTS

The financial cost and staff time presented are the best estimates of resource allocation for implementation of the regional water supply plans from FY2005–FY2009. Projected amounts are subject to change, as water managers reassess the District's needs and priorities during the annual strategic planning and budget processes.

The District has allocated \$295.6 million in FY2005 to implement its regional water supply plans and make 119.4 million gallons per day (mgd) of additional water available. The District is anticipating spending \$1.21 billion over the FY2005–FY2009 period on water supply plan implementation. This expenditure is designed to result in 483.9 mgd of additional available water by FY2009. It should be noted that these projected estimates include CERP projects with water resource development benefits.

The numbers above will change as water supply plans are updated. Also, in consideration of these numbers, it is meaningful that water resource development projects are customarily designed to have multiple benefits beyond water supply, and additionally serve other District areas of responsibility.



PLANNING AREAS IN THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT

ALTERNATIVE WATER SUPPLY ANNUAL REPORT

For more than a decade, the South Florida Water Management District has been engaged in cooperative funding agreements for alternative water supply (AWS) systems and stormwater management projects. Through the development of alternative water supplies, many of the threats to South Florida's water supply, and to the environment, can be reduced or eliminated, extending water supplies well into the future.

THE FLORIDA LEGISLATURE ENCOURAGES WATER MANAGEMENT DISTRICTS TO FUND ALTERNATIVE WATER SUPPLY PROJECTS



THE DISTRICT'S AWS FUNDING PROGRAM PARTIALLY SUPPORTS THE CITY OF POMPAÑO BEACH'S WATER REUSE PLANT PROJECT.

Vastly increased demands on natural supplies of fresh water led the Florida Legislature in 1995 to enact Section 373.1961(2), Florida Statutes. This statute requires that each water management district submit an annual report to the Governor and Florida Legislature on AWS funding. Satisfying this reporting requirement, Chapter 5 of the 2005 *South Florida Environmental Report – Volume II* presents the ninth Alternative Water Supply

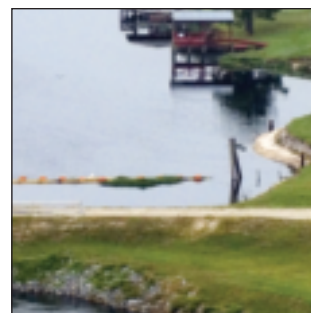
Annual Report and describes the District's water supply projects for Fiscal Year 2005 (FY2005) (October 1, 2004, through September 30, 2005).

This statute fulfills the legislative intent that the water management districts share a portion of their *ad valorem* revenue with those entities willing to develop cost-effective, safe and appropriate alternative water supplies. Each year, the AWS Funding Program Guidelines and Application is published in early January. The guidelines describe the requirements for the AWS Funding Program and provide instructions on how to apply for funding for capital projects involving AWS development.

To be eligible, entities must be a public or private water provider or user, agree to match 50 percent of the total capital costs, and include the completed permit application from the appropriate regulator, among other requirements. Projects throughout the District are eligible for funding. The applications, due by April 1 each year, are reviewed and scored by a selection committee according to the AWS grant criteria in the Guidelines and Application. Each project is scored against consumptive use permits, goals, and objectives of regional water supply plans and environmental benefits, among other criteria.

THE DISTRICT INVESTS \$9.8 MILLION OVER TWO YEARS

Many working projects in South Florida have been funded using this program, saving or offsetting millions of gallons of water every day. In FY2004, the District contributed \$3.8 million to 31 water supply projects designed to make 99 million gallons of water per day available for use. In FY2005, the District is contributing \$6 million to 28 water supply projects as part of the AWS Funding Program. These projects, when completed, are designed to produce 66.12 million gallons of water per day.



EVERGLADES FOREVER ACT ANNUAL FINANCIAL REPORT

The South Florida Water Management District is required to provide detailed financial information on Everglades restoration. The 1997 Everglades Oversight Act requires the reporting of financial information for the Everglades Construction Project (ECP). The 1994 Everglades Forever Act (EFA) requires the District to account for all monies used to fund the 1994 ECP, and to provide a comparison annually of actual versus projected revenues, and a projection of costs and revenues over the successive five-year period. These financial reports are central to Chapter 6 of the *2005 South Florida Environmental Report – Volume II*.

DEDICATED FUNDING SUPPORTS EVERGLADES AND FLORIDA BAY RESTORATION

Dedicated funding is essential to the Everglades and Florida Bay protection and restoration programs. The 1994 ECP, a major element of the Everglades Restoration Program, is one of the nation's largest environmental restoration projects, and has a projected cost of \$836.2 million over 20 years. The Florida Bay Restoration Program also has a projected cost of \$367.0 million. In 1996, the District and the Florida Department of Transportation (FDOT) received federal authorization to redirect the use of Alligator Alley tolls for both restoration programs. A total of \$31.1 million – split equally between both restoration programs – has been received from the FDOT since 1997.

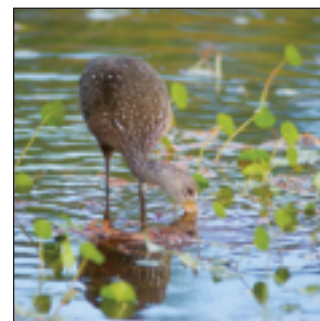
The District, other agencies, and the agricultural community share the cost of the ECP. Funding sources designated by the EFA for the ECP include 1/10 mill *ad valorem* tax, agricultural privilege taxes, state land funds, federal funds, excess revenues from Alligator Alley tolls, other environmental mitigation funds, and any additional funds that become available. Since FY1994, net revenues received were \$549.9 million. In FY2004, net revenues totaled \$57.6 million (unaudited), of which \$55.1 million came from tax collections, and the remaining \$2.5 million were from the other sources listed above.

Since the EFA's enactment, the District has dedicated its maximum Lake Okeechobee basin 1/10 mill *ad valorem* taxing authority to the ECP. Through FY2004, \$325.3 million net *ad valorem* tax revenue was received for Everglades restoration, of which \$43.2 million (unaudited) were collected in FY2004. The 1/10 mill *ad valorem* tax is projected to generate \$49.2 million in FY2005.

To fund the first phase of the Everglades Restoration Program, the EFA imposes an annual tax on agriculture within the Everglades Agricultural Area (EAA) and the C-139 basin. Net EAA agricultural privilege taxes collected from FY1995 through FY2004 were \$119.6 million. During this period, the net C-139 basin agricultural privilege taxes totaled \$5.5 million. During FY2004, net agricultural privilege taxes received were \$11.9 million (unaudited), and this is projected to grow to \$12.2 million in FY2005.

EXPANDED USE OF DEDICATED FUNDING SUPPORTS THE EVERGLADES LONG-TERM PLAN

The EFA also requires the District to implement basin-specific solutions to achieve compliance with water quality standards. The 2003 state legislative session amended the 1994 EFA to include the Conceptual Plan for Achieving Long-Term Water Quality Goals (Long-Term Plan) as the strategy for achieving the long-term water quality goals for the Everglades Protection Area. The amended EFA also expanded the use of the 1/10 mill *ad valorem* tax to include the initial phase of the Long-Term Plan, including Stormwater Treatment Area enhancements, research, and operation and maintenance of the ECP. It is currently projected that the Long-Term Plan's initial 13-year phase will cost \$443.9 million.



ACHIEVING EVERGLADES WATER QUALITY STANDARDS, WHILE BENEFITING WILDLIFE (SUCH AS THE LIMPIN, *ARAMUS GUARAUNA*) IS A KEY DISTRICT STRATEGIC AND FINANCIAL PRIORITY.

DISTRICT WATER MANAGEMENT PLAN ANNUAL REPORT



Following a comprehensive regional examination of water resource management, the South Florida Water Management District's Governing Board approved the District Water Management Plan (DWMP) in August 2000, consistent with the requirements of Section 373.036, Florida Statutes, and Section 62-40.520, Florida Administrative Code. The DWMP is a direction-setting document and a communication tool that, along with the Strategic Plan and annual budget cycle, enables the District to meet its goals, and to position itself to design, build, operate, and maintain the diverse projects needed to attain its identified objectives.

THE DISTRICT WATER MANAGEMENT PLAN ANNUAL REPORT INCLUDES PERFORMANCE MEASURES

Each of Florida's five water management districts has a 2000 DWMP and annually reports on its progress, describing the status of activities undertaken by the District as well as performance measures. In an effort to



GROUND BREAKING FOR A WATER QUALITY PROJECT, CERP'S TAYLOR CREEK/NUBBIN SLOUGH PROJECT, JUNE 2004.

facilitate comparison between the water management districts, the DWMP and its annual reports are organized by the agencies' four interrelated areas of responsibility – water quality, flood control, natural systems, and water supply. The District's policies, programs, projects, and processes described in the DWMP reflect the multifunctional nature of water resource management in the region.

In 2004, the District developed its Strategic Plan, which reinforced the priorities outlined in the DWMP and organized the agency's mission and mandates into ten programs. The seven priorities outlined in this plan are to (1) build three reservoirs through private/public partnerships; (2) achieve Everglades water quality standards; (3) acquire land for Kissimmee River restoration; (4) reduce phosphorus inputs to Lake Okeechobee; (5) refurbish the regional flood control system; (6) implement water supply plan recommendations; and (7) continue to recognize the value of employees.

EVERGLADES RESTORATION HAS BEEN ACCELERATED

Increased water storage and improved water quality are necessary for Everglades restoration. During Fiscal Year 2004, the District committed to building three reservoirs by 2009, in order to complete a major part of the restoration five years ahead of schedule. Substantial progress continues to be made towards reducing phosphorus levels discharged into the Everglades Protection Area. The combined performance of the District's regulatory program and the Stormwater Treatment Areas has exceeded expectations. The Long-Term Plan was developed to achieve compliance with water quality goals established in the Everglades Forever Act. This plan is predicated upon maximizing water quality improvement through an adaptive implementation process.

LAKE OKEECHOBEE AND KISSIMMEE RIVER RESTORATION ARE PROGRESSING WELL

The District continues its partnership with other agencies to restore the ecological integrity of the Kissimmee River and floodplain ecosystem. Birds are making a comeback as a result of the first phase of this restoration. Lake Tohopekaliga was drawn down to allow for the physical removal of organic muck and nuisance vegetation. This project will significantly improve fish and wildlife habitat.

The Lake Okeechobee Protection Plan was completed in January 2004, in cooperation with the Florida Department of Environmental Protection and other agencies and stakeholders. In summer 2004, a series of major storm events tested the District's flood protection and emergency management systems and operations. The system performed exceptionally well and received national recognition. The historic S-310 navigational lock was renovated during the summer. This lock was constructed in 1933 as a hurricane gate and modified into a navigation lock in 1981.

FLORIDA FOREVER WORK PLAN, 2005 ANNUAL UPDATE

The Florida Forever Work Plan describes projects eligible for funding under the Florida Forever Act (Section 259.105, Florida Statutes) and reports on the South Florida Water Management District's progress and changes since the previous annual work plan submission on January 1, 2004. Inclusion of the Florida Forever Work Plan within the *2005 South Florida Environmental Report* provides enhanced reporting on the state of water resources (Volume I) and status of activities supporting the goals of Florida Forever (Volume II).

THE FLORIDA FOREVER PROGRAM PROMOTES SUSTAINABLE USES OF SOUTH FLORIDA'S WATER RESOURCES

The Florida Forever Program was created in 1999. This program authorized the issuance of up to \$3 billion in bonds over a 10-year period to be used for land acquisition (including less-than-fee purchases), water resource development, stormwater management, water body restoration, recreational facility construction, public access improvements, invasive plant control, and related projects. It is intended to accomplish environmental restoration, enhance public access and recreational enjoyment, promote long-term management goals, and facilitate water resource development.

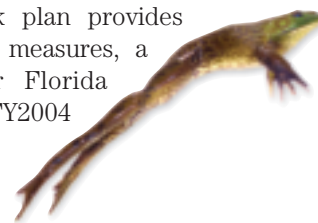
The state's five water management districts annually create five-year plans that identify projects meeting specific criteria for the Florida Forever Program. Each district integrates its surface water improvement and management plans, Save Our Rivers (SOR) land acquisition lists, stormwater management projects, proposed water resource development, and water body restoration projects and other activities that support the goals of Florida Forever.

MORE THAN \$1 BILLION IS PROJECTED TO BE SPENT ACQUIRING LANDS FOR ELIGIBLE FLORIDA FOREVER PROJECTS

Each year, 35 percent of the Florida Forever bond proceeds are distributed to the Florida Department of Environmental Protection for land acquisition and capital expenditures in order to implement the priority lists submitted by the water management districts. Over the life of the program, a minimum of 50 percent of the funding is used for land acquisition. The annual net share for the South Florida Water Management District is \$33 million. Including Florida Forever funding, a total of \$101 million was spent by the District to acquire 12,935 acres of land in Fiscal Year 2004 (FY2004).

There are 60 projects eligible for Florida Forever funding in the FY2005–FY2009 period. These include CERP projects, SOR projects, and water quality and supply initiatives, plans, and studies. The estimated five-year real estate expenditures by the District to purchase lands for eligible projects is projected to total \$194 million, of which Florida Forever funding totaling \$36 million is projected to be expended in FY2005.

The Florida Forever Work Plan provides regional project information, along with systemwide and regional descriptions of land use, water quality, water management practices, physical conditions, and other characteristics as required by statutes. The work plan provides program goals and performance measures, a listing of projects eligible for Florida Forever funding, and includes a FY2004 real estate acquisition report.



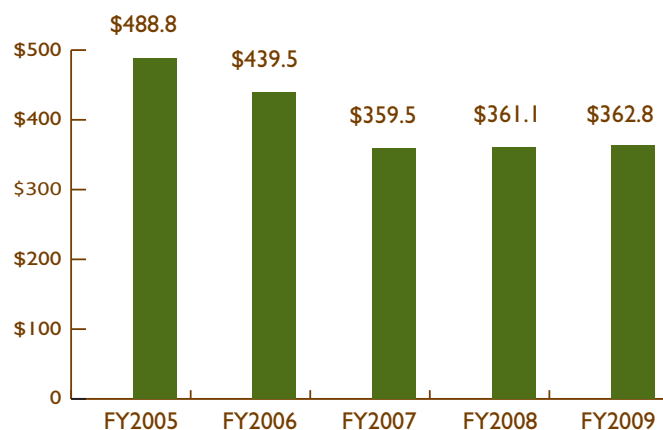
ALLAPATTAH RANCH, ACQUIRED BY THE DISTRICT FOR CERP'S INDIAN RIVER LAGOON – SOUTH RESTORATION PROJECT THROUGH FLORIDA FOREVER PROGRAM FUNDS.

FIVE-YEAR CAPITAL IMPROVEMENTS PLAN

The Five-Year Capital Improvements Plan (CIP) is a multiyear budget plan that includes estimated capital project expenditures, anticipated revenues, and project descriptions for the five-year period from Fiscal Years 2005–2009 (FY2005–FY2009). The CIP reflects the South Florida Water Management District's priorities as outlined in its Strategic Plan, provides a formal mechanism for decision making, and serves as a financial management tool as well as a reporting document. The goal of the CIP is to support the District's mission by efficiently and effectively directing resources to District programs based on District priority level. Capital improvement projects include improvement/refurbishment, construction, and land acquisition.

This important plan is the subject of Chapter 9 of the *2005 South Florida Environmental Report – Volume II*. This chapter provides the five-year financial schedule of expenditures and revenues for those approved capital projects in the current fiscal year, along with the District's four-year capital project forecast. It also includes a description for each of the capital projects found in the Volume II Consolidated Project Report Database.

ANNUAL CAPITAL BUDGET ESTIMATES FOR THE FIVE-YEAR PERIOD, FISCAL YEARS 2005–2009



Surface Water Projects	\$401	\$369	\$286.1	\$282.3	\$286.8
Facilities Construction & Other Major Projects	\$1.8	\$1.0	\$0.4	\$2.5	\$2.7
Land Management	\$37.7	\$22.0	\$15.3	\$6.1	\$5.7
Works	\$48.1	\$46.7	\$57.7	\$70.2	\$67.6
Total	\$488.8	\$439.5	\$359.5	\$361.1	\$362.8

CAPITAL IMPROVEMENTS SPENDING IS PROJECTED TO BE \$489 MILLION IN FISCAL YEAR 2005 AND \$2 BILLION THROUGH FISCAL YEAR 2009

As reflected in the chart on this page, the five-year CIP represents \$2.01 billion in District-related projects. The total FY2005 budgeted capital expenditures are \$488.8 million, which is 61.7 percent of the total District FY2005 budget of \$792.3 million and 24.3 percent of the total five-year CIP forecasted budget. The FY2006 is \$439.5 million (or 21.9 percent), FY2007 is \$359.5 million (or 17.9 percent), FY2008 is \$361.1 million (or 17.9 percent), and FY2009 is \$362.8 million (or 18.0 percent) of the total five-year CIP forecasted budget.

The largest share of the FY2005 CIP is contained within the Surface Water Projects category (\$401.2 million, or 82.1 percent). Three of the four District programs with the largest capital budgets are represented within the Surface Water Projects category. These are CERP/Critical Restoration Projects at \$285.0 million, the District Everglades Program at \$69.2 million, and the Kissimmee Restoration Program at \$44.1 million. The significant resources included in the Operations and Maintenance Program budget for Central and Southern Florida Flood Control Project structure retrofits is contained within the Works category (\$48.1 million, or 9.8 percent).

CAPITAL IMPROVEMENTS FUNDING IS CONSISTENT WITH STRATEGIC PRIORITIES

Significant capital budgets within the District's CERP, District Everglades, Kissimmee Restoration, and Operations and Maintenance program areas are consistent with the following strategic priorities established by the District's Governing Board: build three reservoirs through public/private partnerships; achieve Everglades water quality standards; acquire land for Kissimmee River restoration; and refurbish the South Florida's regional flood control system.

GLOSSARY



Acre-feet (ac-ft): The volume required to cover one acre to a depth of one foot, commonly used to express large volumes of water (1 acre-foot = 325,900 gallons).

Ad valorem tax: A tax imposed on the value of real and personal property, as certified by the property appraiser in each county.

Alternative Water Supply (AWS): A supply of water that has been reclaimed after municipal, commercial, and/or agricultural uses; or a supply of storm water, or brackish or salt water, that has been treated in accordance with applicable rules and standards sufficient to supply an intended use.

Aquifer Storage and Recovery (ASR): The injection of fresh water into a confined saline aquifer (underground, water-bearing layer) during times when supply exceeds demand (wet season), and recovering it during times when there is a supply deficit (dry season).

Best Management Practices (BMPs): Land, agricultural, industrial, and waste management techniques that reduce pollutant export from a specified area.

Capital Projects: Individual facilities and land acquisition projects identified in the District's Five-Year Capital Improvements Plan.

Comprehensive Everglades Restoration Plan (CERP): The framework and guide for the restoration, protection, and preservation of the South Florida ecosystem. CERP also provides for water-related needs of the region, such as water supply and flood protection.

Compliance monitoring: In a water quality management program, compliance is associated with meeting permit conditions as well as ambient standards. Ongoing monitoring provides periodic water quality data, which are used to assess compliance.



Consolidated Project Report Database: A newly created database designed to consistently describe projects and processes associated with various planning efforts by the District.

Critical Restoration Projects: Seven projects that are essential to restoring the South Florida ecosystem, authorized in 1996 prior to CERP. These are small restoration projects undertaken by the District and U.S. Army Corps of Engineers, and are being implemented with CERP projects.

District Water Management Plan: As required by Florida law (Chapter 373.036, Florida Statutes), a regional water resource plan developed annually by each of Florida's five water management districts. This plan enables the water management districts to meet their individual goals and objectives.

Discharge (or flow): The rate of water movement past a reference point, measured as volume per unit time (usually expressed as cubic feet or cubic meters per second).

Ecosystem: Biological communities together with their environment, functioning as a unit.

Estuary: The part of the wide lower course of a river where its current is met by ocean tides or an arm of the sea at the lower end of a river where fresh and salt water meet.

Everglades Agricultural Area (EAA): An area extending south from Lake Okeechobee to the northern levee of Water Conservation Area 3A, from its eastern boundary at the L-8 canal to the western boundary along the L-1, L-2, and L-3 levees. The EAA incorporates almost 3,000 square kilometers (1,158 square miles) of highly productive agricultural land.

Everglades Construction Project (ECP): The foundation of a large ecosystem restoration program, composed of twelve interrelated construction projects between Lake Okeechobee and the Everglades, including about 40,000 acres of Stormwater Treatment Areas. It also contains four hydropattern restoration projects that will improve the volume, timing, and distribution of water entering the Everglades.

GLOSSARY

Everglades Forever Act (EFA): A 1994 Florida law (Section 373.4592, Florida Statutes), amended in 2003, to promote Everglades restoration and protection. This will be achieved through comprehensive and innovative solutions to issues of water quality, water quantity, hydroperiod, and invasion of exotic species to the Everglades ecosystem.

Everglades Protection Area (EPA): As defined in the Everglades Forever Act, the EPA is comprised of Water Conservation Areas 1, 2A, 2B, 3A, and 3B, the Arthur R. Marshall Loxahatchee National Wildlife Refuge, and the Everglades National Park.

Fiscal Year (FY): The 12-month period for which the annual budget is developed and implemented. The fiscal year for the District begins on October 1 and ends on September 30.

Florida Forever Act: A 1999 Florida law (Section 259.105, Florida Statutes) authorizing the issuance of up to \$3 billion in bonds over a 10-year period. This funding is used for land acquisition, water resource development, stormwater management projects, water body restoration activities, recreational facilities, public access improvements, and invasive plant removal.

Florida Statutes (F.S.): A permanent collection of state laws organized by subject area into a code made up of titles, chapters, parts, and sections. The Florida Statutes are updated annually by laws that create, amend, or repeal statutory material.

Flow-weighted mean (FWM) concentration: The average concentration of a substance in water, corrected for the volume of water flow at the time of sampling. Samples taken when flow is high are given greater weight in the average.

Geometric mean: A statistical average of a set of transformed numbers, often used to represent a central tendency in highly variable data, such as water quality. It is calculated from data transformed using powers or logarithms and then transformed back to original scale after averaging.

Lake Okeechobee Construction Project (LOCP): As required by the Lake Okeechobee Protection Act, a project designed to improve the hydrology and water quality of the lake and downstream receiving waters.

Loading (or mass loading): The amount of material carried by water into a specified area, expressed as mass per unit of time. One example is phosphorus loading into Water Conservation Area 2A, measured in metric tons per year.

Minimum Flows and Levels (MFLs): Florida law (Chapter 373, Florida Statutes) requires the state's water management districts to set water levels for each major body of water "...at which further withdrawals would be significantly harmful to the water resources or ecology of the area."



Parts per billion (ppb): A unit of measure, equivalent to micrograms per liter (1 ppb = 1 µg/L).

Phosphorus: An element that is essential for life. In freshwater aquatic environments, phosphorus is often in short supply; increased levels of this nutrient can promote the growth of algae and other plants.

Regional Water Supply Plan: A detailed plan developed by the District (Section 373.0361, Florida Statutes) to evaluate available regional water supply and project demands. The plan forecasts future demands for 20 years and develops strategies to meet identified needs.

Save Our Rivers (SOR): In 1981, the Florida Legislature created the Save Our Rivers program for the water management districts to acquire environmentally sensitive land. The legislation produced Section 373.59, Florida Statutes, known as the Water Management Lands Trust Fund.

Stage: The height of a water surface above an established reference point.

Stormwater Treatment Area (STA): A large, constructed wetland designed to remove pollutants, particularly nutrients, from stormwater runoff using natural processes.

Submerged aquatic vegetation (SAV): Wetland plants that exist completely below the water surface.

Total Maximum Daily Load (TMDL): The maximum allowed level of pollutant loading for a water body, while still protecting its uses and maintaining compliance with water quality standards, as defined in the Clean Water Act.

Water Conservation Areas (WCAs): Diked areas of the remnant Everglades that are hydrologically controlled for flood control and water supply purposes. The primary targets of the Everglades restoration, and major components of the Everglades Protection Area.

Water quality (WQ) criteria: Constituent concentrations based on scientific data and judgments on the relationship between pollutant concentrations and environmental and human health effects.

Water quality standards (WQS): State-mandated water quality levels that are comprised of a beneficial use classification, water quality criteria applicable to that classification, Florida antidegradation policy, and several provisions in other rules.

Watershed: A region or area bounded peripherally by a water parting and draining ultimately to a particular watercourse or body of water.

Water Year 2004 (WY2004): The period from May 1, 2003 through April 30, 2004 during which water quality and other data were collected and reported on in the *2005 South Florida Environmental Report*.

Wetland: An area that is inundated or saturated by surface water or groundwater with vegetation adapted for life under those soil conditions (for example, lakes, swamps, marshes).



ACKNOWLEDGMENTS

The South Florida Water Management District wishes to gratefully acknowledge the contributions of the many professionals who have made the *2005 South Florida Environmental Report* a reality.

Authors: The *2005 South Florida Environmental Report* could not exist without the diligent effort of its many authors. The professionalism and dedication of these individuals are gratefully acknowledged. Names of the contributing authors are presented at the beginning of each chapter and are compiled in the acknowledgments page in each volume of the report.

Editorial and Production Team: The authors' products were organized, edited, and formatted by an editorial and production team of skilled professionals. Stacey Efron, South Florida Environmental Report Production Manager, plays a remarkable role in leading the team's efforts. The exceptional teamwork and productivity of these individuals are respectfully acknowledged: Susan Bennett, Ken Chen, Dianne W. Dorsey, Zoe Fedeles (Zoe Graphics), Gail Irwin, Christopher King, Heather Lewin, Patrick Lynch, Trudy Morris, Kathryn Ronan, Barbara Ross, Diane Smith, and Wendy Wagman.

Project Team: Palmer Mason, State Legislative Affairs Representative in the District's Office of Policy and Legislation, was the project sponsor for the *2005 South Florida Environmental Report*, providing overall direction in its development. He also led the effort for legislative modification, along with Frank Bernardino, Henry Bittaker, David Gilpin-Hudson, Beth Ross, and representatives from the other water management districts and the Florida Department of Environmental Protection, in order to make water management district reporting in Florida more effective and efficient.

Garth Redfield, Chief Environmental Scientist in the District's Environmental Resource Assessment Department, serves as the project manager of the *2005 South Florida Environmental Report – Volume I*, managing its development

in association with colleagues Stacey Efron, Gary Goforth, and Kirk Burns. This staff works closely with Frank Nearhoof of the Florida Department of Environmental Protection's Water Quality Standards and Special Projects Program to jointly coordinate the creation of Volume I, Chapter 2 and its associated appendices. Overall, this large, multidisciplinary document could not have been produced without the thoughtful oversight of senior management. In particular, the effective leadership of Debra Azeredo, Linda Lindstrom, and Jan Loftin from the District are gratefully acknowledged.

David Gilpin-Hudson, Lead Planner in the District's Finance and Administration Department, serves as the project manager for *2005 South Florida Environmental Report – Volume II*, under the guidance of the Volume II Project Management Oversight Group, including Debra Azeredo, Aaron Basinger, Doug Bergstrom, Palmer Mason, and Steve Reel. Additional support for Volume II was provided by Henry Bittaker, Stan Ford, and Garth Redfield.

Other Contributors: For Volume I, the following individuals from the District's Environmental Resource Assessment Department provided essential data analyses and technical assessments for multiple report chapters and appendices: Violeta Ciuca, Guy Germain, Steven Hill, Nenad Iricanin, Julie LaRock, Cheol Mo, Richard Pfeuffer, Darren Rumbold, and Shi Kui Xue. The following individuals from the District are also acknowledged for their vital assistance in conducting the peer review and public workshops: Robin Campbell, Andrea Carlton, Linda Davis, Trudy Morris, and Michael Wedding.

Volume II includes the development of the Consolidated Project Report Database, which was programmed by Marcy Cautreels. The database content review team included Maribel Balbin, Susan Bennett, David Gilpin-Hudson, Palmer Mason, Patti Nicholas, Greg Rogers, Barbara Ross, Wendy Wagman, Beth Williams, and Carl Woehlcke. The project managers and chapter authors are also respectfully acknowledged for their supportive efforts in populating the database.

FOR FURTHER INFORMATION PLEASE CONTACT:

FOR VOLUME I:

Garth Redfield, Ph.D.
Environmental Resource Assessment Department
South Florida Water Management District
3301 Gun Club Road, West Palm Beach, FL 33406
561-682-6611 gredfield@sfwmd.gov

FOR VOLUME II:

David Gilpin-Hudson
Finance and Administration Department
South Florida Water Management District
3301 Gun Club Road, West Palm Beach, FL 33406
561-682-6784 dhudson@sfwmd.gov

FOR VOLUME I, CHAPTER 2:

Frank Nearhoof
Water Quality Standards and Special Projects Program
Florida Department of Environmental Protection
2600 Blair Stone Road, Mail Station 3560, Tallahassee, FL 32399
850-245-8420 frank.nearhoof@dep.state.fl.us

For additional *2005 South Florida Environmental Report* copies, or the Consolidated Project Report Database CD, please contact the District's Reference Center at 561-682-2850. The complete 2005 report is also available on the World Wide Web at www.sfwmd.gov/sfer/



On the cover: Savannas Preserve State Park in St. Lucie County stretches more than 10 miles from Fort Pierce to Jensen Beach and serves an important role in the South Florida environment. More than 5,000 acres in size, the preserve contains a variety of habitats, including uplands on the Atlantic Coastal Ridge, savanna-like wetlands and pine flatwoods. It also is home to the largest freshwater marsh system on the southeast coast of Florida.

Scrub habitat in the preserve (front cover) is dominated by reindeer moss (*Cladina evansii*) and broomsedge bluestem (*Andropogon virginicus*).

The freshwater marsh habitat (back cover) is abundant in fragrant water lily (*Nymphaea odorata*) and pickerelweed (*Pontedaria cordata*).

Visitors to this state park typically see an abundance of birds and other wildlife on these natural and beautiful Florida lands.

For more information, visit the Florida Department of Environmental Protection's Website at <http://www.floridastateparks.org/savannas/>



South Florida Water Management District
3301 Gun Club Road • West Palm Beach, Florida 33406
561-686-8800 • FL WATS 1-800-432-2045 • www.sfwmd.gov

MAILING ADDRESS: P.O. Box 24680 • West Palm Beach, FL 33416-4680

sfwmd.gov