

SOUTH FLORIDA

Environmental Report 2012

EXECUTIVE SUMMARY



MARCH 1, 2012



This year, the State of Florida and the South Florida Water Management District documented significant progress in the science-based work of ecosystem restoration. From the Kissimmee Basin, south through the Everglades and to our coastal estuaries and Florida Bay, we continue to explore and implement cost-effective, scientifically sound solutions that are improving our natural systems and sustaining South Florida's environment, economy and quality of life.

Water quality improvements remain a top priority. The District's 45,000 acres of Stormwater Treatment Areas treated more than 735,000 acre-feet of water this past year. While these flows were less than previous years because of continued dry conditions, nutrient loads to the Everglades Protection Area were reduced by 79 percent and outflow concentrations were in the lowest range ever for all of the treatment areas. In addition, construction is nearing completion on 11,500 acres of additional Stormwater Treatment Areas, which will increase treatment capacity by another 25 percent. These projects – along with others under consideration – will deliver additional water quality improvements south of Lake Okeechobee and further expand our efforts to achieve state water quality standards in the Everglades.

Source controls remain an important part of our water quality improvement strategies. For the sixteenth consecutive year, the Everglades Agricultural Area exceeded its 25 percent phosphorus-reduction requirement, delivering an exceptional 79 percent reduction this past year. Together, best management practices and Stormwater Treatment Areas have prevented more than 2,411 metric tons of phosphorus from entering Everglades waters to-date.

Dry conditions during the past year resulted in relatively low nutrient inflows to Lake Okeechobee. Much remains to be done to achieve restoration goals for the nation's second largest freshwater lake. As part of addressing this challenge, which was more than a century in the making, the three-year Lake Okeechobee Watershed Protection Plan Update was completed in March 2011. Documented in the plan update are key projects that include the Lakeside Ranch Stormwater Treatment Area – the first phase of which will be operational this year – and an innovative water storage program that enlists private landowners, such as ranchers, to hold additional water on their properties. This dispersed water management program has expanded throughout the Northern Everglades watershed and is successfully reducing flows and nutrient loads to the lake and downstream estuaries.

With streamlined operations and a focus on our core mission responsibilities, we are committed to delivering results like these – and many more. Technology such as automated monitoring, electronic databases and online tools are helping to effectively deliver our mission priorities. The *2012 South Florida Environmental Report* itself – now entirely electronic at a savings of \$98,000 – provides a fitting example. Efficiencies like this allow us to focus our resources toward improving the Everglades ecosystem and producing the results Florida's citizens both expect and deserve.



Herschel T. Vinyard, Jr.
Secretary
Florida Department of
Environmental Protection



Melissa L. Meeker
Executive Director
South Florida Water
Management District



sfwmd.gov

Foreword

The 2012 *South Florida Environmental Report* (SFER) marks the 14th year of consolidated reporting by the South Florida Water Management District and the Florida Department of Environmental Protection pursuant to Chapter 2005-36, Laws of Florida, and Subsection 373.036(7), Florida Statutes. This is the second year the SFER is a comprehensive three-volume publication. This Executive Summary focuses on major updates and accomplishments over the reporting year. The report distinctly serves the public and decision makers with thorough, up-to-date information on the many advances toward South Florida's environmental restoration and other key activities.

Volume I, The South Florida Environment, documents relevant scientific and engineering efforts throughout Florida, spanning diverse areas of the interconnected Northern and Southern Everglades systems. This volume satisfies the annual reporting mandates required by dozens of federal and state regulations and permits.

Volume II, District Annual Plans and Reports, comprises annual plans and reports required of all of Florida's water management districts. This volume captures the milestones in implementing the many programs and projects outlined in the agency's Strategic Plan. Now in its eighth year, a web-accessible consolidated database is also included to efficiently provide additional project-related information.

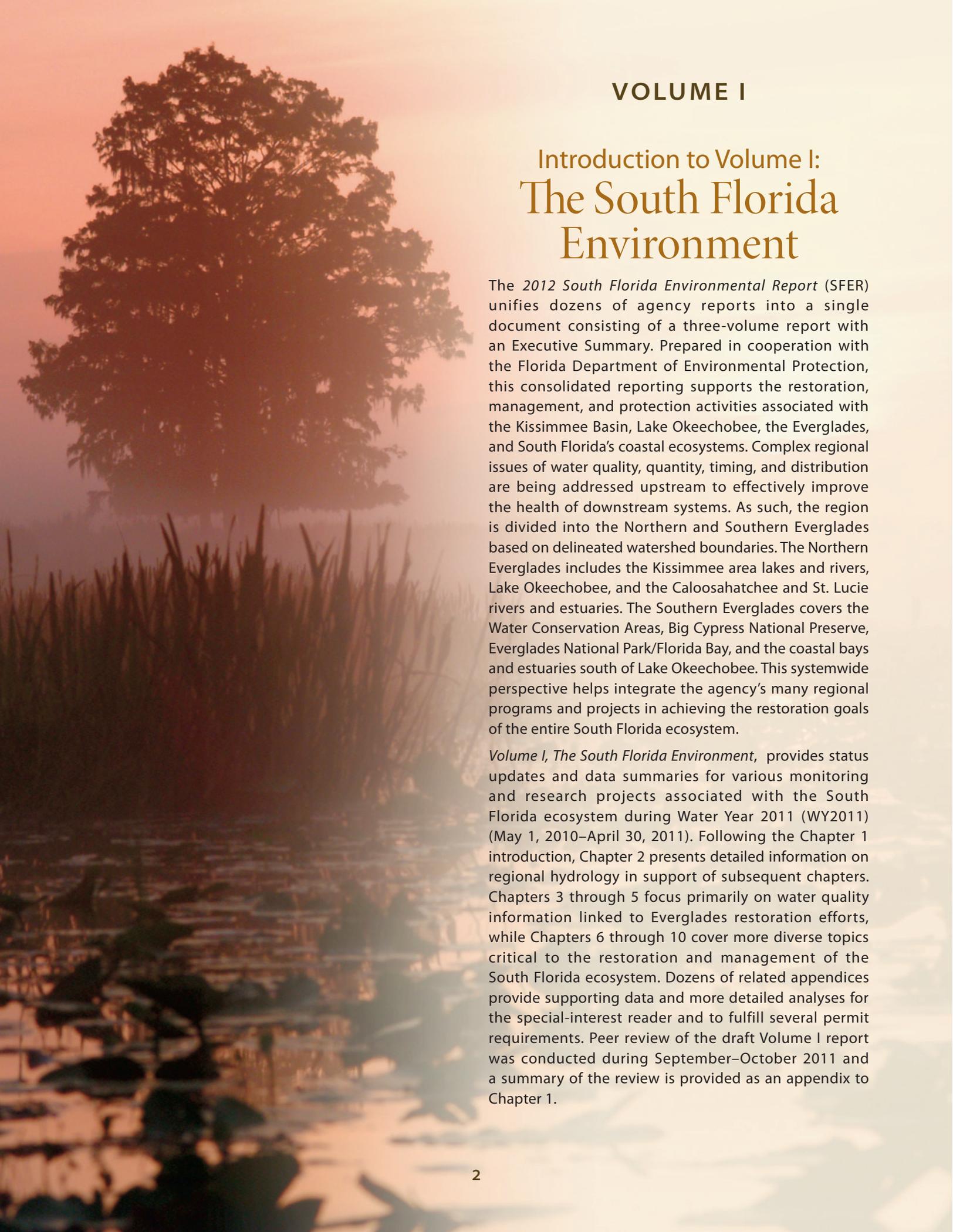
Volume III, Annual Permit Reports, expands on Volume I to further streamline unified reporting and comply with various permit-related reporting requirements. This volume supports the Comprehensive Everglades Restoration Plan Regulation Act, Everglades Forever Act, Northern Everglades and Estuaries Protection Program, Environmental Permitting projects, and Emergency Orders.

The entire 2012 report is available on the District's website www.sfwmd.gov/sfer. Overall, the far-reaching efforts featured in the SFER provide the scientific foundation of agency programs and projects that ultimately support prudent environmental decision making. With the ongoing support of stakeholders and the public, the 2012 SFER showcases sound management and progress toward restoration of the entire South Florida region.

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VOLUME I

Introduction to Volume I: The South Florida Environment

The *2012 South Florida Environmental Report (SFER)* unifies dozens of agency reports into a single document consisting of a three-volume report with an Executive Summary. Prepared in cooperation with the Florida Department of Environmental Protection, this consolidated reporting supports the restoration, management, and protection activities associated with the Kissimmee Basin, Lake Okeechobee, the Everglades, and South Florida's coastal ecosystems. Complex regional issues of water quality, quantity, timing, and distribution are being addressed upstream to effectively improve the health of downstream systems. As such, the region is divided into the Northern and Southern Everglades based on delineated watershed boundaries. The Northern Everglades includes the Kissimmee area lakes and rivers, Lake Okeechobee, and the Caloosahatchee and St. Lucie rivers and estuaries. The Southern Everglades covers the Water Conservation Areas, Big Cypress National Preserve, Everglades National Park/Florida Bay, and the coastal bays and estuaries south of Lake Okeechobee. This systemwide perspective helps integrate the agency's many regional programs and projects in achieving the restoration goals of the entire South Florida ecosystem.

Volume I, The South Florida Environment, provides status updates and data summaries for various monitoring and research projects associated with the South Florida ecosystem during Water Year 2011 (WY2011) (May 1, 2010–April 30, 2011). Following the Chapter 1 introduction, Chapter 2 presents detailed information on regional hydrology in support of subsequent chapters. Chapters 3 through 5 focus primarily on water quality information linked to Everglades restoration efforts, while Chapters 6 through 10 cover more diverse topics critical to the restoration and management of the South Florida ecosystem. Dozens of related appendices provide supporting data and more detailed analyses for the special-interest reader and to fulfill several permit requirements. Peer review of the draft Volume I report was conducted during September–October 2011 and a summary of the review is provided as an appendix to Chapter 1.

Regional Hydrology

In South Florida's complex water management system, rainfall is stored in lakes, detention ponds, wetlands, impoundments, and aquifers, or is discharged to the coast through rivers and estuaries. Hydrologic extremes are exemplified by flooding and excess water during wet years, and wildfires and water shortage during drought years. Region-wide water management is accomplished by the District's operation and maintenance of more than 2,600 miles of canals and levees, about 1,200 water control structures, and 60 pump stations.

Regional hydrology, the subject of Chapter 2 in Volume I, forms the foundation for restoration science and aids in the interpretation of results throughout the report. In fact, hydrological information is used directly in seven of ten chapters in the SFER. WY2011 hydrology, including rainfall, water levels, inflows, and outflows for all the major components of the South Florida regional water management system, is presented and compared with the previous water year (WY2010) and historical conditions. In addition, the chapter examines the impacts of the 2010–2011 La Niña event on local weather patterns as a recent example of climatic phenomena linked to South Florida hydrology.

Rainfall in Water Year 2011 Reflects La Niña Event

South Florida's rainfall was below average for WY2011 in sharp contrast to the previous El Niño year with higher rainfall and with much of the precipitation during the annual dry season. This drier weather phenomenon in WY2011 was due to a La Niña event, which produced 40 inches of rainfall, just 76 percent of the historical average. The La Niña pattern led to a rainfall deficit of about 12 inches region-wide and limited impacts from tropical systems. Nine months of the water year had below average

rainfall and the driest rain area was Palm Beach County with a deficit of more than 20 inches; Martin and St. Lucie counties and the west Everglades Agricultural Area also showed high rainfall shortfalls. Several areas in the southern part of the region showed less severe drought conditions: the Water Conservation Areas, Miami-Dade County, and Everglades National Park, all recorded rainfall less than 10 inches below historical average levels.

Lake Okeechobee Water Levels Mirror Dry Conditions

On May 3, 2010, near the start of WY2011, Lake Okeechobee, which is the main storage area within the regional water management system, was at a stage of 15.15 feet National Geodetic Vertical Datum of 1929 (ft NGVD). Reflecting the influence of lower inflows, the lake level declined for the remainder of the water year, reaching a minimum stage of just 10.93 ft NGVD at the end of the water year on April 30, 2011. The lake level continued to fall before reaching its lowest stage of the calendar year at 9.64 ft NGVD on June 17, 2011. When lake levels declined enough in May 2011 to restrict gravity discharges, temporary forward pumps were installed to allow water deliveries.

As drought conditions worsened, Phase I water restrictions were declared for water users to protect regional resources. Restrictions included a 15 percent decrease in allocations for many golf courses, nurseries and agricultural users. In May 2011, Modified Phase III restrictions (45 percent cutbacks) were declared for surface water users in the Lake Okeechobee Service Area. For all of South Florida, residential landscape irrigation was limited under Phase I restrictions to two days per week. When not impacted by drought or water shortage conditions, South Florida residents and businesses follow the District's Year-Round



Regional Inflows and Outflows



LEGEND

- CANALS
- NORTHERN EVERGLADES
- WATER CONSERVATION AREAS
- STORMWATER TREATMENT AREAS
- MICCOSUKEE INDIAN RESERVATION
- BIG CYPRESS SEMINOLE INDIAN RESERVATION
- ROTENBERGER AND HOLEY LAND WILDLIFE MANAGEMENT AREAS

↓ WATER FLOW (ACRE-FEET IN THOUSANDS)	Water Year	
	2011*	2010
1. Lake Kissimmee Outflows	464	1,308
2. Lake Istokpoga Outflows	122	180
3. Lake Okeechobee Inflows	848	2,400
4. Lake Okeechobee Outflows	1,564	554
5. St. Lucie Canal Inflows	285	76
6. St. Lucie Canal Outflows	269	131
7. Caloosahatchee Inflows	586	199
8. Caloosahatchee Outflows	1,141	1,087
9. Water Conservation Area 1 Inflows	153	310
10. Water Conservation Area 1 Outflows	217	521
11. Water Conservation Area 2 Inflows	467	1,299
12. Water Conservation Area 2 Outflows	420	884
13. Water Conservation Area 3 Inflows	722	1,471
14. Water Conservation Area 3 Outflows	826	1,137
15. Everglades National Park Inflows	935	1,356

* Water Year 2011 flows are reflected on map

Landscape Irrigation Rule, which limits lawn watering to two days a week, with a three-day per week provision for some counties.

Water Year 2011 Water Flows Declined Across the Region as Rainfall Deficits Increased

Overall, reduced runoff resulted in surface and subsurface storage depletion, in which both the Water Conservation Areas and Lake Okeechobee surface storage reached critically low levels. During both wet and dry seasons, most water control structures were operated under water supply mode due to rain deficit conditions.

Regional inflows and outflows for South Florida are shown graphically and numerically in the above map and table. The pervasive effect of La Niña drought conditions is clear when comparing historical average flows and those from WY2010 to those recorded in WY2011. Lake Okeechobee inflows were less than one-half the historical average and only about one-third of WY2010 inflows, while outflows were slightly above the normal historical volume and much greater than WY2010. Inflows to the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Water Conservation Area 1) were severely restricted to about 30 percent of the historical average. Overall, inflows to all of the Water Conservation Areas were reduced to about one-half of the volumes seen in WY2010. Inflows to Everglades National Park for WY2011 were above 930,000 acre-feet, nearly at historical average levels (984,000 acre-feet). The park inflows benefited from less severe drought conditions in the southern part of the region and from the buffering effect of water storage in Lake Okeechobee and the Water Conservation Areas.

Water Quality in the Everglades Protection Area

In Volume I, Chapter 3A fulfills the reporting requirements of the Everglades Forever Act by providing an update on the status of water quality in the Everglades Protection Area (EPA). During WY2011, as in recent years, Everglades water quality generally met the state Class III water quality criteria specified in Chapter 62-302, Florida Administrative Code, with a few excursions being limited to specific areas within the EPA, as discussed below. This chapter also presents an update on nutrients in surface waters in the EPA, including a comparison of total phosphorus (TP) levels to the phosphorus criterion, and evaluates potential factors affecting water quality in this region.

Water Quality Monitoring Results

With more than 1,400 samples collected across 158 stations for 11 parameters, the majority of monitoring results indicated general compliance with state water quality standards. Similar to WY2010 monitoring results, water quality excursions were identified in WY2011 for dissolved oxygen (DO), alkalinity, pH, and specific conductance; however, these excursions were limited to specific areas of the EPA. With some excursions below the site-specific alternative criterion, DO is classified as a concern for several areas within the EPA. Excursions found for alkalinity and pH in the Arthur R. Marshall Loxahatchee National Wildlife Refuge reflect a natural condition resulting from the dominance of soft water in the refuge and are not considered violations of state water quality standards. As reported in WY2010, specific conductance was categorized as a minimal concern for some areas of the EPA and were generally associated with intrusion of mineral-rich groundwater into the canals and marsh areas highly influenced by these canal inflows. No exceedances were found this year for un-ionized ammonia. Additionally, nine pesticides or their breakdown products were detected at levels above method detection limits within the EPA during WY2011. Only atrazine concentrations exceeded its toxicity-based guideline concentration. All other parameters were below their respective state water quality standards.

Surface Water Trends for Total Phosphorus

TP loads from surface sources to the EPA totaled approximately 29.9 metric tons (mt), with a flow-weighted mean concentration of 19 parts per billion (ppb). Another 193 mt of TP are estimated to have entered the EPA through atmospheric deposition. The 29.9 mt TP load in the surface

inflows to the EPA represent a decrease of approximately 65 percent compared to the previous water year (85.0 mt in WY2010). This year's decline was partially due to a 46 percent reduction in flow volume entering the EPA associated with drought conditions in addition to reduced TP concentrations in inflows. Overall, the reduced inflow concentrations continue to demonstrate the efficacy of Best Management Practices and Stormwater Treatment Area nutrient removal.

For the second straight year, the WY2011 annual geometric mean TP concentrations at interior sites in all areas of the EPA were below the TP criterion of 10 ppb in all portions of the EPA. Total phosphorus concentrations were highest in Arthur R. Marshall Loxahatchee National Wildlife Refuge inflows and lowest within Everglades National Park. Annual geometric mean inflow TP concentrations ranged from 42.0 ppb for the refuge to 9.8 ppb for the park. Annual geometric mean TP concentrations at interior sites ranged from 8.5 ppb in the refuge to 4.1 ppb in the park. Annual geometric mean TP concentrations for individual interior marsh monitoring stations ranged from less than 3.0 ppb in some unimpacted portions of the marsh to 32.8 ppb at a refuge site that is highly influenced by canal inputs. Of the interior marsh sites, 78.2 percent exhibited annual geometric mean TP concentrations of 10.0 ppb or less, with 87.2 percent of the marsh sites having annual geometric mean TP concentrations of 15.0 ppb or less, which is the annual TP criterion for individual monitoring sites.

Five-year TP Criterion Assessment in the Everglades Protection Area

The TP criterion rule specifies that each component of the four-part test be achieved for a water body to be considered in compliance with the criterion. The five-year (WY2007–WY2011) TP criterion assessment results indicate that unimpacted portions of each Water Conservation Area passed all four parts of the compliance test. In contrast, impacted portions of each water body failed one or more parts of the test. The impacted portions of the Water Conservation Areas consistently exceeded the annual and five-year network TP concentration limits of 11 ppb and 10 ppb, respectively. In all cases, the annual network geometric mean TP concentrations for WY2011 in both the impacted and unimpacted areas were the lowest of the five-year assessment period.

Regional Mercury and Sulfur Monitoring and Environmental Assessment

In Volume I, Chapter 3B updates the status of mercury and sulfur monitoring in South Florida and highlights the progress on research findings. Along with Appendices 3-1 and 3-2 in Volume III, this chapter fulfills the Everglades Forever Act requirement that the South Florida Water Management District and Florida Department of Environmental Protection annually issue a peer-reviewed report summarizing all data and findings of mercury monitoring and research in South Florida.

Elevated mercury concentrations in fish and wildlife persist in the Everglades Protection Area. As a toxic form of mercury that bioaccumulates in food chains, methylmercury presents a risk to wildlife and humans that consume Everglades fish. Sulfur in the form of sulfate has been linked to methylmercury production in Everglades marshes, while the sulfide form of sulfur, which is toxic to some aquatic plants and animals at high concentrations, may restrict the production of methylmercury. Regional effects of elevated mercury and sulfur concentrations are evident, and the Everglades have some of the highest mercury levels in fish in Florida.

Key Findings of Mercury and Sulfur Research and Monitoring

Over the past two decades, total mercury concentrations in largemouth bass in the Water Conservation Areas have notably declined by about 60 percent. In contrast, there has been no significant trend for mercury in bass over the same period in the Shark River Slough region of Everglades National Park. In WY2011, mean mercury concentrations in bass were 0.55 and 1.3 parts per million in the Water Conservation Areas and Everglades National Park, respectively. These values exceed both federal wildlife protection and human health criteria for consumption of

fish recommended by the U.S. Environmental Protection Agency, which is 0.3 parts per million.

Studies in South Florida and other aquatic environments provide evidence that Everglades marshes are an optimal environment for the production of methylmercury and a contributor to the elevated levels documented throughout the ecosystem. Methylmercury production is promoted in shallow subtropical wetlands with organic-rich anoxic soils and high sulfate inputs, and is supported by elevated wet deposition rate of inorganic mercury from the atmosphere. Further studies are needed to better predict conditions that control mercury accumulation in fish, especially in mercury “hot spots” where bass show very elevated mercury levels.

Sulfur in the form of sulfate may increase the rate of methylmercury production in portions of this region. Recent preliminary studies on the potential for high sulfate levels to cause soil phosphorus release in the Stormwater Treatment Areas and Water Conservation Areas revealed no increase in total phosphorus concentration with sulfate enrichment. Additional studies are needed to gain a better predictive understanding of the role of sulfate, dissolved organic carbon, and other factors in promoting the Everglades mercury problem. There is also a need for better estimates of sulfur sources and sinks across the region so that mass balances can be developed for areas within the region.

The National Mercury Deposition Network has shown that wet deposition of mercury into the Everglades is one of the highest rates in the continental United States. Deposition modeling supports the view that mercury originating outside of North America dominates inputs to South Florida.



Nutrient Source Control Programs

In Volume I, Chapter 4 provides an update for WY2011 on the phosphorus and nitrogen source control programs being implemented for the Northern and Southern Everglades by the South Florida Water Management District (see map). Nutrient source control programs are based on mandatory and incentive-driven Best Management Practices (BMPs). BMPs apply to agricultural and non-agricultural areas, and range from infrastructure improvements to optimized operations. By reducing nutrients in runoff, source controls aid in the restoration and protection of wetlands, rivers, lakes, and estuaries.

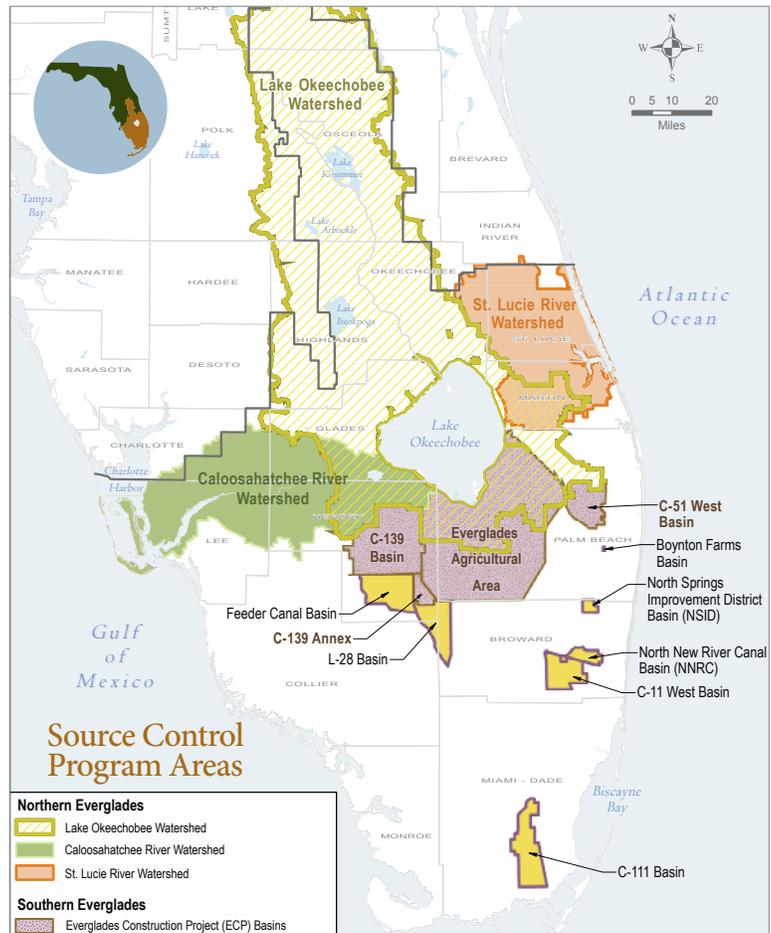
Program goals for all basins include water quality performance measures that are used to assess the progress, made by implementing BMPs, toward achieving overall restoration objectives. Such measures have a long-standing record of success in the Southern Everglades. District source control programs are described in protection plans for the Northern Everglades and continue to be developed for the Lake Okeechobee, Caloosahatchee, and St. Lucie River watersheds. Northern Everglades efforts are being coordinated with the Florida Department of Environmental Protection and Florida Department of Agriculture and Consumer Services. Highlights of the source control programs are presented below.

Northern Everglades: Lake Okeechobee and River Watersheds

- The Lake Okeechobee, St. Lucie River, and Caloosahatchee River watersheds source control programs will include performance metrics that ensure consistent implementation of BMPs, measure actual reduction achieved, and have a mechanism for triggering improvements if water quality goals are not met.
- To meet these objectives, in WY2011 the District continued to develop a data sharing process across agencies, analyze historical data, and develop performance metrics in which hydrologic variability is considered.
- Optimizations of water quality monitoring networks in the Northern Everglades watersheds were also completed and modifications proposed.

Southern Everglades

- The application of source control BMPs in the C-139 and Everglades Agricultural Area basins remains a successful approach to reducing total phosphorus (TP) inputs to



the Everglades Protection Area. With WY2011 marking the sixteenth consecutive year of basin compliance and a long-term reduction of 55 percent relative to the baseline period, the Everglades Agricultural Area Basin achieved a 79 percent reduction in its TP load. As of November 2010, landowners within the C-139 Basin began implementing comprehensive BMP plans. TP loading from the C-139 Basin was 20 metric tons for WY2011 and did not exceed the basin limit. Research and demonstration projects to optimize BMPs are ongoing in both basins.

- The total TP load of 11 metric tons discharged to the Everglades Protection Area from the non-Everglades Construction Project basins during WY2011 reflects a decreasing trend, which can be attributed, in part, to this year's low rainfall but also to diversions of discharges and water quality improvement efforts in the basins. Several demonstration, research, and construction projects for further improving water quality are ongoing in these basins.

Performance and Optimization of the Everglades Stormwater Treatment Areas

The six Everglades Stormwater Treatment Areas (STAs) — STA-1 East, STA-1 West, STA-2, STA-3/4, STA-5, and STA-6 — have been created south of Lake Okeechobee in the Everglades Agricultural Area to remove excess total phosphorus (TP) from surface water before entering the Everglades Protection Area (EPA) (see map on page 4). Varying in size, configuration, environmental condition, and period of operation, the STAs are shallow, freshwater marshes currently providing approximately 45,000 acres of effective treatment area to reduce phosphorus levels in runoff water. In Volume I, Chapter 5 presents the STA performance, construction, operation and maintenance, and research and optimization efforts undertaken during WY2011. The chapter also fulfills various reporting mandates and addresses components identified in the Long-Term Plan for Achieving Water Quality Goals in the EPA (Long-Term Plan).

Everglades STA Overview

- Since 1994, Everglades STAs have treated more than 11.5 million acre-feet of inflow and retained approximately 1,470 metric tons of TP that would have otherwise entered the EPA. In WY2011, the STAs treated more than 735,000 acre-feet of water, reducing TP loads by 79 percent and TP concentration from 94 to 20 parts per billion. Overall, the STAs retained about 67.5 metric tons of TP during WY2011. Through methodical management and enhancements, outflow TP concentrations were in the lowest range observed for all STAs over their entire period of operation.
- Build-outs of 11,500 acres of new STAs (Compartments B and C) progressed during this reporting period. Both projects were flow capable as of December 2010, and construction completion is planned in WY2012. Vegetation recruitment through control of nuisance and woody species, as well as monitoring efforts to prepare for future operation, began and will continue in WY2012.
- Supplemental water from Lake Okeechobee was delivered to the STAs, except STA-6, during WY2011 to minimize drought impacts. STA management and research are focused on optimizing and sustaining treatment area performance. As part of ongoing improvements, additional bulrush planting was completed in areas too deep for cattail to thrive and in areas that could benefit from additional vegetation strips. Drawdown in STA-3/4 Cell 1A is expected to enhance cattail reestablishment in areas previously impacted by chronic deepwater conditions. Further analysis of existing STA data and new field investigations are also continuing to improve understanding of these treatment systems, while further research studies are continuing to find ways to improve STA condition and/or performance.
- Avian protection surveys were conducted during WY2011, and operational priorities were adjusted to aid bird nesting while maintaining STA treatment performance.

Everglades Research and Evaluation

The South Florida Water Management District and collaborating agencies continue to sponsor a broad scope of research projects focusing on hydrology, wildlife ecology, plant ecology, ecosystem structure and function, and landscape science. Programs of study support short-term operational needs and long-term restoration goals, and are focused especially on regional hydrological information needs for decision making on Everglades projects. In Volume I, Chapter 6 highlights major research studies and key findings. Highlights for WY2011 include the following.

- Everglades ecology was influenced greatly by exceptionally dry conditions in WY2011. Water Conservation Area 3A was unusually dry in May and June 2010. No peat fires were reported during this extreme dry event.
- Synthesizing more than a decade of detailed research, Christopher McVoy, Winifred Park Said, Jayantha Obeysekera, Joel VanArman, and Thomas Dreschel, along with the University Press of Florida published *Landscapes and Hydrology of the Predrainage Everglades*. This book characterizes soils, vegetation, geomorphology, and hydrology of the predrainage (circa 1850s) Everglades and documents baseline conditions as a key reference for Everglades restoration.
- During the 2011 nesting season, an estimated 26,452 wading bird nests were initiated throughout South Florida, with the majority (96 percent) occurring in the Water Conservation Areas or Everglades National Park. This is a 21 percent increase relative to last year's season but 66 percent less than nests in 2009 — the best nesting year on record in South Florida since the 1940s. Overall, nest numbers were lower for all species of wading birds relative to the average of the past 10 years, but the extent of the decrease varied considerably among species.
- Continuing research at the Loxahatchee Impoundment Landscape Assessment (LILA) facility has documented reductions in large, predatory fish during a simulated drought, followed by a marked increase in crayfish numbers. These food chain responses continue to be studied, particularly with regard to wading bird foraging responses. Tree island studies at the LILA facility are providing a more detailed understanding of tree growth and belowground processes and critical information on water and nutrient dynamics on tree islands.
- A one-year study of cattail control using a cattail-specific herbicide, imazamox, has provided evidence of good control of cattail in marginally invaded habitats with only minimal collateral damage to other native plant communities. This finding could provide more options for managing cattail expansion in Everglades habitats.
- Findings from the Cattail Habitat Improvement Project demonstrate that openings created by herbicides can support a desirable food web for wildlife with an increased prey base in both enriched and transitionally enriched areas.
- Biological monitoring in the Florida Bay salinity transition zone documented reductions in the wading bird prey base (fish) associated with cold temperatures and high water levels in WY2010. The prey base appears to have rebounded well in WY2011 and was expected to attract roseate spoonbills to feed and nest in the southern Everglades transition zone. However, for unknown reasons, few spoonbills nested in Florida Bay in WY2011, although juveniles have been observed foraging in the bay.



Status of Nonindigenous Species

With its mild climate, diverse environments and expanding urbanization, South Florida is particularly vulnerable to invasion by nonnative species. In Volume I, Chapter 7 reviews broad issues of key “South Florida Water Management District-centric” nonindigenous plants and animals plaguing South Florida and their relationship to restoration, management, planning, organization, and funding. The chapter provides updates on priority species, highlights emerging threats to native plants and animals and summarizes new research findings. It also discusses control or management activities for species capable of impacting District resources.

Nonindigenous Plants

- The District has the nation’s largest aquatic plant management program, managing floating and submerged aquatic vegetation region-wide. The agency’s successful melaleuca management program has become a national model for regional, interagency invasive plant control programs.
- Sixty-nine plant species are District priorities for control. While control programs for some aggressive plants, such as melaleuca, have been positive, challenges keep expanding as other harmful invasive plants are introduced. Further expansion of Old World climbing fern and Brazilian pepper in parts of the Everglades is problematic.
- Biological control of several invasive plants continues to show promise, especially for melaleuca. More than 40,000 sterile Asian grass carp were released into 11

District canals for plant control in the water management system.

Nonindigenous Animals

- Nonindigenous animal species are numerous in South Florida. For example, more than 50 exotic animal species have been found in the Kissimmee Basin and more than 150 in the Greater Everglades. Prioritizing these species for control is challenging across regulatory agencies.
- The Florida Fish and Wildlife Conservation Commission continues to build its invasive animal management program and work closely with the District and other partners to manage nonnative animals in South Florida. During 2011, federal, state, and tribal partners continued rapid response efforts to control animal invaders such as the African python, Nile monitor, and Argentine tegu in the Greater Everglades.
- Burmese pythons continue to be removed in the Everglades and surrounding rural areas. The District remains actively involved in efforts to halt the spread of these snakes through search and removal, and supporting management-relevant research. A pilot study using detection dogs demonstrated that they can be an effective tool in management efforts.

Looking ahead, nonnative invasions will continue to exert pressure on native species and ecosystem functions and require long-term, multi-agency management. To address the persistent influx of new invasions, partner agencies are providing information to policy makers for developing strategies and regulations toward prevention.



Lake Okeechobee Protection Program

Lake Okeechobee is the largest lake in the southeastern United States. To improve the ecological health of Lake Okeechobee, the South Florida Water Management District and coordinating agencies are working to reduce excessive total phosphorus (TP) loading, extreme variation in water levels, and the rapid spread of nonindigenous plant species. Several components of the Comprehensive Everglades Restoration Plan and the Northern Everglades and Estuaries Protection Program are focused on addressing elevated TP levels, improving water quality, and providing alternative water storage to improve the regulation of lake levels. In Volume I, Chapter 8 presents the WY2011 status of Lake Okeechobee and its watershed for these coordinated efforts. Key highlights are provided here.

Environmental Conditions in Water Year 2011

- In WY2011, the TP load to Lake Okeechobee from all drainage basins and atmospheric deposition was 177 metric tons (mt), which is 63 percent, or 301 mt, less than the load in WY2010. The relatively low loading this year was a result of reduced flows into the lake due to drought conditions. From WY2007 to WY2011, the average TP load to the lake was 352 mt, which is still about 2.5 times greater than the established Total Maximum Daily Load of 140 mt.
- The WY2011 inflow of water to Lake Okeechobee was 0.933 million acre-feet, which is 38 percent of the baseline average, which is the arithmetic mean of annual inflows from 2001 through 2009, of 2.433 million acre-feet. Over this water year, the lake stage declined from 15.13 to 10.96 feet National Geodetic Vertical Datum, with levels ending within the water shortage management sub-band of the lake's regulation schedule.
- Following the extended impacts of the 2004–2005 hurricanes, Lake Okeechobee is still showing signs of improvement. While the lake's submerged aquatic vegetation declined by about 40 percent from 2009 to 2010 likely due to lower lake stages, the proportion of submerged vascular plants increased relative to the macroalga chara. Since vascular plants are generally considered to be better habitat than chara, this change can be viewed as an improvement in the lake's ecological health. Also the replacement of submerged aquatic vegetation by emergent species contributed to maintaining beneficial aquatic habitat. Low lake stages in 2011 were opportune for planting native trees to improve habitat for various wetland species, and the District planted a total of 5,161 trees at six locations in and around Lakes Okeechobee and Istokpoga.

Lake Okeechobee Watershed Protection Program

- As part of the Northern Everglades and Estuaries Protection Program, the three-year update of the Lake Okeechobee Protection Plan was completed and submitted to the Florida Legislature in March 2011. Notably, in WY2011 nine research and assessment projects were under way or completed to help address water quality and storage enhancements of the lake's overall watershed. For example, construction and monitoring were initiated for the Permeable Reactive Barriers Project at Candler Ranch — a treatment technology being tested for nutrient reduction. The District also launched the new Northern Everglades Payment for Environmental Services Program in partnership with private landowners, which obtains water management services such as water and nutrient retention, and reduces flows and nutrient loads to the lake and downstream estuaries.
- The Lake Okeechobee Protection Plan is being implemented as a comprehensive, watershed-based approach to help protect the lake and downstream estuaries. In support of this plan, Phase II of the Chemical Treatment Pilot Project to evaluate the feasibility of large-scale implementation was completed in WY2011. Final designs of the Lakeside Ranch Stormwater Treatment Area South and S-191A pump station were completed in December 2011, and construction of the North Stormwater Treatment Area is in progress. Both the Fisheating Creek and Taylor Creek Feasibility Studies are under way to determine suitable storage and water quality features for these sub-watersheds.

Kissimmee River Restoration and Basin Initiatives

In Volume I, Chapter 9 highlights the major WY2011 activities associated with the Kissimmee Basin. The Kissimmee Basin forms the headwaters of the historic Kissimmee-Okeechobee-Everglades system and is characterized by diverse wetland and lake ecosystems. The Upper Basin includes more than two dozen water bodies and their tributary streams, known collectively as the Kissimmee Chain of Lakes, and the Lower Basin includes the Kissimmee River and floodplain. Channelized for flood control in the 1960s, the Kissimmee River and floodplain experienced pervasive ecological changes when flow in the original river channel ceased, thereby preventing seasonal inundation of the floodplain. These changes included drastic declines in wetlands, diminished fish and wildlife populations, and loss of ecosystem functions.

In partnership with the U.S. Army Corps of Engineers, construction for the Kissimmee River Restoration Project began in 1999. Three of four restoration phases have been completed to date, with the final phase scheduled to be completed in 2014. Numerous ecological benefits of the project have been documented by the South Florida Water Management District's Kissimmee River Restoration Evaluation Program. In recent years, the District has worked to integrate the restoration project with various management strategies for the Kissimmee Basin and Northern Everglades region, including the Kissimmee Chain of Lakes Long-Term Management Plan, Water Reservations for the Kissimmee Basin, and the Lake Okeechobee Watershed Protection Program.

Kissimmee Basin Accomplishments

- The first three phases of the Kissimmee River Restoration Project have reestablished flow to 24 miles of river channel and allowed intermittent inundation of 7,710 acres of floodplain. Construction activities advanced in WY2011 in the headwaters and lower part of the river. Looking ahead, the final phase of construction is scheduled to begin in 2012, with overall completion in late 2014.
- Despite below-average annual rainfall in the Kissimmee Basin, water management operations succeeded in maintaining continuous inflow to the Kissimmee River throughout WY2011. The number of years with continuous flow — a key restoration goal — has now increased to seven out of the last ten years under the interim regulation schedule. Continuing the decade-long trend since Phase I completion, the Kissimmee floodplain stage also met the project's fluctuation target in the upper part of this restoration area. While dry conditions



in recent years have affected wading bird nesting and foraging and reduced their numbers below restoration targets, waterfowl abundance continues to exceed its restoration expectation.

- Kissimmee Basin total phosphorus (TP) loads have declined since WY2005 due to lower inflows and system recovery from the impacts of three hurricanes that crossed the headwater lakes in 2004. Total loading in the last five years (WY2007–WY2011) was less than 50 percent of the total loading of the previous five years, mostly due to repeated drought conditions in recent years. Similarly, TP concentrations have also declined. Together, these declines are important because the basin is a major contributor of nutrients to Lake Okeechobee. Over time, floodplain and river restoration are expected to favor lower TP concentrations as a more natural hydroperiod and stable wetland ecosystem become established. As part of focused restoration efforts to enhance TP retention, work progressed in WY2011 with a survey of the nutrient content and phosphorus storage capacity of river channel sediments and floodplain soils.

Coastal Priorities

The South Florida Water Management District and collaborating agencies are working to preserve and improve South Florida's coastal estuaries, which depend on fresh water for their health. In Volume I, Chapter 10 presents key information and environmental results for the coastal ecosystems where efforts are focused on supporting restoration projects and regulatory rules, such as Minimum Flows and Levels. The chapter also serves as the annual report for the Caloosahatchee River and St. Lucie River Watershed Protection Plans under the Northern Everglades and Estuaries Protection Program. WY2011 highlights of coastal ecosystem findings and protection plan implementation are presented below.

- The District is working on several critical restoration projects to benefit estuarine systems generally aimed at reducing pollutant loads or improving salinity patterns through freshwater inflow management. In the Loxahatchee River, a pilot project to add fresh water during the dry season was conducted to help meet minimum flow targets. In lower Biscayne Bay, portions of a flow redistribution project began operation. Water control improvements were also made on the southwest coast to benefit the Fakahatchee Estuary and Naples Bay.
- In support of coastal priorities, the agency progressed with various monitoring, applied research, and modeling activities this year. For example, submerged aquatic vegetation monitoring continued in the Southern Indian River Lagoon and Caloosahatchee River Estuary, with an emphasis on tape grass in the upper estuary. In addition, a project was begun to provide information on important low salinity zones under differing flow regimes in riverine estuaries.
- The Loxahatchee Interagency Science Team collaboratively developed a science plan for the Loxahatchee River to prioritize monitoring efforts in support of adaptively managing the system and targeting crucial data gaps needed to measure ecosystem restoration success.
- The District successfully applied a salinity forecasting model to make routine operational recommendation to the U.S. Army Corps of Engineers on supplemental flows to the Caloosahatchee River Estuary. The District also began development of a hydrodynamic model for Naples Bay.
- Appendices 10-1 and 10-2 in Volume I provide three-year updates to the St. Lucie and Caloosahatchee River Watershed Protection Plans providing detailed information on climate, inflows, water quality, and valued ecosystem components for these important coastal ecosystems.

VOLUME II

District Annual Plans and Reports

Chapter 2005-36, Laws of Florida, and Subsection 373.036(7), Florida Statutes, directs each of the state's water management districts to consolidate its annual plans and reports that are submitted to Florida's governor and legislature. Since 2005, the South Florida Water Management District has fulfilled this mandate by presenting the applicable plans and reports in Volume II of the South Florida Environmental Report. Incorporation of these reports into a single document has improved reporting efficiency and quality while also making the information more accessible to policy makers, stakeholders, and the public.

The project-related information described in this volume parallels the District's performance management cycle throughout fiscal year 2011 (October 1, 2010 through September 30, 2011). During this period, the Strategic Plan, Annual Work Plan, and Annual Budget are developed and implemented, followed by evaluation and reporting. Consistent with chapter topics and content in corresponding reports of the other water management districts, Volume II chapters cover the following:

- Annual Work Plan Report
- Priority Water Bodies List and Schedule
- Five-Year Capital Improvements Plan
- Five-Year Water Resource Development Work Program
- Alternative Water Supply Annual Report
- Florida Forever Work Plan, Annual Update
- Land Stewardship Annual Report
- Mitigation Donation Annual Report

Now in its seventh year, the SFER Consolidated Project Report Database provides a comprehensive update on many District projects (activities with start and end dates) and processes (ongoing activities) that are referenced in the *2012 South Florida Environmental Report*. The database is designed to uniformly describe projects and processes linked to report-related planning efforts and provide these details in one accessible location rather than repeating them in several reports. It also enables rapid data sorting, searches, and retrieval for efficient information and project management. The 2011 database is available at www.sfwmd.gov/sfer.

Fiscal Year 2011 Annual Work Plan Report

The South Florida Water Management District's annual business cycle is comprised of four key elements: the Strategic Plan, Annual Work Plan, Annual Budget, and Reporting and Evaluation. Under this process, Work Plan Reports are prepared quarterly, and the fourth quarter report represents the status at the end of the fiscal year. In Volume II, Chapter 2 presents the year-end report of the FY2011 Annual Work Plan, the final step of the annual reporting cycle. The chapter highlights the FY2011 status of key projects/processes, financial summaries, accomplishments and success indicators.

Annual Work Plan Performance Remains Strong

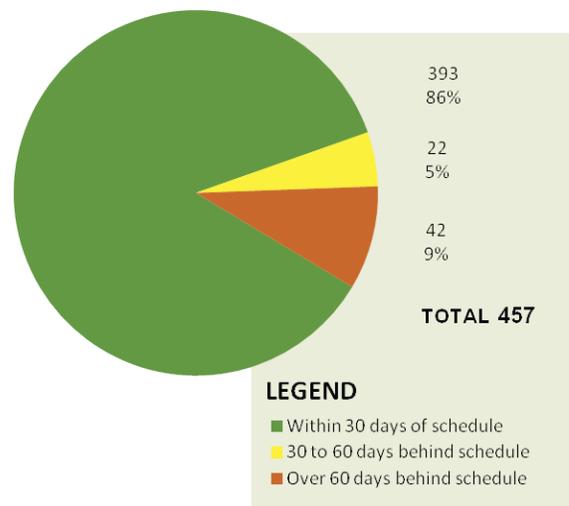
As in previous fiscal years, adherence to the planned schedules during FY2011 for all District projects and processes was categorized using color-coded criteria (see pie chart). Using these criteria, 86 percent of these activities were green, 5 percent were yellow and 9 percent were red. Improving on the last two fiscal years, 91 percent of all projects collectively were within 60 days of their planned schedules.

Gross Revenues and Expenditures Decrease in Fiscal Year 2011

The Annual Work Plan includes the status of revenue collection and expenditure rates. During FY2011, the District collected 100 percent of its budgeted revenue, or \$536 million. While the percentage collected was higher than FY2010, the amount was \$84 million less than the previous year. FY2011 revenue collection rates were 99 percent of budgeted taxes (both ad valorem and agricultural privilege taxes), 91 percent of budgeted intergovernmental revenues, 159.4 percent of budgeted investment earnings, and 99 percent of other budgeted items such as leases, licenses, permits, fees, sales of District property and self-insurance charges.

Expenditure rates were tracked as an indicator of overall program activity. In FY2011, the District spent 86 percent of the total budget of \$703 million. The FY2011 discretionary expenditure rate of 88 percent increased by eight percent from FY2010, or \$217 million, and the restricted expenditure rate of 80 percent increased from FY2010 levels by eight percent. Of the unspent \$102 million (\$58 and \$44 million of budgeted ad valorem and restricted funds, respectively) in FY2011, about 75 percent, or \$76 million, was carried over for ongoing work in FY2012.

Fiscal Year 2011 Status of Major District Projects and Processes (October 1, 2010 – September 30, 2011)



Linked to the District's Annual Work Plan and Strategic Plan, success indicators have been established for tracking agency results. These indicators identify and measure levels of success, and annual targets are used to assess year-to-year progress of the agency's projects and processes. Success indicator values are summarized in the chapter for FY2010 and FY2011. Actual indicator values for the FY2011 are compared to the specific targets established at the beginning of the fiscal year. Further details on success indicators, including definitions, targets, and other related information are available on the District's website at www.sfwmd.gov/budget.

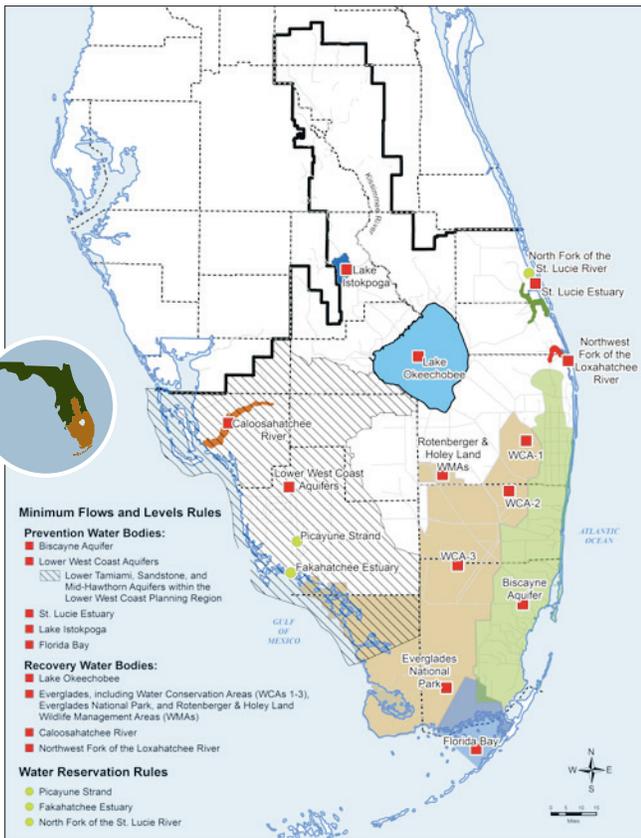
2012 Priority Water Bodies List and Schedule

To protect and conserve adequate water supplies for natural systems, the South Florida Water Management District applies region-wide water resource protection rules as well as Minimum Flows and Levels (MFLs), Water Reservations, and Restricted Allocation Area rules. In Volume II, Chapter 3 provides a summary of current rules in effect during 2011 and the priorities and schedule for developing new rules planned for 2012 through 2017.

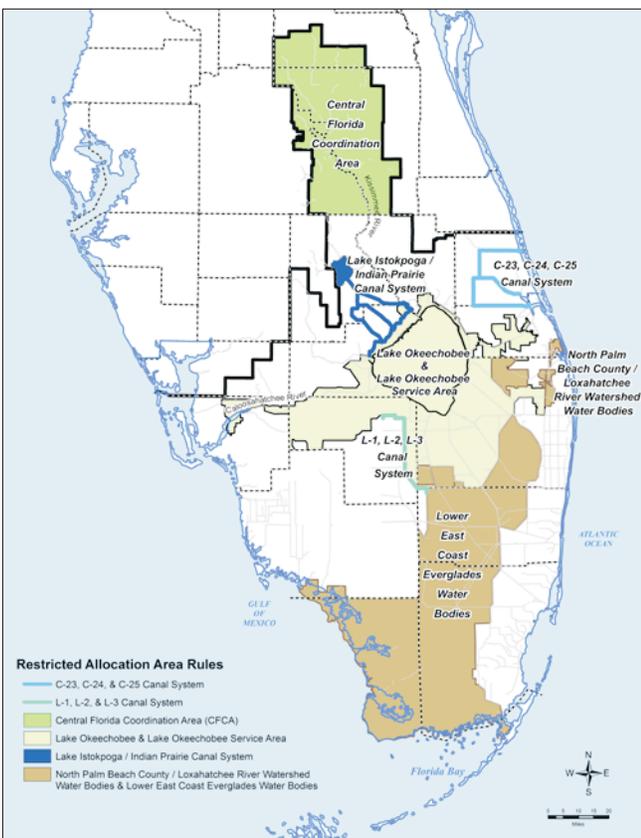
In accordance with state law, each year the District identifies specific water bodies for which MFL rules will be established. Another list specifies those water bodies for which Water Reservation and Restricted Allocation Area rules will be developed in order to protect natural systems from future consumptive use allocations. To date, the District has adopted MFL rules for 13 water bodies and has authorized Restricted Allocation Area rules for several large areas including the Everglades and Loxahatchee River Watersheds and the Lake Okeechobee Service Area. Water bodies where MFL or Water Reservation rules have been adopted are shown on the top map. Water bodies where Restricted Allocation Area rules have been adopted are shown on the bottom map.

In 2011, the District continued collecting technical data and refining hydrodynamic and ecological models for the Caloosahatchee River and Estuary. Technical evaluation and documentation of current MFL criteria for Florida Bay also progressed this past year. This information was used to help determine whether to update MFLs for these priority water bodies. On December 15, 2011, the District's Governing Board adopted the 2012 MFL Priority Water Body List and Schedule, which was subsequently submitted to the Florida Department of Environmental Protection for review and approval. Planned activities in 2012 include continuing progress on the MFL evaluation for the Caloosahatchee River and Estuary, and Florida Bay.

Additional rulemaking activities include continuing Water Reservation rule development associated with two Comprehensive Everglades Restoration Plan projects: the Caloosahatchee River (C-43) West Basin Storage Reservoir Project and the Biscayne Bay Coastal Wetlands Project (Phase 1). Water reservation rule development efforts for the Kissimmee River, its floodplain, and the Chain of Lakes will move forward in 2014 after completion of the Kissimmee Basin Modeling and Operation Study. Further details on these plans are available at www.sfwmd.gov/reservations.



Regional Priority Water Bodies



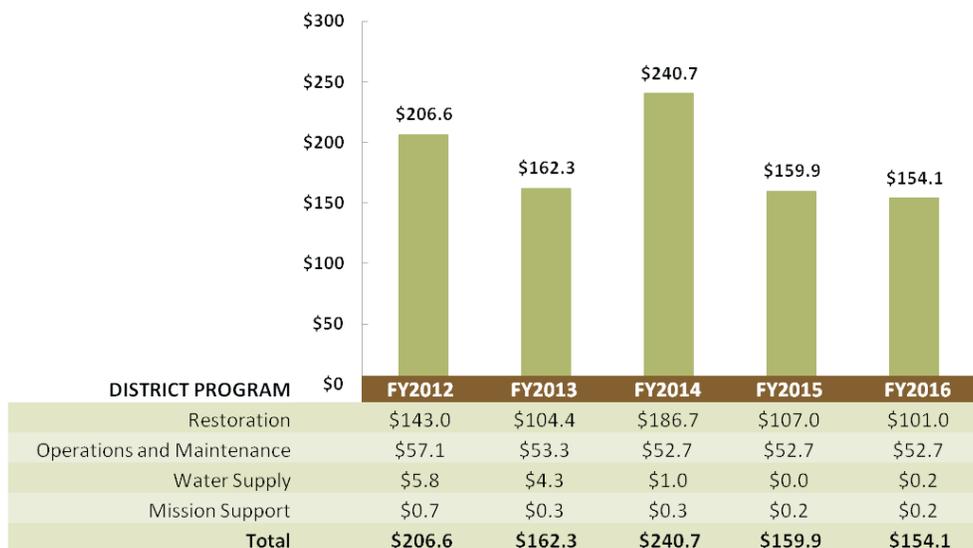
Five-Year Capital Improvements Plan

In accordance with state law, each year the South Florida Water Management District annually reports on the agency’s Five-Year Capital Improvements Plan. The plan includes estimated capital project expenditures and anticipated revenues over a five-year period. In Volume II, Chapter 4 includes projected revenues and expenditures for capital improvements for FY2012–FY2016.

Over the next five years, the District estimates it will spend \$923.6 million on projects contained in the Five-Year Capital Improvements Plan, of which \$206.6 million are contained in the FY2012 budget. The plan dedicates \$163.7 million for regional water quality enhancement projects, with the balance allocated for other agency priorities related to water supply, restoration, and operations and maintenance.

A summary of the expenditures in the District’s Five-Year Capital Improvements Plan are shown in the figure below. These expenditures are for (1) basic construction costs including design, engineering, permits, inspections, and site development; (2) other project costs including land acquisition and associated costs, surveys, and facility acquisition; and (3) estimated changes in operation and maintenance costs for those projects that will be owned and capitalized as fixed assets by the District. More detailed descriptions of these capital projects are provided in the SFER Consolidated Project Report Database at www.sfwmd.gov/sfer.

Five-Year Annual Capital Budget Estimates
(Fiscal Years 2012–2016)



Five-Year Water Resource Development Work Plan

Updated Water Supply Plans in Progress

The purpose of water supply planning is to develop strategies to meet the existing and future water demands of urban and agricultural users while still meeting the needs of the environment. Regional water supply plans are updated every five years for each of the South Florida Water Management District's four planning regions and encompass a 20-year planning horizon. State law requires that all the water management districts prepare an annual Five-Year Water Resource Development Work Program to update the agency's implementation strategy for the water resource development component of each approved regional water supply plan. The Work Program is included in Volume II, Chapter 5A, to fulfill various reporting requirements on planning, projects, and funding related to water supply.

The 2011 Upper East Coast Water Supply Plan Update was approved by the District's Governing Board on March 10, 2011. The Lower West Coast Water Supply Plan Update

will be brought forward for approval in 2012, and the Kissimmee Basin and Lower East Coast updates will be brought forward in 2013. Plan updates identify Water Resource Development and Water Supply Development projects that are expected to meet the needs of all reasonable-beneficial uses through 2030 during a 1-in-10-year drought event, while sustaining the region's water resources and related natural systems.

Allocations for Water Resource Development Projects

The District has allocated \$3.9 million in FY2012 for Water Resource Development projects and anticipates spending \$11.5 million on these projects over the next five years (FY2012–FY2016). These projects include groundwater monitoring, resource assessments, conservation, and water resource protection activities. The allocations include \$438,000 in FY2012 and \$2.2 million from FY2012 to FY2016 to implement the Comprehensive Water Conservation

Alternative Water Supply Annual Report

Due to the limitations that exist on development of traditional freshwater sources, future regional water demands will be met primarily through developing Alternative Water Supply (AWS) sources. Alternatives include nontraditional water supplies such as brackish groundwater, surface water captured during wet weather, and reclaimed water. The South Florida Water Management District's program to support the development of AWS projects has been in place for more than a decade. This program, in cooperation with the state, has approved \$185.5 million since 1997 for the construction of 468 AWS projects. In Volume II, Chapter 5B provides an annual update on the agency's AWS funding efforts during FY2011.

In 2005, the Florida legislature created the Water Protection and Sustainability Program, which established annually recurring state funding, when available, to the District for the construction of AWS projects. From FY2006 through FY2011, the District approved more than \$165 million in funding (including Water Protection and Sustainability Program funds) for 285 projects that created more than 420 million gallons per day of additional alternative water capacity.

AWS program funds have been dedicated in FY2012 for four projects in the Big Cypress Basin. These represent an investment of \$1.82 million and will provide an additional 8 million gallons of water per day. Additionally, three regional projects have been awarded \$900,000 to create an additional 2.8 million gallons per day of AWS capacity.

Florida Forever Work Plan, 2012 Annual Update

In Volume II, Chapter 6A presents the 2012 annual update of the Florida Forever Work Plan. This chapter identifies projects eligible for funding under the Florida Forever Act (Section 259.105, Florida Statutes) as well as projects eligible for land acquisition funding from state-appropriated accounts or trust funds under Section 373.139(3)(c), Florida Statutes, along with five-year projected expenditures for FY2012–FY2016. Land acquisition activity during FY2011 is also provided in this chapter.

Progress under Florida Forever

In FY2011, the South Florida Water Management District acquired 30,794 acres of land and expended a total of \$216.5 million using Florida Forever Act funds, leveraged with other funds provided by the District along with federal, state, and local governments. District funds totaling \$194.2 million were used to acquire 27,257 acres of land in the Everglades Agricultural Area and C-139 Basin. Expenditures also benefited the Critical Corkscrew Regional Ecosystem Watershed, Indian River Lagoon-South, and Biscayne Bay Coastal Wetlands projects. Additionally, as external partner acquisitions, Miami-Dade County acquired 30 acres of land

for \$109,270 within Comprehensive Everglades Restoration Plan (CERP) project footprints; and the State designated 5,255 acres of land within Fakahatchee Strand Preserve for use in the Picayune Strand Restoration CERP project at a cost of \$3 million. At the close of FY2011, a total of 243,167 acres, or 60 percent, of land needed for CERP had been acquired.

The 2012 Florida Forever Work Plan update identifies a total of 58 eligible projects under the Florida Forever/Save Our Rivers Program, Northern Everglades and Estuaries Protection Program, CERP, and other water resource projects. In this reporting period, the Spanish Creek/Four Corners, Lemkin Creek, and Caloosahatchee Basin Storage and Treatment projects have been added to the eligible list of projects.

Over the next five years, estimated expenditures for projects total \$417.2 million, of which \$416.9 million will be used for construction, with \$163.7 million identified for regional water quality enhancement projects. Five-year expenditure projections are conservatively estimated to include \$176 million for Florida Forever/Save Our Rivers projects, \$93 million for Northern Everglades and Estuaries Protection Program projects, and \$149 million for CERP projects.

Land Stewardship Annual Report

Through land stewardship, the South Florida Water Management District is responsible for managing agency-owned lands, including Save Our Rivers and other natural conservation lands, as well as those areas being maintained for future water resource projects. The program also administers mitigation banks and regional off-site mitigation areas and oversees the development of recreational uses on these public lands. As of FY2010, program funds come primarily from ad valorem tax revenues, supplemented by other funding sources including off-site mitigation, mitigation bank revenues, lease revenues, grants for wetland restoration and exotic control projects, and the Everglades Restoration Trust Fund.

In Volume II, Chapter 6B highlights the 22 Save Our Rivers and Florida Forever natural lands projects for the District's five land management regions (Upper Lakes, Kissimmee/Okeechobee, East Coast, Everglades, and West

Coast) and FY2011–FY2012 land management activities and acquisition status for each region. The chapter also provides project descriptions for major program components: hydrologic and habitat restoration, vegetation management, invasive species control, prescribed burning, wildlife management, public use, water resource education, law enforcement, mitigation, infrastructure management, and management of project lands for future Comprehensive Everglades Restoration Plan and other water resource projects.

The District and its partners manage more than 1.43 million acres of public land while providing recreational opportunities to the public. In FY2011, the District invested \$11.3 million in land management, while \$4.1 million in revenue was generated from agricultural leases and mitigation banks. Land management costs in FY2012 are anticipated to be \$7.8 million.

Mitigation Donation Annual Report

Wetland Mitigation Funds Benefit Regional Restoration

Mitigation is the acquisition, creation, restoration, or enhancement of wetlands to compensate for permitted wetland impacts. Each year, Florida's water management districts report on the expenditure of funds received as mitigation for such impacts. Mitigation funding enables the South Florida Water Management District to direct funds toward priority restoration in a cost-effective manner that benefits the South Florida ecosystem.

In Volume II, Chapter 7 presents mitigation fund expenditures for FY2011 for the agency's two regional mitigation projects: Corkscrew Regional Ecosystem Watershed and Pennsuco Regional Mitigation Area. The chapter also features restoration and management efforts for these projects. Spanning more than 60,000 acres in Lee and Collier counties, the Corkscrew Regional Ecosystem

Watershed contains some of the largest remaining pristine cypress wetlands in the United States, providing habitat to many protected species. Covering about 13,000 acres in Miami-Dade County, Pennsuco is an impaired wetland ecosystem that likely will continue to degrade and further impact adjacent natural areas unless invasive exotics are reduced. Importantly, continued enhancements to these vital wetlands offer regional ecological benefits and contribute to overall Everglades restoration goals.

Although neither project still accepts cash payments, existing dedicated funds are used for restoration and management. In FY2011, the District invested more than \$80,000 to acquire 10 acres, filed conservation easements on 1,244 acres, and expended approximately \$1.1 million on restoring 6,795 acres in the two areas. It is anticipated that FY2012 combined expenditures will be nearly \$1 million.

VOLUME III

Annual Permit Reports

Now in its second year in the South Florida Environmental Report, Volume III efficiently builds on the South Florida Water Management District's consolidated reporting and maximizes the streamlined submittal process for annual permit reports to the Florida Department of Environmental Protection and the U.S. Army Corps of Engineers. This volume is also intended to assist in efforts to streamline the permit reporting process, so that meaningful comparisons of yearly progress can more easily be made and assure the permitting agencies that the District is documenting all required permit-specific conditions.

Specifically, Volume III summarizes the status of projects and environmental monitoring results collected during Water Year 2011 (WY2011) (May 1, 2010–April 30, 2011). The volume contains five chapters and 11 supporting appendices consisting of federal permit reporting under the Clean Water Act and state permit reporting for the Comprehensive Everglades Restoration Plan Regulation Act, Everglades Forever Act, Northern Everglades and Estuaries Protection Program, Environmental Resource Permitting projects, and Emergency Orders in place during the reporting year.

Glossary

Acre-feet (ac-ft): The volume required to cover 1 acre to a depth of 1 foot, commonly used to express large amounts 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, 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.

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

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

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.

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).

Drought: An extended period of low rainfall, below-normal streamflow, and depleted surface and subsurface storage.

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 12 interrelated construction projects between Lake Okeechobee and the Everglades, currently including nearly 45,000 acres of Stormwater Treatment Areas with roughly 12,000 additional acres under construction. It also contains four hydropattern restoration projects that will improve the volume, timing, and distribution of water entering the Everglades.

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 nonindigenous species to the Everglades ecosystem.

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



Expenditure: The disbursement of appropriated funds to purchase goods or services.

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 bonds to fund 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 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.

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 WCA-2A, measured in metric tons per year. Note that 1 metric ton (mt) is equivalent to 1,000 kilograms, or 2,205 pounds.

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."

Northern Everglades and Estuaries Protection Program (NEEPP): As defined by Florida law (Section 373.4595, Florida Statutes), an initiative to holistically restore the Everglades through increased focus and integration of regional projects in the Northern Everglades, including the Lake Okeechobee watershed, and the Caloosahatchee and St. Lucie River watersheds and estuaries.

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

Revenue: Monies received from all sources, with the exception of fund balances, that will be used to fund expenditures in a fiscal year.

Stage: The height of a water surface above an established reference point. This vertical control measurement is usually expressed as feet National Geodetic Vertical Datum of 1929 or feet North American Vertical Datum of 1988.

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.

Total phosphorus (TP): An estimate of the concentration of phosphorus in both organic and inorganic forms in a water sample. In freshwater environments, increased levels of this nutrient can promote the growth of algae and other plants.

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

Water quality: The physical, chemical, and biological condition of water as applied to a specific use, typically propagation of fish and wildlife, public water supply, industry, or recreation.

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

Water Reservations: As defined by Florida law (Subsection 373.223(4), Florida Statutes), water set aside or designated for use, in a certain location, time, or quantity, as may be required for protecting fish and wildlife or public health and safety.

Water Year (WY): The period from May 1 through April 30, during which water quality and other data are collected and reported in the South Florida Environmental Report.



Acknowledgments

The South Florida Water Management District gratefully acknowledges the many professionals who have contributed to the *2012 South Florida Environmental Report*. Along with this Executive Summary, the three-volume main report was developed collaboratively by more than 200 authors and contributors from the District, the Florida Department of Environmental Protection, and other supporting agencies and organizations with expertise in the various reporting topics. A detailed list of contributors is presented on the acknowledgments page of the main report www.sfwmd.gov/sfer.

For further information, please contact:

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Garth Redfield
Water Quality Bureau
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, FL 33406
561-682-6611
gredfiel@sfwmd.gov

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Ernest Marks
Ecosystems Division
Florida Department of Environmental Protection
23900 Commonwealth Boulevard, Mail Station 24
Tallahassee, FL 32399-3000
850-245-3166
ernest.marks@dep.state.fl.us

The complete 2012 SFER is available online at www.sfwmd.gov/sfer.



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

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

sfwmd.gov