

SOUTH FLORIDA

Environmental Report 2014

EXECUTIVE SUMMARY



MARCH 1, 2014



Progress on key projects to improve water quality and restore America's Everglades—plus managing water from record-setting rainfall—marked the highlights of Water Year 2013 for the Florida Department of Environmental Protection (FDEP) and the South Florida Water Management District (SFWMD).

The expanded network of Stormwater Treatment Areas south of Lake Okeechobee treated 1.2 million acre-feet of water, achieving their best performance to date. Improved farming practices in the Everglades Agricultural Area resulted in an impressive 41 percent phosphorus reduction; to the west of this area, the C-139 Basin reduced phosphorus discharges to historic levels. Working in tandem for nearly two decades now, these best management practices at the source combined with regional treatment marshes have prevented approximately 4,270 metric tons of phosphorus from entering Everglades waters.

The SFWMD also began implementing the Restoration Strategies plan championed by Governor Rick Scott to further reduce phosphorus levels and meet water quality standards for the Everglades. This stepped-up effort includes construction of additional storage and treatment projects, a detailed science plan and expanded source controls. Work is underway on several key construction projects, and the science plan studies are moving forward.

The *2014 South Florida Environmental Report* incorporates the three-year update to the Lake Okeechobee Protection Plan, including analysis of long-term average annual flows, loads and concentrations. Heavy rains and stormwater runoff from Tropical Storm Isaac caused a three-foot rise in the lake's water level in just one month. To help reduce nutrient loads, FDEP kicked off development of the Lake Okeechobee Basin Management Action Plan, which will build on efforts already underway to meet target phosphorus levels.

Also of note, the first three phases of Kissimmee River restoration have reestablished flow to 24 miles of river channel and returned flow to more than 7,700 acres of floodplain; wading bird nesting on Lake Okeechobee was at historic levels (highest since 2006), while federally endangered wood storks, white ibis and great egrets led a moderate improvement in overall nesting throughout South Florida; and progress continued on a suite of watershed construction projects to benefit the St. Lucie and Caloosahatchee watersheds and estuaries.

The State's commitment to protect, preserve and improve the South Florida ecosystem through sound science is unwavering. To sustain Florida's progress this coming year, Governor Scott supports continued state funding for Restoration Strategies and has proposed increased funding to achieve additional stormwater treatment, increased southerly flow into the Everglades and accelerating Kissimmee River restoration. We will continue to identify and implement efficient and effective measures that are focused on long-term environmental sustainability.



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Foreword

The 2014 *South Florida Environmental Report* (SFER) marks the 16th 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 fourth 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 agency's strategic priorities and projects. Now in its 10th 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 2014 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 2014 SFER showcases sound management and progress toward restoration of the entire South Florida region.

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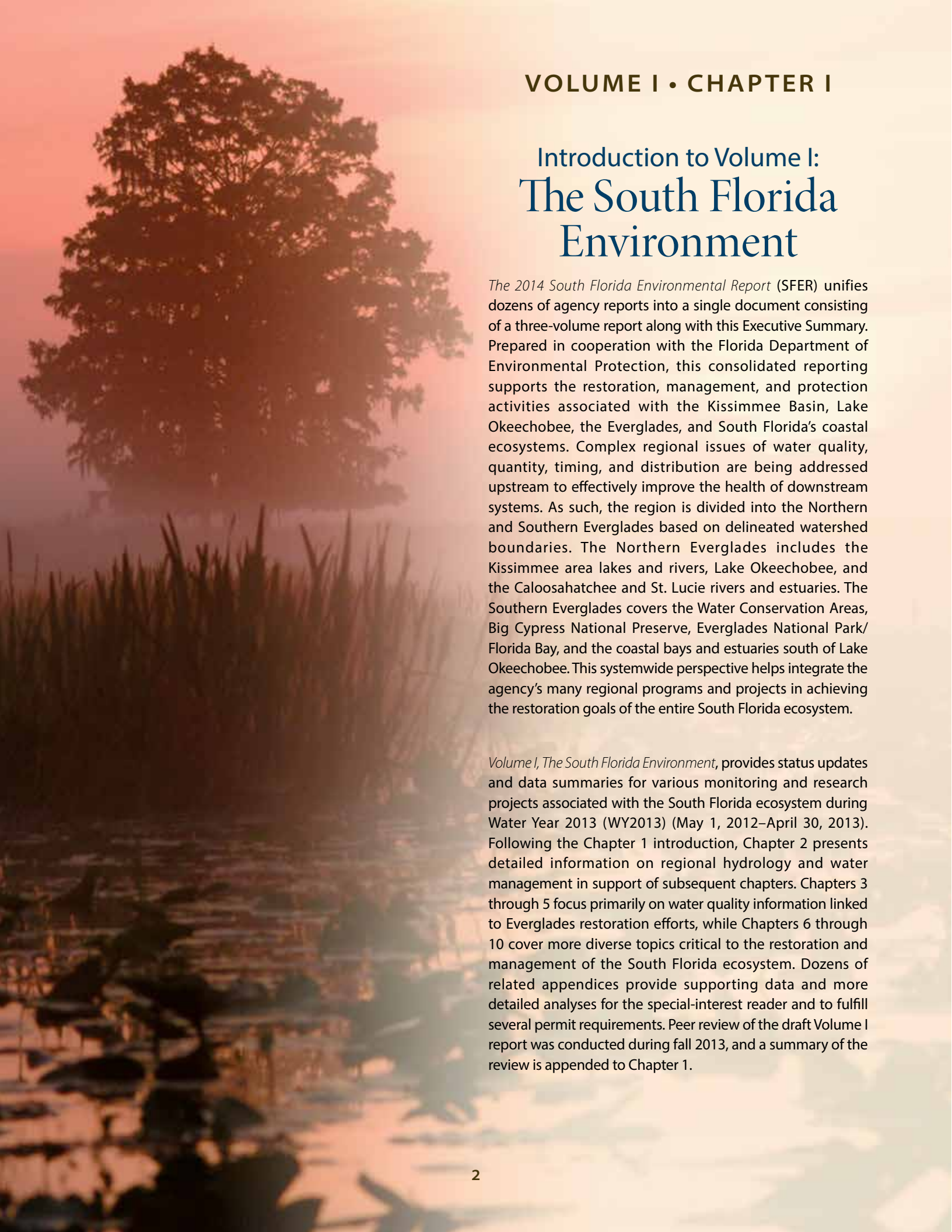
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VOLUME I • CHAPTER I

Introduction to Volume I: The South Florida Environment

The 2014 South Florida Environmental Report (SFER) unifies dozens of agency reports into a single document consisting of a three-volume report along with this 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 2013 (WY2013) (May 1, 2012–April 30, 2013). Following the Chapter 1 introduction, Chapter 2 presents detailed information on regional hydrology and water management 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 fall 2013, and a summary of the review is appended to Chapter 1.

South Florida Hydrology and Water Management

The ecological and physical characteristics of South Florida have been shaped by years of hydrologic variation—ranging from extreme drought to flood, sometimes within a relatively short time period. South Florida hydrology is driven by rainfall, rainfall-generated runoff, groundwater recharge and discharge, and evapotranspiration. Region-wide water management is accomplished by approximately 4,800 miles of canals and levees, roughly 1,350 water control structures, and nearly 70 pump stations. Regional hydrology forms the foundation for restoration science and aids in interpreting results throughout this report. In fact, hydrological and water management information covered in this chapter is used as supporting data in most of the other Volume I chapters. WY2013 hydrology, including rainfall, water levels, inflows, and outflows for the regional water management system, is compared with the previous water year (WY2012) and historical conditions. The chapter also examines the hydrologic impact of the high rainfall events associated with the WY2013 hurricane season.

Rainfall in Water Year 2013 Reflects Wet and Dry Extremes

The 2011 La Niña condition continued in the beginning of 2012. By spring 2012, the tropical Pacific west of Peru started warming and the El Niño trend was observed by late summer. From September to the end of 2012, neutral conditions continued and 2012 ended as an El Niño Southern Oscillation (ENSO) neutral year. ENSO neutral conditions persisted for the remainder of WY2013. South Florida's hydrology during neutral years is not predictable. November 2012 for the District area was the driest since 1932. Following the two below-average rainfall years of WY2011 and WY2012, hydrologic conditions of South Florida improved with average rainfall in WY2013—53.17 inches compared to the region's annual average of 52.75 inches. Meteorologically,

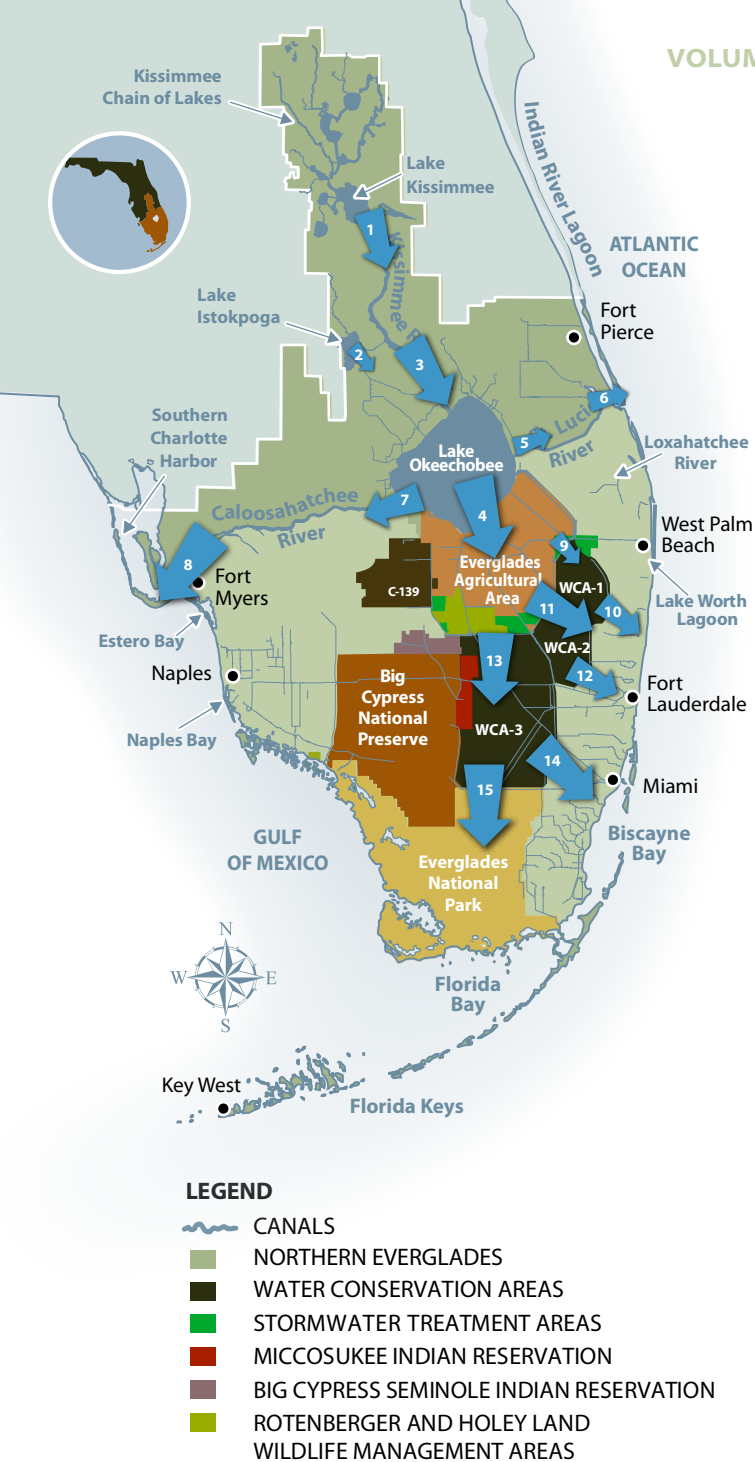
WY2013 was an average rainfall year but the rain distribution was spatially and temporally distributed unevenly. Spatially, Miami-Dade and Water Conservation Areas 1 and 2 rainfall areas had close to 10 inches of rain over their respective averages, while the Southwest and Upper Kissimmee rainfall areas had close to a 3-inch deficit. Temporally, on the average, six months experienced drought conditions. Overall, the dry season was drier than normal and, in fact, it would have been a drought if not for a very wet April 2013 and May 2013.

Hurricane Season Headlined by Tropical Storm Isaac

Lake Okeechobee, the main storage of the regional water management system, was at a stage of 11.7 feet National Geodetic Vertical Datum (ft NGVD) on May 1, 2012, followed by minor increases in water levels until August 2012. The most significant hydrologic event in WY2013 was Tropical Storm Isaac, which created flooding in late August 2012 and initiated several days of flood control emergency operations. Lake Okeechobee was at 12.4 ft NGVD on August 24, 2012, at the start of the storm. The lake level rose markedly to 15.0 ft NGVD by September 15, 2012—a 3-foot increase in one month— from runoff generated by the storm and rainfall from the following days. Lake Okeechobee's average stage was 13.9 ft NGVD for WY2013, almost two feet higher than the previous water year.

Although Tropical Storm Isaac passed far to the west of South Florida, its hydrologic impact on the District area was severe, as the outer bands of rainfall concentrated on the eastern coast and resulted in record rainfall amounts (especially in the C-51 and L-8 basins, with highs of more than 13 inches in localized areas), wide-scale flooding, and erosion of canals. The storm contributed an areal average rainfall of 5.7 inches over the District area, with the heaviest rains (~6 to 10 inches) in Palm Beach, Water Conservation Areas 1 and





Regional Inflows and Outflows

WATER FLOW (ACRE-FEET IN THOUSANDS)

Water Year
2013* 2012

1.Lake Kissimmee Outflows	440	814
2.Lake Istokpoga Outflows	281	228
3.Lake Okeechobee Inflows	2,100	1,821
4.Lake Okeechobee Outflows	1,042	746
5.Flows into the St. Lucie Canal from Lake Okeechobee	104	47
6.Flows into the St. Lucie Estuary through the St. Lucie Canal	153	0.119
7.Flows into the Caloosahatchee Canal from Lake Okeechobee	501	180
8.Flows into the Caloosahatchee Estuary through the Caloosahatchee Canal	1,138	599
9.Water Conservation Area 1 Inflows	364	170
10.Water Conservation Area 1 Outflows	484	15
11.Water Conservation Area 2 Inflows	1,074	386
12.Water Conservation Area 2 Outflows	938	378
13.Water Conservation Area 3 Inflows	1,322	900
14.Water Conservation Area 3 Outflows	1,225	571
15.Everglades National Park Inflows	1,497	744

* Water Year 2013 flows are reflected on map

2, Martin/St. Lucie, Broward, East Everglades Agricultural Area, Lake Okeechobee, Lower Kissimmee, and Miami-Dade rainfall areas. Storm-related operations included widespread discharges across many portions of the central and eastern regions as well as discharge to tide. Emergency pumps also were temporarily installed in western Palm Beach County to relieve localized flooding and provide needed support to nearby communities.

Regional Flows Increase Due to Rainfall Spikes

For parts of the WY2013 wet and dry seasons, most water control structures were operated under water supply mode due to rainfall deficit conditions, but significant flood control

operations dominated during the wet season high rainfall events. Generally, inflows and outflows to most major water bodies were above or close to the historical average and few were below average (see regional flows shown on map and table). Due to a rainy wet season, Lake Okeechobee inflows were 101 percent of the historical average, while outflows were 73 percent of the historical volume and about 40 percent greater in WY2013 than in WY2012. Both inflows and outflows for the Water Conservation Areas also were much higher in WY2013 than in WY2012. These higher levels rippled downstream, with WY2013 inflows to Everglades National Park nearly twice the amount recorded in the previous water year.

Water Quality in the Everglades Protection Area

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 WY2013, 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 4,500 samples collected across 171 active stations for 11 parameters in the EPA, the majority of monitoring results indicated general compliance with state water quality standards. Similar to monitoring results from recent water years, water quality excursions were identified in WY2013 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. These excursions are attributed to phosphorus concentrations within impacted areas (i.e., those areas with ambient soil TP levels greater than 500 milligrams per kilogram). Excursions for alkalinity and pH in the Arthur R. Marshall Loxahatchee National Wildlife Refuge (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. Specific conductance was categorized as a concern for some areas of the EPA but generally associated with intrusion of mineral-rich groundwater into the canals and marsh areas highly influenced by these canal inflows. Additionally, seven pesticides or pesticide breakdown products were detected above their method detection limit but none exceeded toxicity guideline concentrations or state water quality standards. All other measured parameters complied with their respective state water quality standards.

Nutrient Trends in Everglades Surface Water

Each year, the EPA receives variable amounts of surface water inflows based on the hydrologic variability within the upstream basins. Over the last five years, approximately 175 metric tons (mt) of TP was received from upstream sources (Lake Okeechobee, Everglades Agricultural Area

Basin, C-139 Basin, L-8 Basin, C-51W Basin, and other water control districts) for treatment, with a portion (roughly 33 mt, or 19 percent) delivered to the EPA after treatment by the Everglades STAs and a relatively small portion (roughly 5 mt, or 3 percent) delivered to the EPA through diversion. In WY2013, TP loads from all surface sources to the EPA totaled approximately 60.5 mt, with a flow-weighted mean concentration of 25 µg/L. Another 193 mt of TP are estimated to have entered the EPA through atmospheric deposition. The 60.5 mt TP load in the surface inflows to the EPA represents an increase of approximately 65 percent compared to the previous water year (36.7 mt in WY2012), primarily resulting from increased flow volumes this year.

TP concentrations were lowest within the Everglades National Park and highest in the Refuge, with annual geometric mean inflow concentrations ranging from 8.2 to 30.7 µg/L, respectively. Annual geometric mean TP concentrations at interior sites range from 3.7 µg/L in the Park to 8.5 µg/L in the Refuge. Annual geometric mean TP concentrations for individual interior marsh monitoring stations ranged from less than 3.0 µg/L in some unimpacted portions (i.e., those areas with ambient soil TP levels less than 500 milligrams per kilogram) of the marsh to 29.0 µg/L at a Refuge site that is highly influenced by canal inputs. Of the interior marsh sites, 80.4 percent exhibited annual geometric mean TP concentrations of 10.0 µg/L or less, with 92.4 percent of the marsh sites having annual geometric mean TP concentrations of 15.0 µg/L 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. Similar to previous years' reporting, the five-year (WY2009–WY2013) 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 µg/L and 10 µg/L, respectively. In all cases, the annual network geometric mean TP concentrations for WY2013 in both the impacted and unimpacted areas were the lowest of the five-year assessment period.

Mercury and Sulfur Environmental Assessment for the Everglades

The biological accumulation of mercury (Hg) through the Everglades food web requires that mercury be transformed into methylmercury (MeHg) and released into the marsh water where potential impacts to fish and wildlife may occur. Mechanisms that drive mercury methylation and accumulation are very complex and variable. Best available science documents that biological, chemical, and hydrologic factors all influence these processes and their endpoint of elevated mercury levels in fish and wildlife.

Volume I, Chapter 3B fulfills the reporting requirements of the Everglades Forever Act by summarizing water conditions within the Everglades Protection Area (EPA) with respect to concerns regarding mercury concentrations and loads; results of sulfur monitoring are also reported due to its role in mercury cycling. This update includes current status of Hg and sulfur monitoring in the EPA and provides a summary of biota mercury concentrations and mercury atmospheric deposition. Supportive information is provided including sulfate concentrations and loads from surface waters and atmospheric sources (i.e., wet deposition).

Research and Evaluation Highlights

- The State of Florida Total Maximum Daily Load for mercury was finalized and ratified in 2013 by the Florida legislature. The required load reduction for non-hazardous levels of mercury is 86 percent.
- Largemouth bass (*Micropterus salmoides*) total mercury (THg) concentrations have declined spatially throughout the EPA, with levels decreasing by 17 percent since WY1994. However, additional reduction is needed, as the annual THg median concentration in bass still exceeded the U.S. Environmental Protection Agency human health MeHg criteria at various monitoring sites.
- At a lower trophic level, sunfish (*Lepomis spp.*) THg concentrations averaged 0.18 mg/kg, which is nearly 2.5 times the federal criterion (0.077 mg/kg MeHg) for wildlife protection. However, unlike bass, no significant temporal trend was apparent throughout the period of record for this species. Mosquitofish (*Gambusia spp.*) THg concentrations decreased by 40 percent from last year, but still exceeded the federal criterion for protection of wildlife at a few monitoring sites.
- For the last water year (WY2012), annual wet deposition of THg accounted for 136.7 kilograms of Hg to the EPA, representing 97 to 99 percent of the Hg delivered to the EPA. Wet deposition of sulfate accounted for 7,375 metric tons (mt) to the EPA, ranging from 4.8 to 31.6 percent of the total sulfate load to the EPA. This suggests that wet sulfate deposition is minimal in relation to surface water inflows, although it should be cautioned that this is based only on one monitoring site.
- In WY2013, sulfate loads from surface sources, including internal transfers to the EPA, totaled approximately 96,263 mt, while atmospheric sulfate deposition (wet plus dry deposition) was estimated to be 8,655 mt. Overall, this load represents an increase of roughly 80 percent compared to the previous year (53,545 mt in WY2012), driven primarily by high flow volumes in WY2013. Annual mean inflow sulfate concentrations ranged from 50.9 milligrams per liter (mg/L) for the Refuge to 3.5 mg/L for Everglades National Park. Sulfate levels were generally lower at interior marsh regions (37.9 mg/L for WCA-2 to 4.7 mg/L for the Park), indicating that plant uptake and conversion to other sulfur species are occurring within the marsh.



Nutrient Source Control Programs

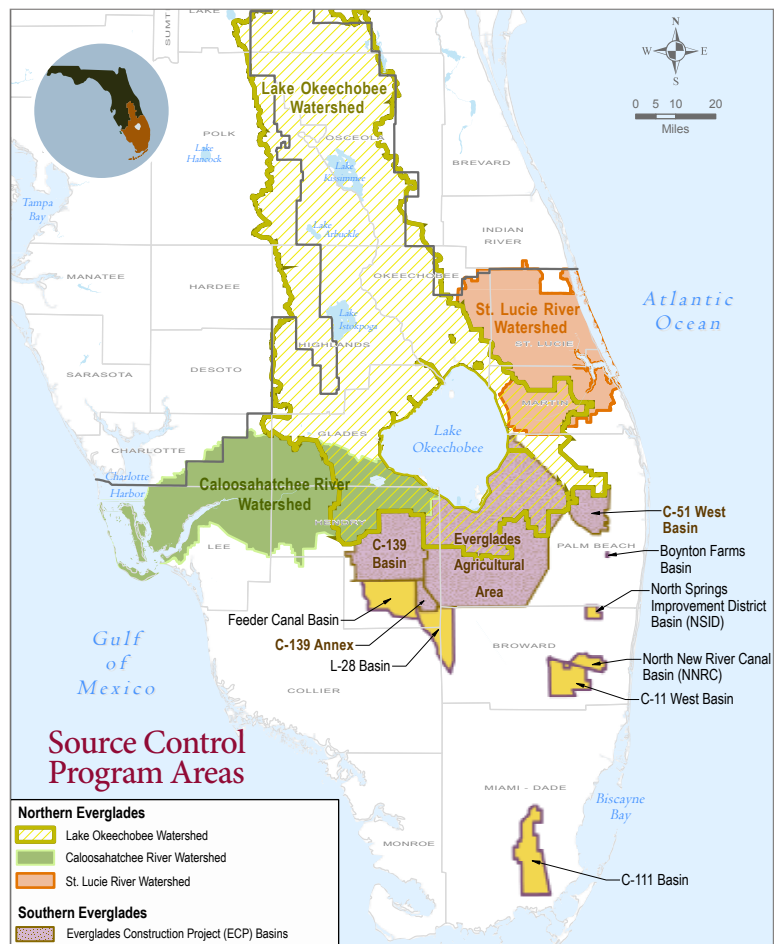
Volume I, Chapter 4 provides an update for WY2013 on the phosphorus and nitrogen source control programs being implemented for the Southern and Northern Everglades by the South Florida Water Management District (see map). Nutrient source control programs are based on mandatory and incentive-driven Best 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 are assessed by water quality performance measures that gauge progress, made by implementing BMPs, toward achieving overall restoration objectives. Such measures have shown a long-standing record of success in the Everglades Agricultural Area (EAA) basin in the Southern Everglades. District source control programs continue to be developed for the Caloosahatchee and St. Lucie River watersheds and refined in the Lake Okeechobee watershed. The Northern Everglades efforts are coordinated with the Florida Department of Environmental Protection and Florida Department of Agriculture and Consumer Services (FDACS).

Southern Everglades

The application of mandatory source control BMPs in the C-139 and EAA basins remains a successful approach to reducing total phosphorus (TP) inputs to the Everglades Protection Area (EPA). With WY2013 marking the 18th consecutive year of basin compliance and a long-term reduction of 55 percent relative to the baseline period, the EAA Basin achieved a 41 percent reduction in its TP load. WY2013 was the second year of full implementation of comprehensive BMP plans in the C-139 Basin. Discharges from the basin carried 10 metric tons (mt) of TP, which is below the predicted load from the pre-BMP baseline period. Research and demonstration projects to optimize BMPs are ongoing in both basins.

The total TP load of 15 mt discharged to the Everglades Protection Area from the non-ECP basins during WY2013 represents continued decreased TP loads since the implementation of basin diversions and water quality improvement efforts.



Northern Everglades

In support of the mandatory source control program for the Lake Okeechobee Watershed, the District prepared technical information and developed preliminary amendments to Chapter 40E-61, F.A.C., which include permit requirements, timelines for implementation, and expanded watershed boundaries.

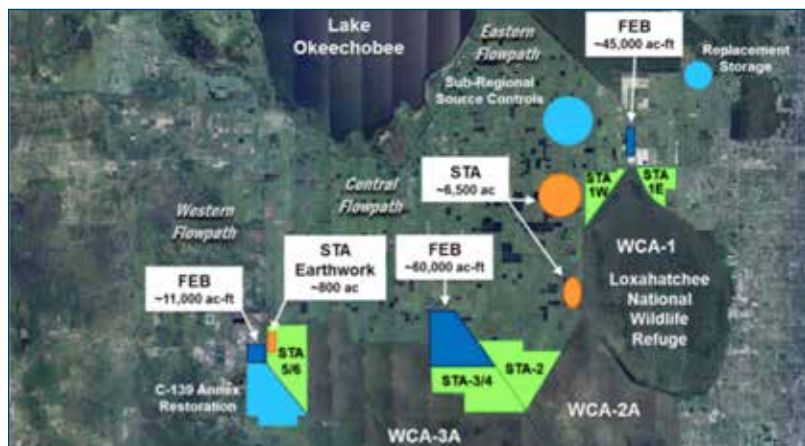
In support of rulemaking to expand the District's source control program under Chapter 40E-61, F.A.C., to the river watersheds, historical data were evaluated and preliminary baselines were established for tracking progress toward achieving water quality goals for the St. Lucie River Watershed. Analysis of total phosphorus and total nitrogen data for the Caloosahatchee River Watershed is underway and focused on developing data inventories for the tidal and coastal sub-watersheds. Water quality monitoring networks to evaluate progress toward achieving water quality goals were defined, and hydrologic evaluations to improve the delineation of tributary areas were completed.

Restoration Strategies – Design and Construction Status of Water Quality Improvement Projects

In June 2012, the State of Florida and the U.S. Environmental Protection Agency reached consensus on new restoration strategies for further improving water quality in the Everglades. These strategies will expand water quality improvement projects to achieve the total phosphorus (TP) water quality standard established for the Everglades. Specifically, the South Florida Water Management District is implementing a regional water quality plan to complete several water treatment and storage projects in three flow paths—Eastern, Central and Western—between Lake Okeechobee and the Greater Everglades. The Restoration Strategies Regional Water Quality Plan (RWQP) projects include more than 6,500 acres of new Stormwater Treatment Areas (STAs). The technical plan also calls for 116,000 acre-feet of additional water storage through construction of Flow Equalization Basins (FEB). These impoundments will capture runoff during storm events and provide a more steady flow of water to the Everglades STAs, helping to maintain desired water levels needed to achieve optimal performance.

Under the Restoration Strategies Program, planned efforts also involve implementing additional source controls in areas of the eastern Everglades Agricultural Area where TP levels in stormwater runoff have been historically higher. Additionally, a robust Science Plan has been developed to ensure continued research and monitoring to improve and optimize the performance of the STAs (see Chapter 5C of this volume). Overall, the technical plan is part of a revised National Pollutant Discharge Elimination System watershed permit for operating the five Everglades STAs south of Lake Okeechobee (see map). This permit, along with a new state-issued Everglades Forever Act watershed permit, establishes stringent TP limits (known as a Water Quality Based Effluent Limitation) for water discharged from the Everglades STAs into the Everglades Protection Area.

The design and construction of the treatment and storage projects are planned to occur in three phases over a 12-year timeframe, with completion of all projects set for 2025. Currently, work is underway on several components of the plan's first two phases in the Central and Eastern flow paths. As a new chapter in this year's Volume I, Chapter 5A provides an overview of the status on the Restoration Strategies projects and related activities and milestones described in the RWQP, pursuant to the watershed permits and their associated Consent Orders.



Performance of the Everglades Stormwater Treatment Areas

The Everglades Stormwater Treatment Areas (STAs)—STA-1 East, STA-1 West, STA-2, STA-3/4, and STA-5/6—were designed and constructed to reduce total phosphorus (TP) in runoff water before it enters the Everglades Protection Area (EPA). Varying in size, configuration, environmental condition, and period of operation, the STAs are shallow, freshwater marshes currently providing approximately 57,000 acres of effective treatment area. Volume I, Chapter 5B, presents information on STA treatment performance, operations, enhancements, and related scientific studies during WY2013. The chapter fulfills various reporting mandates and addresses components identified in the Everglades Forever Act and Long-Term Plan for Achieving Water Quality Goals in the EPA.

Everglades STA Overview

- Over their combined operational periods, the STAs have treated more than 13.4 million acre-feet (ac-ft) of inflow and retained 1,727 metric tons (mt) of TP that would have otherwise entered the EPA. In WY2013, the STAs collectively treated 1.2 million acre-feet of water, reducing TP loads by 84 percent and produced an outflow flow-weighted mean (FWM) TP concentration of 21 micrograms per liter ($\mu\text{g/L}$). This was the highest combined annual TP load reduction achieved to date and one of the lowest combined annual outflow FWM TP concentrations.
- The outflow FWM TP concentrations for individual STAs in WY2013 ranged from 14 (STA-3/4) to 36 $\mu\text{g/L}$ (STA-1W), while the percent TP load retained ranged from 78 (STA-2) to 90 percent (STA-5/6). Notably, STA-3/4 over its 10-year operational history has treated the most runoff (~4.2

million ac-ft), retained the most TP load (493 mt), achieved the highest percent of TP load retained (84 percent), and discharged water at the lowest outflow FWM TP concentration (17 $\mu\text{g/L}$) of all the STAs.

- With the completion of construction of Compartment C in mid-2012, the original footprints of STA-5 and STA-6 have been combined with Compartment C into an integrated facility, now known as STA-5/6. Construction of Compartment B also was completed in WY2013, which has substantially increased the effective treatment area of STA-2.
- With the exception of STA-5/6, all the other STAs were kept fully hydrated this year and did not dry out. High hydraulic and TP loads associated with runoff from Tropical Storm Isaac in August 2012 affected all STAs, except STA-5/6, to some degree; STA-1E was the most impacted facility. The record volume of runoff exceeded the treatment capacity of STA-1E and STA-1W, necessitating the partial diversion of stormwater directly into the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Water Conservation Area 1).
- Both federally protected Everglade snail kite (*Rostrhamus sociabilis*) and black-necked stilt (*Himantopus mexicanus*) nests were observed during the 2012 and 2013 nesting seasons, respectively. Operational adjustments were implemented in the STAs to minimize impacts to nests during these periods.
- STA-related research, including the STA-3/4 Periphyton-based Stormwater Treatment Area evaluation, continued this year.



Update for the Restoration Strategies Science Plan

In accordance with the Everglades Forever Act (EFA) Section 373.4592(3), Florida Statutes, and consent orders issued by the Florida Department of Environmental Protection (FDEP) in conjunction with the EFA and NPDES watershed permits by which the District operates the Everglades Stormwater Treatment Areas (STAs), the *Science Plan for the Everglades Stormwater Treatment Areas* was developed to investigate the critical factors that collectively influence the total phosphorus reduction and treatment performance in the Everglades STAs. It is expected that the results from the Science Plan will be used to enhance the design and operations of projects under the Restoration Strategies Program, which will ultimately improve capabilities of the STAs to achieve compliance with the state's water quality criteria for total phosphorus.

The Science Plan was developed by the District in consultation with federal and state technical representatives designated by the USEPA and FDEP. Published in June 2013, the complete version of the Science Plan, including the Five-Year Work Plan of the individual studies, is available on the District's website at www.sfwmd.gov/rs_scienceplan. In July 2013, the initial nine proposed studies outlined in the Five-Year Work Plan were reviewed and received approval

to move forward by the District's Restoration Strategies Steering Group. During July and August 2013, three technical workshops were held with the technical representatives to provide an open, collaborative forum for further discussion and refinement of the proposed work of the individual study plans. It is expected that additional workshops with technical representatives and public meetings with stakeholders will continue to be held as the Science Plan studies are further refined and implemented.

As a new addition to Volume I, Chapter 5C provides an update on the Science Plan, with key highlights of the plan as well as ongoing planning and implementation efforts. As the proposed study plans of the Science Plan are further detailed and implemented, it is anticipated that this chapter in future SFERs will integrate and synthesize information to effectively communicate plan findings and what adaptive management measures may be necessary. The findings will be used to gauge progress toward optimizing phosphorus treatment performance and achieving the Water Quality Based Effluent Limit for total phosphorus. This information will then be used to identify essential information gaps to direct future Science Plan efforts, key areas of uncertainty, and what, if any, policy and management actions are needed.



Everglades Research and Evaluation

The South Florida Water Management District and collaborating agencies continue to sponsor 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, especially on regional hydrological information needs for decision making on Everglades projects. In Volume I, Chapter 6 highlights major research findings as highlighted below.

- Above-average rainfall for WY2013 created some physiological stress for hardwoods on tree islands, especially in Water Conservation Area (WCA) 3A. Dry season recession rates were generally conducive to wading bird foraging, except in WCA-1 where a hydrological reversal in March created a significant decline. Nesting behavior was initially robust, but fledgling success was below average due to an early onset of the 2013 wet season and possibly less aquatic prey.
- The 2013 wading bird nesting season in the Everglades was characterized by an average number of nests for most species and a relatively high level of nest failures and abandonment. An estimated 35,879 nests were initiated this nesting season—a moderate improvement relative to the past two years but still about 50 percent lower than record levels in 2009. Nest failures were large in 2013 due to high rainfall events in February and early April that promoted large-scale, water level reversals and the loss of food resources. For example, of approximately 8,000 white ibis nests at Alley North colony in WCA-3A, 93 percent had failed by early May.
- In the Loxahatchee Impoundment Landscape Assessment facility, an experimental study assessed the movement of crayfish across various Everglades depth features and habitats under drought conditions. The water level recession prompted a large-scale movement of crayfish from ridges to sloughs, resulting in a considerable increase (668 percent)

in their abundance at depths that are sufficiently shallow for foraging by the majority of wading bird species in the Everglades.

- Progress continued on the Active Marsh Improvement Project, in which methods to restore the ridge and open water slough structural patterning within nutrient-enriched cattail areas. Appropriate herbicide treatment rates to remove cattails while minimizing damage to other plants are also being studied. While nutrient loads to the Everglades have been significantly reduced, the downstream ecosystem is generally resilient. Project findings to date suggest that it may be possible to rehabilitate these areas.
- The Decomp Physical Model is designed to examine the restorative nature of historical flow velocities between WCA-3A and WCA-3B. Baseline data from the model confirm that in the current conditions of low water flow, restoration of the characteristic ridge and slough microtopography is unlikely. Water velocities were below critical entrainment thresholds required to resuspend and redistribute sediments.
- An evaluation of the Minimum Flows and Levels (MFL) rule, conducted to examine the ecological conditions that Florida Bay has experienced since its implementation in 2006, determined that the MFL rule provided appropriate guidance and protection to the resources of Florida Bay.
- The District's SEACOM Model, used to evaluate the proposed Central Everglades Planning Project (CEPP), demonstrated that all the CEPP alternatives provided benefit to the nearshore Florida Bay seagrass community. The preferred alternative created a more mixed submerged aquatic vegetation community, with more species richness, higher overall productivity for co-dominant species, and a trend toward historical conditions projected by the Natural System Model.



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 established nonindigenous plants and animals in 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

- Regionwide efforts to control invasive plants continue on District-managed lands. The District has the country's largest aquatic plant management program, managing floating and submerged aquatic vegetation systemwide. The successful melaleuca (*Melaleuca quinquenervia*) management program also continues to be a national model for regional, interagency invasive plant control programs.
- Biological control of several invasive plants continues to show promise. Notably, in 2013 construction of a mass rearing facility at the U.S. Department of Agriculture's Agricultural Research Service biological control laboratory in Davie was completed. The new facility supports biological control agent rearing and field release for melaleuca and other invasive plant species.
- A total of 75 plant species are District priorities for control. Although control programs for some aggressive plants have been positive, challenges keep mounting as other harmful invasives are introduced and their ranges expand. Those species with a high potential to become widespread invaders

are the focus of interagency rapid response efforts aimed at containment and possible eradication.

Nonindigenous Animals

- Nonindigenous animal species are numerous in South Florida—ranging from roughly 62 species in the Kissimmee Basin to more than 129 in the Greater Everglades. While prioritizing these species for control is challenging across regulatory agencies, this issue is complicated further by a deficiency of practical control measures.
 - Targeted efforts by the Florida Fish and Wildlife Conservation Commission are ongoing to build its invasive animal management program, while working closely with the District and other partners to manage nonnative animals in South Florida. During 2013, federal, state, and tribal partners progressed with rapid response efforts to control animal invaders such as the northern African python (*Python sebae*) and Argentine black and white tegu (*Tupinambis merianae*) in the Greater Everglades.
 - Burmese pythons (*Python molurus bivittatus*) 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 by supporting management-relevant research. The District and partnering agencies are implementing a region-wide python monitoring and removal program to better understand their distribution and abundance in the ecosystem.
- Looking ahead, nonnative invasions will continue to exert pressure on native species and ecosystem functions and require long-term, multiagency management. To address the persistent influx of new invasions, collaborating agencies are providing information to policy makers for developing strategies and regulations toward prevention.



Lake Okeechobee Watershed Protection Program Annual and Three-Year Update

The Northern Everglades and Estuaries Protection Program (NEEPP) coordinating agencies [South Florida Water Management District, Florida Department of Environmental Protection (FDEP) and Florida Department of Agriculture and Consumer Services (FDACS)] and other federal, state and local agencies are working to restore Lake Okeechobee. NEEPP is focused on improving water quality and hydrology of the system, and evaluating progress toward achieving restoration goals and learning more about the system. Volume I, Chapter 8 presents the annual (WY2013) status and three-year update for Lake Okeechobee and its watershed under these coordinated interagency efforts.

Watershed Update

- WY2013 inflow to Lake Okeechobee was 2.15 million ac-ft, which is 91 percent of the most recent 12-year average. The lake began the water year at an elevation of 11.68 feet National Geodetic Vertical Datum (NGVD). Lower levels continued until August 25, 2012, when Tropical Storm Isaac delivered more than 5 inches of rain on average District-wide. Inflow for September was 34 percent of the entire water year.

- Total phosphorus (TP) loading to the lake in WY2013 [569 metric tons (mt) including atmospheric deposition] continues to be higher than the Total Maximum Daily Load (TMDL). The current five-year average (WY2009–WY2013) TP load was 451 mt, which is over three times greater than the 140 mt/yr TMDL for the lake. In-lake TP concentrations declined from a high of 233 micrograms per liter (µg/L) in WY2005 to 93 µg/L in WY2012. In-lake TP concentrations increased in WY2013 to 124 µg/L. The five-year average TP concentration returned to pre-hurricane (pre-2004) values.

- As part of the three-year update, long-term average annual flows, loads, and concentrations from each sub-watershed were provided. For the most recent 12-year period (calendar years 2001–2012), the average annual TP load to the lake from all drainage basins and atmospheric deposition was 547 mt, and the average annual discharge to the lake was 2.36 million ac-ft. There continues to be disproportionately high TP loads from Taylor Creek/Nubbin Slough, Indian Prairie, and Fisheating Creek sub-watersheds due to higher TP concentrations. The Upper Kissimmee and Lake Istokpoga sub-watersheds have displayed disproportionately low loads compared to flows due to lower TP concentrations.

- Fixing the complex and varying problems in the Lake Okeechobee Watershed requires a multifaceted restoration approach. The coordinating agencies are committed to restoring Lake Okeechobee and its watershed, continuing existing efforts, and identifying new opportunities to improve the ecosystem. Over the past three years, the coordinating agencies have continued implementation of various efforts to improve conditions including: completion of Lakeside Ranch Stormwater Treatment Area (STA) Phase I, operation of two pilot-scale STAs in Taylor Creek/Nubbin Slough, implementation of Hybrid Wetland Treatment Technology to remove TP at sub-basin and farm scales, expansion of the Dispersed Water Management Program, and implementation of Source Control Programs to retain nutrients at the source.

Lake Ecological Update

- WY2013 areal coverage of submerged aquatic vegetation (SAV) in Lake Okeechobee continued to increase to 47,692 acres from the previous year's total of 36,325 acres. However, some historical, nearshore SAV habitat continues to be replaced by the expansion of emergent vegetation such as spike rush (*Eleocharis spp.*). These changes appear to be a continuing trend related to generally lower lake stages as a result of the implementation of the interim 2008 Lake Okeechobee Regulation Operating Schedule as well as recent dry conditions. Also similar to WY2012, algal blooms across the lake were quite low this year.

- Wading bird foraging, a key metric for evaluating the lake's health, improved to levels observed in 2010 and 2011 as a result of prey densities in the lake's marsh rebounding after the driest period on record in 2011, which resulted in a very poor wading bird season in 2012. Notably, wading bird nesting effort on the lake was at historic levels this year—the highest recorded since 2006—due to several factors such as increased prey densities and favorable water levels during the nesting season.

- The Lake Okeechobee fishery remains healthy and comparable to historical levels. The black crappie (*Pomoxis nigromaculatus*) population. Its recovery has lagged relative to other important lake species, appears to be continuing to improve, with the highest population values recorded since 2005 encountered this past year.

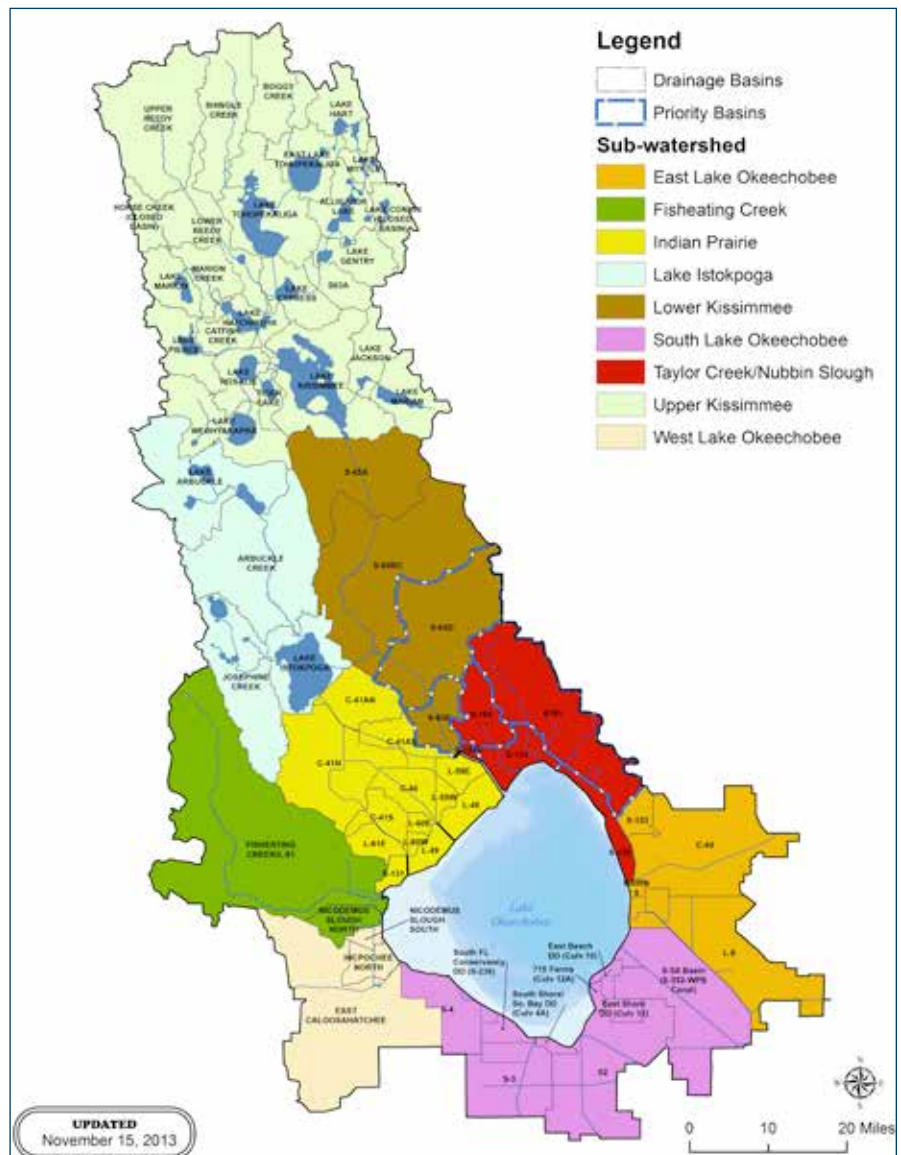
Strategies Moving Forward

- A key strategy moving forward is the development of the Lake Okeechobee Basin Management Action Plan (BMAP), which the FDEP kicked off in early 2013. The BMAP—the “blueprint” for restoring impaired waters by reducing pollutant loadings to meet a TMDL—is developed collaboratively with existing and new stakeholders, and provides an enforceable framework necessary to achieve the established TMDL. The legislative intent of NEEPP states that the implementation of the Lake Okeechobee Watershed Protection Plan, river watershed protection plans, and related BMAP will work in conjunction to “...provide a reasonable means of achieving the total maximum daily load requirements and achieving and maintaining compliance with state water quality standards.” The Lake Okeechobee BMAP will build upon the efforts and strategies identified in the Lake Okeechobee Watershed Protection Plan.

- Implementation of urban and agricultural Source Control Programs is continuing. Enrollment in the FDACS Agricultural Best Management Practices (BMPs) Program in the Lake Okeechobee Watershed is 74 percent (1,595,033 acres) of the agricultural lands in the watershed, and FDACS continues to partner with landowners to implement cost-share BMPs as additional source controls. Proposed rulemaking workshops to amend the District’s Lake Okeechobee Drainage Basin rules to meet the requirements of NEEPP are anticipated in 2014.

- Efforts are underway to expand the Dispersed Water Management (DWM) Program, which provides shallow water storage by retention and detention to enhance Lake Okeechobee and estuary health. DWM projects reduce discharge volumes, may reduce nutrient loading to downstream receiving waters, and expand groundwater recharge opportunities. Based on the success of this program and current funding constraints, the District is seeking additional funding opportunities.

- The agencies continue to support water quality and quantity improvement projects in the Northern Everglades from the local to the regional scale. This includes activities such as continuing to operate, evaluate, and optimize performance of Northern Everglades STAs; supporting the investigation and implementation of innovative treatment technologies; and identifying funding opportunities for new projects. Examples of three regional projects that have recently been funded with state dollars are the Istokpoga Marsh Watershed Improvement District – Water Quality Improvement Project, Nicodemus Slough Dispersed Water Management Project, and Lake Hicpochee North Hydrologic Enhancement Project.



Kissimmee River Restoration and Basin Initiatives

In Volume I, Chapter 9 highlights the major WY2013 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, river, and lake ecosystems. The Upper Basin includes the Kissimmee Chain of Lakes, and the Lower Basin includes the Kissimmee River. Channelized for flood control in the 1960s by construction of canal C-38, the Kissimmee River and its floodplain experienced pervasive ecological changes because the canal prevented flow in the original river channel and 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 restoration phases have been completed to date. The last major phases of construction are scheduled to begin in 2017 and be completed by 2019. Numerous ecological benefits of the project already have been documented by the 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 and Kissimmee Upper Basin Monitoring and Assessment Project, the Kissimmee Basin Modeling and Operations Study, and the Lake Okeechobee Watershed Protection Program.

Kissimmee Basin Highlights

- 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 WY2013 in the headwaters and lower part of the river.
- Water management operations effectively maintained continuous inflow to the Kissimmee River restoration area throughout WY2013. Under the interim regulation schedule, this key restoration goal has been achieved in 9 of the last 12 years. Above-average rainfall in June and August 2013 allowed Upper Basin lakes to refill and the entire river floodplain to be inundated. The restoration area achieved its inundation target of at least 180 days at most monitoring sites. A slow, prolonged decline in water levels also met the defined target for floodplain recession.



- Similar to recent years, WY2013 dissolved oxygen concentrations in restored portions of the river channel remained higher than pre-restoration levels, meeting two of the three restoration targets. The third metric, frequency of concentrations greater than 2.0 milligrams per liter, fell just slightly short of its 90 percent target due to declining concentrations associated with rain events.

- In WY2013, Kissimmee River nutrient loads were comparable to historical averages. Annual flow-weighted mean concentrations of both total phosphorus and nitrogen were close to their most recent 12-year averages, respectively, although generally higher than the 20 plus-year baseline period.

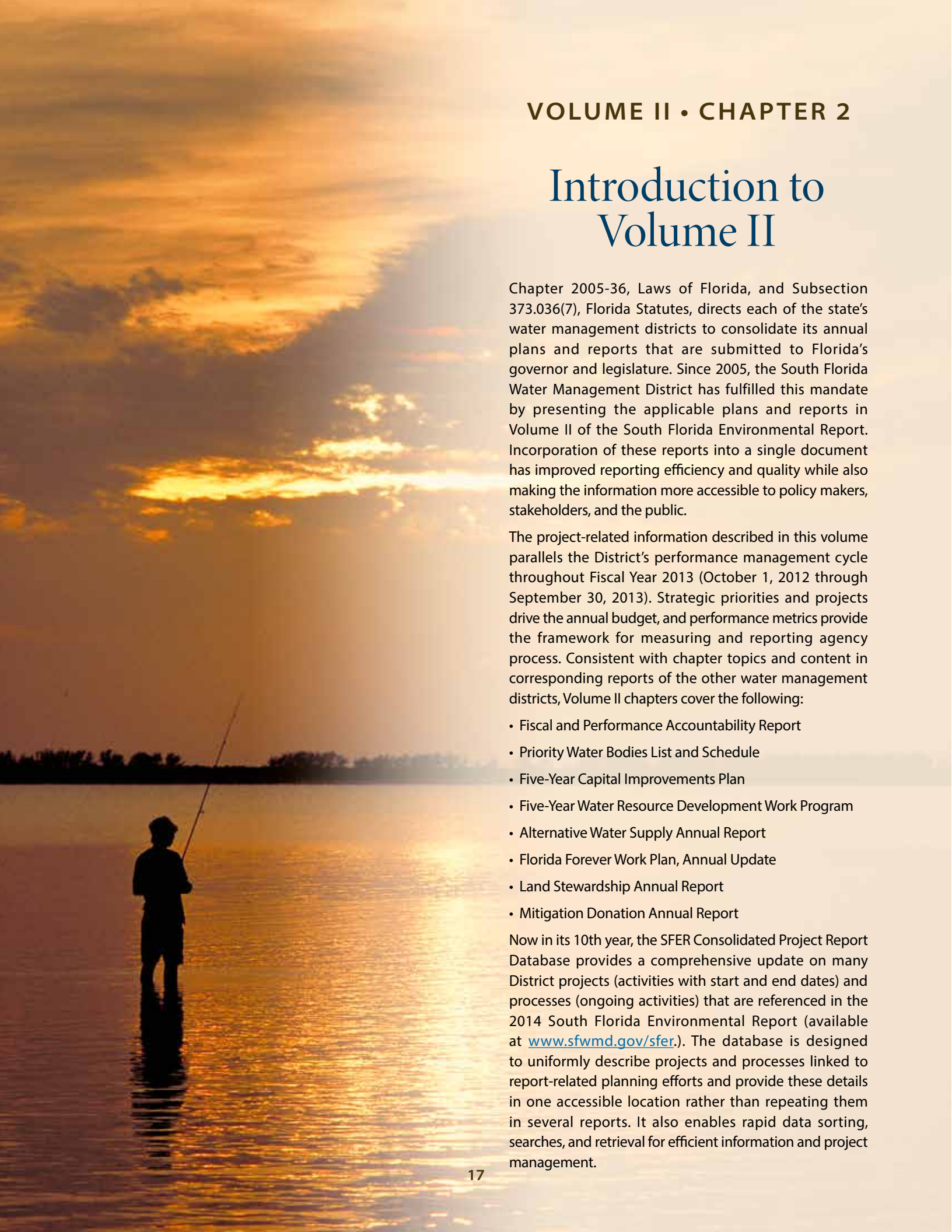
- A soil survey was completed in the restoration area to provide baseline data for soil nutrient content, organic matter, and phosphorus sorption/release potential for post-restoration comparisons. Survey results showed that these attributes were typically similar throughout the floodplain, except for phosphorus, which was higher in dredged material yet unlikely to migrate downstream due to its low solubility.

- The number of wading bird nesting colonies, as well as the total number of nests, increased from the previous year. However, most nesting continued to occur on islands in the Kissimmee Chain of Lakes and Lake Istokpoga, rather than within the Kissimmee River restoration area. Although numbers of wading birds and waterfowl using the

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 serves as the annual report for the Caloosahatchee River and St. Lucie River Watershed Protection Plans under the Northern Everglades and Estuaries Protection Program. For both estuaries, freshwater derived from both Lake Okeechobee and the coastal watershed has a profound influence on circulation and transport, water quality, and biotic resources. In addition to an update on relevant watershed construction projects, the chapter summarizes estuary monitoring and associated research that link watershed freshwater inflow to ecological patterns and trends. WY2013 highlights of coastal research findings and protection plan implementation are presented below.

- WY2013 reflected wet and dry extremes for rainfall and freshwater inflows to the St. Lucie Estuary (SLE) and Caloosahatchee River Estuary (CRE). Both rainfall and reduced inflows in the dry season were offset by increased inflows in the wet season. Releases from Lake Okeechobee to accommodate increased water levels in September 2012 following Tropical Storm Isaac were an important component to wet season total inflows.
- The loading to the CRE and SLE only includes gauged areas of the watersheds and do not include areas downstream of S-79 in the CRE Watershed and the tidal portion of the SLE Watershed. In 2013, the gauged portions of the SLE Watershed accounted for 93.6 percent TP loading and 85.6 percent of TN loading, and the C-43 Basin accounted for 77.8 percent of TP loading and 69.5 percent of TN loading. Another source of nutrient loading to the northern estuaries is from Lake Okeechobee, which in WY2013 contributed 6.4 percent TP and 14.4 percent TN of the loads from the gauged portions of the SLE Watershed and 22.2 percent TP and 30.5 percent TN of the loads from the gauged portions of the CRE Watershed.
- TP, TN, and chlorophyll a concentrations in WY2013 exceeded their respective targets for Total Maximum Daily Loads and Impaired Waters Rule in the upper SLE but not the lower estuary near the St. Lucie Inlet. Chlorophyll a concentrations in the entire CRE were less than the critical value of 11.0 micrograms per liter.
- Salinity critical for eastern oyster (*Crassostrea virginica*) survival was maintained in the estuaries during much of the year. The percentage of days with salinity favorable for oysters generally was greater than the long-term average, except in September 2012 following Tropical Storm Isaac, in which freshwater inflows increased and suppressed oyster densities. During that period, increased freshwater inflow also led to reductions in salt-tolerant seagrasses such as turtle grass (*Thalassia testudinum*) and shoal grass (*Halodule wrightii*), thereby resulting in negative impacts to these estuarine habitats.
- The Adaptive Protocol Release Study was conducted to evaluate the potential effects of different short-term inflow strategies on water quality and plankton abundances during the dry season in the CRE. Uniquely, this in-situ study focused on assessing effects of short-term pulses of Lake Okeechobee-derived fresh water on ecological responses along the estuary's salinity gradient.
- Progress continued on a suite of watershed construction projects being implemented to improve hydrology, water quality, and aquatic habitats in the Northern Everglades watersheds and estuaries. For the SLE, these include the Indian River Lagoon – South C-44 Reservoir and Stormwater Treatment Area, Old Palm City Phase 3 Stormwater Quality Improvement, Manatee Creek Basin Water Quality Retrofit, and Manatee Pocket Dredging projects. For the CRE, these include the Spanish Creek-Four Corners Initiative, C-43 Water Quality Treatment and Testing Facility Project, and Caloosahatchee Basin Storage/Treatment Initiative.



VOLUME II • CHAPTER 2

Introduction to Volume II

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 2013 (October 1, 2012 through September 30, 2013). Strategic priorities and projects drive the annual budget, and performance metrics provide the framework for measuring and reporting agency process. Consistent with chapter topics and content in corresponding reports of the other water management districts, Volume II chapters cover the following:

- Fiscal and Performance Accountability 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 10th 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 2014 South Florida Environmental Report (available at www.sfwmd.gov/sfer). 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.

Fiscal Year 2013 Fiscal and Performance Accountability Report

The South Florida Water Management District tracks and manages agency performance by linking long-term strategic priorities, annual budgets and performance metrics reporting. Fiscal and Performance Accountability Reports (also known as Annual 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 FY2013 Performance Accountability Report, the final step of the annual reporting cycle. The chapter highlights the FY2013 status of key projects/processes, financial summaries, accomplishments, and performance metrics.

Fiscal and Performance Accountability Report Remains Strong

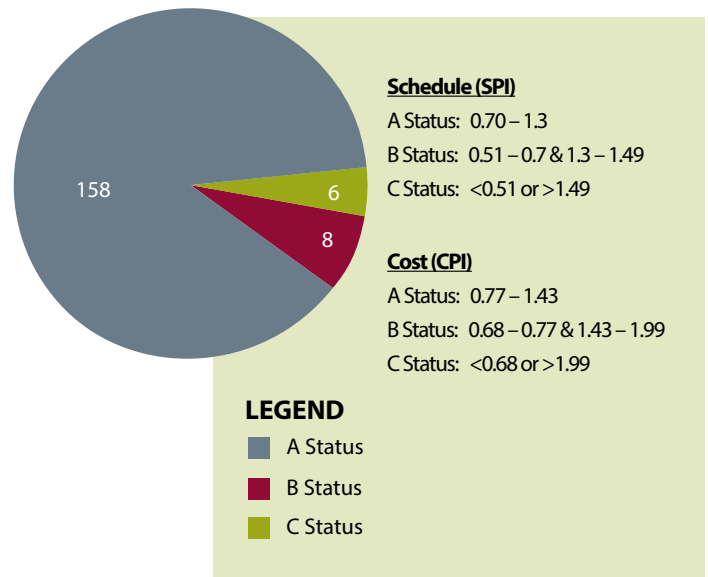
Earned Value is a key project management tool in which planned and actual completed work is compared to confirm if agency projects are on track. This report presents the FY2013 Annual Work Plan project milestone achievement based on Earned Value indices (schedule and cost) and performance level achieved: A (on plan), B, or C status. Performance indices were calculated for each project and measured against the defined ranges (see chart). A project with a Schedule Performance Index of 1.00 is exactly on schedule, and a project with a Cost Performance Index (CPI) of 1.00 is exactly on budget, which represents the ideal situation where project execution matches project planning. Overall in FY2013, 158 (92 percent) of the total (172) portfolio projects were categorized in A status, 8 (5 percent) in B status, and 6 (3 percent) in C status.

Established metrics quantitatively monitor the performance of the SFWMD's processes and projects necessary to fulfill core missions at a minimal cost and time. They are the daily tools driven by data that help the agency better understand, manage, and improve overall performance. The metrics provide the information necessary to make effective and productive business decisions. Specifically, process performance measures indicate if the District is meeting its process goals, if the District's customers are satisfied, if the District's processes are in statistical control, and if and where operational improvements are necessary.

Fiscal Year 2013 Gross Revenues and Expenditures

As of September 30, 2013, 94.9 percent of the District's budgeted operating revenue (excluding fund balance) has been collected. Ad valorem taxes comprise 68 percent of the budgeted operating revenues and drive collections based on the annual cycle of the property tax bill. The remaining

Fiscal Year 2013 Status of Major District Projects and Processes (October 1, 2012 – September 30, 2013)



revenue source is fund balance, which represents the amount of prior year residual revenue that is budgeted in the current year and has already been received. Total FY2013 sources collected were 96.7 percent of budget, or \$601.9 million. 99.8 percent of budgeted ad valorem tax revenue and 102.1 percent of budgeted agricultural privilege tax revenue have been collected. Ad valorem and agricultural privilege tax collections peak November through January. Historical ad valorem trends for the past five years show an average collection rate of 99.2 percent by September. Also, 48.5 percent of budgeted intergovernmental revenues have been collected. The bulk of intergovernmental revenue is from reimbursements from the Save Our Everglades Trust Fund, Water Management Lands Trust Fund, and the Florida Fish and Wildlife Conservation Commission. Reimbursement requests are submitted to the state based on actual expenses incurred.

Expenditure rates are used as indicators of progress in program implementation. At the end of FY2013, the District expended 69 percent of its budget, a slight increase from the 64 percent expended in FY2012.

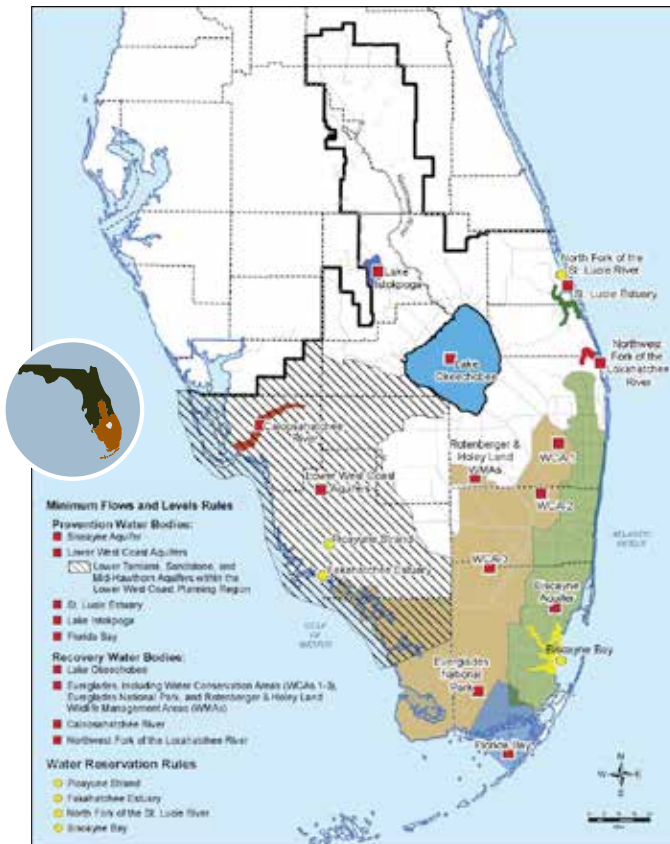
2014 Priority Water Bodies List and Schedule

To protect and conserve adequate water supplies for natural systems, the South Florida Water Management District adopts water resource protection rules and criteria, including Minimum Flows and Levels (MFLs), Water Reservations, and Restricted Allocation Areas. Chapter 3 of Volume II provides a summary of rules and criteria in effect during 2013 and the priorities and schedule for developing new rules planned for 2014 through 2018.

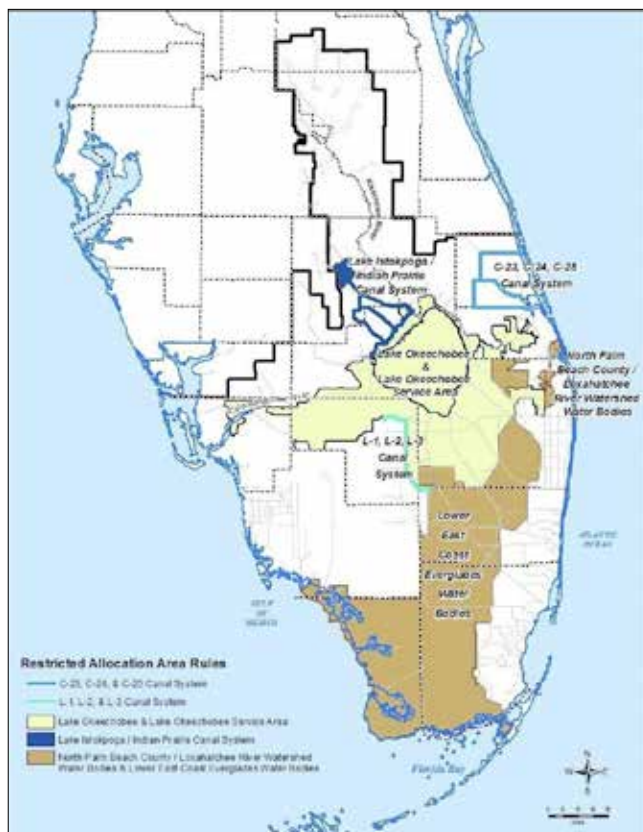
In accordance with state law, the District develops an annual Priority Water Body List and Schedule, which identifies specific water bodies for which MFL and Water Reservation rules will be adopted to protect them from the effects of consumptive use allocations. In addition to MFLs and Water Reservations, the District also implements consumptive use permitting criteria and Restricted Allocation Area rules. The District has adopted nine rules establishing minimum flows and levels for 40 water bodies, four Water Reservations (top map), and six Restricted Allocation Areas (bottom map).

In October 2013, the District's Governing Board adopted the 2014 Priority Water Body List and Schedule, which was subsequently submitted to the Florida Department of Environmental Protection for review and approval. In July 2013, the District adopted a Water Reservation rule for nearshore Biscayne Bay, which is associated with the Biscayne Coastal Wetlands Project. The District continued collecting technical data and refining hydrodynamic and ecological models as part of the MFL reevaluation for the Caloosahatchee River. Technical reevaluation and updating documentation for the northeastern Florida Bay MFL also progressed this past year and is expected to be completed in March 2014.

The District's planned MFL and Water Reservation activities for 2014 are the adoption of a Water Reservation for the Caloosahatchee River (C-43) West Basin Storage Reservoir Project and continuing the reservation process for the Kissimmee Basin, which includes the Upper Chain of Lakes and the Kissimmee River and its floodplain. Further details on these plans are available at www.sfwmd.gov/reservations.



Regional Priority Water Bodies



Five-Year Capital Improvements Plan

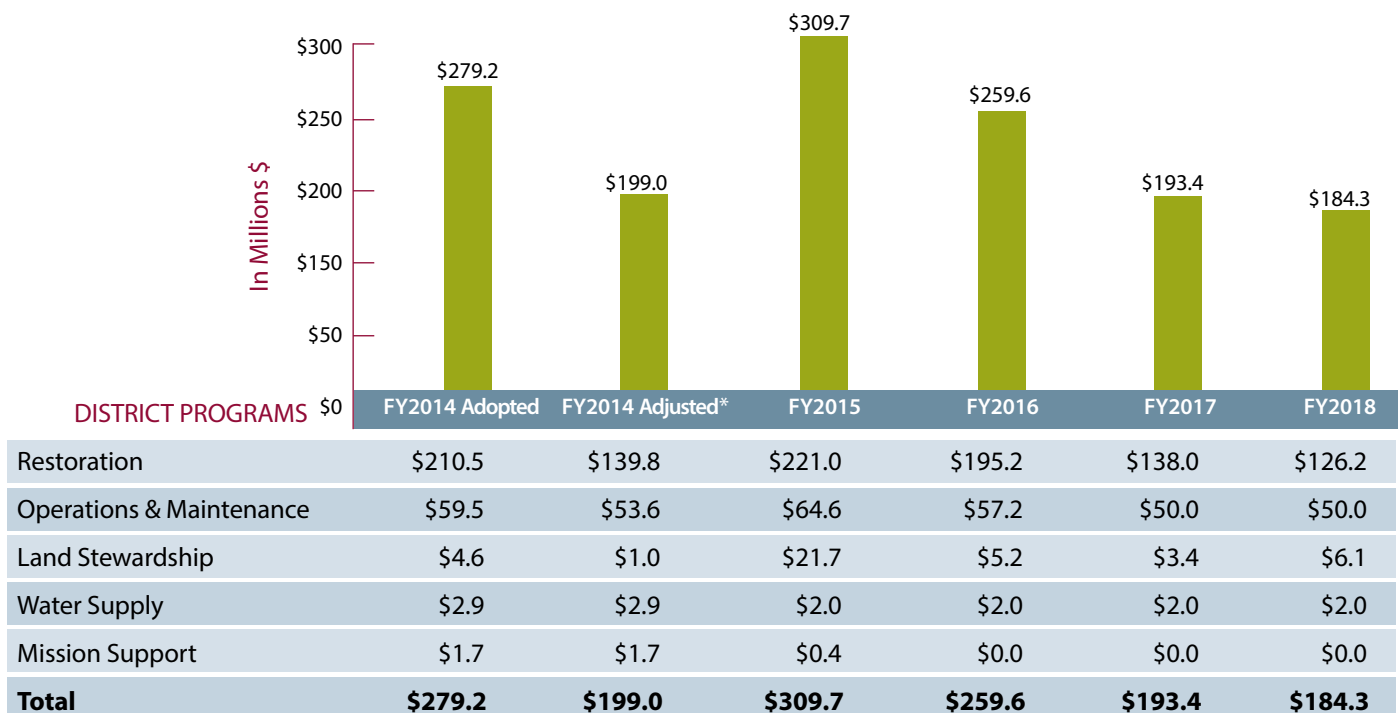
In accordance with Section 373.536, Florida Statutes, each year the South Florida Water Management District reports on the agency's Five-Year Capital Improvements Plan (CIP). The plan includes estimated capital project expenditures and anticipated revenues over a five-year period. Volume II, Chapter 4, includes projected revenues and expenditures for capital improvements for FY2014–FY2018.

The FY2014 adopted budget included a planned capital improvements project budget of \$279.2 million. Based on the revised estimated project schedules, the District's Five-Year CIP has been adjusted to a total of \$199.0 million for FY2014. The difference of \$80.2 million has been re-budgeted and included in the FY2015 amount in the plan, reflecting the preliminary budget submitted to the Florida legislature on January 15, 2014. Over the next five years, FY2014 (adjusted) through FY2018, the District estimates spending \$1.1 billion

on projects contained in the Five-Year CIP. Currently, the plan reflects ongoing commitments to District Governing Board priorities including \$376.0 million dedicated for Restoration Strategies projects; \$255.1 million in recurring ad valorem funds allocated for the refurbishment, replacement, and improvement of South Florida's flood control infrastructure; and other agency water supply and restoration priorities.

A summary of the expenditures in the District's Five-Year CIP are shown in the figure below. These expenditures are for (1) basic construction costs including design, engineering, permits, inspections, and site development; and (2) other project costs including land acquisition and associated costs, surveys, and facility acquisition and improvements. 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 2014–2018)



*FY2014 adjusted budget reflects re-budgeted amounts from the FY2014 adopted budget to FY2015 based on updated project timing/schedule.

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 existing and future water demands for urban and agricultural users while meeting the needs of the environment. The District has prepared regional water supply plans for a 20-year planning horizon that are updated every five years for each of the agency's planning regions. Plan updates identify water resource and water supply development projects expected to meet the needs of all reasonable-beneficial water needs and to protect natural systems from harm up to and during a 1-in-10-year drought event. The most recent Upper East Coast, Lower West Coast, and Lower East Coast Water Supply Plan updates were approved by the District's Governing Board in 2011, 2012, and 2013, respectively. The District is working with the Southwest Florida and St. Johns Water Management Districts to finalize a joint water supply plan for the Central Florida Water Initiative area. It is anticipated that updates to the Lower Kissimmee Basin water supply plan will be approved in 2014.

State law requires that all 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.

Allocations for Water Resource Development Projects

The District has allocated \$113 million in FY2014 for water resource development projects, which includes 50 percent of Central and Southern Florida project operations and maintenance to provide water supply. The agency anticipates spending \$551.6 million on both regional and District-wide projects over the next five years (FY2014–FY2018).

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 \$193.5 million since 1997 for the construction of 488 AWS projects. In Volume II, Chapter 5B provides an annual update on the agency's AWS funding efforts during FY2013.

In 2005, the Florida legislature created the Water Protection and Sustainability Program (WPSP), which established

annually recurring state funding, when available, to the District for the construction of AWS projects. From FY2006 through FY2013, the District approved more than \$169 million in funding (including WPSP and carry forward amounts) for 300 projects that created more than 437 million gallons per day (mgd) of additional alternative water capacity.

AWS funds have been dedicated in FY2014 for six projects, three of which are located within the Big Cypress Basin. Together, these six projects will receive \$2.55 million. Three projects will distribute 2.88 mgd to neighborhoods that did not previously have reclaimed water available. The other three are multi-year projects that created 3.5 mgd of AWS capacity, which was previously accounted for in prior fiscal years.

Florida Forever Work Plan, 2014 Annual Update

In Volume II, Chapter 6A presents the 2014 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. Land acquisition activity during FY2013 is also provided in this chapter.

The 2014 Florida Forever Work Plan update identifies a total of 42 eligible projects under the Florida Forever Program, Northern Everglades and Estuaries Protection Program (NEEPP), Comprehensive Everglades Restoration Plan (CERP), and other water resource projects. Two NEEPP projects, Lake Hicpochee Hydrologic Enhancement and Rio St. Lucie Stormwater Quality - Sediment Nutrients projects, were added. One NEEPP project, the Hybrid Wetland Treatment Technology Project, was removed and has been transferred to the Florida Department of Agriculture and Consumer Services as the lead agency. Also, the inactive Strazzulla Wetlands CERP project was removed. The land acquired for this project will be exchanged for U.S. Department of Interior land, located on the western side of the Arthur R. Marshall Loxahatchee National Wildlife Refuge, which will become part of the Restoration Strategies Program. Project modifications were made to the Picayune Strand Restoration and Loxahatchee River Watershed Restoration CERP projects to reflect

boundary revisions made through the project planning and implementation processes.

Progress under Florida Forever

In FY2013, the SFWMD obtained 276 acres of land interests, expending a total of \$674,960. The acquisitions were made with District and local government funds. No Florida Forever or Save Our Everglades Trust Fund monies were used to fund FY2013 land acquisitions.

As of September 30, 2013, a total of 235,695 acres (nearly 60 percent) of land needed to implement CERP were already acquired. A total of 267 acres were acquired in FY2013 for CERP projects, through donations and expenditure of \$234,560. Through donations, the District received 170 acres for the Biscayne Bay Coastal Wetlands Project and 3 acres for the Loxahatchee River Watershed Restoration Project. Miami-Dade County, as an external acquisition partner, continues to secure land within District CERP projects; acquiring 91 acres of land for \$234,560 within the Biscayne Bay Coastal Wetlands Project; and 3 acres through a donation of land received for the C-111 Spreader Canal Project.

The District expended \$440,400 for tenant improvements located within the Kissimmee River Restoration Project to demolish and remove the structures from the floodplain.



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 FY2013, program funds come primarily from ad valorem tax revenues, supplemented by other funding sources including off-site mitigation, mitigation revenue, lease revenue, and grants for wetland restoration and exotic control projects.

In Volume II, Chapter 6B highlights 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 FY2012–FY2013 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 1.45 million acres of public land while providing recreational opportunities to the public. In FY2013, the District invested \$6.9 million in land management, while \$4.2 million in revenue was generated from agricultural leases and mitigation banks. Land management costs in FY2014 are anticipated to be \$8.5 million (including \$1 million in Lake Belt mitigation funds dedicated to the C-139 Annex Restoration Project).

VOLUME II • CHAPTER 7

Mitigation Donation Annual Report

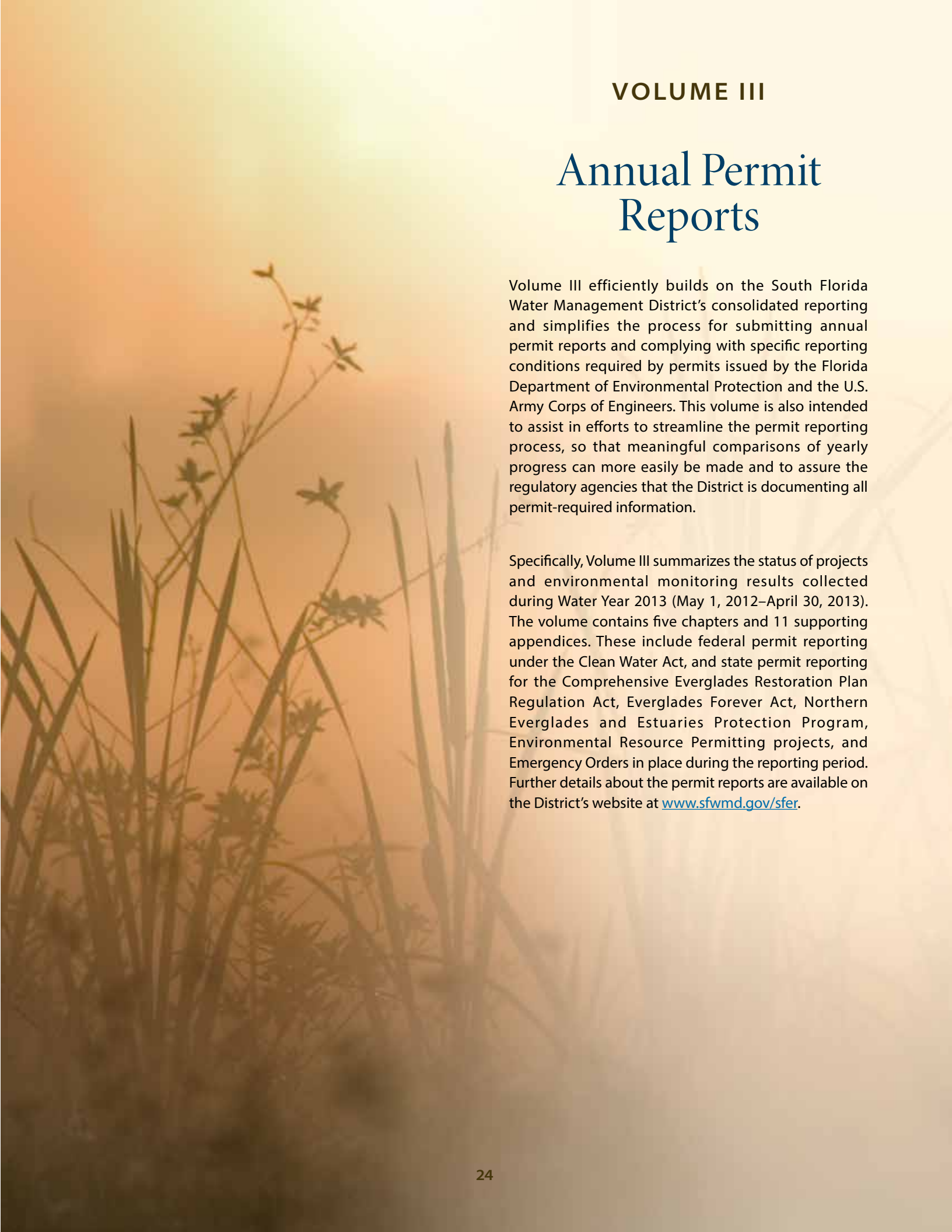
Wetland Mitigation Funds Benefit Regional Restoration

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 FY2013 for the agency's two regional mitigation projects: Corkscrew Regional Ecosystem Watershed and Pennsuco Regional Mitigation Area. The chapter also describes 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 controlled. 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 from developers with impacts to wetlands, existing dedicated funds are used for restoration and management. In FY2013, the District expended more than \$850,000 on supporting the enhancement of 4,403 acres in the two areas. It is anticipated that FY2014 combined expenditures will be just over \$850,000.



VOLUME III

Annual Permit Reports

Volume III efficiently builds on the South Florida Water Management District's consolidated reporting and simplifies the process for submitting annual permit reports and complying with specific reporting conditions required by permits issued by 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 to assure the regulatory agencies that the District is documenting all permit-required information.

Specifically, Volume III summarizes the status of projects and environmental monitoring results collected during Water Year 2013 (May 1, 2012–April 30, 2013). The volume contains five chapters and 11 supporting appendices. These include 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 period. Further details about the permit reports are available on the District's website at www.sfwmd.gov/sfer.

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 various interrelated construction projects between Lake Okeechobee and the Everglades. This includes the Everglades Stormwater Treatment Areas, which have a total area with infrastructure components of approximately 68,000 acres, with roughly 57,000 acres of effective treatment area currently operational.

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 *2014 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. The professionalism and dedication of the entire 2014 SFER team that helped prepare this large, complex document are gratefully recognized.

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The complete 2014 SFER is available online at www.sfwmd.gov/sfer.

ON THE COVER

Restoration Strategies for Clean Water for the Everglades

In 2012, the State of Florida, led by Governor Rick Scott, and the U.S. Environmental Protection Agency reached a consensus on new strategies for improving water quality in America's Everglades. Based on months of scientific and technical discussions, these Restoration Strategies will expand water quality improvement projects to achieve the phosphorus water quality standard established for the Everglades.

Under the Restoration Strategies Program, the South Florida Water Management District is implementing a technical plan to complete several projects that will create more than 6,500 acres of new stormwater treatment areas (STAs) and 116,000 acre-feet of additional water storage through construction of flow equalization basins (FEBs). Flow equalization basins provide a more steady flow of water to the STAs (front cover), helping to maintain desired water levels needed to achieve optimal water quality treatment performance. Expanded nutrient source controls will also be implemented, and a Science Plan will ensure continued research to further improve and optimize STA performance.

Everglades stormwater treatment areas are vast freshwater treatment wetlands situated south of Lake Okeechobee, which use "green" technology to reduce excess phosphorus from surface waters before entering the Everglades. Their vast, shallow waters and rich plant life also make them outstanding habitat for wildlife such as the protected roseate spoonbill, *Platalea ajaja* (back cover).

For more information, visit www.sfwmd.gov/restorationstrategies



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