

# Chapter 8: Implementation of the Long-Term Plan for Achieving Water Quality Goals in the Everglades Protection Area

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## SUMMARY

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Pursuant to the requirements of Section 373.4592(13), Florida Statutes, also known as the Everglades Forever Act, this chapter presents an update on the progress of the implementation of the Long-Term Plan for Achieving Water Quality Goals in the Everglades Protection Area (Long-Term Plan) (Burns and McDonnell, 2003) and subsequent amendments. In addition to being required by state and federal law, achieving Everglades water quality standards by implementing the Long-Term Plan is one of the strategic priorities of the South Florida Water Management District (SFWMD or District).

Because there is overlap between many of the Long-Term Plan projects and other District Everglades restoration efforts, the updates for many of the Long-Term Plan projects appear in other chapters of this volume. The Long-Term Plan projects that cover the non-Everglades Construction Project (non-ECP) basins and source controls are discussed in Chapter 4 of this volume, and the Long-Term Plan projects relating to the Everglades Construction Project Stormwater Treatment Areas (STAs) are covered in Chapter 5 of this volume. The Long-Term Plan projects being implemented as part of the District's Everglades expedited projects effort are presented in Chapter 7A of this volume. **Table 8-1** indicates the specific chapters in this report where each Long-Term Plan project update appears. The financial reporting related to the implementation of the Long-Term Plan is covered in Chapter 13 of this volume.

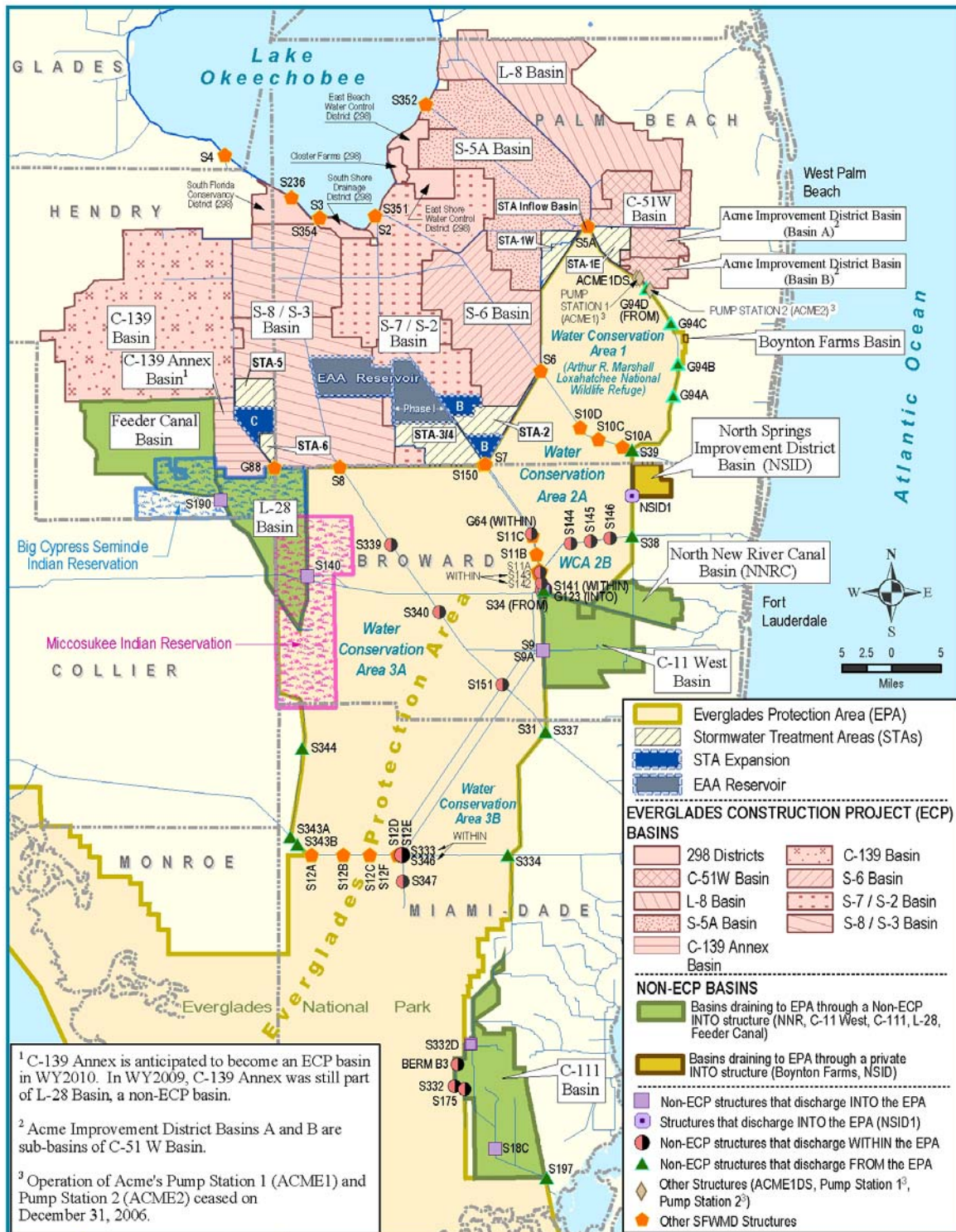
The long-term Everglades water quality goal is for all discharges to the Everglades Protection Area (EPA) to achieve and maintain water quality standards in the EPA, including compliance with the total phosphorus (TP) criterion established in Rule 62-302.540, Florida Administrative Code. Substantial progress toward reducing phosphorus levels discharged into the EPA has been made by the state of Florida and other stakeholders. As of April 30, 2009, the Everglades Agricultural Area's Best Management Practices and the Everglades Construction Project Stormwater Treatment Areas have collectively removed more than 3,200 metric tons<sup>1</sup> of TP that otherwise would have entered the Everglades.

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<sup>1</sup>Similar to last year's report, the inception-to-date numbers for the Stormwater Treatment Areas include start-up flows and loads.

However, additional measures are necessary to achieve the Everglades water quality goal. The Long-Term Plan sets forth measures to achieve that goal, permitting the state of Florida and the District to fulfill their obligations under both the Everglades Forever Act (Section 373.4592, Florida Statutes) and the federal Settlement Agreement (Case No. 88-1886-CIV-MORENO). A summarized list and locations of the basins addressed in the Long-Term Plan are presented in **Table 8-2** and **Figure 8-1**, respectively.

The District continued implementation of the Long-Term Plan in Fiscal Year 2009 (FY2009) (October 1, 2008–September 30, 2009). No FY2009 Long-Term Plan revision requests were submitted to the Florida Department of Environmental Protection; however, as a result of the proposed *River of Grass* acquisition (see Chapter 7A of this volume), the long-term strategy for Everglades restoration may result in significant revisions to the Long-Term Plan. Future updates to this chapter will reflect any further revisions to the Long-Term Plan, as developed.



**Figure 8-1.** Overview of the Everglades Protection Area (EPA) and tributary basins.

**Table 8-1.** Summary of projects and cross-referenced chapters in the Long-Term Plan for Achieving Water Quality Goals in the Everglades Protection Area (Long-Term Plan).

<b>Project Description</b>	<b>Chapter References in the 2010 SFER – Volume I</b>
<b><u>EVERGLADES CONSTRUCTION PROJECT BASINS</u></b>	
STA-1E Enhancements	5 (STA-1E section)
STA-1W Enhancements	5 (STA-1W section)
STA-2 Enhancements	5 (STA-2 section); 7A
STA-3/4 Enhancements	5 (STA-3/4 section)
STA-5 Enhancements	5 (STA-5 section); 7A
STA-6 Enhancements	5 (STA-6 section); 7A
ECP Operation and Maintenance - STAs and non-STAs	5 (each STA section)
ECP Compliance Monitoring	5 (each STA section)
ECP Operations Monitoring	5 (project-level activities section)
STA Site Management	5 (project-level activities section)
Acme Basin B	4
Compartment B STA including STA-2, Cell 4	5, 7A
Compartment C STA including STA-5 Flow-way 3 and STA-6, Section 2	5, 7A
EAA Conveyance and Regional Treatment Project (ECART)	Future reports
<b><u>NON-ECP BASINS</u></b>	
North Springs Improvement District Basin	4
North New River Canal Basin	4
C-11 West Basin	4
Feeder Canal Basin	4
<b><u>PROCESS DEVELOPMENT AND ENGINEERING</u></b>	
<b><u>Basin Source Controls</u></b>	
EAA Basins - Source Controls	4
C-139 Basin - Source Controls	4
<b><u>Enhanced Control and Monitoring</u></b>	
Acquisition of Survey Data	5 (Project complete – see prior reports)
Additional Flow and Water Quality Monitoring Stations	5 (Project complete – see prior reports)
Review and Correction of Flow Measurement Anomalies	5 (project-level activities section)
Analysis and Interpretation	5 (project-level activities section)
Update and Maintenance of Hydraulic Models	5 (project-level activities section)

**Table 8-1.** Continued.

<b>Project Description</b>	<b>Chapter References in the 2009 SFER – Volume I</b>
<b><u>Improved Analytical and Forecasting Tools</u></b>	
Continued Development and Refinement of DMSTA	8
Water Quality Impacts of Reservoirs	8
Periphyton-based STA (PSTA) Investigations	5 (project-level activities section)
PSTA Implementation Project in STA-3/4	5 (project-level activities section)
<b><u>Optimizing SAV Performance</u></b>	
Operational Strategy	Project complete – see prior reports
Vegetation Maintenance	5
Hydrologic and Hydraulic Assessment	Future reports
Internal Measurements	Future reports
Comparative Analysis	Future reports
<b><u>Additional Structural and Operational Measures</u></b>	
Evaluation of Full-Scale STA Enhancements	Project complete – see prior reports
<b><u>Improved Reliability of Inflow Forecasts</u></b>	
Update Baseline Datasets	8
Basins With Limited Current Data	8
Influence of CERP Projects on Inflow Volumes and Loads	8
Lake Okeechobee Long-Term Trends	8
Determine Water Quality Relationships in the EPA	3A
<b><u>ACCELERATE RECOVERY OF IMPACTED AREAS</u></b>	
Recovery Model Development and Calibration	6 (2007 SFER) and Future reports
Downstream Influence of Adding Clean Water to Previously Impacted Areas	5
Options for Accelerating Recovery	6
Alternatives Analysis and Plan Formulation	Future reports
Hydropattern Restoration	Future reports
Implement Steps for Recovery in Impacted Areas	Future reports
<b><u>ADAPTIVE IMPLEMENTATION</u></b>	5, 8
<b><u>PROGRAM MANAGEMENT</u></b>	8
CERP – Comprehensive Everglades Restoration Plan DMSTA – Dynamic Model for Stormwater Treatment Areas ECP – Everglades Construction Project EPA – Everglades Protection Area PSTA – Periphyton-Based Stormwater Treatment Area STA – Stormwater Treatment Area	

**Table 8-2.** EPA tributary basins included in the Long-Term Plan.

<b>Basin</b>	<b>Canal</b>	<b>Stormwater Treatment Areas</b>	<b>Receiving Water Conservation Areas</b>
S-5A (EAA)	West Palm Beach Canal	STA-1W, STA-1E, STA-2	WCA-1
S-6 (EAA)	Hillsboro Canal	STA-2	WCA-2A
S-7 (EAA)	North New River Canal (NNRC)	STA-3/4	WCA-2A
S-8 (EAA)	Miami Canal	STA-3/4, STA-6	WCA-3A
C-51 West and L-8	C-51 West	STA-1E, STA-1W	WCA-1
C-139 (including Annex)	L-3 Canal	STA-5, STA-6	WCA-3A
ACME Basin B	West Palm Beach Canal	STA-1E	WCA-1
North Springs Improvement District	N/A	N/A	WCA-2A
NNRC (G-123)	NNRC	N/A	WCA-3A
C-11 West	C-11 West	N/A	WCA-3A
Feeder Canal	L-28 Interceptor Canal	N/A	WCA-3A
L-28	L-28	N/A	WCA-3A

EAA – Everglades Agricultural Area

N/A – Not Applicable

NNRC – North New River Canal

WCA – Water Conservation Area

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## INTRODUCTION

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The long-term Everglades water quality goal is for all discharges to the Everglades Protection Area (EPA) to achieve and maintain water quality standards, including compliance with the total phosphorus (TP) criterion established in Rule 62-302.540, Florida Administrative Code. For additional information about the TP criterion rule, see Chapter 3A of this volume. The Long-Term Plan for Achieving Water Quality Goals in the Everglades Protection Area (Long-Term Plan) contains activities to achieve the Everglades water quality goal and to permit the state of Florida and the South Florida Water Management District (SFWMD or District) to fulfill their obligations under both the Everglades Forever Act (EFA) (Section 373.4592, Florida Statutes) and the federal Everglades Settlement Agreement (Settlement Agreement dated July 26, 1991, entered in Case No. 88-1886-CIV-MORENO, U.S. District Court for the Southern District of Florida, as modified by the Omnibus Order entered in the case on April 27, 2001).

Achieving Everglades water quality standards by implementing the Long-Term Plan is one of the agency's key strategic priorities, as outlined in the District's Strategic Plan (see [www.sfwmd.gov/budget](http://www.sfwmd.gov/budget)). The District's strategies for the Everglades program include implementing on schedule the Long-Term Plan projects as well as the Everglades expedited projects included in the Long-Term Plan. Success indicators include completing the Long-Term Plan projects on schedule. This chapter presents the status update on the implementation of the Long-Term Plan.

For more information about the Everglades Agricultural Area (EAA) source controls program and Stormwater Treatment Area (STA) performance, refer to Chapters 4 and 5 of this volume, respectively. Source control measures recommended in the Long-Term Plan are being implemented in urban and other tributary basins as described in the Source Controls for the Non-ECP Basins section of Chapter 4. In addition, STA expansion projects are being implemented through the District's Everglades expedited projects (see Chapter 7A of this volume).

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## OVERVIEW OF THE LONG-TERM PLAN

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The Long-Term Plan was developed in response to a requirement of the 1994 EFA, for the District to develop a document describing the state's plan for achieving the long-term Everglades water quality goals. The EFA was amended in 2003 to require implementation of the Long-Term Plan because it was recognized by the Florida legislature as the Best Available Phosphorus Reduction Technology (BAPRT). The Everglades phosphorus rule, which was developed in 2003, also recognized the Long-Term Plan as the BAPRT. In July 2008, however, a federal district court judge concluded that provisions in the EFA and phosphorus rule relating to moderating provisions (that purportedly extended compliance deadlines to 2016) and interim effluent limits violated the Clean Water Act. The court upheld the phosphorus rules' criterion, four-part test and data screening provisions.

As required by the EFA, the Long-Term Plan (dated October 27, 2003) was submitted to the Florida Department of Environmental Protection (FDEP) in December 2003. The October 27, 2003, version of the Long-Term Plan is located on the District's web site at [www.sfwmd.gov](http://www.sfwmd.gov). Through this web link, descriptions of all subsequent revisions to the Long-Term Plan — including documents, data, presentations, and related links — are also available.

The Long-Term Plan program encompasses 48 individual projects, each having a schedule, scope, and cost estimate. Many of its components are more process-like, such as source controls components and ongoing STA maintenance, operations, and monitoring. The Long-Term Plan



also contains restoration projects that are intended to assist in accelerating the recovery of impacted areas in the EPA. In general, the Long-Term Plan is focused on implementing regional projects and source controls to improve water quality entering the EPA and water quality within the EPA.

The status of water quality conditions within the EPA is presented in Chapter 3A of this volume. Both Chapters 3A and 8 of this volume acknowledge that until the Long-Term Plan projects have been implemented for a sufficient period of time, it is not possible to measure certain responses of the EPA to the Long-Term Plan projects. In the meantime, there is a measurable reduction in the TP levels in discharges from the Everglades Construction Project (ECP) basins when compared to the historical period prior to implementation of the EAA Best Management Practices (BMPs) and the ECP STAs.

## STATUS OF PROJECT-LEVEL ACTIVITIES

The District began implementing the Long-Term Plan projects in Fiscal Year 2004 (FY2004) (October 1, 2003–September 30, 2004). On February 25, 2009, the sixth annual public meeting was held at the District headquarters in West Palm Beach, FL. The purpose of this meeting was to provide the public with an updated status of the projects in FY2009 (October 1, 2008–September 30, 2009). This chapter presents the status update on the project-level activities for FY2009.

Because of overlap among several Long-Term Plan projects and other Everglades restoration efforts by the District, updates for several of the Long-Term Plan projects appear in other chapters of this volume. **Table 8-1** summarizes all of the Long-Term Plan projects, including cross-references to other chapters in which the specific project update appears. The status of project-level activities for nine of the Long-Term Plan projects, including overall program management activities for FY2009, is updated and summarized below.

## Continued Development and Refinement of the Dynamic Model for Stormwater Treatment Areas

The Dynamic Model for Stormwater Treatment Areas (DMSTA, [www.wwwalker.net/dmsta](http://www.wwwalker.net/dmsta)) was originally developed in 2001 based on data from approximately 80 experimental wetland treatment platforms, test cells, and full-scale demonstration cells, and natural wetlands. It served to integrate and scale up diverse data from small-scale systems into a tool for use in design and optimization of full-scale STAs to remove phosphorus from agricultural runoff and other sources of inflow to the Everglades. A second version (DMSTA2, 2005) incorporated refinements to the structure, calibrations, and interface based on additional data from full-scale STAs collected through early 2005. Separate calibrations were developed for four wetland community types (emergent, submergent, periphyton, and mixed communities on preexistent wetland soils) and for Florida lakes and reservoirs.

While developed primarily as a design tool, DMSTA can also be used as a diagnostic tool for interpreting recent monitoring data. Variations in measured STA outflow concentrations and loads reflect variations in inflow volumes, inflow TP loads, water depths, climate, management, TP cycling within wetland communities, measurement errors, and other random factors. It is difficult to evaluate the inherent TP removal performance of the wetland community in the context of data variations induced by the other factors. The DMSTA attempts to factor out the effects of management (inflow distribution, depth), hydrologic variations, and climatologic variations, so that the data provide a better signal of vegetation function and long-term performance relative to design simulations and management expectations. Walker and Kadlec (2008) provide examples of this type of application to recent data from STA-1W and STA-2.



STA datasets were updated to reflect data through October 2007 and used to test the previous calibrations. Initial results indicated that there were no red flags indicating an immediate need to recalibrate the model. Because of the extreme drought and STA enhancement, expansion, and repair activities during the 2005–2007 period, the data were of limited use for model testing. The current plan is to update the datasets through the 2009 wet season and release a new version in early 2010. Additional planned DMSTA enhancements include improvements to hydraulics, topography, dryout simulation, irrigation needs, uncertainty analysis, report formats, design diagnostics, capacity for handling larger and more complex cell networks, user interface, and reprogramming to increase computational speed.

The Everglades Phosphorus Gradient Model (EPGM, [www.walker.net/epgm](http://www.walker.net/epgm)) was developed to simulate water-column and soil phosphorus gradients in marsh areas receiving STA discharges (Walker and Kadlec, 1996). Coupling with DMSTA provides full representation of the three major phosphorus storage compartments. Further work on DMSTA/EPGM coupling is also planned during the 2009–2010 time frame.

### **Water Quality Impacts of Reservoirs**

The Water Quality Impacts of Reservoirs Project was initiated in FY2004, as recommended in Section 5.3.2, Water Quality Impacts of Reservoirs of the Process Development and Engineering component of the Long-Term Plan. This project was completed in FY2005. All documents completed in support of this project can be obtained by contacting the District.

### **Update Baseline Datasets**

As recommended in the Long-Term Plan, the analyses presented in the baseline data for the Basin-Specific Feasibility Studies to Achieve the Long-Term Water Quality Goals for the Everglades (Goforth and Piccone, 2001) should be updated no less frequently than once every two years in order to continually improve the degree of confidence in the accuracy of projected flow volumes and associated TP loads for inflows to the treatment areas and, in some instances, discharges that flow directly into the EPA.

The Long-Term Plan recommendation was to provide funding for the inflow dataset updates beginning in FY2005, and extend through FY2015 in alternating years. As recommended, the inflow datasets were updated in FY2007 and finalized in October 2007. The results of this update are posted on the District's web site at [www.sfwmd.gov/](http://www.sfwmd.gov/). The District is responsible for updating the baseline datasets, which are subsequently reviewed by the FDEP as well as interested stakeholders. The next scheduled update is occurring in FY09; the approximate target date for the availability of documents as a result of this effort is October 2009.

### **Basins with Limited Current Data**

Water quality performance projections for Everglades restoration efforts depend on understanding water movement and nutrient loadings from multiple watersheds. The projections utilize models that are calibrated from flow and water quality data collected at representative sites throughout the region. This project, which focused on obtaining improved water quality data for several Everglades tributary basins, was completed in FY2007. All documents completed in support of this project can be obtained by contacting the District.

## **Influence of CERP Projects on Inflow Volumes and Loads**

As Comprehensive Everglades Restoration Plan (CERP) projects proceed through planning and implementation, their projected impact on the inflow volumes and loads to the STAs and to receiving water bodies in the EPA will require periodic review and updates. In that regard, construction on the EAA A-1 CERP Reservoir Project, which was slated to be linked operationally to STA-3/4 in 2010, was suspended in June 2008 and the associated contract was terminated in December 2008 following litigation-related delays linked to the issued permit. This, along with the pending *River of Grass* land acquisition, has halted the proposed schedule for the EAA Reservoir Project, thereby postponing the next scheduled (FY2010) work effort for the Influence of CERP Projects on Inflow Volumes and Loads Project. It is anticipated that updates on this planned project will be presented in future SFERs.

## **Lake Okeechobee Long-Term Trends**

When the Long-Term Plan was developed, it was assumed that Lake Okeechobee would contribute a significant portion of the water anticipated to be captured and treated in the STAs. The most recent estimated percent contribution of Lake Okeechobee releases to the total STA inflows is about 4 percent of the volume and TP load. This estimated percent contribution is based on Water Year 2008 (WY2008) (May 1, 2008–April 30, 2009) Lake Okeechobee water quality information. In FY2009, District staff working on the Long-Term Plan continued to closely monitor the quality of water discharged from the lake to STA-3/4 to ensure the inflow volumes and phosphorus loads were within the STA's operational envelope.

## **2008 Report to Governor and Legislature**

The 2008 Report to the Governor and Legislature was developed in accordance with the 2003 Long-Term Plan requirement that by December 31, 2008, the District submit a comprehensive report to the governor and legislature on the status and progress of water quality improvement measures identified in the 2003 Long-Term Plan. The final report is available at: [www.sfwmd.gov/](http://www.sfwmd.gov/).

## **Adaptive Implementation**

Part 6 of the Long-Term Plan recommends that a dedicated funding source be established to facilitate the adaptive implementation process and assure that additional steps are expeditiously implemented. Work continues on several STA optimization activities, including the strategies for STA vegetation management. For further information, see Chapter 5 of this volume.

## **Program Management**

During FY2009 the District and its contractors performed various program management activities, including STA operational support, project and program accounting activities, project and program reporting activities, and overall Everglades program coordination.

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## REVISIONS TO THE LONG-TERM PLAN

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As stated in the amended EFA (October 2003), revisions to the Long-Term Plan shall be incorporated through an adaptive management approach, including a Process Development and Engineering component used to identify and implement incremental optimization measures for further reductions in total phosphorus. In addition, as stated in the amended EFA, revisions to the Long-Term Plan shall be approved by the FDEP.

The District did not submit any FY2009 Long-Term Plan revision requests to the FDEP. Descriptions of previously approved revisions to the Long-Term Plan can be found on the District's web site and in the 2005–2009 SFERs – Volume I, Chapter 8. Copies of all District request letters, FDEP approval letters, and supporting documentation can be found at [www.sfwmd.gov/](http://www.sfwmd.gov/).

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## CHALLENGES TO ACHIEVING LONG-TERM WATER QUALITY GOALS

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Successful implementation of the Long-Term Plan continues to require integration of numerous research, planning, regulatory, and construction activities. The District and the FDEP are committed to achieving the long-term water quality goals for the Everglades.

### REGULATORY ISSUES

The Long-Term Plan being implemented by the District is the road map for achieving water quality standards, including the TP criterion, in the EPA. To date, several permit renewals have been issued to these facilities, with the remaining renewals scheduled for issuance in 2010.

The long-term permits issued by the FDEP include Administrative Orders (AOs), which provide a specific period of time for the District to achieve the newly adopted numeric phosphorus criterion. The long-term permits and associated AOs provide a reasonable time frame for the District to achieve the new criterion and include several key provisions, such as (1) transect monitoring (necessary to monitor what effect the discharges from these facilities may have on the impacted and unimpacted areas), (2) monitoring to determine the effectiveness and responsiveness of the facilities based on inflows (flows and TP loads), and (3) the requirement for the planning, design, and construction of additional regional water management projects and internal improvements and enhancements that, when fully implemented, shall result in the improved performance of the STAs.

In addition to the FDEP fulfilling the regulatory requirements associated with these facilities as outlined in the EFA, the FDEP is also tasked with evaluating water quality standards for parameters other than TP for the EPA and EAA canals. As a part of this evaluation, the FDEP is directed specifically by the EFA to recognize, by rulemaking, the existing beneficial uses of the EAA conveyance canals. The FDEP continues to evaluate water quality standards for canals as part of a state-wide reevaluation of water quality standards, with a specific emphasis on classifications, which will include consideration of the existing beneficial uses. The FDEP has been conducting this review in consultation with a policy advisory committee of appropriate stakeholders. The FDEP has finalized an initial draft document summarizing the committee's conclusions and findings from this effort, and the document is under internal review. Other regulatory issues are discussed in Chapter 4 of this volume.

## **STA OPTIMIZATION RESEARCH**

Chapter 5 of this volume presents a summary of STA optimization research during FY2009. While critical research is continuing on STA optimization, the Long-Term Plan includes a process of adaptive implementation to incorporate the best available and scientifically defensible information throughout the implementation of the Long-Term Plan.

## **SOURCE CONTROL MEASURES**

Controlling TP loads at the source, from the EAA, the C-139, and the non-ECP basins, continues to be a high priority in the Long-Term Plan. For this reason, source control development and implementation funding was provided again in FY2009. Additional information about the Long-Term Plan source control projects, including efforts to evaluate the effectiveness of different source control activities, can be found in Chapter 4 of this volume.

## **SYNCHRONIZATION WITH CERP PROJECTS**

The majority of Everglades tributary basins contain proposed CERP projects (see Chapter 7A of this volume). As in previous years, the District continued in FY2009 to coordinate with members of CERP's project delivery teams in an effort to integrate Long-Term Plan projects with CERP projects, where possible, consistent with the 2003 amended EFA. Integrating some of the Long-Term Plan components with CERP projects continues to have the potential for significant cost savings and water quality improvements as many CERP projects are in the planning and design phases. However, uncertainty continues as to how CERP projects will influence flows and water quality as well as the implementation schedules for the projects. Close coordination continues between members of the project delivery teams and agency staff implementing the Long-Term Plan components to ensure project goals are met.

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## **STATUS OF WATER QUALITY AND FLOW CONDITIONS IN THE EVERGLADES PROTECTION AREA**

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The EAA BMPs and the ECP STAs have been removing phosphorus from waters discharging to the EPA for over 15 years. As a result, water quality conditions are improving in the areas of the EPA that are downstream of STA discharges. As described in Chapter 3A of this volume, TP concentrations in the inflows to the Refuge, WCA-2, and WCA-3 for WY2009 were the lowest of the baseline, Phase I, and Phase II monitoring periods. Additional water quality improvements are anticipated as more Long-Term Plan projects are implemented and those projects complete a stabilization phase. The Long-Term Plan not only has a series of projects being implemented, but also an adaptive management component providing continual enhancements to projects with the expectation of improved phosphorous control.

The response of the EPA to the Long-Term Plan projects from a flow distribution and timing perspective may not be measured until after the Hydropattern Restoration projects are completed. It is anticipated that future SFERs will include details on the plans for future Hydropattern Restoration projects. For more information about the hydrology of the South Florida environment and the status of water quality in the EPA, see Chapters 2 and 3A of this volume, respectively.

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## LITERATURE CITED

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