

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

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SUMMARY

Pursuant to the requirements of Section 373.4592(13), Florida Statutes (F.S.), 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 Everglades Stormwater Program basins (also known as non-Everglades Construction Project, or non-ECP, basins) and source controls are covered 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 that are being implemented through the Acceler8 initiative are covered 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, 2007, the Everglades Agricultural Area's Best Management Practices (BMPs) and the Stormwater Treatment Areas have collectively removed more than 2,678 metric tons¹ of TP that otherwise would have entered the Everglades; however, additional measures are necessary to achieve the Everglades water quality goal. The Long-Term Plan sets forth measures to achieve that goal and permits 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.

¹Similar to last year's report, the inception-to-date numbers presented for the STAs now include start-up flows and loads.

The District continued implementation of the Long-Term Plan in Fiscal Year 2007 (October 1, 2006 through September 30, 2007). The District's requests for revisions to the Long-Term Plan were approved by the Florida Department of Environmental Protection on January 11, 2007, January 31, 2007, and March 16, 2007, as summarized in this chapter.

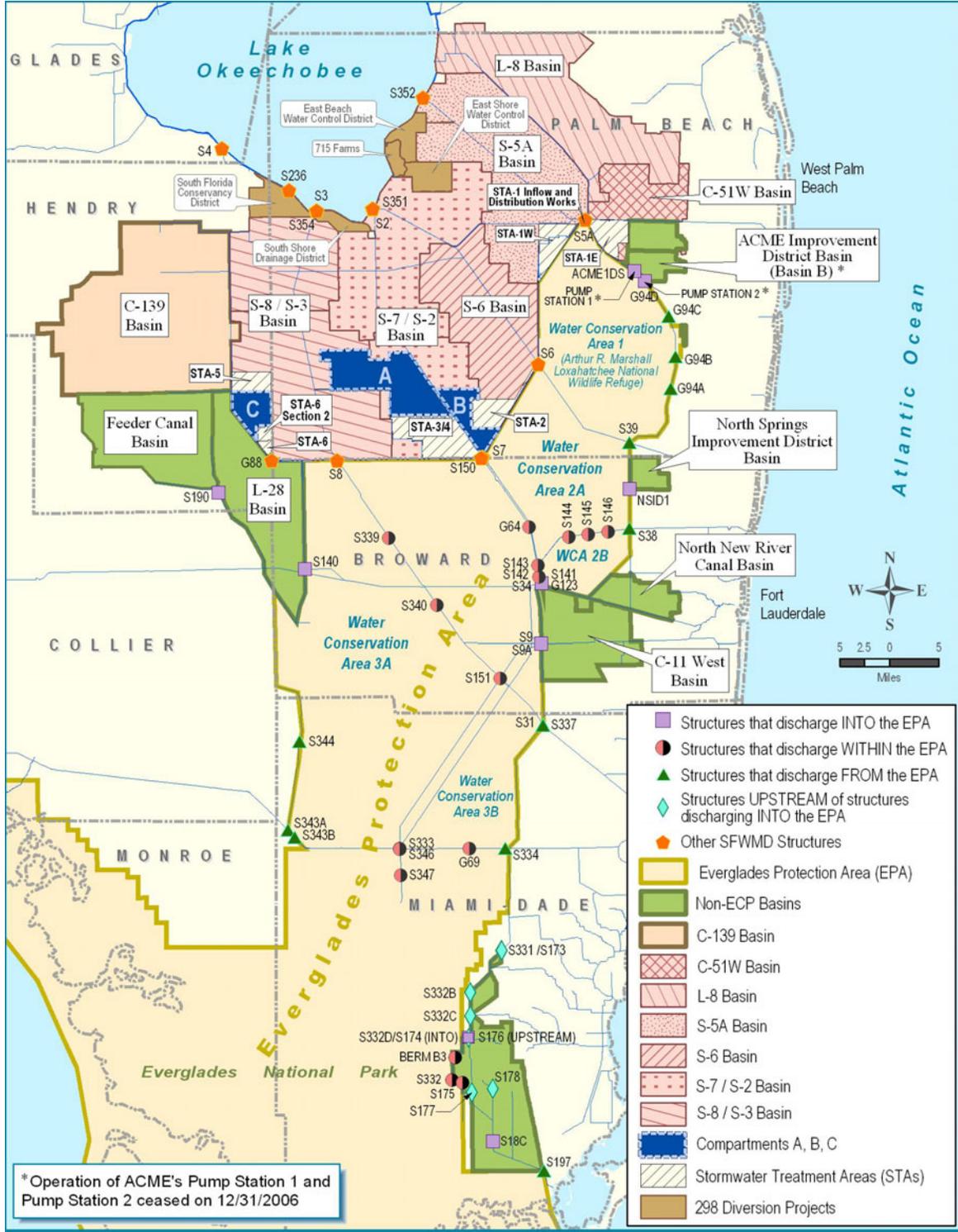


Figure 8-1. Overview of the Everglades Protection Area (EPA) and tributary basins.

Table 8-1. Summary of projects and cross-referenced chapters in the Long-Term Plan.

Project Description	Chapter References in the 2008 SFER – Volume I
<u>EVERGLADES CONSTRUCTION PROJECT (ECP) BASINS</u>	
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)
<u>EVERGLADES STORMWATER PROGRAM (ESP) BASINS</u>	
Acme Basin B	4
North Springs Improvement District Basin	4
North New River Canal Basin	4
C-11 West Basin	4
Feeder Canal Basin	4
<u>PROCESS DEVELOPMENT AND ENGINEERING (PDE)</u>	
<u>Basin Source Controls</u>	
EAA Basins - Source Controls	4
C-139 Basin - Source Controls	4
<u>Enhanced Control and Monitoring</u>	
Acquisition of Survey Data	Project complete – see prior reports
Additional Flow and Water Quality Monitoring Stations	5 (project-level activities section)
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.

Project Description	Chapter References in the 2008 SFER – Volume I
<u>Improved Analytical and Forecasting Tools</u>	
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)
<u>Optimizing SAV Performance</u>	
Operational Strategy	5 (STA-2 section)
Vegetation Maintenance	5 (STA-2 section)
Hydrologic and Hydraulic Assessment	5 (project-level activities section)
Internal Measurements	5 (project-level activities section)
Comparative Analysis	5 (future reports)
<u>Additional Structural and Operational Measures</u>	
Evaluation of Full-Scale STA Enhancements	5 (STA-1W section)
<u>Improved Reliability of Inflow Forecasts</u>	
Update Baseline Data Sets	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	3C
<u>ACCELERATE RECOVERY OF IMPACTED AREAS</u>	
Recovery Model Development and Calibration	6
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
<u>ADAPTIVE IMPLEMENTATION</u>	8
<u>PROGRAM MANAGEMENT</u>	8

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

Basin	Canal	Stormwater Treatment Areas	Receiving Water Conservation Areas
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-3A
S-8 (EAA)	Miami Canal	STA-3/4, STA-6	WCA-3A
C-51 West and L-8 Basin	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	N/A	N/A	WCA-1
North Springs Improvement District (NSID)	N/A	N/A	WCA-2A
North New River Canal (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

N/A = Not Applicable

INTRODUCTION

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 phosphorus criterion established in Rule 62-302.540, Florida Administrative Code (F.A.C.). For additional information on the phosphorus criterion rule, see Chapter 3C 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 (F.S.)] and the federal Everglades Settlement Agreement (i.e., 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 District's Strategic Plan (see <http://www.sfwmd.gov/>, under *About SFWMD, Budget & Strategic Plan* section). The District's strategies for the Everglades program include implementing the Long-Term Plan projects as well as expediting the Long-Term Plan Acceler8 projects and successfully completing the STA initial expansion projects (Acceler8) and the STA enhancements projects on schedule. 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 on the Everglades Agricultural Area (EAA) source controls program and 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 included in the Everglades Stormwater Program (see Chapter 4). In addition, STA expansion projects are being implemented through Acceler8 (see Chapter 7A).

OVERVIEW OF THE LONG-TERM PLAN

The Long-Term Plan was developed in response to a requirement of the 1994 Everglades Forever Act for the District to develop a document describing the state's plan for achieving the long-term Everglades water quality goals. The Everglades Forever Act was amended in 2003 to require implementation of the Long-Term Plan because it was recognized by the 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 BAPRT.

As required by the Everglades Forever Act, 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 <http://www.sfwmd.gov/sta>, under the *Long-Term Plan* section. 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, as its names indicates, is a plan with more than 50 individual projects (each having a schedule, scope, and cost estimate), but the Long-Term Plan is also a program, in that it includes many components that are more process-like, such as the source controls

components, and the ongoing maintenance, operations, and monitoring of the Stormwater Treatment Areas. The Long-Term Plan also contains restoration projects that are intended to assist in accelerating recovery of impacted areas in the Everglades Protection Area. All in all, the Long-Term Plan is focused on implementing regional projects and source controls to improve water quality entering and water quality within the Everglades Protection Area (EPA). The status of water quality conditions within the Everglades Protection Area is presented in Chapter 3A. As discussed in both this chapter (see section “Status of Water Quality and Flow Conditions in the Everglades Protection Area”) and in Chapter 3A (see section “Analysis Periods”), until the Long-Term Plan projects have been implemented for a sufficient period of time, it is not possible to measure the response of the Everglades Protection Area to the Long-Term Plan projects. In the mean time, there is measurable reduction in the phosphorus levels in discharges from the Everglades Construction Project basins when compared to the historic period (i.e., prior to implementation of the EAA BMPs and the ECP STAs.)

The Long-Term Plan is being implemented on a parallel path with several other large-scale ecosystem restoration programs, such as the Comprehensive Everglades Restoration Plan (CERP), the Lake Okeechobee Protection Plan (LOPP), the Lake Okeechobee and Estuary Recovery Plan (LOER), and the Northern Everglades and Estuaries Protection Program (NEEP). There is overlap between many CERP projects and Long-Term Plan projects, but there is very little overlap between the projects in the Long-Term Plan and those in the LOPP, LOER, and NEEP. This is due to the fact that the focus of the Long-Term Plan is on the area recently coined the Southern Everglades, while the focus of LOPP, LOER, and NEEP is on the area referred to as the Northern Everglades. For more information on CERP, LOPP, LOER, and NEEP, see Chapter 7A of this volume.

While the Long-Term Plan focuses on water quality issues in the Southern Everglades, CERP covers a wider geographical range, i.e., the Northern and Southern Everglades, and consists of more than 50 projects with multiple purposes, such as water supply, flood protection, and in some cases water quality improvement. CERP is being implemented on a 50/50 cost-share basis between the local sponsor (i.e., the SFWMD) and the federal government. In contrast, the Long-Term Plan is being implemented mainly by the SFWMD, FDEP, and local partners, and is being funded predominantly with state funds also referred to as the Everglades Trust Fund (i.e., dedicated *ad valorem* taxes, agricultural privilege tax revenues, license plate and toll fees, etc.). For more information on the Everglades Trust Fund and Long-Term Plan funding, see Chapter 13 of this volume.

Because there are many basins covered in the Long-Term Plan that also contain CERP projects, when the EFA was revised in 2003, the legislature recognized that in basins where a CERP project was planned that could help achieve Everglades water quality goals, it would be the most efficient use of taxpayer dollars to integrate the two program’s projects. For example, the C-11 Impoundment has multiple purposes such as flood protection, water storage, water supply, and water quality. The legislature recognized that once implemented, this project will also significantly reduce discharges from this basin to the Everglades; therefore, in lieu of the state constructing a separate water quality treatment project in the C-11W basin, integration efforts have focused on finding ways to further reduce phosphorus levels in the remaining discharges from the C-11W basin to the Everglades, or better yet, to help eliminate the remaining discharges to the Everglades by redirecting these discharges to other areas with water supply needs.

This year, therefore, in keeping with the direction of the legislature, the District continued to look for ways to integrate Long-Term Plan and CERP projects, and successful integration efforts are described in the section titled “Revisions to the Long-Term Plan.”

STATUS OF PROJECT-LEVEL ACTIVITIES

The District began implementing the Long-Term Plan projects in Fiscal Year 2004 (FY2004) (October 1, 2003 through September 30, 2004). On March 1, 2007, the fourth annual public meeting was held at District headquarters in West Palm Beach. The purpose of this meeting was to provide the public with an updated status of the projects in FY2007 at that time and to receive input on proposed modifications to the Long-Term Plan. This chapter presents the status update on the project-level activities for the entire FY2007.

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. An update on the status of project-level activities for eight of the Long-Term Plan projects for FY2007 is summarized below.

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

The Dynamic Model for Stormwater Treatment Areas (DMSTA) (Walker and Kadlec, 2005) is the tool used to model the future of phosphorus performance in the STAs. The DMSTA was used to evaluate components of the Long-Term Plan and will be applied to future enhancements and the interaction between Comprehensive Everglades Restoration Plan (CERP) reservoirs and the STAs. To increase the certainty in the accuracy of the model predictions, the model will be updated and calibrated.

The DMSTA refinement tasks identified in the Long-Term Plan for FY2006 were completed by the U.S. Department of the Interior and the U.S. Army Corps of Engineers (USACE) through contracts with Dr. William W. Walker, Jr. Additional information on the September 2005 version of the DMSTA, referred to as Dynamic Model for Stormwater Treatment Areas Model Version 2 (DMSTA2), can be found online at <http://www.wwwalker.net/dmsta/index.htm> (as of November 2007).

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 found online at www.sfwmd.gov, under the *STA Management* section. All of the project hydrologic, water quality and climatic data are available from the District's web site at <http://www.sfwmd.gov/sta>, (as of November 2007).

Update Baseline Data Sets

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 to continually improve the degree of confidence in the projected flow volumes and associated TP loads in inflows to the treatment areas, or in some instances, in discharges directly to the EPA.

The Long-Term Plan recommendation was to provide funding for the inflow data set updates beginning in FY2005, and extending through FY2015 in alternating years. As recommended, the inflow data sets are being updated in FY2007. The results of this update will be posted online at www.sfwmd.gov/sta. The District has the responsibility for updating the baseline data sets; the updated data sets are reviewed by the FDEP as well as interested stakeholders.

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. The FY2007 work associated with this project was completed as part of the effort to develop the long-term compliance permits for the Non-ECP Basins and the revised Part 3 of the Long-Term Plan, which was included in the January 2007 FDEP-approved Long-Term Plan revisions. The revised Part 3 document can be found online at www.sfwmd.gov/sta.

Influence of CERP Projects on Inflow Volumes and Loads

As CERP projects proceed through planning and implementation, the projected impact of these projects on the inflow volumes and loads to the STAs and to receiving water bodies in the EPA must be updated. Of particular interest is the EAA Storage Reservoirs Project, which will be linked operationally to one or more of the STAs upon its completion. Because the Phase I EAA storage reservoir has been expedited to the design and construction phase, more detailed information now exists regarding the proposed size, location, and operation of the reservoir, which will provide inflows to the STAs. As part of the EAA Regional Feasibility Study, analyses were conducted in FY2005 and early FY2006 to determine ways to optimize the performance of the linked Phase I EAA Storage Reservoir and the STAs. The documents produced as part of the EAA Regional Feasibility Study can be found at www.sfwmd.gov/sta.

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 about 5 percent of the TP load. This estimated percent contribution is based on the recent Lake Okeechobee water quality information, i.e., following the 2004 and 2005 hurricanes. As revised information becomes available on Lake Okeechobee water quality, the anticipated percent contribution from Lake Okeechobee will be revised accordingly. The September 2006 FDEP-approved Long-Term Plan revision added coordination between District staff working on the Long-Term Plan and the Lake Okeechobee CERP and Protection Project in FY2006 through FY2008. In FY2006, District staff and consultants working on the Long-Term Plan and Lake Okeechobee projects coordinated with the USACE to develop updated STA performance projections in support of the USACE's evaluation of alternative revised Lake Okeechobee operating schedules. USACE and District staff continued work on the revised Lake Okeechobee operating schedule in FY2007. Implementation of a revised schedule is anticipated to occur in late FY2007 or early FY2008.

Adaptive Implementation

Part 6 of the Long-Term Plan includes a recommendation that a dedicated funding source be established to facilitate the adaptive implementation process and assure that additional steps are expeditiously implemented. Work continued on several STA optimization activities including the real-time monitoring of phosphorus at STA structures and strategies for STA vegetation management. Another adaptive implementation activity referred to as Best Management Practices (BMPs) in District canals has been underway in FY2007. The results of these activities are being used to develop plans for implementation of sediment removal in canals upstream of STA inflow structures. The first sediment removal project is scheduled to occur in FY2008 at the STA-5 inflow structures.

Program Management

During FY2007, 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.

REVISIONS TO THE LONG-TERM PLAN

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 (PDE) component to identify and implement incremental optimization measures for further reductions in phosphorus. Also, as stated in the amended EFA, revisions to the Long-Term Plan shall be approved by the FDEP.

During FY2007, the District submitted four revision requests to the FDEP, as summarized below. Descriptions of previously approved revisions to the Long-Term Plan can be found on the District's web site and in the 2005, 2006 and 2007 SFER – Volume I, Chapter 8. Copies of all District request letters, FDEP approval letters, and supporting documentation can be found at www.sfwmd.gov/sta.

1. On January 3, 2007, the District submitted a request to the FDEP for a proposed major revision to the Long-Term Plan. On January 31, 2007, the FDEP approved the District's proposed revision, a brief description of which is presented below:

- Add Everglades Agricultural Area Conveyance and Regional Treatment (ECART) Project to Long-Term Plan
- Integrate with L-8 Basin Comprehensive Everglades Restoration Plan Project
- Revisions to the Source Controls Projects in the Non-Everglades Construction Project basins
- Provide Funding for Manatee Barriers on Lake Okeechobee Outlet Structures as required by the 404 permit, which authorizes construction of the STA-5 Flow-way 3

2. On January 5, 2007, the District submitted a request to the FDEP for a proposed minor revision to the Long-Term Plan. On January 11, 2007, the FDEP approved the District's proposed revision, a brief description of which is presented below:

When the 2003 Long-Term Plan was developed, the monitoring at the G-253 levee in STA-1W was shown to continue even after the new Cell 1 levee was complete. It is proposed that with the new Cell 1 levee monitoring information, we will have sufficient information about the eastern flow-way without needing to continue the G-253 monitoring. For this reason, it is proposed to discontinue monitoring at the G-253 levee. It is also proposed that this revision will not have significant impact on scope or schedule. It is also proposed that this revision will not have significant cost impacts (approximate savings of \$80,000 per year).

3. On March 1, 2007, the District submitted a request to the FDEP for a proposed minor revision to the Long-Term Plan. On March 16, 2007, the FDEP approved the District's proposed revision, a brief description of which is presented below:

For the first half of calendar year 2005, the western flow-way of STA-1W (Cells 2 and 4) was taken off line and drained for the construction of the new interior levee and associated structures as recommended in the 2003 Long-Term Plan. Once the cells were drained, it became apparent that there were significant maintenance issues requiring attention. The G-254 culverts and spreader canals associated with the levee separating Cells 2 and 4 were filled with sediment which needed to be removed to ensure proper flow through the flow-way. In addition, five of the G-254 culverts which were part of the original ENR project (and by 2005 were 10 years old), were deteriorated to the point that they required replacement. Through adaptive implementation, this unscheduled maintenance work was completed using funds that were budgeted but not needed for the Long-Term Plan enhancements projects that were underway at that time.

After completion of the new Cell 2 interior levee and the extensive maintenance activities described above, the western flow-way was re-flooded to allow vegetation grow-in. For the last half of 2005 and most of 2006, the western flow-way was kept hydrated and vegetation re-establishment was monitored. The Long-Term Plan recommendation included establishing emergent vegetation in the new Cell 2A, re-establishing SAV in Cell 4, and converting the new Cell 2B to an SAV cell. During this time, the emergent vegetation was starting to grow in Cell 2A and becoming well established, but the SAV was not starting to grow in Cell 2B nor was it reestablishing in Cell 4. Small quantities of SAV were placed in corrals in these cells, but after a short time, the plants died, and any small areas of SAV that did start to grow eventually died off. It was thought that the reason for the poor SAV grow-in was the extremely loose sediment, referred to as floc, which was easily re-suspended in the water column and was preventing light penetration needed for the vegetation to survive.

It was then proposed to plant rice in Cells 2B and 4 to help stabilize the sediments, and in turn promote favorable conditions for SAV grow-in, similar to the use of rice in Cell 5 earlier in 2006. In late 2006, rice was planted in Cells 2B and 4. The rice was planted aurally because the cells could not be dried out enough to allow the use of tractors as was done in the Cell 5 rice planting effort. Late 2006, a large SAV inoculation effort was completed in Cells 2B and 4. The rice and SAV in these two cells were then monitored for the next couple months. The SAV at some inoculation sites in Cell 4 was showing some promise, but for the most part, the SAV was not surviving. There have been some small areas of SAV growth in Cell 2B; the rice planted late last year did not survive. The continued high turbidity levels in the water caused by high levels of suspended floc material is thought to be the cause of the poor growing conditions for both the rice and SAV.

It is now proposed to re-drain Cells 2B and 4 to remove the floc/accrued material, replant with rice, re-flood, and inoculate with SAV. Because the work will be completed at the same time as the Cells 1 and 3 enhancements and associated dry-out, it will be easier to dry out Cells 2B and 4. If the cells can be thoroughly dried out, conventional earthmoving equipment can be used to remove the floc and haul it to a nearby parcel of District-owned land. This method will be less expensive, more effective and faster than removing the sediment from the cell while it is flooded; hydraulic dredging could cost 4 to 5 times as much and the efficiency is

highly uncertain considering the extremely loose nature of the floc material. Performing the rice planting in dry conditions should be more effective than planting it in wet conditions as was done in these two cells late last year. The Cell 5 rice planting effort was completed in dry conditions, and continues to appear to have been a very successful method for stabilizing the sediment and creating favorable conditions for SAV grow-in.

Before starting to drain Cells 2B and 4, bulkheads will be built and installed in the eight G-249 culverts in the new Cell 2 levee. This will allow the storage of the water currently in Cell 2A to sustain the existing emergent vegetation, and will minimize the amount of discharge water. The Cell 4 outflow structures (G-307 and G-309) will be opened to allow gravity discharge of water from Cells 2B and 4 into the Discharge Canal. It is estimated that the volume of water to be discharged from Cells 2B and 4 is about 400-500 acre-feet and the available storage in the Discharge Canal is about 100-200 acre-feet. Once the available storage in the Discharge Canal has been used, in order to drain more water from the cells, temporary pumps will be used to pump water from the Discharge Canal to the adjacent landowner's farm canal. It is estimated that initially about 200-400 acre-feet of water will be discharged in this manner. Additional pumping to maintain water levels may also be necessary throughout the completion of the earthwork and rice planting. The actual volume and quality of water discharged to the adjacent landowner's farm canal will be monitored and reported to the District's Everglades Regulation Division. Other required monitoring and reporting will be addressed with FDEP to ensure compliance with permit requirements. Once the cells have been drained, and the floc/accrued material has been removed, rice will be planted with tractors using a similar method to what was used in Cell 5 last year. Once the rice planting is complete, the bulkheads in the Cell 2 levee can be removed to hydrate Cells 2B and 4. If no water is available in the upstream basin, the temporary pumps can be used to hydrate the rice with water from the Discharge Canal.

In order to implement the above, the District is seeking concurrence with the FDEP and is also discussing this plan with the Refuge. The District is also entering into an agreement with the adjacent landowner for the acceptance of the discharge water. Water samples are currently being collected to characterize the quality of the water in Cells 2B and 4 that is proposed to be discharged. A similar process was followed in early 2006 to implement the Cell 5 draining and rice planting effort. An agreement between the District and Gladeview Water Control District was signed to allow the District to pump the discharge water to Gladeview's canal. On January 30, 2006, FDEP issued a modification to the master dewatering permit for the cell 5 dewatering activity. A Long-Term Plan revision was requested by the District and approved by the FDEP. It is estimated that approximately 100,000 cubic yards of material will need to be removed and hauled. In order to complete the work within the plan timeframe, the procurement must be complete by early to mid-April.

4. On July 27, 2007, the District submitted a request to the FDEP for a proposed major revision to the Long-Term Plan, a brief description of which is presented below:

The projects in the October 2003 Long-Term Plan were designed to achieve compliance with the water quality standards for the Everglades Protection Area (EPA) based on specific assumptions and the best available information. One of the key assumptions during the development of the Long-Term Plan was that the strategy for Acme Basin B, as well as determination of its implementation schedule, would be accomplished through the CERP planning process.

Subsequent to completion of the Long-Term Plan, it was determined that the overall timeframe associated with the CERP planning process might impact the ability to complete the Acme Basin B project by the originally planned date of December 31, 2006, and within the original budget. Also subsequent to the completion of the Long-Term Plan, it was confirmed that the optimal plan for addressing Acme Basin B discharges would include discharging to the C-51W Canal for eventual treatment in STA-1E.

The re-routing of Acme Basin B runoff to the C-51 West Canal required numerous infrastructure changes within the Village's system. As part of those changes the District has been responsible for completing the following features as previously identified in the March 2006 Long-Term Plan revision:

- Improvements to the C-1 Canal to increase conveyance capacity and connect the C-1 Canal to the C-51 West Canal
- Construction of new pump station PS7 to pump from the C-1 Canal into the C-51 West Canal
- Construction of a detention area on the District-owned Section 24, Township 44 South, Range 40 East property (e.g., lands situated immediately south of the Rustic Ranches subdivision and west of Flying Cow Road) for temporary offline storage
- Construction of new pump station PS24 to fill the Section 24 detention area

The District's project will pump stormwater from Acme Basin B into a temporary detention area where it will be attenuated and discharged back into the Acme Basin B canal system at a rate matching evapo-transpiration. The detention area will provide water quality treatment while recharging the canal systems (resulting in a reduction of seepage losses from the Refuge) and will provide reductions in discharges from Acme Basin B into the C-51 West Canal, as well as reductions in water supply demands from the Refuge. The flows that are not retained in the Village's water management system will be routed north through the C-1 Canal, which will be connected to the C-51 West Canal via PS7 and will ultimately flow to STA-1E for treatment prior to discharging to the Refuge.

Pursuant to the Memorandum of Understanding (Contract Number CN051212) of May 31, 2005 between the District and the Village, construction was initiated by the District on the C-1 Canal improvements and PS7. As construction proceeded on work associated with PS7, stakeholder concerns were received concerning the location and type of pump station proposed. The Village agreed to lend its support to the District to effect a change in the pump station location to the west of Flying Cow Road and a change in the type of pump from diesel to electric power to reduce the noise impact to local residents. While these stakeholder concerns were being worked out, the District moved forward and completed construction of the C-1 Canal improvements and installed temporary pumps to direct runoff from Acme Basin B into the C-51W Canal. This work met the intent of the Long-Term Plan by diverting Acme Basin B runoff from the Refuge by December 31, 2006.

Also as a result of the need to relocate and redesign PS7, the Village and the District initiated development of an amendment to the 2005 MOU to incorporate the revised project features. Amendment No. 1 to the 2005 MOU defines the level of support mutually agreed upon; the essence being that the Village will undertake the redesign of PS7 to a Village standard electric pump design as well as the construction and future operation and maintenance of the new facility. Amendment No. 1 to the 2005 MOU was approved by the District's Governing Board on May 10, 2007; and by the Village on June 19, 2007. Amendment No. 1 allows for the removal of the PS7 annual operation and maintenance costs from the Long Term Plan budget. All other costs for PS7 are anticipated to remain as projected in the March 2006 Long Term Plan revision. MOU Amendment No. 1 does not change any other responsibilities of the Village for the evaluation, design and construction of the following improvements:

- Replace and reconfigure the Village's six control structures along Pierson Road at the Village's canals C-1, C-2, C-4, C-6, C-7 and C-8; and water control structures 40, 123, 42, 43, 44 and 45 respectively. Additional modifications will be made to ACME Basin B water control structures 108, 144, 52, 95 and 66;

- Use of the backup pumps and modifications to the Village's Pump Station Numbers 3, 4 and 6 in the Village's C-2, C-7 and C-8 Canals. The nominal capacities of those backup pumps are 60,000 gpm, 60,000 gpm and 62,000 gpm, respectively.
- New Pump Station Number 8 with a capacity of 125 cfs (56,100 gpm) at Pierson Road and the C-2 Canal.

The Village completed the above-listed modifications to the Acme system to divert Basin B discharges to the C-51 West Canal in 2006.

PS1 was retired from drainage service on December 31, 2006. An existing two-way pump at PS2 and culverts at both pump stations (PS1 and PS2) will remain in use for water supply withdrawals from the Refuge. As such, the Village's master system ERP permit which covered these two pump stations was modified to state that PS1 was to be dismantled and PS2 can only be used for water supply purposes and if in the future PS2 is required for discharges from the Village, a permit modification or Emergency Order would be required.

Work on the Section 24 Detention Area and PS24 has progressed to a Preliminary (30 percent) Design. This Preliminary Design included an Opinion of Probable Construction Cost which was approximately twice that which was identified at Basis of Design Report stage (which was the same as the costs shown in the March 2006 Long-Term Plan revisions), which was the basis for the allocated budget. The cost increase was attributed mainly to the following reasons:

- The addition of a seepage control system
- Change in design standards for embankments (as opposed to levees or berms)
- Change to wetland vegetative planting plan to compensate for change to a slow release operational plan
- Other miscellaneous detailed design changes

A value engineering (VE) review of the Preliminary Design was conducted to examine methods and opportunities to reduce the projected cost and keep it within budget. Two key items were identified to reduce costs:

- Change PS24 from diesel to electric power
- Remove wetland park elements and simply construct an impoundment for flood attenuation purposes (with 1,028 ac-ft being the design parameter provided by the Village from its hydraulic system model to maintain the current level of flood protection)

The Village has agreed to participate in a further VE review with particular emphasis on the system model and the storage volume required to maintain the current level of flood protection. Depending upon the outcome of the further VE review with the Village, the District may opt to conduct the design, construction and operation and maintenance for Section 24 Detention Area and PS24, or may provide a range of opportunities for the Village's further involvement in any or all of these functions.

The Section 24 Reservation of Use will remain in effect through December 31, 2008 as currently described in the 2003 Long-Term Plan and the March 2006 revision to the Long-Term Plan.

CHALLENGES TO ACHIEVING LONG-TERM WATER QUALITY GOALS

Successful implementation of the Long-Term Plan will 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 has the planning goal of achieving water quality standards, including the TP criterion in the EPA. During the initial phase of implementation (pre-2016) of the Long-Term Plan, permits issued by the FDEP are to be based on Best Available Phosphorus Reduction Technology, as defined by the EFA, and include technology-based effluent limitations consistent with the Long-Term Plan. In addition, the FDEP must evaluate water quality standards for parameters other than TP for the EPA and EAA canals. As a part of this evaluation, the FDEP is also specifically directed by the EFA to recognize by rulemaking the existing beneficial uses of the EAA conveyance canals.

The FDEP has been evaluating water quality standards for canals as a 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 will be conducting this review in consultation with a technical advisory committee of appropriate stakeholders, with final recommendations from this effort due by the end of 2007. 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 FY2007. 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 during 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 FY2007 and will continue to be provided throughout the implementation of the Long-Term Plan. Additional information on 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 FY2007 to coordinate with members of CERP's Project Delivery Teams (PDTs) 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 still in the early planning and design phases. However, uncertainty continues as to how CERP projects will influence flows and water quality and as to the implementation schedules for the projects. Continued close coordination is needed between members of the PDTs and staff implementing the Long-Term Plan components to ensure that project goals are met on schedule.

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

The EAA BMPs and the STAs have been removing phosphorus from waters discharging to the EPA for over 10 years, and, as a result, water quality conditions are improving in the areas of the EPA that are downstream of STA discharges. 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 complete; however, efforts are under way to develop the tools for predicting the response of the system to the proposed projects. The status of the development of the tools needed to predict recovery is reported in Chapter 6 of this volume. For more information on the hydrology of the South Florida environment and on the status of water quality in the EPA, see Chapters 2 and 3A of this volume, respectively.

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- Burns and McDonnell. 2003. Everglades Protection Area Tributary Basins Long-Term Plan for Achieving Water Quality Goals. October 2003. Report prepared for the South Florida Water Management District, West Palm Beach, FL.
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