# Chapter 8B: The Everglades Stormwater Program

Paul McGinnes, Damon Meiers, Shi Kui Xue,
Stuart Van Horn, Ron Bearzotti, Vincent Peluso,
Steve Sentes, Barbara Powell, Julia Lacy, Carlos Adorisio,
Lisa Smith and Richard Pfeuffer

## SUMMARY

The Everglades Stormwater Program (ESP) is charged with administering the non-Everglades Construction Project (non-ECP) permit. Through its Regulatory Action Strategy, the ESP is also responsible for developing and implementing strategies for achieving compliance with state water quality standards at structures that discharge into the Everglades Protection Area (EPA) but are not part of the Everglades Construction Project (ECP). The South Florida Water Management District (SFWMD or District) continues to foster communication with local governments, special districts, the Miccosukee and Seminole Indian tribes, and other state and federal agencies to achieve the goals of the Everglades Forever Act (EFA), the non-ECP permit and a future long-term compliance permit.

The District has also implemented improved monitoring programs upstream of structures that discharge into the EPA to identify Everglades "hot spots" (areas of water quality concern). The District's water quality monitoring program indicates that the quality of water discharging into the EPA is generally acceptable, with the exception of phosphorus (P) concentrations, dissolved oxygen (DO), pH, and turbidity at a few sites. In addition, the District has executed a number of cooperative cost-share agreements with local governments to implement water quality improvement plans that consist of monitoring, Best Management Practices (BMPs) and operational modifications.

Public outreach initiatives have expanded to include public education and development of educational tools, such as turfgrass and landscaping BMPs and an urban BMP development document for South Florida. A feasibility study has been initiated in conjunction with the ECP program to evaluate alternative combinations of private and public works, including integration with the Comprehensive Everglades Restoration Plan (CERP), to achieve compliance with the long-term water quality standards for the EPA. These and other accomplishments, as well as updates to ongoing activities, are described in this chapter.

## INTRODUCTION

This section of Chapter 8 of the *2003 Everglades Consolidated Report* (2003 ECR) provides an update on the status and progress of the implementation of the Everglades Stormwater Program (ESP). On April 20, 1998 the Florida Department of Environmental Protection

(Department or FDEP) issued the non-ECP permit (FDEP File No. 06, 50259070), which was issued pursuant to sections 9(k) and 9(l) of the Everglades Forever Act (EFA). The permit authorized the continued operation of water control structures that are operated, maintained and controlled by the District and that discharge waters into, within or from the EPA, and which were not included in the permit(s) issued for the ECP. The non-ECP permit requires that the District implement schedules and strategies for the following purposes: (1) achieve and maintain water quality standards; (2) evaluate existing programs, permits and water quality data; (3) develop a regulatory program, where needed, to improve water quality; and (4) develop a monitoring program to track progress toward achieving compliance with water quality standards to the maximum extent practicable. The ESP elements, along with other District programs and activities, have previously been identified and described in detail in Chapter 11 of the *2000 Everglades Consolidated Report* (2000 ECR) as the District's water quality improvement strategies for non-ECP tributary basins and structures discharging into, within or from the EPA.

The first and most basic element of the ESP is the water quality monitoring and analysis program. Non-ECP permit conditions require the District to document the accuracy of collected data and measure progress toward achieving and maintaining compliance with state water quality standards by December 31, 2006**.** To fulfill permit conditions, the District has completed an annual analysis of water quality data at non-ECP structures by comparing the data with state water quality standards.

To continue to document the accuracy of the collected data and measure progress toward achieving and maintaining compliance with state water quality standards, the District has compared water quality data from non-ECP structures from May 1, 2001 through April 30, 2002 to state water quality standards. **Table 8B-1** provides a summary of flow-weighted mean total phosphorus (TP) concentrations at non-ECP "into" structures for the period of record. Results of all water quality analyses in the *2003 Everglades Consolidated Report* are included in **Appendix 8B-1**. A brief summary of these analyses is also provided in the Water Quality Monitoring and Analysis section below.

The ESP portion of Chapter 8 of the 2003 ECR also contains an update on the implementation of the 10-step Regulatory Action Strategy, water quality improvement initiatives, financial assessments, public outreach initiatives, an update of specific activities in ESP basins, and a "findings" section.

**Figure 8B-1** is an updated map of the ESP hydrologic basins and non-ECP structures. The map provides a wealth of regional information, including urban and tributary boundaries for basins associated with the ESP program, and the location of non-ECP structures. The map depicts the location of ESP structures, the boundaries of ESP hydrologic contributing basins, the Everglades Agricultural Area (EAA) boundaries (regulated by Chapters 40E-61 and 40E-63 of the Florida Administrative Code), and the EPA boundaries.

ESP chapters of previous Everglades Consolidated Reports (2001 ECR, Chapter 11; 2002 ECR, Chapter 8B) included comparisons of state water quality standards to quality assured water quality data at non-ECP structures. These analyses found that there were very few excursions from Class III numeric water quality criterion for any parameter in the eight ESP contributing basins, except for excursions from the standard for DO. It should be noted that the FDEP is currently reviewing the Class III water quality standard for DO because excursions from the existing standard are frequently found in unimpacted South Florida natural water systems. **Table 8B-1** is provided as a summary of flow-weighted mean total phosphorous (TP) concentrations at non-ECP "into" structures from May 1, 2001 through April 30, 2002. This year's data, along with data from previous ECRs, indicated that water quality was generally acceptable in all eight ESP

contributory basins, with the exception of DO and TP concentrations in three of the eight basins: Wellington/Acme Improvement District, feeder canal, and L-28. It should also be noted that there were significant TP concentration reductions in Water Year 2002 (WY02) in the feeder canal and L-28 basins when compared with previous years.

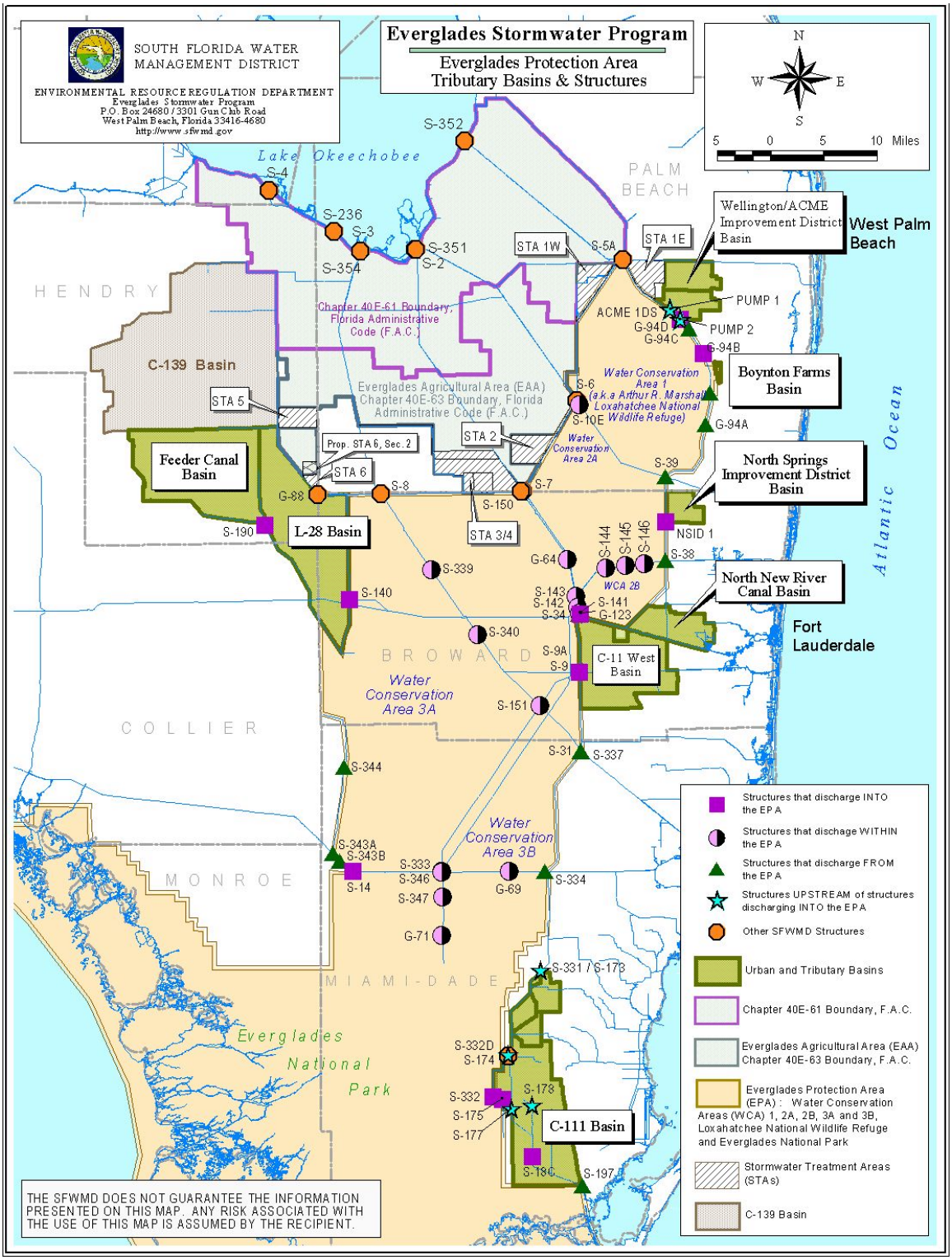


**Figure 8B-1.** Tributary basins, water control structures and other features related to the ESP

# STATUS AND PROGRESS OF IMPLEMENTING THE ELEMENTS OF THE ESP

## ESP WATER QUALITY ANALYSIS AND MONITORING PROGRAMS

The appendices to this chapter include an annual update of the non-ECP permit monitoring program (Specific Condition No. 12), monitoring results from the S-332D structure at the C-111 basin, and a comparison of water quality data from samples collected at non-ECP structures to state water quality standards from May 1, 2001 through April 30, 2002 (non-ECP fifth year data). These comparisons fulfill non-ECP permit requirements to document the accuracy of the collected data and to measure progress toward achieving and maintaining compliance with state water quality standards. The data for the groups of water quality parameters including physical parameters, nutrients, major ions, and trace metals were evaluated for the period from May 1, 2001 through April 30, 2002. The evaluation indicated that except for incidences of variations for DO, there were very few excursions from Class III water quality standards found in samples collected at non-ECP structures. The excursions found included excursions for pH at S-145 and excursions for turbidity at S-10E and S-178.

The quarterly surface water and the bi-annual sediment pesticide sampling during this period indicated that only three pesticides were detected in any of the analyses. Diazinon, the pesticide most widely used by homeowners on lawns and gardens to control insects and grub worms, was detected in two surface water samples of the discharge at the North Springs Improvement District 1 (NSID-1) pump station. Chlorpyrifos (ethyl), a pesticide used on food and feed crops, ornamentals, lawns and turf, was detected in one sample at S-177. Ethion, a pesticide commonly used for citrus, was detected in one sediment sample at S-176.

**Table 8B-1** summarizes the flow-weighted mean TP concentrations, total flow volumes, and TP loads at non-ECP "into" structures for the period May 1, 2001 through April 30, 2002. As is shown in the table, flows were significantly higher in WY02 than in WY01 for most of the structures, because WY02 was a wet year compared to WY01. This is the first year that TP loads have been presented in the Everglades Consolidated Report; thus, a direct comparison with historical data cannot be performed for this year. Flow-weighted mean TP concentrations vary greatly between basins. The highest TP concentrations are from ACME basin B, the feeder canal basin and the L-28 basin. The North Springs Improvement District, North New River and C-11 West basins have TP concentrations below 50 μg/L. The only basin that has a TP concentration below the potential default standard of 10 μg/L is the C-111 basin. Though these concentrations are low, all concentrations greater than approximately 10 μg/L will have to be addressed, as is discussed in Chapter 5. The TP data for the EPA as a whole are provided in Chapter 2 of the *2003 Everglades Consolidated Report*.

Some of the highest TP concentrations (above 90 μg/L) for non-ECP structures discharging directly to the EPA during WY02 were observed for monitoring locations at the ACME-2 and G-94D culverts, and at the ACME-1DS and ACME-1 pump stations. Weekly autosampler collection and biweekly grab samples at the respective upstream monitoring locations VOW-1 (ACME pump station 1) and VOW-2 (ACME pump station 2) were initiated in July 2000 based on a monitoring agreement between the District and the Village of Wellington/ACME Improvement District (VOW/ACME). The ACME1DS and G-94D culverts, operated by VOW/ACME, remain open at all times when upstream pump stations ACME-1 or ACME-2 are operating and discharging to the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge). During WY02 the VOW/ACME discharged more frequently than during WY01.

Sixteen District data-collection trips to the culvert monitoring locations resulted in nine sampled flow events. The monitoring agreement with VOW/ACME resulted in a sufficient number of samples (114) being collected by both grab and autosamplers upstream of the pump stations to cover a broad range of flows observed during pumping events and adequately characterize TP concentrations.

**Table 8B-1.** Annual flow-weighted mean TP concentrations for WY02 (May 1, 2001 through April 30, 2002)

| Hydrologic Basin | Structure | Water Quality Station Id | Total Flow Volume (acre-feet) | Sample Size (Grab) | Number of Days with Positive Flow | Arithmetic Average (Grab)(µg/L) | Sample Size (Comp) | Sample Type | Total Samples Collected During Flow | Flow-Weighted[2] Mean Concentration (µg/L) | Flow-Weighted[3] Mean Concentration (µg/L) | TP Load (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ACME (Basin B) | ACME1DS | ACME1DS | 15,670 [6] | 16 | 102 [6] | 74 | 0 | Grab [4] | 9 | 96 [7] | 95 [7] | 1836 |
| | ACME1 | VOW1 | 15,670 | 21 | 102 | 80 | 27 [8] | Auto [5] & Grab [4] | 114 | 90 | 89 | 1720 |
| | G94D | G94D | 17,524 [6] | 16 | 106 [6] | 92 | 0 | Grab [4] | 9 | 92 [7] | 118 [7] | 2551 |
| | ACME2 | VOW2 | 17,524 | 22 | 106 | 142 | 26 [8] | Auto [5] & Grab [4] | 116 | 155 | 152 | 3286 |
| North Springs Improv. District | NSID1 | NSIDSP01 | 2,494 | 10 | 14 | 26 | 0 [9] | Grab [4] | 6 | 26 | 26 | 80 |
| | | S-38B (WCA-2A near NSID1) | 2,494 | 4 | 14 | 20 | 0 | Grab [4] | 0 | ND[1] | 16 | 49 |
| North New River | G-123 | G123 | 52,047 | 13 | 101 | 17 | 48 [8] | Auto [5] & Grab [4] | 106 | 16 | 16 | 1057 |
| C-11 West | S-9 | S9 | 283,618 | 48 | 227 | 17 | 42 | Auto [5] & Grab [4] | 224 | 19 | 19 | 6716 |
| C-111 | S-175 | S175 | 6 | 26 | 2 | 7 | 0 | Grab [4] | 2 | 7 | 5 | 0 |
| | S-332 | S332 | 0 | 26 | 0 | 6 | 0 | Grab [4] | 0 | ND [1] | ND [1] | 0 |
| | S-18C | S18C | 172,835 | 26 | 296 | 6 | 0 | Grab [4] | 21 | 5 | 7 | 1525 |
| L-28 | S-140 | S140 | 109,994 | 16 | 189 | 46 | 52 [8] | Auto [5] & Grab [4] | 201 | 47 | 48 | 6460 |
| Feeder Canal | S-190 | S190 | 84,982 | 16 | 223 | 60 | 53 [8] | Auto [5] & Grab [4] | 236 | 90 | 89 | 9314 |
| Boynton Farms | Various[10] | Various[10] | ND[1] | 32 | ND[1] | 310-1781 | ND[1] | Grab [4] | ND[1] | ND[1] | ND[1] | ND[1] |

Notes:

1) ND - no data available
2) Flow-weighted Mean Concentration based on days of flow and monitored TP data only.
3) Flow-weighted Mean Concentration based on estimation algorithm to determine TP concentration on non-monitored days
4) (Grab) indicates samples collected by grab sampling methodology.
5) (Auto) indicates that samples were collected by automatic composite samples.
6) Flow data from upstream pump structures, ACME1 and ACME2, is representative of the flow through the ACMD1DS and G94D culverts, respectively.
7) Flow weighted mean concentrations for ACME1DS and G94D were calculated using the flow data at upstream structures ACME1 and ACME2, respectively.
8) Autosampler installed upstream of structure during WY2001.
9) Autosampler installed upstream of structure during WY2002, but no data are available.
10) Sites include BFBAFCP,BFBAFNP,BFBAFSP, BFBDFCP, BFBDFNP,BFBDFSP, BFBDFWP, BFBMFCP,BFBMFSP, BFBMFNP and BFBWNCP

As shown in **Table 3** of **Appendix 8B-1b**, more than 75 percent of the TP analyses at the upstream VOW/ACME monitoring sites were below 160 ppb, with median TP values ranging between 69 and 130 ppb. Discharge data were not available for the ACME-1DS and G-94D culverts. However, the discharge data during WY02 from the upstream pump stations (15,670 ac-ft for ACME-1 and 17,524 ac-ft for ACME-2) can be used as an indication of the magnitude and occurrence of flow through the downstream culverts.

The feeder canal basin had a flow-weighted mean concentration of nearly 90 ppb at S-190, with discharge of 84,984 ac-ft (**Table 8B-1**). More than 75 percent of the TP analyses at the S-190 monitoring sites are below 86 ppb, with a median concentration of 42 ppb for the autosamples and 41 ppb for the grab samples (**Appendix 8B-1b**, **Table 3)**.

The lowest TP concentrations were observed at structures in the C-111 basin at S-18C, S-174, S-177, S-331, S-173 and S-332D, which discharge to the southeastern portion of Everglades National Park (ENP or Park) by way of the C-111 canal and Taylor Slough. The TP data for these monitoring locations had an observed median concentration of 6 ppb for S-18C, S-175 and S-332, with 75 percent of the samples having concentrations below 10 ppb for S-18C, S-175 and S-332. During WY02, the S-175 and S-332 structures were operated infrequently and discharged only 6 ac-ft through S-175, with no discharge through S-332 to the Park. The S-18C structure discharged approximately 172,835 ac-ft to the lower C-111 canal. The flow through S-178 had a flow-weighted mean concentration of 93 ppb, the highest TP concentration in the C-111 basin, with a discharge of 4,398 ac-ft.

Everglades Stormwater Program (ESP) staff and the District's Environmental Monitoring and Assessment (EMA) Department are working on a joint project with the Seminole Indian Tribe's Water Resource Management Department and the U.S. Geological Survey (USGS). The project includes the installation of Ultrasonic Velocity Meters (UVMs) to estimate flow, autosamplers to collect composite water quality samples, and grab samples at select locations based on watershed boundaries, land use, and discharge quantities. Sample collection at the S-190 structure, which is the main discharge location for the feeder canal basin, will be coordinated with flows from the entitlement waters and has recently been converted from timed sampling (water sampled at periodic intervals) to flow-proportional sampling. The data reported from autosamplers in WY02 are from timed sampling.

The Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge) headquarters property is owned and operated by the U.S. Fish and Wildlife Service (USFWS) and is bordered by several farms immediately east of its boundary that discharge onto the property. The headquarters property is identified in the EFA as being within the boundary of the EPA but is east of the protective levee, has no connection to enable discharge westward to Water Conservation Area 1 (WCA-1), and stands alone as an isolated parcel. The Boynton Farm basin water quality monitoring program, monitoring the discharge onto the headquarters' property, has been ongoing during WY02. Although access limitations and other boundary issues still exist, surface water quality samples for most of the identified "into" structures have been obtained during times of flow. Recently, the Williams Nursery pump on the north side of the Refuge was voluntarily removed. Data collected during WY02 for Amestory Farm includes sites BFBAFCP, BFBAFNP and BFBAFSP; Dubois Farm includes sites BFBDFCP, BFBDFNP, BFBDFSP and BFBDFWP; Mecca Farm includes sites BFBMFCP, BFBMFSP and BFBMFNP; Williams Nursery includes site BFBWNCP. These are event-driven grab samples with no associated flow measurements. The TP data are provided in **Table 8B-1,** which shows extremely high TP concentrations (mean concentration of 310 to 1,781 ppb). As part of the expansion work for State Road 7 to the east of the remaining farm properties, the Lake Worth Drainage District (LWDD) is continuing its efforts

to provide sufficient capacity to allow all discharges from the remaining farms to go east. This would eliminate the need for these farms to pump west into the Refuge.

The flow-proportional autosampler, headwater pressure sensor, and calibrated flow monitoring equipment with telemetry that monitor NSID's pump station discharges into WCA-2A are functioning for the NSID basin. The surface water quality monitoring program has continued at NSID-1 during times of flow into WCA-2A. Also, this year the District has obtained a significant number of upstream water quality monitoring samples taken during times of flow. The upstream data at pump NSID-1 (NSIDSP01) can be found in **Table 8B-1**, which indicated a flow-weighted TP concentration of 26 ppb (**Table 8B-1**, **Appendix 8B-1b** and **Table 3**, **Appendix 8B-1e)**. Operation of the autosampler and telemetry equipment used to collect the data was delayed due to unforeseen pump repairs, which have since been completed. Pump testing was performed and pump curves were developed and programmed into the equipment. All systems are now operational and should provide flow-weighted proportional sampling data results for WY03.

## Reporting Requirements

As required by Specific Condition 5 of the non-ECP permit, the District is required to submit an annual report that includes a description and evaluation of the implementation of strategies and schedules contained in the permit, as appropriate. The annual report must also include results of the evaluation of water quality data and updates on the implementation of the Regulatory Action Strategy and the Mercury Screening Program. Information contained in this chapter and other chapters of the *2003 Everglades Consolidated Report* fulfills the reporting requirements of the non-ECP permit as detailed in the specific conditions of the non-ECP permit. The requirements are listed below in **Table 8B-2**.

**Table 8B-2.** Non-ECP permit reporting requirements

| Specific Condition | Reporting Requirement | Location in Everglades Consolidated Report |
|---|---|---|
| 4 | New permit or permit modifications | Renewal due in April 2003 |
| 5 | Submittal of Annual Report | Chapters 1, 2A, 2B, 3, 4A, 4B, 4C, 7, 8A, 8B, 8C |
| 6 | Land acquisition and water treatment facility status update | Chapter 8B |
| 7 | First and second data evaluation reports | Completed in 1998 Annual Report |
| 8 | Regulatory Action Report | Chapter 8B |
| 9 | Update on implementation of schedules and strategies | Chapters 1, 2A, 2B, 3, 4A, 4B, 4C, 7, 8A, 8B, 8C |
| 10 | CompQAP | CompQAP 870166G (DEP approved) |
| 11 | Mercury Screening Program report | Chapters 2A and 2B |
| 12 | Annual report, data requirements | See below |
| 12(b) | Dates of sampling | Appendix 8B- |

| Specific Condition | Reporting Requirement | Location in Everglades Consolidated Report |
|---|---|---|
| 12(c) | Water quality sampling methodology | CompQAP 870166G (Sec's 6.0 and 7.0) |
| 12(d) | Map of sampling locations | Chapter 8B, Figure 8B-1 |
| 12(e) | Statement of sampling authenticity | Appendix 8B- |
| 12(f) | CompQAP | CompQAP 870166G |
| 12(g)(I-v) | Water quality data and associated information | Appendix 8B- |
| 12(g)(iv) | Monthly flow volumes | Appendix 8B- |
| 12(h) | Water quality data evaluation | Appendix 8B- |
| 12(I) | Recommendations for improving WQ monitoring | Completed in 1998 Annual Report |
| 12(j) | Implementation of strategies | Chapters 1, 2A, 2B, 3, 4A, 4B, 4C, 7, 8A, 8B, 8C |
| 16 | Monitoring locations report | Submitted to FDEP in 1998 |
| 19 | Additional strategies (if developed) | Not applicable at this time |

## Regulatory Action Strategy

The status of the Regulatory Action Strategy (RAS), which applies to all basins discharging into the Everglades Protection Area but are not part of the ECP, is updated and submitted annually to the FDEP. A detailed description of the RAS and the 10-step approach to addressing basin-specific water quality issues are provided in Chapter 11 of the *2000 Everglades Consolidated Report* and in a new document titled *Everglades Stormwater Program Regulatory Action Strategy Status Report*, dated August 2002.

Steps 1 through 3 of the RAS require an inventory of all structures discharging directly into the EPA (step 1), the characterization of available water quality data (step 2) and, when needed, an expanded monitoring program at structures discharging into the EPA (step 3). At the time of this update, steps 1 through 3 of the RAS have been completed for all basins. Step 4 (evaluating data from direct structures) is ongoing as additional data are collected. District staff had analyzed ahead of schedule all the District's data that are available since 1978 and presented them as part of the non-ECP permit's first annual monitoring report on April 20, 1999 (SFWMD, 1999a). Autosampling equipment for flow-proportional TP sampling has been installed at the Wellington/ACME, the North Springs Improvement District, and the C-11 West basin "into" structures. Autosampling equipment for time-composite TP sampling has been installed at the S-18C "into" structure in the C-111 basin and the "into" structures for the North New River, L-28, and feeder canal basins. Additional equipment necessary for conducting flow-proportional TP sampling has been purchased and installed this year. Step 5 (shift monitoring burdens for direct structures) has been completed at the Wellington/ACME and North Springs Improvement District basins. The only other structures not owned or operated by the District are the Boynton

Farms structures. The District is continuing to monitor these structures to ensure collection of good quality data.

Steps 6 and 7 require that any structures that are upstream of the direct structures and have potential water quality concerns must be identified and any existing data characterized. Both of these steps have been completed in all basins, where applicable. The basins are at varying stages of steps 8, 9 and 10. These steps require monitoring of upstream structures, evaluating the data for upstream structures and taking remedial actions, and shifting the monitoring burdens for upstream structures, respectively. The District has executed cooperative/cost-share agreements with local governments for upstream water quality monitoring within the Wellington/ACME, North Springs Improvement District, C-11 west and North New River Canal basins. Additional agreements will be pursued within these and other basins as needed. District personnel are conducting additional upstream sampling within the C-111, C-11 West, North New River Canal, L-28 and feeder canal basins.

A summary of the vital statistics for each of the basins covered by the Regulatory Action Strategy appears in the District document *Everglades Stormwater Program Regulatory Action Strategy Status Report* and is repeated in **Table 8B-3**. The data in this table indicate size, TP concentrations and loads entering the EAA, cooperative agreements in place in each basin, and how each basin interfaces with the relevant portions of CERP.

**Table 8B-3.** Regulatory Action Strategy summary table

| Basin | Structures and Type* | County | Area (acres) | Average Annual TP Conc. (ppb)** | Average Annual Load (tons/year)** | Cooperative Agreements | CERP and Other Federal Projects |
|---|---|---|---|---|---|---|---|
| **Wellington/Acme Improvement District** | ACME1DS (pump 1), Type 3<br>G94D (pump 2), Type 1 | Palm Beach | 18,894 | 117 | 5.1 | WQ monitoring<br>WQ improvement plan | Acme Basin B OPE |
| **Boynton Farms** | Several Private Pumps<br>Types 3 & 4 | Palm Beach | 489 | 1,193 | N/A | None | Agricultural Reserve Reservoir |
| **North Springs Improvement District** | NSID1<br>Type 3 | Broward | 7,064 | 29 | 0.3 | WQ monitoring & improvement | Hillsboro Impoundment |
| **North New River Canal** | G-123<br>Type 1 | Broward | 17,904 | 16 | 0.6 | OPWCD WQ monitoring<br>PAID<br>WQ monitoring & improvement<br>BDDWQ monitoring & improvement<br>City of Sunrise WQ improvement plan | Divert Flows from WCA-2 to Central Lake Belt |
| **C-11 West** | S-9<br>Type 1 | Broward | 45,701 | 20 | 5.4 | SBDD Q monitoring & improvement<br>CBWCD WQ monitoring & improvement<br>ITDD (Weston) WQ monitoring & improvement | C-11 West Impoundment/Diversion<br>C-11 West Critical Project |
| **C-111** | S-332<br>S-175<br>S-18C<br>All Type 1 | Miami-Dade | 62,776 | 8 | 4.2 | USDA BMP Research Agreement | C-111 General Reevaluation Report<br>Mod Water Deliveries |

| Basin | Structures and Type* | County | Area (acres) | Average Annual TP Conc. (ppb)** | Average Annual Load (tons/year)** | Cooperative Agreements | CERP and Other Federal Projects |
|---|---|---|---|---|---|---|---|
| **Feeder Canal** | S-190<br>Type 1 | Hendry | 72,324 | 116 | 12.2 | Western Basins BMP Incentive Program | Tribal Critical Projects<br>CERP Components |
| **L-28** | S-140<br>Type 1 | Hendry, Collier & Broward | 71,790 | 89 | 7.6 | Western Basins BMP Incentive Program | Tribal Critical Projects<br>CERP Components |

* Structure Types: Type 1 – structures that are owned and operated by SFWMD; Type 2 – structures that are not owned but are operated by SFWMD; Type 3 – structures that are not owned or operated by SFWMD but are permitted by SFWMD; Type 4 – structures that are not owned or operated by SFWMD and not permitted by SFWMD.

** Loads and concentrations calculated as averages over the last eight water years

The cooperative agreements discussed above also include implementation of Best Management Practices (BMPs) and operational changes to improve water quality. A BMP incentive program that will provide funds for landowners who meet specific requirements to implement BMPs has been initiated within the L-28 and feeder canal basins. This program is being conducted in cooperation with the Hendry Soil and Water Conservation District and the Natural Resource Conservation Service (NRCS). Implementation of water quality improvement plans, including BMPs and operational modifications, has been partially initiated in the L-28, feeder canal, C-11 West, North Springs Improvement District, and Wellington/ACME basins (see the "Updates of Activities in ESP Basins" section of this chapter for more detailed information on each basin).

## Water Quality Improvement Plans

In fiscal year 2000 the District began a process that will lead to the development of basin-specific alternative analysis/conceptual designs for tributary basins discharging into the EPA. The activities associated with this effort include six non-ECP basins and all basins associated with the Everglades Construction Project. The goal of this effort is to provide alternative analyses and conceptual designs to identify the best combination of BMPs, optimized Stormwater Treatment Areas (STAs), and Advanced Treatment Technologies (ATTs) necessary to meet the final water quality and water quantity objectives for the benefit of the Everglades. Alternative analysis, the first part of this process, is nearing completion. Alternatives have been developed and analyzed for feasibility. Meetings with stakeholders are being conducted to determine preferred alternatives prior to completion of conceptual designs (refer to the "Achieving Long-term Water Quality Goals" section of this chapter for more information).

Agreements with local stakeholders (municipalities and water control districts) within the C-11 west, North New River canal, North Springs Improvement District, and the Wellington/ACME basins have been executed that require local stakeholders to develop and implement BMPs where feasible. The District has provided in-kind services, expertise and funding to aid these initiatives. Also, a BMP incentive program has been initiated within the L-28 and feeder canal basins that will provide funds for landowners who meet specific requirements to implement BMPs. This program is being conducted in cooperation with the Hendry Soil and Water Conservation District and the NRCS. Additional agreements and coordination with agencies and landowners in other basins are being pursued. Upstream water quality monitoring data being collected will help determine the locations for and types of BMPs that should be implemented.

The Comprehensive Everglades Restoration Plan (CERP) includes several components that will have a direct impact on ESP activities (see **Chapter 7**). ESP staff have coordinated and contributed to the Water Preserve Area (WPA) Feasibility Study (covers several non-ECP basins), the Wellington/ACME Basin B Project Delivery Team (PDT), and the C-111 north spreader canal PDT. Additional coordination will occur as planning activities for individual CERP components are initiated. In addition, ESP personnel are coordinating with ECP research staff on ATTs to determine their applicability in the non-ECP basins and the WPA components.

The District has entered into a cost-sharing agreement with the United States Department of Agriculture-Agricultural Research Service (USDA-ARS) to perform BMP research aimed at protecting groundwater and surface water from agricultural chemicals in southern Miami Dade County. The primary goal of this research is to determine pesticide and nutrient loading to groundwater from normal farming practices and evaluate the efficacy of summer cover crops as a BMP for vegetable crop production. This research is near completion, and the results and

recommendations will be disseminated to the southern Miami Dade County farm community through the University of Florida's Tropical Research and Education Center (UF-TREC).

## FINANCIAL ASSESSMENTS

A conceptual methodology for calculating a financial assessment based on the benefit each parcel might receive has been developed and is being reviewed. This methodology would require a higher assessment per acre from land uses that generate a larger loading of pollutants relative to other land uses within the drainage basin. The methodology would use Geographic Information Systems (GIS) to identify the size, land use, ownership, and existence of permitted treatment facilities for each parcel within a basin. GIS mapping in the Wellington/ACME Improvement District basin is near completion; additional mapping in the North Springs Improvement District, North New River canal and C-11 West basins is continuing. GIS mapping and a pilot test of the methodology have been completed in basin B of the Wellington/ACME basin. Some Everglades restoration activities do not have dedicated sources of revenue, so results of the pilot test will be used as part of a comprehensive review of possible funding sources for those activities. This review includes policy issues and decisions regarding possible revenue sources. It is unclear how, or even if, this financial assessment methodology will fit into these policy decisions. While these issues are being resolved, mapping activities and technical and policy review of the calculation methodology within the basins will continue.

### Public Outreach Initiatives

The public involvement campaign has continued to expand. The campaign includes Websites, BMP documents, workshops, and various activities in the C-11 west basin, which is the ESP pilot basin for public involvement activities. Public involvement activities are continuing in the C-11 west basin. The activities include a variety of strategies aimed at educating stakeholders and the public about implementing changes that will result in enhanced water quality and reduced phosphorus (P) content in stormwater discharges.

The District has been instrumental in forming the Freddy's Friends Club and the Teddy's Friends Club for students at Silver Ridge Elementary School and Cooper City Elementary School, respectively (Freddy the Alligator is the District's mascot; Teddy is the Central Broward Water Control District's mascot). These clubs provide students with educational activities related to water quality improvement and water conservation. In addition, various educational presentations related to the C-11 west canal and its water quality have reached approximately 2,000 local elementary school students.

The District continues to sponsor meetings with ESP basin stakeholders to discuss the EFA deadline for meeting the 2006 standard for phosphorus and to communicate the integrated nature of other District programs with the ESP and other agencies' programs.

An ESP Website has been completed and will be located on the District's Website. The ESP Website includes maps, publications, photos, project information, and basin program updates. An ESP summary document designed for lay readers and describing the program can be found in pdf format on the District Website at http://www.sfwmd.gov/org/reg/evg/espsum/espsum2000.pdf.

ESP staff have completed the Urban Stormwater Best Management Practices document, which discusses sources of pollutants, targets and quantifies pollutant types, discusses methods for selecting feasible BMPs and provides information on structural and nonstructural BMPs for

urban land uses. A copy in pdf format can be found on the District's Website at http://www.sfwmd.gov/org/reg/evg/bmp manual.pdf.

The *Turf & Landscape Best Management Practices Manual*, developed by a 36-member working group that includes landscaping interests, fertilizer industries, government agencies, colleges and universities, special interest groups, and environmental organizations, was posted on each work group member's Website. The agreed-upon messages in the manual will be used to develop retail displays, complimentary fliers and other promotional pieces. Group members have been soliciting speaking engagements to promote the manual throughout the basin and have promoted that effort in their newsletters and other publications. The manual is intended to serve as a guide for local governments seeking to improve water quality within their municipalities. A hard copy version of this manual will be available in fall 2002.

# PROGRAM MANAGEMENT AND IMPLEMENTATION

## UPDATES OF ACTIVITIES IN ESP BASINS

### Wellington/Acme Improvement District Basin

A water quality improvement plan was implemented through a cooperative agreement between Wellington and the South Florida Water Management District. The plan includes implementation of BMPs, operational changes in the local water management system, and development of several alternatives to resolve water quality concerns in the basin B area. As a result of this agreement, the Village of Wellington has created a BMP ordinance that addresses the storage, handling and transport of livestock waste, the proper use, storage and application of fertilizer, and irrigation practices. Wellington has also implemented several maintenance BMPs within its canal right-of-ways, including raised inlets, sediment sumps, sediment removal and canal vegetation harvesting. Additionally, upstream monitoring has identified "hotspots" within basin B. The District will be working with Wellington to develop remedial measures to address these hotspots.

The Project Delivery Team (PDT) for the Wellington/ACME basin B component of CERP has been initiated and is in the Project Implementation Report (PIR) development phase. This phase develops and selects alternatives and completes the federal NEPA process. The information provided in the Basin Specific Feasibility Study to Achieve Long Term Water Quality Goals will be used in the PIR phase to accelerate the technical review process. Both ESP and Wellington staff are members of the PDT.

ESP personnel have been coordinating with Surface Water Management staff to encourage additional water quality treatment and BMPs in new Environmental Resource Permit applications. The staffs have been successful in issuing permits that exceed the required water quality treatment criteria, including permits for innovative BMPs designed to reduce discharges of nutrients into the Wellington canal system.

In 2000, ESP staff coordinated with District research staff and the Village of Wellington to implement a chemical treatment and solids separation (CTSS) pilot study in basin B (located at ACME pump station 2 near G-94D). The pilot study trailer that was used is one of the same trailers that were used for the CTSS pilot study done in the Everglades Nutrient Removal (ENR) Project. This pilot study was conducted to determine the feasibility of chemical treatment of

stormwater in an urban basin. The study indicates that TP levels of 10 ppb or less can be achieved using this technology (Chapter 4). A new, larger-scale CTSS demonstration project is to be conducted in basin B in 2003. The project is designed to address large-scale design issues identified during the previous pilot study.

## Boynton Farms Basin

The water quality monitoring program in this basin is continuing. Although access limitations and other boundary issues still exist, surface water quality samples for most of the identified "into" structures have been obtained during times of flow. The results of these analyses can be found in the **Chapter 8B** appendices. Recently, the Williams Nursery pump on the north side of the Refuge headquarters property was voluntarily removed.

The Refuge headquarters property is owned and operated by the USFWS and is bordered by several farms immediately east of its boundary that discharge onto the property. The headquarters property is identified in the EFA as being within the boundary of the EPA but is east of the protective levee for WCA-1, has no connection to enable discharging westward to WCA-1, and stands alone as an isolated parcel. The Lake Worth Drainage District (LWDD) is continuing its efforts to provide sufficient capacity to allow all discharges from the remaining farms to flow east. This would eliminate the need for these farms to pump west into the Refuge headquarters property. The District will continue to offer technical support to help landowners comply with EFA requirements.

## North Springs Improvement District Basin

The existing cooperative agreement between the District and the NSID continues to be effective in meeting ESP goals in this basin. The flow-proportional autosampler, headwater pressure sensor and calibrated flow-monitoring equipment with telemetry that monitor the NSID's pump station discharges into WCA-2A are functioning as designed. The surface water quality monitoring program is continuing at NSID pump station 1 during times of flow into Water Conservation Area 2A. This year the NSID has also obtained a significant number of upstream water quality monitoring samples taken during times of flow. The NSID pump station 1 data and the upstream data can be found in **Table 8B-1** and in the **Chapter 8B** appendices.

The upstream data indicate areas where sources of P are potentially higher and can therefore identify "hot spots" where both public outreach and implementation of stormwater BMPs will be most effective. The agricultural lands in the north sub-basin showed the highest concentrations of TP. The owner of these properties intends to develop them for residential and golf course use, which should result in an improvement in water quality based on the lower levels of P found in the existing residential and golf course areas and the additional water management areas being proposed.

## North New River Canal Basin

Pursuant to steps 9 and 10 of the RAS, the District has executed three additional cost share agreements within this basin. The agreement with the Plantation Acres Improvement District includes a monitoring program and determination and implementation of BMPs. The city of Sunrise has one outfall to the North New River canal that has been monitored by the District for the last 18 months; therefore, the city's agreement concentrates on determining hotspots and implementing BMPs, with an emphasis on public education. There is also an agreement that

includes a sampling program and BMPs for the Bonaventure sub-basin within the city of Weston. The Old Plantation Water Control District will be enhancing its original agreement, signed in September 2001, to include determination and implementation of appropriate BMPs and public education initiatives. The arithmetic average for TP at the G-123 pump station remains below 18ppb.

## C-11 West Basin

A cooperative/cost share agreement between the District and the Indian Trace Development District (within the city of Weston) was executed on May 30, 2002 for implementation of a water quality monitoring and improvement program. Identification of hot spots and implementation of BMPs will be determined from the collected data. The District has continued to work closely with the Central Broward Water Control District and the South Broward Drainage District to implement cooperative/cost-share water quality monitoring and improvement agreements within the C-11 west basin. Results from upstream monitoring reveal TP concentrations generally ranging from 7 ppb to 50 ppb. Concentrations higher than 50 ppb are primarily associated with areas with predominantly agricultural and/or nursery land uses.

District research staff have implemented a chemical treatment and solids separation (CTSS) pilot study within the C-11 west basin (located near the S-9 pump station). The pilot study trailer that was used is one of the same trailers that was used for the CTSS pilot study done in the ENR Project and the Wellington/ACME Improvement District basin. This pilot study was conducted to determine the feasibility of chemical treatment within the C-11 west basin. The study indicates TP levels of 10 ppb or less can be achieved using this technology.

The Western C-11 Basin Critical Restoration Project was authorized in the Water Resource Development Act as "a water quality improvement project essential to Everglades restoration." Accordingly, the project has been identified as an important part of the District's overall strategy for achieving and maintaining water quality standards for "non-ECP" structures as required by the Everglades Forever Act (Chapter 373.4592(9)(k)(1)(a), Florida Statutes). Completed in late 2002, pumping station S-9A, phase I of the critical restoration project, was a seepage-control structure that replaced the S-9 pump station's role of backpumping seepage losses from WCA-3A. S-9A, a four-bay pump station, has two 175-cfs diesel engine-driven pumps and two 75-cfs electric motor-driven pumps. The smaller pumps will operate continuously and will maintain C-11 west canal elevations between 3.2 and 3.5 ft NGVD (National Geodetic Vertical Datum). This is a much narrower range of variation than that maintained by the larger S-9 pumps, which now operate during both storm and non-storm conditions. The operation of these smaller pumps will also reduce bottom scour and drawdown experienced in C-11 that is caused by the operation of the larger S-9 pumps. Since bottom scour and the large amount of drawdown caused by the operation of the large pumps result in re-suspension of suspended material that often contains significant quantities of P, reduction of these factors should reduce P levels entering the EPA.

Under the project cooperative agreement between the District and the U.S. Army Corps of Engineers (USACE), the District has agreed to accept responsibility for operation of the facility and acquisition of all necessary permits required for operational authorization. Accordingly, on August 31, 2001 the FDEP issued to the District a modification of the existing non-ECP permit (FDEP File Number 06,502590709) for operational authorization of the S-9A pump station. An autosampler has been installed at the new S-9A pump station and its results will be included in future Everglades Consolidated Reports.

Phase II of the Western C-11 Basin Critical Restoration Project is a two-gated spillway/divide structure (S-381) currently scheduled for completion in 2003. The S-381 structure will act as a canal divide to separate the urban area to the east of the structure from the more natural areas to the west of the structure. When both phases of the critical restoration are completed, cleaner seepage water will be returned at S-9A into WCA-3A at the same rate that it enters the 7,900-ft reach of the C-11 canal from the S-9A to the S-381 gated structure.

The Public Outreach Initiatives section of this chapter discusses several outreach activities being conducted within the basin to encourage residents to reduce pollutants entering the C-11 west canal.

## C-111 Basin

A monitoring program is currently being implemented in the C-111 basin to meet the requirements of the biological opinion issued by the USFWS in 1999 to protect the Cape Sable seaside sparrow (CSSS). The monitoring program and emergency operations to protect the endangered CSSS are being spearheaded by the USACE. The Interim Operating Plan (IOP) has been completed and outlines the operations pursuant to the water management targets in the biological opinion.

An autosampler has been installed at the S-178 structure. This structure is an upstream structure within the C-111 basin and has been identified as needing improved water quality data to accurately characterize water quality within this sub-basin. As is discussed in the Water Quality Improvement Plans section of this chapter, research in this area on pesticide and nutrient transport and groundcover BMPs continues.

## L-28 Basin

ESP staff continue to work with the Seminole Indian Tribe's Water Resource Management Department on a joint project with the District's EMA Department and the USGS. The project included the installation of Ultrasonic Velocity Meters (UVMs) to estimate flow, autosamplers to collect composite water quality, and grab samples at select locations based on watershed boundaries, land use, and discharge quantities. The automatic sampler currently onsite at the S-140 structure is scheduled to be converted from time to flow-proportional sampling within the next year. A canal that will convey the Tribe's established entitlement of water (47,000 ac-ft per year) via the recently constructed S-409 pump station is scheduled to be completed by January 2003.

The Natural Resource Conservation Service (NRCS) has assisted with the completion of conservation plans for the reservations of both the Seminole Tribe of Florida and the Miccosukee Tribe of Indians of Florida. Both reservations are located in the L-28 basin. Both tribes have voluntarily completed the NRCS conservation plans and implementation of on-farm BMPs. ESP staff will continue to include the development and implementation of BMPs for row crops, citrus, beef cattle and other agricultural activities in the basin. Upstream water quality monitoring will gauge the effectiveness of these BMPs and indicate where farm conservation plans might need adjustment.

To maximize basin participation and provide incentives to improve water quality, the District has proposed a volunteer program for the three western basins (feeder canal, L-28 and C-139). This program is funded with $100,000 in FY02; additional requests of $100,000 each year for the next two years will provide total funding of $300,000. Future funding is dependent on budget

approval by the District's governing board. The program proposes to conduct informational workshops, informal site visits and the cost sharing of BMPs while coordinating closely with landowners to prepare BMP Plans for implementation. The District has been granted the option to enter into a cooperative agreement with a state or federal agency to disburse funds to landowners upon their implementation of recommended BMP Plans. The District anticipates that this program will result in an immediate reduction in nutrient loads entering the EPA. The District has entered into a cooperative agreement with the Hendry Soil and Water Conservation District (HSWCD) to administer the volunteer incentive program.

### Feeder Canal Basin

ESP staff continue to work with the Seminole Tribe's Water Resource Management Department on a joint project with the District's EMA Department and the USGS. This project includes the installation of Ultrasonic Velocity Meters (UVMs) to estimate flow, autosamplers to collect composite water quality, and grab samples at select locations based on watershed boundaries, land use, and discharge quantities. The automatic sampler currently onsite at the S-190 structure is scheduled to be converted from time sampling to flow-proportional sampling within the coming year. The Seminole Tribe's established entitlement of water (47,000 ac-ft per year) is to be conveyed via the recently constructed S-409 pump station. The operation of the S-190 structure, which is the main discharge location for the feeder canal basin, will be coordinated with flows from the entitlement waters.

The District, in partnership with the NRCS and other government agencies, shares information and provides support to local landowners in developing voluntary BMPs. Workshops that provide education about BMPs, available landowner assistance programs, and guidance in developing on-farm conservation plans is expected to be ongoing. The District will continue to evaluate water quality within this basin by initiating a sampling program for upstream discharges to the S-190. The objective of these data will be to either confirm the level of success from present BMPs or highlight the need for additional BMPs.

## FINDINGS

That portion of the District's water quality monitoring program that has been implemented as a result of the EFA and the non-ECP permit indicates that the quality of water discharging into the EPA is generally acceptable, with the exception of P concentrations discharging from the Wellington/ACME, feeder canal and L-28 basins, which have flow-weighted mean TP concentrations above 48 ppb. Flow-weighted mean TP concentrations were 19 ppb for the C-11 west basin and 16 to 26 ppb for the North New River and North Springs Improvement District. With a potential P numerical standard of 10 ppb, these basins will be required to implement appropriate water quality improvement measures. To better characterize the quality of water discharging into the EPA, the District has implemented a plan to install flow-proportional automated samplers at all "into" structures.

After initial reviews of water quality monitoring programs upstream of the direct "into" structures, it is apparently necessary to revise existing programs and implement new programs where none exist to better characterize water quality within the basins. Revised monitoring programs have been implemented within the Wellington/ACME, C-11 west, North New River Canal and North Springs Improvement District basins. Recommendations for implementation of new water quality programs, and revisions to existing programs are also being developed in other basins. Concurrently, the District will continue to monitor water quality in accordance with the

non-ECP permit to measure progress toward achieving compliance with state water quality standards.

Extensive coordination with local governments, 298 special districts, the Miccosukee and Seminole Indian tribes, and other state and federal agencies will be essential for achieving the goals and requirements of the Everglades Forever Act, the non-ECP permit and the future Long Term Compliance Permit. Consequently, the District has conducted several meetings to foster coordination within the basins. The District has also executed several cooperative/cost-share agreements with local governments to implement water quality improvement plans involving BMPs and operational modifications. The public-involvement element of the ESP will provide additional avenues of participation for environmental groups, agricultural and urban communities, locally impacted industries and the general public. Coordination with CERP, the Water Preserve Area Feasibility Study, ongoing critical projects within non-ECP basins, the Basin-Specific Feasibility Study (discussed in **Chapter 8A**), and local governments is also facilitating the development of long-term solutions for achieving statewide water quality standards.

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