Chapter 3: Phosphorus Controls for the Basins Tributary to the Everglades Protection Area

Carlos Adorisio, Carmela Bedregal, Samira Daroub[1],
Paul McGinnes, Cordella Miessau, Douglas Pescatore,
Barbara Powell, Pamela Sievers, Stuart Van Horn,
Jose Vega and Shi Kui Xue

SUMMARY

This chapter provides an update on the progress of the Everglades Program and permits, as mandated by the Everglades Forever Act (EFA), for controlling phosphorus in discharges tributary to the Everglades Protection Area (EPA). The South Florida Water Management District (District or SFWMD) is responsible for specific compliance requirements stipulated in permits issued by the Florida Department of Environmental Protection (FDEP), which are mechanisms for assuring that the District complies with the EFA. The District's permits associated with this program are the Everglades Construction Project (ECP) and non-Everglades Construction Project (non-ECP) permits. Each permit includes discharge basins with both urban and agricultural land uses, and adopts a comprehensive approach of source control including regulatory, voluntary, and educational programs.

The ECP permit requires the District to construct, maintain, and operate the ECP in the Everglades Agricultural Area (EAA) and the C-139 basins, the largest tributary sources to the EPA, and to provide reasonable assurance that a phosphorus source control program using Best Management Practices (BMPs) has been implemented in those basins prior to discharging to the Stormwater Treatment Areas (STAs). This BMP program is known as the Everglades Regulatory Program, and is detailed in *Section I* of this chapter.

The EAA basin has been in compliance with the Everglades Regulatory Program of BMPs for nine years since the first compliance year, Water Year 1996 (WY1996) (May 1, 1995 through April 30, 1996). In order to carry out these activities, the EFA mandated the creation of an Everglades Program including a regulatory component to oversee implementation of farm-level BMPs. The EAA basin is required to reduce total phosphorus (TP) loads by 25 percent when compared to the pre-BMP base period. Over the nine years since the program's initiation, the EAA's annual percentage load reduction average is greater than 50 percent.

[1] University of Florida Institute of Food and Agricultural Sciences, Everglades Research and Education Center, Belle Glade, FL.

WY2003 was the first compliance year in which the BMP program was implemented in the C-139 basin. Unlike the EAA basin's goal of achieving a 25-percent reduction of TP loads from historic baseline levels, the goal of the C-139 basin is to maintain TP loads at or below historic baseline levels. The initial compliance determination period for the C-139 basin was WY2003. The basin was determined to be out of compliance for WY2003 and WY2004. Because of the time sequence of regulatory requirements in this basin, and the fact that it is a relatively young program, the impact of BMPs on water quality is not expected to be realized immediately. Additionally, observations made in the basin indicate that the area appears to be in a transition period of changing land uses that are resulting in increasing trends in runoff and phosphorus concentration. The action plan for the C-139 basin is to (1) create funding programs that will accelerate the implementation of BMPs on individual farms, (2) provide training to landowners on effective implementation of BMPs, and (3) utilize BMP demonstration projects at the farm and regional levels to ensure a holistic approach to improving water quality.

In addition to the Everglades Regulatory Program, the EFA and Chapter 40E-63, Florida Administrative Code, require that EAA landowners, through the Everglades Agricultural Area - Everglades Protection District (EAA-EPD), sponsor a program of BMP research, testing, and implementation to monitor the efficacy of established BMPs. This has been accomplished through the University of Florida Institute of Food and Agricultural Sciences (UF/IFAS) BMP farm-scale study in the EAA, which is sponsored by the EAA-EPD and the FDEP, and is summarized in this chapter. The EFA further mandates that specific water control districts located in the EAA that previously discharged to Lake Okeechobee divert their discharges south through the EAA, and become part of the Everglades Regulatory Program and institute BMPs, which are further discussed in this chapter. The diversions are part of the ECP, and are further discussed in Chapter 4 of the 2005 SFER – Volume I.

In addition to the ECP permit, the non-ECP permit was issued to the District by the FDEP, as mandated by the EFA, for the operation and maintenance of discharge structures within the control of the District, and that discharge into, within, or from the EPA but are not included in the ECP. There are eight non-ECP basins discharging to the EPA and regulated under the non-ECP permit including ACME Improvement District, North Springs Improvement District, C-11 West, North New River, Feeder Canal, L-28, Boynton Farms, and C-111 basins. The affected entities within these basins are primarily local governments and municipalities, special drainage districts, the Seminole Indian Tribe of Florida and the Miccosukee Tribe of Indians of Florida, and federal agencies.

The non-ECP permit, as outlined by the EFA, requires schedules and strategies for achieving and maintaining water quality standards. This requirement involves evaluating existing programs, permits, and water quality data, acquiring lands and constructing and operating water treatment facilities, if appropriate, together with developing funding mechanisms and a regulatory program designed to improve water quality. These schedules, strategies, monitoring plans, and funding mechanisms are discussed in this chapter and described in detail in the District's Regulatory Action Strategies (RAS) Report referenced by the permit and implemented through the District's program, known as the Everglades Stormwater Program (ESP). Land use in these basins is typically urban, with the exception of Feeder Canal, L-28, and Boynton Farms, which are agricultural areas. During WY2004, these agricultural areas contributed approximately 66 percent of the total load from the non-ECP basins.

The RAS is basically a 10-step plan for providing a thorough assessment of each basin using the available information and data to develop scientifically sound water quality improvement strategies. The initial assessment steps of data collection and evaluation, followed by development of action plans for each basin, have been completed. Action plans are in place and

include a combination of voluntary BMPs, requirement and/or modification of permits to include water quality criteria, construction projects, cooperative agreements, basin-specific regulatory programs, and public education. The action plan for each non-ECP basin is detailed in *Section II* of this chapter.

In addition to the source control programs implemented through the ECP and non-ECP permits, the recently amended EFA (2003) references the Long-Term Plan for Achieving Water Quality Goals in the Everglades Protection Area (Long-Term Plan), which identifies projects for achieving long-term water quality standards in the EPA. The Long-Term Plan projects for the ECP and non-ECP basins identify and implement incremental optimization measures for phosphorus reduction, including improvements, where practicable, in urban and agricultural BMPs and integration with congressionally authorized components of the Comprehensive Everglades Restoration Plan (CERP) and/or other federal projects. The Long-Term Plan also includes cost estimates, funding mechanisms, and implementation schedules of the proposed water quality improvement plan. The Everglades Regulatory Program and ESP staff also contributes to the implementation of certain ECP and non-ECP components of the Long-Term Plan. All Long-Term Plan projects described for the ECP and non-ECP basins have been initiated, and are on schedule and within proposed budgets.

The non-ECP permit requires that general water quality be monitored for all discharges covered by the permit in addition to phosphorus, the parameter of primary concern. An evaluation of the District's continued water quality monitoring program for the non-ECP basins indicates that the quality of water discharging into the EPA is generally acceptable. However, there are some exceptions involving phosphorus, dissolved oxygen, and occasional excursions from standards for pH and specific conductance. Unlike the ECP basins that are required to decrease TP levels in discharges based on historic loads, there is no specific phosphorus requirement established at the point of discharge for the non-ECP basins. It is anticipated that the implementation of the water quality improvement plans, as described in the Long-Term Plan, for the non-ECP basins will significantly contribute to achieving long-term water quality standards in the EPA. Water quality data are tracked for increasing and decreasing trends, so that the action plan may be modified as necessary through an adaptive management process to ensure optimization measures for TP reduction.

Water quality data for TP collected during WY2004 for each basin represented in the ECP and non-ECP permits are summarized in **Table 3-1**. Except for occasional bypass events occurring during periods of unusually high runoff, the basins designated as ECP do not discharge directly to the EPA, but discharge to the STAs for further treatment. TP loads and concentrations from the non-ECP basins are defined as those discharged directly to the EPA through structures that are regulated by the non-ECP permit.

Table 3-1. Summary of Everglades Construction Project and non-Everglades Construction Project (ECP and non-ECP) basin discharge total phosphorus (TP) concentrations and loads for Water Year 2004 (WY2004).

Basin[1]	ECP or Non-ECP	Primary Land Use	TP Concentration (flow-weighted mean, ppb)	TP Load (metric tons)
Everglades Agricultural Area (EAA)	ECP	Agricultural	69	82.3
C-139	ECP	Agricultural	274	69.0
ACME Basin B	Non-ECP	Urban	89	2.2
North Springs Improvement District (NSID)	Non-ECP	Urban	(no flow)[2]	(no flow)[2]
North New River	Non-ECP	Urban	16	.05
C-11 West	Non-ECP	Urban	16	5.1
C-111	Non-ECP	Urban	9	1.8
L-28	Non-ECP	Agricultural	42	7
Feeder Canal	Non-ECP	Agricultural	99	14.4
Boynton Farms	Non-ECP	Agricultural	(n/a)[3]	(n/a)[3]

[1] ECP basin discharges receive further treatment downstream through the STAs prior to discharge to the EPA.

[2] There were no discharges from the NSID basin to the EPA during WY2004.

[3] There is no instrumentation in place for flow monitoring from this area.

An overall evaluation of the Everglades Program indicates that it is successfully reducing phosphorus at its sources, although there is much that remains to be done. The program in the EAA basin has reduced the amount of phosphorus by more than 50 percent over historical levels since the implementation of BMPs in the basin. Future directions in the EAA basin require more research into TP reduction mechanisms, and additional implementation of the applicable portions of the Long-Term Plan in the basin. The BMP program in the C-139 basin has just begun and has not yet resulted in a reduction of TP loads from this basin. Future directions for the C-139 basin require implementation of additional BMPs to bring the basin into compliance, and may require additional rulemaking in the basin. The ESP has been successfully implemented in the non-ECP basins through application of the RAS. Future directions in the basins differ on a basin-by-basin basis, but include effective implementation of additional BMPs, as applicable, with capital improvement projects and land acquisitions in accordance with the Long-Term Plan.

SECTION I: EVERGLADES REGULATORY PROGRAM – ECP BASINS

OVERVIEW

The South Florida Water Management District (District or SFWMD) is responsible for carrying out the programs mandated by the Everglades Forever Act (EFA) through compliance requirements stipulated in permits issued by the Florida Department of Environmental Protection (FDEP). The permits, which are currently issued for Stormwater Treatment Areas 1 West, 2, 3/4, 5, and 6 (STA-1W, 2, 3/ 4, 5, and 6), are collectively referred to as the "ECP permit." The ECP permit requires the District to construct, maintain, and operate the ECP in the Everglades Agricultural Area (EAA) and C-139 basins in accordance with the EFA. Aside from the requirements related to the STAs (discussed in Chapter 4 of the *2005 South Florida Environmental Report – Volume I*), the ECP permit requires the District to provide reasonable assurance that a Best Management Practice (BMP) program in accordance with Rule 40E-63, Florida Administrative Code (F.A.C.), is implemented in areas discharging to the STAs. The tributaries to the ECP and their associated STAs are summarized in **Table 3-2**[2]. The permit also requires that an annual report describing the Everglades Program performance is submitted to the FDEP for review, and allows for it to be consolidated into the Everglades Consolidated Report, now known as the *South Florida Environmental Report* (SFER).

The EAA and the C-139 basins, referred to as the "ECP basins," are the largest tributary sources to the Everglades Protection Area (EPA). Agriculture is the predominant land use in both the EAA and the C-139 basins. The EAA basin covers approximately 500,000 acres located south of Lake Okeechobee within eastern Hendry and western Palm Beach counties, an area of approximately 1,122 square miles of highly productive agricultural land comprised of rich organic peat or muck soils. The area is considered to be one of Florida's most important agricultural regions, with approximately 77 percent of the EAA devoted to agricultural production. The major crops in the EAA basin include sugar cane, vegetables, and sod, with secondary crops in rice and citrus. The C-139 basin covers approximately 170,000 acres located southwest of Lake Okeechobee entirely within eastern Hendry County west of the EAA basin.

Other surface water tributary sources to the ECP (STA inflows) include diversions of EFA-specified Chapter 298, Florida Statutes (F.S.); designated water control district (298 District) flows from Lake Okeechobee including the agricultural lease 3420 (the 715 Farms or Closter Farms); and normal environmental, water supply, and regulatory releases from Lake Okeechobee. These areas are depicted in **Figure 3-1**. To accurately assess the performance of the phosphorus reduction efforts and compliance in the EAA basin, the District measures flows and TP concentrations at each of the structures entering and leaving the EAA. From these values, TP loads are calculated which are then used in the model written into the rule that determines basin performance relative to the base period. Summaries of the TP flows and loads through each structure are presented in **Table 3-3**. While these data are used in the model, they are not used to determine a phosphorus mass balance for the EAA.

[2] Based on information provided in the Long-Term Plan (October 27, 2003) and the Everglades Protection Project Conceptual Design document (February 15, 1994).

Table 3-2. Basins tributary to the ECP and their associated Stormwater Treatment Areas (STAs).

EFA ECP Basins	Chapter 40E-63, F.A.C., Hydrologic Sub-basins	Receiving STA
EAA		
	S-5A	STA-1W, STA-1E[1,2]
	S-6	STA-2
	S-7/S-2	STA-3/4[4]
	S-8/S-3	STA-3/4[4], STA-6[1]
	298 District Diversion Projects	
	East Beach Water Control District	STA-1W[3], STA-1E[2]
	East Shore Water Control District	STA-2
	Closter Farms	STA-2
	South Shore Drainage District	STA-3/4[4]
	South Florida Conservancy District	STA-3/4[4]
C-139		STA-5, STA-3/4, STA-6[1]

[1] Proposed configuration. This STA is not operational yet.

[2] Under construction by the U.S. Army Corps of Engineers, STA-1E is planned to receive a portion of the flows coming from the S-5A basin. The treated effluent will be diverted away from the EPA and into the C-51 canal.

[3] Primarily routed to STA-1W.

[4] With the completion of STA-3/4, all flow leaving the EAA will discharge to an STA prior to entering the EPA under normal operating conditions.

Table 3-3. Summary of Everglades Agricultural Area (EAA) basin TP calculations.

EAA Related Loads by Structure
Water Year 2004

This table represents the flows and loads at each structure leaving and entering the EAA. It does not attempt to make a determination as to where the loads originate.

EAA to Lake

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
S3	0.09	0.26	282
S2	0.05	0.21	200
S352	0	0.00	N/A
Total	**0.14**	**0.47**	246

Lake to EAA

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
S354 (S3)	12.91	105.84	99
S351 (S2)	21.07	179.32	95
S352	21.18	87.74	195
Total	**55.15**	**372.90**	120

EAA to WCAs

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
S8	30.86	350.17	71.32
G404	3.74	72.15	41.92
G357	0.32	0.98	26.09
S150	0.45	10.27	35.79
S7	8.58	156.16	44.46
Total	**43.95**	**589.74**	60

WCAs to EAA

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
S8	0.00	0.02	21.03
G404	0.00	0.00	N/A
G357	0.00	0.00	N/A
S150	0	0.00	N/A
S7	0.08	2.01	32.82
Total	**0.08**	**2.03**	33

EAA to STA1W Distribution Works

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
S5A	**52.90**	**314.92**	136

C-51 to EAA

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
S5AW	**0.00**	**0.00**	N/A

EAA to STA2

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
S6	23.77	245.53	78.35
G328	0.50	11.41	35.25
Total	**24.27**	**256.94**	77

STA2 to EAA

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
S6	0.00	0.00	N/A
G328	0.00	0.00	N/A
Total	**0.00**	**0.00**	N/A

EAA to STA6

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
G600	**3.43**	**52.68**	53

STA6 to EAA

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
G600	**0.00**	**0.00**	N/A

EAA to STA5

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
G344 (a,b,c,d)	0.000	0.00	N/A
G349B	0.041	0.70	47.06
G350B	0.046	0.80	46.36
G507	0.170	3.07	44.99
Total	**0.257**	**4.564**	46

STA5 to EAA

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
G344 (a,b,c,d)	16.42	136.47	97.36
G349B	0.00	0.00	N/A
G350B	0.00	0.00	N/A
Total	**16.42**	**136.47**	98

EAA to Rotenberger

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
G410	0.93	16.85	44.72
G402(a,b,c,d)	0.00	0.00	N/A
Total	**0.93**	**16.85**	45

Rotenberger to EAA

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
G410	0.00	0.00	N/A
G402(a,b,c,d)	0.03	0.35	63.77
Total	**0.03**	**0.35**	64

EAA to Holeyland

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
G200	**1.90**	**20.96**	73

C-139 to EAA

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
G136	**3.34**	**13.22**	205

Holeyland to EAA

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
G204	0.00	0.00	N/A
G205	0.00	0.00	N/A
G206	0.00	0.00	N/A
Total	**0.00**	**0.00**	N/A

298 Districts to EAA

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)
EBPS	7.04	19.09	298.63
ESPS	2.98	29.81	80.95
Total	**10.03**	**48.90**	165.92

Note: The values shown are annual summaries of flows and loads of the monitoring data for each structure. The flows and loads are not used to determine a mass balance for the basin and are not used for compliance determination. In addition, due to construction activities directly involving STA-3/4, related changes in flow paths and delays in availability of operational and water quality data, STA-3/4 has not been included in the compliance calculations of TP loads and concentrations for the EAA.

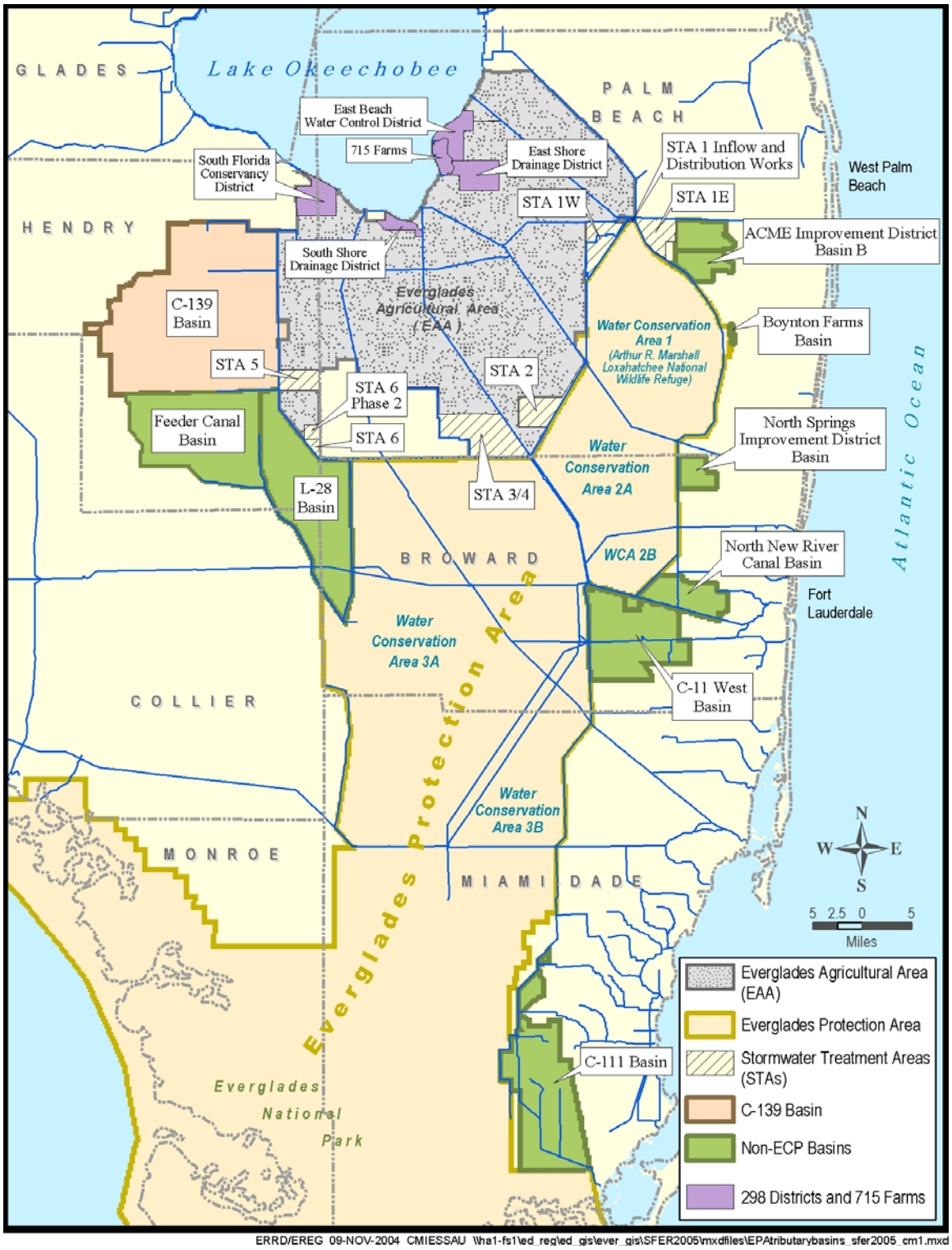

Figure 3-1. Basins tributary to the Everglades Protection Area (EPA).

The 1994 EFA defined that STAs and BMP implementation for the ECP basins are the best available technology for achieving interim phosphorus water quality goals for the EPA. In order to carry out these activities, the EFA mandated the creation of an Everglades Program, including a regulatory component to oversee implementation of BMPs at the farm level. The District promulgated Chapter 40E-63, F.A.C. ("Rule 40E-63"), which details the scope of the Everglades Regulatory Program for the EAA and the C-139 basins. In this rule, the District describes the implementation procedures and compliance measures for the BMP program mandated by the Florida Legislature in the EFA including (1) enforcing implementation of BMPs, (2) conducting a water quality monitoring program to evaluate the effectiveness of BMPs, (3) tracking area-wide phosphorus loads, and (4) developing a mandatory BMP research program for phosphorus and other water quality parameters of concern.

The EFA also requires the District to oversee the implementation of BMPs in the 298 District diversion projects [Subparagraph 373.4592(4)(f)(2), Florida Statutes (F.S)]. The 298 Districts are areas within the EFA-defined EAA boundaries that have historically discharged to Lake Okeechobee, and that are regulated under Chapter 40E-61, F.A.C. The EFA requires that these areas divert 80 percent of their flow and load to the EAA once the construction of the receiving STA is complete. As each 298 District diverts its discharges to the EPA, it must obtain a Rule 40E-63 permit for implementation of approved BMPs and discharge monitoring plans similar to those required from EAA dischargers. In addition, diversion projects are required to submit to the District flow and load data for TP from Lake Okeechobee and EAA discharge structures to verify that the 80-percent diversion requirements are met on an annual basis. However, 40E-61 permits and other Lake Okeechobee requirements continue to apply, as these areas maintain their ability to discharge north. Once all diversion projects are complete, flows from approximately 28,500 acres that previously discharged only to Lake Okeechobee will combine with flows from the EAA (500,000 acres), and will be routed to the ECP. Diversion of Closter Farm, East Beach Water Control District (EBWCD), and East Shore Water Control District (ESWCD) began in 2002. The Closter Farms diversion actually flows into the East Shore Water Control District and subsequently into the EAA. The flows and loads entering the EAA from EBWCD and ESWCD are indicated along with other inflows and outflows from the EAA in **Table 3-3**, designated as the EBPS (for EBWCD) and the ESPS (for ESWCD). The South Shore Water Control District and South Florida Conservancy District will initiate diversion of their flows and loads in 2004.

In addition to the ECP permit, the recently amended EFA (2003) references the Long-Term Plan for Achieving Water Quality Goals in the Everglades Protection Area (Long-Term Plan). The Long-Term Plan identifies projects in the ECP (as well as other areas discharging into the EPA) that must be completed prior to December 31, 2006 for achieving long-term water quality standards (see Chapter 8 of the 2005 SFER – Volume I). The Long-Term Plan is developed in full recognition of the substantive remaining scientific uncertainties surrounding the objective to achieve compliance with the TP criterion, and it is predicated upon maximizing water quality improvements through an adaptive implementation process. The planning goal during the initial phase of the Long-Term Plan (2003–2016 inclusive) is that permits issued by the FDEP to meet water quality standards in the EPA shall be based on Best Available Phosphorus Reduction Technology (BAPRT). BAPRT consists of the combination of BMPs and STAs, which includes a continuing research and monitoring program to reduce outflow TP concentrations. The BMP programs identified in the ECP permit, as well as for the non-ECP permit areas (as described in *Section II* of this chapter) and the Long-Term Plan identifies and implements incremental optimization measures for phosphorus reduction including improvements, where practicable, in urban and agricultural BMPs, and integration with congressionally authorized components of the Comprehensive Everglades Restoration Plan (CERP).

The EFA-mandated ECP and Long-Term Plan projects are primarily financed through the Everglades Trust Fund. The fund's primary sources include the Everglades agricultural privilege tax, the C-139 agricultural privilege tax, *ad valorem* revenues (the "1/10 mill"), and the Alligator Alley toll revenues. Among the available funding sources, the agricultural privilege tax represents the direct contribution from permittees in the EAA and C-139 basins. The tax is paid by landowners and operators of all real estate property that is zoned or used for agricultural purposes including state lands. The current annual tax rate applicable for the EAA is $31 per acre except for vegetable acreage, which is taxed at the minimum rate of $24.89 per acre. The EFA provides for an incentive credit to encourage the performance of BMPs in the EAA. The credit reduces the applicable rate to a minimum of $24.89 per acre based on the phosphorus loading reductions achieved in excess of 25 percent. Since the program's inception, EAA landowners have qualified for the minimum tax rate because phosphorus reductions have exceeded the mandated amounts. The EAA agricultural privilege tax credits are detailed in Appendix 3-1, Table 3.

The annual tax rate per acre currently applicable to the C-139 basin is $4.30 per acre. This rate does not provide for a tax incentive, and applies to all crops. Originally, the EFA defined a variable tax rate to be computed by dividing $654,656 by the number of acres included on the C-139 agricultural privilege tax roll for each year. In 2003, the EFA was modified to fix the rate at $4.30 per acre by basing the calculation on the number of agricultural acres listed in the 2001 tax roll only. The modification would prevent tax increases on agricultural taxpayers as land use changes occur, such as large tracts of land in the C-139 basin being taken out of agricultural production and restored to wildlife habitat.

In accordance with the EFA, permittees (landowners and/or operators) within the EAA and C-139 basins who are in full compliance with their Everglades Program permits are not required to implement additional water quality measures prior to December 31, 2006. The EFA also establishes that the Everglades Program constitutes the foundation for building a long-term program to ultimately achieve restoration and protection of the EPA. In implementing the program, the Florida Legislature found it important to recognize in the EFA that the EAA and adjacent areas provide a base for an agricultural industry, which in turn provides important products, jobs, and income both regionally and nationally. As stated in the EFA [Paragraph 373.4592(1)(e), F.S.], "it is the intent of the legislature to preserve natural values in the Everglades while maintaining the quality of life for all residents of South Florida, including those in agriculture, and to minimize the impact on South Florida jobs, including agricultural, tourism, and related jobs, all of which contribute to a robust economy."

EVERGLADES REGULATORY PROGRAM: EAA BASIN

The ECP permits require the District to continue to implement the Everglades BMP Regulatory Program for the EAA in accordance with Rule 40E-63. The rule states that uses of Everglades Works of the District (EWOD) within the EAA basins require a permit. Rule 40E-63 permits approve a BMP plan and a water quality monitoring plan for each sub-basin or farm, as applicable. Rule 40E-63 defines the EAA regulated area as multiple hydrologic drainage basins that remain static (e.g., S-2, S-3, S-5A, S-6, S-7, S-8).

Currently, there are 33 EAA basin EWOD permits, including approximately 205 sub-basins and 286 privately owned water control structures discharging into the District canals in the EAA, and encompassing an area of approximately 500,000 acres. Most of the sub-basins have muck soils and a highly managed drainage system using pumps. The areas represented by single permits vary substantially between 120 and 92,000 acres. The total permitted acreage varies from year to year as areas are converted from agricultural production to STAs, thereby removing that acreage from the permit.

EAA Basin Best Management Practice Plans

Each EWOD permit approves an onsite implementation plan for BMPs (BMP plan) in accordance with the EFA [Subparagraph 373.4592(4)(f)(2)(c), F.S.], which states that permits issued under the Everglades Regulatory Program require BMPs for varying crops and soil types. The BMP plan includes operational programs or physical enhancements designed to reduce phosphorus levels in water discharged to the EWOD. The District is responsible for ensuring that a base level of BMPs is established for each permit area, and that BMP plans between different permittees are consistent and comparable. To accomplish this task, a system of BMP "equivalents" was developed by assigning points to BMPs within the basic categories of water management practices, nutrient management practices, control of sediment and particulate matter, and pasture management. The BMP points system was originally based on the review of reports and publications produced by UF/IFAS, on the best professional judgment of District staff, and on extensive cooperative workshops conducted among affected landowners, consultants, and the general public. These "equivalents" do not assess BMP effectiveness, as there is currently insufficient data on each BMP to determine relative effectiveness; however, they have been proven successful in ensuring a consistent base level of BMPs between permitted areas, which is their intended purpose.

The minimum level of BMP plan implementation in the EAA is established by rule. By using the BMP equivalents approach, each permittee has the flexibility to develop a BMP plan that is best suited for site-specific soil types, hydrology, and crop conditions. For each proposed BMP, the permittee must consider how the BMP will be implemented, how staff responsible for BMP implementation will be trained, and how BMP implementation will be documented. If the basin is determined to be out of compliance, then there is a system outlined by rule for increasing the level of BMP implementation. A summary of the general categories available for BMP implementation is presented in **Table 3-4**. Appendix 3-1 provides a more complete table listing BMP practices and the points available for each. Selection of BMPs is not limited to this listing. Alternative BMPs may be proposed with justification for achieving water quality improvements, along with a description of how it will be implemented, documented, and training will be provided.

Table 3-4: Best Management Practice (BMP) implementation categories.

BMP	PTS	DESCRIPTION
Nutrient Control Practices	2 ½–15	Minimizes the movement of nutrients offsite
Nutrient Management Plan	15–35	Managing the amount, source, placement, form, and timing of the application of nutrients on lands with cattle operations
Water Management Practices	5–35	Minimizes the volume of offsite discharges
Particulate Matter and Sediment Controls	2 ½–15	Minimizes the movement of particular matter and sediment
Pasture Management	2 ½–10	On-farm site operation and management practices

Note: A BMP plan is required for each land use or crop, and shall be implemented across the entire farm acreage (drainage area). BMPs are not limited to this list; see Appendix 3-1. Alternative BMPs may be proposed with justification for achieving water quality improvements along with a description of how it will be implemented, documented, and responsible personnel will be trained.

The rule requires an initial minimum level of BMP implementation of 25 points for the EAA. Additional levels of BMP practices to further reduce TP loads are required if the basin is shown to be out of compliance. Because the EAA basin has remained in compliance with the load reduction requirement, the permittees continue to implement the rule required minimum of 25 points in BMP practices.

Post-permit compliance activities include verification of the implementation of the approved BMP plans by review of BMP implementation reports prepared by the permittee and in-field visual observations and review of documentation. Onsite verifications allow the District to discuss BMP strategies and optimization of current BMP practices with permittees.

EAA Basin Compliance Determination

The ECP permits require that the District annually evaluate BMP performance in agricultural areas upstream of the STAs, consistent with Rule 40E-63 and Paragraph 373.4592(4)(f), F.S.

The primary means for determining the success of the Rule 40E-63 program is through the District's data collection at the EAA basin level. Data from District structures are used to calculate the measured TP load discharged from each basin. TP load is a more representative measure of compliance for the basins than concentration alone because it accounts for both concentration and volume. Discharge TP concentrations and flow are recorded at all current inflow and outflow points.

Within the EAA basin, monitoring is mandated by the rule at two levels: (1) EAA basin-level monitoring by the District, and (2) individual sub-basin or farm-level monitoring by the owner/operator of private water control structures discharging within the primary basin.

For primary compliance, the EAA basin must demonstrate a 25-percent reduction in load annually compared to the pre-BMP base period. Basin-level monitoring includes both inflow and outflow structures from the EAA at which TP concentrations and flows are measured. Discharge

quantity is recorded at all current inflow and outflow points defining the boundary of the EAA basin. Thirty-four water control structures define this boundary for the EAA in WY2004. Discharge TP samples are collected at 30 locations in the EAA, where the concentrations are deemed to be representative of discharges for all boundary structures. All monitoring locations in the EAA basin are equipped with automatic samplers. During discharge events, TP samples are collected primarily by automatic samplers, which are programmed to collect samples on a flow proportional basis. The samples are collected regularly from the autosamplers (generally every seven days), and the samples are composited at the end of the collection period. Grab samples are also collected at the end of each period as a backup source of data for the autosamplers.

During WY2004, 542 TP samples were collected by autosampler, and 983 TP samples were collected by grab method for the EAA basin. All samples are collected and preserved in the field using methods specified and approved by the FDEP and adopted by the District for use in the EAA. All samples are collected by District personnel or by contractors trained in District sampling techniques and are transported to the District lab for analysis using analytical methods specifically approved for Everglades samples.

From these measurements, the District calculates TP loads entering and leaving the EAA and thus is able to infer the contribution from the EAA. The inflow and outflow structures that are monitored include the S-2/351 complex, S-3/354 complex, S-352, S-5A complex, S-6, S-7, S-150, S-8, G-136, G-200, G-328, G-344A, G-344B, G-344C, G-344D, G-349B, G-350B, G-600, G-410, G-402A, G-402B, G-402C, G-402D, G-404, G-357, EBPS3, ESPS2, G204, G205, G206, and G507 structures (**Figure 3-2**). The rule requires that all flows into and out of the EAA be used to calculate loads, and all data used in these calculations must pass appropriate quality assurance/quality control (QA/QC) review. During WY2004, STA-3/4 began receiving inflow from the EAA with two of the three flow ways passing their required startup criteria. However, flows associated with STA-3/4 were not used in EAA compliance calculations because proper QA/QC data were not available for this STA. With the exception of STA-3/4, the TP loads measured at these structures collectively determined primary compliance for all EWOD permits during WY2004. **Table 3-5** summarizes the annual loads recorded at the inflow and outflow structures indicated above.

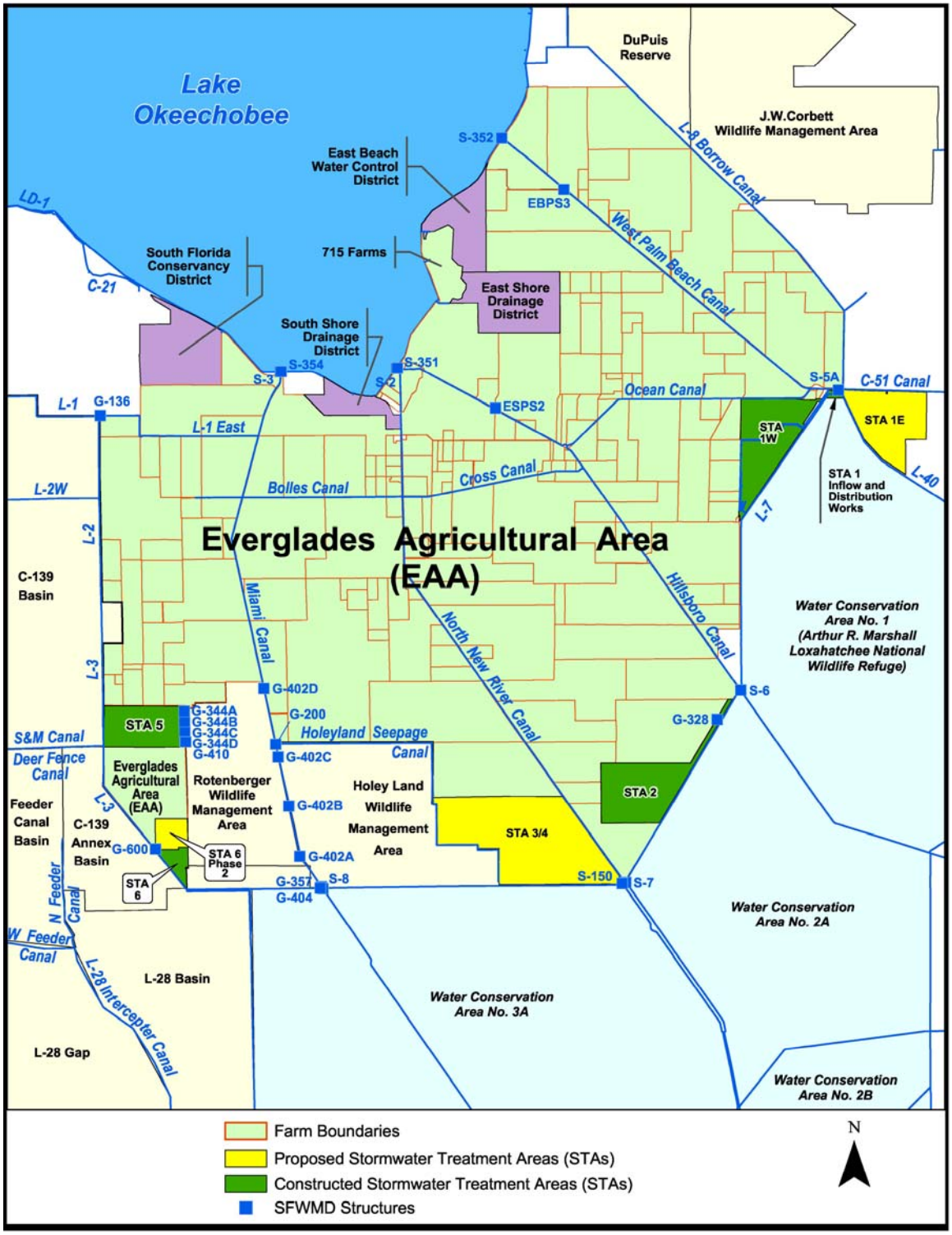

Figure 3-2. The EAA basin and primary compliance water control structures within the ECP boundary.

Table 3-5. Results of WY2004 EAA basin TP compliance calculations.

WY2004 EAA TP Load	
Estimated TP load from the EAA during the base period years adjusted for WY2004 rainfall amount and distribution (1979–1988)	229.2 mt
Actual WY2004 TP load from the EAA with BMPs implemented	82.3 mt
WY2004 TP load reduction (relative difference)	64 %
Three-year average TP load reduction	55 %

WY2004 EAA TP Concentration (ppb)	
Actual annual average EAA TP concentration prior to BMP implementation (1979–1988)	173 ppb
Actual WY2004 TP concentration from the EAA with BMPs implemented	69 ppb
Three-year flow-weighted mean TP concentration	71 ppb

Note: Due to construction activities directly involving STA-3/4, related changes in flow paths and delays in availability of operational and water quality data, this STA has not been included in the compliance calculations of TP loads and concentrations for the EAA.

A secondary method of program compliance measurement is through individual sub-basin ("permit-level" or "farm-level") water quality monitoring conducted by the permittee. All permit-level monitoring is performed by sampling organizations using FDEP-approved and District-specified sampling and sample preservation techniques and laboratories using FDEP-approved analytical techniques hired by the individual permittees. The District performs independent audits on all permittee hired sampling organizations to assure compliance with specified sampling and preservation methods, and all laboratories performing analyses are required to participate in the Everglades round robin laboratory performance evaluation program conducted by the FDEP to assure that comparable results are obtained from all laboratories submitting data directly related to EFA activities.

Permit-level monitoring is required by rule but is only to be used for compliance determinations if the EAA basin does not meet the 25-percent load reduction requirement. Permit-level data are also used to determine credits toward the Everglades agricultural privilege tax mandated by the EFA. A summary table of the tax credits is presented in Appendix 3-1, Table 2. Permittee water quality monitoring results are not used to calculate the TP reduction at the EAA basin level.

EAA BASIN-LEVEL MONITORING RESULTS

Phosphorus load reduction measurements are conducted and reported annually. The EFA specifically mandates a method to measure and calculate the annual basin export of phosphorus in surface water runoff from EAA lands (farms, cities, and industry). These calculations are made using an adjustment for the hydrologic variability associated with rainfall and surface water discharges over time. These adjusted equations, calibrated to the base period WY1980–WY1988 (May 1, 1979 through April 30, 1988), attempt to predict what the average annual TP load would have been for the EAA basin if the current water year's rainfall amount and monthly distribution had occurred during the base period. Compliance is determined by comparing the observed TP loads for the current year to the predicted loads from the base period.

Since the implementation of BMPs required by the Everglades Regulatory Program, TP loads from the surface water runoff attributable to the lands within the EAA basin have generally declined. To interpret phosphorus measurements taken at inflow and outflow water control structures for the EAA basin, it is important to recognize that water leaving the EAA basin through these structures is a combination of EAA farm- and urban-generated runoff and water passing through the EAA basin canals from external basins. This "pass through" water includes discharges from Lake Okeechobee and 298 District diversion areas. When compared on a water-year-by-water-year basis since the full implementation of BMPs in WY1996, Lake Okeechobee discharges to the EAA typically have had higher TP concentrations than EAA basin discharges. These other sources influence the water quality within the EAA; however, to what extent is unknown. Therefore, separate accounting of TP loads from various sources is required to develop accurate conclusions about TP loads originating from the EAA basin. The accounting of tributary sources and flow configurations to the Everglades is complex, and the reported TP loads attributed to the farms, cities, and industries within the EAA basin should not be confused with the total load being delivered to the Everglades.

EAA BASIN ANNUAL PHOSPHORUS MEASUREMENTS AND CALCULATIONS

The first year of the 25-percent reduction compliance measurement mandated by statute occurred during WY1996 (May 1, 1995 through April 30, 1996). The EAA basin TP loads and

concentrations are determined in accordance with procedures specified in the Everglades Regulatory Program (Rule 40E-63, Appendix A, F.A.C.) and the EFA [Subparagraph 373.4592(4)(c)(2), F.S.]. A summary of the WY2004 compliance calculation for observed and predicted TP loads is provided in **Table 3-5**.

The compliance related data for all calculated years are summarized in **Tables 3-6** and **3-7**. The observed and predicted (base period rainfall adjusted) data for the EAA TP calculations and annual rainfall and flow measurements are presented in **Table 3-7**. The TP values presented in **Tables 3-6** and **3-7** are attributable only to the EAA basin (farms, cities, and industry), and do not represent the cumulative TP being discharged to the Everglades from all sources. Although the data include TP concentrations, only load is used to determine compliance.

Table 3-6. Summary of historical TP compliance calculations for the EAA basin.

	WY80 ↓ WY91 Pre-BMPs	WY92 ↓ WY93	WY94	WY95	WY96	WY97	WY98	WY99	WY00	WY01	WY02	WY03	WY04
			Partial BMP Implementation*					**Full BMP Implementation**					
Three-Year Average Phosphorus Load % Reduction	n/a	n/a	39 %	36 %	47 %	51 %	55 %	44 %	48 %	57 %	59 %	57 %	55 %
Phosphorus Concentration (ppb)	173 12-yr avg	166 2-yr avg	121	130	109	106	100	107	114	107	92	69	71
			3-year flow-weighted mean										
% Acres Implemented with BMPs per the Everglades BMP Program	0	0 *	15	63	100	100	100	100	100	100	100	100	100
WY Annual Phosphorus Concentration (ppb)	173 12-yr avg	166 2-yr avg	112	116	98	100	102	124	119	64	77	66	69
WY Annual Calculated Phosphorus Load % Reduction	n/a	n/a	17%	31%	68%	49%	34%	49%	55%	73%	55%	35%	64%
80% Confidence Interval in %**	n/a	n/a	-26–46	-4–54	54–78	32–62	6–54	29–64	38–68	62–82	43–68	15–55	54–75

* Lake Okeechobee SWIM BMP Program, 1992-1993, gave BMP credit for:

- Initiation of deep-well injection of domestic wastewater from Belle Glade, South Bay, and Pahokee
- Pump BMPs in S-2 and S-3 basins

** Load is calculated using *measured* flow and concentrations. When comparing loads between the water year (WY) and the base period, there is a confidence interval for the percent reduction value associated with the adjustment for rainfall variability. This confidence interval represents the uncertainty relative to the prediction model.

Table 3-7. WY1980 through WY2004 EAA basin TP measurements and calculations.

Water Year	Observed TP (mt)	Predicted* TP (mt)	%** TP Reduction	Annual Rain (in)	Annual Flow (k ac-ft)	Base Period	Pre-BMP Period	LOK SWIM BMPs	Evrglds Rule BMPs
80	167	154	-9%	53.50	1162				
81	85	98	13%	35.05	550				
82	234	255	8%	46.65	781				
83	473	462	-2%	64.35	1965				
84	188	212	11%	49.83	980				
85	229	180	-27%	39.70	824				
86	197	240	18%	51.15	1059				
87	291	261	-12%	51.97	1286				
88	140	128	-9%	43.43	701				
89	183	274	33%	39.68	750				
90	121	120	-1%	40.14	552				
91	180	219	17%	50.37	707				
92	106	179	41%	47.61	908				
93	318	572	44%	61.69	1639				
94	132	160	17%	50.54	952				
95	268	388	31%	67.01	1878				
96	162	503	68%	56.86	1336	First Compliance Year			
97	122	240	49%	52.02	996				
98	161	244	34%	56.12	1276				
99	128	249	49%	43.42	833				
00	193	425	55%	57.51	1311				
01	52	195	73%	37.28	667				
02	101	227	55%	49.14	1071				
03	81	125	35%	45.55	992				
04	82	229	64%	46.76	961				

Note: The dashed vertical line indicates the period for which BMPs were not fully implemented (WY1992–WY1995).

* "Predicted TP" represents the base period load, adjusted for rainfall variability.

** "%TP Reduction" values for WY1980–WY1989 represent the model calibration period.

Figures 3-3 through **3-7** represent the data graphically. Each bar in **Figure 3-3** represents the percent TP load reduction for each water year, including the base period years. In **Figure 3-4**, each bar represents the actual measured (observed) annual TP tonnage from the EAA basin in each water year, and the solid line represents the annual TP tonnage predicted (rainfall adjusted) by the rule-mandated model. The annual percent reduction of TP is calculated as the relative difference between the actual measured (bar) EAA basin TP load and the predicted (line) base period TP load (adjusted for rainfall). The EAA basin percent TP load reduction trend is presented in **Figure 3-5**. The solid line shows the three-year trend of percent load reduction. The "♦" symbol represents the annual measurements. An upward trend in the solid line in **Figure 3-5** denotes a reduction in loads, that is, an improvement in the water quality of EAA discharges. **Figure 3-6** shows the cumulative observed load reduction, as well as the cumulative EFA mandated 25-percent reduction. As this chart indicates, the EAA basin has consistently outperformed its mandated goal. For the nine years that the program has been fully implemented, discharges of 1,355 metric tons (mt) of TP were prevented from leaving the EAA basin as runoff, compared to what would have been expected under the same hydrologic conditions during the base period. This exceeds the annual mandated 25-percent load reduction, equating to a cumulative reduction of over 609 metric tons since WY1996, if just the minimum level of load reduction had been achieved annually.

TP concentrations are calculated in addition to load. Concentration levels, however, are not evaluated to determine EAA basin compliance, but flow-weighted concentrations allow for relative comparisons between years. The annual concentrations and three-year trends presented are true "annual flow-weighted" values calculated by dividing the total annual cumulative TP load by the total annual cumulative flow. **Figure 3-7** shows the TP concentration trends for the EAA discharges.

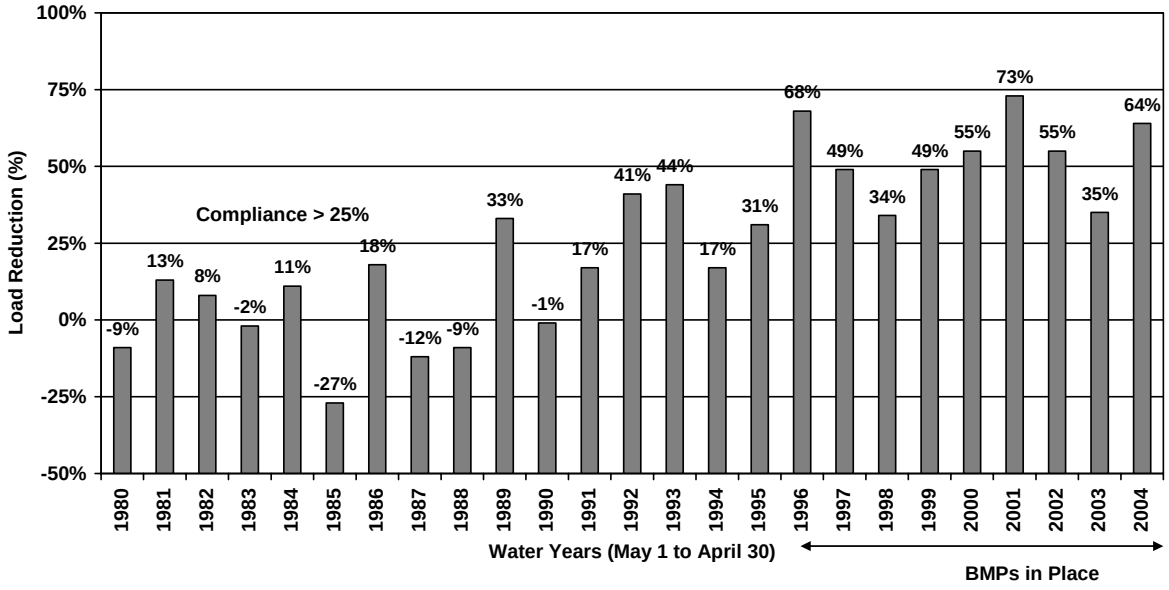

Figure 3-3. EAA basin percent TP load reduction.

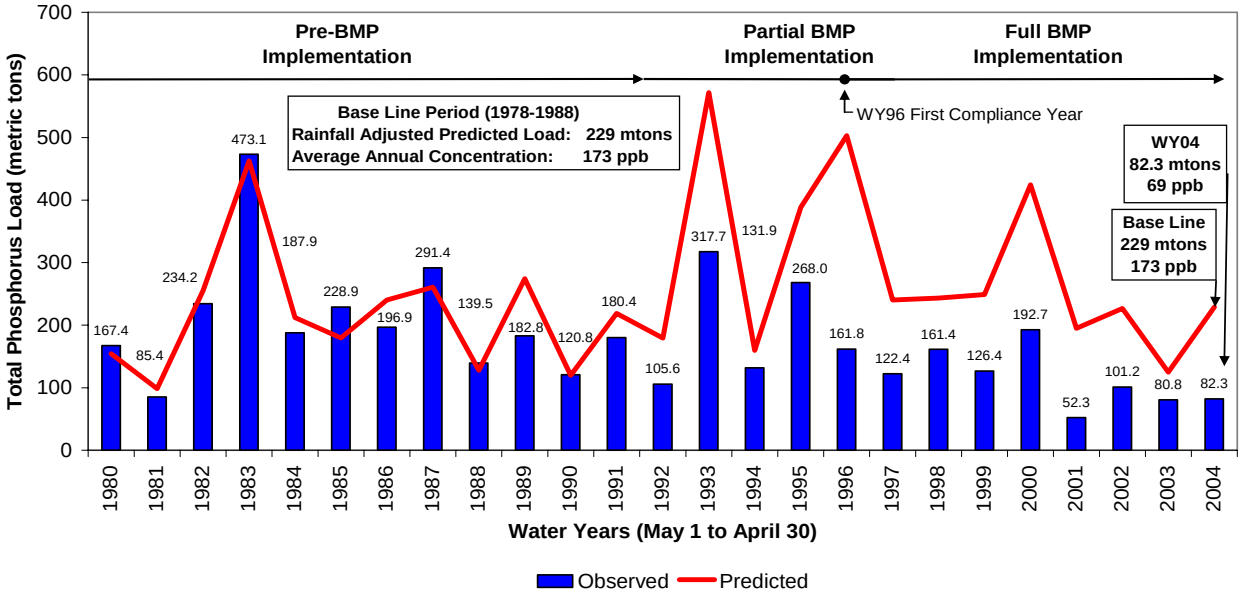

Figure 3-4. EAA basin TP measured and calculated loads.

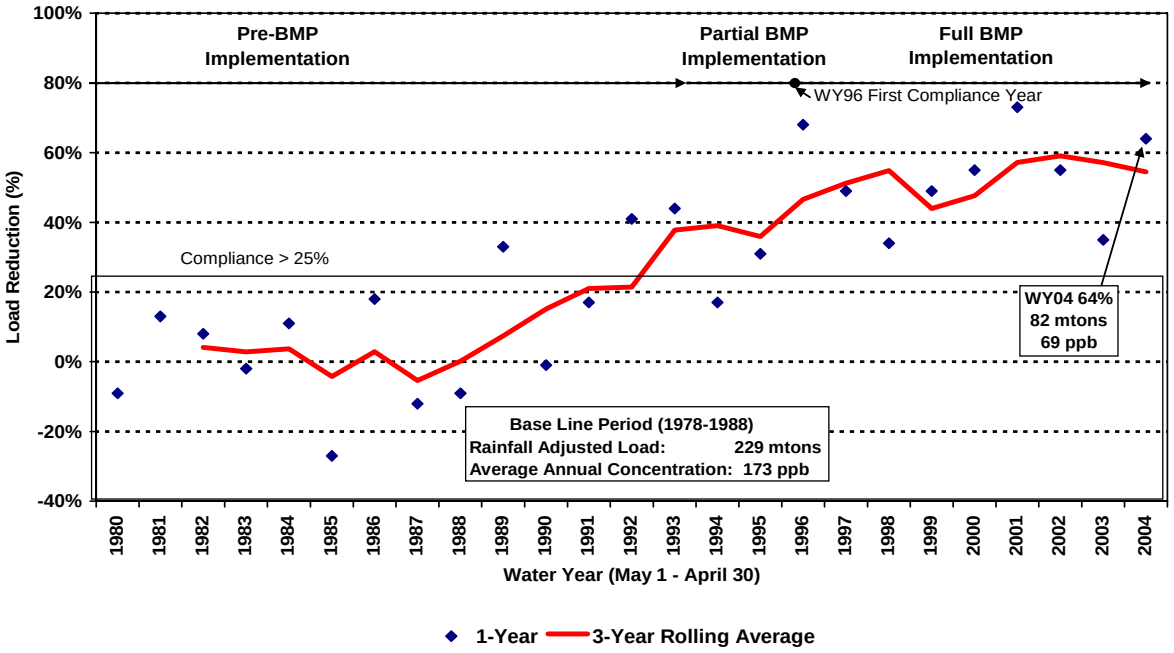

Figure 3-5. EAA basin percent TP load reduction trend.

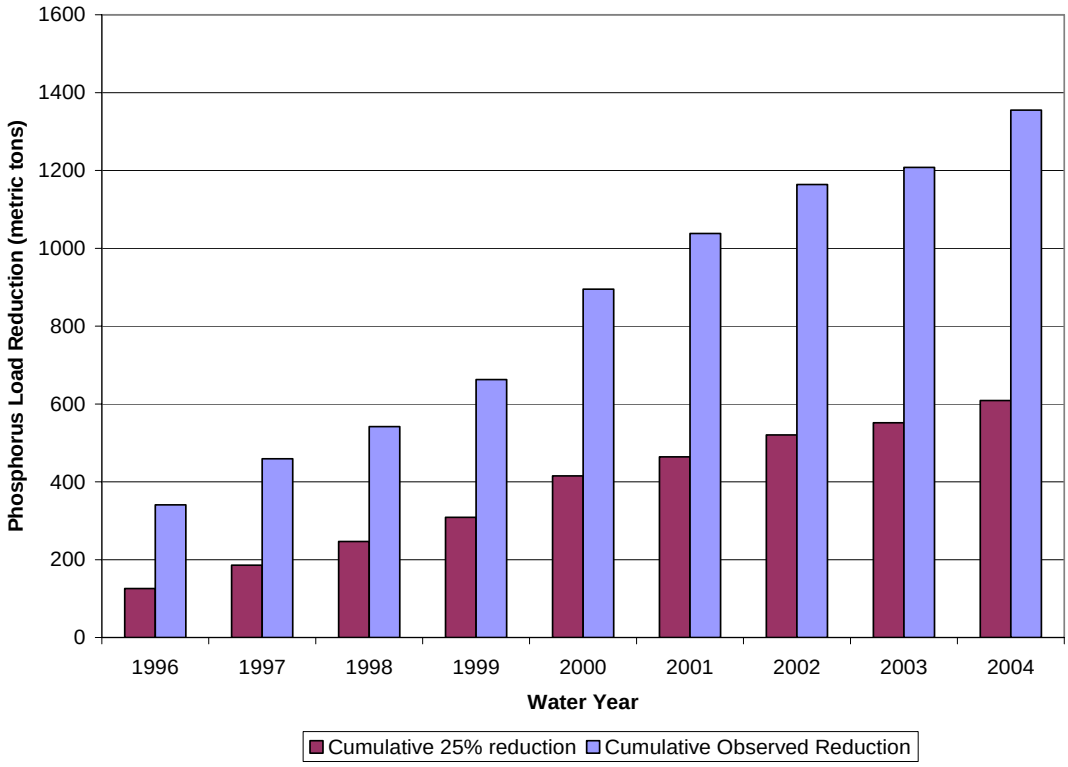

Figure 3-6. EAA basin cumulative percent TP load reduction.

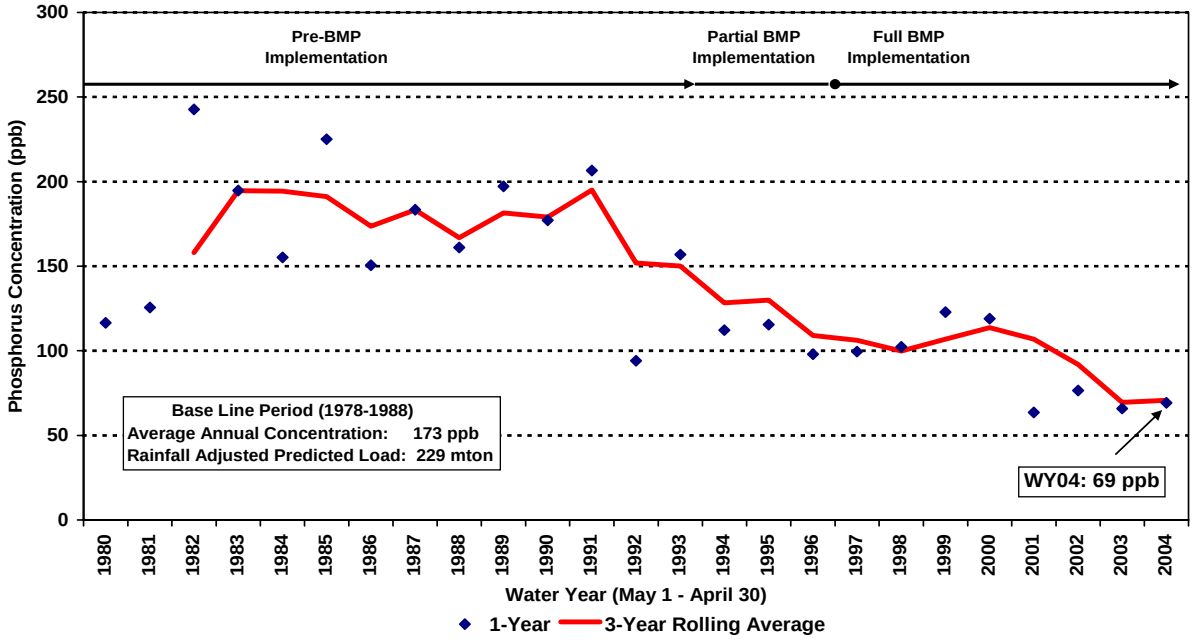

Figure 3-7. EAA basin flow-weighted TP concentrations.

EAA BASIN PERMIT-LEVEL MONITORING RESULTS

Permit-level data are useful for making relative comparisons between farms or between water years for the same farm only when they are used in conjunction with in-depth knowledge of unique farm characteristics. The District currently uses such relative comparisons when discussing individual farm performance and BMP optimization with permittees.

In the EAA basin and in accordance with Rule 40E-63, F.A.C., this on-farm or permittee-level water quality monitoring will only be used for compliance determination if the basin does not meet the 25-percent TP load reduction requirement. The permittee water quality monitoring results are not used to calculate the phosphorus reduction at the EAA basin level. The District currently conducts EAA basin-level monitoring at all inflow and outflow structures for this purpose.

In addition to a BMP Plan, each applicant for a Rule 40E-63 EAA permit is required to propose a Discharge Monitoring Plan for individual drainage basins within the permitted area. Permit-level monitoring plans consist of flow measurements, collection, and compositing of discharge water samples for TP analysis. Discharges are generally quantified using site-specific calibration equations. Water quality samples are generally collected daily during discharge by automatic samplers collecting flow-weighted aliquots, and are composited for a sampling period of up to 21 days prior to being transported to a laboratory for analysis. Daily TP load is calculated by multiplying the TP concentration for the sampling period by each daily flow. Rule 40E-63 requires data to be submitted in an electronic format.

Annual average flow-weighted TP concentrations (parts per billion, or ppb) and load discharges (pounds per acre, or lb/ac) have been calculated from permittees' daily water quality monitoring data reported during WY2004. **Figures 3-8** and **3-9** present frequency distributions of WY2004 permittees' drainage basin TP loads and concentrations, respectively. Appendix 3-2 presents WY2004 data in tabular form and as spatial distributions of TP loads and concentrations discharged by permit drainage basins. The EAA basin-level data verify that the individual farms have collectively reduced TP loads coincident with BMP implementation. An analysis of the data obtained from permit level monitoring indicates that the average annual cumulative total volume of water discharged from the 300+ permittee or farm-level pump stations is greater than the observed volume attributable to the EAA being released from the District water control structures surrounding the EAA. This is because EAA basin canal water (including rainfall, Lake Okeechobee discharges, and 298 District diversions from Lake Okeechobee) and the surface water discharged from any one of the given 200+ defined permittee drainage sub-basins (farms) may be drawn back into the farm for irrigation or freeze protection by another farm. Each year, a tremendous amount of water is recycled in this manner within the EAA prior to discharge to the Everglades. This leads to the conclusion that the permittee-level water quality monitoring cannot be used to determine the measure of TP discharged to the Everglades without taking into consideration many other complex parameters affecting the relationship between the water quality and flow data from an individual EAA farm or subset of farms and the EAA basin as a whole.

There are also several factors affecting TP load at the farm level, making it difficult to compare the level of BMP performance between farms and draw meaningful conclusions concerning any differences. UF/IFAS studies, discussed in previous Everglades Consolidated Reports (SFWMD, 2000; 2001; 2002a; 2003; 2004) and in other IFAS publications, make the point that each farm has a characteristic "lowest achievable discharge phosphorus concentration" that cannot be realized without an extensive implementation period and substantial financial impact. Consideration must also be given to the minimum phosphorus required to support the agricultural production of specific crops. These and other factors such as variations related to historic and existing land use, fertilizer practices, soil characteristics, hydrology, land area, and geographic location may create differences in BMP effectiveness between sites, preventing a direct comparison. Variables affecting individual farms include:

1. **Weather Patterns.** Timing and distribution of rainfall can affect an individual farm load. The model used to calculate the rainfall-adjusted unit area load for an individual permittee farm is dependent on District rainfall data collected for each EWOD sub-basin (e.g., S-5A, S-6, S-7, and S-8) within the EAA. Adjacent farms can be located in different EWOD sub-basins and therefore have a significantly different rainfall adjustment.
2. **Cropping Patterns.** The history of cropping patterns on a farm can affect loads by creating a phosphorus "sink," or accumulation. The implementation of nutrient application control BMPs should correct this situation over time.
3. **Hydrology.** The hydrology of a farm affects loads in many ways. Examples include the size of the farm relative to the discharge pump capacity, or the effects of seepage from an adjacent STA. Gradually, permittees are rebuilding or replacing older pumps to improve the relationship between the farm area and the pump capacity.
4. **Soil Characteristics.** Soil depth and composition can also have a significant impact on a farm's performance. As one example, a farm may have high levels of calcium carbonate present in its soil, resulting in a high soil pH and precipitation of phosphorus, while an adjacent farm may have much lower levels of calcium carbonate present in its soil and therefore would therefore have a lower soil pH.

These examples illustrate how each farm can be unique with respect to BMP selection and effectiveness. Permittees recognize these factors and may voluntarily adjust their operations and monitor the effects of these changes on water quality. Many of the adjustments require capital improvements that are phased in over time. An installation of culverts to improve internal drainage and minimize discharges, for example, could require as much as eight years on a 20,000-acre farm.

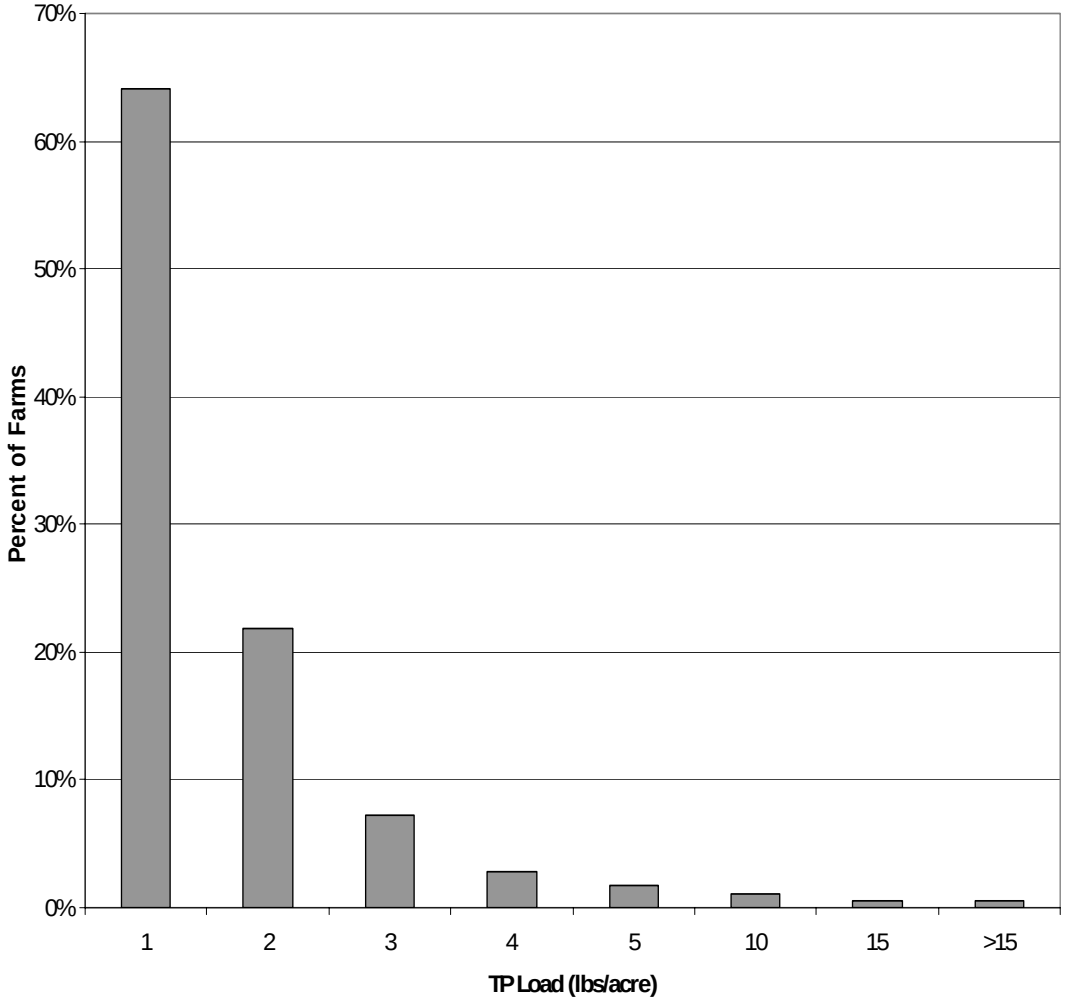

Figure 3-8. EAA permit-level TP load frequency distribution.

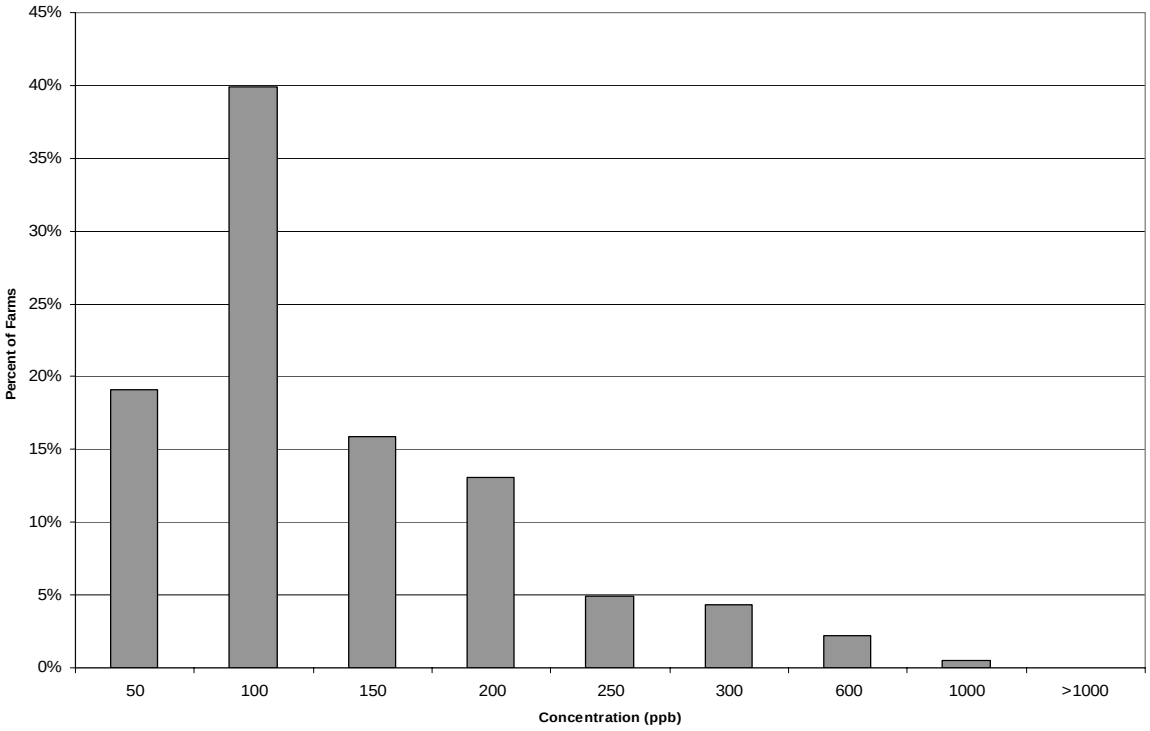

Figure 3-9. EAA permit-level TP concentration frequency distribution.

Long-Term Plan Update for the EAA Basin

The Long-Term plan objectives for the EAA basin are to (1) identify urban and agricultural discharges that are candidates for cost effective implementation of source controls, (2) characterize the management practices on lands or processes contributing to those discharges, and (3) implement voluntary cost effective source controls, above and beyond those mandated by rule, in concert with landowners and municipalities. These tasks were initiated in 2004 and are anticipated to continue until 2009 with an annual budget of $50,000. The initial year for implementation of the Long-Term Plan in the EAA basin was Fiscal Year 2004 (FY2004). Concurrent with the first year milestone, the District has initiated analyses of the past nine years of farm-level water quality data and associated reported best management practices to identify additional opportunities to improve water quality. Preliminary results from this study are anticipated in February 2005. The District, working in cooperation with the agricultural community, is also spearheading the creation of a technical advisory working group that will act as a forum for BMP discussion and implementation.

Update on BMP Research

In addition to the Everglades Regulatory Program, the EFA and Chapter 40E-63, F.A.C. require EAA landowners, through the Everglades Agricultural Area - Everglades Protection District (EAA-EPD), to sponsor a program of BMP research, testing, and implementation to monitor the efficacy of established BMPs in improving water quality in the EPA. Specific water quality issues to be addressed by the research included phosphorus fertilizer application processes, particulate matter and its relationship to phosphorus, pesticide application practices, and other water quality components, specifically including conductivity. BMP effectiveness has been demonstrated at different scales in the EAA basin as a whole, and through individual sub-basin or farm-level research projects in this basin. Research projects to quantify BMP effectiveness are necessary to improve the understanding and predictability of phosphorus and other water quality parameters relative to BMPs. To encourage BMP optimization as data become available, research results are provided to the industry through outreach programs sponsored by the District, FDEP, UF/IFAS, and EAA-EPD.

In 1992, the UF/IFAS initiated a research program to test BMP effectiveness in the EAA basin. The project was funded primarily by the EAA-EPD, with supplemental financial contributions from the FDEP and the District. Ten farms ranging in size from approximately 320 to 4,600 acres have been studied in an attempt to develop and verify the effectiveness of BMPs for reducing TP loading in the EAA basin. These farms are representative of the EAA basin with respect to soils, crops, water, and fertilizer management practices and geographic locations. Land use on the selected farms varies from monocultures of sugarcane and vegetables to multicultures of vegetables, rice, sod, and sugarcane. Since January 2002, research on three farms continues. The latest project evaluation and data summary can be found in the UF/IFAS Phase 12 Annual Report on Implementation and Verification of BMPs for Reducing Phosphorus Loading in the EAA and EAA BMPs for Reducing Particulate Phosphorus Transport (Daroub et al., 2004a).

With regard to BMP efficacy, the research results have shown that water management and crop rotation BMPs have the greatest potential impact on TP loads and concentrations of farm discharges. Water management practices that proved most effective included making internal drainage improvements to the farm to allow more uniform drainage.

In 2000, particulate phosphorus transport studies were initiated on three farms. The primary goals are to identify sources and mobility characteristics of particulate phosphorus on EAA farms and to modify management practices to reduce particulate phosphorus transport off the farm. Studies have shown that particulate phosphorus accounted for 20–70 percent of TP exported from EAA farms and that particulate phosphorus was frequently the cause of spikes in TP loads. Increased particulate phosphorus load rates in discharge water may occur from transport of moderate amounts of high phosphorus content material.

The requirement for atrazine research is ongoing in the STAs, and pesticide monitoring activities in the STAs are discussed in Chapter 4 of the 2005 SFER – Volume I. The EAA-EPD is continuing to provide educational seminars on the correct uses and application techniques of pesticides.

Specific conductance in the EAA was investigated since 1997 on ten farms (twelve discharge sites) for various periods ranging from 24 to 72 months. The objectives of the study were to monitor specific conductance in the EAA and included the development, testing, and implementation of BMPs to address a reduction of specific conductance. A final report was issued in March 2004 (Daroub et al., 2004b). It was found that shallow groundwater hydrology and quality has a major impact on specific conductance in the EAA. Comparing average specific conductance data points of the study sites to historical chloride concentration maps of shallow groundwater (Parker et al., 1955; Jones, 1948) revealed that the current elevated farm conductance readings of the two farms coincided with historically high chloride concentrations in shallow ground water wells. The issue of specific conductance in the EAA is hydrogeologic, as shallow groundwater is the major factor controlling the level of specific conductance in the EAA farm canals.

These research projects confirm the effectiveness of existing BMPs, as well as provide direction on areas of future focus. The IFAS recommendation is that the primary focus should turn to evaluation of the active biological and chemical interactions that flourish in the ecosystems south of the EAA so that relationships between phosphorus leaving the EAA and its eventual downstream points can be developed.

Another key component to the IFAS research goals is to promote the continued, uniform, and conscientious implementation and management of BMPs. This is accomplished through their extension program consisting of numerous seminars, workshops, and publications offered to the EAA community.

EVERGLADES REGULATORY PROGRAM: C-139 BASIN

In 1994, the EFA mandated that landowners within the C-139 basin should not collectively exceed an annual average phosphorus loading observed during the period extending from October 1, 1978 to September 30, 1988 after historic rainfall adjustments. The District was also assigned the responsibility of implementing a water quality monitoring program and evaluating whether any presently existing standards were being exceeded. The EFA established that if the basin was determined to be out of compliance, then a BMP program would have to be implemented. These EFA requirements were incorporated in the FDEP-issued ECP permit for STA-5 (the STA serving the C-139 basin) when the permit was issued in November 1997. Subsequently, Rule 40E-63 was amended in 2002 to create the C-139 Basin Regulatory Program in accordance with the EFA and ECP permit requirements.

There are currently 26 C-139 basin EWOD permits, which include approximately 48 sub-basins encompassing an area of approximately 170,000 acres **(Figure 3-10**). Water is discharged from the sub-basins primarily by gravity discharge through sandy soils. The areas represented by single permits vary from 194 to 60,491 acres.

C-139 Basin Best Management Practice Plans

For the C-139 basin, the rule requires four specific levels of implementation, defined as Levels I, II, III, and IV. Level I is the initial level for BMP plan implementation and requires the selection of 15 points of BMPs for implementation as a condition of permit issuance. Level II is triggered after the first determination that compliance loads for the C-139 basin during the previous water year have been collectively exceeded as established by the rule (i.e., if the C-139 basin is out of compliance). The rule does not require additional BMPs to be implemented under Level II but does require on-site inspections to verify BMP implementation. If there is a second determination that the C-139 basin is out of compliance, then Level III is initiated. This level requires an additional 10 points of BMPs, bringing the total to 25 points. If the C-139 basin is out of compliance a third time, then Level IV is initiated. This level also requires an additional 10 points of BMPs, bringing the total to 35 points. If the C-139 basin is out of compliance a fourth time, then the District must initiate a rulemaking effort to establish a program to bring the C-139 basin into compliance.

WY2004 was the second year of BMP implementation at the 15-point level and was the first year that inspections were conducted. In accordance with Rule 40E-63, field verification visits were conducted for all C-139 farms regulated under the Everglades Regulatory Program. Field verification and records review indicated that permittees are generally attempting to comply with mandated BMPs. However, continued verifications are necessary to clarify specific aspects of BMP implementation and ensure that BMPs are implemented consistently and systematically. A major component of BMP implementation is education and outreach. Field verification enables the District to discuss optimization of BMP practices one-on-one with farm personnel responsible for the day-to-day implementation of BMPs and to assess record keeping for individual farms. Significant staff time is dedicated to clarifying BMP implementation concepts and recordkeeping.

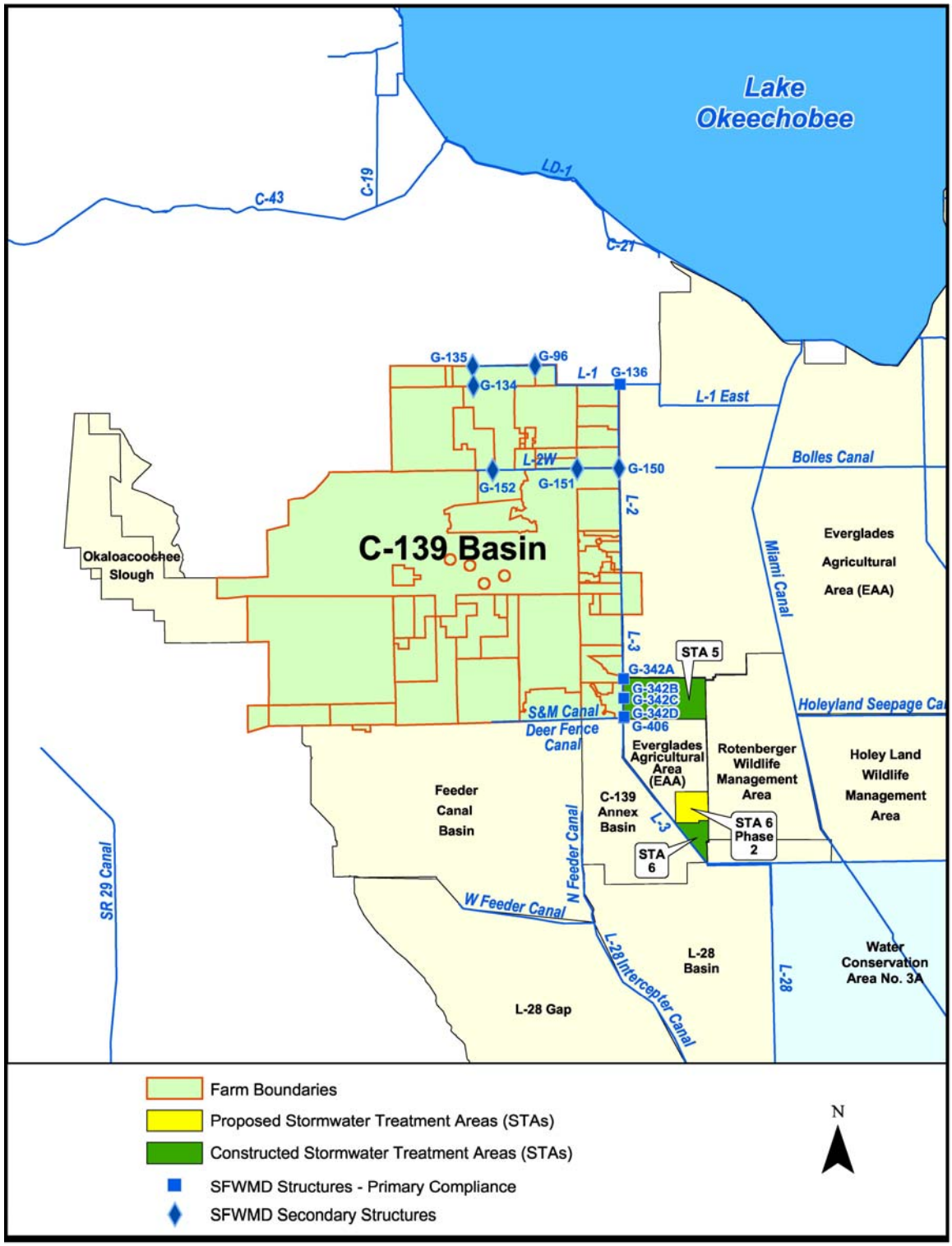

Figure 3-10. The C-139 basin and primary compliance water control structures within the ECP boundary.

The BMP requirement of 15 points represents the minimal level of BMP implementation. As such, it should not be expected to result in immediate or drastic improvements in water quality. At the time the C-139 regulatory program was conceived, TP loads from the basin fluctuated within target historical levels. The intent of the rule-required minimum BMP Level I/II was to provide for mandatory basic measures that were estimated to be sufficient to ensure continued compliance, based on phosphorus levels at the inception of the rule. For instance, at the Level I/II minimal levels, many permittees are able to claim credit for BMPs that were being implemented voluntarily prior to rule requirements taking effect. Also, because individual farms may choose significantly different means of achieving compliance with BMP plan levels, the initially required 15 points may be achieved without incorporating key components of a BMP plan, such as water management or fertilizer application practices. There is room for improvement in water quality as the BMP plan requirements increase to levels that require a more comprehensive approach similar to that in the EAA.

Gradual implementation of the permitted BMP plans will determine the level of effort required to meet the EFA target. However, it should be noted that realizing the benefits of the increased BMP requirements may be delayed by the learning curve that each permittee is subject to. The rule provides permittees with up to 90 days from the date they are officially notified to complete implementation of BMPs, which in addition to the period necessary for the District to process and calculate the annual water quality loading results in a lag of up to six months every year. Official notifications for WY2004 results were provided to permittees at the beginning of August 2004; thus, Level III BMPs are not required to be implemented basin-wide until November 2004. This timing is not only significant in terms of the delay, but also in terms of water quality impact for the following year's discharges, as WY2005 phosphorus loading will incorporate discharges from the wet season months of May 2004 through October 2004 prior to implementation of the next level of BMPs. The BMPs may not yield results in one-year cycles. Efforts are under way to ensure that discharges from the C-139 basin meet established TP load targets and limits prior to discharge to STA-5 for further treatment in order to ultimately reduce the nutrient loading contribution to the northern Everglades.

C-139 Basin Compliance Determination

Within the C-139 basin, the rule establishes monitoring requirements as a two level process:

1. C-139 basin-level monitoring performed by the District and mandated by the rule
2. Individual sub-basin or farm-level monitoring performed by the owner/operator of private water control structures discharging within the C-139 basin and described in the rule as optional

Primary compliance is based on the C-139 basin annual load not exceeding a baseline period average annual load. While the annual load is an observed value, the baseline-derived annual load is a value adjusted to reflect rainfall levels comparable to those of the evaluated period. The determination requires annual calculation of the TP load leaving the outflow structures from the C-139 basin based on discharge phosphorus concentrations and water flow recorded at all outflow points, including G-136, G-342A, G-342B, G-342C, G-342D, and G-406. As in the EAA basin, the TP loads measured at these structures collectively determine primary compliance for all C-139 EWOD permits. Discharge quantity is recorded at all current inflow and outflow points defining the boundary of the C-139 basin. Six water control structures define this boundary for the C-139 in WY2004. Discharge TP samples are collected at these structures, where the concentrations are deemed to be representative of discharges for all boundary structures. All monitoring locations in the C-139 basin are equipped with automatic samplers. During discharge

events, TP samples are collected primarily by automatic samplers which are programmed to collect samples on a flow proportional basis. The samples are collected regularly from the autosamplers (generally every seven days), and the samples are composited at the end of the collection period. Grab samples are also collected at the end of each period as a backup source of data for the autosamplers. During WY2004, 144 composite TP samples were collected by autosampler, and 287 TP samples were collected by grab method for the EAA basin.

The rule allows an optional secondary method of compliance for the C-139 basin determined through individual sub-basin (permit-level or farm-level) water quality monitoring conducted by the permittee. Under the Optional On-Farm Discharge Monitoring Program, owners/operators of private water control structures discharging within the C-139 basin may voluntarily monitor the discharge from their farms or sub-basins. Participants may also elect to discontinue voluntary participation at any time by submitting an application to modify their permit. In the event that the C-139 basin is found to be out of compliance, participants in the optional program will not be required to perform additional BMPs, as long as the District determines that they have not exceeded their proportional share of the total C-139 basin phosphorus load. Currently, no owners/operators of private water control structures discharging within the C-139 basin have elected to participate in the voluntary program.

C-139 Basin-Level Monitoring Results

Water leaving the C-139 basin, in contrast to the EAA, is primarily from agricultural sources within the basin. The TP load delivered to the Everglades is not the same as the TP loads leaving the outflow structures from the C-139 basin, because some flows discharge into other water bodies. Outfall structure G-136 discharges to the L-1 canal, which flows into the EAA basin. Outfall structures G-342A, G-342B, G-342C, and G-342D flow into STA-5. Outfall structure G-406 discharges only into the L-3 canal when STA-5 cannot receive additional discharges.

C-139 BASIN ANNUAL PHOSPHORUS MEASUREMENTS AND CALCULATIONS

WY2004 marked the second year of compliance measurement for the C-139 basin. A summary of the WY2004 compliance calculation for the observed load, predicted target load, and the limit load is provided in **Table 3-8**. The overall TP loads, flows, and flow-weighted concentrations at the six primary basin outflow structures are summarized in **Table 3-9**. The C-139 basin TP loads and concentrations are determined in accordance with procedures specified in the Everglades Regulatory Program (Rule 40E-63, Appendix B, F.A.C.) and the EFA.

The data for all calculated years (pre-compliance and initial compliance) are summarized in **Tables 3-10** and **3-11**. The observed, predicted target, and limit data for the C-139 TP calculations, along with the annual rainfall and flow measurements are presented in **Table 3-11**. The TP values presented in **Tables 3-10** and **3-11** are attributable only to the C-139 basin, and do not represent the cumulative TP being discharged to the Everglades after treatment through STA-5 or pass-through in the EAA.

Table 3-8. Results of WY2004 C-139 basin TP compliance calculations.

WY2004 C-139 TP Load (mt)	
Estimated TP Target load (adjusted for WY2003 rainfall amount and distribution)	25.4 mt
Estimated TP Limit load (Target load at the upper 90% confidence interval)	45.3 mt
Actual WY2004 TP load from the C-139 with partial BMP implementation	69.0 mt

WY2004 C-139 TP Concentration (ppb)	
Actual annual average C-139 TP concentration prior to BMP implementation (1979 to 1988)	227 ppb
Actual WY2004 TP concentration from the C-139 with minimum BMP implementation	274 ppb
Three-year flow-weighted mean TP concentration	267 ppb

Table 3-9. Summary of C-139 basin TP calculations.

C-139 Related Loads by Structure

Water Year 2004

This table represents the flows and loads at each structure leaving the C-139 Basin.

C-139 to EAA

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)	% of Total Load	% of Total Flow
G136	**3.34**	**13.22**	**205**	**4.8%**	**6.5%**

C-139 to STA5

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)	% of Total Load	% of Total Flow
G342A	10.07	46.32	176	14.6%	22.7%
G342B	10.15	48.70	169	14.7%	23.9%
G342C	9.79	29.37	270	14.2%	14.4%
G342D	18.62	28.63	527	27.0%	14.0%
Total	**48.62**	**153.01**	**258**	**70.5%**	**75.1%**

C-139 to WCA3

Structure	Load(mtons)	Flow (kac-ft)	Conc. (ppb)	% of Total Load	% of Total Flow
G406	**17.04**	**37.63**	**367**	**24.7%**	**18.5%**

Note: the values shown are annual summaries of flows and loads of the monitoring data for each structure. There flows and loads are not used to determine a mass balance for the basin and are not used for compliance determination.

Table 3-10. Summary of historical C-139 basin TP concentrations.

	WY80 ↓ WY88 Pre-BMPs	WY94	WY95	WY96	WY97	WY98	WY99	WY00	WY01	WY02	WY03 ****	WY04
Phosphorus Concentration (ppb)	227 9-yr avg	131	163	166	188	185	202	197	216	240	270	267
			←			**3-year flow-weighted mean**						→
WY Annual Phosphorus Concentration (ppb)	227 9-yr avg	129	184	167	226	170	212	210	246	267	279	274
80% Confidence Interval in %***	n/a	-29 to 60	-110 to 40	-60 to 52	-106 to 37	-50 to 54	-112 to 33	-157 to 20	-402 to -44	-230 to -3	-256 to -10	-384 to -53

** The relative difference is shown for the observed and predicted target loads. However, the C-139 basin does not employ a load reduction for compliance determinations.

*** Load is calculated using measured flow and concentrations. When comparing loads between the water year (WY) and the base period, there is a confidence interval for the percent reduction value associated with the adjustment for rainfall variability. This confidence interval represents the uncertainty relative to the prediction model.

**** First year of compliance measurement, WY2003.

Table 3-11. WY1980 through WY2004 C-139 basin TP measurements and calculations.

Water Year	Observed TP (mtons)	Predicted* Target TP (mtons)	Predicted** Limit TP (mtons)	Annual Rain (in)	Annual Flow (Kac-ft)	Base Period	Pre-BMP Period
80	34.7	42.1	76	56.39	172		
81	4.1	3.6	7	31.06	51		
82	6.1	8.8	16	38.61	44		
83	148.1	115.2	222	71.98	344		
84	40.4	20.2	36	47.19	156		
85	14.6	19.6	35	46.88	63		
86	17.0	19.3	34	46.71	110		
87	37.7	55.0	101	60.19	149		
88	28.2	21.6	38	47.96	94		
89	14.2	11.0	20	40.69	73		
90	5.5	9.8	18	39.62	46		
91	5.0	20.8	37	47.53	45		
92	12.3	27.9	50	51.04	100		
93	26.3	39.4	71	55.49	137		
94	21.8	30.2	54	52.03	136		
95	61.9	53.8	98	59.85	272		
96	48.5	55.2	101	60.24	236		
97	45.9	40.1	72	55.74	165		
98	35.6	42.9	77	56.65	170		
99	35.6	29.9	53	51.92	136		
00	52.4	36.4	65	54.46	202		
01	17.1	6.4	12	35.70	56		
02	65.9	35.8	64	54.23	200		
03***	77.3	39.1	70	55.40	224		
04	69.0	25.4	45.3	49.90	204		

* “Predicted Target TP” represents the target base period load, adjusted for rainfall variability.

** “Predicted Limit TP” represents the target base period load, at the upper 90% confidence interval.

*** First year of compliance measurement, WY2003. WY2003 and WY2004 only required the minimum level of 15 points in BMPs.

Figures 3-11 and **3-12** represent the data graphically. In **Figure 3-11**, each bar represents the actual measured (observed) annual TP tonnage from the C-139 basin in each water year, and the lines represent the annual TP target and limit loads predicted, after being adjusted for rainfall, by the rule mandated method. **Figure 3-12** represents the annual flow-weighted mean TP concentration of discharge from the C-139 basin shown by both individual yearly concentration values represented by the diamond symbols, and the three-year rolling average flow-weighted mean concentration represented by the solid line. As with **Figure 3-11**, WY2004 was the second year of compliance. Compliance in the C-139 basin is determined by TP load discharged from the basin, not concentration.

C-139 Permit-Level Monitoring Results

At this time, permit-level monitoring does not occur in the C-139 basin. No owners/operators of private water control structures discharging within the C-139 basin have elected to participate in the Optional On-Farm Discharge Monitoring Program.

Long-Term Plan Update for the C-139 Basin

The Long-Term Plan objectives for the C-139 basin are to (1) identify urban and agricultural discharges that are candidates for cost effective implementation of source controls, (2) characterize the management practices on lands or processes contributing to those discharges, and (3) implement voluntary cost effective source controls above and beyond those mandated by rule in concert with landowners and municipalities. These tasks were initiated in 2004, and are anticipated continue until 2014. The annual budget allocated to Long-Term Plan activities is $250,000 from FY2004 through FY2006, and $100,000 thereafter.

A component of the Long-Term Plan is the C-139 and Western Basins BMP Grant Program. In 2002, the District launched the grant program to provide funding to local landowners to encourage implementation of voluntary BMPs that were anticipated to reduce phosphorus discharges from their farms. Initially, the Everglades Program contributed an annual amount of $100,000 for three years. The amount was increased in 2004 by $250,000 using program funds, and by $350,000 using Long-Term Plan funds allocated to the C-139 and Feeder Canal basins. Of the $900,000 contributed to the program by the District, $470,000 has been committed to landowners in the C-139 basin, with the balance dedicated to the Feeder Canal basin (discussed further under *Section II* of this chapter). The Natural Resources Conservation Service (NRCS) and the Florida Department of Agriculture and Consumer Services (FDACS) have partnered with the District to increase the funding provided to landowners and stakeholders with the funds being administered by the Hendry Soil and Water Conservation District.

The grant program has evolved more recently to allow for funding of BMP demonstration projects at both the individual farm level, and in areas that have a potential impact on regional water quality compliance results. These demonstration projects will provide data on how to more effectively implement BMPs in the C-139 basin. This approach, in coordination with the STA optimization projects (discussed in Chapters 4 and 8 of the 2005 SFER – Volume I), allows for a more holistic approach to evaluating water quality improvement projects in the Everglades Regulatory Program. Results of the Western Basins BMP Grant Program are summarized in a separate annual report, presented on the District's Website at (http://www.sfwmd.gov/org/reg/esp/pdfs/wbasins_bmp_grant_program_annrpt.pdf).

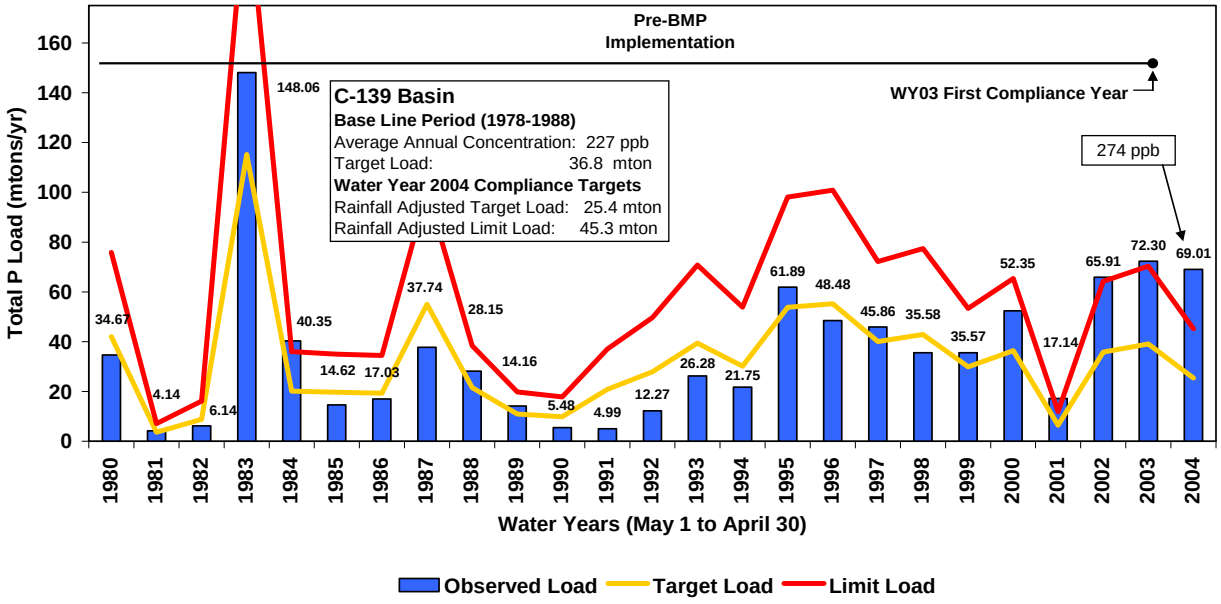

Figure 3-11. C-139 basin TP measured and calculated loads.

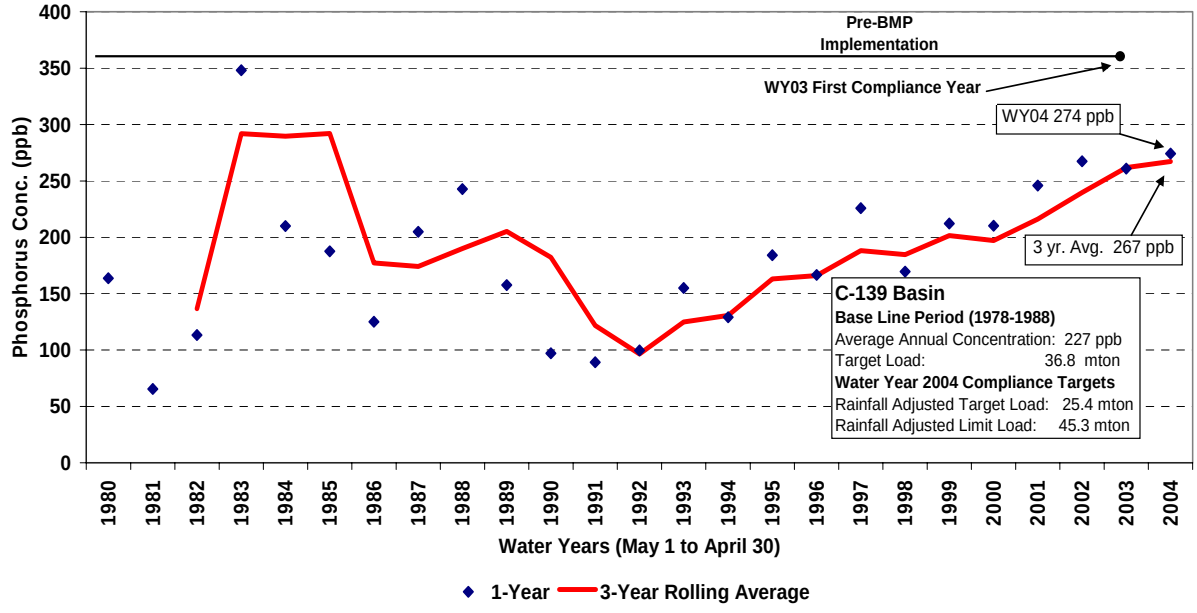

Figure 3-12. C-139 basin flow-weighted TP concentrations.

EVERGLADES REGULATORY PROGRAM FINDINGS AND FUTURE DIRECTIONS

An overall evaluation of the Everglades Program indicates that it is successfully reducing phosphorus at its sources, although there is much that remains to be done. The program in the EAA basin has resulted in TP reductions by more than 50 percent over historical levels since BMP implementation in the basin. Future directions in the EAA basin require additional research into TP reduction mechanisms, and further implementation of the applicable portions of the Long-Term Plan in the basin. The BMP program in the C-139 basin has just begun and has not yet resulted in a reduction of TP loads from this basin. Future directions for the C-139 basin require implementation of additional BMPs to bring the basin into compliance, and may require additional rulemaking in the basin. For both basins, public education and outreach is a critical program component for improving water quality, and the District will continue to develop more effective methods to accomplish this goal.

All Long-Term Plan projects described for the EAA and C-139 basins have been initiated and are on schedule and within the proposed budgets.

SECTION II: EVERGLADES STORMWATER PROGRAM – NON-ECP BASINS

OVERVIEW

On April 20, 1998, the FDEP issued the non-ECP permit (FDEP File No. 06, 50259070), pursuant to Sections 9(k) and 9(l) of the Everglades Forever Act. The permit authorized the continued operation of water control structures that are operated, maintained, and controlled by the District, that discharge waters "into," "within," or "from" the EPA, and which were not included in the permits issued for the ECP. Water quality at the "within" and "from" structures relative to the EPA is addressed in Chapters 2A and 2B of the 2005 SFER – Volume I. The purpose of this section is to address water quality at the "into" structures, that is, those discharging directly into the EPA. There are ten "into" structures located in eight non-ECP basins discharging to the EPA, and regulated under the non-ECP permit including the ACME Improvement District, North Springs Improvement District (NSID), C-11 West, North New River Canal (NNRC), Feeder Canal, L-28, Boynton Farms, and C-111 basins. These basins encompass a wide range of land uses: three (NSID, NNRC and C-11 West) are primarily urban; two (ACME Improvement District and C-111) have both urban and agricultural or equestrian areas; and the remaining three (Feeder Canal, L-28 and Boynton Farms) are exclusively agricultural. The location of ESP structures, the boundaries of ESP hydrologic contributing basins, and the EPA boundaries are indicated in **Figure 3-13**. The affected entities within these basins are primarily local governments and municipalities, special drainage districts, the Seminole Indian Tribe of Florida, the Miccosukee Tribe of Indians of Florida, and federal agencies.

The non-ECP permit requires that the District implement a program that has become known as the Everglades Stormwater Program that includes 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.

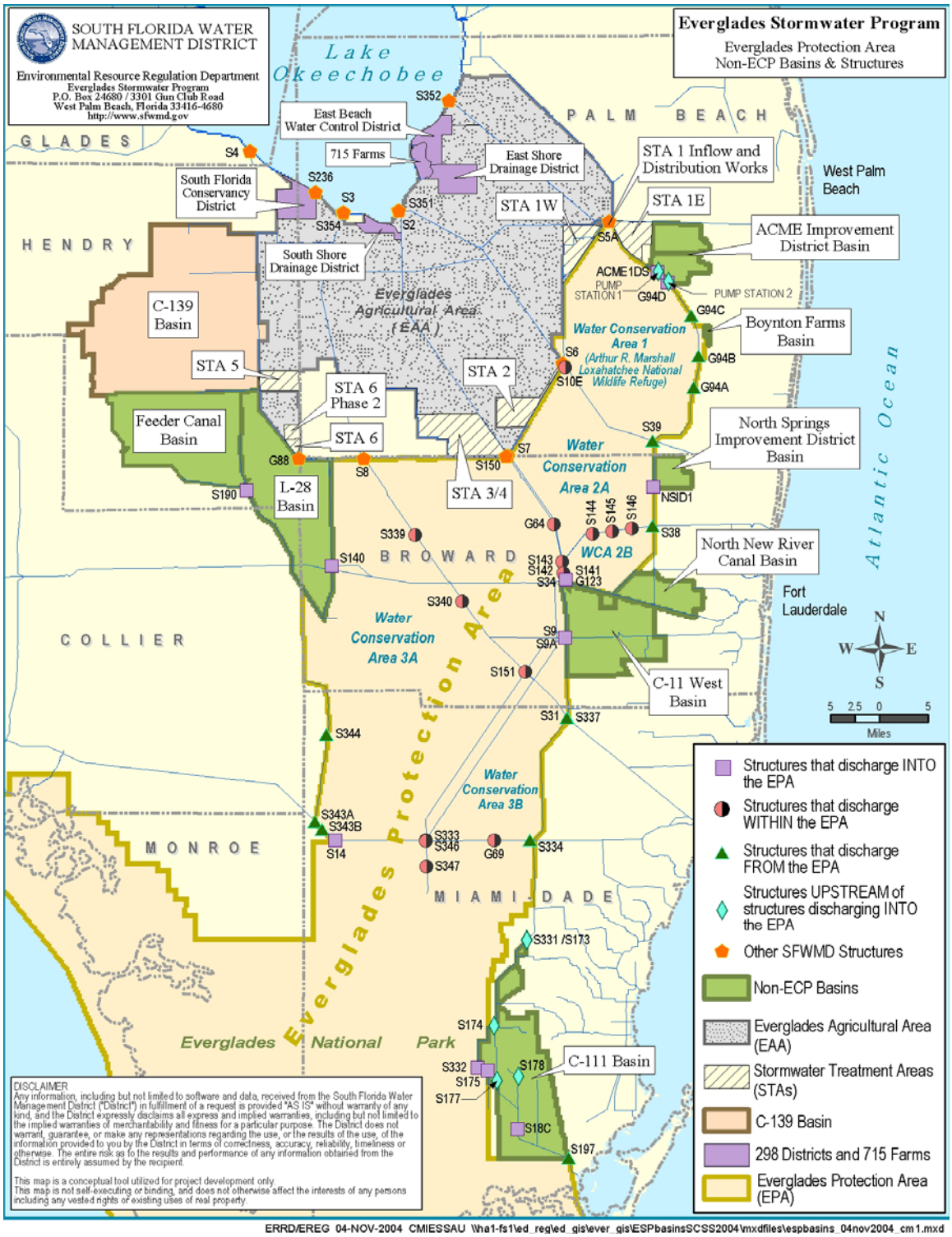

Figure 3-13. Non-ECP basins and primary water control structures within the Everglades Stormwater Program (ESP) boundary.

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 schedules and strategies 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 (RAS) and the Mercury Screening Program. Information contained in this chapter and other chapters of the *2005 South Florida Environmental Report* fulfills the reporting requirements of the non-ECP permit, as detailed in the specific conditions of the non-ECP permit. The requirements are summarized in **Table 3-12**. This information was previously described in detail in Chapter 11 of the 2000 Everglades Consolidated Report (SFWMD, 2001) Additional information on the Everglades Stormwater Program is also available on the District's Website at http://www.sfwmd.gov/org/reg/esp/.

The RAS, which was incorporated into the non-ECP permit, is the initial 10-step plan that was developed to provide a thorough assessment of each basin, using available information and data to develop scientifically sound water quality improvement strategies. Action plans were developed for each basin, and included a combination of voluntary BMPs, requirement for and/or modification of permits to include water quality criteria, construction projects, cooperative agreements, and/or public education. These plans also provided for coordination with other projects implemented through CERP, the Long-Term Plan, and other governmental agency programs that related to controlling loads discharged from the basins. An option not utilized in the ESP basins to date is a mandatory regulatory program. This option will be considered for implementation if the original action plans do not result in the desired improvements in water quality.

The first five steps of the RAS focus on the "into" structures directly discharging to the EPA. Steps 6 through 10 focus on the discharges upstream of the "into" structures that may be contributing to the TP loads. Steps 1 through 3 of the RAS required an inventory of all "into" 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 "into" structures (step 3). Steps 1 through 3 have been completed for all ESP basins (also referred to as non-ECP basins). Auto-sampling equipment for flow-proportional TP sampling have been installed at the "into" structures in the ACME Improvement District, NSID, NNRC, L-28, Feeder Canal, and C-11 West basins. Auto-sampling equipment for flow proportional TP sampling has also been installed at the S-18C "into" structure in the C-111 basin.

Step 4 included evaluating data from all "into" structures. This is ongoing as additional data continues to be collected. The data analyzed by the District dates back to 1978. These data were presented as part of the non-ECP permit in the non-ECP Structures First Annual Monitoring Report (SFWMD, 1999).

Step 5, which requires a shift of monitoring responsibilities from the District to the structure owner/operator for non-District structures, has been completed at the ACME Improvement District and NSID basins. The only other discharge points not owned or operated by the District are the Boynton Farms pumps. The District is continuing to monitor these points to ensure collection of data.

The RAS focus turns to discharges upstream of "into" structures under steps 6 and 7 requiring that discharges that are upstream of the "into" structures and have potential water quality concerns must be identified and any existing data must be characterized. Steps 6 and 7 have been completed in all ESP basins, where applicable. Currently, the basins are at varying stages of steps 8, 9, and 10. These steps require monitoring of upstream discharge locations, evaluating the data obtained and taking appropriate remedial actions, and shifting the monitoring burdens for

upstream structures to local governing bodies or property owners, respectively. The District has executed cooperative/cost-share agreements with local governments for upstream water quality monitoring within the ACME Improvement District, NSID, C-11 West, and NNRC Canal basins. Additional agreements will be pursued within these and other basins as needed. District personnel are conducting upstream sampling within the C-111, C-11 West, NNRC, and Feeder Canal basins.

Relevant RAS information for each of ESP basin is presented in the Everglades Stormwater Program Regulatory Action Strategy Status Report, available on the District's Website at http://www.sfwmd.gov/org/reg/esp/pdfs/rasrpt2002/rasrpt2002.htm. A summary is presented in **Table 3-13**. The data in this table indicate basin area, cooperative agreements in place in each basin, and how each basin interfaces with the relevant portions of CERP. Each basin action plan is detailed below.

Table 3-12. Non-ECP permit reporting requirements.

Specific Condition	Reporting Requirement	Location in 2005 SFER [2]
4[1]	New permit or permit modifications	Renewal in April 21, 2008
5	Submittal of Annual Report	Chapters 1, 2A, 2B, 3, 4, 7, and 8
6	Land acquisition and water treatment facility status update	2005 SFER – Volume II
7	First and second data evaluation reports	Completed in 1998 Annual Report
8	Regulatory Action Report	Chapter 3
9	Update on implementation of schedules and strategies	Chapters 1, 2A, 2B, 3, 4, 7, 8
10	Quality Assurance Manual	Current FDEP-approved manual
11	Mercury Screening Program Report	Chapters 2A and 2B
12	Annual Report, data requirements	See below
12 (b)	Dates of sampling	Appendix 3-2
12 (c)	Water quality sampling methodology	CompQAP 870166G (Sections 6.0 and 7.0)
12 (d)	Map of sampling locations	Chapter 3, Figure 3-13
12 (e)	Statement of sampling authenticity	Appendix 3-1
12 (f)	Comprehensive Quality Assurance Manual	CompQAP 870166G
12 (g) (I-v)	Water quality data and associated information	Appendix 3-2
12 (g) (iv)	Monthly flow volumes	Appendix 3-2
12 (h)	Water quality data evaluation	Appendix 3-2
12(I)	Recommendations for improving WQ monitoring	Completed in 1998 Annual Report
12 (j)	Implementation of strategies	Chapters 1, 2A, 2B, 3, 4, 7, 8
16	Monitoring Locations Report	Submitted to FDEP in 1998
19	Additional strategies (if developed)	Not applicable at this time

[1] Specific conditions 1–3 do not deal with reporting requirements and therefore are not referenced in this table.

[2] All cross-referenced chapters and appendices are applicable to the 2005 SFER – Volume I unless noted otherwise.

Table 3-13. Regulatory Action Strategy (RAS) summary table.

EFA Non-ECP Basins	Structures ID and Type*	County	Area (acres)	Receiving Area	Cooperative Agreements	CERP and Other Federal Projects
ACME Improvement District	ACME1DS (pump 1), Type 3 G94D (pump 2), Type 1	Palm Beach	18,894	WCA 1	WQ monitoring WQ improvement plan	ACME Basin B Discharge (CERP)
Boynton Farms	Several Private Pumps Types 3 & 4	Palm Beach	421	EPA	None	Palm Beach County Agricultural Reserve Water Reservoir (CERP)
North Springs Improvement District	NSID1 Type 3	Broward	7,064	WCA 2A	WQ monitoring & improvement	Site 1 Impoundment (CERP)
North New River Canal	G-123 Type 1	Broward	17,904	WCA 3A	OPWCD WQ monitoring & Improvement PAID WQ monitoring & improvement BDD WQ monitoring & improvement City of Sunrise WQ improvement plan	Divert Flows from WCA-2 to Central Lake Belt (CERP)
C-11 West	S-9 S-9A All Type 1	Broward	45,701	WCA 3A	SBDD WQ monitoring & improvement CBWCD WQ monitoring & improvement ITDD (Weston) WQ monitoring & improvement	C-11 West Impoundment/Diversion (CERP) C-11 West Critical Project
C-111	S-332 S-175 S-18C All Type 1	Miami-Dade	62,776	ENP	UF-TREC BMP Research Agreement	Interim Operating Plan for Cape Sable Seaside Sparrow CSOP C-111 Spreader Canal (CERP)
Feeder Canal	S-190 Type 1	Hendry	68,883	WCA 3A	Western Basins BMP Incentive Program	Tribal Critical Projects CERP Components
L-28	S-140 Type 1	Hendry, Collier & Broward	71,790	WCA 3A	Western Basins BMP Incentive Program	Tribal Critical Projects 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

WATER QUALITY IMPROVEMENT PLANS

The 10-step RAS basically outlined the initial data collection and evaluation phase of the ESP. From the RAS evaluations, water quality improvement plans or strategies were developed. These plans include:

- Cooperative agreements for monitoring as well as implementation of BMPs
- Educational programs on BMPs and water quality impacts to the Everglades
- Evaluation of construction projects
- Requirement for and/or modification to permits to address water quality concerns
- Development of local ordinances to manage TP sources within a basin

The District later conducted the Basin-Specific Feasibility Studies (BSFS) to integrate information from research, regulation and planning studies to evaluate alternative combinations of basin level source controls, regional treatment, and advanced treatment technologies.

The results of the BSFS were used to develop what is known as the District's Long-Term Plan, and was submitted to the FDEP in December 2003 as supplemental information for the application for the Long-Term Compliance Permit, as required by the amended EFA. To achieve the long-term water quality goals for discharges from the ESP basins, the plan proposes a combination of source controls and integration with diversion and construction activities planned as part of the CERP and/or other federal projects. The plan also includes cost estimates, funding mechanisms, and implementation schedules of the proposed water quality improvements plan. Additional information regarding the Long-Term Plan is discussed in Chapter 8 of the 2005 SFER – Volume I.

Previously-referenced cooperative/cost-share agreements executed by the District with local governments (municipalities and water control districts) within the ACME Improvement District, NSID, C-11 West, and NNRC basins require the development and implementation of BMPs. The District has provided in-kind services, expertise, and funding to aid these initiatives. Also, the BMP incentive (grant) program that provides funds for landowners who meet specific requirements to implement BMPs is still continuing within the C-139, L-28, and Feeder Canal basins. 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.

A major component of the water quality improvement plans is public education. District staff have developed an ESP Website, available online at http://www.sfwmd.gov/org/reg/esp/, which includes extensive information about the program as well as relevant BMP documents such as the Turf and Landscape BMP Manual for the C-11 West Basin (http://www.sfwmd.gov/org/exo/broward/c11bmp/index.html) and the Urban Stormwater BMPs (http://www.sfwmd.gov/org/reg/esp/pdfs/bmp_manual.pdf).

District staff has prepared a Public Outreach Plan for the ESP basins (http://www.sfwmd.gov/org/reg/esp/pdfs/pop_esp_112004.pdf). The Public Outreach Plan includes both new components and enhancements to the existing public outreach initiatives being implemented in the C-11 West basin. The plan also coordinates public outreach initiatives being

conducted by other District departments and governmental agencies to maximize resources and target audiences. Additional details of the ESP public outreach initiatives are described in the Public Outreach Plan. The Public Outreach Plan will benefit all basins within the ESP, but it will focus primarily on Broward County's ESP basins. Three of the eight ESP basins (C-11 West, NNRC, and NSID) are located within Broward County. Public outreach strategies that are specific to the ESP basins within Broward County are described below. Implementation of the Public Outreach Plan is expected to start in fall 2004.

Broward County stakeholders have worked with District staff on enhancements to the District's "Know-the-Flow" seminar to include a turf and landscape BMP components. The "Know-the-Flow" seminar presents information about primary, secondary, and tertiary stormwater management systems in lay-man terms. The goal is to have the more than 10,000 property managers in Broward County take this enhanced seminar to earn continuing education credits to maintain their licenses. Enhanced "Know-the-Flow" seminars for Broward County property managers have been offered monthly since April 2004.

District staff and stakeholders in Broward County have also formed working groups to develop nursery and equine BMPs for voluntary implementation. The purpose of these working groups is to develop area-specific BMPs for these industries, and to disseminate this information to the local business owners. A Nursery BMP Grant program for the C-11 West basin, which will assist nursery owners with the implementation of BMPs, is expected to be established in 2005. FDACS is assisting in the development of these BMPs by providing facilitation, coordination, organization, expertise, and publication resources. Once the nursery and equine BMP manuals are completed, FDACS plans to adopt them through the state rulemaking process. The BMP manuals are expected to be completed by December 2004, and adopted by state rule by December 2005.

As recommended in the Long-Term Plan, the District has partnered with the Broward County Department of Planning and Environmental Protection in coordinating a county-wide working group to develop a comprehensive pollution prevention plan with specific water quality goals and milestones. The working group, known as Broward Everglades Working Group, was established in May 2004. The Working Group members include representatives from government agencies, water management authorities (special drainage districts), local municipalities, and other stakeholders. The District will pursue pollution prevention activities such as erosion and sedimentation control enforcement during construction, promotion of turf and landscape BMPs for golf courses, adoption of pollution prevention ordinances, support and coordination of the District's Public Outreach Plan, etc. A comprehensive pollution prevention plan is expected to be completed by December 2004.

SCHEDULES AND STRATEGIES IN ESP BASINS

This section presents comprehensive water quality improvement plans developed for each ESP basin. The water quality improvement plans include the combination of source controls, diversion strategies, and capital improvement projects implemented and/or proposed in each of the ESP basins to meet the phosphorus criterion in the EPA. It includes structural and non-structural best management practices and public outreach activities by each stakeholder, as well as the timelines for their implementation. A brief basin description, including water quality monitoring results is included for each ESP basin.

The ESP basins source control schedules and strategies (water quality improvement plans) are a result of close coordination between the District and stakeholders (including local governments, special drainage districts, the Miccosukee and Seminole Indian tribes,

environmental interest groups, agricultural and urban communities, and other state and federal agencies), and are consistent with the Long-Term Plan.

ACME Improvement District Basin (Village of Wellington)

The ACME Improvement District is a dependent district of the Village of Wellington (VOW). The VOW occupies approximately 30 square miles and is located west of State Road 7, south of State Road 80, and east of WCA-1 in Palm Beach County. Land use within this basin is mostly residential in the northern portion (Basin A). Rural/agricultural areas are predominant in the southern portion (Basin B). There are also a number of horse farms and other equestrian facilities in Basin B. The major portion of Basin B, totaling 8,680 acres, and some drainage overflows from Basin A discharge via two pumps to the L-40 borrow canal within Water Conservation Area 1 (WCA-1). These two pump stations are known as VOW1 and VOW2. The discharges from VOW1 and VOW2 flow through the culvert structures ACME 1DS and G94D, respectively, into the L-40 borrow canal.

The District has been collecting grab samples for water quality at the two main discharge points into the WCA-1 (ACME 1DS and G94D) since the beginning of 1997. In March 1999, the District and the VOW entered into a water quality monitoring agreement that included the installation of composite autosamplers and flow recorders with telemetry at the VOW1 and VOW2 pump stations. Appendix 3-2h includes flow-weighted mean TP concentrations for ACME 1DS and G94D from WY1998–WY2004. The composite flow-weighted mean TP concentration from WY2001–WY2004 averages 80 ppb at ACME 1DS and 128 ppb at G94D.

The 1999 agreement also provided for upstream water quality monitoring (grab samples) at representative land use sites during flow events. A summary of the upstream water quality data and a map of the ACME Improvement District basin showing these data are included in Appendix 3-2h. Results from upstream monitoring reveal TP concentrations generally ranging from 20 to 200 ppb. TP concentrations below 50 ppb are associated with areas where permitted surface water management systems with substantial lake areas exist. Concentrations higher than 100 ppb are primarily associated with areas that have predominantly agricultural, nursery, and equine land uses within Basin B.

The VOW and the District executed a second cooperative agreement in May 2000 for the implementation of a water quality improvement plan. The plan included the 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, VOW has implemented a BMP ordinance that addresses the storage, handling, and transport of livestock waste; the proper use, storage and application of fertilizer (requiring the application of low phosphorus fertilizer only); and irrigation practices. The VOW has implemented an education campaign regarding water quality and BMPs, and has a dedicated staff member to oversee compliance with the BMP ordinance and other environmental related ordinances. The VOW has also implemented several maintenance BMPs within its canal right-of-ways, including raised inlets, sediment sumps, sediment removal, and canal vegetation harvesting.

The District entered into a third cooperative agreement with the VOW on September 2003 that will provide a District's cost share of up to $50,000 toward the remediation of "hot spots" within Basin B through a BMP implementation plan. The VOW will be designing and implementing agreed upon BMPs. Implementation of BMPs under this agreement is expected to be completed by September 2006.

To assist the VOW, the District has enhanced requirements for water quality treatment and BMPs in Environmental Resource Permit applications for the area, and has 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 VOW canal system. The District has dedicated staff members to oversee increased compliance and enforcement activities in Basin B.

For this basin, the Long-Term Plan relies on the implementation of source controls and the ACME Basin B Discharge Project that will divert all Basin B stormwater flows to the STA-1E by way of the C-51 West canal. The ACME Basin B Discharge Project, a component of CERP, is in the Project Implementation Report development phase. The District has purchased 374 acres within Section 24, west of the VOW, for future use in CERP as a wetland area with floodwater storage capability and environmental feature. To complement the CERP project, the VOW's conveyance system will be substantially modified to enable the diversion of flows from Basin B into Basin A, and then into the C-51 West canal. Once these modifications are built, the VOW1 and VOW2 pumps will no longer discharge stormwater flows to WCA-1. Representatives from the District, VOW, U.S. Army Corps of Engineers (USACE), and other agencies are part of the Project Delivery Team (PDT), and are pursuing the completion of this project by the end of 2006.

The Long-Term Plan recommends the allocation of $100,000 to assist the VOW in developing, evaluating, and implementing source controls or BMPs (Project Bc75 for FY2005–FY2006). The District expects to use these funds to enter into a fourth cooperative cost-share agreement with the VOW to develop additional BMP implementation plans by December 2005.

North Springs Improvement District Basin

The North Springs Improvement District (NSID) basin has an area of approximately 11 square miles, or 7,064 acres. It is located in northern Broward County along the eastern border of WCA-2A. The northern boundary is the Broward-Palm Beach county line. The Sawgrass Expressway transects the area, entering from the east and turning south as it exits along the western border. The basin is completely within the NSID, and includes the northern portion of the City of Coral Springs (north of Wiles Road), and the western portion of the City of Parkland (west of University Drive). Agricultural lands in the northern part of NSID are being converted into residential development.

Two pump stations, NSID Pump Stations 1 and 2, are used to discharge storm water north along the L-36N borrow canal to the Hillsboro canal, which discharges to tide. The NSID is included in the ESP because NSID Pump Station 1 is permitted to pump into WCA-2A when the L-36N borrow and Hillsboro canals are not capable of accepting additional flows.

In September 2000, the District and the NSID entered into a cooperative agreement that provided a District's cost share of $50,000 to address water quality and quantity concerns. The intended objective of this agreement was for local programs to more effectively monitor and improve water quality to meet the objectives of the EFA. The NSID surface water management master permit was modified to require both discharge and upstream monitoring of water quality during flow, in accordance with the steps in the RAS.

The District and NSID have been monitoring the water quality at NSID Pump Station 1 since 1990. A composite autosampler was installed at this pump station in 2001. No TP data from this auto-sampler was available from WY2002–WY2004 because of either the failure of the analytical

reports to include QA/QC data that are required for all water quality data submitted to the District, or lack of flows into WCA-2A. Appendix 3-2h includes arithmetic average (grab samples) and flow-weighted mean TP concentrations for NSID Pump Station 1 from WY1998–WY2004. The arithmetic average of TP concentrations for grab samples in the last three water years is approximately 23 ppb.

In accordance with the cooperative agreement, monitoring at upstream sites was initiated to identify possible sources of phosphorus. A summary of the upstream water quality data and a map of the NSID basin showing these data are included in Appendix 3-2h. From June 2001 to the present, the average TP concentration at NSID Pump Station 2 (NSIDNP02) was 41 ppb. The inputs from the eastern basin, through site NSIDEC02, show lower levels of TP at 28 ppb. The unique characteristics of this eastern basin versus other areas in NSID are that the control elevation is 9 feet National Geodetic Vertical Datum (ft NGVD) and it is completely developed, whereas the western basin has a control elevation of 7 ft NGVD and it has ongoing development activities and operating golf courses. Historically, the highest upstream levels of TP were found in the discharges from the northern sub-basin with averages at three monitoring sites of 49, 88, and 178 ppb, respectively, over the period of record (June 2001 to the present). This basin was previously an agricultural area, but it is in the process of being converted to residential and commercial uses over the next few years. The development plans for these areas will include water management provisions that will exceed the minimum permit criteria and provide additional storage and water quality treatment. It is expected that 95 percent of the currently undeveloped areas in the northern part of the basin will be developed by December 2006. Based on sample results, the best water quality in the entire basin is at NSID Pump Station 1, which has a large attenuation lake directly preceding it.

Because the NSID basin preferentially discharges to the Hillsboro Canal via the L-36N borrow canal and only pumps to WCA-2A during times of potential flooding, significant reductions in discharges to WCA-2A may be possible through additional storage in the basin or redirection of excess flows. Operational BMPs (more effective management of pump regimes) have been implemented which have reduced discharges from this basin into WCA-2A. As a result, the last two confirmed discharges from NSID Pump Station 1 into WCA-2A occurred in July 2002 and September 2004.

The NSID has installed an inter-basin transfer pump station, with a capacity of 25,000 gallons per minute, which will move water to the east during times of high water in the western basin. This will serve to further reduce the need to pump to WCA-2A. Telemetry with remote pump control, level sensors, pump discharge adjustment, and other important operational appurtenances will be installed and utilized to maximize pumping efficiencies and further reduce the need to pump into WCA-2A. The telemetry installation is expected to be completed by December 2006.

The NSID currently requires the renewal of surface water permits every five years to ensure the stormwater management systems are working appropriately. District staff is coordinating with Coral Springs and Parkland, which have areas within NSID basin boundaries, to pursue public outreach activities, develop water quality improvement and pollution prevention activities, and facilitate BMP implementation designed to reduce the flows and TP concentrations in their stormwater discharges. Much of the drainage infrastructure in this basin is under the control of local homeowner's associations. As part of the District's efforts, NSID stakeholders and many others are included in the District's Public Outreach Plan and the Broward Everglades Working Group.

For this basin, the Long-Term Plan relies on the implementation of source controls and the diversion of current NSID releases made to WCA-2A to the CERP Hillsboro Site 1 Project. The CERP Hillsboro Site 1 Project, scheduled for completion in 2007, consists of a 1,600-acre impoundment located on the north side of the Hillsboro Canal just east of WCA-1. The project also includes planned conveyance improvements to structure S-39A, located at the north end of L-36N borrow canal where flows enter the Hillsboro Canal, and improvements to a section of the Hillsboro Canal.

The Long-Term Plan allocated funds to conduct a hydraulic/hydrologic evaluation of storm events in the NSID Basin to determine if there would be any negative impacts to the Hillsboro Canal from redirecting storm water away from WCA-2A to the CERP Hillsboro Site 1 Project (Project Bc71). This evaluation was to include an assessment of the potential for connecting adjacent lake areas to the NSID water management system for additional surface water storage (i.e., water management operations will be evaluated to determine how more water may be retained within the basin or discharges could be more tightly regulated to minimize the need to pump into WCA-2A, except under extreme circumstances). The District hired a consultant to perform this evaluation, which was completed in July 2004. The evaluation determined the water elevations on the Hillsboro Canal would increase during large storm events. The District plans to perform further analysis of this issue to evaluate potential mitigation measures. The District expects to complete this evaluation by July 2005. If mitigation measures are determined unfeasible, then it may be possible that some NSID flow during a large storm event would have to be discharged to the EPA to avoid flooding impacts in the Hillsboro Canal basin. Because of these possible negative effects, the Long-Term Plan recommendation of redirecting all NSID flows away from the EPA may not be feasible. If necessary, the District will evaluate the potential TP loads that could be expected to enter the EPA during large storm events.

C-11 West Basin

The C-11 West Basin is a rapidly urbanizing basin located in south central Broward County west of Ft. Lauderdale that drains into the current Everglades system. This basin has an area of approximately 72 square miles, approximately 61 percent of which has been developed. Sixteen percent of the basin area is used for a combination of agriculture and nursery operations, and the remaining areas are wetlands, rangelands, or forested uplands. The excess water in this basin, comprised of stormwater runoff and ground water seepage from the EPA, is pumped from the C-11 West Canal via the S-9 and S-9A pump structures into WCA 3A. The S-9A pump structure was put into operation in early 2003.

The C-11 West basin covers most or parts of the cities of Weston, Sunrise, Cooper City, Pembroke Pines, the towns of Davie and Southwest Ranches, and unincorporated areas of south central Broward County. There are three drainage districts within the C-11 West Basin: Indian Trace Development District (ITDD), South Broward Drainage District (SBDD), and Central Broward Water Control District (CBWCD). These drainage districts operate and maintain the secondary canals draining into the C-11 West canal.

There has been extensive water quality monitoring at the primary discharge structure, the S-9 pump station. The District has been collecting grab samples for water quality data at this structure since December 1977 and a composite auto-sampler began collecting samples at S-9 in December 1996. Appendix 3-2h includes flow-weighted mean TP concentrations for S-9 from WY1998–WY2004. The composite flow-weighted mean TP concentration from WY2001–WY2004 averages 19 ppb. Appendix 3-2h also shows the composite flow-weighted

mean TP concentration for S-9A at 13 ppb in WY2004. The S-9A pump station discharges mostly seepage returns into WCA-3A and, therefore, it is expected to show lower TP concentrations.

Pursuant to the RAS, the District entered into cooperative and cost share agreements with all three drainage districts within the C-11 West Basin (**Table 3-14**). The purpose of the agreements is to implement local water quality monitoring and improvement programs that will help meet the objectives of the EFA. The tasks include establishing public involvement activities, monitoring programs for upstream structures, and implementing appropriate BMPs designed to reduce nutrient loads being discharged in stormwater flows. The agreements include stipulations that require remedial actions be taken where hot spots are identified and may require construction of capital improvement projects.

Table 3-14. Agreements with local drainage districts in C-11 West basin.

Drainage District	Amount of Agreement	Date of Agreement
CBWCD	$50,000	September 2000
SBDD	$50,000	October 2000
ITDD	$15,000	May 2002

Upstream water quality monitoring has already yielded a significant amount of data indicating the TP concentrations in the basin. A summary of the upstream water quality data and a map of the C-11 West basin showing these data are included in Appendix 3-2h. Results from upstream monitoring reveal TP concentrations generally ranging from 7 to 50 ppb. TP concentrations between 7 to 25 ppb are associated with areas where permitted surface water management systems exist. TP concentrations between 25 to 50 ppb are associated with older residential areas, which lack permitted surface water management systems. It has also been observed that TP concentrations increase during periods of construction due to sediment erosion. Concentrations higher than 50 ppb are primarily associated with areas that have predominantly agricultural and/or nursery land uses.

Several public involvement activities are being implemented in the C-11 West basin that include a variety of strategies aimed at educating stakeholders and the public. The aim of these educational programs is to motivate the residents and stakeholders in the basin to implement changes that will result in enhanced water quality and reduced phosphorus levels in stormwater discharges. To initiate the campaign, the District and the Broward County Extension Education Division hosted the first C-11 West Canal Basin Working Group in early 2000. The 36-member working group included representatives of landscaping interests, fertilizer industries, government agencies, colleges, universities, special interest groups, and environmental organizations. The group developed turfgrass and landscaping BMPs that will help residents reduce pollution without sacrificing the basin's urban landscapes. The Turf and Landscape Best Management Practices Manual was incorporated into a "mini-Website" that was posted on each of the working group member Websites.

The District has been instrumental in forming the Freddy's Friends Club and the Teddy's Friends Club, the District's and CBWCD's mascots, respectively, at elementary schools in the basin. The program has also posted interpretive signs along the C-11 West canal and selected secondary canals. The signs communicate the canal's role in flood protection, its connection to the Everglades and the concept that residents' activities affect water quality.

The C-11 West basin includes a regulatory component to source controls. The District's Environmental Resource Permits within this basin have been required, when necessary, to provide additional pretreatment facilities/features to offset adverse water quality impact from new developments.

For the C-11 West basin, the Long-Term Plan relies on the implementation of source controls and CERP projects as the primary means of reducing TP discharges to WCA-3A from the C-11 West basin. The Western C-11 Impoundment and Diversion Canal CERP Project, scheduled for completion in January 2006, consists of a 1,600-acre STA/impoundment within the C-11 West basin, and approximately 8 miles of canal that will divert flood waters to other CERP storage areas. This impoundment will be located north of the C-11 West canal and east of U.S. Highway 27. This project is complemented by the ongoing C-11 West Basin Critical Project, which includes structural and operational changes to the water management system by isolating WCA-3A seepage from C-11 West basin runoff. The combination of a proposed divide structure (S-381, scheduled for completion by the end of 2004), and the S-9A pump station (completed) will contain and return seepage to WCA-3A. It is expected that the TP levels going into WCA-3A will be reduced by back-pumping clean seepage water, and by decreasing operation of the larger S-9 pumps, which cause scour and drawdown. In addition, the North Lake Belt Storage CERP Project, scheduled for completion in June 2036, will further reduce to a minimum the stormwater flows pumped into WCA-3A through S-9.

The Long-Term Plan allocated funds to conduct an evaluation of the potential connection between the Western C-11 Impoundment and the WCA 3A/3B Levee Seepage Management CERP projects, and potential internal enhancements to the impoundment for water quality improvements (Project Bc73; FY2004–FY2005). The District hired a consultant to complete an evaluation of the stormwater treatment potential of the proposed Western C-11 impoundment. The consultant determined that an additional TP reduction of 3 to 5 percent could be achieved if excess stormwater inflows are routed through the impoundment. ESP staff is working with the Water Preserve Area PDT to pursue a modification to the impoundment design and operation to accommodate the routing of excess flows.

The Long-Term Plan also allocated funds to assist local communities in developing, evaluating and implementing source controls or BMPs (Project Bc73; FY2005–FY2006). These funds will also be used to help with the implementation of the Public Outreach Plan, starting in fall 2004.

The sections below present source control schedules and strategies for each of the drainage districts within the C-11 West basin.

SOUTH BROWARD DRAINAGE DISTRICT

Non-Structural BMPs: South Broward Drainage District (SBDD) is now requiring the renewal of surface water permits every year to ensure the stormwater management systems are working appropriately. Owners renewing a permit for their property must have it inspected and certified by a professional engineer. If the inspection reveals a problem, then this must be corrected prior to the certification.

SBDD personnel perform regular inspections and maintenance of canals. If livestock manure on or near a canal is determined to be a potential problem, then the property owner is advised to take the appropriate corrective action. Property owners failing to take corrective actions may be referred to the county's Department of Planning and Environmental Protection.

Structural BMPs and Operational Changes: Drainage facilities for the S-9 and S-10 sub-basins of the SBDD will be modified to provide additional stormwater treatment. Both basins, totaling about 10 square miles, will be interconnected and control structures will provide 1.5 inches of stormwater runoff detention prior to discharging into the C-11 West canal. Three control structures are planned to replace six unrestricted outfalls, which presently do not provide for any detention within these basins. It is expected this project will be completed by December 2006. The District's CERP division is to contribute $1 million toward the cost of this $3.6 million project.

The SBDD is also in the process of closing three more unrestricted outfalls located within S-8 sub-basin. Stormwater runoff currently draining through these unrestricted outfalls will be rerouted through the existing SBDD S-8 pump station. A total of $30,000 will be contributed by the District under its agreement with the SBDD toward the cost of rerouting the flows through the S-8 pump station. It is expected the closing of the unrestricted outfalls will be completed by December 2005. In addition, the surface water permit for this pump station will be modified to provide 1.5 inches of stormwater detention prior to discharge. This would provide an additional 0.5-inch detention over the current permit conditions. It is expected that operational changes associated with the permit modification will be implemented by December 2005.

Public Outreach: The SBDD is in the process of developing a Website that will have links to all BMP documents and manuals produced for this area. This Website is expected to be online by December 2004. In addition, the SBDD is an active participant of working groups that develop BMPs.

CENTRAL BROWARD WATER CONTROL DISTRICT

Non-Structural BMPs: Central Broward Water Control District's (CBWCD) surface water permits for construction include added special requirements such as:

- construction of littoral shelves in new lakes
- renewal of surface water permits every 5 years
- floodplain encroachment analysis
- more stringent criteria, if deemed necessary

In addition, single family properties not served by a surface water management system are required to maintain 30 percent of the parcel undeveloped at its natural elevation and erect a berm to retain a 25-year, 3-day storm event. The CBWCD ensures these requirements are met prior to issuing any permits to the single family property. The CBWCD also has authority to require any property owners to correct existing and potential problems, if deemed necessary. When maintaining canals, CBWCD personnel advise livestock owners if manure is determined to be a potential pollution problem for the canal.

Structural BMPs and Operational Changes: In December 2003, the CBWCD completed a C-11 West Basin Comprehensive Facilities Report Update, which included the development of a stormwater model of the entire C-11 West basin, identification of problem areas, evaluation of improvement alternatives, cost estimates, and specific recommendations for flood and water quality control including ranking of capital improvement projects. The report recommended $1.1 million in capital improvements for immediate implementation. The CBWCD budgeted $400,000 in capital improvement projects for FY2004 to begin implementation of the capital improvement program. Additional funds will likely be budgeted for FY2005 to continue project implementation of these capital improvement projects.

On October 22, 2003, the CBWCD Board of Commissioners passed a motion to work cooperatively with the District to fund and implement water quality improvement projects in the C-11 West basin. The board also directed the CBWCD Engineer to begin detailed modeling and preliminary design of water control structures to be located at each of the points of discharge of the secondary canals into the C-11 West canal. These water control structures are intended to supplement the over $1.1 million in capital improvement projects recommended in the C-11 West Facilities Report. This project is currently under way and includes new canals and culverts to redirect runoff from basins with limited storage to basins with excess storage capacity. Taking advantage of excess basin storage capacity reduces flood levels, improves water quality, increases aquifer recharge, and reduces the volume of runoff discharged by the CBWCD into the C-11 West canal. The proposed water control structures are intended to further increase storage and retention capacity with the secondary canal system prior to discharge into the C-11 West canal. The greatest benefit of these control structures will be to control runoff from older areas developed prior to modern regulatory requirements for stormwater management systems. By attenuating runoff, many pollutants settle out of the water column or are absorbed through biological processes.

The proposed water control structures are estimated to cost an additional $1 million, bringing the total cost of water quality improvement projects for the CBWCD western basin up to $2.1 million. The proposed structures are currently in preliminary design, and should be ready to begin construction by FY2005. The District, under its agreement with CBWCD, contributed $39,000 to pay for the cost of preliminary design. The District's budget for FY2005 includes a legislative appropriation of $1 million to assist the CBWCD in payment for the construction of the water control structures.

Public Outreach: The CBWCD has a Website with links to the C-11 West Turf and Landscape BMP site, and in the future will have links to all BMP documents and manuals produced. Also, CBWCD does water quality presentations at local elementary schools, and has established Freddy's and Teddy's Friends clubs. The drainage district does water quality presentations for local homeowners associations and at public meetings in the towns of Davie and Southwest Ranches, and sponsors and participates in the town of Davie Annual Waterway Cleanup, in which the CBWCD also distributes fliers and brochures that deal with water quality problems and pollution prevention. In addition, CBWCD has installed six interpretive signs at

their secondary canals N-32, N-27, N-18, S-7, S-22, and S-35. CBWCD has been and is an active participant of working groups that develop BMPs.

INDIAN TRACE DEVELOPMENT DISTRICT (CITY OF WESTON)

The City of Weston has direct control of Indian Trace Development District (ITDD) and Bonaventure Development District (BDD). The BDD is located within the NNRC basin, which is another ESP basin. Therefore, the initiatives and strategies listed under the *Non-Structural BMPs* and *Public Outreach* sections below also apply to the BDD.

Non-Structural BMPs: The City of Weston employs a contractor to sweep 114 miles of curb on main roads three to four times per year. The city has inventoried all of the approximate 600 catch basins within the city's right-of-ways using a computerized system, and contracts to have these areas cleaned at least once every 18 months, or as needed. The city also does aquatic control of the canals and lakes. City crews also perform the following maintenance activities:

- Inspect catch basins regularly and after storms (French drains are maintained and inspected more often)
- Inspect and maintain water control structures (culverts, weirs and pumps)
- Remove from lakes floating trash, garbage and large items (bikes, shopping carts)

The city has three landscaping contractors (two for the ITDD area and the other for the BDD area), and each may subcontract pest control or fertilizing activities. Contracts are for three to five years and include city right-of-ways (medians and swales), public parks, public facilities (fire stations, public utilities, etc), and in certain areas, road maintenance extending from "edge of water to edge of water" (i.e., the maintenance goes beyond the swale to the edge of water). Per the contracts, contractors use only the amount of fertilizers that plants can take, requiring soil testing; phosphorus content on fertilizers used varies between 2 to 5 percent; pest control is based on a certain threshold before pesticides are applied and a log is kept for each application: (1) irrigation is limited for 1 to 1.5 inches per cycle (twice per week on sandy areas and once per week on mucky areas), (2) grass clippings on hard surface must be blown back onto grass, and (3) leaves must be removed.

A consultant in charge of the City of Weston Engineering Department does the permit approvals for construction and performs the construction inspections. During these inspections, it is ensured that erosion and sedimentation control measures are in place and working properly.

Structural BMPs and Operational Changes: Most of the ITDD is served by a pump system. The District and the city's consultant will investigate the possibility of modifying the ITDD's operational criteria to increase the stormwater detention to 1.5 inches prior to discharging into the C-11 West Canal. A preliminary investigation is expected to be completed by March 2005.

Public Outreach: The city has included general pollution prevention information in its quarterly newsletter. The newsletter is mailed to every household within the city, and is also available for pick up at city facilities. The city has a webpage, public access channel and radio, and a public information staff for outreach purposes. The city also has a database listing of all homeowner associations including the management companies.

North New River Canal Basin

The NNRC basin occupies an area just under 30 square miles, and is located southeast of WCA-2B, west of the Florida Turnpike. The bulk of the basin lies immediately north of I-595 in Broward County, and covers most or part of the cities of Plantation, Sunrise, and Weston. The NNRC basin is almost completely developed with predominantly residential and commercial land uses. There are eight sub-basins within the NNRC basin: Old Plantation Water Control District (OPWCD), Plantation Acres Improvement District (PAID), Bonaventure Development District within the City of Weston (BDD), the City of Sunrise, the City of Plantation (not within a drainage district), and Markham Park. The outfalls of the two remaining sub-basins (Lago-Mar Country Club and the Sunshine trailer park) are privately owned.

The "into" structure serving this basin and discharging into WCA-3A is G-123, located at U.S. 27 and I-75. This structure is mainly used for water supply to WCA-3A and is not intended to be used for flood control. However, during large storm events, the pumps at G-123 may be turned on to provide some flood relief for the basin when storage capacity is available in the WCAs. Operation of these pumps is not on any regular schedule, and varies significantly with rainfall and water stage. Flood relief for this basin is mainly provided by the G-54 structure located on the North New River Canal, just west of the Florida Turnpike, which discharges to tide.

The District has been collecting grab samples for water quality data at the G-123 structure since December 1982. A composite auto-sampler was installed at G-123 in October 2000. Appendix 3-2h includes flow-weighted mean TP concentrations for G-123 from WY1998–WY2004. The composite flow-weighted mean TP concentration from WY2001–WY2004 averages 15 ppb. The flow volume discharges from the G-123 pump station have been reduced significantly, due to the operational changes implemented by the District, with none or insignificant flow volumes in the last two water years.

Pursuant to the RAS, the District entered into cooperative and cost share agreements with four of the eight entities within the NNRC (**Table 3-15**). The agreements outline procedures to implement local water quality monitoring and improvement programs that will help meet the requirements of the EFA. The tasks considered in the agreements include the continuation of monitoring programs for upstream structures and implementation of appropriate BMPs designed to reduce nutrient loads being discharged in stormwater flows. The agreements include stipulations that require remedial actions be taken where hot spots are identified and may require construction of capital improvement projects. Agreements with the remaining sub-basins were either not possible or not practical. The District will pursue implementation of non-structural BMPs in these sub-basins.

Table 3-15. Agreements with local drainage districts and cities in the NNRC basin.

Drainage District/City	Amount of Agreement	Date of Agreement
OPWCD	$25,000	September 2001
PAID	$50,000	March 2002
BDD	$10,000	May 2002
CITY OF SUNRISE	$15,000	December 2003

Upstream water quality monitoring has yielded data indicating that TP concentrations found in the basin generally range from 10 to 80 ppb. A summary of the upstream water quality data and a map of the NNRC basin showing these data are included in Appendix 3-2h. TP concentrations between 10 and 25 ppb are associated with areas where permitted surface water management systems exist. TP concentrations between 25 and 50 ppb are associated with older residential areas that lack permitted surface water management systems. Areas where TP concentrations exceed 50 ppb are associated with golf courses or ongoing construction.

Public outreach initiatives for PAID, OPWCD, BDD, and the cities of Sunrise and Plantation will be developed as part of the ESP Public Outreach Plan and will be done in coordination with stakeholders and landowners in the basin.

For this basin, the Long-Term Plan relies on the implementation of source controls and the discontinuation in use of the G-123 pump station after December 31, 2006, other than as may be absolutely necessary for water supply, until completion of the CERP project as the primary means of reducing TP discharges to WCA-3A from the NNRC basin. The WCA-2 and WCA-3 Diversion Project (CERP component YY4) is to be completed by 2018, and includes the construction of a new basin divide structure across the North New River Canal at Markham Park and canals to reroute urban runoff from the Bonaventure pump stations to the North New River Canal downstream (east) of the new divide structure. The new divide structure will effectively eliminate urban runoff from the NNRC basin from discharging to the WCA-3A. Seepage from WCA-2B that is collected in the L-35A borrow canal will be redirected into new canals, which will convey it south to the Everglades National Park.

Basin stakeholders have expressed concerns that discontinuing use of the G-123 pump station may reduce flood protection in the basin. Prior to discontinuing the use of the G-123 pump station, a detailed flood impact analysis will be performed to ensure that the basin's current level of flood protection is maintained. The Long-Term Plan has allocated funds to perform the flood impact analysis (Project Bc72). It is expected this analysis will be completed by July 2005.

The sections below present initiatives and strategies for each of the drainage districts and cities within the NNRC basin.

PLANTATION ACRES IMPROVEMENT DISTRICT

Plantation Acres Improvement District (PAID) has a continuous inspection program which may revoke private stormwater management system permits older than five years if it is determined the private system is not working appropriately. In addition, PAID crews clean and spray canals to keep them free from excessive vegetation.

PAID is in the process of upgrading all six pump stations discharging into the C-42 Canal. The upgrades include replacement of pumps and motors as well as automation and remote control of operations. The cost of this project is estimated to be about $462,000, and is expected to be completed by 2006. Also, PAID expects to have a permanent budget item of $50,000 per year to improve road side swales and install catch basins and drainage pipes. The District will contribute $44,000 under its agreement with PAID toward the cost of these capital improvement projects.

OLD PLANTATION WATER CONTROL DISTRICT

The Old Plantation Water Control District (OPWCD) requires the renewal of surface water permits every five years to ensure stormwater management systems are working appropriately. In addition, the OPWCD uses a harvester to remove excessive aquatic vegetation, and performs regular canal maintenance.

The OPWCD has proposed to add remote sensing equipment to its four pump stations to allow for collection of real time information. This information will allow reduction of pump discharges from the two pump stations that discharge to the North New River canal west of the G-54 structure, and redirection of some of the discharge through the other two pump stations, which discharge to tide.

BONAVENTURE DEVELOPMENT DISTRICT (CITY OF WESTON)

The City of Weston has direct control of the Bonaventure Development District (BDD) and the ITDD. The ITDD is located within the C-11 West basin, which is another ESP basin. Therefore, the schedules and strategies listed under the *Indian Trace Development District* section also apply to the BDD.

Feeder Canal Basin

The Feeder Canal basin is largely agricultural, consisting of approximately 107 square miles (or 68,883 acres) located in Hendry County. The canals and structures within this basin provide flood protection and drainage within three sub-basins in addition to conveying excess runoff to WCA-3A for water supply and environmental use. The two major canals associated with the Feeder Canal basin are the North Feeder and the West Feeder canals. These two canals merge in the lower southeastern corner of the basin, and discharge south through the S-190 structure into the L-28 Interceptor canal, and eventually into WCA-3A. These major canals provide drainage for the western portion of the Big Cypress Seminole Indian Reservation, plus privately owned agricultural land lying north and west of the reservation. Two secondary canals also exist in the Feeder Canal basin located upstream of the West Feeder canal.

Of the three major sub-basins within the Feeder Canal basin, the North Feeder sub-basin, consisting of approximately 23,150 acres, is under the operation of a single family enterprise (known as the McDaniel Ranch). Land uses within this basin include cattle on unimproved and improved pastures, sugar cane, row crops, and large tracts of undeveloped natural areas. Another sub-basin, a section of the Big Cypress Seminole Indian Reservation, is about 13,850 acres. Seminole land uses are similar to the North Feeder sub-basin, as they include cattle on unimproved and improved pastures, citrus, sugar cane, and large tracts of undeveloped natural area. There are approximately 28 private property owners in the third major sub-basin, the West Feeder sub-basin. Approximately 31,900 acres of the West Feeder sub-basin is the headwater tributary to the West Feeder Canal, with the primary surface water drainage system consisting of two canals, the Lard Can and the Wingate Mill canals.

The District has been collecting grab samples for water quality data at the S-190 structure since 1987, and a composite auto-sampler began collecting samples in August 2000. Appendix 3-2h includes flow-weighted mean TP concentrations for S-190 from WY1998–WY2004. The composite flow-weighted mean TP concentration from WY2001–WY2004 averages 102 ppb.

Water quality sampling is well established in two of the three sub-basins through a variety of permit conditions and/or land-owner agreements. In the North Feeder sub-basin, water quality monitoring is detailed within an Environmental Resource Permit (Permit No. 26-00239-P) issued to the McDaniel Ranch for their internal detention areas and final discharge locations (District's structures PC-17A and G-108) into the North Feeder canal. In addition, the landowner's agreement between the McDaniel Ranch and the Seminole Indian Tribe of Florida identifies the same two discharge locations (PC-17A and G-108) as water quality compliance points, and enumerates the "target level" for this discharge at 50 ppb. TP concentrations and loads are summarized at the end of the water year, and documented in compliance letters issued to the McDaniel Ranch. Appendix 3-2h includes a summary of TP concentrations and loads for the McDaniel Ranch from WY1999–WY2004. The summary combines flows and loads for both outfall structures (PC-17A and G-108). The combined flow-weighted mean TP concentrations from WY1999–WY2004 have decreased from about 500 ppb to about 120 ppb.

The landowner's agreement between the District and the Seminole Indian Tribe of Florida stipulates water quality monitoring within the Big Cypress Seminole Indian Reservation. Under this agreement, water quality for discharges into the Seminole reservation land from the West Feeder sub-basin is monitored at the WWEIR. Water quality at the WWEIR monitoring location is representative of the entire West Feeder sub-basin. The flow-weighted mean TP concentrations from WY2002–WY2004 at this monitoring station for this period average 71 ppb. These data are summarized by the District in progress reports, Total Phosphorus Load Calculations for Sites Stipulated in the SFWMD/Seminole Tribe Agreement. These reports can be found online at http://www.sfwmd.gov/org/reg/esp/pdfs/seminole/index.htm.

Upstream water quality monitoring within the West Feeder sub-basin has been less intense. However, information from a past water quality sampling survey conducted by the District did not demonstrate high TP levels (generally below 32 ppb). This grab sampling was considered a survey because it was conducted only for a brief period of time (from June 26, 1996 through October 31, 1997), and it did not attempt to quantify any other inputs, such as flow, rainfall, land use, etc. A summary of grab sampling survey and a map of the Feeder Canal basin showing these data are included in Appendix 3-2h.

The District will continue to evaluate water quality within this basin by initiating water sampling programs for discharges upstream of the S-190 structure. The objective of these programs will be either to confirm the level of success from present BMPs, or highlight the need for additional BMPs.

A major component of the source control strategies in this basin includes the District's C-139 and Western Basins BMP Grant Program (Feeder Canal, L-28, and C-139 basins). Within these basins, the District's governing board has approved funds of $900,000 since FY2002 in support of projects that would implement water quality improvement BMPs. Approximately $402,000 out of the $900,000 has been awarded to projects within the Feeder Canal basin. The District has partnered with the Hendry Soil and Water Conservation District (HSWCD) to implement the grant program. Additionally, the Natural Resource Conservation Service (NRCS) provides cost-share dollars through their Environmental Quality Improvement Program (EQIP) and Wetland Restoration Program, and offers technical design and implementation of BMPs through their Resource Conservation Plans. The FDACS provides further support and assistance, allowing the landowners to reach a 75-percent cost-share requirement with the NRCS. Workshops that provide education about BMPs, available landowner assistance programs, and guidance in developing on-farm conservation plans are ongoing. The 2002–2003 Western Basins Area BMP Grant Program Annual Report provides further details on these projects, and can be found online at http://www.sfwmd.gov/org/reg/esp/pdfs/wbasins_bmp_grant_program_annrpt.pdf.

For the Feeder Canal basin, the Long-Term Plan recommended the implementation of source controls. The Long-Term Plan allocated funds to implement voluntary source controls or BMPs in the West Feeder sub-basin (e.g., those lands tributary to the Wingate Mill and Lard Can canals), as part of the BMP Incentive Program for the Feeder Canal basin (Project Bc74; FY2004–FY2006).

The Long-Term Plan also recommended the accelerated completion (by 2009) of the Big Cypress/L-28 Interceptor Modifications CERP Project as the primary means of reducing TP discharges to WCA-3A from the Feeder Canal basin. The Big Cypress/L-28 Interceptor Modifications CERP Project, scheduled for completion in June 2015, will degrade the west berm along the L-28 interceptor canal to allow for sheet flow of storm waters into the Big Cypress National Preserve, and then into WCA-3A. The project also includes the conversion of the S-190 structure from a gated spillway to a pump station, and the construction of two STAs within the Feeder Canal basin, to meet applicable water quality standards in downstream receiving waters. The District has determined that the Big Cypress/L-28 Interceptor Modification CERP Project cannot be accelerated and completed by 2009. Therefore, this project will be completed by 2015, as originally scheduled. The District also met with stakeholders in early 2004 to discuss the benefits of an interim pump at S-190, with an associated downstream plug to encourage sheetflow into Big Cypress National Preserve. However, after further investigation, it was determined the interim project was not feasible, primarily because of concerns with the level of phosphorus concentrations.

For this area, the Long-Term Plan relies on the implementation of the Seminole Tribe Big Cypress Reservation Water Conservation Plan, a Federal Critical Restoration Project being funded by the USACE under Section 528 of the 1996 Water Resources Development Act. The project, scheduled to be completed by late 2006, involves improvements designed to improve water quality, restore wetland hydrology, increase water storage capacity, and enhance flood protection within the reservation.

The Long-Term Plan also relies on the completion of the surface water management system for the McDaniel Ranch (located within the North Feeder sub-basin). This system, currently scheduled to be completed by December 2006, will provide stormwater detention and pre-treatment prior to discharge. The system is being built pursuant of the landowner's agreement between the McDaniel Ranch and the Seminole Indian Tribe of Florida, which also requires BMP implementation within the McDaniel Ranch. As part of the refurbishing of the PC-17A gated structure, the District incorporated various improvements (e.g., adding non-removable sediment boards, replacing wood boards with metal material, digging a sediment sump upstream of the structure, and improving vegetation barriers) to affect BMPs directly at the structure. When possible at the time of scheduled maintenance for other structures, the District will optimize their design and operation to reduce nutrient loading.

L-28 Basin

The L-28 basin is approximately 113 square miles, with portions located in Broward, Hendry, and Collier counties. The L-28 basin is entirely occupied by four landowners. The C-139 annex (approximately 25 percent of the basin) is comprised of the U.S. Sugar Corporation's Southern Division Ranch, Unit 1. The Big Cypress Seminole Indian Reservation occupies approximately 34 percent of the basin. Approximately 28 percent of the basin is situated in the Miccosukee Indian Reservation. The remaining 13 percent of the basin is within the Big Cypress National Preserve. Wetland and agricultural land uses account for approximately 96 percent of the basin area. Land uses with the Big Cypress Seminole Indian Reservation include

cattle on unimproved and improved pastures, citrus, sugar cane, and large tracts of undeveloped natural area. The Miccosukee Indian Reservation includes largely native areas with only a single cattle operation and a commercial fuel facility. There are also additional lands that have been converted to citrus or sugar cane and crops.

The surface water management system in the L-28 basin provides drainage and flood protection in addition to providing water to WCA-3A when necessary for water supply purposes. The L-28 borrow canal is the primary drainage canal, running north and south for a distance of approximately 10 miles along the eastern border of the basin, and receives flow from the L-3/L-4 borrow canal system. The L-28 borrow canal conveys stormwater runoff to the S-140 pump station, which discharges it directly into WCA-3A. The L-28 interceptor canal, which borders the basin on the southwest, conveys discharges from the S-190 structure (Feeder Canal basin) to WCA-3A, and is separated from the L-28 basin by a levee.

The C-139 annex presently drains to the L-28 borrow canal at the north line of the Big Cypress Seminole Indian Reservation. Runoff from the C-139 annex will be diverted to STA-6 in concert with the presently planned construction of STA-6, Section 2 (scheduled for completion before December 31, 2006). Upon completion of the diversion, the total area of the L-28 basin will be effectively reduced to approximately 85 square miles.

The District has been collecting grab samples for water quality data at the S-140 structure since 1987, and a composite auto-sampler began collecting samples in August 2000. Appendix 3-2h includes flow-weighted mean TP concentrations for S-140 from WY1998–WY2004. The composite flow-weighted mean TP concentration from WY2001–WY2004 averages 63 ppb.

The landowner's agreement between the District and the Seminole Indian Tribe of Florida stipulates water quality monitoring within the Big Cypress Seminole Indian Reservation. Under this agreement, water quality for discharges into and from the Seminole reservation land within the L-28 basin is monitored at L28U, G-409, and USSO. Flow-weighted mean TP concentrations from WY2002–WY2004 at these monitoring stations range between 58 and 98 ppb. These data are summarized by the District in progress reports, Total Phosphorus Load Calculations for Sites Stipulated in the SFWMD/Seminole Tribe Agreement.

The NRCS has several programs that provide support and assistance to landowners in the L-28 basin. These programs have helped implement water quality improvement projects, and NRCS has provided cost share dollars through their EQIP, Wetland Restoration Program, and through the technical design and implementation of BMPs through their Resource Conservation Plans. Workshops that provide education about BMPs, available landowner assistance programs, and guidance in developing on-farm conservation plans are ongoing.

For the L-28 basin, the Long-Term Plan also relies on the implementation of the Miccosukee Water Management Plan, which is a critical project to construct a managed wetland on the Miccosukee Indian Reservation. The project will convert approximately 900 acres of tribally owned cattle pastures into wetland retention/detention to provide water storage capacity, as well as water quality enhancement for water that will be discharged to WCA-3A through the S-140 pump station. This project is being designed to accommodate flows and loads from Miccosukee Indian Reservation lands only. Completion of the project is currently planned for 2010.

The Long-Term Plan also relies on the Seminole Tribe Big Cypress Reservation Water Conservation Plan to be implemented under the NRCS PL 83-566 Small Watershed Project Program. The plan proposes construction of 3,835 acres of retention areas designed to improve

water quality for flows from the Seminole Reservation lands only. Funding for this project has not yet been authorized.

As recommended by the Long-Term Plan, the District will pursue the completion of the above projects by October 2008. This requires close cooperation between tribal, state, and federal agencies.

Another project affecting the L-28 basin is the CERP Project Component RR4. This CERP Project, expected to be completed by 2015, includes the relocation and enlargement of the S-140 pump structure to improve hydropattern restoration to the northwest corner of WCA-3A and increase flows to the region. It is assumed that the water quality of discharges from the relocated pump structure will be sufficient to meet applicable water quality standards in downstream receiving waters (WCA 3A).

Boynton Farms Basin

The Boynton Farms Basin is the smallest ESP basin at approximately 421 acres, or slightly over 0.66 square miles. It is located in southern Palm Beach County, along the eastern border of the Refuge, which is on the eastern side of WCA-1A. Land use in this basin is primarily agricultural, and structures and drainage canals in this area are associated with agricultural water usage and drainage needs. All discharge structures in this basin are owned and operated by private landowners. Currently, there are three farms within this basin: Mecca, Amestoy, and DuBois farms. Crops grown on these lands mainly include row crops such as peppers, tomatoes, and ornamentals. Local governmental agencies include the Refuge, the Lake Worth Drainage District (LWDD), and Palm Beach County.

No cooperative agreements are in place with these private landowners because their issued permits do not allow for any discharge into the Refuge property. The Refuge headquarters property, which is considered part of the EPA although outside the boundaries of WCA-1, receives discharges from this basin but no discharges from this basin reach WCA-1.

Although overall basin boundaries have been finalized, there are still some issues in dispute. It is unclear whether some of the discharge structures are actually pumping onto Refuge property, or are discharging onto the farmers' property bordering the Refuge with storm water, then sheet-flowing onto the Refuge. Refuge water quality data have established that elevated nutrient levels on the Refuge property are linked to these discharges.

Currently, the District has limited access to sampling sites. Water quality sampling for the discharges from this basin has been conducted by the District from April 2000 to the present. Water quality monitoring is only conducted during flow events. A summary of the upstream water quality data and a map of the Boynton Farms Basin showing these data are included in Appendix 3-2h. Monitoring results show all three farms have similar levels of TP concentrations in their discharges. The average TP concentration for all monitoring sites in this basin is slightly above 1,000 ppb. Information regarding flow data from these properties is not available to the District at this time.

The District continues to offer technical support to help landowners comply with water quality criteria through contact with landowners, Refuge staff, and the LWDD personnel. The Williams Nursery pump on the north side of the Refuge headquarters property was voluntarily removed. As a result, discharges from this nursery into the Refuge property no longer occur, and the property was removed from the Boynton Farms Basin boundaries.

The entire Boynton Farms Basin is currently within the footprint of the Palm Beach County Agriculture Reserve Water Reservoir CERP Project (which is also part of the East Coast Buffer Project). The District is pursuing acquisition of this area through a willing seller program. In July 2004, Palm Beach County purchased the Amestoy properties located within the Boynton Farms Basin, consisting of approximately 216 acres. These properties are currently under lease for farming through May 2005. The District may consider acquiring all or a portion of these Amestoy properties from the county as part of the CERP project. However, at this time the District has not determined if it will proceed with land acquisition activities in this area.

Landowners within the basin, whose properties are not purchased as part of the CERP project and continue discharging onto the Refuge property, may need to implement capital improvement projects or other remedies to redirect all runoff discharges away from the Refuge property. The District will investigate options to divert storm water away from the Refuge Headquarters property and into the LWDD. The LWDD has been apprised of the issues, and is working on expanding capacity to the east to accept stormwater flows.

C-111 Basin

The C-111 basin is located in the southernmost portion of Miami-Dade County adjacent to the Everglades National Park. The predominant land use in this basin is agricultural, although portions of Florida City and Homestead lie within the basin. The C-111 basin is under the jurisdiction of Miami-Dade County - Department of Environmental Resources Management. In the 1960's, the area was channelized as part of the Central & Southern Florida Project for flood control and other purposes. Major restoration efforts have been ongoing in this area in recent years, with goals intended to promote improvement of hydroperiods and timing of water deliveries to ENP, while maintaining water table elevations to prevent saltwater intrusion into the local groundwater.

The C-111 basin covers an area of approximately 100 square miles. There are five main operational canals in this basin: C-111, C-111E, C-113, L-31N borrow, and L-31W borrow canals. These canals have three functions, which are to (1) provide drainage and flood protection for the C-111 basin; (2) supply water to the C-111, C-102, and C-103 basins and to the ENP, specifically to Taylor Slough and the park's panhandle; and (3) maintain a groundwater table elevation near the lower reach of C-111 adequate to prevent saltwater intrusion into local groundwater. Water is supplied to the C-111 basin by the South Dade conveyance system via the L-31N borrow canal.

There are three structures – S-18C, S-175 and S-332 – within the C-111 basin discharging into the ENP that are included in the non-ECP permit. The L-31W borrow canal is used to make water deliveries to Taylor Slough in the ENP via S-332D, S-332, and S-175. Water is discharged to the park's panhandle through over bank flow along the south side of the C-111 canal between S-18C and S-197. The S-18C structure is located on the C-111 canal approximately 2 miles south of the confluence of the C-111 and C-111E canals in the Southern Glades region. The S-175 and S-332 structures are in close proximity along the L-31W borrow canal along the south side of the Frog Pond, approximately 1.5 miles north of the entrance to the ENP. Water quality data has been collected at these structures since 1978 by the District and the USACE. Currently, TP concentrations in the C-111 basin are below the 10-ppb level of concern. However, monitoring at the "into" structures will continue because these concentrations may change as future projects are constructed and seepage water entering the basin from the ENP is reduced. Upstream monitoring is performed by the District at the S-176, S-178, and S-332D structures. Results of the monitoring at the "into" and upstream structures are summarized in Appendix 3-2h.

In 2003, the U.S. Department of Agriculture (USDA) completed a final report on the fate and transport of indicator pesticides, the efficacy of summer cover crops in controlling pesticide contamination of surface and ground water, and attenuation of pesticides during their transport in the upper Biscayne aquifer in cooperation with the University of Florida Tropical Research and Education Center (UF-TREC). This research was done under a $200,000 cooperative agreement with the District. Results from this study will contribute to the establishment of risk reduction strategies for pesticide use, enhance water quality and promote agricultural sustainability.

In 2003, the District also entered into a $73,737 cooperative agreement with the UF-TREC to perform BMP research to determine the efficacy of zeolite as a soil amendment on water holding capacity, and movement of phosphorus, ammonium, and nitrate in agricultural soils in the C-111 basin. In addition, the District, in partnership with NRCS, has sponsored a Mobile Irrigation Lab in this area to help local growers improve their irrigation practices. The main sources of public education in this basin are the UF-TREC and UF-IFAS. The results of the studies described above will be disseminated to the southern Miami-Dade County farm community through these institutions.

Emergency actions to protect the cape sable seaside sparrow (*Ammodramus maritimus mirabilis*) continue to influence the C-111 system operations under Emergency Order No. 9, authorizing the construction and operation of the structures (S-332B, S-332C, and S-332D) and associated detention areas as outlined in the Interim Operational Plan. The biological opinion issued by the U.S. Fish and Wildlife Service (USFWS) established water management targets for the eastern populations of the sparrow located on the edge of the ENP that borders the C-111 and the L-31N borrow canals. Construction of the detention areas and structures in this area is complete.

The C-111 basin is part of the Combined Structural and Operational Plan (CSOP). CSOP is currently being developed by the USACE in partnership with the District. This plan will include a complete analysis and redesign of drainage patterns from the Tamiami Trail south to the ENP. Historically, drainage patterns in this basin have been in the form of surface water movement from west to east with very few canals or structures. In addition, surface water infiltrated directly into the groundwater with high seepage influence from the ENP. Flow patterns are changing to pumped systems directing water to the west, with goals to improve conditions in the Taylor Slough portion of the ENP. In the lower C-111 basin, water will sheet flow to the south and east to improve freshwater flows to Florida Bay and the park's panhandle.

Several federal projects are scheduled for construction in this area, and are at different stages of implementation. The federal initiatives are the C-111, the Modified Water Deliveries to Everglades National Park. and the CERP C-111 Spreader Canal projects. The District shares the cost of implementing the C-111 and CERP projects and participates in PDTs formed to support CERP implementation. The Project Management Plans are available on CERP's Website at http://www.evergladesplan.org.

WATER QUALITY MONITORING AND ANALYSIS FOR WATER YEAR 2004

The first and most basic element of the Everglades Stormwater Program is the water quality monitoring and analysis program. Non-ECP permit conditions require the District to document the accuracy of collected data, and to measure progress toward achieving and maintaining compliance with state water quality standards by December 31, 2006. Although phosphorus is of primary concern, the permit has specified that all state standards should be met. 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. Unlike the ECP basins that are required to decrease TP levels in discharges based on historical loads, there is no phosphorus-specific requirement established at the point of discharge for the non-ECP basins. It is anticipated that the implementation of the water quality improvement plans, as described in the Long-Term Plan, for the non-ECP basins will significantly contribute to achieving long-term water quality standards in the EPA. Water quality data is tracked for increasing and decreasing trends so that the action plan may be modified, as necessary, through an adaptive management process to ensure optimization measures for TP reduction and for other parameters of concern.

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 WY2004 water quality data from non-ECP structures to state water quality standards. **Table 3-16** provides a summary of flow-weighted mean TP concentrations at non-ECP "into" structures for the period of record. Results of all water quality analyses are included in Appendix 3-2.

In compliance with Specific Condition No. 12, the appendices to this chapter include an annual update of the non-ECP permit monitoring program, providing non-ECP monitoring results, and a comparison of WY2004 water quality data from samples collected at non-ECP structures to state water quality standards. These comparisons fulfill non-ECP permit requirements to document the accuracy of the collected data, and 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 WY2004. The evaluation indicated that there were very few excursions from Class III water quality standards found in samples collected at non-ECP structures, except for incidences of variations for dissolved oxygen (DO). The excursions identified include results for pH at S-178, and specific conductance at S-175 and S-10E.

Previous reports, specifically Chapter 11 of the 2001 ECR, and Chapter 8B of the 2002–2004 ECRs, included comparisons of state water quality standards to water quality data obtained from non-ECP structures. These analyses found that there were very few excursions from Class III numeric water quality criteria for any parameter in the eight ESP contributing basins. There were excursions from the existing standard for DO, but it should be noted that the FDEP has completed an evaluation of DO levels in the EPA. Based on this evaluation, the FDEP has developed a site-specific alternative criterion (SSAC) to formally recognize the natural background conditions in the EPA marshes. Additional information on the DO SSAC can be found in Chapter 2A of the 2005 SFER – Volume I.

As phosphorus is the primary parameter of concern for Everglades restoration, it is the focus of water quality considerations for the ESP basins. Although no load limitations have been established for the ESP basins, TP concentrations are monitored to determine progress toward the goals established in the non-ECP permit. **Table 3-16** summarizes the flow-weighted mean TP concentrations, total flow volumes, and TP loads at non-ECP "into" structures, the exit points from the ESP basins for flow entering the EPA, during WY2004. As shown in this table, flows were higher in WY2004 than in WY2003 for some basin discharge points (ACME Basin B, C-11W through S9A, NNRC, C-111 through S-18C, and Feeder Canal), while flows were lower for other basin discharge points (C-111 through S-175 and S-332, NSID, and C-11W through S-9). The flow from the L-28 basin in WY2004 was similar to that in WY2003. This is the third year that TP loads have been presented, thus allowing an evaluation of trends or changes. A direct comparison to last year's data indicated a reduction of TP load from C-11W, C-111 through S-175 and S-332, and L-28. There was a slight increase of the load from ACME Basin B, NNRC, and C-111 through S-18C, with a substantial increase from the Feeder Canal. The changes in loads from these basins are predominantly associated with changes in flow volumes.

Flow-weighted mean TP concentrations vary greatly between basins. The highest TP concentrations are identified in ACME Basin B and the Feeder Canal basin, whereas the L-28, North New River, and C-11 West basins have TP concentrations below 50 ppb. There was no discharge to the EPA from NSID for WY2004. There was observed TP reduction for the L-28 basin (flow-weighted TP reduced from 62 ppb in WY2003, to 42 ppb in WY2004). The only basin that has a TP concentration below the proposed TP standard of 10 ppb is the C-111 Basin. Though many of these concentrations are relatively low, all concentrations greater than approximately 10 ppb will have to be addressed further (as discussed in Chapter 2C of the 2005 SFER – Volume I). The Boynton Farms basin exhibits the highest TP concentrations (average of 973 ppb) of any basin, but because no flow measurements are available for this basin, no flow-weighted mean concentrations could be determined. All the TP data for the EPA is provided in Chapters 2A and 2C of the 2005 SFER – Volume I.

Some of the highest TP concentrations for non-ECP structures discharging directly to the EPA during WY2004 were observed for the ACME Basin B basin through monitoring locations at the ACME1DS and G-94D culverts and at the upstream pump stations: (1) ACME1 (auto-sampler VOW1), and (2) ACME2 (auto-sampler VOW2). The ACME1DS and G-94D culverts, operated by the Village of Wellington (VOW), remain open at all times and discharge to the Refuge when upstream pump stations ACME1 or ACME2 are operating. Fourteen District data collection trips to the culvert monitoring locations resulted in only three sampled flow events at ACME1DS, and four sampled flow events at G-94D. The monitoring agreement with VOW resulted in a sufficient number of samples (39) collected by both grab and auto-sampler techniques upstream of the pump stations to cover a broad range of flows (28 samples) observed during pumping events, and adequately characterize the TP concentrations.

As shown in Table 3 of Appendix 3-2, more than 75 percent of the data collected at the upstream VOW1 monitoring sites were below 84 ppb, with median TP values ranging between 64 and 72 ppb. More than 75 percent of the data collected at the upstream VOW2 monitoring sites were below 150 ppb, with median TP values ranging from 80 to 96 ppb. Discharge data were not available for the ACEM1DS and G-94D culverts, although discharge data from the upstream pump stations during WY2004 [10,018 and 9,871 acre-feet (ac-ft) for ACME1 and ACME2, respectively] can be used as an indication of the magnitude and occurrence of flow through the downstream culverts.

Table 3-16. Non-ECP basins annual flow-weighted mean TP concentrations for WY2004.

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	10,018 [6]	14	77 [6]	46	0	Grab [4]	3/14	74 [7]	72	890
	ACME1	VOW1	10,018	14	77	78	25 [8]	Auto [5] & Grab [4]	28/39	76	77	957
	G94D	G94D	9,871 [6]	14	88 [6]	67	0	Grab [4]	4/14	104 [7]	91	1,105
	ACME2	VOW2	9,871	14	88	94	24 [8]	Auto [5] & Grab [4]	27/38	98	101	1,227
North Springs Improv. District	NSID1	NSIDSP01	0	4	0	17	6 [9]	Auto 5 & Grab [4]	0/10	N/F[11]	N/F[11]	N/F[11]
		S-38B (WCA-2A near NSID1)	0	3	0	18	0	Grab [4]	0/3	N/F[11]	N/F[11]	N/F[11]
North New River	G-123	G123	2,299	48	13	20	43 [8]	Auto [5] & Grab [4]	6/91	17	16	46
C-11 West	S-9	S9	149,708	51	113	15	25	Auto [5] & Grab [4]	35/76	18	18	3,387
	S-9A	S9A	107,609	51	272	14	29	Auto [5] & Grab [4]	73/80	13	13	1,735
C-111	S-175	S175	2	26	6	7	0	Grab [4]	1/26	5	5	0
	S-332	S332	3	26	4	7	0	Grab [4]	1/26	13	13	0
	S-18C	S18C	158,813	52	263	4	35	Auto [5] & Grab [4]	70/87	9	9	1,845
L-28	S-140	S140	136,152	51	218	35	33 [8]	Auto [5] & Grab [4]	79/84	42	42	7,018
Feeder Canal	S-190	S190	117,699	21	252	53	30 [8]	Auto [5] & Grab [4]	45/51	103	99	14,410
Boynton Farms	Various[10]	Various[10]	N/D[1]	16	N/D[1]	973	N/D[1]	Grab [4]	N/D[1]	N/D[1]	N/D[1]	N/D[1]

Notes:

1) N/D 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) Auto-sampler installed upstream of structure during WY2001.
9) Auto-sampler 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. These sites are pumps that have no flow recording devices attributed to them.
11) N/F - no flow.

The TP concentrations observed for the Feeder Canal basin and L-28 basin showed median TP concentrations of 30 ppb and 33 ppb for grab samples, and 74 ppb and 40 ppb for auto samples, respectively. During WY2004, the Feeder Canal basin discharged 117,699 ac-ft, and the L-28 basin discharged 136,152 ac-ft into the western portion of Water Conservation Area 3A (WCA-3A).

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 4 ppb (grab) and 6 ppb (auto) for S-18C; 6 ppb (grab) for S-332; 6 ppb (grab) for S-175; 75 percent of the samples having concentrations below 5 ppb (grab); 8 ppb (auto) for S-18C; 10 ppb (grab) for S-175; and 9 ppb (grab) for S-332. During WY2004, the S-175 and S-332 structures were operated infrequently, and discharged only 2 ac-ft through S-175, and 3 ac-ft through S-332 to the Park. The S-18C structure discharged approximately 158,813 ac-ft to the lower C-111 canal. The flow through S-178 had a median TP concentration of 27 ppb, the highest TP concentration in the C-111 basin, with a negative annual discharge of 1069 ac-ft.

The Boynton Farm basin water quality monitoring program that monitors the discharge onto the Refuge headquarters property has continued during WY2004. 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. These are event-driven grab samples with no associated flow measurements. The TP data, provided in **Table 3-16,** show extremely high TP concentrations averaging 973 ppb for the samples collected from these stations. These very high TP results are consistent with the crops and agricultural practices currently found on these farms.

No flow into the EPA occurred at the NSID1 structure due to the operational changes implemented by the NSID. Flows at G-123 are also low because the District has begun to minimize use of this station consistent with the recommendation in the Long-Term Plan to discontinue its use after December 31, 2006, other than that which may be absolutely necessary for water supply purposes.

Table 3-16 also presents information for the S-9A pump station, which was built to address a specific issue in the S-9 basin. Previously, the S-9 pump station had to be operated more frequently than was necessary to return seepage water that originated in WCA-3A and seeped through the ground to canals in the C-11 West drainage basin. Because of the large capacity of the S-9 pump station, operation of those pumps caused greater drawdown of the C-11 West canal and its tributaries than was desirable. Therefore, the S-9A pump station was constructed with a lower pump capacity, and was designed to collect seepage water from the collection canals immediately external to WCA-3A and return it to the WCA. This alteration in the hydrology of the system has been successful in improving the quality of the water entering WCA-3A. This year, the flow-weighted mean TP concentration of water discharged from the S-9A pump station was 13 ppb, compared with a flow-weighted mean TP concentration of 18 ppb through the S-9 pump station. The total volume of water that has been pumped through both the S-9 and S-9A stations is comparable to the flow through the S-9 station prior to the construction of S-9A. Furthermore, the total flow through both structures had a flow-weighted mean TP concentration of 16 ppb, compared to the concentration of 17 ppb for the total flow through S-9 last year.

Based on the analysis provided in Appendix 3-2, none of the pesticides detected during the quarterly surface water sampling were found to be of concern. The biannual sediment pesticide sampling indicated that dichlorodiphenyldichloroethylene (DDE), an environmental dehydrochlorination product of dichlorodiphenyltrichloroethane (DDT), was detected at several locations at levels of "potential concern."

EVERGLADES STORMWATER PROGRAM FINDINGS AND FUTURE DIRECTIONS

The previous subsections provide an update on each of the ESP (or non-ECP) components of the Long-Term Plan (Project Bc71 through Bc75). All Long-Term Plan projects described for the non-ECP basins have been initiated and are on schedule and within proposed budgets.

The 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 phosphorus concentrations are greater than 10 ppb in discharges from seven of the eight ESP basins. Except for those elevated phosphorus levels, the quality of water discharging into the EPA is generally acceptable. 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.

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, the 298 District, the Seminole Indian Tribe of Florida, the Miccosukee Tribe of Indians of Florida, and other state and federal agencies will continue to be essential for achieving the goals and requirements of the EFA, 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 efforts with CERP, ongoing critical projects within non-ECP basins, the Long-Term Plan, and local governments are also facilitating the development of long-term solutions for achieving statewide water quality standards. These efforts have resulted in detailed action plans (schedules and strategies) which have been or are to be implemented in each ESP basin. The actions plans for water quality improvements are designed to meet the TP criterion in the EPA.

PROGRAM SUMMARY

The ultimate goal of both the Everglades Regulatory Program in the EAA and C-139 and the Everglades Stormwater Program in the ESP basins is the reduction of phosphorus entering the EPA by controlling it at its source. For the EAA and C-139, the reduction comes by regulatory action enforcing the application of BMPs by rule to reduce TP loads. For the ESP basins, the reduction comes through voluntary compliance involving BMPs, capital projects, education and cooperative efforts to reduce TP concentrations. Regardless of the differences in the approaches, both utilize a variety of "tools," chosen for their specific applicability and intended to improve water quality in the Everglades.

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