Chapter 4: Nutrient Source Control Programs

Edited by William Baker, Agnes Ramsey[1] and Pamela Wade

SUMMARY

Source control program requirements were established by legislation for the Northern and Southern Everglades. The Northern Everglades and Estuaries Protection Program (NEEPP) [Section 373.4595, Florida Statutes (F.S.)] established source control requirements for the Lake Okeechobee, Caloosahatchee River and Estuary, and St. Lucie River and Estuary watersheds (the Northern Everglades), with varying levels of responsibility accorded to each of the coordinating agencies - the South Florida Water Management District (SFWMD or District), Florida Department of Agriculture and Consumer Services (FDACS), and Florida Department of Environmental Protection (FDEP). The Everglades Forever Act (EFA) (Section 373.4592, F.S.) established source control requirements for the Everglades Construction Project (ECP) basins and the non-Everglades Construction Project (non-ECP) basins in the Southern Everglades with primary responsibility assigned to the District. The Northern and Southern Everglades source control program implementation areas are depicted in **Figure 4-1**.

This chapter and related appendices (Appendices 4-1 through 4-4) of the *2012 South Florida Environmental Report* (SFER) – *Volume I* provide the Water Year 2011 (WY2011) (May 1, 2010–April 30, 2011) update on the consistent and holistic approach to source control programs in the major watersheds of South Florida, while at the same time recognizing the unique source control issues of each sub-watershed. For this reporting period, permit-specific reports are provided in the 2012 SFER – Volume III. The nonpoint source control programs implemented through each agency address the reduction of pollutants through on-site measures that prevent or reduce pollution at its source, such as agricultural and urban best management practices (BMPs), which, along with construction and other pollution control projects, are needed to achieve mandated pollution reduction levels and water quality standards, including total maximum daily loads (TMDLs). The three coordinating agencies implement their respective programs through specific rules promulgated by each that are based on statutory authorizations.

Source control is an integral component of Northern and Southern Everglades restoration and protection programs. For the Northern Everglades, source control program planning is incorporated into the Lake Okeechobee Watershed Construction Project Phase II Technical Plan (SFWMD et al., 2008), 2011 Lake Okeechobee Protection Plan Update (the first three-year update)(SFWMD et al., 2011), Caloosahatchee River Watershed Protection Plan (SFWMD et al., 2009a), and St. Lucie River Watershed Protection Plan (SFWMD et al., 2009b); which must be updated every three years and are being updated this year (see Chapters 8 and 10 and Appendices 10-1 and 10-2 of this volume). For the Southern Everglades, source control program planning is incorporated into the Long-Term Plan for Achieving Water Quality Goals in the Everglades Protection Area (Long-Term Plan) (Burns and McDonnell, 2003) (see Chapter 5 of this volume).

[1] Contributed as SFWMD staff during the draft SFER production cycle.

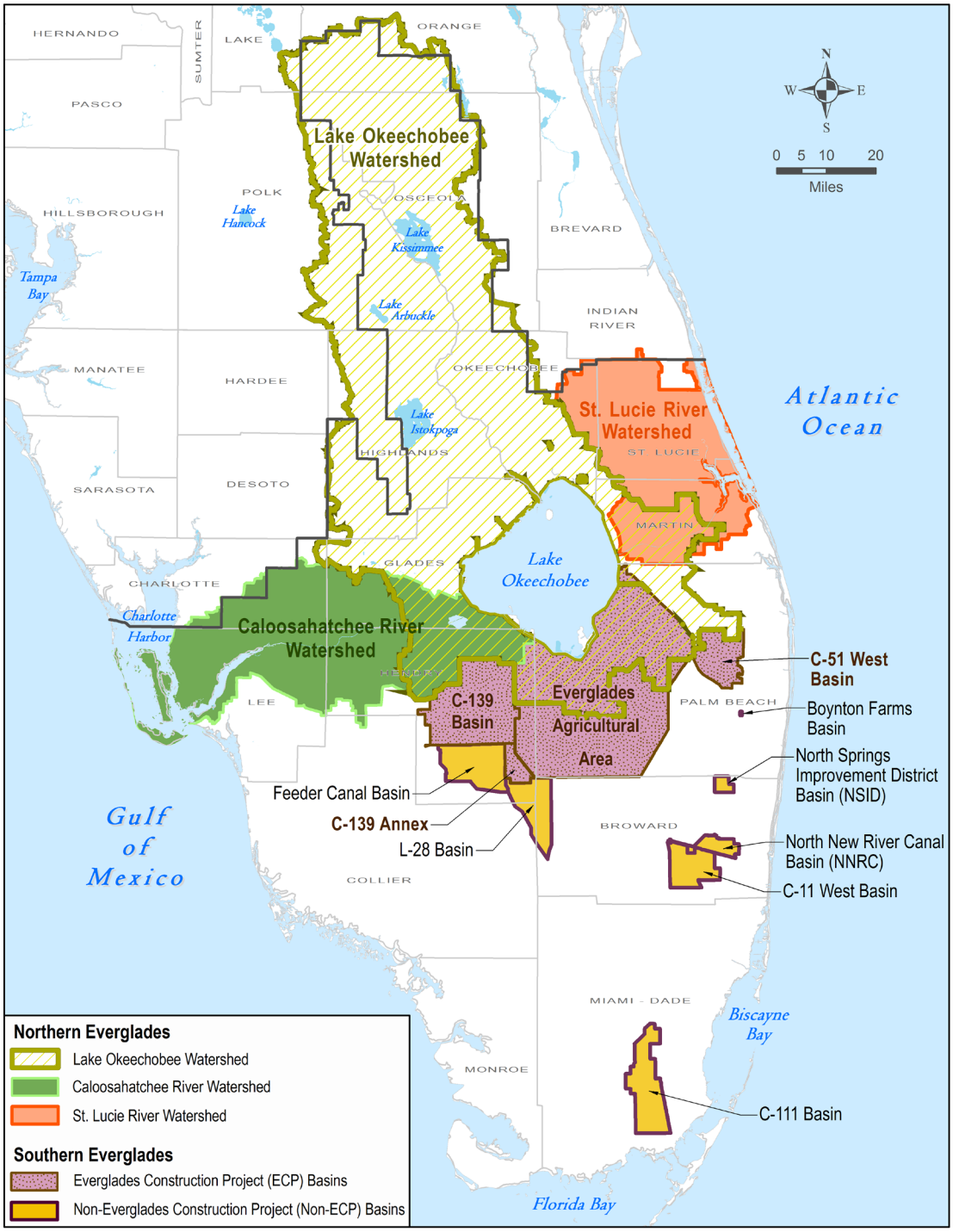


Figure 4-1. The Northern Everglades and Southern Everglades source control program implementation areas.

WATER YEAR 2011 NUTRIENT SOURCE CONTROLS HIGHLIGHTS

An overview of nutrient source control program status and related activities during WY2011 is presented below. A summary of the WY2011 discharge total phosphorus (TP) load by sub-watershed is provided in **Table 4-1**.

Lake Okeechobee Watershed

For the Lake Okeechobee Watershed, the District has accomplished the following:

- Continued work on the development of a data sharing process with the FDACS for tracking landowner participation and implementation of FDACS agricultural BMPs associated with their Notice of Intent process. The data sharing process and schedule is being finalized and the District and FDACS are currently working on a system to increase dataset accuracy.
- Analyzed flow and water quality data to further understand available historical data for the Lake Okeechobee Watershed. The analysis is the initial step in developing and ultimately recommending a baseline period for each sub-watershed.
- Continued developing performance metrics in which rainfall variability for collective source control programs is considered. The SFWMD Lake Okeechobee Watershed source control program is expected to include performance metrics that ensure consistent BMP implementation, measure actual reduction achieved, and have a mechanism for triggering improvements should the water quality goals not be achieved.
- Completed an evaluation of the Lake Okeechobee Watershed Assessment monitoring network. A process for ongoing annual evaluations was developed to manage the dynamic monitoring network.

Caloosahatchee and St. Lucie River Watersheds

For the Caloosahatchee River Watershed, the District has accomplished the following:

- Analyzed the 2009 wet season (June–October 2009) synoptic monitoring program for the tributary streams within the freshwater portion of the river.
- Developed an inventory and compilation of TP and total nitrogen (TN) data.

For the St. Lucie River Watershed, the District has accomplished the following:

- Began conducting a synoptic monitoring program for phosphorus and nitrogen during the WY2011 wet season for the C-23 and C-24 basins, which account for 60 percent of the TP load in the watershed.
- Began developing performance metrics.

For both river watersheds, the District has accomplished the following:

- Performed an evaluation of existing watershed monitoring networks resulting in recommendations of proposed modifications.
- Completed an analysis of historic data, including identification of proposed baseline periods and a preliminary recommendation of the type (nutrient load or concentration) of performance measure that would be appropriate given the data availability for the watershed.

Everglades Agricultural Area (ECP) Basin

In the Everglades Agricultural Area (EAA), the following has been accomplished:

- The EAA achieved an estimated 79 percent [174 metric tons (mt)] TP load reduction for WY2011 compared with the predicted load from the pre-BMP baseline period adjusted for rainfall. The total cumulative reduction in TP loads due to BMP implementation since WY1996 is 2,411 mt, which represents a long-term reduction of 55 percent overall.
- Post-permit compliance activities were continued by the District. BMP inspections were emphasized using a prioritized list based on an analysis of farm-level results for WY2010, farm location, water quality history, size, and date of previous inspection.
- Research on improving BMP effectiveness through canal discharge management and the control of floating aquatic vegetation continued through a cooperative effort between the District and the EAA Everglades Protection District.
- The District continued to refine the source control approach to effectively improve phosphorus discharge concentrations using area-specific data collection and analysis.

C-139 (ECP) Basin

Highlights for the C-139 Basin are as follows:

- Landowners within the C-139 Basin began the implementation of comprehensive BMP plans as outlined in the amended Chapter 40E-63, Florida Administrative Code (F.A.C.) effective November 2010. As a result, the "Initial Performance Measure Determination" period was reset to WY2012 to account for additional water quality improvement activities.
- Discharges from the C-139 Basin carried 20 mt of TP load, which is above the predicted load from the pre-BMP baseline period adjusted for rainfall. However, the basin load did not exceed the limit and did meet the performance measure for WY2011.
- Monitoring and data analyses efforts to identify upstream TP sources and potential water quality improvement projects that can be developed to control those sources were assessed for optimization by the District.
- The District ensured that technical information continued to be developed through research and demonstration projects to optimize source controls within the basin.

Non-ECP Basins

Highlights for the Non-ECP basins are as follows:

- The total TP load of 11 mt discharged to the Everglades Protection Area from the non-ECP basin structures during WY2011 represents a continued decreasing trend partially attributable to metrological conditions, but also due to basin diversions and water quality improvement efforts in the basins.
- Demonstration, research, and construction projects continued in the non-ECP basins for continued water quality improvements in discharges to the Everglades Protection Area (EPA).

Table 4-1. Summary of Water Year 2011 (WY2011) (May 1, 2010–April 30, 2011) discharge total phosphorus (TP) load by sub-watershed.

Sub-watershed	Area (acres)	TP Load[1] (metric tons)	TP Unit Area Load (pounds per acre[2])
Lake Okeechobee Watershed Sub-watersheds[3]			
Upper Kissimmee	1,028,421	36.0	0.08
Lower Kissimmee	429,188	13.0	0.07
Taylor Creek/Nubbin Slough	196,732	30.6	0.34
Lake Istokpoga	394,203	7.2	0.04
Indian Prairie[4]	262,099	25.4	0.21
Fisheating Creek/Nicodemus Slough[5]	332,114	14.0	0.09
West Lake Okeechobee[6]	204,093	26.2[7]	0.28
South Lake Okeechobee	363,314	4.2[8]	NA[9]
East Lake Okeechobee	239,011	19.2[7]	0.18
Caloosahatchee River Watershed Sub-watersheds[10]	1,084,465		
St. Lucie River Watershed Sub-watersheds[10]	688,085		
ECP Basins[11]			
Everglades Agricultural Area	470,324	45.4	0.21
C-139	168,450	20.2	0.27
non-ECP Basins			
C-11 West[12]	45,728	2.3	0.11
North New River Canal	17,904	no flow[13]	no flow[13]
North Springs Improvement District	7,022	no flow[13]	no flow[13]
Feeder Canal	68,883	2.2	0.07
L-28	71,790	3.8	0.12
C-111	72,902	3.1	0.09
Boynton Farms	217	NA[13]	NA[13]

[1] This differs from loads presented in Chapter 8 of the 2011 SFER – Volume I because it focused solely on TP loads entering Lake Okeechobee.
[2] 1 pound per acre = 1.12 kilogram per hectare.
[3] Sub-watershed acreage is based on most recent hydrologic boundaries and may differ in total acreage from previous reports.
[4] The Indian Prairie Sub-watershed area has changed based on the L-61W area now being considered in the Fisheating Creek/Nicodemus Slough Sub-watershed.
[5] The Fisheating Creek/Nicodemus Slough Sub-watershed area has changed based on the L-61W area now being considered as part of the sub-watershed, and the area that drains to Culvert 5A being considered in the West Lake Okeechobee Sub-watershed area.
[6] The West Lake Okeechobee Sub-watershed area has changed based on the Culvert 5A area now being considered in this sub-watershed rather than in the Fisheating Creek/Nicodemus Slough Sub-watershed.
[7] The East and West Lake Okeechobee sub-watersheds loads are calculated by utilizing a mass balance approach.
[8] The South Lake Okeechobee Sub-watershed load includes TP load into Lake Okeechobee only.
[9] The unit area load for the South Lake Okeechobee Sub-watershed is not presented in this table because only the TP loads to Lake Okeechobee are presented. Therefore, the TP load presented does not represent the total TP load from the area.
[10] Sub-watershed load calculation methods are currently under development and will be reported for TP as well as TN in future SFERs.
[11] The ECP basins discharges receive further treatment downstream through the stormwater treatment areas prior to discharge to the EPA.
[12] The C-11 West basin flows west to Water Conservation Area 3A through pumps S-9 and S-9A to the EPA, and also flows east through S-13A. The reported unit area load represents only the portion of TP load directed to the EPA.
[13] No discharges to the EPA during WY2011.
[14] NA = not available because no instrumentation is in place for flow monitoring.

OVERVIEW OF NORTHERN EVERGLADES SOURCE CONTROLS

William Baker and Agnes Ramsey[1]

Contributor: Pamela Wade

In the Northern Everglades and Estuaries Protection Program (NEEPP), the legislature found that the Lake Okeechobee, Caloosahatchee River, and St. Lucie River watersheds are critical water resources; watershed changes have resulted in adverse changes to the hydrology and water quality of Lake Okeechobee, and the Caloosahatchee and St. Lucie rivers and their estuaries; and improvement to the hydrology, water quality, and associated aquatic habitats within the watersheds is essential to the protection of the Greater Everglades ecosystem. The legislature further found that the expeditious implementation of the Lake Okeechobee Watershed Protection Plan and the river watershed protection plans is needed to improve the quality, quantity, timing, and distribution of water in the Northern Everglades ecosystem and that the implementation of the plans provide a reasonable means of achieving the total maximum daily load (TMDL) requirements and achieving and maintaining compliance with state water quality standards. The NEEPP includes a phased, comprehensive, and innovative protection program made up of three types of approaches at various scales for meeting these needs. The approaches are source control programs, construction projects, and research and water quality monitoring programs. The various scales are source, local, sub-regional, and regional (**Figure 4-2**). This chapter provides annual progress reports on source control programs at the various scales within the jurisdiction of the South Florida Water Management District (District or SFWMD), as well as providing the progress of other source control programs in the Northern Everglades.

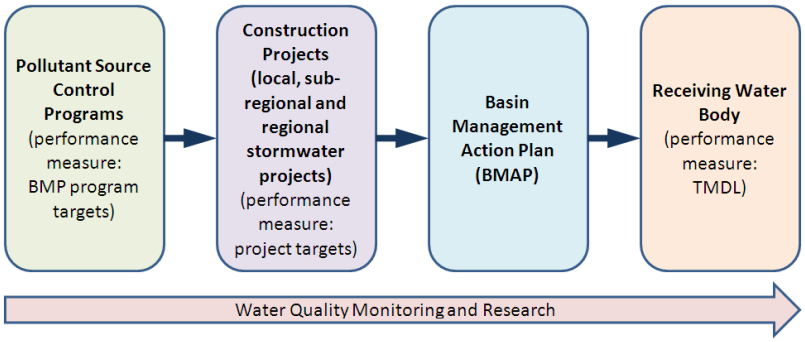


Figure 4-2. NEEPP water quality treatment approach.

Pursuant to the NEEPP, every three years, the specific objectives, goals, and elements of the protection plans must be evaluated, and any needed modifications identified. This year, Chapter 4 of the *South Florida Environmental Report (SFER) – Volume I* includes the source control portion of the three-year (triennial) update to the river watershed protection plans, while the river watershed protection plans themselves may be found in Appendices 10-1 and 10-2 of this volume. This chapter also contains the annual progress report for the Lake Okeechobee Watershed source control program. Additional information on Lake Okeechobee Watershed construction projects and research may be found in previous editions of the SFER, in Chapter 8 of this volume, and in the Lake Okeechobee Protection Plan 2011 Update (SFWMD et al., 2011). In addition, the Water Year 2011 (WY2011) (May 1, 2010 to April 30, 2011) phosphorus and nitrogen discharged in runoff from the Northern Everglades sub-watersheds are provided in this chapter.

The District, Florida Department of Environmental Protection (FDEP), and Florida Department of Agriculture and Consumer Services (FDACS) (the coordinating agencies) are directed by the NEEPP to implement a pollutant source control program designed to be a multifaceted approach to reducing pollutant loads to the Lake Okeechobee, Caloosahatchee River, and St. Lucie River watersheds. The nutrients of concern in the Northern Everglades are phosphorus in the Lake Okeechobee Watershed and both phosphorus and nitrogen in the river watersheds. The source control programs shall include implementation of regulations and best management practices (BMPs), development and implementation of improved BMPs, improvement and restoration of the hydrologic function of natural and managed systems, and utilization of alternative technologies for nutrient reduction at the source. Each source control program includes a water quality monitoring component to assess their success in achieving their performance goals. The latest plans that describe the responsibilities and related activities of each of the coordinating agencies can be found in the Lake Okeechobee Protection Plan Update submitted to the legislature by the coordinating agencies in March 2011 (SFWMD et al., 2011) and the river watershed protection plans submitted to the legislature by the coordinating agencies in January 2009 (SFWMD et al., 2009a, 2009b). Updates are contained in this chapter.

The coordinating agencies perform their responsibilities in concert, through an interagency memorandum of understanding, which was updated in April 2011. The memorandum of understanding establishes the role of each agency in accordance with the statutory authority of the NEEPP. The coordinating agencies apply a consistent source control strategy across the Northern Everglades watersheds. **Table 4-2** identifies the coordinating agency (or other entity), program, and type of programs in place or being developed to address source control in the Northern Everglades. The success of the Northern Everglades source control strategies of each of the coordinating agencies is dependent upon the communication, coordination and maintenance of consistency between the watershed source control programs while factoring in the unique needs and characteristics of each region.

Regulatory source control programs have been demonstrated as the foundation to cost-effective strategies for reducing pollutant loads in runoff. The District's Works of the District (WOD) program in Chapter 40E-61, Florida Administrative Code (F.A.C.) was in place prior to the establishment of the NEEPP. This program requires users of WOD in the Lake Okeechobee Watershed to reduce phosphorus at the source, which minimizes transport in runoff so that water quality-based limits are met. The legislative intent of the NEEPP states that water quality standards shall be achieved and complied with in part through the refinement of existing regulations and further provides that “The initial phase of phosphorus load reductions shall be based upon the District’s Technical Publication 81-2 and the district’s WOD program” (Technical Publication 81-2 is SFWMD, 1981). By utilizing the existing regulatory authority of Chapter 40E-61, F.A.C., the District will build upon previous experience as well as prevent unnecessary infrastructure costs associated with downstream regional treatment systems.

Refinements to Chapter 40E-61, F.A.C. are necessary to meet the intent of the NEEPP. The main purpose of Chapter 40E-61, F.A.C is to establish criteria to gauge progress and ensure that the uses of WOD within the watershed are compatible with the District’s ability to implement Chapter 373, Florida Statutes (F.S.), including evaluating the performance of source control activities not addressed by other rules. The NEEPP requires the coordinating agencies to institute a reevaluation of the BMPs and make appropriate changes to the rule where water quality problems are detected despite BMP implementation to assure an adaptive management approach to achieving water quality limits. The current evaluation method within Chapter 40E-61, F.A.C. is based on numerical limitations for parcels developed from the 1989 Surface Water Improvement and Management Plan (SFWMD, 1989) (see 2011 SFER Status of Source Controls in the Lake Okeechobee Watershed for further details) which was produced prior to the establishment of the Lake Okeechobee TMDL. Also, the current method does not evaluate performance and progress

of the collective source control program for the watershed. Therefore, the evaluation method is currently being revised to enable the coordinating agencies to meet this objective and to account for the more recent water quality requirements. Consistent evaluation methods will also be developed for the river and estuary watersheds. Further, the NEEPP requires the District to provide for additional source controls needed to enhance the performance of the Lake Okeechobee Watershed Construction Projects.

Table 4-2. Source control programs within the Northern Everglades.

Lead Agency	Program[1]	Type 1[2]	Type 2[3]
SFWMD	Chapter 40E-61, Works of the District BMP Program[4]	√	
	Environmental Resource Permitting Program		√
	Dairy remediation projects[5]		√
	Dairy Best Available Technologies[5]		√6
FDACS	Agricultural BMP Program	√	
	Animal Manure Implementation Rule	√	
	Urban Turf Fertilizer Rule	√	
FDEP	Dairy Rule/Confined Animal Feeding Operation (CAFO)	√	
	Environmental Resource Permitting Program		√
	Stormwater Infrastructure Updates and Master Planning		√
	Municipal Separate Storm Sewer System Permit Program	√	
	Comprehensive Planning – Land Development Regulations		√7
	New Biosolids Rule - Chapter 62-640, F.A.C.	√8	
Florida Department of Health	Application of Septage – Senate Bill 392/2007 Changes to Section 373.4593, F.S.	√8	
University of Florida Institute of Food and Agricultural Sciences	Florida Yards and Neighborhoods Program		√

[1] Applicable to all three watersheds except where noted in the other footnotes below.

[2] Type 1 source controls (working definition provided by staff and subject to refinement): nutrient reduction program for which required reductions are expected because of ongoing implementation of collective source control programs, which are to be assessed at the sub-watershed level.

[3] Type 2 source controls (working definition provided by staff and subject to refinement): other nutrient reduction program to be assessed at the sub-watershed level where either future implementation and/or nutrient reduction performance is uncertain, or the program is intended to maintain nutrient reduction performance at current levels.

[4] The rule currently applies to the Lake Okeechobee Watershed. However, as directed by the NEEPP, the rule will be amended to include the river watersheds.

[5] Applicable to the Lake Okeechobee Watershed only.

[6] Estimates of source control reductions assume general application of these BMPs, but not on specific parcels.

[7] It is assumed that future changes in land use will have no effect on performance evaluations. That is permit targets/limits will not change.

[8] Estimates of source control reductions assume land application of biosolids and septage has ceased.

In addition to the modifications identified above, changes have been identified for Chapter 40E-61, F.A.C. to incorporate NEEPP mandates that modify the boundary of the program through the inclusion of the Upper Kissimmee Sub-watershed, Lake Istokpoga Sub-watershed, Caloosahatchee River Watershed, and St. Lucie River Watershed (**Figure 4-3**), and to identify the nutrients of concern for the river watersheds, which include nitrogen as well as phosphorus. **Figures 4-4** through **4-6** present the source control program implementation areas for Lake Okeechobee, Caloosahatchee River, and St. Lucie River watersheds, respectively.

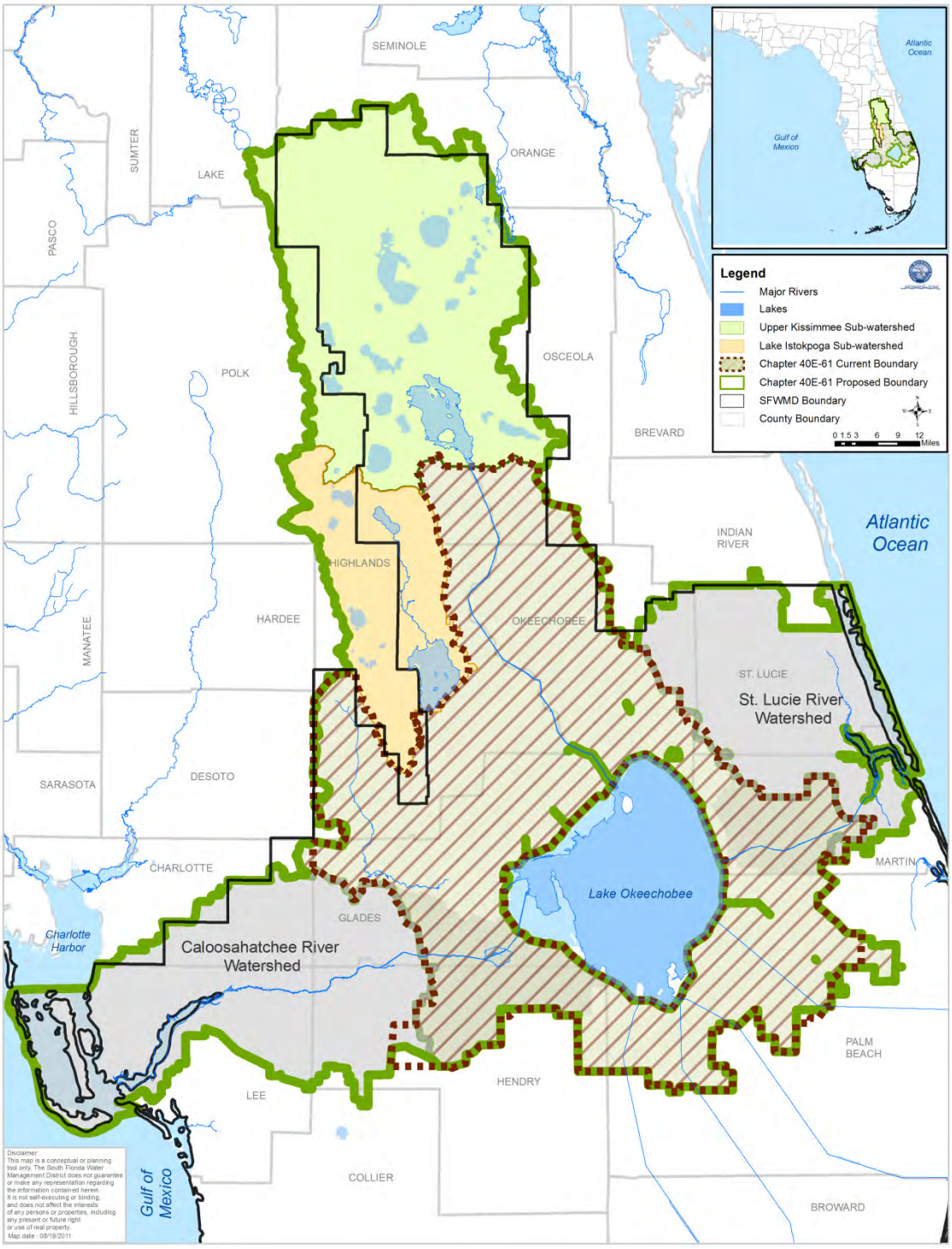


Figure 4-3. Chapter 40E-61, F.A.C. proposed boundary changes.

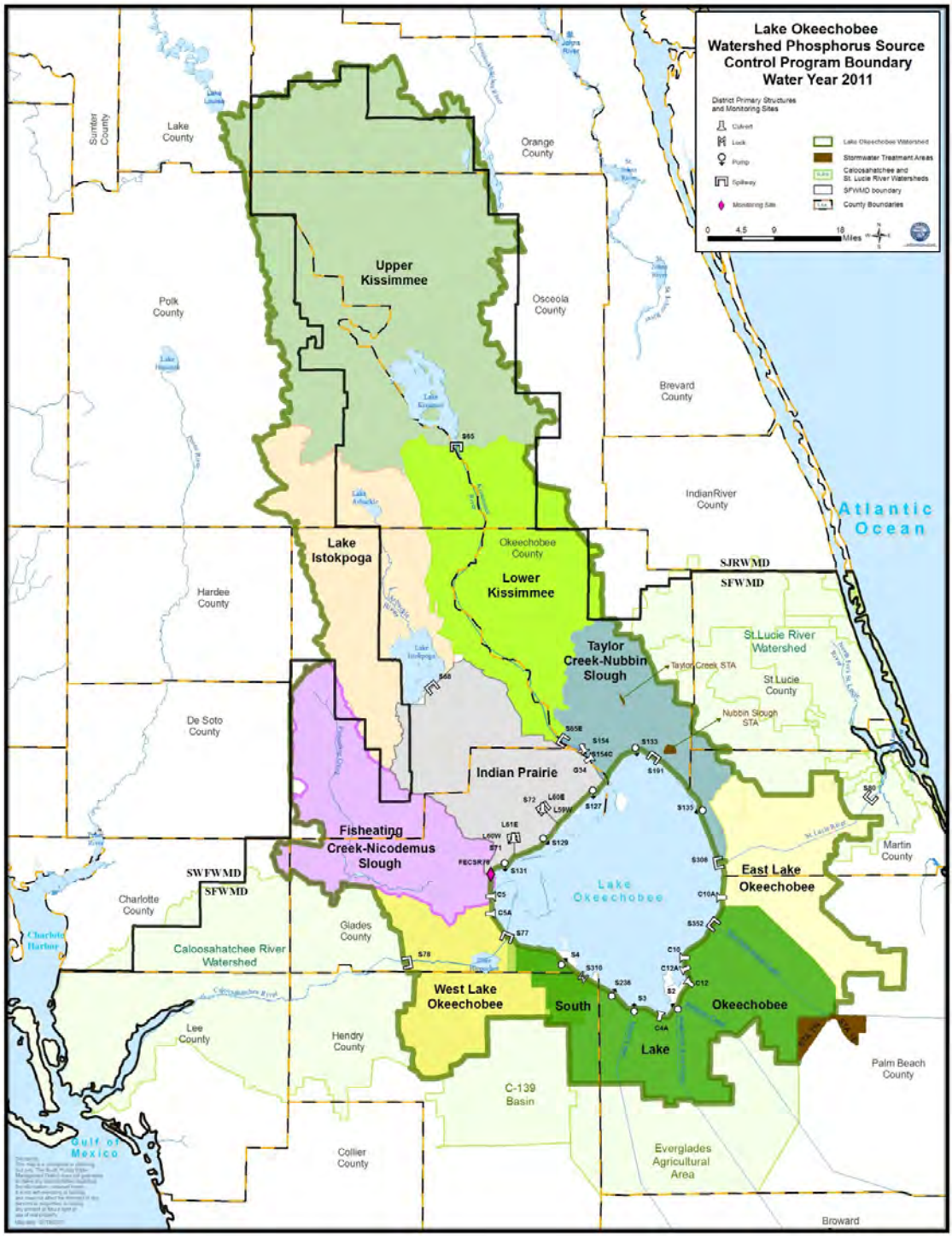


Figure 4-4. Lake Okeechobee Watershed source control program implementation area.

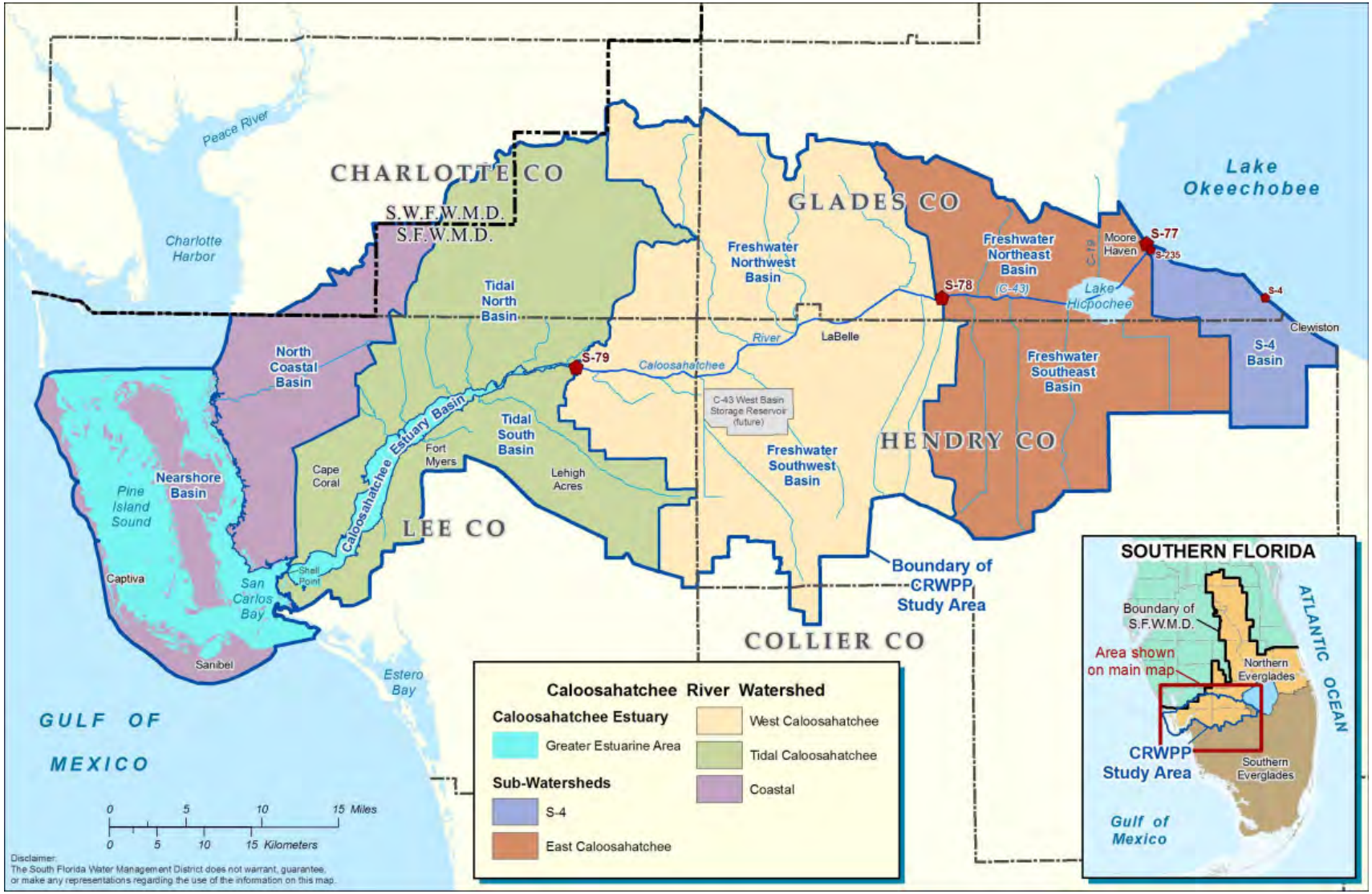


Figure 4-5. The Caloosahatchee River Watershed source control program implementation area.

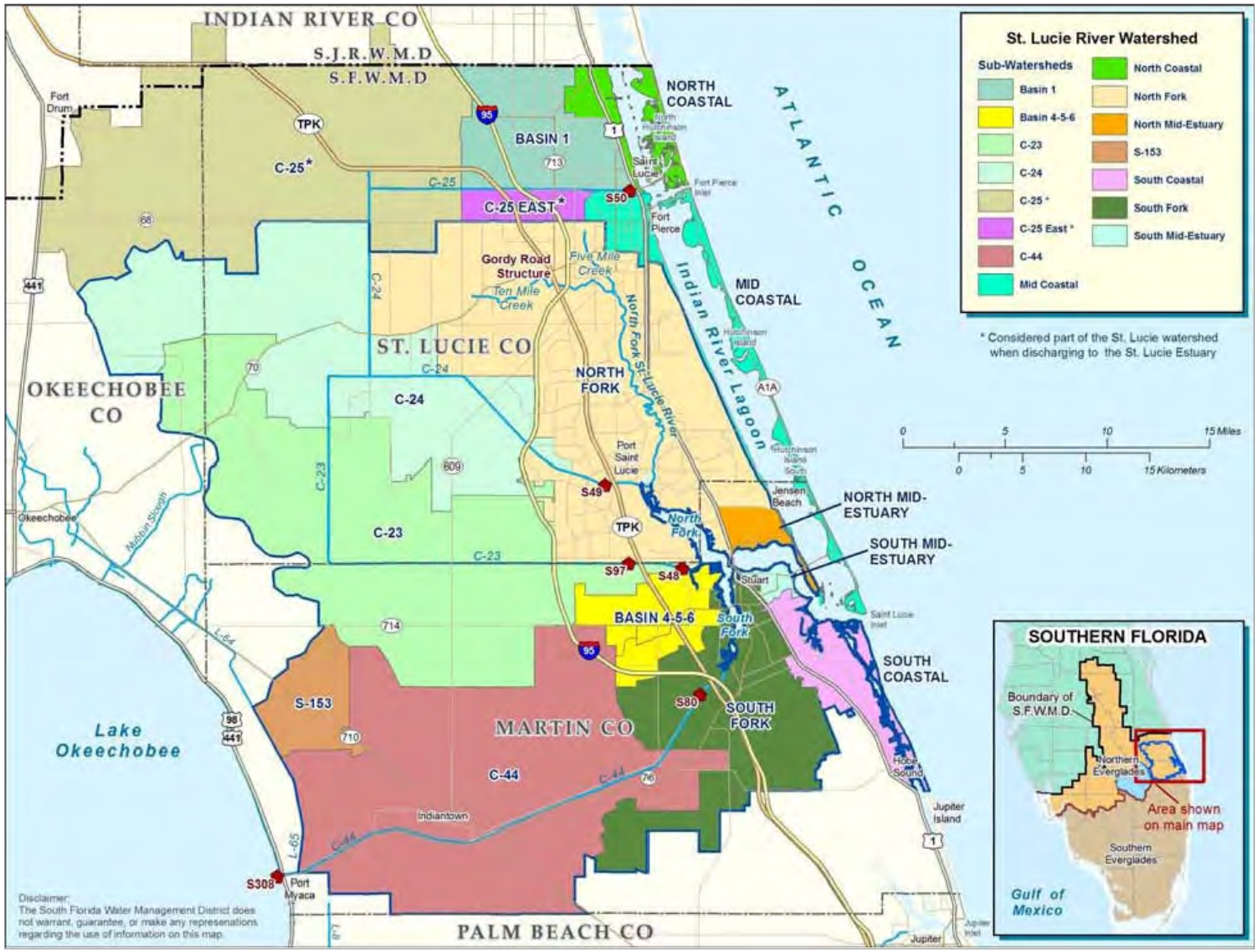


Figure 4-6. The St. Lucie River Watershed source control program implementation area.

STATUS OF SOURCE CONTROLS IN NORTHERN EVERGLADES WATERSHEDS

Carmela Bedregal and Kathy Edgemon

Contributors: Elizabeth Alvi[2], William Baker, Bonita Gorham[1], Steffany Gornak, Clegg Hooks[3] and Agnes Ramsey[1]

BACKGROUND

This section provides the status of the pollutant source control programs for phosphorus and nitrogen implemented by the coordinating agencies in the Northern Everglades watersheds. Pursuant to the NEEPP, source control programs include (1) implementation of regulations and BMPs, (2) development and implementation of improved BMPs, (3) improvement and restoration of the hydrologic function of natural and managed systems, and (4) utilization of alternative technologies for nutrient reduction. Source control programs must include a water quality monitoring counterpart to assess their performance.

LAKE OKEECHOBEE SOURCE CONTROLS: ANNUAL UPDATE

As indicated in the *Overview of Northern Everglades Source Controls* section of this chapter, the coordinating agencies (FDEP, FDACS and the District) apply a consistent source control strategy across the Northern Everglades watersheds. Except for a few watershed-specific programs (e.g., Former Dairy Remediation Sites and Dairy Best Available Technology Projects), similar regulatory and incentive-based programs and rules apply or are under development. The program results specific to the Lake Okeechobee Watershed were described at length in the March 2011 Lake Okeechobee Protection Plan Update (SFWMD et al., 2011), and the most recent information on Northern Everglades and statewide efforts is provided under the river watershed protection plan updates later in this chapter (e.g., adoption or update of FDACS BMP manuals, FDEP biosolids rule, FDACS manure application rule, etc.). Given these commonalities, and in order to streamline reporting, this portion of the annual report focuses on the distinct activities for which progress is reported since the 2011 Lake Okeechobee Protection Plan Update (e.g., current levels of source control implementation in the Lake Okeechobee Watershed under the regulatory and incentive-based programs).

District Environmental Resource Permit Program

An update and a description of the Environmental Resource Permitting (ERP) program are provided under the river protection plan updates discussions. One objective of the program is to enforce existing rules to prevent additional impairment to water bodies. A breakdown of the acres covered by ERP or surface water (SW) permits and WOD permits by sub-watershed is provided in **Table 4-3**. Projects are identified as SW if they were issued before 1995, and ERP if issued afterwards.

[2] Florida Department of Environmental Protection, Tallahassee, FL.
[3] Florida Department of Agriculture and Consumer Services, Tallahassee, FL.

Table 4–3. Acres of District Issued ERP/SW and WOD permits by sub-watershed[1] in the Lake Okeechobee Watershed

Sub-watersheds	Within Each Sub-watershed			
	Total Acres with ERP/SW Permits	Percentage of Total Acreage	Total Acres with WOD Permits	Percentage of Total Acreage
Upper Kissimmee	247,129	24%	NA	NA
Lower Kissimmee	179,058	42%	149,905	35%
Taylor Creek/Nubbin Slough	55,815	28%	152,261	77%
Lake Istokpoga	31,470	8%	6,312	21%
Indian Prairie	147,024	56%	183,655	70%
Fisheating Creek/Nicodemus Slough	90,056	27%	299,227	90%
West Lake Okeechobee	104,556	51%	34,006	17%
South Lake Okeechobee[2]	247,413	68%	358,211	99%
East Lake Okeechobee[3]	117,240	49%	5,066	2%
Grand Total	1,219,761	35%	1,188,643	35%

[1] Overlapping records are not duplicated and FDEP issued permits are not included.

[2] The South Lake Okeechobee sub-watershed includes the S-4 basin, which is an area of overlap with the Caloosahatchee Watershed. Therefore, 12,148 acres of the ERP/SW acreage are in the S-4 basin and reported in **Table 4-6**.

[3] The East Lake Okeechobee sub-watershed includes the C-44 basin, which is an area of overlap with the St. Lucie Watershed. Therefore, 82,294 acres of the ERP/SW acreage are in the S-4 basin and reported in **Table 4-5**.

District Lake Okeechobee Watershed Regulatory Phosphorus Source Control Program

A regulatory phosphorus source control program is currently in place for portions of the Lake Okeechobee Watershed. This regulatory program includes the S-4 and C-44 sub-watersheds, which overlap with the Caloosahatchee and St. Lucie watersheds, respectively. Further, the District is proposing to modify Chapter 40E-61, F.A.C. to include the Upper Kissimmee and Lake Istokpoga sub-watersheds.

The main focus of Lake Okeechobee Watershed source control programs in WY2011 was to (1) conduct a historical data analysis for the Lake Okeechobee sub-watersheds and summary basins in support of performance metric development, (2) evaluate the existing monitoring network for optimization opportunities, (3) conduct monitoring to identify areas of concern, and (4) increase BMP implementation.

Florida Department of Agriculture and Consumer Services Nutrient Source Control Program

The NEEPP authorizes the FDACS to initiate rule development for BMPs, conservation plans, nutrient management plans, or other measures necessary for nutrient reduction in the Northern Everglades watershed. Under this authority, the FDACS has adopted, and recently revised, Chapter 5M-3, F.A.C., which requires agricultural producers in the Northern Everglades to implement BMPs in applicable FDACS manuals, develop and implement a conservation plan, or monitor their water quality under the District's WOD program to demonstrate compliance with state water quality standards. The FDACS has adopted BMP manuals for most agricultural commodities, both regionally and statewide. Examples of these are manuals for cow/calf, vegetable and agronomic crops, Indian River Citrus, and Ridge Citrus operations. The rule also provides criteria for the land application of animal manures. The FDACS, along with the Florida Farm Bureau, Florida Cattleman's Association, and University of Florida's Institute of Food and Agricultural Sciences (IFAS) extension services hold cow/calf BMP workshops in Polk, Osceola, Hendry, and Glades counties. Additionally, the FDACS has an urban turf fertilizer rule, which regulates fertilizer application to residential yards.

Water Year 2011 Activities

- **District Regulatory Program.** Implementation of this program is an ongoing activity as described in Chapter 40E-61, F.A.C. Source control permit applications were processed and phosphorus concentration levels within the watershed were evaluated to identify potential areas of water quality concern. Data sources included the Lake Okeechobee Watershed Assessment upstream monitoring network, District ambient monitoring network (see Appendix 4-1 and Chapter 8 of this volume), and Lake Okeechobee inflow monitoring stations. Water quality concerns are discussed with coordinating agencies on a routine basis.
- **Table 4-3** above presents a summary of the District's WOD, ERP, and SW permit coverage for each sub-watershed. It should be noted that the District WOD source control program boundary has not yet been amended to be consistent with the NEEPP and does not yet include the Upper Kissimmee or Lake Istokpoga sub-watersheds. This boundary change will be updated in the proposed amendments to Chapter 40E-61, F.A.C.
- **District evaluation of the existing watershed monitoring network for regulatory purposes.** The District also completed an optimization evaluation of Lake Okeechobee Watershed Assessment network monitoring sites. A process for ongoing annual evaluations was developed and implemented to manage the dynamic monitoring network. Results from the optimization review were used for further monitoring site reductions.
- **District development of water quality performance criteria and regulatory program rule updates.** In addition, District efforts progressed with regard to aligning their regulatory program with the NEEPP legislative mandate as discussed in the 2011 Lake Okeechobee Protection Plan Update (SFWMD et al., 2011). The current emphasis is on developing technical documents in support of establishing performance measures to ultimately replace the current rule's outdated discharge target concentrations. See Chapter 4 of the 2011 SFER, Status of Source Controls in the Lake Okeechobee Watershed section for further information.
- **FDACS BMP program implementation.** The FDACS continued to enroll agricultural landowners in adopted BMP programs. To enroll, farmers operating in an area covered by FDACS BMPs submit a Notice of Intent under the appropriate rule to implement the adopted BMPs applicable to their operations. The current status of FDACS BMP implementation in the Lake Okeechobee Watershed is provided in **Table 4-4**.

Table 4-4. Acres and estimated percentage of agricultural land enrolled in BMP programs by sub-watershed[1] in the Lake Okeechobee Watershed.

Sub-Watersheds	Agricultural Acres[2]	Total Adjusted Enrolled Acres[2]	Percent Agricultural Acres Enrolled[3]
Upper Kissimmee	287,088.50	67,932.71	23.66%[4]
Lower Kissimmee	287,371.60	246,259.38	85.69%
Taylor Creek/Nubbin Slough	143,621.61	126,125.73	87.82%
Lake Istokpoga	159,347.57	124,946.20	78.41%
Indian Prairie	199,463.30	164,587.19	82.52%
Fisheating Creek/Nicodemus Slough	176,342.77	236,658.47	134.20%[5]
West Lake Okeechobee	140,034.75	78,954.37	56.38%
South Lake Okeechobee[5]	341,408.33	323,306.93	94.70%
East Lake Okeechobee	109,971.71	45,561.44	41.43%
Grand Total	1,844,650.14	1,414,332.42	76.67%

[1] Notice of Intent data from the FDACS June 2011 database and 2010 tax parcel database. Land use information obtained from District and Southwest Florida Water Management District 2004 land use datasets. The most recent sub-watershed boundaries are used.

[2] Agricultural acreage was determined using 2008 land use/land cover. The agricultural land cover acres include traditional agriculture, range land, and silvipasture that fall within Notice of Intent areas. These estimates continue to be revised on a regular basis.

[3] The enrolled acres include the total acres with natural areas that fall within enrolled areas. Overlapping records are not duplicated. Silviculture manual acreage is not included. Estimated acreage is based on the lesser of the enrolled Notice of Intent acres or the calculated parcel acres, to determine an approximate percentage of land mass enrolled in each of the sub-watersheds.

[4] The enrollment acreage for the Upper Kissimmee Sub-watershed is lower than others due to the initial focus on priority sub-watersheds within the Lake Okeechobee Watershed

[5] The Fisheating Creek/Nicodemus Slough Sub-watershed shows an enrollment greater than 100 percent due to the inclusion of cattle grazing BMP Notice of Intents on forestry lands not classified as agriculture use.

[6] The South Lake Okeechobee sub-watershed has been covered by the District Regulatory Source Control Program mandated by Chapter 40E-63, F.A.C. for phosphorus at 100 percent coverage since 1996. A Management Plan Master Permit under Chapter 40E-61, F.A.C. has been in place since 1992.

Water Year 2012 Anticipated Activities

- **District Regulatory Program.** Implementation of this program will continue as described in Chapter 40E-61, F.A.C. including permit processing and water quality assessment. In addition, the District continues to coordinate with the FDACS regarding BMP enrollment and implementation under the incentive-based voluntary program (information can be found at http://www.floridaagwaterpolicy.com). The District continues the development of a system that tracks the land area where BMPs are currently implemented under the various nutrient source control programs. This system includes agricultural activities (i.e., FDACS Notice of Intent or District source control permit) along with non-agricultural activities. This system will enable the coordinating agencies to determine consolidated implementation coverage and how it relates to the water quality in discharges from the area.

- **District development of water quality performance criteria and regulatory program rule updates.** A technical support document with the preliminary proposed performance measures for the Lake Okeechobee Watershed will be completed. The District is proposing to modify Chapter 40E-61, F.A.C. to incorporate requirements of the NEEPP.
- **FDACS BMP program implementation.** The FDACS will continue to enroll agricultural lands within the three Northern Everglades watersheds, fund cost-share programs as funds are available, conduct implementation assurance activities, and adopt or update BMP Manuals as needed.
- **FDEP Source Control Programs.** The FDEP will continue to implement source control programs according to the Lake Okeechobee Protection Plan.

CALOOSAHATCHEE AND ST. LUCIE RIVER WATERSHED SOURCE CONTROL PROGRAMS: PROTECTION PLAN UPDATES

The coordinating agencies' source control strategy for the Northern Everglades watersheds is to implement effective source controls through regulatory and incentive-based programs. It requires the establishment of criteria and performance metrics to ensure runoff to tributaries and canals allow the agencies to meet the NEEPP and TMDL goals.

The source control objectives, as presented in Chapter 7 of the 2009 river watershed protection plans (SFWMD et al., 2009a, 2009b), are as follows:

- Implement nonpoint source BMPs on agricultural and non-agricultural lands to ensure the amount of nutrients discharged off-site are minimized to the greatest practicable extent.
- Coordinate with local governments to implement non-agricultural, nonpoint source BMPs within their respective geographic boundaries.
- Assess water management practices within the watershed and develop recommendations for structural, nonstructural, and operational improvements that consider and balance water quality and supply, flood control, estuarine salinity, and aquatic habitat considerations.
- Ensure biosolids within the river and estuary watersheds do not contribute to nutrient loadings in the watershed.
- Coordinate with the Florida Department of Health (FDOH) to ensure septage disposal within the watershed is under an approved agricultural use plan limiting applications based on nutrient loading limits established in the proposed revisions to the District's Chapter 40E-61 Regulatory Nutrient Source Control Program.
- Ensure entities utilizing animal manure land application develop a resource management system-level conservation plan.
- Utilize alternative and innovative nutrient control technologies.
- Utilize federal programs that offer opportunities for water quality treatment, including preservation, restoration, or creation of wetlands on agricultural land.
- Implement a source monitoring program to (1) measure the collective performance and progress of the coordinating agencies' programs, (2) support adaptive management within the programs, (3) identify priority areas of water quality concern and BMP optimization, and (4) provide data to evaluate and enhance performance of downstream facilities.

This section focuses on the implementation of the regulation and BMP elements of source controls. An update on projects for improvement and restoration of the hydrologic function of natural and managed systems, such as the Dispersed Water Management Program, and on alternative nutrient reduction technologies are described in the river watershed protection plan updates found in Appendices 10-1 and 10-2 of this volume.

South Florida Water Management District Nutrient Source Control Programs

Environmental Resource Permit Program

Under Part IV of Chapter 373, F.S., the District and FDEP are granted authority to implement the ERP Program. The ERP program regulates activities involving the alteration of surface water flows, and it includes activities in uplands that alter stormwater runoff, as well as dredging and filling in wetlands and other surface waters. The program requires reasonable assurances that new activities or modifications of existing facilities will not degrade water quality, compromise flood protection, or harm wetland systems.

ERP applications are processed by the FDEP or District in accordance with the division of responsibilities specified in the "Operating Agreement Concerning Regulation under Part IV, Chapter 373, F.S., between South Florida Water Management District and Department of Environmental Protection" (effective on July 1, 2007). A breakdown of the acres covered by ERP/SW permits by sub-watershed is provided in **Tables 4-5** and **4-6** for the Caloosahatchee and St. Lucie watersheds, respectively, and maps showing the aerial coverage of these permits are provided in Appendix 4-4 of this volume. Projects are identified as SW if they were issued before 1995, and ERP if issued afterwards.

The FDEP and District require an applicant to provide reasonable assurances that state water quality standards will not be violated. If the proposed activity significantly degrades or is within an Outstanding Florida Water, the applicant must provide reasonable assurance that the proposed activity will be clearly within the public interest. If the applicant is unable to meet water quality standards because existing ambient water quality does not meet standards, the FDEP or District shall consider mitigation measures proposed by or acceptable to the applicant that cause net improvement of the water quality in the receiving body of water for those parameters that do not meet standards, pursuant to Section 373.414(1)(b)3, F.S. This requirement for net improvement is currently applied to the water bodies included in the NEEPP.

Table 4-5. Acres of District Issued ERP/SW permits by sub-watershed[1] in the Caloosahatchee Watershed.

Sub-Watersheds	Total Acres with ERP/SW permits within Sub-Watershed[1]	Percentage of Sub-Watershed Acreage
S-4	12,142	29%
East Caloosahatchee	98,699	50%
West Caloosahatchee	170,168	49%
Tidal Caloosahatchee	108,194	41%
Coastal Caloosahatchee	25,411	11%
Total	414,619	38%

[1] Overlapping records are not duplicated and FDEP issued permits are not included.

Table 4-6. Acres of District Issued ERP/SW permits by sub-watershed[1] in the St. Lucie Watershed.

Sub-watersheds	Total Acres with ERP/SW permits within Sub-watershed[1]	Percentage of Sub-watershed Acreage
C-23	68,973	62%
C-24	71,440	81%
C-25	89,061	78%
North Fork	77,733	68%
Basins 4 and 5	3,813	37%
Basin 6	2,075	43%
South Fork	30,193	63%
North Mid-estuary	2,319	55%
South Mid-estuary	708	39%
South Coastal	4,474	57%
C-44	82,147	63%
Total	432,936	68%

[1] Overlapping records are not duplicated and FDEP issued permits are not included.

The FDEP is proposing statewide ERP legislation. This legislation addresses the adoption of statewide ERP rules to govern the construction, alteration, operation, maintenance, repair, abandonment and removal of surface water management systems. These new rules shall rely primarily on FDEP and District rules currently in effect with a reconciliation of differences for a statewide approach while accounting for differing physical and natural conditions. The applicant's handbook, adopted as a part of this rule, shall include a discussion of stormwater quality and quantity criteria.

The 2009 river watershed protection plans included development of an ERP basin rule to address the potential for new activities to impact hydrology in accordance with the NEEPP intent section (SFWMD et al., 2009a, 2009b). District staff developed a methodology, using calculations similar to the draft Statewide Stormwater Rule, to be included in a basin rule to demonstrate no impact to hydrology. During rule discussions, it was proposed that this methodology be applied utilizing existing ERP criteria. This proposal was included in the latest version of the 2011 Lake Okeechobee Protection Plan Update (SFWMD et al., 2011). The proposal to use existing ERP criteria to implement the methodology will not be pursued in the river watershed protection plans or the Lake Okeechobee Protection Plan due to concerns that implementation would be considered non-rule policy.

District staff will not pursue a basin rule but will continue to work with the FDEP and the other water management districts to develop and implement the more comprehensive ERP rule.

River Watershed Regulatory Nutrient Source Control Program

NEEPP mandates that the regulatory source control program adopted under Chapter 40E-61, F.A.C. be expanded to encompass phosphorus and nitrogen in the Caloosahatchee and St. Lucie watersheds. In late 2009, the District initiated the activities and technical analyses necessary to develop programs and initiate consultation with stakeholders and coordinating agencies required for rule amendment. These activities are described in the paragraphs below in reference to the District objectives as outlined in the 2009 river protection plan updates (SFWMD et al., 2009a, 2009b).

Evaluation of existing watershed monitoring networks for regulatory purposes. The District evaluated existing water quality monitoring networks in the Caloosahatchee and St. Lucie watersheds to determine if they would be effective in measuring the success of source control programs at the watershed level (Tier I stations) and within the watersheds. This will support adaptive management within the programs, allow for identification of priority areas of water quality concern and BMP optimization, and provide data to evaluate and enhance performance of downstream facilities (Tier II stations). The findings for collective performance measurement are described in the next few paragraphs.

For the Caloosahatchee River Watershed, water quality and flow monitoring stations exist to estimate nutrient loading at the Tier I level for the freshwater sub-watersheds — S4, East Caloosahatchee, and West Caloosahatchee. The freshwater network was improved in 2010 by replacing monthly grab sampling at the S-235, S-77, S-78, and S-79 structures with flow-triggered autosamplers and weekly water quality grabs. Nevertheless, network improvements or hydrologic investigations may be required at some stations to ensure data are reasonably representative of tributary areas including the following:

- Lack of water quality monitoring at S-342N, which conveys discharges from Nicodemus Slough, a Lake Okeechobee basin, into the East Caloosahatchee Sub-watershed. Synoptic water quality monitoring has been initiated to estimate nutrient loading through this structure.
- Nutrient discharges from private structures in the S4 sub-watershed into the East Caloosahatchee Sub-watershed (Disston Water Control District Structure 3, and the Nine Mile and Flaghole canals, which are not monitored, and flow into Lake Hicpochee). Note, however, discharges from this sub-watershed to Lake Okeechobee through the L-D1 culverts are considered to be negligible (Gary Goforth, Inc. et al., 2011).
- Nutrient discharges from the East Caloosahatchee Sub-watershed into the West Caloosahatchee Sub-watershed via private canals connecting canals 3 and 2.
- Nutrient discharges from the Tidal Caloosahatchee Sub-watershed into the West Caloosahatchee Sub-watershed bypassing S-78 via Telegraph Swamp.

Water quality monitoring is conducted in most tributaries within the Tidal and Coastal Caloosahatchee sub-watersheds. There are nineteen monitored tributaries in the Tidal Caloosahatchee Sub-watershed (only Marshpoint and Courtney Canal are not monitored) and eight monitored tributaries in the Coastal Caloosahatchee Sub-watershed (only Yucca Pen Creek is not monitored). Water quality monitoring in the Tidal Caloosahatchee Sub-watershed is conducted by Lee County and the City of Cape Coral. Water quality monitoring in the Coastal Caloosahatchee Sub-watershed is performed by the City of Cape Coral, City of Sanibel, and Lee County (HDR Engineering, Inc., 2011a). Flow monitoring is conducted by the United States Geological Survey at Shell Point, at the intersection of the Tidal and Coastal sub-watersheds, and at Telegraph Creek, Meade Canal, San Carlos Canal, Courtney Canal, Orange River, and Billy Creek.

For the St. Lucie Watershed, the evaluation indicates that, although many of the existing stations can be used for Tier I monitoring, the monitoring network needs to be supplemented in some sub-watersheds (HDR Engineering, Inc., 2011b). Approximately 130,000 acres (ac) are downstream of water control structures and not represented by monitoring. Eighty-five percent of this acreage is in the North Fork and South Fork sub-watersheds and are drained by several streams, some of which are tidally influenced. In order to monitor nutrient loading representative of the entire watershed, disregarding locations where flow is known to be negligible, 12 to 20

permanent water quality or flow monitoring locations have been identified for further review and analysis during performance measure development.

In parallel, the completed or ongoing initiatives implemented to improve the understanding of the nutrient loading contributions within the watersheds, and to further refine the monitoring network including Tier II stations are as follows:

- For the Caloosahatchee Watershed, a one-year synoptic monitoring program for total phosphorus (TP), total nitrogen (TN), and flow was completed in 2009. The study included monitoring of 30 freshwater tributaries. Findings have provided insight on upstream locations of higher nutrient concentration and flow that may warrant synoptic or permanent Tier II monitoring.
- For the St. Lucie Watershed, a three-year synoptic monitoring program for TP, TN, and flow was initiated in 2010 within the C-23 and C-24 sub-watersheds.
- Concurrent with these evaluations, the hydrology of the sub-basins comprising these watersheds is being evaluated to verify tributary boundaries and cross-boundary discharges, such as discussed for the Caloosahatchee Watershed, and to consider economy-of-scale in prioritizing monitoring locations.

Based upon funding and technical constraints (such as in tidally influenced areas), the District will fill the gaps for water quality monitoring coverage in the watersheds. In the immediate future, the objective is to evaluate the feasibility of accurate flow monitoring methods for nutrient loading calculation for source control performance measures in the Tidal Caloosahatchee sub-watershed (approximately 260,000 ac) and in the North Fork and South Fork of the St. Lucie River (approximately 100,000 ac).

Establish water quality performance criteria specific to the collective source control programs. Performance shall be measured for the collective implementation of nonpoint source BMPs on agricultural and non-agricultural lands, and for the other pollutant source control program objectives of the plans, as described earlier in this section.

The District completed an assessment of historic TP, TN, inorganic nitrogen, and flow tributary data for the Caloosahatchee and St Lucie watersheds (HDR Engineering, Inc., 2011a and 2011b, respectively). These analyses provide the basis for development of water quality performance criteria (performance measure methods) of the collective source control programs implemented by the coordinating agencies at the sub-watershed level and to support monitoring network optimization at Tier I and II levels. The analyses included (1) calculating inorganic nitrogen and TN based on measured nitrate+nitrite (NOx), ammonia nitrogen (NH_3-N), and total Kjeldahl nitrogen (TKN); (2) calculating average flows, loads, flow-weighted mean (FWM) concentrations, and unit area loads; and (3) analyzing normality, trends, regressions, and outliers of the datasets.

Performance measure method development is being coordinated with protection plan data and model assessments of the estimated performance of protection plan preferred projects and programs. Based upon completion of collective source control performance measure methods, development of monitoring requirements and individual site water quality-based limits will be considered for sites used for septage application or disposal, and for agricultural sites where the voluntary incentive-based FDACS BMP program is not implemented.

Implement a regulatory nutrient source control program utilizing BMPs for agricultural and non-agricultural lands. According to the NEEPP, refinement of existing regulations and development of BMPs complementing existing regulatory programs are a basis for achieving and maintaining compliance with water quality standards. Together with the ERP Program, Chapter 40E-61 and Chapter 40E-63, F.A.C. are foundational, long-standing regulations that establish criteria to ensure discharges from nonpoint sources in portions of the Lake Okeechobee Watershed meet legislative objectives for water quality protection. Chapter 40E-61, F.A.C. has been in place in portions of the Lake Okeechobee Watershed since 1989.

Nonpoint source BMPs, consistent with those planned for the Lake Okeechobee Watershed and designed to achieve the objectives of the river protection plans, must be implemented on an expedited basis. Furthermore, specific elements that need to be incorporated into an amended Chapter 40E-61, F.A.C. encompassing the Northern Everglades watersheds include the following:

- For agricultural lands in areas where agricultural nonpoint source BMPs, or interim measures have been adopted by FDACS rule, the owner or operator shall implement these measures or demonstrate compliance with the District nutrient source control program by conducting monitoring prescribed by the FDEP or District.
- For non-agricultural lands, both (1) implementation of an ongoing program for improvement of existing and development of new BMPs, and (2) adoption of technology-based standards under the District's nutrient source control program are required. Where these standards have been adopted, the owner or operator of a non-agricultural nonpoint source shall implement these measures.

In response, the District initiated a phased approach for development of the source control program in the river watersheds. As described above, the phases include 1) assessing the suitability of the existing monitoring network and historic data to measure a regulatory source control program's performance; and 2) developing performance measures to set benchmarks for evaluating the effectiveness of the collective source control programs. Upon completion of performance measure development, the District will initiate a rule amendment to Chapter 40E-61, F.A.C. to develop a nutrient source control program utilizing BMPs for agricultural and non-agricultural lands for the Caloosahatchee and St Lucie watersheds. The regulatory nutrient source control program will be streamlined to prevent duplication with existing programs. For example, agricultural lands participating in an FDACS program will be recognized as meeting the BMP implementation requirements of the amended rule. The regulatory nutrient source control program will focus on areas where implementation criteria is lacking or needs strengthening based on measured performance. In addition, the 2011 memorandum of understanding establishes that the coordinating agencies will focus their efforts on the basins where water quality problems are identified based on available monitoring data.

In the interim, the District is coordinating with the FDACS to identify agricultural lands currently participating in the FDACS agricultural BMP program. Please refer to **Tables 4-7** and **4-8** for a status of FDACS BMP implementation as of March 2011. Maps providing approximate coverage of agricultural and non-agricultural source control programs in the Caloosahatchee and St. Lucie watersheds are provided in Appendix 4-4 of this volume. Future versions of the SFERs will include information on District lands leased for agricultural uses and associated BMP requirements.

Table 4-7. Acres and estimated percentage of agricultural land enrolled in BMP programs by sub-watershed[1] in the Caloosahatchee Watershed.

Sub-Watersheds	Agricultural Acres[2]	Total Enrolled Acres[3]	Percent Agricultural Acres Enrolled[2]
S-4	35,297.80	26,749.51	75.78%
East Caloosahatchee	134,791.47	73,497.42	54.53%
West Caloosahatchee	195,226.82	108,419.87	55.54%
Tidal Caloosahatchee	76,703.86	256.74	0.33%
Coastal Caloosahatchee	34,548.13	242.07	0.70%
Grand Total	476,568.08	209,165.61	43.89%

[1] Notice of Intent data from the FDACS June 2011 database and 2010 tax parcel database. Land use information obtained from District and Southwest Florida Water Management District 2004 land use datasets. The most recent sub-watershed boundaries are used.

[2] Agricultural acreage determined using 2008 land use/land cover. The agricultural land cover acres include traditional agriculture, range land, and silvipasture that fall within Notice of Intent areas. These estimates continue to be revised on a regular basis.

[3] The enrolled acres include the total acres with natural areas that fall within enrolled areas. Overlapping records are not duplicated. Silviculture manual acreage is not included. Estimated acreage is based on the lesser of the enrolled Notice of Intent acres or the calculated parcel acres, to determine an approximate percentage of land mass enrolled in each of the sub-watersheds.

Table 4-8. Acres and estimated percentage of agricultural land enrolled in BMP programs by sub-watershed[1] in the St. Lucie Watershed.

Sub-Watersheds	Agricultural Acres[2]	Total Adjusted Enrolled Acres[3]	Percent Agricultural Acres Enrolled[2]
C-23	79,492.56	52,796.63	66.42%
C-24	60,367.45	39,677.09	65.73%
C-25 and C-25 East	89,827.12	91,684.41	57.90%
North Fork	34,123.28	9,254.67	27.12%
Basins 4-5	1,660.41	47.92	2.89%
Basin 6	1,034.37	38.58	3.73%
South Fork	20,554.33	1,421.27	6.91%
C-44 and S-153	87,019.31	39,021.29	44.84%
Grand Total	374,078.83	194,264.77	51.93%

[1] Notice of Intent data from the FDACS June 2011 database and 2010 tax parcel database. Land use information obtained from District and Southwest Florida Water Management District 2004 land use datasets. The most recent sub-watershed boundaries are used.

[2] Agricultural acreage determined using 2008 land use/land cover. The agricultural land cover acres include traditional agriculture, range land, and silvipasture that fall within Notice of Intent areas. These estimates continue to be revised on a regular basis.

[3] The enrolled acres include the total acres with natural areas that fall within enrolled areas. Overlapping records are not duplicated. Silviculture manual acreage is not included. Estimated acreage is based on the lesser of the enrolled Notice of Intent.

Florida Department of Agriculture and Consumer Services Nutrient Source Control Programs

Agricultural Best Management Practices Program

The Florida Watershed Restoration Act (Section 403.067, F.S.) enacted in 1999, authorizes the FDACS to develop, adopt by rule, and implement agricultural BMPs statewide to achieve the level of pollution reduction established by the FDEP for agricultural pollutant source in allocations pursuant to BMPs. The NEEPP further clarifies FDACS` roles for source control implementation in the Caloosahatchee and St. Lucie watersheds as follows: conduct an ongoing program for improvement of existing interim measures or BMPs and the development of new interim measures or BMPs; and work with the University of Florida's IFAS to review, and where appropriate, develop revised nutrient application rates for all agricultural soil amendments in the watersheds. Where water quality problems are detected despite the appropriate implementation of adopted BMPs, the FDACs shall reevaluate BMPs and make appropriate changes to its BMP rules. This shall be done in consultation with the other coordinating agencies and affected parties.

In response, FDACS' Office of Agricultural Water Policy works with producers to develop, adopt, and implement agricultural BMPs specific to various agricultural operations. Chapter 5M-3, F.A.C. spells out the conditions under which enrollment in a BMP program is required, and the implementation and record keeping requirements under a Notice of Intent to implement FDACS BMPs. The rule also ensures access is provided by Notice of Intent participants for confirmation of BMP implementation. The rule incorporates the NEEPP requirement that agricultural entities shall implement BMPs pursuant to an FDACS-adopted manual or a conservation plan, or that they shall conduct water quality monitoring as prescribed by the FDEP or District. The sections below provide an update on and current status of the specific FDACS river watershed source control objectives as proposed by the FDACS in the 2009 river watershed protection plans.

Adopt BMP manuals for cow/calf, equine, container nursery, and sod operations. To date, the FDACS has adopted BMP manuals for citrus, vegetable and row crop, container nursery, sod, cow/calf, and specialty fruit and nut operations. The equine manual is nearing completion and is targeted for adoption by December 2011. The FDACS is also working on updating and consolidating the existing regional citrus BMP programs into a statewide BMP manual. Revisions to expand the container nursery manual to in-ground nurseries and update the vegetable and row crop manual are also underway. The NEEPP states that BMPs shall be developed in accordance with the Florida Watershed Restoration Act (Section 403.067, F.S.), and designed to achieve the objectives of the appropriate protection plans. The FDEP shall use best professional judgment in making the initial determination of BMP effectiveness.

Intensify efforts to sign-up cow/calf and equine producers for BMP implementation. As of March 2011, the FDACS reports BMP enrollment in the Caloosahatchee and St. Lucie watersheds is as follows:

- Enrollment of approximately 209,166 ac of the 476,568 agricultural ac in the Caloosahatchee Watershed (44 percent).
- Enrollment of approximately 194,265 ac of the total 374,079 ac of agricultural lands in the St. Lucie Watershed (52 percent).

An account of FDACS BMP enrollment by sub-watershed for the Caloosahatchee and St. Lucie watersheds is provided in **Tables 4-7** and **4-8**, respectively.

Evaluate the need for BMP enrollment and implementation for other commodities within the watershed and conduct these on a priority basis. Since the cow/calf manual was adopted in 2008, the FDACS reports a significant increase in enrollment. Little activity in enrollment has occurred for nursery or sod operations, likely due to the economic slowdown since 2008, which led to a reduced demand for these products. In addition, citrus acreage has declined because some groves have been purchased for development, and some have gone out of production due to canker and citrus greening.

Current enrollment per BMP manual or program in the St. Lucie and Caloosahatchee watersheds is presented in **Tables 4-9** and **4-10**, respectively. As funds become available, FDACS staff contacts producers to gauge their interest in implementing any cost-share BMPs identified for their farms at the time of Notice of Intent sign-up.

Table 4-9. Estimated total acres by BMP implementation categories in the Caloosahatchee Watershed.

Office of Agricultural Water Policy (FDACS) BMP Enrollment by Commodity	Total Enrolled Acres within Watershed (Percent of Total Enrollment)
Citrus	29,942.13 (14%)
Cow/Calf	54,559.28 (26%)
Container Nursery	895.22 (0.4%)
Sod	2,100.00 (1%)
Vegetable and Agronomic Crops	54,281.91 (26%)
Dairies	1,344.85 (1%)
Mixed Use	29,362.56 (14%)
Grand Total	209,165.61

Table 4-10. Estimated total acres by BMP implementation categories in the St. Lucie Watershed.

Office of Agricultural Water Policy (FDACS) BMP Enrollment by Commodity	Total Enrolled Acres within Watershed (Percent of Total Enrollment)
Citrus	93,090.34 (48%)
Cow/Calf	87,775.46 (45%)
Container Nursery	1,934.49 (1%)
Sod	311.65 (0.2%)
Vegetable and Agronomic Crops	2,410.23 (1%)
Equine	4.64 (~0%)
Dairies	7,244.86 (4%)
Mixed Use	1,493.10 (1%)
Grand Total	194,264.77

Develop a BMP Implementation Assurance Program to follow-up with cow/calf and, once a manual is adopted, equine operations. The FDACS is responsible for ensuring BMPs are implemented as described in their Notice of Intents. Operations that submit Notice of Intents receive a written survey on a rotating basis by commodity approximately every five years. The surveys include questions on the nutrient management, irrigation management, and other key BMPs in the FDACS manuals. A description of the survey process and site inspection component of implementation assurance are provided in the 2011 Lake Okeechobee Protection Plan Update (SFWMD et al., 2011) and the 2010 Report on Implementation of Agricultural Best Management Practices (FDACS, 2010)[4]. NEEPP operations are visited upon completion of cost-shared

[4] See http://www.floridaagwaterpolicy.com/ImplementationAssurance.html.

structural BMPs or in the order in which Notice of Intents are completed and implemented. The initial focus for site inspections is on cow/calf operations. FDACS staff use a site inspection form to rate overall implementation as satisfactory, conditional, or unsatisfactory. For a rating of unsatisfactory or conditional, follow-up inspections are conducted within a specified time.

Training and Education on BMP Implementation and Record Keeping. The FDACS has partnered with the Florida Farm Bureau, Florida Cattlemen's Association, and IFAS extension services to hold cow/calf BMP workshops in Polk, Osceola, Hendry, and Glades counties.

Continue on-farm BMP demonstration projects to provide BMP effectiveness data and insight into what nutrient BMPs may be necessary to reach nutrient reduction goals. A long-term project was started in 2003 to demonstrate and evaluate water quality effectiveness of cow-calf BMPs within the Northern Everglades. Two types of BMPs evaluated with regard to nitrogen and phosphorus (concentration and load) and economics were (1) ditch fencing and culvert crossing and (2) wetland water retention. These studies are described in detail in the 2011 Lake Okeechobee Watershed Protection Plan Update (SFWMD et al., 2011).

These two types of BMPs were evaluated at a 275 hectare ranch (Pelaez Ranch) located in Okeechobee County. Pre- and post-BMP monitoring data collection and analyses were used to evaluate the two BMPs. Overall, results showed that the ditch fencing and culvert crossing BMPs can reduce TP concentrations and loads from ranches without causing adverse impact on cattle production. Effectiveness of the wetland water retention BMP was less conclusive, and the study cites that additional long-term data collection would be useful for evaluating the effectiveness of this BMP.

In addition, the FDACS is working collaboratively with IFAS to review and develop revised nutrient application rates for agricultural soil amendments in the watershed. The FDACS reports that the following IFAS documents on fertilization recommendations have been updated:

- Fertility Considerations for Sod Production, Fact Sheet SL-52, updated July 2010 (Sartain, 2010)
- Standardized Fertilization Recommendations for Agronomic Crops, Fact Sheet SL-129, updated April 2009 (Mylavarapu et al., 2009)
- Nutrition of Florida Trees, Fact Sheet SL-253, updated in May 2011 (Obreza and Morgan, 2011)

Animal Manure Application Rule

The Land Application Requirements Rule (5M-10.003, F.A.C.) for animal manure became effective in February 2009. The provisions of this rule were modified slightly and incorporated into the recent revisions to Chapter 5M-3, F.A.C. Consequently, the FDACS will repeal Chapter 5M-10, F.A.C. Under the new provisions, agricultural operations that land-apply manure in the Northern Everglades watersheds shall do so uniformly at phosphorus-based rates, as determined by soil and tissue results. Application cannot occur when soils are saturated or inundated with water; within 30 feet (ft) of any wetland, lake, stream, or estuary; or within 100 ft from a drinking water well.

Operations that apply manure at rates exceeding one ton per acre shall not apply manure within 50 ft of any lake, wetland, stream, or estuary, and shall also implement a nutrient management plan; however, these application rates have not been reported in the river watersheds. A nutrient management plan specifies the amount, placement, form, and timing of the application of nutrients, including manure, animal by-products, biosolids, and soil amendments. The plan must be approved by the United States Department of Agriculture National Resources Conservation Service (NRCS) or a NRCS certified Technical Service Provider.

Urban Turf Fertilizer Rule

The statewide Urban Fertilizer Rule (5E-1.003(2), F.A.C.) became effective in December 2007. Anyone who fertilizes a lawn has to comply with the statewide rule, unless subject to a stricter local ordinance. The rule limits the phosphorus and nitrogen content of fertilizers to the levels considered sufficient to support healthy urban turf and lawns, as follows:

- Application rates for phosphorus shall not exceed 0.25 pounds (lbs) of phosphorus oxide (P_2O_5) per 1,000 square feet (ft^2) per application and not exceed 0.50 lbs P_2O_5 per 1,000 ft^2 per year.
- Application rates for nitrogen shall not exceed 0.7 lbs of readily available nitrogen per 1,000 ft^2 per application unless it is slow release fertilizer, which can be applied at a rate of 1.0 lb of TN per 1,000 ft^2 per application.

Exceptions to the rates above apply to new plantings or when low nutrient levels in the soils are demonstrated via a soil test. Under this rule, the FDACS expects a 20 to 25 percent reduction in nitrogen and a 15 percent reduction in phosphorus in every bag of fertilizer sold to the public. The rule is enforced in the market place by FDACS field inspectors under the Division of Agricultural Environmental Services except where a local government enforces a stricter local ordinance.

Florida Department of Environmental Protection Pollutant Source Control Programs

The FDEP is responsible for several existing and planned source control programs primarily for non-agricultural areas, which have the following general objectives:

- Enhance existing regulations for management of biosolids within the watershed.
- Administer the National Pollutant Discharge Elimination System (NPDES) permit program.
- Implement pollutant reduction plans for municipal stormwater management systems.
- Coordinate with applicable authorities on septage disposal to ensure nutrient loadings are considered.
- Promote initiatives to improve existing stormwater and wastewater infrastructure.
- Adopt land development regulations to promote proper stormwater management.
- Implement the ERP program pursuant to the operating agreement between the District and FDEP and act as the lead agency on the Statewide Stormwater Rule development.

Biosolids

The Biosolids Rule, Chapter 62-640, F.A.C was revised on August 29, 2010. The revisions include new requirements for site permitting, nutrient management plans, registration of distributed and marketed Class AA biosolids as fertilizer, and prohibition of land application of other types of biosolids (Class B) in the Northern Everglades watersheds unless a nutrient balance demonstration is completed by the applicant and approved by the FDEP. The nutrient balance demonstration shall be submitted with the site's nutrient management plans at the time of permit application for the sites. Also, record keeping and reporting requirements to document compliance with the nutrient balance demonstration is required.

Biosolid application sites are shown in **Figure 4-7**. In 2011, the Caloosahatchee Watershed had five active biosolids application sites and the St. Lucie Watershed had three. Pre-NEEPP, the Caloosahatchee Watershed had 11 sites and the St. Lucie had six. The end of application at these sites, assuming a nutrient balance demonstration is not applied for and approved, will be by January 13, 2013 when all sites are required to be permitted in accordance with the revised Biosolids Rule.

National Pollutant Discharge Elimination System Wastewater and Concentrated Animal Feeding Operation Facilities

The NPDES is a federal program established by Section 402 of the Clean Water Act. The NPDES program requires point source dischargers to obtain permits that place limits on the type and quantity of pollutants that can be released into the nation's waters. The United States Environmental Protection Agency has delegated the authority for issuing these permits to the FDEP. NPDES permits are required for point discharges of wastewater or industrial facilities, for concentrated animal feeding operations (CAFOs) and for stormwater discharges from construction activities, industrial activities, and municipal separate storm sewer facilities.

No new wastewater NPDES nor CAFO permits have been issued or decommissioned in the Caloosahatchee or St. Lucie watersheds since January 2010. Although wastewater permits are occasionally revised, no revisions of the NPDES permits have changed effluent characteristics or flow, nor have involved any TMDL or water quality issues. **Table 4-11** summarizes information on renewal and nutrient limitations for NPDES and CAFO permits in the watersheds.

Municipal Separate Storm Sewer System Permit Program

The FDEP is in the process of reissuing all Phase I municipal separate storm sewer permits for the Caloosahatchee Watershed, including the permit for Lee County. All reissued Phase I permits include a new section on TMDL implementation and require enhanced tracking of load reductions achieved through implementation of the permit's stormwater management program, including nutrient load reductions from street sweeping activities.

Phase II municipal separate storm sewer permits are generic permits that include a requirement for modifying the stormwater management program if it is not achieving the load allocations in an adopted TMDL and to comply with the conditions of a Basin Management Action Plan (BMAP). For the Caloosahatchee Watershed, Hendry and Glades counties were issued Phase II permits in 2010. For the St. Lucie Watershed, all municipal separate storm sewer permits are Phase II. Note that while an adopted TMDL does apply to the St. Lucie Watershed, the BMAP has not yet been adopted. Therefore, these Phase II facilities are not required to make changes to their stormwater management program at this point in time.

Application of Septage

Sections 373.4595(4)(a)2.f and 373.4595(4)(b)2.f, F.S. require all entities disposing of septage within the river watersheds to develop and submit to the FDOH an agricultural use plan that limits applications based upon nutrient loading. At this time, no FDOH-regulated septage disposal sites are located in the Northern Everglades watersheds. A FDOH-regulated disposal site remained in the Lake Okeechobee Watershed as of April 2010, but has since then been removed. This assessment is made based on annual review of permit applications for septage disposal sites in the FDOH Environmental Health Database.

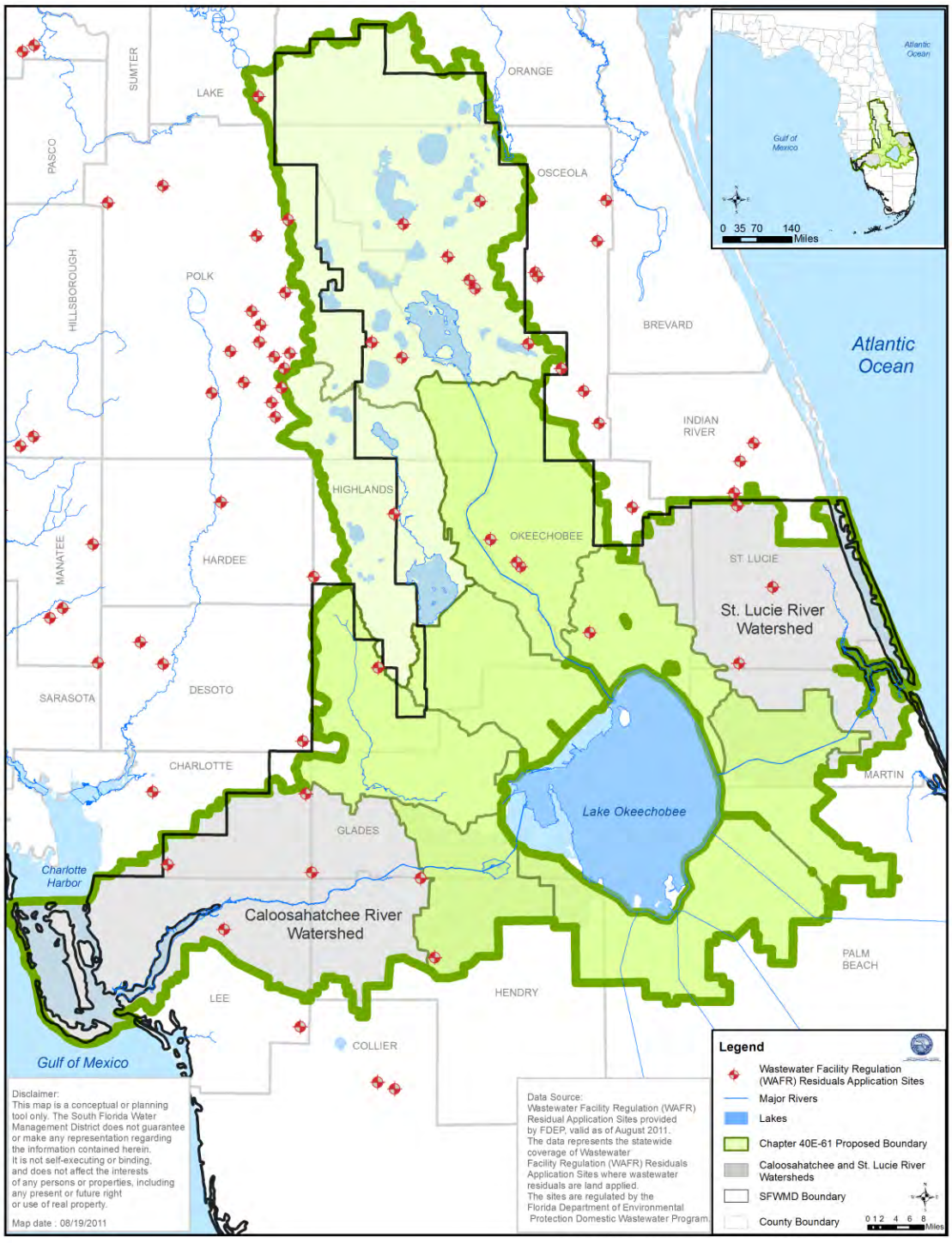


Figure 4-7. Biosolid application sites in the Northern Everglades watersheds.

Table 4-11. NPDES wastewater and CAFO permits in the Caloosahatchee and St. Lucie watersheds.

Sub-watershed	Facility ID	Name	Permit Type	Nutrient Monitoring	Permit Renewal Date	Permit Expiration Date
Caloosahatchee Watershed						
Wastewater Permits						
	FL0001490	Florida Power and Light Fort Myers Plant	Industrial Wastewater	Yes	12/10/2010	12/9/2015
	FLG110706	Florida Rock Labelle Concrete Batch Plant	Concrete Batch Plant Generic Permit	No	4/8/2010	4/7/2015
CAFO Wastewater Permits						
East Caloosahatchee	FLA284629	Graham Farms		Yes[1]	8/05/2005	8/04/2010[2]
St. Lucie Watershed						
Wastewater Permits						
	FLG110601	Tarmac America - Stuart	Concrete Batch Plant Generic Permit	No	1/26/2010	1/25/2015
	FLG110333	CEMEX LLC - Stuart	Concrete Batch Plant Generic Permit	No	6/18/2010	6/17/2015
	FLG110724	CEMEX LLC - Indiantown	Concrete Batch Plant Generic Permit	No	4/13/2011	4/12/2016
	FL0184152	South Martin Regional Utility - Demineralization Concentrate Discharge	Industrial Wastewater Individual Permit	Yes	7/28/2010	7/27/2015
	FLG110611	Continental Florida Material - Fort Pierce	Concrete Batch Plant Generic Permit	No	1/11/2010	1/10/2015
	FLG110638	Adonel Concrete - Fort Pierce Plant	Concrete Batch Plant Generic Permit	No	3/4/2010	3/3/2015
	FLG110574	Tarmac America - Fort Pierce	Concrete Batch Plant Generic Permit	No	7/30/2010	7/29/2015
CAFO Wastewater Permits						
C-25	FLA447871	Burnham Farms, Inc.		Yes[1]	7/29/2008	7/28/2013
C-25	FLA190560	J L Farms		Yes[1]	5/16/2008	5/15/2013
C-25	FLA139254	Larson Dairy – Barn #3		Yes[1]	7/01/2008	6/30/2013
C-24	FLA187577	Gracewood Dairy		Yes[1]	2/20/2006	2/19/2011[1]
C-44	FLA413950	Payson Park Thoroughbred Training Center		Yes[1]	8/02/2007	8/01/2012

[1] Includes phosphorus and nitrogen monitoring of surface water discharges, groundwater, and land application effluent.

[2] Permit renewal application under process.

Any new applications for septage disposal within the Northern Everglades watersheds will be required to limit septage amounts applied to meet phosphorous agronomic rates, as described in Rule 64E-6.010(7)(q), F.A.C. In addition, as indicated in the 2009 river watershed protection plans (SFWMD et al., 2009a, 2009b), once the District promulgates nutrient concentration limits for runoff from sites in these watersheds through proposed amendments to Chapter 40E-61, F.A.C., the FDOH will notify all county permitting authorities in the watersheds that nutrient concentrations originating from these sites shall not exceed the established limits.

Another element for reducing nutrient impacts from septic systems is to ensure their proper operation and maintenance. To that effect, the legislature approved a bill on June 4, 2010 directing the FDOH to create and administer a statewide five-year cycle septic tank evaluation program. Following adoption, concerns were received regarding the potential cost to rural and semi-rural communities because of the inspections and associated system repair costs. In response, the 2011 Florida legislature added language in the Budget Implementation Act requiring the FDOH to submit a plan for approval by the Legislature Budget Commission before expending funds in furtherance of the evaluation program; however, they did not repeal or modify the five-year septic tank evaluation program established in 2010. In addition, since FDOH will have to adopt a rule to implement the program, such a rule will require ratification from the legislature. The FDOH would not restart rule development until they receive approval by the Legislature Budget Commission.

Florida-friendly Landscaping Program

Since 2009, the University of Florida IFAS Florida Yards and Neighborhood Program has been expanded from the original homeowner approach to cover a broader audience. The new programs are (1) Florida Yards and Neighborhoods Homeowner Program, which educates homeowners about how to design, install, and maintain Florida-friendly landscapes; (2) Florida Yards and Neighborhoods Builder and Developer Program, which educates builders and developers, landscape architects, homeowners associations, and property managers on how to design, install, and maintain Florida-friendly landscapes; and (3) Green Industries BMP Program, which trains and certifies landscape professionals. Beginning January 1, 2014, this certification will be required for any person applying commercial fertilizer to an urban landscape. These programs disseminate nine principles of the Florida-friendly landscaping: (1) right plant, right place, (2) water efficiently, (3) fertilize appropriately, (4) mulch, (5) attract wildlife, (6) manage yard pests responsibly, (7) recycle, (8) reduce stormwater runoff, and (9) protect the waterfront.

In addition, the 2009 legislature (Senate Bill 2080) created or amended Sections 373.185(3)(a),(b) and (c), F.S., which promote the use of Florida-friendly landscaping to conserve and protect the state's water resources. The law prevents deed restrictions, covenants, or local government ordinances that prohibit property owners from using Florida-friendly landscaping and pollution prevention measures. Furthermore, county and municipal governments with impaired water bodies are required to adopt FDEP's Model Ordinance for Florida-Friendly Fertilizer Use on Urban Landscapes, or to adopt more stringent measures where necessary to address nonpoint source pollution as demonstrated based on science, economics, and technology (e.g., adoption of a blackout period preventing application of fertilizer during certain months). To date, those with known ordinances, or those known to be in the process of passing ordinances, in the Caloosahatchee River Watershed include Charlotte County, Cape Coral, Fort Myers, Lee County, Fort Myers Beach, and the City of Sanibel. In the St. Lucie River Watershed local ordinances have been adopted, or are in the process of being adopted, for the City of Stuart, City of Port St. Lucie, Town of Sewall's Point, Martin County, and St. Lucie County.

These water quality landscaping initiatives in urban environments would not be complete without a component to address golf courses. Florida currently has more than 1,300 golf courses and more are being designed and built every year (FDEP, 2007). The golf industry represents a substantial component of Florida's economy and lifestyle. The Florida Golf Course Superintendents Association worked proactively with the FDEP, University of Florida IFAS, and other regulatory agencies to publish the Best Management Practices for Enhancement of Environmental Quality on Florida Golf Courses (FDEP, 2007), which discusses pollution prevention at golf courses.

Stormwater and Wastewater Infrastructure Updates and Planning

Stormwater and wastewater infrastructure updates and master planning implementation and responsibility fall on local governments. Regarding existing urbanized areas, local governments may need to conduct stormwater management retrofit projects on portions of urbanized areas of the Northern Everglades watersheds that were developed before current criteria for ERP and municipal separate storm sewer permitting programs. These retrofits are limited by funding availability. An update on these projects is provided in the river watershed protection plan updates (Appendices 10-1 and 10-2 of this volume).

Regarding future development, FDEP's Office of Intergovernmental Programs coordinates involvement in statewide planning efforts conducted under various authorities, including Chapter 187, F.S. (State Comprehensive Plan), which sets forth goals that articulate Florida's desired future. The State Comprehensive Plan is reviewed annually, and local plans are updated every five to seven years through the evaluation and appraisal report process.

Submerged Lands and Environmental Resource Permitting Program

As discussed earlier in the *South Florida Water Management District Nutrient Source Control Programs* section, ERP applications within the river watersheds are processed by either the FDEP or District in accordance with an operating agreement. In addition, FDEP is proposing Statewide ERP legislation. This legislation addresses the adoption of statewide ERP rules to govern the construction, alteration, operation, maintenance, repair, abandonment and removal of surface water management systems. These new rules shall rely primarily on FDEP and SFWMD rules currently in effect with a reconciliation of differences for a statewide approach while accounting for differing physical and natural conditions. The applicant's handbook, adopted as a part of this rule, shall include a discussion of stormwater quality and quantity criteria. Besides ERPs, the FDEP also has permitting authority for Comprehensive Everglades Restoration Plan projects (CERPRA). **Table 4-12** provides a summary of ERP and CERPRA permits issued or modified in the river watersheds since January 2009.

STRATEGIES FOR MOVING FORWARD

- The District will expand the existing monitoring network to maximize evaluation of source control performance across all sub-watersheds. Based upon funding availability and technical constraints (such as tidally influenced areas), the District will fill in gaps of water quality monitoring coverage in the watersheds. In the immediate future, the objective is to expand the coverage so the monitoring network is representative, if technically feasible, to implement flow monitoring in three tidally-influenced sections of the Caloosahatchee and St. Lucie rivers, which encompass approximately 360,000 ac.

Table 4-12. ERP and CERPRA Permits in the Caloosahatchee and St. Lucie Watersheds.

Permit Number	Project	Permit and Action Type	Description	Applicant or Permittee	Issuance Date	Expiration Date
Caloosahatchee Watershed						
0298251-001	C-43 Water Quality Monitoring Platforms	ERP Exemption	Construct four Water Quality Monitoring Platforms	SFWMD	12/11/09	12/11/10
0221500-005	North Ten Mile Canal Stormwater Treatment System (STA)	ERP Modification	Filter Marsh Phase II	Lee County Department of Natural Resources	Processing	
St. Lucie Watershed						
0254895-004	Indian River Lagoon South C-44 Reservoir Constructed Wetland Buffer	CERPRA Minor Modification	Construct two culverts at C-133 canal for access, updated turbidity monitoring locations	SFWMD	8/06/10	7/24/12
0254895-005	Indian River Lagoon South C-44 Reservoir Constructed Wetland Buffer	CERPRA Minor Modification	Removal of agrochemical impacted soils for Intake canal and access road [United States Army Corps of Engineers (USACE) Contract 1] area	SFWMD	1/13/11	7/24/12
0297646-001	Indian River Lagoon South C-44 Reservoir and STA	CERPRA New Permit	C-44 Reservoir and STA construction and interim operations (except Troup Indiantown Water Control District)	USACE	5/27/10	5/27/15
0297646-002	Indian River Lagoon South C-44 Reservoir and STA	CERPRA Major Modification	Intake canal construction and adjacent private lands wetland mitigation	USACE	2/08/11	5/27/15
020073-007	Manatee Pocket	ERP Major Modification	Expand dredge area	Martin County	2/23/09	2/23/14
020073-0091	Manatee Pocket	ERP Minor Modification	Change disposal location	Martin County	2/26/10	2/26/15
0294582-001	Danforth Creek	New Permit	Dredge/muck removal and sediment trap	Martin County	2/01/10	2/01/15
294572-001	Warner Creek and Hidden River	New Permit	Dredge/muck removal and sediment trap	Martin County	8/19/10	8/19/15

- The District will complete a preliminary proposal of performance measure methods to determine the collective performance of the source control programs at the sub-watershed level. Development of performance measure methods will be prioritized at the sub-watershed level and brought forward for peer and technical review by stakeholders. Next, the development of water quality monitoring requirements and performance measures will be considered at the individual level for sites with prior septage application; and for agricultural sites where landowners opt not to participate in the FDACS BMP program.
- Upon completion of performance measure development, the District is proposing to amend Chapter 40E-61, F.A.C. to incorporate requirements of the NEEPP. Agricultural lands participating in FDACS programs will be recognized as meeting the intent of the amended rule. It is expected that the proposed amendments will include incentives to participate in nutrient reduction demonstration and research projects to provide the data necessary for optimizing BMP performance.
- The District will continue to coordinate with the FDEP and the other water management districts to develop and implement the statewide ERP rule.
- As no FDOH-regulated septage application sites remain in the Northern Everglades or Lake Okeechobee watersheds, the FDOH has a rule amendment in development to prohibit land application of septage in these areas.

OVERVIEW OF SOUTHERN EVERGLADES SOURCE CONTROLS

William Baker

The Southern Everglades source control program is one of several strategies to achieve water quality standards in the Everglades Protection Area (EPA). The program includes implementation of phosphorus reduction BMPs and regulatory, voluntary, and educational programs as well as integration of state, local, and regional water quality projects. The Everglades Forever Act (EFA), Section 373.4592, F.S., outlines the District's responsibilities and schedules to implement basin-specific solutions to control phosphorus at the source.

The EFA mandates specific performance levels for controlling phosphorus in discharges from the Everglades Construction Project (ECP) basins, which include the Everglades Agricultural Area (EAA) and C-139 basins. For the non-Everglades Construction Project (non-ECP) basins, the EFA requires the FDEP to issue long-term compliance permits to the District to regulate phosphorus levels in discharges. It is expected these permits will include TP limitations in future modifications. BMP implementation guidelines are outlined in a District regulatory rule (Chapter 40E-63, F.A.C.) also known as the Everglades Works of the District regulatory program (available at www.sfwmd.gov/rules) for the EAA and C-139ECP basins, and through FDEP Permit No. 06, 502590709 for non-ECP basins. The District is required to implement, monitor, optimize, and annually report on each basin's progress on an Everglades phosphorus source control strategy in accordance with the EFA.

The District has identified all basins with discharges tributary to the EPA in which phosphorus source control programs are to be implemented (**Figure 4-1**). Background and details of these source control programs, including requirements for (1) implementing BMP plans, discharge monitoring plans, and water quality improvement plans (WQIPs), (2) research and demonstration projects, (3) data evaluation, (4) compliance methodologies and determinations, and (5) educational and outreach activities, have been extensively reported in previous SFERs.

To ensure compliance with the EFA, the District must comply with specific source control requirements stipulated in permits issued by the FDEP [i.e., ECP stormwater treatment area (STA) and non-ECP permits]. These permits incorporate a comprehensive approach for controlling phosphorus, including implementation of source controls through the utilization of regulatory, cooperative and educational programs. The District is required by these permits to annually report on the results of these program. This chapter and related Volume I and Volume III appendices serve as the reporting mechanisms to fulfill this requirement.

Continued implementation of mandatory BMP programs in the EAA and C-139 basins and WQIPs in non-ECP basins, and achievement of the required levels of performance in TP loading from these basins are necessary for the District to achieve the phosphorus criterion in the EPA and fulfill its obligations under the EFA and the federal Everglades Settlement Agreement (Settlement Agreement dated July 26, 1991, Case No. 88-1886-CIV-MORENO, United States District Court for the Southern District of Florida, as modified by the Omnibus Order entered in the case on April 27, 2001). During WY2011, the District continued to implement the source control activities on a basin-specific basis. Detailed updates on these activities are provided in the *Status of Source Controls in the ECP Basins* and *Status of Source Controls in the Non-ECP Basins* sections of this chapter. Supplemental information for the ECP and non-ECP basins is provided in Appendices 4-2 and 4-3 of this volume, respectively.

The long-term Everglades water quality goal is for all discharges to the EPA to achieve and maintain water quality standards in the EPA, including compliance with the TP criterion established in Rule 62-302.540, F.A.C. This goal will be accomplished through a combination of TP control strategies , for example, STAs (see Chapter 5 of this volume) and alternative treatment technologies (see Chapter 8 of this volume) integrated with other regional water management projects in a comprehensive approach. Controlling phosphorus at the source is a critical component of water quality improvement efforts in the Everglades restoration program.

STATUS OF SOURCE CONTROLS IN THE ECP BASINS

Carlos Adorisio, Ximena Pernett and Doug Pescatore

Contributors: Carmela Bedregal, Steve Sarley, Jonathan Madden, Pamela Wade, Cordella Miessau, Lacramioara Ursu and William Baker

BACKGROUND

For the EAA and C-139 basins, the EFA mandates a nonpoint regulatory source control program to implement BMPs to control phosphorus at the source and a monitoring program to assess program effectiveness [Section 373.4592(4)(f), F.S.]. The EFA further mandates that Chapter 40E-63, F.A.C. is to outline the specific methodology and permissible TP loading levels for both basins based on historical data or baseline periods defined in the EFA. For the EAA, the legislature provided a tax incentive credit against the EAA agricultural privilege tax for any phosphorous load reductions achieved in excess of 25 percent in order to encourage BMP performance and maximize load reductions. Achieving TP load requirements from these tributary basins is critical to the success of the ECP because the STAs were designed based on historical data and an expected range of inflow TP loads. It is primarily the source control program's mandated implementation of BMPs in the EAA and C-139 basins that regulate TP loads in discharges from the basins prior to inflow to an STA. Along with the design characteristics of the

STAs, performance of an STA in achieving further load reductions to meet EPA water quality standards is reliant on the level of phosphorous discharged to the STA for treatment.

The EAA Basin is required to achieve a 25 percent reduction of the TP loads discharged when compared to the pre-BMP baseline period as defined in the EFA. The specific compliance methodology to assess if the 25 percent reduction goal is being met is also defined in Chapter 40E-63 and outlined in the *Water Year 2011 Phosphorus Results* section below.

If the EAA Basin is determined to be out of compliance, then, in accordance with the rule, the data collected by the individual permittees under an approved discharge monitoring plan for each farm are used as a secondary compliance method. This secondary method assesses individual farm TP load contributions and individual farm compliance. However, the rule does not have a provision for use of TP load data from individual farms for determining compliance when the basin-level TP load reduction requirement is met. The District collects monitoring data from the EAA Basin at discharge locations to evaluate the overall effectiveness of the BMPs in achieving and maintaining compliance with the TP load reduction requirement.

For the C-139 Basin to be in compliance, it must also meet phosphorus levels relative to the EFA defined baseline period using specific methods defined within Chapter 40E-63. However, in contrast to the EAA, which has a load reduction requirement of 25 percent, the C-139 Basin mandate is to maintain the historical load levels observed during the baseline period.

The EFA states that if the basin is out of compliance, actions required from individual landowners are conditioned on the proportional share of the TP load discharged from the basin. A secondary compliance determination (specified in Chapter 40E-63) for individual landowners in the C-139 Basin is an optional farm-level compliance and monitoring program. However, since permittees in the C-139 Basin are not required to collect water quality and quantity data to characterize farm-level discharges, a water quality and quantity monitoring network will collect data for upstream areas throughout the basin to differentiate the relative contribution of the hydrologic sub-basins within the C-139 Basin that will support water quality improvement activities if necessary. The specific procedures for determining EAA and C-139 basin compliance, basin-level data collection efforts, and farm-level discharge monitoring plans are outlined in Appendix 4-2.

Investigation to improve the selection, design criteria, and implementation of BMPs is ongoing and occurs through different mechanisms based on the factors specific to each basin. This section provides a WY2011 update on compliance with TP loading limits and source control strategies for the EAA and C-139 basins. The compliance update includes WY2011 phosphorus results, monitoring program updates, short-term and long-term variations, and investigative issues. The source control strategies update includes program accomplishments, ongoing activities, and planned initiatives.

EVERGLADES AGRICULTURAL AREA BASIN UPDATE

During WY2011, the TP loads discharged from the EAA Basin decreased by 79 percent compared to the predicted load from the pre-BMP baseline period adjusted for hydrologic variability associated with rainfall. This represents the sixteenth consecutive year the EAA Basin was in compliance. Because the EAA Basin has been in compliance each year since the program's inception, the secondary compliance method at the permit-level has not been necessary. Although permit-level compliance determination was not necessary, the data provided indicates the lowest overall permit-level discharge rate since this data has been fully reported. Representative monitoring locations for determining WY2011 compliance with the TP load reduction requirement are shown in **Figure 4-8**.

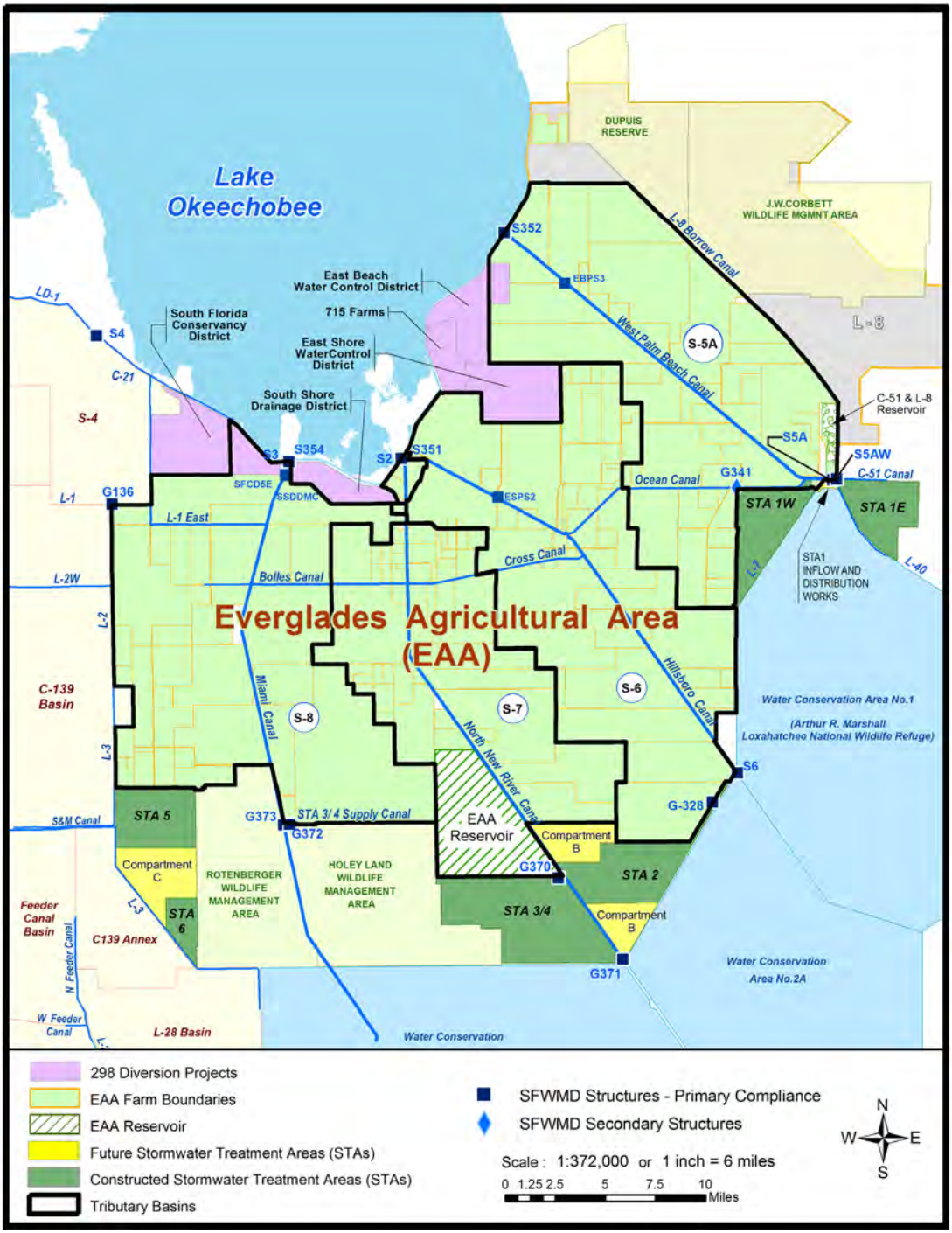


Figure 4-8. The EAA Basin and primary compliance water control structures for the basin boundaries during WY2011.

Water Year 2011 Phosphorus Results

This section provides an update on the observed WY2011 TP loads in comparison to the basin's EFA mandated load limits as defined by Chapter 40E-63. Additional detailed information on the EAA Basin-level monitoring program and summaries of sub-basin flows, related TP loads, and TP FWM concentrations are presented in Appendix 4-2 of this volume.

Table 4-13 provides a summary of the WY2011 results for the observed and predicted TP loads in metric tons (mt) where the observed load is based on samples collected during the water year, and the predicted load is the pre-BMP baseline period load adjusted for the hydrologic variability associated with rainfall. The target loads are calculated based upon the predicted loads reduced by 25 percent to meet EFA requirements, while limit loads are calculated based on the 90th percentile confidence level value of the target loads. Limit loads provide for a higher confidence level so that a single year of exceedance verifies noncompliance. Target loads are evaluated based on exceedance for three consecutive years for a target confidence level of 87.5 percent. The alternate confidence levels accommodate for possible statistical error in the regression model. **Table 4-13** also summarizes TP concentrations in parts per billion (ppb).

Table 4-13. Results of WY2011 EAA Basin TP compliance calculations.

	TP Load
Predicted TP load (adjusted for WY2011 rainfall amounts and monthly distribution relative to baseline period)[1]	219 mt
Target TP load (Predicted TP load reduced by 25 percent)	164 mt
Limit TP load (upper 90% confidence limit for target load)	231 mt
Observed WY2011 TP load from the EAA with BMPs implemented	45 mt
WY2011 TP load reduction (relative difference between observed and predicted TP loads)	79%
Three-year average TP load reduction	62%

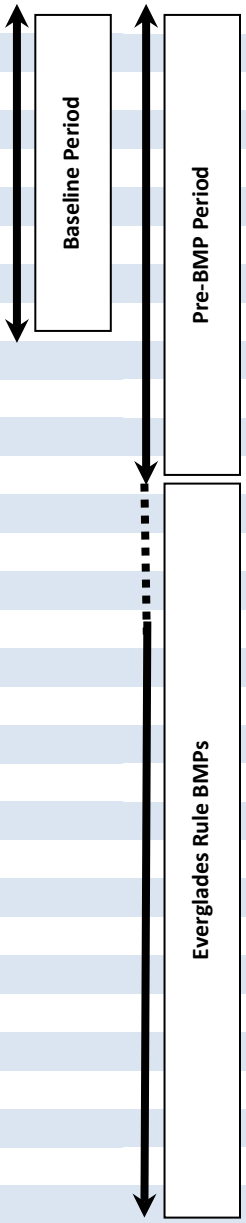
	TP Concentration
Observed annual average EAA TP concentration prior to BMP implementation (WY1980–WY1988)[1]	173 ppb
Observed WY2011 TP concentration from the EAA with BMPs implemented	71 ppb
Three-year (WY2009–WY2011) FWM TP concentration	112 ppb

[1]The baseline period of record is October 1978–September 1988 in accordance with EFA requirements. Under Chapter 40E-63, F.A.C. compliance is based on whole water year periods (May 1–April 30) that fall within the October 1978–September 1988 range, that is, WY1980–WY1988 (May 1, 1979–April 30, 1988).

Table 4-14 summarizes data for all calculated water years. This table presents observed and predicted TP data and annual rainfall and flow measurements. Additionally, the TP values presented are attributable only to the EAA Basin (farms, cities, and industries) and do not represent the cumulative TP being discharged through the EAA boundary structures from all sources.

Table 4-14. WY1980–WY2011 EAA Basin TP measurements and calculations.

Water Year	Observed TP Load[1] (mt)	Predicted TP Load[2] (mt)	Percent TP Load Reduction[3]	Annual Rainfall (inches)	Annual Flow (kac-ft)[4]	Baseline and BMP Status Timeline[5]
1980	167	154	-9%	53.50	1,162	
1981	85	98	13%	35.05	550	
1982	234	255	8%	46.65	781	
1983	473	462	-2%	64.35	1,965	
1984	188	212	11%	49.83	980	
1985	229	180	-27%	39.70	824	
1986	197	240	18%	51.15	1,059	
1987	291	261	-12%	51.97	1,286	
1988	140	128	-9%	43.43	701	
1989	183	274	33%	39.68	750	
1990	121	120	-1%	40.14	552	
1991	180	219	17%	50.37	707	
1992	106	179	41%	47.61	908	
1993	318	572	44%	61.69	1,639	
1994	132	160	17%	50.54	952	
1995	268	388	31%	67.01	1,878	
1996[4]	162	503	68%	56.86	1,336	
1997	122	240	49%	52.02	996	
1998	161	244	34%	56.12	1,276	
1999	128	249	49%	43.42	833	
2000	193	425	55%	57.51	1,311	
2001	52	195	73%	37.28	667	
2002	101	227	55%	49.14	1,071	
2003	81	125	35%	45.55	992	
2004	82	229	64%	46.76	961	
2005	182	444	59%	50.98	1,190	
2006	153	270	44%	50.08	1,035	
2007	150	182	18%	37.23	727	
2008	94	167	44%	46.95	619	
2009	129	407	68%	43.7	877	
2010	169	288	41%	61.9	1079	
2011	45	219	79%	42.0	517	



[1]TP values are attributable only to the EAA Basin (farms, cities, and industries) and do not represent the cumulative TP being discharged through the EAA boundary structures from all sources such as Lake Okeechobee and 298 Districts.

[2] Predicted TP load represents the baseline period load adjusted for rainfall variability.

[3] Percent TP load reduction values for WY1980–WY1988 represent the compliance model calibration period.

[4] kac-ft = thousands of acre-feet.

[5]Dashed vertical line indicates the period for which BMPs were not fully implemented from WY1992 to WY1995.

[4] 1996 was the first year of compliance measurement for the EAA Basin.

The EAA Basin percent TP load reduction trend is presented in **Figure 4-9**. The solid line shows the three-year trend of percent load reduction. The diamond (♦) symbol represents the annual measurements. An upward trend in the solid line in **Figure 4-9** denotes a reduction in loads; that is, an overall long-term improvement in the water quality of EAA Basin runoff discharges.

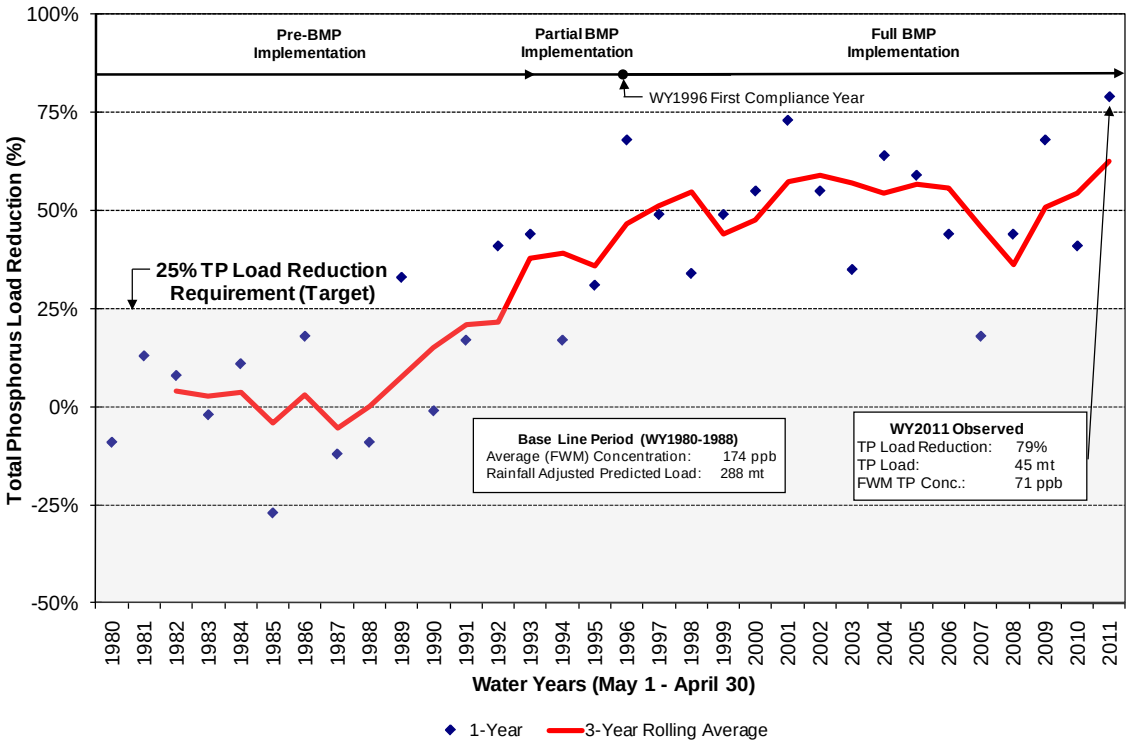


Figure 4-9. EAA Basin percent TP load reduction trend with period of record comparisons.

Supplemental evaluation of the EAA data at the basin, sub-basin, and permit level is presented in Appendix 4-2 of this volume. The supplemental evaluation includes compliance calculation details, monitoring data and water quality summary, discussion of short-term and long-term variations in basin loads, cumulative load reductions, permit-level data, and agricultural privilege tax incentive credit information.

EAA Basin Source Control Strategy

The source control strategy for the EAA Basin primarily relies on an EFA-mandated regulatory program for BMP implementation for which compliance determinations began in WY1996. Chapter 40E-63 requires a permit for a BMP plan for each crop or land use within each sub-basin or farm. In addition, through an adaptive management process, the regulatory program ensures that mandatory BMP implementation and performance measures continue to be applicable in response to regional changes and new tributaries to the Everglades.

The BMP plans are comprehensive, generally consisting of nutrient management, water management, and sediment controls. Changes to the BMP plans require the District's approval. Permittees are also required to collect water quality and quantity data at farm discharges (permit level) through approved discharge monitoring plans. Refer to 2009 SFER – Volume I, Appendix 4-1 for more information on comprehensive BMP plans and BMP plan examples, and

Appendix 4-2 for permit-level water quality and quantity data for the EAA. Water quality data collected at the permit level are used as general indicators of individual BMP plan performance and used as a secondary means of compliance if the EAA is not in compliance at the basin level, but cannot be related directly to individual BMPs or considered in isolation of other potential factors affecting performance.

The original guidance document for BMP design and BMP plan implementation in the EAA is the Procedural Guide for the Development of Farm-Level Best Management Practice Plans for Phosphorus Control in the EAA, Version 1.1, developed by IFAS (Bottcher et al., 1997). Additional research has been conducted to improve BMP effectiveness and design by IFAS pursuant to the EFA and Chapter 40E-63 requirements and via the EAA – Everglades Protection District (EAA–EPD) Master Research Permit. Investigation to improve the selection, design criteria, and implementation of BMPs is ongoing. Updates to documentation for individual BMPs are available at http://edis.ifas.ufl.edu. Searching this site for "EAA BMP" provides documents including design criteria for construction (as applicable), operation of BMPs, and farm management applicable to the EAA. The District refers to these updated technical sources when conducting BMP field verifications and advising permittees on revising BMP plans. The update on source control activities below describes the current investigations to enhance the body of knowledge on BMPs in the EAA. The District's current emphasis is on working cooperatively with the EAA–EPD to continue the floating aquatic vegetation research approved through a 2010 scope of work modification.

In addition to the EAA–EPD research, BMP research is conducted by individual consultants for the EAA–EPD outside the oversight of the permit by individual landowners, other agencies, or IFAS. Results from these research projects can result in recommendations to adjust BMP implementation, but consideration is given to site-specific conditions on a farm-by-farm case.

As indicated in the IFAS Procedural Guide, the industry definition for a BMP is an "on-farm operational procedure designed to reduce phosphorus losses in drainage waters to an environmentally acceptable level" (Bottcher et al., 1997). Based on Chapter 40E-63, permittees are required to revise their BMP plan to enhance performance if the basin as a whole is not in compliance and the secondary performance measure at the individual farm level is also not met. However, since the EAA Basin has been in compliance with required phosphorus loading levels, implementation of more effective BMP practices has not been mandatory.

In addition, the strategy in the EAA Basin includes supplemental source control projects for the purpose of maintaining or improving the current level of performance. The District conducts upstream data collection at tributaries and supplementary analyses of non-agricultural and agricultural sources with the potential to affect basinwide performance to determine the most effective source control strategies. Cooperation of landowners and other interested parties is necessary for the successful implementation of source controls beyond those required by the regulatory program.

EAA Basin Source Control Activities

During WY2011, the District implemented the ongoing EFA-mandated regulatory BMP program and made progress on the supplemental projects as detailed in the 2008 SFER – Volume I, Chapter 4.

Water Year 2011 Activities

- **BMP Regulatory Program.** At the end of WY2011, there were 474,622 ac under 32 EWOD permits in the EAA. Tracking of the acreage where BMPs are fully implemented is essential to assess BMP program effectiveness. This is because BMP performance is measured based

on the comparison of phosphorus loading levels from different water year periods with the assumption that major factors affecting runoff (rainfall and acreage) are the same for each period. Post-permit compliance activities continued in these farm basins through on-site BMP verifications. BMP verifications were prioritized based on farm location, water quality history, size, and date of previous verification.

- **298 and 715 Farms Diversion Projects.** Prior to calendar year 2001, the diversion areas discharged exclusively to Lake Okeechobee and therefore were not part of the EAA baseline period. From 2001 to 2005, diversion projects were completed to direct most of the flows from these areas to the south for treatment in STAs and discharge to the EPA. These are areas of overlap between the Northern and Southern Everglades source control programs and the source control programs established in these basins must achieve the discharge requirements of both the Lake Okeechobee TMDLs and the ECP. Defining a separate method for evaluating the impact of BMPs on TP loads in these recent tributaries (diversion areas) to the EPA is required by the EFA. Two phosphorus reduction performance goals continue in effect for these areas to reduce the TP loads discharged from the areas by 25 percent, and to reduce the TP loads discharged to Lake Okeechobee from the areas by 80 percent. The existing data for the 298 Diversion. Stakeholder input is currently being gathered to implement a compliance methodology for the diversion areas to assess compliance and provide consistency with the EAA source control program.
- **EAA TP Load Reduction Compliance Model.** In September 2007, a review of EAA BMP rule models was initiated to determine how upcoming changes to EAA facilities as a result of Comprehensive Everglades Restoration Plan (CERP)/Everglades Expedited Restoration Projects implementation would affect the TP load compliance and BMP replacement water models. The objectives were to review (1) algorithms contained in Chapter 40E-63 and (2) models implemented to assess compliance. Formalization of any conclusions or recommended action with respect to the EAA TP Load Reduction Compliance Model depends upon analyses incorporating final planned projects, and no significant effort was able to be made in WY2011. Changes will be incorporated into Chapter 40E-63 as necessary through the rulemaking process.
- **BMP Research.** In addition to the regulatory program, the EFA and Chapter 40E-63 require EAA landowners, through the EAA–EPD, to sponsor a program of BMP research, testing, and implementation that monitors the efficacy of established BMPs in improving water quality in the EPA. The master permit for BMP research, testing, and implementation is the mechanism through which the District regulates research on BMP effectiveness and outreach. Meaningful findings that can be incorporated into agricultural practices are essential to meet and maintain the performance goals of the ECP and to optimize the regulatory program. The master permit is issued to the EAA–EPD, and research is conducted by IFAS in Belle Glade. The activities under the EAA–EPD Master Permit for WY2011 were as follows:
    - Two BMP training workshops were conducted from September 2010 to May 2011 for growers in the EAA with a total of 194 participants. Feedback received via evaluations collected after training workshops was positive and was used to modify and improve training topics, content, and speaker selections.
    - Under the approved 2010 scope of work modification, the following activities have been conducted: (1) bathymetric surveys of farm main canals, (2) dry season sediment analyses of farm main canals, (3) analyses of ambient main canal and drainage water quality monitoring (biweekly) grab samples for TP, total dissolved phosphorus, particulate phosphorus, dissolved organic phosphorus, total suspended solids, total dissolved calcium, and pH,

(4) bimonthly qualitative and quantitative assessment of floating aquatic vegetation biomass from each farm main canal, (5) flow composite sampling of farm drainage water, and (6) monitoring of farm canal drainage flow rates, canal elevations, rainfall, and estimation of farm drainage water velocities during drainage events.

- **East Beach Water Control District Data Collection and Analysis.** Upstream water quality data were collected from January through September in 2007 and 2009, to gain additional insight on phosphorus speciation and sources within this area. Fifteen monitoring sites were previously selected based on contributing area, land use, and conveyance system configuration (Phase I). The two periods of monitoring provided data during varied dry and wet conditions to characterize water quality so identification of the major nutrient sources within the basin could be determined. Analysis of the data indicates elevated levels of nutrients occur in both agricultural and non-agricultural areas and vary in location and timing throughout the year. Elevated phosphorus concentration level spikes in the wet period from areas dominated by agricultural land use are likely associated with surface water runoff. Coincident with East Beach Water Control District pumping of excess stormwater runoff to the West Palm Beach Canal, samples from predominantly agricultural areas indicated elevated TP levels primarily due to high levels of dissolved phosphorus, typically indicative of fertilizer in runoff. The analysis also revealed elevated phosphorus and specific conductivity levels through the dry period within the northeast area, typically associated with groundwater influence. The lack of basin discharges during dry periods makes it difficult to assess the potential significance of dry period conditions toward phosphorus loading. The next steps include utilizing results to prioritize BMP field verifications and post-permit compliance reporting for applicable areas. Summary and evaluation of all EAA basins, sub-basins and reported permit basin level data is performed, at a minimum, on an annual basis. Tracking of trends in the East Beach Water Control District discharges in the future, as in the past, shall be part of this process.
- **Data Collection and Analysis in the S-5A, S-2 and S-6 Sub-basins.** Sediment data collection along the West Palm Beach and Hillsboro canals was conducted through a contract signed between the District and IFAS. The primary objective of the project was to characterize sediments in eastern EAA sub-basins along these two major canals during the wet and dry seasons. A final report documenting data collection and analysis was submitted to the District during WY2011, and District staff is currently evaluating the findings.

Water Year 2012 Anticipated Activities

- **BMP Regulatory Program.** The District's post-permit compliance activities are slated to continue. BMP verifications are expected to be prioritized based on the analysis of farm-level results for WY2011. The prioritized list is based on farm location, water quality history, size, and date of previous verification.
- **298 and 715 Farms Diversion Projects.** The District plans to continue gathering stakeholders' input to (1) implement a compliance methodology for the diversion areas, (2) evaluate effectiveness of BMPs in the diversion areas discharging to the EPA to meet requirements of the EFA, and (3) ensure consistency with Lake Okeechobee water quality goals associated with the NEEPP.
- **BMP Research.** The EAA–EPD is expected to continue research on phosphorus loading from EAA farms based on improved floating aquatic vegetation and canal management practices. Also, the EAA–EPD will continue to conduct BMP training workshops and create publications. The following activities are being proposed for calendar year 2012: (1) wet season sediment analyses for all 80 study farms, (2) biweekly sampling of ambient canal and

drainage waters, (3) survey and composition analysis every two months of floating aquatic vegetation biomass, (4) two BMP training workshops, and (5) an annual report.

- **West Palm Beach and Hillsboro Canal Data Collection**. Canal water quality and sediment data will be collected and analyzed to further the understanding of phosphorus sources, transport mechanisms, and sinks affecting TP loading from the EAA at the sub-basin level.

C-139 BASIN UPDATE

During WY2011, amendments to rules within Chapter 40E-63, F.A.C. were adopted to provide for a more comprehensive and effective source control program. The amended rule includes requirements for implementation of all defined categories of BMPs (nutrient management, water management, sediment controls, and pasture management) for all properties, as applicable. As a result, the "Initial Performance Measure Determination" period was reset to account for additional water quality improvement activities and will be WY2012. However, basin performance will be computed and reported on an annual water year basis, that is, annual phosphorus loads will be compared to the predicted annual average phosphorus load derived for the baseline period.

Chapter 40E-63, F.A.C. allows for the option of a permit-level discharge monitoring plan to be considered as a secondary performance methodology should the C-139 Basin be determined to not meet overall load performance. None of the permits issued to date include an optional discharge monitoring plan; therefore, only C-139 Basin-level data are reported in this chapter. The C-139 Basin and the representative monitoring locations during WY2011 for determining TP load performance are shown in **Figure 4-10**.

Water Year 2011 Phosphorus Results

This section provides an update on the observed WY2011 TP loads in comparison to the basin's EFA-mandated load limits as defined by Chapter 40E-63. The TP load discharged from the C-139 Basin was above the predicted load from the pre-BMP baseline period adjusted for rainfall. However, the basin load did not exceed the limit and did meet the performance measure target for WY2011. Due to the rule amendments described above, WY2011, WY2012, and WY2013 observed phosphorus load are only comparable to the limit load under the performance measure methodology and the three-year target test will not be applicable until the WY2012 through WY2014 results are available.

Table 4-15 provides a summary of the results of the WY2011 performance analysis for total observed and predicted TP loads, where the predicted load is the pre-BMP baseline period load adjusted for differences in rainfall volume and monthly distribution. Performance is determined by comparing the observed TP load for the current water year to the predicted target load from the calibration period and pre-BMP baseline period as described by Chapter 40E-63. The target loads are calculated based upon the predicted loads, while limit loads are calculated based on the 90^{th} percentile of the predicted loads. A single-year exceedance of limit loads verifies not meeting performance, while the basin must exceed the target load for three consecutive years to not meet performance. The alternate confidence levels accommodate for possible statistical errors in the regression model and provides for a 90 percent confidence level for the limit and a 87.5 percent confidence level for the target.

Supplemental evaluation of the C-139 Basin data is presented in Appendix 4-2 of this volume. The supplemental evaluation includes performance calculation details, monitoring data, and a water quality summary as well as discussion of short-term and long-term variations in basin loads. In an effort to focus on the BMP source controls efforts, individual structure flows, related TP loads, and FWM concentrations are also presented.

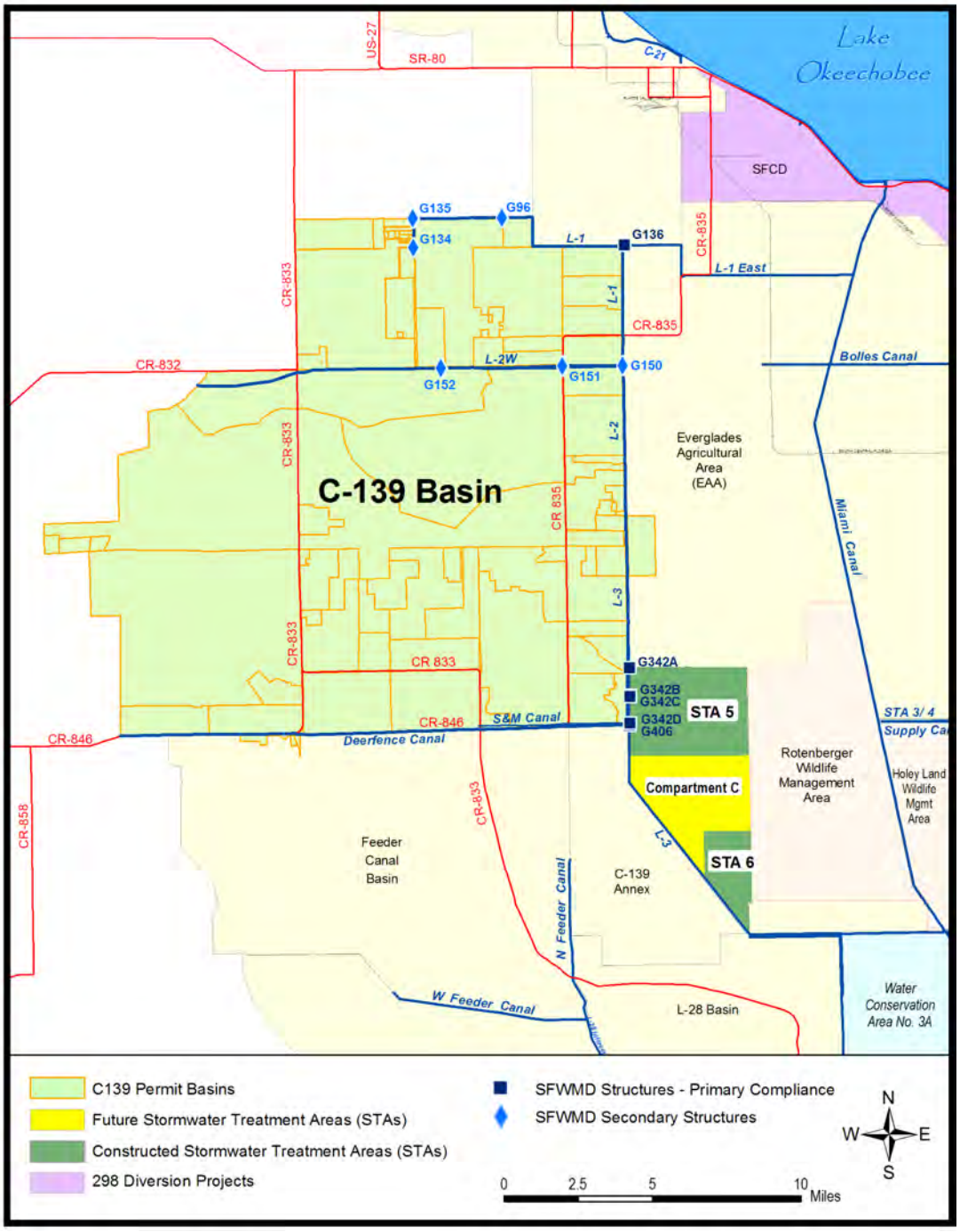


Figure 4-10. The C-139 Basin and primary compliance water control structures for the basin boundary during WY2011.

Table 4-15. Results of WY2011 C-139 Basin TP compliance calculations.

	TP Load
Target (predicted) TP load (adjusted for WY2011 rainfall amounts and monthly distribution relative to baseline period[1])	13 mt
Limit TP load (upper 90th percentile confidence level for target load)	31 mt
Observed WY2011 TP load from the C-139 Basin with partial implementation of Comprehensive BMP Plans	20 mt
	TP Concentration
Observed annual average C-139 Basin TP concentration prior to BMP implementation (WY1980–WY1988)[1]	235 ppb
Observed WY2011 TP concentration from the C-139 Basin with partial implementation of Comprehensive BMP Plans	154 ppb
Three-year (WY2008–WY2011) FWM TP concentration	197 ppb

[1]The baseline period of record is October 1978–September 1988 in accordance with EFA requirements. Under Chapter 40E-63, F.A.C., compliance is based on whole water year periods (May 1–April 30) that fall within the October 1978–September 1988 range, that is, WY1980–WY1988 (May 1, 1979–April 30, 1988).

The observed, WY2011 predicted target, and WY2011 predicted limit TP data for the C-139 Basin are presented in **Figure 4-11**. The figure presents observed data since WY2000, which coincides with the start of STA-5 operations and includes some intermediate years after the baseline was selected and before BMP implementation was started. For a global indication of TP trends in C-139 Basin runoff, concentration data since WY1980 is presented in **Figure 4-12**. The TP values presented in **Figures 4-11** and **4-12** are attributable only to the C-139 basin.

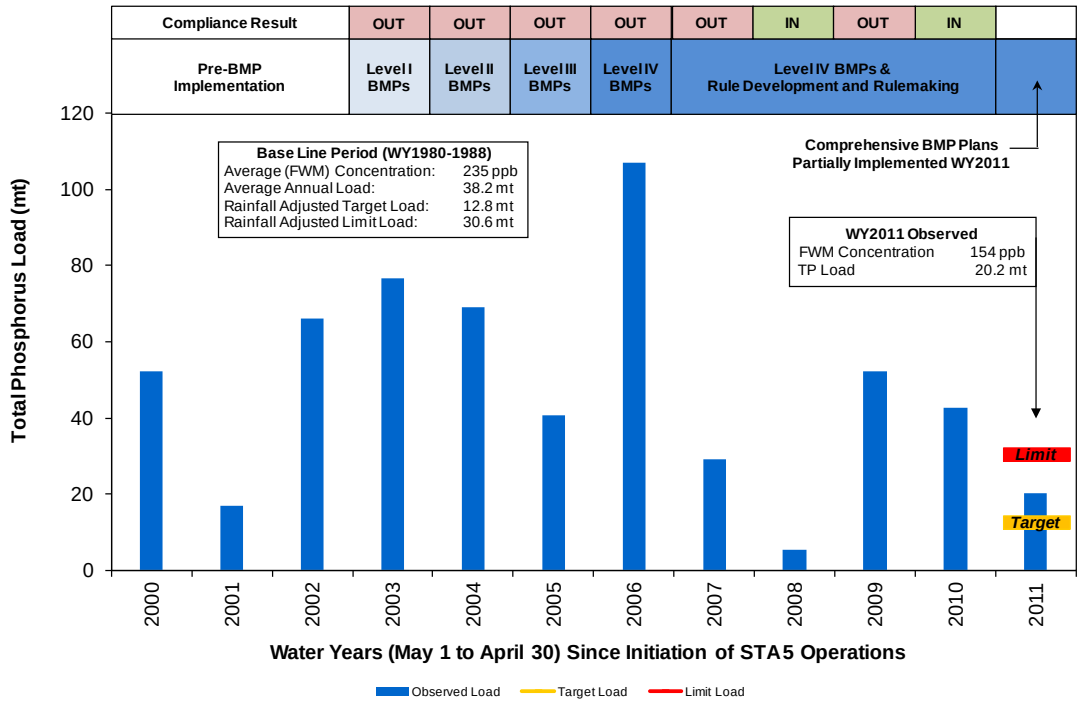


Figure 4-11. C-139 Basin annual TP load results.

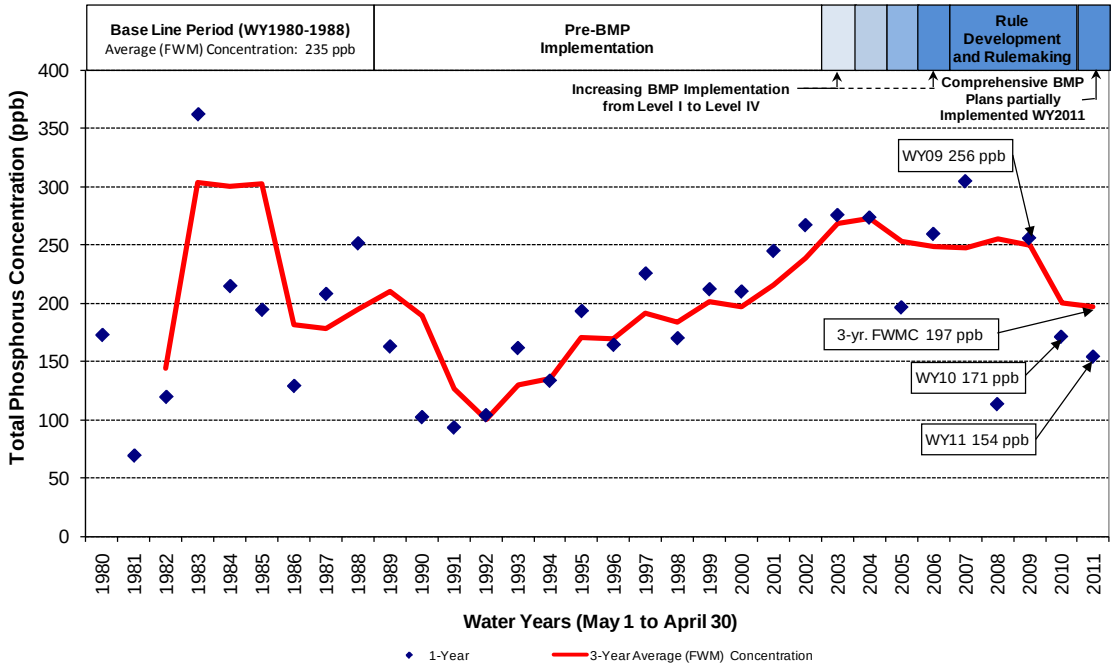


Figure 4-12. C-139 Basin TP FWM concentration results.
(Note: WY09 = WY 2009, WY10 = WY2010, and WY11 = WY2011.)

C-139 Basin Source Control Strategy

The C-139 Basin source control strategy primarily relied on the EFA-mandated regulatory program with increasing levels of BMP implementation based on compliance status with basin phosphorus load levels (targets and limits). However, since the program started in 2002, the C-139 Basin was unable to meet the historical phosphorus load levels for four consecutive years. In response and as required by Section 40E-63.460(3)(d), F.A.C., a rulemaking process to amend Part IV of Chapter 40E-63, F.A.C. was initiated in 2007 and completed in 2010. BMP implementation levels and compliance actions since program inception (including the rulemaking process) are summarized in **Table 4-16**.

The implementation of the mandatory BMP program revealed basin-specific constraints that needed to be considered for the program to be effective. In general, three key underlying challenges needed to be considered:

- The C-139 Basin canals have limited capacity to detain or store runoff, thus preventing landowners from recycling excess runoff. Travel time to the basin outlets can be short. Storm events at the end of the wet season can cause flooding and are concurrent with planting and fertilization of winter crops.
- Sandy soils have limited binding capacity for phosphorus. Any non-utilized synthetic fertilizers containing phosphorus are lost to the groundwater or transported off-site in runoff.
- As water use demands have intensified, the historically rain-fed system has been supplemented with groundwater, a new source of TP.

Table 4-16. WY2003–WY2011 C-139 Basin BMP implementation summary.

Compliance Water Year	BMP Level	Met Performance	Compliance Action
WY2003	Initial Implementation of Level I – 15 points	No	Go to Level II Full Implementation in November 2003
WY2004	Implement Level II – 15 points with site verification visits	No	Go to Level III Full Implementation in November 2004
WY2005	Implement Level III – 25 points with site verification visits	No	Go to Level IV Full Implementation in November 2005
WY2006	Implement Level IV – 35 points with site verification visits	No	Initiate Rule Development
WY2007	Continue Level IV	No	Continue Rule Development Process
WY2008	Continue Level IV	Yes	Continue Rule Development Process
WY2009	Continue Level IV	No	Continue Rule Development Process
WY2010	Continue Level IV	Yes	Continue Rule Development Process
WY2011	Comprehensive BMP Plan	Yes[1]	Partial Implementation of Comprehensive BMP Plans

[1] WY2011 performance is shown for reference only. Initial Performance Measure Determination Period under amended methodology set forth in Appendix B2 of Part IV of Chapter 40E-63, F.A.C. is WY2012.

The District has conducted technical investigations including water quality analyses, hydrology evaluations, and demonstration projects in order to develop solutions to these challenges. Also, the District has cost-shared implementation of higher cost technologies, implemented a water quality monitoring network, conducted integrated regulatory approaches with consumptive water use and stormwater management system permitting groups within the agency, enhanced stakeholder interaction and outreach, and contracted modeling [i.e., Watershed Assessment Model (WAM)] to evaluate the feasibility and TP reductions of BMPs and source control infrastructure projects.

The results from the activities conducted above and lessons learned from the regulatory program were incorporated into the rule (adopted on November 9, 2010), for a more comprehensive effective program. The amended rule includes requirements for implementation of all defined categories of BMPs (nutrient management, water management, sediment controls, and pasture management) for all properties, as applicable. A comprehensive BMP plan will serve to control the different types of phosphorus species (particulate or dissolved), sources, and transport mechanisms through which phosphorus leaves a farm or ranch.

Since permittees in the C-139 Basin are not required to collect water quality and quantity data to characterize farm-level discharges, the water quality and quantity monitoring network will collect data for upstream areas throughout the basin to differentiate the relative contribution of the hydrologic sub-basins within the C-139 Basin, the timing of releases, and phosphorus species. This information is crucial for developing effective source control strategies. This sub-regional monitoring and data analysis will support water quality improvement activities in case the amendments are insufficient to achieve consistent compliance with the EFA TP-based period load requirements.

C-139 Basin Source Control Activities

Water Year 2011 Activities

During WY2011, the District continued to strengthen the mandatory regulatory program for the following C-139 Basin source control initiatives as detailed in the 2010 SFER – Volume I, Chapter 4:

- **BMP Regulatory Compliance Program.** Mandatory BMP inspections continued by the District during WY2011. The staff priority was the completion and adoption of the amendments to Part IV of Chapter 40E-63, F.A.C. After rule adoption in November 2010, all permits expired and needed to be renewed. At of the end of WY2011, 18 permits had been renewed or issued.
- **Integrated Permit Compliance.** The integrated permit compliance effort was initiated by the District with a landowner workshop in April 2007. While EWOD permitted BMP implementation addresses nutrient controls, SW permitting addresses water quality treatment, attenuation, and storage, and consumptive water use authorizations address water use and conservation. SW and consumptive water use permits supplement the phosphorus control efforts of Chapter 40E-63. The integrated regulatory approach generally consists of a review of all permits, consultation with permittees, and a request for submission of outstanding items or a timeline for addressing them. A total of four follow-up consultations, representing 46,508.74 ac (27.6 percent) of the basin, were conducted in WY2011. Issues identified and resolved included inconsistencies between the as-built and the permitted surface water management system, and pending engineering and environmental reports (certification, wetland monitoring reports, schedule, etc.).
- **C-139 Basin Vegetable Production Demonstration Project (Long-Term Plan Project C-139 Basin – Source Controls, Fiscal Year 2010 (FY2010) (October 1, 2009–September 30, 2010)–FY2011).** Phase III of this District project continued during WY2011. The contract was amended to include field testing of two additional fertilizer treatments and also greenhouse phosphorus fertigation trials. A semiannual report for the data collected during fall 2010 was completed in WY2011. Weather conditions during fall and winter 2010 greatly impacted the growth and yield of crops in the demonstration project. Days with temperatures at or below freezing occurred on December 7, 14, and 27, 2010, and on January 13 and 23, 2011, causing a reduction in the number of harvests per crop, crop quantity per harvest, and crop quality or fruit size. The spring demonstration field and greenhouse trials were already conducted and will be reported in WY2012.
- **C-139 Basin Monitoring Network (Long-Term Plan Project C-139 Basin – Source Controls, FY2006–FY2010).** Automatic sampling stations collecting TP concentration and flow are installed in the C-139 Basin to isolate runoff from the sub-regions identified in the November 2010 revisions to Chapter 40E-63. As of WY2010, eight stations have been installed and calibrated, and sample collection has begun. The data collected are being analyzed under the C-139 Phosphorus Transport and Cycling Project, which is discussed

below. Dry conditions and low water levels in canals impeded progress to improving flow accuracy at many sites.

- **C-139 Basin Upstream Synoptic Monitoring Project.** As part of monitoring initiatives, the District continued collecting water samples at ten sites that represent locations upstream of basin regulatory compliance points. These sampling locations give snapshots of phosphorus concentrations throughout the watershed in the wet season (April–October). The samples are collected weekly if water is flowing. The parameters tested were TP, total dissolved phosphorus (represents total soluble phosphorus), and orthophosphorus (represents soluble reactive phosphorus). WY2011 data are being analyzed and compared with data collected for WY2006–WY2010 under the C-139 Basin Phosphorus Transport and Cycling Project discussed in the next bullet.
- **C-139 Basin Phosphorus Transport and Cycling Project.** Water quality and quantity data collected from May 1, 2005 to April 30, 2009 were analyzed with the goals of providing recommendations to continue improving the effectiveness of the regulatory source control program and to optimize the existing monitoring network. The final report was submitted in November 2010 and the following recommendations were made: (1) focus on monitoring programs at the farm/field level to gain a better understanding of the performance of individual BMPs, (2) implement edge of the farm or regional treatment technologies to address historic legacy phosphorus throughout the basin, and (3) implement operational protocols and BMP projects to increase water retention and reduce flow rate and phosphorus concentration (particularly for soluble reactive forms). A new contract (C-139 Basin Phosphorus Source Controls Technical Support 2011) was signed in March 2011 to (1) update this analysis and include the data collected during WY2010 and WY2011, and (2) incorporate detailed data for one impoundment into the C-139 Basin WAM, and validate the modeled results against observed data.
- **C-139 Basin Phosphorus Water Quality and Hydrology Analysis.** The Watershed Assessment Model (WAM) has been used to evaluate the impact of alternative land use and management practices associated with the implementation of BMPs and load reduction projects. In April 2009, a panel of five experts completed a peer review of WAM and several recommendations were made (Graham et al., 2009). The recommendations were to (1) improve documentation, (2) ensure scientifically sound calibration and validation procedures are followed using established and objective goodness-of-fit measures, and (3) test the model. In response, the District developed (1) WAM documentation; (2) review and documentation of the WAM interface, data, and code structure; (3) model calibration and validation; and (4) final documentation and presentation. For the model calibration and validation task, the C-139 Basin was selected since a WAM-View version of the model with data up to 2005 had previously been developed. This task included updating the model simulation period to 2009, a model upgrade under ESRI's® ArcGIS® platform, and better calibration and verification results to meet the criteria outlined by the panel.
- **C-139 Basin Regional Feasibility Study.** A District regional feasibility study, encompassing the C-139 Basin, the Feeder Canal Basin, and the L-28 basin began in September 2008. The feasibility study is intended to address two significant water resources issues in this region: (1) water quality of discharges to downstream waters, and (2) balancing annual climate patterns with flood, natural resources (wetlands) protection, and water availability. The following activities were completed during WY2011: (1) monitoring of the eight nested pair groundwater wells continued, (2) a spreadsheet model (including the Dynamic Model for STAs) for assessing water quality was developed to pre-screen alternatives and to develop a better technical understanding to successfully implement Phase II, (3) a Phase I final report was produced and included a work plan for conducting Phase II of the project, and (4) a contract was executed to initiate Phase II.

- **BMP Demonstration Grant.** Activities continued during the third year of the cooperative agreement with the Hendry Soil and Water Conservation District for development of BMP demonstration projects in the C-139 basin. The following activities were conducted under the selected projects:
    - **Surface Water Optimization.** Water quality and quantity data were collected during a 12-month period that concluded in WY2011. The final report describing the project implementation and analysis of the BMP performance and effectiveness based on the data collected, as well as a discussion of factors affecting its performance and assumptions, is being produced.
    - **Chemical Precipitation Treatment.** Water quality and quantity data collection continue during WY2011. However, due to dry conditions, limited data have been collected. The final report should be submitted in WY2012.
    - **Evaluation of Aboveground Impoundment for Reducing Phosphorus in Discharges.** Data (water quality and quantity, soil, plant tissue, and topography) were collected from July 2009 to July 2010. Preliminary results indicate that the treatment efficiency for the impoundment was 20 percent or 14 kilograms per hectare during the study. Modifications (structural and managerial) to improve this efficiency were identified. However, they need to be field tested to evaluate their feasibility and associated costs. The Phase I Final Report is expected in WY2012.

Water Year 2012 Anticipated Activities

- **BMP Regulatory Program.** The following activities are planned in WY2012: (1) complete the renewal of all permits, (2) conduct site inspections to verify implementation of comprehensive BMP plans (new requirement of amended Chapter 40E-63), and (3) disseminate the results of the BMP demonstration projects funded to date.
- **Integrated Permit Compliance.** The District will continue this coordinated initiative to bring landowners in the C-139 Basin in compliance with ERP and consumptive water use permits.
- **C-139 Basin Vegetable Production Demonstration Project (Long-Term Plan Project C-139 Basin – Source Controls, FY2009–FY2011).** The District will continue Phase VI of this project during WY2012. The annual field day was conducted in May 2011 at the Southwest Florida Research and Education Center in Immokalee. Greenhouse and foliar application trials will be conducted in fall 2011 and a final project report summarizing the results from WY2009 through WY2012 will be provided.
- **BMP Demonstration Projects.** The three current funded projects will be finished in WY2012 and final reports summarizing the results and findings will be provided. Based upon availability of resources, the District will fund and/or cost-share demonstration projects that focus on innovation and/or optimization of BMPs based on specific basin-specific challenges. It is the intent to maximize the use of funds available for the greatest basinwide benefits.
- **C-139 Basin Phosphorus Source Controls Technical Support 2011.** This project is scheduled to finish in mid-water year. A report summarizing project's results and recommendations to continue improving the effectiveness of the source controls program will be provided.
- **C-139 Basin Regional Feasibility Study.** Phase II of this study is scheduled to be complete in mid-water year. The following activities are anticipated in WY2012: (1) monitoring of eight nested pair groundwater wells will continue through mid-water year, (2) calibration and

verification of the "Routing Tool Spreadsheet" model for suitability to the task of assessing alternatives, and (3) evaluation and determination of planning costs of the selected alternatives.

OTHER ECP BASIN UPDATES

This section discusses source control efforts in other ECP basins. These include the L-8 and C-51 West basins in east central Palm Beach County. While a portion of stormwater runoff from each of these basins is discharged either to tide through the S-155A structure to the C-51 East basin and Lake Worth Lagoon or to Lake Okeechobee, drainage from each of these basins is also discharged, either directly or via an adjacent basin, to STA-1W and STA-1E. The Village of Wellington's Acme Improvement District is one of the sub-basins of the C-51 West basin. Further background information on these basins can be found in previous SFERs.

C-51 West and L-8 Basins Source Control Strategies and Activities

The District monitors water quality in the C-51 West and L-8 basins to ensure phosphorus loads generated within these basins do not affect the performance of STA-1W and STA-1E. The water quality monitoring programs include monitoring of TP concentration and flows at discharge locations to the C-51 West canal, as required by the Village of Wellington Acme Improvement District's ERP, and upstream monitoring associated with Village of Wellington administered phosphorus source control programs. Appendix 4-3 includes a summary of TP concentration data for the Village of Wellington Acme Improvement District.

The Village of Wellington, in addition to its upstream water quality monitoring program, has been administering numerous phosphorus source control activities within the Acme Basin since WY1998. These activities, which include enforcement of Village of Wellington-enacted phosphorus source control ordinances associated with equestrian activities within the basin, remain ongoing.

The District has been conducting a land use and drainage study of the L-8 and C-51 West basins in an effort to isolate areas of concern for phosphorus loading to surface waters within these basins that ultimately can discharge to STA-1W and STA-1E, and identify potential water quality improvement measures to reduce TP loads in discharges from these basins.

Water Year 2011 Activities

- **Acme Basin B Project.** The final component of this project, construction of a 365 ac wetland area with floodwater storage capability and environmental features within Section 24, west of the Acme Improvement District, was completed during WY2011. The wetland area is planned to store and improve the quality of stormwater runoff from the Acme Basin B before its eventual discharge to the C-51 West canal. More detail on this project is available at www.evergladesplan.org/pm/projects/proj_38_acme.aspx.
- **DinoSoil Treatment Pilot Study.** The Village of Wellington initiated a DinoSoil treatment pilot study in WY2010 to determine, through extensive water quality testing, the product's effectiveness in reducing phosphorus concentrations within Acme Sub-basin canals. Water quality testing associated with the project continued into WY2011. Results of the water quality testing program have not provided conclusive evidence of DinoSoil's effectiveness at reducing phosphorus concentrations in the treated canals.
- **C-51 West and L-8 Basins Study.** One of the preliminary recommendations of this study was the implementation of a synoptic water quality monitoring program to evaluate water quality from areas not currently monitored and to identify areas contributing discharge to surface waters with the highest phosphorus concentrations.

Water Year 2012 Anticipated Activities

- The recommended synoptic water quality monitoring program for the C-51 West and L-8 basins is planned to be implemented in WY2012.

FUTURE DIRECTIONS FOR THE ECP BASINS

The District is planning several activities for the ECP basins in the future to improve the effectiveness of the regulatory source control programs.

EAA Basin

The EAA Basin's performance compelled the following planned activities:

- Complete water quality technical evaluations on priority areas to determine if site-specific strategies are necessary to maintain basinwide performance.
- Work cooperatively with the EAA–EPD to continue the floating aquatic vegetation research approved through the 2010 scope of work modification.
- Complete the process of establishing BMP performance measures for Closter Farms and the 298 Diversion Projects.

C-139 Basin

Through the integrated permit compliance and other supplementary projects that have encouraged awareness, the C-139 Basin may be overcoming the lag between source control implementation and achieving TP loading performance levels as required by the EFA. WY2011 results reflected a third year of hydrological drought in the region. Enhancement of the BMP mandatory program will continue with emphasis on supplementary projects to ensure long-term compliance. Planned activities include the following:

- **Continued Funding of BMP Demonstration Projects.** Based on availability of funding, the direction continues to be toward providing regulatory and funding incentives to spearhead landowner-driven BMP demonstration projects to improve effectiveness.
- **Continued Data Collection.** Supplementary water quality and quantity data at the regional level (hydrologic sub-basins) will continue to be used for a better understanding of upstream contributions, program effectiveness, and to assist with focused remedial action under a revised rule.
- **Applying Lessons Learned and Evaluating the Applicability of the Latest Technology.** Technical findings on water quality analysis, hydrology, modeling, and BMP demonstration and research are planned to better understand basin conditions both through adaptive management and regional solutions.

C-51 West and L-8 Basins

In the L-8 basin, it is expected that phosphorus source control BMPs will be implemented when the amendments to Chapter 40-61, F.A.C. are completed.

STATUS OF SOURCE CONTROLS IN THE NON-ECP BASINS

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BACKGROUND

Seven basins that discharge directly to the EPA are not part of the ECP. Five of these basins have discharge structures that are operated and maintained by the District and are permitted under the non-ECP permit: C-11 West, North New River Canal, Feeder Canal, L-28, and C-111. These discharge structures are the S-9 and S-9A (C-11 West), G-123 (North New River Canal), S-190 (Feeder Canal), S-140 (L-28), and S-18C, S-332D, and S-174 (C-111). North Springs Improvement District and Boynton Farms basins are also non-ECP basins capable of discharging directly to the EPA through structures owned or operated by the District. The non-ECP basins have historically contributed approximately 12 percent of the TP load discharging to the EPA compared to the 88 percent contribution by the ECP basins. As required by the EFA, these basins have adhered to source control programs and water quality monitoring since WY1998. Specifically, the non-ECP permit requires the implementation of basin-specific water quality improvement plans (WQIPs) to ensure progress toward ultimately achieving established water quality standards in discharges from each of the non-ECP basins. These WQIPs are consistent with the EFA and include source control strategies such as (1) voluntary BMPs, (2) training and educational initiatives, (3) cooperative agreements, (4) modification of stormwater system permits to include water quality and operational criteria, (5) basin-specific regulatory programs, and (6) full integration with ongoing and future CERP and other local construction projects. The location of the non-ECP basins and the associated structures that discharge into the EPA are depicted in **Figure 4-13**.

WATER QUALITY SUMMARIES

The water quality in non-ECP basin discharges is monitored to track the success of the WQIPs in each basin and to assess progress in achieving established water quality standards. The distribution of loads from the non-ECP basins to the EPA by water year is presented in **Figure 4-14.** As shown in this figure, the total TP load of 11.4 mt discharged to the EPA from the non-ECP basin structures during WY2011 represents a significant decrease from the total TP load discharged in WY2010. Appendix 4-3 provides additional information on TP loading to the EPA from the non-ECP basins. TP loads and FWM TP concentrations discharged to the EPA during WY2011 from the structures at the Feeder Canal, L-28, and C-11 West basins decreased from WY2010 levels, and the FWM TP concentration for the Feeder Canal Basin in WY2011 was the lowest value for the period of record (WY1998-WY2011). TP concentrations in discharges from the C-111 basin increased slightly from WY2010; however, TP loads discharged from the basin decreased from WY2010 as a result of lower discharge volumes. The North New River Canal, North Springs Improvement District, and Boynton Farms basins did not discharge to the EPA during WY2011.

As required by the EFA, the non-ECP permit is expected to be modified to require compliance with the TP limits for the Feeder Canal, L-28, C-111, C-11 West, and North New River Canal basins. This proposed permit requirement resulted from the EFA requirement that discharge limits for long-term compliance permits allowing phosphorus discharges into the EPA be established.

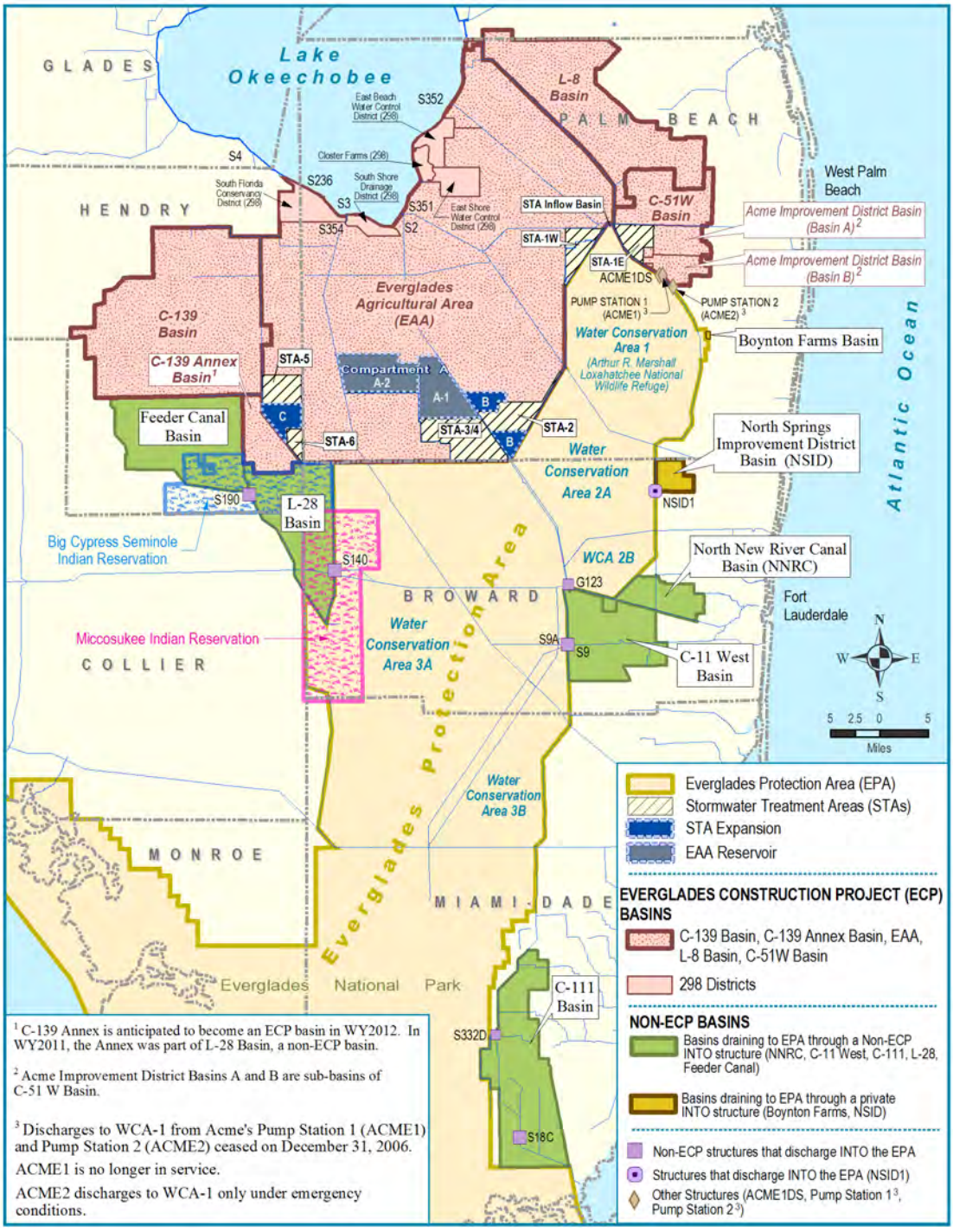

Figure 4-13. The non-ECP basins and primary compliance water control structures discharging to the EPA.

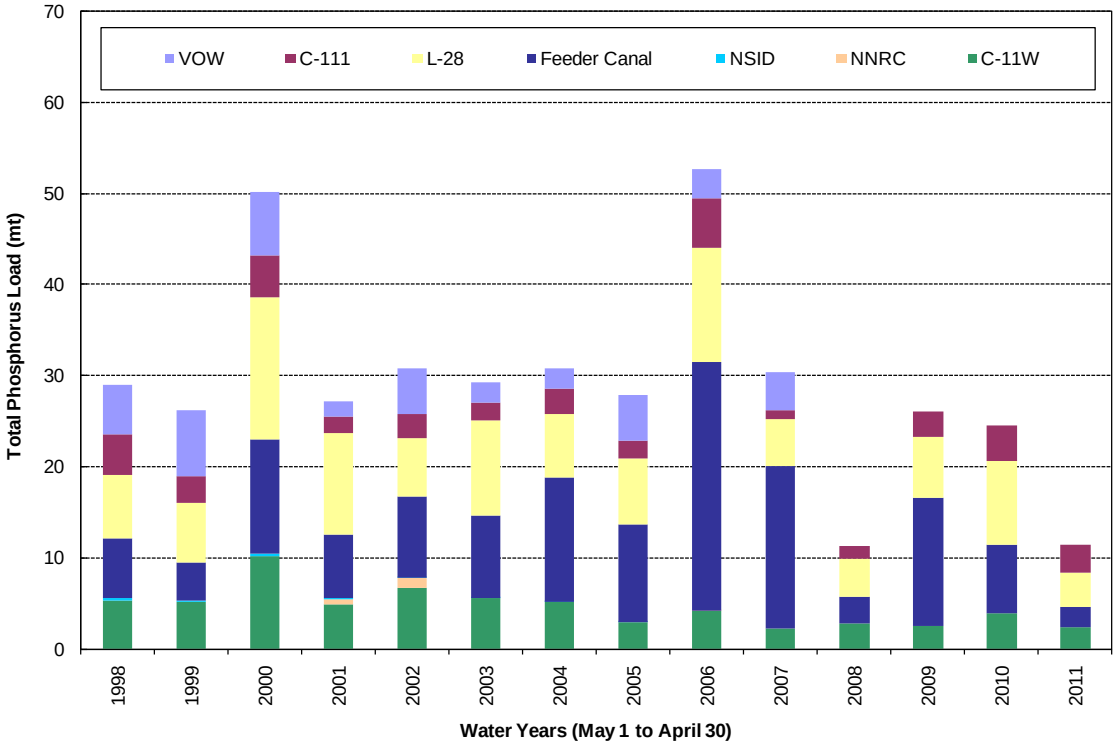

Figure 4-14. Non-ECP basin TP loads into the EPA for WY1998–WY2011. Note: VOW = Village of Wellington, NSID = North Springs Improvement District, NNRC = North New River Canal, C-11W = C-11West; VOW Acme basins no longer discharge directly into the EPA.

SOURCE CONTROL STRATEGIES AND ACTIVITIES

During WY2011, the source control strategies for each of the non-ECP basins continued as summarized below. Additional details on these strategies can be found in previous SFERs.

Feeder Canal Basin

Water Year 2011 Activities

- **Rulemaking.** The District continued the preliminary activities necessary for implementation of a BMP regulatory program in this basin.
- **Seminole Tribe Water Conservation Plan Project.** The United States Army Corps of Engineers (USACE) is constructing four water resource areas designed to improve water quality, restore wetland hydrology, increase water storage capacity, and enhance flood protection within the Big Cypress Seminole Indian Reservation. As of June 2011 (WY2012), only one of the four water reserve areas had been constructed. The project is sponsored by the Seminole Tribe of Florida.
- **McDaniel Ranch.** Surface water management for McDaniel Ranch is substantially completed and the District continued working with the landowners to ensure appropriate water quality treatment and BMP implementation.

- **Integrated Permit Compliance.** The District continued meeting with landowners to ensure permit compliance and facilitate implementation of phosphorus source control BMPs.
- **Upstream Water Quality Monitoring.** The District continued collecting surface water grab samples at two locations within the West Feeder Canal Sub-basin. The purpose of this monitoring is to identify areas of water quality concern and plan future activities improvement.
- **PC-17A Structure Hydrologic and Hydraulic Analysis.** This study was conducted to verify the adequacy of the PC-17A structure's conveyance capacity. The District has completed the study and determined the structure's conveyance capacity is inadequate. The study evaluated alternatives in the form of operational changes and/or structural changes to offset the structure deficiencies. The District will consider implementation of these alternatives in consultation with affected landowners.

Water Year 2012 Anticipated Activities

- **Rulemaking.** The District plans to continue developing the technical support documents necessary to implement a regulatory source control program for the Feeder Canal Basin, including the development of compliance methodology to evaluate program performance. Statutory changes are necessary before rulemaking can be initiated.
- **McDaniel Ranch.** The District expects to continue working with McDaniel Ranch area owners to ensure TP concentrations in basin discharges do not exceed 50 ppb.
- **Integrated Permit Compliance.** The District plans to continue meeting with landowners to ensure permit compliance and to facilitate implementation of phosphorus source control BMPs.
- **Upstream Water Quality Monitoring.** The District expects to continue water quality monitoring of the West Feeder Canal Sub-basin.

L-28 Basin

Water Year 2011 Activities

- **C-139 Annex Diversion.** The C-139 Annex ERP modification authorizing operation of the new discharge structure to divert flows to STA-6 for treatment was issued by the District in May 2010. The permit requires BMP implementation and maintenance of C-139 Annex TP loads in discharges into STA-6 at or below historical discharge levels. The landowner certified implementation of the required BMPs in August 2010. The entire C-139 Annex property was purchased by the District in October 2010 and leased back to the previous landowner. In January 2011, the lessee was made co-permittee of the ERP to ensure its obligation to implement BMPs and maintain the C-139 Annex TP loads in discharges into STA-6 at or below historical discharge levels. As of June 2011 (WY2012), the new discharge structure had not started regular operations due to a series of malfunctions. The District is in the process of repairing and upgrading the structure. This work is expected to be completed in WY2012.
- **L-28 Weir Demonstration Project.** This demonstration project, completed in December 2009, rehydrates approximately 8,000 ac of historic Everglades within the triangular area of the L-28 basin south of Interstate 75. The project reduces stormwater drainage from the triangular area to the S-140 pump station. Results of the demonstration project will be evaluated by the District over a period of five years to determine the potential water quality improvement benefits of the project.

Water Year 2012 Anticipated Activities

- **C-139 Annex Diversion.** Operation of the C-139 Annex's new discharge structure is scheduled to start in WY2012.

C-111 Basin

Water Year 2011 Activities

- **Outreach and Education.** The District, FDACS, and South Dade Soil and Water Conservation District sponsored a mobile irrigation lab in the C-111 basin, to help local growers improve irrigation practices. The main sources of training and education in this basin continue to be the University of Florida's Tropical Research and Education Center and IFAS.
- **C-111 Project.** Construction of the North Detention Area of the C-111 Project remains on hold pending valuation of District acquired lands associated with construction of the northern detention area.
- **C-111 Spreader Canal Western Project.** The project aims to improve water quantity, timing, and distribution in the Southern Everglades and Model Lands, downstream estuaries, and Florida Bay. The project is comprised of the Frog Pond Impoundment, Aerojet Canal, plugging of the C-110 and L-31 E canals, and the S-199 and S-200 pump stations.
- **Combined Structural and Operational Plan.** This remains on hold because of a change in the allowable maximum L-29 canal stage associated with the Tamiami Trail component of the Modified Water Deliveries to Everglades National Park Project.

Water Year 2012 Anticipated Activities

- **C-111 Spreader Canal Western Project.** This project is scheduled to be completed in WY2012.
- **C-111 Project.** The District and the USACE will be negotiating a new agreement that would allow start of construction of the North Detention Area in January 2012.
- **Combined Structural and Operational Plan.** The District and USACE will be working on a new Combined Operational Plan (COP) that will supersede the Combined Structural and Operational Plan (CSOP). Completion of the COP is expected in WY2012.

C-11 West Basin

Water Year 2011 Activities

- **Broward Everglades Working Group.** The District continued its support of Broward County water quality improvement initiatives within the C-11 West basin through its participation in the working group. The District continued to assist Broward County in revising and implementing the C-11 West Basin Pollution Reduction Action Plan of April 2006, a compilation of C-11 West basin stakeholder action plans developed to reduce phosphorus discharges to Water Conservation Area (WCA)-3A.
- **Broward County Water Preserve Area CERP Project.** This project's completion is expected to result in significantly reduced flows to WCA-3A and consequent reduction in the TP load to WCA-3A. More details on this project are available at www.evergladesplan.org/pm/projects/proj_45_broward_wpa.aspx.
- **South Broward Drainage District Improvements.** Improvements to eliminate remaining unrestricted outfalls to the C-11 West canal continued during WY2011 with the installation of a control gate at an outfall located in the S-9/S-10 basin.

- **Town of Southwest Ranches Agreement.** The District entered into an agreement with the Town of Southwest Ranches that provides for Southwest Ranches-sponsored BMP education programs targeting S-9/S-10 basin nurseries and residents.
- **Central Broward Water Control District Improvements.** The Central Broward Water Control District continues providing public outreach and education within the basin.
- **Educational Public Service Announcements.** The District's airing of bi-lingual public service announcements is currently being implemented through the Broward County Non-ECP Basins Contract for EFA Pollutant Source Control Activities (see bullet on this item below).
- **Everglades Website.** Links to the District's Everglades (www.sfwmd.gov/everglades/) and water conservation (www.sfwmd.gov/watersip/) information websites and Broward County's NatureScape website (www.broward.org/naturescape/) continue to be provided on the websites of most Broward County stakeholders. Broward County has assisted the District, through the Broward County Non-ECP Basins Contract for EFA Pollutant Source Control Activities, in expanding website link coverage to those Broward County municipality websites that had not previously provided links to District Everglades websites.
- **2011 Broward County Non-ECP Basins Contract for EFA Pollutant Source Control Activities.** The District and Broward County initiated this cost-share agreement focusing on water conservation and water pollution prevention initiatives within Broward County non-ECP basins. The agreement includes initiatives to educate golf course operators, property managers, landscaping personnel, and residents through "Know the Flow" workshops, informational brochures, televised bilingual public service announcements, expanded website linkage to District websites, and other educational venues.

Water Year 2012 Anticipated Activities

- **Broward Everglades Working Group.** The District will continue working with Broward County to expand stakeholder participation in the C-11 West basin to support Broward County water quality improvement initiatives.
- **Town of Southwest Ranches Nursery BMP Education Program.** The District and the Town of Southwest Ranches will continue Southwest Ranches-sponsored BMP education programs targeting S-9/S-10 basin nurseries and residents through mid-water year.
- **Broward County Non-ECP Basins Contract for EFA Pollutant Source Control Activities.** The District and Broward County will continue implementation of water pollution prevention and water conservation initiatives associated with this contract through mid-water year.

North New River Canal and North Springs Improvement District Basins

Water Year 2011 Activities

- **2011 Broward County Non-ECP Basins Contract for EFA Pollutant Source Control Activities.** The District and Broward County continued implementation of cost-share agreement initiatives, focusing on water pollution prevention and water conservation. Details of the agreement are presented in the bullet item of the same title under the *C-11 West Basin* section above.

Water Year 2012 Anticipated Activities

- **Broward County Non-ECP Basins Contract for EFA Pollutant Source Control Activities.** In tandem with the C-11 West basin efforts, the District and Broward County will continue implementation of water pollution prevention and water conservation initiatives associated with the Broward County Non-ECP Basins Contract for EFA Pollutant Source Control Activities through mid-water year.

Boynton Farms Basin

Water Year 2011 Activities

- **ERP Program.** Only one property remains in this basin and it is owned by Palm Beach County. The District has utilized the existing ERP program, as opposed to creating a separate regulatory program, to require the remaining landowner to submit an ERP permit modification to incorporate an appropriate long-term or interim BMP plan, and revisions to its existing system that would meet EFA-required water quality standards. That is, the ERP modification for the property will include provisions that either discharges to the Arthur R. Marshall Loxahatchee Wildlife Refuge will be treated to meet water quality standards or will not occur. As of June 2011 (WY2012), the ERP modification is pending submission; however, no discharges to the refuge have occurred since WY2007. Also, the eastern portion of the property is being leased by an agricultural operator; however, stormwater discharges from this eastern area are being directed away from the refuge into the Lake Worth Drainage District's E-1 canal.

Water Year 2012 Anticipated Activities

- **ERP Program.** The District will work toward developing the ERP modification for the Palm Beach County owned property that will include the previously mentioned provisions.

FUTURE EFFORTS FOR THE NON-ECP BASINS

Continued implementation of the WQIPs for the non-ECP basins, which are consistent with the EFA, is necessary to ensure continued progress in improving water quality. The District will continue to track WQIP implementation and work cooperatively with local governments, the Seminole Indian Tribe of Florida, the Miccosukee Tribe of Indians of Florida, and other state and federal agencies to ensure essential components of the WQIPs are completed as scheduled.

The Feeder Canal Basin project plan is expected to be revised to recommend additional funding to support the initiation of rulemaking for a basin-specific BMP regulatory program. In the interim, the District's strategy within the Feeder Canal Basin continues to utilize existing regulatory programs including integration of compliance efforts to ensure landowners comply with existing ERP requirements, and incorporation of BMPs as conditions of SW permits or ERPs, or through landowner agreements.

The C-139 Annex sub-basin (an area within the L-28 basin) flows will be diverted to STA-6 for treatment and this will be designated in the future as an ECP basin.

The District will continue coordinating with the FDEP for the non-ECP permit renewal process within the remaining non-ECP basins, which will establish long-term compliance permit requirements as well as TP limits. WQIPs, as described and discussed in this chapter and previous SFERs, are expected to progress toward meeting established water quality standards.

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