2008 Report on the Long-Term Plan for Achieving Water Quality Goals for the Everglades Protection Area Tributary Basins

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EXECUTIVE SUMMARY

The long-term Everglades water quality objective is to implement the optimal combination of source controls, Stormwater Treatment Areas (STAs), Advanced Treatment Technologies, and/or regulatory programs to ensure that all waters in the Everglades Protection Area (EPA) meet water quality standards, including compliance with the phosphorus criterion established in Rule 62-302.540 of the Florida Administrative Code (F.A.C.), consistent with the requirements of Florida's 1994 Everglades Forever Act (EFA, Section 373.4592 Florida Statutes). The October 27, 2003 *Everglades Protection Area Tributary Basins, Long-Term Plan for Achieving Water Quality Goals* (Burns & McDonnell 2003) (Long-Term Plan) sets forth a recommended plan and strategy for achieving that objective allowing the State of Florida and the South Florida Water Management District (District) to fulfill their obligations under both the EFA and the federal Everglades Settlement Agreement (Case No. 88-1886-CIV-MORENO). This document provides the first 5-year report on the Long-Term Plan and is to be submitted no later than December 31, 2008, to the Governor and the Legislature.

Substantial progress towards reducing phosphorus levels discharged into the EPA has been made by the State of Florida and other stakeholders. The combined performance of the regulatory program in the Everglades Agricultural Area (EAA) and the STAs constructed under the 1994 Everglades Construction Project, both mandated by the EFA, has exceeded initial expectations. Since the inception, the EAA best management practices (BMPs) and the ECP STAs have collectively removed more than 2,848 metric tons of TP that otherwise would have entered the Everglades.

As originally envisioned, the Everglades Construction Project was to consist of approximately 40,000 acres of effective treatment area[1] of constructed wetlands distributed among six discrete STAs. The ECP has been expanded to a total of slightly more than 45,000 acres in recent years, and further expansion of the ECP is underway with the increased footprint being implemented expected to be approximately 56,500 acres of effective treatment area. Outflow total phosphorus (TP) concentrations from the STAs continue to improve following enhancements and recovery from the 2004-2005 hurricanes, averaging 26 ppb for Water Year 2008 (WY2008) (SFER 2009, in press). As a direct result of these significant water quality improvement strategies, TP loads to

the EPA from the ECP Basins over the last five years have decreased 70% from the WY1979-1988 base period (SFER 2009, in press)[2]. In part due to the regional drought, WY2008 TP loads from the ECP Basins exhibited an 86% reduction from the WY1979-1988 base period (SFER 2009, in press). Since 1994, over 1,050 metric tons of TP have been removed by the STAs that otherwise would have entered the EPA.

A combination of phosphorus source controls, local government and private water control and conservation programs, and integration with Comprehensive Everglades Restoration Plan (CERP) projects form the foundation for water quality improvements in the Non-ECP Basins. TP loads from the Non-ECP Basins to the EPA over the last five years have decreased 25% from the WY1979-1988 base period (SFER 2009, in press). In part due to the regional drought, WY2008 TP loads from the Non-ECP Basins exhibited a 74% reduction from the WY1979-1988 base period (SFER 2009, in press).

Ongoing engineering and scientific investigations by the District and others engaged in Everglades Restoration since the time of development of the 2003 Long-Term Plan have provided valuable information which has supported refinements to the estimated performance of the water quality improvement strategies for both the ECP and non-ECP basins. In many respects, work conducted over the past 5 years has far exceeded the original expectations. For example, major increases in the STA system footprint have occurred well in advance of what was originally viewed as recommended, and conversion of significant portions of the macrophyte-based STAs to SAV systems has been achieved successfully in spite of the major disturbances of the hurricane seasons of 2004 and 2005 followed by the severe drought conditions that have prevailed in the region in 2006, 2007, and much of 2008. This period of STA operations has been extremely instructive in management of these large systems following significant hurricane disturbances, and periods of both hydraulic and phosphorus overload and dry out. Considering the range of operational challenges that have been imposed on the STA system during periods of start up, recovery, and stabilization, it is significant that the treatment performance of the various STAs

[1] A distinction is made between effective treatment area, which equates to acreage of treatment vegetation, and total area which includes canals, levees, control structures and all other areas that are not directly removing TP. Typically, the total area is about 15% larger than the effective treatment area.
[2] It should be noted that discharges from the ECP Basins are not comprised entirely of EAA runoff; TP loads to the EPA from the EAA have been reduced by approximately 80% compared to the WY1979-1988 base period.

appears to be measurably improving with time and as the District learns how to optimize system operations.

Because there were several events that occurred during the development of this 2008 Report that could result in additional proposed revisions to the Long-Term Plan, this 2008 Report focuses on activities and accomplishments to date in the ECP Basins and non-ECP Basins. A future effort is planned to develop a comprehensive set of Long-Term Plan proposed revisions, once all of the related projects and activities are better defined. Planning will proceed with reliance on a strategy of adaptive implementation, in which all scientifically defensible steps are to be expeditiously implemented with ongoing refinements expected to be necessary. Through a continued collaborative approach to issues evaluation, the District will continue its leadership role in implementation of the Long-Term Plan and in achievement of water quality goals for the Everglades Protection Area.

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BCNP	-	Big Cypress National Preserve
BMP	-	Best Management Practices
C-#	-	Refers to a District canal with its numeric designation
CERP	-	Comprehensive Everglades Restoration Plan
DMSTA	-	Dynamic Model for Stormwater Treatment Areas
EAA	-	Everglades Agricultural Area
ECP	-	Everglades Construction Project
EFA	-	Everglades Forever Act
EPA	-	Everglades Protection Area
ERP	-	Environmental Resource Permit
ESP	-	Everglades Stormwater Program
F.A.C.	-	Florida Administrative Code
F.S.	-	Florida Statutes
FY	-	Fiscal Year
G-#	-	Refers to a District structure with its numeric designation
L-#	-	Refers to a District levee with its numeric designation
NNRC	-	North New River Canal
NRCS	-	Natural Resource Conservation Service
NSID	-	North Springs Improvement District
OM&M	-	Operation, Maintenance and Monitoring
PDE	-	Process Development and Engineering
PL	-	Public Law
PSTA	-	Periphyton-Based Stormwater Treatment Area
S-#	-	Refers to federally constructed District or USACE structure with its numeric designation
SAV	-	Submerged Aquatic Vegetation
SFWMD	-	South Florida Water Management District
SFWMM	-	South Florida Water Management Model
STA	-	Stormwater Treatment Area
STA-#	-	STA with its numeric designation
TP	-	Total Phosphorus
USACE	-	United States Army Corps of Engineers
WCA	-	Water Conservation Area
WCA-#	-	WCA with its numeric designation
WMA	-	Wildlife Management Area
WMP	-	Water Management Plan

1. INTRODUCTION

This document provides the first 5-year report on the October 27, 2003 *Everglades Protection Area Tributary Basins, Long-Term Plan for Achieving Water Quality Goals* (Burns & McDonnell 2003). This 2008 report on the Long-Term Plan is to be submitted no later than December 31, 2008, to the Governor and the Legislature. The long-term Everglades water quality objective is to implement the optimal combination of source controls, Stormwater Treatment Areas (STAs), Advanced Treatment Technologies, and/or regulatory programs to ensure that all waters in the Everglades Protection Area (EPA) meet water quality standards, including compliance with the phosphorus criterion established in Rule 62-302.540 of the Florida Administrative Code (F.A.C.), consistent with the requirements of Florida's 1994 Everglades Forever Act (EFA, Section 373.4592 Florida Statutes). The Long-Term Plan sets forth a recommended plan and strategy for achieving that objective allowing the State of Florida and the South Florida Water Management District (District) to fulfill their obligations under both the EFA and the federal Everglades Settlement Agreement (Case No. 88-1886-CIV-MORENO).

The basins and STAs addressed in the Long-Term Plan are identified in Table 1-1; basin and STA locations are shown in Figure 1-1. The basins are organized into two primary groupings:

1. Those basins addressed through the 1994 Everglades Construction Project (the ECP Basins);

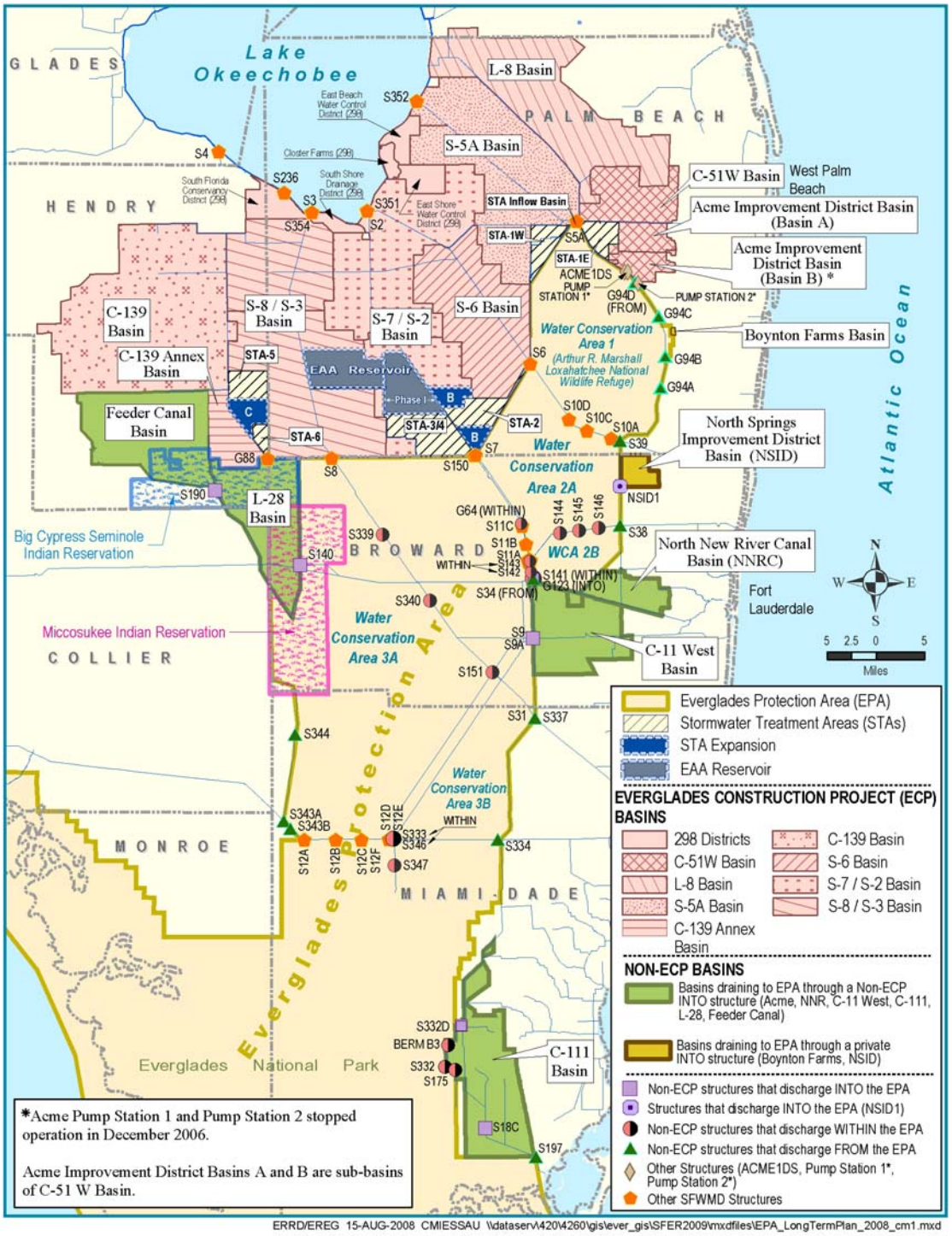
2. Urban and other tributary basins not addressed by the ECP, i.e., the Non-ECP Basins. Two other basins that are tributaries to the EPA (the C-111 and Boynton Farms Basins) are being managed through other District and Federal programs, and are not further discussed herein.

Substantial progress towards reducing phosphorus levels discharged into the EPA has been made by the State of Florida and other stakeholders. The combined performance of the regulatory program in the Everglades Agricultural Area (EAA) and the STAs constructed under the 1994 Everglades Construction Project, both mandated by the EFA, has exceeded initial expectations. Since the inception, the EAA best management practices (BMPs) and the ECP STAs have collectively removed more than 2,848 metric tons of TP that otherwise would have entered the Everglades.

Table 1-1. Hydrologic Basins and Stormwater Treatment Areas Addressed in the Long-Term Plan

Everglades Construction Project (ECP) Basins	
Hydrologic Basin	**Receiving Stormwater Treatment Area (STA)**
C-51 West	STA-1E
Acme Improvement District, Basin B	STA-1E
S-5A	STA-1W, STA-1E
S-6	STA-2
S-7/S-2	STA-3/4
S-8/S-3	STA-3/4, STA-6
C-139	STA-5, STA-3/4
C-139 Annex	STA-6
Non-ECP Basins	
North Springs Improvement District (NSID)	
North New River Canal (NNRC)	
C-11 West	
L-28	
Feeder Canal	

Figure 1-1. Locations of the Everglades Protection Area and Tributary Basins



As originally envisioned, the Everglades Construction Project was to consist of approximately 40,000 acres of effective treatment area[3] of constructed wetlands distributed among six discrete STAs. The ECP has been expanded to a total of slightly more than 45,000 acres in recent years, and further expansion of the ECP is underway with the increased footprint being implemented expected to be approximately 56,500 acres of effective treatment area. Outflow total phosphorus (TP) concentrations from the STAs continue to improve following enhancements and recovery from the 2004-2005 hurricanes, averaging 26 ppb for Water Year 2008 (WY2008) (SFER 2009, in press). As a direct result of these significant water quality improvement strategies, TP loads to the EPA from the ECP Basins over the last five years have decreased 70% from the WY1979-1988 base period (SFER 2009, in press)[4]. In part due to the regional drought, WY2008 TP loads from the ECP Basins exhibited an 86% reduction from the WY1979-1988 base period (SFER 2009, in press). Since 1994, over 1,050 metric tons of TP have been removed by the STAs that otherwise would have entered the EPA.

TP loads from other tributary basins not addressed by the ECP (Non-ECP Basins, formerly referred to as the Everglades Stormwater Program) to the EPA over the last five years have decreased 25% from the WY1979-1988 base period (SFER 2009, in press). In part due to the regional drought, WY2008 TP loads from the Non-ECP Basins exhibited a 74% reduction from the WY1979-1988 base period (SFER 2009, in press).

Table 1-2 compares the actual water quality performance with the projected (2003) performance of the Pre-2006 Projects in the ECP Basins. The calendar year 2007 performance results reflect the influence of a number of notable antecedent events and conditions, including:

- **Regional drought conditions during 2007.** During the regional drought it became difficult to find source water to maintain minimum depths in the treatment cells needed to keep the vegetation alive. The District was able to very effectively manage the available water through various operational strategies, however some of the treatment cells dried out. Once water became available and the vegetation was able to re-establish in these cells, they were then able to provide treatment again. The drought conditions also caused a delay in hydrating and bringing on line the initial STA expansion projects which resulted from a major revision to

[3] A distinction is made between effective treatment area, which equates to acreage of treatment vegetation, and total area which includes canals, levees, control structures and all other areas that are not directly removing TP. Typically, the total area is about 15% larger than the effective treatment area.

[4] It should be noted that discharges from the ECP Basins are not comprised entirely of EAA runoff; TP loads to the EPA from the EAA have been reduced by approximately 80% compared to the WY1979-1988 base period.

the 2003 Long-Term Plan. These additional treatment areas for STA-2 and STA-5, built concurrently with STA-6 Section 2, were flow-capable by December 2006, but start up and flow through of these areas was delayed by the regional drought conditions.

- **Vegetation conversion activities in 4 of the 6 STAs within the last 2-3 years.** Phosphorus reduction may not be fully stabilized until 2-3 years following completion of vegetation conversion activities.

- **Prolonged impacts of the 2004 and 2005 hurricanes.** Hurricane impacts in the fall of 2004 and 2005 substantively affected the vegetative communities and associated treatment performance, and at least some portions of the STA system are still recovering.

Thus, a direct comparison between the projected performance and the actual performance for 2007 provides limited insight into the efficacy of the Pre-2006 Projects, as the above conditions were not factors addressed by the analyses producing the projections included in the 2003 Long-Term Plan. It is noted that design is underway on another 11,600+/- acres of effective treatment area with a scheduled completion (flow-capable) of December 2010. As the STAs stabilize over time, and as additional infrastructure modifications and refinements are accomplished, it is anticipated that the phosphorus concentrations observed in the ECP discharges will continue to be reduced in the future.

Table 1-3 summarizes the comparison of the projected and actual water quality performance of the Pre-2006 Projects in the Non-ECP Basins. Recognizing the limited timeframe encompassed by the 2007 actual performance results, overall the actual TP loads from the Non-ECP basins were slightly less than projected.

Table 1-2. Comparison of Projected and Actual Performance of Pre-2006 Projects in the ECP Basins, Including Source Controls, for 2007

STA	Inflow or Outflow	2003 Long-term Average Annual Projected Performance Beginning January 1, 2007			Actual Performance January - December 2007			Comparison		
		Volume ac-ft	TP Load metric tons	Flow-weighted Mean (ppb)	Volume ac-ft	TP Load metric tons	FWM ppb	Volume ac-ft	TP Load metric tons	FWM ppb
STA-1E	Inflow	165,424	23.10	113	99,881	13.52	110	-65,543	-9.59	-3
	Outflow	175,000	3.31 - 5.30	15 - 24	88,720	2.28	21	-86,280	-2.02	1
STA-1W	Inflow	160,300	27.40	139	93,718	20.12	174	-66,582	-7.29	35
	Outflow	183,300	3.15 - 4.95	14 - 22	89,774	6.44	58	-93,526	2.39	40
STA-2	Inflow	212,400	26.17	100	135,663	17.62	105	-76,737	-8.55	5
	Outflow	222,600	4.59 - 7.55	17 - 28	153,293	3.94	21	-69,307	-2.13	-2
STA-3/4	Inflow	633,700	60.74	78	189,483	18.51	79	-444,217	-42.23	1
	Outflow	621,200	10.98 - 16.47	14 - 21	186,234	4.71	21	-434,966	-9.01	3
STA-5	Inflow	144,600	31.80	178	13,917	1.97	115	-130,683	-29.83	-64
	Outflow	125,500	3.03 - 4.55	20 - 30	6,387	0.75	95	-119,113	-3.04	70
STA-6	Inflow	57,000	5.48	78	6,376	0.56	71	-50,624	-4.92	-7
	Outflow	35,100	0.75 - 1.05	17 - 24	2,458	0.12	38	-32,642	-0.78	18
Total ECP	Inflow	1,373,424	174.7	103	539,038	72.29	109	-834,386	-102.40	6
	Outflow	1,362,700	25.80 - 39.87	15 - 24	526,865	18.23	28	-835,835	-14.61	9

Notes: "Long-term" was taken as that represented by a 31-year geometric mean based on model simulations. As applied in the 2003 *Long-Term Plan*, the geometric mean is computed as the geometric mean concentration of 7-day flow-weighted mean concentrations. The comparison of TP values is based on the actual 2007 FWM/load minus the average of the range of projected FWM/loads. Projected outflow TP ranges reflect uncertainty of STA performance modeling.

Table 1-3. Comparison of Projected and Actual Performance of Pre-2006 Projects in the Non-ECP Basins, Including Source Controls, for 2007

BASIN	2003 Long-term Average Annual Projected Performance Beginning January 1, 2007			Actual Performance January - December 2007			Comparison		
	Volume ac-ft	TP Load metric tons	Flow-weighted Mean (ppb)	Volume ac-ft	TP Load metric tons	FWM ppb	Volume ac-ft	TP Load metric tons	FWM ppb
Acme Basin B	0	0.00	-	0	0.00	-	0	0.00	-
NSID	6,800	0.293	39	0	0.00	-	-6,800	-0.29	-39
NNRC	0	0.00	-	0	0.00	-	0	0.00	0
C-11 West	18,300	0.493	22	124,671	2.50	16	106,371	2.01	-6
L-28	84,000	3.982	39	66,520	3.08	38	-17,480	-0.90	-1
Feeder Canal	77,000	4.76	50	23,700	3.08	105	-53,300	-1.68	55
Total Non-ECP	186,100	9.53	42	214,891	8.67	33	28,791	-0.86	-9

Notes: "Long-term" was taken as that represented by a 31-year geometric mean based on model simulations. "FWM" is the flow-weighted mean concentration of total phosphorus. The comparison of TP values is based on the actual 2007 FWM/load minus the average of the range of projected FWM/loads.

Several events occurred during the course of preparing this report that could impact the strategies and projected improvements in water quality addressed in the Long-Term Plan, including the following:

- On May 15, 2008, the District Governing Board suspended construction of the EAA Storage Reservoir due to a legal challenge to the construction permit issued by the U.S. Army Corps of Engineers to the District under Section 404 of the Clean Water Act.

- On June 24, 2008, the District and U.S. Sugar Corporation executed a statement of principles initiating negotiations pursuant to which the District could acquire as much as 187,000 acres of agricultural land located in and around the EAA that could be used for Everglades water storage and water quality projects.

- The draft Environmental Impact Statement for the Section 404 constructions permits for Compartments B and C is undergoing revision based on public and agency comments and, as a result, the anticipated issuance date is being pushed back.

- On July 29, 2008, Judge Gold issued a ruling on the case styled *Miccosukee Tribe of Indians of Florida vs. United Sates of America* Case No 04-21448-CIV-GOLD (S.D. Fla.), and an appeal filed by the intervener is currently pending.

Planning will proceed with reliance on a strategy of adaptive implementation, in which all scientifically defensible steps are to be expeditiously implemented but with ongoing refinements expected to be necessary. In keeping with the adaptive implementation approach, future revisions to the Long-Term Plan may be necessary as a result of the above events.

2. WATER QUALITY IMPROVEMENT STRATEGIES, ECP BASINS

The central element of the regional long-term strategy for improving water quality in inflows into the EPA from the Everglades Agricultural Area and adjoining basins is the design, construction, and operation of the Everglades Construction Project (ECP), an extensive system of Stormwater Treatment Areas (STAs) — constructed wetlands designed to reduce phosphorus in agricultural and urban stormwater, and Lake Okeechobee releases to the south, prior to their entry into the EPA. This section reports on activities designed to improve the water quality entering the Everglades Protection Area from the ECP Basins. The following sections report on specific water quality improvement strategies for the ECP Basins, including:

- Phosphorus source control programs in the Everglades Agricultural Area (EAA) and C-139 basins, and
- Structural, operational and vegetation management enhancements to the STAs.

2.1 Phosphorus Source Controls

The effective control of total phosphorus (TP) loads in the upstream basins has been a fundamental strategy in the comprehensive program to improve water quality entering the EPA. The Everglades phosphorus source control program is a strategic priority under the District's Everglades Program (Van Horn et al. 2008). The Everglades Forever Act and the Long-Term Plan outline District responsibilities and schedules to implement basin-specific solutions to control phosphorus at the source. These solutions are implemented through both regulatory and non-regulatory efforts in basins within the Everglades Construction Project (ECP) area and areas outside of the original ECP area, known as non-ECP basins. The overall source control strategy includes implementation of Best Management Practices (BMPs) for phosphorus reduction, regulatory programs, voluntary programs, educational programs, and integration with local and regional projects. The District implements, monitors, optimizes, and reports on the progress of the source control strategy for each basin on an annual basis, and the results are presented in the annual South Florida Environmental Report. The following sections report on the source control programs in the ECP basins.

2.1.1 Everglades Agricultural Area

The EFA mandates specific performance levels for controlling phosphorus in discharges from the ECP basins, specifically the EAA and C-139 basins (Van Horn et al. 2008). The

EAA and C-139 basins' success indicators for meeting those performance levels are outlined in District rules, Chapter 40E-63, F.A.C. For the EAA, the phosphorus load reduction goal is an average of 25% compared to the base period (WY1980-1988). The first year of compliance for the EAA was WY1996. The EAA continues to meet the required performance levels of the EFA as evidenced by an average reduction in TP loads of 52 percent over the past thirteen years, and maintenance of those historical reduction levels is critical to continued success. Since WY1996, the BMP phosphorus control program of the EAA has removed approximately 1,791 metric tons of phosphorus from waters subsequently delivered to the EPA.

2.1.2 C-139 Basin

The goal of the source control program in the C-139 Basin is to maintain TP loads at or below historical levels (Van Horn et al. 2008). WY2008 marked the first year that the C-139 Basin met the phosphorus load requirements required by the EFA and Ch. 40E-63, F.A.C. (Rule 40E-63) since WY2003, the initial compliance year. Source control activities for the C-139 Basin consist of mandatory BMPs which have been increased on an annual basis based on achieving compliance with historical, pre-BMP phosphorus levels (Van Horn et al., 2008). Because of non-compliance in prior years, a revision to the BMP strategy implemented through the regulatory program prescribed by Rule 40E-63 was initiated in 2006. The revision is to develop a more effective regulatory/BMP program for optimization of farm-implemented BMPs using an adaptive implementation strategy. This will require demonstration of optimized BMP implementation at the farm level, and expansion of the mandated water quality monitoring program to upstream areas (sub-regions), in order to determine the most effective BMPs and prioritized implementation strategy.

2.1.3 C-139 Annex

The C-139 Annex presently drains to the L-28 Borrow Canal at the north line of the Big Cypress Seminole Indian Reservation. In December 2006, the infrastructure to divert all runoff from the C-139 Annex to the L-3 drainage system for treatment in STA-6 was completed. District staff continues to coordinate regulatory compliance requirements with the landowner to implement a phosphorus source control strategy for diversion discharges.

2.1.4 Ch. 298 Districts and Closter Farms

Landowners in the EAA, working in concert with the District and other agencies, have implemented effective strategies to reduce the discharge of phosphorus to Lake Okeechobee (Van Horn et al. 2008). Stormwater runoff and seepage from four special drainage districts established through Ch. 298 of the Florida Statutes (F.S.) and a 3,200(±) acre parcel along the southern rim of Lake Okeechobee historically discharged directly to Lake Okeechobee. The four special drainage districts are:

1. East Beach Water Control District (EBWCD)
2. East Shore Water Control District (ESWCD)
3. South Shore Drainage District (SSDD)
4. South Florida Conservancy District, Unit 5 (SFCD)

The 3,200(±) acre state-owned parcel, also known as 715 Farms is leased to Closter Farms, and is located adjacent to EBWCD and ESWCD. Historically, as for the referenced 298 Districts, stormwaters from this parcel were pumped directly to Lake Okeechobee.

As required by the Everglades Forever Act, diversion projects were completed between 2001 and 2005 to direct most of the flows from these five basins in the EAA to the south for treatment in the STAs. The goal of the ECP diversion project for the Ch. 298 Districts/715 Farms was defined in the 1994 *Conceptual Design for the Everglades Protection Project* (Burns & McDonnell 1994):

> *The primary objective of these modifications and improvements is to reduce total phosphorus loads discharged directly to the Lake from these areas by not less than 80 percent. … It is our understanding that conceptual design is developed upon the basic premise that, on a long-term average basis, 80 percent of the volume (and load) historically discharged from these areas (after modifications to reflect the implementation of Best Management Practices) is to be diverted to other water bodies …*

2.1.5 Acme Improvement District Basin B (Village of Wellington)

Prior to construction of diversion facilities, stormwater runoff from Basin B of the Village of Wellington's Acme Improvement District was pumped directly into WCA-1. Subsequent to the development of the 2003 Long-Term Plan, the Acme Basin B Discharge CERP Project was added to the Long-Term Plan through an FDEP approved revision. Changes to Acme's internal conveyance system, coupled with the C-1 Canal improvements and construction of a new pump station (ACME7 Pump Station) made possible diversion of Basin B flows to STA-1E by way of the C-51 West Canal. These improvements were completed by December 2006, and direct discharges from Acme Basin B into WCA-1 have ceased (Van Horn et al. 2008). The water quality improvement strategy for the Acme basin consists of a combination of ongoing training and education initiatives, mandatory BMPs required by existing Village BMP ordinances, additional water quality requirements in stormwater management system permit conditions, and integration with the Acme Basin B Discharge CERP Project.

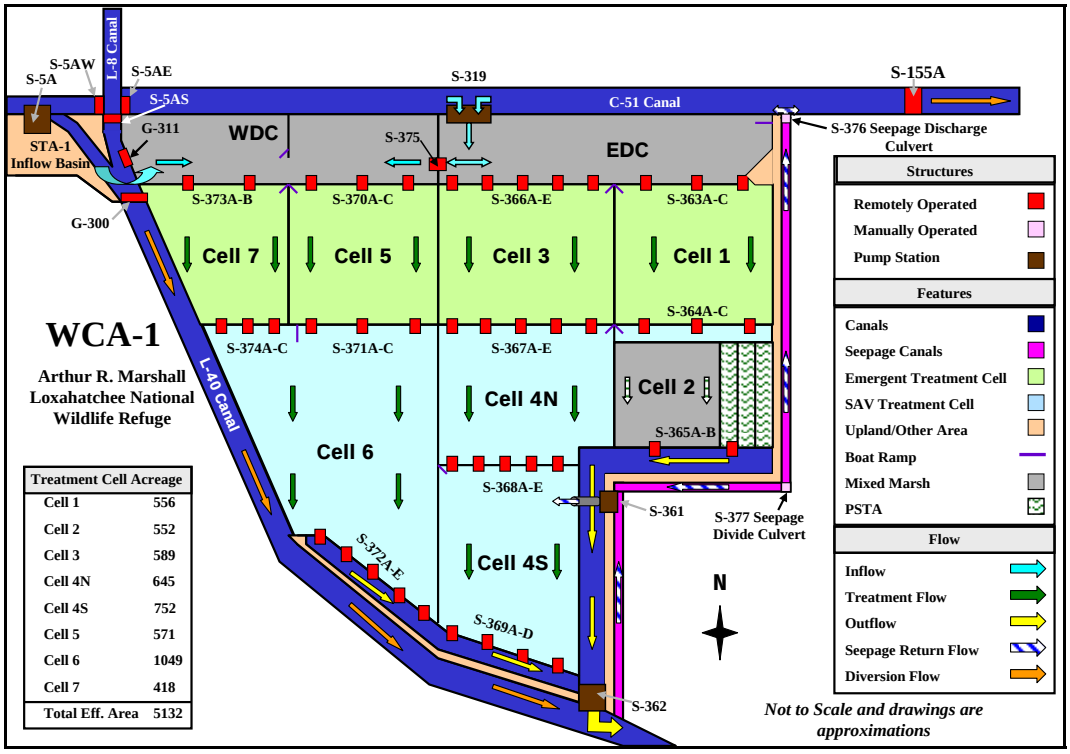
2.2 STA Enhancements and Expansion

Part 2 of the 2003 Long-Term Plan contained recommended structural, vegetation and operational enhancements for all six of the ECP STAs. These enhancements were completed as recommended, and in some cases, further enhancements to the projects contained in the 2003 Long-Term Plan have been implemented. The treatment area of three STAs (STA-2, STA-5 and STA-6) was expanded by a total of 5,274 acres. Within the treatment areas, STA optimization efforts are continuing for all 6 STAs, including analyses and interpretation of performance data, investigations of dry-out on treatment performance, analysis of optimal depths for SAV, and evaluation of periphyton-based stormwater treatment areas (PSTAs) at the STA-1E and STA-3/4 demonstration projects. The following sections summarize the structural, vegetation, and operational enhancements completed in the STAs, and the expansion of STA-2, STA-5 and STA-6.

2.2.1 STA-1E

STA-1E is situated immediately east of the Arthur R. Marshall Loxahatchee National Wildlife Refuge (WCA-1) and south of the C-51 West Canal. A schematic diagram of STA-1E is presented in Figure 2-1. The primary source of inflow to this STA is the C-51 West Basin. In December 2006, Acme Basin B runoff was diverted from the Loxahatchee National Wildlife Refuge to STA-1E.

Figure 2-1. Schematic of STA-1E



Runoff from the C-51 West Basin is introduced to STA-1E through Pumping Station S-319. Another source of inflow is a portion of the runoff from the S-5A Basin which is introduced to STA-1E through the G-311 gated spillway located on the eastern boundary of the STA-1 Inflow Basin. An additional source of inflow to STA-1E is runoff from the Rustic Ranches subdivision; runoff from that area is introduced to STA-1E through Pumping Station S-361, which also serves to return seepage to the STA. Discharges from STA-1E are directed to WCA-1 through Pumping Station S-362.

The STA-1 Inflow Basin and associated water control structures permit the diversion and redirection of inflows between STA-1E, STA-1W, the WCA-1 and the L-8 Canal to the north. The synchronized operation of STA-1W, STA-1E and the structures in the STA-1 Inflow Basin allows redirection of flows in order to balance the phosphorus loading rate among the STAs, and also whenever the discharge from Pumping Station S-5A exceeds the hydraulic capacity of STA-1W. Runoff from the C-51 West Basin can be directed to STA-1W through G-311 as well.

STA-1E provides a total effective treatment area of 5,132 acres, situated generally between the C-51 West Canal (on the north) and WCA 1 (in the southwest), and west of Flying Cow Road. In addition to treating inflows from the C-51 West Canal and the S-5A Basin, other minor inflows include:

- Supplemental water from Lake Okeechobee necessary to prevent dryout of the STA; and
- Runoff from the adjacent L-8 Basin until the L-8 Diversion project is completed.

STA-1E consists of three parallel flow paths, each developed with cells in series, preceded by distribution cells located along and parallel to the C-51 West Canal. Those distribution cells encompass 1,046 acres in addition to the 5,132 acres in the STA-1E treatment cells. Following limited emergency operations associated with the 2004 hurricanes, the Central and Western flow-ways of STA-1E (Cells 3, 4N and 4S; and Cells 7, 5, and 6, respectively) began flow-through operations in September 2005.

The Eastern Flow-way (Cells 1 and 2), representing about 20% of the treatment area, is on-line but remains under the control of the U. S. Army Corps of Engineers (USACE) for a periphyton-based STA (PSTA) Demonstration project. The project is currently in the startup phase and is anticipated to be operated over an 18-month period by the USACE (T. Brown, pers. comm.). After completion of the PSTA project, test cell levees and structures will be removed by the USACE to return the Eastern flow-way to full flow capability. Until the Eastern flow-way has full flow capacity, inflows to STA-1E will be restricted to avoid hydraulic and phosphorus overload of the remaining flow-ways.

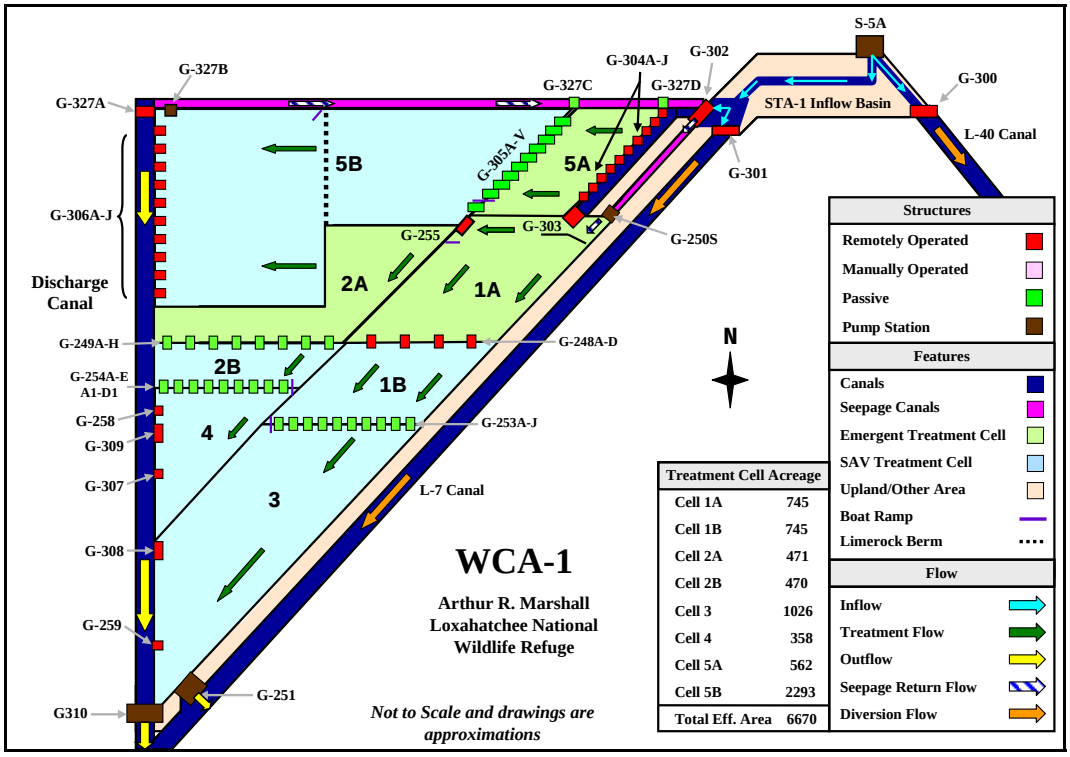
In fulfillment of the public access and recreation requirements of the Everglades Forever Act, and as further described in Ch. 373.1391(1)(a) and (b), Florida Statutes, recreational facilities were proposed at each of the STAs. The recreational facilities were designed to ensure compatibility with the restoration goals of the ECP and the water quality and hydrological purposes of the STAs. The STA-1E recreational facilities, located along the northern perimeter adjacent to the C-51 West Canal, are complete and open to the public.

2.2.2 STA-1W

STA-1W and STA-1E are hydraulically connected through the STA-1 Inflow Basin, situated adjacent to the extreme northerly end of the Arthur R. Marshall Loxahatchee National Wildlife Refuge. As described in the prior section, the STA-1 Inflow Basin and associated water control structures provide operational flexibility for distributing flows between STA-1E, STA-1W, and WCA-1.

STA-1W is situated immediately west of the Arthur R. Marshall Loxahatchee National Wildlife Refuge (WCA-1) and south of the L10/L12 (West Palm Beach) Canal. A schematic diagram of STA-1W as it currently exists is shown in Figure 2-2. The primary source of inflow to STA-1W is the S-5A Basin in the Everglades Agricultural Area. Runoff from the S-5A Basin is lifted by Pumping Station S-5A to the STA-1 Inflow Basin. Discharges from the Inflow Basin to STA-1W are made through Structure G-302, a gated spillway in Levee L-7 (which forms the westerly perimeter of WCA-1). Discharges from STA-1W are directed to WCA-1 through pumping stations G-251 and G-310.

Figure 2-2. Schematic of Existing STA-1W



STA-1W provides a nominal treatment area of 6,670 acres, generally bounded by the Ocean Canal (on the north) and Water Conservation Area 1 (on the east and south). STA-1W can receive inflows from a number of tributary basins:

- The EAA Basin via the S-5A pump station, including diversions from East Beach Water Control District.
- Outflow from the L-8 Basin that may be routed to the S-5A pump station. Historically, these L-8 Basin outflows have at times included some Lake Okeechobee releases during periods of excessively elevated lake stages, or portions of Lake Okeechobee water supply releases.
- The C-51W Basin via the S-319 and G-311 structures, and the STA-1 Inflow Basin, including diverted waters from Acme Basin B.

STA-1W has three flow paths, each developed with cells in series. The northern path flows through Cells 5A and 5B in a westerly direction and the eastern and western paths (Cells 1 through 4) flow in a southwesterly direction. Cells 1 through 4 comprise the original Everglades Nutrient Removal (ENR) project. All cells were originally developed in emergent vegetation except Cells 4 and 5B, which were developed in submerged aquatic vegetation (SAV). Long-Term Plan recommended enhancements which have been completed include compartmentalization of Cells 1 and 2, conversion of vegetation to SAV in Cells 1B, 2B and 3, improved flow controls through remote operation of water control structures, and the addition of a public recreation facility along the Ocean Canal and Cell 5B. Revision 2 to the Long-Term Plan included numerous structural improvements beyond the Pre-2006 activities of the 2003 Long-Term Plan, including replacement of the discharge structure from Cell 4 with a remotely operable structure, improvement in the canal and marsh conveyance capacities, addition of remote operations capability at the inflow gates to Cell 5, and removal of floating vegetative tussocks in Cell 2.

There have been several revisions to the Long-Term Plan consisting of projects designed to improve the TP removal performance of STA-1W. In particular, one revision included extensive rehabilitation activities within STA-1W, including drying out the Western flow-way, removal of approximately 100,000 cubic yards of organic material, re-flooding, vegetation enhancements, and associated maintenance activities.

2.2.3 STA-2

STA-2 currently provides a total effective treatment area of 8,240 acres (including the recent expansion described herein), and is situated between the North New River Canal to the west and Water Conservation Area 2A (WCA-2A) to the east. A schematic of STA-2 as it currently exists is shown in Figure 2-3. Roughly half of STA-2 is situated on the former Brown's Farm Wildlife Management Area. This stormwater treatment area treats inflows from the Hillsboro Canal (via Pumping Station S-6) and an adjacent agricultural area (via Pumping Station G-328). Those inflows are comprised of contributions from a number of sources, including:

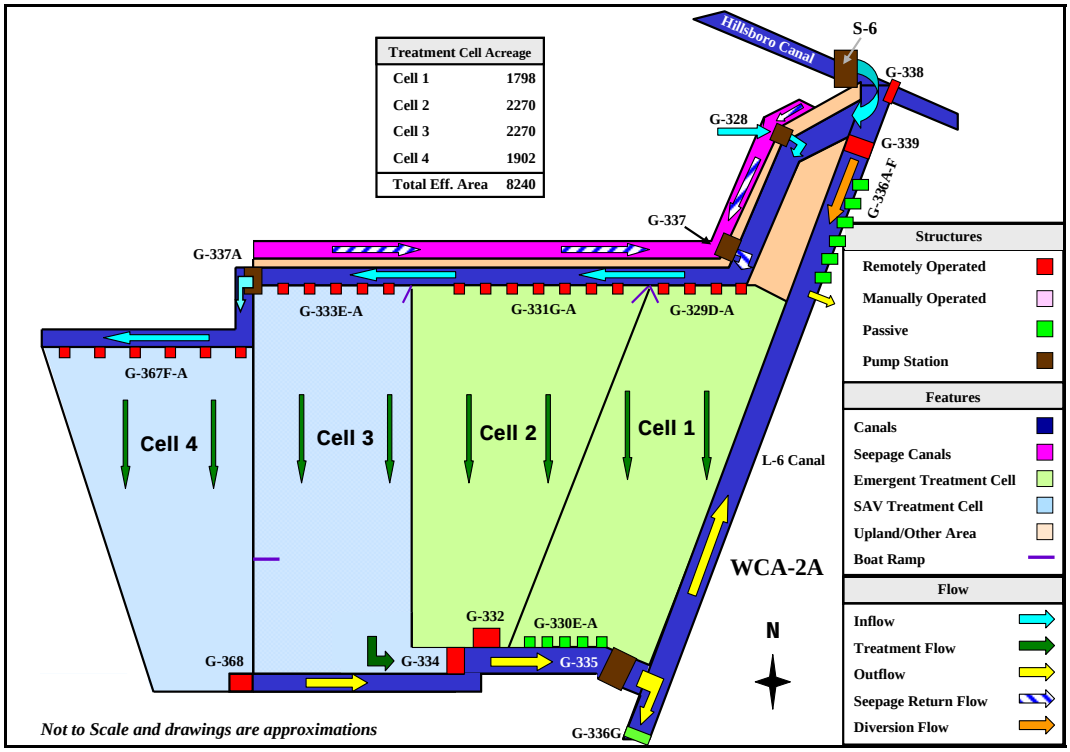
- Agricultural runoff and discharges from the S-6/S-2 Basin;
- A partial diversion of runoff from the S-5A Basin via the Ocean and Hillsboro Canals;
- Chapter 298 drainage districts situated on the easterly shore of Lake Okeechobee;
- Supplemental (irrigation) water from Lake Okeechobee necessary to prevent dryout of the STA;
- Water supply releases from Lake Okeechobee meant for delivery to the Lower East Coast.

Revision 2 to the Long-Term Plan included expansion of STA-2 to include Cell 4, with an effective treatment area of approximately 1,902 acres. Cell 4 was flow-capable by December 2006, and began flow-through operation in February 2008. With the addition of Cell 4, STA-2 now contains four parallel flow paths, each with a southerly flow direction. Cells 1 and 2 are at present populated primarily with emergent macrophytic vegetative communities; Cells 3 and 4 are primarily submerged aquatic vegetation (SAV), although there are vestiges of emergent vegetation (former Brown's Farm Wildlife Management Area, or WMA, lands) in the southeasterly corner Cell 3.

As recommended in the 2003 Long-Term Plan, a tracer study was conducted in STA-2 Cell 3 to achieve a better understanding of the hydraulics of the cell. The tracer study (DB Environmental, Inc., 2004) demonstrated efficient hydraulics in STA-2 Cell 3 without compartmentalization. In addition, the phosphorus removal performance with and without

Cell 3 compartmentalization was evaluated using DMSTA2 and the modeling results indicated no improved phosphorus removal performance with the levee compared to without the levee. For these reasons, and because Cell 3 has consistently been one of the highest performing treatment cells, Revision 5 to the Long-Term Plan included approval to not construct the internal levee in Cell 3.

Figure 2-3. Schematic of Existing STA-2



2.2.4 STA-3/4

STA-3/4 provides a total effective treatment area of 16,543 acres, situated generally between U.S. Highway 27 (on the east) and the Holey Land Wildlife Management Area (on the west), lying immediately north of the L-5 Borrow Canal. A schematic of STA-3/4 is shown in Figure 2-4. The inflows to this STA are comprised of contributions from a number of sources, including:

- Agricultural runoff and discharges from the North New River Canal Basin (S-7/S-2 Basin) via Pump Station G370;

- Agricultural runoff and discharges from the Miami Canal Basin (S-8/S-3 Basin) via Pump Station G-372;

- Lake Okeechobee. Anticipated inflows from Lake Okeechobee include:

  - Regulatory releases to both the Miami Canal and North New River Canal;

  - Best Management Practice (BMP) makeup water for both the Miami Canal and North New River Canal basins;

  - Supplemental (irrigation) water necessary to prevent dryout of the STA (considered as delivered to the Miami Canal).

- Agricultural runoff and discharges from the C-139 Basin (episodic inflows through Structure G-136 and the L-1E Canal to the Miami Canal);

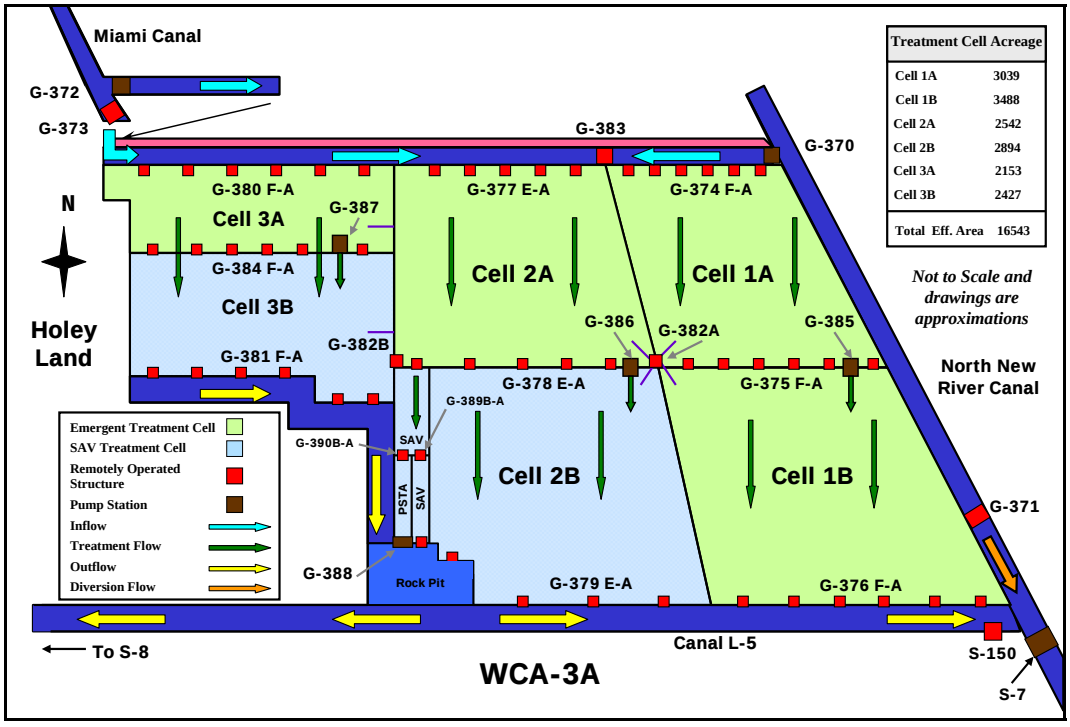
- Pumping Station S-236 discharges to be diverted from Lake Okeechobee to the Miami Canal for delivery to STA-3/4;

- Storm runoff and discharges from the South Shore Drainage District, to be diverted from Lake Okeechobee to the Miami Canal for delivery to STA-3/4.

STA-3/4 consists of three parallel flow paths. The most easterly flow path (Cells 1A and 1B in series) generally treats inflows from the North New River Canal. The two westerly flow paths (Cells 2A and 2B in series, Cell 3A and 3B in series) generally treat inflows from the Miami Canal.

STA-3/4 was originally developed in emergent macrophyte vegetation throughout its effective treatment area. The construction sequence and methods employed during construction of STA-3/4 were structured to promote maximum possible vegetative grow-in and maturation as early as possible. STA enhancement activities recommended in the 2003 Long-Term Plan and now complete include compartmentalization of the western flow-way, conversion of vegetation to SAV in two of the downstream cells (Cells 2B and 3B), installation of water supply pumps, and the addition of two public recreation facilities.

Figure 2-4. Schematic of STA-3/4



Revision 3 to the Long-Term Plan amended the vegetation conversion method in STA-3/4, Cell 1B to occur incrementally while keeping the cell online (Toth 2008). As of January 2008, herbicide applications have cumulatively treated emergent vegetation cover on 41% of the effective treatment area of Cell 1B, and the flow-way remains one of the highest performing of all the STAs, with a current 365-day flow-weighted mean of 16 ppb. The primary benefit of this conversion is the cell does not have to be taken off-line, and there is no subsequent 12- to 24-month start up period (with a corresponding absence of flow-through treatment) while the vegetation is established. An ongoing study in Cell 1B has been implemented to provide the data that is necessary to evaluate/confirm the feasibility and utility of this approach prior to the next phase of incremental conversion, which is planned to occur in fall 2008 (Fiscal Year 2009 [FY2009]) when emergent vegetation in another 1,000 acres (30%) of the cell will be treated with herbicide. Controlled burn blocks will be created in this treated area in January to February 2009 and will be inoculated at the onset of the following wet season (June to July 2009). These same steps will be repeated to initiate the final (northernmost) conversion increment (1,000 acres) in fall 2009 to spring 2010 (FY2010). Based on this approach and schedule, it is anticipated that a majority of the cell will be converted to SAV by the

end of 2011. The PSTA demonstration project was also constructed in Cell 2B as recommended in the 2003 Long-Term Plan.

2.2.5 STA-5

STA-5 provides a total effective treatment area of 6,095 acres, situated generally on lands between the L-2 Borrow Canal (on the west) and Rotenberger Wildlife Management Area (on the east), immediately northeast of the confluence of the Deer Fence Canal with the L-2/L-3 Borrow Canal. A schematic diagram of STA-5 as it currently exists is presented in Figure 2-5. This stormwater treatment area is intended to treat inflows from the L-2/L-3 Borrow Canal (via the G-342 structures). These inflows are comprised of contributions from the following:

- Agricultural runoff and discharges from the C-139 Basin (partial, see STA-6 discussion);

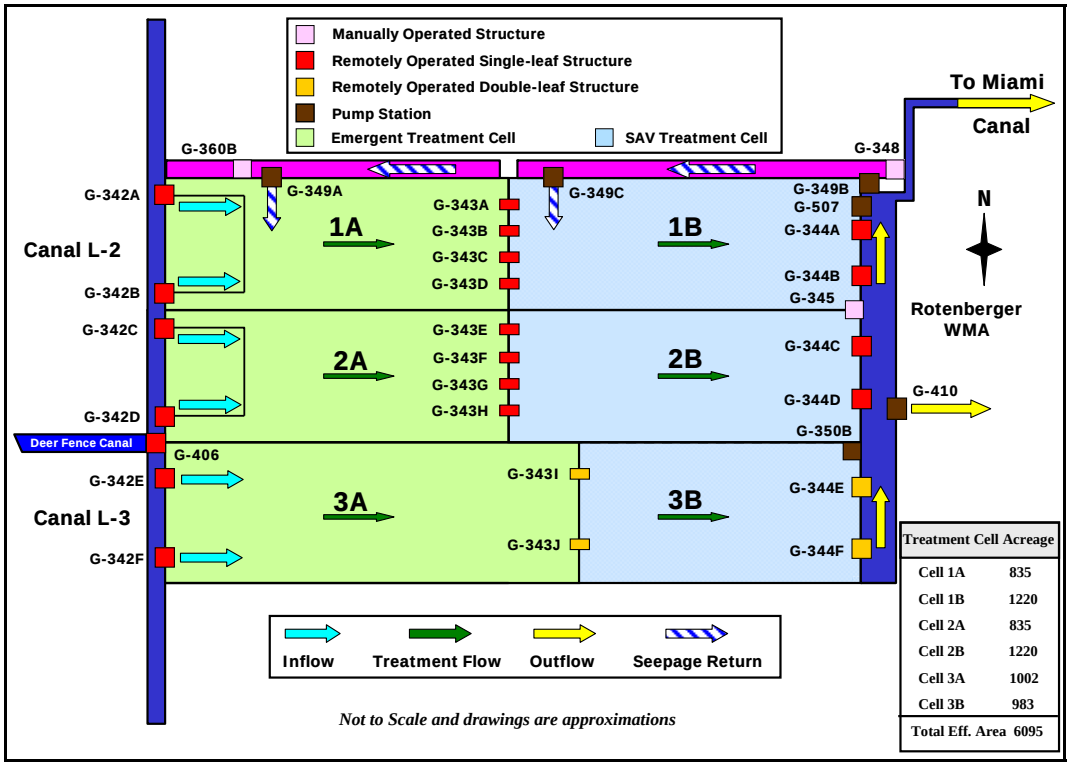
- Supplemental (irrigation) water from Lake Okeechobee necessary to prevent dryout of the STA.

Discharges to STA-5 may be directed either to the Miami Canal (through the STA-5 Discharge Canal along the north line of the Rotenberger Wildlife Management Area [WMA]) or to the Rotenberger WMA itself. Discharges to the Rotenberger WMA via Pump Station G-410 are for the purpose of hydrologic restoration of the (approx.) 29,000-acre WMA.

Long-Term Plan enhancements which have been completed include grading in the northern two flow-ways to remove flow restrictions, conversion of vegetation to SAV in the downstream Cell 2B, replacement and remote operation of water control structures along the intermediate levees, and construction of an additional seepage return pump station along the northern seepage canal. Revision 2 to the Long-Term Plan included the addition of a third flow-way to STA-5 (Cells 3A and 3B consist of 1,985 acres of effective treatment area) which is now complete and started flow-through operation in August 2008. With the completion of the new third flow-way, STA-5 has three parallel flow paths, each developed with two cells in series, and each with an easterly flow direction. In 2008, the District conducted sediment removal in two miles of the L-2/L-3

Canal upstream of the inflow to STA-5, and in an additional 4.2 miles of inflow distribution canals within the STA.

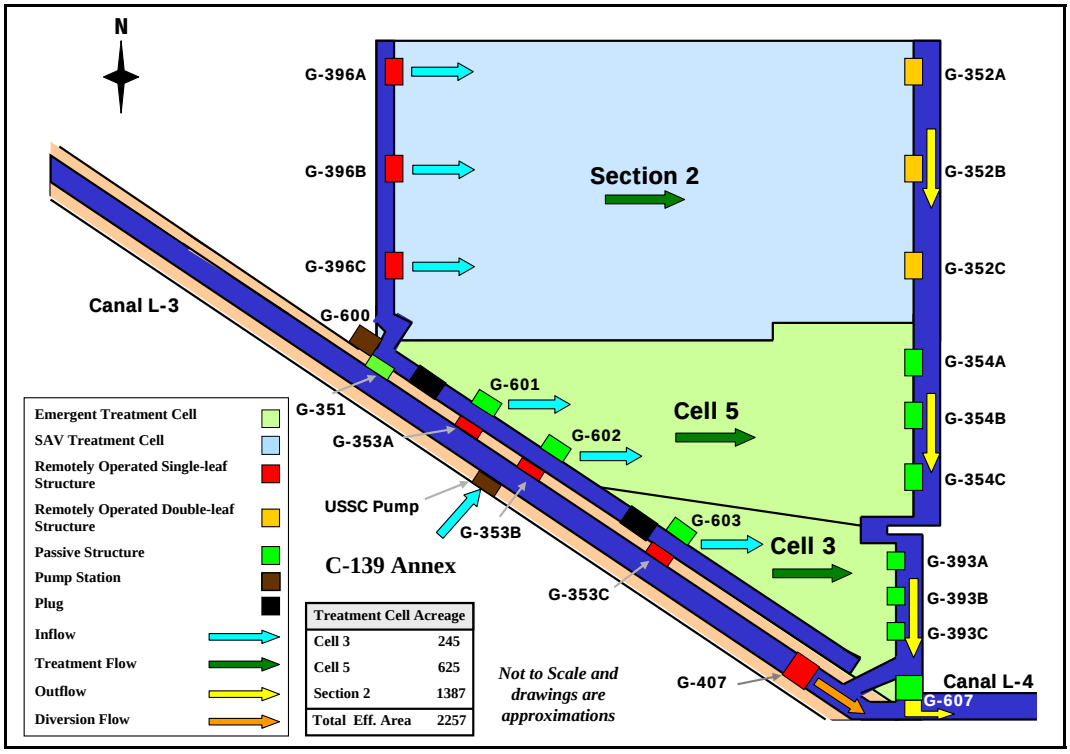
Figure 2-5. Schematic of Existing STA-5



2.2.6 STA-6

STA-6 currently provides a total effective treatment area of 2,257 acres, situated on lands between the L-3 Borrow Canal (on the west) and Rotenberger Wildlife Management Area (on the east), immediately north of the confluence of the L-3 and L-4 Borrow Canals. A schematic diagram of STA-6 as it currently exists, including both Section 1 (Cells 3 and 5) and Section 2, is presented in Figure 2-6.

Figure 2-6. Schematic of STA-6



Inflows to STA-6 are comprised of contributions from a number of sources, including:

- Agricultural runoff and discharges from the C-139 Basin;
- Stormwater runoff from the fallow lands comprising Compartment C located between STA-5 and STA-6; and
- Upon commencement of discharges, agricultural runoff from the USSC Southern Division Ranch, Unit 1 (the "C-139 Annex").

Long-Term Plan enhancements which are now complete include the addition of Section 2 with approximately 1,387 acres of effective treatment area, and improved flow control with the addition of new inflow gates for Cells 3 and 5.

3. WATER QUALITY IMPROVEMENT STRATEGIES, NON-ECP BASINS

The Non-Everglades Construction Project (Non-ECP) Basins (formerly known as the Everglades Stormwater Program Basins) are those basins discharging to the Everglades Protection Area from areas outside of the Everglades Agricultural Area. The Non-ECP Basins currently addressed in the Long-Term Plan are listed in Table 3-1; the overall boundaries of those basins are shown in Figure 3-1.

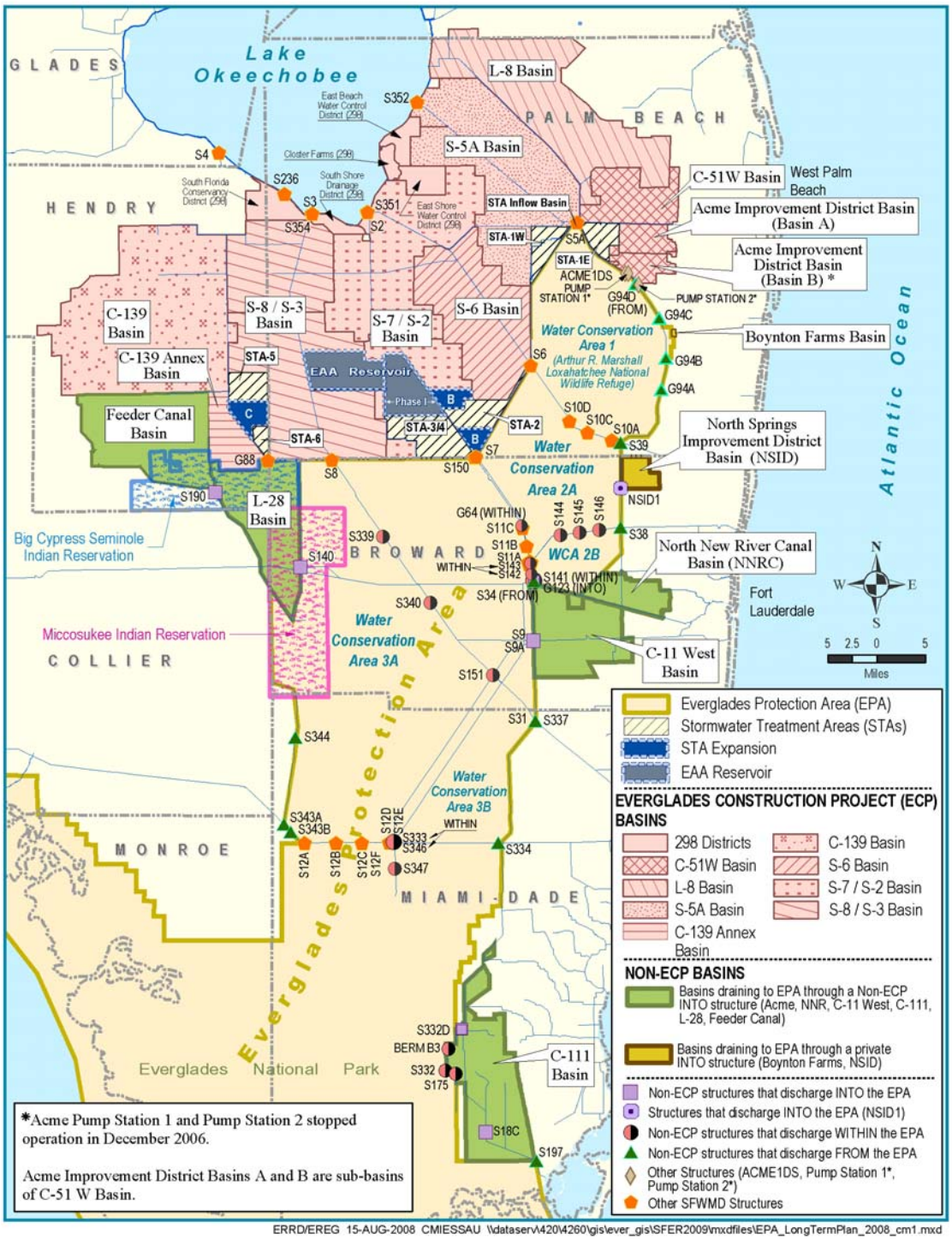
Table 3-1. Non-ECP Basins Included in Long-Term Plan

Hydrologic Basin
North Springs Improvement District
North New River Canal
C-11 West
L-28
Feeder Canal

Since the development of the 2003 Long-Term Plan, Acme Basin B has been moved from the list of Non-ECP Basins to the list of ECP Basins. Runoff from Acme Basin B was previously directed to WCA-1. However, as part of Revision 4 to the Long-Term Plan[5], diversion facilities were constructed, such that discharges to WCA-1 were terminated in December 2006. Runoff from Acme Basin B is now directed to the C-51 West Canal for treatment in STA-1E. The two remaining Non-ECP Basins, the C-111 Basin and the Boynton Farms Basin, are being addressed by other District and Federal programs.

[5] Copies of all Revisions to the Long-Term Plan are available at the District's Long-Term Plan website.

Figure 3-1. Non-ECP Basin Locations
(Note: With the diversion of its runoff to C-51W, Acme Basin B is now an ECP Basin.)



Each of the Non-ECP basins is scheduled to receive one or more projects under CERP. In general, the recommended strategy in the Non-ECP basins is to rely upon phosphorus source controls and full integration with CERP to achieve water quality standards and the water quality improvement goals of the Everglades Forever Act, to the extent that this is consistent with state and federal authorization. Additional guidance for implementation of the recommended strategy was provided by the Florida Legislature in its 2003 amendment of the Everglades Forever Act (373.4592 F.S.), which states:

> *(c) It is the intent of the Legislature that implementation of the Long-Term Plan shall be integrated and consistent with the implementation of the projects and activities in the Congressionally authorized components of the CERP so that unnecessary and duplicative costs will be avoided. Nothing in this section shall modify any existing cost share or responsibility provided for projects listed in s. 528 of the Water Resources Development Act of 1996 (110 Stat. 3769) or provided for projects listed in section 601 of the Water Resources Development Act of 2000 (114 Stat. 2572). The Legislature does not intend for the provisions of this section to diminish commitments made by the State of Florida to restore and maintain water quality in the Everglades Protection Area, including the federal lands in the settlement agreement referenced in paragraph (4)(e).*

A combination of phosphorus source controls, local government and private water control and conservation programs, and integration with Comprehensive Everglades Restoration Plan (CERP) projects form the foundation for water quality improvements in the Non-ECP Basins.

3.1 North Springs Improvement District (NSID) Basin

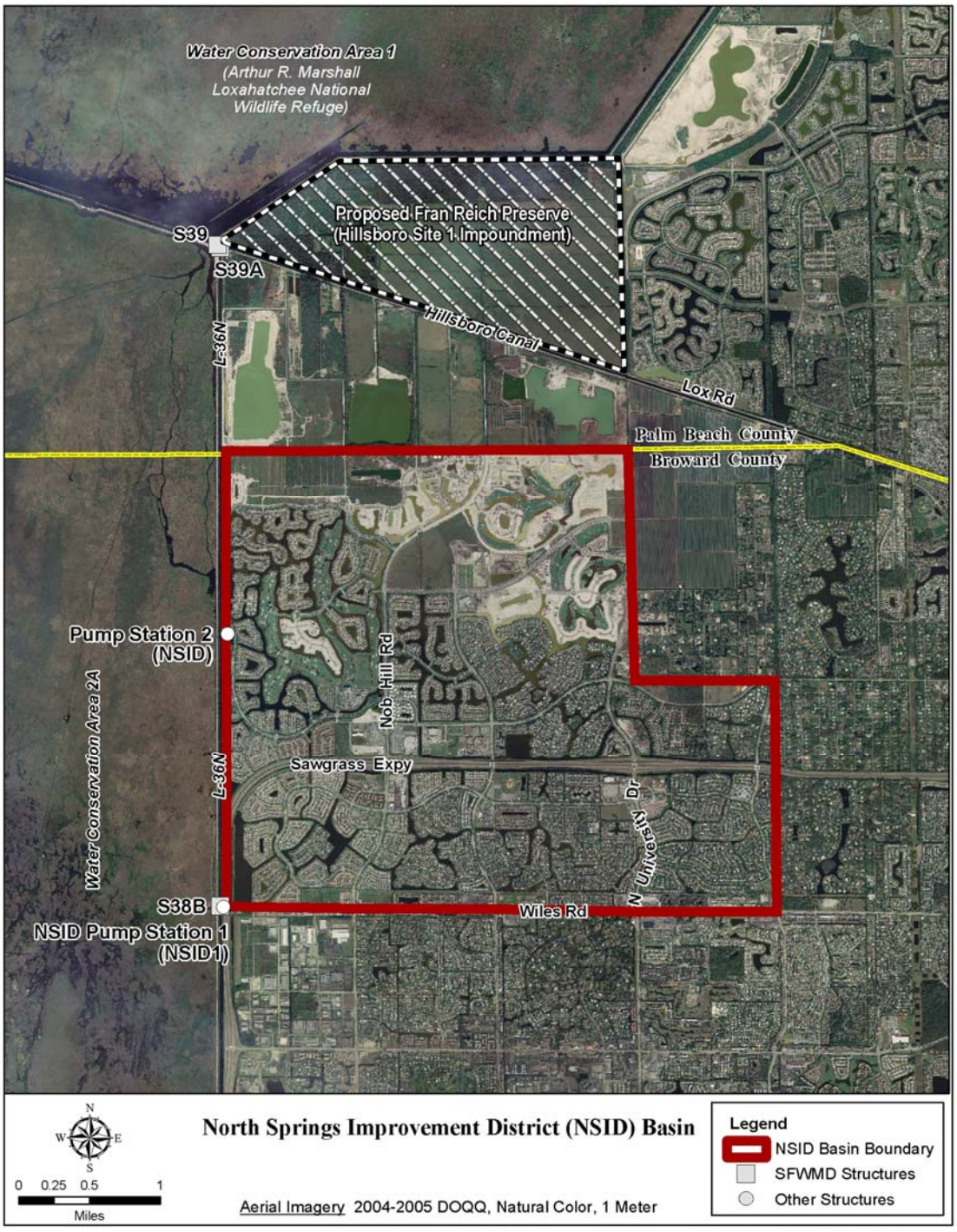
The NSID Basin covers an area of approximately 7,400 acres (11 square miles) in northern Broward County. The basin is bounded on the north by the Palm Beach County line and on the west by the L-36 North (L-36N) Borrow Canal and Water Conservation Area (WCA) 2A. The Sawgrass Expressway (Florida Highway 869) runs in an east-west direction through the basin, turning south along the basin's western border as it approaches WCA-2A. The City of Coral Springs comprises much of the southern half of the basin. The City of Parkland comprises much of the northern half of the basin. A map illustrating the boundaries of the NSID Basin is presented in Figure 3-2.

Land use in the NSID Basin consists primarily of urban residential development. Most of the land in the southern half of the basin is heavily developed with residential subdivisions. The northern portion of the basin is currently in the process of being converted from agricultural to urban land use as new residential development continues. It is expected that most of the remaining undeveloped agricultural land in the basin will be developed into urban residential land use in the near future.

Drainage from the NSID Basin is managed in a network of interconnected lakes and canals that are operated by the NSID to provide flood protection throughout the basin. Two pumping stations, NSID Pump Station No. 1 (NSID1) and NSID Pump Station No. 2 (NSID2), are used to discharge stormwater north through the L-36N Borrow Canal and then into the Hillsboro Canal through a series of culverts (S-39A). The Hillsboro Canal conveys stormwater to the east, eventually discharging excess flow to tide. However, when the L-36N Canal and the Hillsboro Canal are not capable of accepting additional flow, water from the NSID Basin is discharged into WCA-2A through NSID1. The primary phosphorus reduction strategy for the NSID is to minimize pumping to the WCA. Starting in WY2001, operation of the NSID1 structure has adhered to the operational criteria set forth in the NSID Environmental Resource Permit (ERP). The ERP requires that flows be pumped by NSID1 to the WCA-2A only when the NSID basin stage reaches a certain elevation or when capacity is not available in the Hillsboro Canal to discharge to tide. Because of this operational BMP, the discharge flow volumes at NSID1 to WCA-2A have been significantly reduced since WY2001, when compared to previous water years. Also, while the land use in the northern sections of the basin has changed from agricultural to residential land use in the last few years, TP concentrations have dropped significantly, from a flow-weighted mean of 48 ppb for WY1995-WY2000 to 18 ppb for the one event that occurred during the period WY2001-2008.

It should be noted that NSID1 is not under the control of the District and therefore it is not included in the set of structures that fall under the District's permitting requirement of the Everglades Forever Act (Ch. 373.4592(9)(k)). However, the District is utilizing its ERP program to effect implementation of phosphorus source controls in the NSID Basin.

Figure 3-2. North Springs Improvement District Basin Map



As recommended in the 2003 Long-Term Plan, the District assisted Broward County in coordinating a county-wide working group to develop a comprehensive pollution prevention plan with specific water quality goals and milestones. This group, called the Broward Everglades Working Group (BEWG) includes the District, Broward County, the Cities of Pembroke Pines, Cooper City, Sunrise, Weston Plantation, Parkland and Coral Springs, the Towns of Davie and Southwest Ranches, the South Broward Drainage District the Central Broward Water Control District, the Indian Trace Development District, the Bonaventure Development District, the North Springs Improvement District, the Plantation Acres Improvement District, and the Old Plantation Water Control District, the Florida Department of Agriculture and Consumer Services, the Broward Farm Bureau, the Florida Nurseries, Growers and Landscapers Association, the equine community, Miccosukee Tribe of Indians of Florida, and Broward Audubon. The working group has met at least twelve times over the past four years. NSID Basin stakeholders participate in this working group and the ERP process will require the development of a comprehensive pollution prevention plan for this basin.

The January 3, 2007, Long-Term Plan Revision provided additional source control funding through FY 2010 for this basin. The District has been using these funds for educational activities to ensure awareness and proper implementation of pollutant source control practices and to provide public outreach in partnership with Broward County.

Also as recommended in the 2003 Long-Term Plan, the District hired a consultant to perform a hydraulic evaluation of storm events in the basin to determine if there would be any negative impacts from redirecting water currently discharged to WCA-2A to the Hillsboro Canal east of S-39. This evaluation was completed in July 2004. In formulating the assumptions for the evaluation, it was determined through coordination with the CERP project delivery team that the Site 1 Impoundment (aka Fran Reich Preserve) CERP Project's design does not include impoundment storage capacity reserved for storm event flows from NSID, and therefore cannot be depended on for flood protection purposes. The hydraulic/hydrologic evaluation, based on a single event analysis, therefore excluded flow into the impoundment and predicted the water elevations in the Hillsboro Canal would increase under these circumstances during large storm events.

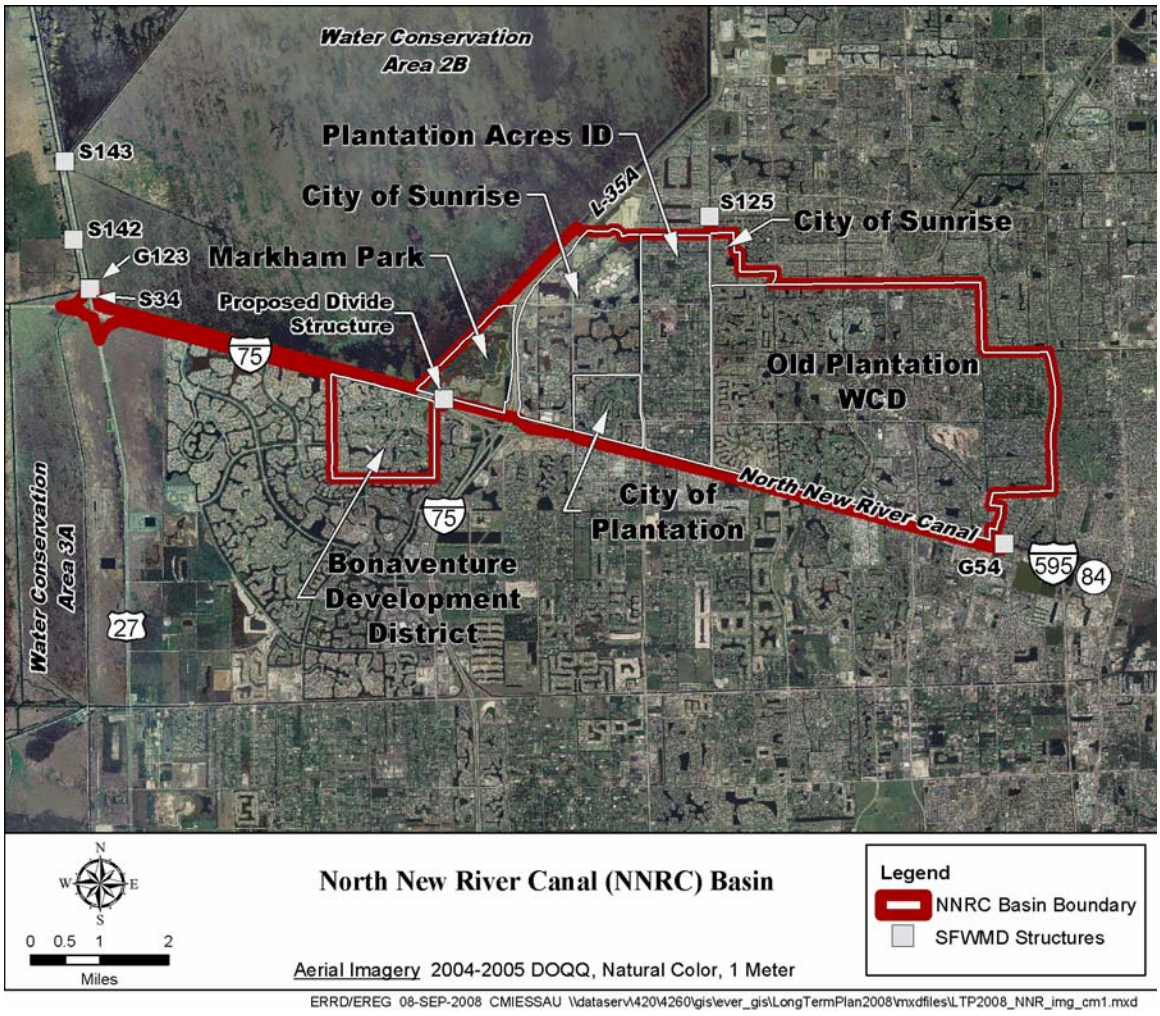
The District performed further analysis through a second consultant contract to evaluate potential mitigation measures and to estimate the 50-year present value cost associated with such alternatives. This evaluation, completed in October 2005, estimated conceptual costs in 2006 dollars for improvements for conveyance to the canals and the G-56 tidal structure at almost $17 million. Alternatively, costs for an impoundment site were estimated to be between $57 million and $133 million depending largely on land acquisition costs. The expenditure for these mitigation measures is considered to be infeasible and impractical considering the relatively small TP load estimated to be diverted from the EPA. During a large storm event, the existing NSID system may be required to discharge to the EPA to avoid flooding impacts in the Hillsboro Canal basin.

3.2 North New River Canal (NNRC) Basin

The North New River Canal Basin (NNRC Basin) covers an area of approximately 19,000 acres (30 square miles) in eastern Broward County. The basin is located southeast of WCA-2B, west of the Florida Turnpike and north of Interstate 595. The NNRC Basin is located immediately to the north of the C-11 West Basin, separated from that basin by the North New River Canal which runs generally east-west along the southern boundary of the basin. A map of the NNRC Basin is presented in Figure 3-3.

Land use in the NNRC Basin is almost entirely urban residential and commercial development. Portions of the Cities of Sunrise and Plantation comprise the area of the basin north of the North New River Canal. Bonaventure, a densely developed commercial and residential area, makes up the small area located south of the North New River Canal. Small amounts of agricultural and undeveloped land still exist. Land values in the basin continue to rise as development continues. The G-123 structure, located at SR 27 and I-595, discharges water from this basin to WCA-3A. This structure is mainly used for water supply to WCA-3A and is not intended to be used for flood control. However, during large storm events, when storage is available in the water conservation areas, G-123 may be turned on to provide some relief. For flood control purposes, this basin is primarily served by the G-54 structure located just west of the turnpike. This structure allows stormwater outflows from the basin to the east for subsequent discharge to tide.

Figure 3-3. North New River Canal Basin Map



NNRC Basin stakeholders have participated in the Broward Everglades Working Group described in the previous section. The District has worked cooperatively with all local water control districts in this basin to implement operational changes that either reduce their discharges or provide additional water quality treatment prior to discharge. In addition, the District and Broward County have implemented public outreach and education activities in this basin targeting pollutant reduction at the source.

The January 3, 2007, Long-Term Plan Revision (Revision 6) provided additional source control funding, through FY 2010, for this basin. The District has been using these funds for educational activities to ensure awareness and proper implementation of pollutant source control practices and to provide public outreach in partnership with Broward County.

Revision 6 also recommended to include in ERP requirements the implementation of appropriate source control programs (i.e., Best Management Practices or BMPs) to achieve water quality goals.

Revision 6 also included revision of the operational strategy for this basin. The strategy approved by FDEP in Revision 6 was to discontinue the use of G-123, other than as may be absolutely necessary for water supply or flood protection emergencies, until completion of the WCA-2 and WCA-3 Diversion CERP Project. The revised operating strategy has been highly effective, with only one year that required discharge since WY2003, resulting in a decrease in the average annual TP load from 375 kg/yr for WY1995-WY2002 to 8 kg/yr for WY2003-WY2008.

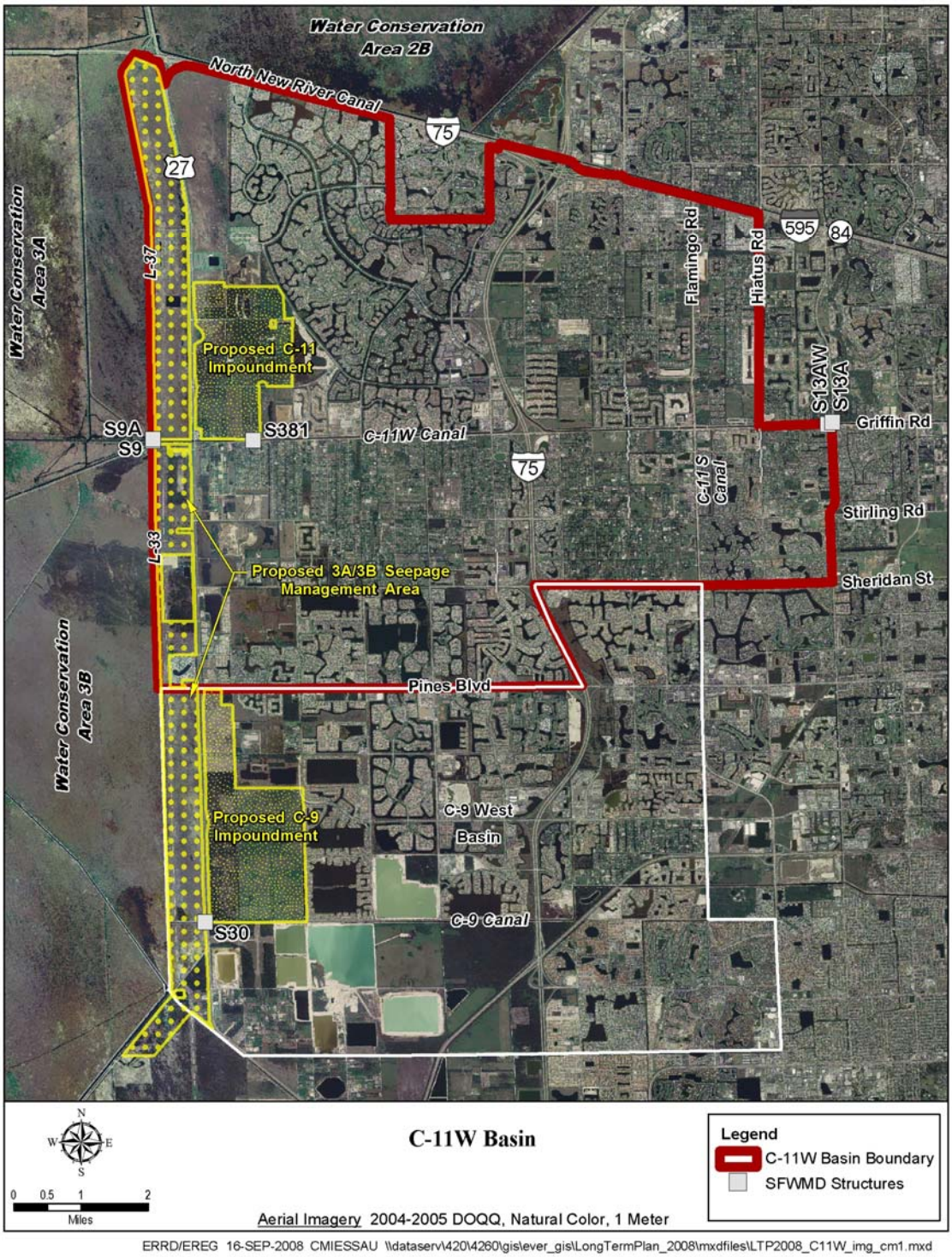
3.3 C-11 West Basin

The C-11 West Basin covers an area of approximately 46,000 acres (72 square miles) in south-central Broward County. Current water management activities in the basin provide flood protection, drainage, water supply, protection from saltwater intrusion and seepage collection from WCA-3A. The four primary canals in the basin are the C-11 West, the C-11 South, the L-37 Borrow Canal, and the section of the L-33 Borrow Canal between the C-11 West Canal and Pines Boulevard. A map of the C-11 West Basin is presented in Figure 3-4.

Currently, stormwater runoff from the C-11 West Basin is pumped into WCA-3A through the District's S-9 pump station. Seepage flows from WCA-3A historically were also returned through the S-9 pump station. The S-9A pump structure directly adjacent to S-9 became operational in early 2003, and a divide structure (S-381) was completed in early 2005 (C-11 West Critical Project). These new facilities allowed improvements to the operation of the water management system by separating and returning seepage water with less phosphorus to WCA-3A via S-9A, thereby decreasing the pumping frequency at the larger S-9 structure.

Gated culvert structure 13AW (S-13AW), located at the east end of the C-11 West Canal (or about 10 miles east of S-9) operates as a basin divide structure and assists in maintaining optimum water control stages in the C-11 Canal and passes dry season releases to the area east of the structure (i.e., C-11 East Basin, which drains to tide). The structure is remotely operated to maintain optimum headwater stages in the C-11 Canal.

Figure 3-4. C-11W Basin Map



There has been extensive water quality monitoring at the original S-9 pump station, the primary discharge structure from the C-11 West Basin. During the limited period since the S-9A and S-381 structures have been in place, flows, TP loads, and TP concentrations in discharges from the S-9 and S-9A structures (also known as the S-9 Complex) to WCA-3A have been reduced, as shown in Table 3-2.

Table 3-2. Comparison of Discharges from the S-9 Complex

Time Period	Volume ac-ft	TP Load kg	TP Conc ppb
WY1995-2003	251,982	5,525	17.8
WY2004-2008	172,272	3,493	16.4
Differences	*-79,710*	*-2,031*	*-1.3*

The Broward Everglades Working Group (described in the sections above) has developed a document titled "*Broward County C-11 West Basin Pollution Reduction Action Plan*" in April 2006. The District will assist Broward County and all stakeholders in the implementation of the action plan for the C-11 West Basin.

Revision 6 to the Long-Term Plan, dated January 3, 2007, provided additional source control funding, through FY 2010, for this basin. The District has been using these funds for educational activities to ensure awareness and proper implementation of pollutant source control practices and to provide public outreach in partnership with Broward County. This Long-Term Plan Revision also recommended including in ERP requirements the implementation of appropriate source control programs (i.e., BMPs) to achieve water quality goals.

3.4 L-28 Basin

The L-28 Basin covers an area of about 72,000 acres (113 square miles). It is located west of WCA-3A and south of the Everglades Agricultural Area at the northeast corner of the Big Cypress National Preserve in Broward, Hendry and Collier Counties. A map of the L-28 Basin is presented in Figure 3-5. The L-28 Basin is entirely occupied by four landowners. The C-139 Annex (approximately 25% of the basin) is comprised of the U.S. Sugar Corporation's Southern Division Ranch, Unit 1. The Seminole Tribe's Big Cypress Reservation occupies approximately 34% of the basin. Approximately 28% of the basin is

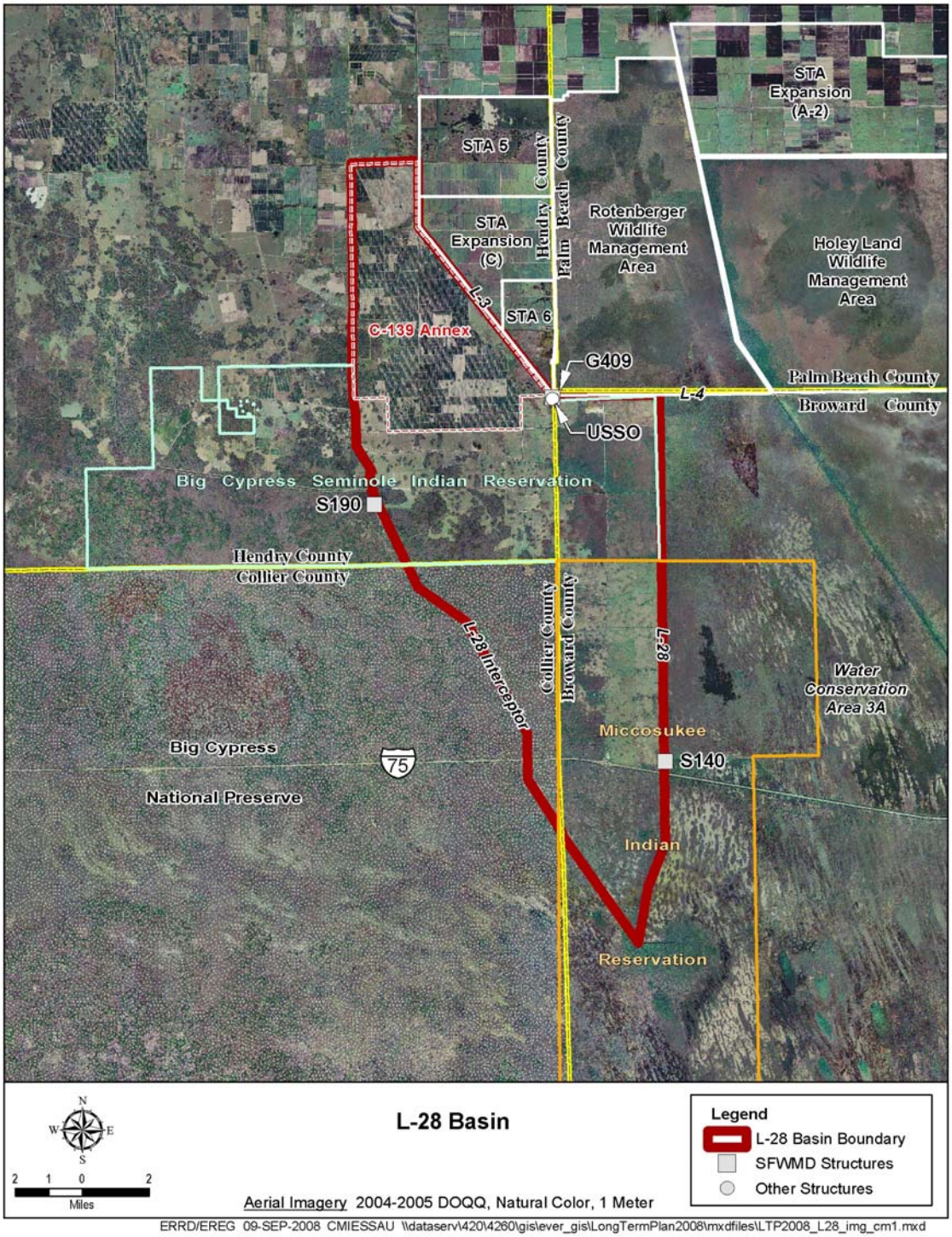
situated in the Miccosukee Indian Reservation. The remaining 13% of the basin is within the Big Cypress National Preserve.

The surface water management system in the L-28 Basin provides drainage and flood protection in addition to providing water to WCA-3A when necessary for water supply purposes. The L-28 Borrow Canal is the primary drainage canal, running north/south for a distance of approximately 10 miles along the eastern border of the basin. The L-28 Borrow Canal conveys stormwater runoff to the S-140 pump station which discharges it directly into WCA-3A. The S-140 pump station has three pumps with a combined pumping capacity of 1,300 cubic feet per second (cfs). The nominal capacity of S-140 was established to provide an average removal rate from the L-28 Basin of 7/16 inch per day. The L-28 Interceptor Canal, which borders the basin on the southwest, conveys discharges from the S-190 Structure (Feeder Canal Basin) to WCA-3A and is separated from the L-28 Basin by a levee. Wetland and agricultural land uses account for approximately 96 percent of the basin area.

L-28 Basin Demonstration Project. At the request of the Miccosukee Tribe, the District is funding a demonstration project that will result in reduced drainage of the triangle area of the L-28 Canal Basin south of I-75. The project is scheduled for construction by the end of 2010.

Diversion of Flows from the C-139 Annex. The C-139 Annex presently drains to the L-28 Borrow Canal at the north line of the Big Cypress Seminole Indian Reservation. In December 2006, the infrastructure to divert all runoff from the C-139 Annex to STA-6 was completed and once the operation permit is issued, runoff from that area will be diverted to STA-6. Upon diversion, the total area of the L-28 Basin will be effectively reduced to approximately 53,000 acres.

Figure 3-5. L-28 Basin Map



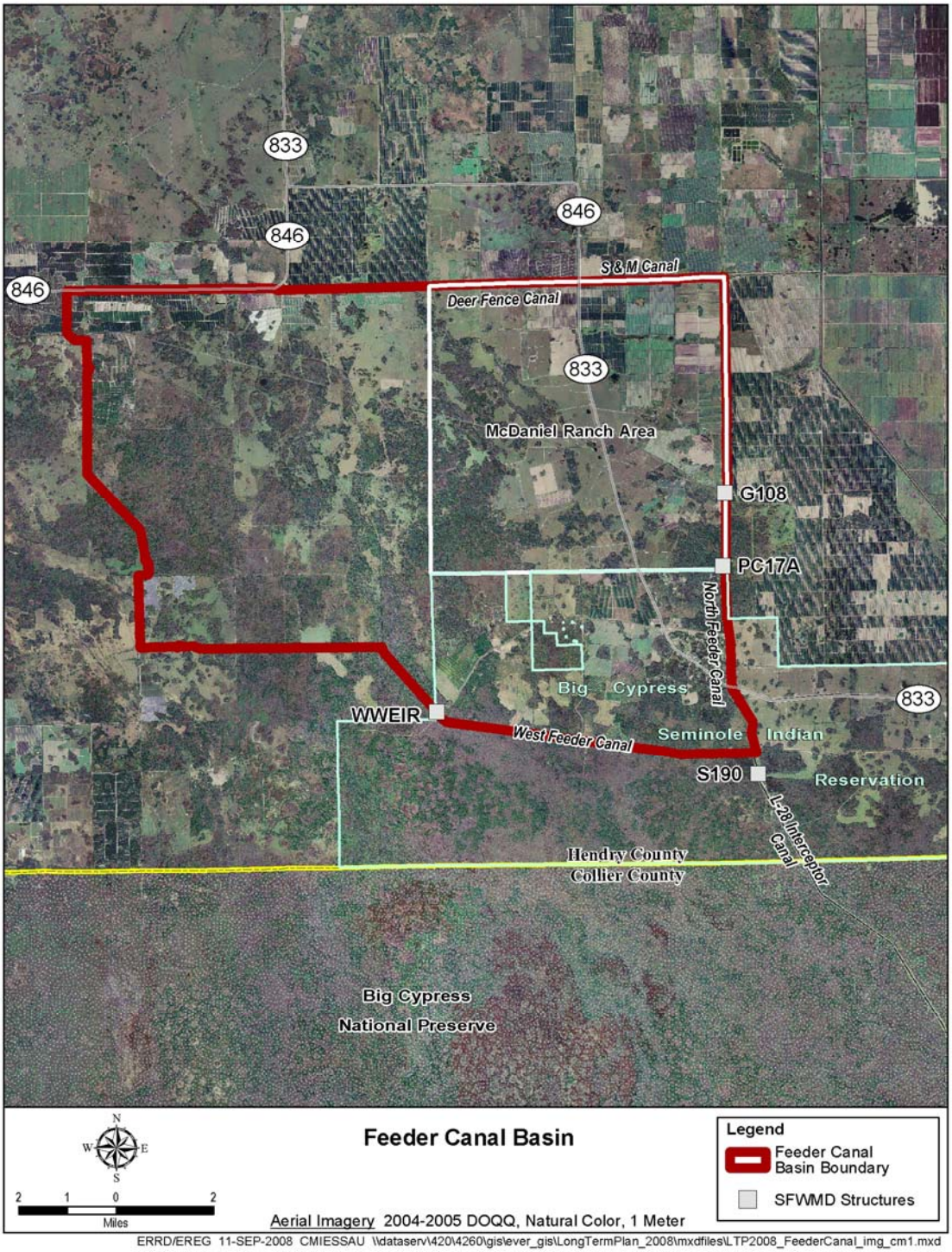
3.5 Feeder Canal Basin

The Feeder Canal Basin covers an area of about 72,000 acres (113 square miles) in southeastern Hendry County. It is located west of WCA-3A, southwest of the Everglades Agricultural Area, and north of the Big Cypress National Preserve. A portion of the Big Cypress Seminole Indian Reservation (approximately 13,500 acres) is located in the southeast corner of the basin. A map of the Feeder Canal Basin is presented in Figure 3-6. Flow-weighted mean TP concentrations for this basin (measured at S-190) over the period encompassing WY1998-WY2008 averaged 117 ppb.

Phosphorus Source Controls. As recommended by the 2003 Long-Term Plan, the District implemented a BMP grant program, for implementation of source controls, or BMPs, for the basin in partnership with Natural Resources Conservation Service (NRCS), the Florida Department of Agriculture and Consumer Services (FDACS), and the Hendry Soil and Water Conservation District. Approximately $500,000 was awarded by the District to fund projects within the Feeder Canal Basin. Revisions 6 and 10 of the Long Term Plan (dated January 3 and December 10, 2007, respectively) recommended additional funding in FY 2007 through FY 2010 for the continued implementation of source controls. Because of the increased trends in phosphorus in discharges from this basin, the District initiated a regional study that incorporates an evaluation of water quality and hydrology. These investigations remain ongoing.

Integrated Permit Compliance Initiative. As recommended by Revision 6 of the Long Term Plan (dated January 3, 2007), the District initiated an integrated regulatory compliance program applicable to all landowners throughout the basin. This program includes ensuring compliance with existing permits including ERPs, Surface Water Management Permits, and Consumptive Use Permits (CUPs). These permits have the potential to affect water quality and quantity and compliance with permit conditions is essential for a holistic approach to reducing phosphorus loads discharging from the basin. This initiative also includes requirements to implement BMPs to reduce phosphorus in discharges.

Figure 3-6. Feeder Canal Basin Map



4. PROCESS DEVELOPMENT AND ENGINEERING (PDE)

The Process Development and Engineering (PDE) component of the Long-Term Plan is a central element of the overall strategy for achieving water quality goals for the Everglades Protection Area. It is founded on the following premises:

- Achieving long-term water quality goals will involve an adaptive management approach, whereby the best available information is used to develop and implement incremental improvement measures

- Continued engineering evaluations are necessary to increase certainty in the predicted benefits of implementing refined stormwater BMPs and/or treatment technologies

- Significant technical and economic benefits can be realized by integrating Everglades water quality performance measures with CERP projects, even to the extent that existing schedules should be re-evaluated in some basins and synchronized with CERP project schedules.

Ongoing engineering and scientific investigations by the District and others engaged in Everglades Restoration since the time of development of the 2003 Long-Term Plan have provided valuable information which has supported refinements to the estimated performance of the water quality improvement strategies for both the ECP and non-ECP basins. In the 2003 Long-Term Plan, substantive focus regarding the ECP Basins was directed toward understanding the ramifications of converting portions of the macrophyte-based STAs to SAV-based systems; many of the PDE elements were directed toward SAV-related issues and included:

- Enhancing the control and monitoring of water quality improvement measures now in place;

- Continuing improvement in analytical and forecasting tools used to project treatment performance;

- Identifying specific methods to optimize SAV performance; and

- Improving the reliability of treatment facility inflow volumes and pollutant loads.

The following report sections provide brief overviews of progress made under each of these major activity categories.

4.1 Enhanced Control and Monitoring

In the 2003 Long-Term Plan, commitment was made to conduct activities needed to improve upon the District's ability to quantify inflows and phosphorus loadings to the STAs in the Everglades Agricultural Area. Activities conducted are summarized in Table 4-1.

Table 4-1. Activities Conducted Supporting Enhanced Control and Monitoring of STA Inflows and Outflows

Activity	Work Completed
Acquisition of Survey Data	Collection of additional topographic surveys within the STAs to more clearly delineate ground surface elevations between interior levees and control structures, and to confirm gage datum elevations at flow measurement stations.
Additional Flow and Water Quality Monitoring Stations	Installation of new flow and water quality monitoring stations for some STAs to provide supplemental data supporting STA performance evaluations and optimization planning.
Review/Correction of Flow Measurement Anomalies	Loading calculation accuracy is dependent on good flow measurements. Over the past 5 years, inflow and outflow measurement sites were checked to confirm accuracy.
Analysis and Interpretation	Adaptive implementation of monitoring and analysis activities supporting interpretation of STA performance has occurred, and several modifications to the originally proposed monitoring programs have been approved by the FDEP through Revisions to the Long-Term Plan.
Update/Maintenance of Hydraulic Models	Two-dimensional hydraulic models of the various STAs have been developed and maintained using Long-Term Plan funding.
STA Operations Optimization Tools	A set of worksheet-based tools are being used on a week to week basis to support guidance recommendations to Operations staff regarding STA inflows (hydraulic and phosphorus loadings) to each cell in each STA.

4.2 Improved Analytical and Forecasting Tools

Among the process development and engineering elements of the Long-Term Plan, one of the most critically needed activities has been continued development and refinement of the analytical tools necessary for increased confidence in:

- Predicting the water quality improvement performance of the STAs.
- Predicting the influence of upstream storage reservoirs (in particular, the EAA Storage Reservoirs) on water quality in reservoir discharges, particularly to the STAs.

Activities conducted since 2003 under this activity category are summarized in Table 4-2.

Table 4-2. Activities Conducted Supporting Improved Analytical or Forecasting Tools

Activity	Work Completed
Continued Development and Refinement of DMSTA	Refinements to the DMSTA model have been made by Dr. William Walker. District staff have worked closely with Dr. William Walker in compiling technical data needed for model calibrations, refinements, etc.
Water Quality Impacts of Reservoirs	District staff assisted in provision of water quality data for lakes and similar water bodies. These data were used by Dr. Walker in calibration of DMSTA to address reservoir effects.
Periphyton-Based Stormwater Treatment Area (PSTA) Investigations	District designed, constructed, and is operating its PSTA demonstration site within the footprint of STA-3/4, Cell 2B.

4.3 Optimizing STA Performance

The 2003 Long-Term Plan included a number of PDE activities focused on better understanding how SAV systems could be used to improve on STA treatment performance. Evaluations focused on vegetation management issues, and assessment of the potential benefits of hydraulic improvements through use of internal levees/berms. Additionally, studies addressing internal measurements of physical, chemical, and biological factors related to treatment performance were included. The status of each of these activities is briefly described in Table 4-3. The originally included activities were focused on optimizing SAV integration into STA-2. However, lessons learned over the past several years have transcended specific STA boundaries; the notes provided are more broadly focused on these topics in relation to performance enhancements for any of the applicable STAs.

Table 4-3. Activities Conducted Related to Optimizing STA Performance

Activity	Work Completed
Operational Strategy	A focused investigation was conducted by the District addressing SAV-based STA treatment performance in relation to operational depths and dry-out conditions. Study results supported development of preliminary operational guidelines for SAV systems.
Strategies for Vegetation Management	Original investigations were focused on managing vegetation systems to achieve the SAV-dominated conditions in selected downstream cells within some STAs. Studies now include methods for controlling non-desirable vegetation and/or animal species as well as implementing and documenting methods for encouraging vegetative community changes to achieve the desired composition.
Hydrologic/Hydraulic Assessment	The 2003 Long-Term Plan placed heavy emphasis on evaluating the treatment benefits of STA cell compartmentalization or alternative means of improving hydraulic flow through these constructed wetlands. Tracer studies were performed in two STAs. One key study confirmed that STA-2, Cell 3 did not require compartmentalization; good sheet flow existed. Good treatment performance in STA-2, Cell 1, also indicates that the originally proposed internal levee is not needed.
Internal Measurements	Over the past 5 years, the District has conducted supplemental internal measurements of flow, water quality, sediment conditions, or biological conditions during the course of performing other routine monitoring or special studies.
Comparative Analysis	This analysis was intended to address the pre- vs. post-levee installation treatment performance in STA-2. In that the internal levee for Cell 3 is not needed, no before and after comparative analysis of the tracer study data is needed.

4.4 Additional Structural and Operational Measures

In the 2003 Long-Term Plan, investigations were described of additional structural and operational measures that could theoretically improve the treatment performance of the STAs within their existing or currently proposed footprints. At the time, investigations were focused on the relative merits of addition of limerock berms within STA cells as a means of providing intermediate hydraulic flow equilibration and also achieving some phosphorus removal. The results of those investigations were inconclusive. Some water quality

improvements were suggested by the monitoring records, but a clear cause and effect relationship was not evident. The berm construction materials and methods led to subsequent hydraulic problems that subsequently required berm removal. No definitive benefits were shown and no further investment toward this form of structural hydraulic modification is planned.

4.5 Improved Reliability of Inflow Forecasts

Treatment performance evaluations are conducted annually as an element of the SFER preparation process. Clearly, reliability of the inflow information is crucial in terms of affects on the quality of the evaluations of performance to date as well as projection of future performance as affected by predicted inflow and phosphorus loading. For these reasons, periodic re-assessment of inflow information is needed, and this PDE activity has been maintained since 2003. The status of each of these activities is summarized in Table 4-4.

Table 4-4. Activities Conducted Related to Improved Reliability of Inflow Forecasts

Activity	Work Completed
Update Baseline Data Sets	Every two years, the District has generated updated compilations of water quality and flow data sets used in calculation of phosphorus loadings and outflow phosphorus concentrations achieved. These updated data sets are critically needed to account for treatment performance in relation to prevailing conditions or events, including drought and tropical storm events.
Basins With Limited Current Data	At the time of development of the 2003 Long-Term Plan, inflows from some of the basins tributary to the Everglades Protection Area were either not well documented, or had flow calibrations in need of verification. The District successfully obtained additional data for the subject basins and completed the tasks associated with this project.
Influence of CERP or Other Regional Projects on Inflow Volumes and Loads	For most of the EPA tributary basins, CERP or other regional water management projects are being planned. Under this task, the District continues to evaluate the potential effects of these types of projects, with primary focus on how those may change the timing and magnitude of inflows into the STAs.
Lake Okeechobee Long-Term Trends	Under the 2003 Long-Term Plan, increased coordination within the District was promoted through regular meetings and data sharing.
Determine Relationship Between Discharges and Water Quality Within the EPA	Investigations on this topic remain ongoing. The District and Department are working together on a Water Quality Based Effluent Limitation (WQBEL) assessment in relation to ongoing permitting of the STAs.

5. RECOVERY OF IMPACTED AREAS WITHIN THE EPA

Hydropattern restoration components for STA outflow distribution along the northern boundaries of WCA-2A and WCA-3A were included in the original Everglades Construction Project (ECP) plans developed in the mid 1990s. Those components were to promote recovery of the remnant Everglades marsh habitats further down gradient within the EPA by installing new infrastructure that would support broader distribution of inflows along this boundary and restore sheetflow through more of the wetlands. Additionally, the Everglades Forever Act of 1994 included provisions that called for use of ECP treated waters to help rehydrate portions of the historical Everglades system contained within two other state-owned land areas, the Rotenberger Wildlife Management Area and the Holey Land Wildlife Management Area. The District's collaborative efforts with the Florida Department of Environmental Protection (FDEP) and Florida Fish and Wildlife Conservation Commission (FFWCC) on hydroperiod restoration strategies for these two areas have spanned over 25 years, and continue now as an element of the Long-Term Plan.

The hydrologic basis of a number of the projects included in the Comprehensive Everglades Restoration Plan (CERP) is founded on the premise that the ECP infrastructure is complete and fully operational, and that the District's source control and BMP efforts in both the ECP and the Non-ECP basins are effective in achieving water quality goals for the tributary basins. Water quality improvement measures for the ECP and Non-ECP basins, and hydropattern restoration measures for the northern EPA must be completed successfully and in a timely fashion in order for future integration of *Long-Term Plan* regional water management actions with those to be planned and implemented in accordance with CERP.

Implementation of hydropattern restoration actions originally envisioned under the ECP thus far has been limited to discharge of STA-2 outflows to portions of the northwestern boundary of WCA-2A, and limited use of STA-5 outflows to support hydroperiod management in the Rotenberger WMA. The FDEP authorized inflows of STA-2 treated waters to areas within WCA-2A where soil total phosphorus (TP) concentrations exceed the 500 mg/kg guidance value used by the Department for differentiating impacted vs. unimpacted Everglades wetlands. The existing STA-2 outflows to WCA-2A were approved by all regulatory and resource management agencies, and have been ongoing since 2001.

The results of the District's ecological monitoring activities in the northwestern margin of WCA-2A in areas believed most influenced by those STA outflows were summarized in Garrett and

Ivanoff (2008). The monitoring results thus far are not considered conclusive, but the preliminary findings have shown no adverse ecological impacts and in fact indicate that the marsh receiving these STA outflows has shown slight improvements for several ecological measures.

Indications of improved conditions cited include:

- Increased hydroperiod
- Decreased surface water phosphorus concentrations
- Steady soil TP concentrations
- Decreased nutrient content in periphyton tissues

Garrett and Ivanoff (2008) concluded that *"These positive trends are numerous and should outweigh any negative impacts (i.e., potential cattail expansion and increases in SO_4 levels within the discharge area)"*. While these results remain preliminary, they are supportive of proceeding with further planning for future implementation of additional hydropattern restoration improvements along the northern EPA borders.

With regard to hydroperiod management for the Rotenberger WMA, Pump Station G-410 and a spreader swale were installed by the District to allow water delivery from the STA-5 outflow canal to the northwestern margin of the Rotenberger tract if water was needed to hydrate the wetland system. Four outflow culverts (G-402A-D) installed on the eastern margin of the tract provide some degree of WMA stage management through release of any excess water to the Miami Canal. In accordance with provisions of the STA-5 discharge permit (No. 0131842), the District monitored downstream receiving areas in the Rotenberger WMA in order to assess ecological effects of STA water discharge.

Pre-discharge monitoring occurred from November 1997 through June 2001 during which the only water delivery was through direct rainfall. The monitoring records documented the overdrained condition:

> *"…the system had no standing water much of the year, resulting in a shortened hydroperiod that promoted the growth of several species indicative of drier habitats. Data collected during this period support that the RWMA was an impacted wetland trending toward an upland area and that changes in operation and management of this area were needed to ensure the protection of this area's natural resource value."* (Newman et al. 2004).

Post-discharge monitoring (July 2001 through June 2003) documented an increase in hydroperiod, from 3 to 7 months, and a doubling of the mean water depth from 0.4 ft during the pre-discharge period to 0.8 ft during the post-discharge period. The conclusion was that STA treated waters supported *"…hydropattern restoration, most likely increasing soil moisture and decreasing the possibility of soil loss through muck fires. Furthermore, this increased hydroperiod during the post-discharge period resulted in the increase of obligate wetland species such as cattail (Typha spp.) and sawgrass."* (Newman et al. 2004).

5.1 Development of Planning and Analytical Tools

The proposed accelerated recovery or hydropattern restoration works would redistribute flow to areas along the northern edge of portions of the EPA, some of which have not previously received surface water inflows bearing phosphorus. Prior to performing detailed planning, design, and construction of the infrastructure required to accomplish the STA outflow diversions and inflow distribution systems to support this rehydration or restoration goal, the following issues need to be fully evaluated:

- The degree to which discharges from the stormwater treatment areas comply with water quality goals;
- The potential impact of the relocated discharges on previously impacted or unimpacted areas (as defined using the 500 mg/kg value defining "impacted areas" in the Everglades Phosphorus Water Quality Standard (62-302.540 F.S.));
- The extent to which modification of the discharge patterns will promote the recovery of previously impacted areas (e.g., areas downstream of the current point discharges);
- The downstream consequences of adding "clean" water to areas that have soil TP levels in excess of the 500 mg/kg guidance concentration; and
- The compatibility of the proposed design and operation with other long-term changes to the regional hydrography (e.g., CERP).

These information or analytical needs provided the basis for inclusion in the 2003 *Long-Term Plan* of the following action items:

- Development and calibration of a recovery model

- Assessment of the downstream influence of adding "clean" water to previously impacted areas

- Evaluation of options for accelerating the recovery of previously impacted areas

Progress made on these action items is summarized in Table 5-1.

Table 5-1. Activities Conducted Related to Development of Planning and Analytical Tools for Evaluating Accelerated Recovery and/or Hydropattern Restoration Alternatives for the Northern Everglades Protection Area

Activity	Work Completed
Recovery Model Development and Calibration	Long-Term Plan funding has supported development and refinement of the Everglades Landscape Model (ELM) and RSM. Both models continue to undergo refinements and were not available for use at the time of developing this 2008 Report. It is possible that one or both will be used in analysis of the likely response of downstream wetland systems to new inflows of water.
Downstream Influences of Adding Clean Water to Previously Impacted Areas	Studies completed to date have not led to conclusive results. The District is funding a Soil Reflux Study to help address this key issue.
Options for Accelerating Recovery	As noted above, model development is not yet complete requiring deferral of detailed evaluation of accelerated recovery options. However, the District has made some progress by facilitating a comprehensive review of accelerated recovery strategies (2005 science and technology workshop). The workshop results helped crystallize a plan of study focused on the potential use of managed fire to promote habitat diversity restoration, and recreation of more natural ecological processes in such managed areas. This Fire Project research remains ongoing.
Alternatives Analysis and Plan Formulation	The analytical tools and research needed to support a quantitative alternatives analysis are not yet available.

5.2 Hydropattern Restoration Works

Hydropattern restoration efforts in the form of the following efforts are underway:

- STA-2, Cells 1 – 4 Outflow Deliveries to WCA-2A via the G-336 Structures and a Degraded Section of Levee L-6
- STA-5 Outflow Deliveries to the Rotenberger Wildlife Management Area via the G-410 Pump Station

As already detailed above, monitoring studies to date have generally indicated favorable ecological system responses to these inflows. Detailed investigations remain underway to continue to monitor these downstream receiving wetland areas.

6. SUMMARY

This document summarizes progress achieved in execution of the many activities included in the 2003 Long-Term Plan. In many respects, work conducted over the past 5 years has far exceeded the original expectations. For example, major increases in STA system footprint have occurred well in advance of what was originally viewed as recommended, and conversion of significant portions of the macrophyte-based STAs to SAV systems has been achieved successfully in spite of the major disturbances of the hurricane seasons of 2004 and 2005 followed by the severe drought conditions that have prevailed in the region in 2006, 2007, and much of 2008. This period of STA operations has been extremely instructive in management of these large systems following significant hurricane disturbances, and periods of both hydraulic and phosphorus overload and dry out. Considering the range of operational challenges that have been imposed on the STA system during periods of start up, recovery, and stabilization, it is significant that the treatment performance of the various STAs appears to be measurably improving with time and as the District learns how to optimize system operations.

The Long-Term Plan remains a dynamic document likely to require frequent and substantive updates as new information becomes available. Through a continued collaborative approach to issues evaluation, the District will continue its leadership role in achievement of water quality goals for the Everglades Protection Area.

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