Settlement Agreement
April-June 2003 Report

As of 11-18-2003, this report has been revised from the version that was originally posted on 10-28-2003

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Technical Oversight Committee
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ARTHUR R. MARSHALL LOXAHATCHEE NATIONAL WILDLIFE REFUGE

The 1991 Settlement Agreement ended the Everglades lawsuit and was entered into by the federal government, the State of Florida and the South Florida Water Management District. The subsequent Consent Decree, as modified in 1995, specified that interim and long-term phosphorus concentration levels for the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge) must be met by Feb. 1, 1999, and Dec. 31, 2006, respectively. The concentration levels vary monthly because they are calculated as a function of water stage measured at gauging stations 1-7, 1-8C and 1-9 within the Refuge. The stage range within which the interim and long-term concentration levels are applicable is 15.42 to 17.14 feet (mean sea level). The monthly total phosphorus concentrations are determined from water samples collected at 14 interior marsh stations, LOX 3 through LOX 16 (**Figure 1**). As required in the Consent Decree, the concentrations are converted to a geometric mean, which is compared to the interim and long-term concentration levels.

Average stages in the Refuge were 16.20, 15.72 and 16.06 feet in April, May and June 2003, respectively (**Figure 2, Table 1)**. The geometric means, calculated from total phosphorus concentrations measured in water samples collected in April, May and June were 7.6, 14.0 and 7.9 ppb, respectively. These values were less than the interim and long-term levels for April, May and June.

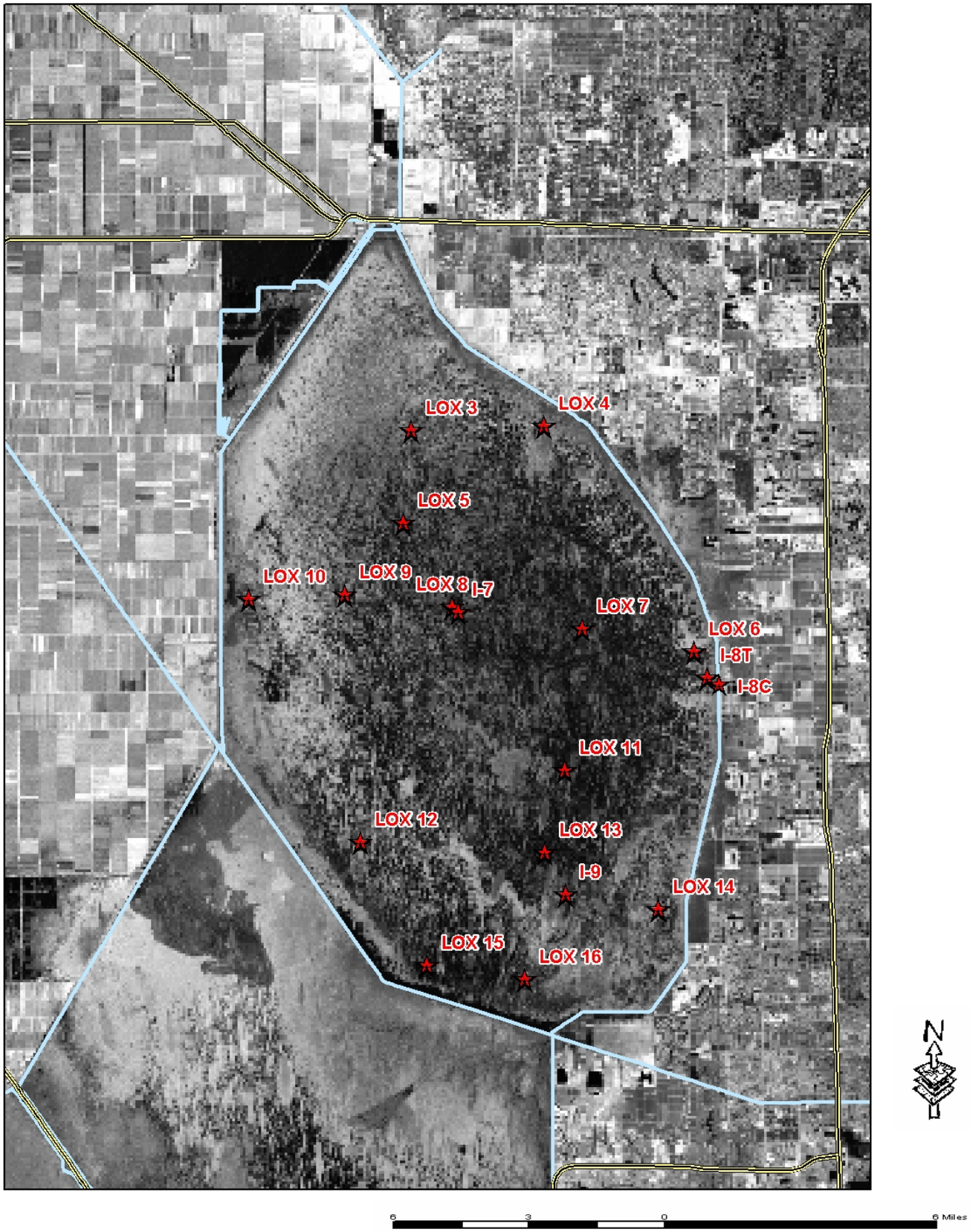

Figure 1. A.R.M. Loxahatchee Refuge Water Quality Sampling and Stage Measurement Sites

★ Station Location

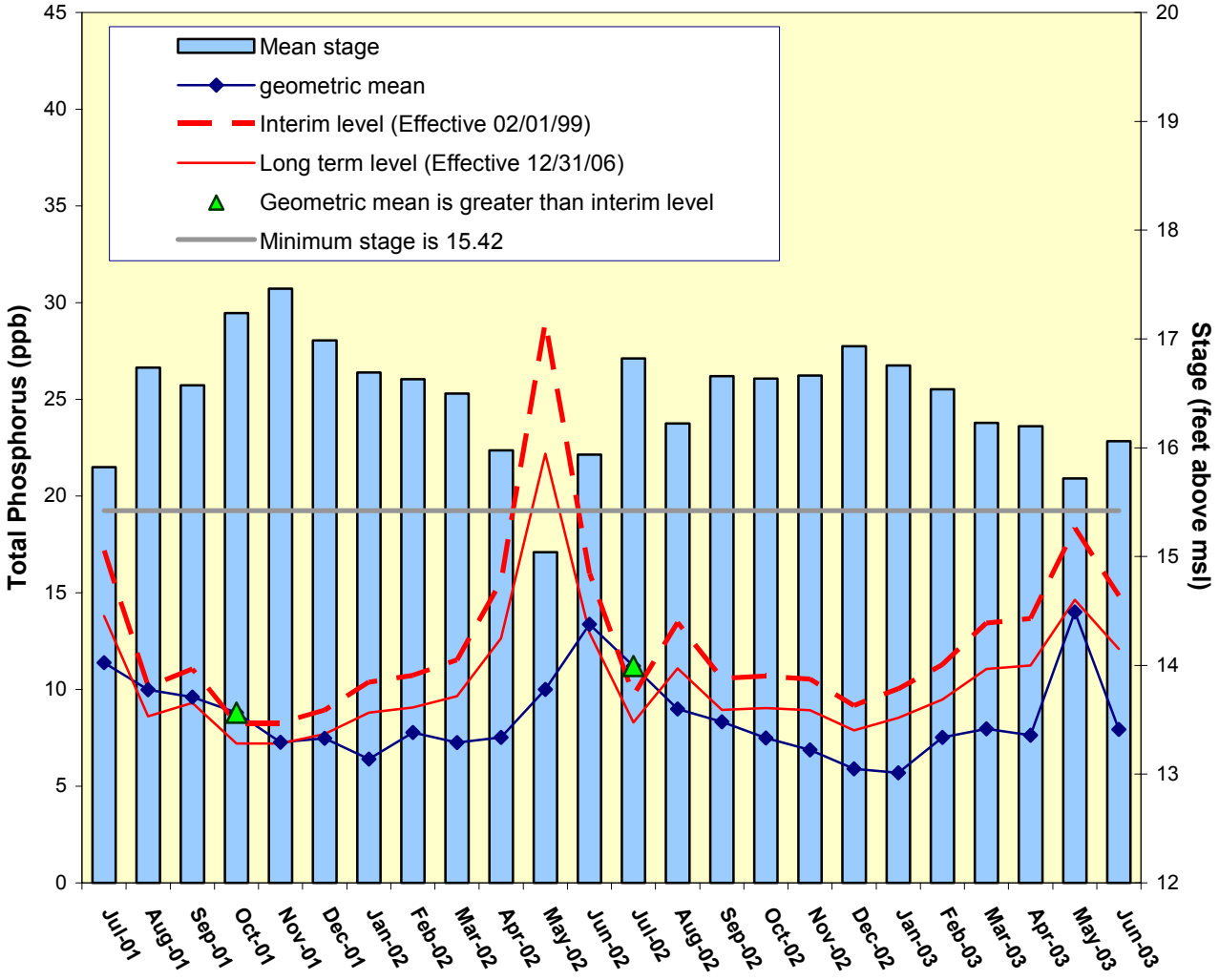

Figure 2. Monthly total phosphorus geometric mean concentrations for the A.R.M. Loxahatchee National Wildlife Refuge compared to the interim and long-term levels. The calculated level concentrations are adjusted for fluctuations in stage.

Table 1. Loxahatchee National Wildlife Refuge Total Phosphorus Compliance Tracking.

Month - Year	Geometric Mean Concentration (ppb)	Interim Level (ppb) Effective 2/1/99	Long Term Level (ppb) Effective 12/31/06	Average Stage (ft,NGVD)	Number of TP Samples	Number of Stage Measure-ments
Jul-2001	11.4	17.2	13.8	15.82	11	3
Aug-2001	10.0	10.1	8.6	16.74	14	3
Sep-2001	9.6	11.1	9.3	16.57	14	3
Oct-2001	8.8	8.3	7.2	17.24	14	3
Nov-2001	7.3	8.3	7.2	17.46	14	3
Dec-2001	7.5	8.9	7.7	16.99	14	3
Jan-2002	6.4	10.4	8.8	16.69	14	3
Feb-2002	7.8	10.7	9.1	16.63	14	3
Mar-2002	7.3	11.5	9.7	16.50	14	3
Apr-2002	7.5	15.6	12.7	15.98	11	3
May-2002	10.0	-	-	15.04	3	3
Jun-2002	13.4	16.0	12.9	15.94	10	3
Jul-2002	11.2	9.7	8.3	16.82	14	3
Aug-2002	9.0	13.5	11.1	16.22	12	3
Sep-2002	8.3	10.6	8.9	16.66	11	3
Oct-2002	7.5	10.7	9.0	16.64	12	3
Nov-2002	6.9	10.5	8.9	16.66	12	3
Dec-2002	5.9	9.2	7.9	16.93	14	3
Jan-2003	5.7	10.0	8.5	16.76	13	3
Feb-2003	7.5	11.3	9.5	16.54	11	3
Mar-2003	8.0	13.4	11.1	16.23	9	3
Apr-2003	7.6	13.7	11.2	16.20	12	3
May-2003	14.0	18.3	14.6	15.72	7	3
Jun-2003	7.9	14.8	12.1	16.06	11	3

Notes: *(1) Average Stage is calculated using stage elevations at three stations on the sampling date*
(2) Highlighted values indicate months when exceedances occurred

EVERGLADES NATIONAL PARK

Shark River Slough

The Consent Decree of 1995 specified that interim and long-term total phosphorus concentration limits for discharges into the Everglades National Park (ENP) through Shark River Slough be met by October 1, 2003, and December 31, 2006, respectively. Only the total phosphorus concentrations for the water year ending September 30 are evaluated for compliance with the Consent Decree limits. It was also specified that the total phosphorus concentrations be presented as 12-month moving flow-weighted means. The long-term total phosphorus concentration limit for inflows to Shark River Slough through structures S12A, S12B, S12C, S12D and S333 represents the concentrations delivered during the Outstanding Florida Waters baseline period of March 1, 1978 to March 1, 1979, and is adjusted for variations in flow.

Inflow concentrations of total phosphorus through Shark River Slough are compared to the interim and long-term limits at the end of each water year from 1991 to 2002 (**Figure 3a**). The 12-month moving flow-weighted mean total phosphorus concentration ending September 2002 was 8.8 ppb. Corresponding interim and long-term limits were 9.6 and 7.9 ppb, respectively. For the nine-year period 1994 through 2002, the interim limit applicable to Shark River Slough has been met in seven times. The limit was exceeded in Water Years 2000 and 2001.

Table 2 presents the moving flow-weighted mean concentrations for each 12-month period beginning in January 2001 as well as the corresponding interim and long-term total phosphorus concentration limits, calculated using the 12-month period flow. For the 12-month periods ending in April, May and June 2003, the flow-weighted mean total phosphorus concentrations were 10.1, 10.2 and 10.5 ppb, respectively. The April and May concentrations were less than the interim limit while the June concentration exceeded the interim limit by 0.1 ppb. The long-term limits were exceeded in each of these recent months.

The Consent Decree stipulates that the percent of flow-weighted mean total phosphorus concentrations greater than 10 ppb from each sampling event in any 12-month period must not exceed a guideline value based on flow into Shark River Slough for the same 12-month period. For the 12-month periods ending April, May and June 2003, the percent of flow-weighted mean total phosphorus concentrations greater than 10 ppb were 48.4, 52.9 and 57.9, respectively. April, May and June observed percentages were greater than the guidelines (**Table 2**). The individual sampling events and the 12-month moving average are presented in **Figure 3b**.

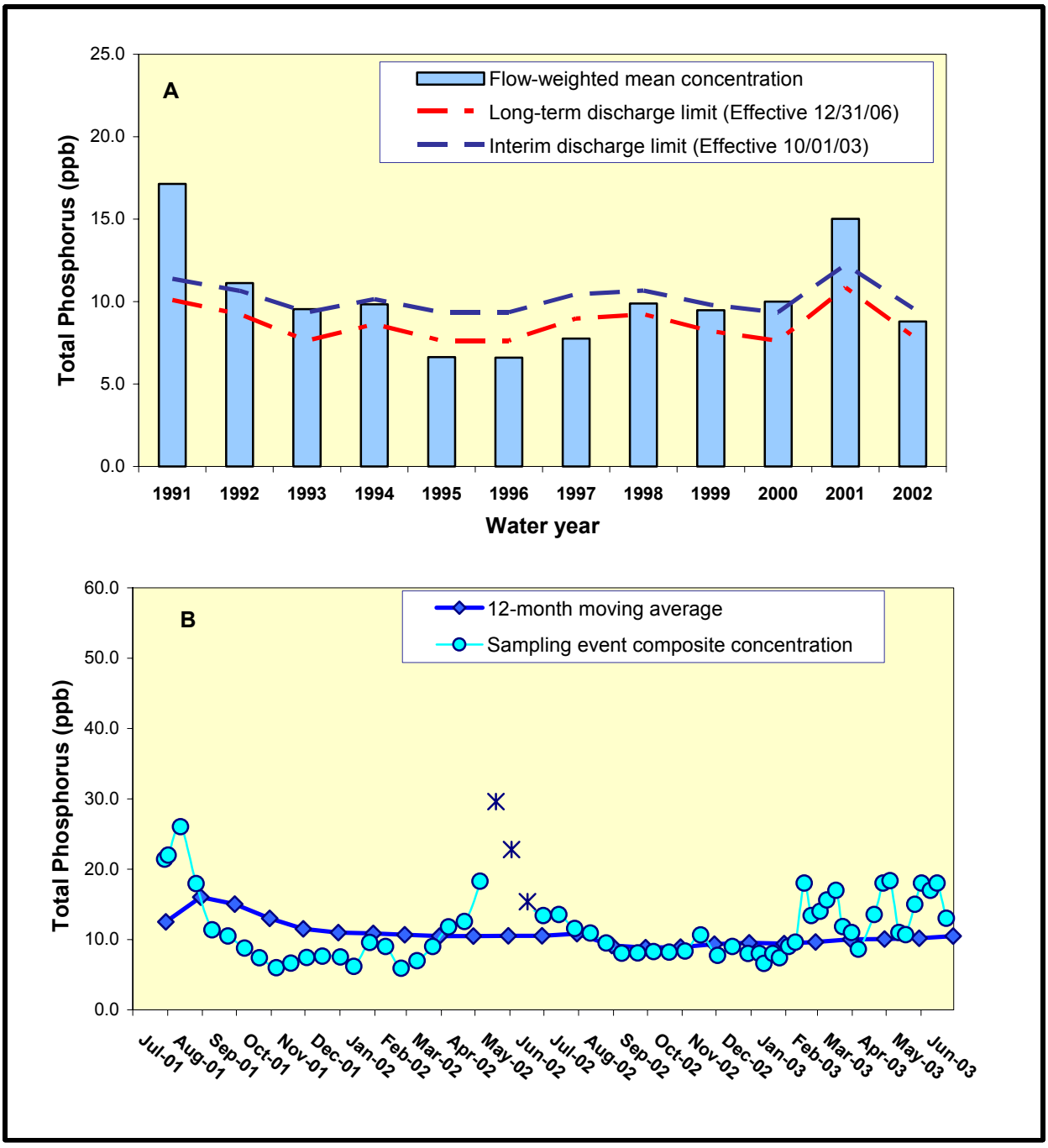

Figure 3. Total phosphorus flow-weighted mean concentrations (fwmc) in inflows to Everglades National Park through Shark River Slough.
A. The 12-month moving average fwmc at the end of each water year compared to the total phosphorus interim and long-term limits.
B. The 12-month moving average fwmc at the end of each month and the composite total phosphorus concentration for each sampling event. *(star): denotes arithmetic average for biweekly samples in May and June 2002 as there was no flow on the sampling dates.

Table 2. Shark River Slough Total Phosphorus Concentration Compliance Tracking.

12-Month Period Ending On	Total Period Flow	Flow Weighted Mean Total Phosphorus	Interim Limit (ppb)	Long Term Limit (ppb)	Percent of Sampling Events Greater than 10 ppb	
			Effective	Effective	(%)	
	(Kac-ft)	(ppb)	10/1/2003	12/31/2006	Guideline	Observed
31-Jul-01	212.8	12.5	13.4	12.2	65.4	***78.9***
31-Aug-01	324.0	16.0	12.8	11.6	61.3	***78.9***
30-Sep-01	419.7	15.0	12.2	11.0	57.9	***78.9***
31-Oct-01	502.4	13.0	11.8	10.5	55.2	***68.4***
30-Nov-01	599.2	11.5	11.3	10.0	52.1	***57.9***
31-Dec-01	677.9	11.0	10.9	9.6	49.8	***52.6***
31-Jan-02	695.1	10.9	10.8	9.5	49.3	***52.6***
28-Feb-02	728.3	10.7	10.7	9.3	48.3	45.0
31-Mar-02	779.2	10.5	10.5	9.0	46.9	40.9
30-Apr-02	800.8	10.5	10.4	8.9	46.3	40.9
31-May-02	804.4	10.5	10.4	8.9	46.3	43.5
30-Jun-02	810.5	10.5	10.3	8.9	46.1	40.9
31-Jul-02	929.4	10.9	9.9	8.3	43.1	***45.8***
31-Aug-02	962.0	9.1	9.7	8.1	42.3	39.1
30-Sep-02	1001.9	8.8	9.6	7.9	41.4	30.4
31-Oct-02	951.4	8.9	9.8	8.2	42.6	30.4
30-Nov-02	836.0	9.4	10.2	8.7	45.4	34.8
31-Dec-02	762.7	9.6	10.5	9.1	47.4	33.3
31-Jan-03	786.8	9.4	10.4	9.0	46.7	32.0
28-Feb-03	781.1	9.7	10.5	9.0	46.9	37.0
31-Mar-03	755.2	10.1	10.6	9.1	47.6	***48.3***
30-Apr-03	756.2	10.1	10.6	9.1	47.5	***48.4***
31-May-03	775.4	10.2	10.5	9.0	47.0	***52.9***
30-Jun-03	800.3	10.5	10.4	8.9	46.4	***57.9***

Notes: *(1) Italicized values exceeded allowed percentage*
(2) Highlighted concentration indicates water year in which interim limit was exceeded

The daily flows through the individual Shark River Slough structures and S334 from July 2001 through June 2003 are presented in **Figure 4a**. Since mid-November 2002 inflows to Shark River Slough have been through S333 and S12D. Beginning in mid-January 2003 a large proportion of the flow in the L29 Canal was released from the system through S334 due to above-average rainfall. This condition lasted until mid-June.

The relationship between the sum of the daily flows at Shark River Slough structures and corresponding flow-weighted mean total phosphorus concentrations for individual sampling events is presented in **Figure 4b.** Values for Water Years 2001 and 2002 follow the strong inverse relationship between flow and total phosphorus concentration expected for waters entering the Park through Shark River Slough. However, during the un-seasonal rainfall conditions that occurred from February through June 2003, total phosphorus concentrations were greater and more variable, 9 to 18 ppb, than observed previously when flows were less than 500 cfs.

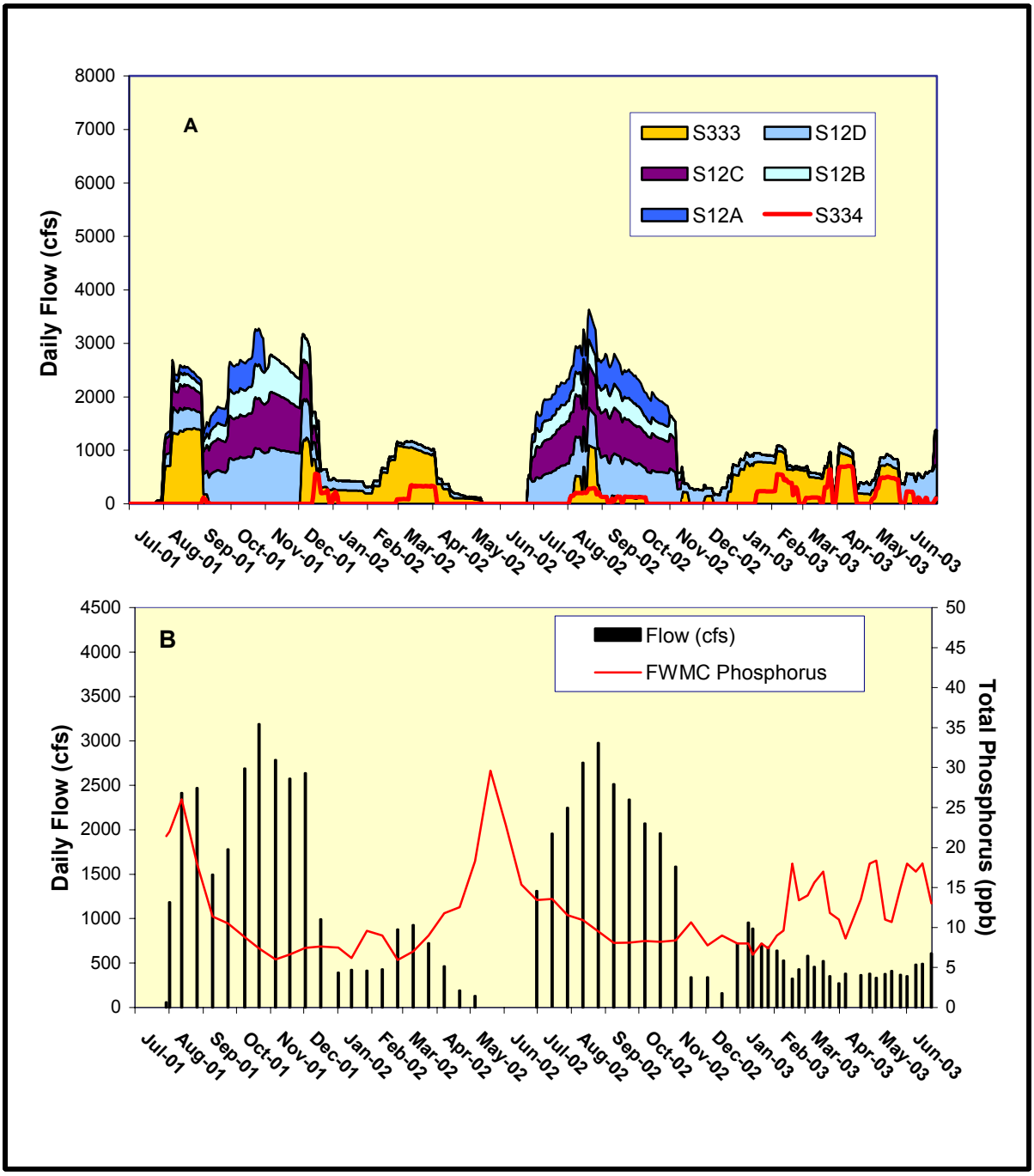

Figure 4. **A**. Daily flows into Shark River Slough by structure. **B**. The relationship between daily flow at Shark River Slough structures and the corresponding flow-weighted mean total phosphorus concentrations for individual sampling events.

Taylor Slough and the Coastal Basins

Under the Consent Decree, a single total phosphorus long-term limit of 11 ppb, to be met by December 31, 2006, was set for the two points of inflow to Taylor Slough (S332 and S175) and the inflow point to the Coastal Basins (S18C). The 11 ppb limit applies to the water year ending September 30.

C-111 Project Structures and Detention Areas

Beginning in August 1999, structure S332D, a new pump station constructed by the U.S. Army Corps of Engineers (USACE), began operation. The structure is adjacent to spillway S174 and pumps water from the L31N canal into the L31W canal. The S332D and S174 structures became the new inflow compliance monitoring sites for Taylor Slough on October 1, 1999, replacing S332 and S175.

The USACE completed construction of the remaining C-111 project structures and detention areas along the eastern boundary of the ENP in June 2002. The project was authorized by the USACE in 1995 to restore more natural hydrologic conditions in Taylor Slough and to maintain flood protection to the east of the L31N and C-111 canals. Project facilities consist of pump stations S332B, S332C and S332D, Detention Cells 1 through 5, a Connector Cell between cells 2 and 3, a Flow Way Cell originating at Berm 3 of Cell 5, and four emergency overflow structures (**Figure 5**). The Flow Way Cell is the only surface water routine discharge location to the ENP from this project.

The construction of these facilities was accelerated to respond to U.S. Fish and Wildlife requirements to give immediate relief to water conditions that threaten the Cape Sable Seaside Sparrow, an endangered species. The USACE signed a Record of Decision on July 2, 2002 that authorizes the implementation of an Interim Operational Plan (IOP) to govern the operation of the new facilities. Since July 31, 2002, the USACE has been operating the project under Emergency Orders issued by the Florida Department of Environmental Protection (FDEP).

The USACE and the South Florida Water Management District (District) will monitor the implementation of the IOP under the terms and conditions of the C-111 Project Cooperation Agreement executed in 1995. The USACE has implemented a monitoring plan approved by FDEP that assesses the hydrologic, environmental, and surface and ground water quality changes that may occur as a result of the IOP.

The monitoring plan treats the detention areas as a single project with five cells, three inflows and a single outflow to ENP. Only Emergency Overflows EO2 and EO4 would discharge into ENP if utilized. Overflows have periodically occurred at EO2 between September 2001 and September 2003. Data from these overflows are presented graphically beginning on page 16 this report. Discharges from Emergency Overflows EO1 and EO3 would flow onto District property and eventually into the L31N Canal. The majority of the water pumped into the detention cells, as well as rainfall, is expected to seep into the Biscayne Aquifer directly below the project site and provide a hydrologic "curtain" to reduce ground water seepage in an easterly direction from ENP. Until FDEP issues an operating permit to the District and approves the District's monitoring plan, the District will continue to report data from S332D and S174 to determine compliance with the Consent Decree requirements as described in the following section.

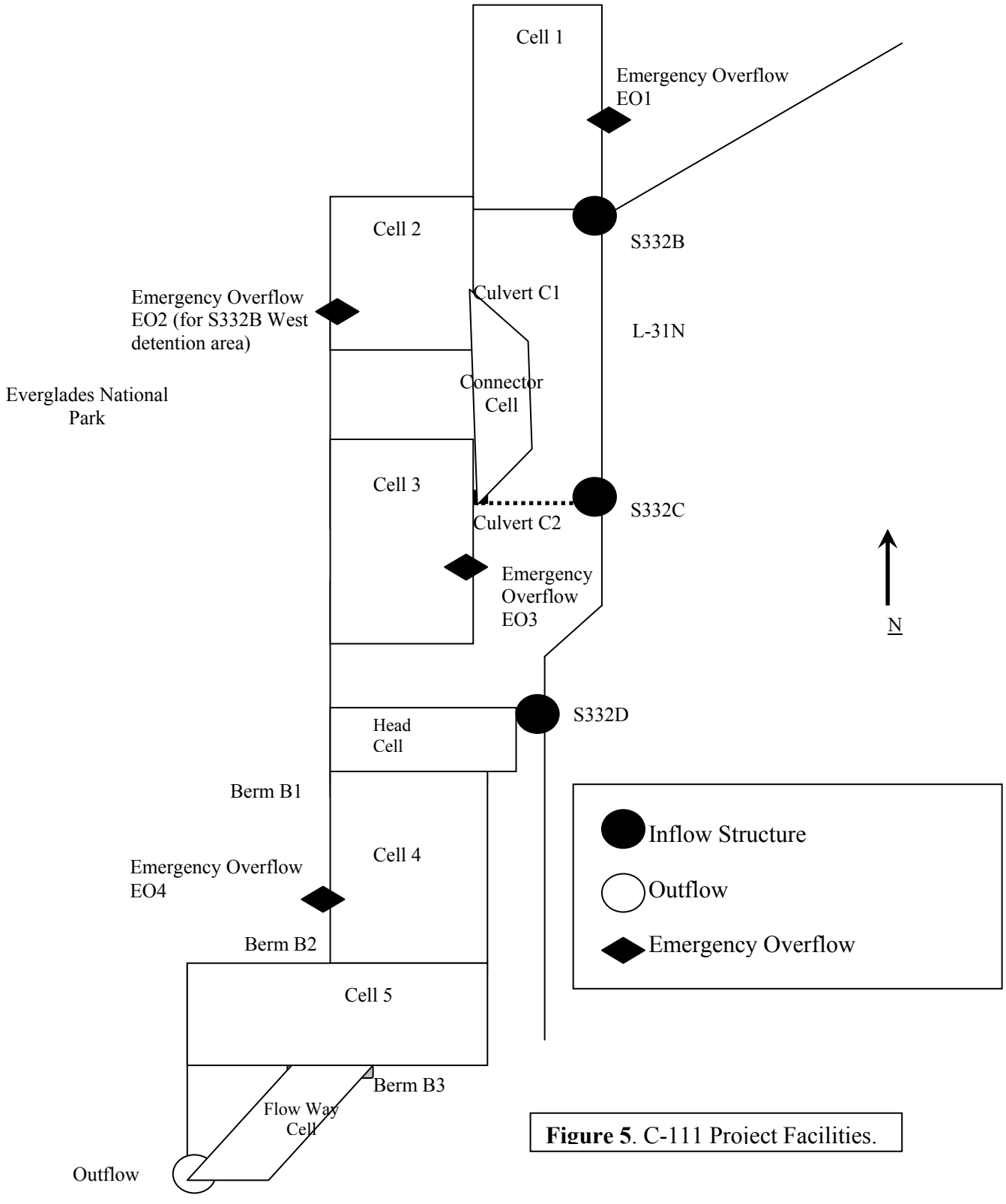

Figure 5. C-111 Project Facilities.

Compliance with Consent Decree

Inflow concentrations of total phosphorus to the Everglades National Park through Taylor Slough and the Coastal Basins are compared to the 11 ppb limit at the end of each water year using data from both the old (S175, S332, S18C) and new (S174, S332D, S18C) combinations of structures (**Figure 6a**). The bars in **Figure 6a** represent the flow-weighted mean total phosphorus concentrations from S332, S175 and S18C for water years 1989 through 2002. The diamond point values for water years 1999 through 2002 represent the new combination of structures. **Figure 6b** presents the 12-month moving average and individual sampling event flow-weighted mean total phosphorus concentrations at the S174, S332D and S18C structures.

Total phosphorus and flow data from both sets of structures presented in prior editions of this report through December 2001 (April 2002 report) showed that, beginning October 2000, the 12-month moving total flow for S332D, S174 and S18C was consistently greater than flow at S332, S175 and S18C. There was also a shift in flow-weighted mean total phosphorus concentration data whereby S332D, S174 and S18C concentrations became equal to and then consistently lower than the concentrations at S332, S175 and S18C. These changes reflected the switch made from S332 to S332D for water delivery to Taylor Slough between July 3 and July 5, 2000. Consequently, as of the July 2002 report, only S332D, S174 and S18C data are presented for monthly tracking of data in **Figure 6b**.

The 12-month flow-weighted mean concentrations for April, May and June 2003 were 5.8, 5.8 and 5.6 ppb, respectively, for the combined flow through S174, S332D and S18C (**Table 3**). The Consent Decree stipulates that the percent of flow-weighted mean total phosphorus concentrations greater than 10 ppb from each sampling event in any 12-month period must not exceed a fixed guideline of 53.1 percent. The percentage of flow-weighted mean total phosphorus concentrations greater than 10 ppb for the combined flow through S174, S332D and S18C was 4.8, 0.0 and 0.0 for the periods ending April, May and June 2003.

The daily flows into Everglades National Park through S332D, S174 and S18C are presented in **Figure 7a**. **Figure 7b** shows the relationship between the daily inflows and the corresponding flow-weighted mean total phosphorus concentrations for each sampling event. As the data indicate, there is no observable linear relationship between daily mean flow and flow-weighted mean total phosphorus concentrations at these structures.

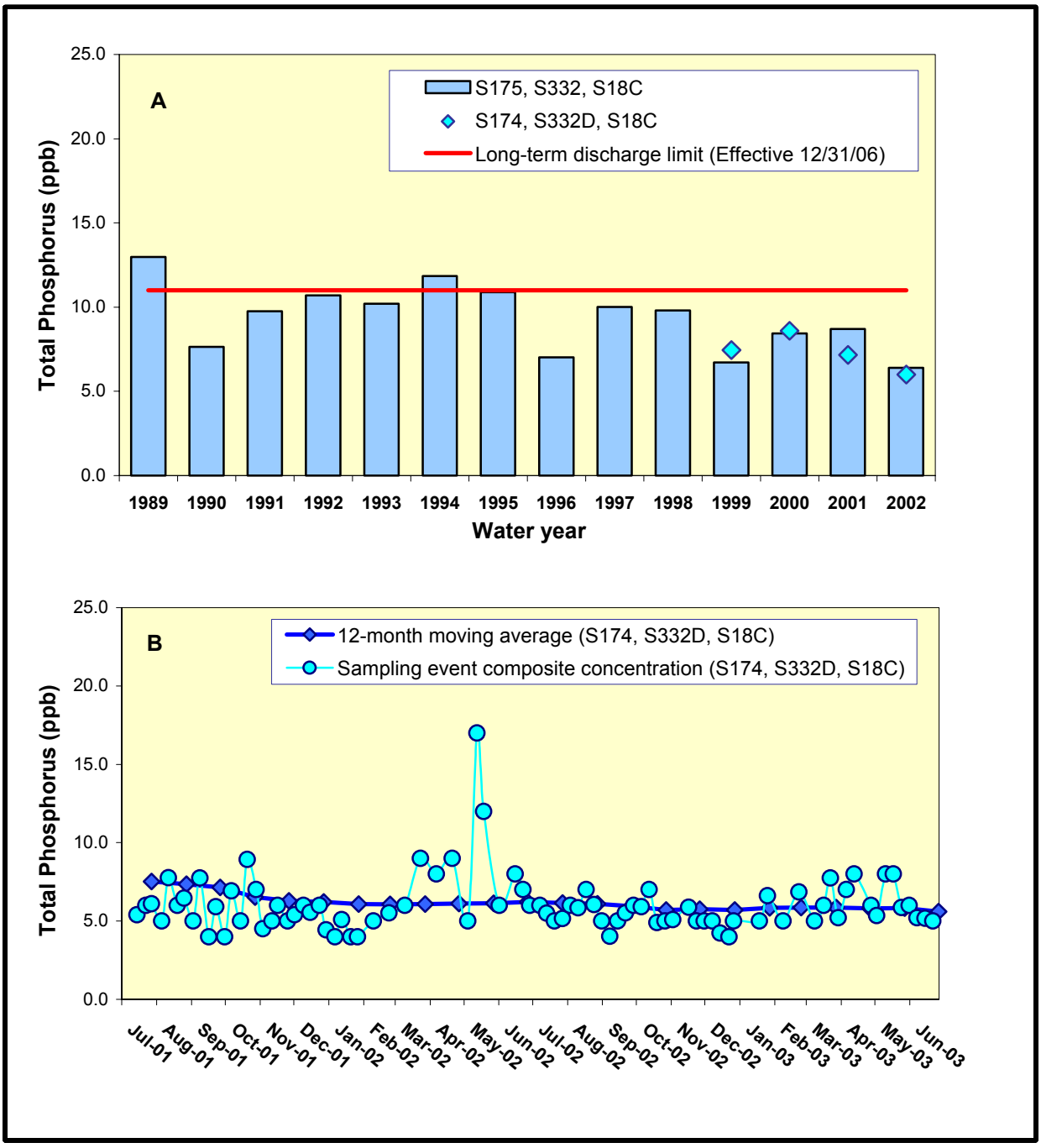

Figure 6. Total phosphorus flow-weighted mean concentrations (fwmc) in inflows to Everglades National Park through Taylor Slough and the Coastal Basins. **A.** The 12-month moving average fwmc at the end of each water year compared to the 11 ppb long-term total phosphorus limit. **B**. The 12-month moving average fwmc at the end of each month and the composite total phosphorus concentration for each sampling event.

Table 3. Taylor Slough and the Coastal Basins Total Phosphorus Concentration Compliance Tracking.

12-Month Period Ending On	Total Period Flow	Flow Weighted Mean Total Phosphorus	Limit (Effective 12/31/06)	Percent of Sampling Events Greater than 10 ppb	
			(ppb)	(%)	
	(Kac-ft)	(ppb)	Long Term	Guideline	Observed
31-Jul-01	243.0	7.5	11.0	53.1	10.7
31-Aug-01	237.1	7.3	11.0	53.1	11.5
30-Sep-01	235.1	7.2	11.0	53.1	11.5
31-Oct-01	235.2	6.5	11.0	53.1	8.0
30-Nov-01	269.7	6.3	11.0	53.1	7.4
31-Dec-01	296.5	6.2	11.0	53.1	6.7
31-Jan-02	316.0	6.1	11.0	53.1	5.9
28-Feb-02	320.6	6.1	11.0	53.1	0.0
31-Mar-02	325.9	6.1	11.0	53.1	0.0
30-Apr-02	331.1	6.1	11.0	53.1	0.0
31-May-02	336.4	6.1	11.0	53.1	5.0
30-Jun-02	364.3	6.2	11.0	53.1	4.9
31-Jul-02	392.1	6.1	11.0	53.1	4.7
31-Aug-02	388.3	6.1	11.0	53.1	4.7
30-Sep-02	371.8	6.0	11.0	53.1	4.7
31-Oct-02	316.0	5.7	11.0	53.1	4.5
30-Nov-02	271.6	5.8	11.0	53.1	4.8
31-Dec-02	249.8	5.7	11.0	53.1	4.7
31-Jan-03	234.2	5.8	11.0	53.1	5.0
28-Feb-03	229.9	5.9	11.0	53.1	5.0
31-Mar-03	230.5	5.9	11.0	53.1	4.9
30-Apr-03	231.5	5.8	11.0	53.1	4.8
31-May-03	244.2	5.8	11.0	53.1	0.0
30-Jun-03	249.8	5.6	11.0	53.1	0.0

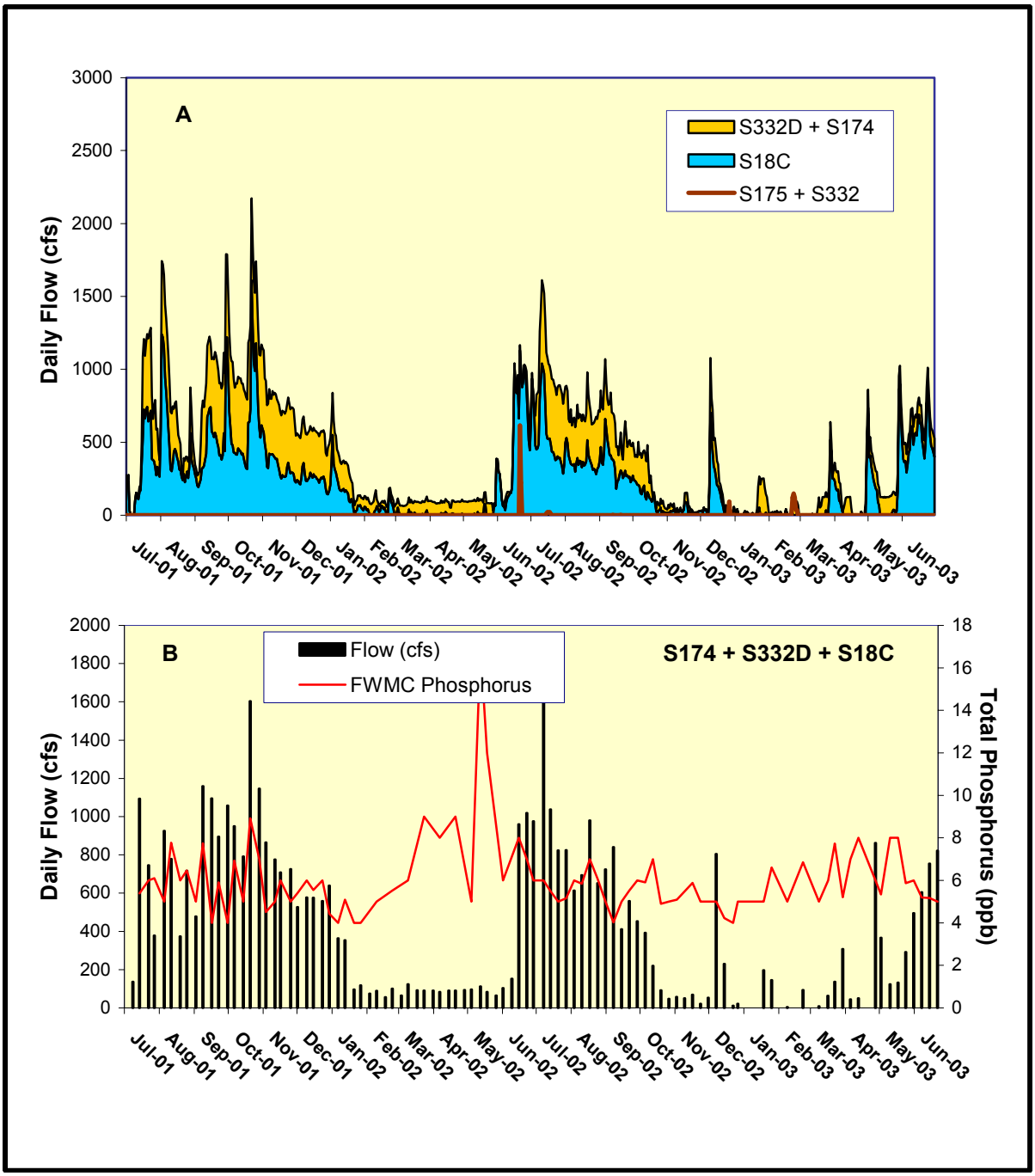

Figure 7. **A.** Daily flows into Everglades National Park through Taylor Slough and S18C. **B**. The relationship between daily flows at Taylor Slough structures and S18C and the corresponding flow-weighted mean total phosphorus concentrations for individual sampling events.

Overflow Events 2000 – 2003 at S332B Weir

Note: Overflow data and total phosphorus data are from the USACE and have not undergone SFWMD QA/QC review. Flow data for S332B have been through the SFWMD's QA/QC review.

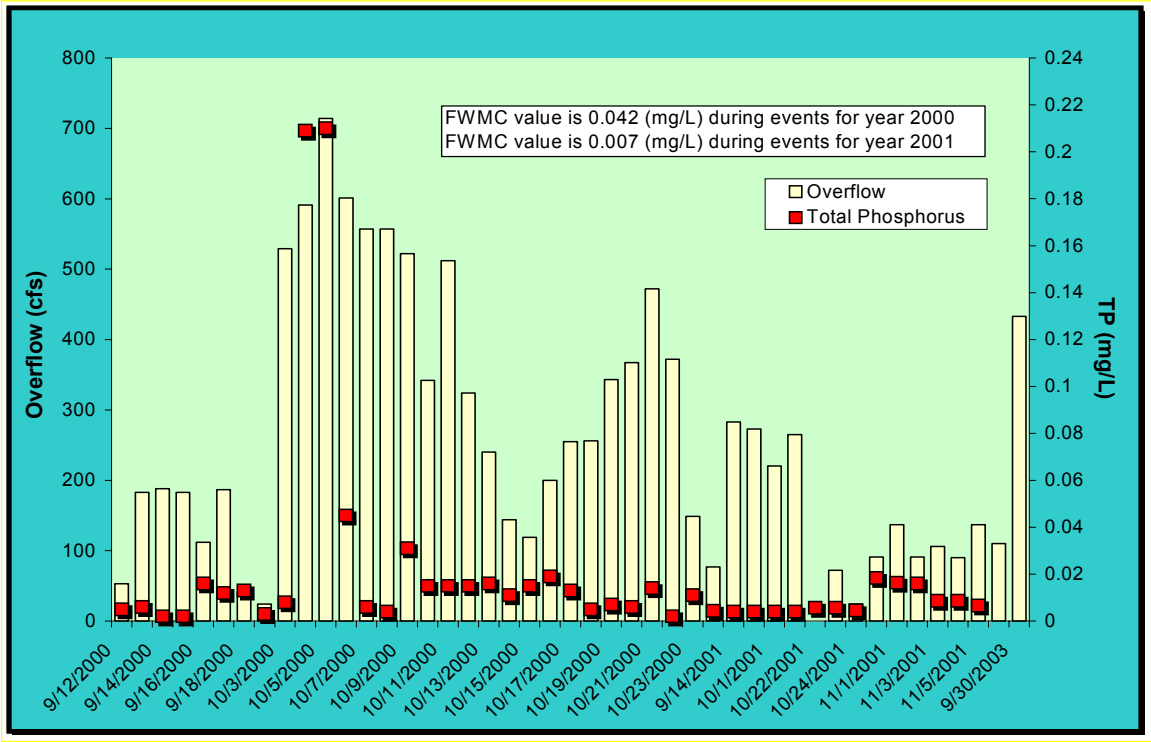

Figure 8. Total Phosphorus concentration for S-332B during overflow events (USACE data).

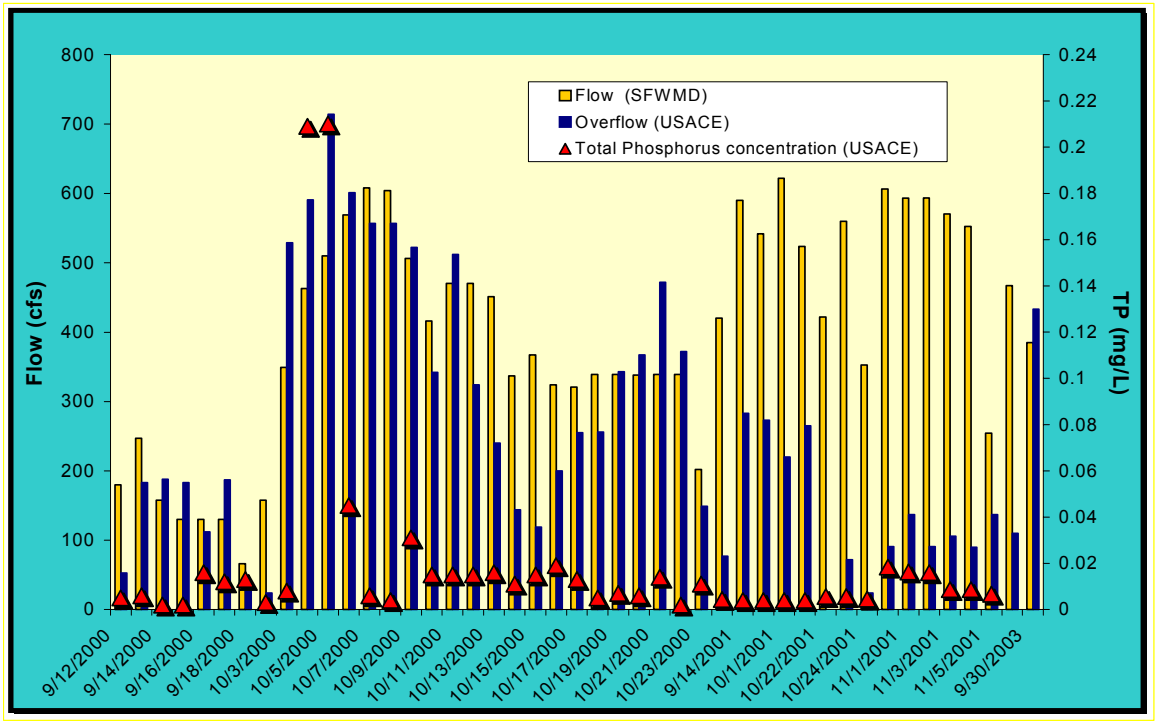

Figure 9. Pump S-332B during overflow events for 2000, 2001 and 2003.

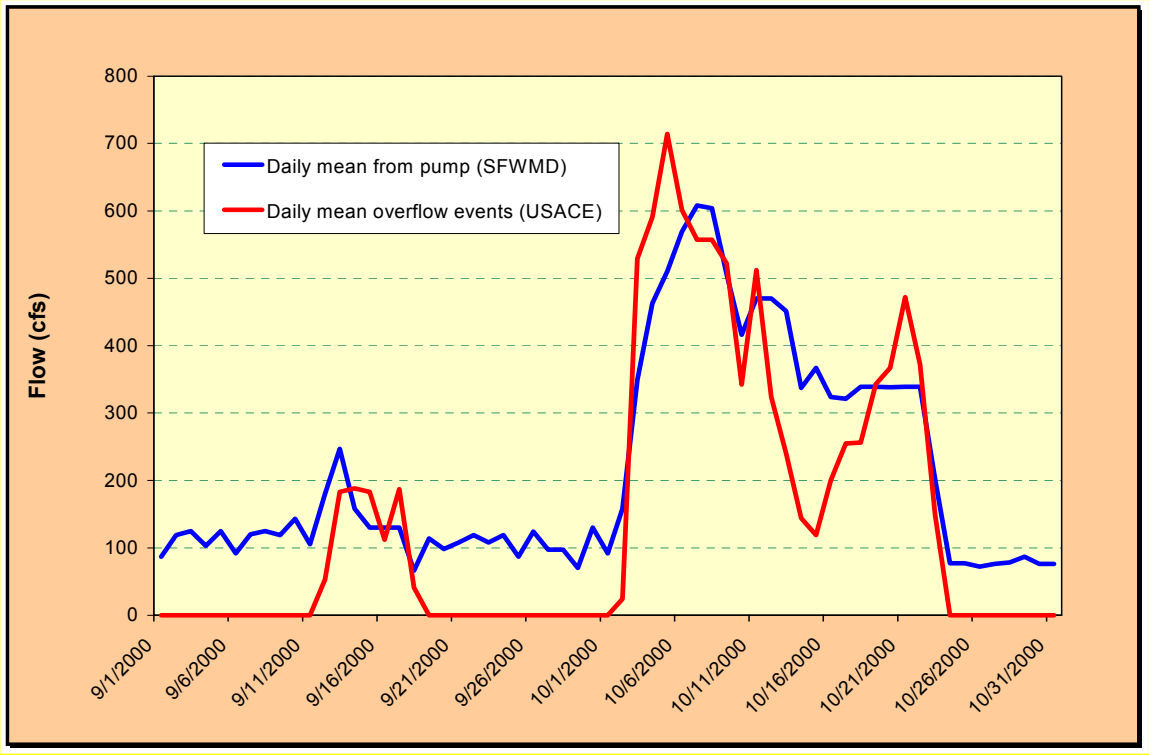

Figure 10. S-332B pump station flows and associated overflow events year 2000.

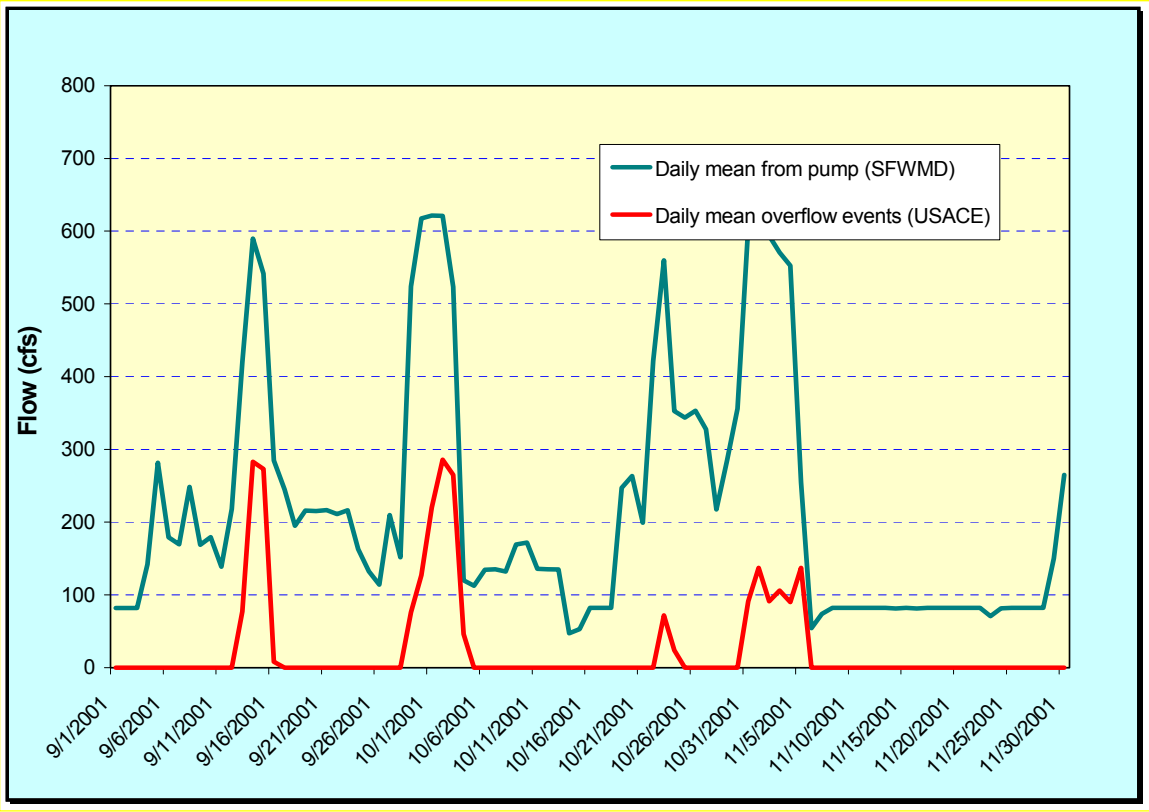

Figure 11. S-332B pump station flows and associated overflow events year 2001.

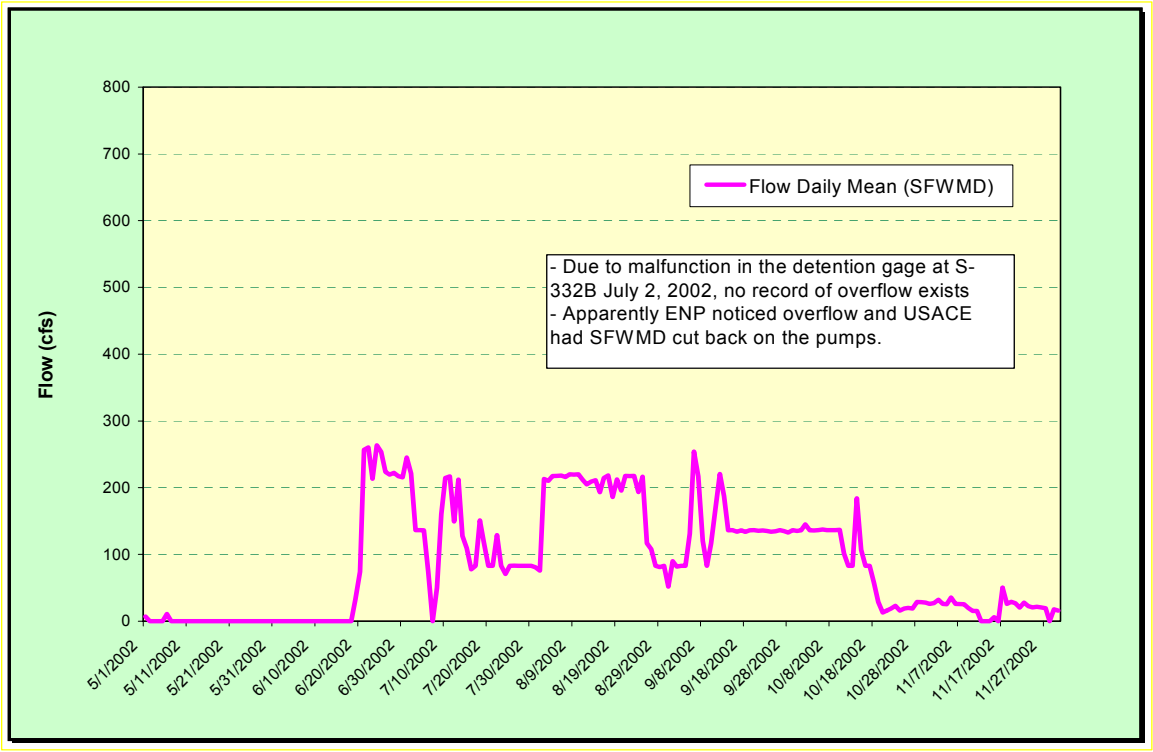

Figure 12. S-332B pump station year 2002.

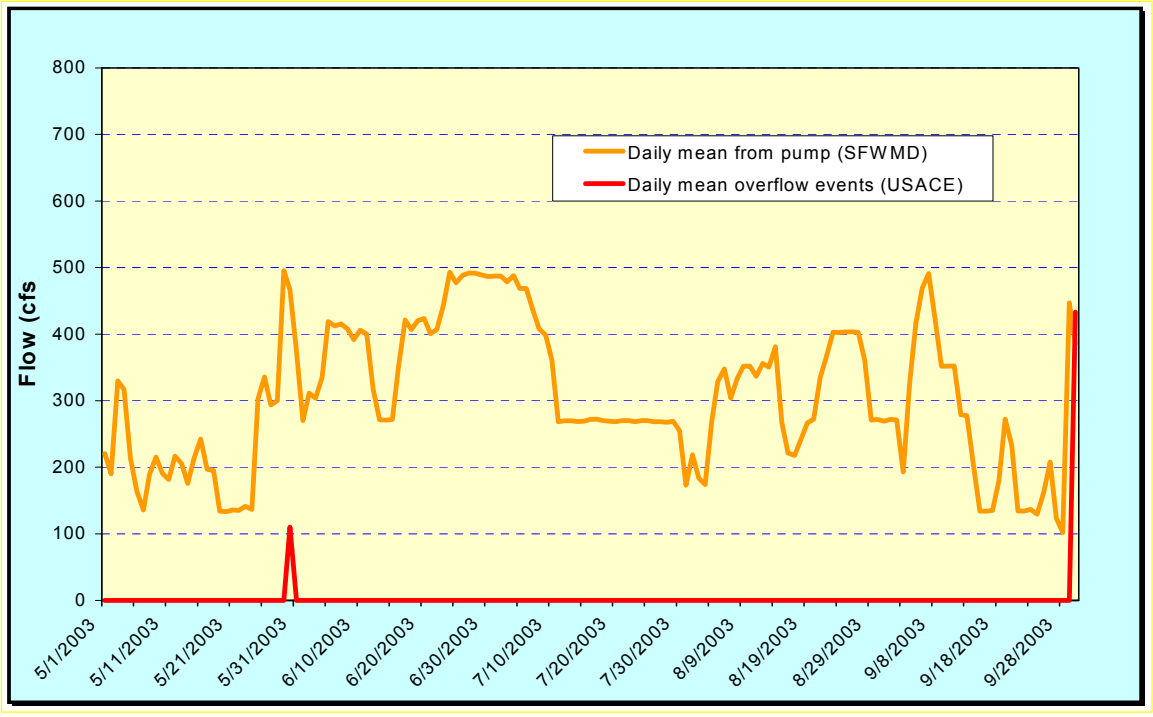

Figure 13. S-332B pump station flows and associated overflow events year 2003.

As of 11-18-2003, this report has been revised from the version that was originally posted on 10-28-2003
In the following pages, Figure 13, Table 4, Table 5 and corresponding text were modified with updated data.

WY2003 Phosphorus Loads to the Everglades Protection Area

(from Chapter 8A, Everglades Consolidated Report, 2004)

The Everglades Protection Area (EPA) is a complex system of marsh areas, canals, levees, and inflow and outflow water-control structures covering almost 2.5 million acres. In addition to rainfall inputs, surface water inflows regulated by water control structures from agricultural tributaries, such as the EAA and the C-139 basin, feed the EPA from the north and western boundaries. The EPA also receives surface water inflows originating from Lake Okeechobee to the north and from predominantly urbanized areas to the east. The timing and distribution of the surface inflows from the tributaries to the EPA are based on a complex set of operational decisions that account for natural and environmental system requirements, water supply for urbanized and natural areas, aquifer recharge, and flood control.

Each year the EPA receives amounts of surface water inflows based on hydrologic variability. These inflows, regulated according to previously mentioned operational decisions, also contribute a certain amount of TP loading to the EPA system. The load schematic presented in **Figure 13** depicts a generalized overview of surface water inflow sources and relative contributions of TP loading to the EPA for Water Year 2003 (WY2003). **Figure 13** also illustrates all connecting tributaries to the EPA: Lake Okeechobee, the EAA, the C-139 basin, other agricultural and urbanized areas, and the STAs. In some cases, surface water inflows represent a mixture of water from several sources as the water passes from one area to another before finally arriving in the EPA. For example, water discharged from Lake Okeechobee can pass through the EAA and then through an STA before arriving in the EPA. As another example, runoff from the C-139 basin can pass through STA-5 and then into the EAA before ultimately arriving in the EPA. The conveyance and delivery system is complex; however, the schematic in **Figure 13** attempts to identify the amount of TP load and its associated pathways to the EPA.

It is also recognized that a certain amount of TP loading to the EPA emanates from atmospheric deposition. **Figure 13** depicts a long-term average range of atmospheric deposition of TP between 107 and 143 tons as the total contribution to the Water Conservation Areas (WCAs). This range is based on data obtained from long-term monitoring that was evaluated and reported in 2002 in a District technical publication (Redfield, EMA-403, February 2002). The TP loads and the relative percent contribution to the region from each source, including and excluding the contribution of atmospheric deposition, are tabulated in **Table 4.** Detailed estimates of TP loads by structure are presented in **Table 5.**

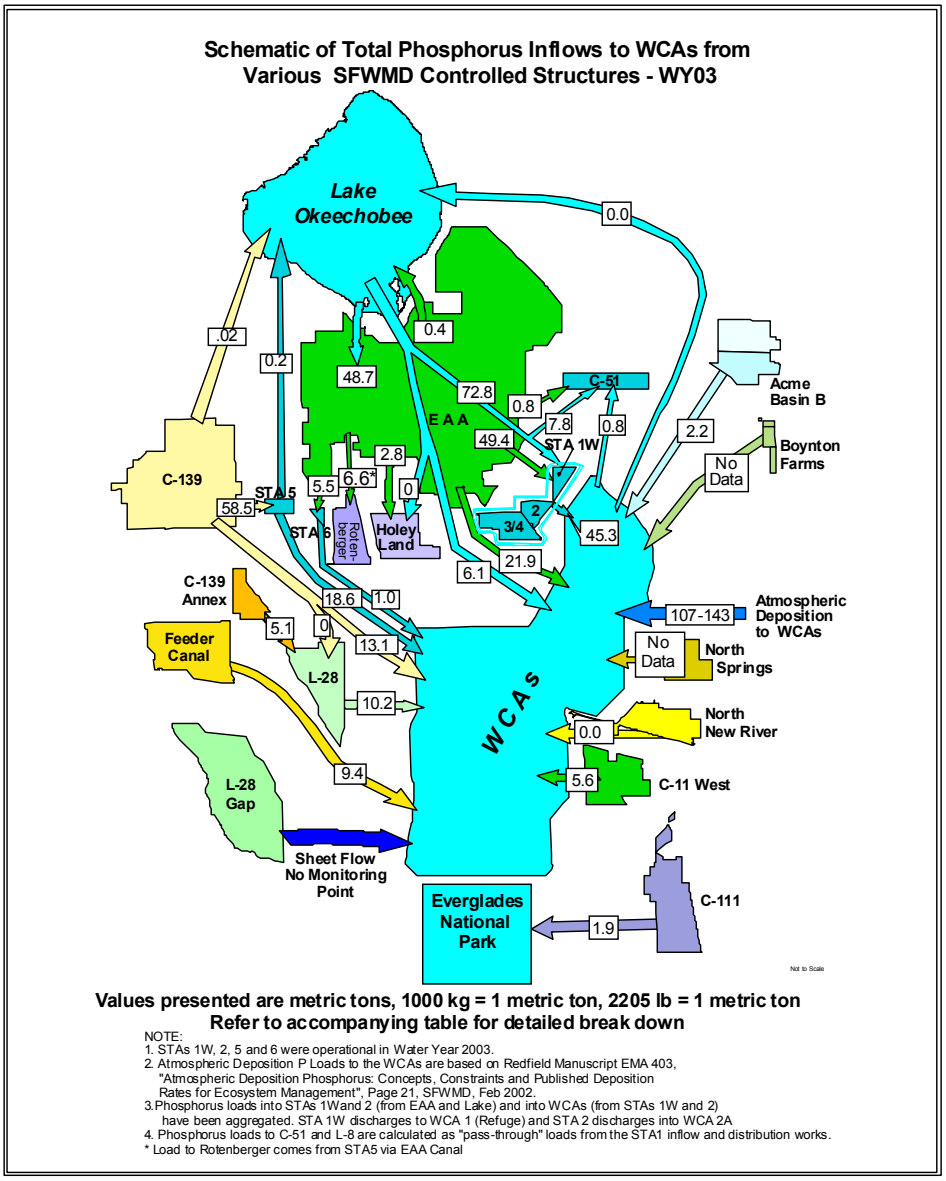

Figure 13. Overview of surface water inflow sources and relative contributions of phosphorus loading to the Everglades Protection Area for Water Year 2003.

Table 4. Water Year 2003 phosphorus loads to the EPA and other waters.

Data provided by Everglades Regulation Division

Source Water	Receiving Water	Phosphorus Load (metric tons)	Portion of Surface Inflows	Portion of Total Inflows
Lake Okeechobee	EPA (WCAs)	6.1	4.5%	1.9%
	EAA	48.7		
	STAs	72.8		
	C-51 Canal	7.8		
	Total from Lake O	**135**		
Everglades Agricultural Area	EPA (WCAs)	21.9	16.1%	6.7%
	Lake Okeechobee	0.4		
	STAs	54.9		
	Holey Land	2.8		
	C-51 West Basin	0.8		
	Total from EAA	**80.8**		
Stormwater Treatment Areas (STAs)	EPA (WCAs)	64.9	47.7%	19.7%
	Lake Okeechobee	0.2		
	Holey Land and Rotenberger	7.8		
	Total from STAs	**72.9**		
Rotenberger	EPA (WCAs)	0.8	0.6%	
C-51 West Basin	EAA	0.1		
	STAs	1.5		
	Total from C-51W Basin	**1.6**		
Acme Basin B	EPA (WCAs)	2.2	1.6%	0.7%
Boynton Farms	EPA (WCAs)	No data		
North Springs Improvement District	EPA (WCAs)	No data		
North New River Canal Basin	EPA (WCAs)	0.0	0.0%	0.0%
C-11 West Basin	EPA (WCAs)	5.6	4.1%	1.7%
C-111 Basin	EPA (ENP)	1.9	1.4%	0.6%
Feeder Canal Basin	EPA (WCAs)	9.4	6.9%	2.8%
L-28 Canal Basin	EPA (WCAs)	10.2	7.5%	3.1%
C-139 Basin	EPA (WCAs)	13.1	9.6%	4.0%
	STAs	58.5		
	Lake Okeechobee	0.02		
	Total C-139 Basin	**71.6**		
C-139 Annex	L-28 Canal	5.1		1.5%
L-28 Gap Basin	EPA (WCAs)	No data		
Total Surface Inflows	EPA (WCAs)	**136**	100%	41.3%
Atmospheric Deposition	WCA-1 (35 mg/m2/yr)	20.0		
	WCA-2 (35 mg/m2/yr)	18.8		
	WCA-3 (25 mg/m2/yr)	70.4		
	ENP (20 mg/m2/yr)	84.1		
	Total atmospheric deposition	**193**		58.7%
Total Loads to the EPA	**EPA (WCAs)**	**329**		100%
Loads From the EPA	STAs	*0.7*		
	Hillsboro Canal (S-39)	*7.7*		
	C-51 West Basin	*0.8*		
	Total loads from the EPA	**9.2**		

Notes on atmospheric deposition:
1: The Everglades National Park area is delineated by coastal line coverage and does not includes Florida Bay.
2: Estimates of areal deposition rates from "Atmospheric Deposition Phosphorus: Concepts, Constraints and Published Deposition Rates for Ecosystem Management", Page 21, SFWMD, Feb 2002. (EMA Report No. 403)

Table 5. Year 2003 Summary of Flow and Total Phosphorus by Structure.

Into WCA1

Structure	Flow	Phosphorus	
	1000 ac-ft	Load (kg)	FWMC (ppb)
G300 & G301	10	2492	198
from EAA		*2086*	
from Lake O		*154*	
from East Beach		*252*	
from Inflow Basin		*0*	
G251 *(from STA-1W)*	97	5276	44
G310 *(from STA-1W)*	499	33415	54
ACME1 *(from Basin B)*	9	864	80
ACME2 *(from Basin B)*	9	1362	117
Total	**624**	**43409**	**56**

From WCA1

Structure	Flow	Phosphorus	
	1000 ac-ft	Load (kg)	FWMC (ppb)
S10A	121	5526	37
S10C	55	2591	38
S10D	67	4252	51
S10E	0	0	n/a
S39	207	7718	30
G300	8	979	103
G301	3	563	214
Total	**461**	**21628**	**38**

Into WCA2

Structure	Flow	Phosphorus	
	1000 ac-ft	Load (kg)	FWMC (ppb)
G335 *(from STA-2)*	308	6634	17
S7	143	9624	55
from EAA		*4961*	
from Lake O		*4663*	
S10A *(from WCA1)*	121	5526	37
S10C *(from WCA1)*	55	2591	38
S10D *(from WCA1)*	67	4252	51
S10E *(from WCA1)*	0	0	n/a
N. Springs Improv. District	1	0	n/a
Total	**695**	**28626**	**33**

From WCA2

Structure	Flow	Phosphorus	
	1000 ac-ft	Load (kg)	FWMC (ppb)
S7	17	489	23
S11A	109	2565	19
S11B	58	792	11
S11C	134	4189	25
S38	34	1057	25
S34	114	3683	26
Total	**464**	**12774**	**22**

Into WCA3

Structure	Flow	Phosphorus	
	1000 ac-ft	Load (kg)	FWMC (ppb)
S140 *(from L28 Canal)*	136	10191	61
S190 *(from Feeder Canal)*	88	9358	86
L3 (G88+G155) *(from C139)*	32	8481	216
STA-6	33	1046	26
S8	292	29420	82
from EAA		*11039*	
from Lake O		*1251*	
from C-139		*4291*	
from STA-5		*12296*	
from Rotenberger		*543*	
S150 *(from EAA)*	69	4086	48
G204 *(from Holey Land)*	0	0	n/a
G404	93	6622	58
from EAA		*-241*	
from C-139		*351*	
from STA-5		*6300*	
from Rotenberger		*213*	
S11A *(from WCA2)*	109	2565	19
S11B (*from WCA2)*	58	792	11
S11C *(from WCA2)*	134	4189	25
G123 *(from N. New River)*	0	0	n/a
S9 *(from C-11 West)*	264	5580	17
Total	**1306**	**82329**	**51**

From WCA3

Structure	Flow	Phosphorus	
	1000 ac-ft	Load (kg)	FWMC (ppb)
S150	0	0	n/a
S8	0	0	n/a
G204	0	0	n/a
S31	0	0	n/a
S337	24	1415	49
S343A	16	155	8
S343B	18	174	8
S344	13	180	12
S12A	112	1191	9
S12B	98	847	7
S12C	188	2008	9
S12D	227	3354	12
S333	207	2979	12
S14	0	0	n/a
Total	**902**	**12303**	**11**

Into Everglades National Park (ENP)

Structure	Flow	Phosphorus	
	1000 ac-ft	Load (kg)	FWMC (ppb)
S12A *(from WCA3)*	112	1191	9
S12B *(from WCA3)*	98	847	7
S12C *(from WCA3)*	188	2008	9
S12D *(from WCA3)*	227	3354	12
S333 *(from WCA3)*	207	2979	12
S14 *(from WCA3)*	0	0	n/a
S174 *(from L-31W)*	6	66	8
S332D *(from L-31W)*	90	659	6
S18C *(from C-111 Canal)*	135	1200	7
Total	**1064**	**12303**	**9**

From ENP

Structure	Flow	Phosphorus	
	1000 ac-ft	Load (kg)	FWMC (ppb)
S334	76	1099	12
S197	16	128	6
Total	**92**	**1227**	**11**

FWMC = flow weighted mean concentration

Comparison of WY2003 Phosphorus Loads to 1979-1988 Baseline

This section reports phosphorus loading into the Everglades Protection Area for WY2003.

October 1978 through September 1988 has been identified as a comparative baseline period for various planning purposes, including the 1992 Everglades SWIM Plan, the design of the Everglades Construction Project, the 1991 Everglades Settlement Agreement and the Everglades Forever Act, as amended. During that 10-yr period, annual phosphorus loads in surface inflows to the EPA ranged from approximately 100 metric tons to over 350 metric tons, with an average of 270 metric tons (1992 Everglades SWIM Plan). Included in this 270 ton annual average was approximately 205 tons to the Water Conservation Areas (WCAs) from the EAA, Lake Okeechobee, L-8 and C-51W basins through the S-5A, S-6, S-7, S-150 and S-8 structures. This 205 ton annual average was the basis of design for the four original STAs of the Everglades Settlement Agreement. During that same 1979-1988 period, phosphorus loads in surface inflows to the Refuge ranged from approximately 40 metric tons to over 150 metric tons per year, with an average of about 110 metric tons (1992, Everglades SWIM Plan). Included in this 110 ton annual average was approximately 105 tons from the EAA, Lake Okeechobee, L-8 and C-51W basins through the S-5A and S-6 pump stations. This 105 ton annual average load to the Refuge was the basis of design for the original STA-1 and STA-2 of the Everglades Settlement Agreement.

As set forth in Appendix C of the Everglades Settlement Agreement, the Settling Parties assumed that if the STAs and BMPs performed as designed, there would be an approximate 80% reduction of stormwater-borne phosphorus loads to the WCAs from the EAA (i.e., excluding other sources such as Lake Okeechobee water supply releases). Using the loads that occurred during the baseline period (WY1979-88), and the Appendix C assumptions, the anticipated 10-year average load equating to this 80% reduction is approximately 40.2 metric tons from the EAA to the WCAs.

Similarly, the Settlement Agreement also envisions an approximate 85% reduction of phosphorus loads from the EAA to the Refuge if the STAs and BMPs achieve their design assumptions. Using the loads that occurred during the baseline period (WY1979-88), and the Appendix C assumptions, the anticipated 10-year average load equating to this 85% reduction is approximately 15.5 metric tons from the EAA to the Refuge.

In 2002 the Technical Oversight Committee (TOC) established, pursuant to the Settlement Agreement, a methodology developed by Walker (1996) for reviewing the load reductions based on annual phosphorus concentrations of water entering the WCAs and Refuge. That methodology assumes compliance with the reduction requirements unless the annual phosphorus inflow concentration to the WCAs (and Refuge) from the EAA and bypassed flows is greater than 76 ppb in any water year or is greater than 50 ppb in three or more consecutive water years (Walker 1996). Compliance will not be tested in water years when the EAA adjusted annual rainfall, as defined in SFWMD Rule 40E-63, is above 63.8 inches. Compliance will also not be tested in water years when the EAA adjusted rainfall is below 35.1 inches if sufficient water is not available to maintain wet conditions in the STAs. The following discussion of WY2003 loads does not substitute for the compliance review

activities of the TOC, but is simply a public presentation of relevant data as requested by the TOC.

Phosphorus loads to the EPA during WY2003 were significantly lower than the WY1979-1988 baseline period. As shown in Tables 8A-7 and 8A-8, loads to the EPA totaled approximately 136 metric tons, with a flow-weighted mean concentration of 48 ppb. It should be recognized that not all of this load came from the EAA. Phosphorus loads to the WCAs from the EAA were calculated as:

a proportion of STA-1W and STA-2 discharges, adjusted to reflect contributions from non-EAA sources [STA-1W (from EAA: 37%), STA-2 (from EAA: 79%)],

STA-6 discharges , and

direct EAA discharges from the S-7, S-8 and S-150 structures.

Phosphorus loads to the WCAs from the EAA during WY2003 totaled about 42.8 tons. This annual load is slightly higher than the 10-yr average expectation of 40.2 tons, however, it should be noted that the 42.8 tons is not a multiple year average value (as is the 10-yr average of 40.2 tons) and that compliance with the load reduction is not scheduled to begin until WY2004. The average of the WY2002 and WY2003 loads from the EAA to the WCAs was 36.2 tons, slightly below the anticipated 10-year average load of 40.2 tons. This relatively low average load is significant considering STA-1E and STA-3/4 were not operational during WY2003.

Phosphorus loads from all sources to the Refuge during WY2003 totaled approximately 43.4 tons, the majority resulting from regulatory releases from Lake Okeechobee. The phosphorus load to the Refuge from the EAA during WY2003 was approximately 16.6 tons, slightly above the anticipated 10-year average load of 15.5 tons. This small degree of overage is significant in that STA-1 East was not yet operational. The average of the WY2002 and WY2003 loads from the EAA to the Refuge was 14.6 tons, slightly below the anticipated 10-year average load of 15.5 tons. The flow-weighted mean phosphorus concentration entering the Refuge from the EAA and bypass flows during WY2003 was 55 ppb, which is below the annual maximum of 76 ppb established by the TOC methodology, and slightly higher than the 49 ppb observed during WY2002.