Settlement Agreement Report

Third Quarter
July - September 2012

Prepared for the
Technical Oversight Committee

December 12, 2012

Final Shark River Slough flow data for Water Year 2012 were not available in time for publication of this report. An updated report will be published after these data become available.

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PURPOSE

The South Florida Water Management District has prepared this report to provide a quarterly update to the Technical Oversight Committee on the compliance status with total phosphorus levels or limits defined in the 1991 Settlement Agreement entered as a Consent Decree in 1992 and modified in 1995. The areas of interest in this report include the interior marsh stations in Arthur R. Marshall Loxahatchee National Wildlife Refuge and two discharges to Everglades National Park: inflows to Shark River Slough and inflows to Taylor Slough and Coastal Basins.

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ACRONYMS AND ABBREVIATIONS

ENP	Everglades National Park
kac-ft	thousand acre feet
NGVD 29	National Geodetic Vertical Datum of 1929
OFW	Outstanding Florida Waters
ppb	parts per billion
Refuge	Arthur R. Marshall Loxahatchee National Wildlife Refuge
SFWMD	South Florida Water Management District
TOC	Technical Oversight Committee
TP	total phosphorus
µg/L	micrograms per liter
USACE	United States Army Corps of Engineers
WCA	Water Conservation Area

EXECUTIVE SUMMARY

This report fulfills the South Florida Water Management District's reporting requirements under the 1991 Settlement Agreement, entered as a Consent Decree in 1992 and modified in 1995, for the third quarter of 2012 (July – September 2012). Total phosphorus (TP) compliance highlights for this period are summarized below for the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge) and Everglades National Park, including Shark River Slough, and Taylor Slough and Coastal Basins (**Table 1** and **Figure 1**):

- **Refuge:** The geometric mean TP concentrations were below the long-term levels in July, August, and September 2012.
- **Shark River Slough:** The 12-month flow-weighted mean TP concentrations for the period ending on September 30, 2012, could not be calculated because the finalized flow data were not available.
- **Taylor Slough and Coastal Basins:** The 12-month flow-weighted mean TP concentrations were below the long-term limits for the 12-month period ending on September 30, 2012. Therefore, Taylor Slough and Coastal Basins was in compliance for Water Year 2012.

Table 1. Total phosphorus compliance, third quarter 2012.

Month	Geometric Mean TP Concentration (ppb)	Long-term Level (ppb)	Mean Stage (ft NGVD 29)	Number of Samples
Arthur R. Marshall Loxahatchee National Wildlife Refuge				
Jul 2012	6.0	12.5	16.00	14
Aug 2012	5.5	11.3	16.18	13
Sep 2012	7.0	7.2	17.38	14

12-Month Period Ending	Total Flow (kac-ft)	12-Month Flow-weighted Mean TP Concentration (ppb)	Long-term Limit (ppb)	Percent of Sampling Events Greater than 10 ppb	
				Guideline	Observed
Everglades National Park – Shark River Slough					
Jul 2012					
Aug 2012					
Sep 2012[a]					
Everglades National Park – Taylor Slough and Coastal Basins					
Jul 2012	255.1	5.8	11.0	53.1	2.1
Aug 2012	273.0	5.8	11.0	53.1	2.0
Sep 2012[a]	**290.7**	**5.7**	**11.0**	**53.1**	**2.0**

The finalized flow data for this table are pending at the time of initial publication. The report and table will be updated after these data become available.

Notes:
- ppb = parts per billion. Values are actually in µg/L (micrograms per liter), which, for the purposes of this report, is equivalent to ppb.
- ft NGVD 29 = elevation in feet related to the National Geodetic Vertical Datum of 1929.
- kac-ft = thousand acre feet.

[a] Water Year 2012 (October 1, 2011–September 30, 2012) compliance evaluation period for inflows to Everglades National Park (Shark River Slough, Taylor Slough and Coastal Basins).

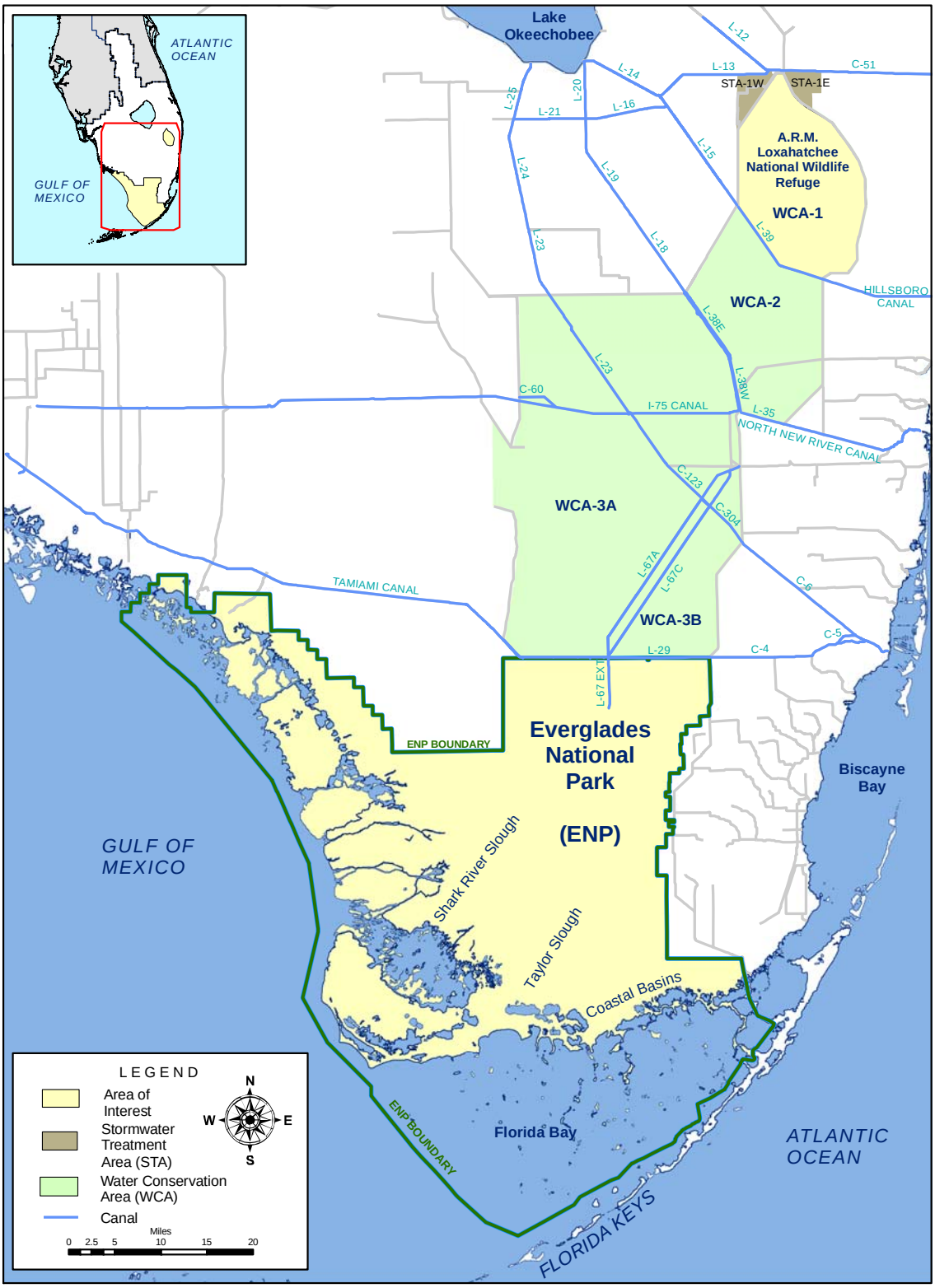

Figure 1. Areas of interest.

ARTHUR R. MARSHALL LOXAHATCHEE NATIONAL WILDLIFE REFUGE

Background

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 total phosphorus (TP) concentration levels for the Arthur R. Marshall Loxahatchee National Wildlife Refuge (Refuge) must be met by February 1, 1999, and December 31, 2006, respectively. Both the interim and long-term 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 relative to the National Geodetic Vertical Datum of 1929 (NGVD 29). The monthly TP concentrations are determined from water samples collected at 14 interior marsh stations, LOX3 through LOX16 (**Figure 2**). 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. Monthly TP data for each station for the past 36 months are provided in **Appendix A**. The calculation methods specified in the Consent Decree are provided in **Appendix D**.

Reporting Period Update

Average sampling day stages in the Refuge were 16.00, 16.18, and 17.38 feet in July, August, and September 2012, respectively (**Figure 3** and **Table 2**). The geometric mean, calculated from TP concentrations measured in water samples collected in July, August, and September 2012, were 6.0, 5.5, and 7.0 parts per billion (ppb), respectively. The geometric mean TP concentrations were below the long-term level for the months of July, August, and September 2012.

A TP sample was not collected at station LOX13 for the month of August 2012, because the water depth was less than 0.1 meter at the site.

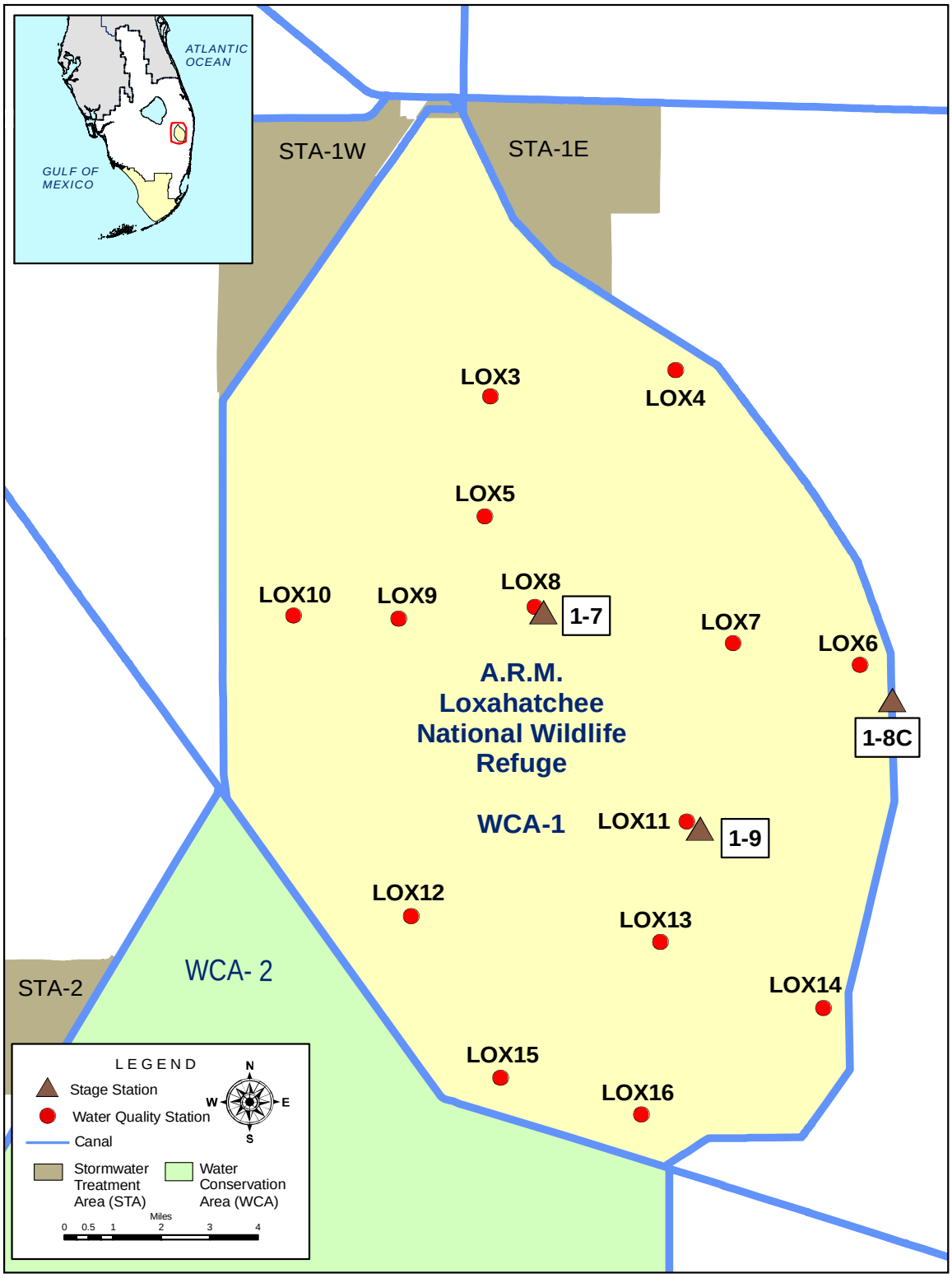

Figure 2. Arthur R. Marshall Loxahatchee National Wildlife Refuge water quality sampling and stage measurement sites.

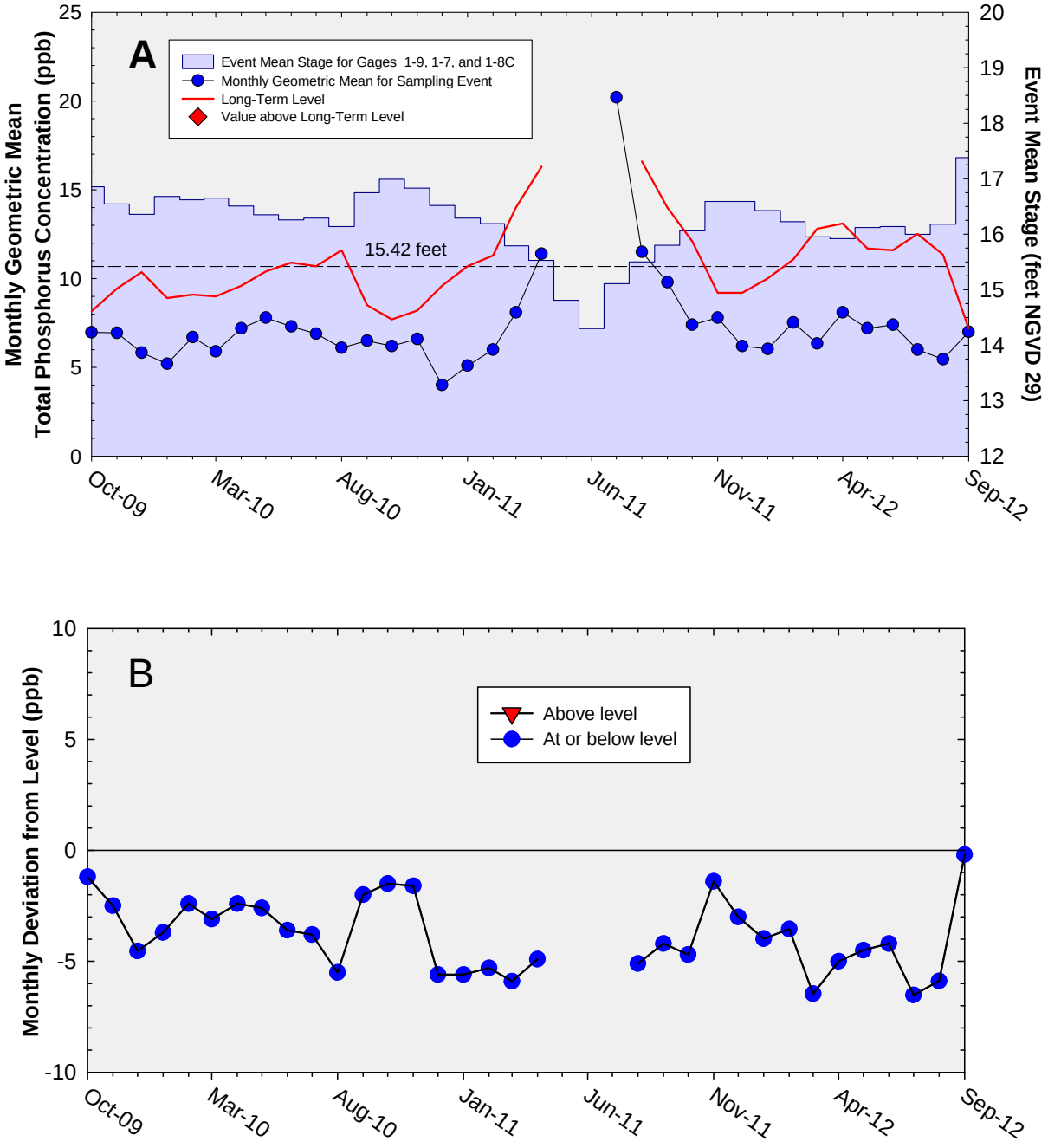

Figure 3. (A) Monthly total phosphorus geometric mean concentrations for the Arthur R. Marshall Loxahatchee National Wildlife Refuge compared to calculated long-term levels, which are adjusted for fluctuations in stage. The long-term level was not applicable for May 2011 through July 2011 because the average stage was less than 15.42 feet. June 2009 was the last month the geometric mean was greater than the long-term level. **(B)** Deviation of monthly geometric mean total phosphorus concentrations with calculated long-term levels. Values smaller than zero indicate that the geometric mean was lower than the long-term level.

Table 2. Loxahatchee National Wildlife Refuge total phosphorus compliance tracking.

Month	Geometric Mean TP Concentration (ppb)	Long-Term Level (ppb) Effective 12/31/2006	Average Stage[a] (ft NGVD 29)	Number of Samples
Oct-2009	7.0	8.2	16.86	14
Nov-2009	6.9	9.4	16.55	14
Dec-2009	5.8	10.4	16.36	12
Jan-2010	5.2	8.9	16.68	14
Feb-2010	6.7	9.1	16.62	14
Mar-2010	5.9	9.0	16.65	14
Apr-2010	7.2	9.6	16.51	14
May-2010	7.8	10.4	16.35	14
Jun-2010	7.3	10.9	16.26	14
Jul-2010	6.9	10.7	16.29	14
Aug-2010	6.1	11.6	16.14	10
Sep-2010	6.5	8.5	16.76	14
Oct-2010	6.2	7.7	16.99	14
Nov-2010	6.6	8.2	16.83	14
Dec-2010	4.0	9.6	16.52	13
Jan-2011	5.1	10.7	16.29	10
Feb-2011	6.0	11.3	16.19	10
Mar-2011	8.1	14.0	15.79	8
Apr-2011	11.4	16.3	15.53	7
May-2011	no data	N/A[b]	14.87	0
Jun-2011	no data	N/A[b]	14.30	0
Jul-2011	20.2	N/A[b]	15.11	4
Aug-2011	11.5	16.6	15.50	8
Sep-2011	9.8	14.0	15.80	11
Oct-2011	7.4	12.1	16.06	11
Nov-2011	7.8	9.2	16.59	14
Dec-2011	6.2	9.2	16.59	7
Jan-2012	6.0	10.0	16.43	14
Feb-2012	7.5	11.1	16.23	13
Mar-2012	6.3	12.8	15.96	10
Apr-2012	8.1	13.1	15.92	10
May-2012	7.2	11.7	16.12	12
Jun-2012	7.4	11.6	16.14	14
Jul-2012	6.0	12.5	16.00	14
Aug-2012	5.5	11.3	16.18	13
Sep-2012	7.0	7.2	17.38	14

Notes:
- ppb = parts per billion. Values are actually in µg/L (micrograms per liter), which, for the purposes of this report, is equivalent to ppb.
- ft NGVD 29 = elevation in feet related to the National Geodetic Vertical Datum of 1929.
- Highlighted rows with bold, italicized text indicate when an excursion over the long-term level occurred.
- The seven "J" flag qualified data collected on December 13, 2011, were excluded from the December 2011 geometric mean calculation following the TOC's decision at the May 30, 2012 quarterly meeting.

[a] Average stage is calculated using stage elevations at stations 1-7, 1-8C, and 1-9 for a given sampling date.
[b] N/A denotes that the level was not applicable because the average stage was less than 15.42 feet.

EVERGLADES NATIONAL PARK

Shark River Slough

Background

The Settlement Agreement/Consent Decree (1995) specified that interim and long-term TP concentration limits for discharges into the Everglades National Park (ENP) (**Figure 4**) through Shark River Slough be met by October 1, 2003, and December 31, 2006, respectively. It was specified that the TP concentrations be presented as 12-month flow-weighted means. Only the TP concentrations for the water year ending September 30 are evaluated for compliance with the Consent Decree limits (**Appendix D**). The long-term TP 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 TP through Shark River Slough are compared to the interim and long-term limits at the end of each water year (October 1 through September 30).

The 12-month flow-weighted mean TP concentration could not be calculated for the period ending on September 30, 2012, because finalized flow data were not available in time for publication of this report.

Reporting Period Update

Final flow data for the water year were not available at the time of preparation for this report. The report will be updated and republished after these data are finalized. Water quality data for Shark River Slough is available in **Appendix B**.

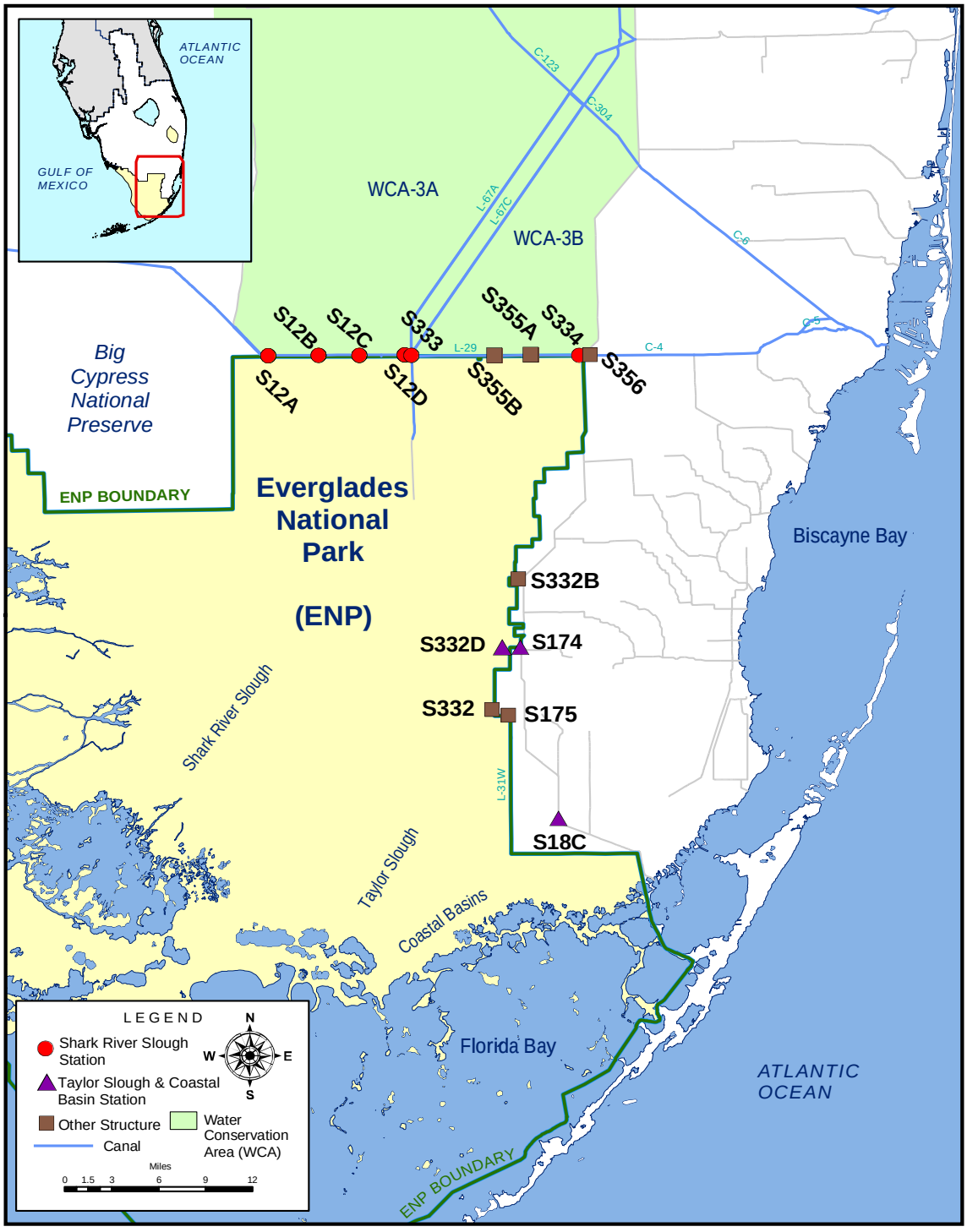

Figure 4. Everglades National Park flow structures.

Taylor Slough and Coastal Basins

Background

Under the Consent Decree, a single TP 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) (see **Appendix C**). The 12-month flow-weighted mean concentrations have consistently been lower than the long-term limit of 11 ppb.

Inflow TP concentrations to the ENP through Taylor Slough and 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 5**). The narrow bars in **Figure** 5 represent the 12-month flow-weighted mean TP concentrations from S332, S175, and S18C for water years 1991 through 2002. The wider bars for water years 1999 through **2012** represent the new combination of structures.

TP and flow data from both sets of structures presented in prior editions of this report through December 2001 (April 2002 report) showed that, beginning in 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 TP 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 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 5**. However, almost no flow passed through S174 from March 2006 to September 2007. The site was plugged in September 2007, preventing any additional flow.

The flow-weighted mean TP concentration was below the long-term limit for the 12-month period ending on September 30, 2012. Therefore, Taylor Slough and Coastal Basins TP concentration was in compliance for Water Year 2012.

Reporting Period Update

Figure 6 presents the 12-month and individual sampling event flow-weighted mean TP concentrations at the S332D and S18C structures. All TP grab sample concentrations taken on positive flow days reported for surface water monitoring at the sites were used for the compliance calculations.

The daily flows into ENP through S332D, S174, and S18C are presented in **Figures 7** and **8**.

For the combined flow through S332D and S18C, the 12-month flow-weighted mean TP concentrations for the periods ending in July, August, and September 2012 were 5.8, 5.8, and 5.7 ppb, respectively (**Table 3**).

The Consent Decree stipulates that the percent of flow-weighted mean TP concentrations greater than 10 ppb from each sampling event in any 12-month period must not exceed a fixed guideline of 53.1 percent. For the 12-month periods ending July, August, and September 2012,

the sampling event TP concentrations greater than 10 ppb were 2.1, 2.0, and 2.0 percent, respectively.

Figure 9 shows the relationship between the daily inflows and the corresponding flow-weighted mean TP concentrations for each sampling event. The sampling event flow-weighted mean concentrations generally remained very low. The average of the flow-weighted mean TP concentrations was 5.2 ppb in the third quarter.

The USACE authorized the C-111 project 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.

The original project facilities consisted of pump stations (S332B, S332C, and S332D), detention cells (Cell 1 through Cell 5), a connector cell between Cell 2 and Cell 3, a flow-way cell originating at Berm 3 of Cell 5, and four diversion structures (DS1 through DS4). Upon completion of a USACE construction project in 2009, an interconnected detention system now exists, starting at S332B west discharge and continuing to the S332D high head cell.

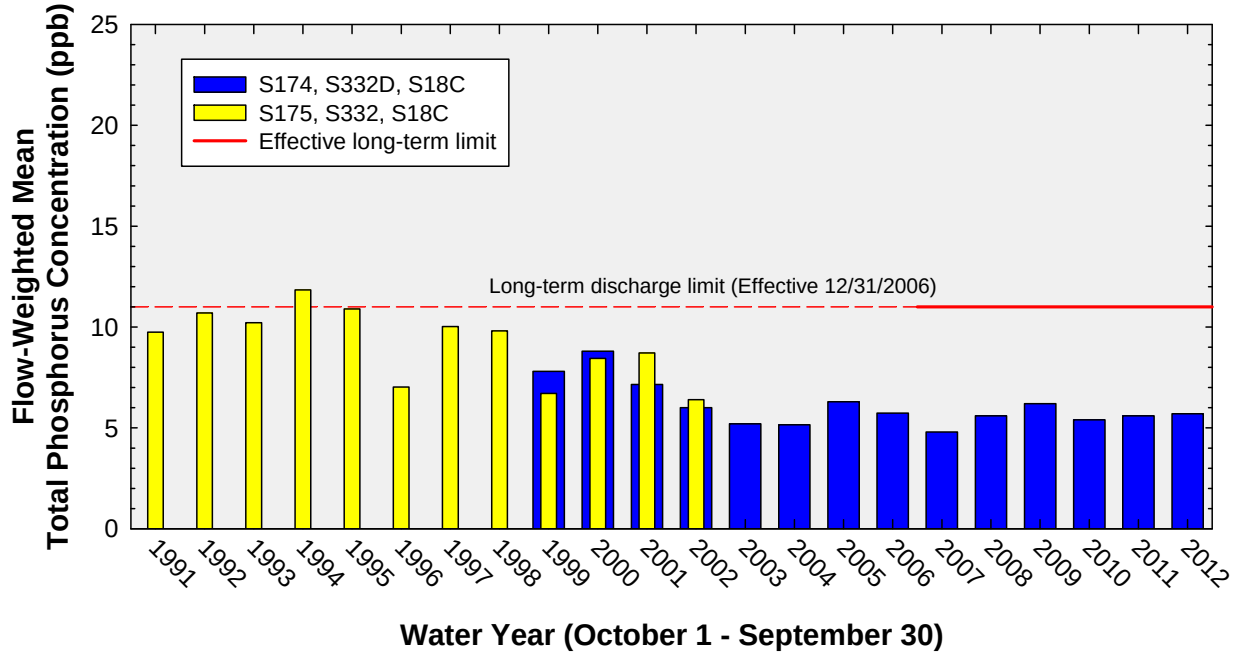

Figure 5. The 12-month flow-weighted mean total phosphorus concentrations in inflows to Everglades National Park through Taylor Slough and Coastal Basins at the end of each water year compared to the 11 ppb long-term total phosphorus limit.

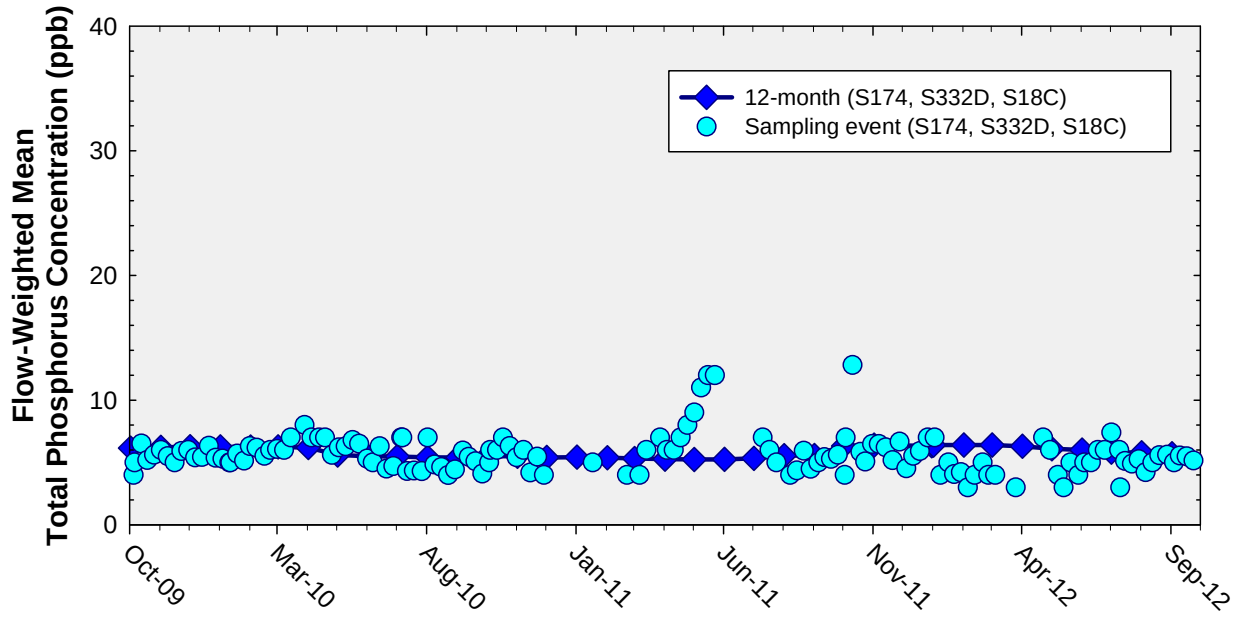

Figure 6. The 12-month flow-weighted mean total phosphorus concentrations in inflows to Everglades National Park through Taylor Slough and Coastal Basins at the end of each month and the flow-weighted mean total phosphorus concentration for each sampling event.

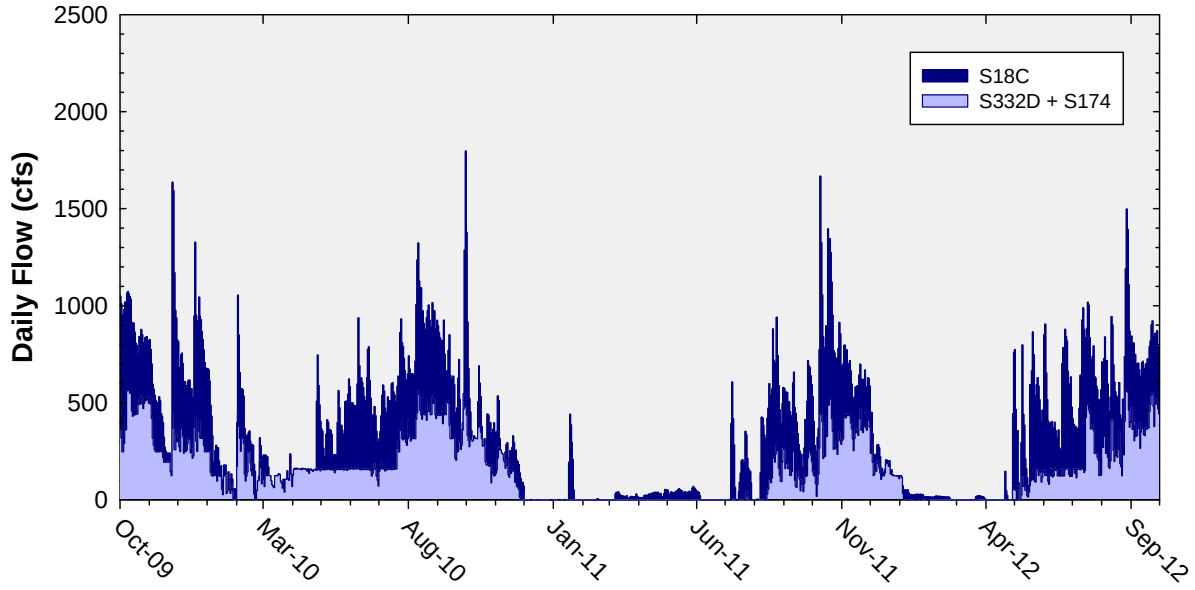

Figure 7. Daily flows into Everglades National Park as a stacked sum of Taylor Slough (structures S332D + S174) and Coastal Basins (structure S18C). Structure S174 was plugged in September 2007, and is no longer used.

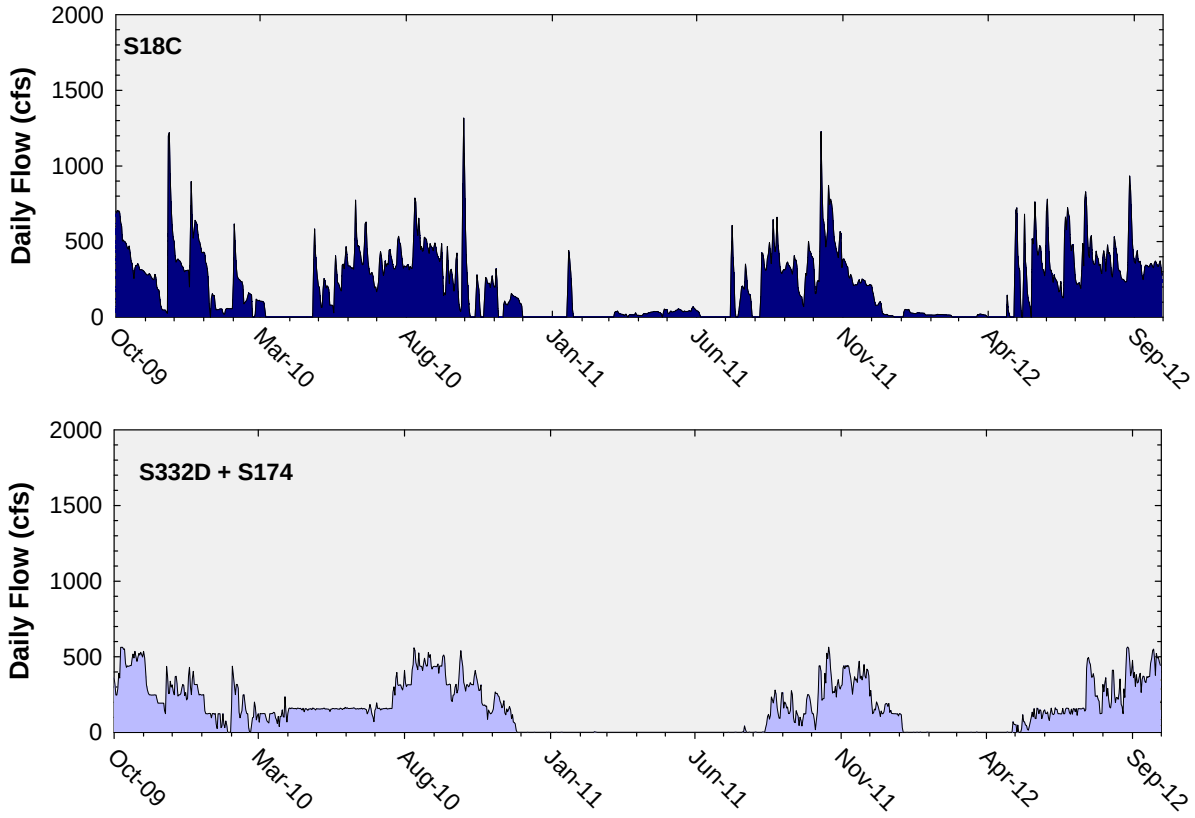

Figure 8. Daily flows at individual Coastal Basins (S18C) and Taylor Slough (S332D + S174) structures into the Everglades National Park.

Table 3. Taylor Slough and Coastal Basins total phosphorus compliance tracking.

12-Month Period	Total Flow (kac-ft)	Flow-Weighted Mean TP Concentration (ppb)	Long-Term Limit (ppb) *Effective 12/31/2006*	Percent of Sampling Events Greater than 10 ppb	
				Guideline	Observed
Nov 2008 - Oct 2009	399.3	6.1	11.0	53.1	2.3
Dec 2008 - Nov 2009	383.5	6.2	11.0	53.1	2.3
Jan 2009 - Dec 2009	391.5	6.3	11.0	53.1	2.4
Feb 2009 - Jan 2010	395.0	6.2	11.0	53.1	2.3
Mar 2009 - Feb 2010	414.5	6.2	11.0	53.1	2.1
Apr 2009 - Mar 2010	418.5	6.2	11.0	53.1	2.1
May 2009 - Apr 2010	430.6	6.2	11.0	53.1	2.0
Jun 2009 - May 2010	441.7	5.6	11.0	53.1	0.0
Jul 2009 - Jun 2010	428.2	5.5	11.0	53.1	0.0
Aug 2009 - Jul 2010	413.2	5.5	11.0	53.1	0.0
Sep 2009 - Aug 2010	404.8	5.4	11.0	53.1	0.0
Oct 2009 - Sep 2010	***377.5***	***5.4***	***11.0***	***53.1***	***0.0***
Nov 2009 - Oct 2010	349.1	5.5	11.0	53.1	0.0
Dec 2009 - Nov 2010	328.9	5.5	11.0	53.1	0.0
Jan 2010 - Dec 2010	283.3	5.4	11.0	53.1	0.0
Feb 2010 - Jan 2011	273.0	5.4	11.0	53.1	0.0
Mar 2010 - Feb 2011	253.5	5.4	11.0	53.1	0.0
Apr 2010 - Mar 2011	246.6	5.3	11.0	53.1	0.0
May 2010 - Apr 2011	235.2	5.3	11.0	53.1	0.0
Jun 2010 - May 2011	215.0	5.2	11.0	53.1	7.1
Jul 2010 - Jun 2011	183.4	5.2	11.0	53.1	8.1
Aug 2010 - Jul 2011	156.3	5.3	11.0	53.1	8.8
Sep 2010 - Aug 2011	126.4	5.5	11.0	53.1	9.4
Oct 2010 - Sep 2011	***111.4***	***5.6***	***11.0***	***53.1***	***9.4***
Nov 2010 - Oct 2011	134.6	6.3	11.0	53.1	12.1
Dec 2010 - Nov 2011	157.9	6.4	11.0	53.1	12.5
Jan 2011 - Dec 2011	170.2	6.3	11.0	53.1	11.1
Feb 2011 - Jan 2012	169.5	6.4	11.0	53.1	10.0
Mar 2011 - Feb 2012	170.2	6.4	11.0	53.1	9.3
Apr 2011 - Mar 2012	169.5	6.4	11.0	53.1	9.5
May 2011 - Apr 2012	170.3	6.3	11.0	53.1	10.0
Jun 2011 - May 2012	193.5	6.1	11.0	53.1	2.5
Jul 2011 - Jun 2012	224.6	6.0	11.0	53.1	2.3
Aug 2011 - July 2012	255.1	5.8	11.0	53.1	2.1
Sep 2011 - Aug 2012	273.0	5.8	11.0	53.1	2.0
Oct 2011 - Sep 2012	***290.7***	***5.7***	***11.0***	***53.1***	***2.0***

Notes:

- kac-ft = thousand acre feet.
- ppb = parts per billion. Values are actually in µg/L (micrograms per liter), which, for the purposes of this report, is equivalent to ppb.
- Compliance is evaluated annually based on the 12-month flow-weighted mean TP concentration for the federal water year ending on September 30. The compliance periods are shown as highlighted rows with bold, italicized text.

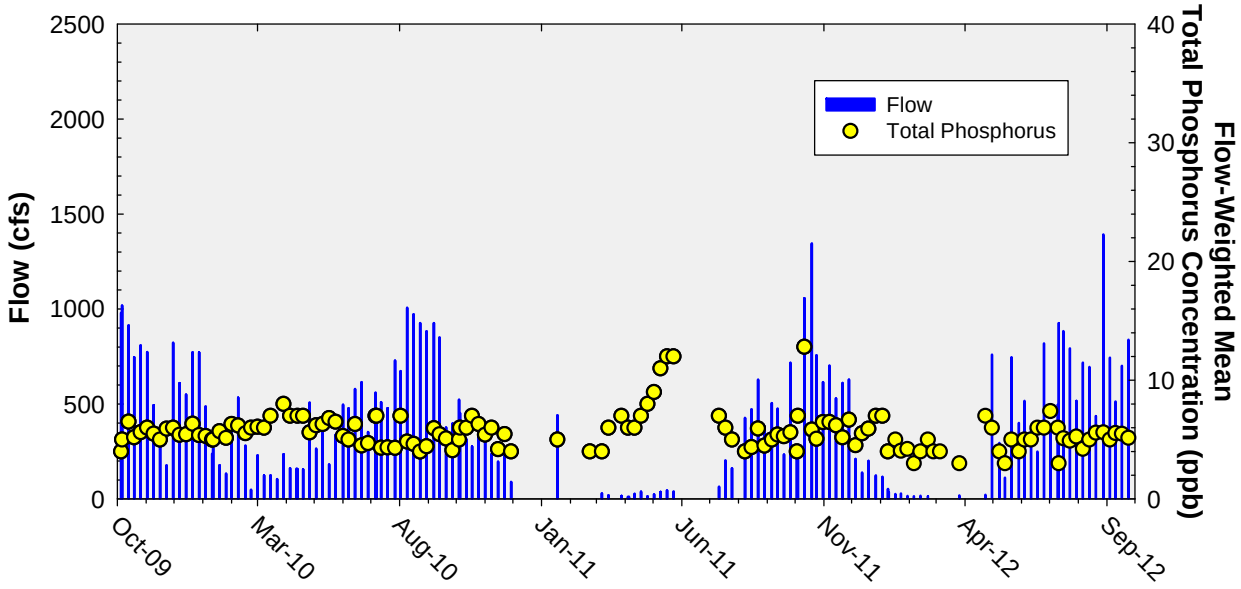

Figure 9. Flow from Taylor Slough and Coastal Basins structures (S332D + S174 and S18C) on the day of sampling and the corresponding flow-weighted mean total phosphorus concentrations for individual sampling events.

APPENDIX A

MONTHLY TOTAL PHOSPHORUS CONCENTRATION DATA FOR THE ARTHUR R. MARSHALL LOXAHATCHEE NATIONAL WILDLIFE REFUGE

Total phosphorus (TP) concentration data used in this report can be directly retrieved from the District's DBHYDRO database by copying and pasting the following link it to the address field of a web browser:
http://www.sfwmd.gov/dbhydroplsql/water_quality_data.report_full?v_where_clause=where+station_id+like+('LOX%25')+and+station_id+not+like+('LOXA%25')+and+test_number+=+25+and+date_collected+>=+'01-JUL-2012'+and+date_collected+<+'01-OCT-2012'+and+sample_type_new+=+'SAMP'&v_target_code=file_csv

The link above generates only data that have not been qualified. Qualified water quality data must be retrieved interactively via the DBHYDRO Browser.

Stage data for stations 1-7, 1-8C, and 1-9 from the reporting quarter can be retrieved by copying and pasting the following link it to the address field of a web browser:
http://www.sfwmd.gov/dbhydroplsql/web_io.report_process?v_period=uspec&v_start_date=20120701&v_end_date=20120930&v_report_type=format7&v_target_code=file_csv&v_run_mode=onLine&v_js_flag=Y&v_dbkey=FE775/FE776/FE777

Table A-1. Refuge monthly TP data (ppb).

Month-Year	LOX3	LOX4	LOX5	LOX6	LOX7	LOX8	LOX9	LOX10	LOX11	LOX12	LOX13	LOX14	LOX15	LOX16
Oct-2009	7	10	7	4	8	9	7	7	7	9	6	7	5	7
Nov-2009	7	16	6	5	6	9	6	5	7	9	6	6	7	7
Dec-2009	---	8	---	4	7	9	6	5	4	5	7	5	6	6
Jan-2010	7	5	7	4	5	8	5	5	5	5	5	4	5	4
Feb-2010	10	8	11	5	8	8	6	7	5	6	5	6	6	6
Mar-2010	11	7	10	2	7	8	6	6	4	6	5	5	6	6
Apr-2010	9	8	10	5	9	10	6	6	6	6	6	7	6	9
May-2010	9	7	14	7	8	8	6	5	9	8	7	8	7	10
Jun-2010	8	8	7	9	7	7	5	5	7	7	6	7	10	12
Jul-2010	9	9	9	8	7	6	5	7	5	6	6	6	7	8
Aug-2010	---	---	---	6	7	6	5	6	6	6	---	5	7	7
Sep-2010	6	10	6	5	6	6	6	6	6	8	6	6	7	8
Oct-2010	5	17	5	6	5	7	5	7	6	7	5	5	6	7
Nov-2010	5	11	6	6	7	9	5	6	7	7	7	7	5	6
Dec-2010	4	7 (J)	5	3	4	5	4	4	3	5	4	4	4	4
Jan-2011	---	8	---	5	6	8	---	---	4	5	4	4	4	5
Feb-2011	---	9	---	5	7	8	---	---	5	6	6	5	4	7
Mar-2011	---	---	---	---	12	15	---	---	7	6	7	7	7	7
Apr-2011	---	---	---	---	---	48	---	---	10	7	7	12	8	11
May-2011	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Jun-2011	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Jul-2011	---	30	---	---	12	---	---	---	---	20	---	---	23	---
Aug-2011	---	---	---	12	13	17	---	---	8	11	---	14	8	12
Sep-2011	---	13	---	10	6	10	12	10	8	11	---	9	8	13
Oct-2011	---	11	---	6	5	8	6	10	7	8	---	7	7	8
Nov-2011	7	18	7	6	7	10	7	8	9	7	9	6	6	7
Dec-2011	7 (J)	10 (J)	6 (J)	5	7 (J)	9 (J)	8 (J)	8 (J)	7	6	8	6	5	7
Jan-2012	5	9	6	5	6	8	3	8	7	6	6	6	6	6
Feb-2012	---	10	9	5	9	10	9	11	7	6	6	7	5	7
Mar-2012	---	6	---	5	8	10	---	---	6	5	7	6	5	7
Apr-2012	---	11	---	5	10	13	---	---	8	8	7	7	6	9
May-2012	---	9	---	5	8	8	9	9	7	6	7	6	6	8
Jun-2012	10	9	9	6	9	10	10	7	7	6	7	5	5	6
Jul-2012	5	7	6	5	5	7	6	6	5	6	8	5	7	7
Aug-2012	5	6	7	4	5	5	6	6	5	7	---	4	6	6
Sep-2012	8	15	8	6	8	7	7	7	5	6	5	7	6	7

Notes:

--- indicates sample was not collected due to insufficient water depth.

(J) indicates analyte detected in field blank and/or associated sample.

APPENDIX B

WEEKLY GRAB TOTAL PHOSPHORUS CONCENTRATION DATA FOR SHARK RIVER SLOUGH

Total phosphorus (TP) concentration data used in this report can be directly retrieved from the District's DBHYDRO database by copying and pasting the following link it to the address field of a web browser:
http://www.sfwmd.gov/dbhydroplsql/water_quality_data.report_full?v_where_clause=where+station_id+in+('S12A','S12B','S12C','S12D','S333')+and+test_number+=+25+and+collect_method+=+'G'+and+date_collected+>=+'01-JUL-2012'+and+date_collected+<+'01-OCT-2012'+and+sample_type_new+=+'SAMP'&v_target_code=file_csv

The link generates only data that have not been flagged. Flagged water quality data must be retrieved interactively via DBHYDRO Browser.

Table B-1. Weekly Grab TP Concentration Data for Shark River Slough (ppb).

Date	S12A	S12B	S12C	S12D	S333	Remarks
10/05/2011	32	---	---	11	13	N/A
10/12/2011	14	---	---	11	12	Compliance data
10/18/2011	27	---	9	13	14	N/A
10/25/2011	20	12	7	11	9	Compliance data
11/01/2011	12	8	6	15	11	N/A
11/08/2011	13	7	6	10	11	Compliance data
11/15/2011	12	8	5	7	14	N/A
11/22/2011	13	8	7	9	8	Compliance data
11/29/2011	12	---	6	8	12	N/A
12/06/2011	16	8	4	*	8	Compliance data
12/08/2011	---	---	---	7	---	Re-sampled datum
12/13/2011	11	8	6	8	9	N/A
12/20/2011	18	13	7	7	8	Compliance data
12/28/2011	18	---	10	8	8	N/A
01/04/2012	11	---	5	10	9	Compliance data
01/11/2012	10	---	---	8	8	N/A
01/18/2012	12	---	---	7	8	Compliance data
01/24/2012	8	---	---	7	8	N/A
01/31/2012	14	---	---	8	9	Compliance data
02/07/2012	14	---	---	7	11	N/A
02/14/2012	11	---	---	8	8	Compliance data
02/22/2012	12	---	---	9	9	N/A
02/28/2012	14	---	---	28	10	Compliance data
03/06/2012	12	---	---	9	11	N/A
03/13/2012	18	---	---	9	11	Compliance data
03/20/2012	18	---	---	10	8	N/A
03/27/2012	22	---	---	13	10	Compliance data
04/04/2012	16 (J)	---	---	---	10 (J)	N/A
04/13/2012	20	---	---	---	12	Compliance data
04/17/2012	19	---	---	---	12	N/A
04/24/2012	18	---	---	---	11	Compliance data
05/01/2012	16	---	---	---	12	N/A
05/09/2012	32	---	---	9	9	Compliance data
05/15/2012	14	---	---	12	12	N/A
05/22/2012	12	---	---	15	17	Compliance data
05/30/2012	26	---	---	**	13	N/A
06/05/2012	21	---	---	9	13	Compliance data
06/12/2012	18	---	---	9	19	N/A
06/19/2012	16	---	---	8	17	Compliance data
06/26/2012	20	---	---	8	13	N/A
07/02/2012	20	---	---	8	10	Compliance data
07/11/2012	14	---	---	---	9	N/A
07/17/2012	7	5	7	8	8	Compliance data
07/24/2012	6	6	9	9	10	N/A
07/31/2012	6	7	9	9	9	Compliance data
08/07/2012	6	7	10	12	10	N/A
08/14/2012	7	8	9	***	9	Compliance data
08/21/2012	9	8	8	***	8	N/A
08/29/2012	5	7	8	12	11	Compliance data
09/04/2012	8	10	8	10	9	N/A
09/11/2012	7	6	9	17	7	Compliance data
09/18/2012	7	7	8	14	9	N/A
09/25/2012	5	5	6	9	7	Compliance data

Notes:
--- indicates water sample was not collected because the spillway gates were closed at the time of the site visit.
(J) indicates analyte detected in field blank and/or associated sample.
"Compliance data" indicates bi-weekly sampling data used for consent decree calculation.
"N/A" indicates bi-weekly sampling data presented for informational purposes only and not used for consent decree calculation.

* Water sample taken at S12D on December 6, 2011, was not properly preserved, thus not analyzed. The site was resampled on December 8, 2011.

** Water sample taken at S12D on May 30, 2012, was misplaced and could not be analyzed.

*** Water samples were not collected at S12D on the August 14 and August 21, 2012, trips because the site was not accessible due to structure maintenance activities being conducted by the USACE.

APPENDIX C

WEEKLY GRAB TOTAL PHOSPHORUS CONCENTRATION DATA FOR TAYLOR SLOUGH AND COASTAL BASINS

Total phosphorus (TP) concentration data used in this report can be directly retrieved from the District's DBHYDRO database by copying and pasting the following link it to the address field of a web browser:
http://www.sfwmd.gov/dbhydroplsql/water_quality_data.report_full?v_where_clause=where+station_id+in+('S332DX','S18C','S174')+and+test_number+=+25+and+collect_method+=+'G'+and+date_collected+>=+'01-JUL-2012'+and+date_collected+<+'01-OCT-2012'+and+sample_type_new+=+'SAMP'&v_target_code=file_csv

The link generates only data that have not been flagged. Flagged water quality data must be retrieved interactively via DBHYDRO Browser.

Daily mean flow data for stations at Taylor Slough, S332D and S174, and Coastal Basins, S18C, during the reporting quarter can be retrieved by copying and pasting the following link to the address field of a web browser:
http://www.sfwmd.gov/dbhydroplsql/web_io.report_process?v_period=uspec&v_start_date=20120701&v_end_date=20120930&v_report_type=format7&v_target_code=file_csv&v_run_mode=onLine&v_js_flag=Y&v_dbkey=15760/TA413/15769

Table C-1. Weekly Grab TP Concentration Data for Taylor Slough and Coastal Basins (ppb).

Date	S332DX	S18C
10/03/2011	--	4
10/04/2011	7	--
10/11/2011	6	17
10/19/2011	7	5
10/24/2011	7	4
10/31/2011	7	6
11/07/2011	8	4
11/14/2011	7	5
11/21/2011	6	4
11/28/2011	8	4
12/05/2011	6	2
12/12/2011	6	4
12/19/2011	6	4
12/27/2011	7	3
01/03/2012	7	6
01/09/2012	--	4
01/10/2012	5	--
01/17/2012	6	5
01/23/2012	5	4
01/30/2012	6	4
02/06/2012	6	3
02/13/2012	5	4
02/21/2012	6	5
02/27/2012	5	4
03/05/2012	7	4
03/12/2012	5	3
03/19/2012	6	4
03/26/2012	6	3

Date	S332DX	S18C
04/02/2012	--	4
04/03/2012	9	--
04/09/2012	8	4
04/16/2012	10	4
04/23/2012	7	7
04/30/2012	6	6
05/08/2012	6	4
05/14/2012	5	3
05/21/2012	6	5
05/29/2012	6	4
06/04/2012	6	4
06/11/2012	6	4
06/18/2012	6	6
06/25/2012	7	6
07/02/2012	5	9
07/10/2012	6	--
07/11/2012	--	3
07/16/2012	6	4
07/23/2012	6	4
07/30/2012	6	5
08/06/2012	6	3
08/13/2012	5	5
08/20/2012	5	6
08/28/2012	5	6
09/04/2012	5	5
09/10/2012	7	4
09/17/2012	5	6
09/24/2012	6	4

Note: -- indicates water sample was not collected.

APPENDIX D

CALCULATION METHODS

Long Term Marsh Concentration Levels for Loxahatchee National Wildlife Refuge

Long Term Marsh Concentration Levels:

$$C = 10.7172 - 0.541156S + 1.372\sqrt{7.5819 - 0.9310S + 0.02902216\,S^2}$$

Terms:

C = the natural log of the geometric mean total phosphorus concentration across 14 marsh stations.

S = average stage measured at gauges CA1-9, CA1-7, and CA1-8C on sampling date (feet).

This equation is applicable over a stage range of 15.42 to 17.14 feet. If the stage on any sampling date exceeds 17.14 feet, a stage of 17.14 feet should be used in calculating the long term concentration levels. The equation shall not apply to dates when the average stage is less than 15.42 feet.

(*1991 Settlement Agreement entered as a Consent Decree in 1992 and modified in 1995, Exhibit B, Appendix B, Attachment II, page B-7*)

Discharge Limits and OFW Standards for Shark River Slough

Interim Discharge Limit:

$$C = 11.16 - 0.00465Q + 1.397\sqrt{6.377 - 0.00591Q + 0.00000436\,Q^2}$$

Long-Term Discharge Limit & OFW Standard:

$$C = 11.38 - 0.00538Q + 1.397\sqrt{2.493 - 0.00231Q + 0.00000170\,Q^2}$$

Frequency Exceedance:

$$F = 48.411 - 0.02896Q + 1.397\sqrt{330.1 - 0.3071Q + 0.0002254\,Q^2}$$

Terms:

Water Year = October through September

Q = total inflow to Shark River Slough for water year, S-12s + S-333 + any additional inflow from the WCAs established in the future, thousand acre-ft/yr (Kac-ft/yr).

C = limit on maximum flow-weighted-mean inflow concentration for any Water Year, composite of all inflows to Shark Slough (ppb).

F = exceedance for maximum frequency (percent) of inflow concentrations exceeding 10 ppb, computed from the time series of concentrations composited across all inflow structures on each sampling date with positive flow in a given Water Year.

The range of flow (Q) used in deriving the limits is 117 to 1061 Kac-ft/yr. If the total flow for any water year exceeds 1061 Kac-ft/yr, a flow of 1061 Kac-ft/yr should be used in calculating the discharge limits.

(*1991 Settlement Agreement entered as a Consent Decree in 1992 and modified in 1995, Exhibit B, Appendix A, Attachment I, page A-5*)

Note: Additional inflows, currently, comprises the discharges through S334, S355A and S335B, and S356. The latest TOC approved methodology to incorporate these additional inflows was documented in the Shark River Slough section of the Settlement Agreement July – September 2006 Report (dated November 9, 2011).

Discharge Limits and OFW Standards for Taylor Slough and Coastal Basins

Long-Term Flow-Weighted Discharge Limit & OFW Standard = 11.0 ppb

Frequency Exceedance:

Frequency of values > 10 ppb must be less than 53.1%.

Terms:

Limits are defined on a Water Year basis, October through September.

Basin flow is the total flow through structures S-332, S-175, S-18C, plus any new release points from this basin established in the future, thousand acre-ft/yr (Kac-ft/yr).

Limits apply to the flow-weighted-mean concentration for any Water Year, composite of all inflows to Taylor Slough (S-332) and Coastal Basin (S-18C).

Frequency exceedance is the exceedance for maximum frequency (percent) of inflow concentrations exceeding 10 ppb, computed from the time series of concentrations composited across all inflow structures on each sampling date with positive flow in a given Water Year.

(*1991 Settlement Agreement entered as a Consent Decree in 1992 and modified in 1995, Exhibit B, Appendix A, Attachment II, page A-6*)

APPENDIX E
DOCUMENT REVISIONS

Table E-1. Revisions to this report since initial publication.

Page/Date	Original	Revision
None		None