

The logo of the South Florida Water Management District is a circular emblem. It features a stylized sun with rays rising over a body of water. A white silhouette of a person is shown in a dynamic pose, appearing to be jumping or running through the water. The text "SOUTH FLORIDA WATER MANAGEMENT DISTRICT" is written in a circle around the central image. At the bottom of the circle, it says "DIVISION OF THE EVERGLADES DIST. 1924".

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CERTIFICATION

Project Name: EAA Basin Data Evaluation (Phase I); Task 2 – Documents
and Data Review; Work Order No: ST061287-WO01

The following key professionals were responsible for completion of the work products contained in this document.

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I hereby certify that the work products contained in this document have been prepared in accordance with generally accepted engineering practices under the supervision and direction of the undersigned, whose Seal as a Licensed Professional Engineer in the State of Florida is affixed below.

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1.0 INTRODUCTION

Florida's 1994 Everglades Forever Act (EFA), F.S. 373.4592, established long-term water quality goals designed to restore and protect the Everglades Protection Area (EPA). As defined in the Act, the EPA includes Water Conservation Areas (WCAs) 1, 2A, 2B, 3A, 3B, the Arthur R. Marshall Loxahatchee National Wildlife Refuge and the Everglades National Park. A primary component of the EFA is the Everglades Construction Project which includes a combination of phosphorus source control programs using mandatory best management practices (BMPs) within the Everglades Agricultural Area (EAA) and downstream treatment within manmade stormwater treatment areas (STAs) to reduce phosphorus levels prior to discharge into the EPA. Through the implementation of BMPs, the EFA requires a reduction in total phosphorus (TP) load in runoff from the EAA of not less than 25% compared to historic levels (1979-1988). To date, an average reduction of approximately 50% has actually been achieved since full implementation of BMPs starting in 1996.

During the 2003 legislative session, the 1994 EFA was amended to include reference to the March 17, 2003, Conceptual Plan for Achieving Long-term Water Quality Goals (Long-Term Plan). Although the Long-Term Plan for the Everglades Agricultural Area (EAA) recognized that the combined performance of the EAA BMP regulatory program and the STAs has exceeded expectations, supplemental adaptive management measures were identified to ultimately achieve water quality goals in the EPA. Accordingly, the Process Development and Engineering (PDE) component of the Long-Term Plan's overall water quality improvement strategy directed activities and funds towards "Identifying opportunities to maintain and improve upon the performance of source controls (BMPs) in reducing overall pollutant loads¹" discharging from specific basins, including the EAA. For the EAA, maintenance of the current level of performance is considered necessary to the Long-Term Plan as stated in section 5.1.1 *EAA Basins [Bc81(1)]*.

As stated in section 5.1 *Source Controls (BMPs) [Bc81]* of the Long Term Plan, activities directed at maintaining performance levels can be categorized into characterization, identification and implementation efforts. Therefore, the South Florida Water Management District is interested in conducting an investigation to characterize EAA basin discharges and processes tributary to those discharges in more detail, including Lake Okeechobee inflows. It is not sufficiently understood in particular the extent to which Lake Okeechobee inflows impact the EAA basins and the relatedness of those inflows to the maintenance of current levels of BMP performance in the EAA. Additionally, in recent years, in response to the published data, the District has received public inquiries on why differences in phosphorus concentration and load exist in surface waters throughout the EAA and the effects of the load coming into the EAA from Lake Okeechobee in the form of irrigation waters and pass through waters. Pass through waters are defined as any water deliveries from Lake

¹ Long-Term Plan page 5-2.

Okeechobee through the EAA canals not used for irrigation purposes within the EAA. The District is interested in exploring trends in the Lake Okeechobee inflows as well as trends in the distribution of these inflows. Furthermore, there have been questions raised about the perceived effects of the 2005 hurricanes on the water quality of the EAA and the spatial distribution of flows and loads. As a result of the large number of influences on the EAA Basin it is important to determine the relationships between these influences and how they have changed with time.

Therefore, in recognition of the Long-Term Plan requirement to carry out additional investigations and to further address public inquiries, this analysis to characterize EAA basin discharges and sub-basin (S-5A, S-6/S-2, S-7/S-2, and S-8/S-3) discharges, and Lake Okeechobee inflows, will be conducted.

1.1 PROJECT OBJECTIVE

The primary objective of this project is to develop an understanding of the relationship between Lake Okeechobee inflows, EAA Basin runoff, and downstream points of entry into STAs and the driving factors that govern those relationships. This could be accomplished through a basin level data evaluation (flows, load, concentrations, and any other relevant data) for trends, changes, and significance that will help define the relationships. This analysis will assist the District in discriminating between verifiable trends in data and perceived trends in data, helping to focus on important aspects that contribute or do not contribute to maintaining the current level of performance of the BMP Program within the EAA basin.

1.2 SCOPE OF WORK

This project is divided into two phases. Phase I is devoted to developing a minimum of three analysis proposals in a four-task process. Phase II, if conducted, will be devoted to conducting one or more of the analyses proposed in Phase I. The scoping of Phase II will take into consideration the objectives of section 5.6.4 *Lake Okeechobee Long-Term Trends [Bc86(4)]* of the Long-Term Plan which identifies a need to better understand the relationship between Lake Okeechobee nutrient status and operations (depth regulation, choice of outflow point) on phosphorus loads discharged to the STAs.

BPC Group Inc. completed the following tasks, which were included in a work order issued by the District under Work Order No: ST061287-WO01. The current work order pertaining to Phase I of the project is divided into several technical and deliverable tasks as given below. Phase II tasks will be developed at the completion of the Phase I activities.

Task 1 – Initial Kick-Off Meeting

This included attending the kick-off meeting at the District headquarters in West Palm Beach, Florida with primary focus on clarifying the project requirements along with establishing lines of communication and project schedule. The meeting was held on August 10, 2006, and the final meeting minutes after being reviewed by the District was delivered on September 20, 2006.

Task 2 – Documents and Data Review

This includes brief reviews of all documents provided by the District with focus on gaining better understanding of the challenges facing the EAA basin with respect to the long term plan requirements and the goal to identify additional opportunities for water quality improvement. This report represents the Task 2 deliverable.

Task 3 – Interim Coordination Meeting

This task involves presenting the findings of the Task 2. The primary focus of the meeting is to ensure that we have a better understanding of the type and extent of the data to be used for data evaluation in Phase II of this project.

Task 4 – Phase II SOW Analysis Proposals

This task includes development of proposals for multiple analyses that could be carried out during Phase II of this project. The proposals will be primarily based on the discussions during the Interim Coordination Meeting in Task 3, with primary focus on the interrelation between the EAA basin and Lake Okeechobee. The proposed analyses will be presented to the District staff for a detailed discussion during the meeting.

This report presents the findings of Task 2. The subsequent task reports will be prepared at a later date.

2.0 SUMMARY OF REVIEW RESULTS

2.1 REVIEW SOURCES

At the conclusion of the kick-off meeting on August 10, 2006, the District provided a copy of the “2006 South Florida Environmental Report” as an important source of document review. The remainder of the sources for the review process included personal communications with District staff and electronic searches of web sites of the District and other agencies.

A total of approximately 120 documents were identified that had some relevance to the EAA and BMPs for phosphorus load reduction. Base on a cursory review of the technical contents, these documents were categorized into the following groups.

- Group A: The documents in this group are the primary references consisting of seven SFWMD reports that contain the most comprehensive numerical data for flow, TP load and TP concentration for basins within the EAA and the Lake Okeechobee structures.
- Group B: This group contains SFWMD documents with supporting numerical data that contain additional or replicated data to that of the primary documents, Group A. The older SFWMD annual reports are in this group.
- Group C: SFWMD documents without numerical data are in this group. These documents describe the system, research efforts and current work.
- Group D: This group includes the SFWMD Excel documents containing numerical data with corresponding macros that were developed by the District to model portions of the system.
- Group E: The PowerPoint presentations developed by the District for various projects are included in this group.
- Group F: The documents searched from external sources (non-District sources) are listed in this group. Although the documents in this group were not reviewed, they were included here as potential sources or references for future work, if necessary.

Appendix A presents a comprehensive list of the documents reviewed for this project. The list of documents in Appendix A are organized in the same order as the above categories.

Additional Information Sources

The following three additional sources also provided background data and supporting information:

- DBHYDRO Browser – contains data for a number of different water quality parameters that can help to provide a more complete understanding of the water quality, flows and loads, in the system.
- Florida's Wetland WebGIS – provides a geographic reference to major components of the system, and visually represents processes or problems within the system.
- Tom James (SFWMD) – knowledgeable of raw data for phosphorus loading conditions at inflow and outflow locations to Lake Okeechobee under various District programs, and has agreed to assist this study by providing compiled data sets as needed for future investigations.

2.2 REVIEW RESULTS

The seven primary documents as indicated in Group A, above, are listed below along with a brief summary of the contents of each document. Appendix B presents a number of tables summarizing the data type and duration for each basin/structure. The actual data are not included here, since the applicable data sets will be identified and selected based upon the discussions during Task 3 of this project.

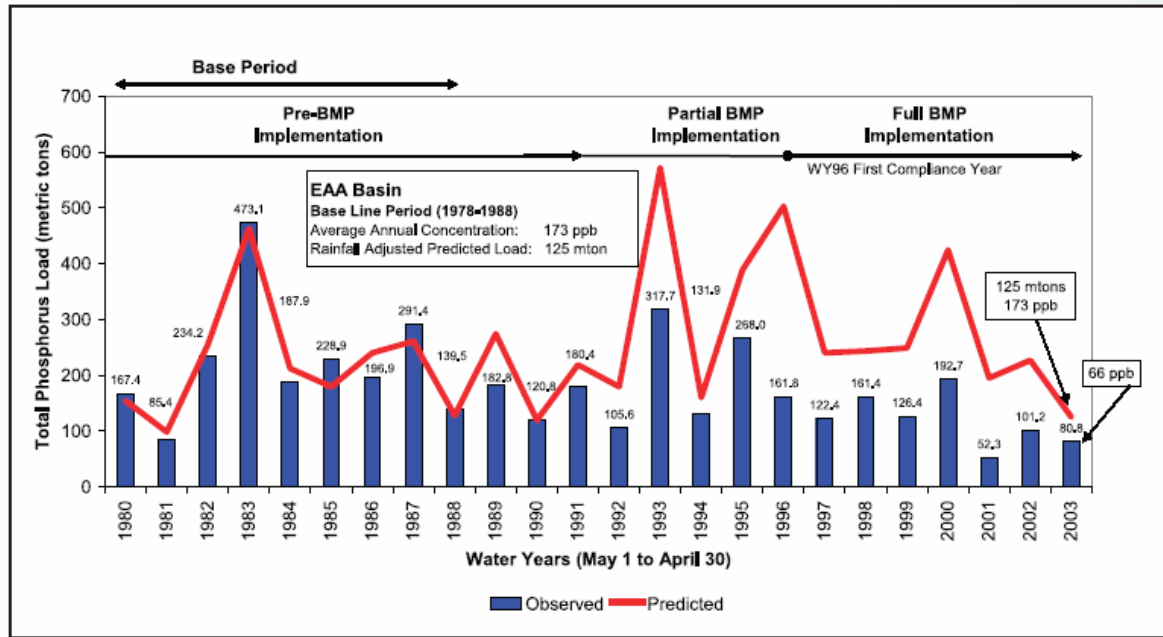
- 2004 Everglades Consolidated Report
- 2005 South Florida Environmental Report
- 2006 South Florida Environmental Report
- Baseline Data for the Basin-Specific Feasibility Studies to Achieve the Long-Term Water Quality Goals for the Everglades (+Appendices)
- C-51 West Sub-basin Updated Analysis of Flow and Phosphorus Data
- Everglades Agricultural Area Regional Feasibility Study for Period 2010-2014 (+Appendices)
- Lake Okeechobee Total Phosphorus Inflows and Outflows – Posted 8-1-2006

Document: SFWMD. (2004) “2004 Everglades Consolidated Report” South Florida Water Management District, West Palm Beach, Florida, January 1, 2004.

http://www.sfwmd.gov/org/ema/everglades/consolidated_04/final/index.html

Data Review Summary: This is an annual status report that provides general conditions (trends) of the environment and certain data for Water Year 2003, but does not include quantitative analyses of the datasets such as statistical evaluations of flow, load, or concentration. As documented in this report, the general trend of BMP effectiveness, expressed as a reduction in the total load of phosphorus from the EAA, is determined by comparing measured phosphorus discharges from District structures for each 12-month water

year to the base period. It was reported that a 35% reduction in phosphorus load over the base period was achieved because of the EAA BMP program. The following figure excerpted from this report presents the trend of observed and predicted phosphorus loads from the EAA since 1980.



Phosphorus loads from the Everglades Agricultural Area, observed and predicted, since 1980

The following chapters of this report provide numerical data for flows, loads and concentrations at various structures throughout the system. Please note that the flow data presented in this document represent the total flows at the structures. These data do not separate the EAA basin runoff from the discharges released from Lake Okeechobee.

- Chapter 2C: Summary of TP concentrations in the EPA: WCA-1, WCA-2, WCA-3 and ENP for WY2002, WY2003 and a historical average from WY1978 through WY2001.
- Chapter 3: WY2003 summary of loads, flows and concentrations entering and leaving the EAA at each structure and leaving the C-139 basin at each structure.
- Chapter 4A: Summary of loads, flows and concentrations for STA-1W, STA-2, STA-5, STA-6 and the Rotenberger Wildlife Management Area for the WY2003; and the TP removal rate for the year at each location.
- Chapter 4B: Summary of WY2003 annual geometric mean inflow and outflow TP concentrations and TP concentration reductions based on various flow patterns within each cell for STA-1W, STA-2, STA-5 and STA-6.
- Chapter 8A: Projected TP reductions in the Everglades Construction Project basins and in the Everglades Stormwater Program Basins; and a WY2003 summary of

- flows and TP loads and concentrations by structure for WCA-1, WCA-2, WCA-3 and the ENP.
- Appx 2C-2: Detailed annual summary of TP concentrations for WY2003 in the ENP, WCA-1, WCA-2 and WCA-3.
- Appx 5-1: Monthly inflow/outflow data for WCA-1 at each structure for WY2003.
- Appx 5-2: Monthly inflow/outflow data for WCA-2 at each structure for WY2003.
- Appx 5-3: Monthly inflow/outflow data for WCA-3 at each structure for WY2003.
- Appx 5-4: Monthly inflow data for the ENP at each structure for WY2003.

Document: *SFWMD. (2005) "2005 South Florida Environmental Report" South Florida Water Management District, West Palm Beach, Florida, February 15, 2005.*
http://www.sfwmd.gov/sfer/SFER_2005/2005/volume1/v1contents.html

Data Review Summary: This is an annual status report that presents an integrative summary of research, planning, and monitoring activities that are in progress throughout the District for Water Year 2004. It was reported that the EAA basin has been in compliance with the Everglades regulatory Program of BMPs for nine years since the first compliance year of Water Year 1996. Over the nine years, the EAA's annual percentage load reduction average of TP is greater than 50% versus the requirement of 25%. This report graphically presents the hydrologic data such as flows and stages for the Water Year 2004, but does not include quantitative analyses of the datasets to account for spatial and temporal variations. The following chapters provide numerical data for flows, loads and concentrations at various structures throughout the system.

- Chapter 2C: Summary of TP concentrations in the EPA: WCA-1, WCA-2, WCA-3 and ENP for WY2003, WY2004 and a historical average from WY1978 through WY2002; and a WY2004 summary of flows and TP loads and concentrations by structure for WCA-1, WCA-2, WCA-3 and the ENP.
- Chapter 3: WY2004 summary of loads, flows and concentrations entering and leaving the EAA at each structure, and leaving the C-139 basin at each structure.
- Chapter 4: Summary of loads, flows and concentrations for STA-1W, STA-2, STA-3/4, STA-5, STA-6 and the Rotenberger Wildlife Management Area for the WY2004; and the TP removal rate for the year at each location.
- Chapter 10: Surface water inflow and TP concentrations and loading rates for the major tributary basins in the Lake Okeechobee watershed for WY2004 and comparable concentrations at the basin outlet structures.
- Appx 2C-2: Detailed annual summary of TP concentrations for WY2004 at the ENP, WCA-1, WCA-2 and WCA-3.
- Appx 3-2g: Maps of monitoring locations and raw sampling data for the following locations and dates:
Village of Wellington: 7/10/2000 - 2/26/2004
North Springs Improvement District: 6/26/2001 - 4/26/2004
South Broward Drainage District: 7/14/2000 - 11/3/2003
Central Broward Water Control District: 7/27/2000 - 11/7/2003

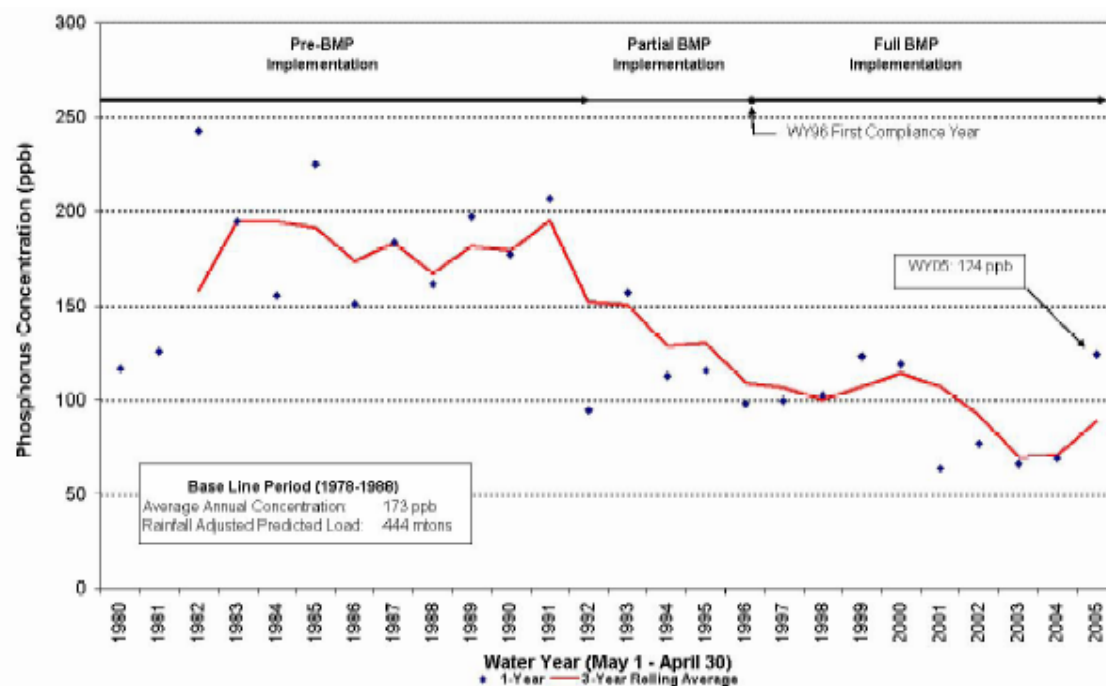
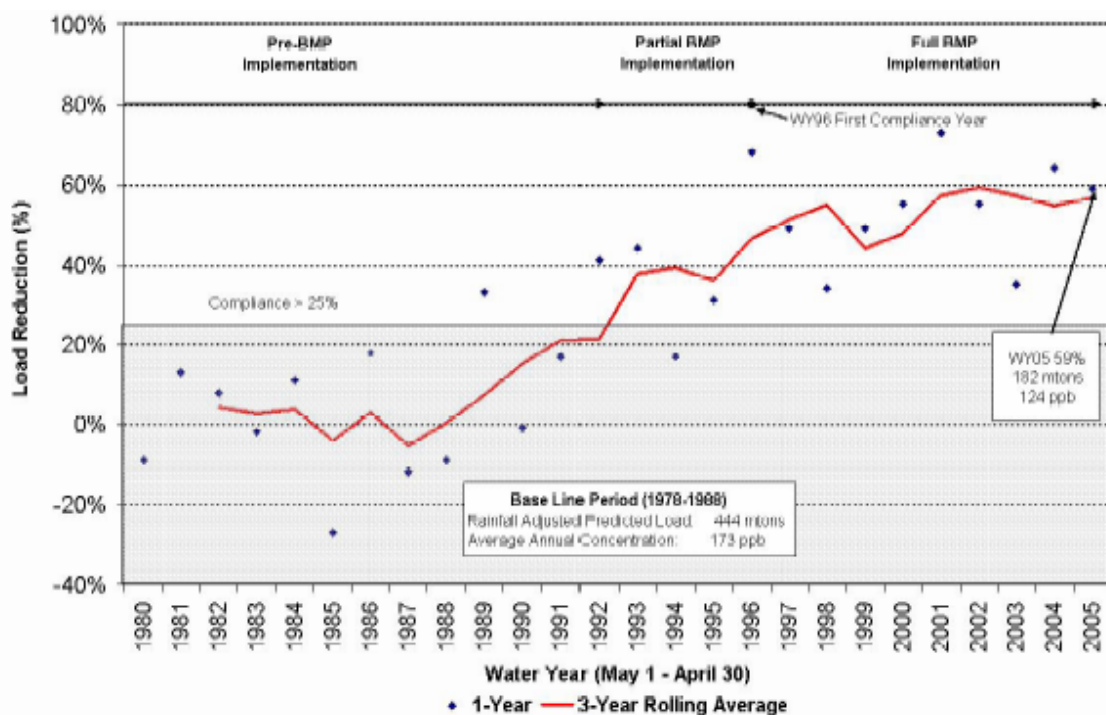
Indian Trace Drainage District: 10/4/2000 - 4/14/2004
North New River Canal Basin: 5/24/2001 - 4/14/2004
West Feeder Basin: 6/26/1996 - 10/23/1997
Boynton Farms: 4/26/2000 - 11/5/2003
C-111 Basin: 5/11/1999 - 4/28/2004

Appx 5-2: WY2004 monthly inflows and outflows for the following locations:
Lake Kissimmee and Lake Istokpoga
Lake Okeechobee
Indian River Lagoon and St. Lucie Estuary
Caloosahatchee River
WCA-1, WCA-2, WCA-3
Everglades National Park

Document: SFWMD. (2006) "2006 South Florida Environmental Report" South Florida Water Management District, West Palm Beach, Florida, March 1, 2006.
http://www.sfwmd.gov/sfer/SFER_2006/volume1/vol1_table_of_contents.html
1

Data Review Summary: This is an annual status report that presents an integrative summary of research, planning, and monitoring activities that are in progress throughout the District for Water Year 2005. It was reported that the EAA's annual percentage load reduction average of TP is greater than 50% over the 10 years since program initiation. The following two plots were reproduced from this report which shows the trends of TP load reduction and flow-weighted TP concentration over EAA. However, quantitative analyses of the spatial and temporal variations along with statistical analyses for potential correlations are not included in the report. This report graphically presents the hydrologic data such as flows and stages for the Water Year 2005, but does not include quantitative analyses of the datasets to account for spatial and temporal variations.

OCTOBER 2006
EAA BASIN DATA EVALUATION (PHASE I)
TASK 2: DOCUMENTS AND DATA REVIEW, ST061287-WO01



The following chapters of this report provide numerical data for flows, loads and concentrations at various structures throughout the system.

- Chapter 2C: Summary of TP concentrations in the EPA: WCA-1, WCA-2, WCA-3 and ENP for WY2004, WY2005 and a historical average from WY1978 through WY2003; and a WY2005 summary of flows and TP loads and concentrations by structure for STA-1, WCA-1, WCA-2, WCA-3 and the ENP.
- Chapter 3: WY2005 summary of loads, flows and concentrations entering and leaving the EAA at each structure and leaving the C-139 basin at each structure; and a graphical representation of the TP and flow data from WY1998 through WY2005 for the following structures: ACME1, ACME2, NSID1, S-9, S-9A, G-123, S-190, S-140, S-18C, S-175 and S-332.
- Chapter 4: Summary of loads, flows and concentrations for STA-1W, STA-2, STA-3/4, STA-5, STA-6 and the Rotenberger Wildlife Management Area for the WY2005; and the TP removal rate for the year at each location. Annual water budgets and TP budgets for flow-ways and treatments cells in the STAs are also detailed in this chapter.
- Chapter 6: Mean TP concentrations of the 0-10cm layer of soil with standard deviations for each monitoring station in northwestern WCA-2A.
- Chapter 10: Water year TP budget for Lake Okeechobee from 1974 through 2005; surface water inflows and TP concentrations and loading rates for the major tributary basins in the Lake Okeechobee watershed for WY2005; and TP budget by land use for the Lake Okeechobee watershed.
- Appx 2C-2: Detailed annual summary of TP concentrations for WY2005 at the ENP, WCA-1, WCA-2 and WCA-3.
- Appx 3-1b: Summary of loads, flows and concentrations entering and leaving the EAA at each structure for WY2005.
- Appx 3-2f: Maps of monitoring locations and raw sampling data for the following locations and dates:
Village of Wellington: 7/10/2000 - 3/28/2005
North Springs Improvement District: 6/26/2001 - 4/25/2005
South Broward Drainage District: 7/14/2000 - 4/8/2005
Central Broward Water Control District: 3/21/2000 - 7/20/2004
Indian Trace Drainage District: 10/4/2000 - 8/2/2004
North New River Canal Basin: 5/24/2001 - 4/8/2005
West Feeder Basin: 6/26/1996 - 10/23/1997
Boynton Farms: 4/26/2000 - 11/6/2003
TP loads for the following water years at indicated structure:
WY1998-WY2005: USSO, S-176
WY1999-WY2005: PC-17A, G-108, Combined PC-17A and G-108, WWEIR
WY2002-WY2004: L-28IN, L-28U
WY2002-WY2005: S-332D

WY2004-WY2005: S-174
WY2005: S-332B

Appx 5-3: WY2005 monthly inflows and outflows for the following locations:
 Lake Kissimmee and Lake Istokpoga
 Lake Okeechobee
 Indian River Lagoon and St. Lucie Estuary
 Caloosahatchee River
 WCA-1, WCA-2, WCA-3
 Everglades National Park

Document: *Goforth, G. and Piccone, T. (2001) "Baseline Data for the Basin-Specific Feasibility Studies to Achieve the Long-Term Water Quality Goals for the Everglades." Environmental Engineering Section, Everglades Construction Project, South Florida Water Management District, West Palm Beach, Florida, May 2001.*
<http://www.sfwmd.gov/org/erd/bsfboard/baseline%20data%20report%20may%202001.pdf>

Data Review Summary: This publication addresses the need for a baseline flow and water quality data set for the STAs and for the other primary basins within the system. The study started with a ten-year period of data from May 1989 to April 1999. For areas that didn't have ten years of data, the most complete data set available was used. In combination with rainfall data from 1965 to 1995 the study used the South Florida Water Management Model (SFWMM) to create a complete synthetic 31-year data set of daily flows and phosphorus concentrations.

A baseline data set was generated for the following STAs/Basins: STA-1 East, STA-1 West, STA-2, STA-3/4, STA-5, STA-6, Acme Basin B, North Springs Improvement District Basin (NSID), North New River Canal Basin, C-11 West Basin, L-28 Basin and Feeder Canal Basin. It should be noted that the inflow data to these STAs represent the outflow measurements from the EAA. The data presented in this report represent the total flow at the structures or canals, and the discharges from Lake Okeechobee are not separated from the EAA runoff.

Document: *Pietro, K. and Goforth, G. (2005) "C-51 West Sub-Basin Updated Analysis of Flow and Phosphorus Data." South Florida Water Management District, West Palm Beach, Florida, June 29, 2005.*
http://www.sfwmd.gov/org/erd/longtermplan/pdfs/final_C-51_West_Basin_Data_Analysis_June2005_Pietro_tech_pub.pdf

Data Review Summary: This publication focuses on the flows, TP loads and TP concentrations entering and leaving the C-51 West Sub-basin through structures S-5AE and S-155 and State Route 7. Yearly averages for S-5AE are provided for 1982 through 2003; for S-155 from 1979 to 2003; and for State Route 7 from 1997 to 2001. These structures were monitored in order to better estimate inflows and loads to STA-1E and STA-1W. It

should be noted that the flow and loads at S-155 and SR-7 are outside the EAA basin, while the measurements at S-5A represent the outflows from the EAA basin.

Document: *A.D.A. Engineering, Inc. "Everglades Agricultural Area Regional Feasibility Study for Period 2010-2014." South Florida Water Management District, West Palm Beach, Florida, October 2005.*

Data Review Summary: This publication is a compilation of historical data and simulated data for all of the major basins in the system. Appendix E of this document (Deliverable 1.3.2 – Historic Inflow Volumes and Total Phosphorus Concentrations by Source) contains flows, TP loads and TP concentrations for the following Basins/Districts and their associated structures: C-51, C-139, L-8, S-5A, S-6/S-2, S-7/S-2, S-8/S-3, South Florida Conservancy District, South Shore Drainage District, East Shore Water Control District, and East Beach Water Control District. The majority of these locations have data recorded from 1995 to 2004.

Document: *James, Tom. "Lake Okeechobee Total Phosphorus Inflows and Outflows – Posted 8/1/2006." South Florida Water Management District, West Palm Beach, Florida, August 1, 2006.*

Data Review Summary: This data set provides monthly averages for flows, loads and concentrations at various inflow and outflow structures to Lake Okeechobee.

The remaining documents listed in Appendix A are included to provide a general background about the Everglades, changes from agricultural and urban development, and recent measures to restore the Everglades. Several of the documents detail the Acceler8 projects and BMPs that are currently being used in the EAA.

3.0 RECOMMENDATIONS

Limited data was encountered for the following areas. Additional studies in these areas would be beneficial to incorporate into the system model.

- Due to the general characteristics of shallow lakes, intense weather and annual turnover can cause sediment re-suspension into the water column. Significant re-suspension is believed to have occurred due to the high water levels and the exceptionally active hurricane seasons of 2004 and 2005. Changes in soluble phosphorus levels also can result from nutrient cycling within the lake.
 - Study: Document the interaction and correlation between lake stage and soluble and particulate phosphorus in Lake Okeechobee.
 - Study: Document the physiochemical and biological processes between the substrate and the water column in Lake Okeechobee and the resulting effects on phosphorus concentrations.
- Research performed by the University of Florida indicated that there were significant concentrations of both dissolved and particulate phosphorus in the canals, and that the current BMPs are not adequate to remove the light-weight flocculants released from the biomass due to erosive velocities during canal pumping cycles.
 - Study: Quantify phosphorus concentrations throughout the EAA due to these sources and develop methods to reduce them.
 - Study: Identify the contributions to the EAA canals of soluble and particulate phosphorus that can be attributed to Lake water.
- Several structures/gates that control the inflow/outflow to/from Lake Okeechobee have limited data.
 - Study: Monitoring the flows and concentrations at these structures may facilitate a better understanding of the system.
 - Study: Additional consideration of the statistical relationship between the phosphorus concentrations at these structures and the lake water trends could yield valuable insight into the District's ability to predict and model the effects on the EAA basins of lake trends.
- It is of invaluable assistance to quantify the effect of the discharges from Lake Okeechobee on the performance of the BMP program in the EAA. Phase II should include a methodology to identify and quantify (to the extent feasible) the effects of flows and loads from Lake Okeechobee for each EAA basin. This would allow the District to statistically segregate the lake and EAA effects from the analysis of the inflows to the STAs. This would enable the District to continue to quantify the BMP performance over time even as changes occur to the Lake Okeechobee release patterns and associated TP loadings.

APPENDIX A

Comprehensive List of Searched Documents

AGENCY	REFERENCE TITLE
	Group A: Primary Documents (SFWMD)
SFWMD	2004 Everglades Consolidated Report
SFWMD	2005 South Florida Environmental Report
SFWMD	2006 South Florida Environmental Report
SFWMD	Baseline Data for the Basin-Specific Feasibility Studies to Achieve the Long-term Water Quality Goals for the Everglades & Appendices
SFWMD	C-51 West Sub-basin Updated Analysis of Flow and Phosphorus Data
	Everglades Agricultural Area Regional Feasibility Study Deliverable 1.3.2 - Historic Inflow Volumes and Total Phosphorus Concentrations
SFWMD	by Source
SFWMD	Everglades Agricultural Area Regional Feasibility Study For Period 2010-2014 & Appendix A-M
SFWMD	Lake Okeechobee Total Phosphorus Inflows and Outflows - Posted 8-1-06

AGENCY	REFERENCE TITLE
SFWMD	Everglades Agricultural Area Storage Reservoir A-1: 30% Earthworks Design Phase
SFWMD	Everglades Protection Area Tributary Basins Long-Term Plan for Achieving Water Quality Goals
SFWMD	Lake Okeechobee Long-Term Trends [Bc86(4)]
SFWMD	Lake Okeechobee Protection Program: Below the surface, an in depth look...
SFWMD	Lake Okeechobee SWIM Plan Update - Chapter 1
SFWMD	LO-4 Lake Okeechobee Total Phosphorus Concentration
SFWMD	LO-5 Lake Okeechobee Phosphorus Loads
SFWMD	Monitoring Plan for Everglades Protection Area - Water Conservation Area 1
	North Springs Improvement District: Task 5 - Evaluation of Existing Conditions and Impacts of Proposed Impoundment on Hillsboro Canal
SFWMD	Hydraulics
SFWMD	Periphyton-based Stormwater Treatment Area Technology
SFWMD	Quality Assessment Report for Water Quality Monitoring
SFWMD	Quick Facts on...Everglades Agricultural Area Stormwater Treatment Area Expansion
SFWMD	Quick Facts on...Everglades Agricultural Area Reservoir A-1
SFWMD	Quick Facts on...Stormwater Treatment Areas
SFWMD	STA-1W 2-D Hydraulic Modeling - Final Report
SFWMD	STA-2 2-D Hydraulic Modeling (Linked Cells Model) Task 1.8 - Final Report
SFWMD	STA-6 2-D Hydraulic Modeling Task 2.3.1 - Final Draft Report
SFWMD	Stormwater Treatment Area 2 Expansion Project: Work Order 1 - Conceptual Planning
SFWMD	Stormwater Treatment Area No. 3 and 4 Plan Formulation Part 12
SFWMD	Stormwater Treatment Area No. 3 and 4 Plan Formulation Part 4
SFWMD	Summary of STA Vegetation Management Practices
SFWMD	Water Quality Impacts of Reservoirs: Task 4 - Data Validation and Data Interface
SFWMD	Hurricane Effects on a Shallow Lake Ecosystem and Its Response to a Controlled Manipulation of Water Level
SFWMD	Everglades Forever Act - The 2000 Florida Statutes (Section 373.4592 Everglades Improvement and Management)
SFWMD	Federal Approval Received for Construction of Largest Acceler8 Reservoir
	Group D: SFWMD Excel Documents and Programs
SFWMD	Basin Compliance Calculations - EAA Regulatory Rule - Version July 31, 2000 (Excel)
SFWMD	Refuge TP Compliance Table & Refuge Inflow Load Table: LOX (Excel)
SFWMD	Refuge TP Data: LOX (Excel)
SFWMD	STA Performance Summary: Inflow and Outflow - Flows and Loads (Excel)
SFWMD	Water Balance Model - EAA Reservoir A-1 (Excel)
	Group E: SFWMD Powerpoint Presentations
SFWMD	Assessing the Water Quality of South Florida Water Management Reservoirs (Presentation)
SFWMD	ECP Basins Projects STA Enhancements (Presentation)
SFWMD	ECP Basins Projects STA Enhancements Update for May 2005 (Presentation)
SFWMD	Long-Term Plan Communications Meeting (Presentation)
SFWMD	Long-Term Plan Communications Meeting: Everglades Construction Project Update (Presentation)

AGENCY	REFERENCE TITLE
SFWMD	Long-Term Plan Update: Accelerate Recovery of Impacted Areas (Presentation)
SFWMD	Long-Term Plan Update: ECP Operation, Maintenance and Monitoring (Presentation)
SFWMD	Long-Term Plan Update: Process Development and Engineering (Presentation)
SFWMD	Long-Term Plan Update: Source Control Projects (Presentation)
SFWMD	Revisions to the Long-Term Plan Achieving Everglades Water Quality Goals (Presentation)
SFWMD	STA Operations and Performance Update (Presentation)
SFWMD	STA-1W Cell 5 Limerock Berm - 2003 Outstanding Project of the Year (Presentation)
SFWMD	STA-2 Expansion Project: Conceptual Plan for Cell 4 - Long-Term Plan Communications Meeting (Presentation)
SFWMD	Water Quality Impacts of Reservoirs (Presentation)
SFWMD	WRAC Issues Workshop: EAA/STA-2 Expansion Cell 4 - Acceler8 Overview (Presentation)
	Group F: Non-District Documents
ASAE	Baseline Conditions in Selected Tributaries in the Lake Okeechobee Watershed
ASAE	Nonpoint Source Best Management Practices Program for the Everglades Agricultural Area
ASCE	Three-Dimensional Modeling of Sediment and Phosphorus Dynamics in Lake Okeechobee, Florida: Spring 1989 Simulation
CA State Univ.	Phosphorus Cycle Figure
Dept ERM	Palm Beach County Sediment Management Project - C-51 Project
FL DEP	Estimation of a Phosphorus TMDL for Lake Okeechobee
FL DEP	Everglades Phosphorus Criterion Technical Support Document, Part I: WCA-2
FL DEP	Everglades Phosphorus Criterion Technical Support Document, Part II: WCA-1
FL DEP	Everglades Phosphorus Criterion Technical Support Document, Part III: WCA-3/ENP
FL DEP	Florida Marks Everglades Restoration Milestone with Guided Tours of Progress
FL DEP	Overview of a Simple Approach to Modeling Internal Loading in Lake Okeechobee (Appendix 3)
FL DEP	Surface Water Quality Standards - Chapter 62-302
FL DEP	Total Maximum Daily Loads - 303(d) List
FL DEP	Total Maximum Daily Loads: Chapter 62-304
FL Dept. of Ag.	Lake Okeechobee TMDL - Technologies & Research: Lessons Learned
ILEC	Lake Okeechobee (World Lakes Database)
Lakeline	Shallow and Deep Lakes: Determining Successful Management Options
Lenntech	Phosphorus Cycle - Lenntech
NOVA SE Univ.	Lake Okeechobee and surrounding areas
PB Co	C-51 Project: Palm Beach County Sediment Management Project
Tech Oversight Com.	Settlement Agreement Refuge TP Compliance Tracking: April-May 2005 (Latest Data Update)
Tech Oversight Com.	Settlement Agreement: January-March 2005 Report
Texas A&M Univ	Torpedograss
The ELC	Phosphorus Cycle - The Environmental Literacy Council
UF/IFAS	Assessing Phosphorus Load Reductions Under Agricultural Best Management Practices

AGENCY	REFERENCE TITLE
UF/IFAS	Best Management Practices in the Everglades Agricultural Area: Controlling Particulate Phosphorus and Canal Sediments
UF/IFAS	Florida's Wetland WebGIS
UF/IFAS	Particulate Phosphorus in the Everglades Agricultural Area: I - Introduction and Sources
UF/IFAS	Particulate Phosphorus in the Everglades Agricultural Area: II - Transport Mechanisms
UF/IFAS	Water Conservation Area Canal Sediment Phosphorus Studies - Inventory, Release and Transport
UF/IFAS	Water Management Best Management Practices for Phosphorus Control on Organic Soils: Minimizing Water Table Fluctuations
Univ. FL	Economic Analysis of Water Treatments for Phosphorus Removal in Florida
US Dept of Interior	Analysis of Marsh Phosphorus Data from Loxahatchee National Wildlife Refuge
US Dept of Interior	Analysis of Water Quality Monitoring Data from A.R.M. Loxahatchee National Wildlife Refuge
US EPA	Total Maximum Daily Load for Total Phosphorus Lake Okeechobee, Florida
US FWS	The South Florida Ecosystem Restoration Initiative
USACE	Everglades Agricultural Area Reservoir A-1: Draft Supplemental Environmental Impact Statement
USACE	Lake Okeechobee Water Retention/Phosphorus Removal Project - Taylor Creek Stormwater Treatment Area
USGS	A.R.M. Loxahatchee national Wildlife Refuge Enhanced Water Quality Monitoring and Modeling
USGS	Enhanced Water Quality Monitoring and Modeling Program for the A.R.M. LNWR - Quarterly Update Report
USGS	The Everglades Depth Estimation Network (EDEN) for Support of Ecological and Biological Assessments
WE&T	The Everglades Are Forever

APPENDIX B
Summary of Data Type and Duration
in Primary Documents

The following two tables summarizes the data in the Primary Document: 2004 Everglades Consolidated Report

**2004 Everglades Consolidated Report
(Basins)**

	EAA	C-139	WCA-1	WCA-2	WCA-3	ENP	STA-1W	STA-2	STA-5	STA-6	RWMA
Flows	WY2003	WY2003	WY2003	WY2003	WY2003	WY2003	WY2003	WY2003	WY2003	WY2003	WY2003
Loads	WY2003	WY2003	WY2003	WY2003	WY2003	WY2003	WY2003	WY2003	WY2003	WY2003	WY2003
Concentrations	WY1980- WY2003	WY1980- WY2003	WY2002- WY2003	WY2002- WY2003	WY2002- WY2003	WY2002- WY2003	WY2003	WY2003	WY2003	WY2003	WY2003

**2004 Everglades Consolidated Report
(Additional Structures with Flows, Loads and Concentrations for WY2003)**

S-2	S-3	S-5A	S-5AW	S-6	S-7	S-8	S-9	S-10A,C-E	S-11A-C	S-12A-D	S-14	S-18C	S-31
S-34	S-38	S-39	S-140	S-150	S-174	S-190	S-197	S-332D	S-333	S-334	S-337	S-343A-B	S-344
S-351	S-352	S-354	G-123	G-136	G-200	G-204	G-251	G-300	G-301	G-310	G-328	G-335	G-342A-D
G-344	G-349B	G-350B	G-357	G-402	G-404	G-406	G-410	G-600	G-88+G-155	EBPS	ESPS	ACME1	ACME2

The following two tables summarizes the data in the Primary Document: 2005 South Florida Environmental Report

**2005 South Florida Environmental Report
(Basins)**

	EAA	C-139	WCA-1	WCA-2	WCA-3	ENP	STA-1W	STA-2	STA-3/4	STA-5	STA-6	RWMA
Flows	WY2004	WY2004	WY2004	WY2004	WY2004	WY2004	WY2004	WY2004	WY2004	WY2004	WY2004	WY2004
Loads	WY2004	WY2004	WY2004	WY2004	WY2004	WY2004	WY2004	WY2004	WY2004	WY2004	WY2004	WY2004
Concentrations	WY2004	WY2004	WY2003-WY2004	WY2003-WY2004	WY2003-WY2004	WY2003-WY2004	WY2004	WY2004	WY2004	WY2004	WY2004	WY2004

**2005 South Florida Environmental Report
(Additional Structures with Flows, Loads and Concentrations for WY2004)**

S-2	S-3	S-5A	S-5AW	S-6	S-7	S-8	S-9	S-9A	S-10A,C-E	S-11A-C	S-12A-D	S-14	S-31
S-34	S-38	S-39	S-140	S-150	S-174	S-190	S-328	S-332D	S-333	S-337	S-343A-B	S-344	S-351
S-352	S-354	G-94C	G-123	G-136	G-200	G-204	G-251	G-300	G-301	G-310	G-328	G-335	G-342A-D
G-344A-D	G-349B	G-350B	G-357	G-402A-D	G-404	G-406	G-410	G-507	G-600	EBPS	ESPS	ACME1	ACME2
C-111	L3												

The following three tables summarizes the data in the Primary Document: 2006 South Florida Environmental Report

**2006 South Florida Environmental Report
(Basins)**

	EAA	C-139	WCA-1	WCA-2	WCA-3	ENP	STA-1W	STA-2	STA-3/4	STA-5	STA-6	RWMA
Flows	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005
Loads	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005
Concentrations	WY1980- WY2005	WY1980- WY2005	WY2004- WY2005	WY2004- WY2005	WY2004- WY2005	WY2004- WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005

**2006 South Florida Environmental Report
(Additional Structures with Flows, Loads and Concentrations for WY2005)**

S-2	S-3	S-5A	S-5AS	S-5AW	S-6	S-7	S-8	S-9	S-9A	S-10A,C-E	S-11A-C	S-12A-D	S-14
S-31	S-34	S-38	S-39	S-140	S-150	S-174	S-190	S-197	S-328	S-332D	S-333	S-334	S-337
S-343A-B	S-344	S-351	S-352	S-354	S-362	G-94A-C	G-123	G-136	G-200	G-204	G-251	G-300	G-301
G-302	G-310	G-328	G-335	G-342A-D	G-344A-D	G-349B	G-350B	G-357	G-370	G-372	G-376	G-379	G-381
G-402A-D	G-404	G-406	G-410	G-507	G-600	EBPS	ESPS	ACME1	ACME2	SSDD	C-111	L3	

2006 South Florida Environmental Report (Structures with additional Temporal Data)											
	ACME1	ACME2	NSID1	S-9	S-9A	G-123	S-190	S-140	S-18C	S-175	S-332
Flows	WY1998-	WY1998-	WY1998-	WY1998-	WY2004-	WY2001-	WY1998-	WY1998-	WY1998-	WY1998-	WY1998-
	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005
Loads	WY1998-	WY1998-	WY1998-	WY1998-	WY2004-	WY2001-	WY1998-	WY1998-	WY1998-	WY1998-	WY1998-
	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005
Concentrations	WY1998-	WY1998-	WY1998-	WY1998-	WY2004-	WY2001-	WY1998-	WY1998-	WY1998-	WY1998-	WY1998-
	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005	WY2005

The following table summarizes the data in the Primary Document: Baseline Data for Basin Specific Feasibility Studies

Baseline Data for the Basin-Specific Feasibility Studies to Achieve the Long-term Water Quality Goals for the Everglades

	STA-1W	STA-1E	STA-2	STA-3/4	STA-5	STA-6	ACME Basin B	NSID Basin	NNRC Basin	C-11 West Basin	L-28 Basin	Feeder Canal Basin
Flows	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995
Loads	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995
Concentrations	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995	1965-1995

The following table summarizes the data in the Primary Document: C-51 Sub-basin Updated Analyses of Flow and Phosphorus Data

C-51 West Sub-basin Updated Analysis of Flow and Phosphorus Data

	S-5AE	S-155	SR-7
Flows	1982-2003	1979-2003	1997-2001
Loads	1982-2004	1979-2004	1997-2002
Concentrations	1982-2005	1979-2005	1997-2003

The following table summarizes the data for the Primary Document: EAA Regional Feasibility Studies

Everglades Agricultural Area Regional Feasibility Study For Period 2010-2014 - Appendix E

	C-51	C-139	L-8	S-5A	S-6/S-2	S-7/S-2	S-8/S-3	SFCD	SSDD	ESWCD	EBWCD
Flows	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004
Loads	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004
Concentrations	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004

	S-2	S-3	S-5AE	S-5AW	S-5AS	S-6	S-7	S-8	S-150	S-350	S-351
Flows	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004
Loads	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004

Concentrations	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004
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	S-352	S-354	G-88	G-135	G-136	G-200	G-204	G-328	G-342A-D	G-344A-D	G-349B
Flows	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	2000-2004	2000-2005	2000-2004	2000-2004
Loads	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	2000-2004	2000-2005	2000-2004	2000-2004
Concentrations	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	2000-2004	2000-2005	2000-2004	2000-2004

	G-357	G-402A	G-404	G-410	G-605	C-4A PS	C-10 PS	G-250 PS	G-507 PS	G-600 PS	P-5-W PS
Flows	2001-2004	2002-2004	1995-2004	2002-2004	1998-2001	1995-2004	1995-2004	1995-2004	2004	1997-2005	1995-2004
Loads	2001-2005	2002-2005	1995-2005	2002-2005	1998-2002	1995-2004	1995-2004	1995-2004	2005	1997-2006	1995-2004
Concentrations	2001-2006	2002-2006	1995-2006	2002-2006	1998-2003	1995-2004	1995-2004	1995-2004	2006	1997-2007	1995-2004

	S-5A PS	S-236 PS	EBPS PS	ESPS	SBPS	ACME1 PS	ACME2 PS	Control 2 PS	C-10A	SR-7	USSO
Flows	1995-2004	1995-2004	2002-2004	2002-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004
Loads	1995-2004	1995-2004	2002-2004	2002-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004
Concentrations	1995-2004	1995-2004	2002-2004	2002-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004	1995-2004

	C-139 Annex	ACME Basin B
Flows	1995-2004	1995-2004
Loads	1995-2004	1995-2004
Concentrations	1995-2004	1995-2004

The following table references data on Lake Okeechobee inflows and outflows obtained from Tom James of SFWMD.

Lake Okeechobee Total Phosphorus Inflows and Outflows – Posted 8-1-2006

Flows, loads and concentrations are provided for structures shown on Figure 3 of this report.