Updated STA Inflow Data Sets For the 2010 Planning Period

Work Order No. CN040902-WO03R2

Prepared for

Prepared by

Gary Goforth, Inc.
10924 SW Hawkview Circle
Stuart, FL 34997
(772) 223-8593

Under Subcontract to

TETRA TECH EC, INC.
759 South Federal Highway, Suite 100
Stuart, FL 34994
(772) 781-3400

FINAL REPORT - REVISED

October 2007

October 12, 2007

Ms. Kelly Gracie
Project Manager
Tetra Tech EC, Inc.
1901 S. Congress Avenue
Ste. 270
Boynton Beach, FL 33426

REVISED 10/30/07

U.S. Army Corps of Engineers
South Florida Water Management District
Tetra Tech Contract No. CN040902-WO03R2
Updated STA Inflow Data Sets

Dear Ms. Gracie:

I am pleased to submit this final report titled "Updated STA Inflow Data Sets for the 2010 Planning Period". This document constitutes Deliverable 7.3.2 under Tetra Tech EC Purchase Order 1020342 dated June 25, 2007.

I gratefully acknowledge the valuable contributions of the staff of the South Florida Water Management District, and the technical review by yourself, staff of the District and of the U. S. Army Corps of Engineers, in the development of the information contained in this report.

Certification

I hereby certify, as a Professional Engineer in the State of Florida, that the information in this document was assembled under my direct personal charge. This report is not intended or represented to be suitable for reuse without specific verification or adaptation by the Engineer. This certification is made in accordance with the provisions of the Laws and Rules of the Florida Board of Professional Engineers under Chapter 61G15-29, Florida Administrative Code.

GF Goforth

Gary F. Goforth, P.E. Florida P.E. # 35525

Date: 10/30/07

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1. Introduction

As part of the adaptive implementation strategy of the *Everglades Protection Area Tributary Basins Long-Term Plan for Achieving Water Quality Goals* (LTP), the analyses presented in the *Baseline Data for the Basin-Specific Feasibility Studies to Achieve the Long-Term Water Quality Goals for the Everglades* (Goforth and Piccone 2001) are to be regularly updated to improve the degree of confidence in the projected total phosphorus loads in inflows to the STAs, or in some instances, discharged directly to the Everglades Protection Area (Burns & McDonnell, 2003 as amended). A previous report updated the basin data sets from Water Year (WY) 1995 through WY2007, covering the period May 1, 1994 through April 30, 2007 (Goforth 2007). Using the flow and phosphorus data developed in that effort, this report updates the STA inflow data sets for regional conditions anticipated for the 2010 planning period, as simulated by the South Florida Water Management Model (SFWMM) 2010BCalt1.

1.1. Scope of Work

This work constitutes Task 7 of CN040902-WO03.Ta18 - Preparation of an Environmental Impact Statement for Everglades Agricultural Area Conveyance and Regional Treatment Project Plus Compartments B and C - between the District and Tetra Tech EC, Inc. This work is being performed under Purchase Order No. 1030342, which was issued on June 25, 2007, between Tetra Tech EC, Inc., and Gary Goforth, Inc.

The scope of work for Task 7 consists of three major elements:

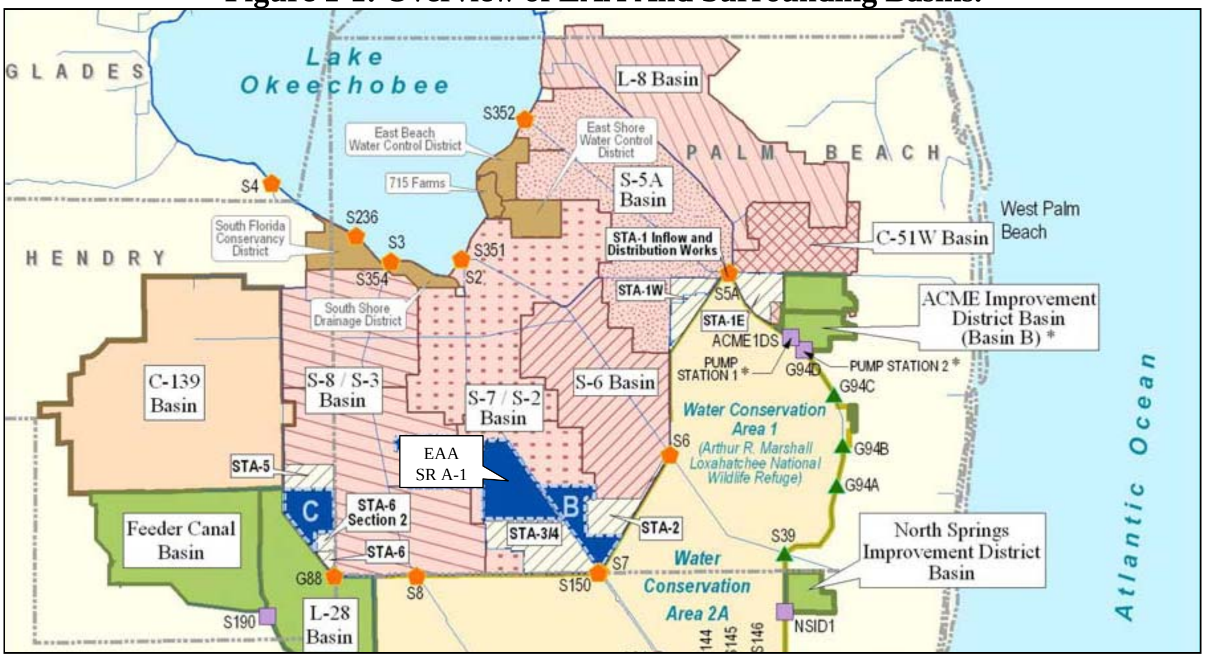
1. Update Flow and Phosphorus Data Sets for ECP Basins
2. Update STA Inflow Data Sets
3. Conduct DMSTA Modeling

This report presents the updated STA inflow data sets for the 2010 planning period. Daily flow time series from the 2010BCalt1 simulation of the SFWMM were provided by the District, and were subsequently checked for reasonableness, segregated by source, and summarized by water year for the thirty-five years covering WY1966-WY2000. Using the monthly phosphorus concentrations presented in the *Updated Flow and Phosphorus Data Sets for ECP Basins*, daily time series of flow and phosphorus were compiled for each STA and the EAA Storage Reservoir. Specific adjustments to the SFWMM flow time series were made for each STA, and these are described in the following sections.

1.2. Regional Conditions for the 2010 Planning Period

The previous update of the STA inflow data sets was completed in 2005 as part of the *EAA Regional Feasibility Study* (ADA/Burns & McDonnell 2005). That Study evaluated the regional water management conditions for two time periods, 2006-2009 and 2010-2014. This present analysis focuses on the regional conditions that are anticipated to be present in the 2010 time frame. The anticipated status of the water resources projects within the basins tributary to the STAs (shown in **Figure 1-1**) is provided in the **Table 1-1**. Appendix A contains a more complete summary of the key modeling assumptions used in this simulation throughout the South Florida area.

Figure 1-1: Overview of EAA And Surrounding Basins.



1.3. Source Data

Data supplied by the District consisted of simulated daily flows from the SFWMM for the simulation identified as 2010BCalt1_WMM5.5.2.1_082307v2_out covering the period January 1, 1995 through December 31, 2000. For all except STA-5 and STA-6, these flows formed the basis for the STA inflow data sets. For STA-5 and STA-6, actual flows in the C-139 and C-139 Annex Basins formed the basis for the inflow data sets. The total phosphorus (TP) concentrations developed in the "Updated Flow and Phosphorus Data Sets for the ECP Basins" were used in conjunction with the flow data described above to develop daily time series data sets (Goforth 2007). These data sets will be used in a subsequent work effort to model the phosphorus performance of the STAs, the EAA Storage Reservoir and the treatment areas on Compartments B and C.

Table 1-1: Anticipated Status of Regional Water Resource Projects in the 2010 Period.

Project	Status During the 2010 Period
Original Everglades Construction Project	All 6 STAs fully operational. Approximately 20% of the S-5A Basin runoff diverted to the Hillsboro Canal through existing facilities. Ch. 298 District and 715 Farms diversions in place. No EAA runoff reduction adjustment necessary to account for Best Management Practices.
Compartment B	Build-out completed and flow-capable by December 2010, including ability to re-direct STA-2 inflow to the North Build-out area.
Compartment C	Build-out completed and flow-capable by December 2010
EAA Storage Reservoir A-1	16,000-acre reservoir operable with a 12-ft depth
Acme Basin B	Runoff directed away from WCA-1 and discharged to C-51W, and then to STA-1E
L-8 Reservoir	Partially completed: 870 acres, depth 44 ft. Facilities not completed for diversion away from S-5A/C-51W.
Everglades Agricultural Area Conveyance and Regional Treatment Project (ECART)	Not completed

2. Basin Runoff From the Ch. 298 Districts and 715 Farms

Runoff from four Ch. 298 Districts and a state lease currently known as 715 Farms currently discharge into the EAA for treatment in the STAs and into Lake Okeechobee. A schematic of the basin showing the primary conveyance features, water control structures and receiving waters is presented in the figure below.

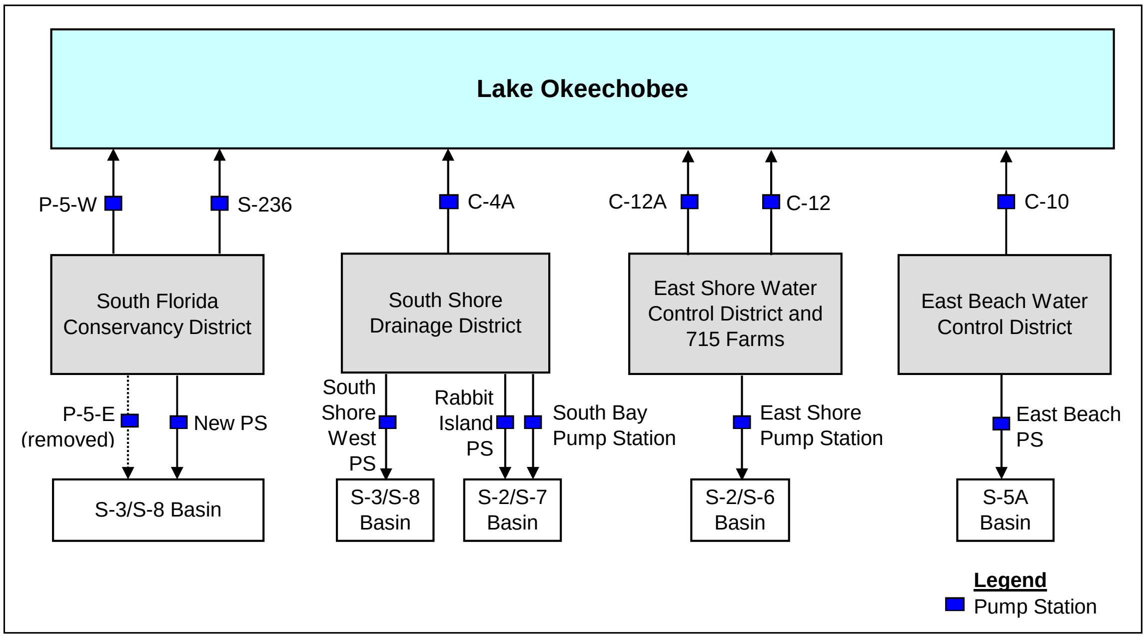


Figure 2-1: Chapter 298 Districts Schematic.

Consistent with the approach utilized in the 2005 EAA Regional Feasibility Study, the updated STA inflow data sets were based on historic runoff volumes from these basins to the maximum extent practicable, as the SFWMM simulations do not well represent either the total discharges or the distribution of these discharges from these basins (ADA/B&M 2005). Runoff volumes for the period May 1, 1994 through April 30, 2000 are available for direct use, while the runoff volumes for the remainder of the 35 year period (May 1, 1965 through April 30, 1994) were estimated by indirect methods. Consistent with the approach utilized in the 2005 EAA Regional Feasibility Study, daily runoff volumes were estimated as a fixed percentage of the daily runoff from the adjacent primary basin of the EAA. That fixed percentage was derived as the ratio of the overall runoff from each Ch. 298 District basin to the overall runoff from the adjacent EAA basin over the WY1995-2007 period. In recognition of the changes in EAA basin contributing area over the WY1995-2007 period due to conversion of agriculture lands to STAs, the EAA runoff was normalized to the effective basin areas reflected in the SFWMM simulation. Application of the approach described above to the Ch. 298 Districts and 715 farms are presented below.

2.1. East Beach Water Control District

Consistent with the methodology utilized in the 2005 EAA Regional Feasibility Study, runoff volumes from the EBWCD were estimated as a fixed percentage of the adjacent S-5A Basin. The table below compares the annual total runoff volume from the EBWCD with the total runoff from the S-5A Basin. Approximately 18.7% of the EBWCD basin is within the historic S-5A Basin, and the runoff volumes for the EBWCD in the table below were reduced from the total runoff presented Table 9-3 of the *Updated Flow and Phosphorus Data Sets for the ECP Basins* to reflect this. For the period WY1995-2007, the annual EBWCD total runoff was approximately 5.57% of the S-5A Basin total runoff, normalized to the effective basin area reflected in the SFWMM simulation. A further adjustment was made to reflect that a small portion of the EBWCD runoff is discharged to Lake Okeechobee, and for the period since the diversion project was complete (WY2003-2007), the discharge to the Lake has been only 2.95% of the total EBWCD runoff.

For WY1966-WY1994, daily runoff volumes from the EBWCD to the S-5A Basin are estimated as (0.9705 x 0.0557 =) 0.0541 times the daily runoff from the S-5A Basin as simulated by the SFWMM. The formula used for this calculation is

EBWCD Runoff = 0.0541 * (RFWPBB – EBDST1 + DIVERS)

The SFWMM flow terms are defined as

- RFWPBB = Runoff from West Palm Beach Canal basin in EAA to the S-5A Complex
- EBDST1 = Flow from EBWCD to S-5A Complex
- DIVERS = Diversion of runoff from West Palm Beach Canal (S-5A) basin into Hillsboro Canal and STA-2

Table 2-1: Comparison of EBWCD Runoff to S-5A Basin Runoff.

Water Year	EBWCD Volume[1] ac-ft	S-5A Basin Volume[2] ac-ft	Ratio
1995	10,452	429,230	0.0244
1996	9,161	289,490	0.0316
1997	2,887	223,775	0.0129
1998	8,163	298,138	0.0274
1999	15,119	181,623	0.0832
2000	23,807	285,525	0.0834
2001	4,249	132,736	0.0320
2002	16,527	247,521	0.0668
2003	16,601	285,058	0.0582
2004	19,304	253,164	0.0763
2005	22,939	331,866	0.0691
2006	14,765	184,681	0.0800
2007	10,112	127,851	0.0791
Average Annual	13,391	251,589	0.0557
Basin area in Acres[3]	6,542	120,240	0.0544

1. From Table 9-3 of *Updated Flow and Phosphorus Data Sets,* adjusted to reflect that 18.7% of the EBWCD is within the historic S-5A Basin.
2. From Table 2-10 of Updated Flow and Phosphorus Data Sets.
S-5A Basin runoff volumes for WY1995-2000 reduced by 2.5% for subsequent conversion of 3,000 acres for use in STA-1W.
3. Basin areas from EAA Regional Feasibility Study (ADA/B&M 2005).

For WY1966-1994, the daily total phosphorus concentrations in the estimated runoff were set equal to the long-term monthly flow-weighted mean concentrations developed in the *Updated Flow and Phosphorus Data Sets*, summarized in the table below.

Table 2-2: Average TP Concentration in Runoff from the EBWCD.

Month	TP Conc ppb	Month	TP Conc ppb
January	229	July	424
February	333	August	480
March	317	September	506
April	488	October	736
May	204	November	672
June	434	December	305

For WY1995-2000, the historic total runoff measured at the C-10 was adjusted to account for the 2.95% that is assumed to be discharged into Lake Okeechobee.

A summary of the estimated annual runoff volume and phosphorus load from the EBWCD to the S-5A Basin for the period WY1966-2000 is presented in the table below. As a matter of information, for the WY1966-2000 period, the SFWMM simulated an annual average of 11,579 AF of total runoff for the EBWCD, with 100% of that directed to Lake Okeechobee.

Table 2-3: Annual Flow and Phosphorus in Runoff from the EBWCD to the EAA.

Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)
1966	20,236	12,026	482
1967	19,699	11,282	464
1968	12,489	7,645	496
1969	26,240	14,825	458
1970	26,459	14,991	459
1971	13,250	7,123	436
1972	17,422	10,792	502
1973	9,870	5,021	412
1974	10,979	6,193	457
1975	14,558	8,481	472
1976	16,685	9,859	479
1977	13,098	6,173	382
1978	16,505	8,795	432
1979	22,193	11,649	426
1980	16,238	9,352	467
1981	10,425	5,769	449
1982	12,491	7,095	460
1983	22,994	12,104	427
1984	19,453	11,671	486
1985	14,501	7,791	436
1986	15,276	8,902	472
1987	16,957	9,241	442
1988	14,369	9,692	547
1989	13,028	7,143	444
1990	11,229	6,815	492
1991	15,265	7,895	419
1992	12,021	6,727	454
1993	25,643	14,417	456
1994	18,315	10,666	472
1995	12,857	8,917	562
1996	11,269	10,869	782
1997	3,551	677	155
1998	10,040	6,707	542
1999	18,596	16,643	726
2000	29,283	21,058	583
Min. Annual	3,551	677	---
Max. Annual	29,283	21,058	---
Avg. Annual	16,100	9,572	482

2.2. East Shore Water Control District and 715 Farms

Consistent with the methodology utilized in the 2005 EAA Regional Feasibility Study, runoff volumes from the ESWCD and 715 Farms were estimated as a percentage of the adjacent S-5A Basin. **Table 2-4** compares the annual total runoff volume from the ESWCD and 715 Farms with the total runoff from the S-5A Basin. For the period WY1995-2007, the annual ESWCD and 715 Farms total runoff was approximately 11.8% of the S-5A Basin total runoff, normalized to the effective basin area reflected in the SFWMM simulation.

A further adjustment was made to reflect that a small portion of the ESWCD and 715 Farms runoff is discharged to Lake Okeechobee, and for the period since the diversion project was complete (WY2003-2007), the discharge to the Lake has been only 8.41% of the total ESWCD and 715 Farms runoff. For WY1966-WY1994, daily runoff volumes from the ESWCD and 715 Farms to the EAA are estimated as (0.9159 x 0.1178 =) 0.1079 times the daily runoff from the S-5A Basin as simulated by the SFWMM. The formula used for this calculation is

ESWCD Runoff = 0.1079 * (RFWPBB – EBDST1 + DIVERS)

The SFWMM flow terms are defined as

- RFWPBB = Runoff from West Palm Beach Canal basin in EAA to the S-5A Complex
- EBDST1 = Flow from EBWCD to S-5A Complex
- DIVERS = Diversion of runoff from West Palm Beach Canal (S-5A) basin into Hillsboro Canal and STA-2

Table 2-4: Comparison of ESWCD & 715 Farms Runoff to S-5A Basin Runoff.

Water Year	ESWCD and & 715 Farms Volume[1] ac-ft	S-5A Basin Volume[2] ac-ft	Ratio
1995	34,326	429,230	0.0800
1996	31,269	289,490	0.1080
1997	19,790	223,775	0.0884
1998	26,377	298,138	0.0885
1999	25,059	181,623	0.1380
2000	45,171	285,525	0.1582
2001	12,677	132,736	0.0955
2002	21,685	247,521	0.0876
2003	32,692	285,058	0.1147
2004	30,282	253,164	0.1196
2005	41,209	331,866	0.1242
2006	30,343	184,681	0.1643
2007	21,020	127,851	0.1644
Average Annual	28,608	251,589	0.1178
Basin area in Acres[3]	11,534	120,240	0.0959

1. From Table 9-7 of *Updated Flow and Phosphorus Data Set.*
2. From Table 2-10 of Updated Flow and Phosphorus Data Sets.
S-5A Basin runoff volumes for WY1995-2000 reduced by 2.5%
for subsequent conversion of 3,000 acres for use in STA-1W.
3. Basin areas from EAA Regional Feasibility Study (ADA/B&M 2005).

For the WY1966-1994 period, the daily total phosphorus concentrations in the estimated runoff were set equal to the long-term monthly flow-weighted mean concentrations developed in the *Updated Flow and Phosphorus Data Sets*, summarized in the table below.

Table 2-5: Average TP Concentration in Runoff from the ESWCD and 715 Farms.

Month	TP Conc ppb	Month	TP Conc ppb
January	73	July	141
February	99	August	129
March	107	September	143
April	127	October	192
May	84	November	133
June	127	December	122

For the WY1995-2000 period, the historic total runoff measured at the C-12 and C-12A was adjusted to account for the 8.41% that is assumed to be discharged into Lake Okeechobee.

A summary of the estimated annual runoff volume and phosphorus load from the ESWCD and 715 Farms to the EAA for the period WY1966-2000 is presented in the table below. As a matter of information, for the WY1966-2000 period, the SFWMM simulated an annual average of 20,737 AF of total runoff for the ESWCD and 715 Farms, with 70.5% of that directed to Lake Okeechobee.

Table 2-6: Annual Flow and Phosphorus in Runoff from the ESWCD and 715 Farms to the EAA.

Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)
1966	40,358	6,785	136
1967	39,285	6,605	136
1968	24,907	4,417	144
1969	52,331	8,602	133
1970	52,769	8,478	130
1971	26,426	4,245	130
1972	34,746	5,931	138
1973	19,684	2,951	122
1974	21,896	3,659	135
1975	29,033	4,844	135
1976	33,275	5,711	139
1977	26,122	3,689	114
1978	32,917	5,160	127
1979	44,260	6,836	125
1980	32,384	5,246	131
1981	20,791	3,361	131
1982	24,911	3,939	128
1983	45,858	7,046	125
1984	38,796	6,650	139
1985	28,919	4,448	125
1986	30,465	5,083	135
1987	33,817	5,385	129
1988	28,656	4,845	137
1989	25,982	4,189	131
1990	22,394	3,842	139
1991	30,444	4,481	119
1992	23,974	3,937	133
1993	51,141	7,954	126
1994	36,527	5,937	132
1995	31,439	6,613	171
1996	28,639	5,018	142
1997	18,125	2,301	103
1998	24,159	4,878	164
1999	22,952	2,747	97
2000	41,372	6,712	132
Min. Annual	**18,125**	**2,301**	**---**
Max. Annual	**52,769**	**8,602**	**---**
Avg. Annual	**31,993**	**5,215**	**132**

2.3. South Shore Drainage District

Consistent with the methodology utilized in the 2005 EAA Regional Feasibility Study, runoff volumes from the South Shore Drainage District (SSDD) were estimated as a percentage of the adjacent S-8 Basin. **Table 2-7** below compares the annual total runoff volume from the SSDD with the total runoff from the S-8 Basin. For the period WY1995-2007, the annual SSDD total runoff was approximately 4.52% of the S-8/S-3 Basin total runoff, normalized to the effective basin area reflected in the SFWMM simulation.

A further adjustment was made to reflect that a small portion of the SSDD runoff is discharged to Lake Okeechobee, and for the period since the diversion project was complete (WY2005-2007), the discharge to the Lake has been only 1% of the total SSDD runoff. For the WY1966-WY1994 period, daily runoff volumes from the SSDD to the EAA are estimated as (0.99 x 0.0452 =) 0.0447 times the daily runoff from the S-8 Basin as simulated by the SFWMM. The formula used for this calculation is

SSDD Runoff = 0.0447 * (MIAST3 - SSDST3 - S236SO - G136SO + S8BPMR + WLES8 + S3PMP + EARIN1)

The SFWMM flow terms are defined as

- MIAST3 = Runoff from Miami Canal basin, 298 District, S-236 Basin, and G-136 to STA-3/4 through Miami Canal and G-372
- SSDST3 = Flow from South Shore Drainage District to STA-3/4
- S236SO = portion of runoff from S-236 basin routed south to STA-3/4
- G136SO = flow from outside model boundary to EAA MIAMI basin
- S8BPMR = emergency bypass of untreated EAA runoff around STA3/4 through S-8 into WCA-3A
- WLES8 = portion of untreated runoff from Miami basin in the EAA used to meet SA-3 demands in the LEC via existing S8
- S3PMP = flow pumped for flood control to LOK from EAA Miami basin
- EARIN1 = Inflow into proposed EAA reservoir (Compartment 1) from Miami Canal (runoff + LOK regulatory releases)

Table 2-7: Comparison of SSDD Runoff to S-8 Basin Runoff

Water Year	SSDD Volume[1] ac-ft	S-8/S-3 Volume[2] ac-ft	Ratio
1995	18,202	404,242	0.0450
1996	14,060	321,134	0.0438
1997	11,242	292,901	0.0384
1998	13,046	360,092	0.0362
1999	11,804	189,522	0.0623
2000	19,779	308,553	0.0641
2001	4,909	140,600	0.0349
2002	6,558	259,778	0.0252
2003	11,232	270,430	0.0415
2004	8,781	285,235	0.0308
2005	16,323	332,302	0.0491
2006	20,735	319,790	0.0648
2007	9,531	190,372	0.0501
Average Annual	12,785	282,689	0.0452
Basin area in Acres[3]	4,230	117,420	0.0360

1. From Table 9-12 of *Updated Flow and Phosphorus Data Set.*
2. From Table 8-22 of Updated Flow and Phosphorus Data Sets.
S-8 Basin runoff volumes for WY1995-1997 reduced by 12.1%, and
reduced by 4.2% for WY1998
for subsequent conversion of lands for use in STA-3/4.
3. Basin areas from EAA Regional Feasibility Study (ADA/B&M 2005).

For WY1966-1994, the daily total phosphorus concentrations in the estimated runoff were set equal to the long-term monthly flow-weighted mean concentrations developed in the *Updated Flow and Phosphorus Data Sets*, summarized in the table below.

Table 2-8: Average TP Concentration in Runoff from the SSDD.

Month	TP Conc ppb	Month	TP Conc ppb
January	73	July	93
February	99	August	103
March	113	September	116
April	119	October	115
May	100	November	121
June	96	December	101

For the WY1995-2000 period, the historic total runoff measured at the C-4A and Rabbit Island Pump Station was adjusted

2. upward by 10.6% to reflect the estimated missing volume from the South Bay Pump Station for that period, and
3. downward to account for the 1% assumed to be discharged into Lake Okeechobee.

A summary of the estimated annual runoff volume and phosphorus load from the SSDD to the EAA for the period WY1966-2000 is presented in the table below. As a matter of information, for the WY1966-2000 period, the SFWMM simulated an annual average of 7,632 AF of total runoff for the SSDD, with 52.1% of that directed to Lake Okeechobee.

Table 2-9: Annual Flow and Phosphorus in Runoff from the SSDD to the EAA.

Annual Runoff			
Water Year	**Volume (acre-feet)**	**TP Load Load (kg)**	**TP Conc. (ppb)**
1966	13,145	1,650	102
1967	11,864	1,451	99
1968	10,197	1,297	103
1969	16,907	2,148	103
1970	17,430	2,257	105
1971	7,286	902	100
1972	13,068	1,733	108
1973	6,916	855	100
1974	5,620	698	101
1975	9,733	1,197	100
1976	12,137	1,580	106
1977	7,088	886	101
1978	11,376	1,511	108
1979	13,194	1,624	100
1980	12,295	1,610	106
1981	4,061	532	106
1982	6,648	885	108
1983	17,356	2,163	101
1984	9,405	1,241	107
1985	6,781	907	108
1986	9,030	1,141	102
1987	11,464	1,434	101
1988	7,613	1,042	111
1989	7,081	886	101
1990	6,524	837	104
1991	9,998	1,172	95
1992	11,196	1,413	102
1993	11,630	1,395	97
1994	8,443	1,082	104
1995	16,671	1,937	94
1996	13,058	1,261	78
1997	10,649	995	76
1998	11,587	1,675	117
1999	11,262	1,602	115
2000	18,368	2,368	104
Min. Annual	**4,061**	**532**	**---**
Max. Annual	**18,368**	**2,368**	**---**
Avg. Annual	**10,774**	**1,353**	**102**

2.4. South Florida Conservancy District

Consistent with the methodology utilized in the 2005 EAA Regional Feasibility Study, runoff volumes from the South Florida Conservancy District (SFCD) were estimated as a percentage of the adjacent S-8 Basin. The table below compares the annual total runoff volume from the SFCD with the total runoff from the S-8 Basin. For the period WY1995-2007, the annual SFCD total runoff was approximately 10.37% of the S-8/S-3 Basin total runoff, normalized to the effective basin area reflected in the SFWMM simulation.

Table 2-10: Comparison of SFCD Runoff to S-8 Basin Runoff

Water Year	SFCD Volume[1] ac-ft	S-8/S-3 Volume[2] ac-ft	Ratio
1995	36,614	404,242	0.0906
1996	32,507	321,134	0.1012
1997	20,135	292,901	0.0687
1998	26,952	360,092	0.0748
1999	39,820	189,522	0.2101
2000	49,994	308,553	0.1620
2001	5,953	140,600	0.0423
2002	19,474	259,778	0.0750
2003	27,503	270,430	0.1017
2004	27,527	285,235	0.0965
2005	35,242	332,302	0.1061
2006	43,977	319,790	0.1375
2007	15,385	190,372	0.0808
Average Annual	29,314	282,689	0.1037
Basin area in Acres[3]	9,775	117,420	0.0832

1. From Table 9-12 of *Updated Flow and Phosphorus Data Set.*
2. From Table 8-22 of Updated Flow and Phosphorus Data Sets.
S-8 Basin runoff volumes for WY1995-1997 reduced by 12.1%, and reduced by 4.2% for WY1998
for subsequent conversion of lands for use in STA-3/4.
3. Basin areas from EAA Regional Feasibility Study (ADA/B&M 2005).

A further adjustment was made to reflect that a small portion of the SFCD runoff is discharged to Lake Okeechobee. The diversion project was fully operational for only a single complete water year (WY2007), and for that period the discharge to the Lake was been only 3.24% of the total SFCD runoff. For WY1966-WY1994, daily runoff volumes from the SFCD to the EAA are estimated as (0.9676 x 0.1037 =) 0.1003 times the daily runoff from the S-8 Basin as simulated by the SFWMM. The formula used for this calculation is

SSDD Runoff = 0.1003 * (MIAST3 - SSDST3 - S236SO - G136SO + S8BPMR + WLES8 + S3PMP + EARIN1)

The SFWMM flow terms are defined as

- MIAST3 = Runoff from Miami Canal basin, 298 District, S-236 Basin, and G-136 to STA-3/4 through Miami Canal and G-372

- SSDST3 = Flow from South Shore Drainage District to STA-3/4
- S236SO = portion of runoff from S-236 basin routed south to appropriate STA's
- G136SO = flow from outside model boundary to EAA MIAMI basin
- S8BPMR = emergency bypass of untreated EAA runoff around STA3&4 through S8 into WCA-3A
- WLES8 = portion of untreated runoff from Miami basin in the EAA used to meet SA-3 demands in the LEC via existing S8
- S3PMP = flow pumped for flood control to LOK from EAA Miami basin
- EARIN1 = Inflow into proposed EAA reservoir (Compartment 1) from Miami Canal (runoff + LOK regulatory releases)

For the WY1966-1994 period, the daily total phosphorus concentrations in the estimated runoff were set equal to the long-term monthly flow-weighted mean concentrations developed in the *Updated Flow and Phosphorus Data Sets*, summarized in the table below.

Table 2-11: Average TP Concentration in Runoff from the SFCD.

Month	TP Conc ppb	Month	TP Conc ppb
January	82	July	100
February	119	August	113
March	106	September	118
April	106	October	142
May	109	November	172
June	110	December	111

For the WY1995-2000 period, the historic total runoff measured at S-236, P-5-W and P-5-E was adjusted

1. upward by 17.3% to reflect the estimated missing volume from the P-5-E Pump Station through November 1997, and
2. downward to account for the 3% that is assumed to be discharged into Lake Okeechobee.

A summary of the estimated annual runoff volume and phosphorus load from the SSDD to the EAA for the period WY1966-2000 is presented in the table below. As a matter of information, for the WY1966-2000 period, the SFWMM simulated an annual average of 19,030 AF of total runoff for the SFCD, with 43.7% of that directed to Lake Okeechobee.

Table 2-12: Annual Flow and Phosphorus in Runoff from the SFCD to the EAA.

Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)
1966	29,507	4,015	110
1967	26,632	3,490	106
1968	22,890	3,147	111
1969	37,952	5,217	111
1970	39,125	5,314	110
1971	16,355	2,181	108
1972	29,335	4,201	116
1973	15,524	2,098	110
1974	12,616	1,636	105
1975	21,847	2,865	106
1976	27,244	3,723	111
1977	15,911	2,099	107
1978	25,535	3,781	120
1979	29,618	3,922	107
1980	27,600	3,755	110
1981	9,116	1,309	116
1982	14,924	2,188	119
1983	38,961	5,180	108
1984	21,112	2,937	113
1985	15,222	2,116	113
1986	20,271	2,703	108
1987	25,733	3,405	107
1988	17,089	2,774	132
1989	15,894	2,090	107
1990	14,644	1,966	109
1991	22,443	2,699	98
1992	25,132	3,492	113
1993	26,105	3,426	106
1994	18,953	2,632	113
1995	35,428	6,721	154
1996	31,454	4,032	104
1997	19,482	2,563	107
1998	26,115	3,486	108
1999	38,530	6,832	144
2000	48,374	6,332	106
Min. Annual	**9,116**	**1,309**	**---**
Max. Annual	**48,374**	**6,832**	**---**
Avg. Annual	**24,648**	**3,438**	**113**

During the analyses described above, an error was identified in the formula used to calculate the annual flows and phosphorus loads, and hence the annual phosphorus concentrations, for the SFCD presented in Table 9-17 of the *Updated Flow and Phosphorus Data Set*. The corrected table is presented in its entirety below.

Table 9-17. Discharge Summary for the South Florida Conservancy District*.

Water Year	Annual Data				Month	Monthly Data			
	Volume		TP Load	TP Conc		Volume		TP Load	TP Conc
	ac-ft	hm^3	kg	ppb		ac-ft	hm^3	kg	ppb
1995	36,614	45.163	6,946	154	**Jan**	987	1.218	99	82
1996	32,507	40.096	4,167	104	**Feb**	1,861	2.296	268	119
1997	20,135	24.836	2,649	107	**Mar**	1,274	1.572	163	106
1998	26,952	33.245	3,597	108	**Apr**	894	1.102	116	106
1999	39,820	49.117	7,061	144	**May**	1,393	1.718	188	109
2000	49,994	61.667	6,544	106	**Jun**	4,169	5.143	564	110
2001	5,953	7.343	788	107	**Jul**	3,904	4.815	478	100
2002	19,474	24.021	2,720	113	**Aug**	3,928	4.845	545	113
2003	27,503	33.925	3,042	90	**Sep**	4,413	5.444	639	118
2004	27,527	33.954	3,485	103	**Oct**	3,170	3.910	547	142
2005	35,242	43.471	4,460	103	**Nov**	2,255	2.782	479	172
2006	43,977	54.245	7,692	142	**Dec**	1,629	2.010	220	111
2007	15,385	18.977	2,169	114	**Annual**	29,878	36.854	4,308	117
Min.	5,953	7.343	788	-					
Max.	49,994	61.667	7,692	-					
Ave.	29,314	36.158	4,255	118					

*Missing data for P-5-E prior to November 1997 were replaced with average long-term monthly percentage of other SFCD discharges.

3. Runoff From the EAA Basins

Summarized in the sections below is the development of runoff time series for the EAA Basin. Consistent with the 2005 EAA RFS, the daily flow values from the SFWMM 2010BCalt1 were combined with the long-term monthly flow-weighted mean TP concentration to develop a daily time series of flow and TP. As was evident in the WY1995-2007 historic data set for the EAA basins, the TP concentrations have increased significantly since the hurricanes of 2004. While the District has not completed analyses establishing the cause of these concentration increases, it is likely associated with higher TP concentrations in the near-shore environment of Lake Okeechobee since the 2004 hurricanes, and therefore, should decrease as the Lake concentrations decrease. Section 6 below discusses the recent decreasing trend in Lake Okeechobee near-shore TP concentrations, which appears to have stabilized around 100 ppb from a high near 300 ppb in January 2005. The subsequent basin data set update anticipated in two years will review the accuracy of these data sets, and any necessary adjustments can be made at that time.

3.1. S-5A Basin

Consistent with the 2005 *EAA Regional Feasibility Study*, the daily flow values from the SFWMM for the S-5A Basin were combined with the long-term monthly flow-weighted mean TP concentration to develop a daily time series of flow and TP. Daily runoff from the S-5A Basin for the simulated 35-yr period was calculated from the following equation

S-5A Basin Runoff = RFWPBB + DIVERS – EBDST1

The SFWMM flow terms are defined as

- RFWPBB = Runoff from West Palm Beach Canal basin to the S-5A Complex
- EBDST1 = Flow from EBWCD to the S-5A Complex
- DIVERS = Diversion of runoff from West Palm Beach Canal basin to the Hillsboro Canal

For the 2010BCalt1simulation, the total flow for EBDST1 was zero, and the long-term annual average flow diverted to the Hillsboro Canal was 62,845 AF/yr, equal to 20.3% of the total S-5A Basin runoff.

The daily total phosphorus concentrations in the estimated runoff were set equal to the long-term monthly flow-weighted mean concentrations developed in the *Updated Flow and Phosphorus Data Sets*, summarized in **Table 3-1** below.

A summary of the estimated annual runoff volume and phosphorus load from the S-5A Basin for the period WY1966-2000 is presented in **Table 3-2** below.

Table 3-1: Average TP Concentration in Runoff from the S-5A Basin.

Month	TP Conc ppb	Month	TP Conc ppb
January	116	July	142
February	171	August	160
March	191	September	173
April	160	October	171
May	172	November	165
June	166	December	174

Table 3-2: Annual Runoff from the S-5A Basin.

Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)
1966	374,351	72,832	158
1967	364,404	72,362	161
1968	231,031	46,400	163
1969	485,418	99,107	166
1970	489,474	102,254	169
1971	245,120	48,252	160
1972	322,294	64,752	163
1973	182,590	36,173	161
1974	203,103	39,415	157
1975	269,301	53,328	161
1976	308,654	62,919	165
1977	242,305	47,562	159
1978	305,334	62,832	167
1979	410,548	79,727	157
1980	300,387	60,553	163
1981	192,852	39,312	165
1982	231,069	48,272	169
1983	425,370	86,194	164
1984	359,867	74,598	168
1985	268,249	54,891	166
1986	282,587	57,138	164
1987	313,681	62,811	162
1988	265,811	52,787	161
1989	241,001	46,412	156
1990	207,722	42,534	166
1991	282,392	52,722	151
1992	222,383	44,275	161
1993	474,371	92,945	159
1994	338,817	67,814	162
1995	505,253	102,969	165
1996	339,505	69,195	165
1997	270,907	55,183	165
1998	346,108	70,183	164
1999	249,229	50,205	163
2000	289,912	59,496	166
Min. Annual	**182,590**	**36,173**	**---**
Max. Annual	**505,253**	**102,969**	**---**
Avg. Annual	**309,754**	**62,240**	**163**

3.2. S-6/S-2 Basin

Consistent with the 2005 *EAA Regional Feasibility Study*, the daily flow values from the SFWMM for the S-6/S-2 Basin were combined with the long-term monthly flow-weighted mean TP concentration to develop a daily time series of flow and TP. Daily runoff from the S-6/S-2 Basin for the simulated 35-yr period was calculated from the following equation

S-6/S-2 Basin Runoff = 34.8% * S2PMP + RFTST2 - (DIVERS + ESDT2 + 715ST2)

The SFWMM flow terms are defined as

- S2PMP = pumping of runoff from EAA NNR/HLSB basin to LOK via S-2
- RFTST2 = Flow to STA-2 from Hillsboro Basin and WPB diversion and Ch. 298 District runoff
- DIVERS = Diversion of runoff from West Palm Beach Canal basin to the Hillsboro Canal
- ESDT2 = Flow from ESWCD to Hillsboro Canal and STA-2
- 715ST2 = Flow from 715 Farms to Hillsboro Canal and STA-2

The long-term average annual runoff simulated for the S-6/S-2 Basin was 186,742 AF/yr, equivalent to an average of approximately 1.56 ft of runoff over the basin area of 119,900 acres. By contrast, the long-term average annual runoff simulated for the S-7/S-2 Basin was 273,504 AF/yr, equivalent to an average of approximately 2.91 ft of runoff over the basin area of 94,087 acres. The 2005 EAA Regional Feasibility Study adjusted the simulated runoff from the S-6/S-2 and S-7/S-2 basins to create a uniform average runoff depth for both basins (ADA/B&M 2005). If the same approach were utilized here, approximately 71,141 AF/yr would be shifted from the S-7/S-2 Basin to the S-6/S-2 Basin, yielding an average of approximately 2.15 ft of runoff over each basin. However, this current analysis did not adjust the SFWMM output on the recommendation of District modeling staff.

The daily total phosphorus concentrations in the estimated runoff were set equal to the long-term monthly flow-weighted mean concentrations developed in the *Updated Flow and Phosphorus Data Sets*, summarized in the table below.

Table 3-3: Average TP Concentration in Runoff from the S-6/S-2 Basin.

Month	TP Conc ppb	Month	TP Conc ppb
January	52	July	94
February	104	August	112
March	129	September	125
April	159	October	119
May	97	November	102
June	84	December	102

A summary of the estimated annual runoff volume and phosphorus load from the S-6/S-2 Basin for the period WY1966-2000 is presented in the table below.

Table 3-4: Annual Runoff from the S-6/S-2 Basin.

Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)
1966	200,985	25,230	102
1967	248,768	31,362	102
1968	160,713	20,797	105
1969	298,165	38,690	105
1970	316,609	42,921	110
1971	143,456	17,680	100
1972	231,878	31,920	112
1973	166,962	20,106	98
1974	122,896	15,646	103
1975	168,167	21,252	102
1976	225,871	29,932	107
1977	159,269	19,513	99
1978	193,843	25,321	106
1979	207,985	25,654	100
1980	238,196	32,983	112
1981	114,832	15,335	108
1982	186,445	26,064	113
1983	303,452	38,162	102
1984	146,275	20,373	113
1985	144,712	19,974	112
1986	194,490	25,708	107
1987	177,843	22,435	102
1988	123,727	15,634	102
1989	98,387	12,793	105
1990	120,001	16,665	113
1991	162,578	18,757	94
1992	132,132	17,265	106
1993	236,777	27,720	95
1994	165,586	22,287	109
1995	278,277	36,205	105
1996	203,586	28,044	112
1997	138,205	18,327	108
1998	188,761	24,872	107
1999	135,279	17,798	107
2000	200,846	28,309	114
Min. Annual	98,387	12,793	---
Max. Annual	316,609	42,921	---
Avg. Annual	186,742	24,335	106

3.3. S-7/S-2 Basin

Consistent with the 2005 *EAA Regional Feasibility Study*, the daily flow values from the SFWMM for the S-7/S-2 Basin were combined with the long-term monthly flow-weighted mean TP concentration to develop a daily time series of flow and TP. Daily runoff from the S-7/S-2 Basin for the simulated 35-yr period was calculated from the following equation

S-7/S-2 Basin Runoff = 65.2% * S2PMP + NNRST2 + NNRST3 + EARIN2 + WLES7

The SFWMM flow terms are defined as

- S2PMP = pumping of runoff from EAA NNR/HLSB basin to LOK via S-2
- NNRST2 = flow from NNR basin conveyed to Compartment B via NNR Canal, Runoff from NNR Basin
- NNRST3 = flow from NNR basin to STA-3/4
- EARIN2 = Inflow into proposed EAA reservoir from NNR Canal
- WLES7 = portion of untreated runoff from NNRC basin in the EAA used to meet SA-2 demands in the LEC via existing S-7

The long-term average annual runoff simulated for the S-7/S-2 Basin was 273,504 AF/yr, equivalent to an average of approximately 2.91 ft of runoff over the basin area of 94,087 acres. By contrast the long-term average annual runoff simulated for the S-6/S-2 Basin was 186,742 AF/yr, equivalent to an average of approximately 1.56 ft of runoff over the basin area of 119,900 acres. The 2005 EAA Regional Feasibility Study adjusted the simulated runoff from the S-6/S-2 and S-7/S-2 basins to create a uniform average runoff depth for both basins (ADA/B&M 2005). If the same approach were utilized here, approximately 71,141 AF/yr would be shifted from the S-7/S-2 Basin to the S-6/S-2 Basin, yielding an average of approximately 2.15 ft of runoff over each basin. However, this current analysis did not adjust the SFWMM output on the recommendation of District modeling staff.

The daily total phosphorus concentrations in the estimated runoff were set equal to the long-term monthly flow-weighted mean concentrations developed in the *Updated Flow and Phosphorus Data Sets*, summarized in **Table 3-5** below.

Table 3-5: Average TP Concentration in Runoff from the S-7/S-2 Basin.

Month	TP Conc ppb	Month	TP Conc ppb
January	78	July	80
February	96	August	78
March	90	September	101
April	108	October	98
May	112	November	152
June	90	December	113

A summary of the estimated annual runoff volume and phosphorus load from the S-7/S-2 Basin for the period WY1966-2000 is presented in the table below.

Table 3-6: Annual Runoff from the S-7/S-2 Basin.

Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)
1966	290,389	32,527	91
1967	358,292	39,578	90
1968	233,495	26,503	92
1969	435,904	50,978	95
1970	435,375	51,432	96
1971	209,985	24,036	93
1972	346,334	42,414	99
1973	250,301	30,385	98
1974	182,807	19,547	87
1975	245,515	27,361	90
1976	327,836	38,137	94
1977	230,457	26,617	94
1978	290,784	37,197	104
1979	299,295	34,899	95
1980	354,848	43,928	100
1981	165,410	19,567	96
1982	304,367	36,521	97
1983	454,047	52,988	95
1984	218,335	26,044	97
1985	205,636	26,023	103
1986	282,331	32,394	93
1987	260,262	30,231	94
1988	187,378	25,830	112
1989	145,302	14,883	83
1990	174,746	20,282	94
1991	256,973	27,149	86
1992	192,107	22,577	95
1993	362,839	41,811	93
1994	239,622	28,000	95
1995	396,070	50,588	104
1996	270,301	29,822	89
1997	199,379	23,981	98
1998	269,346	32,636	98
1999	204,860	29,368	116
2000	291,730	34,641	96
Min. Annual	145,302	14,883	---
Max. Annual	454,047	52,988	---
Avg. Annual	273,504	32,311	96

3.4. S-8/S-3 Basin

Consistent with the 2005 EAA *Regional Feasibility Study*, the daily flow values from the SFWMM for the S-8/S-3 Basin were combined with the long-term monthly flow-weighted mean TP concentration to develop a daily time series of flow and TP. Daily runoff from the S-8/S-3 Basin[1] for the simulated 35-yr period was calculated from the following equation

S-8/S-3 Basin Runoff = S3PMP + MIAST3 + EARIN1 + S8BPMR + WLES8 - SSDST3 - S236SO - G136SO

The SFWMM flow terms are defined as

- MIAST3 = Runoff from Miami Canal basin, 298 District, S-236 Basin, and G-136 to STA-3/4 through Miami Canal and G-372
- SSDST3 = Flow from South Shore Drainage District to STA-3/4
- S236SO = portion of runoff from S-236 basin routed south to appropriate STA's
- G136SO = flow from outside model boundary to EAA MIAMI basin
- S8BPMR = emergency bypass of untreated EAA runoff around STA3&4 through S8 into WCA-3A
- WLES8 = portion of untreated runoff from Miami basin in the EAA used to meet SA-3 demands in the LEC via existing S8
- S3PMP = flow pumped for flood control to LOK from EAA Miami basin
- EARIN1 = Inflow into proposed EAA reservoir (Compartment 1) from Miami Canal (runoff + LOK regulatory releases)

The daily total phosphorus concentrations in the estimated runoff were set equal to the long-term monthly flow-weighted mean concentrations developed in the *Updated Flow and Phosphorus Data Sets*, summarized in the table below.

Table 3-7: Average TP Concentration in Runoff from the S-8/S-3 Basin.

Month	TP Conc ppb	Month	TP Conc ppb
January	56	July	88
February	63	August	80
March	61	September	85
April	102	October	87
May	102	November	122
June	76	December	57

[1] Excluding daily flows from the Compartment C area to STA-6, which should be zero for the 2010 simulation.

A summary of the estimated annual runoff volume and phosphorus load from the S-8/S-3 Basin for the period WY1966-2000 is presented in the table below.

Table 3-8: Annual Runoff from the S-8/S-3 Basin.

Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)
1966	293,759	29,307	81
1967	265,135	27,012	83
1968	227,875	22,429	80
1969	377,828	38,660	83
1970	389,510	36,049	75
1971	162,825	16,904	84
1972	292,041	31,289	87
1973	154,545	15,949	84
1974	125,602	12,842	83
1975	217,496	22,358	83
1976	271,226	28,254	84
1977	158,398	15,993	82
1978	254,214	27,789	89
1979	294,857	30,119	83
1980	274,767	27,964	83
1981	90,751	9,340	83
1982	148,572	15,868	87
1983	387,868	37,379	78
1984	210,179	20,097	78
1985	151,541	17,251	92
1986	201,807	20,063	81
1987	256,184	23,958	76
1988	170,127	19,953	95
1989	158,236	16,543	85
1990	145,787	14,730	82
1991	223,425	21,151	77
1992	250,201	26,280	85
1993	259,890	24,923	78
1994	188,687	18,846	81
1995	323,973	32,559	81
1996	285,890	29,104	83
1997	247,626	27,018	88
1998	280,396	25,950	75
1999	181,622	21,556	96
2000	300,597	31,904	86
Min. Annual	**90,751**	**9,340**	**---**
Max. Annual	**389,510**	**38,660**	**---**
Avg. Annual	**234,955**	**23,925**	**83**

4. Runoff From the Eastern Basins

4.1. L-8 Basin

Consistent with the 2005 *EAA Regional Feasibility Study*, the daily flow values from the SFWMM for the L-8 Basin were combined with the long-term monthly flow-weighted mean TP concentration to develop a daily time series of flow and TP. Daily runoff from the L-8 Basin for the simulated 35-yr period was calculated from the following equation

L-8 Basin Runoff = C10ABK + S2TMCL + S5A3S0 + L8TBPR

The SFWMM flow terms are defined as

- C10ABK = backflow from L-8 canal to LOK, with an average annual flow of 57,008 AF/yr
- S2TMCL = Flow from L-8 to M-Canal via WPB pump station 2, with an average annual flow of 85,022 AF/yr
- S5A3S0 = Flow from L-8 canal to the S-5A Complex with an average annual flow of 34,283 AF/yr
- L8TBPR = Volume of excess water from southern L8 to proposed L8 reservoir, with an average annual flow of 17,461 AF/yr

The daily total phosphorus concentrations in the estimated runoff were set equal to the long-term monthly flow-weighted mean concentrations developed in the *Updated Flow and Phosphorus Data Sets*, summarized in the table below.

Table 4-1: Average TP Concentration in Runoff from the L-8 Basin.

Month	TP Conc ppb	Month	TP Conc ppb
January	71	July	86
February	79	August	100
March	119	September	95
April	116	October	105
May	130	November	89
June	111	December	95

A summary of the estimated annual runoff volume and phosphorus load from the L-8 Basin for the period WY1966-2000 is presented in the table below.

Table 4-2: Annual Runoff from the L-8 Basin.

Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)
1966	172,719	21,304	100
1967	221,828	26,860	98
1968	160,836	19,741	100
1969	282,694	34,664	99
1970	213,658	26,937	102
1971	169,532	20,576	98
1972	173,363	21,181	99
1973	120,243	15,320	103
1974	152,950	18,188	96
1975	188,557	22,813	98
1976	187,285	22,960	99
1977	172,346	21,406	101
1978	172,050	21,001	99
1979	292,823	34,824	96
1980	140,472	17,259	100
1981	134,648	16,578	100
1982	132,342	16,904	104
1983	255,970	31,714	100
1984	227,020	27,656	99
1985	168,510	20,684	100
1986	151,319	18,522	99
1987	160,043	19,547	99
1988	174,841	21,245	99
1989	178,010	21,758	99
1990	136,601	16,663	99
1991	184,360	22,239	98
1992	188,606	23,427	101
1993	331,324	39,890	98
1994	198,213	24,168	99
1995	373,119	44,797	97
1996	274,843	33,681	99
1997	139,353	17,067	99
1998	209,335	25,673	99
1999	169,707	20,689	99
2000	172,578	21,427	101
Min. Annual	**120,243**	**15,320**	**---**
Max. Annual	**373,119**	**44,797**	**---**
Avg. Annual	**193,774**	**23,696**	**99**

4.2. Acme Basin B

Consistent with the 2005 EAA Regional Feasibility Study, the daily flow values from the SFWMM for Acme Basin B were combined with the long-term monthly flow-weighted mean TP concentration to develop a daily time series of flow and TP. Daily runoff from the Acme Basin B for the simulated 35-yr period was calculated from the following equation

Acme Basin B Runoff = ACMECU

The SFWMM flow terms are defined as

- ACMECU = flood control discharges from ACME Basin B through Acme Basin A to C-51 W canal

The daily total phosphorus concentrations in the estimated runoff were set equal to the long-term monthly flow-weighted mean concentrations developed in the *Updated Flow and Phosphorus Data Sets*, summarized in the table below.

Table 4-3: Average TP Concentration in Runoff from Acme Basin B.

Month	TP Conc ppb	Month	TP Conc ppb
January	88	July	104
February	94	August	102
March	94	September	132
April	89	October	194
May	80	November	132
June	94	December	97

A summary of the estimated annual runoff volume and phosphorus load from Acme Basin B for the period WY1966-2000 is presented in the table below.

Table 4-4: Annual Runoff from Acme Basin B.

Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)
1966	40,168	6,027	122
1967	40,645	5,726	114
1968	31,151	4,509	117
1969	41,434	5,711	112
1970	44,568	6,177	112
1971	22,658	3,214	115
1972	31,073	4,334	113
1973	34,285	4,267	101
1974	34,259	4,755	113
1975	28,887	4,267	120
1976	35,010	5,158	119
1977	27,613	3,512	103
1978	36,003	4,933	111
1979	35,000	5,009	116
1980	37,969	5,573	119
1981	25,657	3,533	112
1982	33,819	4,613	111
1983	46,034	6,410	113
1984	40,779	5,899	117
1985	29,939	4,290	116
1986	37,327	5,281	115
1987	36,102	4,900	110
1988	32,324	4,617	116
1989	26,781	3,432	104
1990	22,022	3,025	111
1991	35,431	4,683	107
1992	29,437	4,035	111
1993	39,570	5,525	113
1994	30,789	4,472	118
1995	42,701	6,167	117
1996	37,811	5,652	121
1997	36,874	5,009	110
1998	42,768	5,537	105
1999	35,039	5,052	117
2000	45,370	6,718	120
Min. Annual	**22,022**	**3,025**	**---**
Max. Annual	**46,034**	**6,718**	**---**
Avg. Annual	**35,066**	**4,915**	**114**

4.3. C-51W Basin

Consistent with the 2005 *EAA Regional Feasibility Study*, the daily flow values from the SFWMM from the C-51W Basin were combined with the long-term monthly flow-weighted mean TP concentration to develop a daily time series of flow and TP. Daily runoff from the C-51W Basin for the simulated 35-yr period was calculated from the following equation

C-51W Basin Runoff = S319 + S1324P + S155A - S5A3SO - ACMECU

The SFWMM flow terms are defined as

- S319 = flow from western C-51 basin into STA-1E via S-319, with an average annual flow of 190,003 AF/yr
- S1324P = S-361 pumped inflow for flood control, with an average annual flow of 9,722 AF/yr
- S155A = flow from C-51W canal to the eastern C-51 canal through the S-155A spillway, with an average annual flow of 6,902 AF/yr
- S5A3S0 = flood control discharges from L-8 into C-51W, with an average annual flow of 34,283 AF/yr
- ACMECU = flood control discharges from ACME Basin B through Acme Basin A to C-51 W canal, with an average annual flow of 35,066 AF/yr

The daily total phosphorus concentrations in the estimated runoff were set equal to the long-term monthly flow-weighted mean concentrations developed in the *Updated Flow and Phosphorus Data Sets*, summarized in the table below.

Table 4-5: Average TP Concentration in Runoff from the C-51W Basin.

Month	TP Conc ppb	Month	TP Conc ppb
January	121	July	155
February	93	August	152
March	153	September	208
April	185	October	359
May	203	November	220
June	185	December	143

A summary of the estimated annual runoff volume and phosphorus load from the C-51W Basin for the period WY1966-2000 is presented in the table below.

Table 4-6: Annual Runoff from the C-51W Basin.

Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)
1966	156,200	39,101	203
1967	151,338	36,140	194
1968	127,256	30,943	197
1969	166,708	39,661	193
1970	186,068	45,600	199
1971	110,237	25,658	189
1972	112,134	27,213	197
1973	131,310	29,433	182
1974	117,960	26,945	185
1975	113,905	27,377	195
1976	125,355	33,351	216
1977	109,686	24,532	181
1978	135,849	31,334	187
1979	143,224	34,010	193
1980	132,148	33,602	206
1981	99,398	23,135	189
1982	120,858	28,463	191
1983	196,482	46,395	191
1984	175,448	46,351	214
1985	127,352	33,378	212
1986	131,002	32,343	200
1987	131,881	28,545	175
1988	121,837	30,812	205
1989	113,530	23,733	169
1990	94,220	21,029	181
1991	136,961	30,155	178
1992	119,637	29,179	198
1993	168,775	37,916	182
1994	100,215	24,879	201
1995	190,095	48,060	205
1996	157,048	41,818	216
1997	145,569	34,756	194
1998	154,373	32,045	168
1999	128,034	30,680	194
2000	172,601	46,907	220
Min. Annual	**94,220**	**21,029**	**---**
Max. Annual	**196,482**	**48,060**	**---**
Avg. Annual	**137,277**	**33,014**	**195**

5. Runoff From the Western Basins

5.1. C-139 Basin

Consistent with the methodology utilized in the 2005 *EAA Regional Feasibility Study*, the historic runoff from the C-139 Basin for the WY1995-2007 period was used in lieu of the SFWMM flows for this basin as inflow to STA-5 and STA-6. However, the SFWMM flows for the C-139 Basin discharges to the EAA through G-136 were used; this is also consistent with the 2005 EAA Regional Feasibility Study. A summary of the estimated annual runoff volume and phosphorus load from the C-139 Basin to STA-5 and STA-6 for the period WY1995-2007 is presented in the table below. These values exclude discharges through the G-135 and G-136 structures. The C-139 Basin has been in non-compliance of the load reduction requirements for the last five water years, and the District is actively coordinating with the landowners to investigate causes and possible remedies.

Table 5-1: Annual Runoff from the C-139 Basin to STA-5 and STA-6.

Water Year	Volume ac-ft	TP Load kg	TP Conc. ppb
1995	236,529	56,368	193
1996	214,503	45,070	170
1997	151,440	42,427	227
1998	149,152	30,171	164
1999	122,058	31,376	208
2000	176,867	44,149	202
2001	53,197	16,642	254
2002	182,608	61,521	273
2003	209,265	71,031	275
2004	190,713	64,536	274
2005	150,075	34,933	189
2006	302,638	97,068	260
2007	71,783	28,149	318
Min. Annual	**53,197**	**16,642**	**-**
Max. Annual	**302,638**	**97,068**	**-**
Ave. Annual	**170,064**	**47,957**	**229**

As a matter of information, for the WY1966-2000 period, the SFWMM simulated an annual average of 136,267 AF of total runoff for the C-139 Basin to STA-5 and STA-6.

The SFWMM flows for the C-139 Basin discharges to the EAA through G-136 were used as modeled. These were segregated by SFWMM into two flow terms – G136SO and G136EA, defined as

- G136SO = flow from outside model boundary routed south to STA-3/4 via EAA MIAMI basin
- G136EA = flow from outside model boundary routed to the EAA MIAMI basin (not treated)

The daily total phosphorus concentrations in the estimated runoff for G136SO were set equal to the long-term monthly flow-weighted mean concentrations for G-136 developed in the *Updated Flow and Phosphorus Data Sets*, summarized in the table below.

Table 5-2: Average TP Concentration in Runoff from G-136.

Month	TP Conc ppb	Month	TP Conc ppb
January	89	July	242
February	259	August	213
March	115	September	204
April	67	October	183
May	67	November	237
June	255	December	84

A summary of the estimated annual runoff volume and phosphorus load from G-136 to STA-3/4 for the period WY1966-2000 is presented in the table below.

Table 5-3: Annual Runoff from G-136 to STA-3/4.

	Annual Runoff		
Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)
1966	17,931	4,645	210
1967	18,580	4,942	216
1968	14,365	3,773	213
1969	17,365	4,799	224
1970	16,268	3,722	186
1971	6,322	1,683	216
1972	7,465	1,995	217
1973	5,081	1,421	227
1974	5,161	1,359	213
1975	29,619	8,112	222
1976	18,827	5,120	220
1977	5,216	1,337	208
1978	8,625	2,106	198
1979	9,535	2,382	202
1980	8,024	1,858	188
1981	1,943	516	215
1982	2,863	750	212
1983	49,155	12,980	214
1984	26,820	6,781	205
1985	5,622	1,521	219
1986	15,578	3,890	202
1987	29,845	7,842	213
1988	9,340	2,406	209
1989	5,904	1,543	212
1990	1,054	274	211
1991	2,730	512	152
1992	7,339	1,776	196
1993	9,434	2,489	214
1994	16,596	3,992	195
1995	27,736	6,336	185
1996	13,211	3,258	200
1997	7,330	2,104	233
1998	14,147	3,542	203
1999	9,881	2,641	217
2000	17,132	4,643	220
Min. Annual	**1,054**	**274**	**---**
Max. Annual	**49,155**	**12,980**	**---**
Avg. Annual	**13,201**	**3,401**	**209**

5.2. C-139 Annex Basin

Consistent with the methodology utilized in the 2005 EAA Regional Feasibility Study, the runoff from the C-139 Annex Basin based on historic data for the WY1995-2007 period were used in lieu of the SFWMM simulated flows from this basin. Data records begin in December 1995 for station USSO, and were used to estimate runoff from the C-139 Annex. Since the combined flows from the C-139 Basin and the C-139 Annex Basin will be mingled to generate the inflows to STA-5 and STA-6, it was necessary to create this common period of record. For the period May 1994 through November 1995, the period of record (December 1995 – April 30, 2007) average monthly flow and phosphorus load were used to populate the missing days for the C-139 Annex. This procedure resulted in slightly (1%) less average annual flows and loads compared to the *Updated Flow and Phosphorus Data Set* due to the different period of record. A summary of the estimated annual runoff volume and phosphorus load from the C-139 Basin for the period WY1995-2007 is presented in the table below.

Table 5-4: Annual Runoff from the C-139 Annex Basin.

Water Year	Annual Data		
	Volume ac-ft	TP Load kg	TP Conc ppb
1995	41,486	4,987	97
1996	36,511	4,571	101
1997	40,195	5,107	76
1998	46,081	4,022	103
1999	24,270	3,131	71
2000	46,365	6,416	105
2001	26,831	4,564	112
2002	37,721	3,846	138
2003	43,921	5,261	83
2004	46,858	5,731	97
2005	47,518	5,651	99
2006	65,731	6,901	96
2007	35,826	4,649	85
Min.	24,270	3,131	-
Max.	65,731	6,901	-
Ave.	41,486	4,987	97

As a matter of information, for the WY1966-2000 period, the SFWMM simulated an annual average of 11,986 AF of total runoff for the C-139 Annex, and an annual average of 4,663 AF/yr from the lands north of STA-6 which have been converted to the treatment area of Compartment C.

During the analyses described above, an error was identified in the formula used to calculate the average annual loads, and hence the average annual phosphorus concentration, for the C-139 Annex Basin presented in Table 10-6 of the *Updated Flow and Phosphorus Data Set*. The corrected table is presented in its entirety below, with the corrected values highlighted.

Table 10-6 (Revised). Discharge Summary for C-139 Annex Basin.

Water Year	Annual Data[1]			
	Volume		TP Load	TP Conc
	ac-ft	hm^3	kg	ppb
1995				
1996<	1,742	2.149	164	76
1997	40,195	49.580	5,107	103
1998	46,081	56.840	4,022	71
1999	24,270	29.936	3,131	105
2000	46,365	57.190	6,416	112
2001	26,831	33.095	4,564	138
2002	37,721	46.529	3,846	83
2003	43,921	54.176	5,261	97
2004	46,858	57.799	5,731	99
2005	47,518	58.612	5,651	96
2006	65,731	81.077	6,901	85
2007	35,826	44.191	4,649	105
Min.	24,270	29.936	3,131	-
Max.	65,731	81.077	6,901	-
Ave.	41,938	51.730	5,025	97

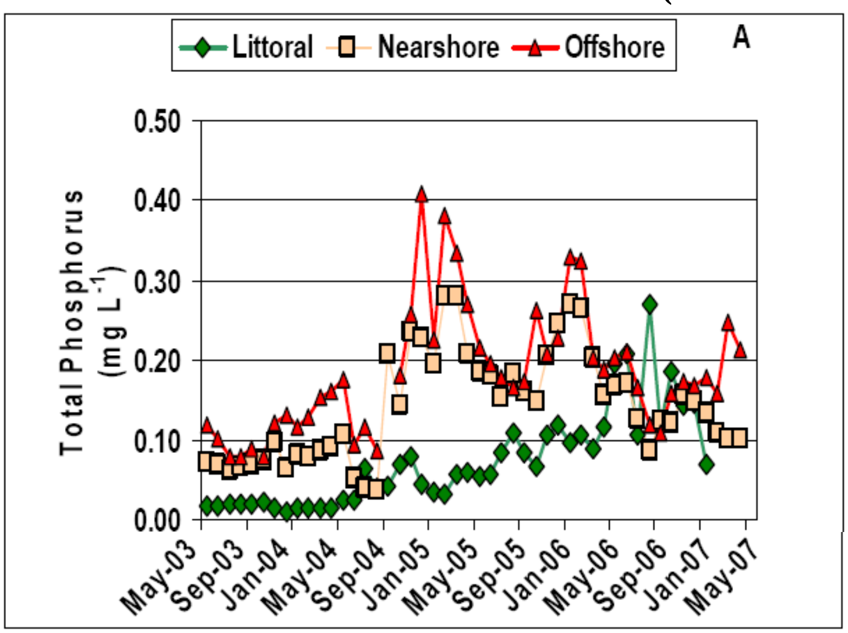
Month	Monthly Data[2]			
	Volume		TP Load	TP Conc
	ac-ft	hm^3	kg	ppb
Jan	1,217	1.501	113	75
Feb	1,218	1.502	82	55
Mar	1,406	1.735	133	76
Apr	1,133	1.397	130	93
May	1,605	1.980	141	71
Jun	5,241	6.465	732	113
Jul	5,987	7.385	850	115
Aug	6,475	7.987	780	98
Sep	6,547	8.075	926	115
Oct	6,042	7.452	747	100
Nov	2,872	3.543	232	66
Dec	1,743	2.150	123	57
Annual	41,486	51.172	4,987	97

1. Symbol "<" after water year indicates partial year data. Missing and partial year data are excluded from annual statistic calculations.
2. Average monthly statistics are calculated using all available data, including those for partial water years; therefore, annual total of monthly averages may not match average of annual totals.

6. Lake Okeechobee Releases

For the purpose of assigning concentrations to Lake releases, the 2005 EAA Regional Feasibility Study utilized the phosphorus concentrations in Lake Okeechobee flow-through measured at the southern structures for all except one basin[2]. The 2005 Study analyzed data through April 2004; subsequent to that data period, the Lake concentration increased dramatically due to the 2004/2005 hurricanes. There exists considerable uncertainty as to the future concentrations of Lake releases, however, there is almost universal agreement that the concentrations will be higher than the 75 ppb observed in the WY1995-2007 period for flow-through releases in the S-7/S-2 and S-8/S-3 basins. The figure below, taken from the draft 2008 South Florida Environmental Report (Figure 10-12 of Volume 1 Chapter 10) documents that the nearshore concentrations appear to have stabilized around 100 ppb. It is recommended that for the purpose of the inflow data sets, the WY1995-2007 observed monthly average concentrations at the S-352 and S-354 structures be scaled such that the flow-weighted mean concentration equals 100 ppb[3]. This approach will preserve the monthly variability of the phosphorus levels and is consistent with the best available information for nearshore Lake concentrations. Lake releases at the S-352 structure will utilize the historic TP concentrations observed during the WY1995-2007 period, which exhibited a flow-weighted mean of 145 ppb. To evaluate the sensitivity of STA performance to Lake concentration, a separate analysis will use a Lake concentration of 150 ppb at the inflow to the EAASR.

Figure 6-1: TP Concentrations for Lake Okeechobee (from SFWMD 2007).



[2] For the L-8 Basin the 2005 Study used the concentration at the Lake structure.
[3] Note that this value is less than the 146 ppb used in 2006 during the Lake Okeechobee Regulation Schedule Study.

6.1. Lake Okeechobee Releases to be Treated

The SFWMM identifies several flow terms quantifying Lake Okeechobee releases designed to be treated within the STAs, Compartment B and the EAA Storage Reservoir. The following sections discuss the application of historic concentrations to SFWMM daily flows.

6.1.1 Releases Directed to the STAs Through S-352

The SFWMM did not simulate any Lake releases through S-352 for subsequent treatment in the STAs.

6.1.2 Releases Directed to the STAs Through S-351

The SFWMM quantified flows directed to the STAs and the EAASR through S-351 for the following terms:

Lake releases at S-351 = LKRNS1 + WSST2B + WSST2E

The SFWMM flow terms are defined as

- LKRNS1 = Excess water from Lake Okeechobee via NNRC to the northern surge tank of the EAA reservoir, with an average annual flow of 139,761 AF/yr
- WSST2B = water supply discharge from LOK to Compartment B, with an average annual flow of 194 AF/yr
- WSST2E = water supply discharge from LOK to the eastern portion of STA-2, with an average annual flow of 16 AF/yr

With the additional water re-directed to Compartment B (see Section 7.4), WSST2B will be set to zero.

As discussed above, the daily total phosphorus concentrations in the Lake releases were re-scaled from the long-term monthly flow-weighted mean concentrations developed in the *Updated Flow and Phosphorus Data Sets*, summarized in **Table 6-1**. To evaluate the sensitivity of STA performance to Lake concentration, a separate analysis will use a Lake concentration of 150 ppb at the inflow to the EAASR.

Table 6-1: Re-scaled TP Concentrations for Lake Releases from S-351.

Month	WY95-07 TP Conc ppb	Scaled TP Conc ppb	Scaled TP Conc ppb
January	71	102	153
February	72	103	155
March	50	73	109
April	80	115	172
May	99	143	214
June	50	73	109
July	44	63	95
August	55	79	118
September	79	114	172
October	75	108	162
November	75	108	161
December	69	99	148
Flow-weighted mean	**75**	**100**	**150**

A summary of the estimated annual runoff volume and phosphorus load in Lake Okeechobee releases at S-352 for treatment downstream for the period WY1966-2000 is presented in the table below.

Table 6-2: Annual Lake Releases At S-351 To Be Treated.

Water Year	Volume (acre-feet)	Average Lake TP = 100 ppb		Average Lake TP = 150 ppb	
		TP Load Load (kg)	TP Conc. (ppb)	TP Load Load (kg)	TP Conc. (ppb)
1966	67,426	9,082	109	13,626	164
1967	289,416	36,837	103	55,268	155
1968	568	95	135	142	203
1969	243,243	31,964	107	47,957	160
1970	376,797	46,519	100	69,795	150
1971	156,562	18,700	97	28,056	145
1972	0	0		0	
1973	0	0		0	
1974	0	0		0	
1975	0	0		0	
1976	0	0		0	
1977	0	0		0	
1978	0	0		0	
1979	167,309	20,076	97	30,121	146
1980	339,092	43,288	103	64,947	155
1981	21,026	3,702	143	5,554	214
1982	0	0		0	
1983	284,738	36,068	103	54,114	154
1984	421,227	48,042	92	72,080	139
1985	162,554	19,897	99	29,852	149
1986	0	0		0	
1987	8,837	1,249	115	1,875	172
1988	48,215	6,503	109	9,757	164
1989	41,415	4,665	91	6,999	137
1990	0	0		0	
1991	0	0		0	
1992	309,189	38,750	102	58,139	152
1993	370,964	44,392	97	66,603	146
1994	40,813	6,156	122	9,235	183
1995	132,031	17,625	108	26,444	162
1996	483,040	60,075	101	90,133	151
1997	101,817	10,829	86	16,247	129
1998	243,638	27,854	93	41,791	139
1999	347,634	44,386	104	66,595	155
2000	234,659	26,507	92	39,770	137
Min. Annual	**0**	**0**	**---**	**0**	**---**
Max. Annual	**483,040**	**60,075**	**---**	**90,133**	**---**
Avg. Annual	**139,777**	**17,236**	**100**	**25,860**	**150**

6.1.3 Releases Directed to the STAs Through S-354

The SFWMM quantified flows directed to the STAs and the EAASR through S-354 for the following terms:

Lake releases at S-354 = LKRSM1 + WSSTA5 + WSSTA6

The SFWMM flow terms are defined as

- LKRSM1 = Excess water from Lake Okeechobee via Miami Canal to the northern surge tank of the EAA reservoir, with an average annual flow of 183,461 AF/yr
- WSSTA5 = water supply discharge from LOK to Compartment B, with an average annual flow of 331 AF/yr
- WSSTA6 = water supply discharge from LOK to the eastern portion of STA-2, with an average annual flow of 2,284 AF/yr

The STA-5 and STA-6 inflows were based on historic values which greatly exceeded the simulated values (see Sections 7.6 and 7.7). Because of this, the simulated water supply deliveries to these STAs were omitted.

The daily total phosphorus concentrations in the releases were re-scaled from the long-term monthly flow-weighted mean concentrations developed in the *Updated Flow and Phosphorus Data Sets*, and are summarized in the table below. To evaluate the sensitivity of STA performance to Lake concentration, a separate analysis will use a Lake concentration of 150 ppb at the inflow to the EAASR.

Table 6-3: Re-scaled TP Concentrations for Lake Releases from S-354.

Month	WY95-07 TP Conc ppb	Scaled TP Conc ppb	Scaled TP Conc ppb
January	55	75	113
February	44	60	90
March	44	59	89
April	67	91	136
May	89	121	181
June	86	117	176
July	74	100	151
August	104	141	211
September	103	140	210
October	108	147	221
November	67	91	137
December	56	77	115
Flow-weighted mean	**75**	**100**	**150**

A summary of the estimated annual runoff volume and phosphorus load in Lake Okeechobee releases at S-354 for treatment downstream for the period WY1966-2000 is presented in the table below.

Table 6-4: Annual Lake Releases At S-354 To Be Treated.

Water Year	Volume (acre-feet)	Average Lake TP = 100 ppb		Average Lake TP = 150 ppb	
		TP Load Load (kg)	TP Conc. (ppb)	TP Load Load (kg)	TP Conc. (ppb)
1966	88,214	9,599	88	14,399	132
1967	365,886	54,884	122	82,326	182
1968	0	0		0	
1969	325,822	43,798	109	65,696	163
1970	512,851	57,250	90	85,874	136
1971	222,160	34,187	125	51,281	187
1972	0	0		0	
1973	0	0		0	
1974	0	0		0	
1975	0	0		0	
1976	0	0		0	
1977	0	0		0	
1978	0	0		0	
1979	207,836	17,203	67	25,804	101
1980	423,365	48,574	93	72,860	140
1981	19,851	2,956	121	4,435	181
1982	0	0		0	
1983	370,907	40,722	89	61,084	134
1984	531,845	66,293	101	99,439	152
1985	265,125	41,613	127	62,419	191
1986	0	0		0	
1987	12,771	1,431	91	2,147	136
1988	53,774	5,782	87	8,673	131
1989	48,252	7,548	127	11,323	190
1990	0	0		0	
1991	0	0		0	
1992	352,822	49,272	113	73,909	170
1993	507,653	59,145	94	88,717	142
1994	45,295	6,699	120	10,048	180
1995	217,949	26,990	100	40,485	151
1996	622,452	70,269	92	105,403	137
1997	145,262	21,308	119	31,963	178
1998	340,958	37,823	90	56,735	135
1999	397,457	50,984	104	76,476	156
2000	342,617	37,676	89	56,515	134
Min. Annual	**0**	**0**	**---**	**0**	**---**
Max. Annual	**622,452**	**70,269**	**---**	**105,403**	**---**
Avg. Annual	**183,461**	**22,629**	**100**	**33,943**	**150**

6.2. Water Supply Bypass

The SFWMM identifies several flow terms quantifying Lake Okeechobee releases designed to satisfy downstream water supply demands. Consistent with the 2005 EAA Regional Feasibility Study, Lake releases to satisfy water supply demands downstream of the STA inflow points will continue to be diverted around the STAs.

6.2.1 Water Supply Bypass Through S-352

The SFWMM quantified flows for the following terms:

Lake releases at S-352 = WLC352 + S352L8

The SFWMM flow terms are defined as

- WLC352 = Excess water from Lake Okeechobee via Miami Canal to the northern surge tank of the EAA reservoir, with an average annual flow of 4,174 AF/yr
- S352L8 = water supply discharge from LOK to Compartment B, with an average annual flow of 16,880 AF/yr

The daily total phosphorus concentrations in the Lake releases were set equal to the long-term monthly flow-weighted mean concentrations developed in the *Updated Flow and Phosphorus Data Sets*, summarized in the table below.

Table 6-5: Average TP Concentration in Lake Releases from the S-352.

Month	WY95-07 TP Conc ppb	Scaled TP Conc ppb
January	55	170
February	44	153
March	44	143
April	67	131
May	89	104
June	86	81
July	74	89
August	104	169
September	103	129
October	108	116
November	67	170
December	56	145
Flow-weighted mean	**75**	**140**

A summary of the estimated annual volume and phosphorus load in Lake Okeechobee releases at S-352 for bypass for the period WY1966-2000 is presented in the table below.

Table 6-6: Annual Lake Releases At S-352 To Be Bypassed.

Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)
1966	32,195	4,282	108
1967	2,040	330	131
1968	63,651	10,038	128
1969	3,461	444	104
1970	0	0	
1971	51,826	8,459	132
1972	41,756	6,795	132
1973	12,639	2,236	143
1974	40,645	7,638	152
1975	20,319	3,314	132
1976	70,697	12,775	146
1977	68,410	12,184	144
1978	35,837	5,719	129
1979	6,511	833	104
1980	11,967	1,950	132
1981	48,611	8,617	144
1982	5,399	830	125
1983	45	6	104
1984	3,700	475	104
1985	2,524	333	107
1986	18,119	2,418	108
1987	13,427	1,687	102
1988	31,693	4,850	124
1989	19,537	3,121	130
1990	60,933	10,180	135
1991	20,421	4,029	160
1992	510	65	104
1993	4,098	438	87
1994	0	0	
1995	8,069	1,298	130
1996	0	0	
1997	6,793	1,129	135
1998	1,280	164	104
1999	9,843	1,234	102
2000	19,942	2,491	101
Min. Annual	**0**	**0**	**---**
Max. Annual	**70,697**	**12,775**	**---**
Avg. Annual	**21,054**	**3,439**	**132**

6.2.2 Water Supply Bypass Through S-351

The SFWMM quantified flows for the following terms:

Lake releases at S-351 = WL1351 + WL2351 + WL3351

The SFWMM flow terms are defined as
- WL1351 = water supply from LOK to LEC SA2 via NNRC in the EAA, with an average annual flow of 2,854 AF/yr
- WL2351 = water supply from LOK (thru S-351) to LEC SA2 via Hillsboro canal in the EAA, with an average annual flow of 1,047 AF/yr
- WL3351 = water supply from LOK (thru S-351) to LEC SA3 via NNRC thru S-150 in the EAA, with an average annual flow of 14,659 AF/yr

The daily total phosphorus concentrations in the Lake releases were the same as presented in **Table 6-1** above. A summary of the estimated annual volume and phosphorus load in Lake Okeechobee releases at S-351 for bypass for the period WY1966-2000 is presented in the table below.

Table 6-7: Annual Lake Releases At S-351 To Be Bypassed.

Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)
1966	38,429	5,866	124
1967	158	22	114
1968	39,895	5,934	121
1969	6,816	1,186	141
1970	0	0	
1971	63,187	7,939	102
1972	36,612	5,851	130
1973	11,068	1,440	105
1974	48,518	5,814	97
1975	31,750	4,228	108
1976	17,893	3,072	139
1977	11,835	1,733	119
1978	1,432	249	141
1979	0	0	
1980	0	0	
1981	20,891	2,892	112
1982	46,189	5,622	99
1983	0	0	
1984	0	0	
1985	36,153	4,464	100
1986	40,672	6,000	120
1987	0	0	
1988	0	0	
1989	81,278	9,714	97
1990	80,644	10,792	108
1991	28,568	4,472	127
1992	0	0	
1993	807	71	71
1994	0	0	
1995	0	0	
1996	0	0	
1997	0	0	
1998	0	0	
1999	3,125	439	114
2000	3,657	636	141
Min. Annual	**0**	**0**	**---**
Max. Annual	**81,278**	**10,792**	**---**
Avg. Annual	**18,559**	**2,527**	**110**

6.2.3 Water Supply Bypass Through S-354

The SFWMM quantified flows for the following terms:

Lake releases at S-351 = WLC354 + WSHOLY + LKTSEM

The SFWMM flow terms are defined as

- WLC354 = water supply discharges to LEC from LOK via S-354, with an average annual flow of 24,417 AF/yr
- WSHOLY = water supply discharge from LOK to Compartment B, with an average annual flow of 1,047 AF/yr
- LKTSEM = Water supply from Lake Okeechobee to meet supplemental BCR Seminole demands, with an average annual flow of 20,868 AF/yr

The daily total phosphorus concentrations in the Lake releases were the same as presented in **Table 6-3** above. A summary of the estimated annual volume and phosphorus load in Lake Okeechobee releases at S-354 for bypass for the period WY1966-2000 is presented in the table below.

Table 6-8: Annual Lake Releases At S-354 To Be Bypassed.

Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)
1966	78,062	10,606	110
1967	26,911	2,816	85
1968	51,033	6,029	96
1969	15,385	1,823	96
1970	2,845	360	102
1971	68,307	7,285	86
1972	34,197	4,350	103
1973	39,268	4,652	96
1974	145,620	15,249	85
1975	109,111	13,007	97
1976	45,392	5,352	96
1977	59,892	6,353	86
1978	14,599	1,855	103
1979	11,203	1,311	95
1980	10,462	1,231	95
1981	58,042	6,713	94
1982	71,291	9,441	107
1983	10,686	1,266	96
1984	20,637	2,365	93
1985	32,199	3,486	88
1986	49,259	6,543	108
1987	18,880	2,373	102
1988	28,253	3,443	99
1989	81,024	8,643	86
1990	299,549	30,195	82
1991	57,812	7,724	108
1992	12,367	1,372	90
1993	18,476	2,422	106
1994	21,346	2,582	98
1995	12,549	1,523	98
1996	27,517	3,057	90
1997	20,298	2,090	83
1998	7,747	1,096	115
1999	32,224	3,617	91
2000	22,447	2,254	81
Min. Annual	**2,845**	**360**	**---**
Max. Annual	**299,549**	**30,195**	**---**
Avg. Annual	**46,140**	**5,271**	**93**

7. STA Inflows

7.1. STA-1E Inflows

A schematic of STA-1E is presented in **Figure 7-1**. The daily inflow to STA-1E was estimated based on the following equation

STA-1E inflows = + C-51W Basin Runoff – S-155A diversion
+ S-5A Basin Re-direction + EBWCD Re-direction
+ Acme Basin B
+ L-8 Basin diversion to C-51W Basin

The SFWMM distributed a long-term average of 53,389 AF/yr of S-5A Basin runoff to STA-1E inflows, equal to 21.62% of the S-5A Basin runoff directed to the STA-1 Inflow Basin. Operationally, it is recommended to send S-5A Basin runoff to STA-1E, but not the full amount modeled in the SFWMM; the operational goal is to balance the phosphorus loading rate between the two STAs by re-distributing basin runoff between the two STAs. This approach is consistent with the recommendations and assumptions made in the 2005 EAA Regional Feasibility Study. In order to balance the phosphorus loading rate among STA-1E and STA-1W, this re-directed volume was adjusted to a long-term average of 18,766 AF/yr, yielding a PLR of 2.0 $g/m^2/yr$ for both STAs, including re-directed flows from STA-1W that exceed the inflow capacity of 3,250 cfs. Runoff from the EBWCD was also re-directed to STA-1E at the same percentage as the S-5A Basin runoff (6%), estimated as a long-term average of 1,028 AF/yr.

The SFWMM simulated the entire volume of the L-8 Basin Runoff to C-51W as entering STA-1E, equal to a long-term average of 34,283 AF/yr. In order to prevent overloading of STA-1E, the existing operational practice is to re-direct a similar volume of STA-1E inflow to the eastern C-51W Basin through synchronized operation of S-319 and S-155A. This operation is not 100% efficient, such that it is likely that less than 100% of the equivalent volume is re-directed. For the purpose of establishing the STA-1E inflow set, it is assumed that 75% of the volume of the L-8 Basin runoff is re-directed away from STA-1E. This approach is consistent with the recommendations and assumptions made in the 2005 EAA Regional Feasibility Study. Accounting for this operational practice requires reducing the simulated inflow volume at S-319 by an amount equal to 75% of the L-8 Basin runoff.

The long-term average annual inflow to STA-1E by source, after the re-directions of flows described above, is summarized in **Table 7-1**. By comparison, prior to the re-directions of flows described above, the average annual inflow was 256,765 AF/yr, with an associated 53,374 kg/yr, 169 ppb, and a phosphorus loading rate of 2.57 g/m2/yr. The estimated annual inflows for WY1966-WY2000 are summarized in **Table 7-2**. Although the long-term goal is to treat less inflow in STA-1E than shown in **Table 7-2**, it is recognized that during the interim period before ECART and the L-8 Basin projects are complete, STA-1E inflows will be higher than the long-term goals. With complete diversion of the L-8 Basin runoff and without implementation of ECART, the long-term average annual inflows to STA-1E are estimated to be 188,254 AF/yr, 41,529 kg/yr, 179 ppb, and a PLR of 2.0 g/m^2/yr. It should also be noted that significantly higher phosphorus loads to STA-1E are estimated in the present analysis than in the 2005 EAA Regional Feasibility Study, due principally to higher observed phosphorus concentrations during the updated period of record, a result of the 2004 hurricanes. A longer period of record will be utilized in the 2009 update of the STA data sets, and it is likely that lower concentrations will be applied to future STA-1E inflows at that time.

Figure 7-1: Schematic of STA-1E (Not to Scale).

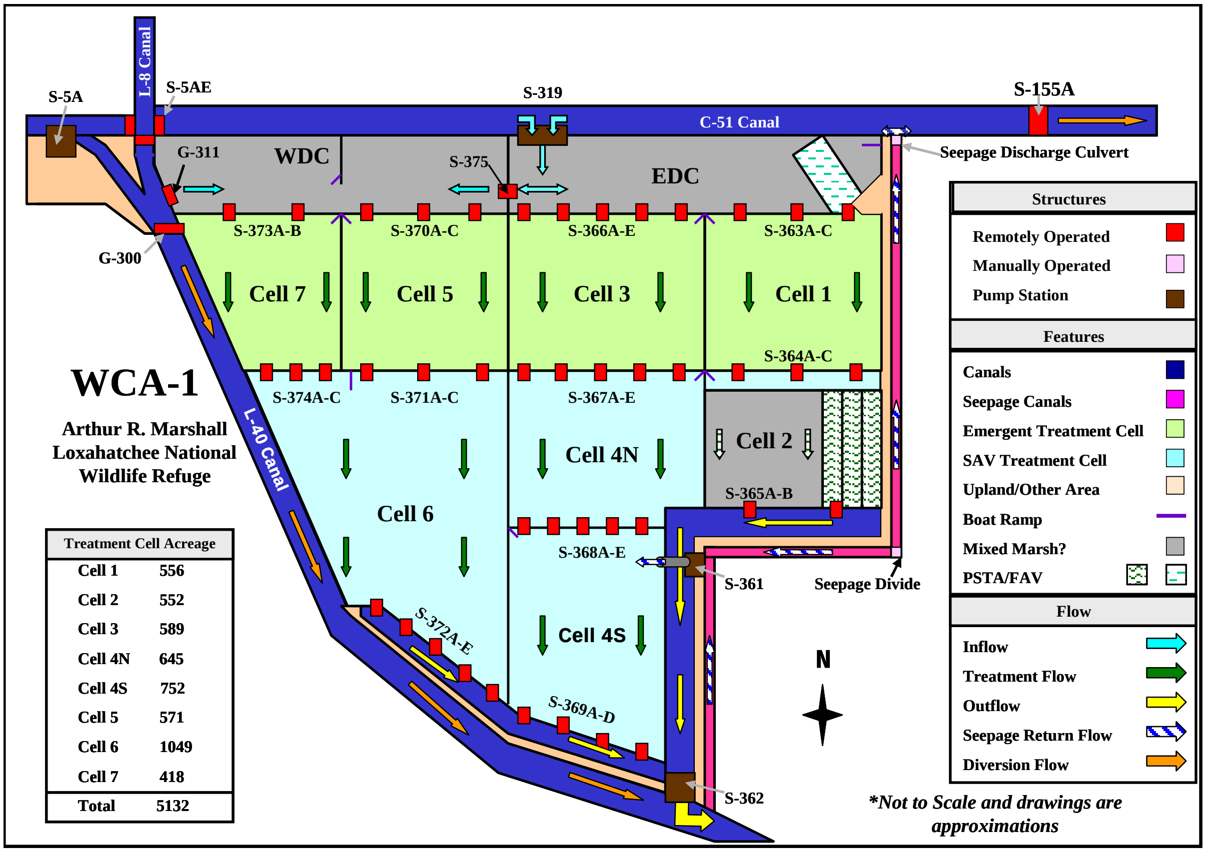


Table 7-1: Summary of Long-term Average Annual Inflow to STA-1E.

Source	Flow (AF/yr)	TP Load (kg/yr)	TP Conc (ppb)
S-5A Basin	18,766	3,802	164
EBWCD	1,028	593	468
L-8 Basin	8,571	1,019	96
Acme Basin B	35,066	4,915	114
C-51W Basin	130,375	31,529	196
Total	**193,818**	**41,864**	**175**

Table 7-2: Annual Runoff to STA-1E from All Sources.

Water Year	Runoff Volume AF/yr	TP Load kg	TP Concentration ppb	Phosphorus Loading Rate (g/m2/yr)
1966	207,119	47,279	185	2.28
1967	230,011	48,572	171	2.34
1968	144,346	32,220	181	1.55
1969	258,166	55,017	173	2.65
1970	292,059	64,167	178	3.09
1971	124,543	26,791	174	1.29
1972	150,203	33,232	179	1.60
1973	162,878	33,187	165	1.60
1974	151,200	31,367	168	1.51
1975	137,308	30,300	179	1.46
1976	172,441	41,445	195	2.00
1977	137,536	28,188	166	1.36
1978	187,664	39,920	172	1.92
1979	203,018	42,221	169	2.03
1980	185,932	42,800	187	2.06
1981	123,249	26,296	173	1.27
1982	173,263	37,096	174	1.79
1983	295,075	62,108	171	2.99
1984	268,428	61,176	185	2.95
1985	185,672	42,972	188	2.07
1986	181,279	40,672	182	1.96
1987	182,987	36,696	163	1.77
1988	174,610	39,864	185	1.92
1989	143,480	28,360	160	1.37
1990	100,746	21,667	174	1.04
1991	190,029	37,915	162	1.83
1992	153,454	34,362	182	1.65
1993	290,036	56,439	158	2.72
1994	157,868	34,967	180	1.68
1995	335,438	70,063	169	3.37
1996	253,830	57,278	183	2.76
1997	190,215	41,454	177	2.00
1998	210,076	40,184	155	1.93
1999	186,924	40,346	175	1.94
2000	242,549	58,617	196	2.82
Min. Annual	**100,746**	**21,667**	**---**	**1.04**
Max. Annual	**335,438**	**70,063**	**---**	**3.37**
Avg. Annual	**193,818**	**41,864**	**175**	**2.02**

7.2. STA-1W Inflows

A schematic of STA-1W is presented in **Figure 7-2**. The daily inflow to STA-1W was estimated based on the following equation

STA-1W Inflows = S-5A Basin Runoff to STA-1 Inflow Basin + EBWCD - STA-1E Re-direction

The SFWMM distributed a long-term average of 53,389 AF/yr of S-5A Basin runoff to STA-1E inflows, equal to 21.62% of the S-5A Basin runoff directed to the STA-1 Inflow Basin. Operationally, it is recommended to send S-5A Basin runoff to STA-1E, but not the full amount modeled in the SFWMM; the operational goal is to balance the phosphorus loading rate between the two STAs by re-distributing basin runoff between the two STAs. This approach is consistent with the recommendations and assumptions made in the 2005 EAA Regional Feasibility Study. In order to balance the phosphorus loading rate among STA-1E and STA-1E, this re-directed volume was adjusted to a long-term average of 18,766 AF/yr, yielding a PLR of 2.0 $g/m^2/yr$ for both STAs, including re-directed flows from STA-1W that exceed the inflow capacity of 3,250 cfs. Runoff from the EBWCD was also re-directed to STA-1E at the same percentage as the S-5A Basin runoff (6%), estimated as a long-term average of 1,028 AF/yr.

The SFWMM distributed a long-term average of approximately 7,207 AF/yr of untreated S-5A Basin runoff to WCA-1. Operationally, it is recommended to capture and treat this in STA-1W. This approach is consistent with the recommendations and assumptions made in the 2005 *EAA Regional Feasibility Study*.

The long-term average annual inflow to STA-1W by source, after the re-directions of flows described above, is summarized in **Table 7-3**. By comparison, prior to the re-directions of flows described above, the average annual inflow was 198,967 AF/yr, with an associated 40,004 kg/yr, 163 ppb, and a phosphorus loading rate of 1.48 g/m2/yr. Although the long-term goal is to treat less inflow in STA-1W than shown in **Table 7-3**, it is recognized that during the interim period before ECART and the L-8 Basin projects are complete, STA-1W inflows will be higher than the long-term goals. With complete diversion of the L-8 Basin runoff and without implementation of ECART, the long-term average annual inflows to STA-1W are estimated to be 240,176 AF/yr, 53,736 kg/yr, 181 ppb, and a PLR of 2.0 $g/m^2/yr$. It should also be noted that significantly higher phosphorus loads to STA-1E are estimated in the present analysis than in the 2005 *EAA Regional Feasibility Study*, due principally to higher observed phosphorus concentrations during the updated period of record, a result of the 2004 hurricanes. A longer period of record will be utilized in the 2009 update of the STA data sets, and it is likely that lower concentrations will be applied to future STA-1W inflows at that time. The estimated annual inflows for WY1966-WY2000 are summarized in **Table 7-4**.

Figure 7-2: Schematic of STA-1W (Not to Scale).

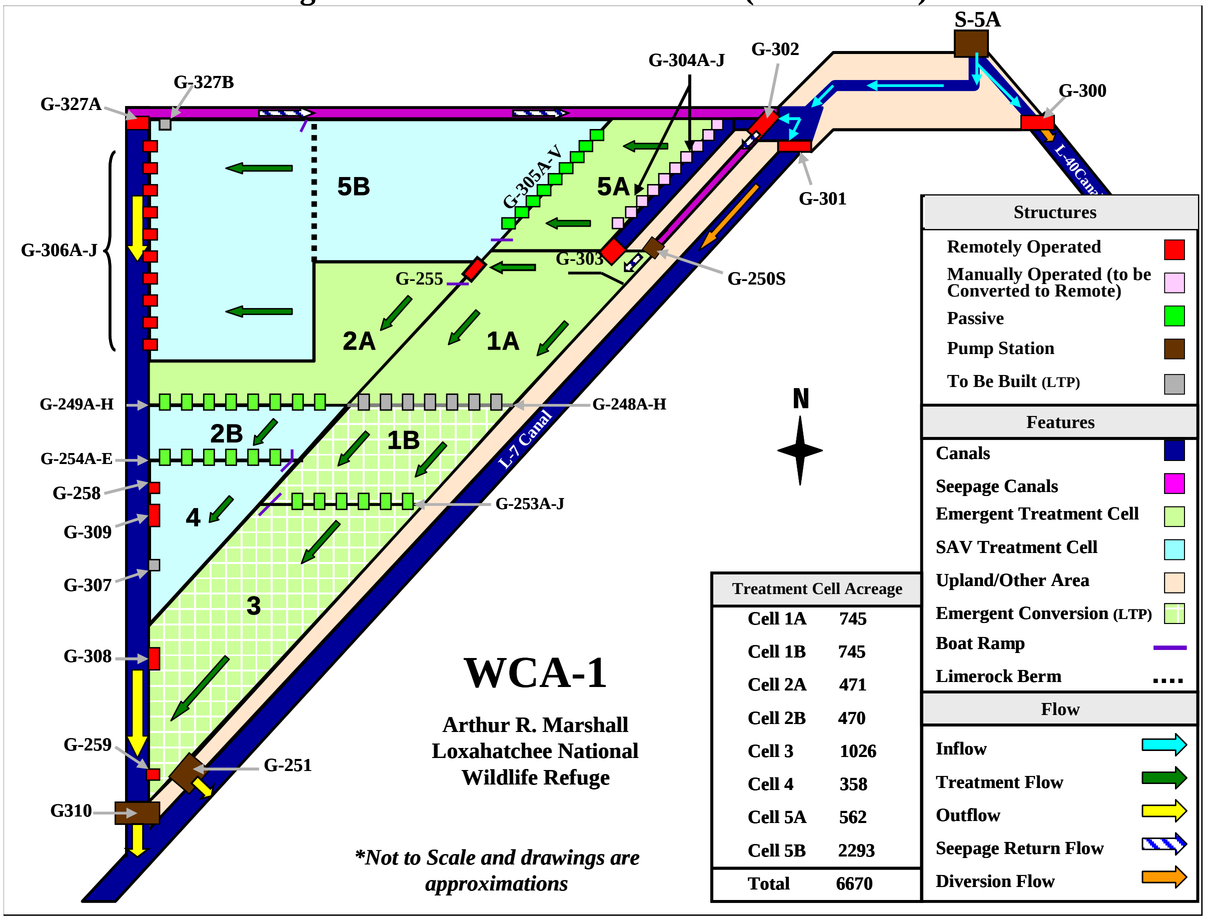


Table 7-3: Summary of Long-term Average Annual Inflow to STA-1W.

Source	Flow (AF/yr)	TP Load (kg/yr)	TP Conc (ppb)
S-5A Basin	228,143	45,753	163
EBWCD	15,005	8,651	467
Total	**243,172**	**54,409**	**181**

Table 7-4: Annual Runoff to STA-1W from All Sources.

Water Year	Runoff Volume AF/yr	TP Load kg	TP Concentration ppb	Phosphorus Loading Rate (g/m2/yr)
1966	294,951	64,803	178	2.40
1967	280,666	62,567	181	2.32
1968	187,653	42,518	184	1.58
1969	372,487	84,997	185	3.15
1970	376,059	87,059	188	3.23
1971	192,880	42,251	178	1.57
1972	260,018	59,078	184	2.19
1973	149,527	32,488	176	1.20
1974	165,401	35,955	176	1.33
1975	213,745	47,648	181	1.77
1976	243,242	55,565	185	2.06
1977	194,093	41,497	173	1.54
1978	241,471	54,650	183	2.02
1979	328,904	70,812	175	2.62
1980	239,208	53,874	183	2.00
1981	153,545	34,694	183	1.29
1982	176,435	41,048	189	1.52
1983	332,207	74,250	181	2.75
1984	281,261	65,410	189	2.42
1985	208,548	47,141	183	1.75
1986	226,244	51,183	183	1.90
1987	249,492	55,565	181	2.06
1988	207,219	47,180	185	1.75
1989	186,922	40,408	175	1.50
1990	167,624	38,540	186	1.43
1991	222,659	46,586	170	1.73
1992	183,360	40,618	180	1.50
1993	365,762	80,203	178	2.97
1994	263,955	59,275	182	2.20
1995	377,781	81,363	175	3.01
1996	255,522	56,669	180	2.10
1997	209,759	43,994	170	1.63
1998	275,407	58,273	172	2.16
1999	187,263	45,860	199	1.70
2000	239,744	60,300	204	2.23
Min. Annual	**149,527**	**32,488**	**---**	**1.20**
Max. Annual	**377,781**	**87,059**	**---**	**3.23**
Avg. Annual	**243,172**	**54,409**	**181**	**2.02**

7.3. STA-2 Inflows

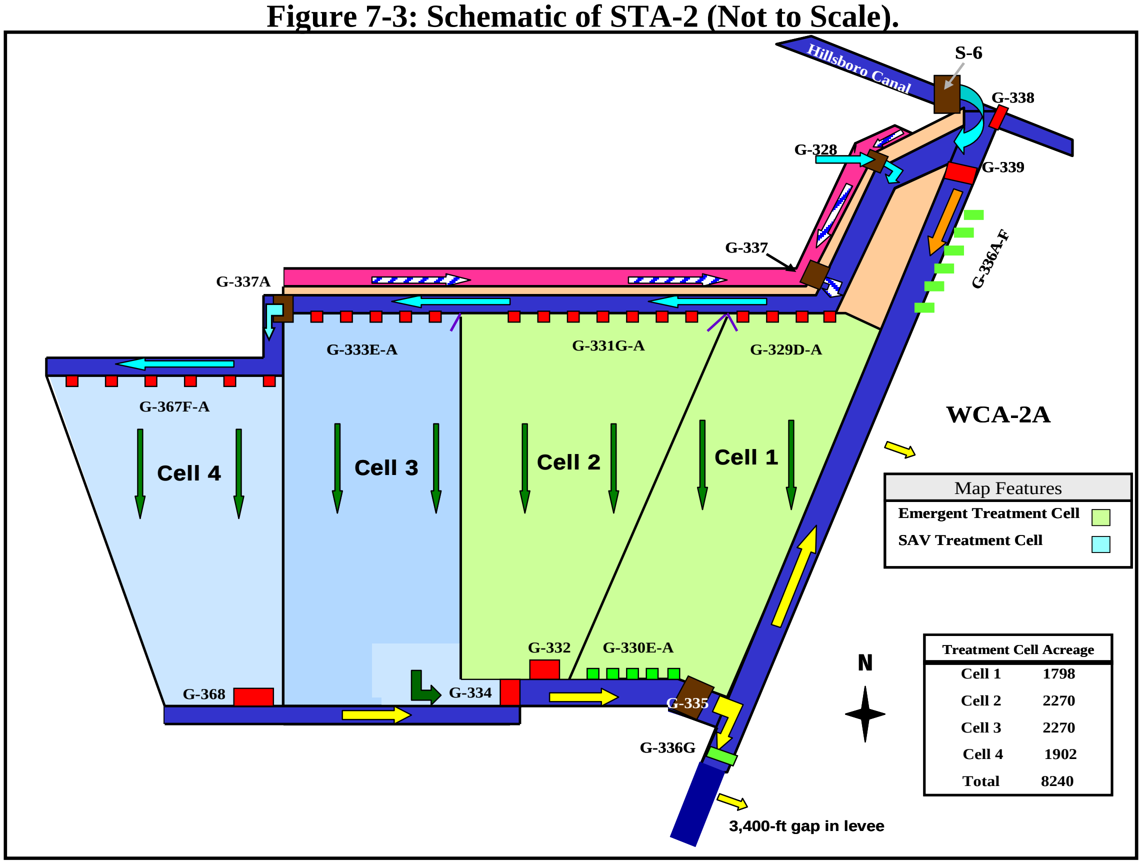
A schematic of STA-2 is presented in **Figure 7-3**. The daily inflow to STA-2 was estimated based on the following equation

STA-2 Inflows = 0.973 * (S-6/S-2 Basin Runoff
+ S-5A Basin Diversion + ESWCD & 715 Farms Runoff)
+ WCA-2A seepage
– Re-direction to Compartment B

The SFWMM simulation distributed approximately 97.3% of the S-6/S-2 Basin runoff south to STA-2, with the balance discharged to Lake Okeechobee. This same percentage was applied to the STA-2 inflow runoff components to obtain the net inflows to STA-2.

The Supply Canal for STA-2 extends from the S-6 pump station to the northeast corner of Cell 1, a distance of approximately 18,500 feet. Consistent with the methodology used in the 2005 EAA Regional Feasibility Study, an inflow to the STA-2 Supply Canal equal to 38 cfs was added to the runoff inflow to represent the seepage from the adjacent WCA-2A (ADA/B&M 2005, Appendix H). A phosphorus concentration of 15 ppb was used to estimate the phosphorus contribution of this seepage.

Figure 7-3: Schematic of STA-2 (Not to Scale).



The estimated discharge of runoff to Lake Okeechobee from the Hillsboro Canal is shown in **Table 7-5**, including S-5A Basin diversion and diversion from the ESWCD and 715 Farms.

Table 7-5: Estimated Discharges to Lake Okeechobee From the Hillsboro Canal.

Source	Flow (AF/yr)	TP Load (kg/yr)	TP Conc (ppb)
S-5A Basin	1,697	341	163
ESWCD & 715 Farms	864	145	136
S-6/S-2 Basin	5,042	657	106
Total	**7,603**	**1,142**	**122**

When the SFWMM Alt1 simulation was developed, the capability did not exist in the model to re-direct a portion of STA-2 inflows west to Compartment B for treatment, with the result that a phosphorus loading rate (PLR) for STA-2 of 1.6 $g/m^2/yr$ was associated with this SFWMM simulation. By comparison for this same SFWMM simulation, the PLR for Compartment B with no re-direction from STA-2 was approximately 0.36 $g/m^2/yr$, indicating available treatment capacity in Compartment B. Consistent with the Compartment B Basis of Design Report (Brown & Caldwell 2007), and because the structural components needed to re-direct water from the S-6 pump station west to Compartment B will be in place upon completion of the Compartment B STA, a portion of STA-2 inflows can in fact be directed to Compartment B in order to reduce the phosphorus loading rate for STA-2. For the purpose of optimizing the treatment performance for the 2010 scenario simulated by the SFWMM Alt1, even though the model did not allow such a redirection, the District can in reality re-direct STA-2 inflows to Compartment B to better balance the PLR among the treatment areas. A PLR of 1.0 $g/m^2/yr$ would balance the loading rate between STA-2 and the North Build-out area of Compartment B (the South Build-out will not receive STA-2 re-direction). Hence for the purpose of optimizing the treatment performance for the 2010 scenario simulated by SFWMM Alt1, a sufficient quantity of STA-2 inflows will be re-directed to Compartment B North Build-out in order to achieve a PLR of 1.0 $g/m^2/yr$. **It is important to note that a PLR of 1.0 $g/m^2/yr$ was used for this analysis as a rough target for balancing the loading rate between STA-2 and Compartment B, specifically the North Build-out area, and not as an ultimate PLR goal for STAs in general.** In the future, for example, upon the completion of ECART, the re-distribution of a portion of STA-2 inflows to Compartment B will be re-evaluated to optimize regional benefits.

The re-direction quantity is further subject to three daily flow constraints:

1. 1000 cfs, roughly equal to the nominal capacity of G-337A;
2. 1,120 cfs, equal to the design flow through the Compartment B North Build-out; and
3. the total inflow to Compartment B including runoff from the S-7/S-2 Basin and re-direction from STA-2 must be less than 1,600 cfs, the combined design flow-through capacity of Compartment B.

A long-term average annual re-direction of 118,810 AF/yr accomplishes this PLR target of 1.0 $g/m^2/yr$ for STA-2 and the North Build-out of Compartment B. The PLR for the South Build-out, which will receive the balance of runoff from the S-7/S-2 Basin, is estimated as

0.5 g/m^2/yr. The resulting PLR for the entire Compartment B is approximately 0.8 g/m^2/yr, indicating some remaining unused treatment capacity in Compartment B even with the above re-distribution scenario.

The resulting long-term average annual inflow to STA-2 by source is summarized in **Table 7-6**, showing the inflows before and after the re-direction. The estimated annual inflows for WY1966-WY2000 are summarized in **Table 7-7**.

Table 7-6: Long-term Average Annual Inflow to STA-2 For a PLR of 1.0 g/m^2/yr.

Source	STA-2 Inflows To Achieve a PLR of 1.0 g/m2/yr		
	Flow (AF/yr)	TP Load (kg/yr)	TP Conc (ppb)
WCA-2A Seepage	27,530	509	15
S-5A Basin	61,148	12,289	163
ESWCD & 715 Farms	31,129	5,215	136
S-6/S-2 Basin	181,700	23,661	106
Inflow Prior to Re-direction	***301,507***	***41,675***	***112***
Re-direct to Compartment B	-118,810	-16,012	109
Net Inflow	**182,697**	**25,662**	**114**

Table 7-7: Annual Runoff to STA-2 from All Sources For a PLR of 1.0 g/m^2/yr.

Water Year	Annual Inflow Volume (acre-feet)	Annual Inflow TP Load Load (kg)	TP Conc. (ppb)	Phosphorus Loading Rate (g/m2/yr)
1966	194,348	27,564	115	1.07
1967	256,391	34,852	110	1.36
1968	146,605	20,508	113	0.80
1969	319,839	45,657	116	1.78
1970	359,097	53,269	120	2.08
1971	136,445	18,149	108	0.71
1972	219,033	32,458	120	1.27
1973	129,561	15,995	100	0.62
1974	98,765	13,171	108	0.51
1975	153,867	20,591	108	0.80
1976	218,954	31,360	116	1.22
1977	142,393	18,280	104	0.71
1978	188,956	26,584	114	1.04
1979	190,137	25,722	110	1.00
1980	226,179	32,810	118	1.28
1981	89,045	12,456	113	0.49
1982	163,922	23,579	117	0.92
1983	347,442	47,455	111	1.85
1984	171,642	26,252	124	1.02
1985	161,500	23,378	117	0.91
1986	177,027	25,112	115	0.98
1987	163,360	22,399	111	0.87
1988	124,360	17,160	112	0.67
1989	100,692	13,819	111	0.54
1990	98,493	14,318	118	0.56
1991	135,292	15,801	95	0.62
1992	105,168	14,181	109	0.55
1993	257,511	33,743	106	1.32
1994	150,669	22,183	119	0.86
1995	299,616	44,030	119	1.72
1996	218,818	32,301	120	1.26
1997	129,616	17,396	109	0.68
1998	177,887	26,038	119	1.02
1999	131,499	17,707	109	0.69
2000	210,263	31,903	123	1.24
Min. Annual	**89,045**	**12,456**	**---**	**0.49**
Max. Annual	**359,097**	**53,269**	**---**	**2.08**
Avg. Annual	**182,697**	**25,662**	**114**	**1.00**

7.3.1 Sensitivity Analysis: Redirection to Compartment B to Achieve an STA-2 Phosphorus Loading Rate of 1.3 g/m^2/yr

An alternative re-direction target was investigated as a sensitivity analysis. An investigation of the performance of STAs and other Florida treatment wetlands by Juston and DeBusk (2005) "confirmed a mass load threshold of 1.3 gP/m^2-yr as important for achieving consistent P removal PLR", and concluded that this threshold "served as a useful guideline to distinguish "well-performing" systems from "challenged" systems." Subject to the daily flow constraints discussed above, a long-term average annual re-direction of 61,225 AF/yr accomplishes this PLR target of 1.3 g/m^2/yr for the SFWMM Alt1 simulation. The PLR for the North Build-out under this re-direction scenario is estimated as 0.6 g/m^2/yr. The PLR for the South Build-out, which will receive the balance of runoff from the S-7/S-2 Basin, is estimated as 0.5 g/m^2/yr. The PLR for the entire Compartment B is approximately 0.6

g/m^2/yr, well below the 1.3 g/m^2/yr threshold and indicating surplus treatment capacity in Compartment B. Using this re-direction quantity, the long-term average annual inflow to STA-2 by source is summarized in **Table 7-8**, and the estimated annual inflows for WY1966-WY2000 are summarized in **Table 7-9**.

Table 7-8: Long-term Average Annual Inflow to STA-2 For a PLR of 1.3 g/m^2/yr.

Source	Flow (AF/yr)	TP Load (kg/yr)	TP Conc (ppb)
WCA-2A Seepage	27,530	509	15
S-5A Basin	61,148	12,289	163
ESWCD & 715 Farms	31,129	5,215	136
S-6/S-2 Basin	181,700	23,661	106
Divert to Compartment B	-61,225	-8,322	110
Total	**240,282**	**33,353**	**113**

Table 7-9: Annual Runoff to STA-2 from All Sources For a PLR of 1.3 g/m^2/yr.

Water Year	Annual Inflow Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)	Phosphorus Loading Rate (g/m2/yr)
1966	260,893	36,271	113	1.41
1967	314,585	42,781	110	1.67
1968	199,237	27,281	111	1.06
1969	387,991	55,368	116	2.16
1970	411,280	60,442	119	2.36
1971	184,879	24,290	107	0.95
1972	282,893	41,075	118	1.60
1973	189,616	23,378	100	0.91
1974	154,541	20,262	106	0.79
1975	210,437	28,204	109	1.10
1976	282,172	39,864	115	1.55
1977	200,306	25,607	104	1.00
1978	248,213	34,510	113	1.35
1979	271,519	36,872	110	1.44
1980	286,805	41,044	116	1.60
1981	145,085	19,706	110	0.77
1982	216,370	30,645	115	1.19
1983	396,003	54,095	111	2.11
1984	222,500	33,463	122	1.30
1985	202,247	28,682	115	1.12
1986	240,387	33,559	113	1.31
1987	226,664	30,894	110	1.20
1988	176,049	23,905	110	0.93
1989	147,080	19,878	110	0.77
1990	154,511	21,849	115	0.85
1991	204,389	24,956	99	0.97
1992	167,165	22,520	109	0.88
1993	323,484	42,705	107	1.66
1994	218,161	31,317	116	1.22
1995	356,712	52,152	119	2.03
1996	265,213	38,565	118	1.50
1997	180,566	24,339	109	0.95
1998	241,173	34,832	117	1.36
1999	177,755	23,299	106	0.91
2000	262,987	38,729	119	1.51
Min. Annual	**145,085**	**19,706**	**---**	**0.77**
Max. Annual	**411,280**	**60,442**	**---**	**2.36**
Avg. Annual	**240,282**	**33,353**	**113**	**1.30**

7.4. Compartment B Inflows

A preliminary schematic of the Compartment B Build-out is presented in **Figure 7-4** (Brown & Caldwell 2007). The daily inflow to Compartment B was estimated based on the following equation

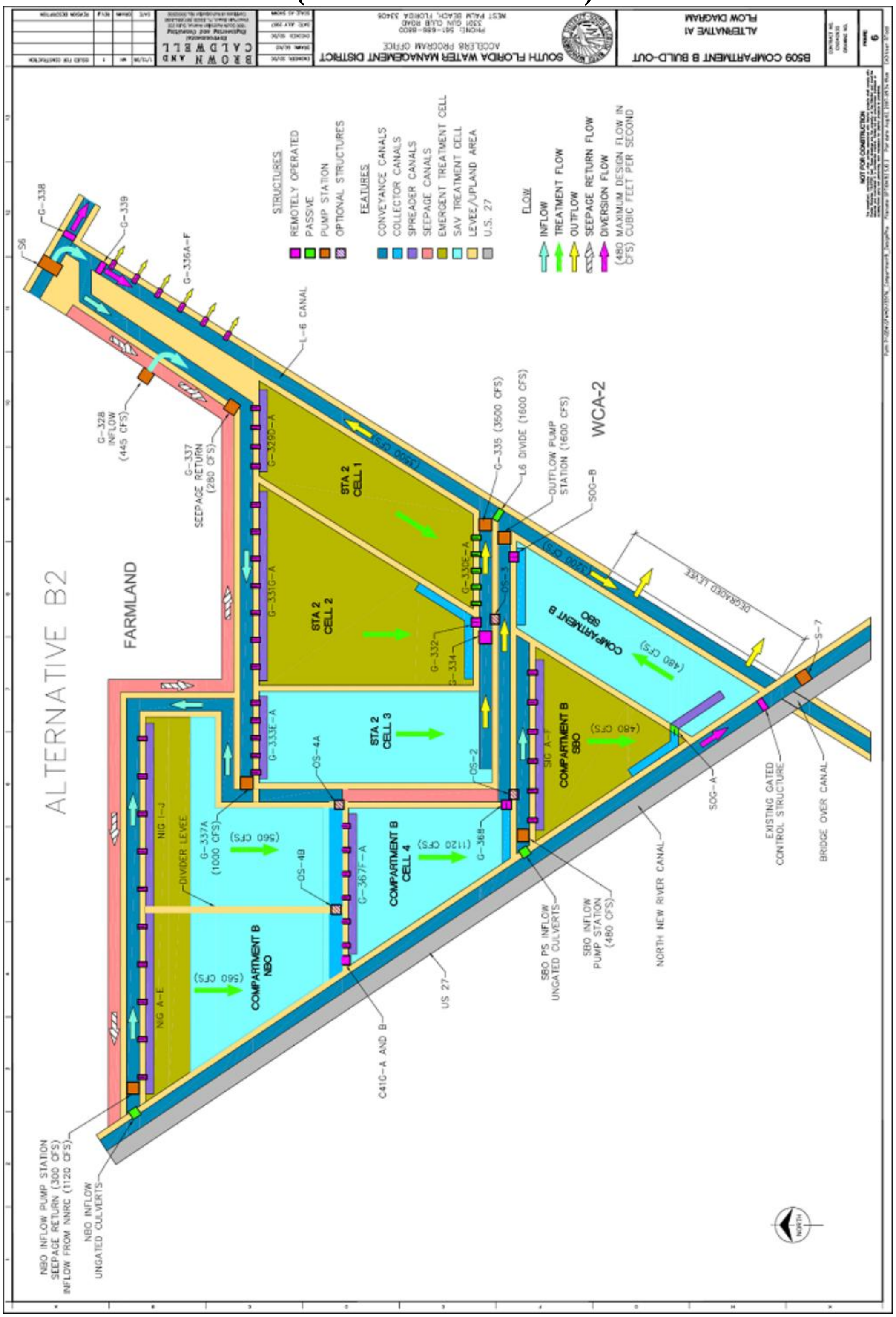
Compartment B Inflow = A portion of the S-7/S-2 Basin Runoff (as defined by SFWMM)
+ Re-direction from STA-2 Inflows

Compartment B will consist of two independent treatment areas (Brown and Caldwell 2007). The North Build-out will consist of three cells, with the initial cells containing approximately 3,922 acres of effective treatment area followed by the existing Cell 4 of STA-2. While the Build-out is still under preliminary design, the present configuration includes a north-south interior levee that will divide the upper area into two parallel cells. Inflows will come from the North New River Canal and inflows re-directed from STA-2, and will be limited to a total of 1,120 cfs. After passing through the North Build-out, treated discharges will be conveyed to a new 1,600-cfs outflow pump station located directly south of the STA-2 outflow pump station G-335 (Brown and Caldwell 2007). The South Build-out will consist of two cells in series, with the initial cell containing approximately 1,477 acres of effective treatment area followed by an additional 1,319 acres. Inflows will come from the North New River Canal and will be limited to 480 cfs. Treated discharges will be conveyed to the new 1,600-cfs outflow pump station located directly south of the STA-2 outflow pump station G-335 (Brown and Caldwell 2007).

The SFWMM distributed a long-term average of approximately 123 AF/yr of untreated S-7/S-2 Basin runoff to WCA-2A. Operationally, it is recommended to capture and treat this in Compartment B. This approach is consistent with the recommendations and assumptions made in the 2005 EAA Regional Feasibility Study.

When the SFWMM Alt1 simulation was developed, the capability did not exist in the model to deliver STA-2 inflows west to Compartment B for treatment, with the result that a phosphorus loading rate (PLR) for STA-2 of 1.6 $g/m^2/yr$ was associated with this SFWMM simulation. By comparison for this same SFWMM simulation, the PLR for Compartment B with no re-direction from STA-2 was approximately 0.36 $g/m^2/yr$, indicating available treatment capacity in Compartment B. Consistent with the Compartment B Basis of Design Report (Brown & Caldwell 2007), and because the structural components needed to re-direct water from the S-6 pump station west to Compartment B will be in place upon completion of the Compartment B STA, a portion of STA-2 inflows can in fact be directed to Compartment B in order to reduce the phosphorus loading rate for STA-2. For the purpose of optimizing the treatment performance for the 2010 scenario simulated by the SFWMM Alt1, even though the model did not allow such a redirection, the District can in reality re-direct STA-2 inflows to Compartment B to better balance the PLR among the treatment areas.

Figure 7-4: Preliminary Schematic of Compartment B Build-out, Subject to Revision (Brown & Caldwell 2007).



A PLR of 1.0 g/m^2/yr would balance the loading rate between STA-2 and the North Build-out area of Compartment B (the South Build-out will not receive STA-2 re-direction). Hence for the purpose of optimizing the treatment performance for the 2010 scenario simulated by SFWMM Alt1, a sufficient quantity of STA-2 inflows will be re-directed to Compartment B North Build-out in order to achieve a PLR of 1.0 g/m^2/yr. **It is important to note that a PLR of 1.0 g/m^2/yr was used for this analysis as a rough target for balancing the loading rate between STA-2 and Compartment B, specifically the North Build-out area, and not as an ultimate PLR goal for STAs in general.** In the future, for example, upon the completion of ECART, the re-distribution of a portion of STA-2 inflows to Compartment B will be re-evaluated to optimize regional benefits.

The re-direction quantity is further subject to three daily flow constraints:

1. 1000 cfs, roughly equal to the nominal capacity of G-337A;
2. 1,120 cfs, equal to the design flow through the Compartment B North Build-out; and
3. the total inflow to Compartment B including runoff from the S-7/S-2 Basin and re-direction from STA-2 must be less than 1,600 cfs, the combined design flow-through capacity of Compartment B.

A long-term average annual re-direction of 118,810 AF/yr accomplishes this PLR target of 1.0 g/m^2/yr for STA-2 and the North Build-out of Compartment B. The PLR for the South Build-out, which will receive the balance of runoff from the S-7/S-2 Basin, is estimated as 0.5 g/m^2/yr. The resulting PLR for the entire Compartment B is approximately 0.8 g/m^2/yr, indicating some remaining unused treatment capacity in Compartment B even with the above re-distribution scenario.

The long-term average annual inflow to Compartment B by source under this alternative is summarized in **Table 7-10**. The estimated annual inflows for WY1966-WY2000 are summarized in **Table 7-11**.

Table 7-10: Long-term Average Annual Inflow to Compartment B For a PLR of 1.0 g/m^2/yr to STA-2.

Source	Flow (AF/yr)	TP Load (kg/yr)	TP Conc (ppb)
S-7/S-2 Basin	106,069	12,411	95
Re-direction from STA-2			
WCA-2A Seepage	10,848	201	15
S-6/S-2 Basin	71,599	9,324	106
S-5 Basin	24,096	4,843	163
ESWCD & 715 Farms	12,267	2,055	136
Total	**224,879**	**28,833**	**104**

The daily time series of inflow to each component of Compartment B was developed in recognition of the respective flow-through capacities. All of the inflow re-directed from STA-2 will enter the North Build-out, to be supplemented by a portion of the runoff from the S-7/S-2 Basin. The balance of the S-7/S-2 runoff will enter the South build-out. Despite an attempt to balance the phosphorus loading rate between the North Build-out and South Build-out, the 480-cfs inflow pump for the South Build-out was a limiting factor to the total flow and load that can enter the South Build-out area, resulting in an estimated PLR for the North Build-out of 1.0 g/m^2/yr, and an estimated PLR for the South Build-out of 0.5 g/m^2/yr. The estimated annual inflows to the North Build-out for WY1966-WY2000 are summarized in **Table 7-12**. The estimated annual inflows to the South Build-out for WY1966-WY2000 are summarized in **Table 7-13**.

Table 7-11: Annual Runoff to Compartment B from All Sources to Achieve a PLR of 1.0 g/m^2/yr to STA-2.

Water Year	Annual Inflow Volume (acre-feet)	Annual Inflow TP Load (kg)	TP Conc. (ppb)	Phosphorus Loading Rate (g/m2/yr)
1966	258,075	32,052	101	0.92
1967	280,790	33,831	98	0.97
1968	182,909	22,736	101	0.65
1969	322,383	40,528	102	1.16
1970	416,654	52,162	101	1.50
1971	197,708	23,697	97	0.68
1972	267,945	35,085	106	1.01
1973	169,100	20,665	99	0.59
1974	173,741	21,178	99	0.61
1975	238,377	29,697	101	0.85
1976	246,815	31,213	103	0.89
1977	179,069	21,788	99	0.62
1978	200,724	27,142	110	0.78
1979	284,550	35,418	101	1.02
1980	225,008	29,673	107	0.85
1981	127,987	16,688	106	0.48
1982	176,648	23,186	106	0.66
1983	344,695	41,913	99	1.20
1984	230,890	30,492	107	0.87
1985	185,802	23,445	102	0.67
1986	215,067	27,185	102	0.78
1987	221,138	27,409	100	0.79
1988	128,736	17,795	112	0.51
1989	143,907	17,657	99	0.51
1990	143,796	19,861	112	0.57
1991	170,769	21,603	103	0.62
1992	178,119	22,723	103	0.65
1993	299,694	37,360	101	1.07
1994	184,986	24,638	108	0.71
1995	366,831	47,397	105	1.36
1996	266,878	31,985	97	0.92
1997	199,002	25,412	104	0.73
1998	289,561	37,571	105	1.08
1999	121,053	16,282	109	0.47
2000	231,365	29,513	103	0.85
Min. Annual	**121,053**	**16,282**	**---**	**0.47**
Max. Annual	**416,654**	**52,162**	**---**	**1.50**
Avg. Annual	**224,879**	**28,485**	**103**	**0.82**

Table 7-12: Annual Inflow to Compartment B North Build-out From All Sources For a PLR of 1.0 g/m^2/yr to STA-2.

Water Year	Annual Inflow Volume (acre-feet)	Annual Inflow TP Load Load (kg)	TP Conc. (ppb)	Phosphorus Loading Rate (g/m2/yr)
1966	204,903	25,955	103	1.10
1967	212,703	26,508	101	1.12
1968	149,105	18,869	103	0.80
1969	251,497	32,648	105	1.39
1970	295,179	37,751	104	1.60
1971	152,908	18,857	100	0.80
1972	208,070	27,722	108	1.18
1973	146,827	18,025	100	0.76
1974	138,283	17,163	101	0.73
1975	174,204	22,299	104	0.95
1976	194,375	25,010	104	1.06
1977	153,868	18,923	100	0.80
1978	167,953	22,597	109	0.96
1979	230,927	29,533	104	1.25
1980	185,131	24,600	108	1.04
1981	119,810	15,684	106	0.67
1982	142,690	19,168	109	0.81
1983	249,694	31,015	101	1.32
1984	173,949	23,622	110	1.00
1985	141,611	18,270	105	0.78
1986	175,882	22,665	104	0.96
1987	179,609	22,964	104	0.97
1988	119,418	16,249	110	0.69
1989	116,278	14,718	103	0.62
1990	126,332	17,801	114	0.76
1991	153,603	19,774	104	0.84
1992	145,645	19,027	106	0.81
1993	228,034	29,201	104	1.24
1994	167,653	22,541	109	0.96
1995	257,006	34,276	108	1.45
1996	192,284	23,779	100	1.01
1997	153,898	20,223	107	0.86
1998	206,294	27,578	108	1.17
1999	110,480	14,579	107	0.62
2000	176,875	23,024	106	0.98
Min. Annual	**110,480**	**14,579**	**---**	**0.62**
Max. Annual	**295,179**	**37,751**	**---**	**1.60**
Avg. Annual	**177,228**	**22,932**	**105**	**0.97**

Table 7-13: Annual Inflow to Compartment B South Build-out From All Sources For a PLR of 1.0 g/m^2/yr to STA-2.

Water Year	Annual Inflow Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)	Phosphorus Loading Rate (g/m2/yr)
1966	53,172	6,096	93	0.54
1967	68,087	7,323	87	0.65
1968	33,804	3,867	93	0.34
1969	70,887	7,880	90	0.70
1970	121,475	14,411	96	1.27
1971	44,800	4,840	88	0.43
1972	59,874	7,363	100	0.65
1973	22,273	2,640	96	0.23
1974	35,458	4,014	92	0.35
1975	64,173	7,398	93	0.65
1976	52,440	6,202	96	0.55
1977	25,201	2,865	92	0.25
1978	32,770	4,545	112	0.40
1979	53,624	5,885	89	0.52
1980	39,877	5,074	103	0.45
1981	8,177	1,004	100	0.09
1982	33,958	4,018	96	0.36
1983	95,001	10,898	93	0.96
1984	56,941	6,871	98	0.61
1985	44,191	5,175	95	0.46
1986	39,185	4,519	93	0.40
1987	41,529	4,446	87	0.39
1988	9,318	1,547	135	0.14
1989	27,629	2,939	86	0.26
1990	17,464	2,061	96	0.18
1991	17,166	1,829	86	0.16
1992	32,474	3,696	92	0.33
1993	71,661	8,158	92	0.72
1994	17,333	2,096	98	0.19
1995	109,825	13,121	97	1.16
1996	74,594	8,207	89	0.73
1997	45,105	5,189	93	0.46
1998	83,267	9,993	97	0.88
1999	10,572	1,703	131	0.15
2000	54,490	6,489	97	0.57
Min. Annual	**8,177**	**1,004**	**---**	**0.09**
Max. Annual	**121,475**	**14,411**	**---**	**1.27**
Avg. Annual	**47,651**	**5,553**	**94**	**0.49**

7.4.1 Redirection to Compartment B to Achieve an STA-2 Phosphorus Loading Rate of 1.3 g/m²/yr

An analysis of the performance of STAs and other Florida treatment wetlands by Juston and DeBusk (2005) “confirmed a mass load threshold of 1.3 gP/m^2-yr as important for achieving consistent P removal PLR”, and concluded that this threshold “served as a useful guideline to distinguish “well-performing” systems from “challenged systems.” Subject to the daily flow constraints discussed above, a long-term average annual re-direction of 61,225 AF/yr accomplishes this PLR target of 1.3 g/m^2/yr for the SFWMM Alt1 simulation. By comparison, with an STA-2 re-direction of this amount, the PLR for Compartment B is approximately 0.6 g/m^2/yr, well below the 1.3 g/m^2/yr threshold and indicating surplus treatment capacity in Compartment B.

The long-term average annual inflow to Compartment B by source under this alternative is summarized in **Table 7-14**. The estimated average annual runoff inflows are more than the simulated inflows of 105,946 AF/yr. The estimated annual inflows for WY1966-WY2000 are summarized in **Table 7-15**.

Table 7-14: Long-term Average Annual Inflow to Compartment B For a PLR of 1.3 g/m^2/yr to STA-2.

Source	Flow (AF/yr)	TP Load (kg/yr)	TP Conc (ppb)
S-7/S-2 Basin	106,069	12,411	95
WCA-2A Seepage	5,590	103	15
S-6/S-2 Basin	36,896	4,805	106
S-5 Basin	12,417	2,496	163
ESWCD & 715 Farms	6,321	1,059	136
Total	**167,294**	**20,873**	**101**

The daily time series of inflow to each component of Compartment B was developed in recognition of the respective inflow pump capacities. All of the inflow re-directed from STA-2 will enter the North Build-out, to be supplemented by a portion of the runoff from the S-7/S-2 Basin. The balance of the S-7/S-2 runoff will enter the South build-out. Despite an attempt to balance the phosphorus loading rate between the North Build-out and South Build-out, the 480-cfs inflow pump for the South Build-out was the limiting factor, resulting in an estimated PLR for the North Build-out of 0.65 g/m^2/yr, and an estimated PLR for the South Build-out of 0.49 g/m^2/yr. The estimated annual inflows to the North Build-out for WY1966-WY2000 are summarized in **Table 7-16**. The estimated annual inflows to the South Build-out for WY1966-WY2000 are summarized in **Table 7-17**.

Table 7-15: Annual Runoff to Compartment B from All Sources to Achieve a PLR of 1.3 g/m^2/yr to STA-2.

Water Year	Annual Inflow Volume (acre-feet)	Annual Inflow TP Load Load (kg)	TP Conc. (ppb)	Phosphorus Loading Rate (g/m2/yr)
1966	191,530	23,344	99	0.67
1967	222,596	25,902	94	0.74
1968	130,277	15,962	99	0.46
1969	254,232	30,818	98	0.88
1970	364,471	44,990	100	1.29
1971	149,273	17,556	95	0.50
1972	204,084	26,468	105	0.76
1973	109,046	13,283	99	0.38
1974	117,966	14,087	97	0.40
1975	181,807	22,083	98	0.63
1976	183,598	22,709	100	0.65
1977	121,157	14,461	97	0.41
1978	141,466	19,216	110	0.55
1979	203,168	24,267	97	0.70
1980	164,381	21,440	106	0.61
1981	71,947	9,439	106	0.27
1982	124,200	16,119	105	0.46
1983	296,134	35,273	97	1.01
1984	180,032	23,282	105	0.67
1985	145,055	18,141	101	0.52
1986	151,707	18,738	100	0.54
1987	157,834	18,914	97	0.54
1988	77,046	11,050	116	0.32
1989	97,519	11,597	96	0.33
1990	87,778	12,330	114	0.35
1991	101,672	12,447	99	0.36
1992	116,122	14,383	100	0.41
1993	233,721	28,398	99	0.81
1994	117,494	15,504	107	0.44
1995	309,735	39,275	103	1.13
1996	220,483	25,721	95	0.74
1997	148,052	18,469	101	0.53
1998	226,275	28,776	103	0.82
1999	74,797	10,690	116	0.31
2000	178,640	22,687	103	0.65
Min. Annual	**71,947**	**9,439**	**---**	**0.27**
Max. Annual	**364,471**	**44,990**	**---**	**1.29**
Avg. Annual	**167,294**	**20,795**	**101**	**0.60**

Table 7-16: Annual Inflow to Compartment B North Build-out from All Sources For a PLR of 1.3 $g/m^2/yr$ to STA-2.

Water Year	Annual Inflow Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)	Phosphorus Loading Rate (g/m2/yr)
1966	138,358	17,248	101	0.73
1967	154,508	18,579	97	0.79
1968	96,472	12,096	102	0.51
1969	183,345	22,938	101	0.97
1970	242,996	30,579	102	1.30
1971	104,473	12,716	99	0.54
1972	144,210	19,105	107	0.81
1973	86,772	10,643	99	0.45
1974	82,507	10,072	99	0.43
1975	117,633	14,686	101	0.62
1976	131,157	16,507	102	0.70
1977	95,955	11,596	98	0.49
1978	108,696	14,671	109	0.62
1979	149,545	18,382	100	0.78
1980	124,504	16,366	107	0.69
1981	63,771	8,435	107	0.36
1982	90,242	12,101	109	0.51
1983	201,133	24,375	98	1.03
1984	123,091	16,411	108	0.70
1985	100,864	12,966	104	0.55
1986	112,522	14,218	102	0.60
1987	116,305	14,469	101	0.61
1988	67,729	9,503	114	0.40
1989	69,890	8,658	100	0.37
1990	70,314	10,270	118	0.44
1991	84,507	10,618	102	0.45
1992	83,648	10,687	104	0.45
1993	162,061	20,240	101	0.86
1994	100,161	13,407	109	0.57
1995	199,909	26,153	106	1.11
1996	145,889	17,515	97	0.74
1997	102,947	13,280	105	0.56
1998	143,008	18,783	106	0.80
1999	64,224	8,987	113	0.38
2000	124,151	16,198	106	0.69
Min. Annual	**63,771**	**8,435**	**---**	**0.36**
Max. Annual	**242,996**	**30,579**	**---**	**1.30**
Avg. Annual	**119,643**	**15,242**	**103**	**0.65**

Table 7-17: Annual Inflow to Compartment B South Build-out from All Sources For a PLR of 1.3 g/m^2/yr to STA-2.

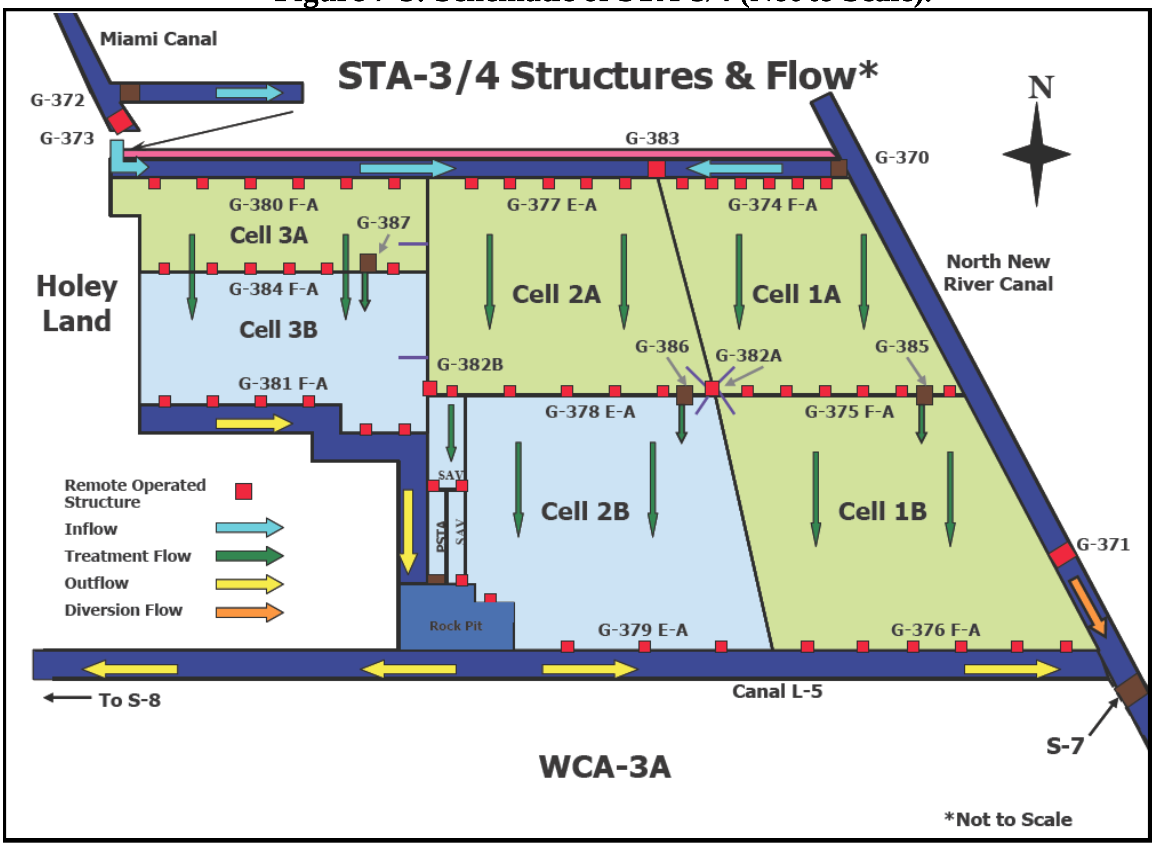
Water Year	Annual Inflow Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)	Phosphorus Loading Rate (g/m2/yr)
1966	53,172	6,096	93	0.54
1967	68,087	7,323	87	0.65
1968	33,804	3,867	93	0.34
1969	70,887	7,880	90	0.70
1970	121,475	14,411	96	1.27
1971	44,800	4,840	88	0.43
1972	59,874	7,363	100	0.65
1973	22,273	2,640	96	0.23
1974	35,458	4,014	92	0.35
1975	64,173	7,398	93	0.65
1976	52,440	6,202	96	0.55
1977	25,201	2,865	92	0.25
1978	32,770	4,545	112	0.40
1979	53,624	5,885	89	0.52
1980	39,877	5,074	103	0.45
1981	8,177	1,004	100	0.09
1982	33,958	4,018	96	0.36
1983	95,001	10,898	93	0.96
1984	56,941	6,871	98	0.61
1985	44,191	5,175	95	0.46
1986	39,185	4,519	93	0.40
1987	41,529	4,446	87	0.39
1988	9,318	1,547	135	0.14
1989	27,629	2,939	86	0.26
1990	17,464	2,061	96	0.18
1991	17,166	1,829	86	0.16
1992	32,474	3,696	92	0.33
1993	71,661	8,158	92	0.72
1994	17,333	2,096	98	0.19
1995	109,825	13,121	97	1.16
1996	74,594	8,207	89	0.73
1997	45,105	5,189	93	0.46
1998	83,267	9,993	97	0.88
1999	10,572	1,703	131	0.15
2000	54,490	6,489	97	0.57
Min. Annual	**8,177**	**1,004**	**---**	**0.09**
Max. Annual	**121,475**	**14,411**	**---**	**1.27**
Avg. Annual	**47,651**	**5,553**	**94**	**0.49**

7.5. STA-3/4 Inflows

A schematic of STA-3/4 is presented in **Figure 7-5**. The daily inflow to STA-3/4 was estimated based on the following equation

STA-3/4 Inflows = A portion of the S-7/S-2 Basin Runoff (as defined by SFWMM)
+ A portion of the S-8/S-3 Basin Runoff (as defined by SFWMM)
+ SSDD Runoff
+ SFCD Runoff
+ C-139 Basin (through G-136, as defined by SFWMM)
+ Flow from the EAA SR (as defined by SFWMM)

Figure 7-5: Schematic of STA-3/4 (Not to Scale).



The SFWMM distributed a long-term average of approximately 4,024 AF/yr of untreated S-8/S-3 Basin runoff to WCA-3A. Operationally, it is recommended to capture and treat this in STA-3/4. This approach is consistent with the recommendations and assumptions made in the 2005 EAA Regional Feasibility Study.

Developing the inflow sets required daily combinations of multiple flow terms from the SFWMM, and for a few days, a negative flow value results. The 2005 EAA Regional Feasibility Study replaced all of these negative values with zero. While a net basin flow may physically be negative, representing storage within the basin that day, the STA inflow cannot be negative. Hence, in the present analyses daily net negative basin flows are allowed, but only nonnegative STA inflows. This approach is consistent with the recently completed analysis of historic data for the WY1995-2007 period (Goforth 2007). The net effect of this is insignificant for all the STAs except STA-3/4, where the net effect increases the STA inflows by approximately 4,381 AF/yr compared to allowing negative values.

The phosphorus removal performance of the EAA Storage Reservoir and the STAs will be evaluated in a subsequent task, however, for the purpose of estimating the phosphorus inflows to STA-3/4, the long-term average EAASR outflow concentration from a previous modeling effort can be used (Goforth 2006). In that effort, using a Lake Okeechobee TP concentration of 100 ppb at the inflow to the EAASR, a long-term average TP outflow concentration of 76.6 ppb was estimated using DMSTA2. For the purpose of initially estimating the phosphorus inflows to STA-3/4, this value shall be used. As a sensitivity analysis, Section 7.5.1 below describes the STA-3/4 inflows if the concentration of Lake Okeechobee releases is 150 ppb at the inflow to the EAASR. During the course of the subsequent TP modeling task, the TP concentration in EAASR outflows to STA-3/4 will be estimated on a daily basis using DMSTA2.

The long-term average annual inflow to STA-3/4 by source is summarized in **Table 7-18**. The estimated average annual runoff inflows are more than the simulated inflows of 554,670 AF/yr. The estimated annual inflows for WY1966-WY2000 are summarized in **Table 7-19**. In addition, the SFWMM projected a long-term average annual discharge into Lake Okeechobee from the S-8/S-3 basin of 5,129 AF/yr and 518 kg/yr of phosphorus, and a long-term average annual discharge into Lake Okeechobee from the S-7/S-2 basin of 12,784 AF/yr and 1,540 kg/yr of phosphorus.

Table 7-18: Summary of Long-term Average Annual Inflow to STA-3/4.

Source	Flow (AF/yr)	TP Load (kg/yr)	TP Conc (ppb)
S-7/S-2 Basin	35,102	4,230	98
S-8/S-3 Basin	132,584	13,383	82
C-139 Basin	13,201	3,401	209
SSDD	10,539	1,324	102
SFCD	24,110	3,363	113
EAA SR	363,442	34,340	77
Total	**583,360**	**60,353**	**84**

Totals are less than the sum of the components due to daily net negative values within the basin.

Table 7-19: Annual Runoff to STA-3/4 from All Sources.

Water Year	Annual Inflow Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)	Phosphorus Loading Rate (g/m2/yr)
1966	470,990	50,749	87	0.76
1967	1,038,013	104,382	82	1.56
1968	276,109	29,999	88	0.45
1969	964,153	100,124	84	1.50
1970	1,369,753	135,859	80	2.03
1971	614,127	61,057	81	0.91
1972	357,361	41,151	93	0.61
1973	198,536	21,018	86	0.31
1974	124,635	13,233	86	0.20
1975	305,281	36,442	97	0.54
1976	394,188	44,713	92	0.67
1977	176,996	19,207	88	0.29
1978	296,417	33,106	91	0.49
1979	742,637	74,125	81	1.11
1980	1,129,978	111,790	80	1.67
1981	137,049	14,279	84	0.21
1982	172,678	19,069	90	0.28
1983	1,079,836	113,622	85	1.70
1984	1,060,664	107,008	82	1.60
1985	567,737	58,960	84	0.88
1986	247,532	27,712	91	0.41
1987	349,832	38,854	90	0.58
1988	278,439	32,275	94	0.48
1989	247,367	25,953	85	0.39
1990	155,472	16,841	88	0.25
1991	170,129	17,580	84	0.26
1992	993,885	97,533	80	1.46
1993	1,113,089	108,581	79	1.62
1994	305,094	32,733	87	0.49
1995	641,324	72,823	92	1.09
1996	1,285,838	126,917	80	1.90
1997	592,784	60,956	83	0.91
1998	835,082	82,952	81	1.24
1999	956,538	99,346	84	1.48
2000	768,042	81,410	86	1.22
Min. Annual	**124,635**	**13,233**	**---**	**0.20**
Max. Annual	**1,369,753**	**135,859**	**---**	**2.03**
Avg. Annual	**583,360**	**60,353**	**84**	**0.90**

7.5.1. STA-3/4 Inflows with Lake Okeechobee TP Concentration of 150 ppb

As an analysis of the sensitivity of STA performance to the phosphorus concentration of Lake Okeechobee releases, this section describes the STA-3/4 inflows if the phosphorus concentration of Lake releases is 150 ppb at the inflow to the EAASR. In a previous modeling effort, using a Lake Okeechobee TP concentration of 150 ppb at the inflow to the EAASR, a long-term average TP outflow concentration of 102.8 ppb was estimated using DMSTA2 (Goforth 2006). This value will be used as an initial estimate of the phosphorus inflows to STA-3/4 from the EAASR. During the course of the subsequent TP modeling task, the TP concentration in EAASR outflows to STA-3/4 will be estimated on a daily basis using DMSTA2.

The long-term average annual inflow to STA-3/4 by source is summarized in **Table 7-20**. The estimated average annual runoff inflows are more than the simulated inflows of 554,670 AF/yr. The estimated annual inflows for WY1966-WY2000 are summarized in **Table 7-21**. In addition, the SFWMM projected a long-term average annual discharge into Lake Okeechobee from the S-8/S-3 basin of 5,129 AF/yr and 518 kg/yr of phosphorus, and a long-term average annual discharge into Lake Okeechobee from the S-7/S-2 basin of 12,784 AF/yr and 1,540 kg/yr of phosphorus.

Table 7-20: Summary of Long-term Average Annual Inflow to STA-3/4 (Lake TP Concentration of 150 ppb).

Source	Flow (AF/yr)	TP Load (kg/yr)	TP Conc (ppb)
S-7/S-2 Basin	35,102	4,230	98
S-8/S-3 Basin	132,584	13,383	82
C-139 Basin	13,201	3,401	209
SSDD	10,539	1,324	102
SFCD	24,110	3,363	113
EAA SR	363,442	46,086	103
Total	**583,360**	**72,099**	**100**

Totals are less than the sum of the components due to daily net negative values within the basin.

Table 7-21: Annual Runoff to STA-3/4 from All Sources (Lake TP Concentration of 150 ppb).

Water Year	Annual Inflow Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)	Phosphorus Loading Rate (g/m2/yr)
1966	470,990	58,292	100	0.87
1967	1,038,013	128,450	100	1.92
1968	276,109	33,865	99	0.51
1969	964,153	118,778	100	1.77
1970	1,369,753	165,651	98	2.47
1971	614,127	76,327	101	1.14
1972	357,361	44,274	100	0.66
1973	198,536	24,062	98	0.36
1974	124,635	15,025	98	0.22
1975	305,281	39,362	105	0.59
1976	394,188	48,465	100	0.72
1977	176,996	21,299	98	0.32
1978	296,417	36,374	99	0.54
1979	742,637	89,993	98	1.34
1980	1,129,978	140,180	101	2.09
1981	137,049	17,100	101	0.26
1982	172,678	20,303	95	0.30
1983	1,079,836	134,320	101	2.01
1984	1,060,664	134,107	103	2.00
1985	567,737	71,495	102	1.07
1986	247,532	31,751	104	0.47
1987	349,832	44,186	102	0.66
1988	278,439	37,058	108	0.55
1989	247,367	30,141	99	0.45
1990	155,472	17,964	94	0.27
1991	170,129	19,165	91	0.29
1992	993,885	123,921	101	1.85
1993	1,113,089	134,883	98	2.01
1994	305,094	38,242	102	0.57
1995	641,324	78,373	99	1.17
1996	1,285,838	158,164	100	2.36
1997	592,784	71,985	98	1.08
1998	835,082	99,694	97	1.49
1999	956,538	124,470	105	1.86
2000	768,042	95,740	101	1.43
Min. Annual	**124,635**	**15,025**	**---**	**0.22**
Max. Annual	**1,369,753**	**165,651**	**---**	**2.47**
Avg. Annual	**583,360**	**72,099**	**100**	**1.08**

7.6. STA-5 Inflows

Consistent with the 2005 EAA Regional Feasibility Study, inflow data sets for STA-5 and STA-6 utilized the historic flows and phosphorus loads for the WY1995-2007 period. For the purpose of developing the STA-5 inflow data set, STA-5 is assumed to be comprised of the existing 3 flow-ways of STA-5 and the 4^{th} and 5^{th} flow-ways of Compartment C that are soon to be constructed (see **Figure 7-6**; URS 2007). The combined C-139 Basin and C-139 Annex runoff will be distributed to STA-5 and STA-6 to balance the phosphorus loading rate among the flow-ways of the STAs (see **Table 7-22**). This approach is consistent with the method used in the 2005 EAA Regional Feasibility Study.

Table 7-22: Estimate of Inflow Distribution to Balance PLR.

Flow-way	Area	TP inflow	Flow at PLR	Load	PLR
STA-5 1	2,055	229	28,177	7,945	0.96
STA-5 2	2,055	229	28,177	7,945	0.96
STA-5 3	1,985	229	27,217	7,674	0.96
STA-5 4	2,176	229	29,836	8,413	0.96
STA-5 5	2,669	229	36,595	10,319	0.96
STA-6 3	1,857	178	32,692	7,180	0.96
STA-6 5	652	97	20,970	2,521	0.96
STA-6 2	245	97	7,880	947	0.96
Total	13,694	203	211,544	52,944	0.96

The long-term average annual inflow to STA-5 is summarized in **Table 7-23**. The estimated average annual inflows are more than the inflows simulated by the SFWMM of 136,267 AF/yr. Because of this, the simulated water supply deliveries to STA-5 (331 AF/yr) were omitted from the STA-5 inflows. The estimated annual inflows for WY1995-WY2007 are summarized in **Table 7-24**.

Table 7-23: Summary of Long-term Average Annual Inflow to STA-5.

Source	Flow (AF/yr)	TP Load (kg/yr)	TP Conc (ppb)
C-139 Basin	150,001	42,300	229

Figure 7-6: Preliminary Layout of Compartment C Build-out; Subject to Revision (URS 2007).

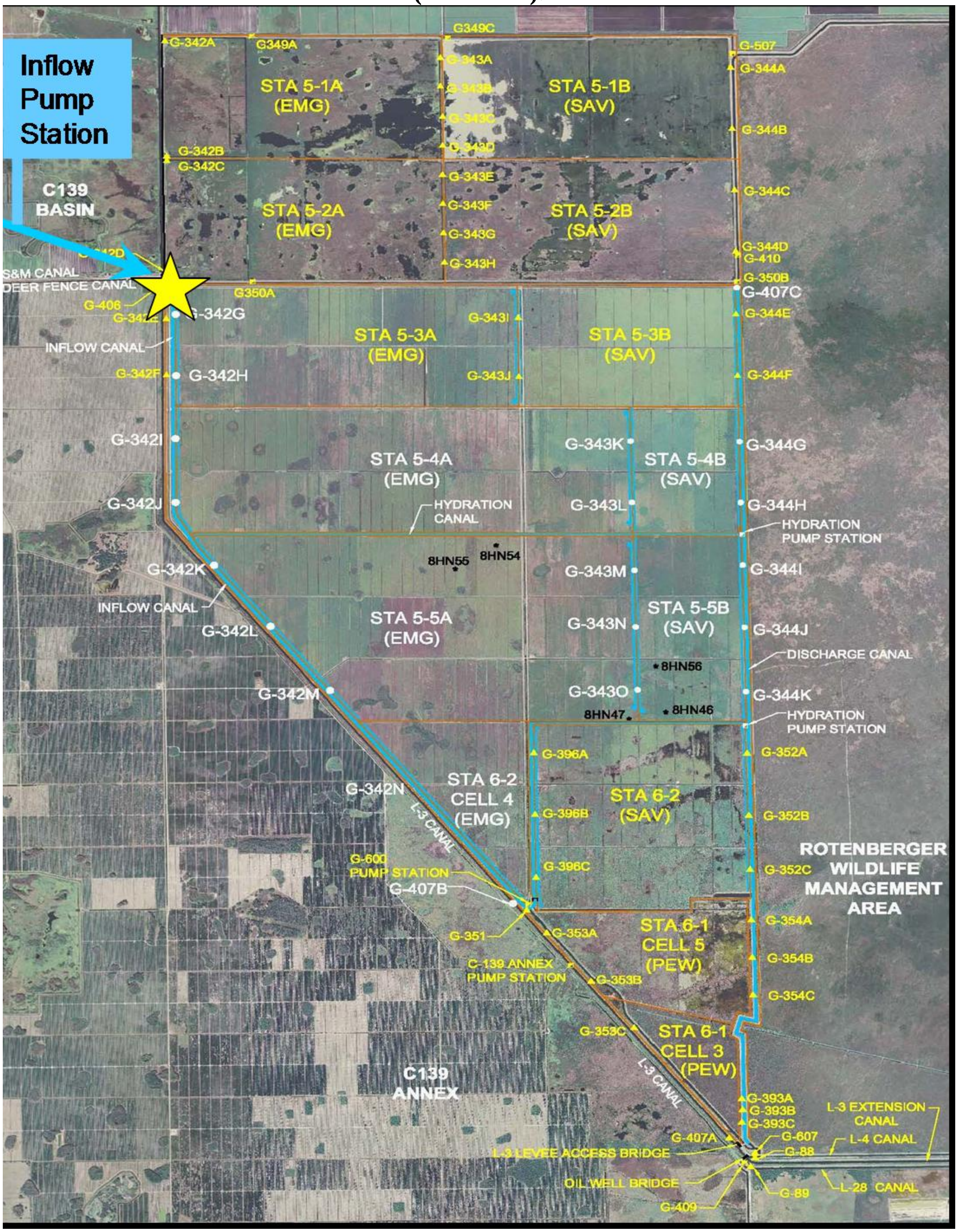


Table 7-24: Annual Runoff to STA-5 from All Sources.

Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)	Phosphorus Loading Rate (g/m2/yr)
1995	208,626	49,719	193	1.12
1996	189,198	39,753	170	0.90
1997	133,575	37,422	227	0.85
1998	131,557	26,612	164	0.60
1999	107,659	27,675	208	0.63
2000	156,002	38,940	202	0.88
2001	46,922	14,679	254	0.33
2002	161,066	54,263	273	1.23
2003	184,578	62,652	275	1.42
2004	168,215	56,922	274	1.29
2005	132,370	30,812	189	0.70
2006	266,936	85,617	260	1.93
2007	63,315	24,828	318	0.56
Min. Annual	**46,922**	**14,679**	**-**	**0.33**
Max. Annual	**266,936**	**85,617**	**-**	**1.93**
Ave. Annual	**150,001**	**42,300**	**229**	**0.96**

7.7. STA-6 Inflows

Consistent with the 2005 EAA Regional Feasibility Study, inflow data sets for STA-5 and STA-6 utilized the historic flows and phosphorus loads for the WY1995-2007 period. For the purpose of developing the STA-5 inflow data set, STA-5 is assumed to be comprised of the existing 3 flow-ways of STA-5 and the 4th and 5th flow-ways of Compartment C that are soon to be constructed. The combined C-139 Basin and C-139 Annex runoff will be distributed to STA-5 and STA-6 to balance the phosphorus loading rate among the flow-ways of the STAs (see **Table 7-22** above). This approach is consistent with the method used in the 2005 EAA Regional Feasibility Study.

The long-term average annual inflow to STA-6 is summarized in **Table 7-25**. The estimated average annual inflows are less than the simulated inflows of 18,937 AF/yr. Because of this, the simulated water supply deliveries to STA-6 (2,284 AF/yr) were omitted from the STA-6 inflows. The estimated annual inflows for WY1995-WY2007 are summarized in **Table 7-26**.

Table 7-25: Summary of Long-term Average Annual Inflow to STA-6.

Source	Flow (AF/yr)	TP Load (kg/yr)	TP Conc (ppb)
C-139 Basin	20,062	5,657	229
C-139 Annex	41,480	4,987	97
Total	**61,542**	**10,644**	**140**

Table 7-26: Annual Runoff to STA-6 from All Sources.

Water Year	Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)	Phosphorus Loading Rate (g/m2/yr)
1995	69,389	11,637	136	1.04
1996	61,742	9,876	130	0.89
1997	58,061	10,112	141	0.91
1998	63,676	7,581	97	0.68
1999	38,669	6,833	143	0.61
2000	67,230	11,624	140	1.04
2001	33,106	6,528	160	0.59
2002	59,264	11,103	152	1.00
2003	68,608	13,640	161	1.22
2004	69,357	13,344	156	1.20
2005	65,222	9,772	121	0.88
2006	101,432	18,352	147	1.65
2007	44,295	7,970	146	0.72
Min. Annual	**33,106**	**6,528**	**-**	**0.59**
Max. Annual	**101,432**	**18,352**	**-**	**1.65**
Ave. Annual	**61,542**	**10,644**	**140**	**0.96**

8. Inflows to the EAA Storage Reservoir

The daily inflow to the EAA Storage Reservoir (EAASR) was estimated based on the following equation

EAASR Inflows = EARIN1 + EARIN2 + LKRSM1 + LKRSN1

The SFWMM flow terms are defined as

- EARIN1 = Inflow into proposed EAA reservoir from Miami Canal (runoff + LOK regulatory releases)
- EARIN2 = Inflow into proposed EAA reservoir from NNR Canal (runoff + LOK regulatory releases)
- LKSRM1 = Excess water from Lake Okeechobee via Miami Canal to northern surge tank of the EAA reservoir
- LKRSN1 = Excess water from Lake Okeechobee via NNRC to the northern surge tank of the EAA reservoir

The long-term average annual inflow to the EAARS by source is summarized in **Table 8-1**. The estimated annual inflows for WY1966-WY2000 are summarized in **Table 8-2**.

Table 8-1: Summary of Long-term Average Annual Inflow to EAASR.

Source	Flow (AF/yr)	TP Load (kg/yr)	TP Conc (ppb)
S-7/S-2 Basin	119,549	14,011	95
S-8/S-3 Basin	97,242	10,012	83
Lake Okee.	323,222	39,862	100
Total	**540,013**	**63,885**	**96**

Table 8-2: Annual Runoff to EAASR from All Sources.

Water Year	Annual Inflow Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)	Phosphorus Loading Rate (g/m2/yr)
1966	448,680	48,754	88	0.79
1967	820,893	110,461	109	1.80
1968	280,406	29,824	86	0.48
1969	876,393	110,271	102	1.79
1970	984,516	112,789	93	1.83
1971	536,974	71,048	107	1.15
1972	298,222	32,989	90	0.54
1973	266,719	30,699	93	0.50
1974	201,931	21,124	85	0.34
1975	184,936	19,434	85	0.32
1976	253,510	27,558	88	0.45
1977	246,506	27,018	89	0.44
1978	303,372	36,131	97	0.59
1979	658,330	70,278	87	1.14
1980	1,082,010	128,515	96	2.09
1981	248,667	29,995	98	0.49
1982	248,533	29,086	95	0.47
1983	862,041	99,586	94	1.62
1984	1,084,409	127,623	95	2.07
1985	525,599	74,223	114	1.21
1986	320,626	34,112	86	0.55
1987	336,082	36,935	89	0.60
1988	321,286	38,374	97	0.62
1989	260,028	29,682	93	0.48
1990	188,853	20,360	87	0.33
1991	324,336	33,012	83	0.54
1992	919,158	117,175	103	1.90
1993	1,067,987	125,414	95	2.04
1994	383,442	45,507	96	0.74
1995	405,190	50,635	101	0.82
1996	1,177,038	137,674	95	2.24
1997	387,496	49,275	103	0.80
1998	708,465	79,202	91	1.29
1999	930,549	117,349	102	1.91
2000	757,265	83,860	90	1.36
Min. Annual	**184,936**	**19,434**	**---**	**0.32**
Max. Annual	**1,177,038**	**137,674**	**---**	**2.24**
Avg. Annual	**540,013**	**63,885**	**96**	**1.04**

8.1. Sensitivity Analysis: Lake Concentration of 150 ppb

As discussed in Section 6, for the purpose of conducting a sensitivity analysis on STA performance, the Lake concentration will be assumed to be 150 ppb at the inflow to the EAASR. The long-term average annual inflow to the EAARS by source with this assumption is summarized in **Table 8-3**. The estimated annual inflows for WY1966-WY2000 are summarized in **Table 8-4**.

Table 8-3: Summary of Long-term Average Annual Inflow to EAASR.

Source	Flow (AF/yr)	TP Load (kg/yr)	TP Conc (ppb)
S-7/S-2 Basin	119,549	14,011	95
S-8/S-3 Basin	97,242	10,012	83
Lake Okee.	323,222	59,799	150
Total	**540,013**	**83,822**	**126**

Table 8-4: Annual Runoff to EAASR from All Sources.

Water Year	Annual Inflow Volume (acre-feet)	TP Load Load (kg)	TP Conc. (ppb)	Phosphorus Loading Rate (g/m2/yr)
1966	448,680	58,097	105	0.94
1967	820,893	156,334	154	2.54
1968	280,406	29,824	86	0.48
1969	876,393	148,163	137	2.41
1970	984,516	164,690	136	2.68
1971	536,974	97,498	147	1.58
1972	298,222	32,989	90	0.54
1973	266,719	30,699	93	0.50
1974	201,931	21,124	85	0.34
1975	184,936	19,434	85	0.32
1976	253,510	27,558	88	0.45
1977	246,506	27,018	89	0.44
1978	303,372	36,131	97	0.59
1979	658,330	88,925	110	1.45
1980	1,082,010	174,460	131	2.84
1981	248,667	33,326	109	0.54
1982	248,533	29,086	95	0.47
1983	862,041	137,993	130	2.24
1984	1,084,409	184,807	138	3.00
1985	525,599	104,985	162	1.71
1986	320,626	34,112	86	0.55
1987	336,082	38,276	92	0.62
1988	321,286	44,519	112	0.72
1989	260,028	35,790	112	0.58
1990	188,853	20,360	87	0.33
1991	324,336	33,012	83	0.54
1992	919,158	161,200	142	2.62
1993	1,067,987	177,197	135	2.88
1994	383,442	51,936	110	0.84
1995	405,190	72,949	146	1.19
1996	1,177,038	202,867	140	3.30
1997	387,496	65,347	137	1.06
1998	708,465	112,050	128	1.82
1999	930,549	165,050	144	2.68
2000	757,265	115,960	124	1.89
Min. Annual	**184,936**	**19,434**	**---**	**0.32**
Max. Annual	**1,177,038**	**202,867**	**---**	**3.30**
Avg. Annual	**540,013**	**83,822**	**126**	**1.36**

9. Summary of Flows and Phosphorus for the 2010 Period

9.1. Overall Flow and Phosphorus Levels

9.1.1. Comparison to the 2005 *EAA Regional Feasibility Study*

The basin runoff, Lake releases and releases from the EAA Storage Reservoir from this analysis are compared to the 2005 *EAA Regional Feasibility Study* in **Table 9.1**. The values in **Table 9.1** reflect Lake Okeechobee phosphorus concentrations of 100 ppb, and balancing the phosphorus loading rate between STA-2 and the North Build-out of Compartment B. The phosphorus performance of the STAs, Compartments B and C, and the EAA Storage Reservoir will be evaluated in a subsequent task by utilizing these flows and phosphorus loads. In addition, the sensitivity of STA performance to the following assumptions will also be evaluated:

1. Lake Okeechobee phosphorus concentration of 150 ppb, and
2. Re-direction of STA-2 inflows to Compartment B to achieve a PLR of 1.3 $g/m^2/yr$.

Differences in basin runoff volumes and phosphorus loads are evident when comparing the current projected values to those values estimated in the in the 2005 *EAA Regional Feasibility Study* and these are discussed below. It is anticipated that the entire STA input data set will be updated in 2009 as part of the continuing Long-Term Plan implementation.

EAA Basin. Long-term average annual runoff volumes for the entire EAA increased approximately 36,500 AF/yr as a result of using the latest version of the SFWMM for the current analyses. Additionally, there is marked variation in the EAA sub-basin runoff volumes. For the S-5A and S-8 sub-basins, the differences are attributable to variations in the SFWMM results. Some of the variations are attributable to differences in the assumptions used in the SFWMM, e.g.,

1. Land use:
    a. 2005: All land use has been updated using most recent FLUCCS data (1995), modified in the Lower East Coast urban areas using 2000 aerial photography (2x2 scale).
    b. 2007: The land use coverage is intermediate between 2000B3 and 2050B3
2. Miami Canal Basin
    a. 2005: EAA cells in the Miami Canal Basin between STA5 and STA6 are not production cells (shrub Land Use). Then, no irrigation demands are required in this area. Runoff from this area is part of the Miami Canal Basin.
    b. 2007: no such assumption
3. STA Sizes
    a. 2005: Compartment B = 7,575 ac; Compartment C = 7,571 ac
    b. 2007: Compartment B = 6,722 ac; Compartment C = 6,230 ac
4. CERP
    a. 2005: L-8 reservoir (rock pit located in S-5A Basin) 870 ac 2 ft deep
    b. 2007: L-8 reservoir 870 ac 44 ft deep

Table 9-1: Comparison of Current Data Sets to 2005 EAA RFS Values.

Basin or Source	Water Years	2005 EAA RFS[1] Flow AF/yr	2005 EAA RFS[1] TP Load kg/yr	2005 EAA RFS[1] TP Conc ppb	This Analysis Flow AF/yr	This Analysis TP Load kg/yr	This Analysis TP Conc ppb
EAA Basin Runoff							
Discharge to STAs							
S-5A Basin	1966-2000	291,096	55,256	154	308,058	61,844	163
S-6/S-2 Basin	1966-2000	236,624	28,327	97	181,700	23,661	106
S-7/S-2 Basin	1966-2000	109,310	10,747	80	141,171	16,640	96
S-8/S-3 Basin	1966-2000	170,624	17,460	83	132,584	13,383	82
Subtotal	1966-2000	807,654	111,790	112	763,513	115,528	123
Discharge to EAASR							
S-7/S-2 Basin	1966-2000	72,078	7,235	81	119,549	14,011	95
S-8/S-3 Basin	1966-2000	59,784	5,910	80	97,242	10,012	83
Subtotal	1966-2000	131,862	13,145	81	216,791	24,023	90
Discharge to Lake Okeechobee							
S-5A Basin	1966-2000	0	0	-	1,697	341	163
S-2/S-6/S-7 Basin	1966-2000	24,946	2,822	92	17,826	2,197	100
S-8/S-3 Basin	1966-2000	4,091	445	88	5,129	518	82
Subtotal	1966-2000	29,037	3,267	91	24,652	3,056	100
Total from EAA Basins							
S-5A Basin	1966-2000	291,096	55,256	154	309,754	62,185	163
S-2/S-6/S-7 Basin	1966-2000	442,958	49,131	90	460,246	56,509	100
S-8/S-3 Basin	1966-2000	234,499	23,815	82	234,955	23,913	83
Total	1966-2000	968,553	128,202	107	1,004,956	142,607	115
Chapter 298 districts and 715 Farms							
Discharge to STAs							
EBWCD	1966-2000	15,212	9,386	500	16,033	9,244	467
ESWCD/715 Farms	1966-2000	29,818	4,588	125	31,129	5,215	136
SSDD	1966-2000	10,559	1,390	107	10,539	1,324	102
SFCD	1966-2000	21,145	3,183	122	24,110	3,363	113
Subtotal	1966-2000	76,734	18,547	196	81,810	19,146	190
Discharge to Lake Okeechobee							
EBWCD	1966-2000	0	0	-	487	278	462
ESWCD/715 Farms	1966-2000	0	0	-	3,801	479	102
SSDD	1966-2000	0	0	-	344	43	102
SFCD	1966-2000	0	0	-	1,363	190	113
Subtotal	1966-2000	0	0	-	5,996	990	134
Total from Ch. 298 Districts and 715 Farms							
EBWCD	1966-2000	15,212	9,386	500	16,520	9,522	467
ESWCD/715 Farms	1966-2000	29,818	4,588	125	34,931	5,694	132
SSDD	1966-2000	10,559	1,390	107	10,883	1,367	102
SFCD	1966-2000	21,145	3,183	122	25,473	3,553	113
Total	1966-2000	76,734	18,547	196	87,806	20,136	186
Western Basins							
C-139 to L2/L-3	Varies	159,030	39,111	199	170,064	47,957	229
C-139 to STA-3/4	1966-2000	13,204	2,958	182	13,201	3,401	209
C-139 to EAA Irrig.	1966-2000	4,383	969	179	4,385	1,130	209
USSC SDR Unit 2	1998-2005	0	0	-	0	0	-
C-139 Annex	Varies	40,176	4,873	98	41,480	4,987	97
Total	Varies	216,793	47,911	179	229,130	57,475	203
Eastern Basins							
C-51 West to STA	1966-2000	136,812	23,307	138	130,375	31,529	196
C-51West to East	1966-2000	3,610	615	138	6,902	1,669	196
L-8 Basin to STA	1966-2000	0	0	-	8,571	1,019	96
L-8 Basin to Lake	1966-2000	71,931	9,157	103	57,008	6,971	99
L-8 to WPB WCA	1966-2000	0	0	-	85,022	10,397	99
L-8 to L-8 Rock Pit	1966-2000	0	0	-	17,461	2,135	99
L-8 to C-51 East	1966-2000	36,256	3,548	79	25,712	3,173	100
Acme Basin B	1966-2000	34,887	4,850	113	35,066	4,915	114
Total	1966-2000	283,496	41,477	119	366,117	61,809	137
Total Runoff	**Varies**	**1,545,576**	**236,137**	**124**	**1,688,009**	**282,026**	**135**

[1] 2005 EAA RFS values came from Appendix D "Inflow Data Sets for the Period 2010-2014"

Table 9-1: Comparison of Current Data Sets to 2005 EAA RFS Values (Cont'd).

Basin or Source	Water Years	2005 EAA RFS[1]			This Analysis		
		Flow AF/yr	TP Load kg/yr	TP Conc ppb	Flow AF/yr	TP Load kg/yr	TP Conc ppb
Lake Okeechobee Releases							
Flow-Through Releases in STA Inflows							
S-351	1966-2000	1,551	132	69	16	2	100
S-352	1966-2000	19	2	104	0	0	-
S-354	1966-2000	26,581	2,115	65	0	0	-
Subtotal	1966-2000	28,150	2,250	65	16	2	100
Water Supply Bypasses							
S-351	1966-2000	11,484	1,189	84	18,559	2,527	110
S-352	1966-2000	14,184	2,227	127	21,054	3,439	132
S-354	1966-2000	109,279	9,391	70	46,140	5,271	93
Subtotal	1966-2000	134,947	12,807	77	85,753	11,237	106
Total Flow-Through Releases							
S-351	1966-2000	13,035	1,321	82	18,575	2,529	110
S-352	1966-2000	14,203	2,229	127	21,054	3,439	132
S-354	1966-2000	135,860	11,506	69	46,140	5,271	93
Total	1966-2000	163,097	15,056	75	85,769	11,239	106
Lake Okeechobee Releases to EAA Storage Reservoir							
S-351	1966-2000	131,928	16,689	103	139,761	17,233	100
S-354	1966-2000	152,793	16,958	90	183,461	22,629	100
Total	1966-2000	284,721	33,647	96	323,222	39,862	100
Total Lake Okeechobee Releases							
S-351	1966-2000	144,963	18,010	101	158,336	19,762	101
S-352	1966-2000	14,203	2,229	127	21,054	3,439	132
S-354	1966-2000	288,653	28,464	80	229,601	27,900	99
Total	1966-2000	447,819	48,703	88	408,991	51,101	101
EAA Storage Reservoir Releases							
S-2/S-6/S-7 Irrig.	1966-2000	105,115	---	---	95,323	9,007	77 [2]
S-3/S-8 Irrig.	1966-2000	74,911	---	---	72,835	6,882	77
STA-3/4	1966-2000	233,685	---	---	363,442	34,340	77
Total	1966-2000	413,711	---	---	531,600	50,229	77
Seepage from WCA-2A							
WCA-2A seepage	1966-2000	27,530	509	15	27,530	509	15
Total Volumes and TP Loads							
Direct STA Inflow	Varies	1,562,245	209,164	109	1,639,453	264,464	131
To EAA SR	1966-2000	416,583	46,792	91	540,013	63,885	96
To Lake Okeechobee	1966-2000	100,968	12,424	100	87,656	11,017	102
Other Destinations	1966-2000	44,249	5,132	94	139,482	18,504	108
Total (w/ L-8 Basin)	Varies	2,124,045	273,512	104	2,406,604	357,870	121
Total (w/o L-8 Basin)	Varies	2,015,858	260,807	105	2,212,830	334,174	122

[1] 2005 EAA RFS values came from Appendix D "Inflow Data Sets for the Period 2010-2014"

[2] Assumes 76.6 ppb TP concentration from EAA Storage Reservoir; Lake O=100 ppb

For the S-7/S-2 and S-6/S-2 sub-basins, in addition to variations in the SFWMM results, the 2005 Study adjusted the simulated runoff from the S-6/S-2 and S-7/S-2 basins to create a uniform average runoff depth for both basins (ADA/B&M 2005). If the same approach were utilized in this analysis, approximately 71,141 AF/yr would be shifted from the S-7/S-2 Basin to the S-6/S-2 Basin, yielding an average of approximately 2.15 ft of runoff over each basin. However, this current analysis did not adjust the SFWMM output on the recommendation of District modeling staff. The long-term average annual EAA-wide runoff phosphorus concentration increased approximately 24 ppb as a result of using the updated WY1995-2007 phosphorus concentrations. The net effect of the increased simulated flows and increased phosphorus concentrations is that the long-term average annual EAA-wide runoff phosphorus load increased approximately 33,737 kg/yr.

Ch. 298 Districts and 715 Farms. Slight increases (<10%) in the estimated flows and phosphorus loads from the Ch. 298 Districts and 715 Farms to the STAs resulted from the use of the updated WY1995-2007 historic data.

Western Basins. The estimated runoff volume from the C-139 Basin increased approximately 10% compared to the 2005 estimates, due primarily to the apparent omission of a portion of the L-2/L-3 Canal flows in the 2005 Study. The C-139 Basin also experienced a significant increase in phosphorus concentrations during the period of record used in the current analysis. In addition, during the 2005 Study, a 10% reduction in phosphorus concentration was incorporated to reflect a then-promising trend in basin BMP effectiveness. For the current study, District staff recommended no adjustment to the period of record data for BMP implementation. The C-139 Basin has been in non-compliance of the load reduction requirements for the last five water years, and the District is actively coordinating with the landowners to investigate causes and possible remedies.

Eastern Basins. The estimated runoff from Acme Basin B was similar between the current study and the 2005 analysis. For the C-51W Basin, a 42% increase in the phosphorus concentration, due primarily to elevated values observed during the 2004 hurricanes, resulted in a significantly higher estimate of phosphorus loads to STA-1E than in the 2005 Study. A longer period of record will be utilized in the 2009 update of the STA data sets, and it is likely that lower concentrations will be applied to future STA-1E inflows at that time.

Lake Okeechobee. The SFWMM simulated a considerably different magnitude and distribution of Lake Okeechobee releases for the current analyses than were simulated for the 2005 Study. Overall, a long-term average of approximately 39,000 AF/yr less Lake releases were simulated in the 2007 SFWMM Alt1 than in the 2005 simulation. The estimated long-term phosphorus concentration in the Lake releases based on historic data increased from 88 ppb to 101 ppb, such that the long-term average annual phosphorus load in Lake releases increased from 48.7 metric tons/yr to 51.1 metric tons/yr. The simulated quantity of water supply releases that bypasses the STAs decreased by almost 50,000 AF/yr to a long-term average annual volume of 85,753 AF/yr. Conversely, the quantity of Lake releases that were captured in the EAA Storage Reservoir increased by a long-term average of almost 40,000 AF/yr.

9.1.2. Comparison to the 1994 *Conceptual Design*.

The basin runoff, Lake releases and releases from the EAA Storage Reservoir from this analysis are compared to the 1994 Conceptual Design in **Table 9.2**. The values in **Table 9.2** reflect Lake Okeechobee phosphorus concentrations of 100 ppb, and balancing the phosphorus loading rate between STA-2 and the North Build-out of Compartment B.

Table 9-2: Comparison of Basin Runoff to the STAs, Compartments B and C, and the EAA Storage Reservoir.

Source Basin	1994 Conceptual Design[1]			This Analysis		
	Flow AF/yr	TP Load kg/yr	TP Conc ppb	Flow AF/yr	TP Load kg/yr	TP Conc ppb
S-5A	195,342	50,631	210	308,058	61,844	163
S-6/S-2	131,676	23,166	143	181,700	23,661	106
S-7/S-2	155,734	19,211	100	223,454	24,415	89
S-8/S-3	187,020	47,290	205	200,833	19,831	80
Total EAA	***669,772***	***140,298***	***170***	***914,044***	***129,751***	***115***
Ch. 298 Districts/715 Farms	24,857	6,156	201	81,810	19,146	190
C-51W	105,376	24,042	185	130,375	31,529	196
L-8	0	0	-	8,571	1,019	96
C-139	97,605	28,693	238	183,265	51,358	227
C-139 Annex	0	0	-	41,480	4,987	97
Acme Basin B	0	0	-	35,066	4,915	114
WCA-2A	27530.11	509.37586	15	27,530	509	15
Lake Okeechobee[2]	254,571	21,364	68	217,536	20,554	77
Effective Treatment Area		39,690			56,997	
Total Inflows	**1,179,711**	**221,062**	**152**	**1,639,677**	**263,769**	**130**

[1] Assumed 20% reduction in EAA runoff.
[2] Calculated as 60% of EAA SR discharge to STA-3/4, equivalent to percentage of Lake inflows.

Differences in basin runoff volumes and phosphorus loads are evident when comparing the current projected values to those values estimated in the in the 2005 *EAA Regional Feasibility Study*, and these comparisons are discussed below.

EAA Basin. The 1994 estimates were based on observed flows and phosphorus loads during the 10-year (WY1979-88) historic period of record. In addition, these flows and loads were adjusted based on an assumed 20% reduction in flow due to BMP implementation, an assumption that never materialized. By contrast, the current estimates are based on simulated runoff from the SFWMM using a 35-year period of rainfall data, and regional water management assumptions, including no reduction in flow due to BMP implementation (see Appendix A for a complete list of assumptions). The estimated phosphorus concentration assigned to the EAA runoff for the present analysis is lower than estimated in the 1994 *Design*, a reflection of better than anticipated BMP performance.

Ch. 298 Districts and 715 Farms. Differences between the current analyses and the 1994 Conceptual Design are due in part to the limited nature of the available data in 1994 compared to the current analysis, and in part due to the use of simulated flows in the current analyses compared to the use of available historic data in 1994. The estimated long-term average phosphorus concentration is approximately 5% lower in the present study.

Eastern Basins. The 1994 Conceptual Design assumed that the entirety of the L-8 Basin runoff would be re-directed away from the STAs, an assumption that will not likely occur until the L-8 Diversion CERP project is completed. Differences in the C-51W Basin runoff values are due largely to differences in available historic data at the time of the analyses. In addition, the diversion of Acme Basin B runoff away from the Refuge and into STA-1E was not contemplated at the time of the 1994 *Design*.

Western Basins. Only limited reliable flow and phosphorus data for the C-139 Basin were available during the 1994 *Design*, while the current estimates are based on measured flows and phosphorus from WY1995-2007. The diversion of C-139 Annex runoff away from the WCA-3A and into STA-5/6 was not contemplated at the time of the 1994 *Design*. The C-139 Basin has been in non-compliance of the load reduction requirements for the last five water years, and the District is actively coordinating with the landowners to investigate causes and possible remedies.

It should be noted that while the estimated phosphorus loads have increased dramatically between 1994 and today, so too has the effective treatment area, increasing from 39,690 acres in 1994 to 57,001 acres with the completion of Compartments B and C. Despite the increase in estimated loads, with the additional treatment acreage, the phosphorus loading rate has decreased slightly from 1.38 $g/m^2/yr$ to 1.16 $g/m^2/yr$.

9.2. Inflows to the STAs and EAA Storage Reservoir

A summary of the estimated inflows to the STAs, including Compartments B and C, and the EAA Storage Reservoir, is presented in **Table 9-3** for concentrations in Lake releases of 100 ppb, and sufficient re-direction of STA-2 inflow to achieve 1.0 $g/m^2/yr$. During the subsequent work task, the phosphorus removal performance of the STAs and EAASR will also be evaluated using a Lake releases concentration of 150 ppb, and using re-direction of STA-2 inflow to achieve 1.3 $g/m^2/yr$.

Table 9-3: Summary of Inflows to the STAs and EAA Storage Reservoir for STA-2 PLR of 1.0 g/m²/yr.

STA	Effective Treatment Area acres	Inflow Volume (acre-feet)	Inflow TP Load Load (kg)	Inflow TP Conc. (ppb)	Phosphorus Loading Rate (g/m2/yr)
STA-1E	5,132	193,818	41,864	175	2.02
STA-1W	6,670	243,172	54,409	181	2.02
STA-2	6,338	182,713	25,664	114	1.00
Compartment B	8,620	225,073	28,509	103	0.82
STA-3/4[1]	16,543	583,360	60,353	84	0.90
STA-5 (incl. Comp. C)	10,940	150,001	42,300	229	0.96
STA-6 (incl. Comp. C)	2,754	61,542	10,644	140	0.96
Total Inflow to STAs	**56,997**	**1,639,679**	**263,743**	**130**	**1.14**
EAA SR A-1	15,200	540,013	63,885	96	1.04
Total	**72,197**	**2,179,692**	**327,628**	**122**	**1.12**

[1] Assumes 76.6 ppb TP concentration from EAA Storage Reservoir; Lake O=100 ppb

9.2.1. Comparison to the 2005 EAA *Regional Feasibility Study*

The STA inflow values from this analysis are compared to the 2005 *EAA Regional Feasibility Analysis* in the table below. The SFMM simulation used in this analysis does not include the completion of ECART, resulting in more flow to EAA SR, less flow to Compartment B, and more flow to STA-1W. Increased flows to STA-1E resulted from a combination of higher simulated flows from the C-51W Basin and acknowledging less than 100% efficient diversion of L-8 Basin runoff. Significantly higher phosphorus loads to STA-1E are estimated in the present analysis, due principally to higher observed phosphorus concentrations during the updated period of record, a result of the 2004 hurricanes. A longer period of record will be utilized in the 2009 update of the STA data sets, and it is likely that lower concentrations will be applied to future STA-1E inflows at that time. Slightly higher flows are estimated for the combined STA-5/6 areas, the result of an apparent omission of a portion of the L-2/L-3 Canal flows in the 2005 Study. Higher phosphorus loads are estimated to STA-5/6, a result of the recent elevated C-139 Basin concentrations. The C-139 Basin has been in non-compliance of the load reduction requirements for the last five water years, and the District is actively coordinating with the landowners to investigate causes and possible remedies.

Table 9-4: Comparison of Inflows to 2005 EAARFS Values (STA-2 PLR of 1.0 g/m^2/yr).

Receiving Water Body	2005 EAA RFS[1]			This Analysis		
	Flow AF/yr	TP Load kg/yr	TP Conc ppb	Flow AF/yr	TP Load kg/yr	TP Conc ppb
STA-1E	171,800	27,030	128	193,818	41,864	175
STA-1W	131,400	25,800	160	243,172	54,409	181
STA-2	180,700	20,300	91	182,713	25,664	114
Compartment B	291,100	44,100	123	225,073	28,509	103
STA-3/4	585,500	65,920	91	583,360	60,353	84
STA-5 (incl. Comp. C)	159,030	39,111	199	150,001	42,300	229
STA-6 (incl. Comp. C)	40,176	4,873	98	61,542	10,644	140
EAA SR	416,900	50,000	97	540,013	63,885	96
Total Inflows	**1,976,606**	**277,134**	**114**	**2,179,692**	**327,628**	**122**

[1] For comparison, inflows from the EAA RFS Alternative 1 for the 2010-2014 Period are presented. Alternative 1 included additional facilities to transfer S-5A Basin runoff to the west.

9.2.2. Comparison to the 1994 *Conceptual Design*.

The STA inflow values from this analysis are compared to the 1994 *Conceptual Design* in the tables below. **Table 9.5** compares the two sets of estimates based on equivalent acreage of treatment areas, i.e., by excluding the inflows to Compartment B and C. On this areal basis, phosphorus loads to STA-2, STA-3/4, STA-5 and STA-6 are estimated to be lower than were estimated in the 1994 *Design*, due primarily to lower concentrations resulting from better-than-anticipated BMP performance.

Table 9-5: Comparison of STA Inflows to 1994 Conceptual Design Values, Excluding Compartments B and C for STA-2 PLR of 1.0 g/m^2/yr.

Receiving Water Body	1994 Conceptual Design			This Analysis		
	Flow AF/yr	TP Load kg/yr	TP Conc ppb	Flow AF/yr	TP Load kg/yr	TP Conc ppb
STA-1E	124,900	29,500	191	193,818	41,864	175
STA-1W	142,853	37,701	214	243,172	54,409	181
STA-2 (excl. Comp. B)	174,641	33,764	157	182,713	25,664	114
STA-3/4	604,753	87,200	117	583,360	60,353	84
STA-5 (excl. Comp. C)	87,000	28,000	261	56,353	15,890	229
STA-6 (excl. Comp. C)	18,034	4,388	197	28,850	3,468	96
Total Inflows	**1,152,181**	**220,553**	**155**	**1,288,266**	**201,649**	**127**

Table 9.6 compares the total flows and phosphorus loads forecast to be captured and treated by the STAs, including the full build-out of Compartment B and Compartment C. Although the estimated phosphorus loads have increased dramatically between 1994 and today, so too has the effective treatment area, increasing from 39,690 acres in 1994 to 57,001 acres with the completion of Compartments B and C. Despite the increase in estimated loads, with the additional treatment acreage, the phosphorus loading rate has decreased slightly from 1.38 $g/m^2/yr$ to 1.16 $g/m^2/yr$.

Table 9-6: Comparison of STA Inflows to 1994 Conceptual Design Values, Including Compartments B and C for STA-2 PLR of 1.0 $g/m^2/yr$.

Receiving Water Body	1994 Conceptual Design				This Analysis			
	Eff. Tr. Area (ac)	Flow AF/yr	TP Load kg/yr	TP Conc ppb	Eff. Tr. Area (ac)	Flow AF/yr	TP Load kg/yr	TP Conc ppb
STA-1E	5,132	124,900	29,500	191	5,132	193,818	41,864	175
STA-1W	6,670	142,853	37,701	214	6,670	243,172	54,409	181
STA-2 (incl. Comp. B)	6,338	174,641	33,764	157	14,958	407,786	54,173	108
STA-3/4	16,543	604,753	87,200	117	16,543	583,360	60,353	84
STA-5 (incl. Comp. C)	4,110	87,000	28,000	261	10,940	150,001	42,300	229
STA-6 (incl. Comp. C)	897	18,034	4,388	197	2,754	61,542	10,644	227
Total Inflows	**39,690**	**1,152,181**	**220,553**	**155**	**56,997**	**1,639,679**	**263,743**	**130**

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Appendix A. SFWMM Model Assumptions

2010BCalt1_WMM5.5.2.1_082307v2_out

Feature	2010 Base Condition Assumptions	2010BCAlt1 Proposed Action
Climate	• The climatic period of record is from 1965 to 2000. • Rainfall estimates have been revised and updated for 1965-2000. • Revised evapotranspiration methods have been used for 1965-2000.	Same as 2010BS
Topography	Updated November 2001 and September 2003 using latest available information (in NGVD 29 datum). Nov 2001 update (Documented in November 2001 SFWMD memorandum from M. Hinton to K. Tarboton) includes: • USGS High Accuracy Elevation data from helicopter surveys collected 1999-2000 for Everglades National Park and Water Conservation Area (WCA) 3 south of Alligator Alley • USGS Lidar data (May 1999) for WCA-3A north of Alligator Alley • Lindahl, Browning, Ferrari & Helstrom 1999 survey for Rotenberger Wildlife Management Area. • Stormwater Treatment Area surveys from 1990s • Aerometric Corp. 1986 survey of the 8-1/2 square mile area • Includes estimate of Everglades Agricultural Area subsidence • Other data as in SFWMM v3.7 • FWC survey 1992 for the Holey Land Wildlife Management Area. September 2003 update includes: • Reverting to FWC 1992 survey data for Rotenberger Wildlife Management Area.	Same as 2010BS

Feature	2010 Base Condition Assumptions	2010BCAlt1 Proposed Action
	• DHI gridded data from Kimley –Horn contracted survey of EAA, 2002-2003. Regridded to 2x2 scale for EAA outside of STAs and WMAs.	
Sea Level	Sea level data from six long-term NOAA stations were used to generate a historic record to use as sea level boundary conditions for the 1965 to 2000 evaluation period.	Same as 2010BS
Land Use	• The land use coverage is intermediate between 2000B3 and 2050B3	Same as 2010BS
Natural Area Land Cover (Vegetation)	Vegetation classes and their spatial distribution in the natural areas comes from the following data: • Walsh 1995 aerial photography in Everglades National Park • Rutchey 1995 classification in WCA-3B, WCA-3A north of Alligator Alley and the Miami Canal, WCA-2A & 2B • Richardson 1990 data for Loxahatchee National Wildlife Refuge • FLUCCS 1995 for Big Cypress National Preserve, Holey Land & Rotenberger Wildlife Management Areas & WCA-3A south of Alligator Alley and Miami Canal. (Documented in August 2003 SFWMD memorandum from J. Barnes and K. Tarboton to J. Obeysekera).	Same as 2010BS
	Lake Okeechobee Service Area	
LOSA Basins	• Southern Indian Prairie Basin, S-4, North Lake Shore and Northeast Lake Shore demands and runoff based on AFSIRS (Agricultural Field-Scale Irrigation Requirement Simulation) modeling using 2010 LU projections.	Same as 2010BS
Lake Okeechobee	• Lake Okeechobee Regulation Schedule WSE according to WSE decision trees, with pulse releases in Zone D modeled as Level III pulse	Same as 2010BS

Feature	2010 Base Condition Assumptions	2010BCAlt1 Proposed Action
	in upper third of the zone, Level II pulse in middle third of the zone, and Level I pulse in the lower third of the zone, when the decision tree calls for regulatory releases to the estuaries in that zone. • WSE thresholds derived from the Class Limit Adjustment (CLA) WSE modification: Increase the frequency of Pulse Releases in Zone D of WSE. • Modified WSE thresholds for zone D1 to improve utilization of EAA reservoir. • Lake Okeechobee Supply Side management policy for Lake Okeechobee Service Area water restriction cutbacks as per rule 40E-21 and 40E-22 in September, 2001 (13.0-10.5 ft. SSM trigger line). • Emergency flood control backpumping to Lake Okeechobee from the Everglades Agricultural Area. • Kissimmee River Restoration and Headwaters Revitalization Project are complete. • Lake Okeechobee environmental releases to supplement reservoir deliveries to Caloosahatchee and St. Lucie Estuaries. • Environmental deliveries to WCA-3A according to Rainfall Driven Operations as means of operating the EAA Reservoirs. • Lake Okeechobee BMP makeup water deliveries to WCAs are not made. • Adaptive protocols are included.	
Acceler8 Projects	Acceler8 Projects On Line by 2010 – See A8 Website. • C44 Reservoirs: 9315 acres, depth 5 .ft. • C43 Reservoirs: 11000 acres, depth 15 ft. • EAA Reservoirs- A-1 Reservoir simulated as two interconnected compartments. Compartment 1: irrigation, 9600 acres, depth 12 ft. Compartment 2: environment 6400 acres, depth	Same as 2010BS

Feature	2010 Base Condition Assumptions	2010BCAlt1 Proposed Action

	12 ft.
	• WPA's
	  • Site 1 Impoundment: 1660 acres; depth 8 ft.
	  • C-9 Impoundment: 1739 acres; depth 4 ft.
	  • C-11 Impoundment: 1730 acres; depth 4 ft.
	  • Acme Basin B discharge to C51W and then to STA1E
	  • WCA-3A/3B Seepage Management Area	

Caloosahatchee River Basin	• Caloosahatchee River Basin irrigation demands and runoff were estimated using the AFSIRS method based on 2010 land use. • Public water supply daily intake from the river is included in the analysis. • C43 reservoir supplements basin irrigation needs and estuarine environmental needs.	Same as 2010BS •
St. Lucie Canal Basin	• St. Lucie Canal Basin demands estimated using the AFSIRS method based on 2010 land use. • Basin demands include the Florida Power & Light reservoir at Indiantown. • C44 reservoir supplements basin irrigation needs and estuarine environmental needs.	• Same as 2010BS
Seminole Brighton Reservation	• Brighton reservation demands were estimated using AFSIRS method based on existing planted acreage in a manner consistent with that applied to other basins not in the distributed mesh of the SFWMM. • The 2 in 10 demand set forth in the Seminole Compact Work plan equals 2,262 MGM (million gallons/month). AFSIRS modeled 2 in 10 demands equaled 2,383 MGM. • While estimated demands, and therefore deliveries, for every month of simulation do not equate to monthly entitlement quantities as per Table 7, Agreement 41-21 (Nov. 1992), tribal rights to these quantities are	Same as 2010BS

Feature	2010 Base Condition Assumptions	2010BCAlt1 Proposed Action
	preserved. • Supply-side Management applies to this agreement.	
Seminole Big Cypress Reservation	• Big Cypress Reservation irrigation demands and runoff were estimated using the AFSIRS method based on existing planted acreage in a manner consistent with that applied to other basins not in the distributed mesh of the SFWMM. • The 2 in 10 demand set forth in the Seminole Compact Work Plan equals 2,606 MGM. AFSIRS modeled 2 in 10 demands equaled 2,659 MGM. • While estimated demands, and therefore deliveries, for every month of simulation do not equate to monthly entitlement quantities as per the District's Final Order and Tribe's Resolution establishing the Big Cypress Reservation entitlement, tribal rights to these quantities are preserved. • Supply-side Management applies to this agreement	Same as 2010BS
Seminole Hollywood Reservation	• Hollywood Reservation demands are set forth under VI. C of the Tribal Rights Compact. • Tribal sources of water supply include various bulk sale agreements with municipal service suppliers.	Same as 2010BS

Feature	2010 Base Condition Assumptions	2010BCAlt1 Proposed Action
Everglades Agricultural Area	• Everglades Agricultural Area irrigation demands are simulated using climatic data for the 36 year period of record and a soil moisture accounting algorithm, with parameters calibrated to match historical regional supplemental deliveries from Lake Okeechobee. • SFWMM EAA runoff and irrigation demand response to rainfall was calibrated for 1984-95 and verified for 1979-1983/1996-2000. No runoff reduction adjustment was necessary to account for Best Management Practices (BMPs).	Same as 2010BS
Everglades Construction Project Stormwater Treatment Areas	• STA-1E: 5132 acres total treatment area • STA-1W: 6670 acres total treatment area • STA-2: 6430 acres total treatment area • STA 2 Cell 4: 1,902 acres total treatment area • STA-3/4: 16543 acres total treatment area • STA-5: 4110 acres total treatment area • STA 5 Flowway 3: 1,985 acres total treatment area • STA-6: 870 acres total treatment area • STA 6 Section 2: 1,387 acres total treatment area • Operation of STAs assumes maintenance of a 6" minimum depth.	Same as 2010BS, plus: • Buildout STA B: 6,722 acres total treatment area. Source 100% EAA runoff • Buildout STA C: 6,230 acres total treatment areas. Source 139 Basin and Annex
Holey Land Wildlife WMA	• As per Memorandum of Agreement between the FWC and the District.	Same as 2010BS
Rotenberger Wildlife WMA	• Interim Operational Schedule as defined in the Operation Plan for Rotenberger (SFWMD Jan 2002).	Same as 2010BS
	Water Conservation Areas	
Water Conservation Area 1 (ARM Loxahatchee	• Current C&SF Regulation Schedule. Includes regulatory releases to tide through LEC canals.	Same as 2010BS

Feature	2010 Base Condition Assumptions	2010BCAlt1 Proposed Action
National Wildlife Refuge)	• No net outflow to maintain minimum stages in the LEC Service Area canals (salinity control), if water levels are less than minimum operating criteria of 14 ft. The bottom floor of the schedule (Zone C) is the area below 14 ft. Any water supply releases below the floor will be matched by an equivalent volume of inflow from Lake Okeechobee.	
Water Conservation Area 2 A&B	• Current C&SF regulation schedule. Includes regulatory releases to tide through LEC canals. • No net outflow to maintain minimum stages in the LEC Service Area canals (salinity control), if water levels in WCA-2A are less than minimum operating criteria of 10.5 ft. Any water supply releases below the floor will be matched by an equivalent volume of inflow from Lake Okeechobee.	Same as 2010BS
Water Conservation Area 3 A&B	• Current C&SF regulation schedule. Includes regulatory releases to tide through LEC canals. • No net outflow to maintain minimum stages in the LEC Service Area canals (salinity control), if water levels are less than minimum operating criteria of 7.5 ft in WCA-3A. Any water supply releases below the floor will be matched by an equivalent volume of inflow from Lake Okeechobee. • Structural and operational modifications for L-67 canal conveyance and S-355 structures as in the federally authorized Modified Water Deliver Project. • Rainfall driven operational criteria for determining timing of deliveries to and discharges from WCA-3A and WCA-3B.	Same as 2010BS
	Lower East Coast Service Areas	
Public Water	• 2010 projections based upon permitted	Same as 2010BS

Feature	2010 Base Condition Assumptions	2010BCAlt1 Proposed Action
Supply and Irrigation	allocation to utilities by 2005, with 2010 well field distribution and inclusion of utility ASR. • Irrigation demands are based upon existing land use (updated through 2010) and calculated using AFSIRS, reduced to account for landscape and golf course areas irrigated using reuse water and landscape areas irrigated using public water supply.	
Other Natural Areas	• For the Northwest Fork of the Loxahatchee River, the District operates the G-92 structure and associated structures to provide approximately 50 cfs over Lainhart Dam to the Northwest Fork, when sufficient water is available in C-18 Canal. • Flows to Pond Apple Slough through S-13A are adjusted in the model to approximate measured flows at the structure. • Flows to Biscayne Bay are simulated through Snake Creek, North Bay, the Miami River, Central Bay and South Bay.	Same as 2010BS
Features	• C-4 Impoundment – 843.5 acres	Same as 2010BS
Upper East Coast Operational CERP	• L-8 Reservoir: 870 acres, depth 44 ft.	Same as 2010BS
Western Basins and Big Cypress National Preserve		
Western Basins	• Estimated and updated historical inflows from western basins at two locations: G-136 and G-406. The G-406 location represents potential inflow from the C-139 Basin into STA 5. Data for the period 1978 - 2000 is the same as the data used for the C-139 Basin Rule development. (Documented in June 2002 SFWMD memorandum from L. Cadavid and L. Brion to J. Obeysekera).	Same as 2010BS

Feature	2010 Base Condition Assumptions	2010BCAlt1 Proposed Action
Big Cypress National Preserve	• Tamiami Trail culverts are not modeled in SFWMM due to the coarse (2x2 mile) model resolution.	Same as 2010BS
	Everglades National Park and Florida Bay	
Everglades National Park	• Water deliveries to Everglades National Park are based upon Everglades Rain-driven operations. • 8.5 SMA as per the federally authorized Alternative 6D of the 8.5 SMA project. • Northern C111 project (2002 IOP EIS) • Southern C111 project modeled per C-111 Project 1994 GRR	Same as 2010BS
	Region-wide Water Management and Related Operations	
Water Shortage Rules	• The existing condition reflects the existing water shortage policies in 2005 as reflected in South Florida Water Management District Chapters 40E-21 and 40E-22, FAC	Same as 2010BS