Appendix 4-2: Water Year 2014 Supplemental Evaluations for Regulatory Source Control Programs in Everglades Construction Project Basins

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INTRODUCTION

The Everglades Forever Act (EFA), Section 373.4592, Florida Statutes (F.S.), mandates a nonpoint regulatory source control program to implement Best Management Practices (BMPs) in the Everglades Agricultural Area (EAA) and C-139 basins to achieve specified total phosphorus (TP) loads at a regional level by controlling phosphorus at the source. A monitoring network is maintained to assess program performance and make adjustments when necessary to assure compliance [Paragraph 373.4592(4)(f), F.S.] This appendix summarizes required monitoring and supplemental data evaluations for these basins during Water Year 2014 (WY2014) (May 1, 2013–April 30, 2014). It provides the underlying data employed in the overall load performance and compliance determination for both the EAA and C-139 basins. Permit-level data used for secondary compliance determination in the EAA and C-139 basins, in the event of basin-level noncompliance, are presented. Supplemental evaluations of the rainfall, flow, and TP load distribution among the EAA sub-basins are also included as well as for the C-139 Basin.

This appendix provides the following:

- EAA Basin compliance calculation details
- EAA Basin basin-level water quality summaries
- EAA Basin water quality summaries by sub-basin
- EAA Basin short-term and long-term variations in rainfall and runoff
- EAA Basin permit-level water quality monitoring data
- EAA Basin Agricultural Privilege Tax Incentive Credits information
- C-139 Basin compliance calculation details
- C-139 Basin basin-level water quality summaries
- C-139 Basin short-term and long-term variations in rainfall and runoff
- C-139 Basin water quality summaries by sub-basin

EAA BASIN SUPPLEMENTAL EVALUATION

EAA BASIN COMPLIANCE CALCULATION DETAILS

Compliance with EAA Basin mandates is based on mathematical equations and methodology outlined in Chapter 40E-63, Florida Administrative Code (F.A.C.). The South Florida Water Management District (District or SFWMD) applied these equations to the monthly rainfall totals for the EAA Basin during WY2014. **Figure 1** provides the monthly rainfall totals and related coefficients used to calculate the target load per the rule's equations. The target load is based upon a 25 percent reduction of the predicted load. The predicted load is the pre-Best Management Practices (pre-BMPs) baseline period load adjusted for the hydrologic variability associated with rainfall as well as accounting for a reduction in the EAA Basin area by a factor equal to the current acreage divided by the baseline acreage. The limit load is the upper 90 percent confidence limit for the target load. The calculated limit is not considered for compliance in WY2014 because the observed basin load was less than the target load.

EAA BASIN-LEVEL MONITORING DATA

Chapter 40E-63, F.A.C. requires the District to report on the status of the required water quality monitoring for determining compliance with TP load mandates for the EAA. Appendices A3 and B2 of Chapter 40E-63 outline data collection requirements. Data collection efforts for WY2014 were consistent with Chapter 40E-63 and supporting appendices.

Basin-level compliance determination is based on water year monitoring at various inflow and outflow points defining the boundary of four major EAA sub-basins (S-5A, S-2/S-6, S-2/S-7, and S-3/S-8) and conveyance canals serving these sub-basins. **Table 1** provides TP sampling statistics for all the District-monitored locations in the EAA Basin during WY2014.

During WY2014, 17 structures comprised the modeling boundary of the EAA Basin, and 19 water quality monitoring sampling points represented the water quality of flow through those structures. Some structures contain more than one sampling point, as these structures are designed to move water in either direction with water quality samples being collected on the upstream side.

EAA BASIN-LEVEL WATER QUALITY SUMMARY

Since the beginning of implementation of BMPs required by the Everglades Regulatory Program, TP loads from the surface water runoff attributable to the lands within the EAA Basin have been evaluated on an annual basis taking into account changes brought about from lands converted to the Everglades Stormwater Treatment Areas (STAs), inflow sources from external basins, and the addition of new water control structures. To interpret TP measurements taken at inflow and outflow water control structures defining the boundary of the EAA Basin, it is important to recognize that water leaving the EAA Basin through these structures is a combination of EAA farm- and urban-generated runoff as well as water passing through the EAA Basin canals from external basins. This pass-through water includes discharges from Lake Okeechobee and areas that historically discharged to Lake Okeechobee (regulated under Chapter 40E_61, F.A.C., permit number 50-00001-Q, addressing source control activities for runoff to Lake Okeechobee) but were diverted south for treatment through the STAs. Once diverted to the STAs, they were required to also meet the requirements under Chapter 40E-63, F.A.C. (a.k.a. 298 diversion project areas). Because the original rule-adopted baseline period did not include data representative of these lake discharges, these diversion areas are not currently evaluated for the 25 percent TP load reduction requirement adopted under Chapter 40E-63 and must be treated as pass-through runoff with a separate performance measure method (see EAA Permit-level Monitoring Data discussion below) The diversion areas depicted in **Figures 4-2a** and **4-2b** of this volume include the South Florida Conservancy District, South Shore Drainage District, East Beach Water Control District, East Shore Water Control District, and 715 Farms (Closter Farms). The runoff from lands within the diversion areas enters the EAA through four pump stations: East Beach Water Control District (pump station EBPS3), the combined area of East Shore Water Control District and Closter Farms (pump station ESPS2), South Shore Drainage District (pump station SSDDMC), and South Florida Conservancy District (pump station SFCD5E).

WY2014 EAA basin estimate TP load calculation

See 40E-63 Appendix A for "Target" equation

Month	**Rainfall** (in)			
May	6.36 in		m_1 =	4.45
June	10.97 in		m_2 =	10.71
July	9.74 in		m_3 =	23.25
August	6.10 in		X =	3.978
September	5.92 in		C =	0.768
October	1.71 in		S =	0.723
November	1.29 in		SE =	0.2060
December	0.16 in			
January	4.16 in		Target[1] TP Load =	213.8 mt
February	2.58 in		Limit[2] TP Load =	289.7 mt
March	2.22 in		Observed TP Load =	104.5 mt
April	2.19 in		Predicted =	285.0 mt
Total Rainfall	53.41 in		% Reduction =	63%

Notes:

[1] Target load is adjusted for reduction in EAA land area (468059 ac./ 523721 ac.)
Target load calculation accounts for 25% reduction of baseline period loads

[2] Limit load is upper 90% confidence limit for Target

[3] Predicted load = Target load / (1 - 0.25)

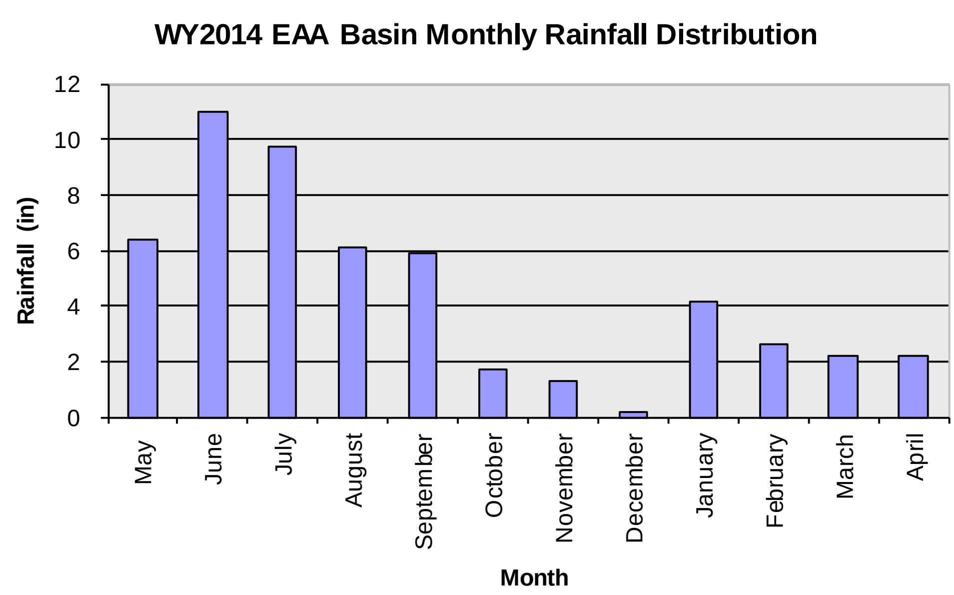


Figure 1. Water Year 2014 (WY2014) (May 1, 2013–April 30, 2014) Everglades Agricultural Area (EAA) Basin monthly rainfall totals, compliance calculation coefficients, and target total phosphorus (TP) load calculation.

[Notes: ac. = acres; in = inches; mt = metric tons.]

Table 1. Summary statistics for WY2014 total phosphorus (TP) monitoring data for the EAA Basin.

[Notes: µg/L = microgram per liter; 1 µg/L = 1 part per billion (ppb).]

Sub-Basin (canal)	Structure	Sampling Point	Sample Type	Number of Samples	Number Used in Load Calculation	Minimum Observed (µg/L)	Maximum Observed (µg/L)	Number Flagged	Flow Curve Rating[1]
S-5A (West Palm Beach Canal)	S-352	S-352	Grab	8	2	95	276	0	Excellent
			Composite[2]	36	36	82	362	0	
	S-5A Complex	S-5A	Grab[6]	265	177	55	379	0	Excellent
			Composite[2, 7]	39	0	70	323	0	
	EBPS	EBEACH	Grab	52	19	68	918	0	Good[3]
			Composite[2]	35	33	99	932	0	
S-2/S-6 (Hillsboro Canal)	S-2 Complex	S2	Grab	17	5	66	396	0	Good
			Composite[2]	5	5	115	214	0	
		S351	Grab	48	26	51	209	0	Fair
			Composite[2]	30	30	45	2,498	0	
	S-6	S-6	Grab	52	27	15	.239	0	Fair
			Composite[2]	40	37	19	139	1	
	G-328	G328	Grab	52	22	7	69	0	Fair
			Composite[2]	33	32	11	137	1	
	ESPS	ESHORE2	Grab	52	16	43	259	0	Good[3]
			Composite[2]	26	25	48	174	0	
S-2/S-7 (North New River Canal)	S-2 Complex	S2	Grab	17	5	66	396	0	Good
			Composite[2]	5	5	115	214	0	
		S351	Grab	48	26	51	209	0	Fair
			Composite[2]	30	30	45	2,498	0	
	G-370	G-370	Grab	52	15	22	144	0	Excellent
			Composite[2]	34	33	28	151	0	
	G-371	G-371	Grab	52	2	21	140	0	Fair
			Composite[2]	0	0			0	
	G-434	G434	Grab	81	47	25	174	0	Good
			Composite[2]	55	48	28	135	0	
	G-435	G435	Grab	58	6	24	82	0	N/A[5]
			Composite[2]	15	10	41	66	0	

Table 1. Continued.

Sub-Basin (canal)	Structure	Sampling Point	Sample Type	Number of Samples	Number Used in Load Calculation	Minimum Observed (μg/L)	Maximum Observed (μg/L)	Number Flagged	Flow Curve Rating[1]
S-3/S-8 (Miami Canal)	S-3 Complex	S3	Grab	13	1	54	115	0	Excellent
			Composite[2]	1	1	88	88	0	
		S354	Grab	50	27	51	179	0	Good
			Composite[2]	32	32	44	115	0	
	G-136	G136	Grab	52	23	18	282	0	Poor[4]
			Composite[2]	27	24	26	202	0	
	SSDDMC	SSDDMC	Grab	52	26	35	178	0	Good
			Composite[2]	32	31	40	194	0	
	SFCD5E	SFCD5E	Grab	52	23	43	157	0	Excellent
			Composite[2]	31	31	44	155	0	
	G-372	G-372	Grab	52	37	23	82	0	Good
			Composite[2]	47	46	32	91	0	
	G-373	G-373	Grab	53	5	28	173	0	Good
			Composite[2]	2	2	77	80	0	

[1]Flow curve ratings – discharge estimates derived from theoretical equations are within a range of expected values based on streamflow measurements used to calibrate the theoretical equations and are classified as excellent (< 5%), good (< 10%), fair (< 15%), or poor (> 15%).

[2]Composite samples could be time-proportional, flow-proportional, or a combination of the two.

[3]Good, based on experience with theoretical ratings based on pump manufacturers' performance curves, but streamflow measurements are not sufficient to calibrate theoretical equations and the flow curve rating cannot adequately be determined.

[4]Streamflow measurements are not sufficient to calibrate theoretical equations and the flow curve rating cannot adequately be determined.

[5]N/A, not available due to lack of field measurements.

[6]Represents discrete daily samples.

[7]Represents the 39 sampling periods containing 265 discrete daily samples.

Table 2 summarizes the annual flow, TP load, and TP flow-weighted mean concentration (FWMC) for every structure used during WY2014 to determine overall compliance with EAA Basin load reduction requirements. The structure summaries present the annual flow and TP load at each structure that inflows and outflows from each EAA sub-basin. Annual individual summaries are not intended to be aggregated to mass balance the flows and loads for a reported EAA Basin TP runoff load. The runoff determination procedures outlined in Chapter 40E-63, F.A.C., for deriving the annual water year TP load values within the EAA Basin are accomplished through daily inflows to the EAA, excluding irrigation flow, subtracted from the outflow results for the entire EAA Basin.

Table 2. WY2014 flow volumes, TP loads, and TP flow-weighted mean concentration (FWMC) for EAA Basin structures. [Notes: kac-ft = thousand acre-feet; mt = metric tons; µg/L = microgram per liter; 1 µg/L = 1 part per billion (ppb); STA = Stormwater Treatment Area.]

Sub-Basin (Canal)	Direction		Structure	Load (mt)	Flow (kac-ft)	Concentration (µg/L)
S5A (West Palm Beach Canal)	Outflow	to Lake Okeechobee	S-352	0.00	0.00	N/A
		to STA-1 inflow and distribution works	S-5A + S-5AW	69.46	316.21	178
		Total		**69.46**	**316.21**	**178**
	Inflow	from Lake Okeechobee	S-352	31.57	160.91	159
		from L-8 Canal	S-5A + S-5AW	0.00	0.00	102
		from East Beach Water Control District	EBPS3	10.37	15.53	541
		Total		**41.94**	**176.45**	**193**
S-2/S-6 (Hillsboro Canal)	Outflow	to Lake Okeechobee[2]	S-2	6.38	25.99	199
		to STA-2 inflow distribution canal	S-6	32.09	264.29	98
		to STA-2 inflow distribution canal	G-328	1.90	39.53	39
		Total		**40.37**	**329.81**	**99**
	Inflow	from Lake Okeechobee[2]	S-351	38.23	181.82	170
		from East Shore Water Control District and Closter Farms	ESPS2	3.74	26.43	115
		Total		**41.96**	**208.25**	**163**
S-2/S-7 (North New River Canal)	Outflow	to Lake Okeechobee[2]	S-2		see S-2 above[2]	
		to STA-3/4	G-370	16.03	143.42	91
		to STA-3/4 bypass structure	G-371	0.00	0.00	N/A
		to STA-2	G-434	5.15	57.55	72
		to STA-2	G-435	0.77	10.35	80
		Total[2]		**21.95**	**211.31**	**84**
	Inflow	from Lake Okeechobee[2]	S-351		see S-351 above[2]	
		from Water Conservation Area 2	G-371	0.00	0.09	39
		Total[3]		**0.00**	**0.09**	**39**
S-3/S-8 (Miami Canal)	Outflow	to Lake Okeechobee	S-3	0.15	1.40	88
		to STA-3/4	G-372	25.15	323.54	63
		to STA-3/4 bypass structure	G-373	0.26	2.76	78
		Total		**25.57**	**327.69**	**63**
	Inflow	from Lake Okeechobee	S354 (S3)	25.97	248.07	85
		from South Shore Drainage District	SSDDMC	1.75	12.18	116
		from South Florida Conservancy District	SFCD5E	2.25	23.53	78
		from Water Conservation Area 3	G-373	0.00	0.00	N/A
		from C-139 Basin	G-136	3.18	23.54	109
		Total		**33.15**	**307.33**	**87**

[1]N/A – not available.
[2]The S-351 inflow and S-2 outflow sites serve the S-2/S-6 and S-2/S-7 sub-basins. The total is shown only once to avoid double counting data.
[3]Totals for inflows and outflows of the S-2/S-7 Sub-basin do not include the inflows and outflows from S-351 and S-2, which are included in the S-2/S-6 Sub-basin totals.

EAA Basin Flows, Phosphorus Loads and Flow-Weighted Mean Concentrations by Sub-Basin

Based on the boundary conditions, **Table 3** presents the summaries of flows and TP loads for each sub-basin. The summaries in **Table 3** generally describe the mass balance of inflows and outflows from the EAA sub-basins. The observed runoff TP load and volume from each sub-basin, summing up to a total observed EAA Basin runoff TP load of 105 metric tons (mt) and runoff volume of 899,031 acre-feet (ac-ft), is noted in this table. More detailed information on the WY2014 load, flow, and TP FWMC at each of the individual inflow and outflow structures**,** along with TP data collection statistics and the current quality level of flow information at each structure, is presented in **Tables 1** and **2**. The locations of the EAA boundary structures represented as inflows and outflows in **Tables 3** and **4** are depicted on **Figure 4-2a** of this volume. The EAA permit-level monitoring data (**Table 5** in the *EAA Permit-Level Monitoring Data* section of this appendix) represents the raw discharges from each farm structure into the regional canal system. Although permit-level discharges do not always result in EAA runoff, analysis of the timing, location, and volumes can provide insight into the EAA Basin runoff TP load. Because the EAA Basin has been in compliance each year since the program's inception, the secondary compliance method at the permit-level has not been necessary.

Table 4 presents a summary of the inflow and outflow TP concentrations for WY2014, which contrasts the concentrations of incoming flows from Lake Okeechobee with the total outflow concentrations from each sub-basin. The annual TP FWMC's at the Lake Okeechobee inflow points (S-351, S-352, and S-354) to the EAA sub-basins for WY2014 ranged between 85 and 170 micrograms per liter (µg/L) [1 µg/L = 1 part per billion (ppb)]. Sub-basin outflow annual TP FWMC's ranged between 63 and 177 µg/L. Determining the source of discharges from EAA boundary structures is accomplished by tracking the inflow sources. All external sources of TP load flowing into the EAA are assumed to pass through during the water year with the exception of inflows from Lake Okeechobee, which can also serve to meet irrigation demands and canal level management. For example, during WY2014, the Miami Canal conveyed EAA Basin runoff, Lake Okeechobee pass-through flows, C-139 Basin runoff, and runoff from two diversion area basins (South Florida Conservancy District and South Shore Drainage District) to the Stormwater Treatment Area 3/4 (STA-3/4) inflow structure (G-372). Therefore, G-372 received multiple sources of water of varying amounts (flow and TP load), which contributed to the total observed flow and TP load.

It should be noted that this document does not quantify or report how flows and TP loads from the various sources are allocated or apportioned to the various sub-basin outflow points. However, this information is useful in knowing how much water from sources external to the EAA Basin (Lake Okeechobee and diversion areas), in addition to EAA Basin runoff, is routed for treatment into a STA as allowed by capacity constraints in any given water year. This detailed information is reported in other chapters of this volume, specifically Chapters 3A and 5B, which provide a comprehensive picture of flow and TP loads (and the source) being discharged to the Everglades Protection Area (EPA) and on STA performance, respectively.

Table 3. EAA sub-basin flows and TP loads by source for WY2014.[1]

Source	Load (mt)		Flow (kac-ft)	
	Inflow	Outflow	Inflow	Outflow
S-5A Sub-Basin (West Palm Beach Canal)				
EAA[2]	N/A[3]	43.94	N/A	211.24
Lake Okeechobee	31.57	15.14	160.91	89.43
East Beach Water Control District	10.37	10.37	15.53	15.53
Total	**41.94**	**69.46**	**176.45**	**316.21**
S-2/S-6 Sub-Basin (Hillsboro Canal)				
EAA[2]	N/A	27.08	N/A	271.44
Lake Okeechobee	13.32	5.40	63.35	15.01
East Shore Water Control District and Closter Farms	3.74	3.74	26.43	26.43
Total	**17.06**	**36.22**	**89.78**	**312.88**
S-2/S-7 Sub-Basin (North New River Canal)				
EAA[2]	N/A	20.47	N/A	197.26
Lake Okeechobee	24.91	5.63	118.47	30.99
Total	**24.91**	**26.10**	**118.47**	**228.24**
S-3/S-8 Sub-Basin (Miami Canal)				
EAA[2]	N/A	13.01	N/A	219.09
Lake Okeechobee	25.97	5.38	248.07	49.34
C-139	3.18	3.18	23.54	23.54
South Shore Drainage District	1.75	1.75	12.18	12.18
South Florida Conservancy District	2.25	2.25	23.53	23.53
Total	**33.15**	**25.57**	**307.33**	**327.69**

[1]The total loads and flows leaving the sub-basins represent pass-through volumes as well as volumes originating within the basin. With the exception of lake inflows, it is assumed that 100 percent of all other inflow sources to the EAA sub-basins pass through the main EAA conveyance canals directly to the outlet of each sub-basin. These assumptions are mandated in the model developed under Chapter 40E-63, Florida Administrative Code (F.A.C.) for determining EAA Basin TP load reductions. Any inflows from the Water Conservation Areas are not represented in this table, as they are not used in the EAA Basin-scale Compliance Model.

[2]EAA represents each sub-basin's portion of total EAA Basin TP load and volume from runoff.

[3]N/A – not applicable.

Table 4. EAA sub-basin Lake inflow and total outflow TP FWMC for WY2014.

EAA Sub-Basin	Lake Inflow TP FWMC (µg/L)	Total Outflow TP FWMC (µg/L)
S-5A (West Palm Beach Canal)	159	178
S-2/S-6 (Hillsboro Canal)	170	94
S-2/S-7 (North New River Canal)	170	93
S-3/S-8 (Miami Canal)	85	63

EAA Basin Short-Term and Long-Term Variations

Rainfall variation in both spatial and temporal distribution influence runoff patterns throughout the basin. For instance, WY2013 and WY2014 experienced nearly the same amount of rainfall (53.5 inches for WY2013 and 53.4 inches for WY2014). For these two water years the statistics that quantify the temporal distribution of rainfall were relatively close and the predicted loads were within 8 percent of each other. The runoff flows for each water year were within 3 percent of each other when adjusted for acreage changes within the EAA Basin. However, the runoff loads and reductions were significantly different with WY2013's runoff load of 154.4 mt with a 41 percent load reduction and WY2014's runoff load of 104.5 mt with a 63 percent load reduction. The major difference between WY2013 and WY2014 observed runoff data was the annual flow weight TP concentrations (WY2013: 141 µg/L and WY2014: 94 µg/L).

Figure 2 depicts the variation of WY2014 sub-basin monthly rainfall compared to the total monthly rainfall for the EAA Basin. A more detailed summary of WY2014 rainfall and predicted load adjustments based on Chapter 40E-63, F.A.C., compliance calculations for the EAA is provided in the *EAA Basin Compliance Calculation Details* section of this appendix. Chapter 2 of this volume includes details of the hydrologic events that occurred throughout the District region during WY2014.

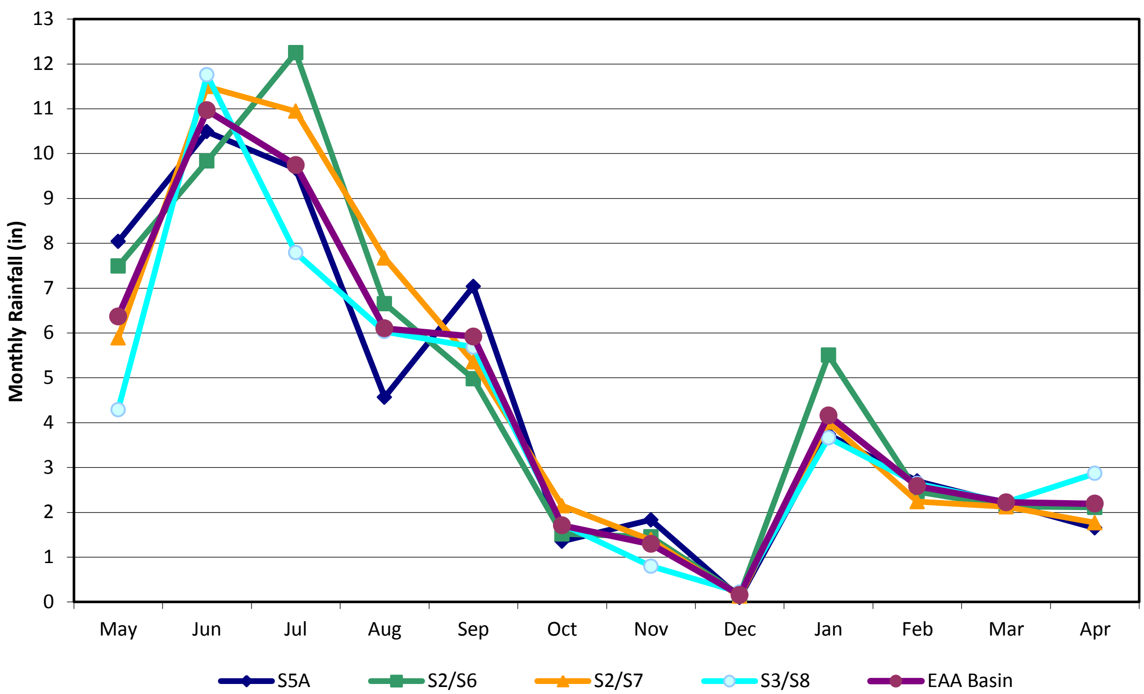
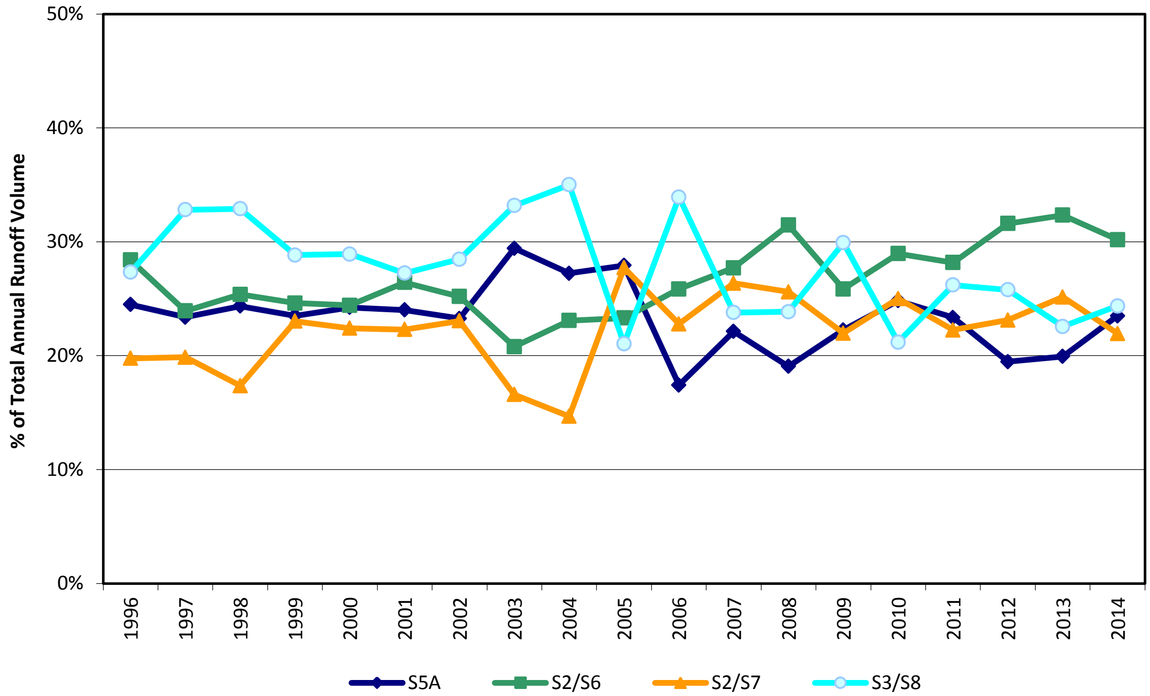


Figure 2. WY2014 EAA Basin and sub-basins monthly rainfall distribution trend.

Since WY1996, runoff volumes between the sub-basins have typically shown a more evenly distributed and narrow range of variation than TP load when based on the percent contribution of each (typically 20 to 30 percent each) to the total EAA Basin runoff (**Figure 3**, top panel**)**. A wider range of variation is observed with runoff TP loads among the sub-basins (**Figure 3**, bottom panel).



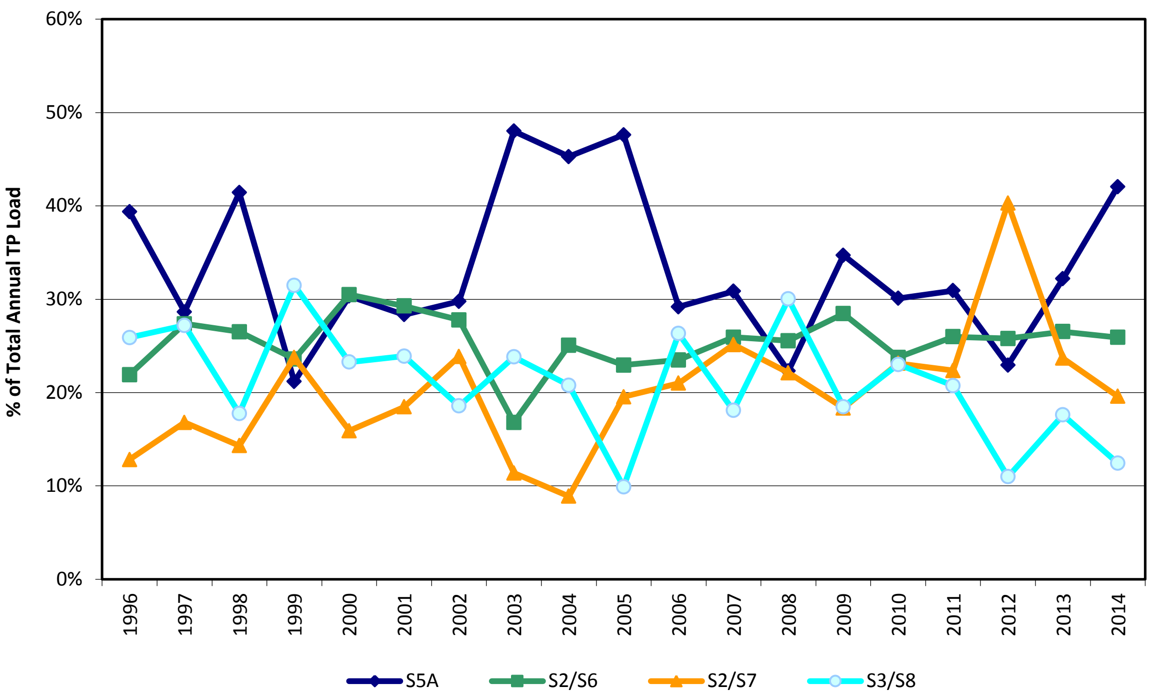


Figure 3. WY1996–WY2014 EAA sub-basin annual runoff volume percent relative contribution trend of basin total (top)and WY1996–WY2014 EAA sub-basin annual TP load percent relative contribution trend of basin total (bottom).

EAA PERMIT-LEVEL MONITORING DATA

The WY2014 TP concentrations and load data for individual farms within the EAA Basin are presented in this section in both tabular form and as a spatial distribution. Individual farms within the EAA are required to collect data representative of daily discharges and submit these permit-level data for any discharge structure to be in compliance with the conditions of their BMP permit issued in accordance with Chapter 40E-63, Part 1, F.A.C. Farm water quality monitoring is required on a flow-proportional basis, and it is generally accomplished through automatic samplers for most farms or daily grab samples during discharges for select farms. The District estimates loads for periods in which data is missing. For each hydraulic drainage area, the determination of permit basin load is only valid if the percent sampled load (i.e., portion of load computed from submitted data relative to the total of submitted plus estimated data) is at least 75 percent. Estimation of the missing data by the District does not relieve the individual farms of their compliance requirement to collect a complete data set representative of daily discharges.

Table 5 identifies separate hydraulic drainage areas (e.g., individual farms) within the EAA Basin. Drainage areas are identified according to the unit area or basin identification (ID) number. The table summarizes each area's TP FWMC, observed TP unit area load, the rainfall adjusted unit area load, and percent sampled load for WY2014.

Table 5 includes five basins (East Beach Water Control District, East Shore Water Control District, Closter Farms [715 Farms], South Shore Drainage District, and South Florida Conservancy District) that prior to calendar year 2001 discharged to Lake Okeechobee and therefore were not included in the EAA Chapter 40E-63, F.A.C., regulatory model boundary. Their discharges were not represented by the baseline period data used to determine compliance with the 25 percent TP load reduction requirement for the EAA. The five diversion basins are shown in **Figures 4-2a** and **4-2b** of this volume. Since 1992, for discharges directed to Lake Okeechobee, landowners have been subject to BMP implementation requirements under Chapter 40E-61, F.A.C. In accordance with EFA requirements, from 2001 to 2005, diversion projects were completed to direct a portion of flows from these areas, previously discharging to Lake Okeechobee, to the south for treatment in the EAA STAs and eventual discharge to the EPA. Upon completion of the diversion projects, these areas were able to discharge to the lake and the STAs and thus were to be subject to the nutrient discharge limitations of the EFA. Currently, two post-diversion phosphorus reduction measures are required by the EFA for discharges from these areas: diversion of no less than 80 percent of historic flows and TP loads from Lake Okeechobee to the STAs and a 25 percent TP load reduction methodology comparable to that adopted under Chapter 40E-63, F.A.C. The necessary regulatory methods have not yet been adopted by rule to implement the 25 percent reduction requirement. Chapter 40E-63, F.A.C., was included in the District's regulatory plan filed with the Office of Fiscal and Regulatory Reform.

Permit-level data allows relative comparisons (1) between farms, (2) between water years for a single farm, and (3) between water years and a baseline for a single farm. The District uses such relative comparisons when considering individual farm BMP performance with permittees. Factors that affect permit-level concentrations and loads are discussed in Chapter 3 of the *2006 South Florida Environmental Report* (SFER) – *Volume I* (refer to the *EAA Basin Permit-Level Monitoring Results* section). Permit-level data are used to regulate TP loads from individual farms if the EAA Basin as a whole does not meet its compliance requirement or in specific cases to track individual basin ID water quality trends. The permit-level results are not used to calculate TP reduction at the EAA Basin level.

Figures 4, **5**, and **6** depict the spatial distribution of TP FWMC, rainfall adjusted unit area loads, and observed unit area loads found in the EAA, respectively. These figures are graphical representations of the **Table 5** data from individual permit holders. Each basin ID is mapped as a whole, and no information is available to account for localized variations within a basin. **Figures 7** and **8** present the basin ID's WY2014 frequency distributions for rainfall adjusted unit area loads and TP FWMC, respectively.

Table 5 lists the TP data using the following column designations:

- **Basin ID** is a unique identifier for each hydraulic drainage area within a permit. It may represent one or more farms.
- **Early Baseline** indicates whether a farm qualifies for early baseline status by having implemented BMPs since January 1, 1994, initiated a discharge monitoring plan since January 1, 1993, and submitted specific information at the initial application period in 1992. A "Y" indicates an early baseline farm; an "N" indicates that a farm does not qualify for early baseline status. If the EAA Basin as a whole falls out of compliance, then the methodology applied to assess compliance at the farm level is different for early baseline and non-early baseline farms. These methodologies are described in Chapter 40E-63, F.A.C.
- **Baseline Year** is the water year for which a farm established its baseline period load. For early baseline farms, the baseline period load is based on data collected from May 1, 1993 through April 30, 1994.
- **Rainfall Adjusted Unit Area Load**:
    - Baseline is the TP load per unit area measured for the baseline year for a basin ID, which includes a 10-year base period rainfall adjustment.
    - WY2014 (adjusted unit area load) is the TP load per unit area for the current water year for a farm, which includes a 10-year base period rainfall adjustment.
- **WY2014 Percent Sampled Load** is the percentage of WY2014 TP load for a basin ID computed from data submitted by the permittee as compared to the total of submitted and estimated load.
- **WY2014 TP Concentration** is the TP FWMC for the farm for WY2014.
- **WY2014 TP Unit Area Load** is the observed TP load per unit area for the current water year for a farm.

Table 5. WY2014 permit-level data for the EAA Basin.

[Note: lbs/ac = pounds per acre.]

Basin ID	Basin Acreage	Early Baseline	Base line Year	Rain Adjusted Unit Area Load (lbs/ac)		WY2014 Unit Area Load (lbs/ac)	WY2014 TP Conc. (µg/L)	WY2014 % Sampled Load	Comments
				Baseline	WY2014				
26-001-01	778	Y	1994	2.12	0.32	0.38	48	99%	
26-002-01	898	N	2001	Unable to Calculate	0.00	0.00	N/A	100%	Pasture Area with no recorded flows
26-003-01	598	N	1999	0.27	0.02	0.03	30	100%	
26-004-01	4502	N	1999	1.22	0.20	0.24	55	100%	
26-006-01	1198	N	1998	1.19	1.38	1.64	271	100%	
26-007-01	653	N	1999	2.07	0.35	0.42	107	100%	
26-008-01	120	Y	1994	2.12	0.32	0.38	48	99%	
26-010-01	1231	N	1995	1.81	0.53	0.63	94	94%	
26-010-02	10004	N	1995	5.83	0.30	0.36	124	99%	
50-002-01	5636	Y	1994	3.21	0.87	1.26	246	100%	
50-002-02	9285	Y	1994	2.90	0.20	0.29	50	100%	
50-003-01	233	Y	1994	0.40		Unable to Calculate		44%	<75% Load Sampled
50-003-02	520	Y	1994	0.62		Unable to Calculate		45%	<75% Load Sampled
50-003-03	119	N	1995	0.22		Unable to Calculate		27%	<75% Load Sampled
50-004-01	909	Y	1994	3.68		Unable to Calculate		31%	<75% Load Sampled
50-005-01	639	Y	1994	0.91		Unable to Calculate		42%	<75% Load Sampled
50-005-02	232	Y	1994	0.06		Unable to Calculate		24%	<75% Load Sampled
50-005-03	320	Y	1994	0.26		Unable to Calculate		29%	<75% Load Sampled
50-005-04	310	Y	1994	1.49		Unable to Calculate		48%	<75% Load Sampled
50-005-05	603	Y	1994	1.95		Unable to Calculate		33%	<75% Load Sampled
50-005-06	532	Y	1994	1.56		Unable to Calculate		35%	<75% Load Sampled
50-006-01	388	Y	1994	4.53		Unable to Calculate		49%	<75% Load Sampled
50-006-02	359	Y	1994	5.50		Unable to Calculate		18%	<75% Load Sampled
50-006-03	655	Y	1994	3.55		Unable to Calculate		33%	<75% Load Sampled
50-007-01	6473	Y	1994	1.56		Unable to Calculate		0%	<75% Load Sampled
50-007-02	5716	Y	1994	15.11		Unable to Calculate		48%	<75% Load Sampled
50-008-01	7289	Y	1994	0.34	0.60	0.71	68	100%	
50-009-04	317	N	1999	5.19	1.24	2.19	140	99%	
50-009-05	1479	Y	1994	1.54	0.61	1.27	97	100%	
50-010-01	784	N	1995	2.42	0.34	0.60	212	100%	
50-010-02	6867	N	1994	1.80	0.36	0.67	75	100%	
50-010-03	5935	Y	1994	1.31	0.16	0.23	32	100%	
50-010-04	8510	Y	1994	4.76	0.44	0.77	135	100%	
50-010-06	10487	N/A[1]	N/A[1]	N/A[1]	0.40	0.47	78	100%	South Florida Conservancy District[1]
50-011-01	1747	Y	1994	2.76		Unable to Calculate		48%	<75% Load Sampled
50-011-03	14356	Y	1994	5.79		Unable to Calculate		62%	<75% Load Sampled
50-011-04	4047	Y	1994	5.21		Unable to Calculate		45%	<75% Load Sampled
50-011-06	638	N	2000	0.82	0.24	0.28	47	100%	
50-012-01	1016	Y	1994	4.06		Unable to Calculate		38%	<75% Load Sampled
50-013-01	1360	N	1997	2.98	1.27	1.84	168	100%	
50-014-01	1520	Y	1994	1.37		Unable to Calculate			<75% Load Sampled
50-015-01	3339	Y	1994	2.62	0.97	1.40	253	100%	
50-015-02	2689	Y	1994	5.28	0.49	0.71	165	100%	
50-016-01	1462	Y	1994	15.11	1.08	1.57	129	100%	
50-017-01	878	Y	1994	3.22		Unable to Calculate		7%	<75% Load Sampled
50-018-01	5860	Y	1994	2.82	0.57	0.83	118	100%	
50-018-02	6722	Y	1994	3.54	0.69	1.00	108	100%	
50-018-03	9062	Y	1994	1.98	0.59	0.85	90	100%	
50-018-04	1913	Y	1994	3.88	0.45	0.53	54	100%	
50-018-05	1846	N	1995	3.64	1.08	1.28	134	100%	
50-018-06	1255	Y	1994	1.46	0.54	0.64	57	100%	
50-018-07	1277	Y	1994	2.12	0.32	0.38	48	99%	
50-018-08	3209	Y	1994	2.28	0.20	0.24	30	100%	
50-018-09	1737	Y	1994	4.22	0.79	0.94	98	100%	
50-018-10	8254	Y	1994	3.05	0.22	0.39	83	100%	
50-018-11	1871	Y	1994	19.73	1.03	1.82	107	100%	
50-018-12	1655	Y	1994	1.78	1.40	2.03	209	100%	
50-018-13	594	Y	1994	0.40	1.52	2.20	156	100%	

Basin ID	Basin Acreage	Early Baseline	Base line Year	Rain Adjusted Unit Area Load (lbs/ac)		WY2014 Unit Area Load (lbs/ac)	WY2014 TP Conc. (µg/L)	WY2014 % Sampled Load	Comments
				Baseline	WY2014				
50-018-14	534	N	1994	2.21	0.91	1.89	101	100%	
50-018-15	732	Y	1994	1.12	0.98	2.03	188	100%	
50-018-16	240	Y	1994	4.11	1.13	2.35	71	100%	
50-018-17	464	Y	1994	3.10	Unable	to	Calculate	47%	<75% Load Sampled
50-018-18	358	Y	1994	0.64	0.57	1.19	116	100%	
50-018-19	314	Y	1994	35.32	2.54	5.27	136	100%	
50-018-20	381	Y	1994	3.59	0.76	1.58	107	100%	
50-018-22	4482	Y	1994	8.18	0.44	0.52	86	100%	
50-018-23	2946	Y	1994	2.22	1.89	2.23	243	100%	
50-018-24	3804	Y	1994	1.96	0.53	0.62	65	100%	
50-018-25	3808	Y	1994	4.99	0.48	1.00	119	100%	
50-019-01	568	Y	1994	1.54	0.12	0.25	100	80%	
50-019-02	1210	Y	1994	1.38	Unable	to	Calculate	51%	<75% Load Sampled
50-019-03	1051	Y	1994	0.58	Unable	to	Calculate	10%	<75% Load Sampled
50-019-04	317	Y	1996	0.44	0.27	0.57	125	97%	
50-020-01	320	Y	1994	3.32	Unable	to	Calculate	36%	<75% Load Sampled
50-021-01	2558	Y	1994	8.92	Unable	to	Calculate	27%	<75% Load Sampled
50-022-01	320	Y	1994	0.80	Unable	to	Calculate	8%	<75% Load Sampled
50-023-01	289	Y	1994	11.83	Unable	to	Calculate	32%	<75% Load Sampled
50-024-01	555	N	1995	6.43	0.03	0.07	65	100%	
50-025-01	824	Y	1994	3.68	Unable	to	Calculate	48%	<75% Load Sampled
50-027-01	2810	Y	1994	2.40	Unable	to	Calculate	41%	<75% Load Sampled
50-027-02	798	Y	1994	1.22	Unable	to	Calculate	27%	<75% Load Sampled
50-027-03	731	Y	1994	2.32	Unable	to	Calculate	20%	<75% Load Sampled
50-027-04	2519	Y	1994	2.10	Unable	to	Calculate	21%	<75% Load Sampled
50-028-01	212	Y	1994	14.54	1.03	1.81	131	100%	
50-029-01	681	Y	1994	4.30	Unable	to	Calculate	13%	<75% Load Sampled
50-030-01	446	Y	1994	14.14	Unable	to	Calculate	33%	<75% Load Sampled
50-031-01	1609	Y	1994	2.56	Unable	to	Calculate	19%	<75% Load Sampled
50-031-02	1387	Y	1994	5.48	Unable	to	Calculate	17%	<75% Load Sampled
50-031-03	609	Y	1994	8.57	Unable	to	Calculate	22%	<75% Load Sampled
50-032-01	306	Y	1994	0.84	Unable	to	Calculate	29%	<75% Load Sampled
50-033-02	6197	N/A[1]	N/A[1]	N/A[1]	3.13	4.53	541	100%	East Beach Water Control District[1]
50-034-01	7897	Y	1994	1.68	Unable	to	Calculate	17%	<75% Load Sampled
50-034-02	601	Y	1994	3.37	Unable	to	Calculate	0%	<75% Load Sampled
50-034-03	4246	Y	1994	4.08	Unable	to	Calculate	62%	<75% Load Sampled
50-034-04	4503	Y	1994	1.54	Unable	to	Calculate	25%	<75% Load Sampled
50-035-01	478	Y	1994	5.74	Unable	to	Calculate	19%	<75% Load Sampled
50-035-02	1666	N	1997	2.98	1.27	1.84	168	100%	
50-035-03	107	N	1999	8.71	Unable	to	Calculate	56%	<75% Load Sampled
50-037-01	1194	Y	1994	6.70	0.00	0.00	N/A	100%	No reported flows for WY2014
50-038-01	1285	Y	1994	3.71	Unable	to	Calculate	0%	<75% Load Sampled
50-039-01	63	N	1995	4.01	0.17	0.30	140	100%	
50-039-02	144	N	1995	4.25	1.17	2.06	150	100%	
50-040-01	216	N	1995	1.40	0.56	0.82	138	100%	
50-040-02	494	N	1995	3.61	0.55	0.80	149	100%	
50-041-01	109	N	1998	2.69	Unable	to	Calculate	21%	<75% Load Sampled
50-041-02	300	N	1998	2.44	0.00	0.00	N/A	100%	No reported flows for WY2014
50-042-01	320	N	1995	0.14	0.00	0.00	N/A	100%	No reported flows for WY2014
50-044-01	2169	N	1996	5.02	1.54	2.24	185	100%	
50-045-01	282	N	1995	4.35	0.60	1.06	120	100%	
50-045-02	152	N	1995	1.41	1.00	1.77	140	100%	
50-046-01	35	N	1994	2.21	0.91	1.89	101	100%	
50-047-01	630	N	1996	1.46	0.38	0.66	80	100%	
50-047-02	640	N	1995	0.84	0.40	0.71	109	100%	
50-047-03	1832	N	1997	0.44	0.40	0.71	84	100%	
50-047-04	198	N	1996	0.68	0.56	0.98	99	100%	
50-047-05	314	N	1997	0.55	1.33	2.35	191	99%	
50-047-07	3494	N	1996	0.67	0.77	1.12	91	100%	
50-047-08	1558	N	1996	0.96	0.62	1.09	88	100%	

Basin ID	Basin Acreage	Early Baseline	Base line Year	Rain Adjusted Unit Area Load (lbs/ac)		WY2014 Unit Area Load (lbs/ac)	WY2014 TP Conc. (µg/L)	WY2014 % Sampled Load	Comments
				Baseline	WY2014				
50-048-01	1185	N	1995	1.25	0.29	0.51	61	100%	
50-048-02	640	N	1995	0.36	0.15	0.32	73	100%	
50-051-01	835	N	1995	0.97	0.29	0.52	127	100%	
50-053-01	149	N	1995	5.16	0.00	0.00	N/A	100%	No reported flows for WY2014
50-054-01	10360	N	1996	1.16	0.89	1.29	136	100%	
50-054-03	7586	N	1996	0.35	0.42	0.60	68	100%	
50-055-01	393	N	1997	0.86	0.19	0.33	143	100%	
50-055-02	810	N	1999	0.45	0.29	0.51	82	100%	
50-055-03	2871	N	1996	0.74	0.19	0.34	60	100%	
50-056-01	850	N	1996	0.98	0.83	1.59	101	100%	
50-058-01	157	N	1995	0.02	0.00	0.00	N/A	100%	No reported flows for WY2014
50-059-01	11551	N	1996	2.35	1.02	1.47	235	92%	
50-059-02	1783	N	1997	1.07	0.44	0.63	89	100%	
50-059-03	720	N	1996	1.65	0.52	0.75	120	100%	
50-059-04	306	N	1996	1.14	0.75	1.08	168	100%	
50-060-01	8208	N	1995	0.18	0.08	0.15	24	100%	
50-060-02	7790	N	1995	0.75	0.26	0.45	70	100%	
50-061-01	639	N	1995	1.44	0.40	0.71	109	100%	
50-061-03	3434	N	1995	0.76	0.25	0.51	56	100%	
50-061-05	314	N	1995	1.89	1.70	3.52	125	100%	
50-061-06	237	N	1995	1.68	0.31	0.65	61	98%	
50-061-07	318	N	1995	1.24	0.41	0.85	71	100%	
50-061-08	368	N	1999	1.76	0.62	0.90	140	100%	
50-061-10	24785	N	1996	0.60	0.16	0.19	30	100%	
50-061-12	730	N	1995	2.55	0.25	0.52	46	100%	
50-061-13	1077	N	1995	1.16	Unable to Calculate			0%	<75% Load Sampled
50-061-15	4084	N	1995	1.91	1.01	1.01	118	100%	
50-061-17	781	N	1995	12.22	1.25	1.82	174	100%	
50-061-18	1555	N	1995	9.82	0.81	1.43	36	100%	
50-061-22	3739	N	1996	0.49	0.31	0.37	39	100%	
50-062-01	4626	N	1996	0.20	0.07	0.14	26	83%	
50-062-02	32535	N	1996	0.46	0.19	0.37	46	100%	
50-062-03	1179	N	1996	0.54	0.25	0.52	73	100%	
50-062-04	901	N	1996	0.26	0.35	0.72	64	100%	
50-062-11	960	N	1996	0.44	0.33	0.69	74	100%	
50-063-01	9760	N	1996	0.45	0.65	1.34	175	100%	
50-064-01	899	N	1997	2.98	1.27	1.84	168	100%	
50-064-03	145	N	1997	2.98	1.27	1.84	168	100%	
50-064-04	1134	N	1997	2.98	1.27	1.84	168	100%	
50-065-02	938	N	1995	3.64	0.40	0.70	107	100%	
50-065-03	3722	N	1997	2.98	1.27	1.84	168	100%	
50-065-05	930	N	1997	2.98	1.27	1.84	168	100%	
50-065-06	454	N	1997	2.98	1.27	1.84	168	100%	
50-065-07	512	N	1995	3.92	0.37	0.66	111	100%	
50-065-08	628	N	1997	2.98	1.27	1.84	168	100%	
50-065-10	792	N	1995	1.55	0.17	0.29	45	100%	
50-067-01	1133	N	1996	0.40	0.21	0.25	75	100%	
50-067-02	10274	N	1996	0.94	0.31	0.36	36	100%	
50-067-03	634	N	1996	1.02	6.19	7.33	132	80%	
50-067-04	3832	N	1996	0.55	0.36	0.43	30	100%	
50-067-05	7323	N	1996	0.42	0.12	0.15	21	100%	
50-067-06	1277	N	1999	0.49	0.34	0.41	113	100%	
50-067-07	1981	N	1999	0.54	0.16	0.19	19	100%	
50-067-09	1278	N	1999	0.54	0.69	0.81	91	100%	
50-067-10	2539	N	1999	1.21	0.54	0.64	58	100%	
50-067-11	6153	N	1999	0.85	0.15	0.18	30	100%	
50-068-01	2616	N	1996	1.13	0.74	1.07	140	100%	
50-069-01	317	N	1996	1.06	0.67	1.40	215	100%	
50-070-01	225	N	1995	3.82	0.99	1.75	129	100%	
50-070-02	264	N	1995	3.09	0.53	0.94	122	100%	

Basin ID	Basin Acreage	Early Baseline	Base line Year	Rain Adjusted Unit Area Load (lbs/ac)		WY2014 Unit Area Load (lbs/ac)	WY2014 TP Conc. (µg/L)	WY2014 % Sampled Load	Comments
				Baseline	WY2014				
50-073-01	68	N	2001	Unable to Calculate	0.00	0.00	N/A	100%	Has onsite retention area and does not discharge
50-077-01	3168	N/A[1]	N/A[1]	N/A[1]	0.60	1.25	106	100%	715 Farms (Closter Farms)[1]
50-078-01	71	N	1999	8.71	0.50	1.04	192	100%	
50-080-01	8109	N/A[1]	N/A[1]	N/A[1]	0.49	1.01	115	100%	East Shore Water Control District[1]
50-081-01	225	N	2004	0.66	0.19	0.40	81	100%	
50-081-02	4846	N/A[1]	N/A[1]	N/A[1]	0.81	0.96	113	100%	South Shore Drainage District[1]
50-082-01	484	N	1995	9.82	1.31	2.71	54	92%	

[1]The five diversion project areas (East Beach Water Control District, East Shore Water Control District, South Florida Conservancy District, South Shore Drainage District, and 715 Farms) discharged to Lake Okeechobee and therefore were not included in the EAA Chapter 40E-63, F.A.C., regulatory model boundary. Their discharges were not represented by the baseline period data used to determine compliance with the 25 percent TP load reduction requirement for the EAA. Refer to Chapter 4 for additional information on source control activities and requirements in these areas.

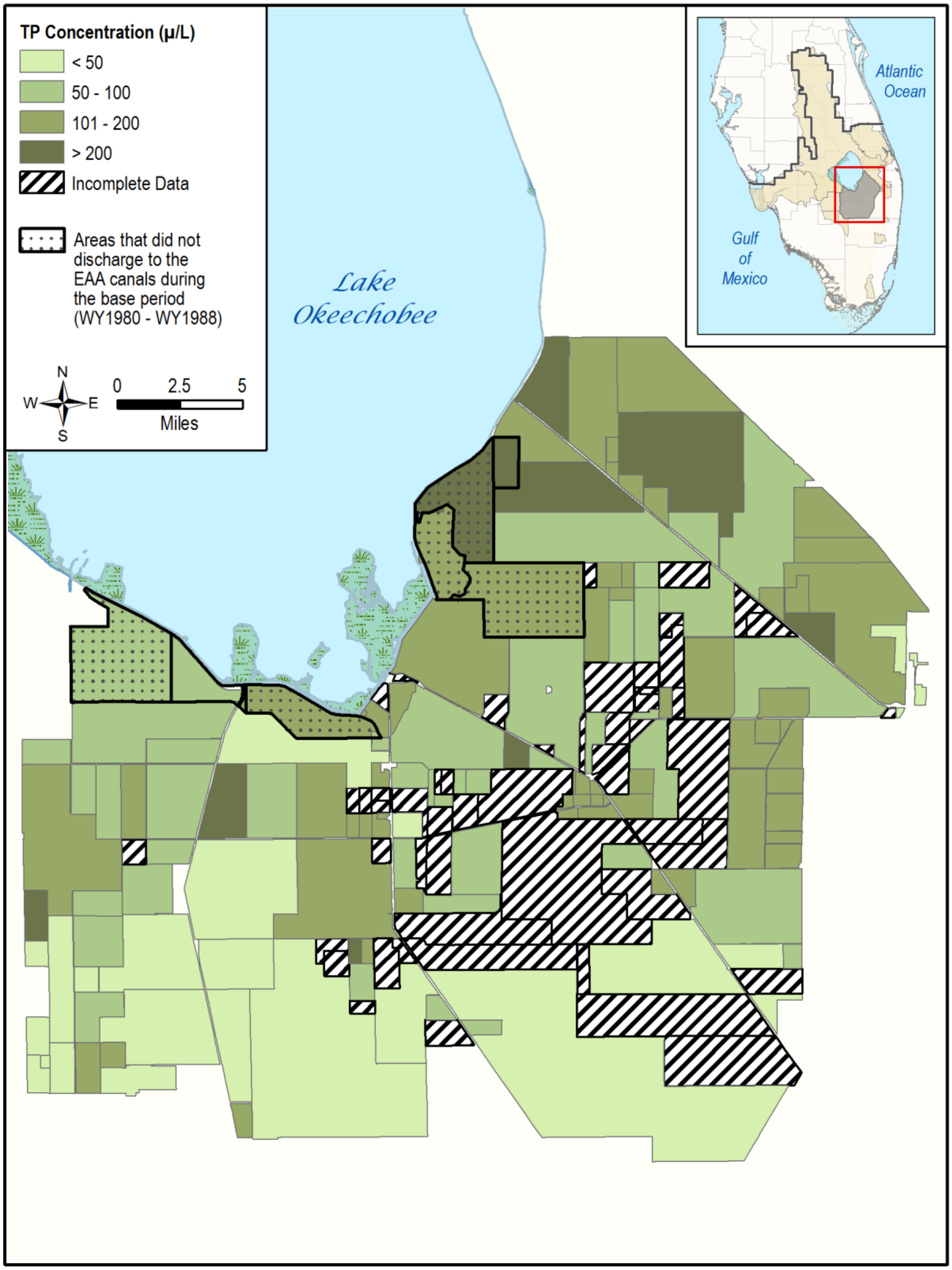


Figure 4. WY2014 TP flow-weighted mean concentrations (FWMC) for the EAA Basin.

[Note: 1 µg/L = 1 ppb.]

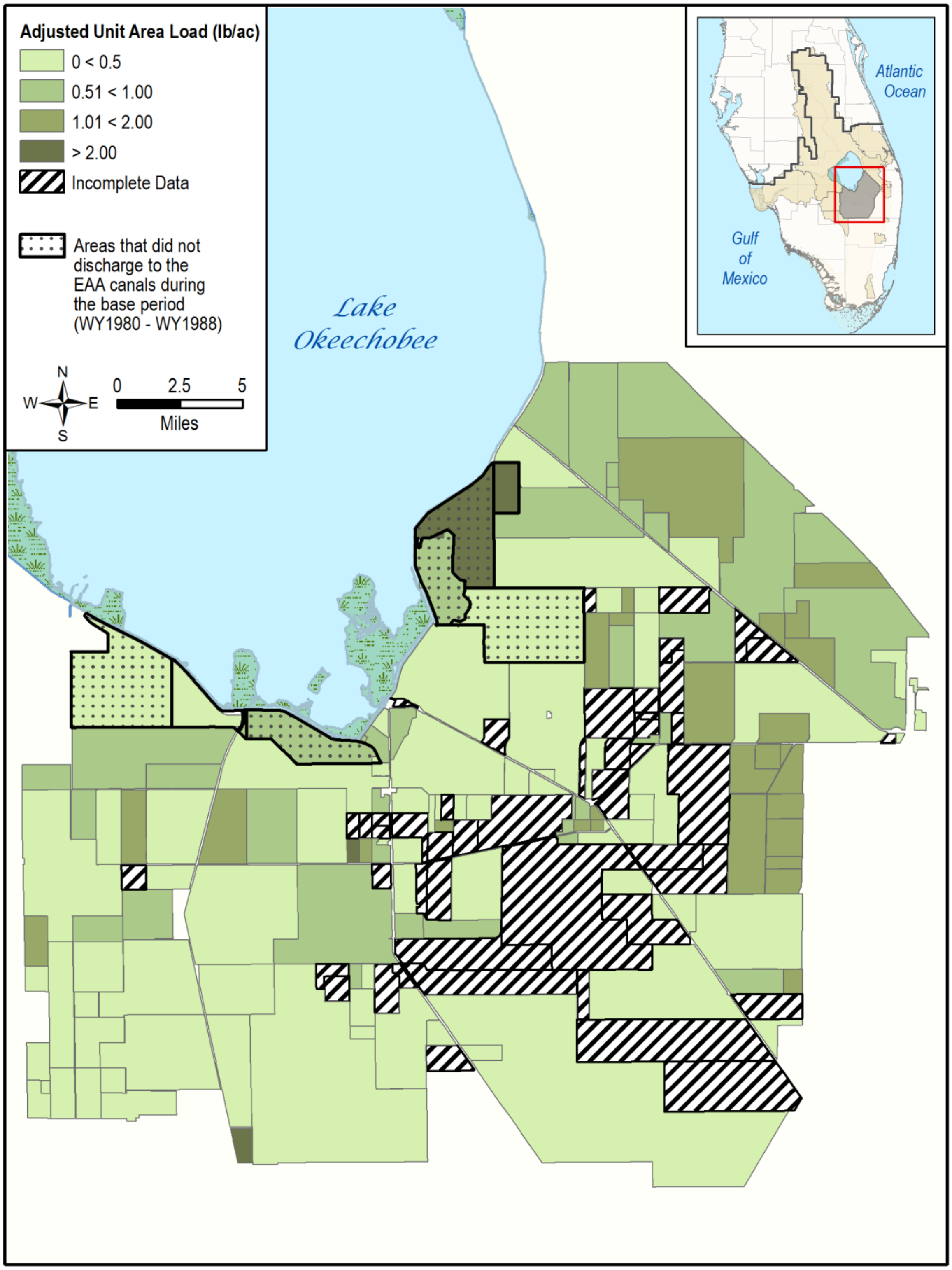


Figure 5. WY2014 rainfall-adjusted unit area TP load for the EAA Basin.

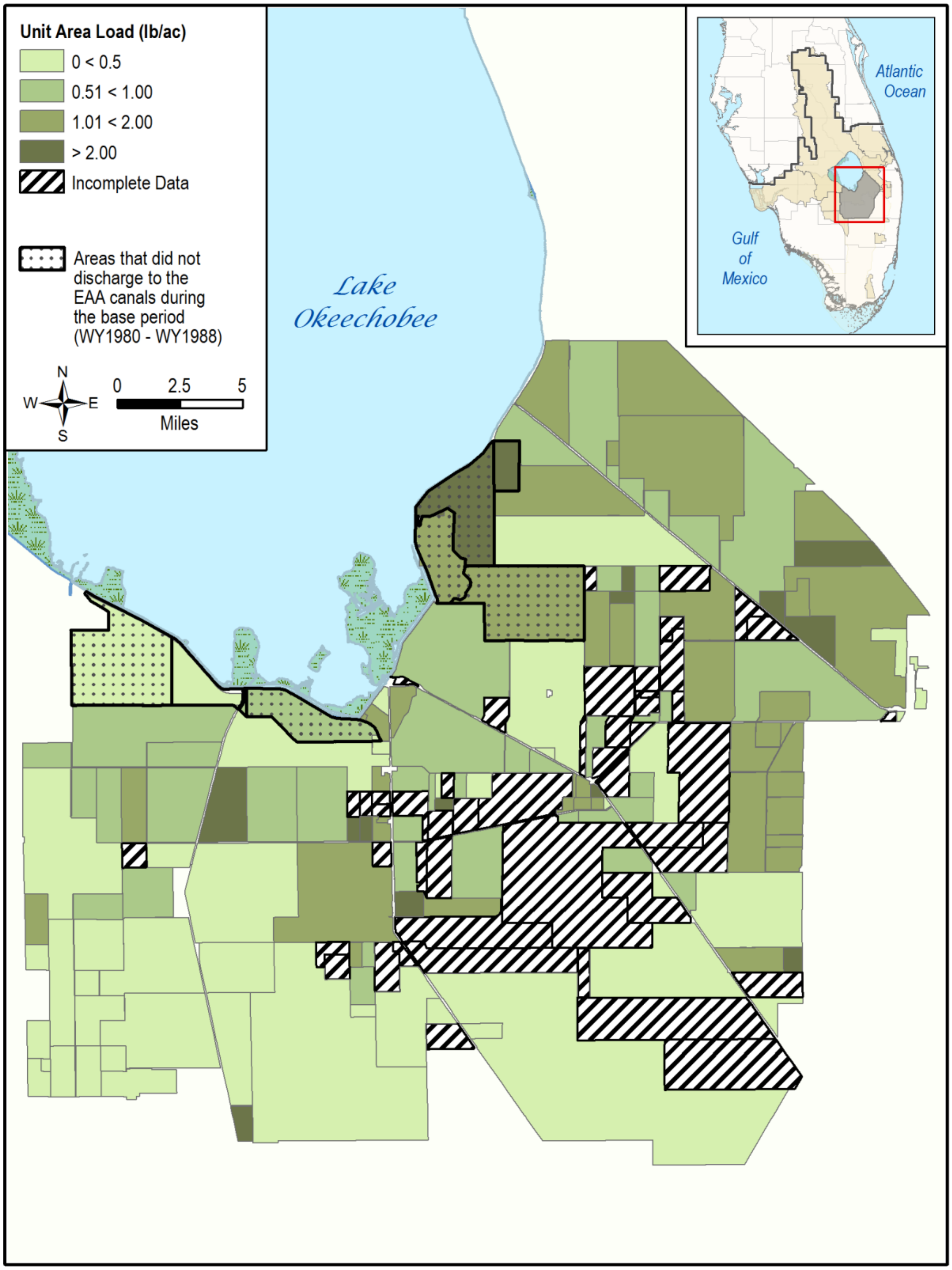


Figure 6. WY2014 observed TP unit area load for the EAA Basin.

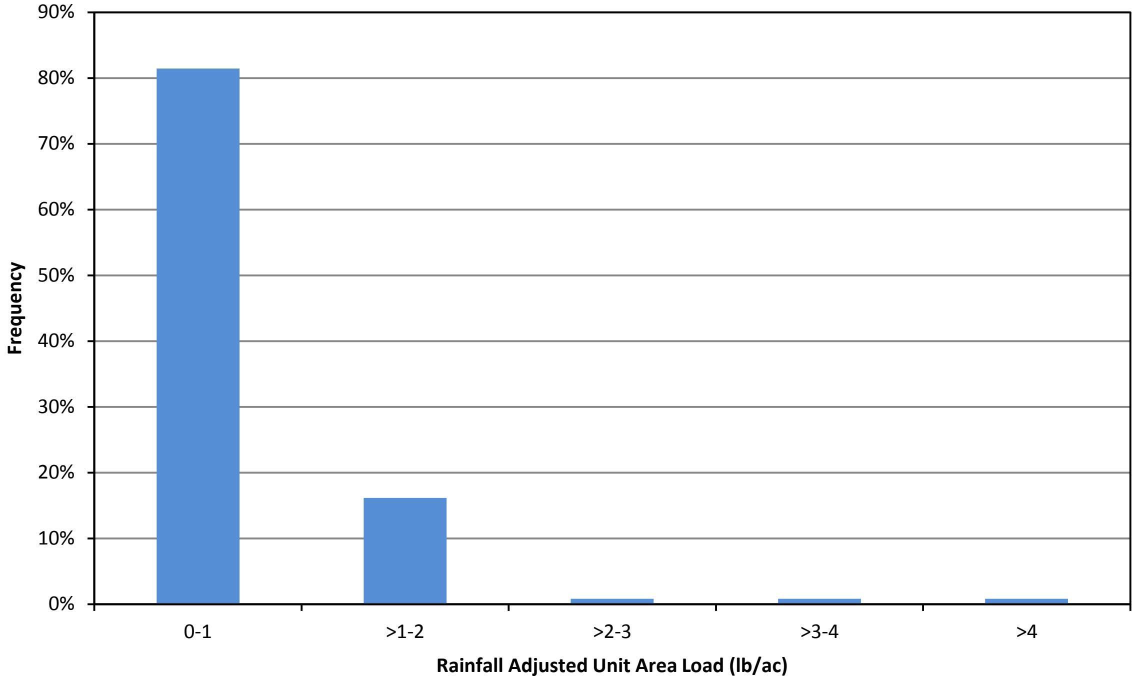


Figure 7. WY2014 EAA Basin ID rainfall-adjusted unit area load frequency distribution.

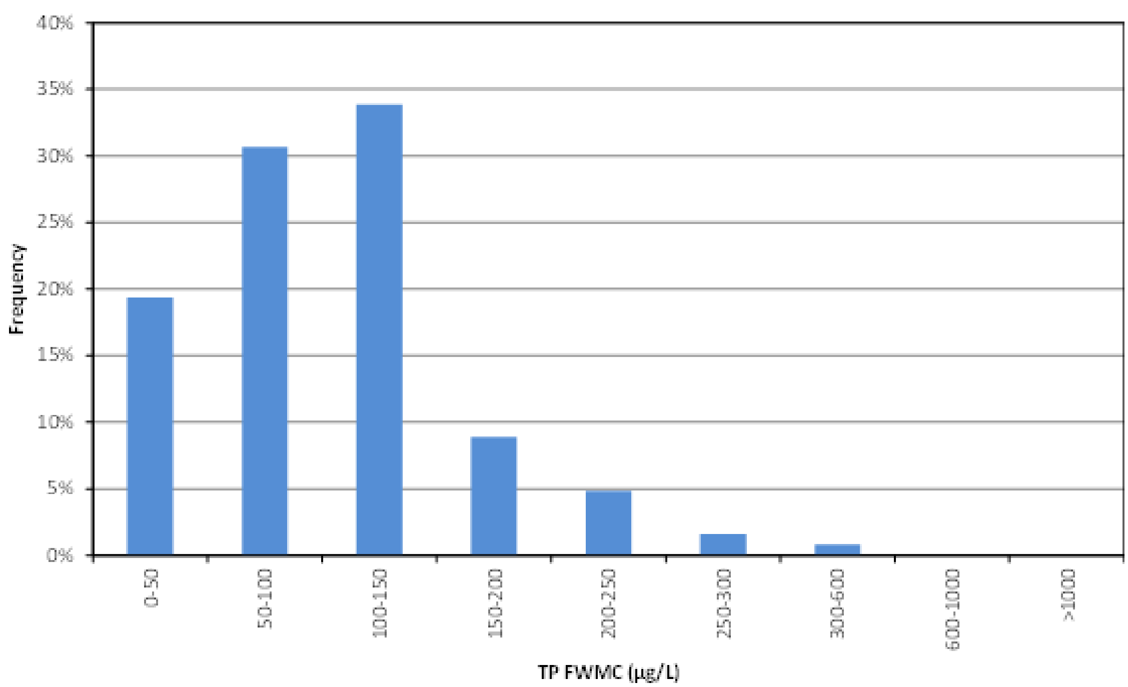


Figure 8. WY2014 EAA Basin ID TP FWMC frequency distribution.

AGRICULTURAL PRIVILEGE TAX INCENTIVE CREDITS

The Everglades Forever Act imposed an Agricultural Privilege Tax for all real property located within the statutorily-defined EAA boundaries and classified as agricultural. Taxes received contribute toward the Everglades Trust Fund managed by the South Florida Water Management District consistent with section 373.45926, Florida Statutes. Funds in the trust fund are expended to implement the Everglades Forever Act, protecting natural resources and improving water quality in the EPA and EAA. Additional revenue and expenditure detail is contained in Appendix 1-5 of this volume.

Incentive credits against the Agricultural Privilege Tax were set forth to encourage the permittees subject to the 25 percent TP load reduction requirement to maximize the reduction of TP loads in their runoff beyond that required by statute. The incentive credits set forth in the EFA expired at the end of WY2012, which is associated with the tax notice mailing in November 2013. House Bill 7065, passed in 2013, amended the EFA to include an amended Agricultural Privilege Tax rate schedule. **Table 6** lists the previous incentive credits through the November 2013 mailing and the amended schedule starting with the mailing in November 2014.

Table 6. Everglades Agricultural Privilege Tax rate schedule and historic area-wide incentive credits for the EAA Basin.

Calendar Year	Water Year	Fiscal Year	Phosphorus Reduction Achieved (%)	Credits Earned	Total Credits (Cumulative)	Credits Used	Credit Balance	Incentive Credit	Per Acre Base Tax
1994	WY93	FY95	44	19	19.00	0.00	19.00	0.33	$24.89
1995	WY94	FY96	17	0	19.00	0.00	19.00	0.33	$24.89
1996	WY95	FY97	31	6	25.00	0.00	25.00	0.33	$24.89
1997	WY96	FY98	68	43	68.00	0.00	68.00	0.33	$24.89
1998	WY97	FY99	49	24	92.00	3.91	88.09	0.54	$27.00
1999	WY98	FY00	34	9	97.09	3.91	93.18	0.54	$27.00
2000	WY99	FY01	49	24	117.18	3.91	113.27	0.54	$27.00
2001	WY00	FY02	55	30	143.27	3.91	139.36	0.54	$27.00
2002	WY01	FY03	73	48	187.36	10.02	177.34	0.61	$31.00
2003	WY02	FY04	55	30	207.34	10.02	197.32	0.61	$31.00
2004	WY03	FY05	35	10	207.32	10.02	197.30	0.61	$31.00
2005	WY04	FY06	64	39	236.30	10.02	226.28	0.61	$31.00
2006	WY05	FY07	59	34	260.28	15.55	244.73	0.65	$35.00
2007	WY06	FY08	44	19	263.73	15.55	248.18	0.65	$35.00
2008	WY07	FY09	18	-7	241.18	15.55	225.63	0.65	$35.00
2009	WY08	FY10	44	19	244.63	15.55	229.08	0.65	$35.00
2010	WY09	FY11	68	43	272.08	15.55	256.53	0.65	$35.00
2011	WY10	FY12	41	16	272.53	15.55	256.98	0.65	$35.00
2012	WY11	FY13	79	54	310.98	15.55	295.43	0.65	$35.00
2013	WY12	FY14	71	46	341.43	15.55	325.88	0.65	$35.00
2014	WY13	FY15	41	N/A	N/A	N/A	N/A	N/A	$25.00
2015	**WY14**	**FY16**	**63**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**$25.00**
Future Tax Rate Schedule (per House Bill 7065):									
2015-2026				*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*$25.00*
2027-2029				*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*$20.00*
2030-2035				*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*$15.00*
2036-				*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*$10.00*

Notes:

1. Calendar Years represent the year of the November mailing of the tax notice
2. Calendar Year 2015 (WY14 / FY16) subject to Governing Board approval.
3. Calculation of Calendar Year 1994 - 2013 tax credits based upon:
   a. Vegetable classified acreage is never charged more than $24.89 pre acre.
   b. Vegetable classified acreage is not eligible for incentive credits.
   c. The minimum per acre charge will never drop below $24.89 through Nov 2013. If incentive credits would cause the per acre charge to drop below $24.89, any earned, unused credits will we carried forward and applied to the following year.

Calculating Credits:

1994 - 1997	N/A
1998 - 2001	$27.00 - $24.89 = $2.11 / .54 = 3.91
2002 - 2005	$31.00 - $24.89 = $6.11 / .61 = 10.02
2006 - 2013	$35.00 - $24.89 = $10.11 / .65 = 15.55

Florida Statute 373.4592, EFA

C-139 BASIN SUPPLEMENTAL EVALUATION

C-139 BASIN COMPLIANCE CALCULATION DETAILS

Compliance with C-139 Basin mandates to maintain discharges at or below the collective average annual phosphorus loading based proportionally on the historical rainfall during the baseline period is defined by mathematical equations and methodology dictated by Chapter 40E-63, F.A.C. The equations relevant to WY2014 compliance are reproduced in **Figure 9**. **Figure 10** presents the monthly rainfall totals for the C-139 Basin during WY2014 and related coefficients used to calculate the target load per the rule's equations. The observed load is based on flow and water quality data measured during the water year. The target load is pre-BMP baseline period load predicted considering the current water year rainfall characteristics. The target load applies a base period regression model to the current water year rainfall characteristics to account for the hydrologic variability between WY2014 and the base period. The target load model was developed to meet the EFA requirement of maintaining pre-BMP baseline period loading rates. Therefore the target load and predicted load are equivalent. A one-year limit is calculated as the target plus a 90 percent confidence interval based on the regression statistics. A two-prong test is considered for the compliance determination. An out of compliance occurs when the observed TP load is three successive years above the target or any one year above the limit, within the rule's designated rainfall range.

The observed TP load for WY2014 is above the target load for the pre-BMP baseline period adjusted for rainfall. However, the basin was determined to be in compliance with the performance measure because the TP load did not exceed the one-year limit or 3-year target test for WY2014. Submittal of permit-level data is not currently a mandatory requirement, but rather an optional method for individual farms to show farm-level compliance with TP loads when the basin as a whole is out of compliance. The optional farm-level monitoring and farm-level compliance methodology for the C-139 Basin is described in Appendix B3 of Chapter 40E-63, F.A.C. Since the C-139 Basin regulatory program began in WY2003, BMP permit holders in the basin have not requested the optional farm-level compliance method and, therefore, no data have been submitted.

RULE 40E-63 C-139 BASIN COMPLIANCE MODEL (from Chapter 40E-63, F.A.C.)

The target, limit and adjusted rainfall will be calculated according to the following equations and explanation:

$$\text{Target} = \exp(-17.0124 + 4.5995\,X + 3.9111\,C - 1.0055\,S)$$

Explained Variance = 74.2%, Standard Error of Estimate = 0.5440

Predictors (X, C, S) are calculated from the first three moments (m_1,m_2,m_3) of the 12 monthly rainfall totals (r_i, i=1 to 12, inches) for the current year:

$m_1 = \text{Sum}\,[\,r_i\,] / 12$

$m_2 = \text{Sum}\,[\,r_i - m_1\,]^2 / 12$

$m_3 = \text{Sum}\,[\,r_i - m_1\,]^3 / 12$

$X = \ln(12\,m_1)$

$C = [\,(12/11)\,m_2]^{0.5}/m_1$

$S = (12/11)\,m_3 / m_2^{1.5}$

$$\text{Limit} = \text{Target}\,\exp(1.440\,SE)$$

SE = standard error of predicted ln(L) for May-April interval

$SE = 0.5440\,[\,1 + 1/10 + 4.8500\,(X-X_m)^2 + 8.1932\,(C–C_m)^2 +$

$0.9247\,(S-S_m)^2 + 4.5950\,(X-X_m)\,(C–C_m) –$

$0.3624\,(X-X_m)\,(S-S_m) – 4.0048\,(C-C_m)\,(S-S_m)\,]^{0.5}$

$$\text{Adjusted Rainfall} = \exp[X + 0.8503\,(C - C_m) – 0.2186\,(S - S_m)]$$

Where :

Target = predicted load for future rainfall conditions (metric tons/yr)

Limit = upper 90% confidence limit for Target (metric tons/yr)

Adjusted Rainfall = equivalent rainfall for mean C and S variables (inches)

X = the natural logarithm of the 12-month total rainfall (inches)

C = coefficient of variation calculated from 12 monthly rainfall totals

S = skewness coefficient calculated from 12 monthly rainfall totals

X_m = average value of the predictor in calibration period = 3.8434

C_m = average value of the predictor in calibration period = 0.9087

S_m = average value of the predictor in calibration period = 0.8200

Figure 9. Chapter 40E-63, Florida Administrative Code (F.A.C.) (referred to as Rule 40E-63 in the figure), Appendix B2 excerpts of hydrologic adjustment and basin compliance mathematical equations to calculate annual TP reductions.

WY2014 C-139 Basin compliance TP load calculation

See 40E-63 Appendix B2 for "Target" equation

Month	Rainfall	(in)			
May	3.59	in	m_1 =	3.88	
June	9.93	in	m_2 =	7.81	
July	7.61	in	m_3 =	15.01	
August	5.87	in	X =	3.840	
September	5.71	in	C =	0.753	
October	1.16	in	S =	0.750	
November	0.65	in	SE =	0.611	
December	0.31	in			
January	3.42	in	Target[1] TP Load =	17.0	mt
February	2.21	in	Limit[2] TP Load =	41.0	mt
March	2.38	in	Observed TP Load =	28.4	mt
April	3.69	in	Predicted[3]=	17.0	mt
Total Rainfall	46.53	in	% Reduction =	-67%	

Notes:

1 Target load is adjusted for reduction in C139 land area (168450 ac./ 169700 ac.)

2 Limit load in upper 90% confidence limit for Target

3 Predicted load = Target load

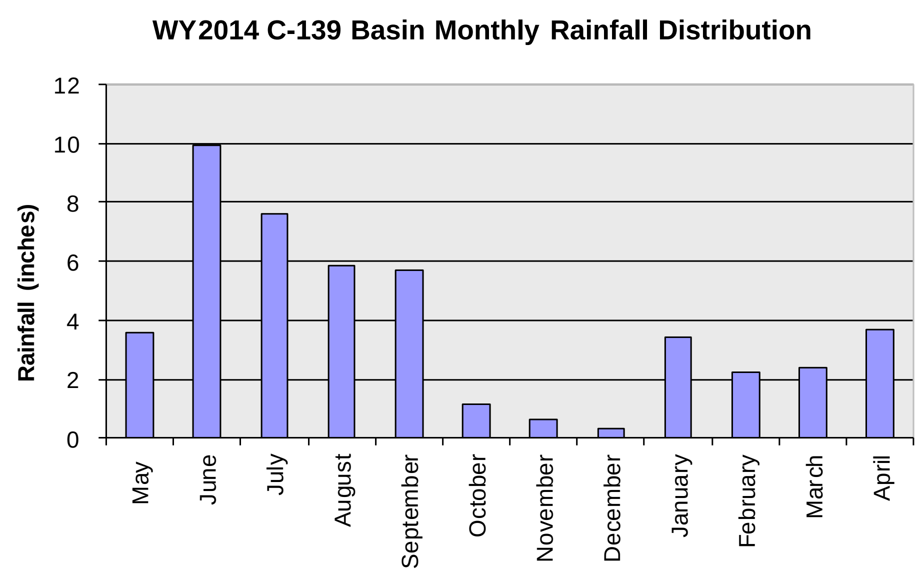


Figure 10. WY2014 C-139 Basin monthly rainfall, total rainfall, calculated target, limit, and observed TP loads, based upon Chapter 40E-63, F.A.C., Appendix B2.

[Notes: ac. = acres; in = inches; mt = metric tons.]

C-139 BASIN-LEVEL MONITORING DATA

Chapter 40E-63, F.A.C., requires the District to report on the status of the required water quality monitoring for determining compliance with TP load mandates for the C-139 Basin. Appendices A3 and B2 of Chapter 40E-63 outline data collection requirements. Data collection efforts for WY2014 were consistent with Chapter 40E-63 and supporting appendices.

During WY2014, the water quality monitoring at G-508 represents both G-508 and G-342O. Therefore, for WY2014, eight structures comprised the modeling boundary of the C-139 Basin and seven water quality monitoring sampling points represented the water quality of flow through those structures. The G-136 structure serves as an outflow boundary point of the C-139 Basin into the EAA Basin. **Table 7** provides WY2014 TP sampling statistics for all the District-monitored locations in the C-139 Basin.

Table 7. Summary statistics for WY2014 TP monitoring data for the C-139 Basin.

[Notes: µg/L = microgram per liter; 1 µg/L = 1 part per billion (ppb).]

Structure	Sampling Point	Sample Type	Number Sampled	Number Used	Minimum (µg/L)	Maximum (µg/L)	Number Flagged	Flow[1] Curve Rating
G-342A	G342A	Grab	50	2	38	203	0	Fair
		Composite[2]	25	25	47	1719	0	
G-342B	G342B	Grab	52	3	44	190	0	Good
		Composite[2]	23	23	60	177	0	
G-342C	G342C	Grab	52	1	40	195	0	Good
		Composite[2]	29	29	56	212	0	
G-342D	G342D	Grab	52	3	51	676	1	Poor [3]
		Composite[2]	27	27	47	532	0	
G-406	G406	Grab	52	2	43	400	1	Good
		Composite[2]	38	8	45	289	0	
G-136	G136	Grab	52	2	18	282	0	Fair
		Composite[2]	27	25	26	202	0	
G-508	G508	Grab	52	2	44	569	1	Good [4]
		Composite[2]	25	23	59	355	0	

[1]Flow Curve Rating - discharge estimates derived from theoretical equations are within a range of expected values based on streamflow measurements used to calibrate the theoretical equations and are classified as excellent (< 5%), good (< 10%), fair (< 15%), or poor (> 15%).

[2]Composite samples could be time-proportional, flow-proportional, or a combination of the two.

[3]Poor, based on experience with ratings at culverts with flashboards, but streamflow measurements are not sufficient to calibrate theoretical equations and the flow curve rating cannot adequately be determined.

[4]Good, based on experience with theoretical ratings based on pump manufacturers' performance curves, but streamflow measurements are not sufficient to calibrate theoretical equations and the flow curve rating cannot adequately be determined.

C-139 BASIN-LEVEL WATER QUALITY SUMMARY

As in the EAA Basin, the District is required to collect monitoring data from the C-139 Basin to determine compliance with TP load limitations. The TP load ultimately discharging to the Everglades is not the same as the TP loads leaving C-139 Basin outflow structures because discharges are directed into other water bodies. The outfall structures accounting for the loads in the C-139 Basin compliance determination include G-136 discharging to the L-1 canal; G-342A, G-342B, G-342C, and G-342D discharging into Stormwater Treatment Area 5 (STA-5) flow-ways 1 and 2; and G-406, G-508, and G-342O discharging into the L-3 canal leading to STA-5 flow-ways 3, 4 and 5, and Stormwater Treatment Area 6 (STA-6). **Table 8** summarizes the overall WY2014 flow, TP load, and TP FWMC at eight primary basin outflow structures.

Table 8. C-139 Basin flows, TP loads, and FWMC by source for WY2014.

[Note: 1 µg/L = 1 part per billion (ppb).]

Source	TP Load (mt)	Flow (kac-ft)	TP FWMC (µg/L)	Percent of Total Load	Percent of Total Flow
C-139 Basin to EAA					
G-136 Total[1]	**3.2**	**23.5**	**109**	**11.2%**	**18.6%**
C-139 Basin to STA-5/6					
G-342A	2.8	12.1	185	9.7%	9.5%
G-342B	2.3	13.6	135	8.0%	10.7%
G-342C	2.3	12.6	144	7.9%	10.0%
G-342D	3.8	12.1	254	13.4%	9.6%
G-406[2]	0.2	2.5	61	0.7%	2.0%
G-508	13.5	48.0	228	47.5%	37.8%
G-342O	0.4	2.3	154	1.6%	1.8%
STA-5/6 Total	**25.2**	**103.3**	**198**	**88.8%**	**81.4%**
C-139 Basin					
Basin Total	**28.4**	**126.8**	**116**	**100%**	**100%**

[1] G-136 discharges runoff from C-139 Basin lands that are tributary to the L-1 canal. Conveyance of runoff through G-136 into the Miami Canal for eventual treatment in STA-3/4 is due to flood control necessities in the L-1 canal and capacity limitations in sending the runoff to the south through the L-2 and L-3 canals for treatment in Stormwater Treatment Area 5 (STA-5).

[2] G-406 is no longer a STA-5 diversion structure. Discharge through G-406 flows south typically to STA-5 flow-way 3 or to Stormwater Treatment Area 6 (STA-6), unless diversion is necessary through G-407 to Water Conservation Area 3.

The C-139 Basin exported 28.4 mt of TP during WY2014, more than the 10.4 mt of TP during WY2013. During WY2014, 52.2 mt of TP (88.8 percent) was exported to STA-5 and STA-6 via G-342A–D structures, G-406, G-342O, and G-508, and 3.2 mt (11.2 percent) to the L-1 canal via G-136.

Although the C-139 Basin received less rainfall in WY2014 (46.53 inches) than in WY2013 (49.88 inches), the total runoff volume was more in WY2014 [126.8 thousand acre-feet (kac-ft)] compared to WY2013 (72.7 kac-ft). The WY2014 TP FWMC was 181 µg/L for the C-139 Basin, which was 56 percent higher than in WY2013 (116 µg/L).

C-139 Basin Short-Term and Long-Term Variations

The 2008 SFER – Volume I, Chapter 4, presents a preliminary review of rainfall, runoff volumes, and water quality data conducted to identify causes for the C-139 Basin repetitive out of compliance results, specifically focusing on WY2007. Further analysis including WY2008 and WY2009 data supports the conclusion that the temporal distribution of rainfall substantially affects the ability for the basin to retain runoff. Detailed discussions of potential factors that contribute to the variation of the basin runoff and loads are presented in the 2009 and 2010 SFERs – Volume I, Chapter 4, under the *C-139 Basin Short-Term and Long-Term Variations* section. In part, the results of these analyses were incorporated in the amendment to Chapter 40E-63, F.A.C., refining the load performance methodology for the basin to incorporate monthly rainfall statistics to the regression for determining performance relative to base period conditions. The following discussion focuses on the derivation of relationships from monthly rainfall, flow, and TP load data over the period of record. These efforts, combined with the concurrent activities described in Chapter 4 of this volume, should help the C-139 Basin meet its TP discharge goals in the long term.

WY2014 rainfall in the C-139 Basin was approximately 2.9 inches below average rainfall, relative to the WY1980–WY2014 period (**Figure 11**). **Figure 12** shows how the amount of annual rainfall in the C-139 Basin compares with the amount of rainfall translated into excess runoff. In general, a higher annual rainfall corresponds to a higher runoff coefficient. However, monthly rainfall distribution also affects the fraction of rainfall resulting in runoff. Evaluation of the intra-annual data has contributed to better understanding, future prediction, and control of TP discharges.

The scatter plot of monthly flow (more than 2 kac-ft) versus monthly TP FWMC in **Figure 13** implies that monthly TP concentrations from the C-139 Basin increase with monthly flow. In general, the WY2014 monthly flow and TP FWMC follow the trend stated above. The highest monthly flow volume in WY2014 was 43.9 kac-ft, which coincided with the highest monthly TP FWMC of 241 µg/L in July 2013.

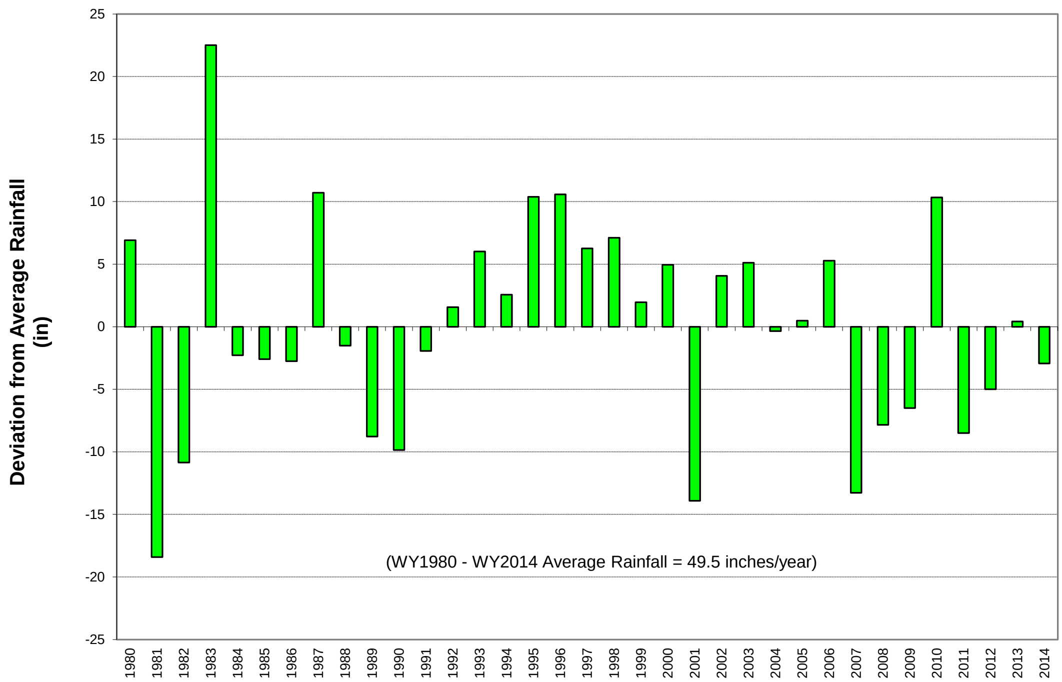


Figure 11. WY1980–WY2014 C-139 Basin annual rainfall deviation from the long-term average.

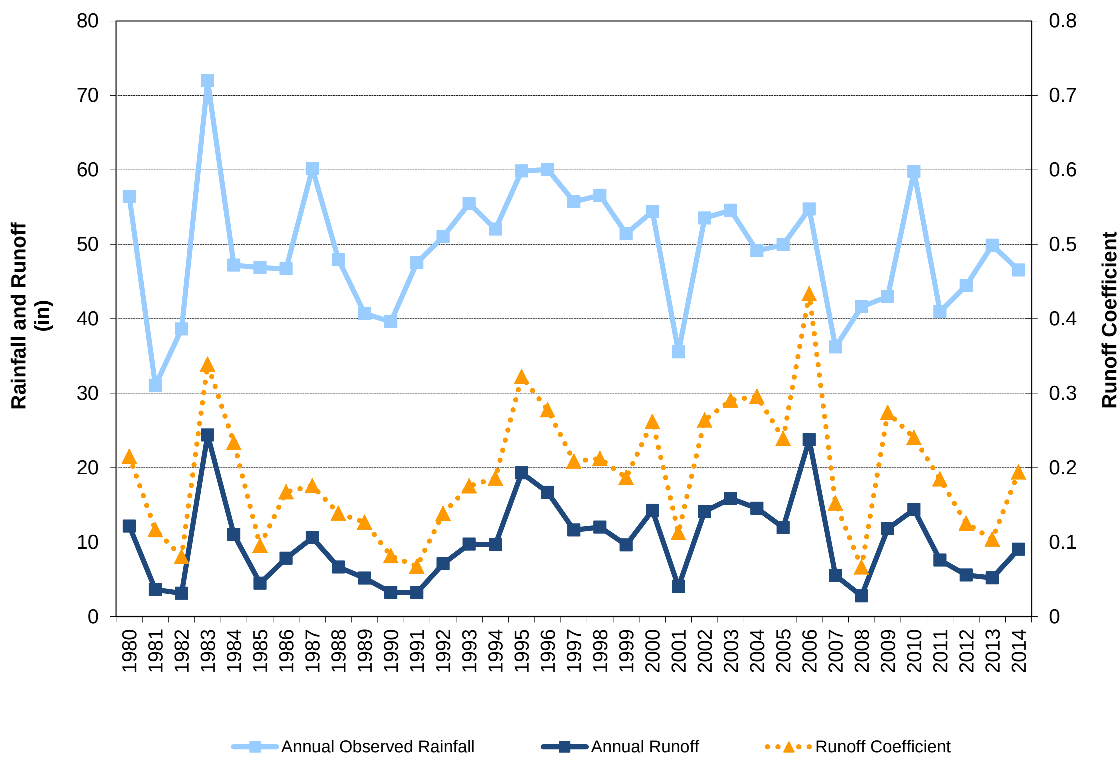


Figure 12. WY1980–WY2014 C-139 Basin annual rainfall and runoff relationship.

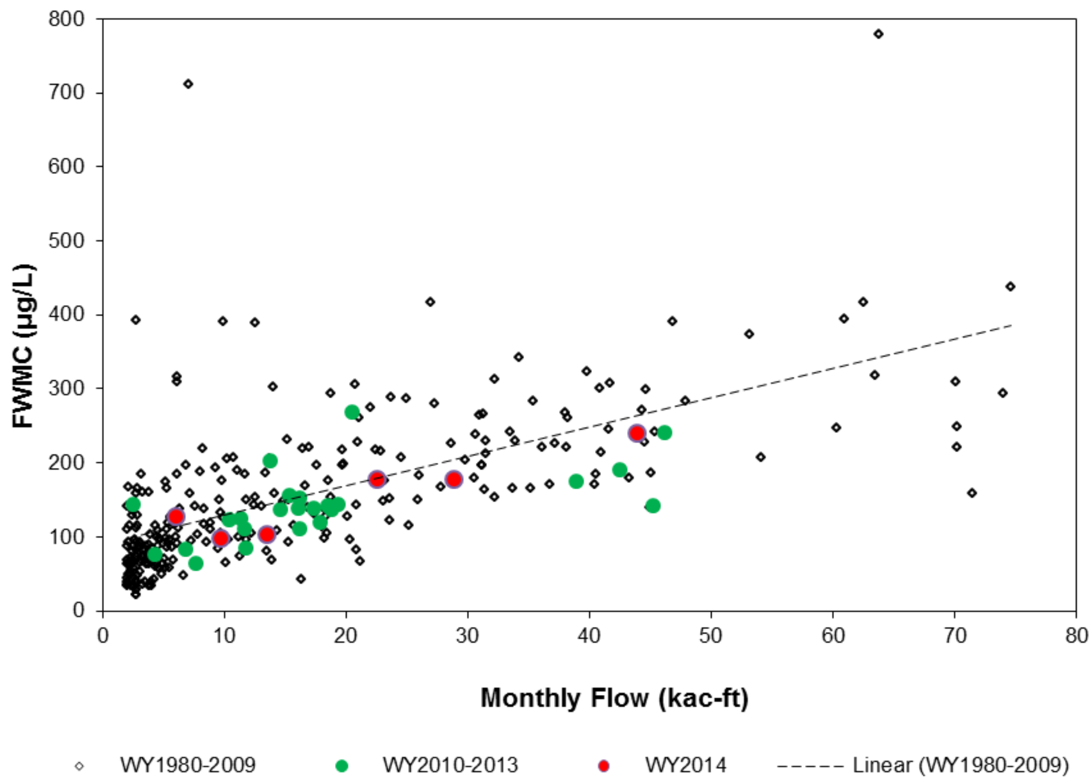


Figure 13. C-139 Basin monthly flow volume versus monthly TP FWMC for selected water years.

C-139 Sub-Basin Level Monitoring Data

To supplement the basin-level analysis with information from smaller units of area (sub-basins) contributing flow and TP load, the District has established an upstream monitoring network for flow and phosphorus concentration. Appendix B3.1 of Chapter 40E-63, F.A.C., defines use of the data from these monitoring sites to compute loads and unit area loads allowing the District to quantify a proportional share performance measure for use when the C-139 Basin as a whole does not meet the required TP load goals. This monitoring project currently has eight monitoring locations for determining water quality and flow data from C-139 sub-basins (**Figure 14**). TP is collected, analyzed, and reported from the automatic samplers. TP, total dissolved phosphorus, and soluble reactive phosphorus are measured from grab samples collected weekly at the same sites, though only TP is used for sub-basin performance calculations. **Table 9** summarizes station names, sampling start date, and number of samples for each collection type during WY2014. The water quality data from these sites are stored in the District's DBHYDRO database under project name C139D.

WY2014 is the third water year of performance measure determination under the rules amended November 2010 and the C-139 Basin has met the TP load requirements based on the two-prong target and limit test. Therefore, no determinations of proportional share must be made at this time based on WY2014 data. Appendix B3.1 of Chapter 40E-63, F.A.C., defines a process to verify if monitoring at each sub-basin site was adequate for the data to be representative of sub-basin discharges. It also contains adjustments to ensure comparability to C-139 Basin unit area load (UAL) target results. The District continues to work in evaluating and improving the data collection process and equipment to ensure representative data is collected for all sub-basins. Challenges in effective monitoring of flow at some of the monitoring sites may require the District to focus resources on the larger (primary and secondary) sub-basins and to reevaluate the need for monitoring the tertiary sub-basins.

Table 10 provides a summary of WY2014 observed UAL, adjustment factor, and assigned UAL for the primary, secondary, and tertiary sub-basins. The table also notes if the monitoring data collected by the District was determined not to be representative of sub-basin discharges in accordance with Appendix B3.1 of Chapter 40E-63, F.A.C. As per these rules, this data would only be used in the future, if the C-139 Basin observed TP load is above the target load in each of the next two water years (within the adjusted rainfall range).

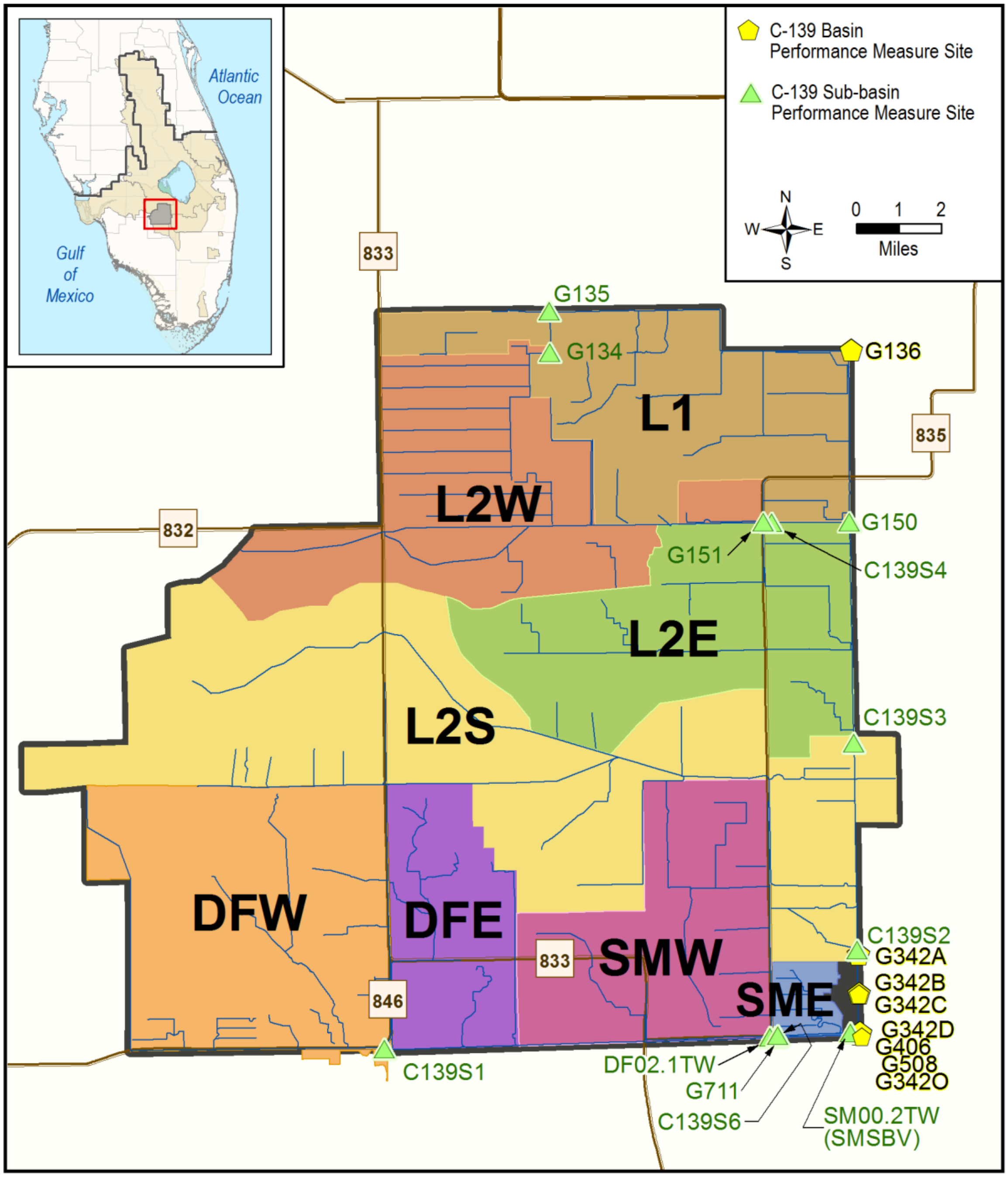


Figure 14. WY2014 C-139 Basin discharge (performance), sub-basin, and upstream synoptic monitoring sites and sub-basins location map.

Table 9. C-139 Basin upstream automatic sampling stations under the C139D Monitoring Project.

Flow Station Name	Water Quality Station Name	Type of Flow Calculation	First Flow or Velocity Record	First Auto Collection	Number of WY2014 Samples Grab/Auto
G150	G150	culvert	5/3/1989	10/25/2006	52/21
C139S1	C139S1	index velocity meter	2/28/2007	12/20/2006	44/44
C139S2	C139S2	index velocity meter	8/30/2006	10/25/2006	52/43
C139S3	C139S3	index velocity meter	10/20/2006	10/25/2006	52/47
G151	C139S4	culvert	9/21/2006	1/2/2008	52/46
C139S6	C139S6	index velocity meter	3/06/2008	6/11/2008	49/45
SMSBV	SM00.2TW	index velocity meter	12/19/2005	4/25/2006	39/37
G711	DF02.1TW	culvert	4/18/2011	4/25/2006	49/49

Table 10. C-139 sub-basin area, flow volume, TP FWMC, observed unit area load (UAL), adjustment factor, and assigned UAL for WY2014.

[Note: lbs/ac = pounds per acre.]

Name	Area (acres)	Observed Flow (inches)	Observed TP FWMC (µg/L)	Observed UAL (lbs/ac)	Adjustment Factor	Assigned UAL (lbs/ac)
Primary Sub-basins						
L1	20,742	13.6	109	0.34	1	0.34
L3	147,709	8.4	197	0.38	1	0.38
Secondary Sub-basins						
L2	91,097	N/A[1]	N/A[1]	N/A[1]	1	0.38[1]
DF	36,764	14.0	345	1.09	1	1.09
SM	19,288	5.1	729	0.85	1	0.85
Tertiary Sub-basins						
L2W	23,278	14.2	139	0.45	1	0.45
L2E	19,390	N/A[2]	N/A[2]	N/A[2]	1	0.38[2]
L2S	48,429	N/A[2]	N/A[2]	N/A[2]	1	0.38[2]
DFW	25,945	N/A[3]	N/A[3]	N/A[3]	1	1.09[3]
DFE	10,819	N/A[3]	N/A[3]	N/A[3]	1	1.09[3]
SMW	17,525	N/A[4]	N/A[4]	N/A[4]	1	0.85[4]
SME	1,763	N/A[4]	N/A[4]	N/A[4]	1	0.85[4]

[1] District monitoring data for secondary sub-basin L2 was determined not to be representative of sub-basin discharges; assigned UAL is equal to assigned UAL for primary sub-basin L3.
[2] District monitoring data for tertiary sub-basins L2E and L2S was determined not to be representative of sub-basin discharges; assigned UAL is equal to assigned UAL secondary sub-basin L2.
[3] District monitoring data for tertiary sub-basins DFW and DFE was determined not to be representative of sub-basin discharges; assigned UAL is equal to assigned UAL secondary sub-basin DF.
[4] District monitoring data for tertiary sub-basins SMW and SME was determined not to be representative of sub-basin discharges; assigned UAL is equal to assigned UAL secondary sub-basin SM.