Appendix 4-1: Supplemental Information for the Everglades Agricultural Area Basin in the Southern Everglades

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INTRODUCTION

The 1994 Everglades Forever Act (EFA), Section 373.4592, Florida Statutes (F.S.), set into motion an aggressive and comprehensive restoration program of construction, research, and regulation projects designed to ensure that all waters discharging into the Everglades Protection Area achieve and maintain compliance with phosphorus and other water quality standards (SFWMD 2002). The EFA mandates landowners to implement best management practices (BMPs) in the Everglades Agricultural Area (EAA) Basin through a permitting program to achieve a 25 percent reduction of the total phosphorus (TP) loads in runoff when compared to a historical pre-BMP baseline period. The South Florida Water Management District (SFWMD or District) established a compliance determination method under Chapter 40E-63, Florida Administrative Code (F.A.C.), to implement this statutory loading requirement. A monitoring network is maintained to assess program performance and make adjustments when necessary to assure compliance (Paragraph 373.4592(4)(f), F.S.). If permanent changes to the data collection procedure, methodology, program requirements, or program compliance and enforcement procedures are necessary, the SFWMD is required to initiate rulemaking per 40E-63.101(5) to incorporate the changes.

Chapter 4 provides an overview of the regulatory source control program established by SFWMD to address EFA mandates including the Water Year 2016 (WY2016) (May 1, 2015–April 30, 2016) compliance determination and source control strategy. This appendix provides detailed information on the procedures SFWMD followed to determine whether the EAA Basin achieved the reduction of 25 percent in TP loads to fulfill the reporting requirements outlined in Appendix A3 of Chapter 40E-63, F.A.C. SFWMD maintains a water quality monitoring network at the EAA Basin-level for primary compliance determination of the landowners collectively. The water quality and quantity collection sources and methods currently applied to the basin-level data are included in this appendix. Additionally, SFWMD collects data at the subbasin level to provide insights on long-term trends and water year-specific characteristics. This appendix includes short-term and long-term variations for rainfall, flow volume, and TP load for each subbasin. While basin-level data are used for the EAA Basin collective compliance determination, permit-level data are used by a secondary compliance method to represent individual landowner proportional share of the EAA Basin TP load for remedial action under a basin-level noncompliance scenario. Individual permittees collect permit-level data in accordance with a discharge monitoring plan established in their permits. WY2016 permit-level data summaries are presented in this appendix.

This appendix also expands on the background for the development of the EAA Basin regulatory program, as it explains the history and rationale behind the source control strategies on which the success of this 20-plus year old program is based.

EAA BASIN REGULATORY PROGRAM BACKGROUND

In 1987, the Florida Legislature passed the Surface Water Improvement and Management (SWIM) Act creating the first Everglades cleanup plan and serving as the state's basis for Everglades restoration. The act ultimately lead to activities identified under the Everglades Construction Project (ECP) that were the foundation of the restoration efforts, including construction of stormwater treatment areas (STAs) and the implementation of BMPs in the EAA Basin (Burns & McDonnell 1994). BMP implementation was required under the SFWMD's Works of the District (WOD) regulatory source control program, which was developed in 1991 through a series of public cooperative workshops and round-table discussions with landowners, consultants, and other interested stakeholders. The year-long effort resulted in Chapter 40E-63, F.A.C., which describes the intent, requirements, and compliance components of the Everglades BMP Regulatory Program adopted in 1992. In February 1994, the *Everglades Protection Project, Palm Beach County, FL, Conceptual Design* (Burns & McDonnell 1994) was completed by Burns & McDonnell detailing the strategy that combined mandatory source controls, utilizing BMPs, and regional treatment projects. This strategy was the basis for the 1994 EFA, which set into action the restoration plan. A historical timeline of the EAA Basin since the beginning of the WOD regulatory program is provided in **Table 1**.

Table 1. Historical timeline of the EAA Basin.

Timeframe	Event
1991	SFWMD initiated development of the EAA regulatory program. The year-long effort resulted in Chapter 40E-63, F.A.C. The rule was initially adopted in December 1991 and was amended in 1992 to add a specific phosphorus load allocation.
1992	SFWMD initiated issuance of WOD permits in accordance with Chapter 40E-63, F.A.C.
1996	The initial compliance determination period for the EAA was completed (Water Year 1996 or May 1, 1995 through April 30, 1996). The EAA basin was found to be in compliance.
1996	As of 1996, the reported land uses in the EAA Basin were sugarcane (75%), vegetables (8%), sod (5%), livestock (2%), and rice and other crops (1%), and other uses, such as urban areas, roadways, canals, and levees (9%).
1997	EAA WOD phosphorus source control permits were renewed.
1997	The EAA Environmental Protection District (EAAEPD) and the University of Florida IFAS entered into an agreement to conduct BMP research, testing and implementation to address water quality standards to meet the requirements of Rule 40E-63.301, F.A.C.
2000	The East Beach Water Control District (EBWCD), and 715 Farms pump structures (i.e., Closter Farms) began operation as part of the diversion project to reroute discharges from Lake Okeechobee to the EAA and treatment in STAs. Discharges became subject to water quality and permitting requirements of the EFA and WOD permits pursuant to Chapter 40E-63, F.A.C. Permits were issued to implement BMPs and permit-level discharge monitoring requirements. Consistent with other EAA WOD permits, the permits issued to the 298 Districts and Closter Farms required achieving compliance with basinwide and farm-level phosphorus load allocations.

Table 1. Continued.

Timeframe	Event
2001	East Shore Water Control District pump structure began operation as part of the diversion project to reroute discharges from Lake Okeechobee to the EAA and treatment in the STAs. WOD permits were issued as for EBWCD and Closter Farms.
2002	Chapter 40E-63, Part I, F.A.C., was amended to incorporate changes in the sources and methods used for EAA water quality compliance determination.
2004	South Shore Drainage District pump structure began operation as part of the diversion project to reroute discharges from Lake Okeechobee to the EAA and treatment in the STAs. WOD permits were issued as for EBWCD and Closter Farms.
2005	South Florida Conservancy District pump structure began operation as part of the diversion project to reroute discharges from Lake Okeechobee to the EAA and treatment in the STAs.
2007	Upstream water quality data were collected within the EBWCD as part of the joint effort between SFWMD and the Florida Department of Environmental Protection. Upstream data was collected from January through October to provide information for determining major sources of nutrient inputs to water bodies within the basin.
2007	EAA WOD phosphorus source control permits were renewed.
2007	SFWMD commissioned an evaluation of the effects of Lake Okeechobee inflows on EAA subbasins and BMP performance. Project objectives included to develop an understanding of the relationship between Lake Okeechobee inflows, EAA Basin runoff, and downstream points of entry into STAs and the driving factors that govern those relationships. Phase I developed three analyses proposals and Phase II included the results. Based on the analyses conducted by the consultant, five-year moving average trends of supplemental inflow from Lake Okeechobee into the S5A subbasin indicated increased TP concentration and load, however, these increases were not reflected in the subbasin outflows (BPC Group Inc. 2007).
2008	A canal water quality and flow data collection effort was conducted during 2008 within the West Palm Beach Canal. The objective was to further the understanding of phosphorus sources, transport mechanisms, and sinks affecting TP loading from the EAA at the subbasin level.
2009	As of 2009, the reported land uses in the EAA Basin were sugarcane (96%), other crops (<1%), livestock (<1%), and other land uses, such as institutional, urban, and industrial (2%). A map is presented in **Figure 1**.
2012	EAA WOD phosphorus source control permits were renewed.
2013	SFWMD initiated a canal cleaning BMP demonstration and implementation project in partnership with EBWCD. Water quality data and canal maintenance records were collected for three years to assess potential benefits.
2013	The canal water quality and flow data collection effort in the West Palm Beach canal was reinitiated and expected to occur for three years. The project continued the original 2008 initiative.

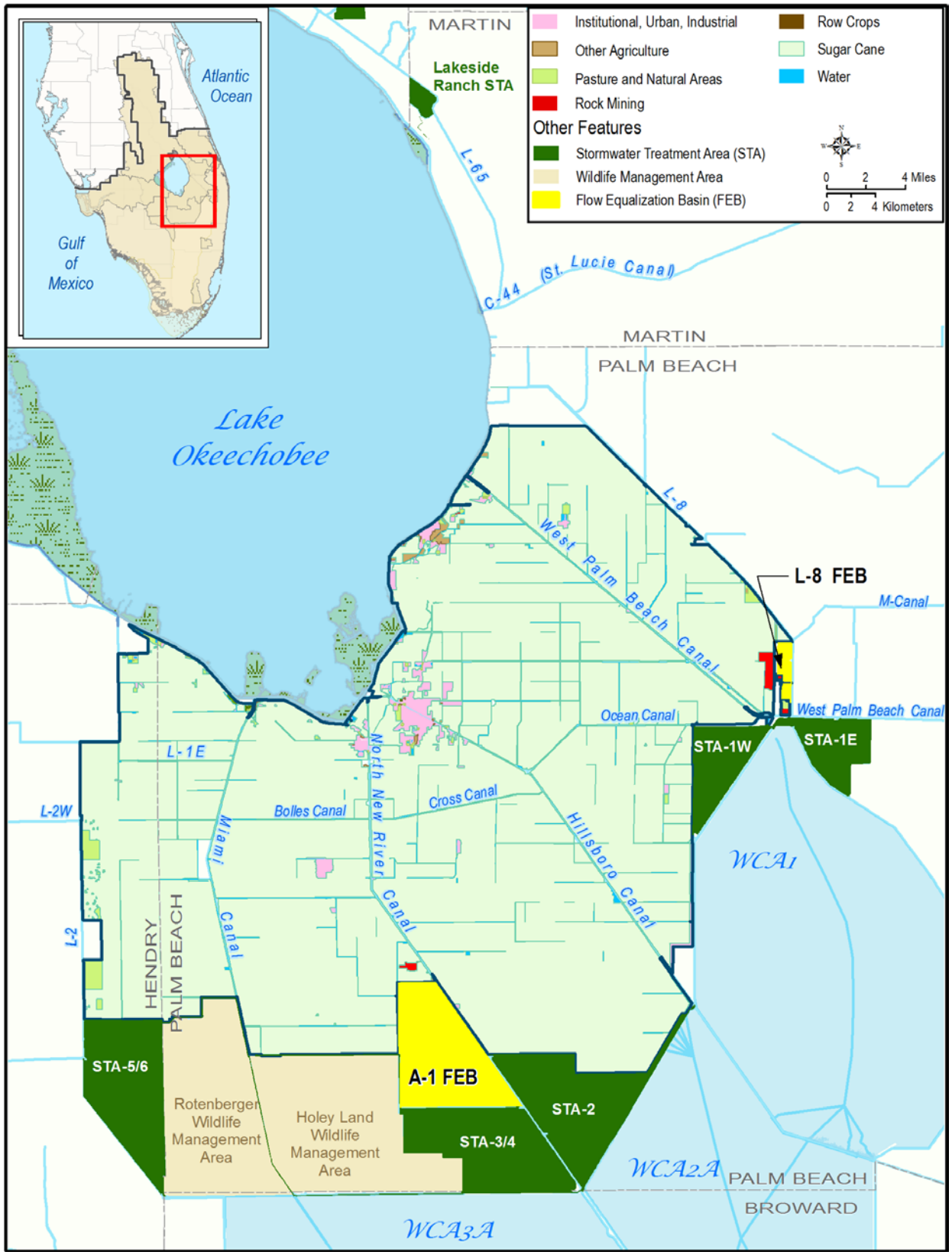

Figure 1. Land use data (2009) for the EAA Basin.

Chapter 40E-63, F.A.C., required all landowners within the EAA Basin to submit permit applications in 1992 outlining land use-specific BMP plans to minimize phosphorus in discharges. At the time of rule development, field plot-scale BMP research had been conducted within the EAA Basin by the University of Florida Institute of Food and Agricultural Services (IFAS), which showed a positive potential efficacy of BMPs to control phosphorus (lzuno and Bottcher 1991). It was expected that whole-farm-scale research would better quantify phosphorus reduction levels for individual BMPs, however, the legal mandates required immediate development and implementation of a BMP program. Thus, before additional research could be conducted, SFWMD was faced with the tasks of establishing a base level of BMPs for each permit area and ensuring that BMP plans among different landowners were consistent and comparable. To accomplish these tasks, a system of BMP "equivalents" was developed. The intent was to assign "points" to BMPs within three basic categories: nutrient management, water management, and particulate matter and sediment control.

Twenty-five BMP equivalent points was set as the minimum level of BMP implementation. Utilizing the BMP equivalents approach, SFWMD ensured a level playing field among permittees while allowing flexibility for each landowner to develop the BMP plan best suited for site-specific soil types, hydrology, and crop conditions. Each BMP plan must address the three BMP categories of nutrient management, water management, and particulate matter and sediment controls, to ensure that phosphorus is targeted in both flow and concentration. A plan incorporating all three categories of BMPs is referred to as a comprehensive BMP plan. The level of points within each of the categories provided an approximate indication of relative performance considering that both flow and concentration would be targeted through a comprehensive plan. The number of points assigned to each BMP was developed as a negotiated solution in a regulatory context. Nevertheless, the BMP point system has proven successful in ensuring implementation of a consistent level of BMPs among permittees with different site conditions.

The source control program requires a 25 percent reduction in TP loads for the EAA Basin as a whole, rather than for each individual farm or permitted basin. In the event that the 25 percent TP load reduction is not met at the basin-level, then additional requirements will apply for specific farms. During the rule development process, there was much discussion on how to identify the permitted basins that would incur additional requirements if the EAA Basin-level performance measure was not met. SFWMD initially proposed that all permitted basins would be treated equally, such that all basins would equally share credit for reductions as well as equally share responsibility for not meeting the EAA Basin-level 25 percent TP load reduction requirement. From the rule development workshops, it was found that some landowners preferred having an option to demonstrate the phosphorus levels discharged from their individual properties. This resulted in permit-level monitoring requirements for use in a secondary compliance method Accordingly, the secondary method identifies those permittees required to revise their BMP plans to enhance performance and comply with a maximum unit area load (UAL), determined according to 40E-63, Appendix A4, F.A.C.

EAA BASIN SUPPLEMENTAL EVALUATION

EAA BASIN PERFORMANCE MEASURE METHODOLOGY

Chapter 40E-63, F.A.C., Part IV, outlines the performance measure and compliance methodology for determining whether the EAA Basin is meeting the annual phosphorus load requirements described in the EFA. The EAA Basin is collectively required to achieve a 25 percent reduction of the TP loads measured in runoff when compared to an estimated historical pre-BMP baseline period of WY1980–WY1988. The measured TP runoff load is determined each water year, with the BMP program implemented, based on flow and water quality data measured by SFWMD at each EAA Basin boundary structure.

For the purposes of this methodology, measured water year runoff TP load refers to the permittees' offsite discharges impacted by BMPs. A monitoring network allows the SFWMD to measure flow and

water quality data at each EAA Basin boundary structure and to account for TP load in basin inflows and outflows following documented standard assumptions. The measured water year runoff TP load is computed as TP load discharged from the EAA Basin boundary as a whole, less external loads crossing into the basin boundary: (1) based on the basin boundary established for the baseline period of WY1980–WY1988 and (2) for pass-through operation delivering water to areas south or east of the EAA Basin.

The compliance methodology incorporates a two-prong test using a target load and a limit load to account for the possibility of statistical error. The target load is based upon a 25 percent reduction of the estimated load. The estimated load is the pre-BMP 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 target load, with a 90 percent confidence interval applied based on the regression statistics, provides a base period limit load. The EAA Basin is out of compliance when the measured runoff TP load is above the target load for three successive years or above the limit load in any one year, within the rule-designated rainfall range appropriate for the baseline period. The estimated TP load during the pre-BMP base period is determined based on SFWMD applying mathematical equations and the compliance methodology outlined in Chapter 40E-63, F.A.C., Part I. **Figure 2** provides the monthly rainfall totals for the EAA Basin during WY2016 and related coefficients used to calculate the target load per the equations.

The measured runoff TP load for WY2016 is below the estimated target load for the baseline period adjusted for rainfall. Therefore, the basin was determined to be in compliance with the performance measure because the TP load did not exceed the one-year limit or three-year target test for WY2016.

EAA BASIN-LEVEL DATA COLLECTION SOURCES AND METHODS

Basin-level compliance assessment is based on water year monitoring at various inflow and outflow points defining the boundary of four major EAA subbasins (S-5A, S-2/S-6, S-2/S-7, and S-3/S-8) and at conveyance canals serving these subbasins. **Table 2** provides TP sampling statistics for all SFWMD-monitored locations in the EAA Basin during WY2016. The locations of the EAA Basin boundary structures represented as inflows and outflows in **Table 2** are depicted in **Figure 4-3** of this volume.

During WY2016, 18 structures comprised the model compliance boundary of the EAA Basin, and 20 monitored sampling points represented the water quality in discharges through those structures. Two structures are designed to move water in two directions, with water quality samples being collected on the upstream side for flow in either direction. Data for these structures, identified as S-2 Complex and S-3 Complex, are provided in **Table 2**.

WY2016 EAA Basin estimated TP load calculation

See 40E-63 Appendix A3 for "Target" equation

Month	Rainfall (in)			
May	1.1	in	m_1 =	4.22
Jun	3.4	in	m_2 =	8.89
Jul	5.2	in	m_3 =	21.53
Aug	8.4	in	X =	3.925
Sep	8.3	in	C =	0.738
Oct	1.4	in	S =	0.886
Nov	2.9	in	SE =	0.1953
Dec	3.3	in		
Jan	10.2	in	Target[1] TP Load =	154 t
Feb	3.0	in	Limit[2] TP Load =	206 t
Mar	2.2	in	Runoff TP Load =	151 t
Apr	1.1	in	Estimated[3] =	206 t
Total Rainfall	50.6	in	% Reduction =	27%

Notes:

[1] Target load is adjusted for reduction in EAA land area (450805 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] Estimated load = Target load / (1 - 0.25)

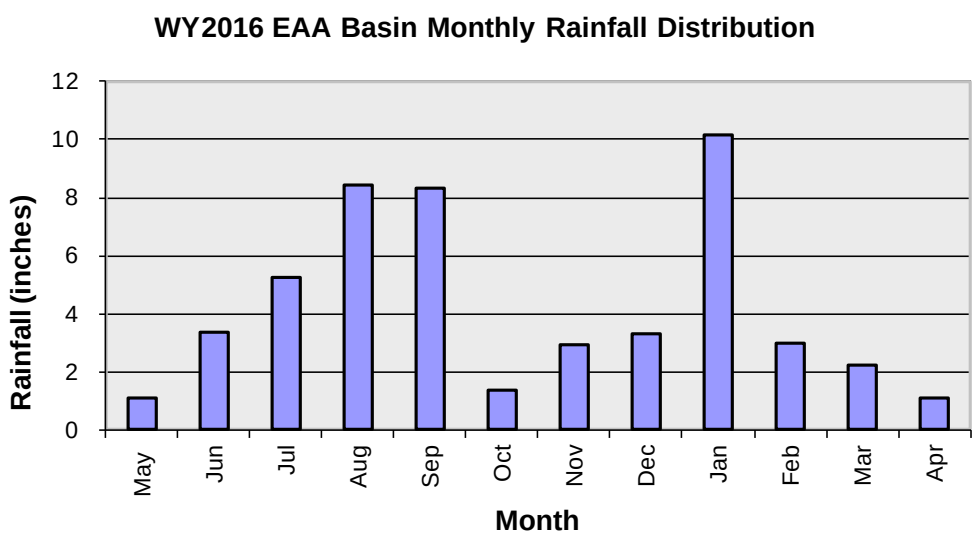

Figure 2. WY2016 EAA Basin monthly rainfall totals, compliance calculation coefficients, and target TP load calculation. [Note: ac – acres; in – inches; and t – metric tons.]

Table 2. Summary statistics for WY2016 TP monitoring data for the EAA Basin.

Subbasin (canal)	Structure	Sampling Site Name	Sample Type	Number of Samples	Number Used in Load Calculation	Minimum (µg/L) [a]	Maximum (µg/L) [a]	Number Flagged	Flow Curve Rating [b]
S-5A (West Palm Beach Canal)	S-352	S352	Grab	81	17	75	356	0	Excellent
			Composite [c]	33	33	95	258	0	
	S-5A Complex	S5A	Grab	52	1	63	246	0	Good
			Composite [c]	50	45	68	483	5	
	EBPS	EBEACH	Grab	49	5	68	1,369	0	N/A[d]
			Composite [c]	30	30	106	1129	0	
S-2/S-6 (Hillsboro Canal)	S-2 Complex	S2	Grab	17	7	62	288	0	Good
			Composite [c]	3	3	170	345	0	
		S351	Grab	53	2	35	185	0	Fair
			Composite [c]	32	32	71	140	0	
	S-6	S6	Grab	52	2	19	245	0	Good
			Composite [c]	37	37	44	283	0	
	G-328	G328	Grab	52	2	9	51	0	Fair
			Composite [c]	33	33	17	82	0	
	ESPS	ESHORE2	Grab	45	3	40	368	0	N/A[d]
			Composite [c]	25	25	50	239	0	
S-2/S-7 (North New River Canal)	S-2 Complex	S2	Grab	17	7	62	288	0	Good
			Composite [c]	3	3	170	345	0	
		S351	Grab	53	2	35	185	0	Fair
			Composite [c]	32	32	71	140	0	
	G-370	G370	Grab	52	1	16	143	0	Excellent
			Composite [c]	36	36	26	166	0	
	G-371	G371	Grab	52	0	17	117	0	Fair
			Composite [c]	0	0				
	G-434	G434	Grab	52	1	28	163	0	Poor
			Composite [c]	44	44	37	263	0	
	G-435	G435	Grab	52	1	17	92	0	Good
			Composite [c]	32	32	18	94	0	
	G-722	G722	Grab	25	2	20	58	0	Good
			Composite [c]	20	20	22	86	0	

Table 2. Continued.

Subbasin (canal)	Structure	Sampling Site Name	Sample Type	Number of Samples	Number Used in Load Calculation	Minimum (µg/L)[a]	Maximum (µg/L)[a]	Number Flagged	Flow Curve Rating[b]
S-3/S-8 (Miami Canal)	S-3 Complex	S3	Grab	16	6	59	185	0	Excellent
			Composite[c]	3	3	175	229	0	
		S354	Grab	53	3	57	155	0	Good
			Composite[c]	31	31	61	204	0	
	G-136	G136	Grab	26	9	17	204	0	Poor
			Composite[c]	21	21	31	145	0	
	SSDDMC	SSDDMC	Grab	51	2	39	289	0	Fair
			Composite[c]	30	30	46	262	0	
	SFCD5E	SFCD5E	Grab	52	4	46	259	0	Poor
			Composite[c]	28	27	51	226	1	
	G-372	G372	Grab	52	1	33	176	0	Good
			Composite[c]	48	48	48	2255	0	
	G-373	G373	Grab	52	0	32	148	0	Good
			Composite[c]	0	0				

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

b. 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%).

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

d. N/A – no streamgauging measurements available.

EAA BASIN-LEVEL WATER QUALITY SUMMARY

TP loads from the surface water runoff attributable to the lands within the EAA Basin are evaluated on an annual basis taking into account the basin boundary changes from lands converted to the Everglades STAs, quantification of inflows crossing the EAA Basin boundaries from external sources, and addition of new EAA Basin boundary 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 Basin farm- and urban-generated runoff as well as water passing through the EAA Basin canals from external sources. Therefore, EAA Basin discharge monitoring data includes pass-through from Lake Okeechobee as well as runoff from inflows that did not occur during the baseline period. These new inflows included discharges from the C-139 Basin as well as inflows from areas that historically discharged to Lake Okeechobee (formerly 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 (also known as the 298 Diversion Project). Once diverted to the STAs, these diversion project areas were also subject to existing requirements (BMP implementation) and anticipated amendments (25 percent TP load reduction) under Chapter 40E-63, F.A.C. Because the original rule-adopted baseline period did not include data representative of these discharges to Lake Okeechobee, these diversion areas are considered external sources crossing into the EAA Basin boundary and are not currently evaluated for the 25 percent TP load reduction requirement adopted under Chapter 40E-63, F.A.C. As such, inflows from these EAA 298 and 715 Farms diversion basin areas to the EAA Basin must be separated from the EAA Basin runoff until an appropriate performance measure methodology is adopted by regulations (see *EAA Permit-level Monitoring* section of this appendix). The EAA 298 and 715 Farms Diversion Basins depicted in Figures 4-3 and 4-4 in Chapter 4 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 Basin 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).

Table 3 summarizes the annual flow, TP load, and TP flow-weighted mean concentration (FWMC) for every structure used during WY2016 to determine overall compliance with EAA Basin load reduction requirements. Annual individual summaries are not intended to be aggregated to mass balance the flows and loads for a reported EAA Basin measured runoff TP load. This is because the determination of EAA Basin measured runoff TP load based on Chapter 40E-63, F.A.C., is based on the daily evaluation of pass-through flows, inflow concentrations and outflow concentrations at the boundary structures defining each EAA subbasin. **Table 4** presents the data at the subbasin level based on this daily evaluation.

Table 3. WY2016 flow volumes, TP loads, and TP FWMC for EAA Basin structures.

Subbasin (Canal)		Direction	Structure	Load (t) [a]	Flow (10^3 ac-ft) [a]	Concentration (µg/L) [a]
S-5A (West Palm Beach Canal)	Outflow	to Lake Okeechobee	S-352	0	0	N/A [b]
		to STA-1 inflow and distribution works	S-5A Complex	70.8	320.2	179
		Total		70.8	320.2	179
	Inflow	from Lake Okeechobee	S-352	42.6	236.6	146
		from L-8 Canal/C-51 Canal	S-5A Complex	0.0	0.0	N/A[b]
		from East Beach Water Control District [c]	EBPS [c]	12.0	13.3	732
		Total		**54.6**	**249.8**	**177**
S-2/S-6 (Hillsboro Canal)	Outflow	to Lake Okeechobee [d]	S-2	7.0	19.4	291
		to STA-2 inflow distribution canal	S-6	43.2	275.3	127
		to STA-2 inflow distribution canal	G-328	1.8	38.5	37
		Total		52.0	333.3	126
	Inflow	from Lake Okeechobee [d]	S-351	40.1	336.3	97
		from East Shore Water Control District and Closter Farms	ESPS	6.4	31.0	167
		Total		**46.5**	**367.3**	**103**
S-2/S-7 (North New River Canal)	Outflow	to Lake Okeechobee [d]	S-2	see S-2 above [d]		
		to STA-3/4	G-370	22.9	203.3	91
		to STA-3/4 bypass structure	G-371	0.0	0.0	41
		to STA-2	G-434	7.7	88.9	70
		to STA-2	G-435	1.5	25.9	48
		Total		32.1	318.1	82
	Inflow	from Lake Okeechobee [d]	S-351	see S-351 above [d]		
		from Water Conservation Area 2	G-371	0	0	N/A
		from A-1 Flow Equalization Basin	G-722	4.3	97.8	35
		Total [d]		**4.3**	**97.8**	**35**
S-3/S-8 (Miami Canal)	Outflow	to Lake Okeechobee	S-3	3.3	13.1	204
		to STA-3/4	G-372	67.9	370.6	149
		to STA-3/4 bypass structure	G-373	0.0	0.0	82
		Total		71.2	383.8	150
	Inflow	from Lake Okeechobee	S-354	31.8	229.1	113
		from South Shore Drainage District	SSDDMC	2.3	12.0	157
		from South Florida Conservancy District	SFCD5E	2.2	16.2	108
		from Water Conservation Area 3	G-373	0	0	N/A
		from C-139 Basin	G-136	2.4	18.2	105
		Total		**38.7**	**275.5**	**114**

a. t = metric tons, 1 t = 10^3 kg; 10^3 ac-ft = thousands of acre-feet, 1 ac-ft = 1,233 cubic meters (m^3); µg/L = microgram per liter, and 1 µg/L ≈ 1 part per billion (ppb).

b. N/A – not available.

c. The load and flow shown represent 81.3 percent of the runoff flow and load at the EBPS3 structure in order to exclude a 1,233-acre portion of the East Beach Water Control District not represented in EAA baseline period, as the flows from this area were discharged to Lake Okeechobee.

d. The S-351 inflow and S-2 outflow sites serve the S-2/S-6 and S-2/S-7 subbasins. To avoid double counting data, totals for inflows and outflows of the S-2/S-7 subbasin do not include the inflows and outflows from S-351 and S-2, which are included in the S-2/S-6 subbasin totals.

Table 4. EAA subbasin flows and TP loads by source for WY2016. [a]

Source	Load (t)[b]		Flow (10^3 ac-ft) [b]	
	Inflow	Outflow	Inflow	Outflow
S-5A Subbasin (West Palm Beach Canal)				
EAA [c]	N/A [d]	34.8	N/A[d]	174.3
Lake Okeechobee	42.6	24.0	236.6	132.7
East Beach Water Control District [e]	12.0	12.0	13.3	13.3
Total	**54.6**	**70.8**	**249.8**	**320.2**
S-2/S-6 Subbasin (Hillsboro Canal)				
EAA [c]	N/A	38.4	N/A[d]	266.2
Lake Okeechobee	14.0	2.7	117.2	23.4
East Shore Water Control District and Closter Farms	6.4	6.4	31.0	31.0
Total	**20.4**	**47.4**	**148.2**	**320.6**
S-2/S-7 Subbasin (North New River Canal)				
EAA [c]	N/A[d]	25.4	N/A[d]	177.4
Lake Okeechobee	26.2	7.6	219.1	63.3
A-1 Flow Equalization Basin	4.3	3.9	97.8	90.1
Total	**30.4**	**36.9**	**317.0**	**330.8**
S-3/S-8 Subbasin (Miami Canal)				
EAA [c]	N/A[d]	52.4	N/A[d]	245.5
Lake Okeechobee	31.8	11.9	229.1	91.8
C-139	2.4	2.4	18.2	18.2
South Shore Drainage District	2.3	2.3	12.0	12.0
South Florida Conservancy District	2.2	2.2	16.2	16.2
Total	**38.7**	**71.2**	**275.5**	**383.8**

a. The total loads and flows leaving the subbasins represent pass-through volumes as well as volumes originating within the basin. It is assumed that 100 percent of the inflows from the C-139 Basin and the diversion basins to the EAA subbasins pass through the main EAA conveyance canals directly to the outlet of each subbasin. Any inflows from the water conservation areas or the L-8 Canal/C-51 Canal are not represented in this table, as they are not used in the EAA Basin-scale Compliance Model.

b. t = metric tons; 1 t = 10^3 kg; 10^3 ac-ft = thousands of acre-feet; and 1 ac-ft = 1,233 cubic meters (m^3).

c. EAA Basin represents each subbasin's portion of total EAA Basin TP load and volume from runoff.

d. N/A – not applicable.

e. The load and flow shown represent 81.3 percent of the runoff flow and load at the EBPS3 structure in order to exclude a 1,233-acre portion of the East Beach Water Control District represented in the EAA Basin baseline period.

Based on the boundary conditions, **Table 4** presents the summaries of flows and TP loads for each subbasin within the EAA Basin. These summaries generally describe the mass balance of inflows and outflows from the EAA subbasins. The runoff TP load and volume from each subbasin, summing up to a total EAA Basin runoff TP load of 151 metric tons (t) and runoff volume of 863,369 acre-feet (ac-ft), are noted in this table.

Annual computation of the EAA Basin's TP load reduction for compliance assessment requires quantification of TP load sources in discharges from the EAA Basin as defined by Chapter 40E-63, F.A.C., in order to establish the portion of the TP load attributable to the EAA Basin permittees. EAA Basin runoff TP load is based on the TP load discharged from each EAA subbasin boundary less TP load entering during pass-through operations (flows from Lake Okeechobee or the A-1 Flow Equalization Basin) and in inflows that did not occur during the baseline period. The methodology assumes that 100 percent of the latter inflows pass through the main EAA conveyance canals directly to the outlet of each subbasin. In contrast, inflows to the EAA Basin to meet irrigation demands and canal-level management consistent with baseline

period agricultural operations are not taken into consideration for the calculation of measured TP in EAA Basin runoff.

There are many inflows to each subbasin as indicated in **Table 4**. For example, during WY2016, the Miami Canal conveyed EAA Basin runoff, Lake Okeechobee pass-through flows, C-139 Basin runoff, and external loads from two diversion area basins (South Florida Conservancy District and South Shore Drainage District) to the STA-3/4 inflow structure (G-372). Therefore, G-372 received multiple sources of water in varying amounts (flow and TP load), which contributed to the total flow and TP load measured at that site. For an approximation of flow and TP load contributions from the various sources to STAs and STA performance in any given water year please refer to Chapters 3A and 5B, respectively.

EAA Basin Short-Term and Long-Term Variations

As discussed in Chapter 4 of this volume, unprecedented hydrologic conditions occurred in WY2016. In particular, while total EAA Basin rainfall levels were within historic ranges at 50.6 inches, the monthly distribution of rainfall was unique with 20 percent of the rainfall occurring during the month of January. This section intends to expand on the discussion in Chapter 4 and present the variation of rainfall, flow volume, and TP load measured for each subbasin.

Rainfall variation in both spatial and temporal distribution influence runoff patterns throughout the basin. For instance, rainfall in excess of 1 inch would be more likely to result in a farm discharging offsite during the summer months than during the winter months when rainfall is at its lowest and irrigation demand is high.

The monthly rainfall distribution for each of the EAA subbasins was similar to that of the EAA Basin overall. In particular, the EAA Basin received a record 10.2 inches of rainfall between January 1 and 29, 2016; this was also observed at the subbasin level. **Figure 3** depicts the variation of WY2016 subbasin monthly rainfall compared to the total monthly rainfall for the EAA Basin. A more detailed summary of WY2016 rainfall and estimated load adjustments based on Chapter 40E-63, F.A.C., compliance calculations for the EAA Basin 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 SFWMD region during WY2016.

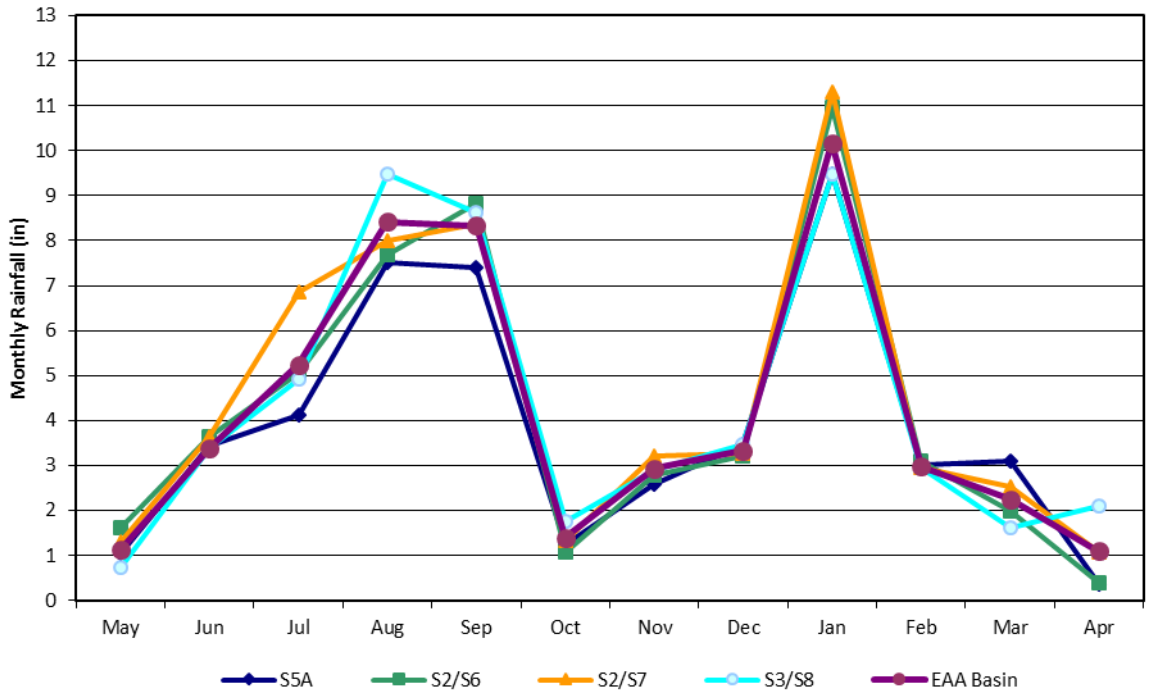

Figure 3. WY2016 EAA Basin and subbasins monthly rainfall distribution trend. (Note in – inches.)

Since WY1996, runoff volumes among the EAA subbasins 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 4**, top panel). A wider range of variation is observed with runoff TP loads among the subbasins (**Figure 4**, bottom panel). Over the last five years, the S-2/S-6 subbasin has shown an increase in the percentage of the EAA Basin runoff flow, with the past five years being over 30 percent. The runoff load percentages for S-2/S-6 subbasin do not show the same trend as the flow.

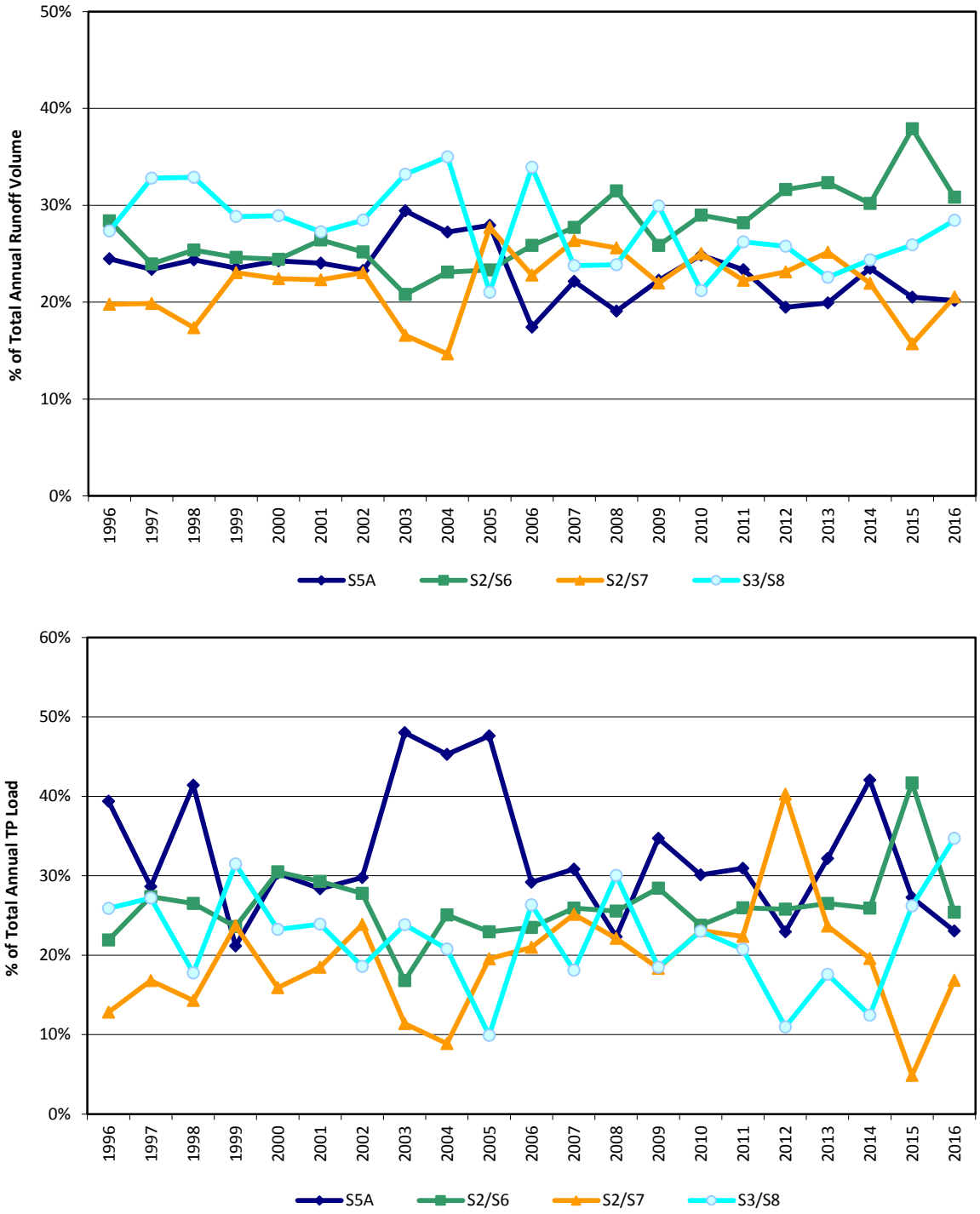

Figure 4. WY1996–WY2016 EAA subbasin annual runoff volume percent relative contribution trend of basin total (top) and WY1996–WY2016 EAA subbasin annual TP load percent relative contribution trend of basin total (bottom).

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EAA BASIN PERMIT-LEVEL MONITORING

Permit-level data are required for a secondary compliance methodology to regulate TP loads from individual permittee's offsite discharges if the EAA Basin as a whole does not meet its compliance requirement. However, the permit-level results have not been used for secondary compliance purposes because the EAA Basin has been in compliance each year since the program's inception.

Permit-level data are useful in specific cases to track individual permit-level water quality trends. Data are compared for each individual hydraulic drainage area or permitted basin, which are identified according to the unit area or Basin Identification (ID) number. Permit-level data allows relative comparisons (1) between permittees, (2) between water years for a single farm, and (3) between water years and a baseline for a single farm. SFWMD uses such relative comparisons when considering individual BMP verifications and in communicating recommendations to permittees. The permit-level data can also provide insight into the measured EAA Basin runoff TP load, for example, the timing, location, and volumes observed at the EAA Basin boundary structures in relation to what was observed by the permit-level data. This is valuable since the EAA basin-level data can be influenced by the magnitude of the Lake Okeechobee pass through and other inflows and concentrations.

The WY2016 TP concentration and load for permit-level data within the EAA Basin are presented in this section in both tabular form and as a spatial distribution. Individual permittees within the EAA Basin are required to collect data representative of daily discharges at all offsite discharge structures. Permittees submit these to comply with conditions of their BMP permit issued in accordance with Chapter 40E-63, F.A.C. Permit-level water quality monitoring is required on a flow-proportional basis, and is accomplished through automatic samplers for most permittees or daily grab samples during discharges for select qualifying permittees. For each permitted basin, the determination of permitted 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. SFWMD estimates loads for periods in which data are missing only for the purpose of preparing for the secondary compliance methodology, which is used to rank permitted basins in the case of EAA Basin-level noncompliance. Estimation of the missing data by SFWMD does not relieve the individual permittees of their compliance requirement to collect a complete data set representative of daily discharges.

Table 5 identifies separate permitted basins (e.g., individual farms) within the EAA Basin by Basin ID. The table summarizes each area's TP FWMC, TP UAL, rainfall adjusted UAL, and percent sampled load for WY2016.

Table 5 includes five 298 Diversion Project areas (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 Chapter 40E-63, F.A.C., regulatory EAA Basin 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 Basin. The five diversion basins are shown in Figures 4-3 and 4-4 in Chapter 4 of this volume. Refer to Chapter 4 of this volume for additional information on source control activities and requirements in these areas.

Table 5. WY2016 permit-level data for the EAA Basin.

Permit Number	Basin ID	Basin Acres [a]	Sub-basin	Baseline Year	Rain Adjusted UAL (lbs/ac) [a]		WY2016 TP Concen-tration [b] (µg/L) [a]	WY2016 Percent Sampled Load	Comments
					Baseline	WY2016 [b]			
26-00001-E	26-001-01	778	S-8	1994 [c]	2.12	0.87	108	100%	
26-00002-E	26-002-01	898	S-8	2001	Unable to Calculate[d]	Unable to Calculate[d]	N/A	0%	Pasture area that historically has not reported flow offsite.
26-00007-E	26-007-01	653	S-8	1999	2.07	0.56	102	100%	
26-00008-E	26-008-01	120	S-8	1994 [c]	2.12	0.87	108	100%	
26-00010-E	26-010-01	1231	S-8	1995	1.81	0.73	187	94%	
26-00010-E	26-010-02	10004	S-8	1995	5.83	0.11	107	99%	
50-00002-E	50-002-01	5636	S-5A	1994 [c]	3.21	1.44	253	100%	
50-00002-E	50-002-02	9285	S-5A	1994 [c]	2.90	0.72	113	100%	
50-00009-E	50-009-04	317	S-6	1999	5.19	0.95	159	98%	
50-00009-E	50-009-05	1479	S-7	1994 [c]	1.54	1.11	151	100%	
50-00009-E	50-018-15	732	S-7	1994 [c]	1.12	0.74	138	100%	
50-00009-E	50-047-05	314	S-6	1997	0.55	0.66	158	98%	
50-00010-E	50-010-02	6867	S-6	1994 [c]	1.80	0.82	137	100%	
50-00010-E	50-010-03	6071	S-8	1994 [c]	1.31	0.61	90	100%	
50-00010-E	50-010-04	8511	S-6	1994 [c]	4.76	1.64	245	100%	
50-00011-E	50-011-03	14356	S-6	1994 [c]	5.79	2.32	330	88%	
50-00011-E	50-011-04	4047	S-6	1994 [c]	5.21	1.51	183	85%	
50-00015-E	50-015-01	3339	S-5A	1994 [c]	2.62	2.87	361	100%	
50-00015-E	50-015-02	2689	S-5A	1994 [c]	5.28	1.65	306	100%	
50-00018-E	26-003-01	598	S-8	1999	0.27	0.00	N/A	N/A	No reported flows for WY2016.
50-00018-E	26-006-01	1198	S-8	1998	1.19	0.40	83	100%	
50-00018-E	50-008-01	7289	S-8	1994 [c]	0.34	0.50	86	100%	Baseline unit load value in the low 5th percentile of basin IDs.
50-00018-E	50-011-06	638	S-8	2000	0.82	0.17	51	100%	
50-00018-E	50-018-01	5860	S-5A	1994 [c]	2.82	2.52	209	100%	
50-00018-E	50-018-03	9062	S-5A	1994 [c]	1.98	1.29	130	100%	
50-00018-E	50-018-04	1913	S-8	1994 [c]	3.88	0.69	80	100%	
50-00018-E	50-018-05	1846	S-8	1995	3.64	1.44	211	100%	
50-00018-E	50-018-06	1255	S-8	1994 [c]	1.46	0.40	56	100%	
50-00018-E	50-018-07	1277	S-8	1994 [c]	2.12	0.87	108	100%	
50-00018-E	50-018-08	3209	S-8	1994 [c]	2.28	0.22	41	100%	
50-00018-E	50-018-09	1737	S-8	1994 [c]	4.22	0.75	113	99%	
50-00018-E	50-018-10	8254	S-6	1994 [c]	3.05	0.79	129	100%	
50-00018-E	50-018-11	1871	S-6	1994 [c]	19.73	1.35	148	84%	
50-00018-E	50-018-12	1655	S-5A	1994 [c]	1.78	1.21	151	100%	
50-00018-E	50-018-13	594	S-5A	1994 [c]	0.40	3.39	186	100%	Baseline unit load value in the low 5th percentile of basin IDs.
50-00018-E	50-018-16	240	S-7	1994 [c]	4.11	2.03	73	99%	
50-00018-E	50-018-18	358	S-7	1994 [c]	0.64	1.48	169	100%	
50-00018-E	50-018-19	314	S-7	1994 [c]	35.32	2.56	103	95%	

Table 5. Continued.

Permit Number	Basin ID	Basin Acres [a]	Sub-basin	Baseline Year	Rain Adjusted UAL (lbs/ac) [a]		WY2016 TP Concen-tration [b] (µg/L) [a]	WY2016 Percent Sampled Load	Comments
					Baseline	WY2016 [b]			
50-00018-E	50-018-20	381	S-7	1994 [c]	3.59	0.77	111	100%	
50-00018-E	50-018-22	4482	S-8	1994 [c]	8.18	0.55	107	90%	
50-00018-E	50-018-23	2946	S-8	1994 [c]	2.22	0.61	74	100%	
50-00018-E	50-018-24	3804	S-8	1994 [c]	1.96	0.68	89	100%	
50-00018-E	50-018-25	3808	S-7	1994 [c]	4.99	0.59	118	100%	
50-00018-E	50-061-17	781	S-5A	1995	12.22	1.81	189	100%	
50-00024-E	50-024-01	555	S-7	1995	6.43	0.69	139	100%	
50-00031-E	50-003-01	233	S-7	1994 [c]	0.40	1.92	483	100%	Baseline unit load value in the low 5th percentile of basin IDs.
50-00031-E	50-003-02	520	S-7	1994 [c]	0.62	0.62	95	100%	
50-00031-E	50-003-03	119	S-6	1995	0.22	1.51	205	82%	
50-00031-E	50-004-01	909	S-5A	1994 [c]	3.68	1.60	364	100%	
50-00031-E	50-005-01	639	S-7	1994 [c]	0.91	0.94	126	99%	
50-00031-E	50-005-02	232	S-7	1994 [c]	0.06	1.42	770	100%	Baseline unit load value in the low 5th percentile of Basin IDs.
50-00031-E	50-005-03	320	S-7	1994 [c]	0.26	1.16	172	98%	
50-00031-E	50-005-04	310	S-7	1994 [c]	1.49	0.11	139	100%	
50-00031-E	50-005-05	603	S-8	1994 [c]	1.95	0.95	316	99%	
50-00031-E	50-005-06	532	S-7	1994 [c]	1.56	Unable to Calculate[d]		74%	
50-00031-E	50-006-01	388	S-5A	1994 [c]	4.53	1.43	342	100%	
50-00031-E	50-006-02	359	S-6	1994 [c]	5.50	0.82	179	100%	
50-00031-E	50-006-03	655	S-6	1994 [c]	3.55	0.62	202	100%	
50-00031-E	50-007-01	6473	S-6	1994 [c]	1.56	0.85	105	100%	
50-00031-E	50-007-02	5716	S-5A	1994 [c]	15.11	3.69	256	100%	
50-00031-E	50-008-02	401	L-8	N/A[a]	N/A[a]	2.27	89	100%	
50-00031-E	50-008-03	1050	L-8	N/A[a]	N/A[a]	1.11	147	100%	
50-00031-E	50-011-01	1747	S-6	1994 [c]	2.76	Unable to Calculate[d]		72%	
50-00031-E	50-012-01	1016	S-6	1994 [c]	4.06	2.67	270	97%	
50-00031-E	50-014-01	1520	S-7	1994 [c]	1.37	0.75	178	93%	
50-00031-E	50-016-01	1462	S-5A	1994 [c]	15.11	1.03	172	100%	
50-00031-E	50-017-01	878	S-7	1994 [c]	3.22	1.85	126	100%	
50-00031-E	50-018-17	464	S-7	1994 [c]	3.10	1.53	215	100%	
50-00031-E	50-019-01	568	S-7	1994 [c]	1.54	0.20	122	100%	
50-00031-E	50-019-02	1210	S-7	1994 [c]	1.38	0.21	101	98%	
50-00031-E	50-019-03	1051	S-7	1994 [c]	0.58	0.41	106	78%	
50-00031-E	50-019-04	317	S-7	1996	0.44	0.04	131	100%	
50-00031-E	50-020-01	320	S-6	1994 [c]	3.32	1.80	353	100%	
50-00031-E	50-021-01	2558	S-6	1994 [c]	8.92	8.25	761	98%	

Table 5. Continued.

Permit Number	Basin ID	Basin Acres [a]	Sub-basin	Baseline Year	Rain Adjusted Unit Area Load (lbs/ac) [a]		WY2016 TP Concen-tration [b] (µg/L) [a]	WY2016 Percent Sampled Load	Comments
					Baseline	WY2016 [b]			
50-00031-E	50-022-01	320	S-7	1994 [c]	0.80	0.15	153	100%	
50-00031-E	50-023-01	289	S-6	1994 [c]	11.83	0.58	167	100%	
50-00031-E	50-025-01	824	S-5A	1994 [c]	3.68	2.90	157	95%	
50-00031-E	50-027-01	2810	S-6	1994 [c]	2.40	0.94	235	100%	
50-00031-E	50-027-02	798	S-6	1994 [c]	1.22	0.89	168	100%	
50-00031-E	50-027-03	731	S-6	1994 [c]	2.32	0.86	243	90%	
50-00031-E	50-027-04	2519	S-6	1994 [c]	2.10	1.00	242	97%	
50-00031-E	50-028-01	212	S-6	1994 [c]	14.54	1.62	228	100%	
50-00031-E	50-029-01	681	S-7	1994 [c]	4.30	Unable to calculate [d]		25%	
50-00031-E	50-030-01	446	S-6	1994 [c]	14.14	4.76	429	96%	
50-00031-E	50-031-01	1609	S-6	1994 [c]	2.56	1.69	170	100%	
50-00031-E	50-031-02	1387	S-6	1994 [c]	5.48	Unable to calculate [d]		61%	
50-00031-E	50-031-03	609	S-6	1994 [c]	8.57	1.92	245	100%	
50-00031-E	50-032-01	306	S-7	1994 [c]	0.84	3.05	125	100%	
50-00031-E	50-034-01	7897	S-6	1994 [c]	1.68	0.82	120	100%	
50-00031-E	50-034-02	601	S-6	1994 [c]	3.37	1.51	1334	97%	
50-00031-E	50-034-03	4246	S-7	1994 [c]	4.08	1.21	226	97%	
50-00031-E	50-034-04	4503	S-7	1994 [c]	1.54	0.33	127	100%	
50-00031-E	50-035-01	478	S-6	1994 [c]	5.74	1.64	202	98%	
50-00031-E	50-038-01	1285	S-5A	1994 [c]	3.71	Unable to calculate [d]		53%	
50-00031-E	50-039-01	63	S-6	1995	4.01	0.55	166	100%	
50-00031-E	50-039-02	144	S-6	1995	4.25	1.53	300	100%	
50-00031-E	50-040-01	216	S-5A	1995	1.40	2.92	131	99%	
50-00031-E	50-040-02	494	S-5A	1995	3.61	2.17	127	98%	
50-00031-E	50-041-01	109	S-6	1998	2.69	2.90	223	100%	
50-00031-E	50-041-02	300	S-7	1998	2.44	3.52	280	100%	
50-00031-E	50-042-01	320	S-7	1995	0.14	0.99	187	100%	
50-00031-E	50-045-01	282	S-6	1995	4.35	0.54	116	100%	
50-00031-E	50-045-02	152	S-6	1995	1.41	0.95	142	100%	
50-00031-E	50-048-01	1185	S-6	1995	1.25	0.78	126	100%	
50-00031-E	50-048-02	640	S-7	1995	0.36	0.28	98	100%	Baseline unit load value in the low 5th percentile of Basin IDs.
50-00031-E	50-051-01	835	S-6	1995	0.97	0.27	103	100%	
50-00031-E	50-053-01	149	S-6	1995	5.16	0.62	236	87%	
50-00031-E	50-058-01	157	S-7	1995	0.02	0.00	60	100%	
50-00031-E	50-061-13	1077	S-7	1995	1.16	2.07	158	100%	
50-00031-E	50-070-01	225	S-6	1995	3.82	0.82	120	100%	
50-00031-E	50-070-02	264	S-6	1995	3.09	0.53	146	100%	
50-00031-E	50-078-01	71	S-7	1999	8.71	0.33	106	100%	

Table 5. Continued.

Permit Number	Basin ID	Basin Acres [a]	Sub-basin	Baseline Year	Rain Adjusted Unit Area Load (lbs/ac) [a]		WY2016 TP Concen-tration [b] (µg/L) [a]	WY2016 Percent Sampled Load	Comments
					Baseline	WY2016[b]			
50-00037-E	50-037-01	1194	S-5A	1994 [c]	6.70	0.00	N/A	N/A	Rock pit provides onsite retention preventing discharge.
50-00046-E	50-046-01	35	S-7	1994 [c]	2.21	1.81	157	100%	
50-00044-E	50-044-01	2169	S-5A	1996	5.02	1.35	126	100%	
50-00047-E	50-047-01	630	S-6	1996	1.46	0.91	216	100%	
50-00047-E	50-047-02	640	S-6	1995	0.84	1.56	261	100%	
50-00047-E	50-047-03	1832	S-6	1997	0.44	1.18	237	100%	
50-00047-E	50-047-04	198	S-6	1996	0.68	1.47	182	100%	
50-00047-E	50-047-07	3494	S-5A	1996	0.67	1.32	184	100%	
50-00047-E	50-047-08	1558	S-6	1996	0.96	1.49	231	100%	
50-00047-E	50-054-01	10360	S-5A	1996	1.16	1.32	201	100%	
50-00047-E	50-054-03	7586	S-5A	1996	0.35	2.01	182	100%	Baseline unit load value in the low 5th percentile of Basin IDs.
50-00047-E	50-055-01	393	S-6	1997	0.86	1.00	115	100%	
50-00047-E	50-055-02	810	S-6	1999	0.45	1.11	214	100%	
50-00047-E	50-056-01	850	S-6	1996	0.98	3.17	315	100%	
50-00047-E	50-059-01	11551	S-5A	1996	2.35	2.66	384	100%	
50-00047-E	50-059-02	1783	S-5A	1997	1.07	1.26	168	100%	
50-00047-E	50-059-03	720	S-5A	1996	1.65	2.65	283	100%	
50-00047-E	50-059-04	306	S-5A	1996	1.14	3.93	308	100%	
50-00047-E	50-061-18	1555	S-6	1995	9.82	2.97	72	100%	
50-00047-E	50-062-01	4626	S-7	1996	0.20	1.24	105	100%	Baseline unit load value in the low 5th percentile of Basin IDs.
50-00047-E	50-062-02	32535	S-7	1996	0.46	0.48	81	100%	
50-00047-E	50-062-11	960	S-7	1996	0.44	0.73	71	100%	
50-00047-E	50-067-03	634	S-8	1996	1.02	2.66	59	100%	
50-00047-E	50-067-04	3832	S-8	1996	0.55	2.03	117	100%	
50-00047-E	50-068-01	2616	S-5A	1996	1.13	1.02	122	100%	
50-00060-E	50-060-01	8208	S-6	1995	0.18	0.34	59	100%	Baseline unit load value in the low 5th percentile of Basin IDs.
50-00060-E	50-060-02	7790	S-6	1995	0.75	0.46	57	100%	
50-00061-E	50-061-03	3434	S-7	1995	0.76	0.48	108	100%	
50-00061-E	50-061-10	24785	S-8	1996	0.60	0.34	67	100%	
50-00061-E	50-061-15	4084	S-5A	1995	1.91	0.75	146	100%	
50-00061-E	50-061-22	3739	S-8	1996	0.49	0.35	55	99%	
50-00062-E	26-004-01	4502	S-8	1999	1.22	0.40	88	100%	
50-00062-E	50-061-05	314	S-7	1995	1.89	12.90	137	100%	
50-00062-E	50-061-06	237	S-7	1995	1.68	0.62	180	100%	
50-00062-E	50-061-07	318	S-7	1995	1.24	0.46	95	100%	
50-00062-E	50-061-12	730	S-7	1995	2.55	1.41	168	100%	

Table 5. Continued.

Permit Number	Basin ID	Basin Acres [a]	Sub-basin	Baseline Year	Rain Adjusted Unit Area Load (lbs/ac) [a]		WY2016 TP Concen-tration [b] (µg/L) [a]	WY2016 Percent Sampled Load	Comments
					Baseline	WY2016 [b]			
50-00062-E	50-062-03	1179	S-7	1996	0.54	0.57	139	100%	
50-00062-E	50-062-04	901	S-7	1996	0.26	0.70	160	100%	Baseline unit load value in the low 5th percentile of Basin IDs.
50-00062-E	50-063-01	9760	S-7	1996	0.45	0.61	257	100%	
50-00062-E	50-067-01	1133	S-8	1996	0.40	0.51	86	100%	Baseline unit load value in the low 5th percentile of Basin IDs
50-00062-E	50-067-02	10274	S-8	1996	0.94	0.71	81	100%	
50-00062-E	50-067-05	7323	S-8	1996	0.42	0.37	62	100%	
50-00062-E	50-067-06	1277	S-8	1999	0.49	Unable to Calculate[d]		0%	
50-00062-E	50-067-07	1981	S-8	1999	0.54	1.96	70	100%	
50-00062-E	50-067-09	1278	S-8	1999	0.54	3.68	510	100%	
50-00062-E	50-067-10	2539	S-8	1999	1.21	1.17	123	100%	
50-00062-E	50-067-11	6153	S-8	1999	0.85	0.60	94	100%	
50-00065-E	50-055-03	2871	S-6	1996	0.74	0.28	137	100%	
50-00065-E	50-061-01	639	S-6	1995	1.44	2.57	194	100%	
50-00065-E	50-061-08	368	S-5A	1999	1.76	1.91	167	100%	
50-00065-E	50-065-02	938	S-6	1995	3.64	0.98	235	100%	
50-00065-E	50-065-07	512	S-6	1995	3.92	2.06	159	100%	
50-00065-E	50-065-10	792	S-6	1995	1.55	1.49	48	100%	
50-00069-E	50-069-01	317	S-7	1996	1.06	0.44	250	100%	
50-00073-E	50-073-01	68	S-5A	2001	Unable to Calculate	0.00	N/A	100%	Non-agricultural Basin ID served by wet and dry detention areas, which historically has not reported flow offsite.
50-00074-E	50-010-01	784	S-6	1995	2.42	0.29	227	100%	
50-00081-E	50-018-14	534	S-7	1994 [c]	2.21	1.81	157	100%	
50-00081-E	50-081-01	225	S-7	2004	0.66	1.08	210	100%	
50-00082-E	50-082-01	484	S-7	1995	9.82	9.08	203	100%	
50-00083-E	50-013-01	1360	S-5A	1997	2.98	1.37	104	100%	
50-00083-E	50-035-02	1666	S-5A	1997	2.98	1.37	104	100%	
50-00083-E	50-064-01	899	S-5A	1997	2.98	1.37	104	100%	
50-00083-E	50-064-03	145	S-5A	1997	2.98	1.37	104	100%	
50-00083-E	50-064-04	1134	S-5A	1997	2.98	1.37	104	100%	
50-00083-E	50-065-03	3722	S-5A	1997	2.98	1.37	104	100%	
50-00083-E	50-065-05	930	S-5A	1997	2.98	1.37	104	100%	
50-00083-E	50-065-06	454	S-5A	1997	2.98	1.37	104	100%	
50-00083-E	50-065-08	628	S-5A	1997	2.98	1.37	104	100%	
50-00084-E	50-018-02	6722	S-5A	1994 [c]	3.54	1.30	157	100%	

Table 5. Continued.

Permit Number	Basin ID	Basin Acres [a]	Sub-basin	Baseline Year	Rain Adjusted Unit Area Load (lbs/ac) [a]		WY2016 TP Concen-tration [b] (µg/L) [a]	WY2016 Percent Sampled Load	Comments
					Baseline	WY2016 [b]			
Lake Okeechobee Diversion Basins – 298 Districts and Closter Permitees [e]									
50-00010-E	50-010-06	10497	N/A[a]	N/A[a]	N/A[a]	0.56	117	100%	South Florida Conservancy District. The diverted acreage is 80% of the total Basin ID acreage.
50-00033-E	50-033-02	6020	N/A[a]	N/A[a]	N/A[a]	7.02	732	100%	East Beach Water Control District. The diverted acreage is 80% of the total Basin ID acreage.
50-00047-E	50-077-01	3127	N/A[a]	N/A[a]	N/A[a]	2.90	282	100%	715 Farms (Closter Farms). The diverted acreage is 100% of the total Basin ID acreage.
50-00080-E	50-080-01	8012	N/A[a]	N/A[a]	N/A[a]	1.53	167	100%	East Shore Drainage District. The diverted acreage is 100% of the total Basin ID acreage.
50-00081-E	50-081-02	3744	N/A[a]	N/A[a]	N/A[a]	1.18	158	100%	South Shore Drainage District. The diverted acreage is 96% of the total Basin ID acreage.

a. 1 acre = 0.004 square kilometers (km2); lbs/ac= pounds per acre; 1 lb/ac = 112.1 kilogram per square kilometer (kg/km2); and µg/L=microgram per liter, 1 µg/L ≈ 1 part per billion (ppb). N/A = Not Applicable

b. Data reflects submittals as of July 14, 2016.

c. Indicates basins that elected to participate in the Early Baseline Option and met requirements as described in Chapter 40E-63.145(4), F.A.C.

d. Unable to calculate indicates the data quality requirement of greater than 75 percent sampled load was not achieved.

e. The five diversion project basins (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 Chapter 40E-63, F.A.C., EAA Basin 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 of this volume for additional information on source control activities and requirements in these areas.

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

- Permit number identifies the permit associated with each Basin ID. A permit may include one or more Basin IDs.
- Basin ID is a unique identifier for each hydraulic drainage basin within a permit. It may represent one or more permittees.
- Subbasin is the EAA subbasin in which each Basin ID resides.
- Baseline year is the water year for which a farm established its baseline period load. For early baseline permit-basins, the baseline period load is based on data collected from May 1, 1993, through April 30, 1994.
- Rainfall adjusted UAL:
  - 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.
  - WY2016 (adjusted UAL) is the TP load per unit area for the current water year for a farm, which includes a 10-year base period rainfall adjustment.
- WY2016 TP concentration is the TP FWMC for the farm for WY2016.

- WY2016 percent sampled load is the percentage of WY2016 TP load for a basin ID computed from data submitted by the permittee as compared to the total of submitted and estimated load.

Figure 5 depicts annual unit area TP load (load per acre) at both the EAA Basin-level and permit-level. The permit-level data show lower unit area TP load in recent years, as compared with the initial years of full BMP implementation. During the first five years of full BMP implementation (WY1996–WY2000), the total permit-level unit area TP load averaged 1.23 pounds per acre (lbs/acre; 137.9 kilograms per square kilometer [kg/km^2]), while the most recent five-year period (WY2012–WY2016) had an average of 0.79 lbs/acre (88.6 kg/km^2), and the intermediate period suggests a decreasing trend. The fluctuations in the five-year rolling average of the permittee unit area TP load correspond to those of the unit area TP loads derived from the SFWMD data for EAA Basin-level compliance calculations.

Similarly, as shown in **Figure 6**, the EAA Basin permittee's annual TP FWMC levels in recent years are lower than those during the first five years of full BMP implementation. TP FWMC levels decreased from an average of 148 micrograms per liter (µg/L) to an average of 119 µg/L during the most recent five-year period, and the intermediate period suggests a decreasing trend. The TP concentration five-year rolling averages presented in **Figure 6** are "annual flow-weighed" values calculated by dividing the total annual cumulative TP load by the total cumulative flow. Overall, the EAA permit-level annual data supports the EAA Basin compliance calculations.

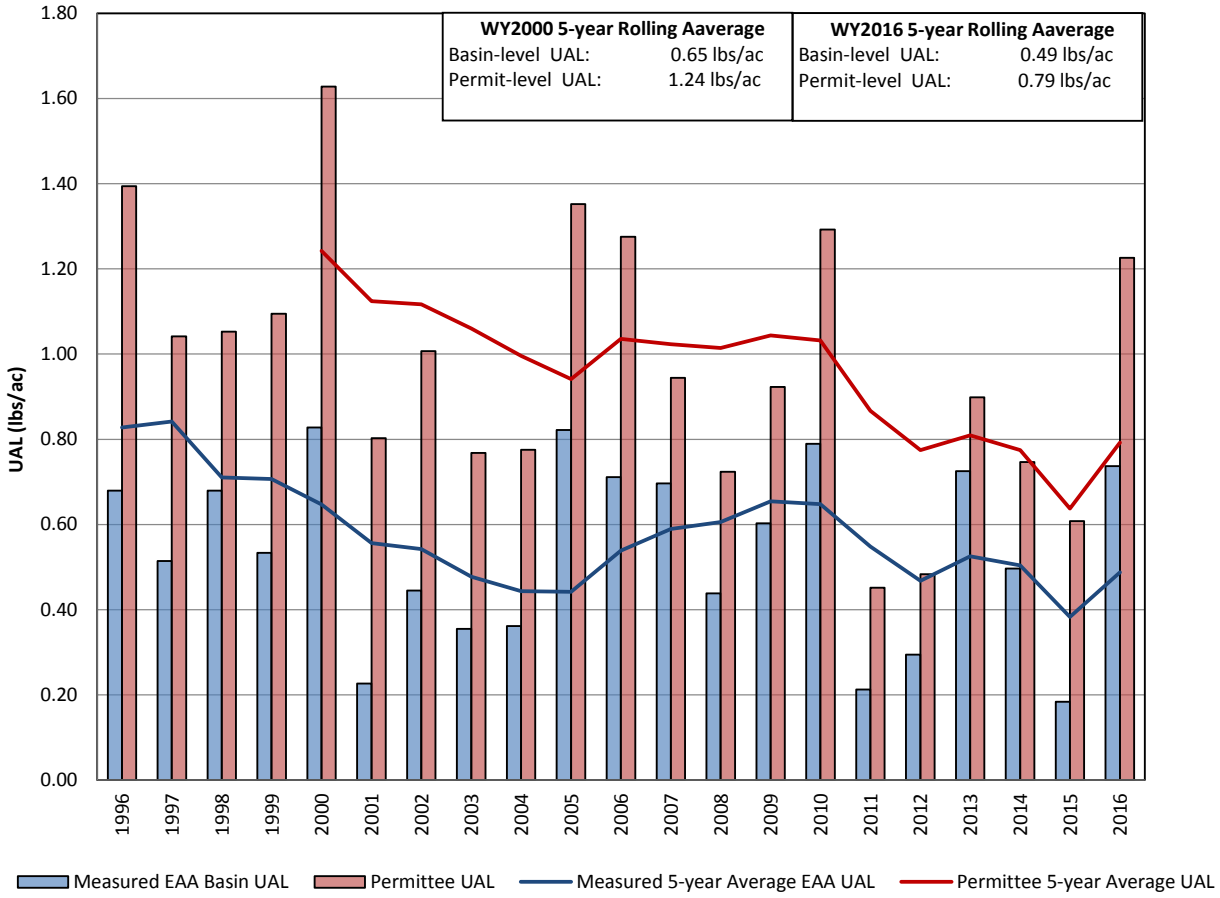

Figure 5. WY1996–WY2016 EAA and permittee TP UAL and five-year rolling averages.

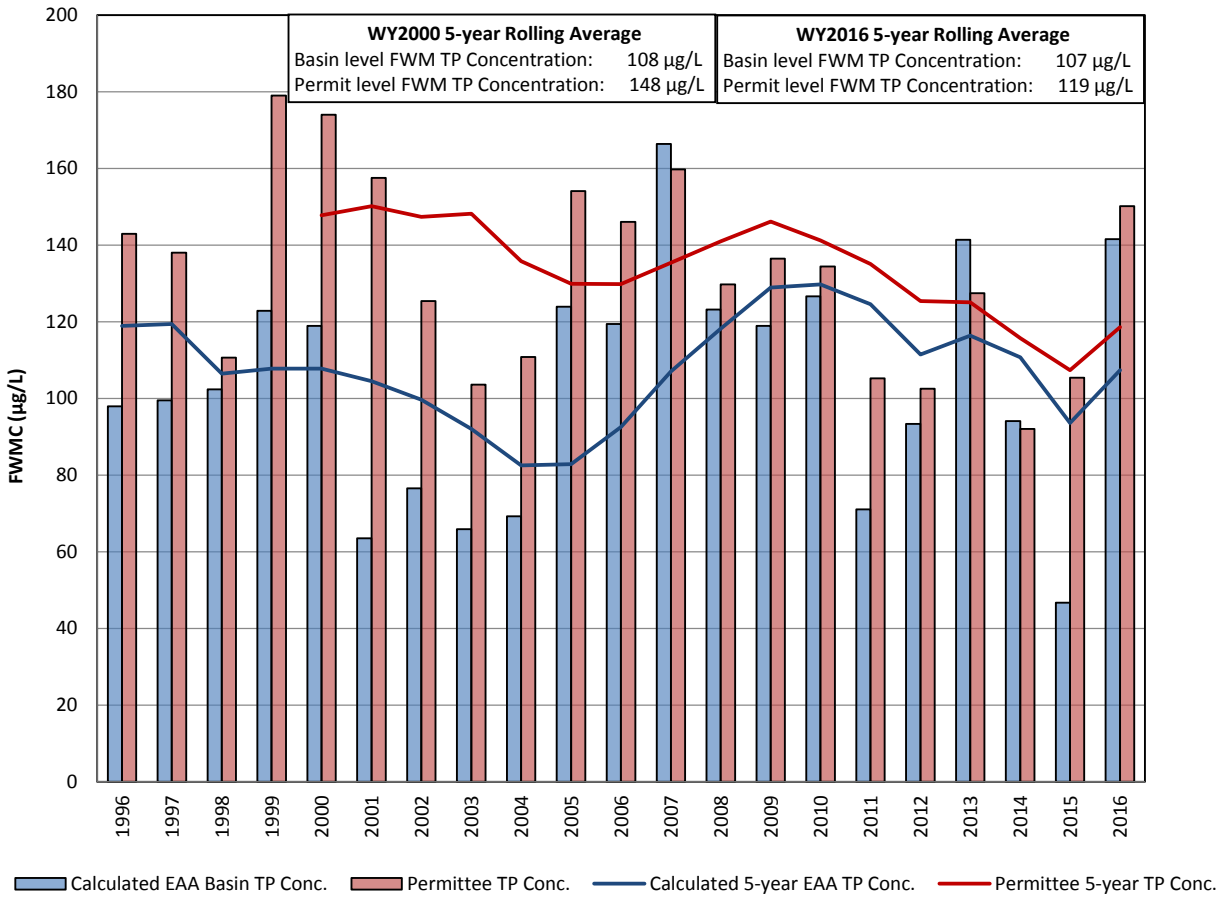

Figure 6. WY1996–WY2016 EAA and permittee TP concentration (Conc.) and five-year rolling averages.

Figures 7 and **8** depict the WY2016 spatial distribution of TP FWMC and rainfall adjusted UALs for the basin IDs and the average of the past five years (WY2011–WY2015), respectively. These figures are graphical representations of the **Table 5** data from individual permit holders. **Figures 9** and **10** present the Basin ID's frequency distributions for rainfall adjusted UALs and TP FWMC, respectively, for WY2016 compared to the average of the past five years (WY2011–WY2015), and to WY1998, as this water year had similar hydrologic conditions during the dry season compared to WY2016.

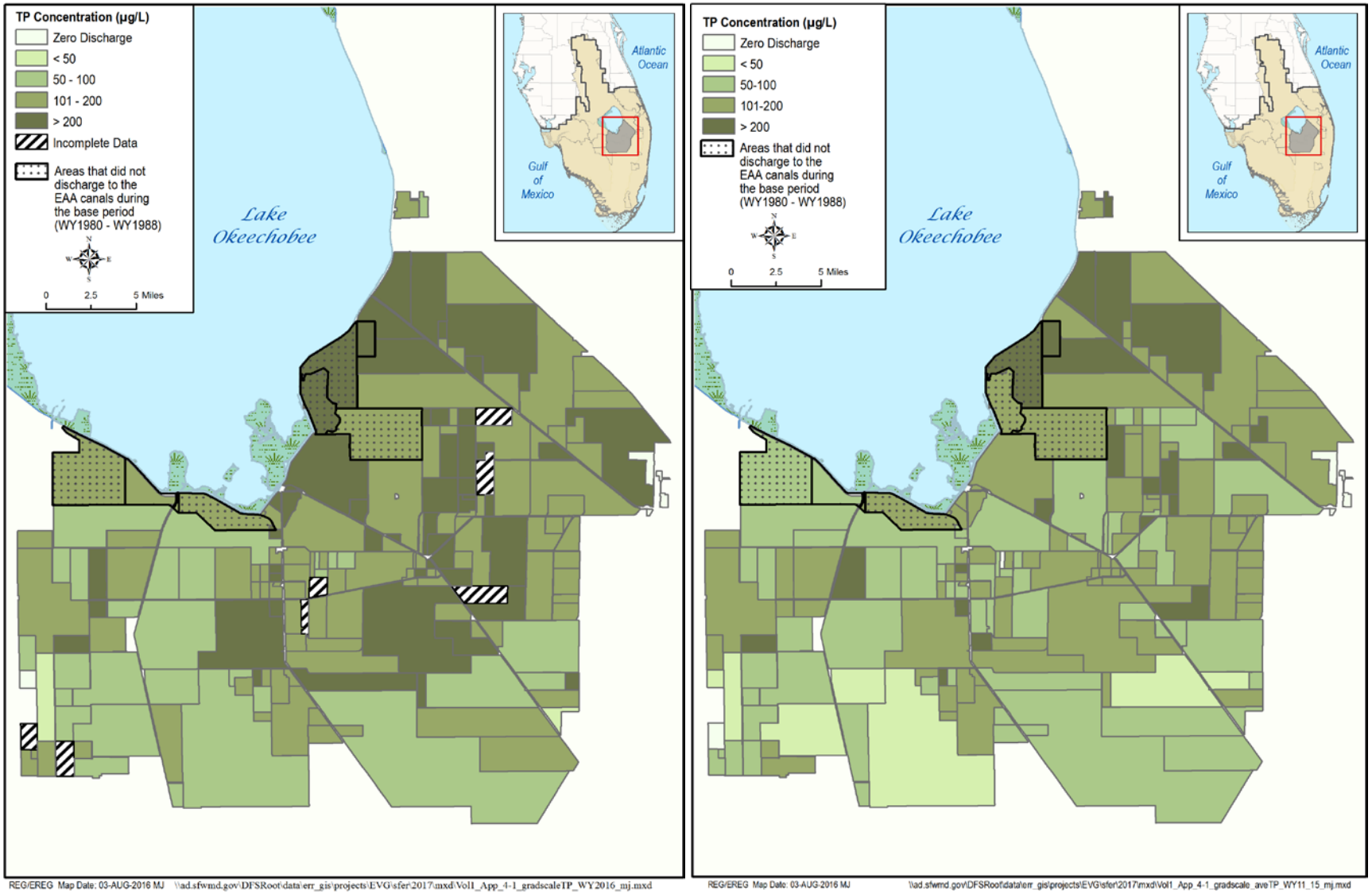

Figure 7. WY2016 (left) and WY2011–WY2015 (right) TP FWMC for the EAA Basin. (Note: 1 µg/L ≈ 1 parts per billion.)

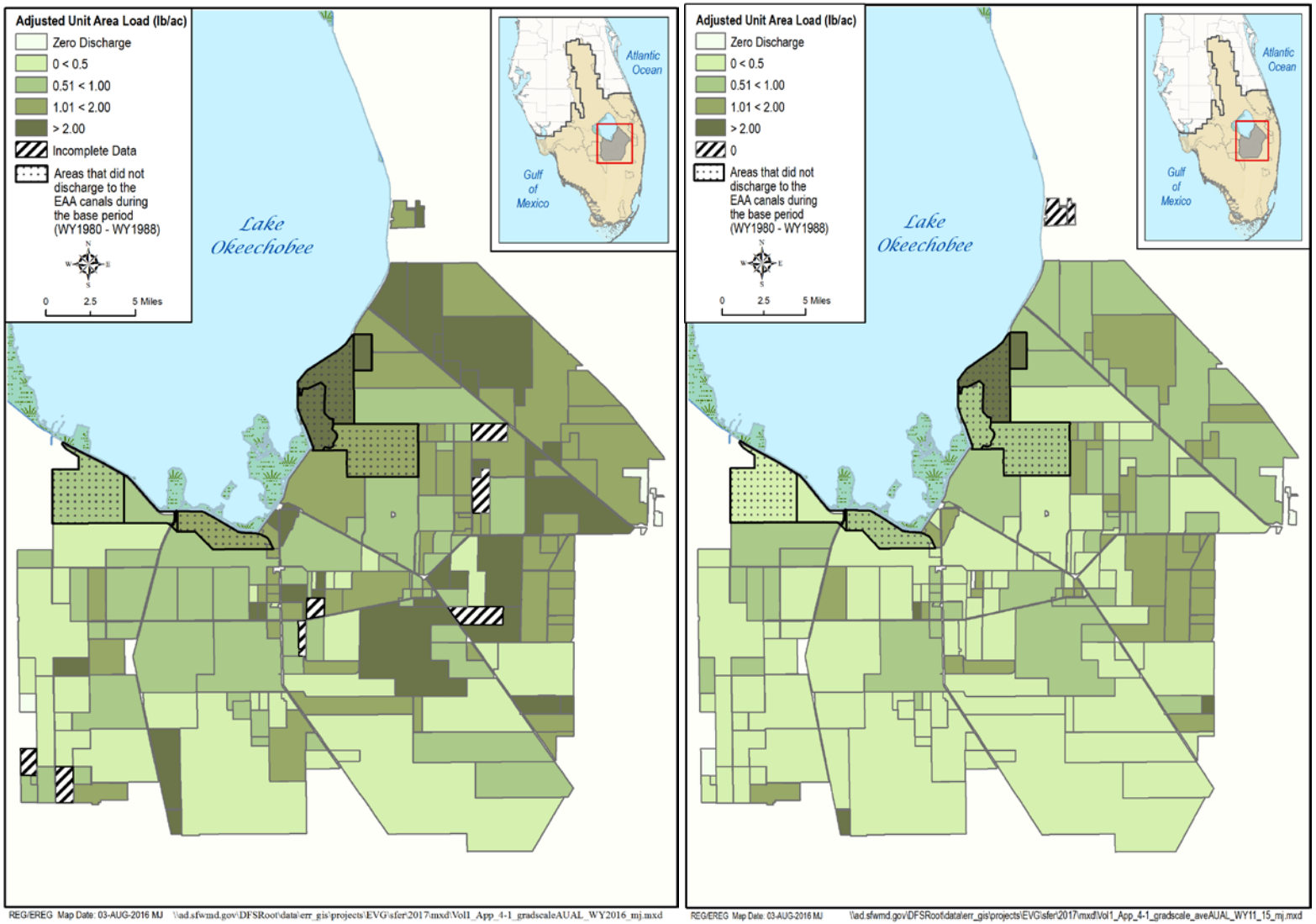

Figure 8. WY2016 (left) and WY2011–WY2015 (right) rainfall-adjusted unit area TP load for the EAA Basin. (Note: lb/ac – pound per acre.)

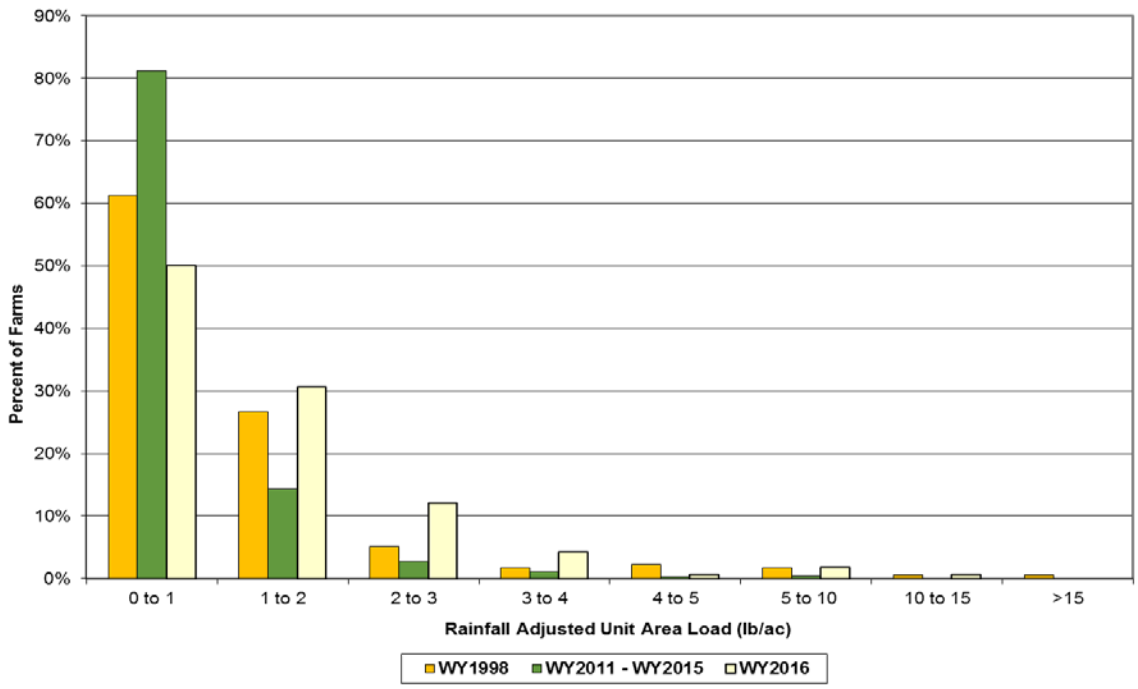

Figure 9. EAA Basin ID rainfall-adjusted UAL frequency distribution.

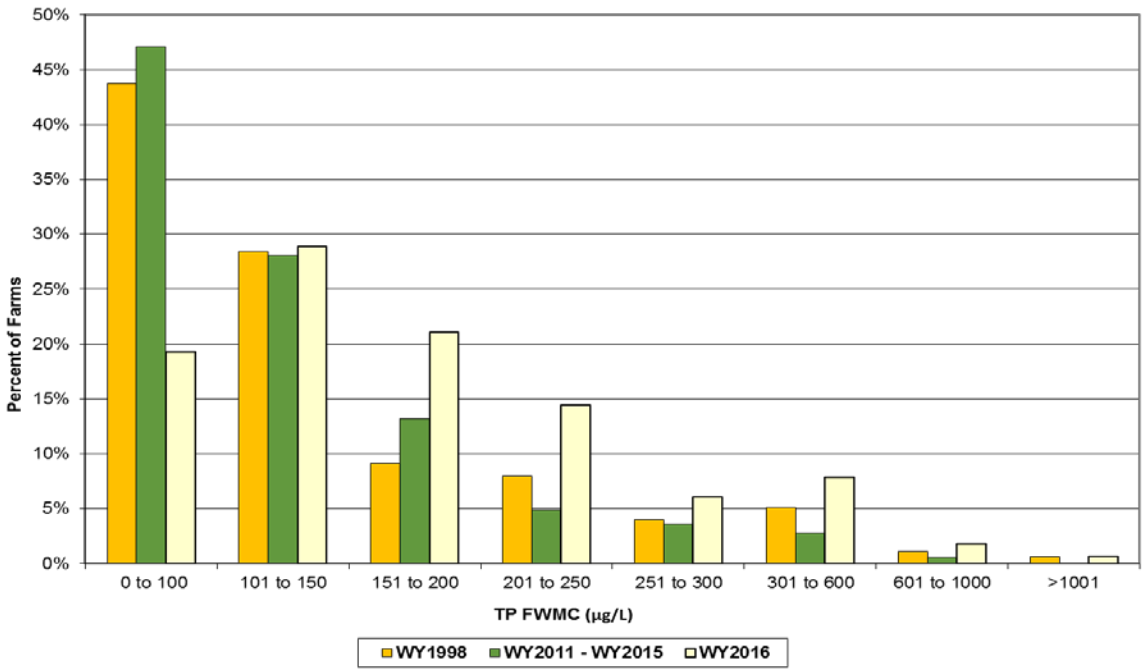

Figure 10 EAA Basin ID TP FWMC frequency distribution.

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