

# Appendix 4-3: Supplemental Information for Everglades Stormwater Program Basins in the Southern Everglades

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## INTRODUCTION

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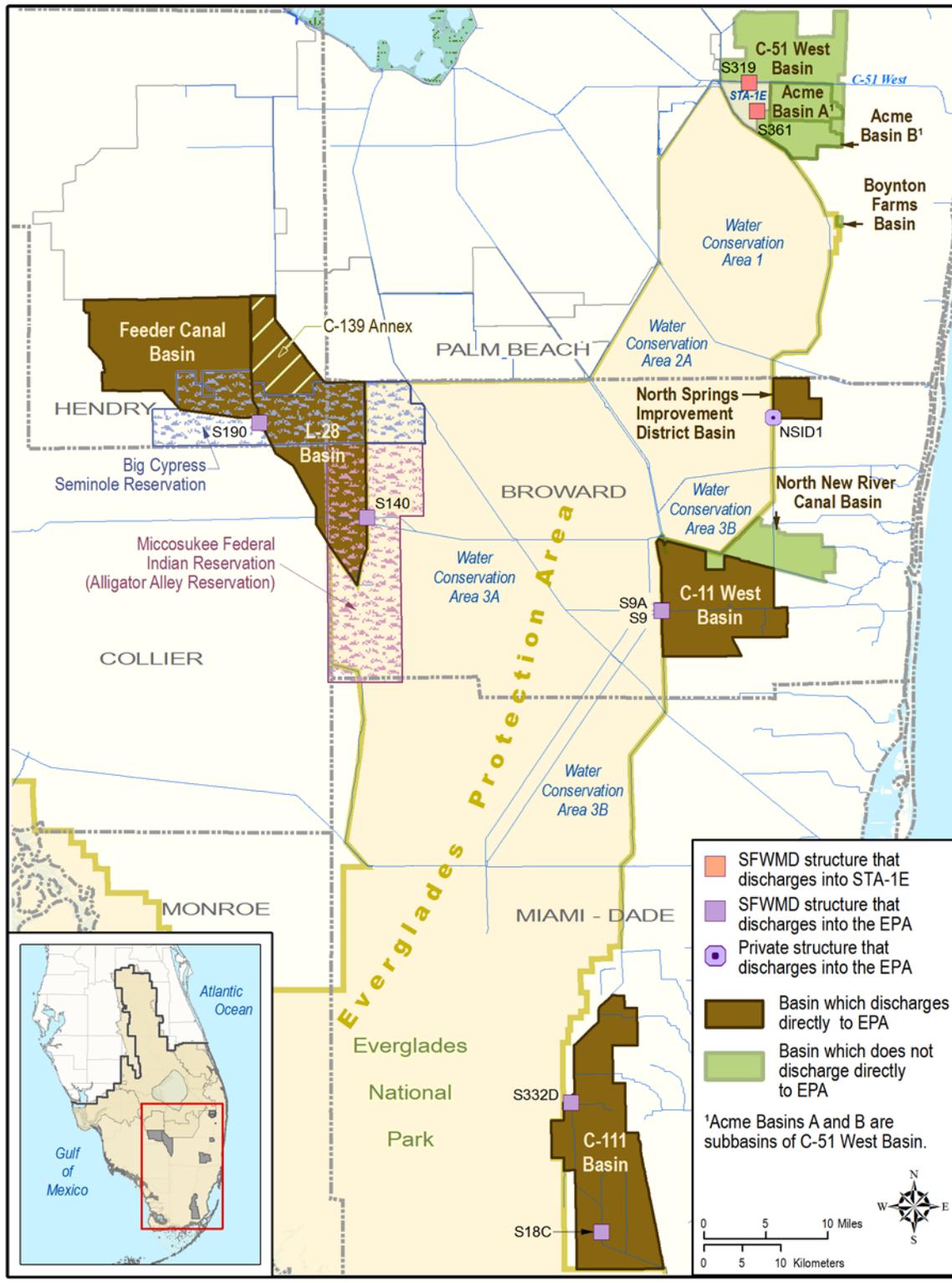
In addition to the Everglades Agricultural Area (EAA) and C-139 basins, which are Everglades Construction Project basins, there are eight other Everglades watershed basins that either discharge to the Everglades Protection Area (EPA) directly or to stormwater treatment areas (STAs) prior to their ultimate discharge to the EPA. Water quality improvement strategies for these basins, including source controls and monitoring aspects, were approved by the Florida Department of Environmental Protection (FDEP) via a long-term compliance permit issued to the South Florida Water Management District (SFWMD or District) pursuant to Section 9(k) of the Everglades Forever Act (EFA). The permit is sometimes referred to as the Non-Everglades Construction Project (Non-ECP) permit because the tributary areas that it addresses were not included in the original permit for the Everglades Construction Project (ECP).

In contrast with the EAA and C-139 basins, which included the implementation of a regulatory source control program under Chapter 40E-63, Florida Administrative Code (F.A.C.), these tributary basins were required to implement tailored strategies and schedules to achieve and maintain water quality standards. SFWMD established the Everglades Stormwater Program (ESP) to implement, track, update, and report on the schedules and strategies for these basins.

The long-term compliance permit authorized SFWMD to operate and maintain 37 structures within its control discharging into, within, or from the EPA. The focus of this appendix is the nine structures that were identified as “into” structures to the EPA and associated with six of the basins: Acme Improvement District (Acme1 and Acme2), North New River (NNR) (G-123), C-11 West (S-9), C-111 (S-332, S-18C, and S-175), L-28 (S-140), and Feeder Canal (S-190). These “into” structures are within SFWMD control.

Specifically, FDEP Permit Number 0237803 (original permit: 06, 502590709), which was originally issued in 1998, required SFWMD to evaluate and report on the progress toward achieving established water quality standards and the effectiveness of source control strategies based on required water quality monitoring. SFWMD was required to provide a detailed description of water quality monitoring programs at basin discharge structures, as well as goals and strategies for water quality improvements within the eight tributary basins. See **Figure 1** for the location of each ESP basin and its associated structures. The data collection requirements, including water quality parameters, collection frequency, and collection methods for structures associated with the basins are outlined in the FDEP permits. This appendix incorporates flow and total phosphorus (TP) data for all “into” structures as well as upstream water quality monitoring.

37 Chapter 3A of this volume and Volume III, Appendix 3-2, present other water quality parameters for which  
 38 monitoring is required under the long-term compliance permit.



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**Figure 1.** Other tributary basins and structures discharging into the EPA.

41 In 2003, the SFWMD submitted an application to FDEP that included the 2003 Long-Term Plan for  
 42 Achieving Water Quality Goals in the EPA (Long-Term Plan; Burns and McDonnell 2003), describing how  
 43 SFWMD will implement additional water quality improvement plans (WQIPs) for each basin. SFWMD is  
 44 required to report annually on the status of WQIPs and monitoring results. A historical timeline of the  
 45 implementation of WQIPs in these tributary basins is provided in **Table 1**.

46 The private pump structures serving the Boynton Farms and North Springs Improvement District  
 47 (NSID) basins (NSID1 structure) were not in the control of SFWMD and were not specifically named in  
 48 the long-term compliance permit. These basins were included in SFWMD’s ESP strategies because they  
 49 also discharged into the EPA, and were not included in the ECP program.

50 Improvements to the stormwater management systems within three of the original eight ESP basins,  
 51 associated with strategies implemented under the ESP program, have resulted in only five basins  
 52 discharging into the EPA directly during Water Year 2016 (WY2016) (May 1, 2015–April 30, 2017).  
 53 Discharges from Boynton Farms and NNR basins are diverted to receiving bodies other than the EPA, and  
 54 Acme Improvement District Basin (Acme) discharges are conveyed to STAs prior to discharging into the  
 55 EPA. Water management system modifications were conducted within Acme directing flows into the C-51  
 56 west canal and then generally directing to STA-1 East (STA-1E). The Acme1 structure was removed in  
 57 2007 and the Acme2 structure has only been allowed to directly discharge untreated flows into Water  
 58 Conservation Area (WCA) 1 under emergency conditions, such as in response to the August 2012 Tropical  
 59 Storm Isaac. This appendix includes historical discharge information from the Acme Basin. .

60 **Table 1.** Historical timeline for the ESP Basins.

Basin	Timeframe	Event
Long-term Compliance (Non-ECP) Permit Overall	1998	Permit No. 06 502590709 was issued by FDEP requiring implementation of strategies and schedules to achieve and maintain state water quality standards and maintain a water quality monitoring program within eight basins—Acme Improvement District (also known as Village of Wellington [VOW]), Boynton Farms, C-11 West, C-111, Feeder Canal, L-28, NNR, and North Springs Improvement District—known as the Non-ECP basins, which are not included in the ECP, and are served by 37 structures discharging into, within, or from the EPA.
	2003	SFWMD submitted to FDEP a long-term compliance permit application that included the 2003 Long-Term Plan (Burns and McDonnell 2003), requiring the SFWMD to implement WQIPs for each basin and FDEP subsequently renewed the permit.
Boynton Farms	2011	An Environmental Resource Permit (ERP) was issued by SFWMD to Palm Beach County providing for the discharge of stormwater from the Amestoy agricultural property (Boynton Farms) in the Boynton Farms Basin from four pump stations to the Lake Worth Drainage District E-1 Canal. Any provisions for discharge from the Amestoy property westward to the EPA were eliminated with the issuance of this permit.
C-11 West	2003	The completion of pump station S-9A in the C-11 West Basin located at the west end of the C-11 west canal allowed for less dramatic stage variation in the canal by reducing the need to pump to the EPA via the higher capacity S-9. Consistent with the WQIP for the C-11 West Basin, pumping to the EPA via S-9A allowed for lower volumes of water entering the EPA, resulting in lower TP loads being discharged from the C-11 West Basin.
	2008	A Surface Water Management (SWM) permit was issued by SFWMD to the City of Weston (Indian Trace Development District or ITDD) in the C-11 West Basin providing for an increase in control elevation from 4.0 to 4.5 feet (ft) National Geodetic Vertical Datum of 1929 (NGVD29) within the ITDD basin. Issuance of this permit provided for additional water quality treatment within the ITDD drainage system before discharge from two ITDD pump stations to the C-11 west canal, as well as a water quality monitoring program at the ITDD pump stations.
	2009	A SWM permit was issued by SFWMD to South Broward Drainage District (SBDD) in the C-11 West Basin providing for the modification of three gravity structures discharging to the C-11 west canal, limiting discharge from SBDD upstream canals until stages within those canals exceed 4.0 ft NGVD29. Issuance of this permit provided for additional water quality treatment within the SBDD drainage system before discharge from the SBDD structures to the C-11 west canal, as well as a water quality monitoring plan at the discharge structures.

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Table 1. Continued.

Basin	Timeframe	Event
Feeder Canal	1986	A SWM permit was issued by SFWMD to McDaniel Ranch in the Feeder Canal Basin for the construction of a surface water management system serving 4,826 acres consisting of swales, ditches, and pumps providing water quality treatment by directing runoff to four reservoirs.
	1996	An agreement between SFWMD and the Seminole Tribe of Florida was executed on January 17, 1996, providing for water quality, water supply, and flood control plans for the Big Cypress Seminole Reservation and the Brighton Seminole Reservation (17,880 acres out of 72,200 acres in the Feeder Canal Basin), implementing Sections V.C. and VI.D. of the Water Rights Compact.
	1996	An agreement between the Seminole Tribe of Florida and McDaniel Ranch (22,830 acres out of 72,200 acres in the Feeder Canal Basin) was executed on May 14, 1996, to develop a master surface water management system, implement best management practices (BMPs), and implement a water quality monitoring plan toward meeting a discharge TP concentration of 50 micrograms per liter (µg/L) prior to entering the Seminole Reservation.
	1999	An ERP was issued by SFWMD to McDaniel Ranch in the Feeder Canal Basin for the construction of a surface water management system serving 21,597 acres discharging to the North Feeder Canal and the wetland system in the southwest corner of the property. The 1996 agreement is referenced by the permit.
	2002	A BMP grant program was implemented by SFWMD to provide cost share dollars for landowners within the Feeder Canal Basin implementing water quality improvement strategies. Program partners include SFWMD, Hendry Soil and Water Conservation District, National Resources Conservation Service, and Florida Department of Agriculture and Consumer Services.
	2006	An ERP modification was issued by SFWMD to McDaniel Ranch in the Feeder Canal Basin pursuant to the sale of 3,256 acres to McDaniel Reserve Realty Holdings for a project entitled Everglades Plantation. The ERP modification provided for directing most flows from the surface water management system, which included 2,075.5 acres of water quality pre-treatment areas, through structure PC-17A. Only during large storm events, small flows would be discharged by way of a planned structure (W-D1AB) to be built upstream of structure G-108.
	2007	Construction of structure W-D1AB in the Feeder Canal Basin upstream of structure G-108 was completed, resulting in the majority of flow from McDaniel Ranch property discharging through structure PC-17A, following water quality treatment in the McDaniel Ranch surface water management system. With the completion of structure W-D1AB, the McDaniel Ranch surface water management system was substantially completed.
	2010	A partnering agreement was established with McDaniel Reserve Realty Holdings in the Feeder Canal Basin for implementation of a BMP program in pasture lands.
	2012	Certification was obtained for the surface water management system serving McDaniel Ranch in the Feeder Canal Basin that was permitted in 2006. The system was certified as complete and converted to operation status.
L-28	1987	SFWMD initiated water quality sampling at the S-140 structure in the L-28 Basin. The S-140 structure discharges to WCA-3A.
	2006	SFWMD completed the expansion of STA-6 allowing diversion of runoff from the C-139 Annex in the L-28 Basin to STA-6 sections 1 and 2.
	2011	An ERP modification was issued by SFWMD to United States Sugar Corporation authorizing operation of the C-139 Annex pump station in the L-28 Basin. The C-139 Annex pump station replaced a gravity structure that discharged from agricultural lands. The permit modification required BMP implementation and maintenance of TP loads discharged to STA-6 at or below historical levels.
	2014	A lease agreement between SFWMD and United States Sugar Corporation for citrus agriculture within the C-139 Annex identified as "Phase 1" terminated on June 30. Phase 2 of the lease is expected to end on or before June 30, 2018.

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Table 1. Continued.

Basin	Timeframe	Event
North New River	2014	SFWMD removed Structure G-123 at the west end of the NNR Canal in the NNR Basin, eliminating the potential of discharge from the NNR Basin to the EPA.
North Springs Improvement District	2009	A SWM permit was issued by SFWMD to NSID in the NSID Basin providing for a pump operation schedule and a water quality monitoring program at NSID pump station 1, which potentially discharges to the EPA, an upstream water quality monitoring program within the NSID basin, and provisions for NSID to implement a SFWMD-approved BMP plan intended to improve the water quality of discharges from the basin.
	2009	A memorandum of understanding (MOU) was established among SFWMD, NSID, and Coral Springs Improvement District (CSID) affecting the NSID Basin, to allow for discharge from NSID pump station 1 to the L-36 south canal during periods when discharge from CSID is less than the MOU-specified threshold level. By providing NSID with ability to discharge to the south given appropriate conditions, the MOU rendered discharge scenarios from NSID pump station 1 to the EPA less likely.
Village of Wellington	1996-2005	Five partnering agreements were established between the SFWMD and VOW in the VOW Basin intended to improve the water quality of discharges from the VOW into the Arthur R. Marshall Loxahatchee National Wildlife Refuge. The agreements provided for VOW's implementation of BMPs consistent with the VOW Basin WQIPs for equine waste handling and fertilization practices and drainage system infrastructure improvements within the Acme (VOW) Basins A and B.
	2007	An ERP was issued by SFWMD to the VOW Basin providing for diversion of stormwater discharges from Acme Basin B to Acme Basin A, and water quality monitoring upstream of and at structures discharging to the C-51 west canal. Issuance of this permit provided for the elimination of discharge from Acme pump stations 1 and 2 to the Arthur R. Marshall Loxahatchee National Wildlife Refuge.

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## BASIN SUPPLEMENTAL EVALUATION

### 66 BASIN-LEVEL MONITORING DATA

67 SFWMD continues to monitor flow at structures S-190, S-140, S-18C, S-332D, S-9, S-9A, S-319, and  
 68 S-361 (**Figure 1**), as well as water quality by way of surface water manual grab samples and deployed  
 69 automatic surface water samplers (autosampler). In addition, the NSID1 (**Figure 1**) and Acme1 and Acme2  
 70 structures were monitored by SFWMD until 2010 and 2006, respectively. After those dates, monitoring for  
 71 these structures was continued by NSID and Acme, respectively. **Table 2** summarizes the annual total flow,  
 72 total TP load, and TP flow-weighted mean concentration (FWMC) for each of the structures. The individual  
 73 aggregated structure summaries represent the collective discharge into a given receiving water body. The  
 74 receiving water bodies include WCA-1, WCA-2A, WCA-3A, Everglades National Park (ENP), and STA-  
 75 1 West (STA-1W). The individual and aggregated structure summaries by basin are presented for WY2007–  
 76 WY2016. Volume III, Appendix 3-2, presents WY2016 water quality sampling statistics for basin discharge  
 77 structures, including C-111 Basin upstream structures.

### 78 BASIN-LEVEL WATER QUALITY SUMMARY

79 This section summarizes the water quality results for the ESP basins. **Figures 2** through **5** summarize  
 80 annual TP load, TP FWMC, and five-year rolling averages for the Feeder Canal, L-28, C-111, and C-11  
 81 West basins for WY1998–WY2016. **Figures 6** and **7** summarize annual TP load and TP FWMC for the  
 82 NSID and Acme basins for WY1998–WY2016. It should be noted that **Figures 3** through **6** represent the  
 83 TP loads from the C-111, C-11 West, NSID, and Acme basins to the EPA and not their discharges to other  
 84 receiving bodies, as this information is not collected. The water quality summary for each ESP basin is also  
 85 discussed in Chapter 4 of this volume.

86 **Table 2.** WY2007–WY2016 ESP basin discharges to the EPA by tributary basin: total flow volumes and TP loads and FWMCs. <sup>a</sup>

ESP Basin Structures into WCA-1											
Basin	Parameter and Unit <sup>b</sup>	Water Year									
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Acme1 <sup>c</sup> (Acme Basin <sup>d</sup> )	Flow Volume (10 <sup>3</sup> ac-ft)	13.61	0	0	0	0	0	0	0	0	0
	TP Load (t)	1.97	0	0	0	0	0	0	0	0	0
	TP FWMC (µg/L)	117	N/A <sup>d</sup>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Acme2 <sup>c,f</sup> (Acme Basin <sup>d</sup> )	Flow Volume (10 <sup>3</sup> ac-ft)	12.71	0	0	0	0	0	1.232	0	0	0
	TP Load (t)	2.22	0	0	0	0	0	0.212	0	0	0
	TP FWMC (µg/L)	141	NF <sup>g</sup>	NF	NF	NF	NF	1392	NF	NF	NF
Total (WCA-1)	Flow Volume (10 <sup>3</sup> ac-ft)	26.32	0.00	0.00	0.00	0.00	0.00	1.23	0.00	0.00	0.00
	TP Load (t)	4.18	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00
	TP FWMC (µg/L)	129	NF	NF	NF	NF	NF	139	NF	NF	NF

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ESP Basin Structures into WCA-2A											
Basin	Parameter and Unit <sup>b</sup>	Water Year									
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
NSID1 Total (NSID Basin) (WCA-2A)	Flow Volume (10 <sup>3</sup> ac-ft)	0	0	0	0	0	0	2.03	0	0	0
	TP Load (t)	0	0	0	0	0	0	0.07	0	0	0
	TP FWMC (µg/L)	NF	NF	NF	NF	NF	NF	26	NF	NF	NF

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Table 2. Continued.

ESP Basin Structures into WCA-3A											
Basin	Parameter and Unit <sup>b</sup>	Water Year									
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
S-190 (Feeder Canal Basin)	Flow Volume (10 <sup>3</sup> ac-ft)	67.03	24.02	83.09	86.35	40.24	49.99	25.15	70.37	39.68	90.81
	TP Load (t)	17.77	2.99	14.06	7.79	2.24	2.53	3.02	6.61	5.29	12.77
	TP FWMC (µg/L)	215	101	137	73	45	41	97	76	108	114
S-140 (L-28 Basin)	Flow Volume (10 <sup>3</sup> ac-ft)	88.52	90.34	136.31	136.94	77.69	85.59	73.31	108.40	108.30	151.91
	TP Load (t)	5.12	4.05	6.65	9.21	3.77	5.06	4.48	6.24	9.88	11.98
	TP FWMC (µg/L)	47	36	40	55	39	48	50	47	74	64
S-9 (C11 West Basin)	Flow Volume (10 <sup>3</sup> ac-ft)	42.46	52.63	54.68	119.30	58.17	113.69	166.72	90.05	67.80	78.33
	TP Load (t)	1.00	1.28	1.30	2.95	0.97	2.18	3.25	1.62	1.29	1.85
	TP FWMC (µg/L)	19	20	19	20	13	16	16	15	15	19
S-9A (C11 West Basin)	Flow Volume (10 <sup>3</sup> ac-ft)	81.35	87.80	88.50	56.05	90.05	77.41	80.76	86.14	51.30	58.31
	TP Load (t)	1.31	1.52	1.26	0.91	1.36	1.30	1.06	1.15	0.64	0.80
	TP FWMC (µg/L)	13	14	12	13	12	14	11	11	10	11
Total (WCA-3A)	Flow Volume (10 <sup>3</sup> ac-ft)	279.36	254.79	362.57	398.63	266.14	326.68	345.95	354.97	267.08	379.37
	TP Load (t)	25.19	9.84	23.27	20.86	8.35	11.06	11.81	15.62	17.09	27.41
	TP FWMC (µg/L)	73	31	52	42	25	27	28	36	52	59

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Table 2. Continued.

ESP Basin Structures into Everglades National Park (ENP)											
Basin	Parameter and Unit <sup>b</sup>	Water Year									
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
S-174 <sup>h,i</sup> (C111 Basin)	Flow Volume (10 <sup>3</sup> ac-ft)	0.00	0	0	0	0	0	0	0	0	0
	TP Load (t)	0.00	0	0	0	0	0	0	0	0	0
	TP FWMC (µg/L)	5	NF								
S-18C (C111 Basin)	Flow Volume (10 <sup>3</sup> ac-ft)	80.36	124.38	173.10	249.36	130.13	104.72	149.23	119.02	84.85	98.45
	TP Load (t)	0.69	1.16	1.55	1.95	1.21	1.21	1.79	0.66	0.50	0.72
	TP FWMC (µg/L)	7	8	7	6	8	9	10	5	5	6
S-332D <sup>i</sup> (C111 Basin)	Flow Volume (10 <sup>3</sup> ac-ft)	45.05	32.69	144.49	181.20	105.08	65.55	133.14	127.60	99.79	109.42
	TP Load (t)	0.30	0.26	1.28	1.82	1.89	0.56	1.04	1.05	0.74	0.96
	TP FWMC (µg/L)	5	6	7	8	15	7	6	7	6	7
Total (ENP)	Flow Volume (10 <sup>3</sup> ac-ft)	125.41	157.07	317.59	430.55	235.21	170.27	282.36	246.62	184.64	207.87
	TP Load (t)	0.99	1.42	2.83	3.77	3.10	1.77	2.83	1.71	1.24	1.68
	TP FWMC (µg/L)	6	7	7	7	11	8	8	6	5	7

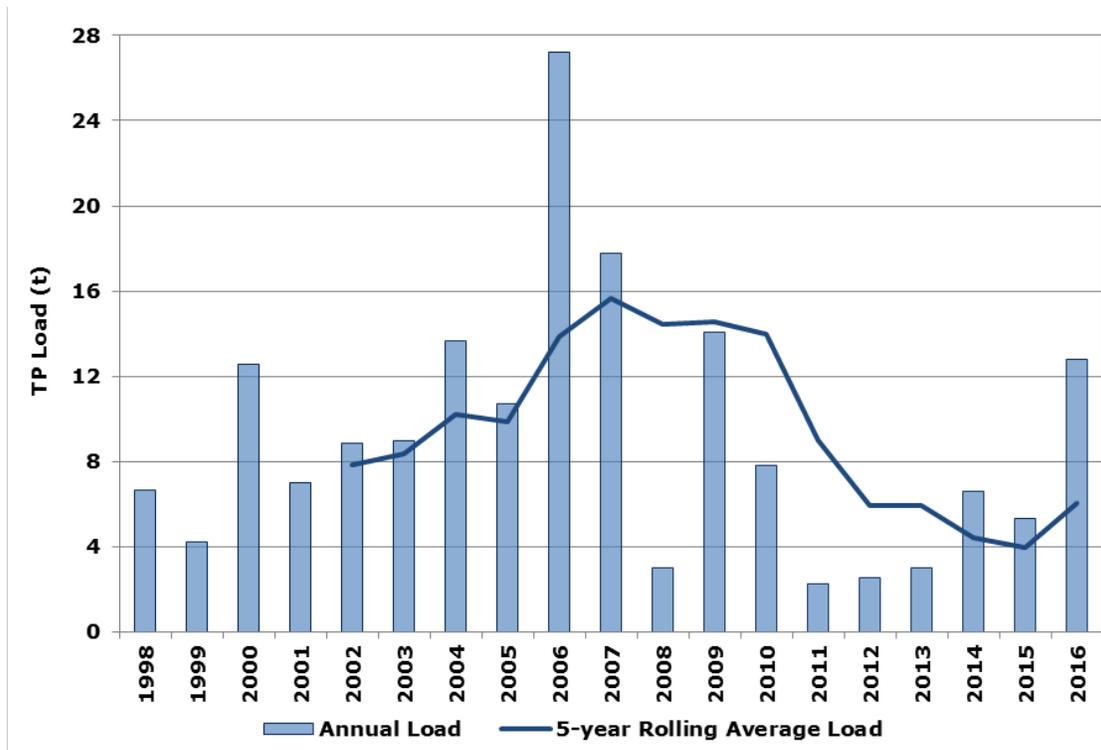
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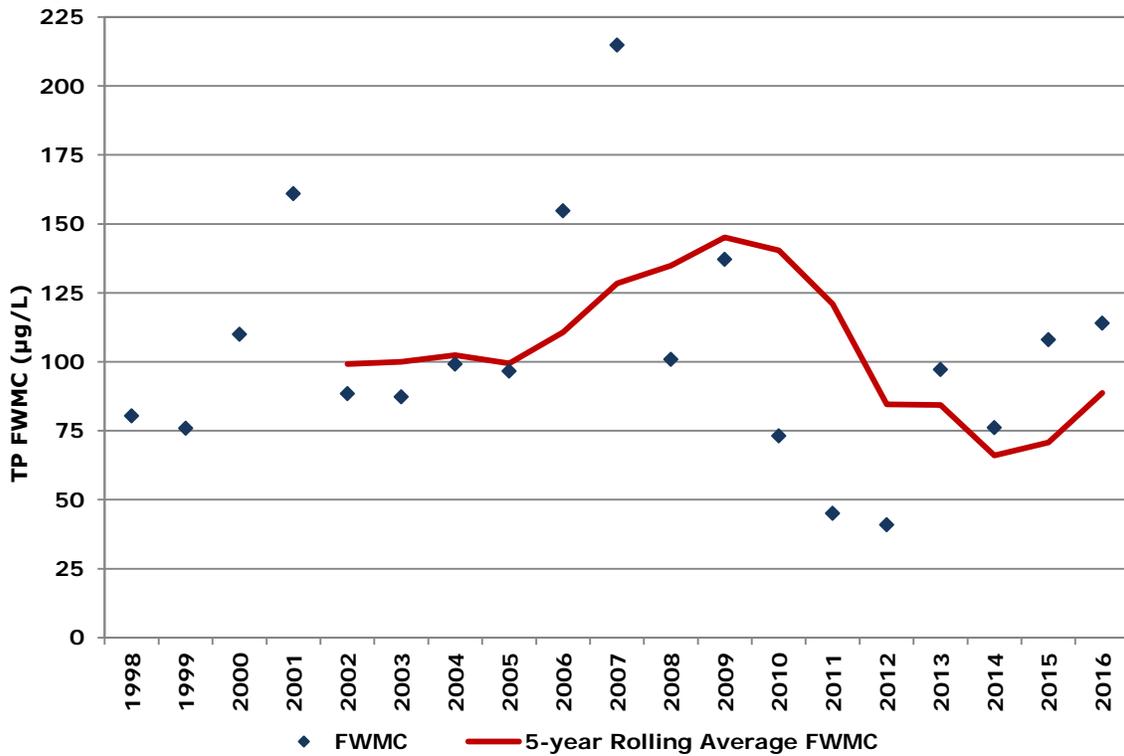
Table 2. Continued.

C-51W Structures into Stormwater Treatment Area 1 East (STA-1E)											
Basin	Parameter and Unit <sup>a</sup>	Water Year									
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
C-51W (S-319)	Flow Volume (10 <sup>3</sup> ac-ft)	38.84	97.14	65.37	22.59	11.78	51.85	94.50	31.78	0	48.67
	TP Load (t)	6.03	12.44	11.24	7.63	1.62	5.76	26.89	8.73	0	7.28
	TP FWMC (µg/L)	126	104	139	274	111	90	231	223	N/A	121
C-51W (Rustic Ranches) (S-361)	Flow Volume (10 <sup>3</sup> ac-ft)	9.02	14.53	10.99	8.76	6.32	6.09	9.37	10.72	8.90	8.59
	TP Load (t)	1.03	1.31	0.92	0.93	0.21	0.19	0.73	0.72	0.32	0.35
	TP FWMC (µg/L)	93	73	68	86	27	26	63	54	29	33
Total (STA-1E)	Flow Volume (10 <sup>3</sup> ac-ft)	47.86	111.67	76.36	31.34	18.10	57.93	103.87	42.51	8.90	57.26
	TP Load (t)	7.07	13.75	12.16	8.56	1.83	5.95	27.62	9.45	0.32	7.63
	TP FWMC (µg/L)	120	100	129	221	82	83	216	180	29	108

- 95 a. Water quality data is collected by SFWMD.
- 96 b. c. 10<sup>3</sup> ac-ft = thousands of acre-feet, 1 ac-ft = 1,233 cubic meters; t = metric tons, 1 t = 10<sup>3</sup> kilograms; µg/L = micrograms per liter, 1 µg/L ≈ 1 part per billion.
- 97 c. Pump stations Acme1 and Acme2 stopped operation in December 2006. The Acme1 structure was removed shortly after. The Acme2 structure might flow under emergency conditions.
- 98 d. Acme Basin has been designated as an Everglades Construction Project (ECP) basin since December 2006.
- 99 e. N/A – not applicable.
- 100 f. Acme2 structure flowed during Tropical Storm Isaac (August 28–31, 2012).
- 101 g. NF – no flow for period.
- 102 h. Structure S-174 was plugged in September 2007.
- 103 i. Flow and load calculation at S-175 and S-332 was replaced in WY2001 with S-174 and S-332D.
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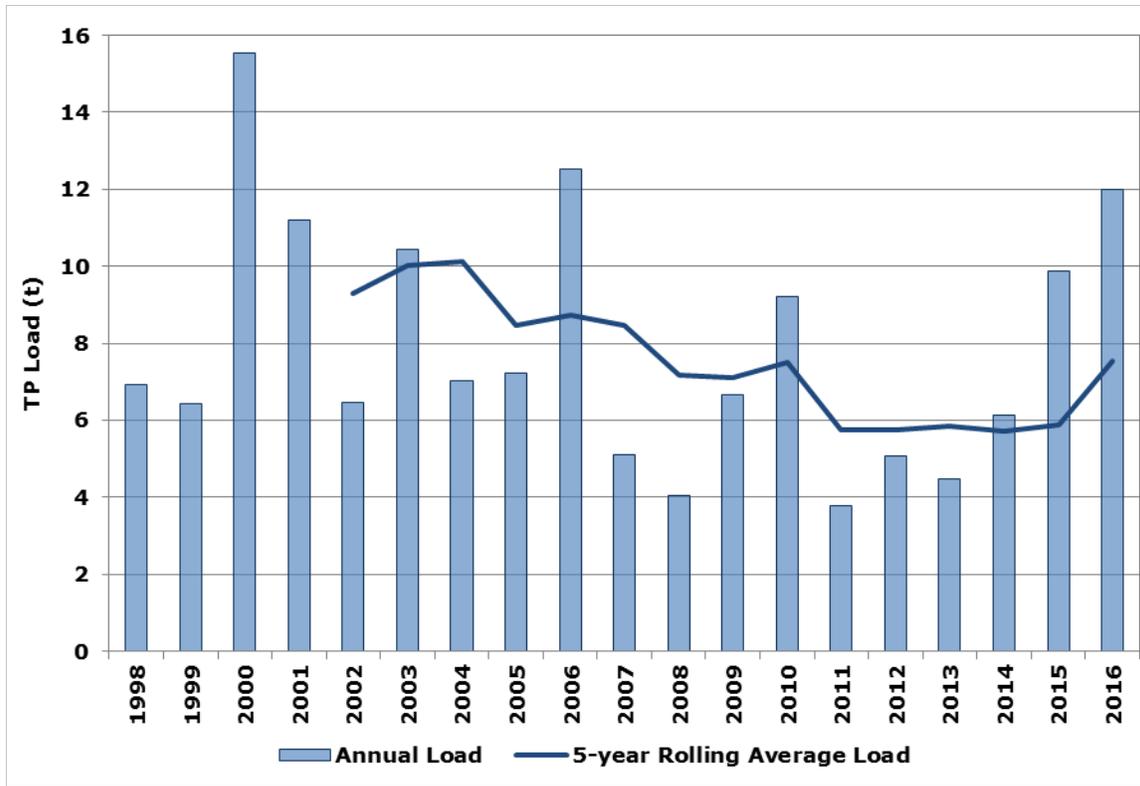
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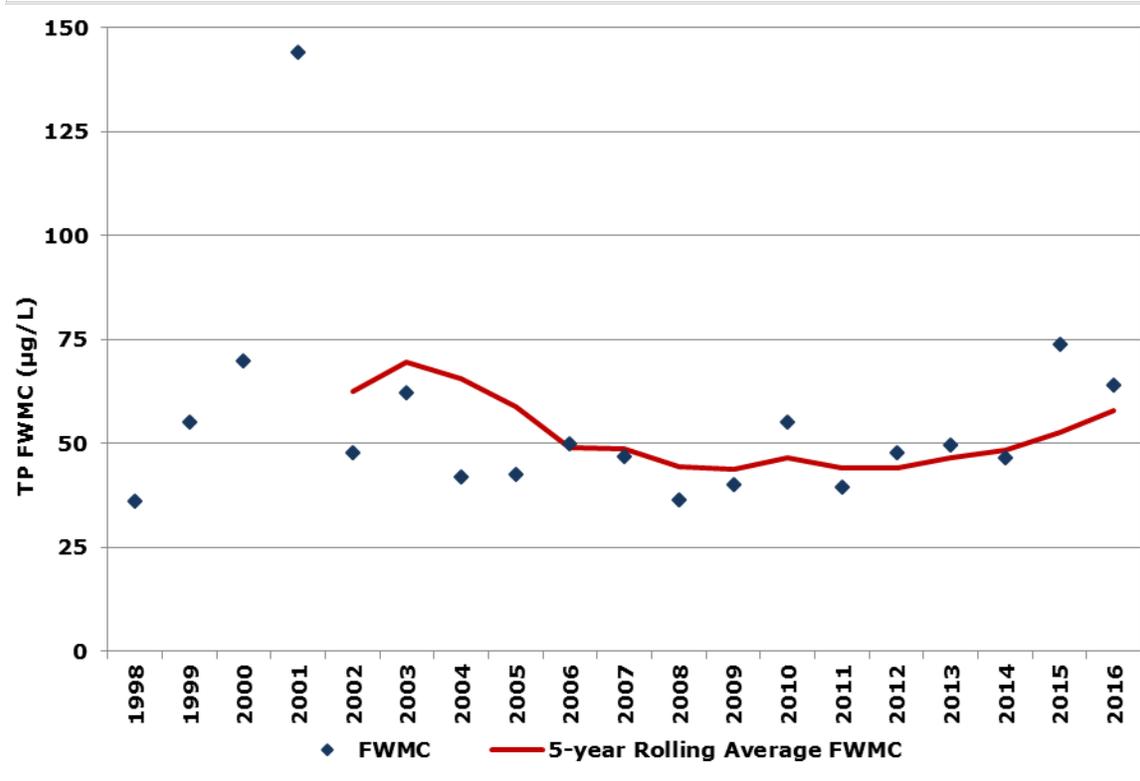
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**Figure 2.** WY1998–WY2016 Feeder Canal Basin (S-190) discharges to the EPA. Upper Plot – annual TP loads and five-year rolling averages. Lower Plot – annual TP FWMC and five-year rolling averages. (Note: t – metric tons and µg/L – micrograms per liter.)



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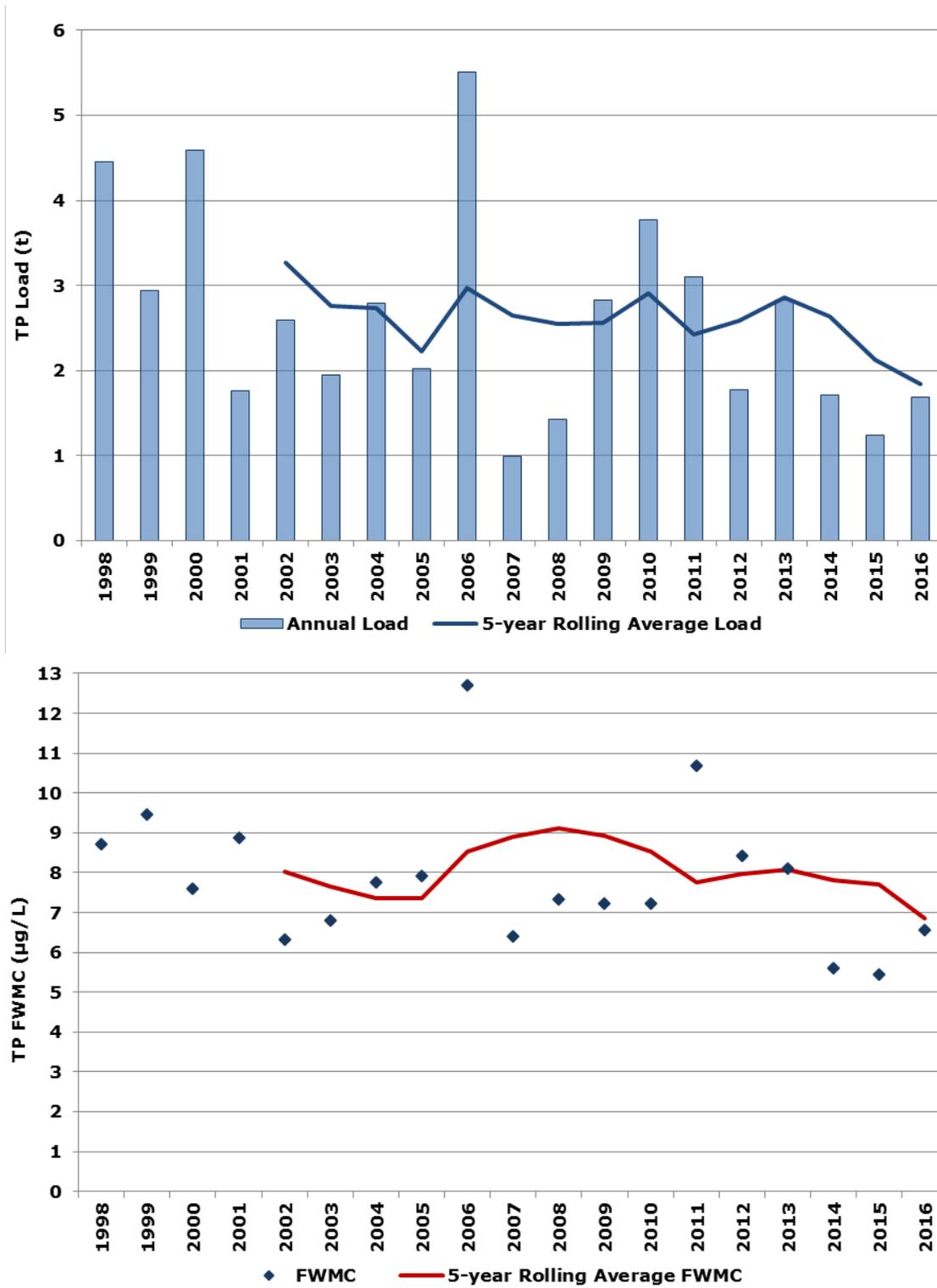
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**Figure 3.** WY1998–WY2016 L-28 Basin (S-140) discharges to the EPA. Upper Plot – annual TP load and five-year rolling average. Lower Plot – annual TP FWMC and five-year rolling averages. (Note: t – metric tons and µg/L – micrograms per liter.)



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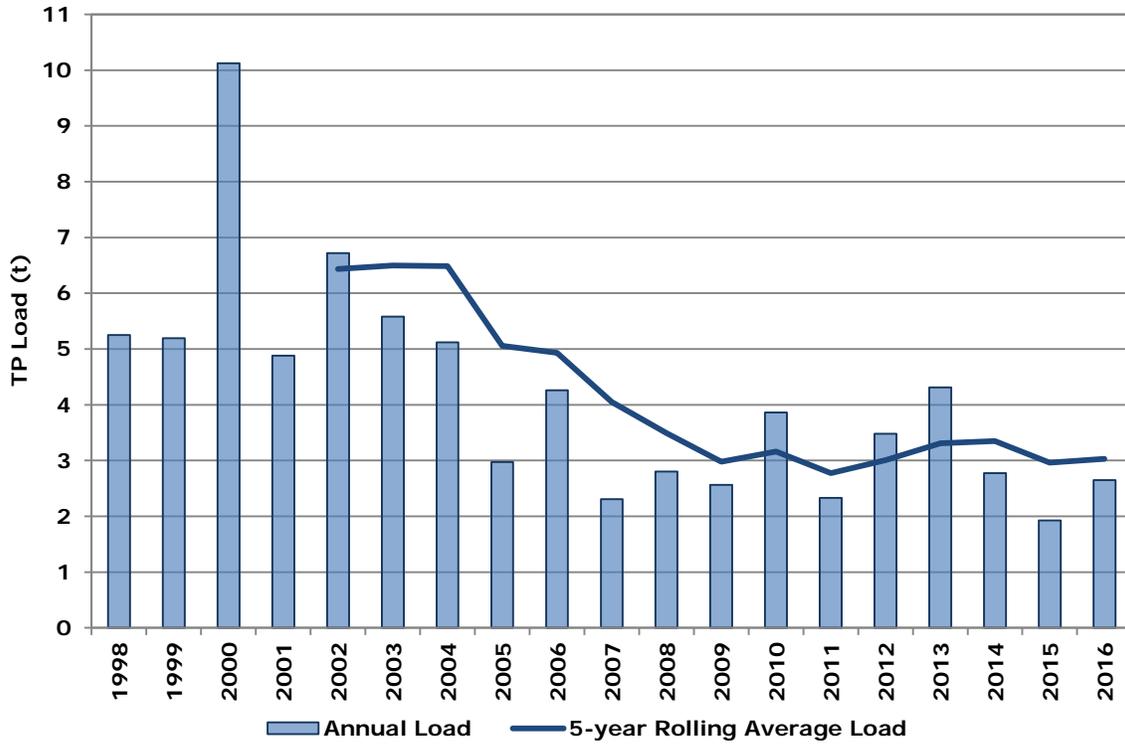
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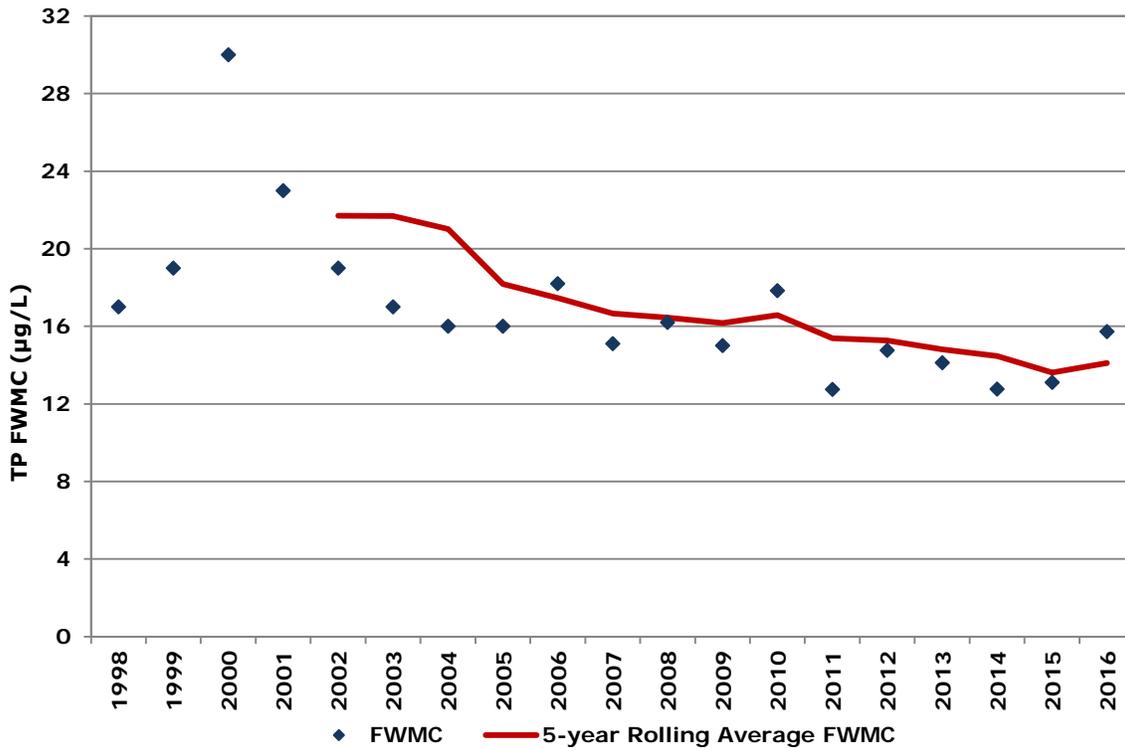
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**Figure 4.** WY1998–WY2016 C-111 Basin (S-18C and S-332D) discharges to the EPA. Upper Plot – annual TP load and five-year rolling averages. Lower Plot – annual TP FWMC and five-year rolling averages. (Notes: Flow and load calculations at S-175 and S-332 were replaced in WY2001 with S-174 and S-332D. Structure S-174 was plugged in September 2007. t – metric tons and µg/L – micrograms per liter.)



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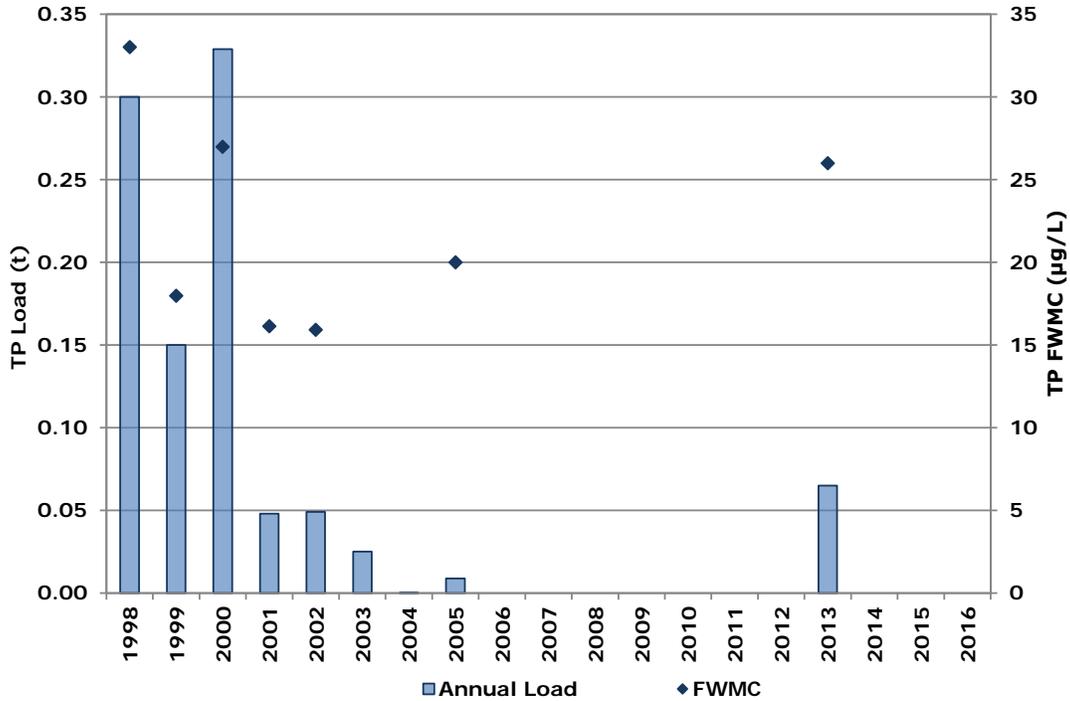
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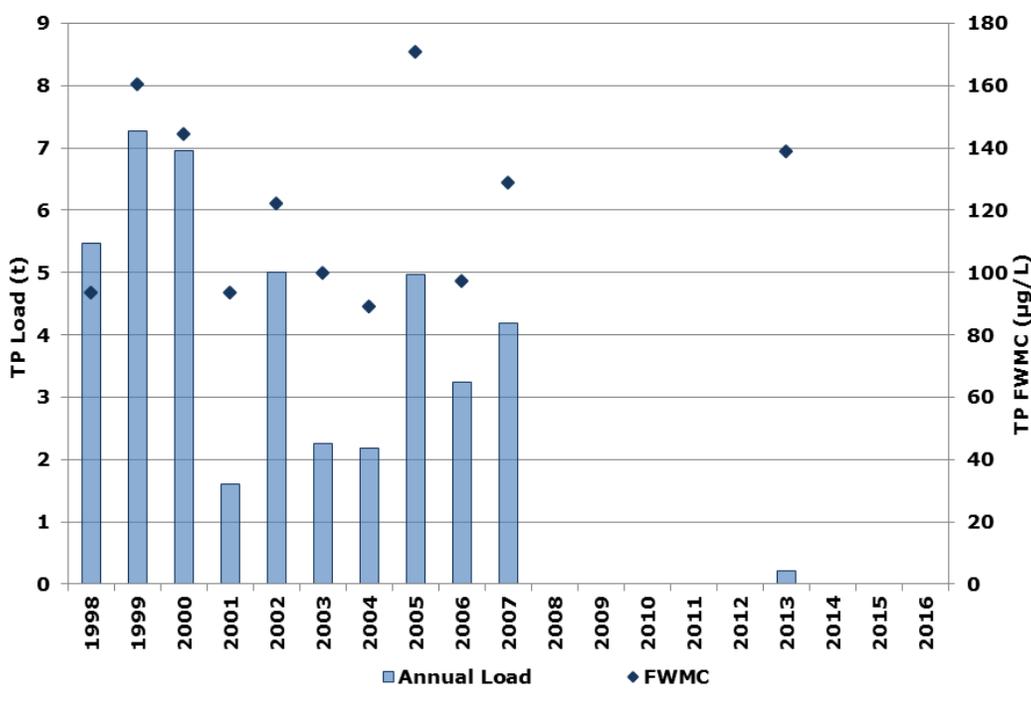
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**Figure 5.** WY1998–WY2016 C-11 West Basin (S-9 and S-9A) discharges to the EPA. Upper Plot – annual TP load and five-year rolling averages. Lower Plot – annual TP FWMC and five-year rolling averages. (Note: t – metric tons and µg/L – micrograms per liter.)



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**Figure 6.** WY1998–WY2016 NSID Basin (NSID1) annual TP load and TP FWMC in discharges to the EPA.



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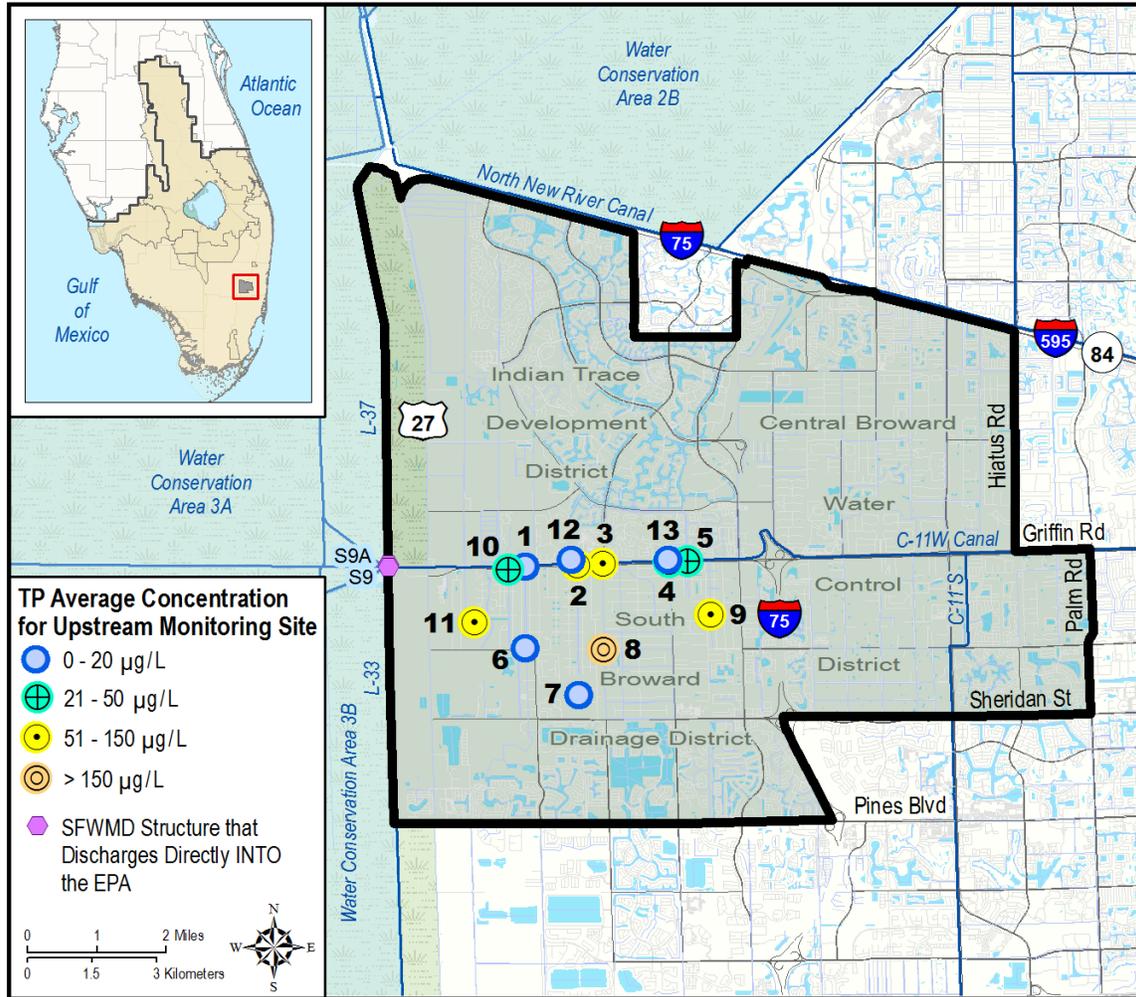
**Figure 7.** WY1998–WY2016 Acme Basin (Acme1 and Acme2) annual TP load and TP FWMC in discharges to the EPA. (Notes: t – metric tons. Pump stations Acme1 and Acme2 stopped operation in December 2006 and Acme Basin discharges were diverted to C-51 west canal. Acme1 structure was removed shortly after; however, 0.2 t of TP load discharged to the EPA in WY2013 as a result of flood protection measures associated with Tropical Storm Isaac.)

140 **UPSTREAM (SUBBASIN) LEVEL WATER QUALITY SUMMARY**

141 Water quality, particularly TP concentrations, in the original ESP basins (Acme, Boynton Farms, C-11  
142 West, C-111, Feeder Canal, L-28, NNR, and NSID), is also monitored at upstream sampling sites within  
143 each basin during flow events. This section summarizes the upstream water quality data for grab and  
144 autosampler sites for the basins.

145 **Figures 8 through 10** present WY2016 TP concentrations for upstream grab sampling sites within the  
146 C-11 West (consisting of South Broward Drainage District, Central Broward Water Control District, and  
147 Indian Trace Development District [ITDD]), NSID, and Acme basins, respectively. The grab data for these  
148 upstream sites is collected by drainage districts designated by Chapter 298, Florida Statutes, in accordance  
149 with requirements provided in Environmental Resource Permits (ERPs) issued by SFWMD to the  
150 drainage districts.

151 **Figure 11** shows the location of upstream structures monitored by SFWMD via grab samples and  
152 autosamplers within the Feeder Canal Basin (PC-17A, G-108, and WWEIR) and the L-28 Basin (USSO).  
153 Flow was also monitored at these structures. **Figure 12** summarizes combined annual TP load, TP FWMC,  
154 and five-year rolling averages for the PC-17A and G-108 structures for WY1999–WY2016. Removal of  
155 G-108 in April 2010 resulted in the diversion of flow from direct discharge to the North Feeder Canal  
156 through PC-17A. **Figures 13 and 14** summarize annual TP load, TP FWMC, and five-year rolling averages  
157 for the WWEIR and USSO structures, respectively, for WY1998–WY2016.

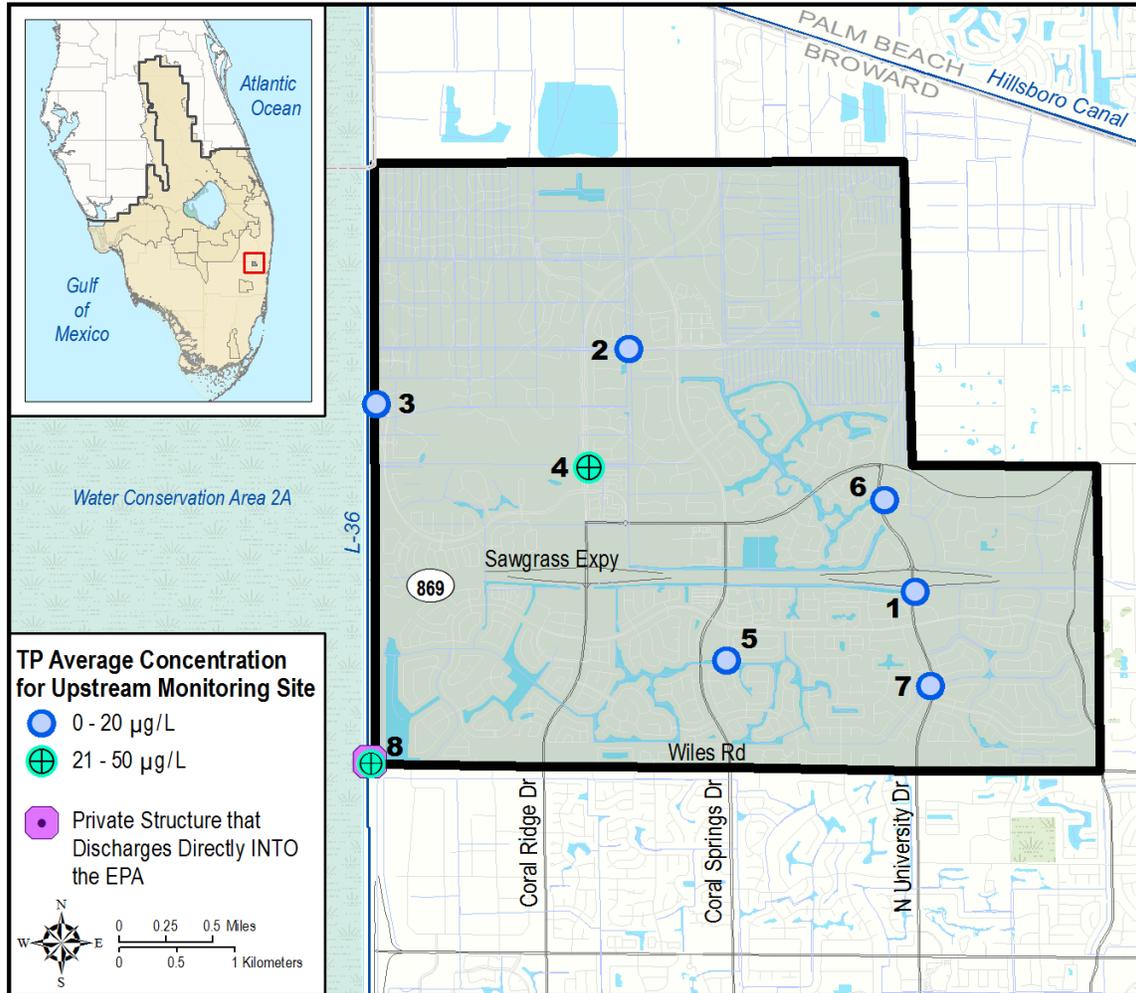


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Map ID	Sampling Site Name	Number of Samples	TP Concentration (µg/L)		
			Average	Minimum	Maximum
1	C1102.0TS	6	15	10	20
2	C1102.8TS	5	64	16	180
3	C1103.3TS	5	68	20	160
4	C1104.3TS	6	26	10	44
5	C1104.6TS	6	23	11	45
6	C112.0TS2	6	14	7	20
7	C112.8TS2	6	13	7	21
8	C113.3TS1	6	167	72	340
9	C114.9TS1	6	74	21	210
10	C1101.7TS	6	25	10	40
11	C110.8TS1	6	86	20	190
12	C1102.7TN	2	4	1	6
13	C1104.3TN	1	1	1	1

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**Figure 8.** WY2016 summary of TP data for C-11 West Basin upstream monitoring sites. (Note: µg/L – micrograms per liter and ID – Identification.)

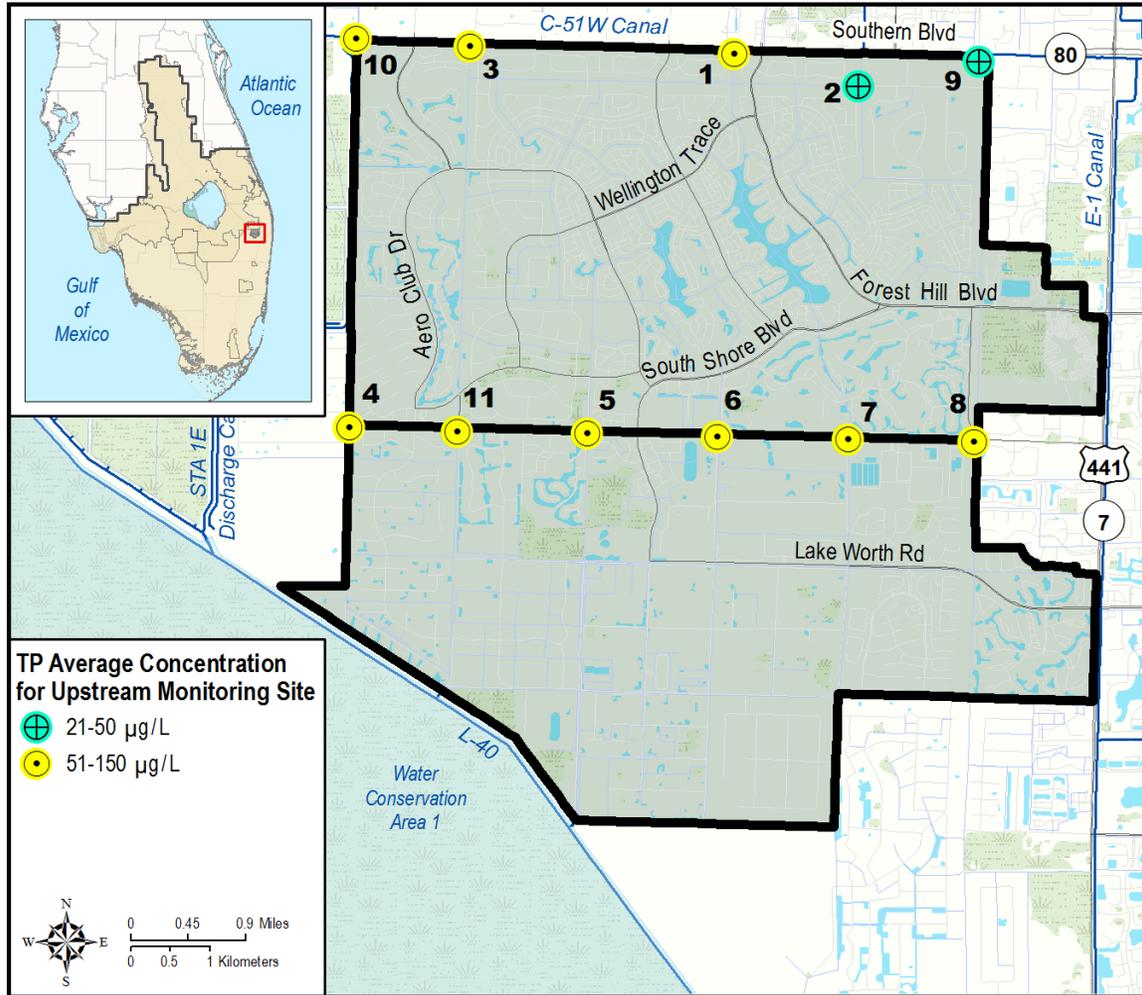


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Map ID	Sampling Site Name	Number of Samples	TP Concentration (µg/L)		
			Average	Minimum	Maximum
1	NSIDEC02	4	1	1	1
2	NSIDNC01	4	1	1	1
3	NSIDNP02	4	2	1	5
4	NSIDWC06	4	39	1	151
5	NSIDWC07	4	1	1	1
6	NSIDEA01	4	1	1	1
7	NSIDEA03	4	1	1	1
8	NSIDSP01	4	25	1	96

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**Figure 9.** WY2016 summary of TP data for the NSID Basin upstream monitoring sites. (Note: µg/L – micrograms per liter and ID – Identification.)



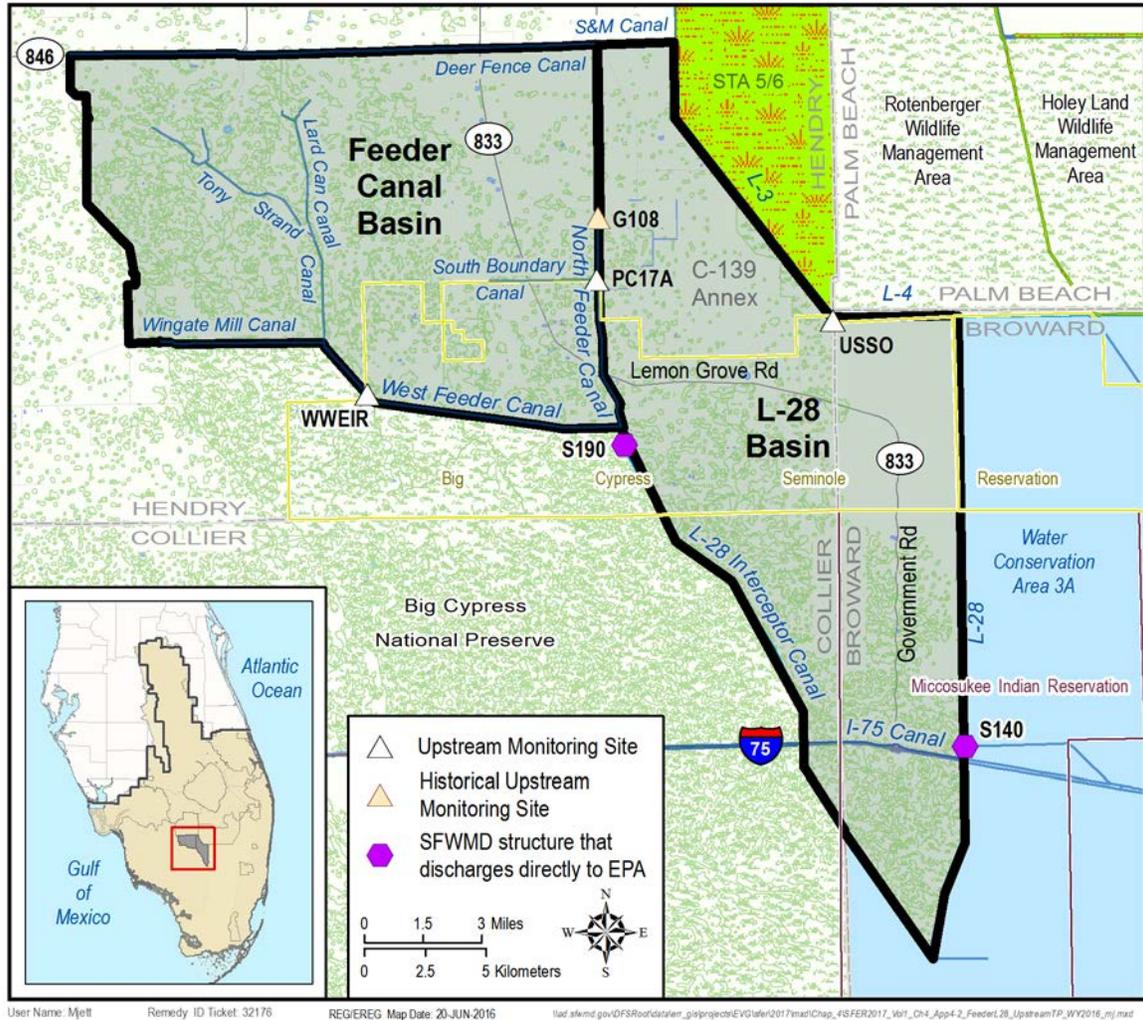
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Map ID	Sampling Site Name	Number of Samples	TP Concentration (µg/L)		
			Average	Minimum	Maximum
1	VOW3	11	52	40	66
2	VOW35	11	33	21	55
3	VOW4	12	54	33	80
4	VOW40	4	55	46	71
5	VOW42	5	103	62	190
6	VOW43	5	135	69	260
7	VOW44	5	138	92	180
8	VOW45	5	59	50	82
9	VOW6	12	42	30	73
10	VOW7	11	57	42	88
11	VOW72	3	79	47	100

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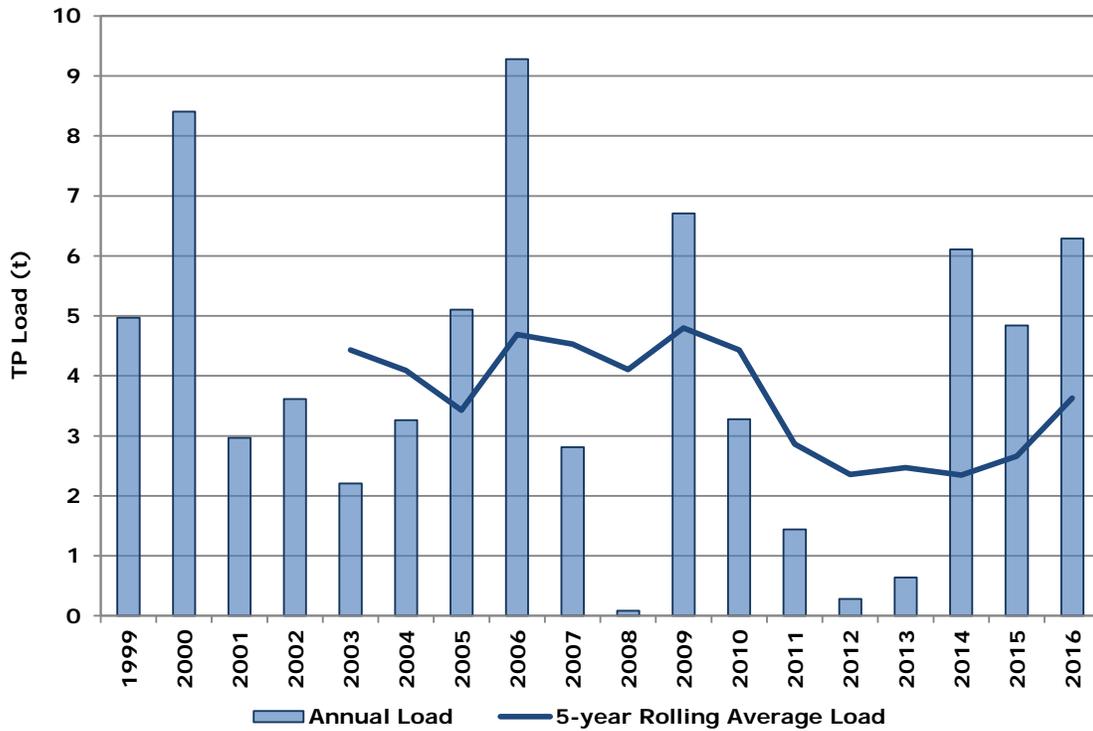
**Figure 10.** WY2016 summary of TP data for the Acme Basin upstream monitoring sites. (Note: µg/L – micrograms per liter.)

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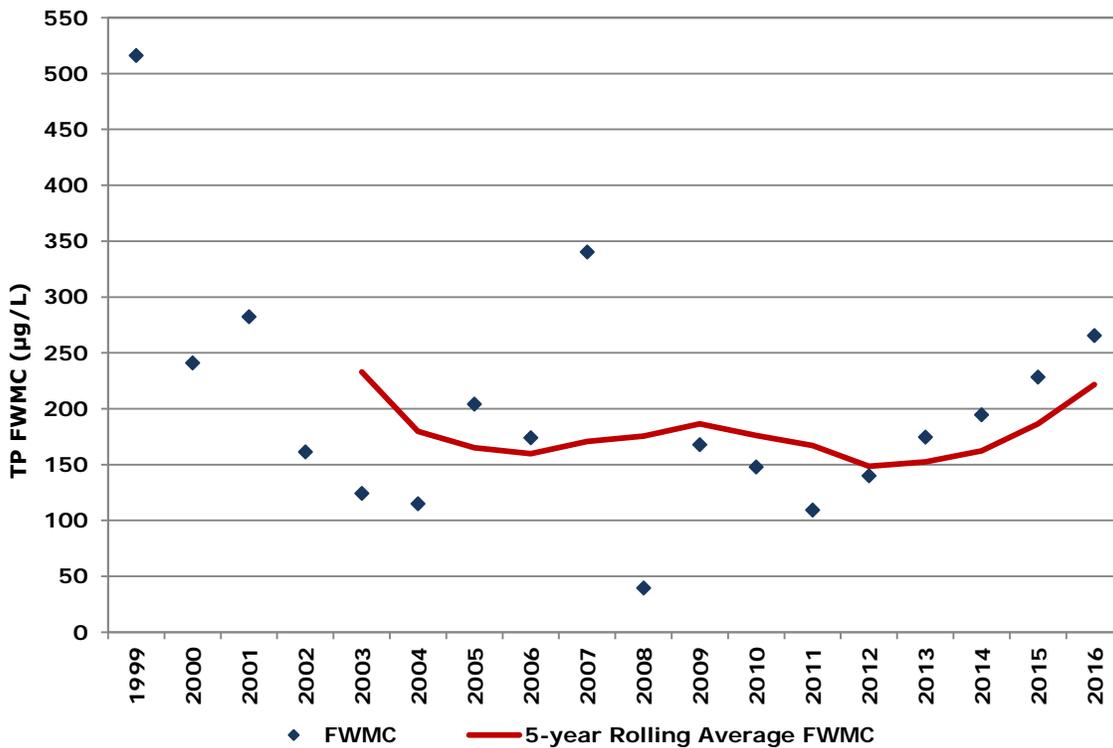


**Figure 11.** Feeder Canal Basin and L-28 Basin upstream monitoring sites.  
(Note: Structure G-108 was removed in April 2010.)

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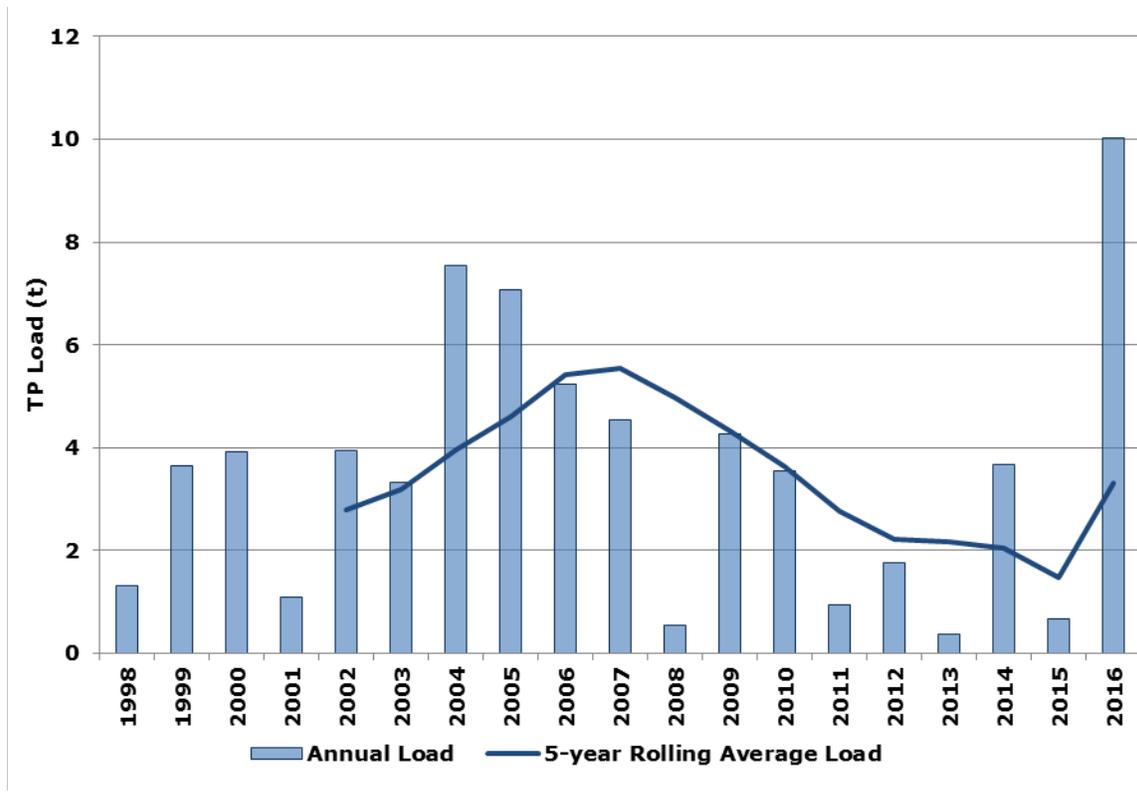
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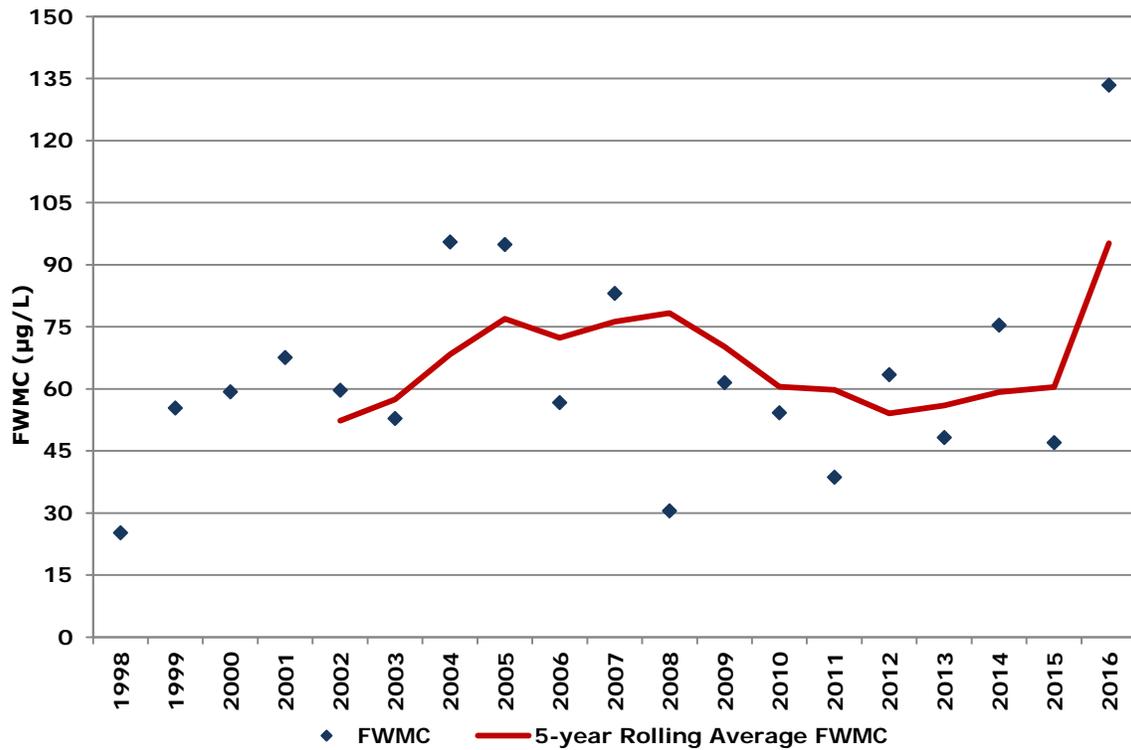
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**Figure 12.** WY1999–WY2016 combined PC-17A and G-108 discharges. Upper Plot – annual TP load and five-year rolling averages. Lower Plot – annual TP FWMC and five-year rolling averages. (Notes: t – metric tons and µg/L – micrograms per liter. Structure G-108 was removed in April 2010.)



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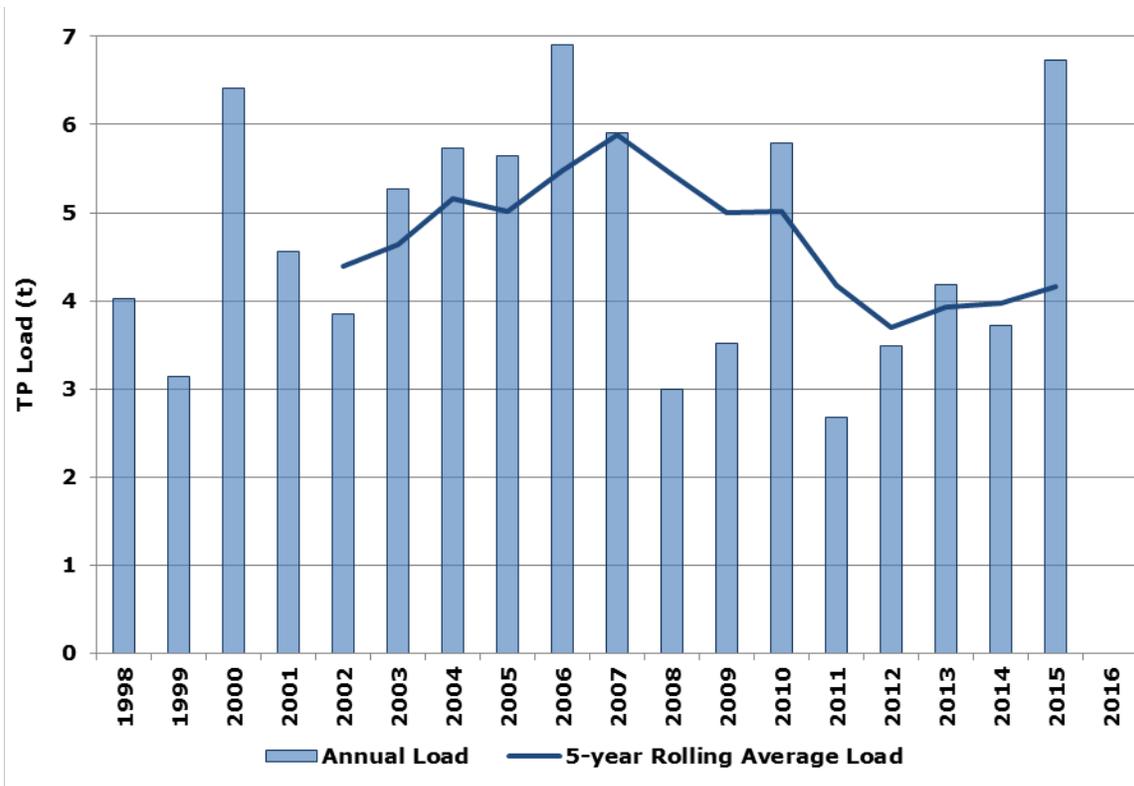
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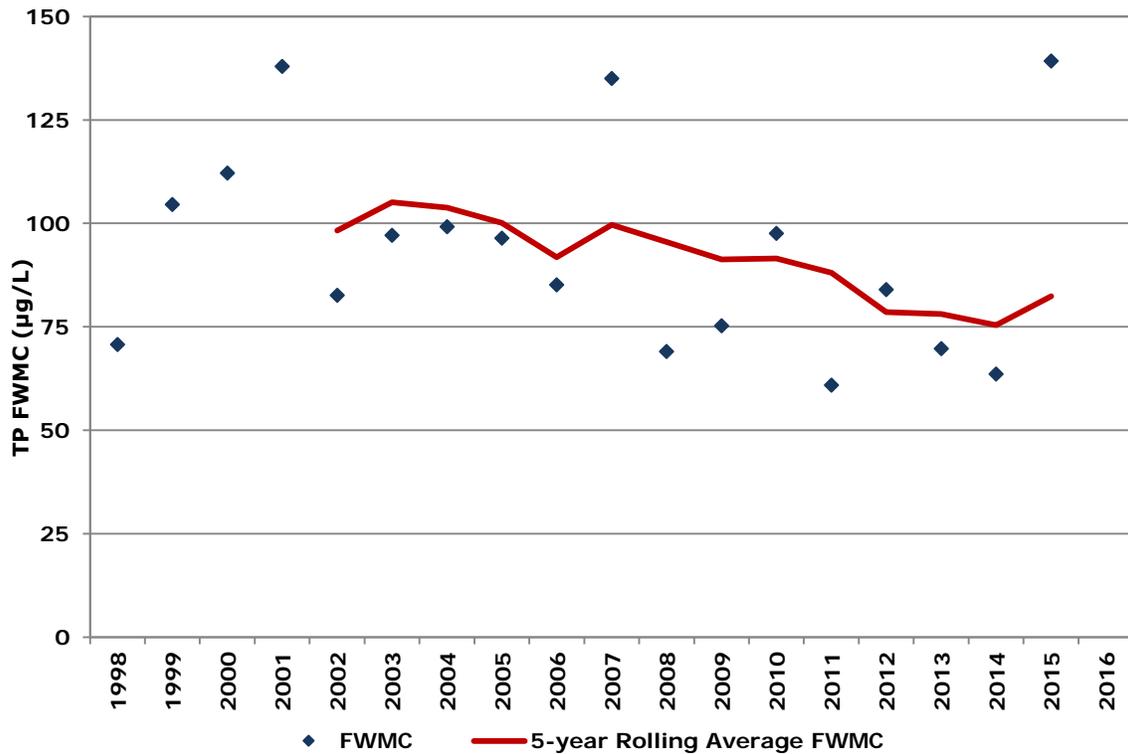
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**Figure 13.** WY1998–WY2016 WWEIR discharges. Upper Plot – annual TP load and five-year rolling averages. Lower Plot – annual TP FWMC and five-year rolling averages. (Note: t – metric tons and µg/L – micrograms per liter.)



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**Figure 14.** WY1998–WY2015 USSO discharges. Upper Plot – annual TP load and five-year rolling averages. Lower Plot – annual TP FWMC and five-year rolling averages. (Note: t – metric tons and µg/L – micrograms per liter.)

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## LITERATURE CITED

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187 Burns and McDonnell. 2003. *Everglades Protection Area Tributary Basins Long-Term Plan for Achieving*  
188 *Water Quality Goals*. Submitted to the South Florida Water Management District, West Palm  
189 Beach, FL. October 27, 2003.