

# **Appendix 4-3: Water Year 2014 Supplemental Evaluations for Regulatory Source Control Programs in Non-Everglades Construction Project Basins**

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## **INTRODUCTION**

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For the five non-Everglades Construction Project (non-ECP) basins, the Florida Department of Environmental Protection Permit Number 06, 502590709 requires that the South Florida Water Management District (District or SFWMD) reports on the status of required water quality monitoring to evaluate progress toward achieving established water quality standards and the effectiveness of source control strategies. The data collection requirements for structures associated with the non-ECP basins are outlined in the non-ECP permit. Chapter 3A of this volume and Volume III, Appendix 3-2, provide the Water Year 2014 (WY2014) (May 1, 2013–April 30, 2014) update on the District’s data collection efforts for non-ECP structures. This appendix summarizes the flow, total phosphorus (TP) load, and TP flow-weighted mean concentration (FWMC) at each non-ECP basin discharge structure for WY1998 through WY2014.

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## **NON-ECP BASIN SUPPLEMENTAL EVALUATION**

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### **BASIN-LEVEL MONITORING DATA**

During WY2014, seven structures (see structures S-190, S-140, S-18C, S-332D, S-9, S-9A, and NSID1 shown in Figure 4-6 of this volume) served as direct or indirect discharge points from the non-ECP basins into the Everglades Protection Area (EPA). While six of these structures are within the control of the District and are referred to as “into” structures under the non-ECP permit, this appendix also incorporates flow and TP data for the remaining private structure, NSID1. The G-123 structure (North New River Canal), reported as a non-ECP structure in earlier SFERs, had not discharged since WY2004. The structure pumps were removed circa 2008 and the District has determined the structure is no longer needed.

Since December 2006, runoff from the Acme Improvement District (Acme) Basin is discharged into the C-51 West canal and then generally directed to Stormwater Treatment Area 1E (STA-1E). Therefore, the Acme Basin has since been designated as an Everglades Construction Project (ECP) basin. However, this appendix includes historical discharge

information from this basin to the EPA. The ACME1 structure was removed in 2007 and the ACME2 structure has only been allowed to directly discharge untreated flows into Water Conservation Area (WCA) 1 under emergency conditions such as the August 2012 Tropical Storm Isaac.

**Table 1** of this appendix summarizes the annual total flow, total TP load, and TP FWMC for each of the above-mentioned structures. The individual aggregated structure summaries represent the collective discharge into a given receiving water body. The receiving water bodies include WCA-1, WCA-2A, WCA-3A, and Everglades National Park. The individual and aggregated structure summaries for non-ECP basins are presented for WY2005 through WY2014. Volume III, Appendix 3-2, presents WY2014 water quality sampling statistics for these non-ECP basin discharge structures, including C-111 Basin upstream structures.

## **BASIN-LEVEL WATER QUALITY SUMMARY**

This section summarizes the water quality results for the non-ECP basins. These basins include the Feeder Canal, L-28, C-111, C-11 West, and North Springs Improvement District. Historical water quality results for the Acme Basin are also included. Since December 2006, this basin has discharged to the C-51 West canal, except during the emergency conditions resulting from the August 2012 Tropical Storm Isaac, and is now designated as an ECP basin. **Figures 1** through **4** summarize annual TP load, TP FWMC, and five-year rolling averages for the Feeder Canal, L-28, C-111, and C-11 West basins for WY1998–WY2014. **Figures 5** and **6** summarize annual TP load and TP FWMC for the North Springs Improvement District and Acme basins for WY1998–WY2014. The water quality summary for each basin is discussed in further detail in Chapter 4 of this volume.

## **UPSTREAM (SUB-BASIN) LEVEL WATER QUALITY SUMMARY**

Water quality, particularly TP concentrations, in Everglades non-ECP basins and the Acme Basin is monitored at the upstream sampling sites during flow events to identify high phosphorus areas within each basin. This section summarizes the water quality data for grab and auto-sampler sites for most non-ECP basins.

**Figures 7, 8, and 9** present WY2014 water quality data for grab sampling sites within the C-11 West Basin (consisting of South Broward Drainage District, Central Broward Water Control District, and Indian Trace Development District), the North Springs Improvement District Basin, and the Acme Basin, respectively.

**Figure 10** shows the location of upstream structures being monitored with auto-samplers within the Feeder Canal Basin (PC-17A, G-108, and WWEIR) and the L-28 Basin (USSO). **Figure 11** summarizes combined annual TP load, TP FWMC, and five-year rolling averages for the PC-17A and G-108 structures for WY1999 through WY2014. Removal of the G-108 structure eliminated discharges to the North Feeder Canal at its location in April 2010 and most of its discharge would now flow through PC-17A. **Figures 12** and **13** summarize annual TP load, TP FWMC, and five-year rolling averages for the WWEIR and USSO structures, respectively, for WY1998–WY2014.

**Table 1.** Water Years 2005 through 2014 (WY2005–WY2014) (May 1, 2004–April 30, 2014) non-Everglades Construction Project (non-ECP) basins structure total flow volume, total phosphorus (TP) load, and TP flow-weighted mean concentration (FWMC) to the Everglades Protection Area by tributary basin.

[Notes: kac-ft = thousand acre-feet; mt = metric tons; µg/L = microgram per liter.]

Non-ECP Basin Structures into Water Conservation Area 1 (WCA-1)											
	Water Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
ACME1 <sup>1</sup>	Flow Vol. (kac-ft)	12.32	14.16	13.61	0	0	0	0	0	0	0
	TP Load (mt)	2.02	1.40	1.97	0	0	0	0	0	0	0
	TP FWMC (µg/L)	133	80	117	N/A <sup>1</sup>	N/A	N/A	N/A	N/A	N/A	N/A
ACME2 <sup>1,2</sup>	Flow Vol. (kac-ft)	11.25	12.77	12.71	0	0	0	0	0	1.23 <sup>2</sup>	0
	TP Load (mt)	2.95	1.83	2.22	0	0	0	0	0	0.21 <sup>2</sup>	0
	TP FWMC (µg/L)	212	116	141	NF <sup>3</sup>	NF	NF	NF	NF	139 <sup>2</sup>	NF
Total (WCA-1)	Flow Vol. (kac-ft)	23.56	26.93	26.32	0.00	0	0	0	0	1	0
	TP Load (mt)	4.97	3.24	4.18	0.00	0	0	0	0	0	0
	TP FWMC (µg/L)	171	97	129	NF	NF	NF	NF	NF	139	NF

Non-ECP Basin Structures into Water Conservation Area 2A (WCA-2A)											
	Water Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
NSID1 Total (WCA-2A)	Flow Vol. (kac-ft)	0.35	0	0	0	0	0	0	0	2.03	0
	TP Load (mt)	0.01	0	0	0	0	0	0	0	0.07	0
	TP FWMC (µg/L)	20	NF	26							

<sup>1</sup>Pump stations ACME1 and ACME2 stopped operation in December 2006. ACME1 structure was removed shortly after. ACME2 structure might flow under emergency conditions.

<sup>2</sup>ACME2 structure flowed during Tropical Storm Isaac (August 28-31, 2012).

<sup>3</sup>NF = no flow for period.

**Table 1.** Continued.

Non-ECP Basin Structures into Water Conservation Area 3 (WCA-3A)											
	Water Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>S-190</b>	Flow Vol. (kac-ft)	89.58	142.47	67.03	24.02	83.09	86.35	40.24	49.99	25.15	70.37
	TP Load (mt)	10.69	27.20	17.77	2.99	14.06	7.79	2.24	2.53	3.02	6.61
	TP FWMC (µg/L)	97	155	215	101	137	73	45	41	97	76
<b>S-140</b>	Flow Vol. (kac-ft)	137.98	203.58	88.52	90.34	136.31	136.94	77.69	85.59	73.31	108.40
	TP Load (mt)	7.22	12.51	5.12	4.05	6.65	9.21	3.77	5.06	4.48	6.24
	TP FWMC (µg/L)	42	50	47	36	40	55	39	48	50	47
<b>S-9</b>	Flow Vol. (kac-ft)	93.40	128.47	42.46	52.63	54.68	119.30	58.17	113.69	166.72	90.05
	TP Load (mt)	2.14	3.06	1.00	1.28	1.30	2.95	0.97	2.18	3.25	1.62
	TP FWMC (µg/L)	19	19	19	20	19	20	13	16	16	15
<b>S-9A</b>	Flow Vol. (kac-ft)	56.58	61.35	81.35	87.80	88.50	56.05	90.05	77.41	80.76	86.14
	TP Load (mt)	0.83	1.21	1.31	1.52	1.26	0.91	1.36	1.30	1.06	1.15
	TP FWMC (µg/L)	12	16	13	14	12	13	12	14	11	11
<b>Total (WCA-3A)</b>	Flow Vol. (kac-ft)	382.54	543.75	279.36	254.79	362.57	398.63	266.14	326.68	345.95	354.97
	TP Load (mt)	21.48	45.49	25.19	9.84	23.27	20.86	8.35	11.06	11.81	15.62
	TP FWMC (µg/L)	46	68	73	31	52	42	25	27	28	36

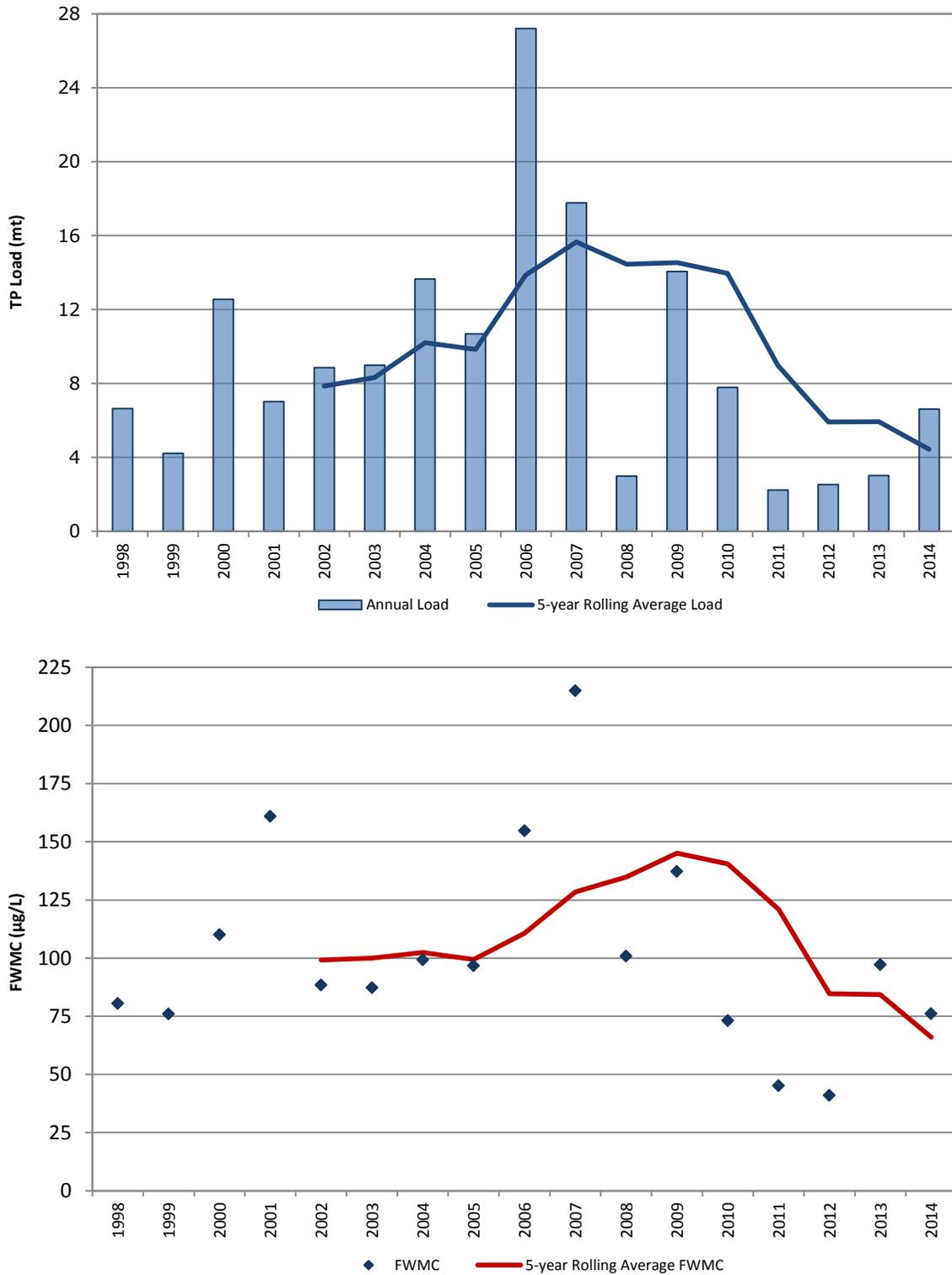
**Table 1.** Continued.

Non-ECP Basin Structures into Everglades National Park (ENP)											
	Water Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>S-174<sup>1,3</sup></b>	Flow Vol. (kac-ft)	30.06	9.20	0.00	0	0	0	0	0	0	0
	TP Load (mt)	0.45	0.16	0.00	0	0	0	0	0	0	0
	TP FWMC (µg/L)	12	14	5	NF <sup>2</sup>	NF	NF	NF	NF	NF	NF
<b>S-18C</b>	Flow Vol. (kac-ft)	100.69	188.51	80.36	124.38	173.10	249.36	130.13	104.72	149.23	119.02
	TP Load (mt)	0.99	3.30	0.69	1.16	1.55	1.95	1.21	1.21	1.79	0.66
	TP FWMC (µg/L)	8	14	7	8	7	6	8	9	10	5
<b>S-332D<sup>3</sup></b>	Flow Vol. (kac-ft)	76.48	153.80	45.05	32.69	144.49	181.20	105.08	65.55	133.14	127.60
	TP Load (mt)	0.59	2.06	0.30	0.26	1.28	1.82	1.89	0.56	1.04	1.05
	TP FWMC (µg/L)	6	11	5	6	7	8	15	7	6	7
<b>Total (ENP)</b>	Flow Vol. (kac-ft)	207.23	351.51	125.41	157.07	317.59	430.55	235.21	170.27	282.36	246.62
	TP Load (mt)	2.02	5.51	0.99	1.42	2.83	3.77	3.10	1.77	2.83	1.71
	TP FWMC (µg/L)	8	13	6	7	7	7	11	8	8	6

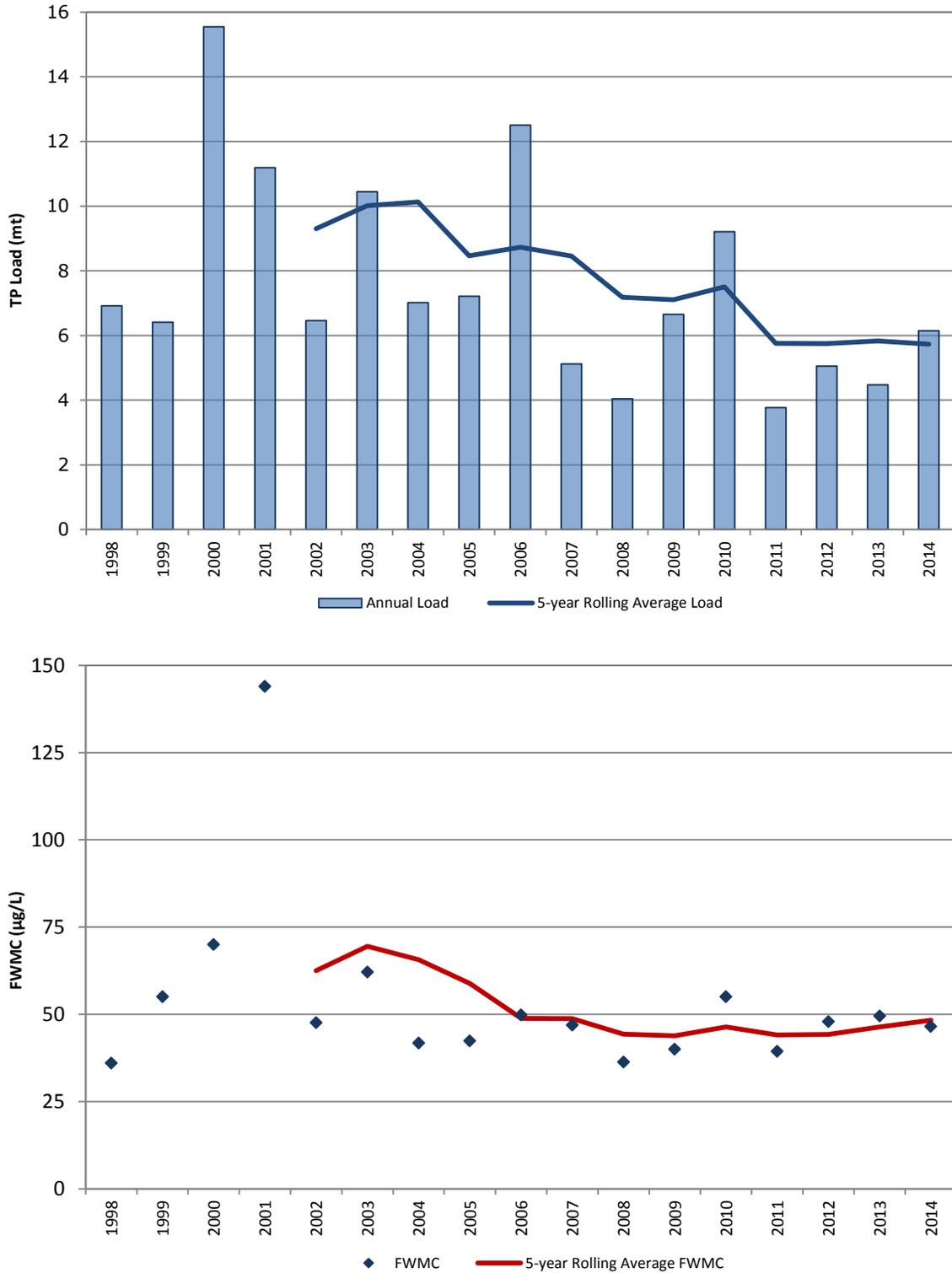
<sup>1</sup>Structure S-174 was plugged in September 2007.

<sup>2</sup>NF = no flow for the period.

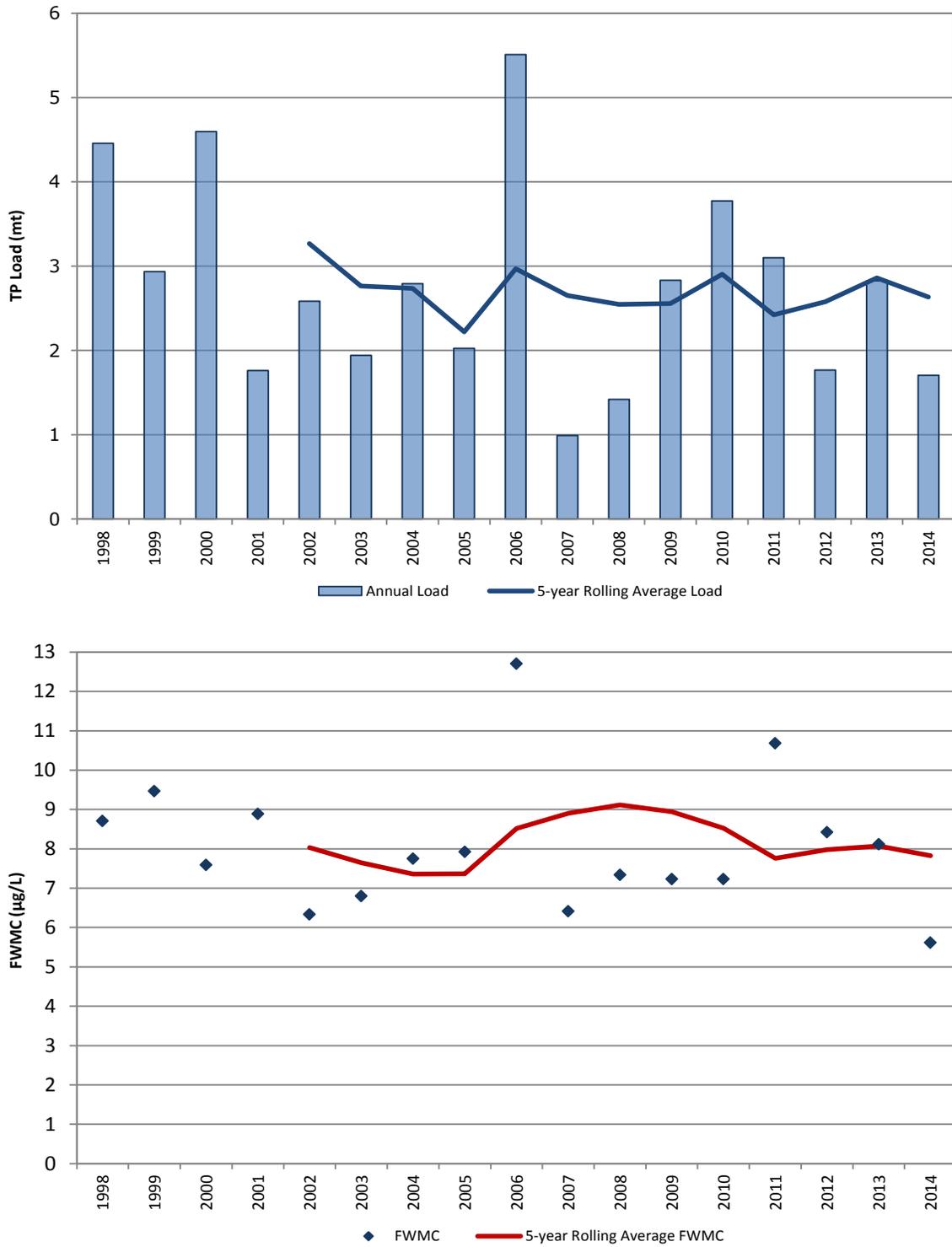
<sup>3</sup>Flow and load calculation at S-175 and S-332 was replaced in WY2001 with S-174 and S-332D.



**Figure 1.** Feeder Canal Basin: annual total phosphorus (TP) load and five-year rolling averages (top) and annual TP flow-weighted mean concentration (FWMC) and five-year rolling averages (bottom).

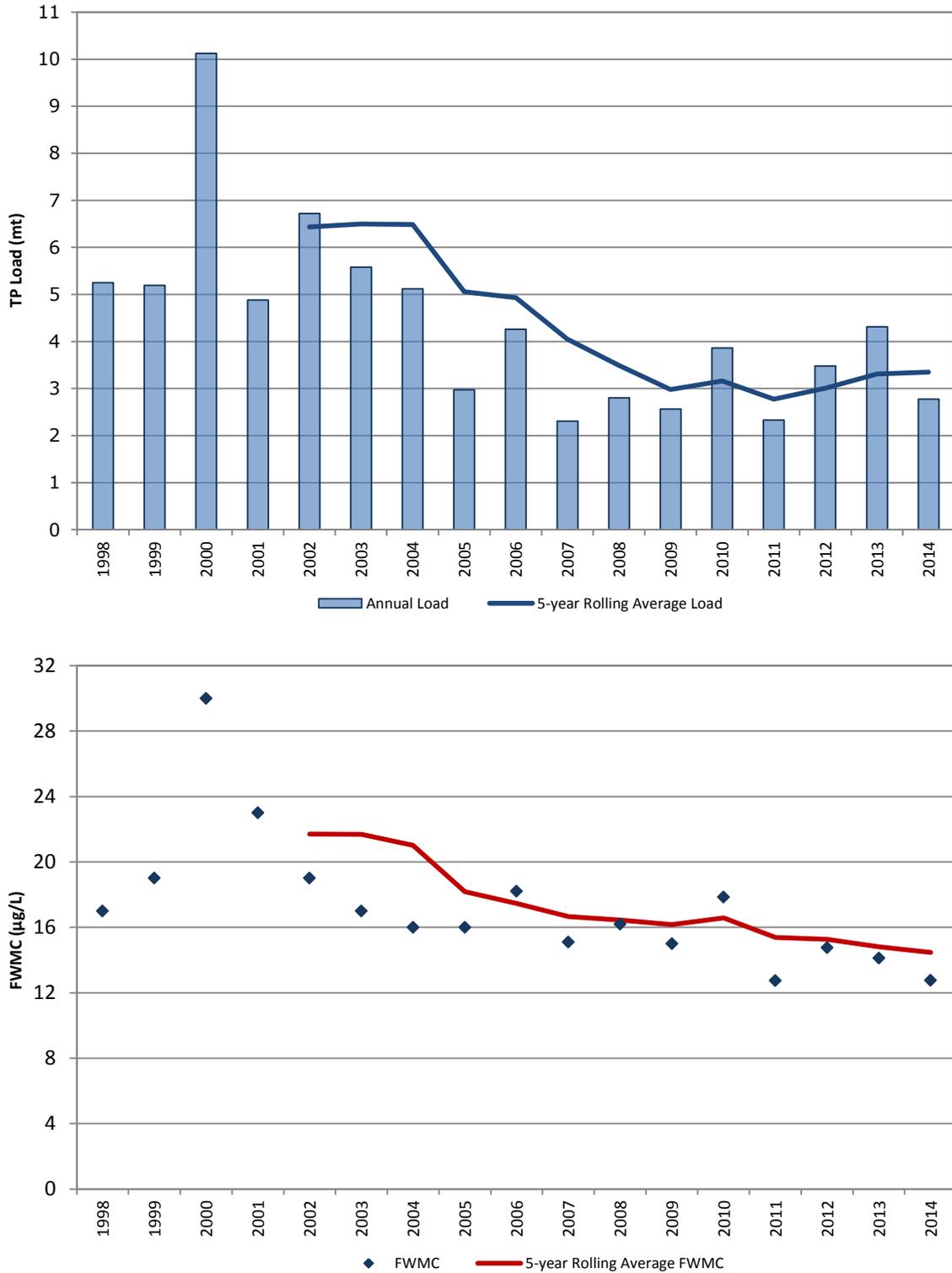


**Figure 2.** L-28 Basin: annual TP load and five-year rolling averages (top) and annual TP FWMC and five-year rolling averages (bottom).

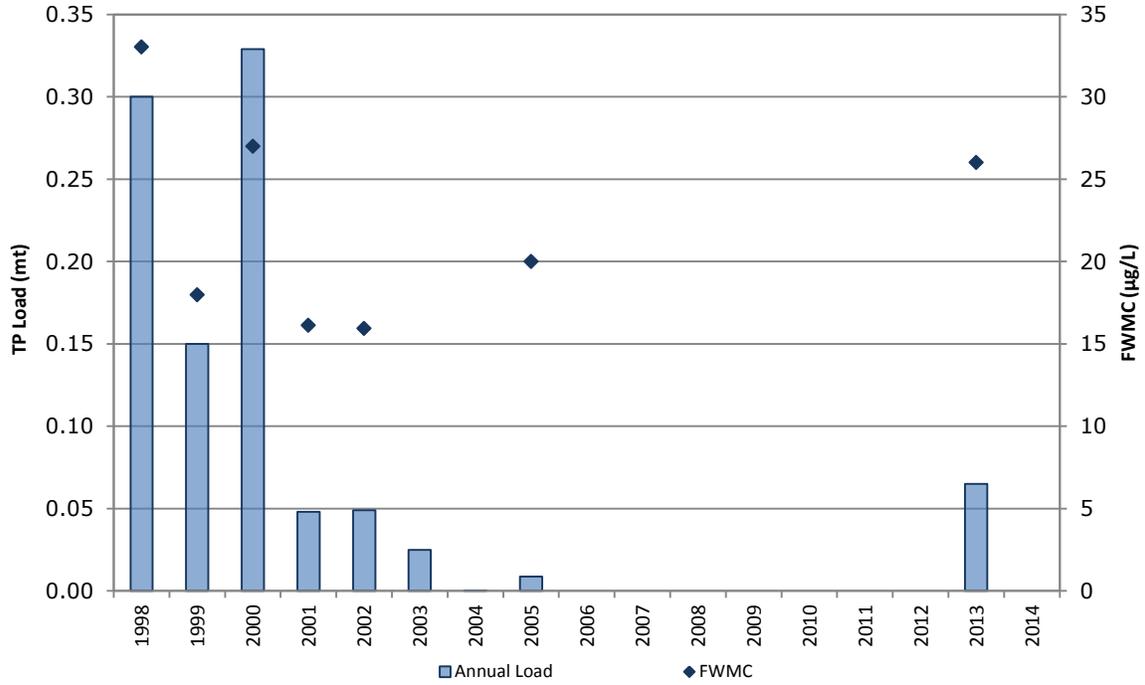


**Figure 3.** C-111 Basin: annual TP load and five-year rolling averages (top) and annual TP FWMC (FWMC) and five-year rolling averages (bottom).

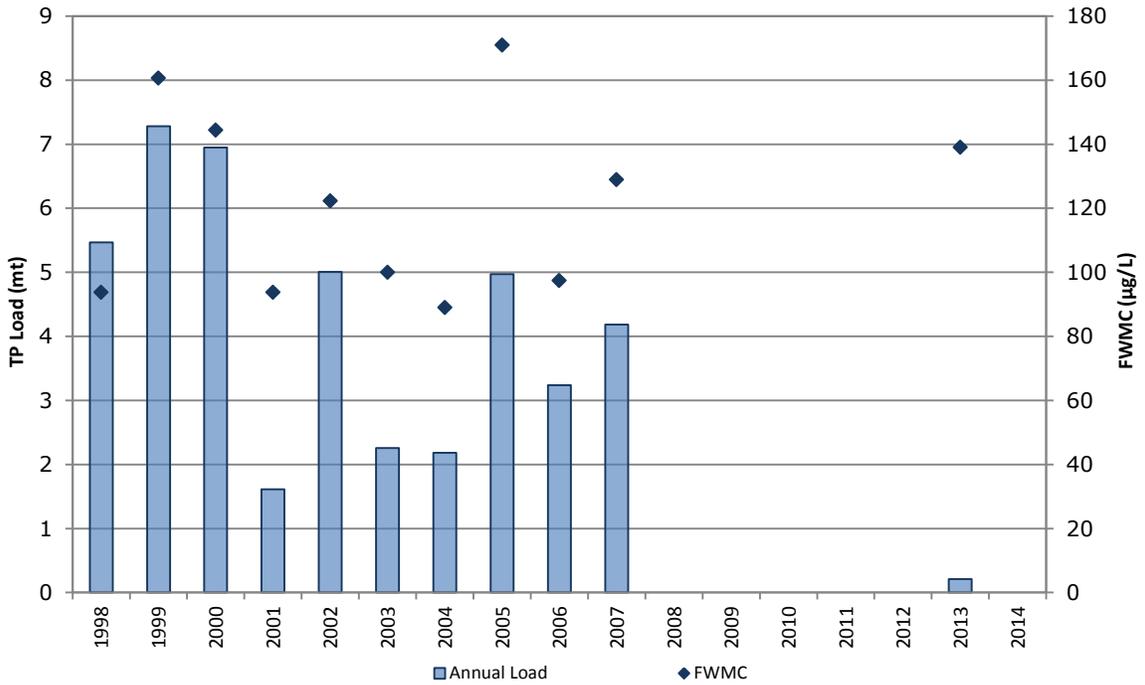
[Notes: Flow and load calculation at S-175 and S-332 was replaced in WY2001 with S-174 and S-332D. Structure S-174 was plugged in September 2007.]



**Figure 4.** C-11 West Basin: annual TP load and five-year rolling averages (top) and annual TP FWMC (FWMC) and five-year rolling averages (bottom).

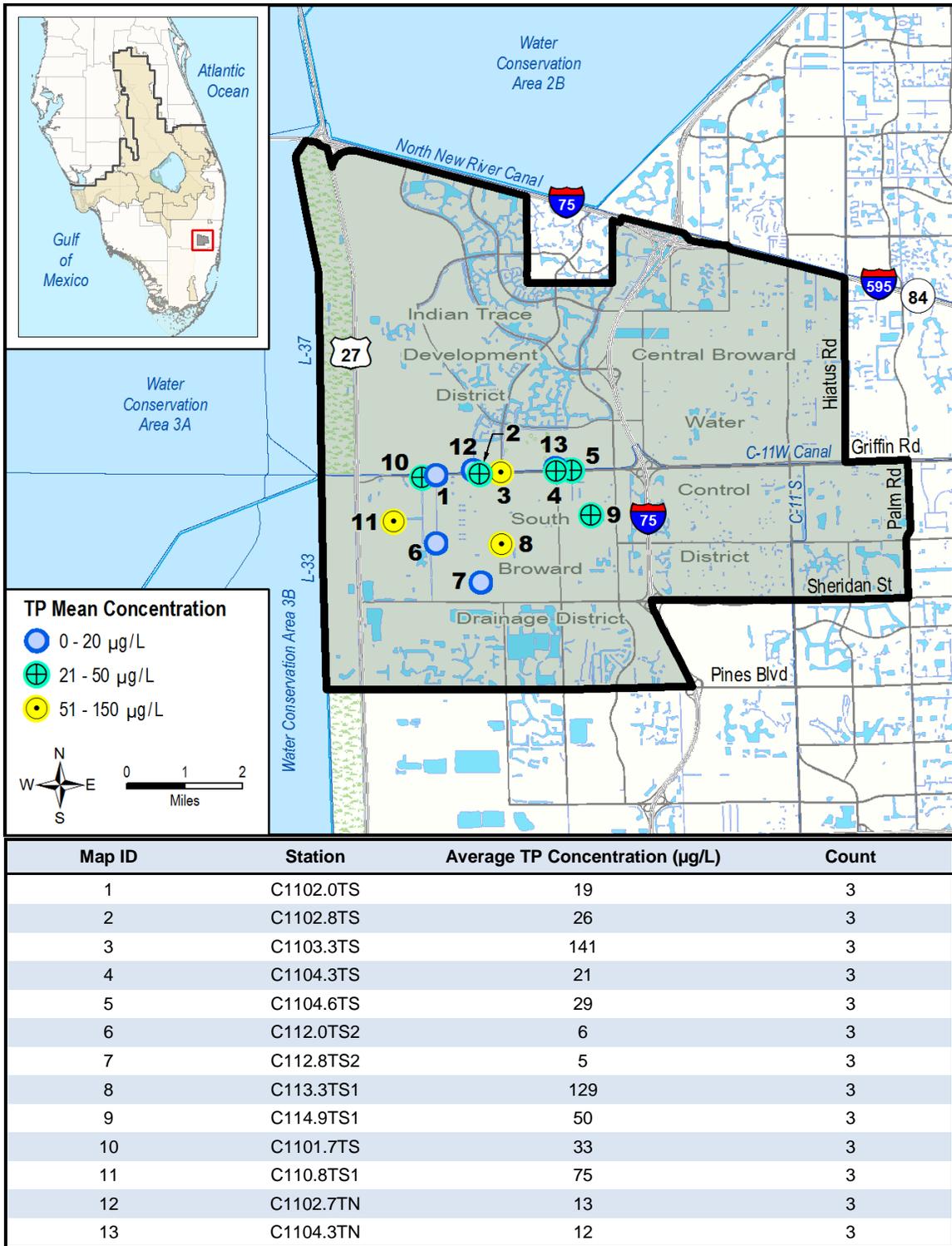


**Figure 5.** North Springs Improvement District Basin annual TP load and TP FWMC.

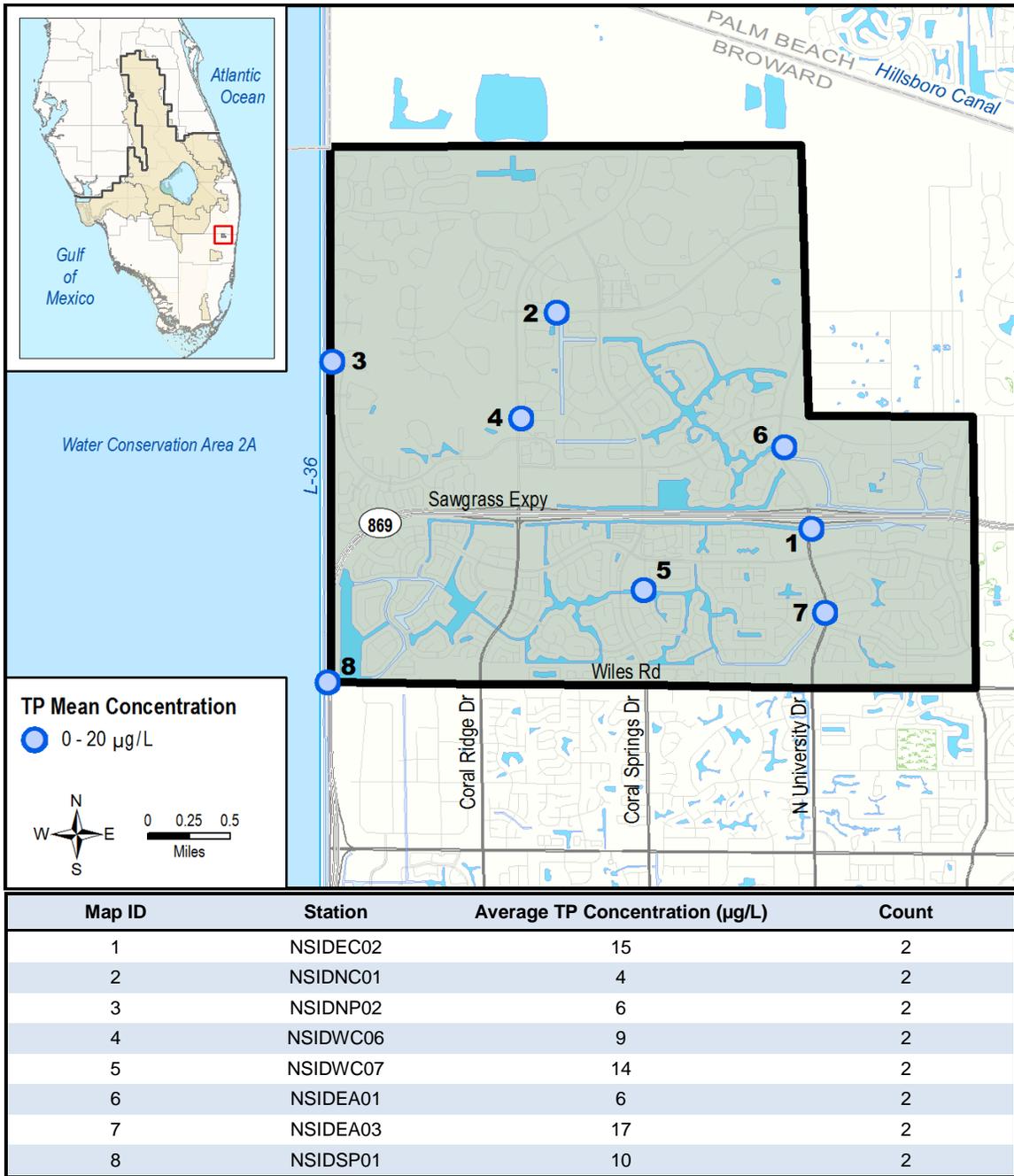


**Figure 6.** Acme Basin annual TP load and TP FWMC.

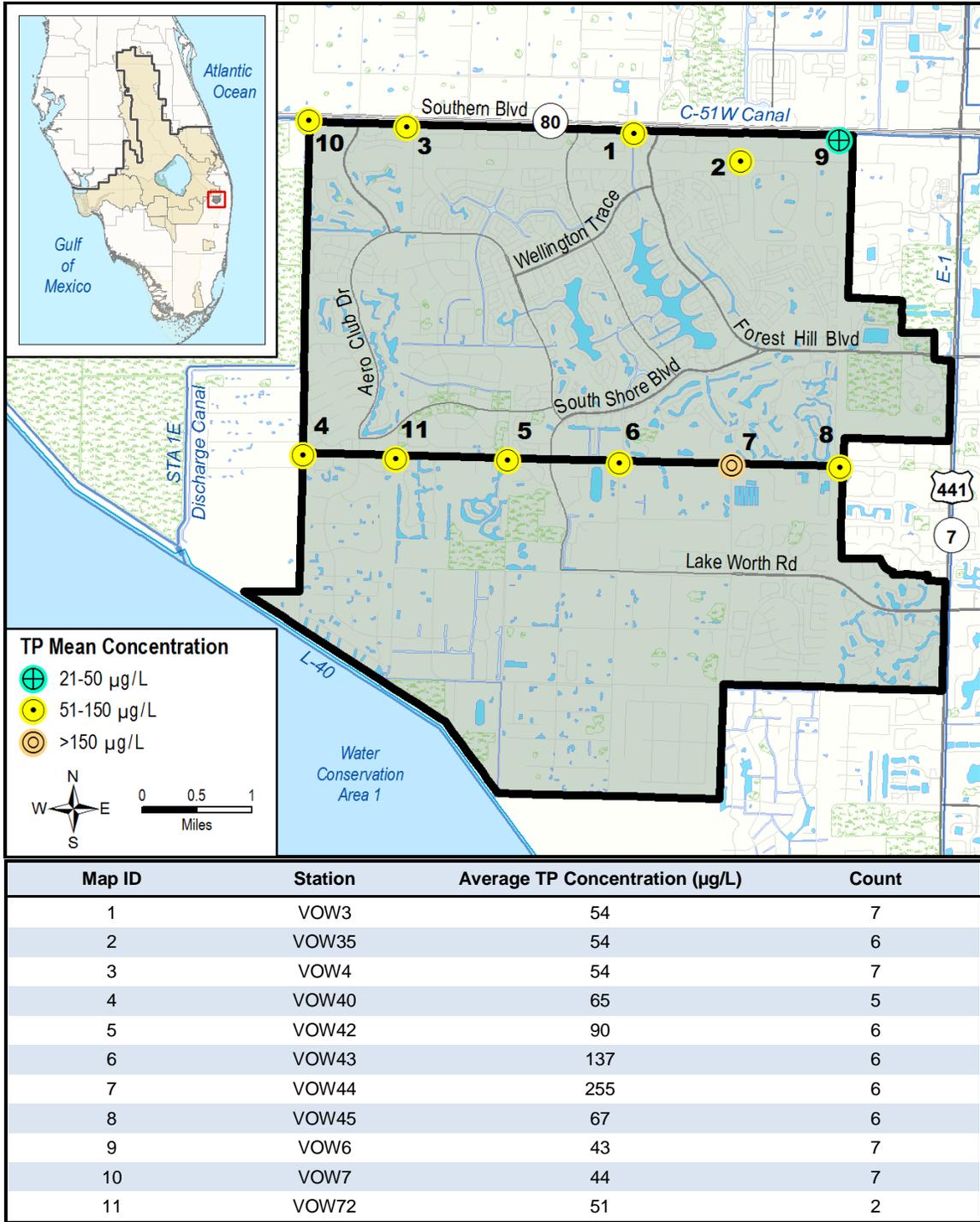
[Note: Acme Basin discharges have been diverted to C-51 West Canal since December 2006; however 0.2 mt of TP load discharged to the EPA in WY2013 as a result of flood protection measures associated with Tropical Storm Isaac.]



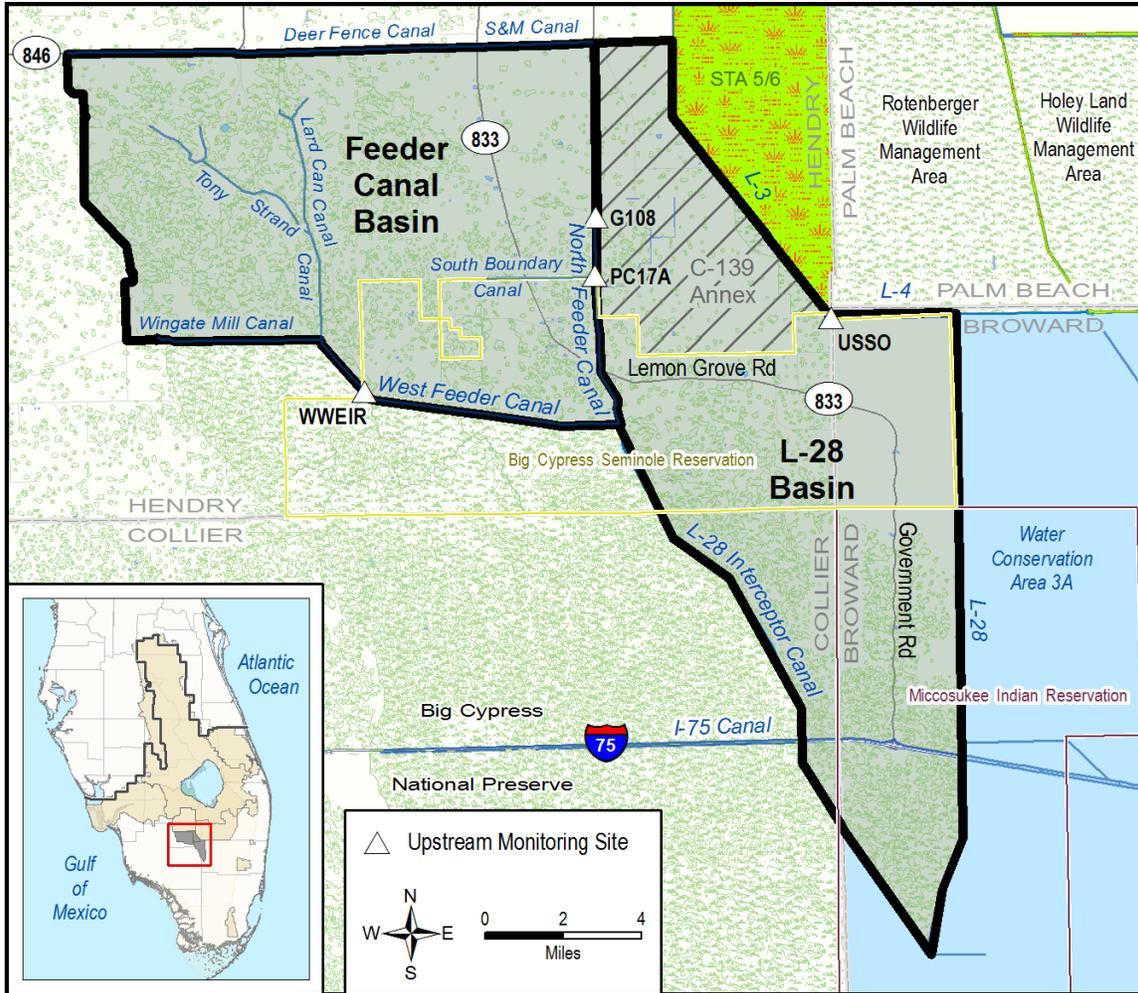
**Figure 7.** Summary of TP data for C-11 West Basin upstream monitoring sites.



**Figure 8.** Summary of TP data for North Springs Improvement District Basin upstream monitoring sites.

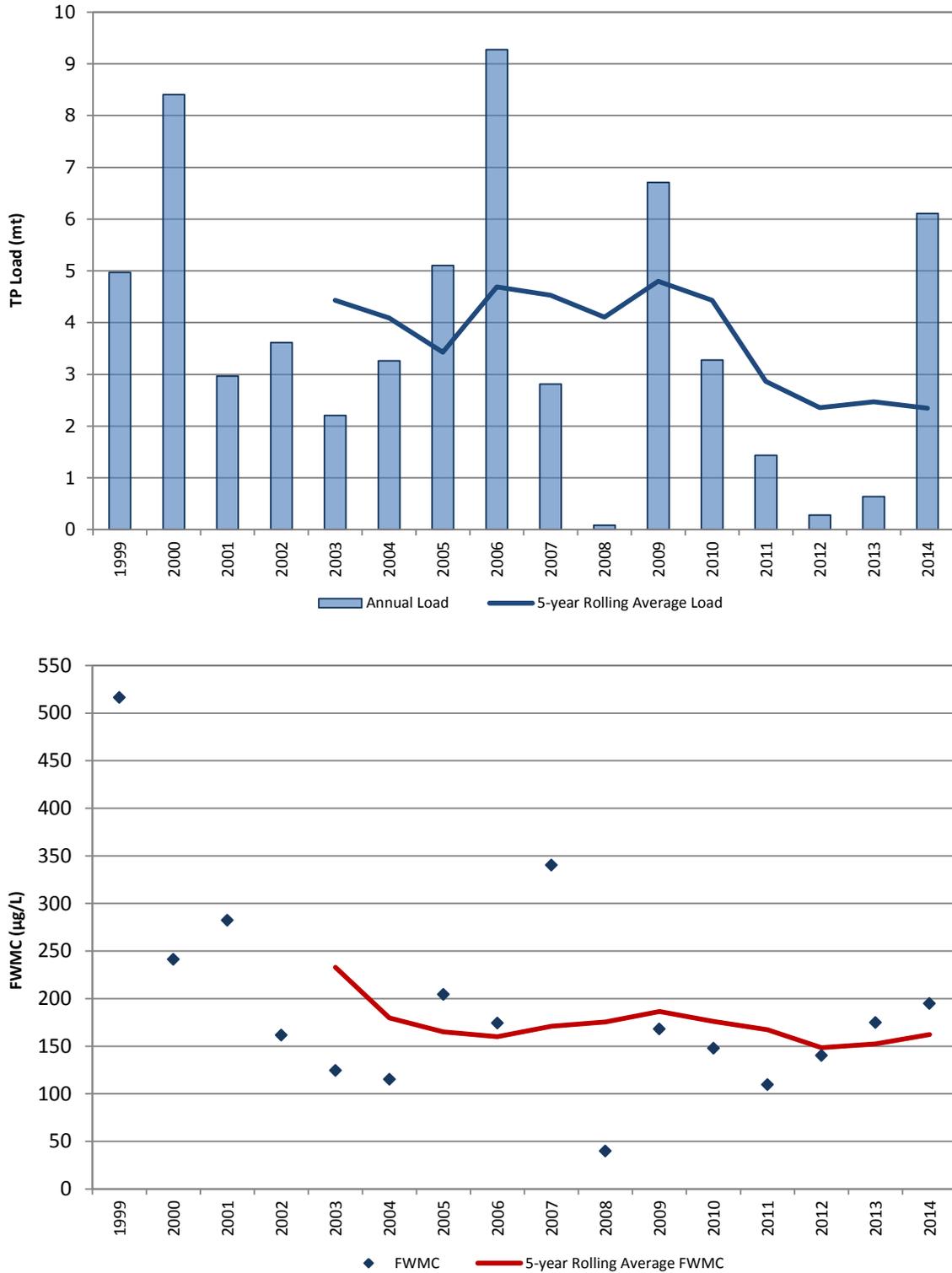


**Figure 9.** Summary of TP data for Acme Basin upstream monitoring sites.



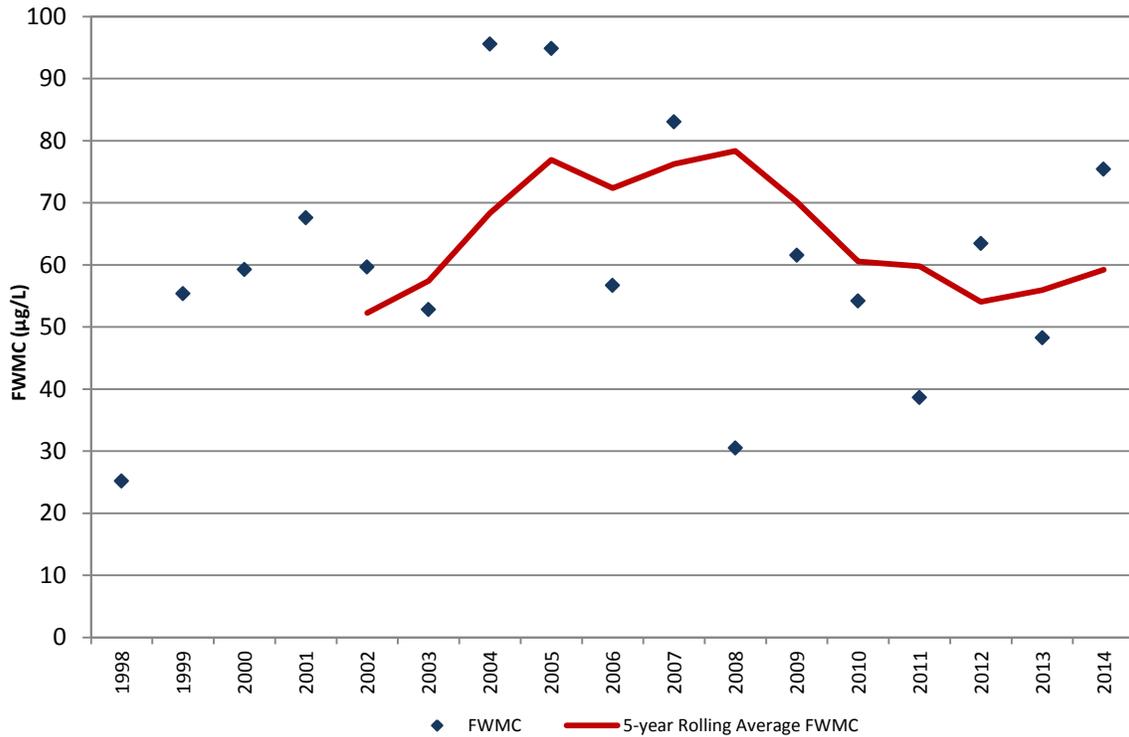
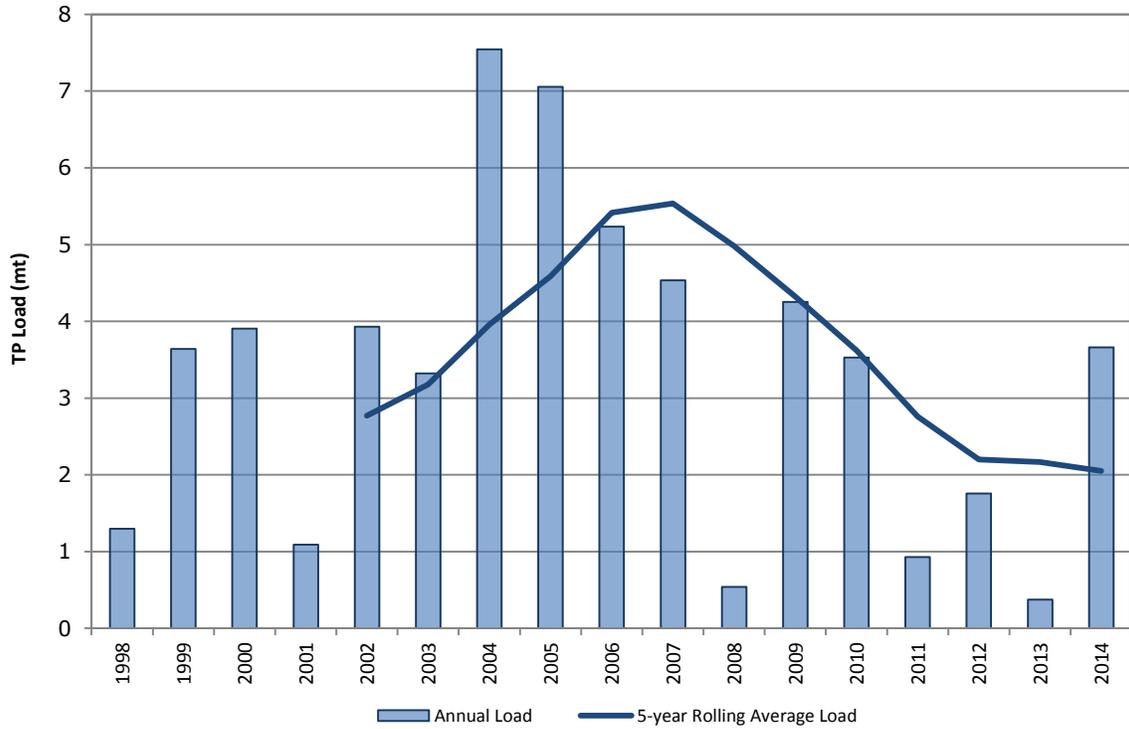
**Figure 10.** Feeder Canal Basin and L-28 Basin upstream monitoring sites.

[Note: Structure G-108 was removed in April 2010.]

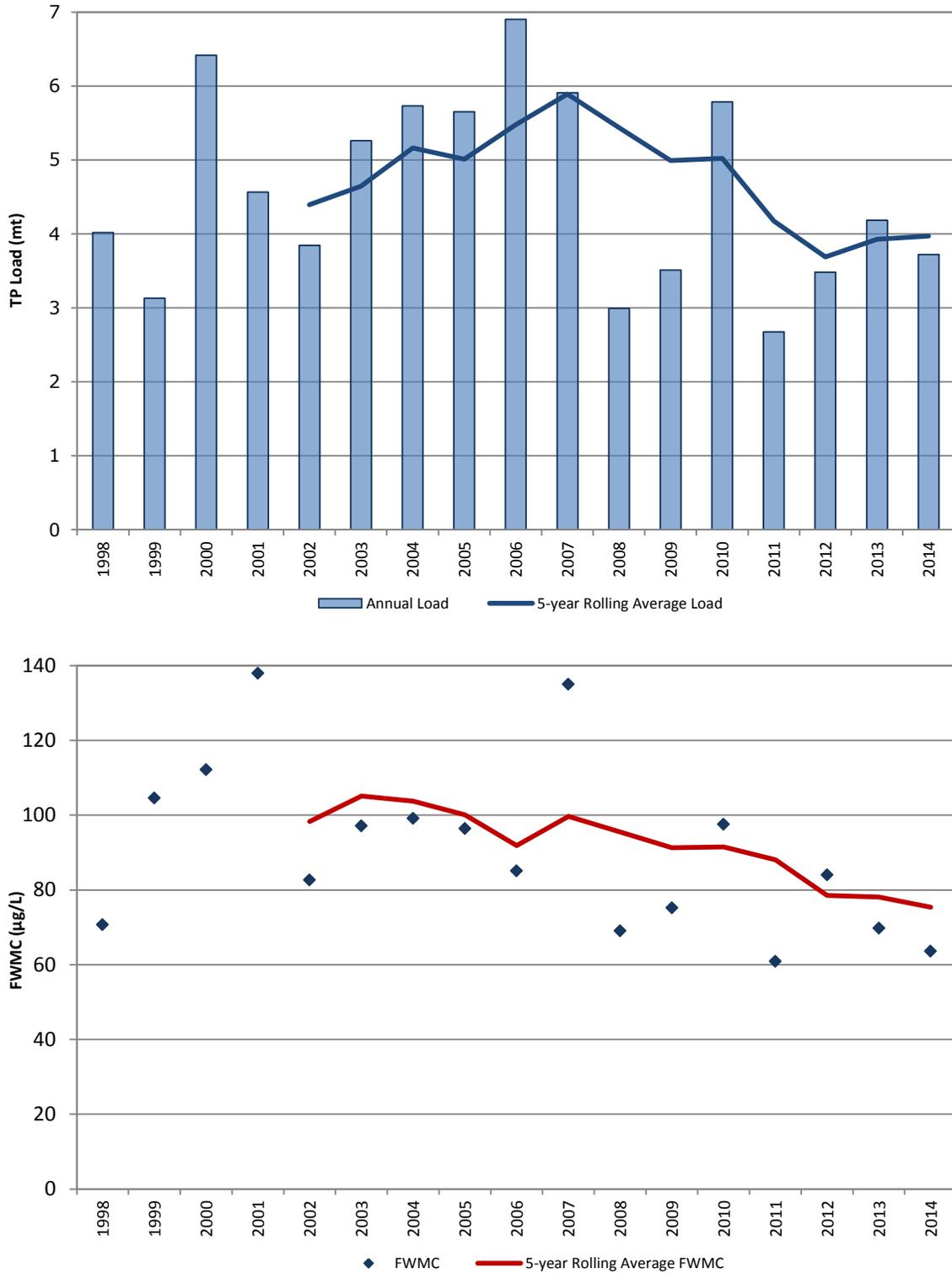


**Figure 11.** Combined PC-17A and G-108: annual TP load and five-year rolling averages (top) and annual TP FWMC and five-year rolling averages (bottom).

[Note: Structure G-108 was removed in April 2010.]



**Figure 12.** WVEIR: annual TP load and five-year rolling averages (top) and annual TP FWMC and five-year rolling averages (bottom).



**Figure 13.** USSO: annual TP load and five-year rolling averages (top) and annual TP FWMC and five-year rolling averages (bottom).