Appendix 4-3: Supplemental Information for the Northern Everglades[1]

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INTRODUCTION

The watersheds encompassing Lake Okeechobee, the Caloosahatchee River, and the St. Lucie River are collectively referred to as the Northern Everglades. The South Florida Water Management District's (District or SFWMD) Regulatory Nutrient Source Control Program in the Northern Everglades is administered under rules of Chapter 40E-61, Florida Administrative Code (F.A.C.), and is also known as the Works of the District (WOD) program. The WOD program was established in the Lake Okeechobee Watershed in 1989, and requires control of nutrients in discharges through best management practices (BMPs) described in permits. The program focuses on reducing nutrient discharges from both agricultural and non-agricultural land uses. Historical timelines of the programs and projects leading to the current source control programs in the Lake Okeechobee subwatersheds are provided at a basin-specific level in Figures 4-15 to 4-27 in Chapter 4 of this volume. Many of these efforts have a potential to impact water quality in watershed discharges.

One component of the longstanding WOD regulatory program is water quality monitoring to establish background data, track changes in water quality discharges over time, and highlight potential areas of water quality concern within the watershed. The water quality monitoring data, including the basin-level, upstream, and ambient monitoring for the Lake Okeechobee, St. Lucie River, and Caloosahatchee River watersheds, is provided in this appendix for Water Year 2015 (WY2015) (May 1, 2014–April 30, 2015). Ensuring that data collected is representative of discharges is critical to tracking progress of water quality improvement strategies. Tracking discharges as inflows and outflows to the watersheds is a complex accounting exercise. There are hydrologic overlaps between the northern and southern Lake Okeechobee watershed as well as the Lake Okeechobee Watershed and the St. Lucie River and Caloosahatchee River watersheds. **Figures 1** and **2** provide flow schematics of the Lake Okeechobee Watershed, depicting the subwatersheds located in the northern and southern part of Lake Okeechobee, respectively, flow transfers between subwatersheds, and existing structures associated with the water quality and flow data used for nutrient calculations. Similarly, **Figures 35** and **53** provide the flow schematics for the Caloosahatchee River Watershed and the St. Lucie River Watershed, respectively.

A key consideration when evaluating trends of pollutants in runoff is the effect of hydrologic variability (rainfall and distribution) from year to year. There are various methods to address the

[1] Table 2A and Figure 71 were updated on March 9, 2016.

uncertainty that results from the variability, and their appropriateness may vary based on the characteristics of each watershed and the data that are available. For example, see the discussion under the EAA *Water Year 2015 Phosphorus Results* section in Chapter 4 of this volume, where a model is used to account for differences in annual rainfall intensity and distribution. For the Northern Everglades Watershed, a five-year rolling average is presented in the *Northern Everglades Watershed Update* section in Chapter 4, which provides a sense of the hydrologic variability when analyzing long-term trends. However, it should be noted that a five-year rolling average approach may not realistically incorporate hydrologic variability in all cases. For example, it may underestimate the effect on annual nutrient load of short duration high intensity events, or the distinct weather patterns during certain years (e.g., the 1990 to 1994 rapid succession of El Niño events). Additionally, the previous year carryover effect of this methodology may cause delays in data response to changes in basin conditions and sources. As such, this appendix includes a supplemental analysis to account for basin hydrologic variability, dependent on data availability. This method of calculating trends in pollutant loads has not been adopted by rule, and is not intended for any regulatory purpose.

The following pages provide a brief description of the existing monitoring networks, the latest land use coverage, and water quality data and trends for each of the Northern Everglades watersheds. Another key consideration when evaluating water quality trends is land use, as certain land uses require the import of more nutrients than others. For example, nutrients are imported as part of a dairy operation whereas native areas have no nutrients imported. Thus, the amount of nutrients in runoff from a dairy operation are greater than those from native areas. As land uses change in an area over time, they may impact the quality of the water discharged from that area. The existing WOD program is implemented on both agricultural and non-agricultural lands, and maps showing agricultural, non-agricultural, and natural areas are presented in the following sections. **Figures 3** through **11** provide the latest land use data for the Lake Okeechobee Watershed by subwatershed, and the latest land use data for the Caloosahatchee River and St. Lucie River watersheds are provided in **Figures 36** through **40** and **Figures 54** through **63**, respectively. Additional details on the land use breakdown in the Lake Okeechobee Watershed and river watersheds can be found respectively in Chapters 4, 8, and 10 of this volume.

LAKE OKEECHOBEE WATERSHED

LAKE OKEECHOBEE WATERSHED BASIN-LEVEL MONITORING

The existing Lake Okeechobee Watershed monitoring network is utilized for tracking basin level trends based on phosphorus concentration and flow data collected to capture representative discharges from the following basins: Upper Kissimmee, Lower Kissimmee, S-133, S-135, S-154, S-154C, S-191, Lake Istokpoga, Indian Prairie, Fisheating Creek, Nicodemus Slough, East Caloosahatchee, C-44, L-8, S-4/Industrial Canal, and South Lake Okeechobee Everglades Agricultural Area (EAA) Diversion Basins. The East Caloosahatchee and S-4/Industrial Canal basins can discharge into either Lake Okeechobee or the Caloosahatchee River and the C-44 Basin can discharge into either Lake Okeechobee or the St. Lucie River. The L-8 Basin can discharge into either Lake Okeechobee or outside of the watershed into the West Palm Beach M Canal, the West Palm Beach Canal (S-5A Subbasin in the EAA Basin or C-51W Basin), and the L-8 Flow Equalization Basin (FEB). It should be noted the L-8 FEB, formerly a reservoir, has been in construction since early 2013, and flows into and out of the reservoir have occurred since September 2004 through temporary structures. The lower segment of the L-8 Canal has been used to move water into the reservoir from other basins (and vice versa) and it will be used in the future to move water into the FEB from other basins (and vice versa). The South Lake Okeechobee basins can discharge into either Lake Okeechobee or outside of the watershed as an external source into the EAA Basin. Additionally, there are two tributaries in the Upper Kissimmee Subwatershed

(Boggy Creek and Shingle Creek) and two tributaries in the Lake Istokpoga Subwatershed (Arbuckle Creek and Josephine Creek) where total phosphorus (TP) and flow data are available upstream of Lake Kissimmee and Lake Istokpoga, respectively.

Figures 12 through **24** depict the TP flow-weighted mean concentration (FWMC) data for the period of record and five-year moving averages to track trends over time and the change in TP load relative to the rainfall adjusted reference period. The reference period is unique to the basin based on available historic data. Data were available to develop rainfall runoff regression equations for 71 percent of the Lake Okeechobee Watershed (Boggy Creek, Shingle Creek, Lower Kissimmee, Fisheating Creek, Arbuckle Creek, Josephine Creek, Indian Prairie, S-133, S-154, S-191, L-8, C-44, East Caloosahatchee, and S-4/Industrial Canal basins) similar to the models used in the EAA and C-139. A negative change in TP load represents a reduction in load and indicates the water quality from the basin is improving.

The remaining 29 percent of the watershed, which includes the S-135, S-154C, Nicodemus Slough, and portions of both the Upper Kissimmee (excluding the Boggy Creek and Shingle Creek basins) and Lake Istokpoga subwatersheds (excluding Arbuckle and Josephine Creek basins) did not have sufficient data to develop statistically significant rainfall runoff regressions for trend analysis. Plots of TP FWMC for S-154C and S-135 are shown in **Figures 21** and **23**, respectively, although change in TP loads are not shown because no annual TP rainfall-load relationships have been developed for those basins.

The WY2015 FWMC for all of these areas are presented in Tables 4-1 and 4-2 of this volume. The FWMC plot for the C-44 Basin is provided in the *St. Lucie River Watershed* section and the East Caloosahatchee and S-4/Industrial Canal basins are included in the *Caloosahatchee River Watershed* section of this appendix.

Chapter 40E-61, F.A.C., adopted in 1989, provided basin-level limitations in the Lake Okeechobee Watershed. It was expected that the concentrations could be achieved through the implementation of permitted phosphorus control plans utilizing BMPs. These limitations ranged from 60 to 180 micrograms per liter (µg/L). Unfortunately, this strategy has not yet been fully implemented. Although the data are presented herein in terms of trends, the discharge limitations set by rule may be used as an annual point of reference for progress, for example, the S-133, S-154, and S-191 basins and the Indian Prairie Subwatershed all had TP discharge concentrations greater than 180 µg/L.

LAKE OKEECHOBEE WATERSHED PERMIT-LEVEL MONITORING

The 1989 rules under Chapter 40E-61, F.A.C., also provided concentration limitations to be applied at the permit level in the Lake Okeechobee Watershed. In an effort to conduct cost-effective monitoring, in lieu of individual permittee monitoring, the rule included provisions for the District to cover the cost of monitoring of the permittees. This is accomplished through the District's upstream monitoring networks within each basin at upstream locations under several different projects. Data are collected under the Lake Okeechobee Watershed Assessment monitoring program, along with data collected from the District's ambient monitoring network and Lake Okeechobee inflow sites for this purpose. Additionally, these data are used to identify, prioritize, and direct resources to upstream areas of water quality concern. The District, Florida Department of Agriculture and Consumer Services, and Florida Department of Environmental Protection meet routinely to discuss areas with water quality concerns and develop agency action plans. The District's ambient monitoring network and United States Geological Survey monitoring network are described further in Chapter 8 of this volume.

An overview of TP concentrations sampled only during flow conditions at the upstream sites is presented in **Figures 25** through **34**. For a historical comparison, the data presented also includes

site-specific information detailing the number of water years when data was recorded, the average annual number of samples collected, and the average annual TP concentration for the data, divided into periods up through WY2001 (up to April 30, 2001) and from WY2002 through WY2014 (May 1, 2001 to April 30, 2014). WY2001 was chosen as the pivot point in the analysis because the Lake Okeechobee Protection Act was passed in 2000 and many of the more recent projects and programs that affected water quality were implemented at that time. Note that several factors such as hydrologic conditions, monitoring program requirements, and financial constraints have a combined effect on the number of samples collected and number of water years represented for each site in the table. Also, note that the concentrations presented in **Figures 25** through **34** are not flow-weighted as flow measurements are not available at most stations.

CALOOSAHATCHEE RIVER WATERSHED

CALOOSAHATCHEE RIVER WATERSHED BASIN-LEVEL MONITORING

The existing Caloosahatchee River Watershed monitoring network is utilized for tracking basin level trends based on nutrient (phosphorus and nitrogen) concentration and flow data collected to capture representative discharges from the following basins: East Caloosahatchee, West Caloosahatchee, and S-4/Industrial Canal subwatersheds. The East Caloosahatchee and the S-4/Industrial Canal subwatersheds can discharge to either the Caloosahatchee River or Lake Okeechobee. The Coastal and Tidal subwatersheds of the Caloosahatchee River Watershed are characterized by numerous tributary flows into the estuary. While many of these tributaries are actively monitored for water quality, the monitoring network does not currently capture all of the subwatershed loads for these areas.

Figures 41 through **46** depict the nutrient FWMC data for the period of record and five-year moving averages to track trends over time and the change in nutrient load relative to the rainfall adjusted reference period. The reference period is unique to each basin based on available historic data. Data were available to develop rainfall runoff regression equations for 55 percent of the Caloosahatchee River Watershed (S-4/Industrial Canal, East Caloosahatchee, and West Caloosahatchee subwatersheds) similar to the models used in the EAA and C-139 basins. A negative change in nutrient load represents a reduction in load, which means that the water quality from that basin is improving. For the remaining 45 percent of the watershed, which includes the Tidal and Coastal subwatersheds, nutrient concentration data collected at the tributaries within these two subwatersheds are used.

The WY2015 FWMC for the Caloosahatchee River subwatersheds are presented in Tables 4-1 and 4-2 in Chapter 4 of this volume. **Table 1** provides a summary of the WY2015 flow, rainfall, and concentration data for the Caloosahatchee subwatersheds. For the tributaries within the Tidal and Coastal subwatersheds, median concentration data for the past five to ten years are presented in **Figures 47** through **50**.

CALOOSAHATCHEE RIVER WATERSHED UPSTREAM-LEVEL MONITORING

In addition to the water quality monitoring at the Caloosahatchee River Watershed basin level, monitoring is conducted within the East Caloosahatchee and West Caloosahatchee basins at upstream locations. The upstream water quality data are used to identify, prioritize, and direct resources to upstream areas of water quality concern.

An overview of TP and total nitrogen (TN) concentrations sampled at the upstream sites are presented in **Figures 51** and **52**, respectively**.** The figures include WY2015 mean TP and TN

concentrations for all samples taken during flow conditions. Note that the concentrations presented in the figures are not flow-weighted as flow measurements are not available at most stations. Sites that are depicted with a square, in general, represent the basin-level monitoring stations.

ST. LUCIE RIVER WATERSHED

ST. LUCIE RIVER WATERSHED BASIN-LEVEL MONITORING

The existing St. Lucie River Watershed monitoring network is utilized for tracking basin-level trends based on nutrient and flow data collected to capture representative discharges from the following basins: C-23, C-24, C-25, C-44, and Ten Mile Creek. The C-44 subwatershed can discharge to either the St. Lucie River or Lake Okeechobee. The North Fork, South Fork, North Mid-Estuary, South Mid-Estuary, Basin 4-5-6, and South Coastal basins are characterized by numerous tributary flows into the estuary. While a number of these tributaries are actively monitored for water quality, the monitoring network does not currently capture loading for these areas.

Figures 64 through **73** depict the nutrient FWMC data for the period of records and five-year moving averages to track trends over time and the change in nutrient load relative to the rainfall adjusted reference period. The reference period is unique to the basin based on available historic data. Data were available to develop rainfall runoff regression equations for 73 percent of the St. Lucie River Watershed (C-23, C-24, C-25, C-44, and Ten Mile Creek) similar to the models used in the EAA and C-139 basins. A negative change in nutrient load represents a reduction in load, which means that the water quality from that basin is improving. The remaining 27 percent of the watershed, which includes the North Fork, South Fork, North Mid-Estuary, South Mid-Estuary, Basin 4-5-6, and South Coastal basins flow data is not monitored. Thus nutrient concentration data at tributaries within these areas are used.

The WY2015 FWMC for the St. Lucie River subwatersheds are presented in Tables 4-1 and 4-2 of Chapter 4 of this volume. **Tables 2A** and **2B** provides a summary of the WY2015 rainfall and concentration data for the St. Lucie basins and tributaries, respectively. For the tributary stations, the median concentration data for the available period is presented in **Figures 74** through **79**.

ST. LUCIE RIVER WATERSHED UPSTREAM-LEVEL MONITORING

In addition to the water quality monitoring at the St. Lucie River Watershed basin level, monitoring is conducted within the C-23, C-24, and C-44 basins at upstream locations. The upstream water quality data is used to identify, prioritize, and direct resources to upstream areas of water quality concern.

An overview of TP and TN concentrations sampled at the upstream sites are presented in **Figures 80** and **81**, respectively. The figures include WY2015 mean TP and TN concentrations for all samples taken during flow conditions. Note that the concentrations presented in the figures are not flow-weighted as flow measurements are not available at most stations. Sites that are depicted with a square, in general, represent the basin-level monitoring stations.

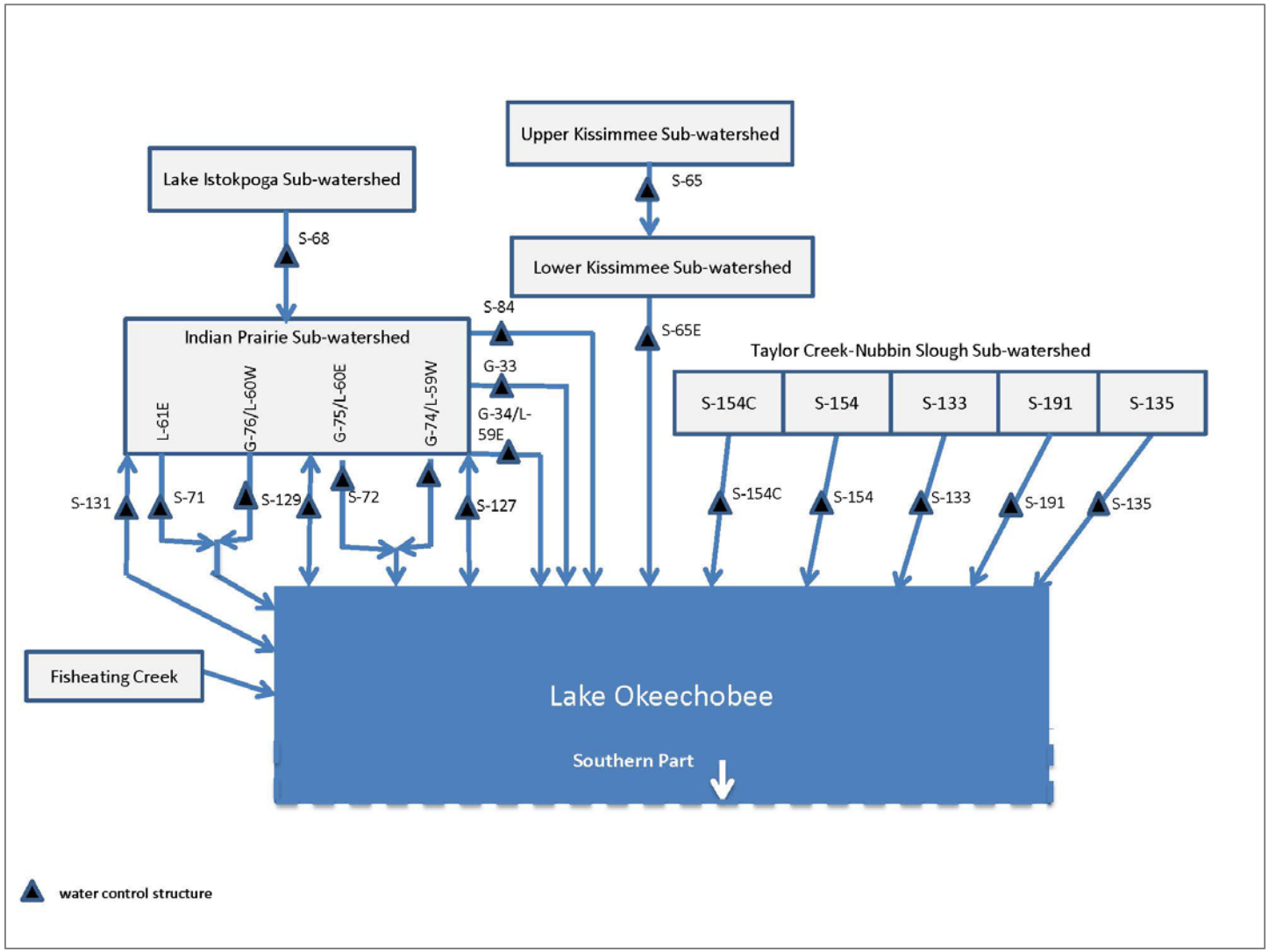


Figure 1. Lake Okeechobee Watershed (northern part of Lake Okeechobee) flow schematic.

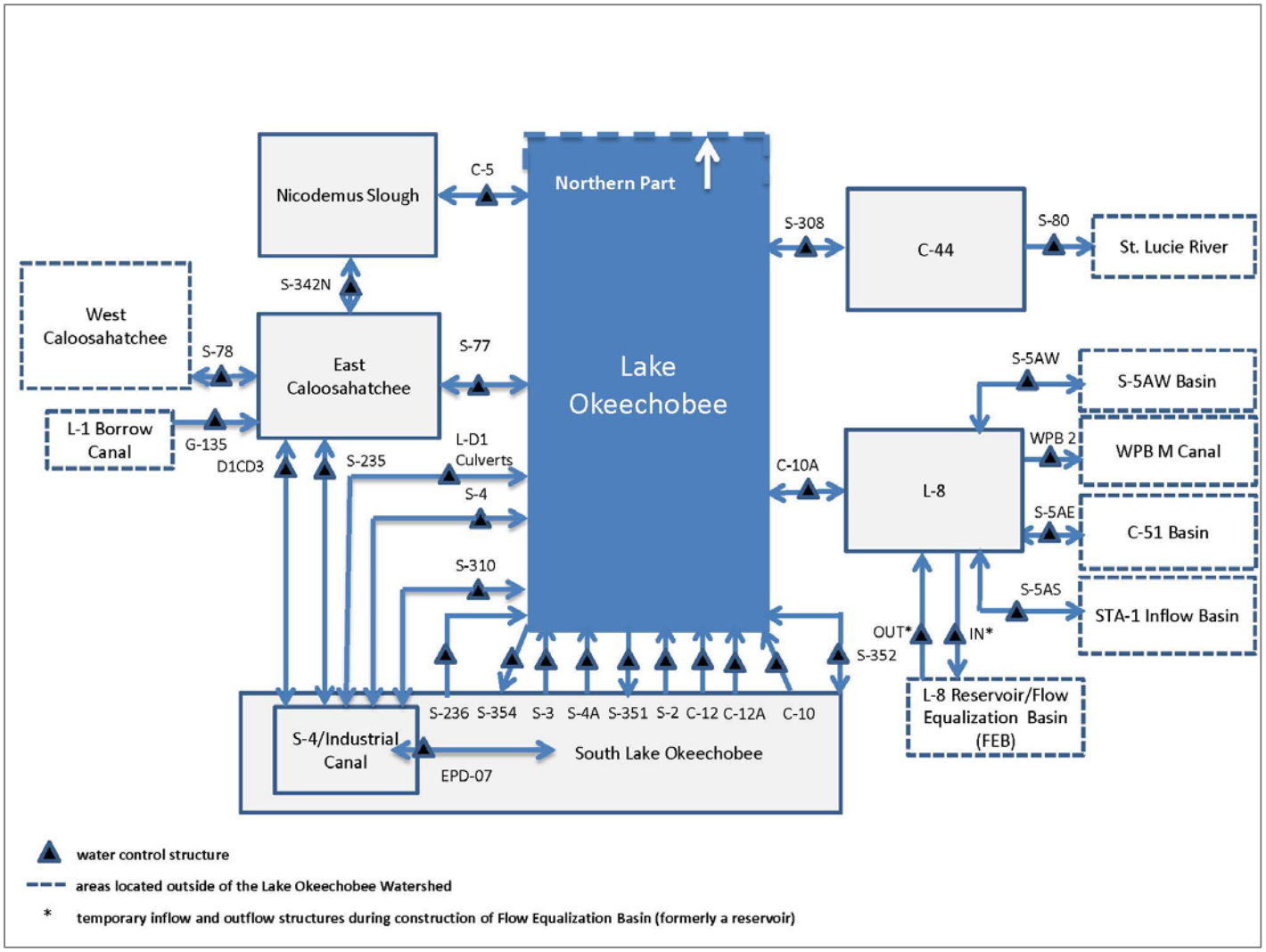


Figure 2. Lake Okeechobee Watershed (southern part of Lake Okeechobee) flow schematic.

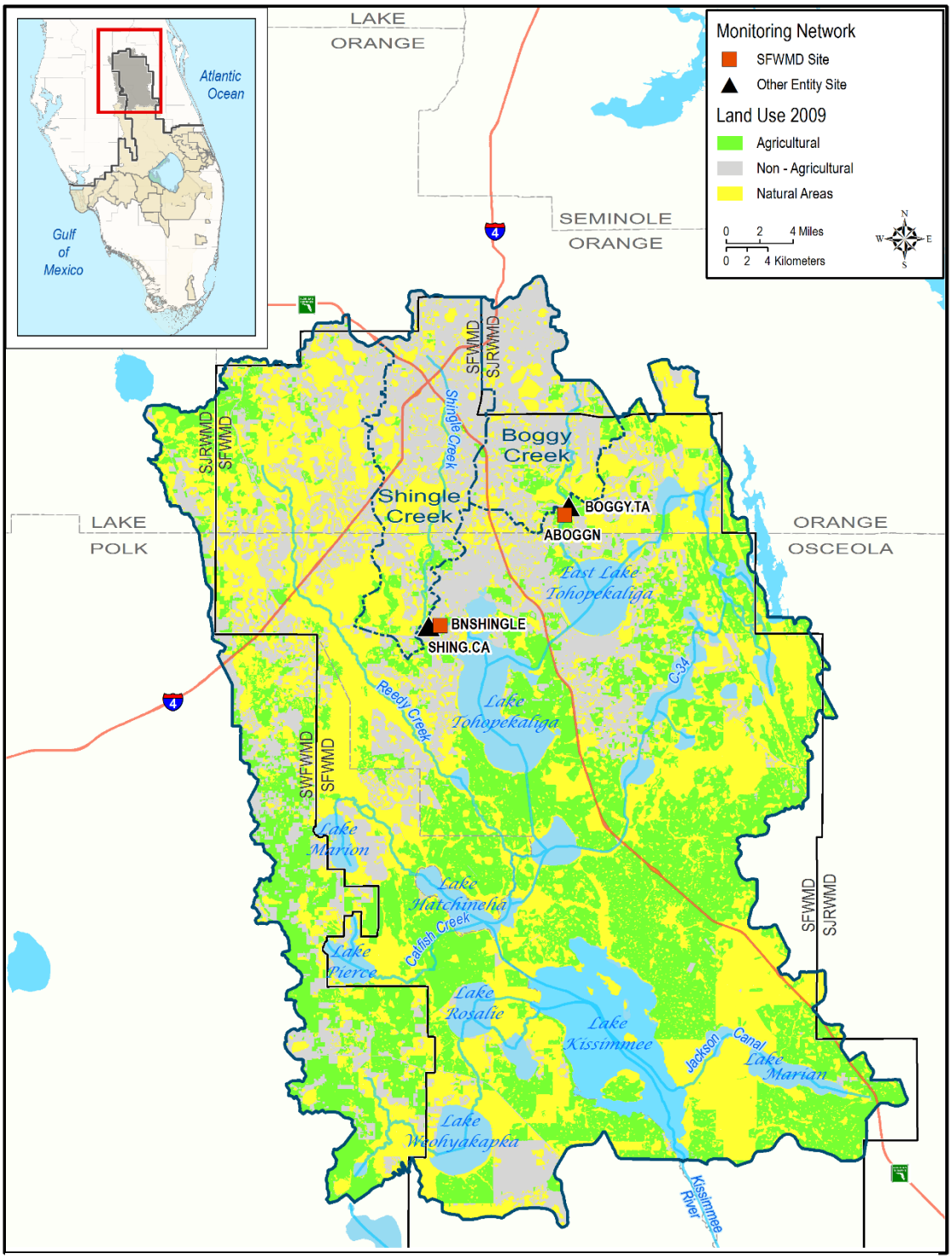


Figure 3. Lake Okeechobee Watershed, Upper Kissimmee Subwatershed. Land use from the most recent available data set (2008–2009).

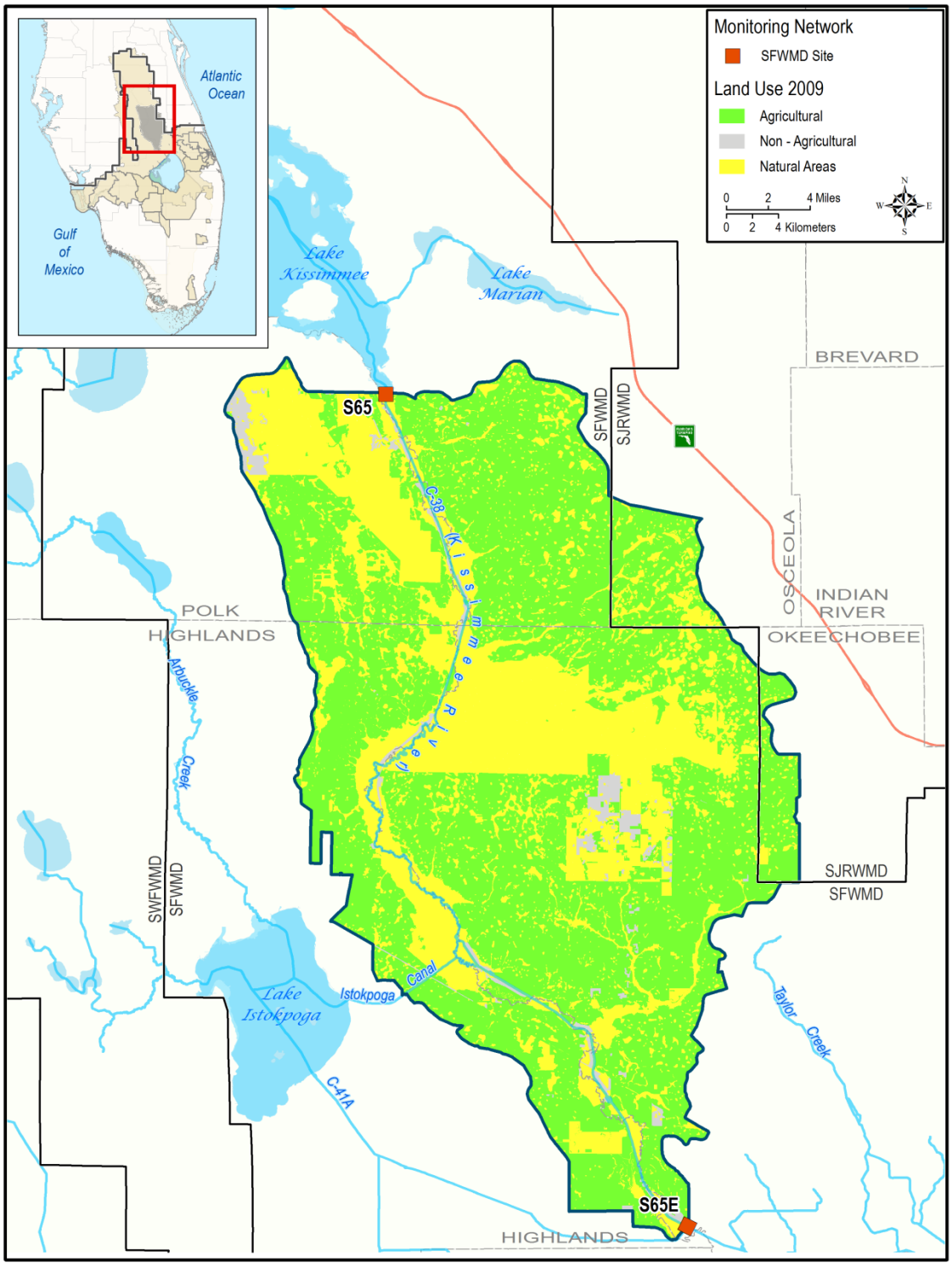


Figure 4. Lake Okeechobee Watershed, Lower Kissimmee Subwatershed. Land use from the most recent available data set (2008–2009).

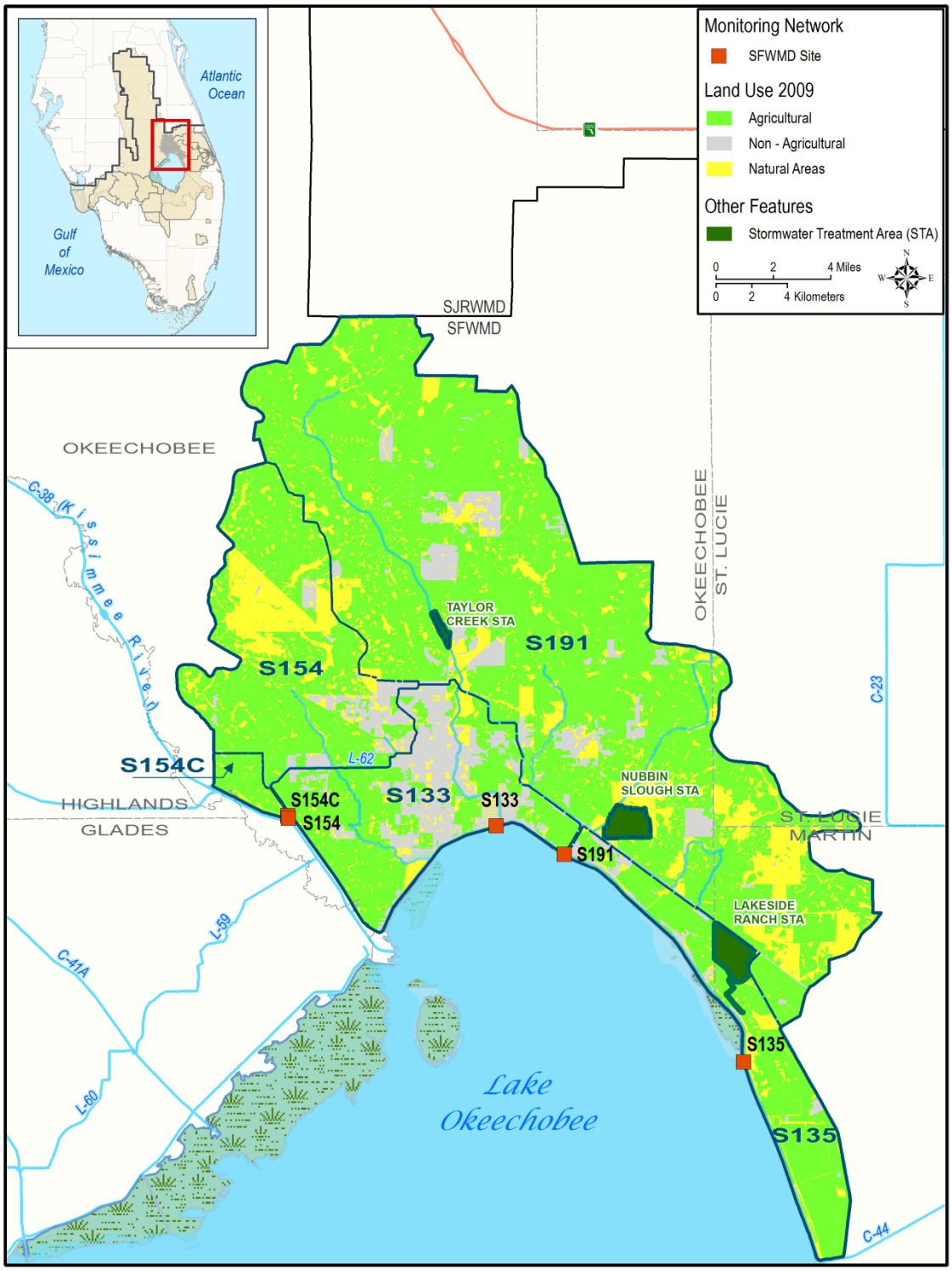


Figure 5. Lake Okeechobee Watershed, Taylor Creek/Nubbin Slough Subwatershed. Land use from the most recent available data set (2008–2009).

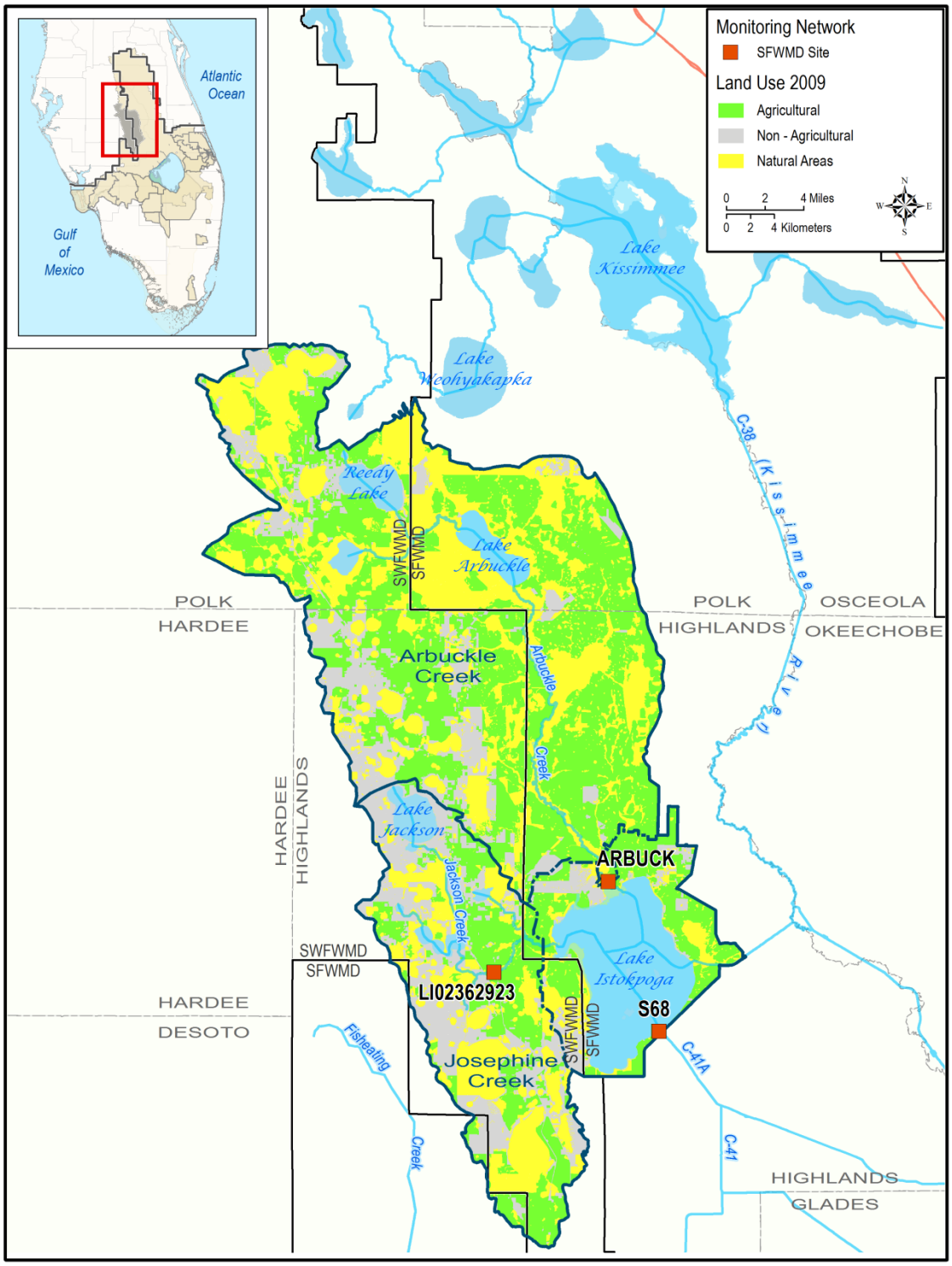


Figure 6. Lake Okeechobee Watershed, Lake Istokpoga Subwatershed. Land use from the most recent available data set (2008–2009).

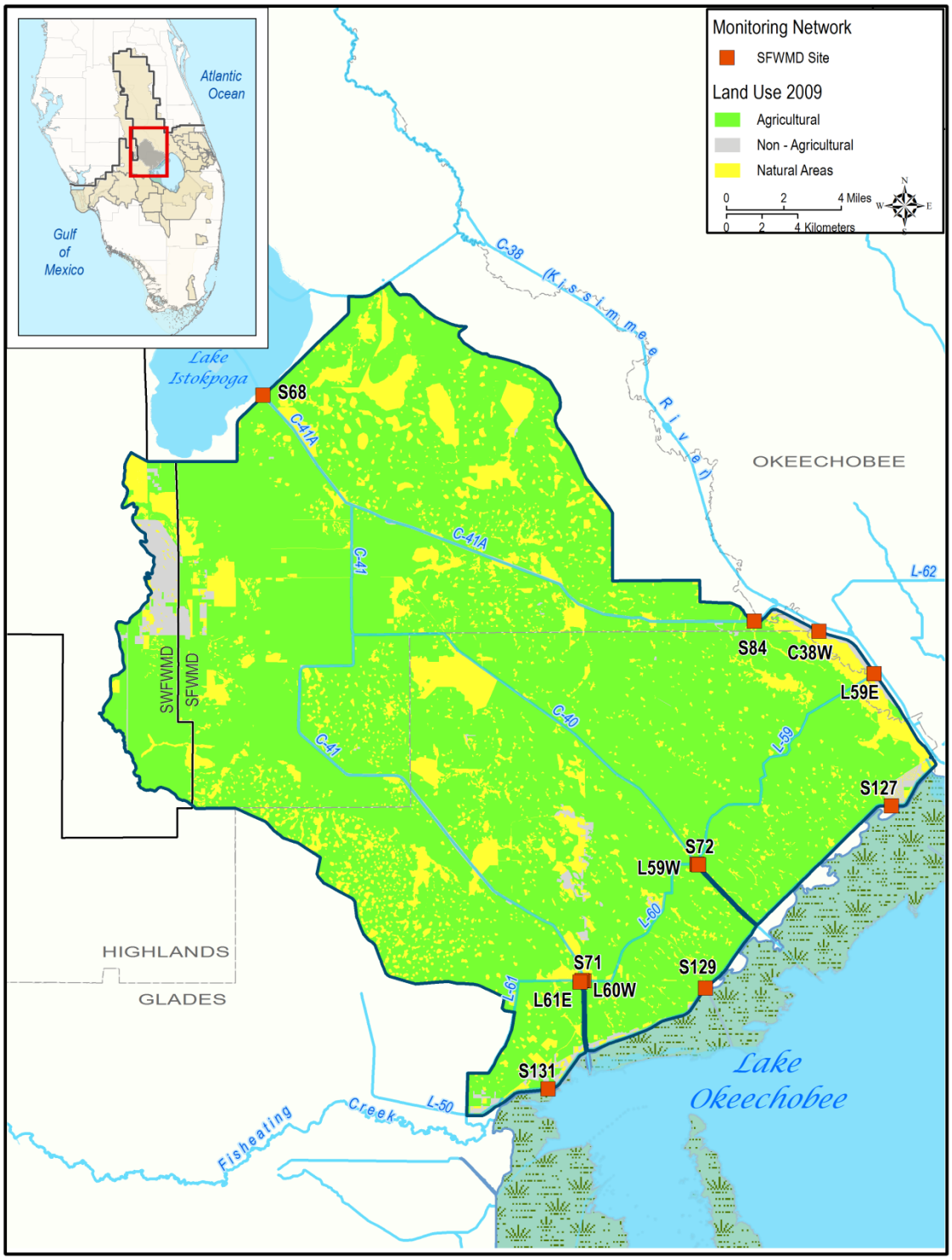


Figure 7. Lake Okeechobee Watershed, Indian Prairie Subwatershed. Land use from the most recent available data set (2008–2009).

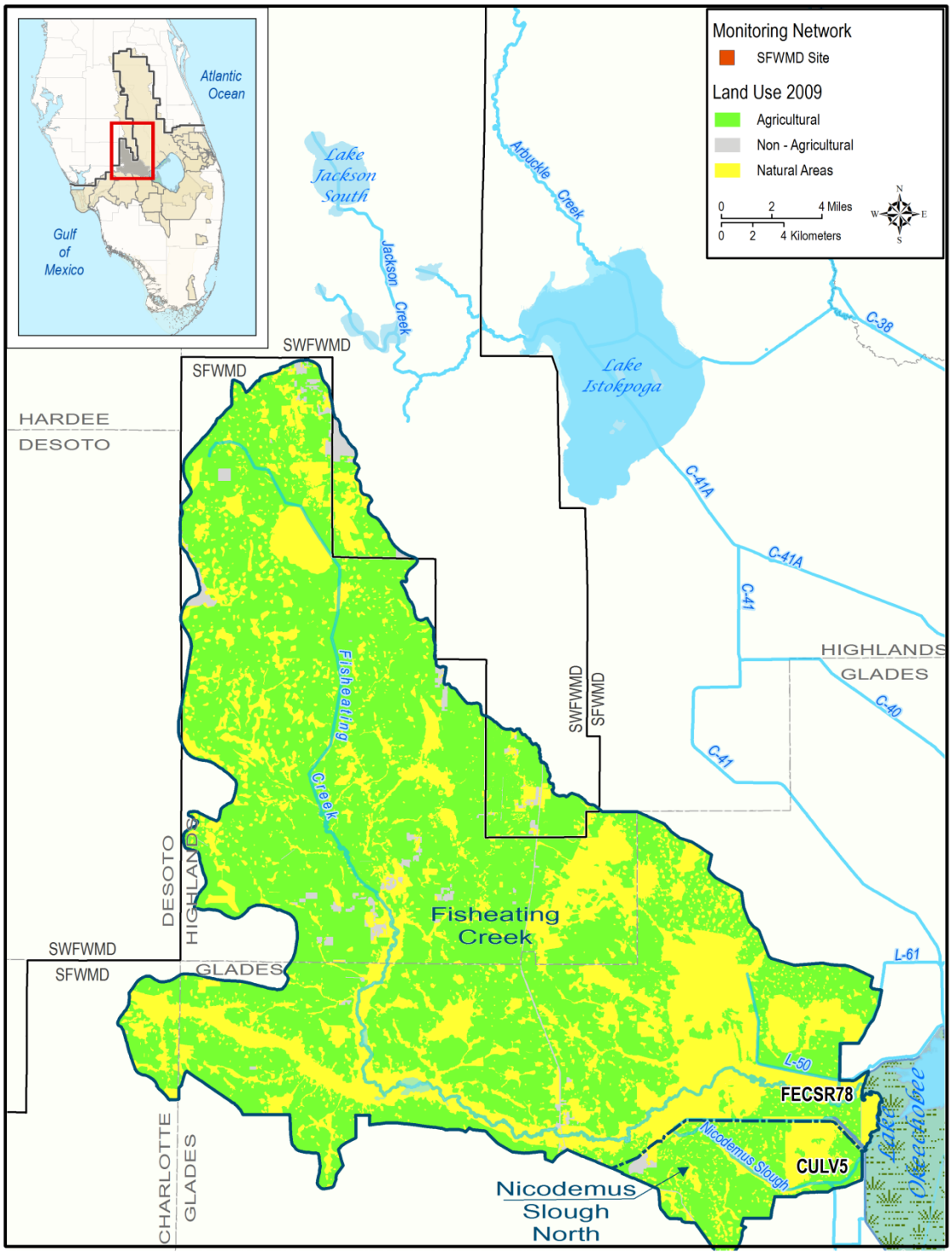


Figure 8. Lake Okeechobee Watershed, Fisheating Creek/Nicodemus Slough Subwatershed. Land use from the most recent available data set (2008–2009).

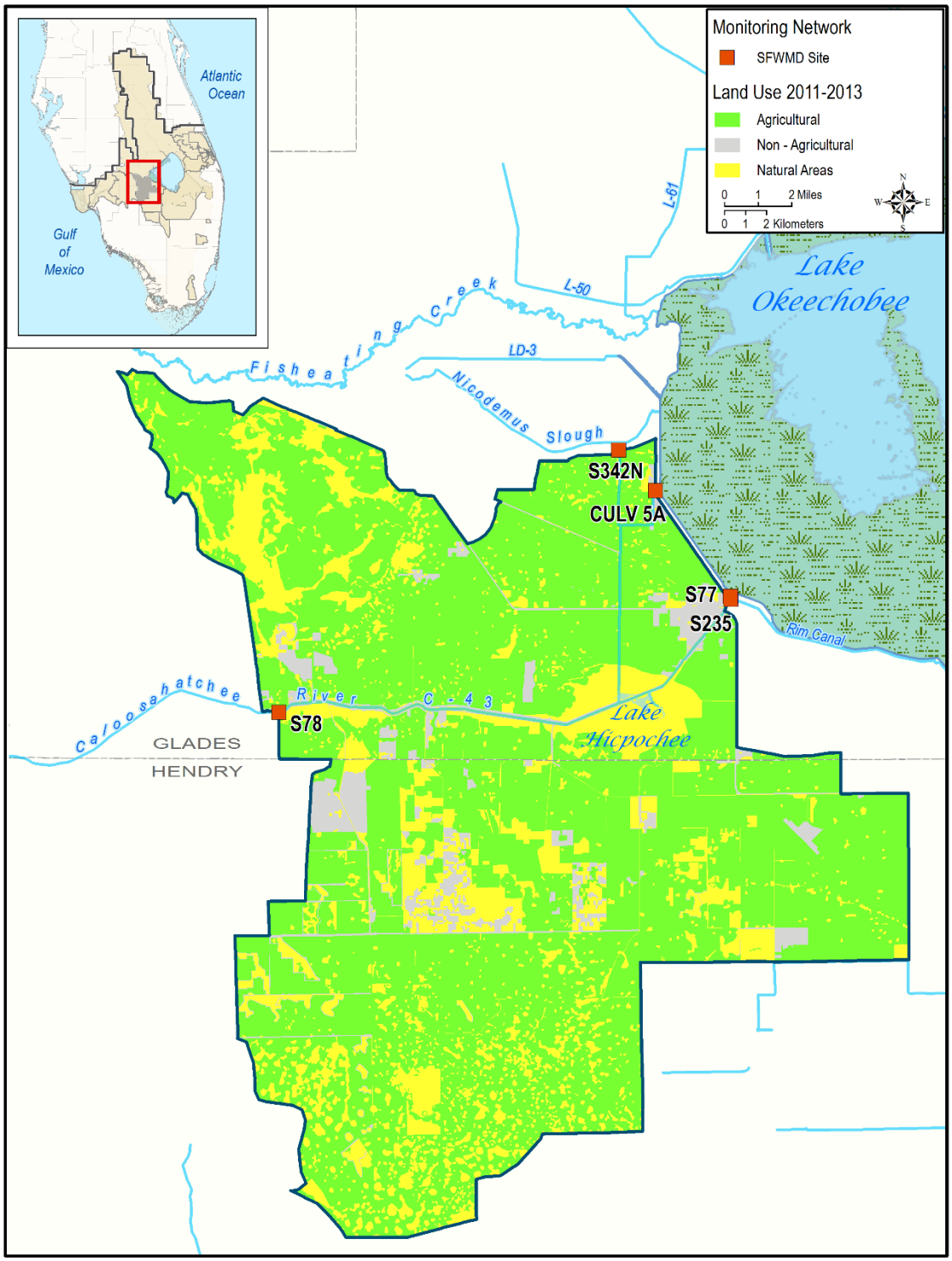


Figure 9. Lake Okeechobee Watershed, West Lake Okeechobee Subwatershed. Land use from the most recent available data set (2011–2013).

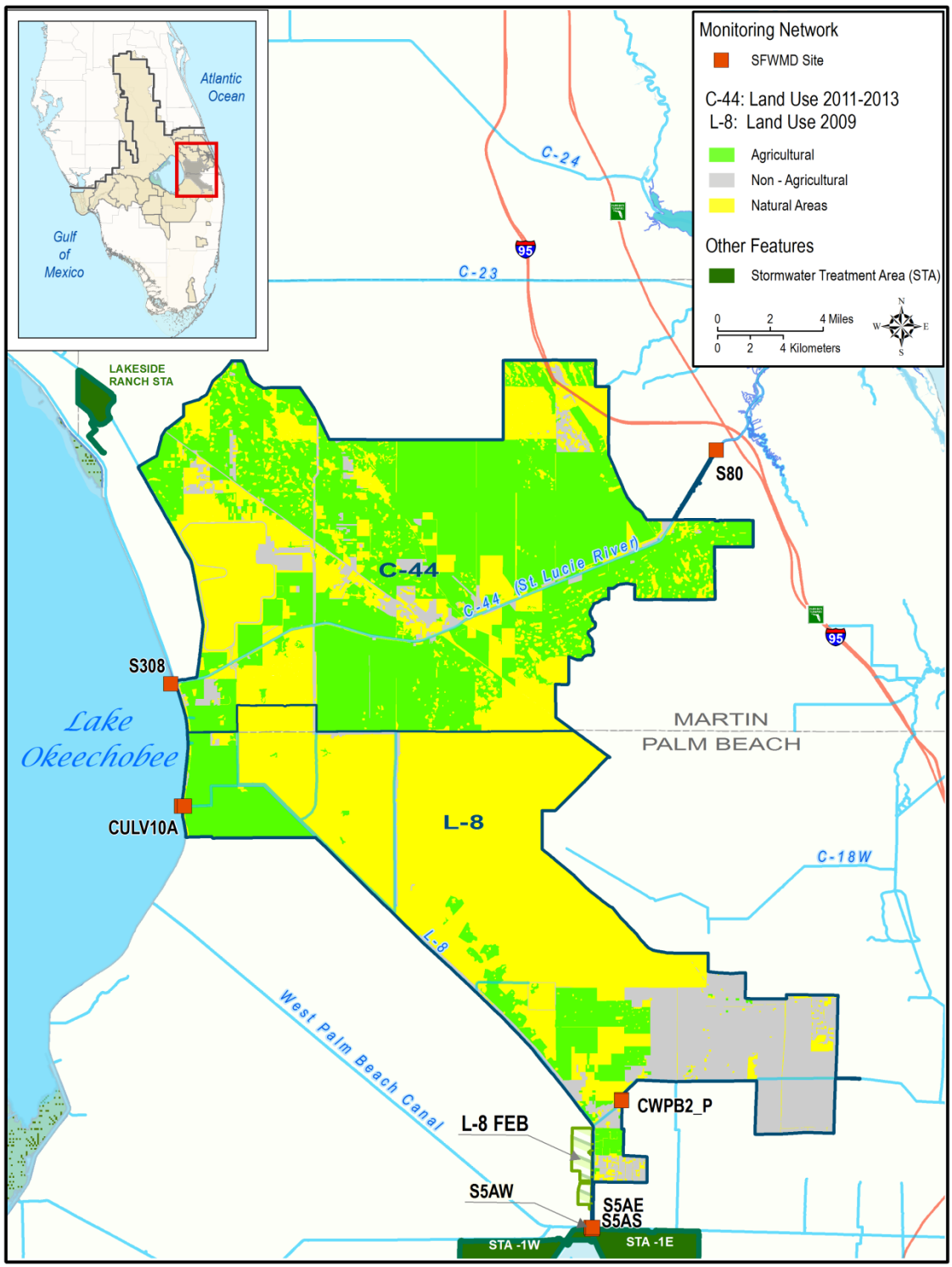


Figure 10. Lake Okeechobee Watershed, East Lake Okeechobee Subwatershed. Land use from the most recent available data set (2011–2013).

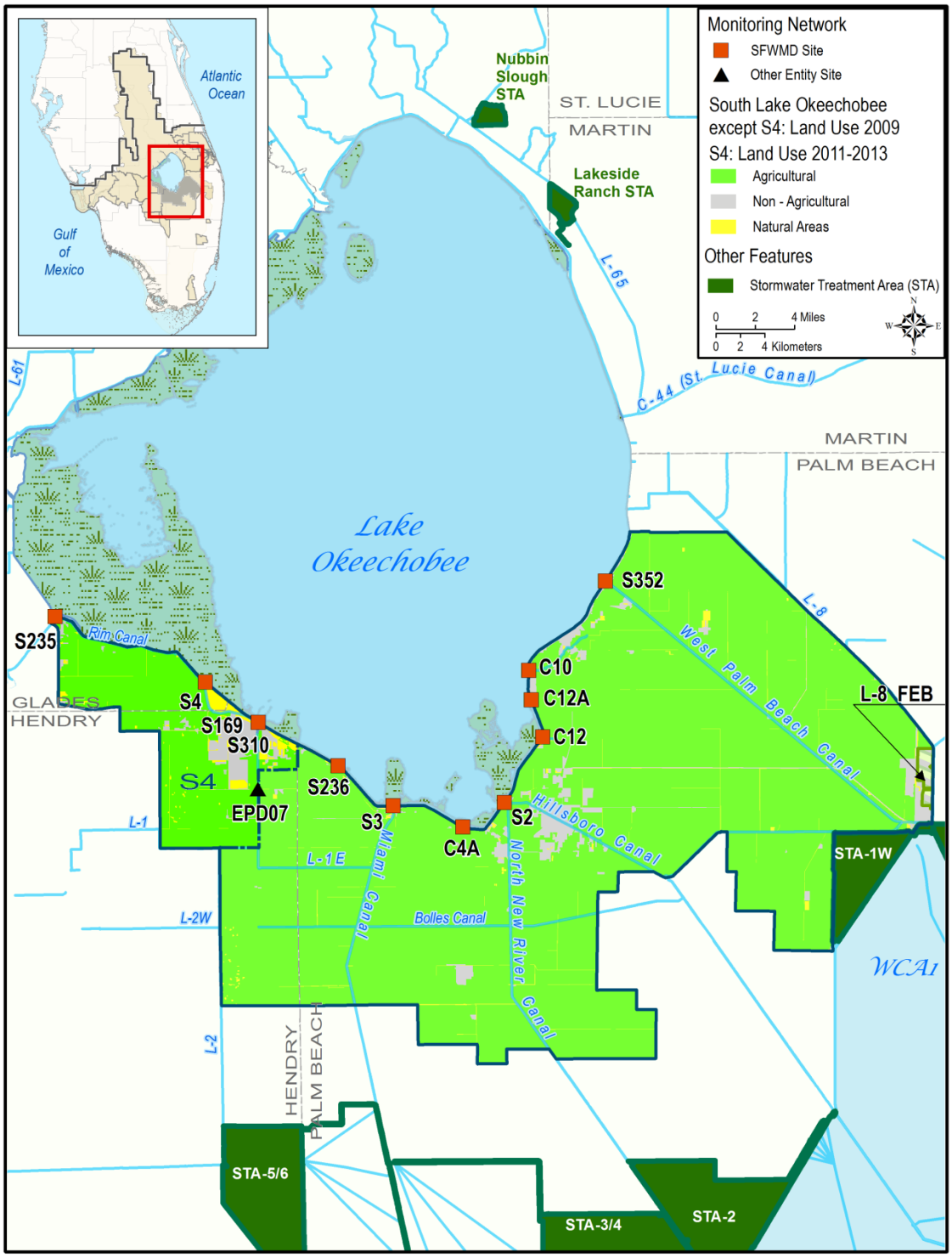


Figure 11. Lake Okeechobee Watershed, South Lake Okeechobee Sub-watershed. Land use from the most recent available data set (2008–2009) and for S-4 basin (2011–2013).

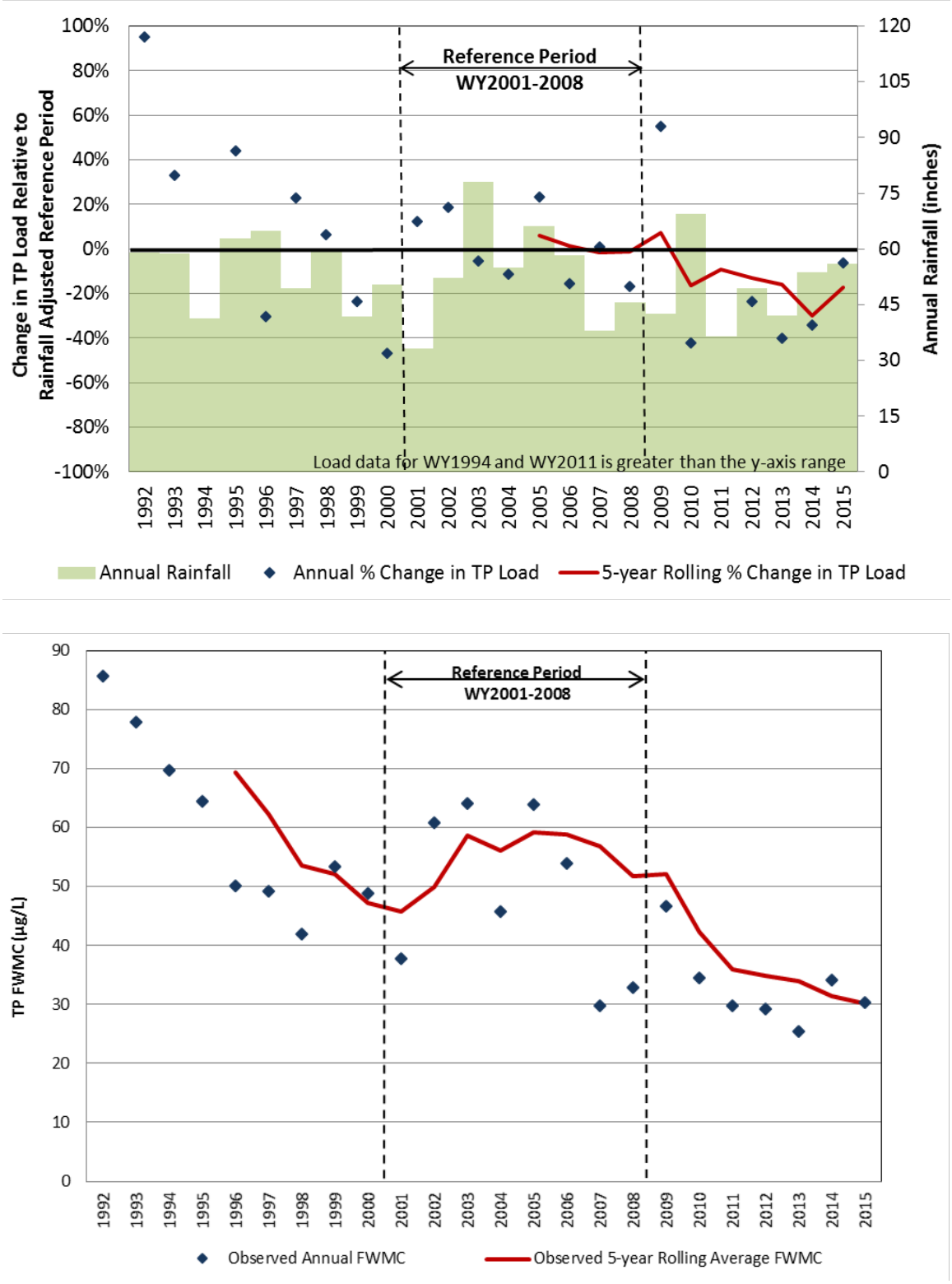
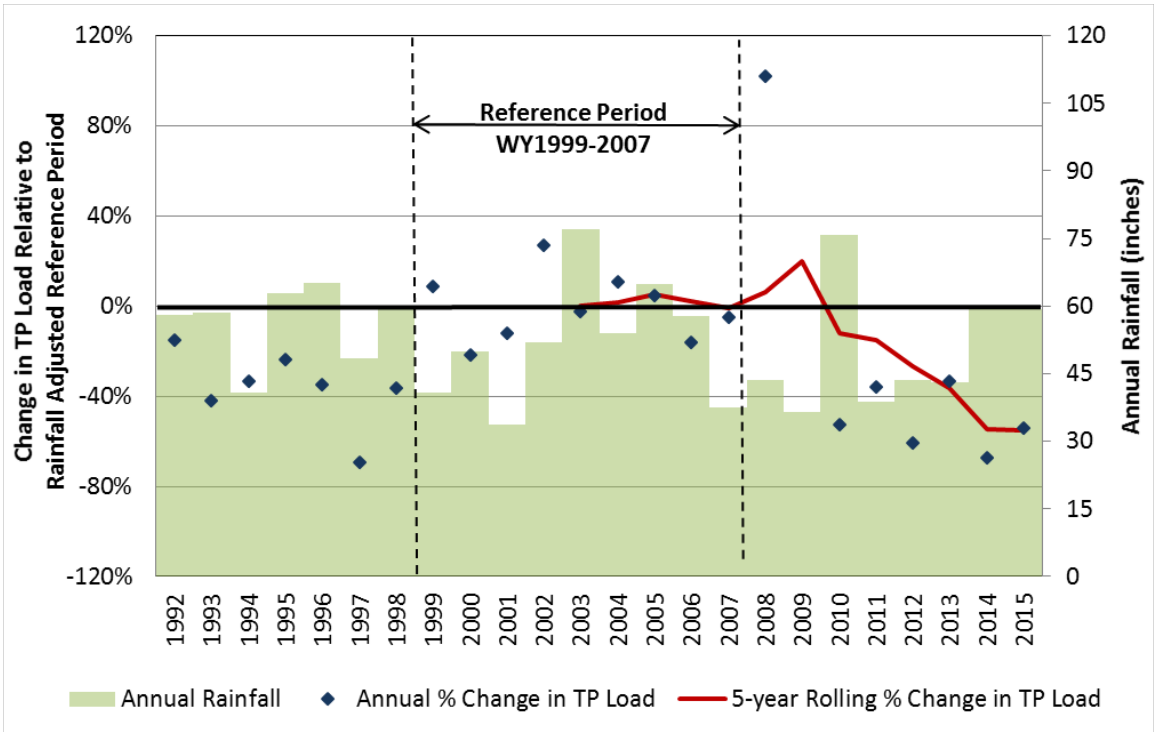


Figure 12. Boggy Creek: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average. [Note: mt – metric tons.]



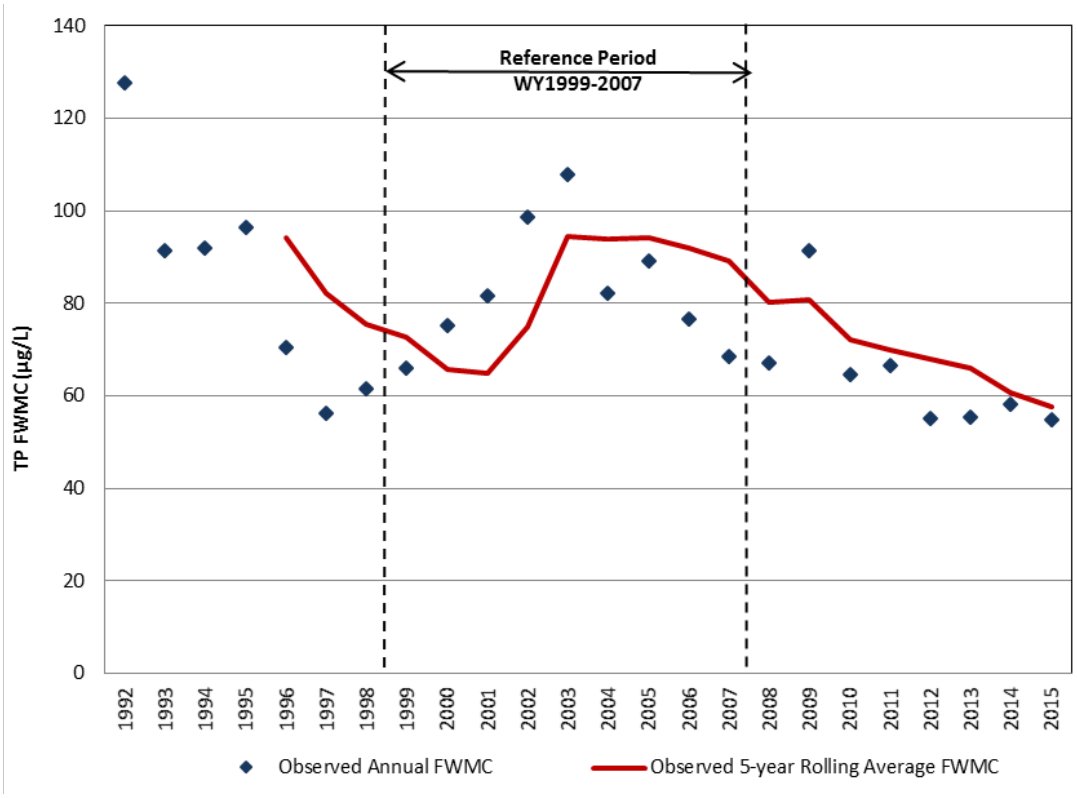
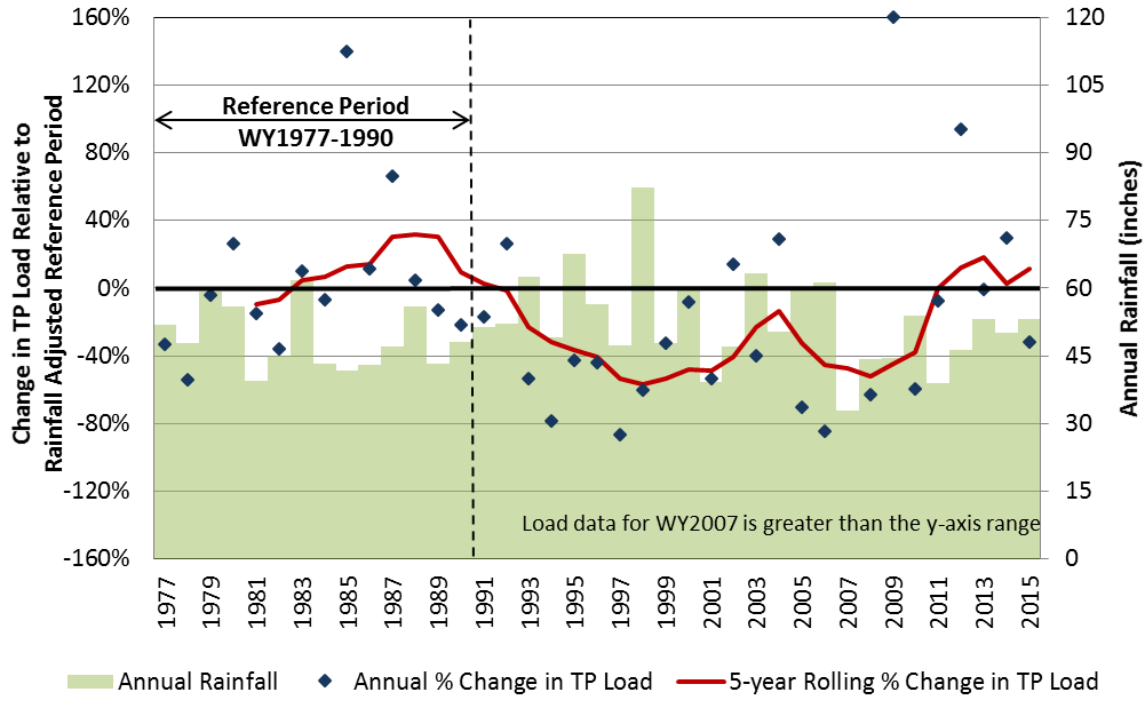


Figure 13. Shingle Creek: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.



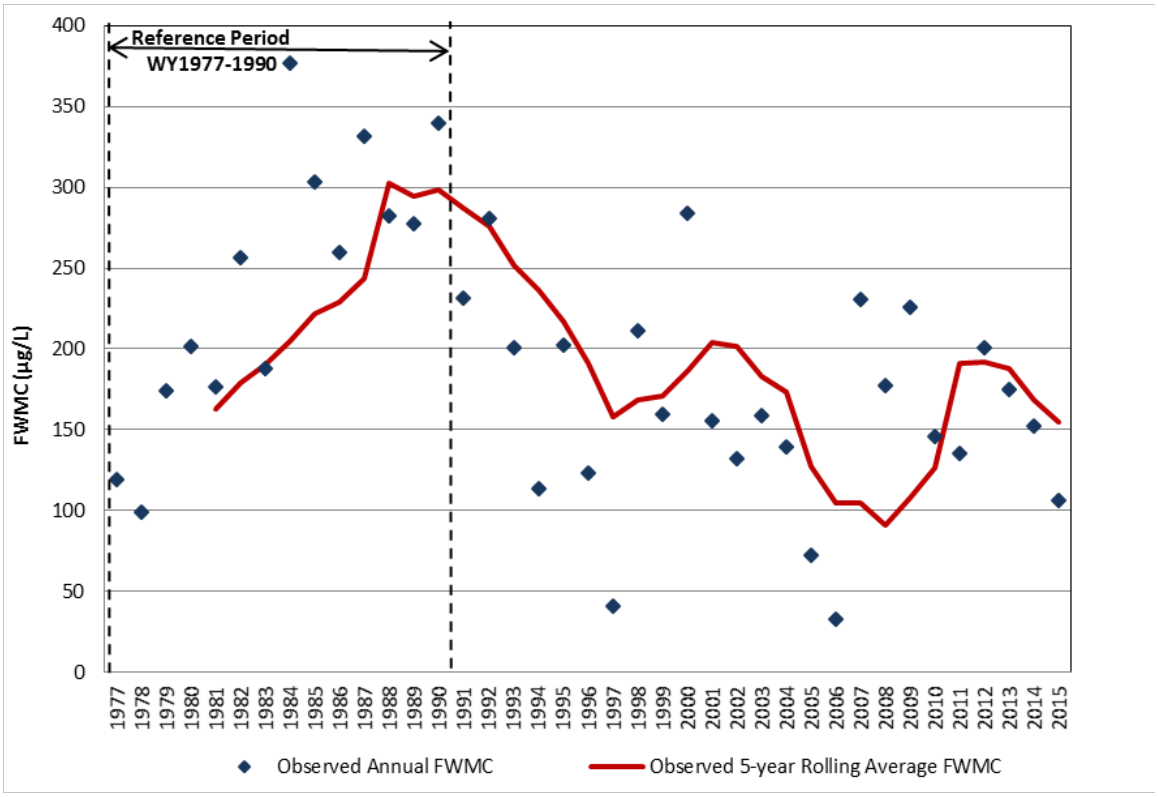
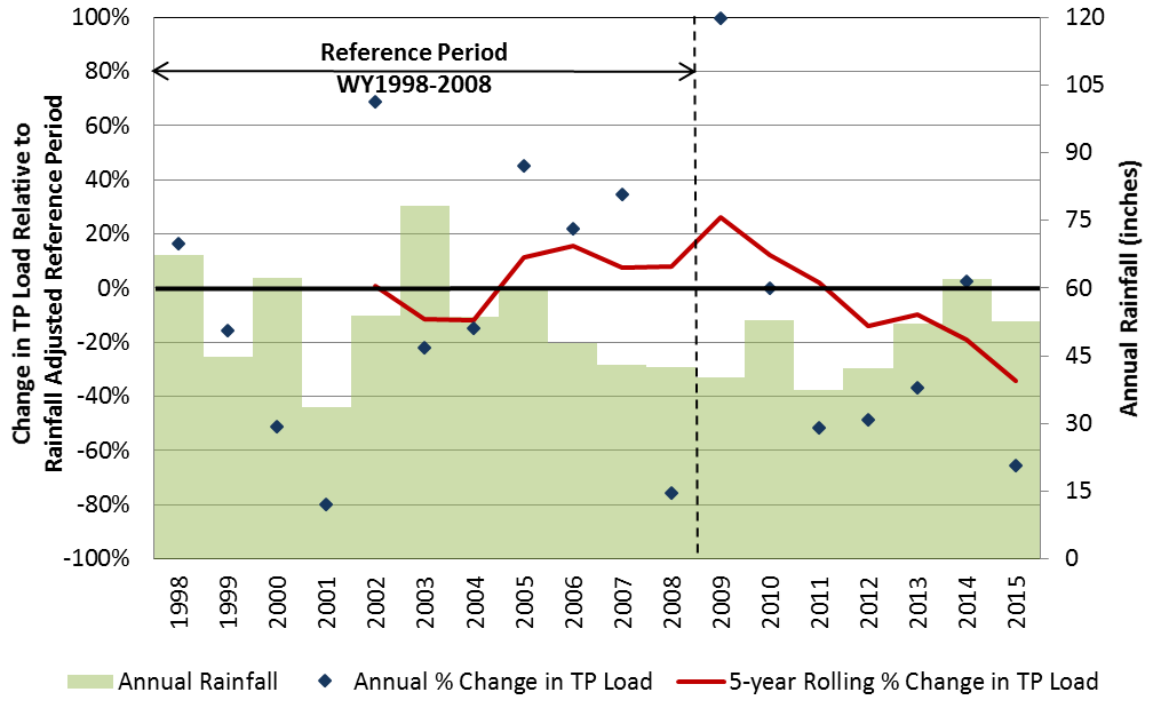


Figure 14. Lower Kissimmee Basin: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.



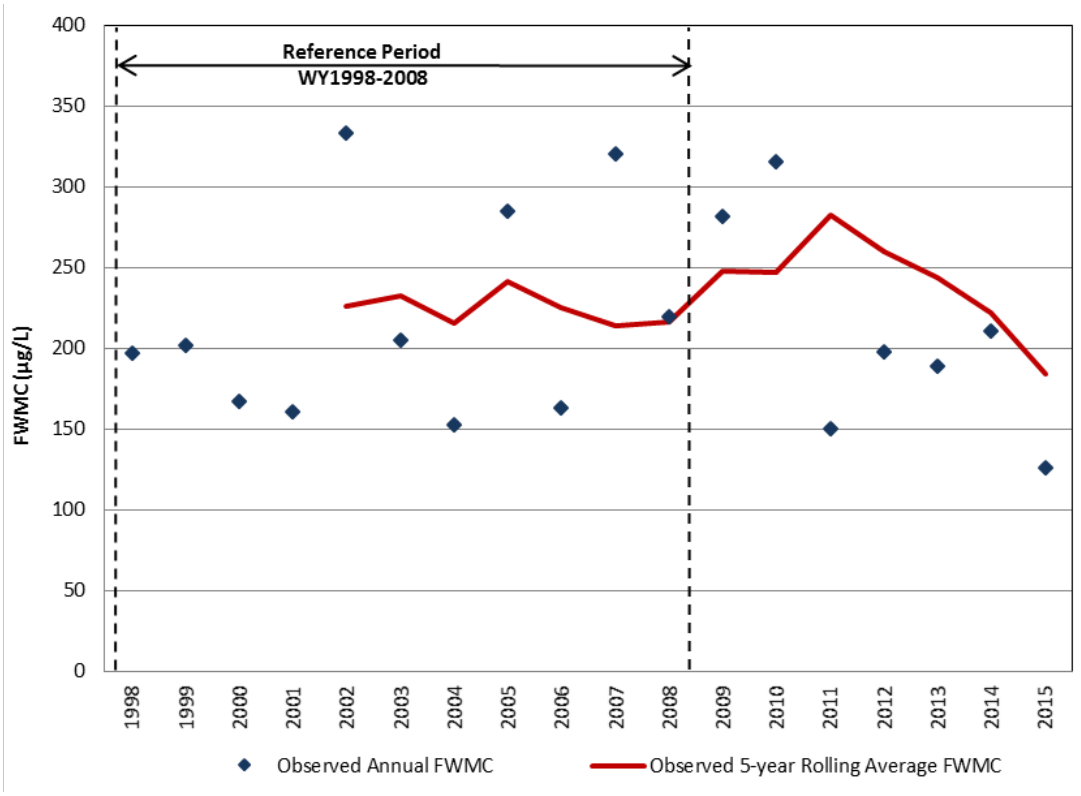
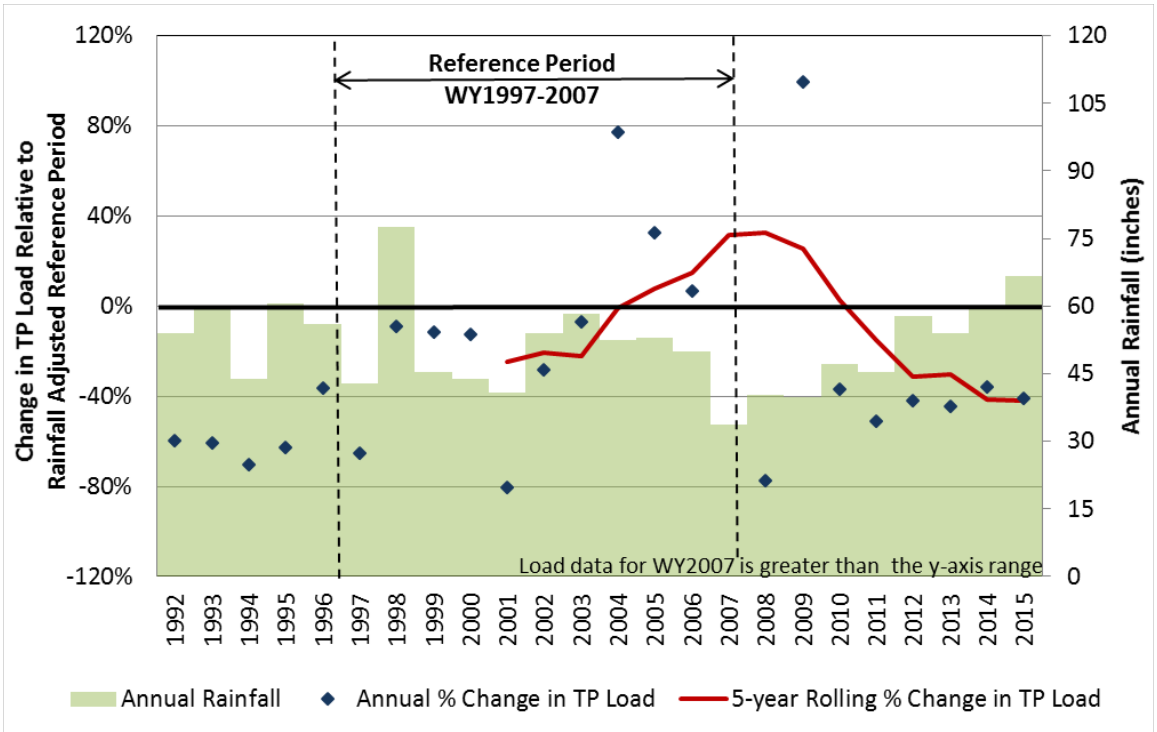


Figure 15. Fisheating Creek: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.



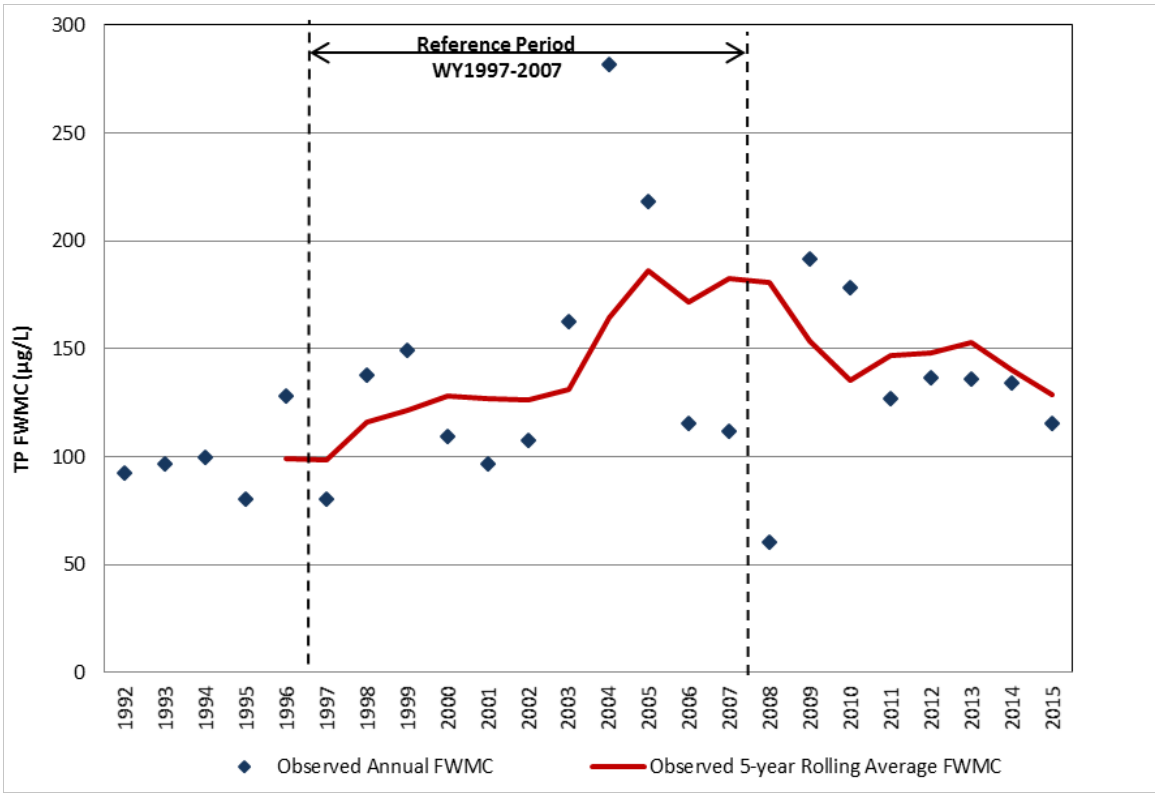


Figure 16. Arbuckle Creek: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.

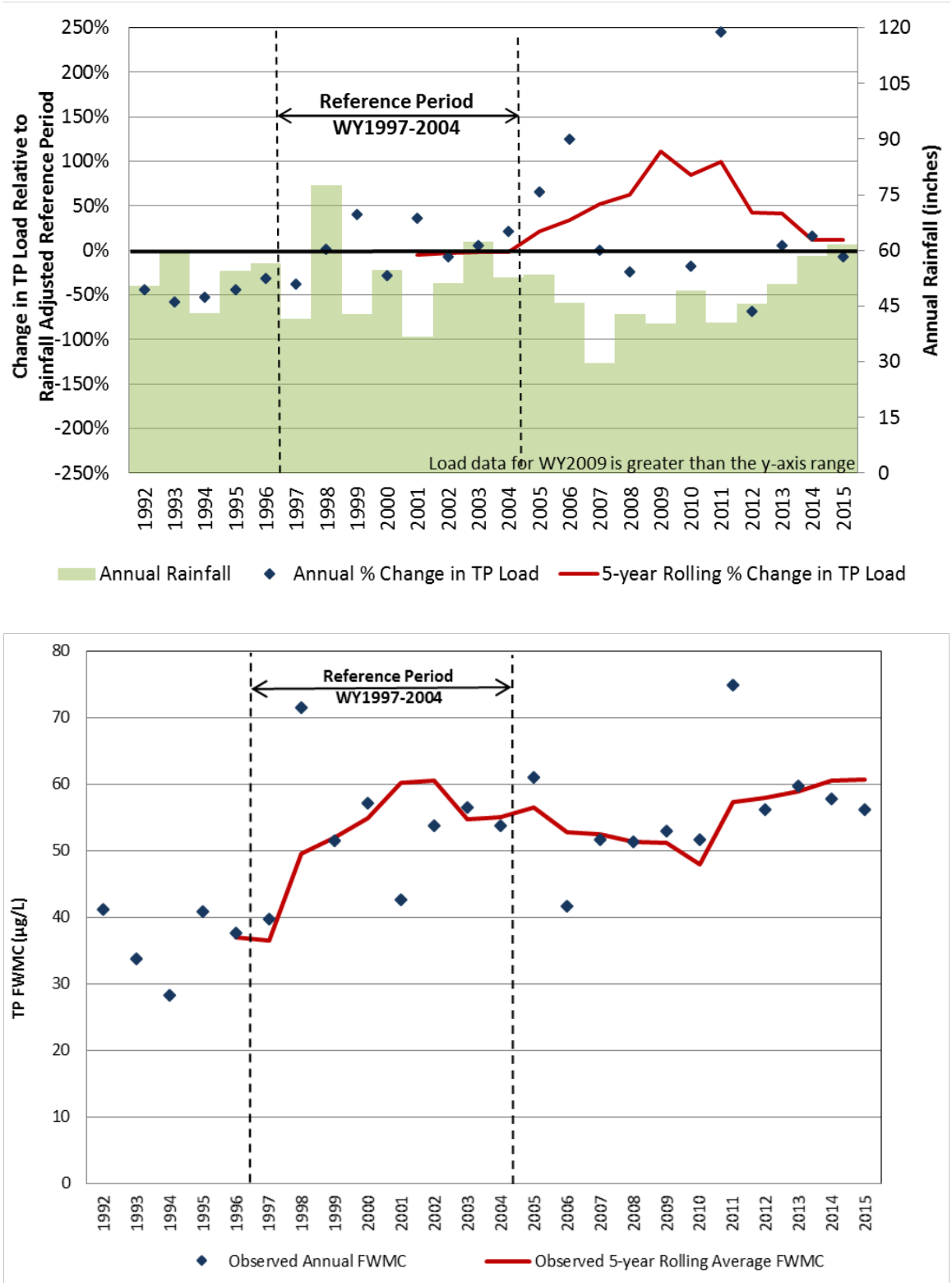
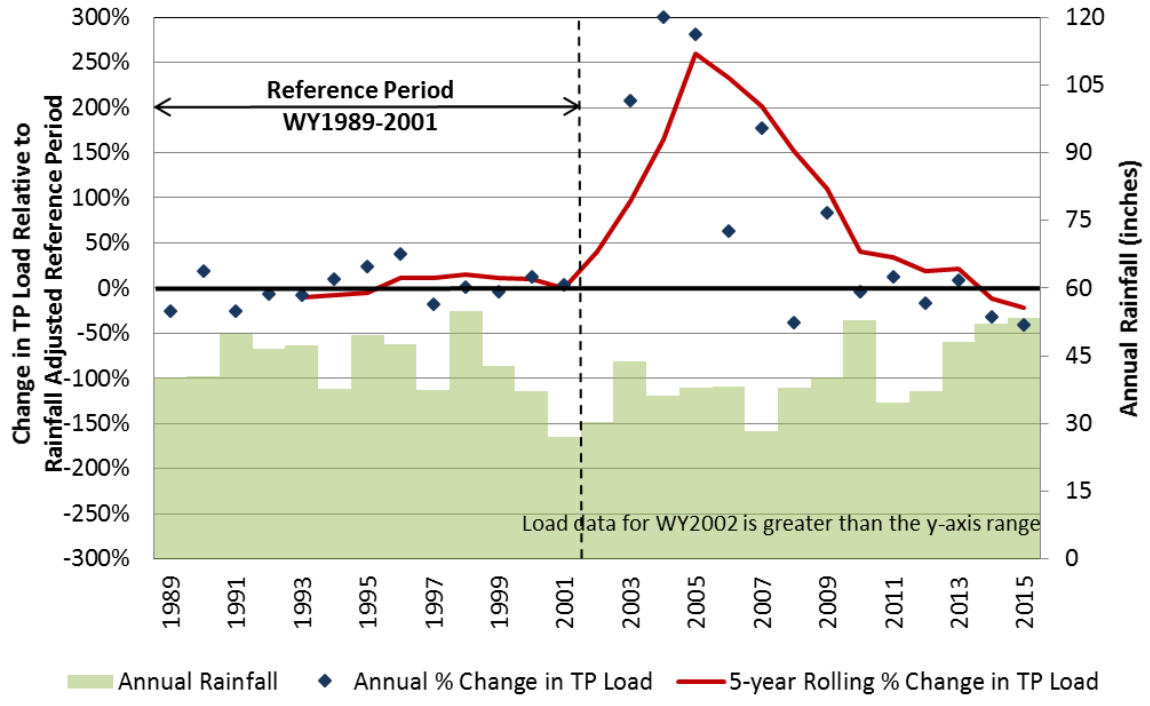


Figure 17. Josephine Creek: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.



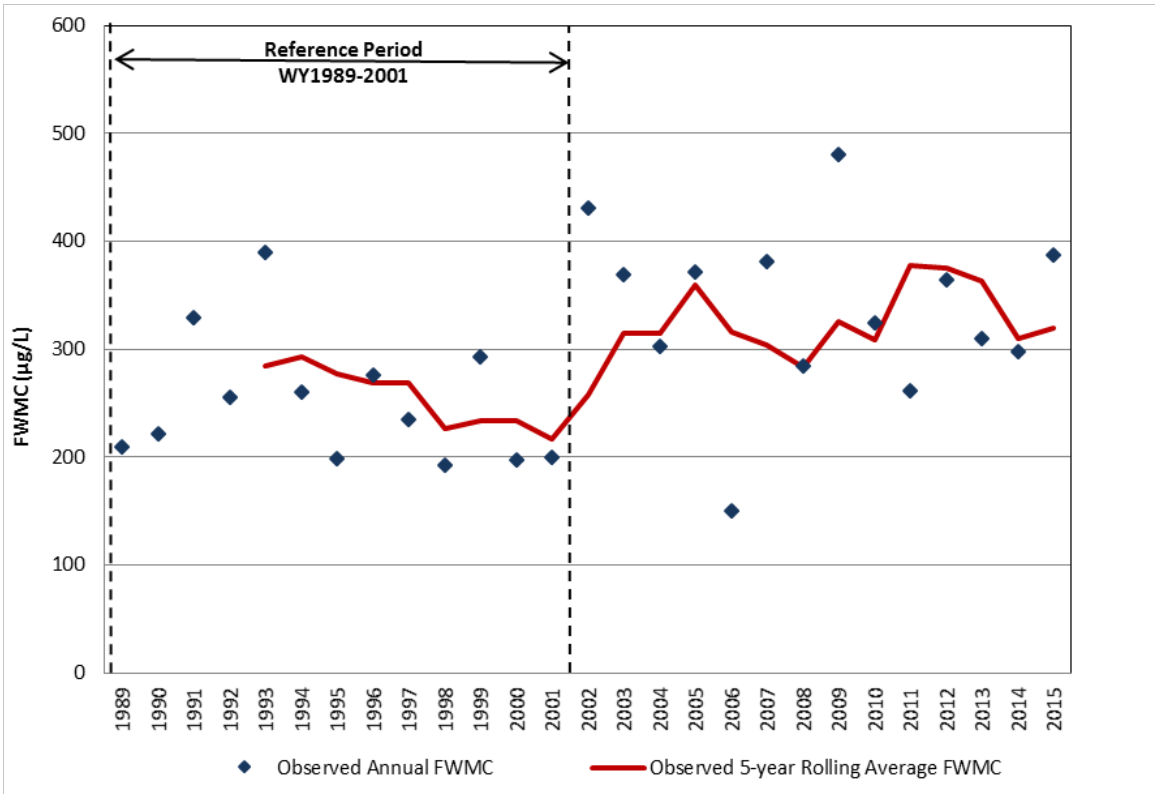
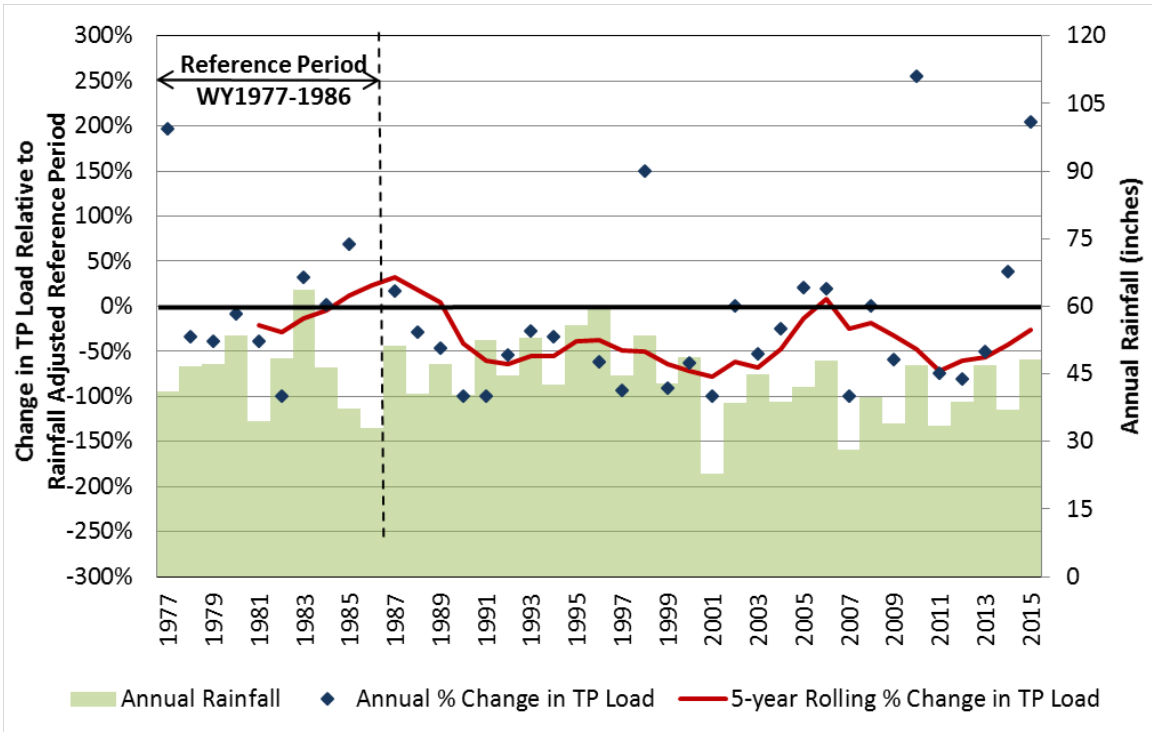


Figure 18. Indian Prairie Basin: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.



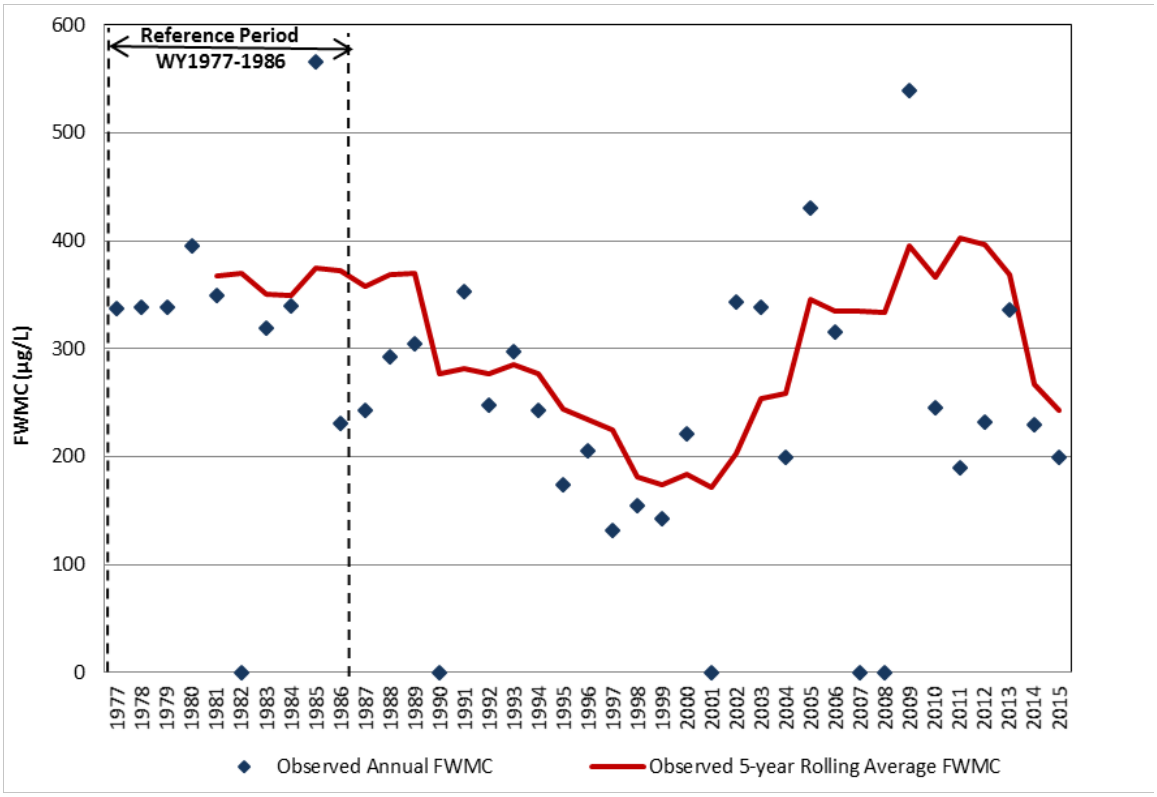
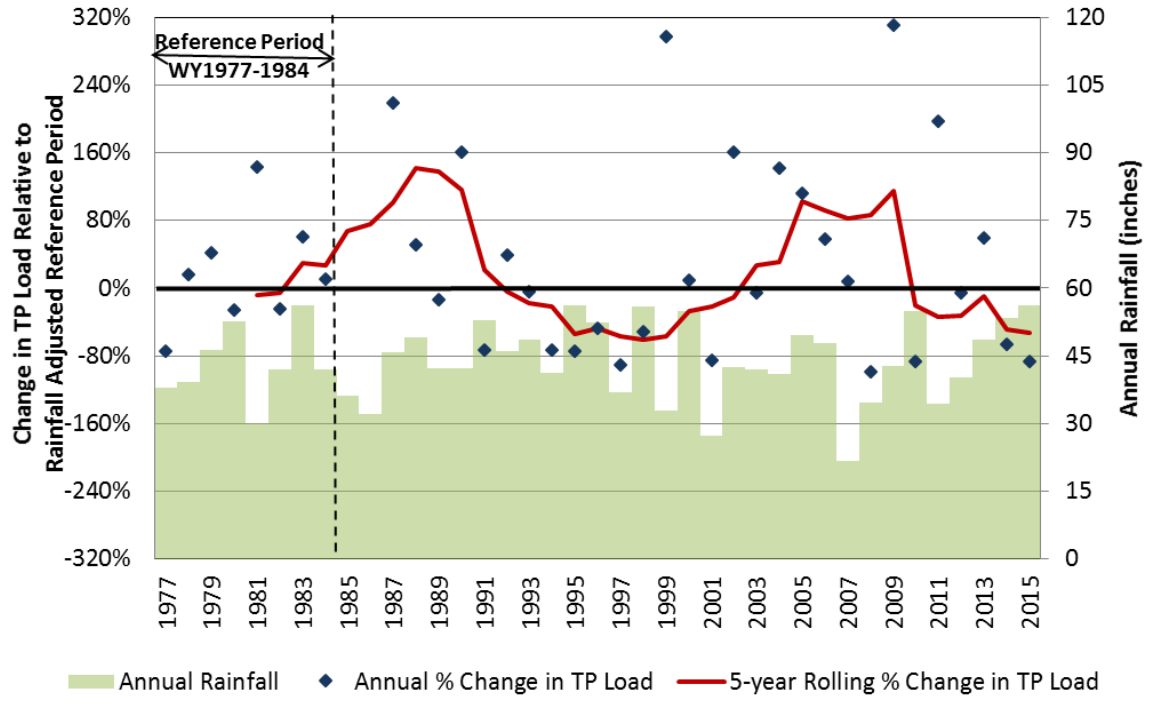


Figure 19. S-133 Basin: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.



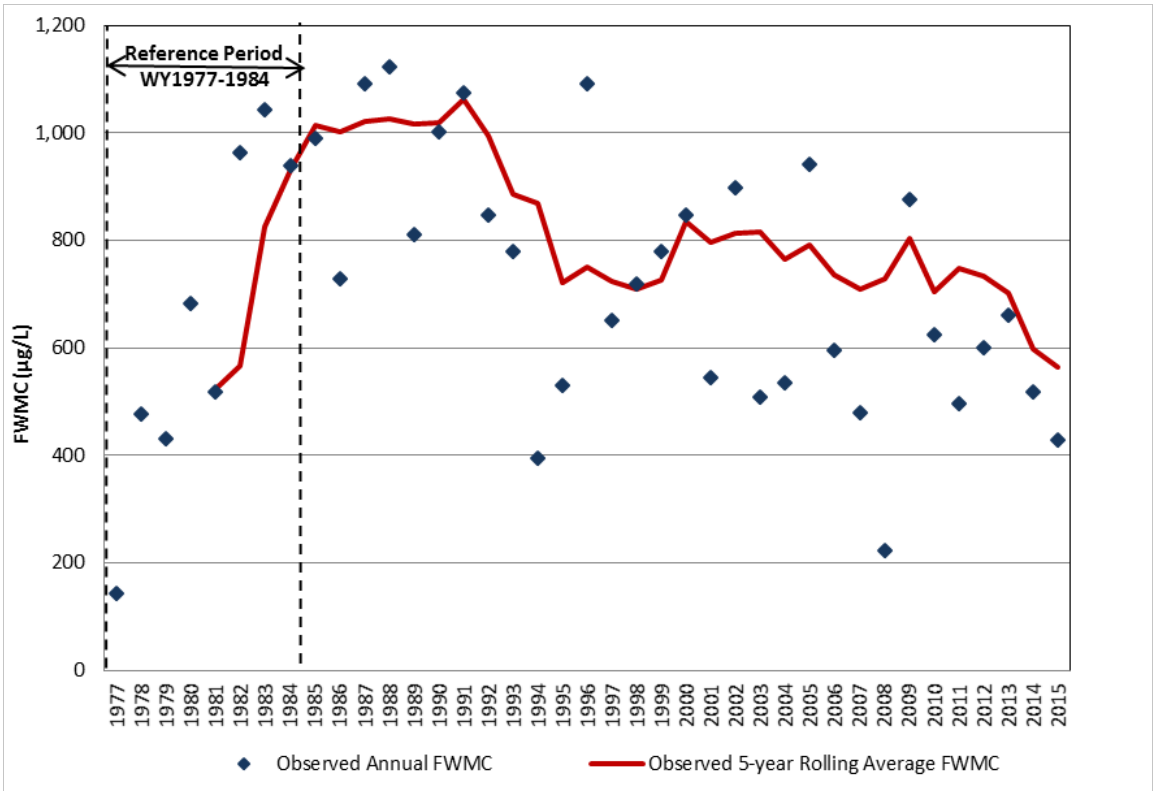


Figure 20. S-154 Basin: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.

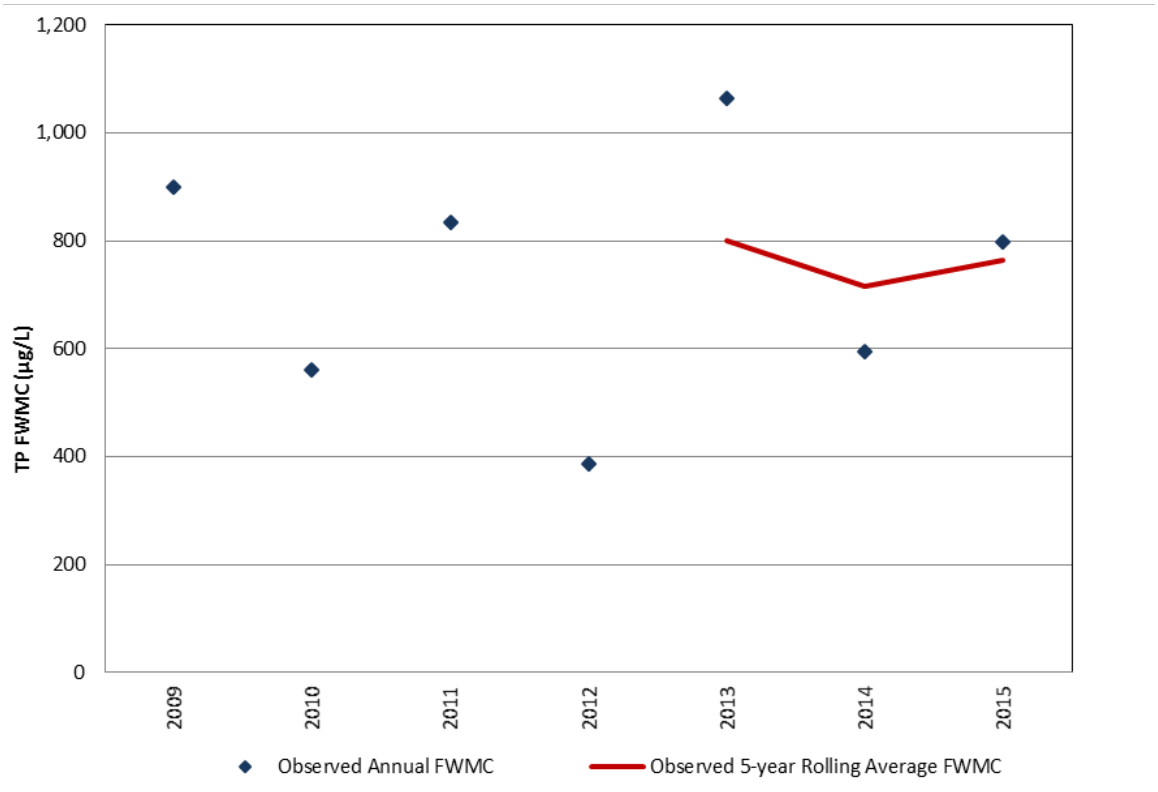
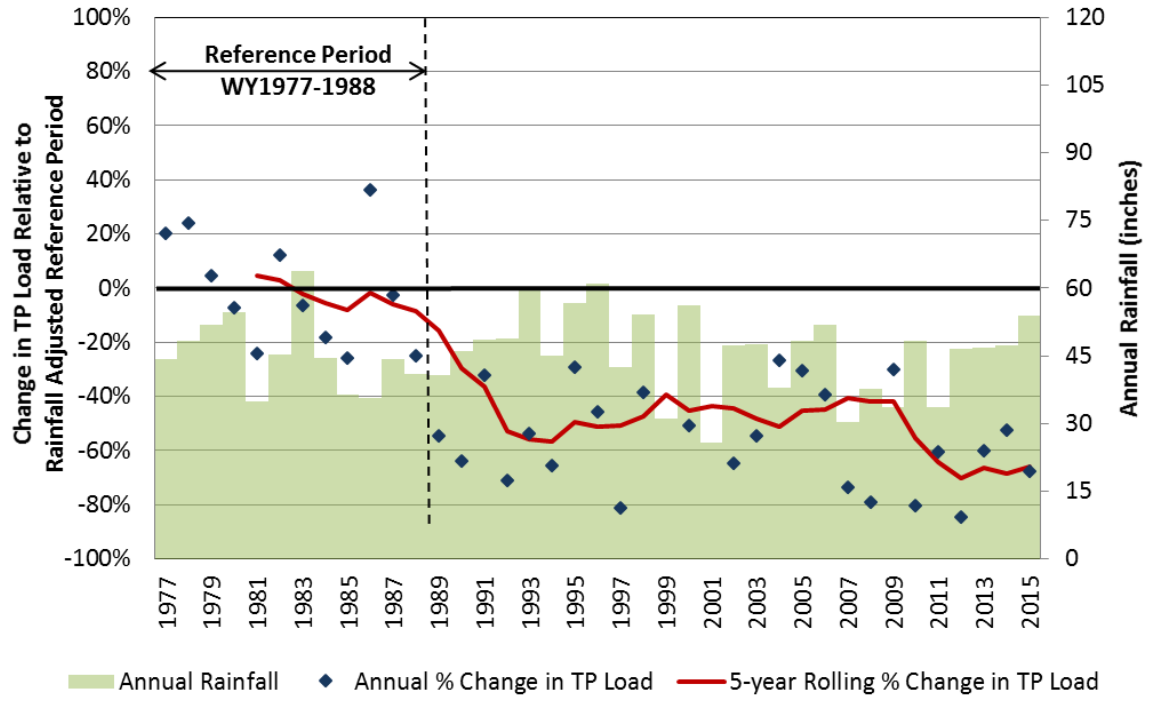


Figure 21. S-154C Basin: TP observed annual FWMC and five-year rolling average. Note: Change in TP loads relative to a reference period are not presented here as no annual TP rainfall-load relationships have been developed for the S-154C Basin.



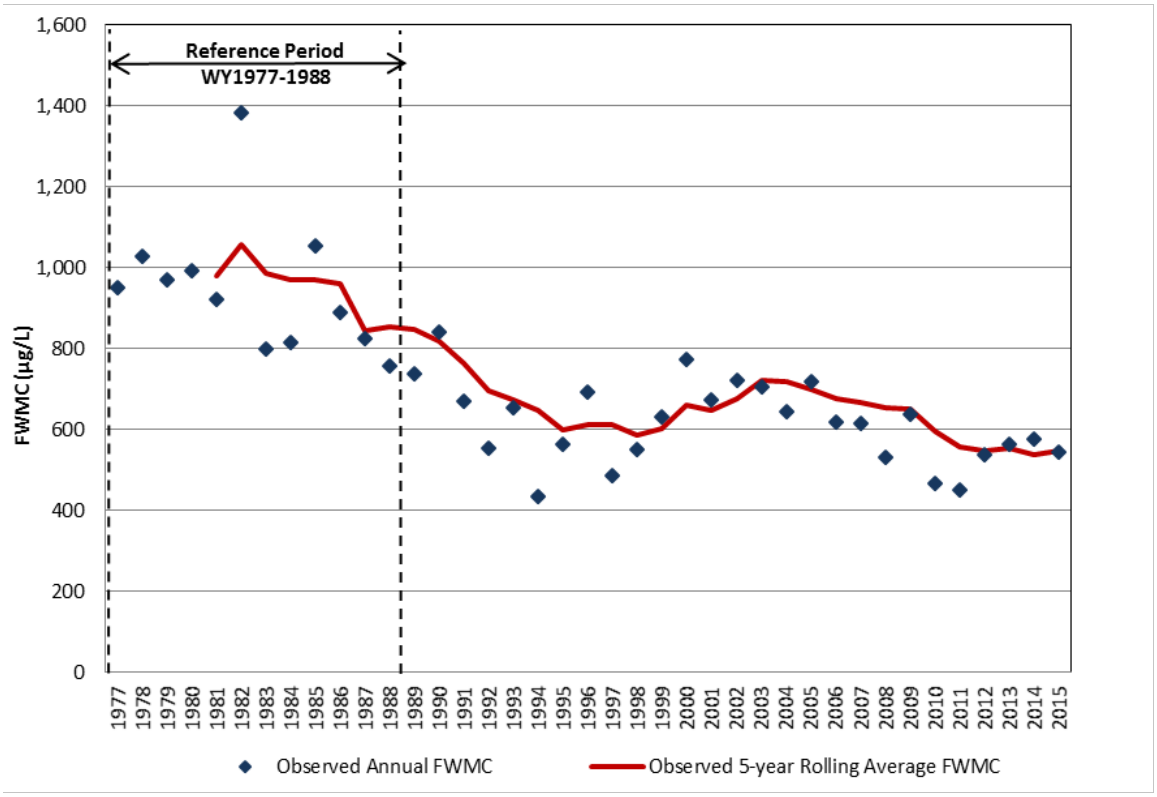


Figure 22. S-191 Basin: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.

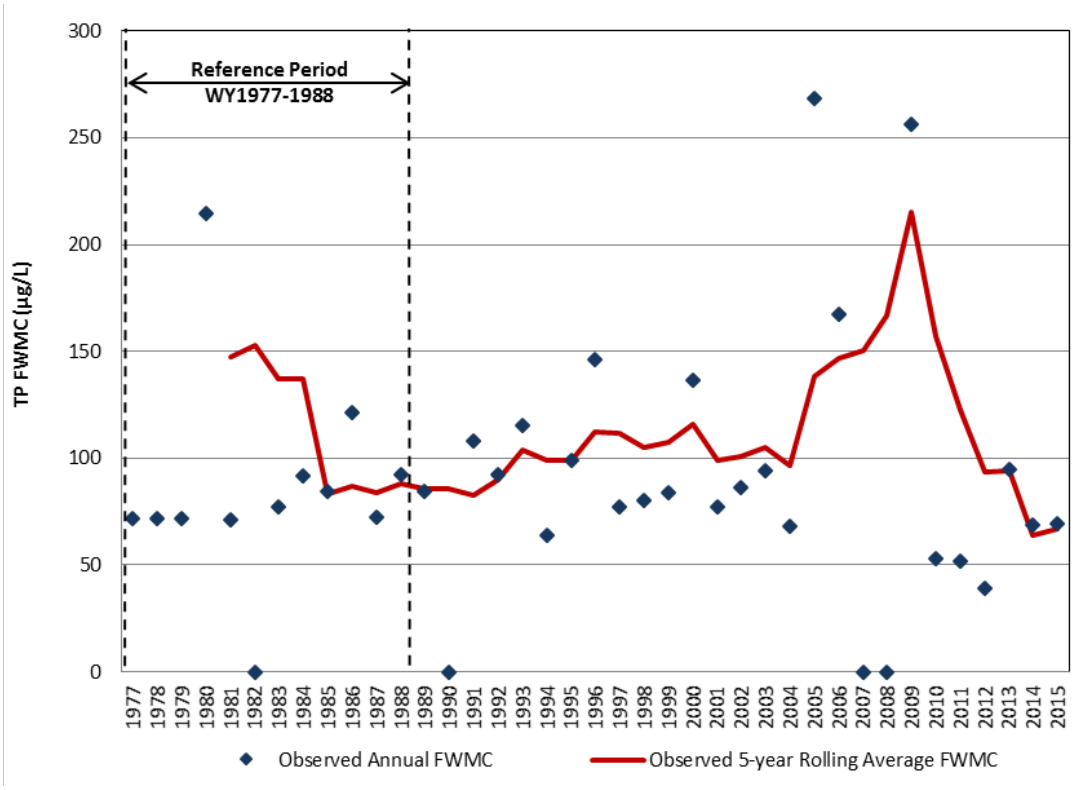
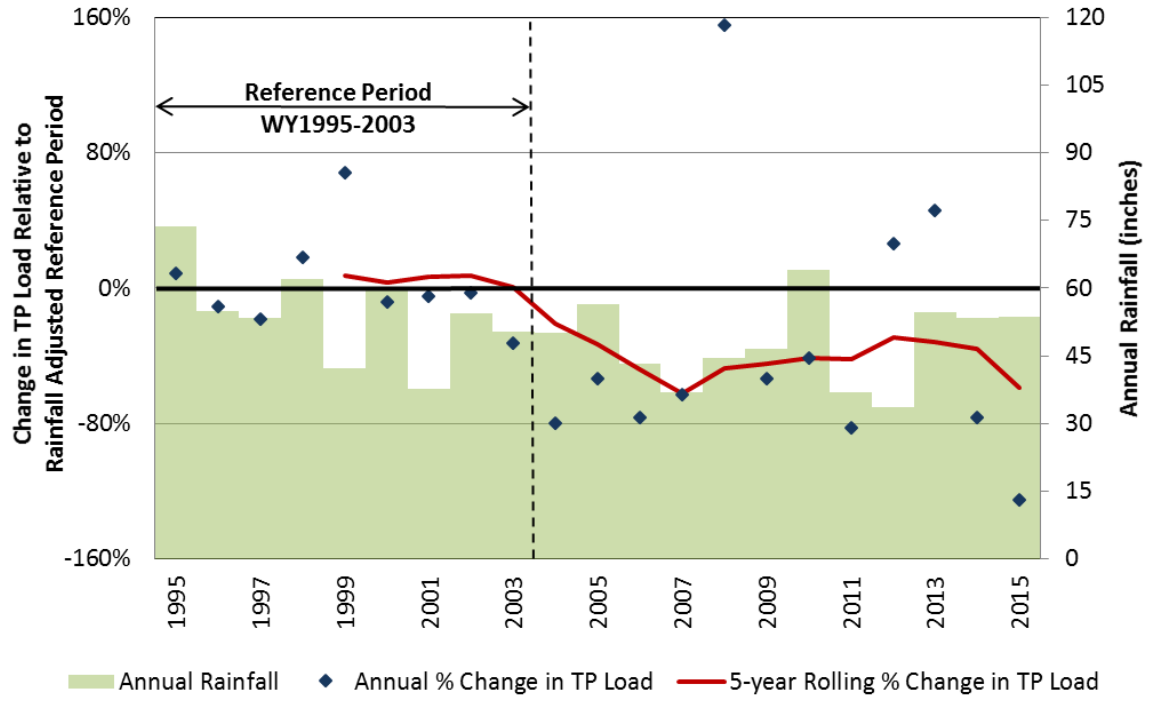


Figure 23. S-135 Basin: TP observed annual FWMC and five-year rolling average. Note: Change in TP loads relative to a reference period are not presented here as TP rainfall-load relationships have not been developed for the S-135 Basin.



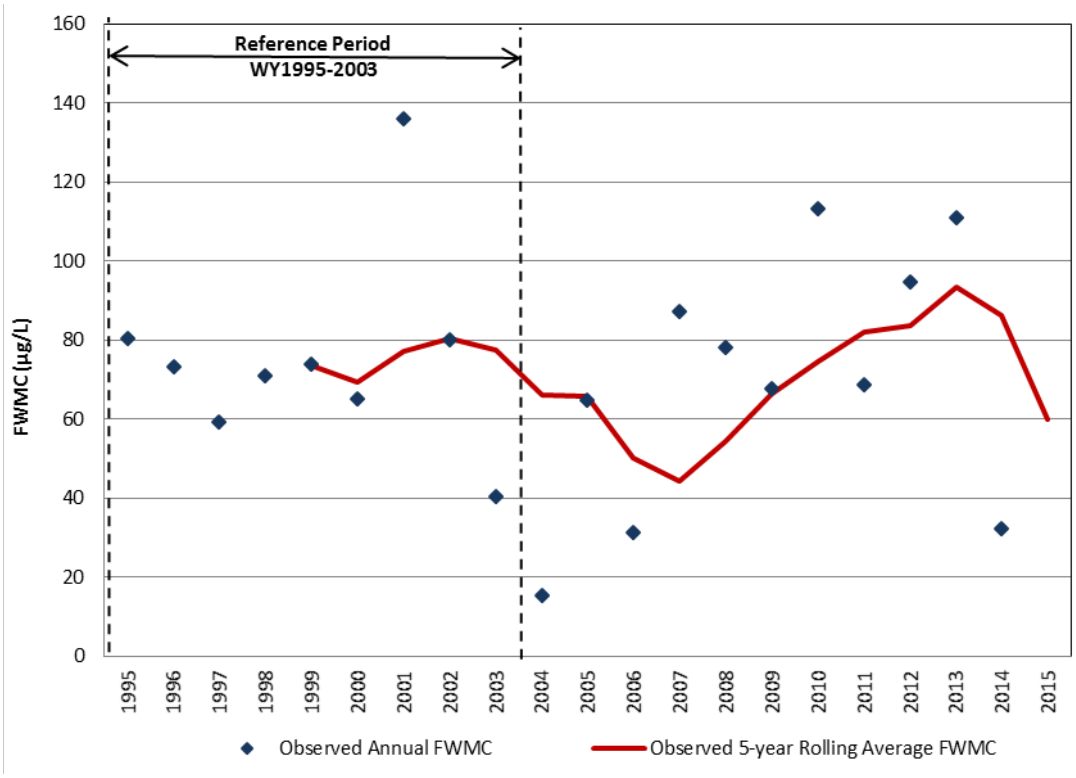


Figure 24. L-8 Basin: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average. [Note: The WY2015 basin runoff load was negative (-2 mt) as a result of more daily TP loads entering the basin than leaving; therefore, a single annual TP concentration cannot be determined.]

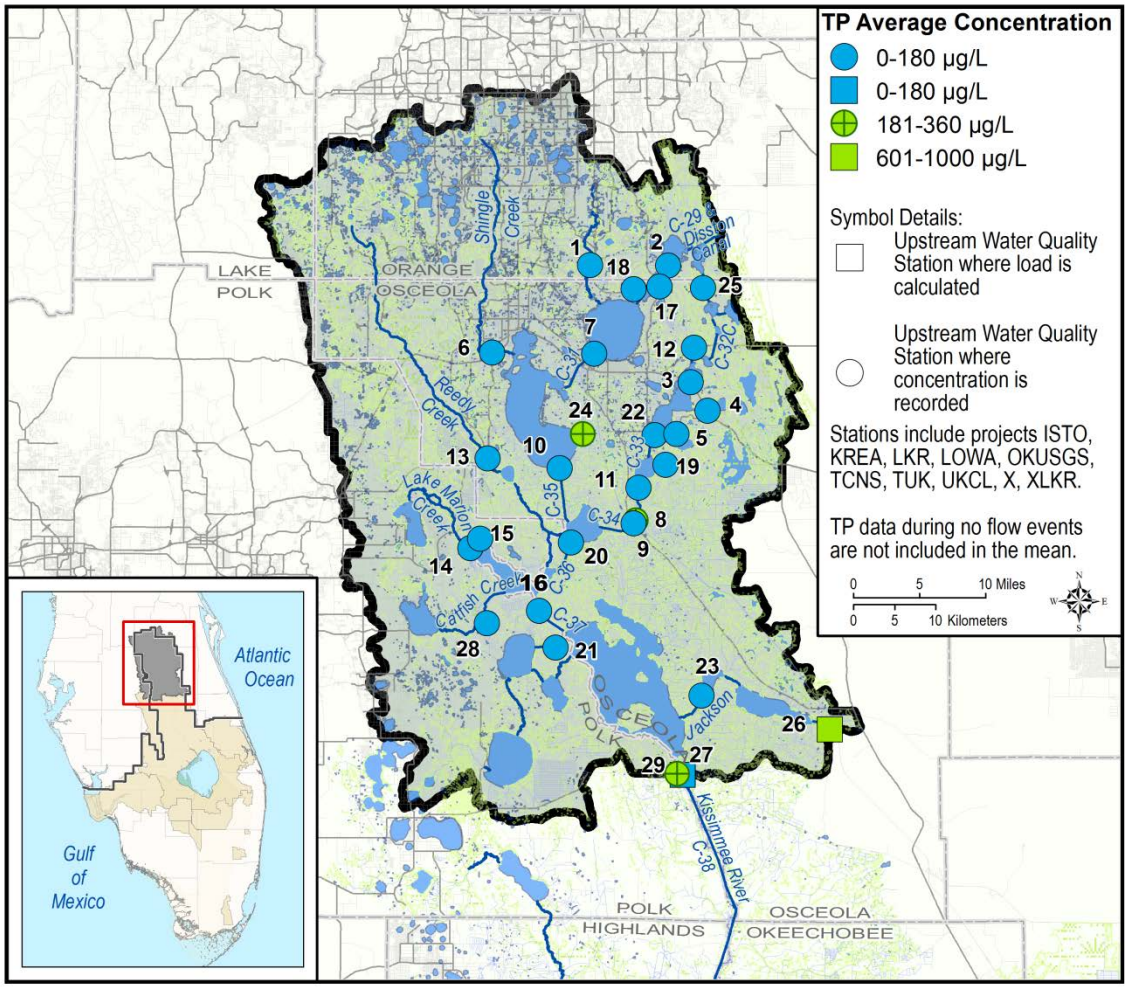


Figure 25a. Upper Kissimmee Subwatershed average TP concentrations for WY2015.

Upper Kissimmee		Up Through WY2001			WY2002 Through WY2014			WY2015 TP Concentration (µg/L)			
Map ID	Station	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# of Samples	Average	Min	Max
1	ABOGGN	-	-	-	5	9.6	25	11	29	17	45
2	AJ33243122	-	-	-	1	3	31	18	26	4	34
3	AL11263113	-	-	-	8	9.1	23	5	16	15	17
4	AL24263113	-	-	-	8	14.6	34	21	22	14	43
5	AL34263113	-	-	-	8	15.6	29	21	19	14	30
6	BNSHINGLE	-	-	-	8	9.9	59	11	53	27	82
7	BS-59	12	3.9	24	13	4.8	19	10	17	14	22
8	CL06283111	-	-	-	3	14.0	116	17	76	19	199
9	CL06283112	-	-	-	-	-	-	3	215	131	284
10	CL18273011	-	-	-	3	14.0	46	23	37	19	64
11	CL19273123	-	-	-	3	11.0	36	18	22	15	30
12	CO35253112	-	-	-	8	10.9	57	9	45	35	64
13	CREEDYBR	16	5.3	64	13	6.9	113	9	54	25	90
14	DLMARNCR	5	7.0	75	2	22.0	67	25	45	25	76
15	DLONDNCR	1	1.0	61	2	6.5	106	16	57	29	111
16	EC-37	4	5.0	142	1	1	49	19	52	35	103
17	ET05253114	-	-	-	8	8.1	40	17	35	22	58
18	ET06253113	-	-	-	8	18.9	79	24	57	40	100
19	GENTRYDTCH	-	-	-	2	9.5	70	18	59	27	146
20	HL08283014	-	-	-	2	10.5	66	19	50	27	79
21	KUB009	-	-	-	2	10.0	73	6	84	34	172
22	LG32263124	-	-	-	3	7.7	24	16	19	13	25
23	LJACKDSCH	-	-	-	2	15.5	65	19	100	63	184
24	LT32263013	-	-	-	8	8.6	179	7	223	159	311
25	MJ01253123	-	-	-	3	6.0	20	16	15	11	23
26	ML22303313	-	-	-	-	-	-	8	766	204	2266
27	PA10313112	-	-	-	8	12.9	145	13	206	27	1033
28	ROMIN	-	-	-	3	6.0	55	21	41	34	52
29	S65	28	10.4	53	13	21.5	60	26	56	28	222

Figure 25b. Upper Kissimmee Subwatershed average TP concentrations for WY2015.

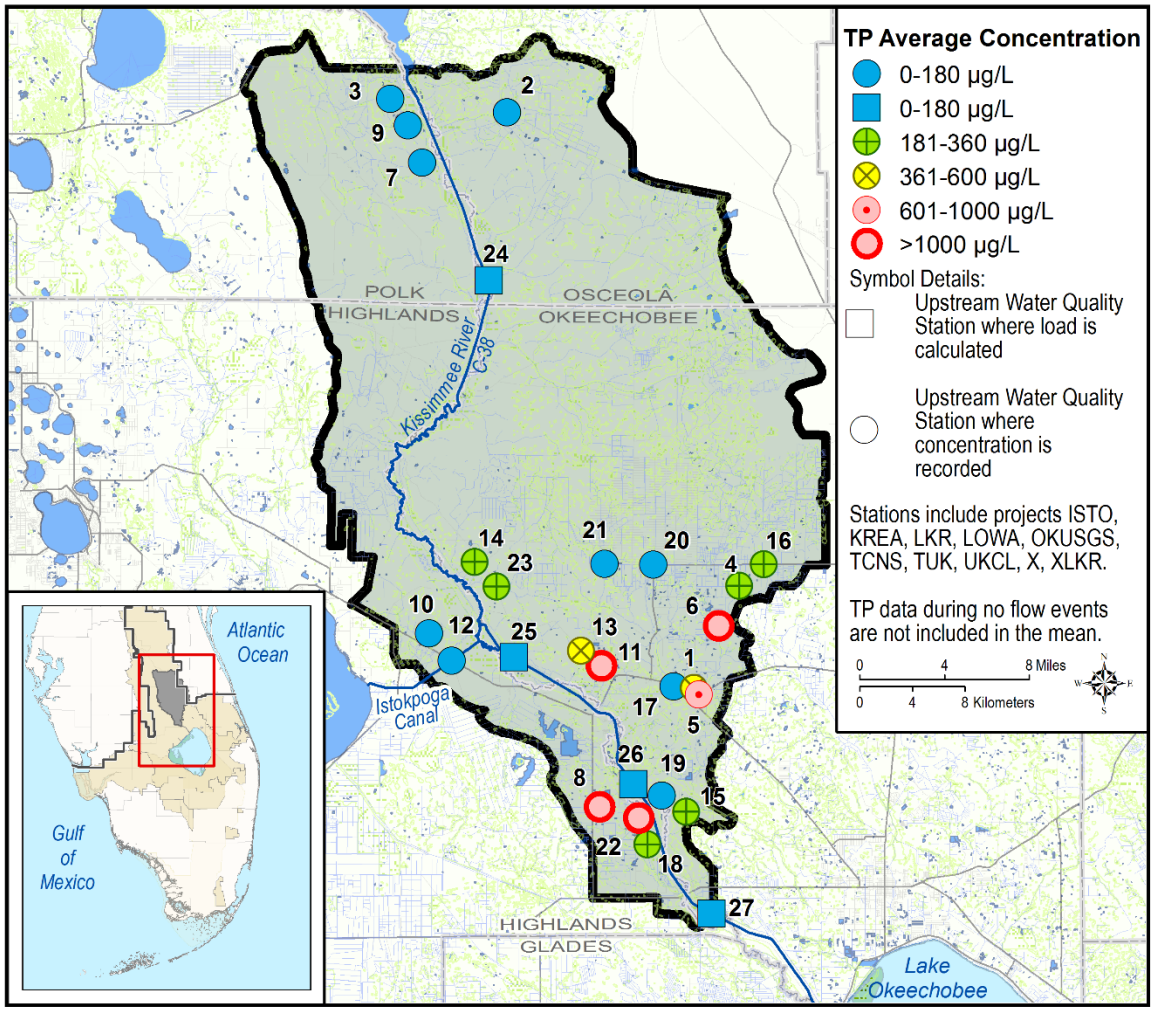
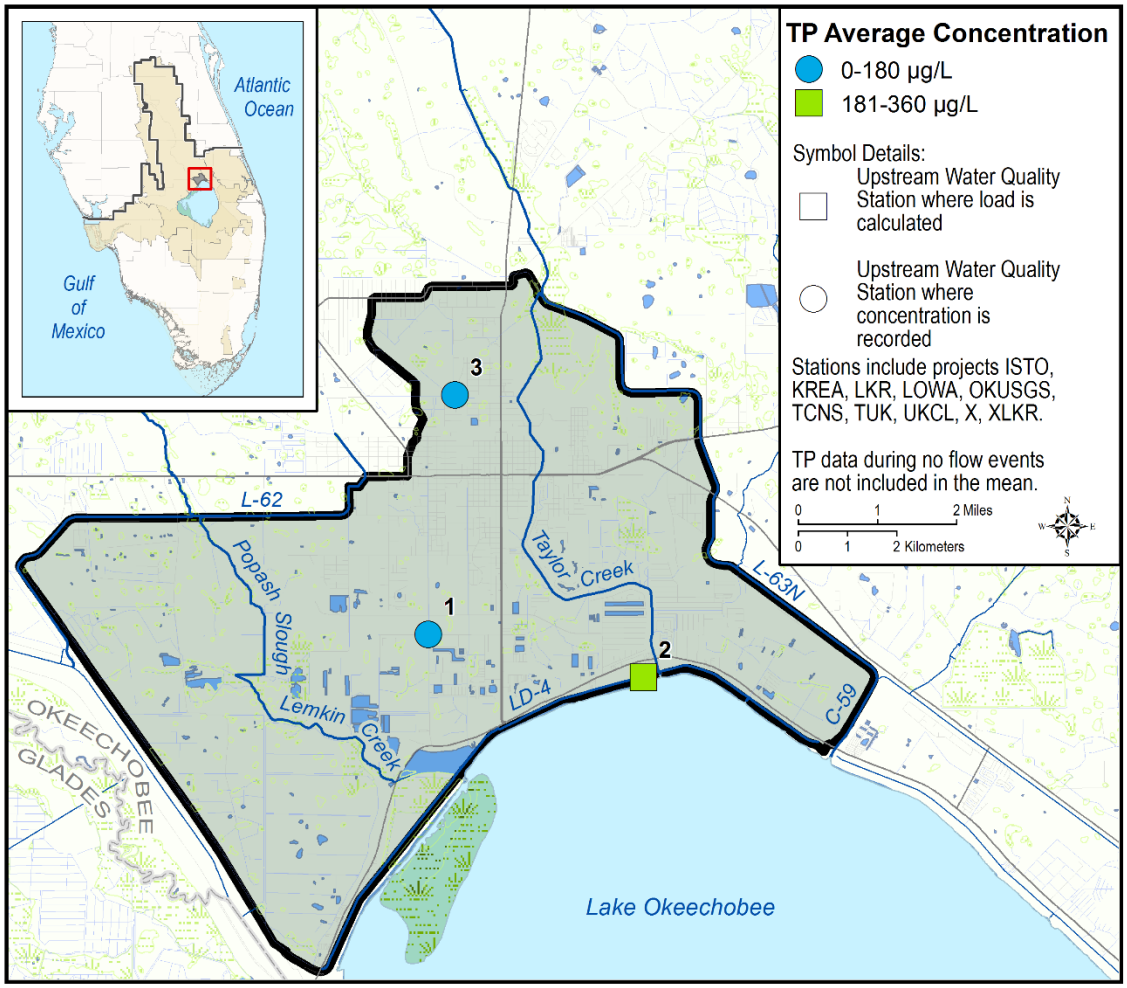


Figure 26a. Lower Kissimmee Subwatershed average TP concentrations for WY2015.

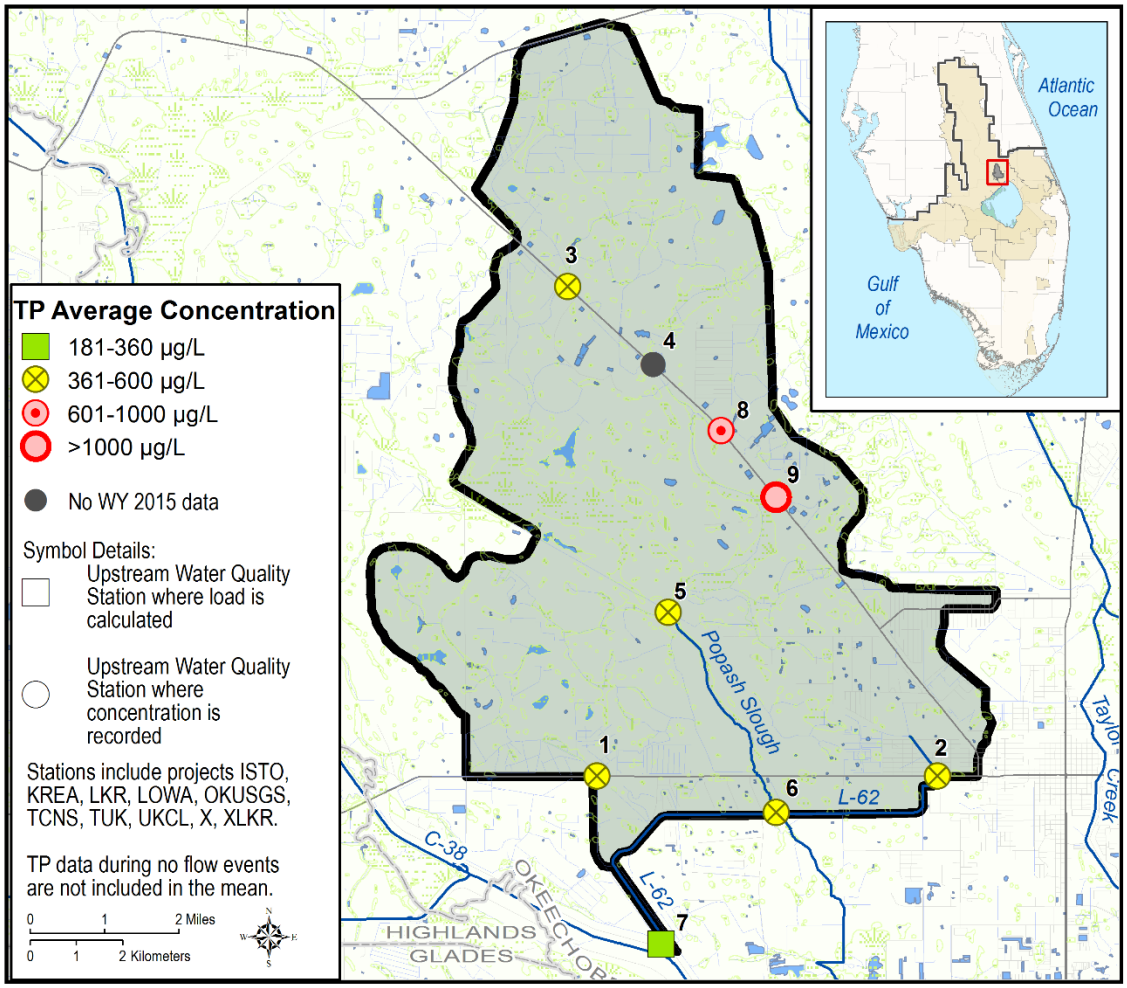
Lower Kissimmee		Up Through WY2001			WY2002 Through WY2014			WY2015 TP Concentration (µg/L)			
Map ID	Station	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# of Samples	Average	Min	Max
1	02272676	9	16.3	460	6	13.5	396	16	514	154	704
2	BB16313214	-	-	-	9	8.4	366	3	130	104	170
3	BM15313111	-	-	-	9	12.1	102	7	35	18	57
4	CY05353444	6	12.3	445	13	20.2	350	21	336	70	1000
5	CY06363411	11	12.6	941	12	9.3	693	11	637	248	1416
6	CY17353413	16	17.1	1140	13	9.3	1273	1	3903	3903	3903
7	IC35313112	-	-	-	9	13.7	90	13	36	22	69
8	KR05373311	10	15.2	765	13	12.9	491	7	1018	105	1888
9	KR23313113	-	-	-	9	10.3	168	5	102	75	171
10	KR24353114	-	-	-	9	11.7	237	18	130	56	383
11	KR29353334	16	15.6	1512	13	8.7	1125	5	1027	871	1287
12	KR30353214	-	-	-	8	14.4	62	1	60	60	60
13	KR30353312	16	13.3	914	13	7.1	806	6	490	123	1206
14	KR32343214	-	-	-	9	8.7	408	5	301	87	514
15	KR36363312	16	16.0	1097	13	11.6	621	5	226	147	302
16	KREA 01	16	27.5	170	13	15.0	326	13	300	121	1009
17	KREA 04	13	15.8	199	13	11.2	161	15	169	87	342
18	KREA 14	15	21.1	619	13	12.1	379	23	207	30	635
19	KREA 17A	13	20.3	232	13	14.2	332	19	148	74	297
20	KREA 22	13	21.0	63	13	14.0	75	22	56	27	147
21	KREA 23	13	15.2	38	13	12.2	104	23	72	39	237
22	KREA 41A	14	25.2	709	13	9.3	678	13	1333	148	4855
23	OK09353212	-	-	-	9	12.6	249	22	196	55	846
24	S65A	28	13.5	58	13	22.4	59	27	51	30	86
25	S65C	28	19.9	58	13	23.5	71	26	59	29	125
26	S65D	28	19.3	79	13	23.2	75	26	69	34	139
27	S65E	29	25.4	101	13	24.8	86	30	76	31	185

Figure 26b. Lower Kissimmee Subwatershed average TP concentrations for WY2015. [Note: Ave – Average.]



S133		Up Through WY2001			WY2002 Through WY2014			WY2015 TP Concentration (µg/L)			
Map ID	Station	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# of Samples	Average	Min	Max
1	LM29373514	5	14.4	308	11	18.5	186	20	142	47	435
2	S133	18	3.9	275	11	2.4	269	3	221	185	267
3	TC09373513	6	18.5	297	10	20.5	113	20	116	42	245

Figure 27. Taylor Creek/Nubbin Slough Subwatershed, S-133 Basin average TP concentrations for WY2015.



S154		Up Through WY2001			WY2002 Through WY2014			WY2015 TP Concentration (µg/L)			
Map ID	Station	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# of Samples	Ave	Min	Max
1	KR16373414	7	20.9	596	12	17.8	272	10	413	117	806
2	KR17373513	4	28.5	389	11	20.1	261	13	402	70	860
3	KREA 20	14	20.1	2982	11	7.2	1267	13	416	101	1228
4	KREA 25	14	13.8	2179	10	5.9	667	0	-	-	-
5	KREA 28	15	23.5	1660	12	7.5	886	7	592	323	1514
6	KREA 30A	13	19.1	1189	11	4.4	790	2	490	400	579
7	S154	19	4	767	12	2.7	551	4	398	118	646
8	TS26363411	9	14.2	10025	11	12.8	690	4	837	466	1153
9	TS36363411	14	13.4	6251	12	8.4	2698	6	3571	2240	5428

Figure 28. Taylor Creek/Nubbin Slough Subwatershed, S-154 Basin average TP concentrations for WY2015.

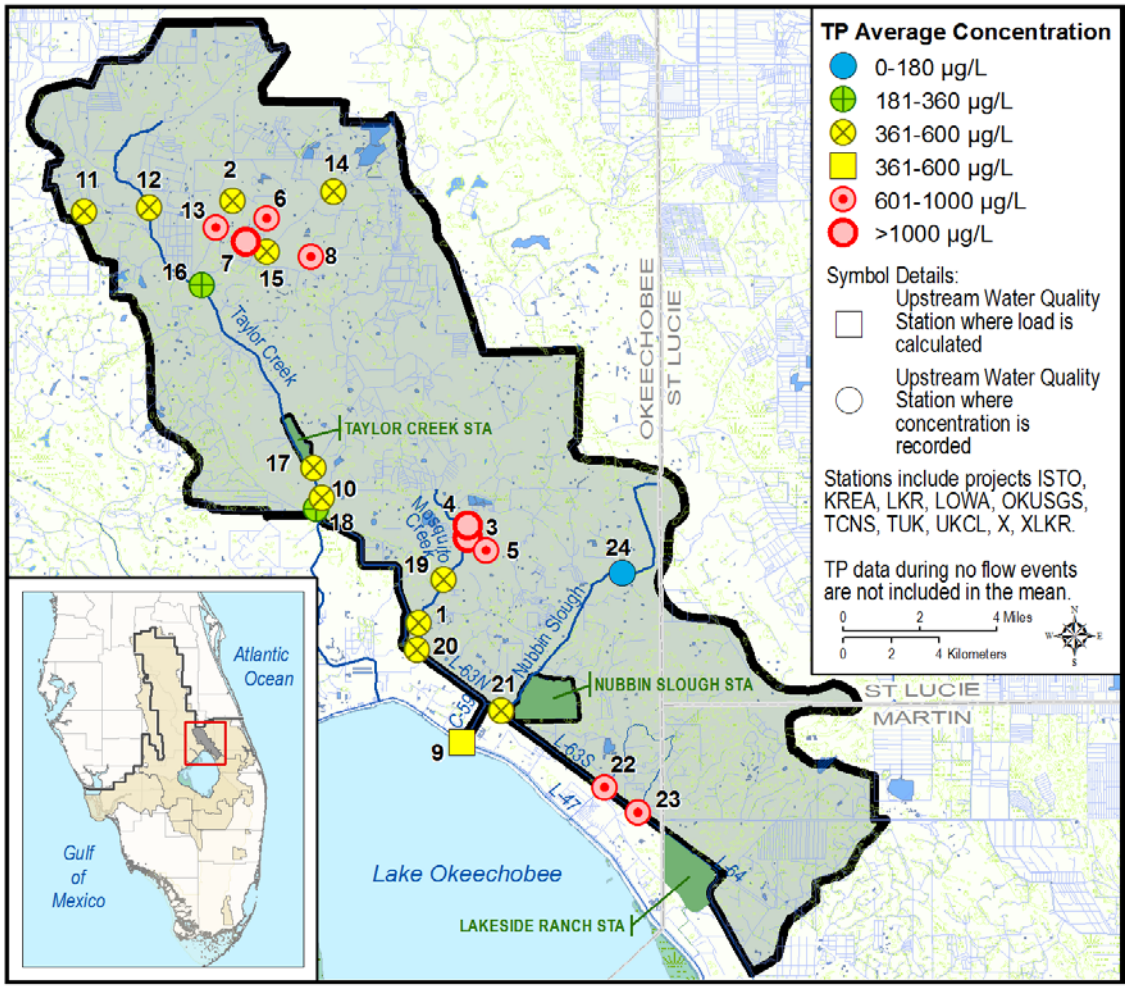
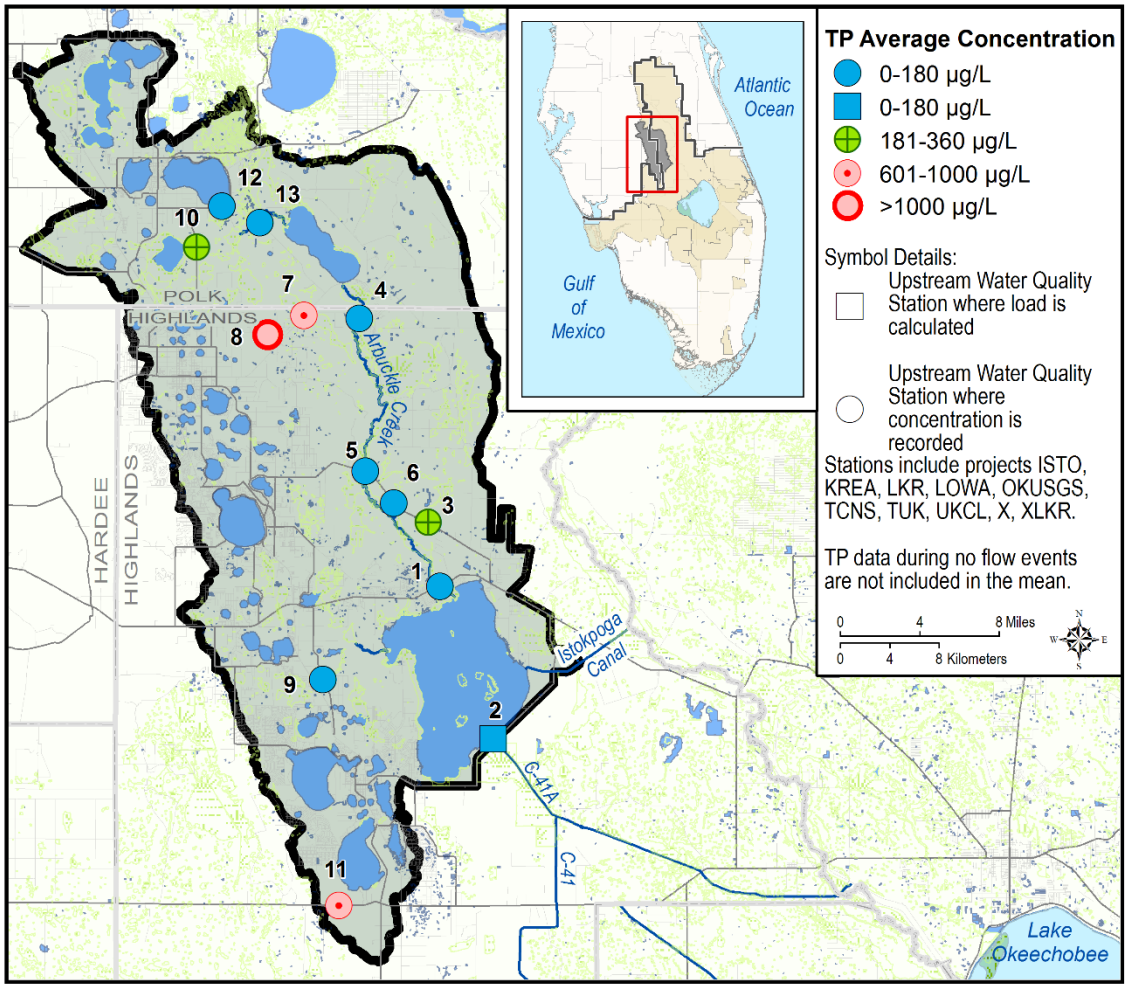


Figure 29a. Taylor Creek/Nubbin Slough Subwatershed, S-191 Basin average TP concentrations for WY2015.

S191		Up Through WY2001			WY2002 Through WY2014			WY2015 TP Concentration (µg/L)			
Map ID	Station	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# of Samples	Average	Min	Max
1	02275197	8	6.9	4381	9	11.0	663	17	439	107	824
2	LB29353513	10	18.2	431	13	15.4	570	10	537	275	814
3	MS05373613	12	27.1	1447	13	10.4	810	1	2158	2158	2158
4	MS08373611	12	38.4	1453	13	16.6	925	11	1865	1067	3020
5	MS08373614	10	17.8	1391	13	9.9	713	2	969	820	1117
6	OT29353514	13	9.5	250	13	6.4	211	21	879	94	1692
7	OT32353511	14	14.9	2047	13	9.8	1937	9	2764	1000	8073
8	OT34353513	13	28.2	247	13	14.5	222	10	642	32	1478
9	S191	23	4.5	720	10	3.0	615	3	659	494	789
10	TC03373511	-	-	-	11	5.5	374	10	493	156	863
11	TC27353413	11	9.7	888	12	4.8	491	10	459	244	880
12	TCNS 201	12	20.8	480	12	8.9	487	8	429	197	977
13	TCNS 204	13	21.3	984	13	12.0	840	12	892	394	1756
14	TCNS 207	13	35.2	822	13	14.8	841	7	522	171	1001
15	TCNS 209	13	35.0	660	13	12.2	457	7	512	106	1083
16	TCNS 213	13	35.5	530	13	19.2	447	16	331	113	721
17	TCNS 214	13	35.2	246	13	17.0	314	16	515	258	835
18	TCNS 217	13	35.7	487	13	21.1	316	25	234	84	573
19	TCNS 220	13	22.3	646	13	10.8	523	18	503	69	2270
20	TCNS 222	13	28.8	636	13	14.2	455	23	388	116	819
21	TCNS 228	13	18.6	734	13	7.9	537	6	573	201	918
22	TCNS 230	13	18.4	616	12	6.4	641	3	695	470	973
23	TCNS 233	13	35.4	452	13	11.7	656	8	616	289	1129
24	TCNS 249	13	17.8	497	13	5.5	203	18	140	57	414

Figure 29b. Taylor Creek/Nubbin Slough Subwatershed, S-191 Basin average TP concentrations for WY2015.



Lake Istokpoga		Up Through WY2001			WY2002 Through WY2014			WY2015 TP Concentration (µg/L)			
Map ID	Station	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# of Samples	Average	Min	Max
1	02270500	-	-	-	6	29.7	123	52	135	65	373
2	02273198	-	-	-	6	18.3	71	45	74	44	144
3	AB27343014	-	-	-	10	20.5	148	21	184	32	1602
4	AR06333013	-	-	-	10	21.9	89	25	61	45	96
5	AR18343012	-	-	-	10	19.1	105	20	123	66	252
6	AR21343013	-	-	-	10	16.0	150	14	100	33	226
7	BN03332911	-	-	-	10	22.8	751	26	710	411	1185
8	BN08332912	-	-	-	10	19.6	1801	19	1739	726	3287
9	LI02362923	-	-	-	3	24.0	59	27	58	40	87
10	LV14322813	-	-	-	10	11.0	336	21	229	143	522
11	PL01382911	-	-	-	9	19.3	1061	22	950	798	1154
12	RD01322813	-	-	-	10	16.3	28	18	31	20	61
13	RD08322913	-	-	-	10	23.3	65	26	82	54	124

Figure 30. Lake Istokpoga Subwatershed average TP concentrations for WY2015.

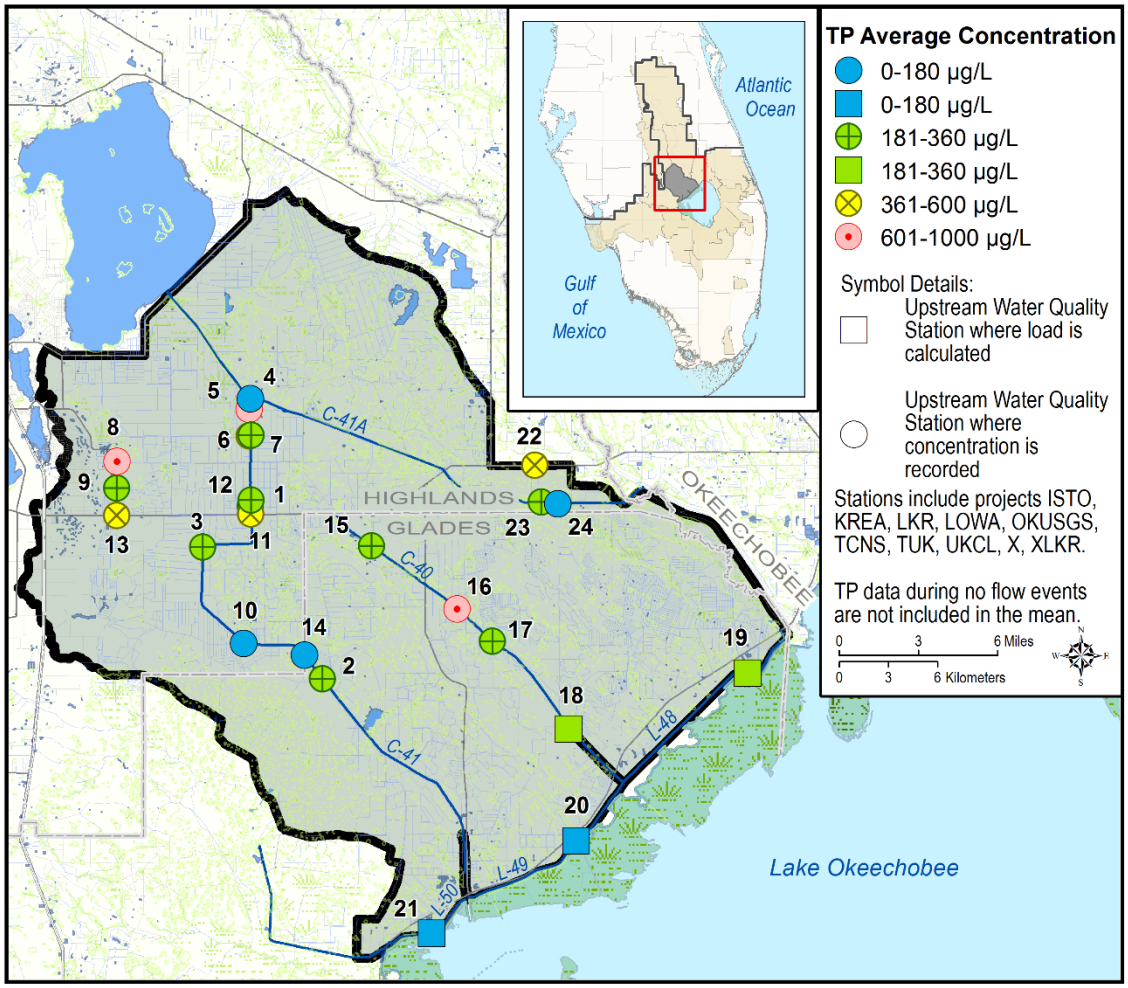
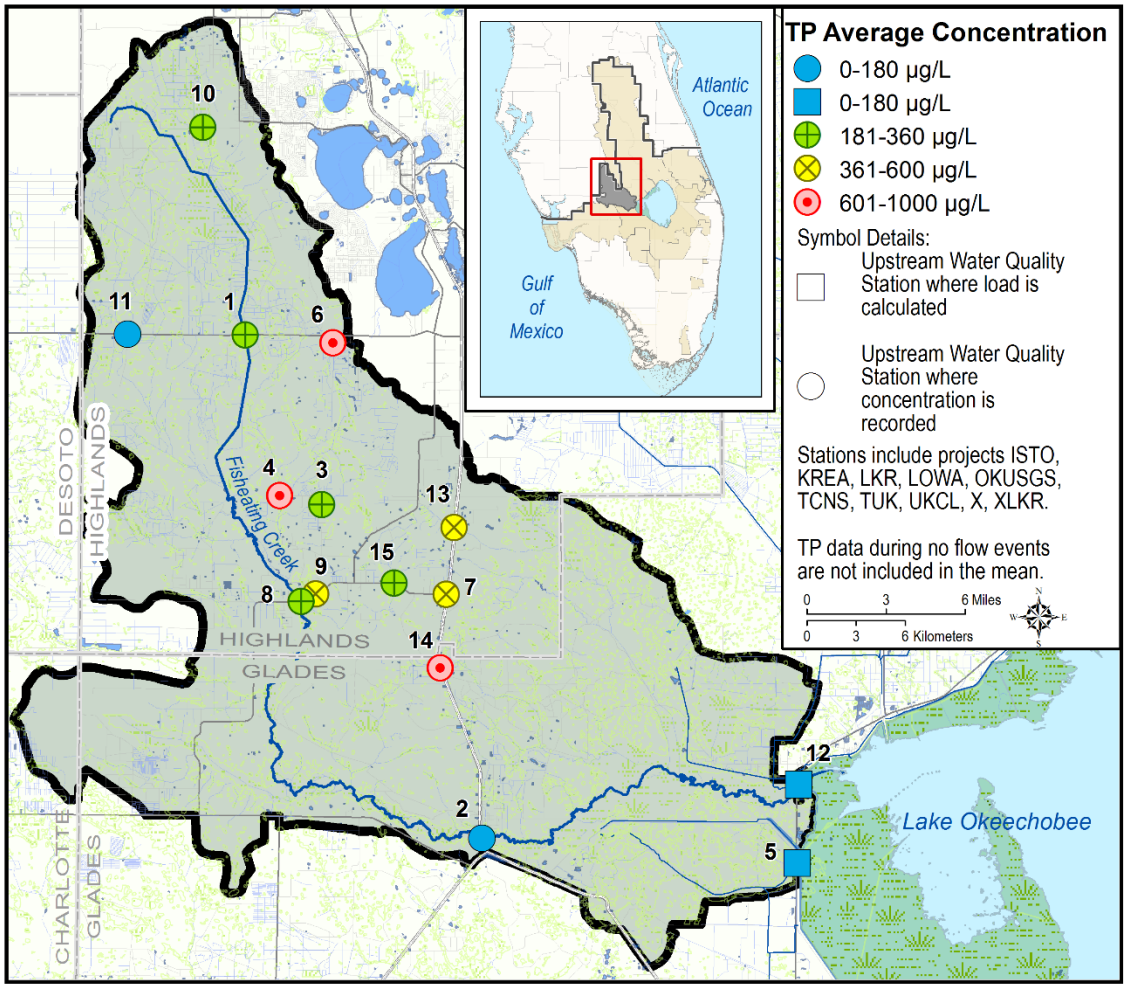


Figure 31a. Indian Prairie Subwatershed average TP concentrations for WY2015.

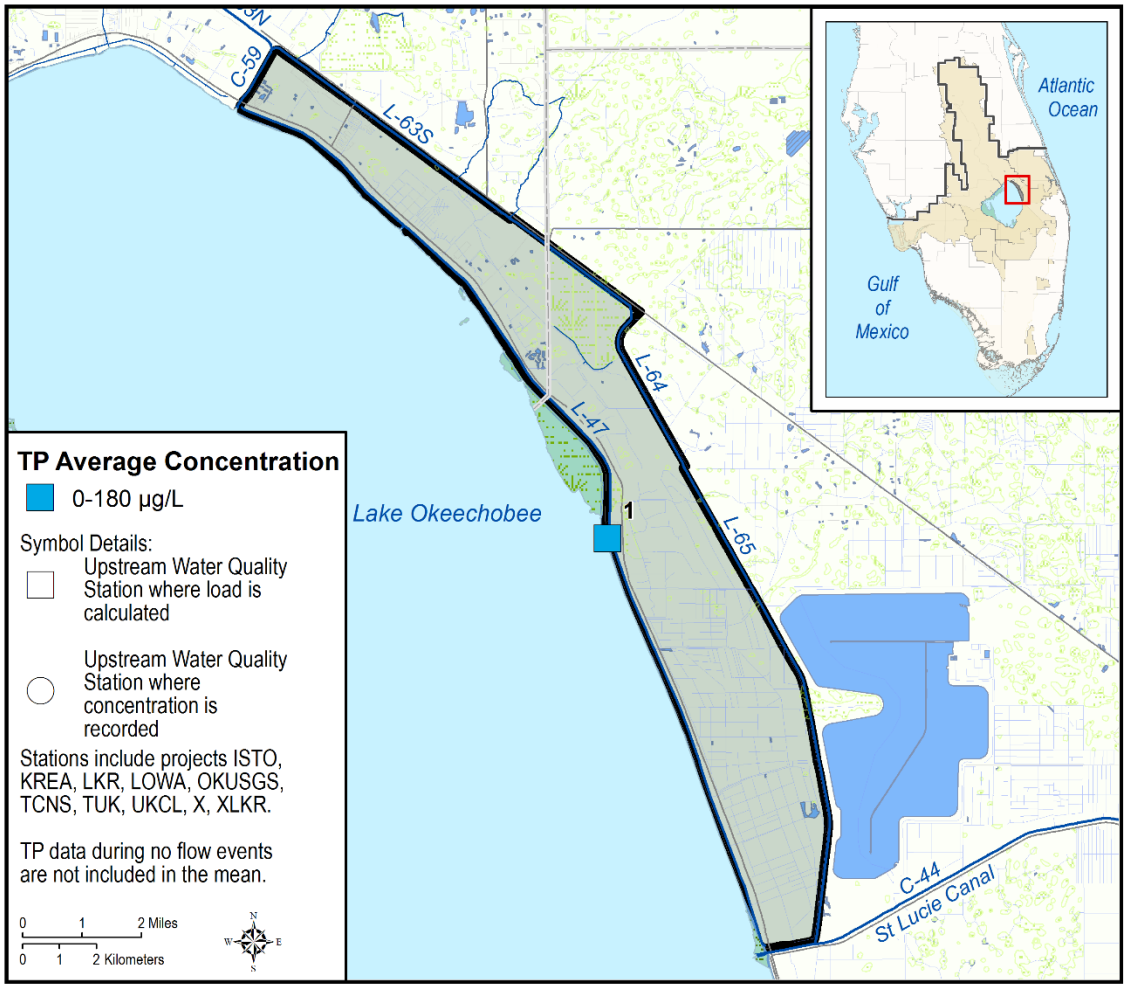
Indian Prairie		Up Through WY2001			WY2002 Through WY2014			WY2015 TP Concentration (µg/L)			
Map ID	Station	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# of Samples	Average	Min	Max
1	02273230	-	-	-	6	7.5	282	15	243	99	651
2	HP06393242	-	-	-	6	15.5	200	14	222	65	578
3	HP09383151	-	-	-	10	17.3	248	13	329	71	735
4	HP11373132	-	-	-	9	11.8	56	10	69	47	89
5	HP15373112	9	20.7	392	13	15.9	458	5	755	223	1476
6	HP22373112	9	20.9	301	13	16.1	479	9	366	151	762
7	HP23373111	1	7.0	291	13	5.8	354	10	265	126	398
8	HP24373013	-	-	-	9	12.2	1091	10	996	711	1436
9	HP25373013	-	-	-	9	23.4	251	24	303	112	1043
10	HP27383124	5	12.0	109	10	12.9	190	15	117	31	245
11	HP34373124	-	-	-	11	7.8	614	2	472	135	809
12	HP35373113	-	-	-	10	4.2	702	3	207	135	301
13	HP36373013	6	12.7	269	9	13.2	444	4	599	126	797
14	HP36383112	6	4.0	301	9	4.9	174	3	128	111	143
15	IP09383232	-	-	-	6	14.3	163	12	258	78	632
16	IP24383214	5	15.0	199	11	6.3	142	3	602	355	795
17	IP29383313	-	-	-	11	18.4	189	3	239	151	308
18	L60E	14	7.9	156	7	3.0	238	6	189	87	286
19	S127	22	5.8	264	11	2.6	207	3	226	121	335
20	S129	20	5.1	145	11	2.7	83	2	40	34	46
21	S131	18	5.1	99	10	4.2	113	3	50	48	52
22	SD28373312	-	-	-	11	10.9	425	5	383	128	616
23	SD33373314	5	6.4	423	10	13.9	330	6	240	52	687
24	SD34373313	-	-	-	10	3.5	659	7	109	63	213

Figure 31b. Indian Prairie Subwatershed average TP concentrations for WY2015.



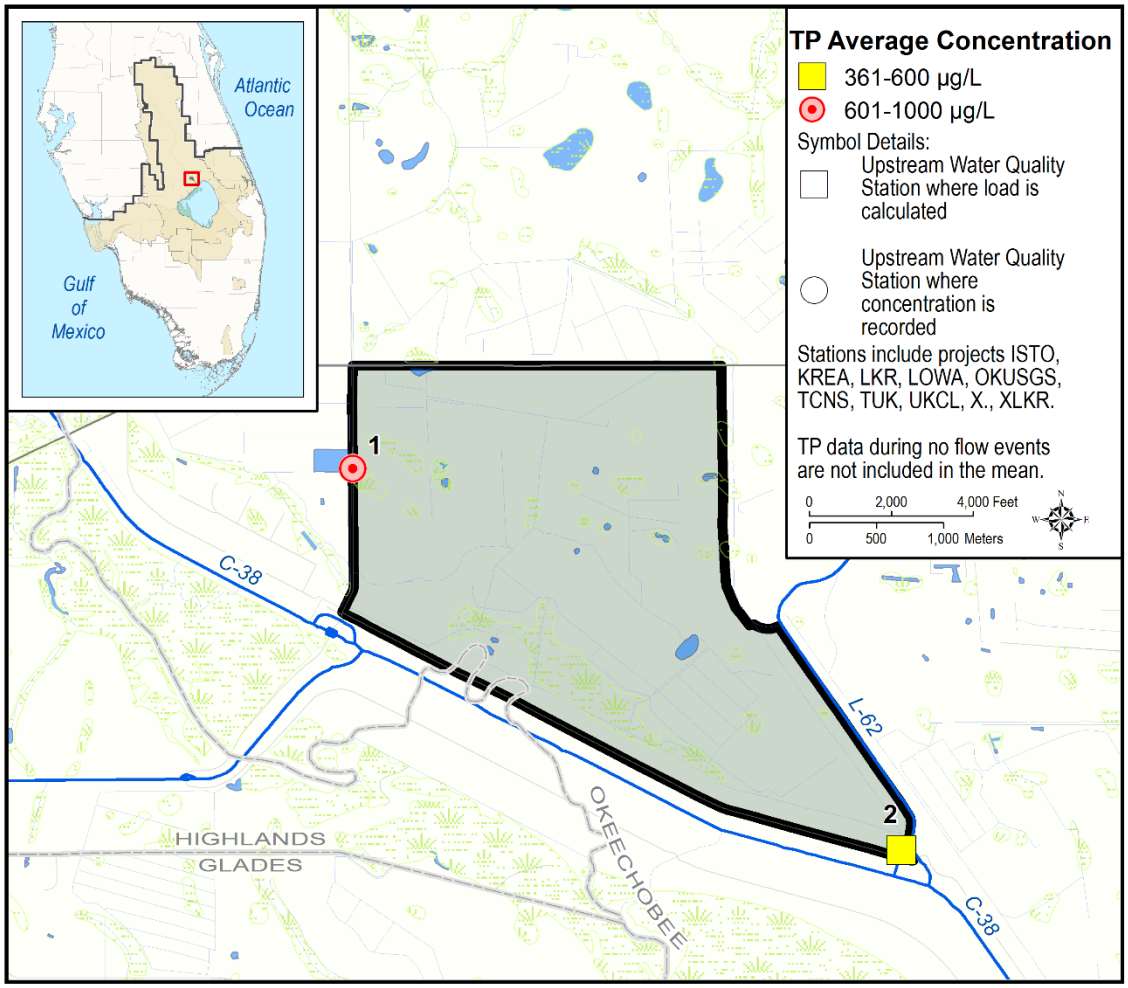
Fisheating Creek		Up Through WY2001			WY2002 Through WY2014			WY2015 TP Concentration (µg/L)			
Map ID	Station	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# of Samples	Average	Min	Max
1	02255600	4	16.8	230	7	10.7	214	12	232	117	417
2	02256500	4	18.0	196	7	10.9	223	8	151	114	196
3	BH04392912	-	-	-	11	18.6	517	17	203	117	326
4	BH32382914	10	16.3	519	13	14.3	512	3	752	385	1146
5	CULV5	6	2.3	62	8	1.4	105	2	89	80	97
6	FE03382911	2	6.0	1795	13	6.2	949	8	714	640	803
7	FE20393013	-	-	-	10	18.5	359	4	455	267	807
8	FE21392913	3	8.7	262	11	19.7	292	8	272	185	410
9	FE21392914	-	-	-	10	12.8	376	4	398	107	983
10	FE26362812	4	13.0	183	10	15.7	243	21	313	113	835
11	FE32372814	-	-	-	10	14.6	251	4	127	72	247
12	FECSR78	22	7.7	166	13	8.2	207	9	140	109	221
13	GA09393011	-	-	-	9	22.2	530	15	378	198	754
14	GG05403011	5	9.0	1473	10	10.2	1156	5	867	605	1131
15	PB24392912	6	18.7	438	11	21.8	310	24	301	189	590

Figure 32. Fisheating Creek/Nicodemus Slough Subwatershed, Fisheating Creek Basin average TP concentrations for WY2015.



S135		Up Through WY2001			WY2002 Through WY2014			WY2015 TP Concentration (µg/L)			
Map ID	Station	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# of Samples	Average	Min	Max
1	S135	17	5.5	102	10	2.8	108	3	67	49	85

Figure 33. Taylor Creek/Nubbin Slough Subwatershed, S-135 Basin average TP concentrations for WY2015.



S154C		Up Through WY2001			WY2002 Through WY2014			WY2015 TP Concentration (µg/L)			
Map ID	Station	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# WY	Ave # Annual Samples	Ave Annual TP Concentration (µg/L)	# of Samples	Average	Min	Max
1	KR20373413	9	12.8	447	11	5.3	616	9	888	178	1760
2	S154C	15	13.3	252	13	15.7	398	21	449	133	1458

Figure 34. Taylor Creek/Nubbin Slough Subwatershed, S-154C Basin average TP concentrations for WY2015.

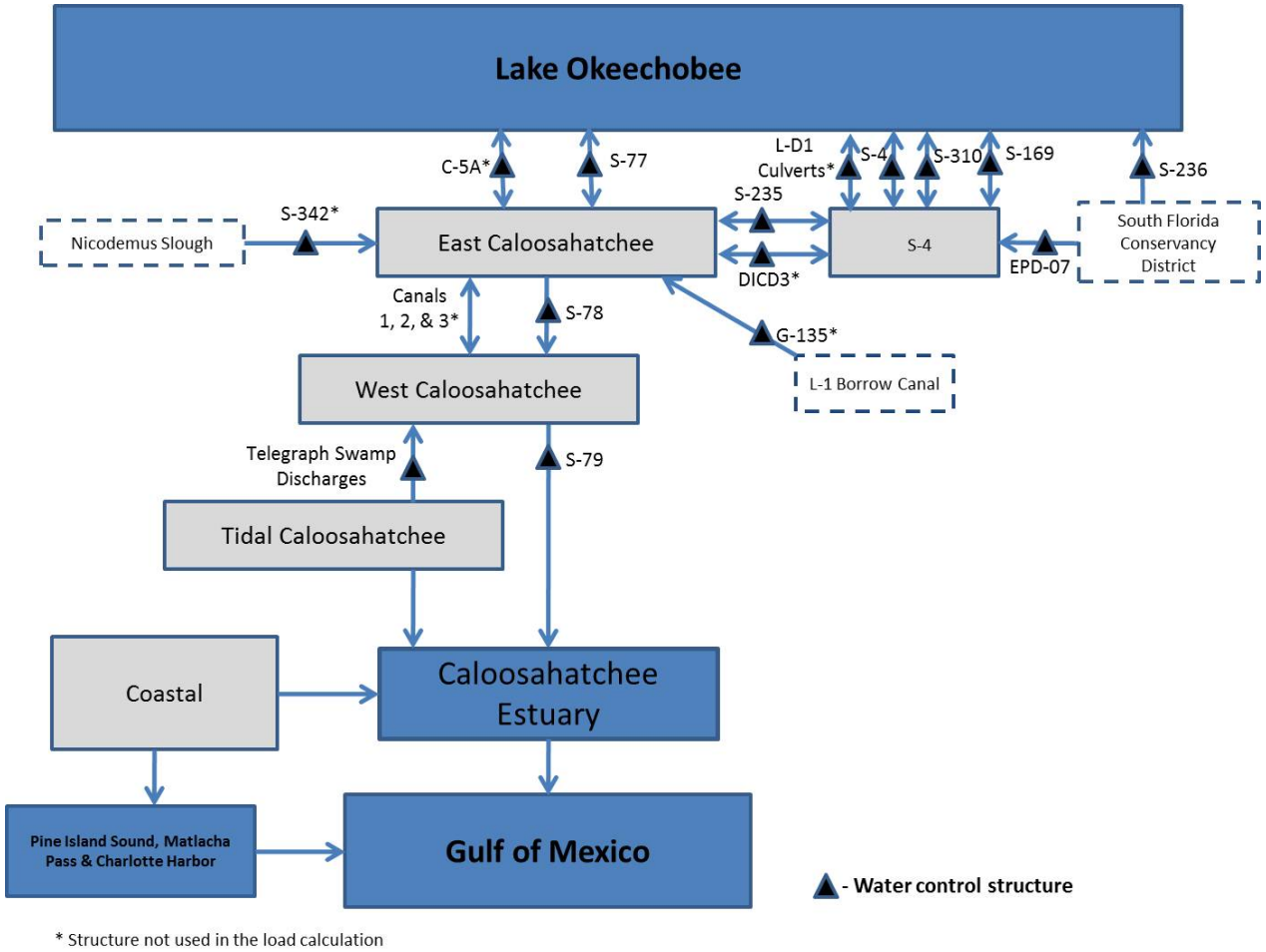


Figure 35. Caloosahatchee River Watershed flow schematic (HDR 2011a).

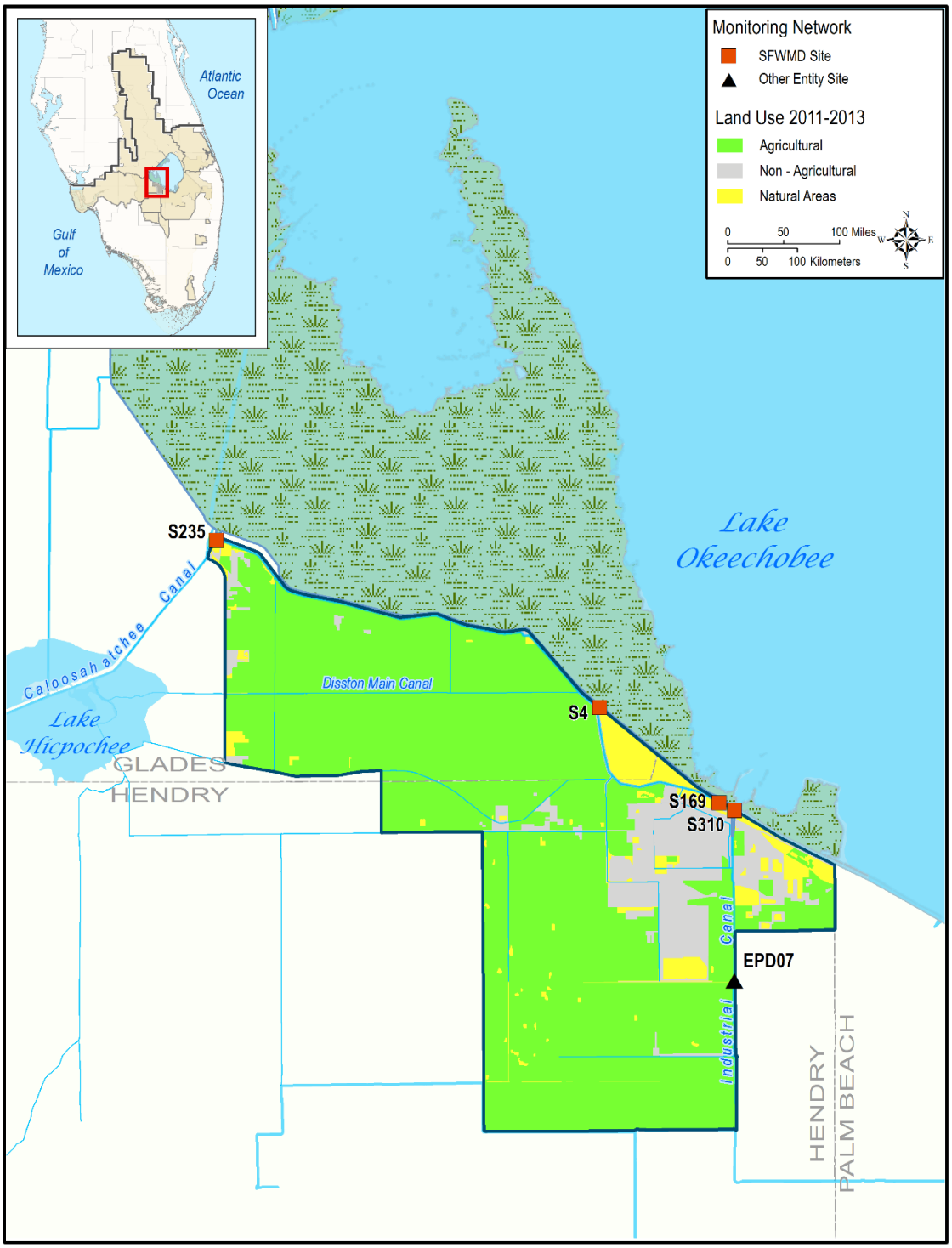


Figure 36. Caloosahatchee River Watershed, S-4 Subwatershed land use from the most recent available data set (2011–2013).

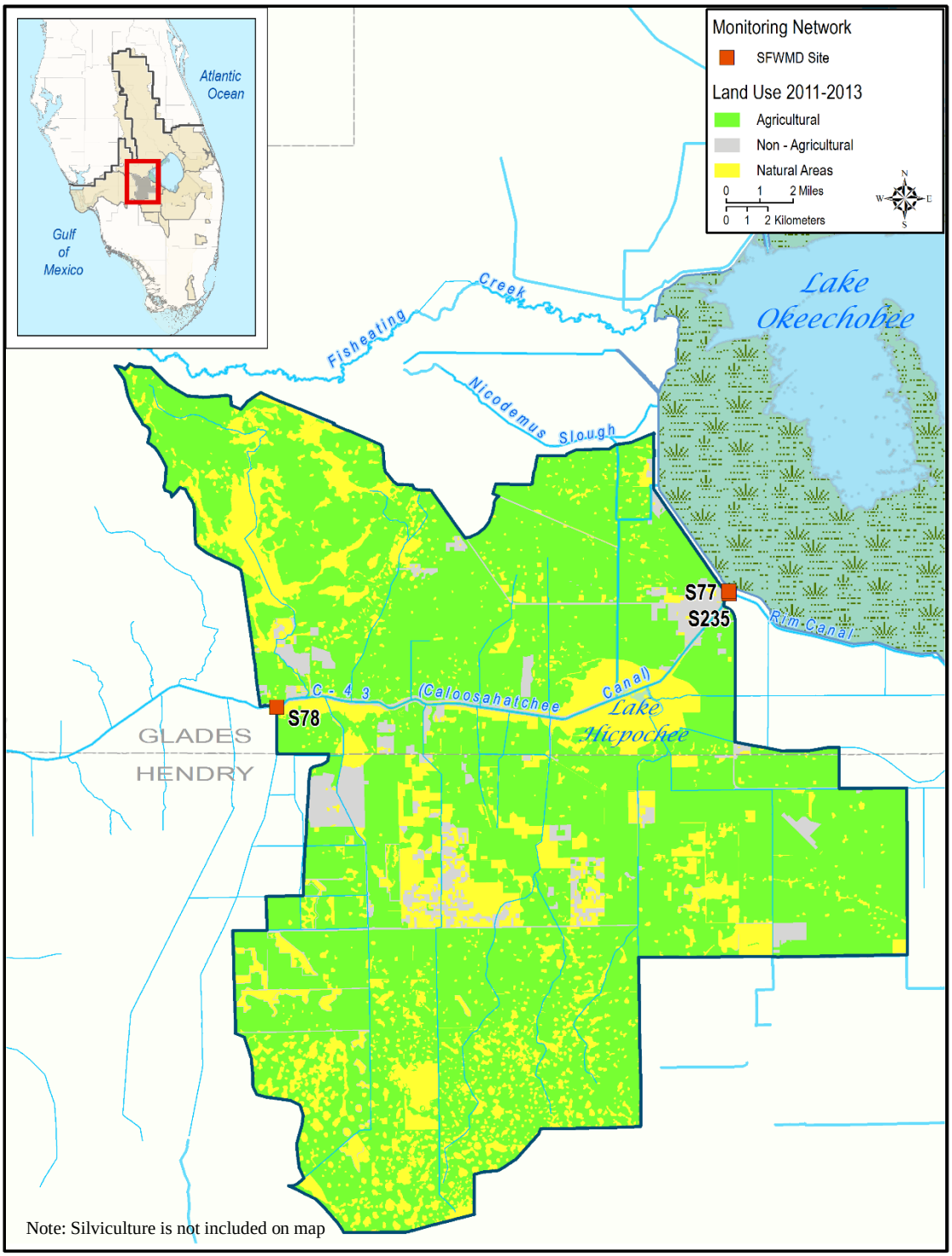


Figure 37. Caloosahatchee River Watershed, East Caloosahatchee Sub-watershed land use from the most recent available data set (2011–2013).

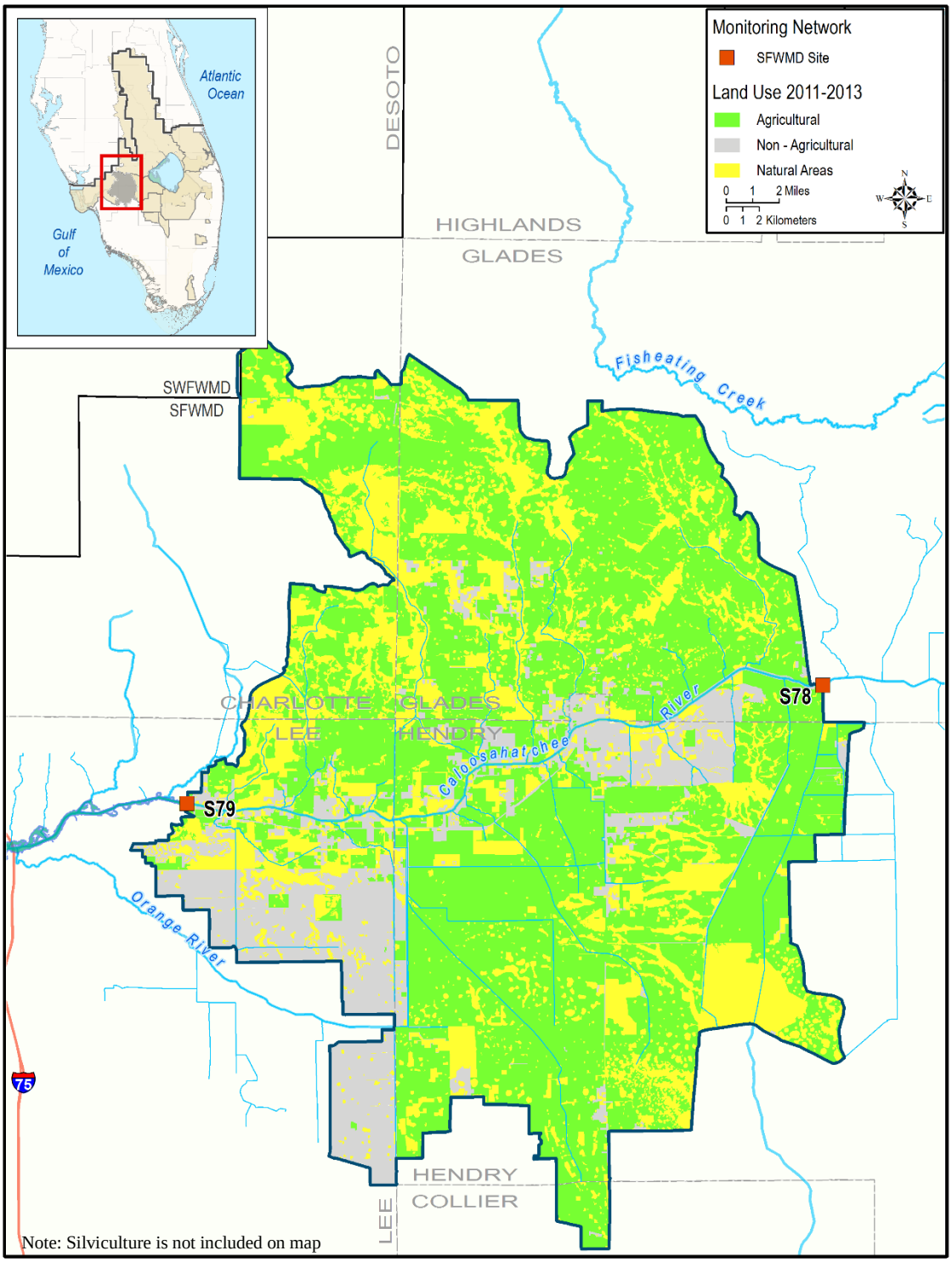


Figure 38. Caloosahatchee River Watershed, West Caloosahatchee Subwatershed land use from the most recent available data set (2011–2013).

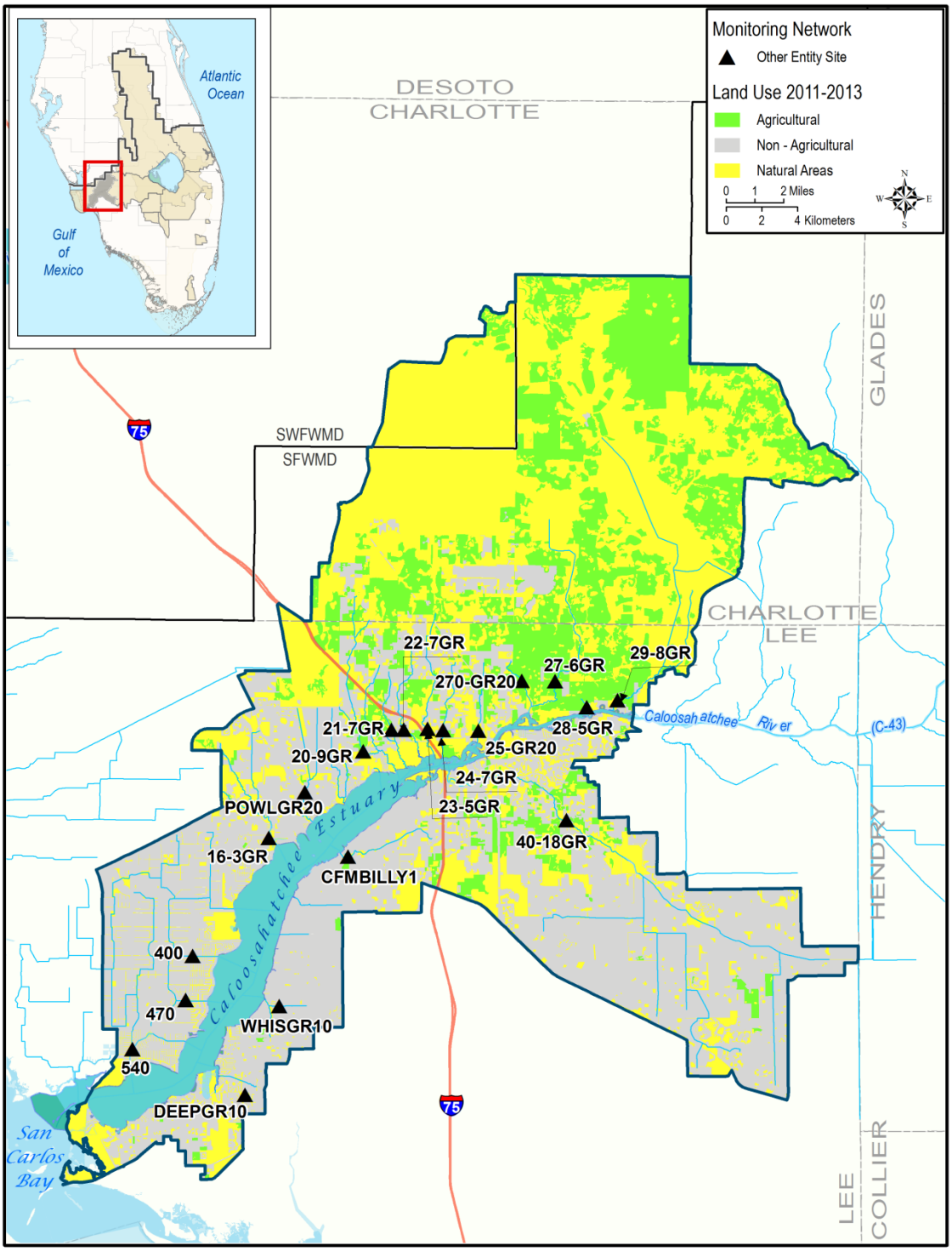


Figure 39. Caloosahatchee River Watershed, Tidal Caloosahatchee Subwatershed land use from the most recent available data set (2011–2013).

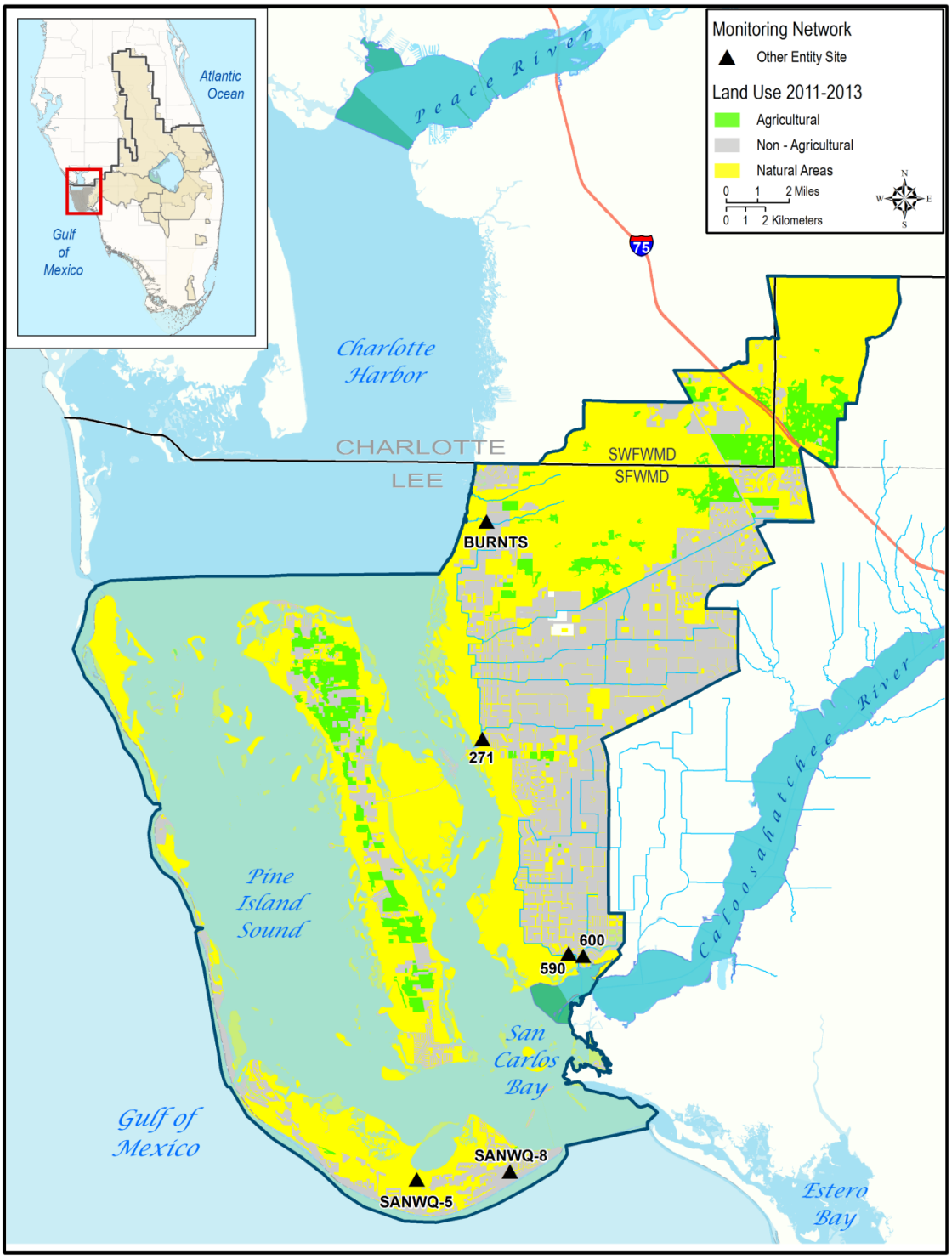
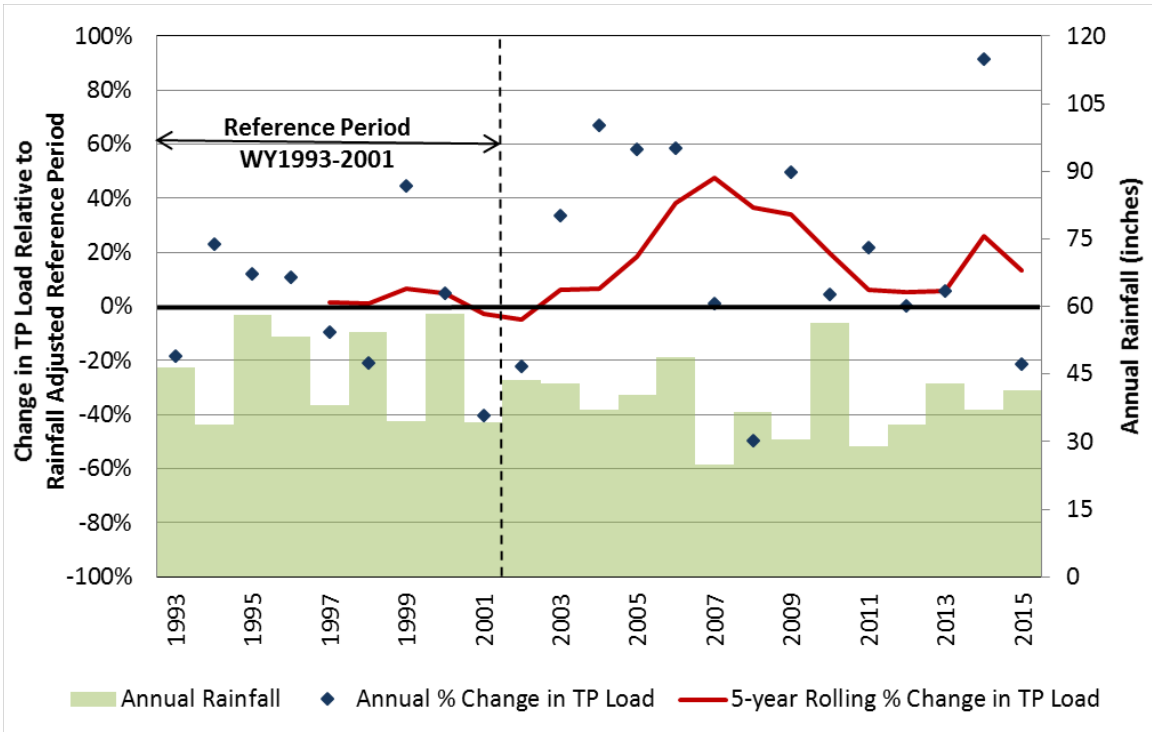


Figure 40. Caloosahatchee River Watershed, Coastal Caloosahatchee Subwatershed land use from the most recent available data set (2011–2013).

Table 1. WY2015 flow, rainfall, and TP and TN concentrations for the Caloosahatchee subwatersheds.

Sub-Watershed	Annual Flow (acre-feet)	Annual Rainfall (inches)	WY2015 TP Concentration (µg/L)[a]	WY2015 TN Concentration (µg/L)[a]
East Caloosahatchee	184,119	43.41	96	1,149
West Caloosahatchee	448,579	44.94	178	1,177
S-4/Industrial Canal	62,319	41.49	161	2,275
Tidal Caloosahatchee[b]		39.45	91	716
Bayshore Creek			140	890
Billy Creek[c]			NA	NA
Chapel Branch			79	1,200
Daughtrey Creek[d]			176	418
Deep Lagoon			85	830
Hancock Creek[d]			140	825
Lower Orange River[d]			20	450
Marsh Point			170	510
Otter Creek			125	905
Owl Creek			69	635
Palm Creek			59	810
Popash Creek			290	990
Powell Creek			180	640
Southeast Cape Coral[d]			82	976
Stroud Creek			85	670
Telegraph Creek[d]			60	920
Trout Creek			42	555
Whiskey Creek			24	395
Coastal Caloosahatchee[b]		40.98	45	1,208
Durden Creek			7	690
Northwest Cape Coral[d]			40	1,150
Sanibel Island[d]			98	2,064
Southwest Cape Coral[d]			45	925

a. Concentrations are flow-weighted means for S4/Industrial Canal, East, and West Caloosahatchee subwatersheds. Concentrations for tributary sites are monthly medians based on grab samples collected by local water quality programs
b. Composite subwatershed nutrient concentrations were calculated by flow-weighting the individual tributary concentrations, using the unit area runoff coefficients and areas for the basins developed for the 2012 Caloosahatchee River Watershed Protection Plan Update (Balci and Bertolotti 2012).
c. Water quality monitoring was not conducted or reported at this site during WY2015. NA – not applicable.
d. Tributaries were combined into larger hydrologic units using the most downstream station as follows: Daughtrey Creek with East Daughtrey Creek; Hancock Creek with Yellow Fever and East Yellow Fever; Lower Orange River with Upper Orange River and Blackstone; Telegraph Creek with Telegraph Swamp and Babcock; Northwest Cape Coral with Upper Yucca Pens, Lower Yucca Pens, and Northcentral Cape Coral; or stations within the same tributary were averaged in Southeast Cape Coral, Sanibel Island, and Southwest Cape Coral.



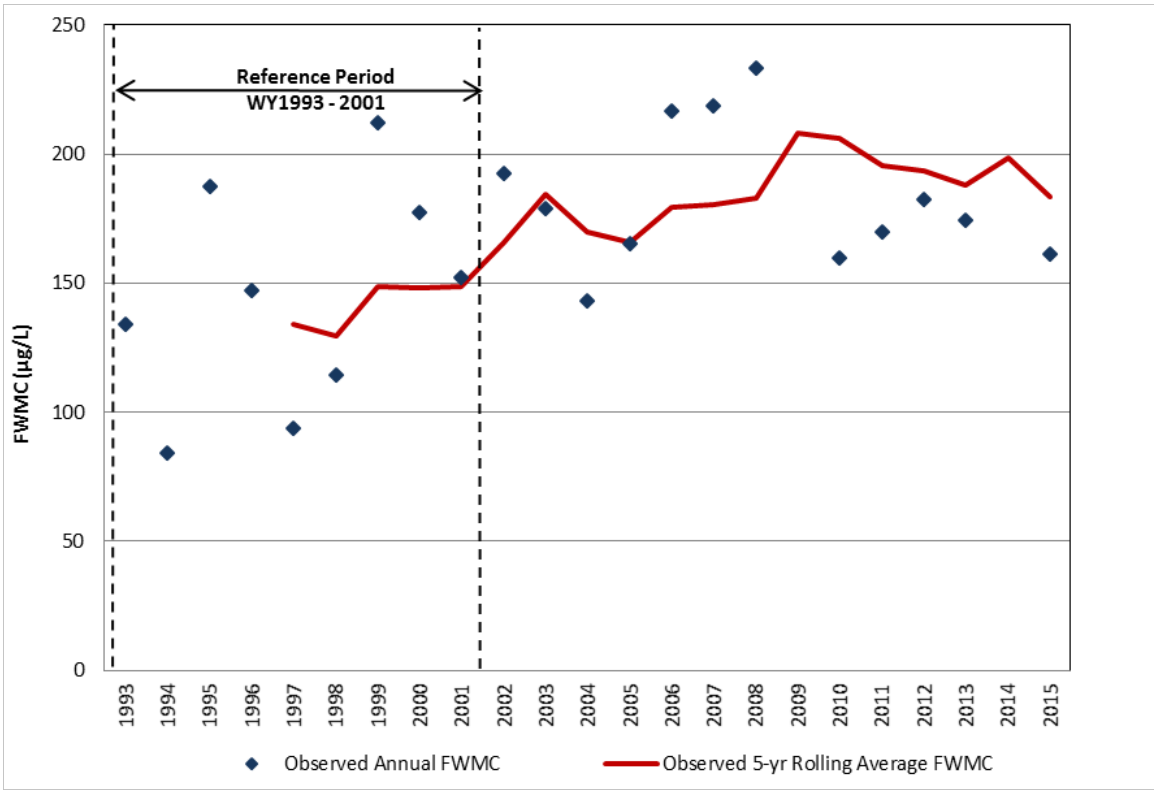
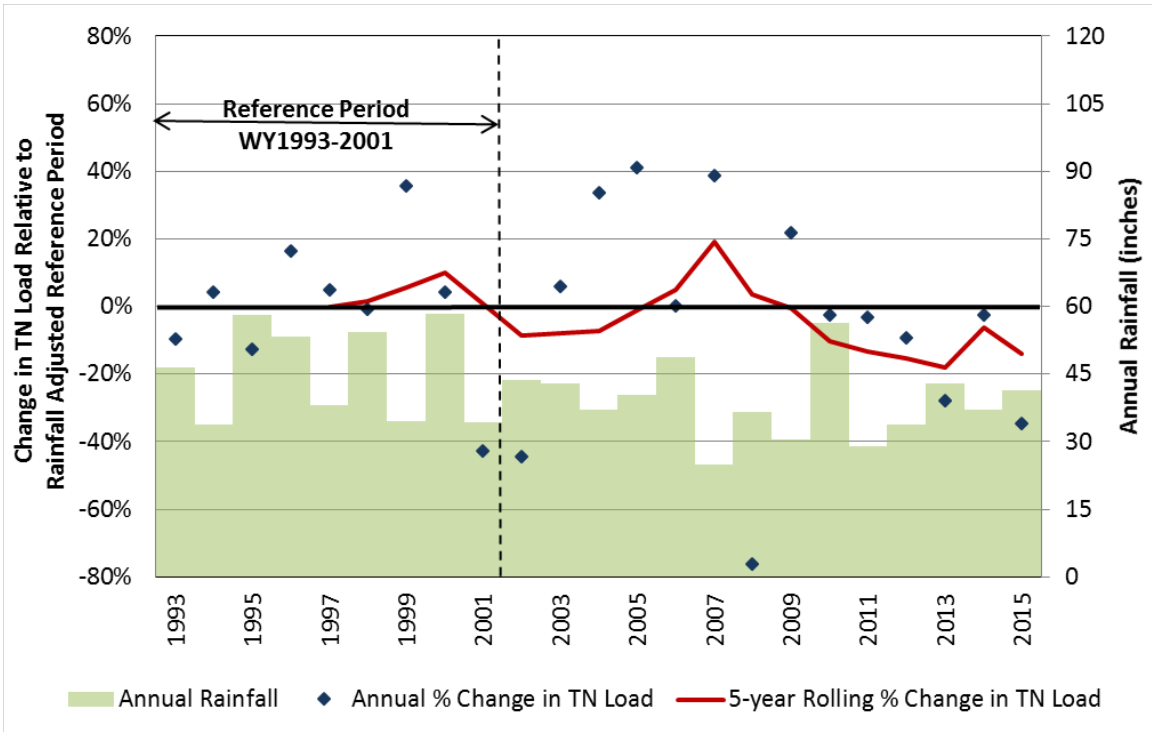


Figure 41. S-4-Industrial Canal Basin: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.



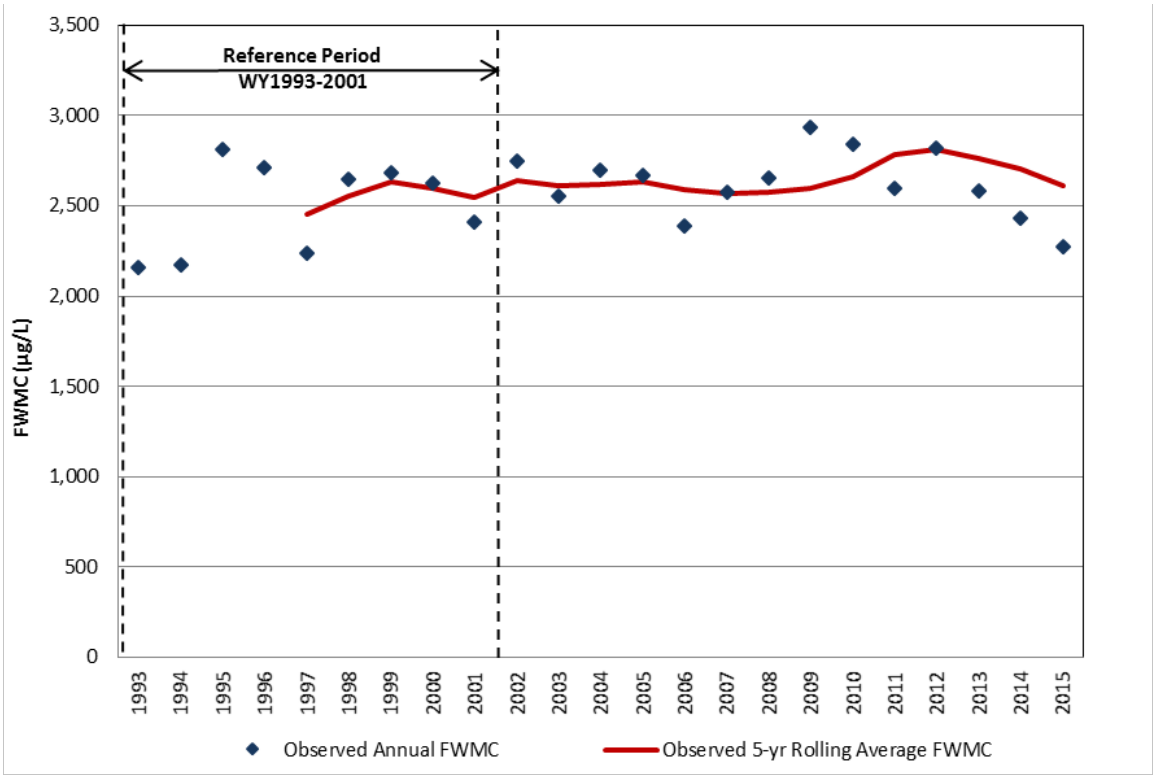


Figure 42. S-4-Industrial Canal Basin: Upper plot - annual percentage change in TN load from reference period and five-year rolling average, with annual rainfall. Lower plot - TN observed annual FWMC and five-year rolling average.

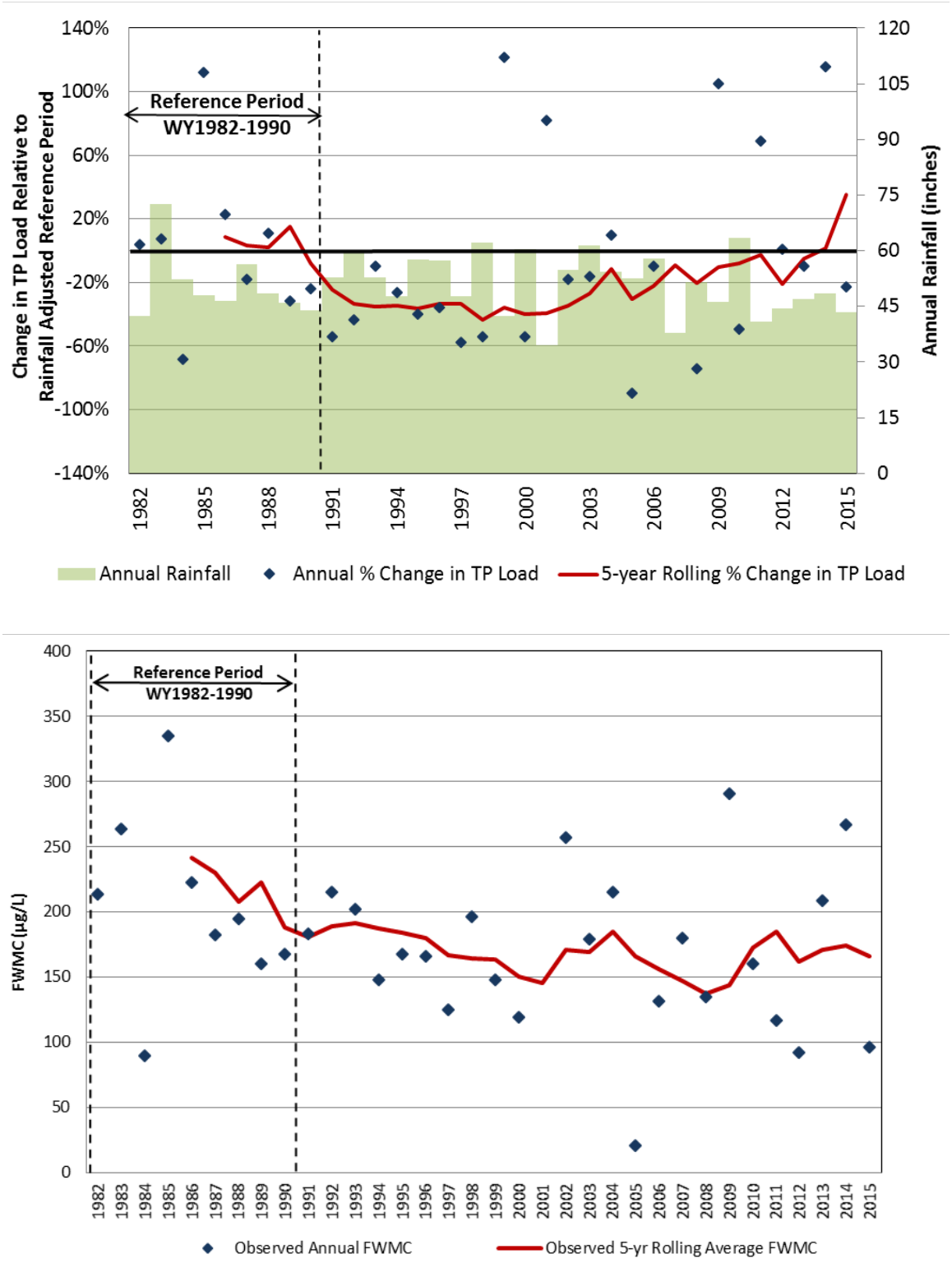
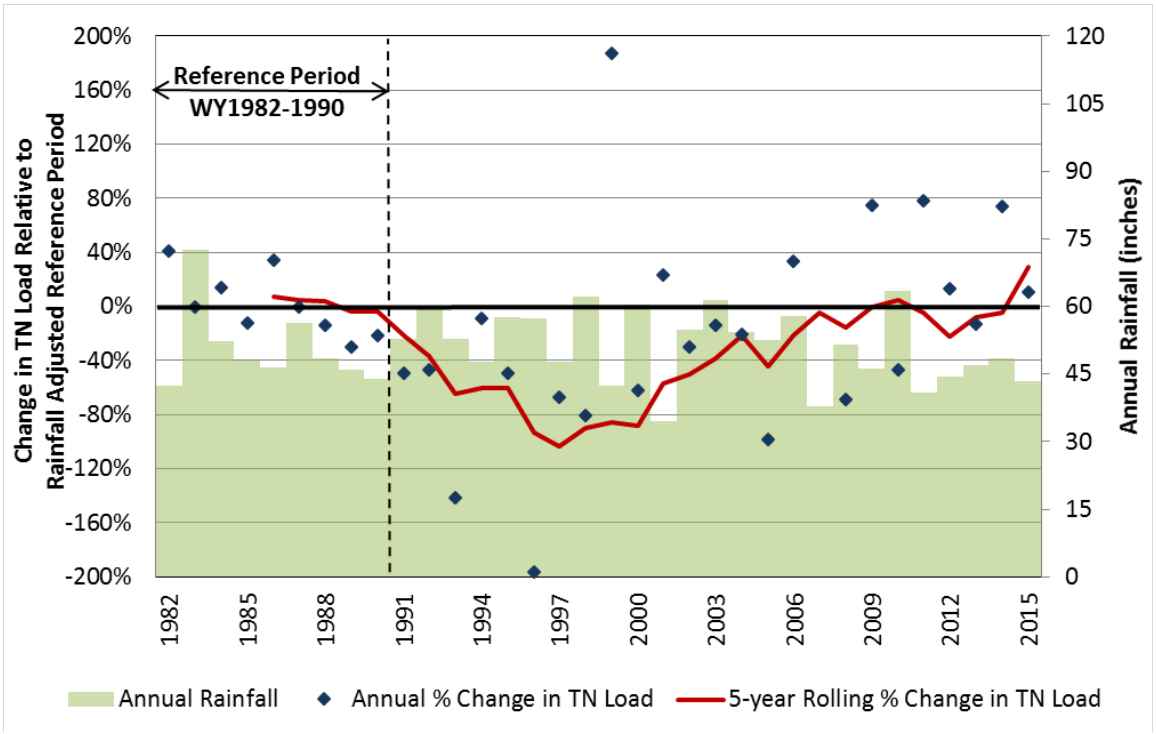


Figure 43. East Caloosahatchee Basin: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.



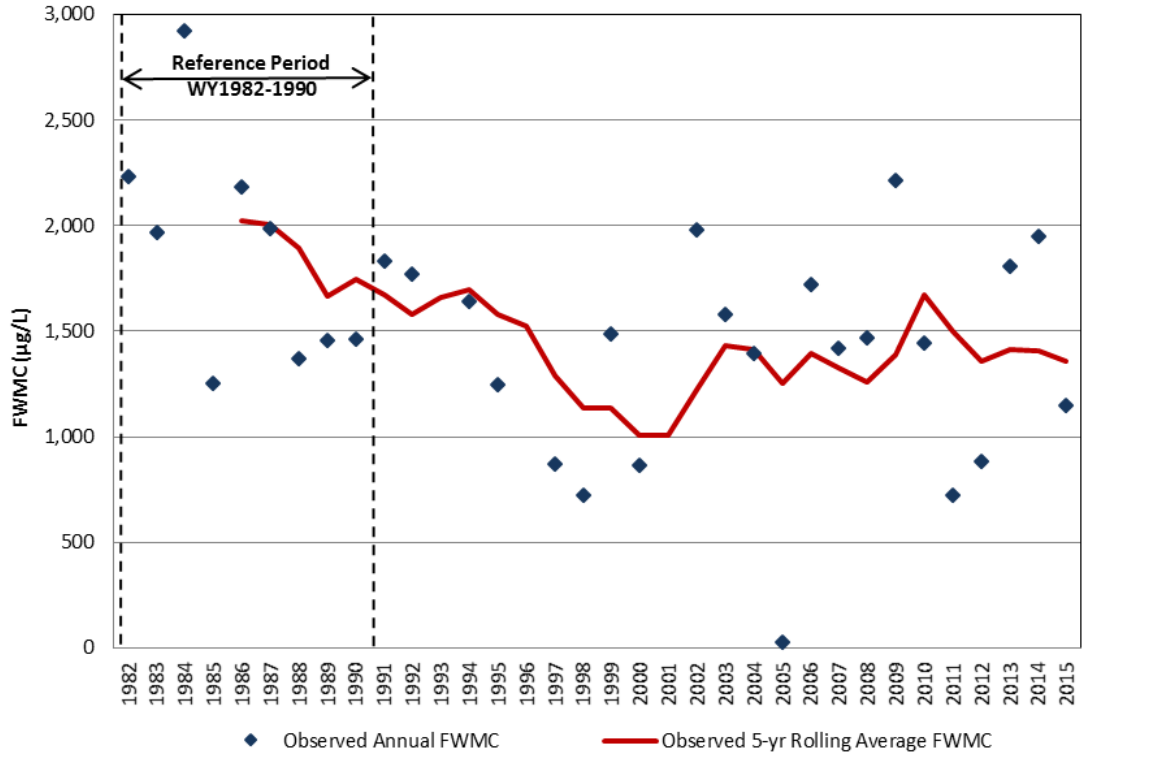
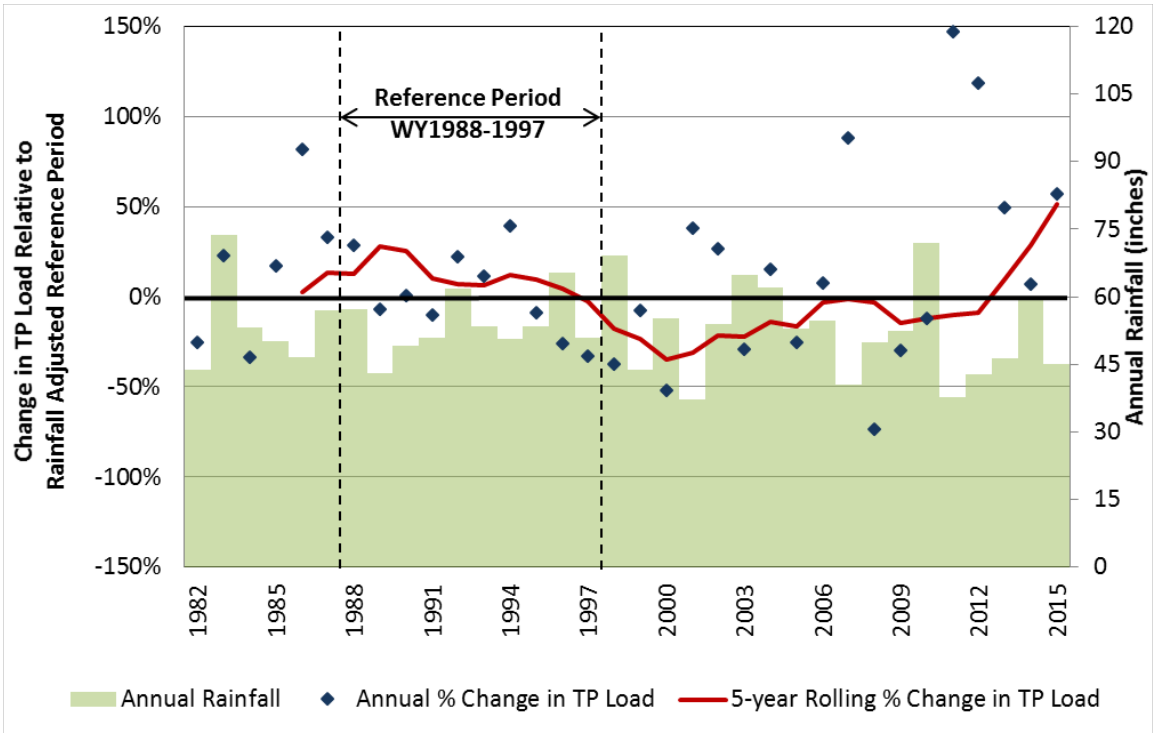


Figure 44. East Caloosahatchee Basin: Upper plot - annual percentage change in TN load from reference period and five-year rolling average, with annual rainfall. Lower plot - TN observed annual FWMC and five-year rolling average.



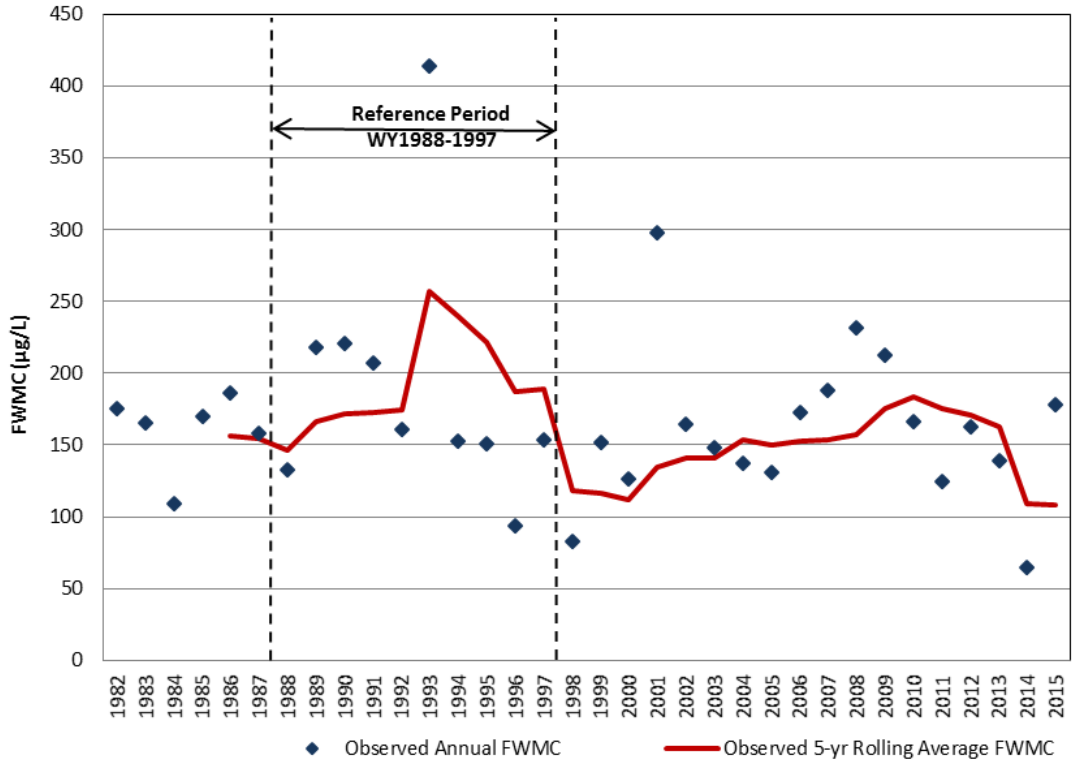
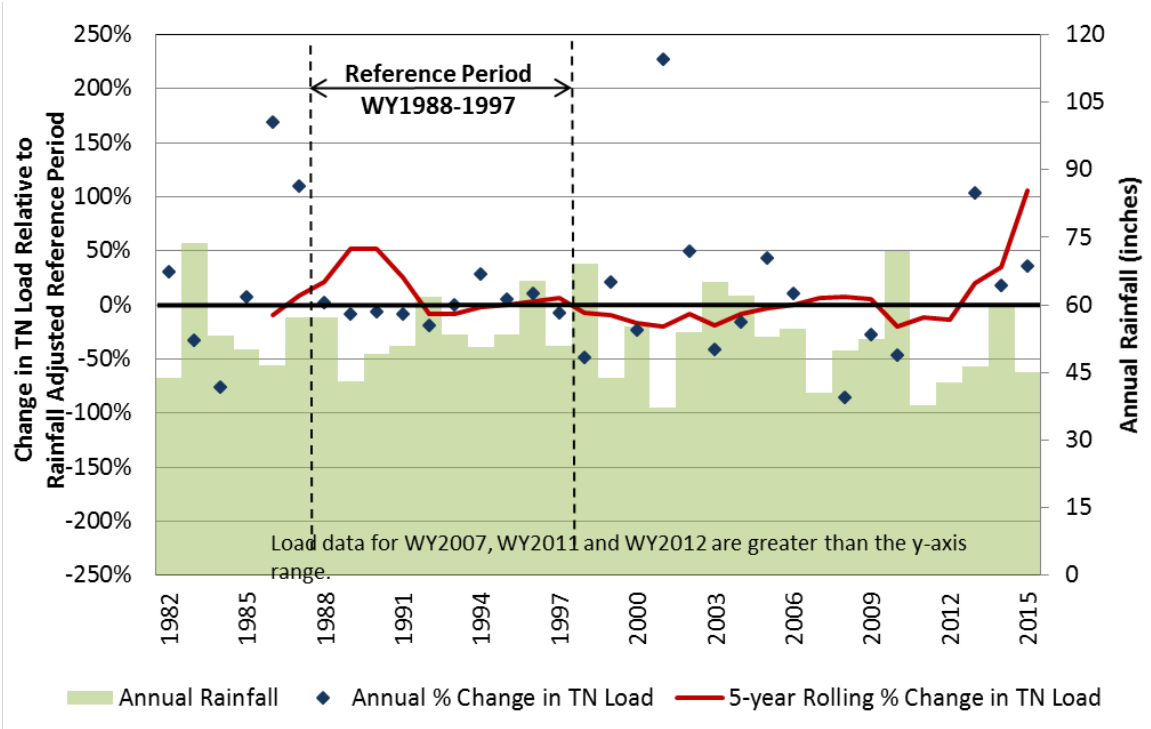


Figure 45. West Caloosahatchee Basin: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.



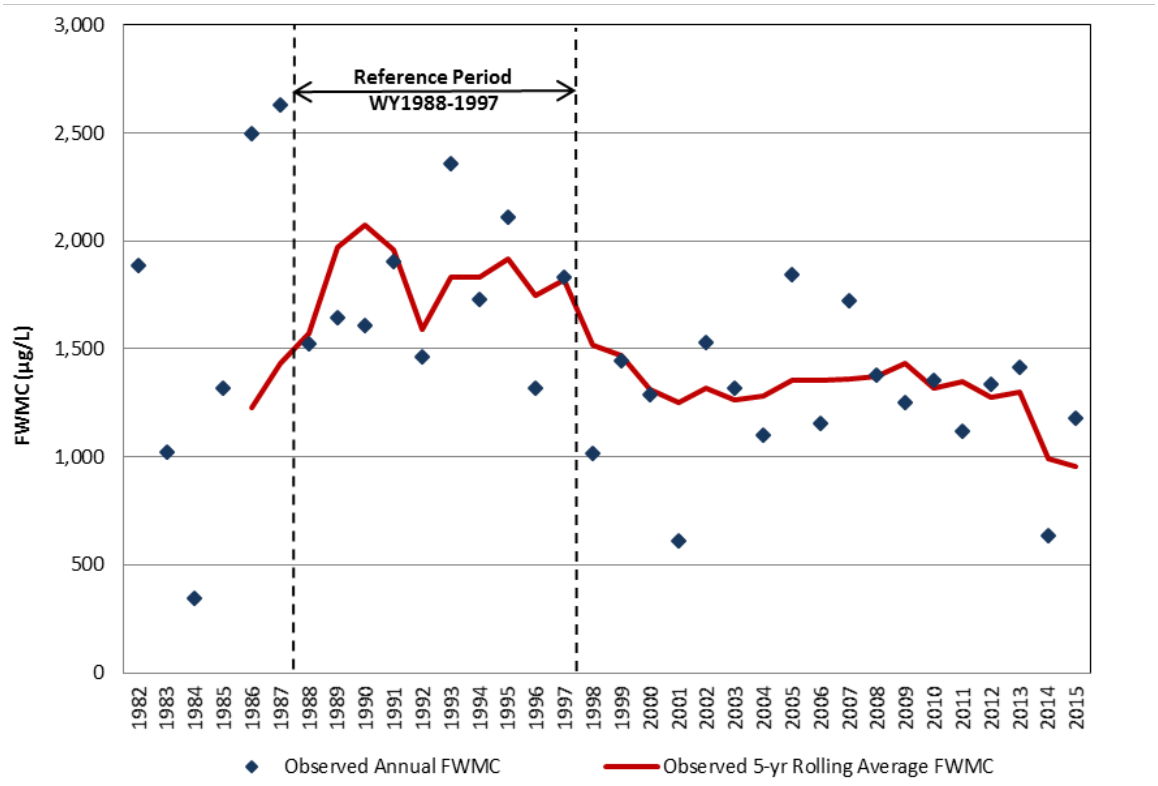


Figure 46. West Caloosahatchee Basin: Upper plot - annual percentage change in TN load from reference period and five-year rolling average, with annual rainfall. Lower plot - TN observed annual FWMC and five-year rolling average.

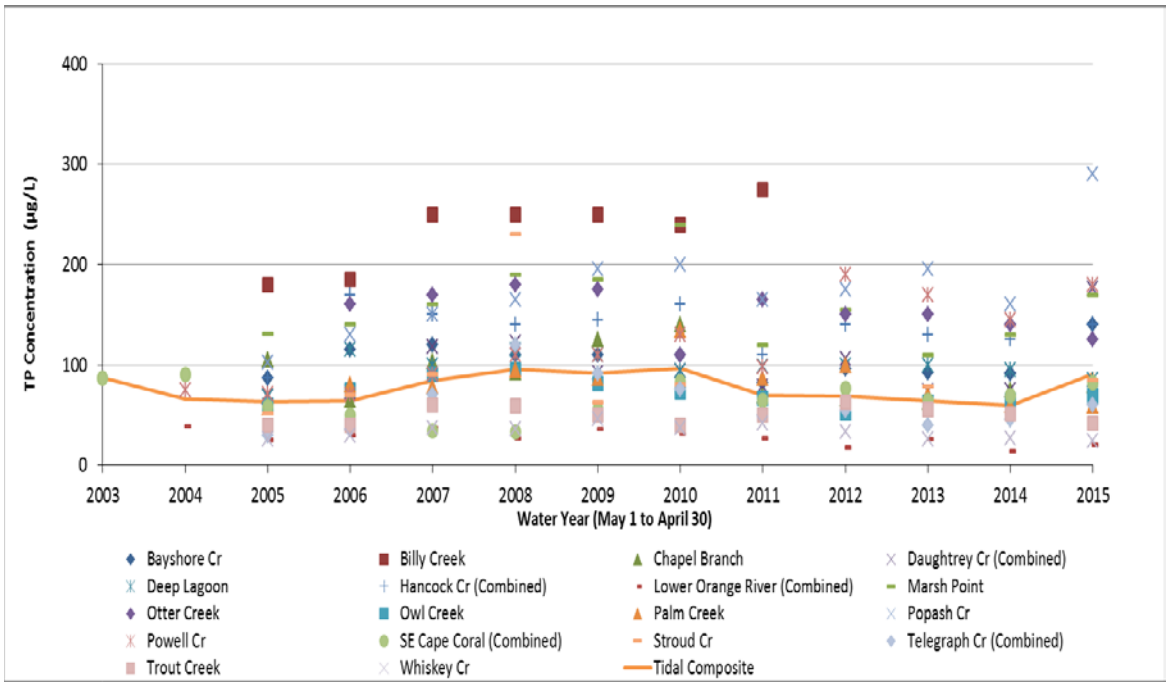


Figure 47. Tidal Caloosahatchee Subwatershed observed TP concentrations.

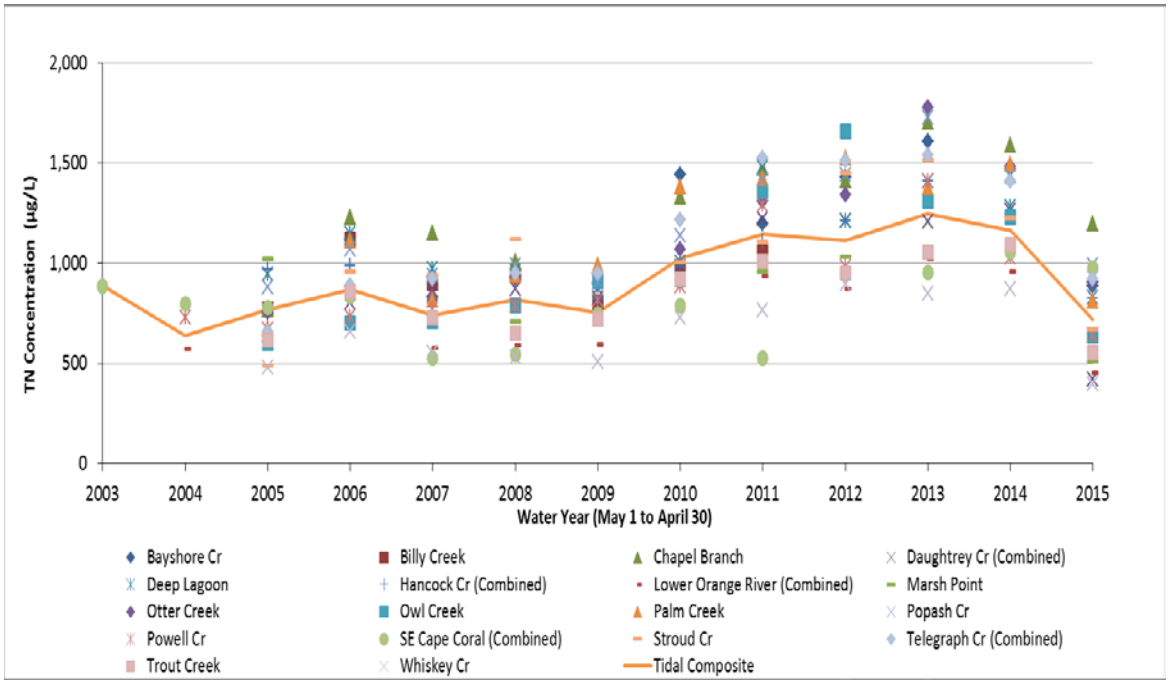


Figure 48. Tidal Caloosahatchee Subwatershed observed TN concentrations.

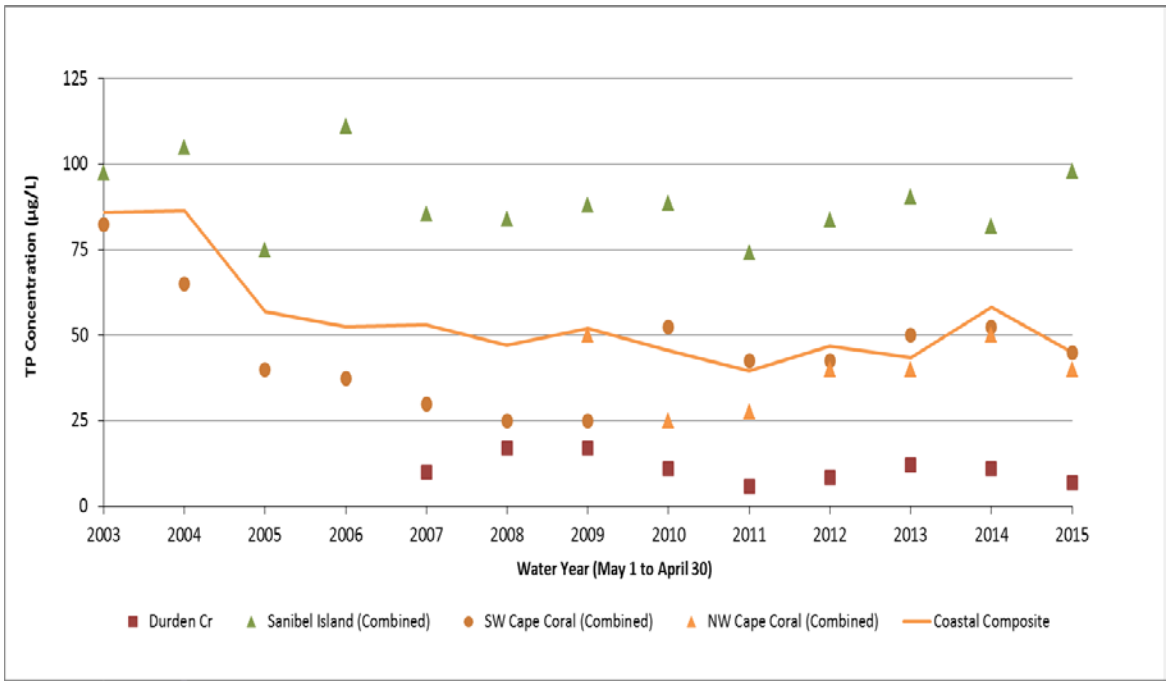


Figure 49. Coastal Caloosahatchee Subwatershed observed TP concentrations.

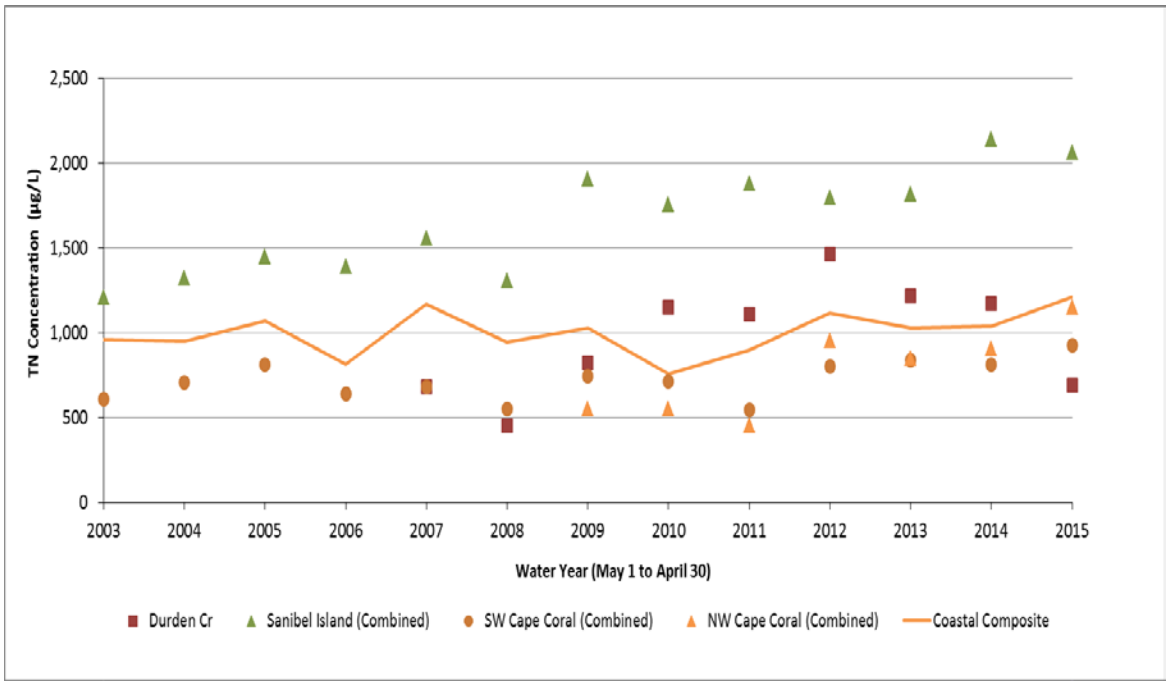
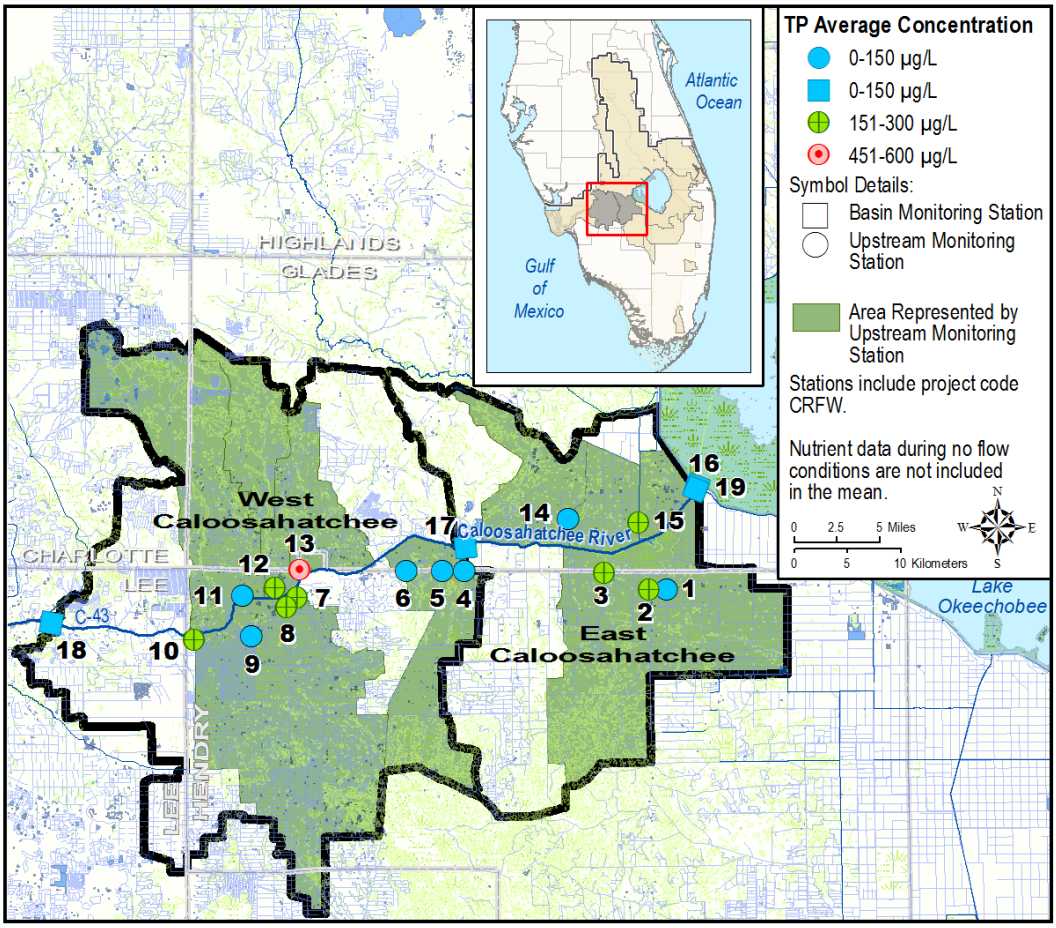


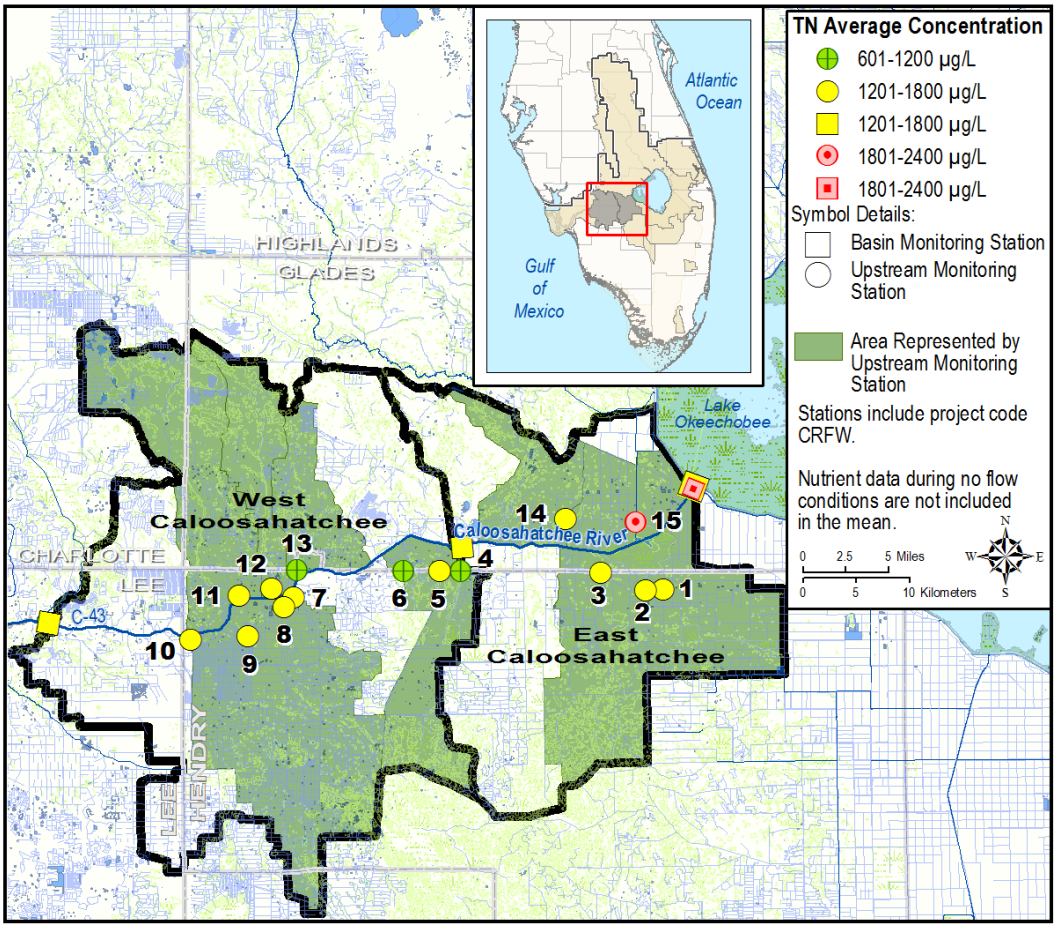
Figure 50. Coastal Caloosahatchee Subwatershed observed TN concentrations.



Caloosahatchee River Watershed		# of Samples	TP Concentration (µg/L)		
Map ID	Station		Average	Min	Max
1	CRFW01	5	59	40	78
2	CRFW02	9	151	96	281
3	CRFW03	8	161	126	198
4	CRFW06	13	83	41	208
5	CRFW07	13	150	45	332
6	CRFW08	8	88	34	156
7	CRFW11	13	154	64	323
8	CRFW12	13	236	112	533
9	CRFW13	13	126	87	206
10	CRFW15	8	223	137	383
11	CRFW23	9	125	73	173
12	CRFW24	12	182	51	279
13	CRFW25A	12	469	80	1390
14	CRFW30	10	121	66	162
15	S47D	7	191	68	360
16	S77[1]	33	90	37	341
17	S78	48	102	51	232
18	S79	47	111	50	186
19	S235[2]	23	131	53	361
NA	East CRW[3]	-	96	-	-
NA	West CRW[3]	-	178	-	-

[1]S77 is operated to flow to and from Lake Okeechobee. Concentrations reported in this summary table represent discharges from Lake Okeechobee, since this is the dominant direction of flow.
[2]S235 is operated to flow to and from the East CRWW basin. Concentrations reported in this summary table represent discharges to the East CRW basin, since this is the dominant direction of flow.
[3]Concentration reported is the basin's annual flow weighted mean concentration calculated based on the basin's monitoring station(s), flows and loads.

Figure 51. Caloosahatchee River Watershed average TP concentrations for WY2015



Caloosahatchee River Watershed		# of Samples	TN Concentration (µg/L)		
Map ID	Station		Average	Min	Max
1	CRFW01	5	1716	1240	2990
2	CRFW02	9	1459	1240	1870
3	CRFW03	8	1538	1460	1650
4	CRFW06	11	1193	956	1530
5	CRFW07	13	1559	1072	1890
6	CRFW08	8	1066	720	1470
7	CRFW11	13	1205	830	1760
8	CRFW12	13	1429	987	3235
9	CRFW13	13	1370	1022	1810
10	CRFW15	8	1353	1220	1450
11	CRFW23	9	1338	960	2800
12	CRFW24	12	1285	620	2100
13	CRFW25A	12	1188	391	1990
14	CRFW30	10	1647	1023	2140
15	S47D	7	1897	1148	2610
16	S77[1]	32	1317	1044	2141
17	S78	45	1324	980	1940
18	S79	50	1231	910	1580
19	S235[2]	22	1875	1140	2920
NA	East CRW[3]	-	1065	-	-
NA	West CRW[3]	-	1075	-	-

[1]S77 is operated to flow to and from Lake Okeechobee. Concentrations reported in this summary table represent discharges from Lake Okeechobee, since this is the dominant direction of flow.
[2]S235 is operated to flow to and from the East CRWW basin. Concentrations reported in this summary table represent discharges to the East CRW basin, since this is the dominant direction of flow.
[3]Concentration reported is the basin's annual flow weighted mean concentration calculated based on the basin's monitoring station(s), flows and loads.

Figure 52. Caloosahatchee River Watershed average TN concentrations for WY2015

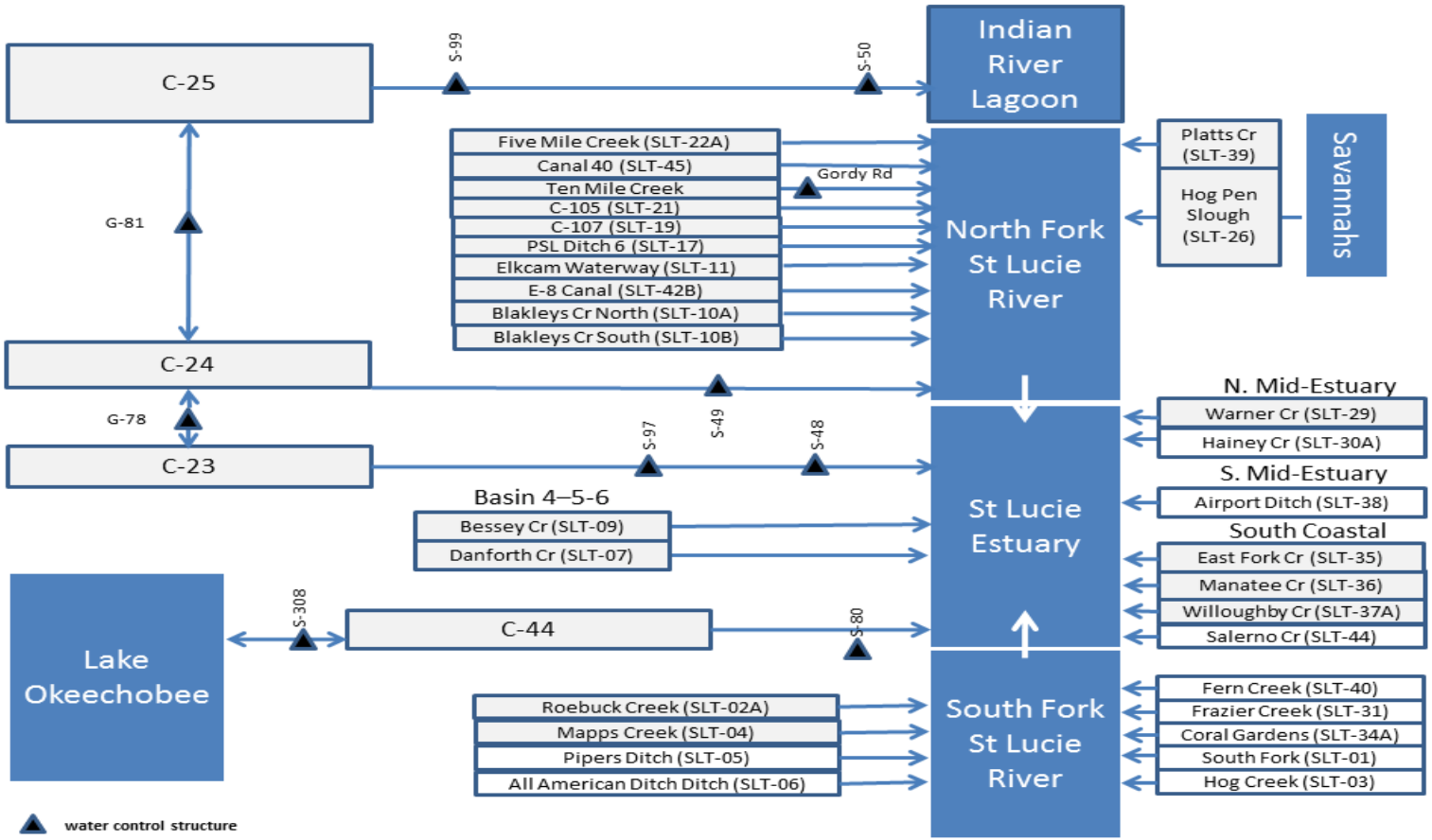


Figure 53. St. Lucie River Watershed flow schematic (HDR 2011b).

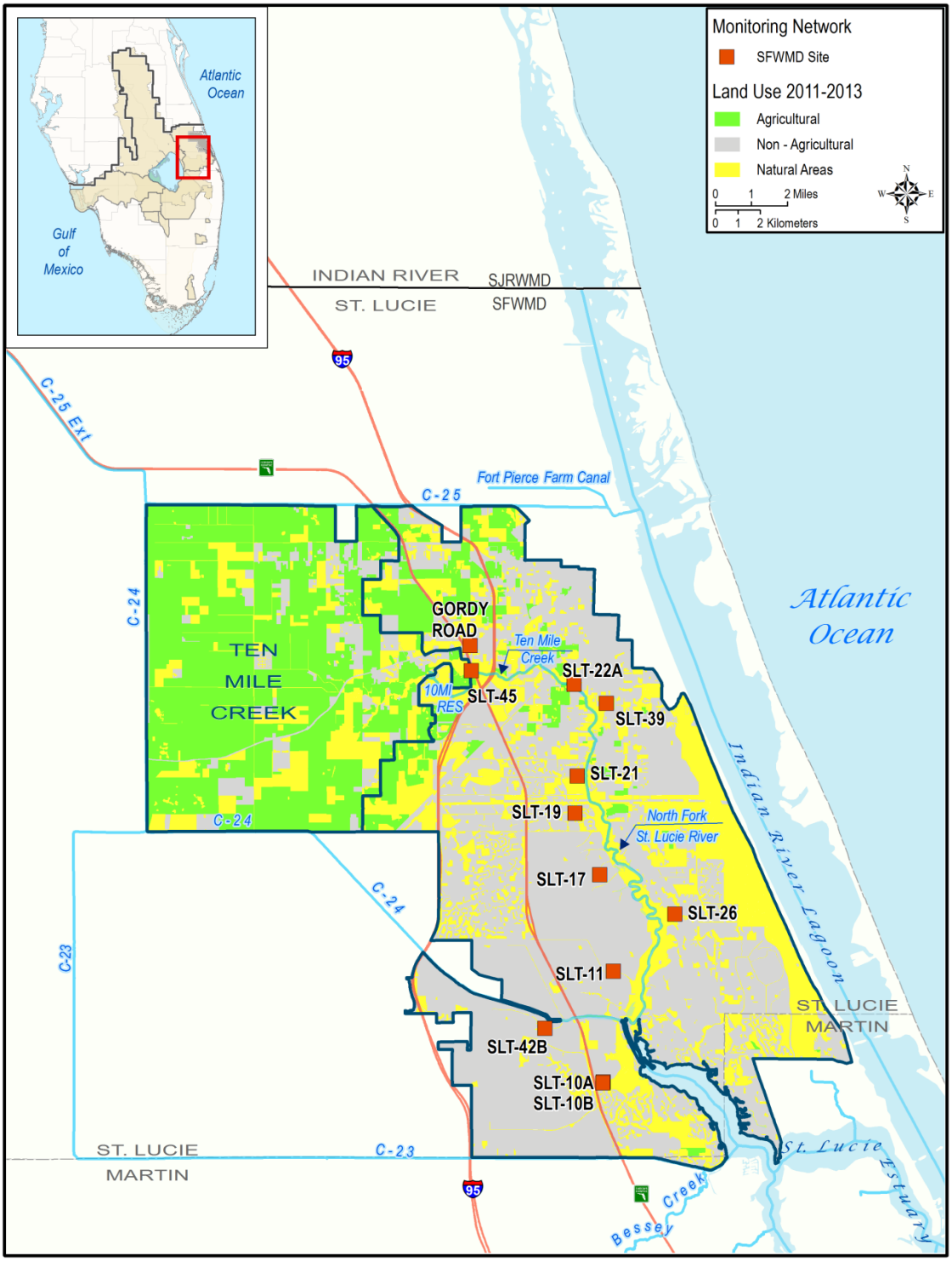


Figure 54. St. Lucie River Watershed, North Fork Subwatershed land use from the most recent available data set (2011–2013).

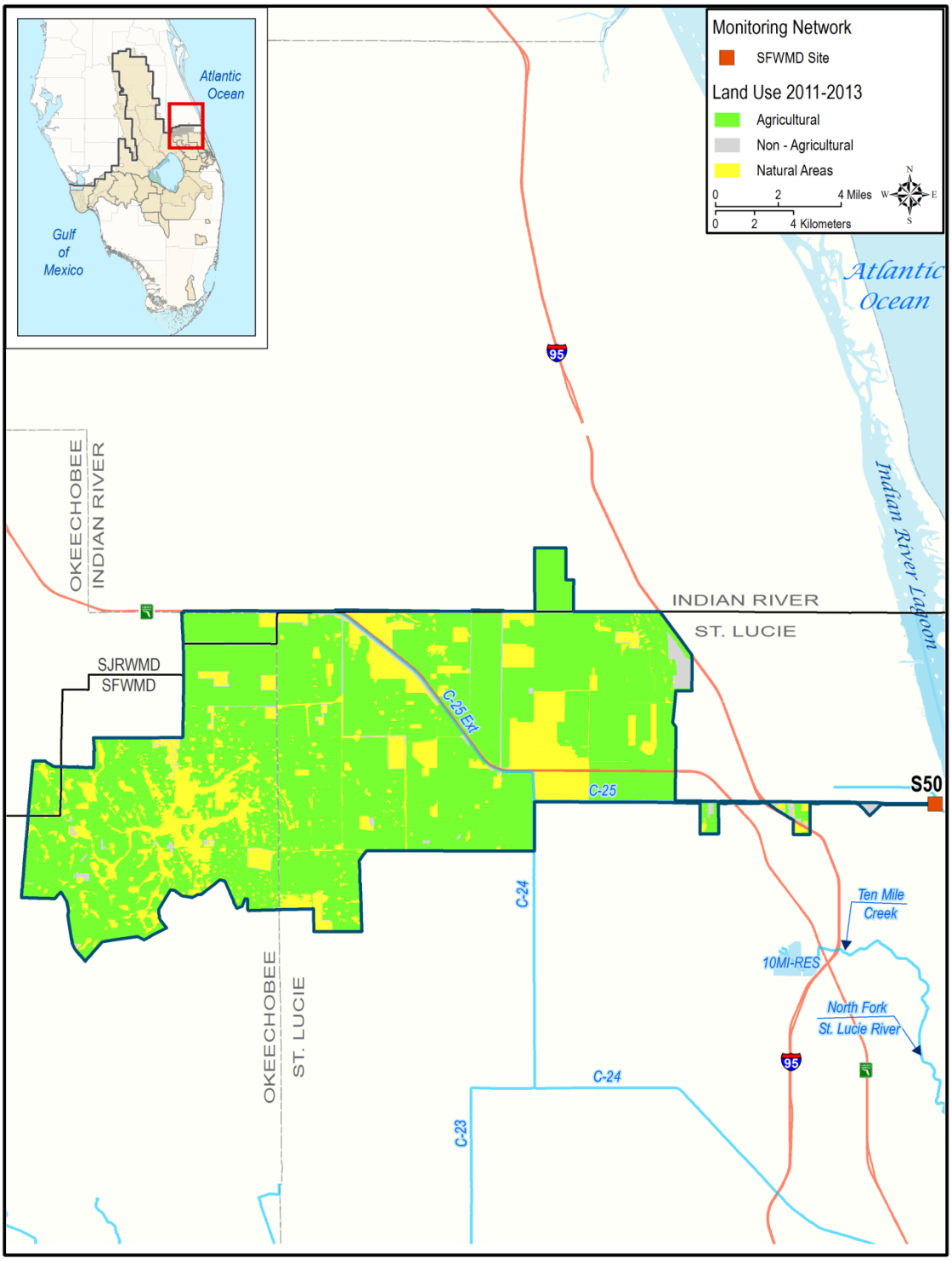


Figure 55. St. Lucie River Watershed, C-25 Subwatershed land use from the most recent available data set (2011–2013).

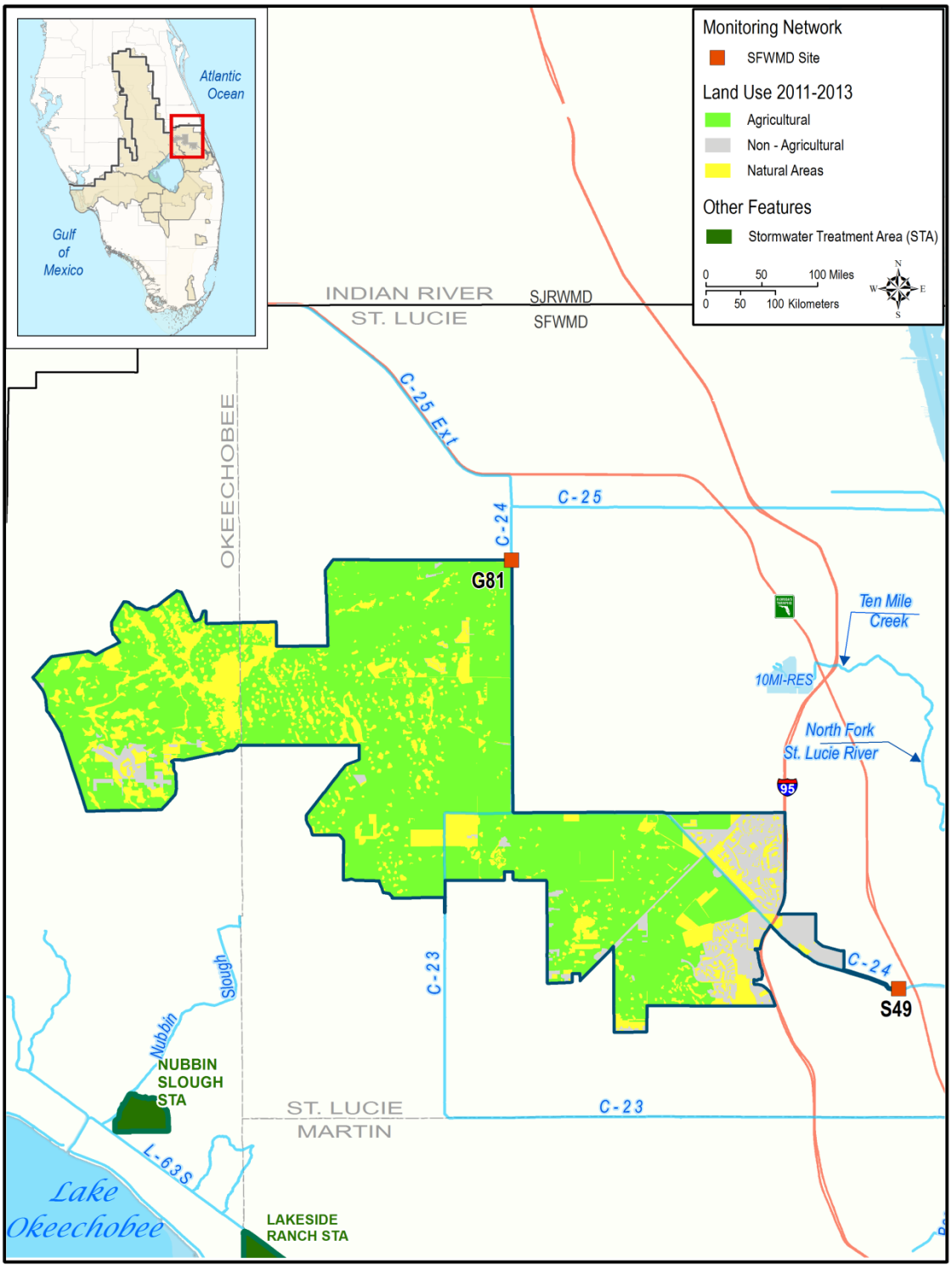


Figure 56. St. Lucie River Watershed, C-24 Sub-watershed land use from the most recent available data set (2011–2013).

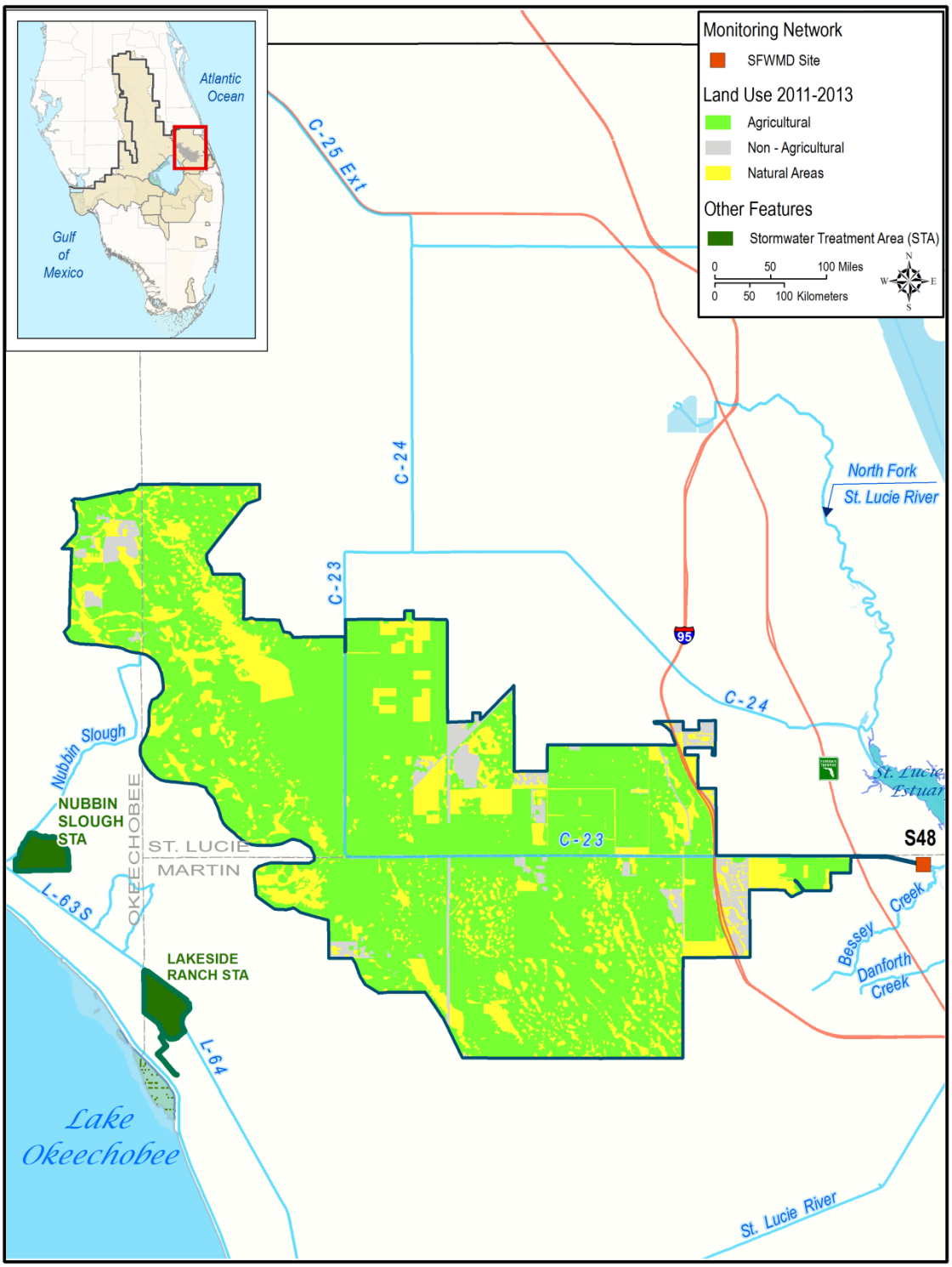


Figure 57. St. Lucie River Watershed, C-23 Subwatershed land use from the most recent available data set (2011–2013).

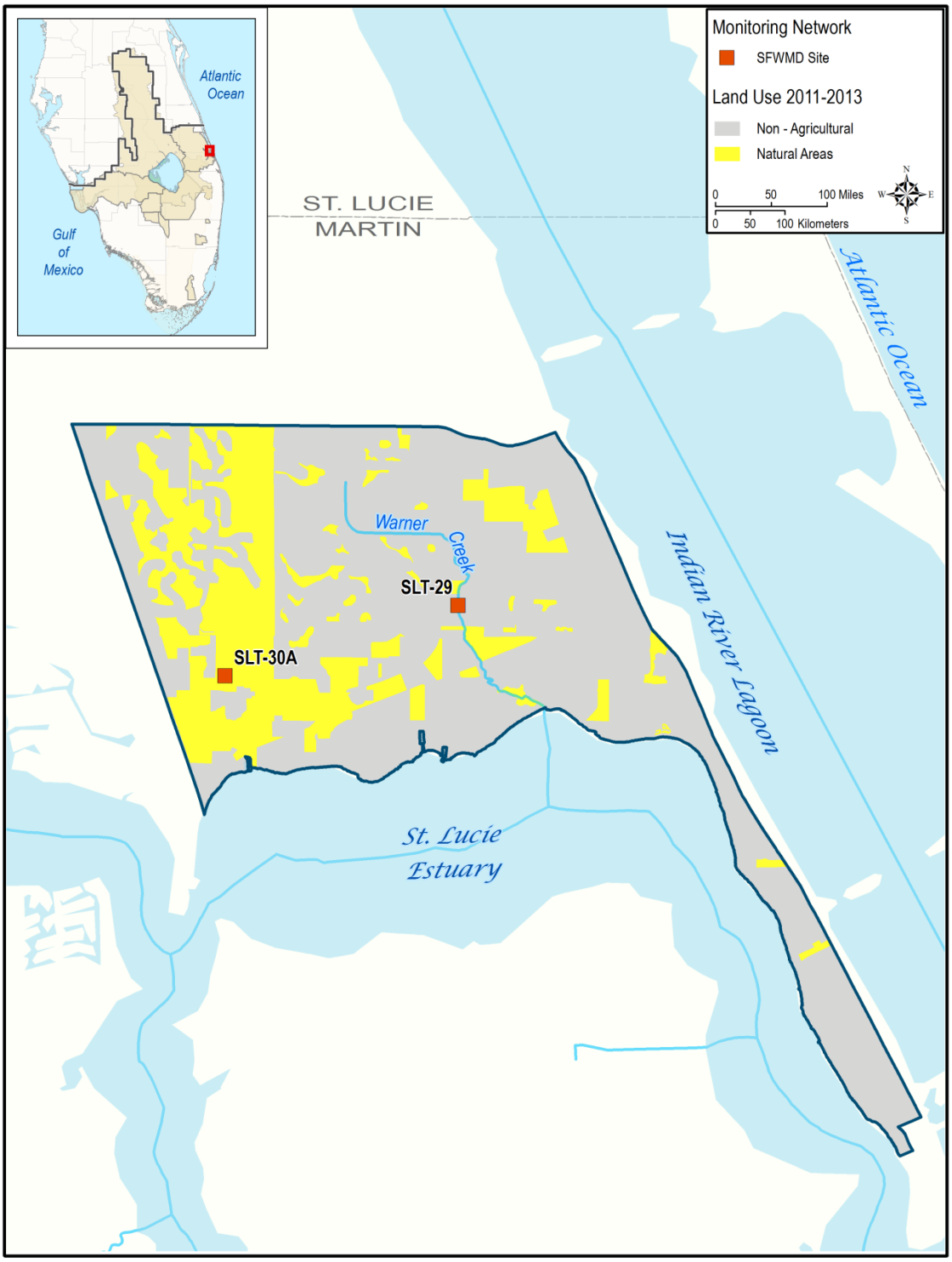


Figure 58. St. Lucie River Watershed, North Mid-Estuary Subwatershed land use from the most recent available data set (2011–2013).

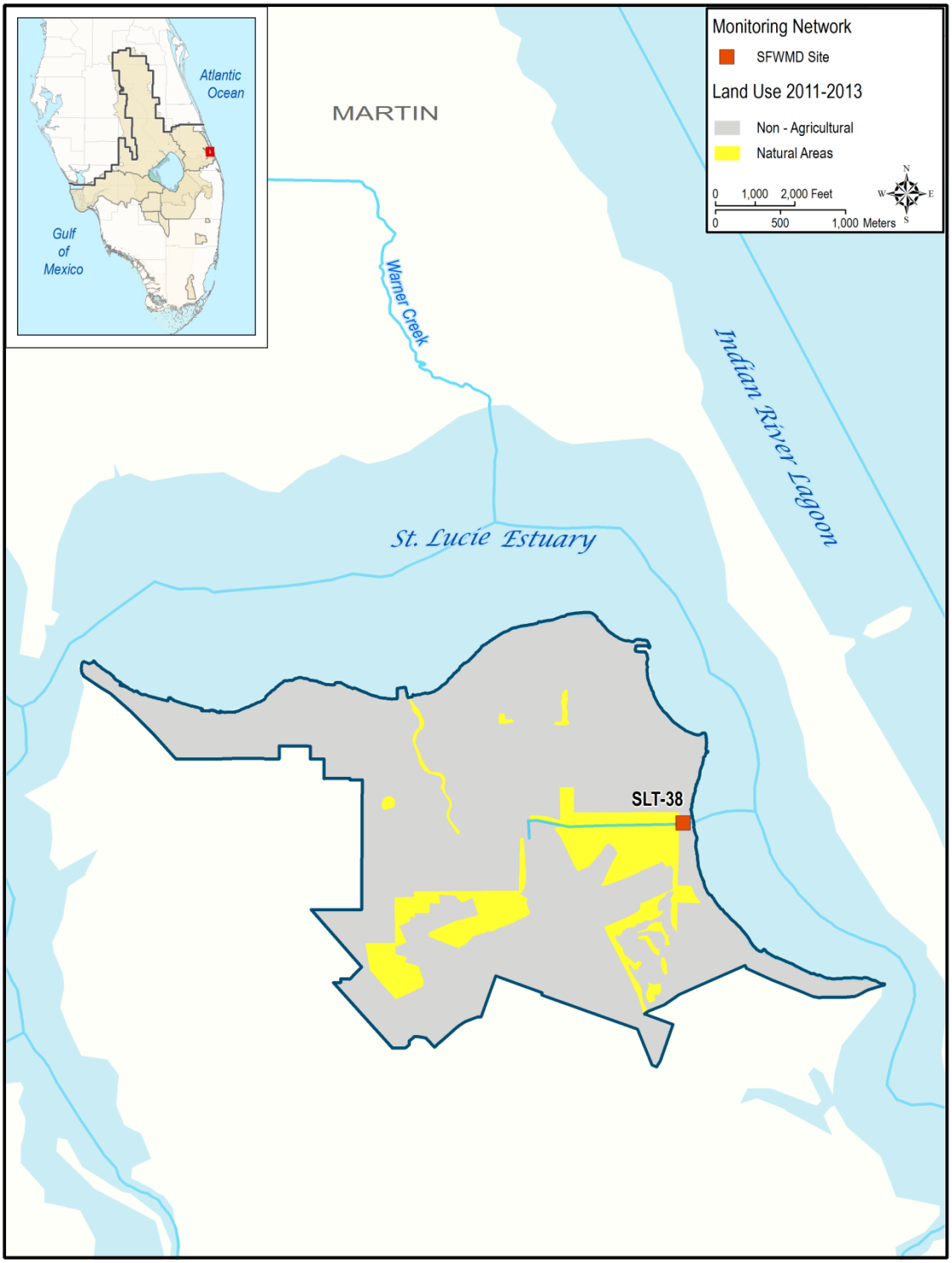


Figure 59. St. Lucie River Watershed, South Mid-Estuary Subwatershed land use from the most recent available data set (2011–2013).

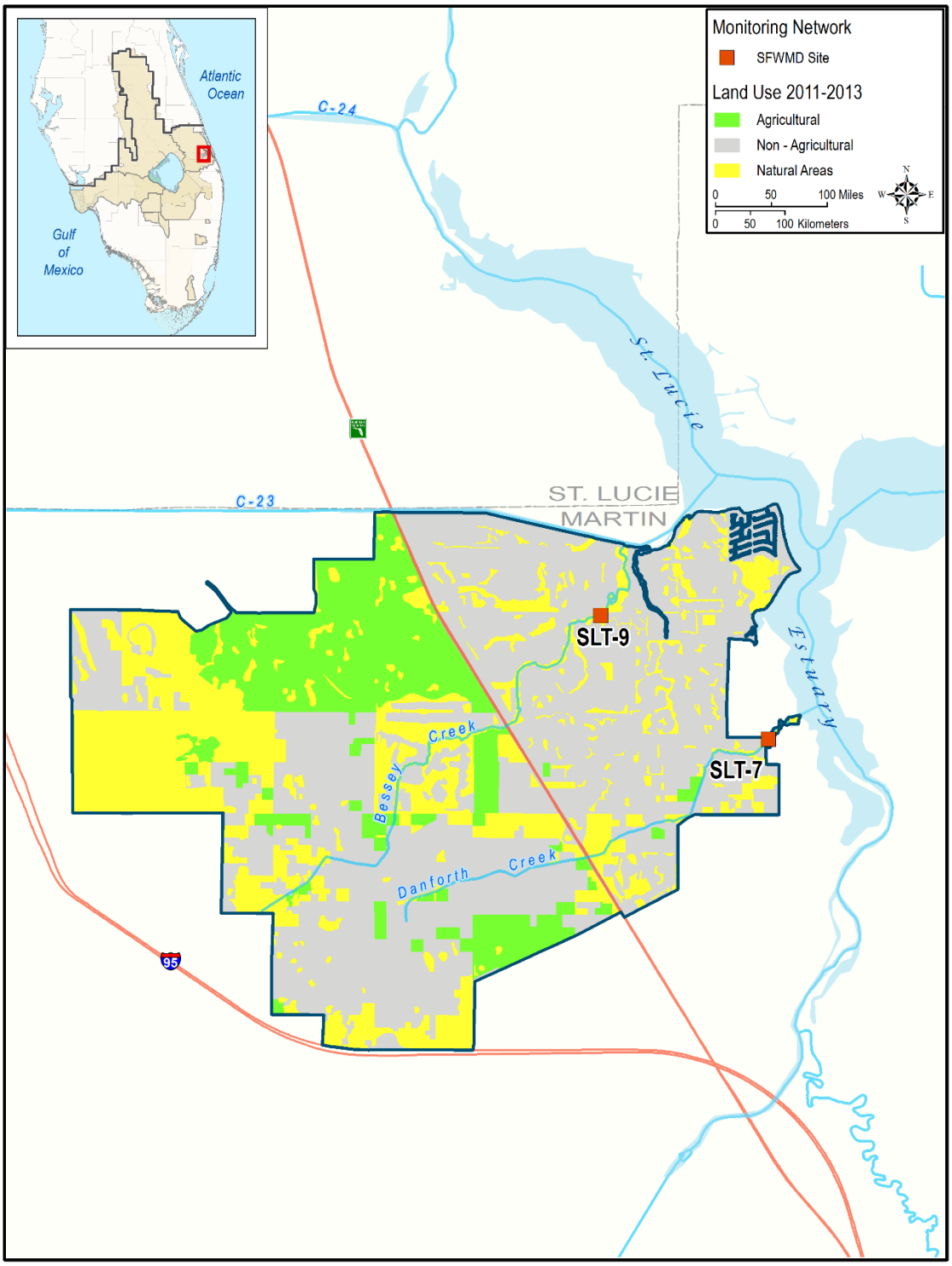


Figure 60. St. Lucie River Watershed, Basin 4-5-6 Subwatershed land use from the most recent available data set (2011–2013).

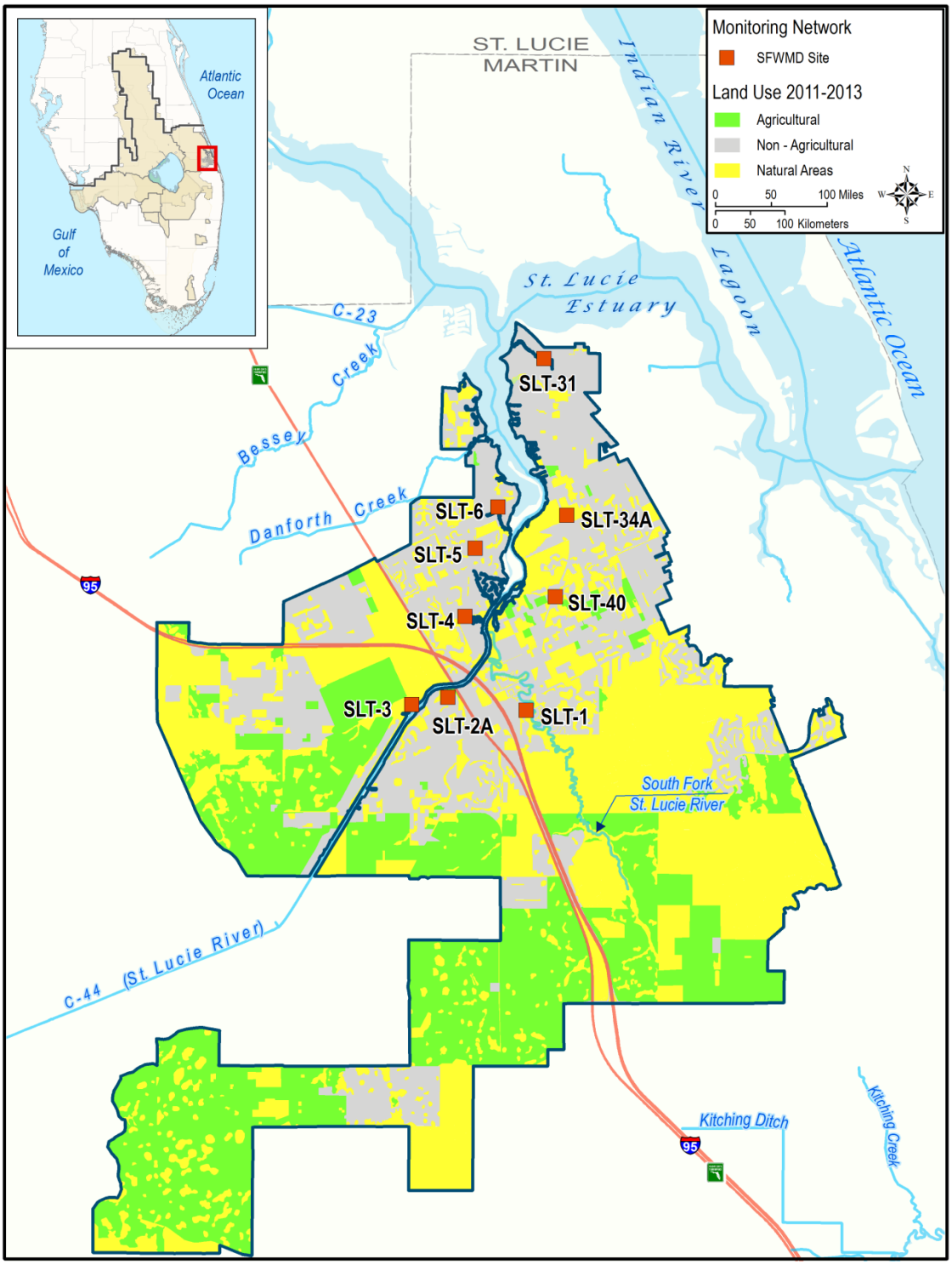


Figure 61. St. Lucie River Watershed, South Fork Subwatershed land use from the most recent available data set (2011–2013).

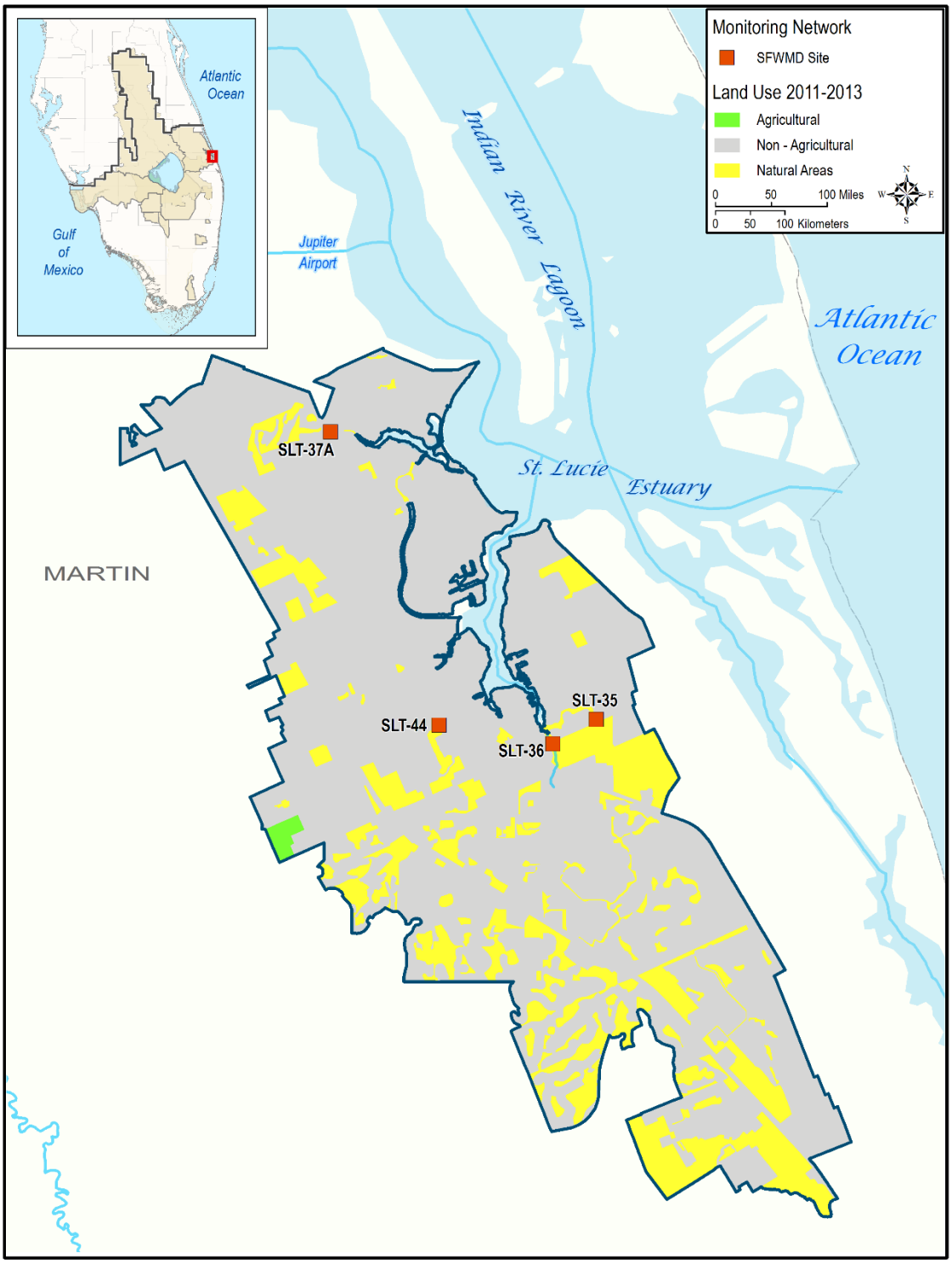


Figure 62. St. Lucie River Watershed, South Coastal Subwatershed, land use from the most recent available data set (2011–2013).

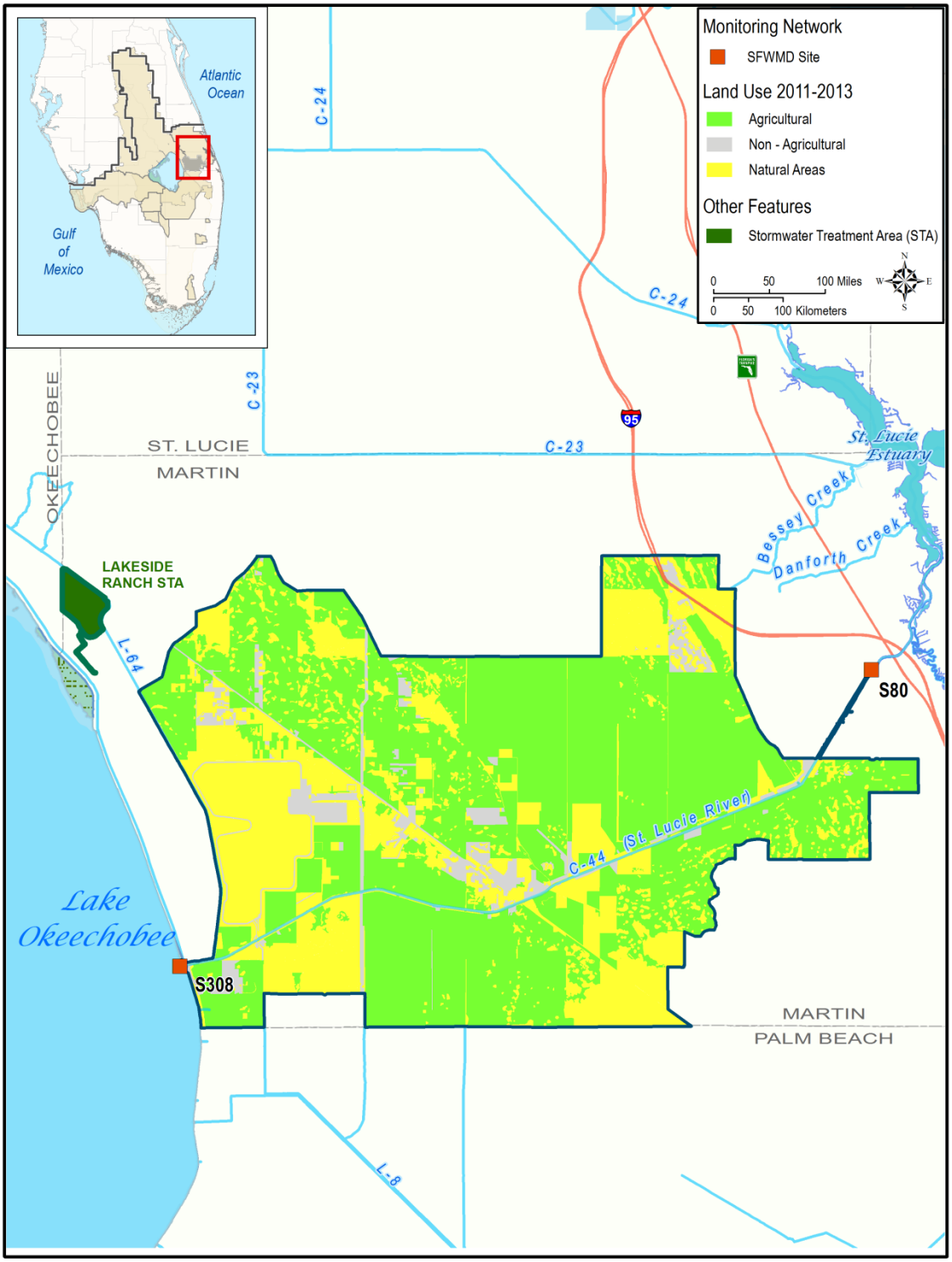


Figure 63. St. Lucie River Watershed, C-44 Subwatershed land use from the most recent available data set (2011–2013).

Table 2A. WY2015 flow, rainfall, and TP and TN concentrations for the St. Lucie basins.
[This table was updated on March 9, 2016.]

Basin	Annual Flow (acre-feet)	Annual Rainfall (inches)	WY2015 TP Concentration (µg/L)[a]	WY2015 TN Concentration (µg/L)[a]
C-23	104,991	49.38	442	1,533
C-24	104,878	52.93	323	1,451
C-25	120,528	58.17	213	1,407
C-44[b]	124,861	50.16	264	1,138
Ten Mile Creek (Gordy Road)[c]	89,455	56.11	192	871
Composite Area[d]	N/A[d]	62.87	101	795

a. Concentrations are flow-weighted means for C-24, C-25, C-23, C-44, and Ten Mile Creek. Concentrations for the composite area are calculated by flow-weighting the individual tributary concentrations, using the unit area runoff coefficients and areas of the tributary basins where data is available during the reference period and only using samples collected when flow is observed and are not tidally influenced.

b. The C-44 Basin calculation is based on the runoff generated within the basin and excludes Lake Okeechobee pass-through flows in the FWMC presented.

c. In previous South Florida Environmental Reports, nutrient loading from Ten Mile Creek (Gordy Road) was not reported. For WY2013, the flow data and basin boundary for Gordy Road was improved and, therefore, nutrient loading from this basin is now estimated.

d. The Composite Area is made up of tributaries representing the North Fork (excluding Ten Mile Creek), the South Fork, South Coastal, Basin 4-5-6, North Mid-Estuary, and South Mid-Estuary. Flow data is not collected for the Composite Area. N/A – not applicable.

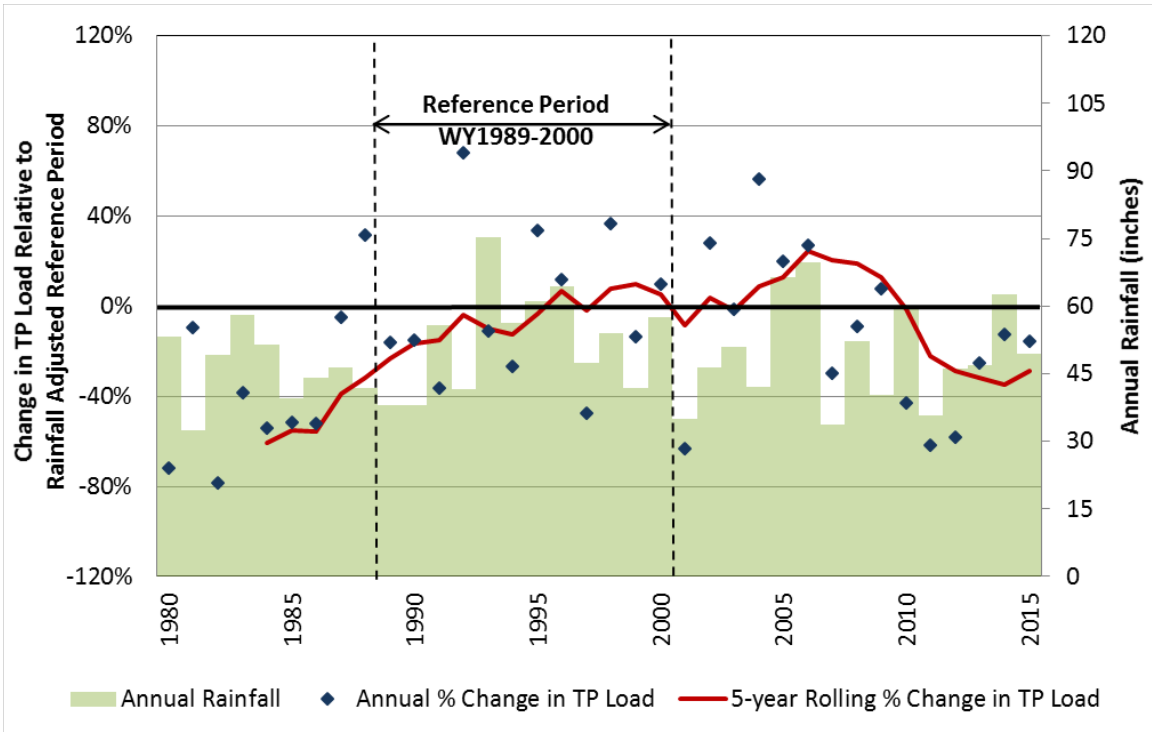
Table 2B. WY2015 rainfall and TP and TN concentrations for the St. Lucie basins and tributaries.

Basin/Tributary	Annual Rainfall (inches)[a]	WY2015 TP Concentration (µg/L)[b]	WY2015 TN Concentration (µg/L)[b]
North Fork	63.76	80	746
Canal 40 (SLT-45)[c]		54	627
Five Mile Creek (SLT-22A)		146	717
Platts Creek (SLT-39)		187	836
Hog Pen Slough (SLT-26)		49	764
C-105 (SLT-21)		37	731
C-107 (SLT-19)		39	722
PSL Ditch 6 (SLT-17)		61	680
Elkham Waterway (SLT-11)		61	693
E-8 Canal (SLT-42B)[c]		100	707
Blakleys Creek North (SLT-10A)[c]		82	914
Blakleys Creek South (SLT-10B)[c]		69	815
South Fork	59.82	125	975
Frazier Creek (SLT-31)		75	762
Coral Gardens Ditch (SLT-34A)		120	1,041
Fern Creek (SLT-40)		105	1,090
South Fork (SLT-1)[c]		94	848
Roebuck Creek (SLT-2A)[c]		51	764
Hog Creek (SLT-3)[c]		262	1,057
Mapps Creek (SLT-4)[c]		111	827
Pipers Ditch (SLT-5)[c]		120	1,206
All American Ditch (SLT-6)[c]		191	1,178
Basin 4-5-6	52.90	169	1,010
Danforth Creek (SLT-07)		158	949
Bessey Creek (SLT-09)		180	1,070
North Mid-Estuary	51.37	23	722
Warner Creek (SLT-29)		17	756
Hainey Creek (SLT-30A)[c]		28	688
South Mid-Estuary	58.06	57	688
Airport Ditch (SLT-38)		57	688
South Coastal	59.96	74	898
East Fork Creek (SLT-35)[c]		80	881
Manatee Creek (SLT-36)		158	1,170
Willoughby Creek (SLT-37A)		19	743
Salerno Creek (SLT-44)		38	798

a. Rainfall is only calculated at the basin level and is not reported for the individual tributaries.

b. Concentrations are monthly medians and are calculated based on samples collected when flow is observed and are not tidally influenced.

c. Data collection either began or was brought back online in WY2014 for these stations.



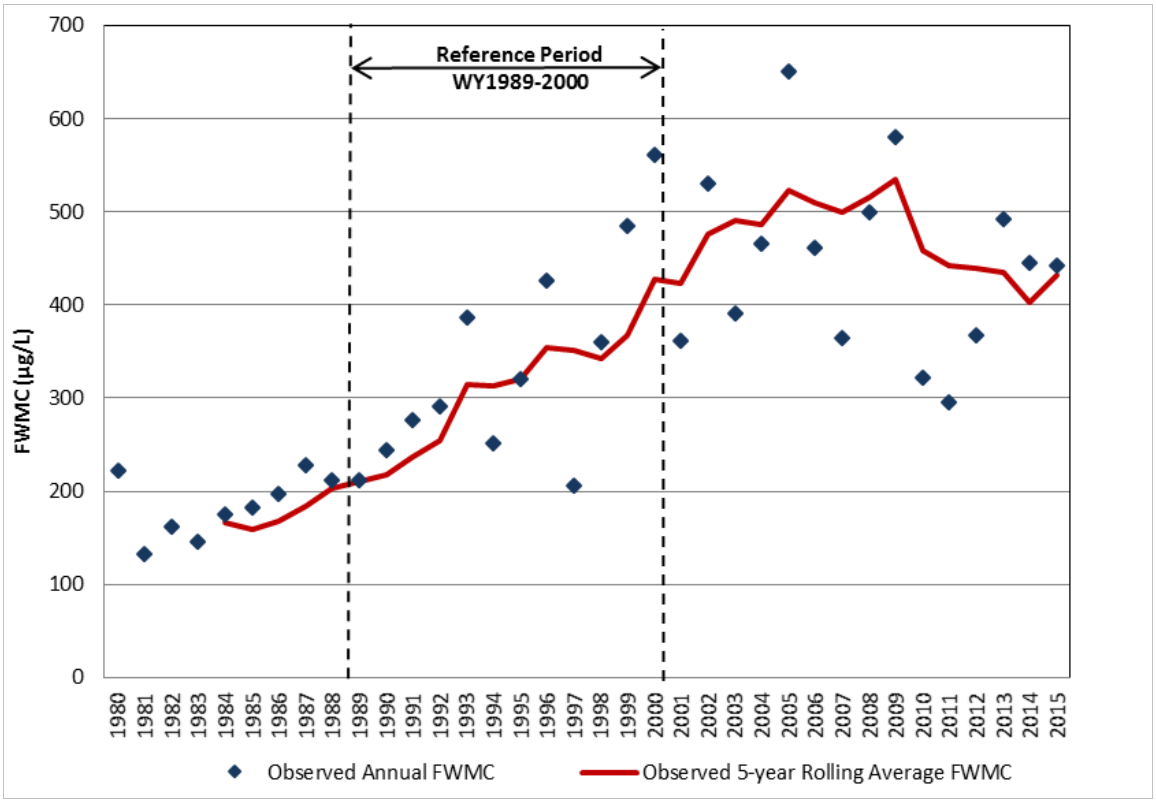
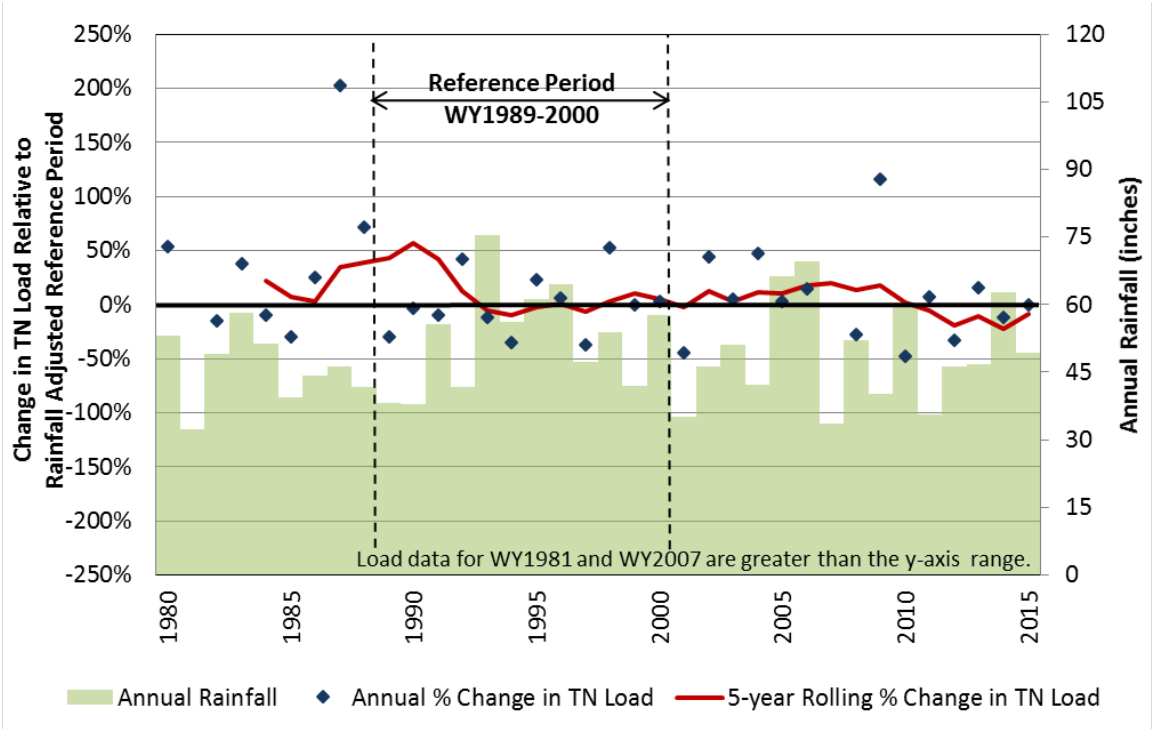


Figure 64. C-23 Basin: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.



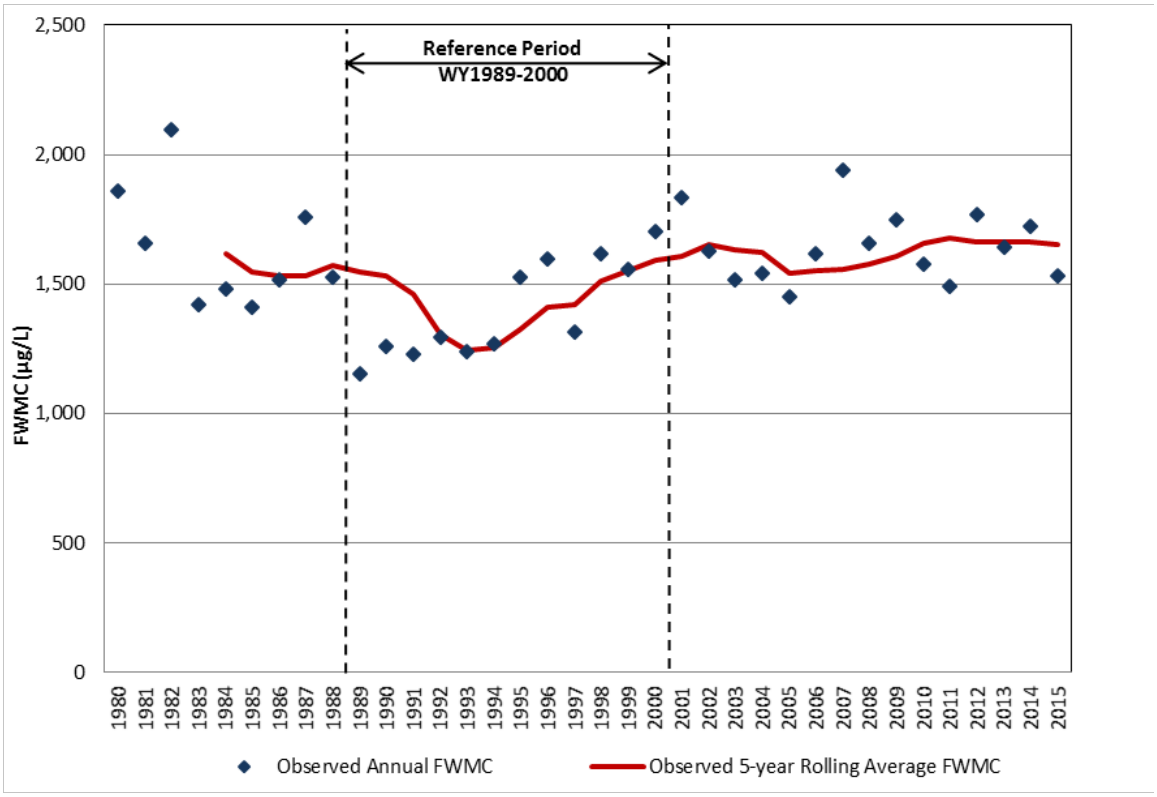
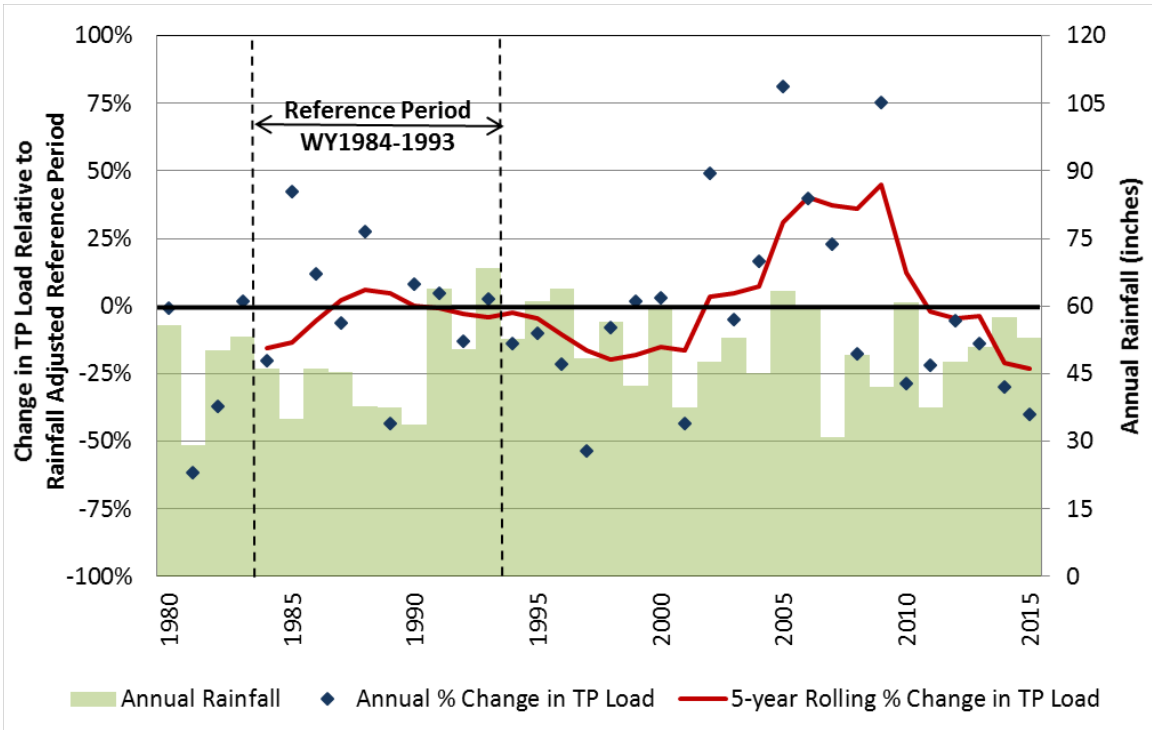


Figure 65. C-23 Basin: Upper plot - annual percentage change in TN load from reference period and five-year rolling average, with annual rainfall. Lower plot - TN observed annual FWMC and five-year rolling average.



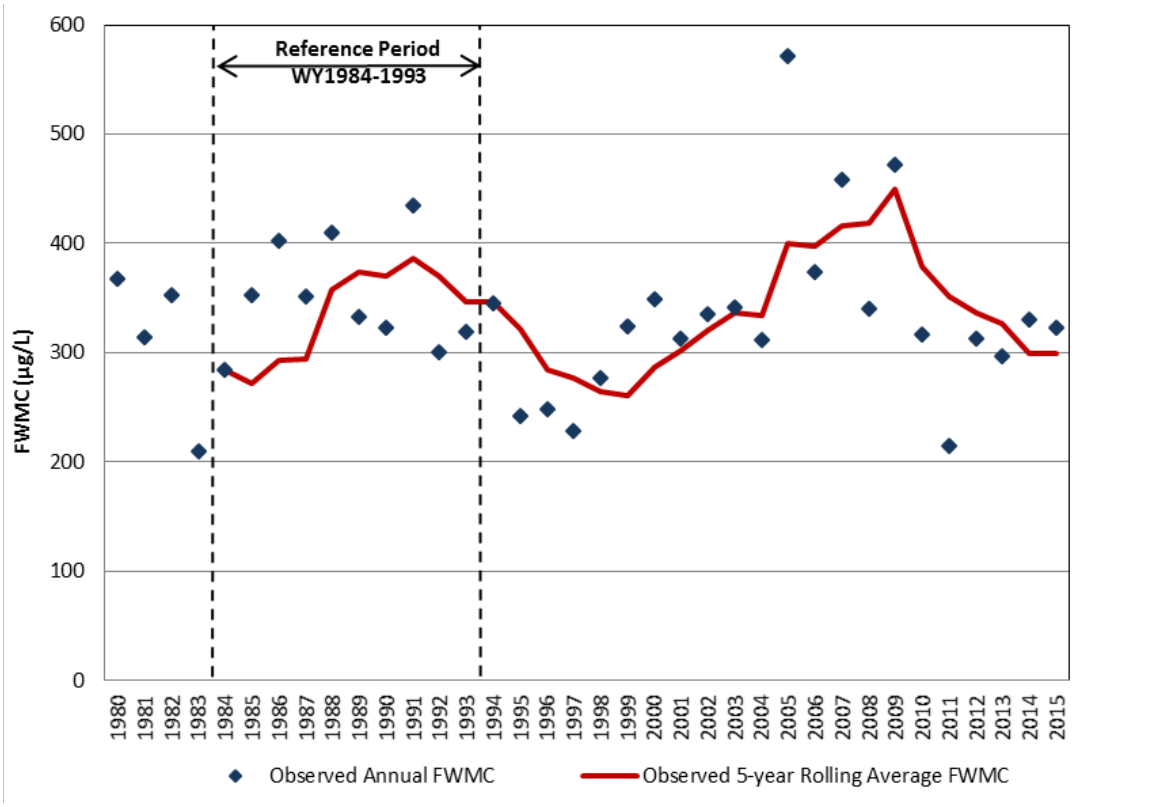
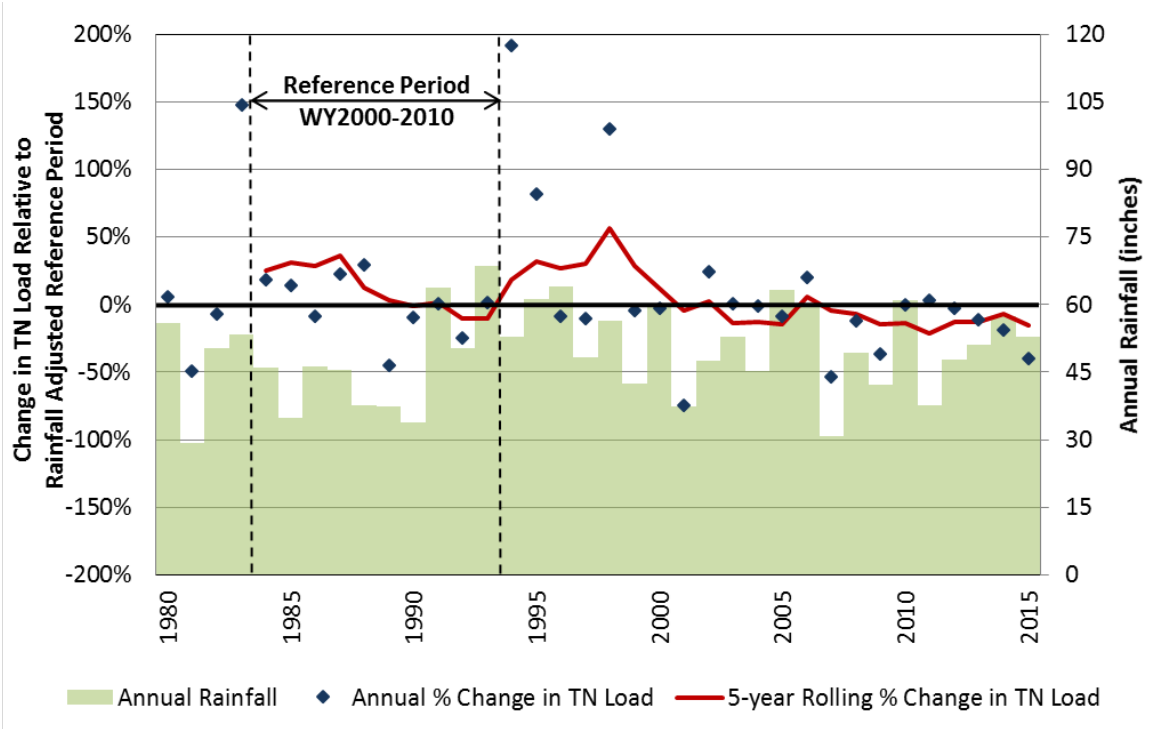


Figure 66. C-24 Basin: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.



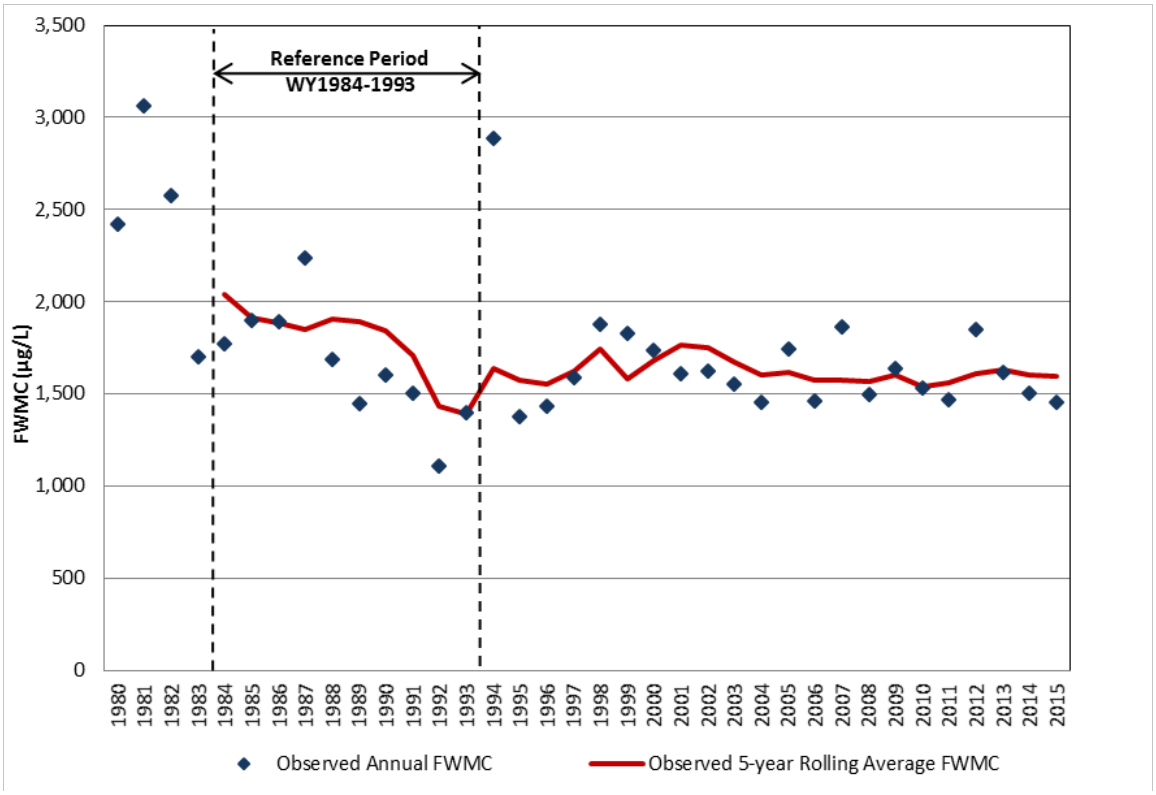
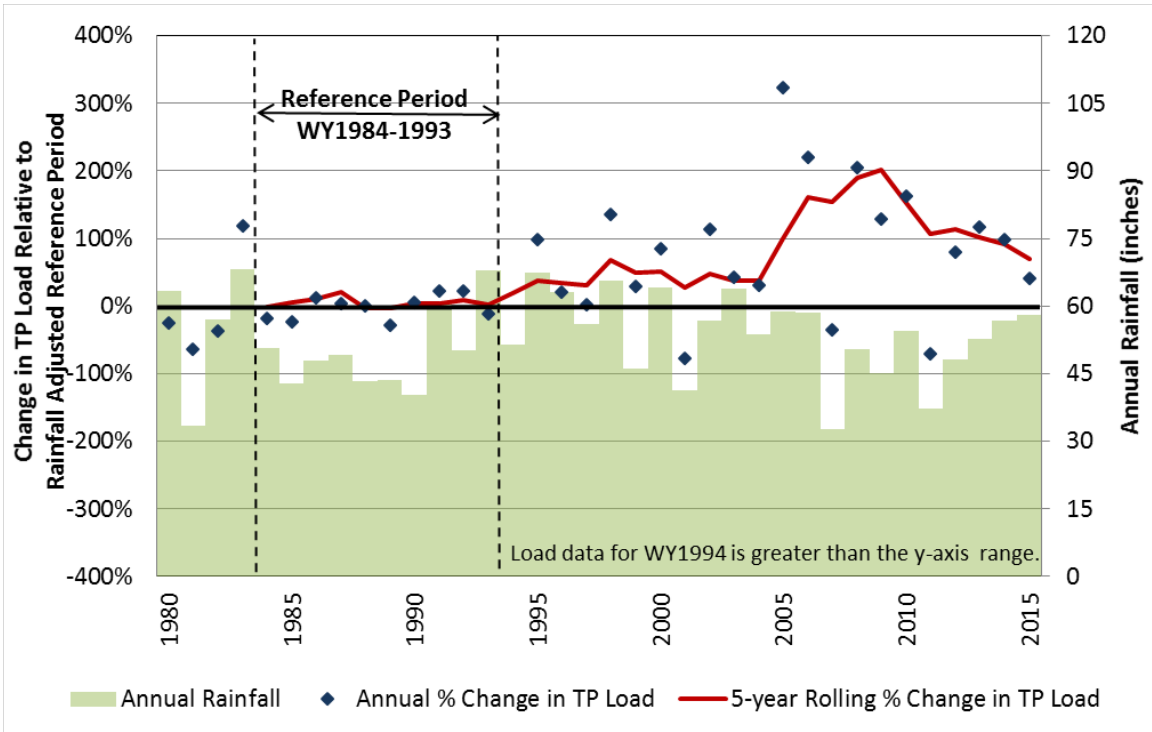


Figure 67. C-24 Basin: Upper plot - annual percentage change in TN load from reference period and five-year rolling average, with annual rainfall. Lower plot - TN observed annual FWMC and five-year rolling average.



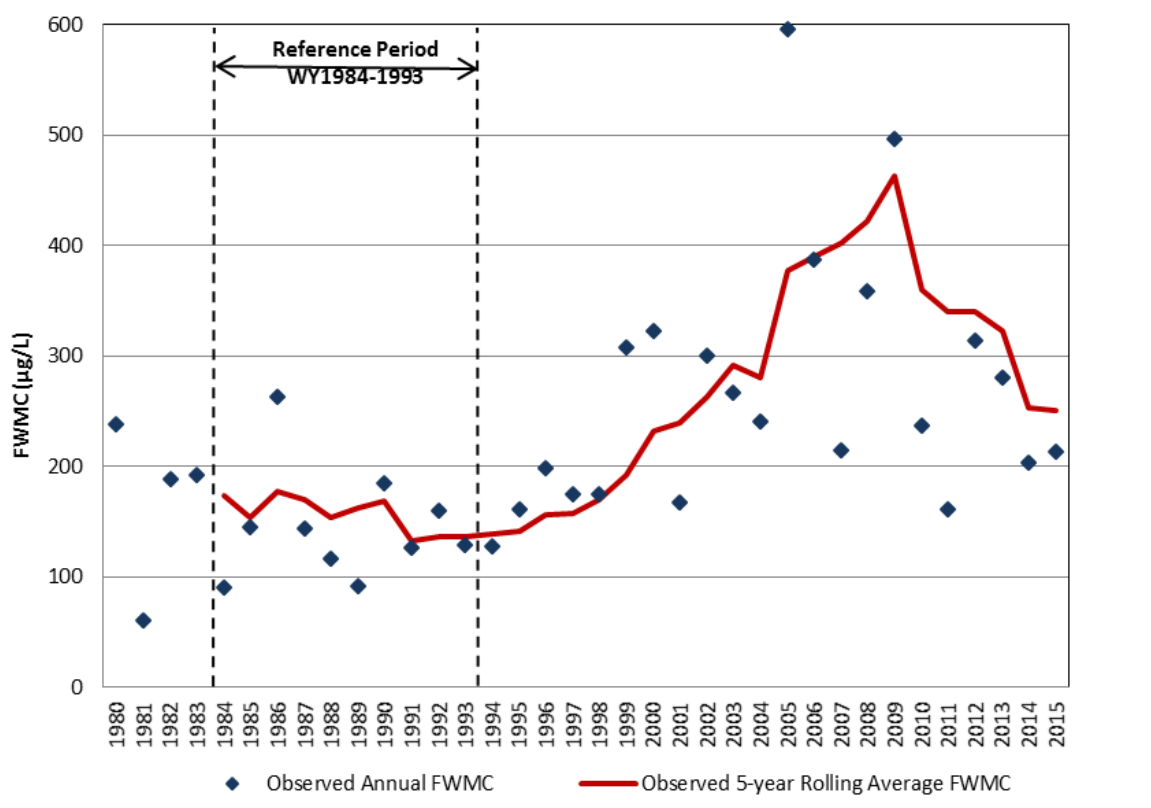
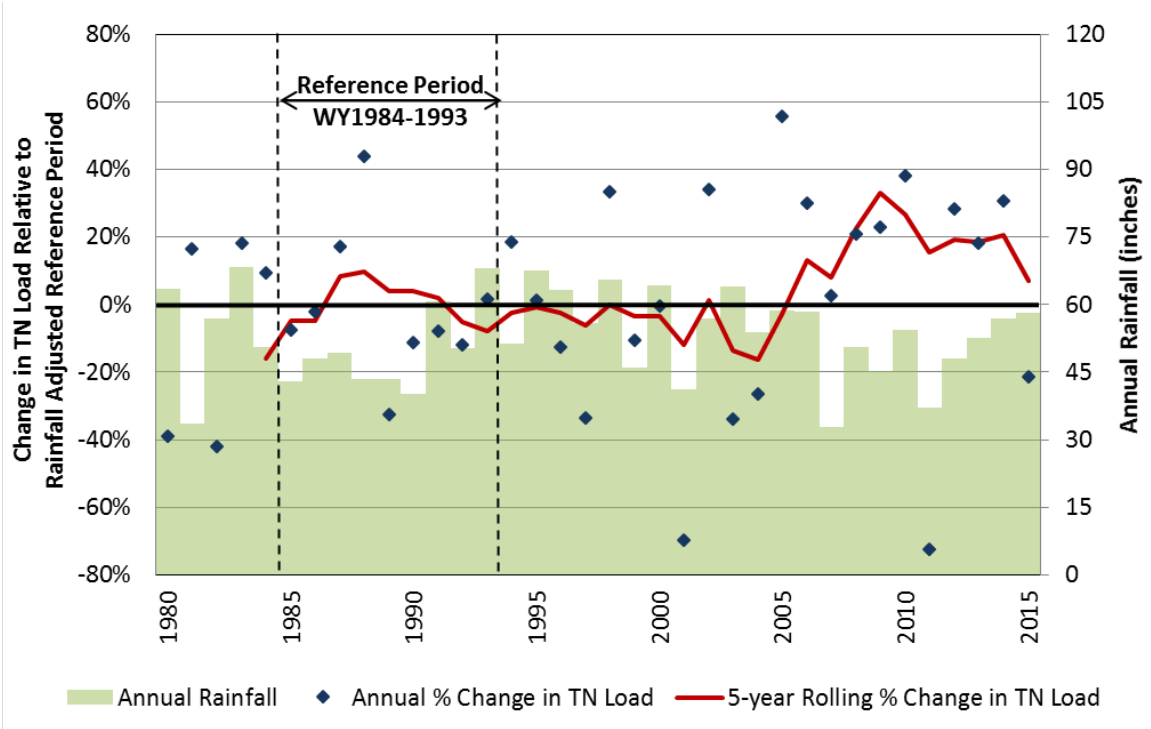


Figure 68. C-25 Basin: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.



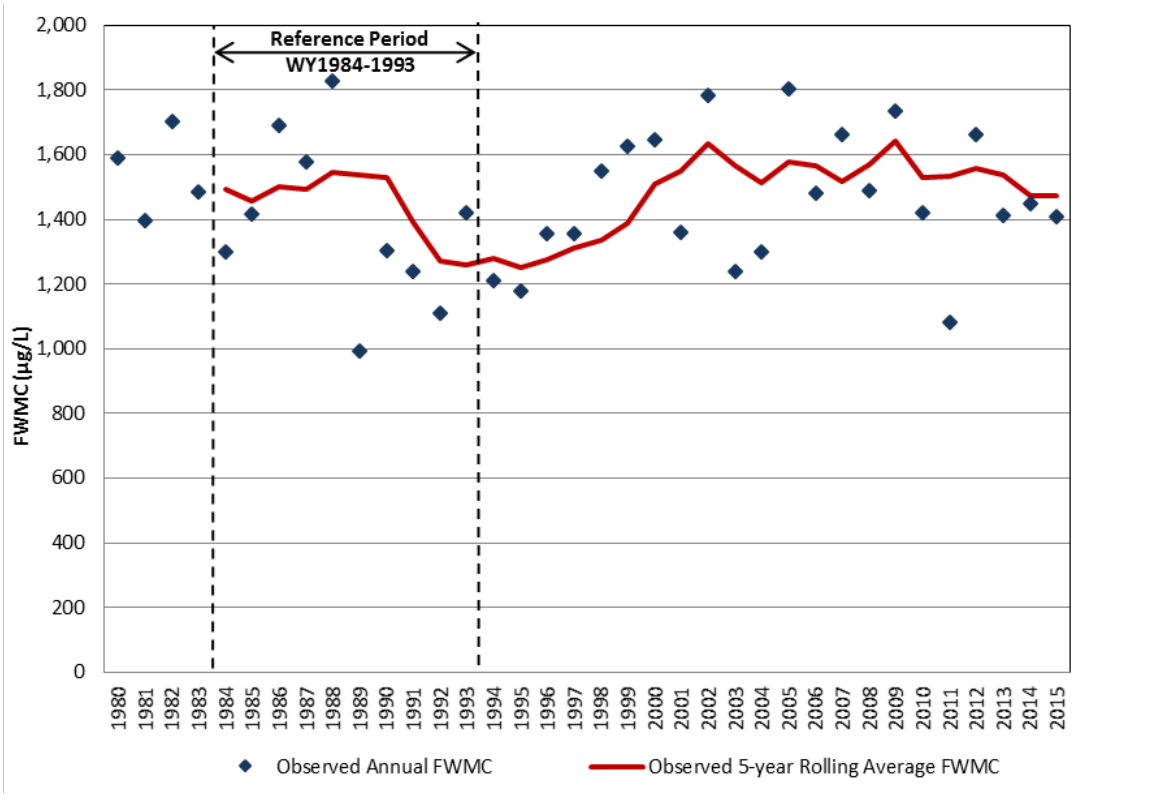
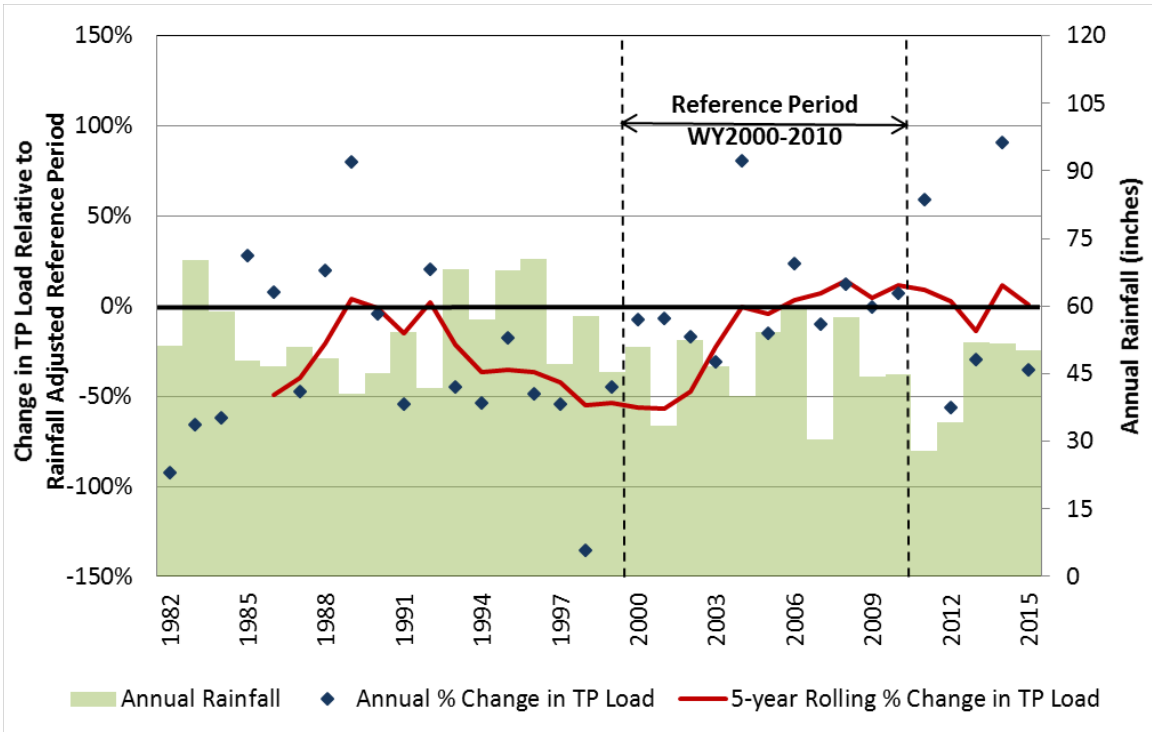


Figure 69. C-25 Basin: Upper plot - annual percentage change in TN load from reference period and five-year rolling average, with annual rainfall. Lower plot - TN observed annual FWMC and five-year rolling average.



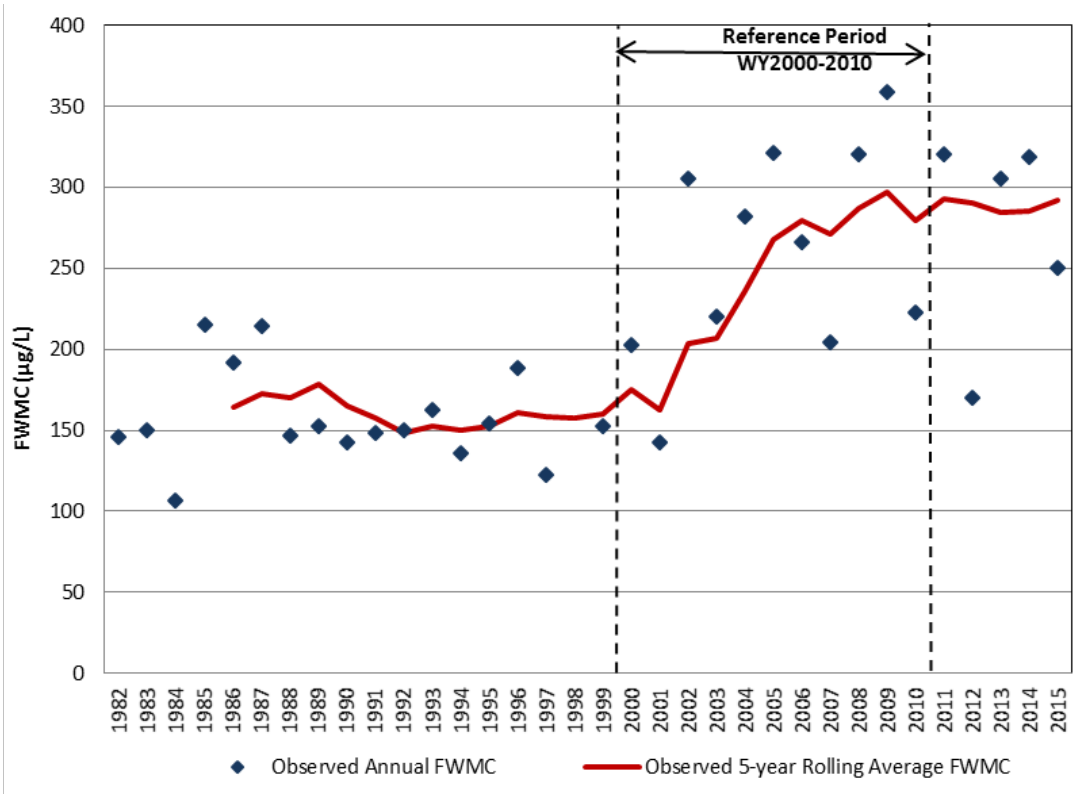
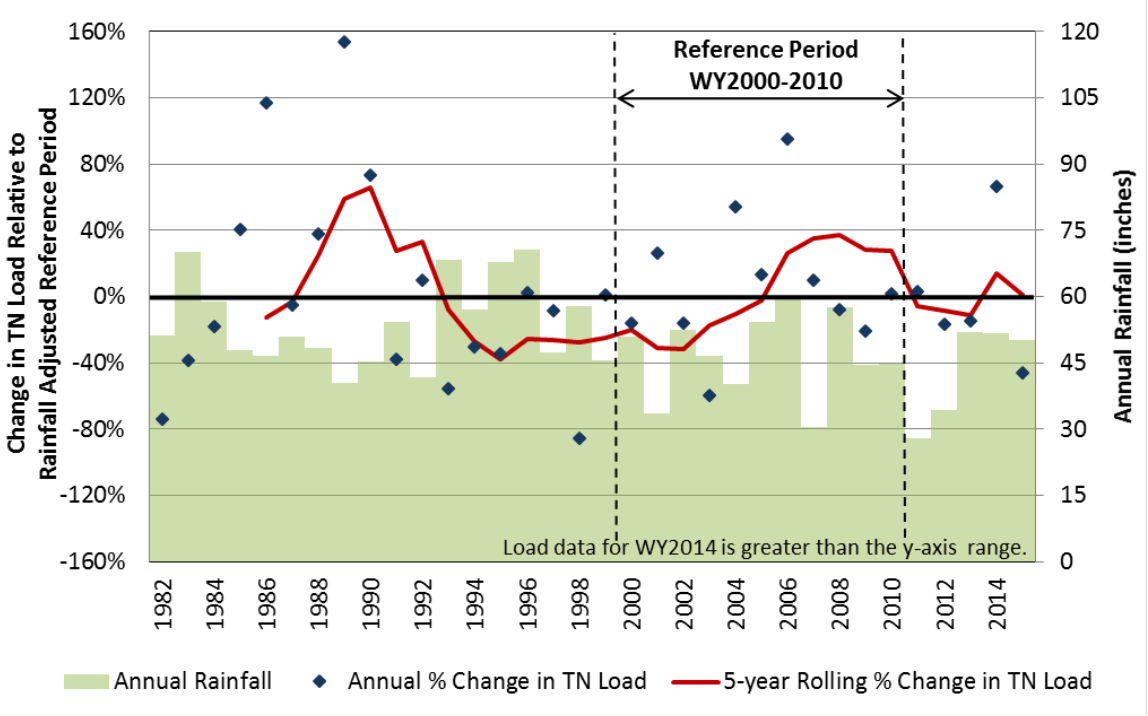


Figure 70. C-44 Basin: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.



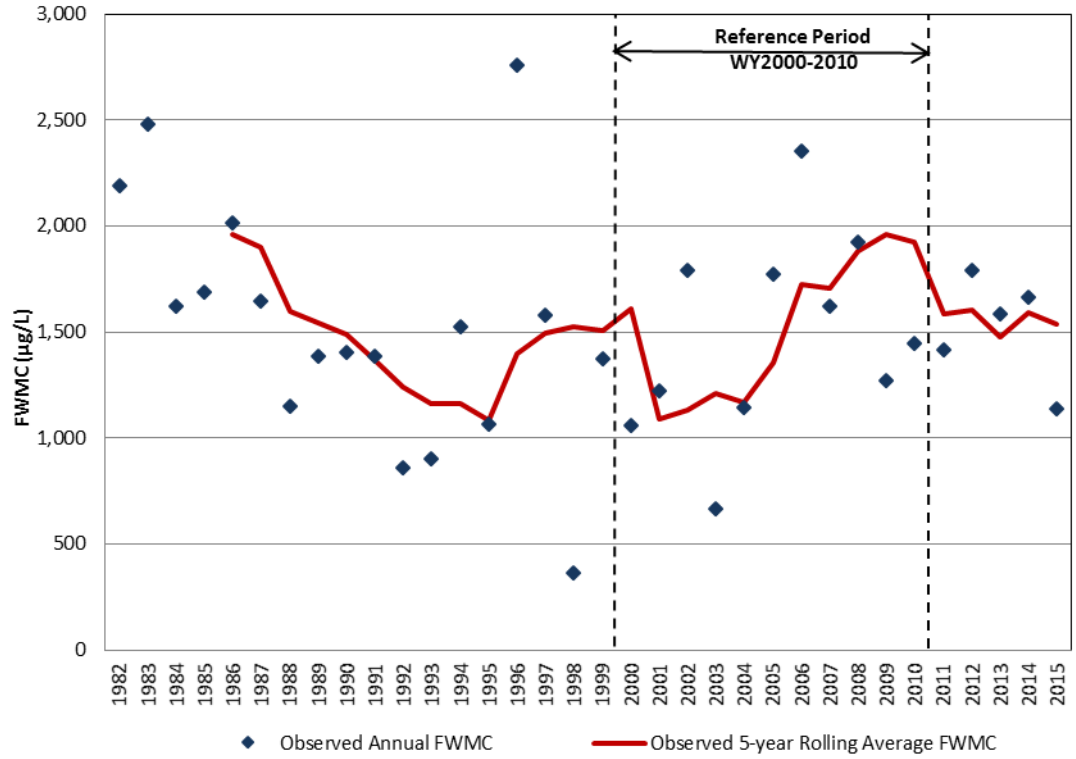
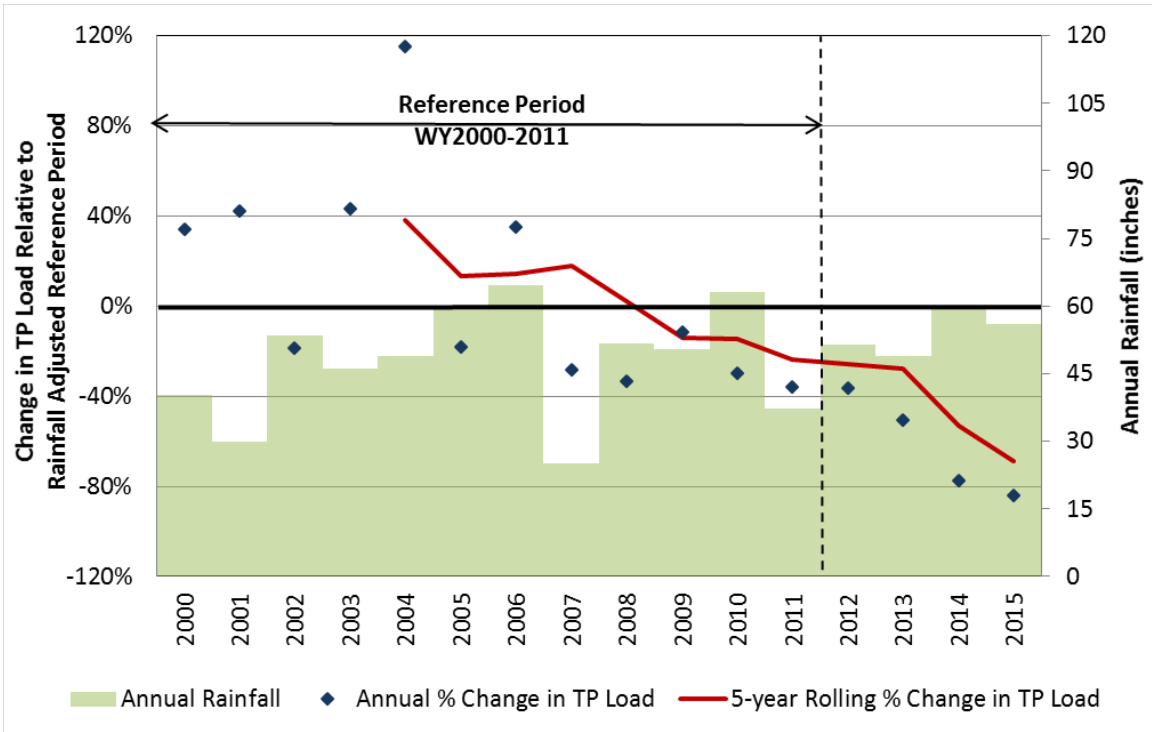


Figure 71. C-44 Basin: Upper plot - annual percentage change in TN load from reference period and five-year rolling average, with annual rainfall. Lower plot - TN observed annual FWMC and five-year rolling average. [This figure was updated on March 9, 2016.]



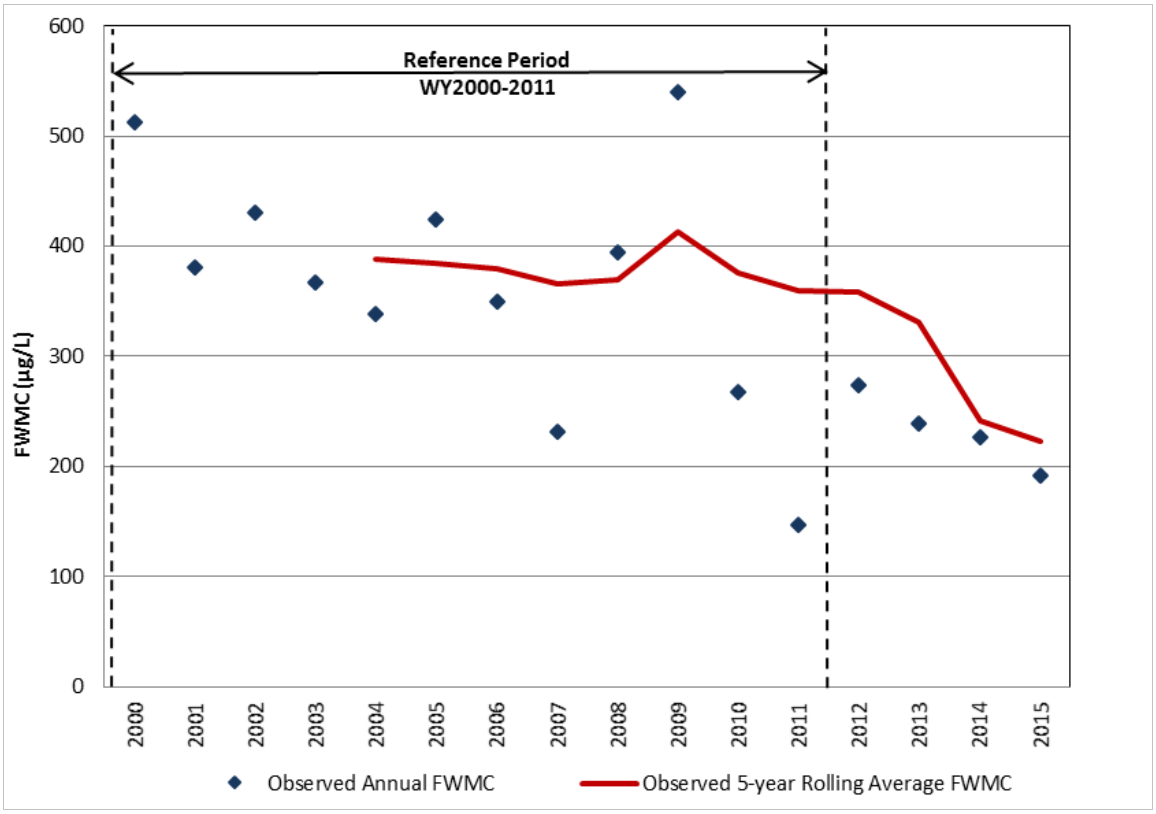
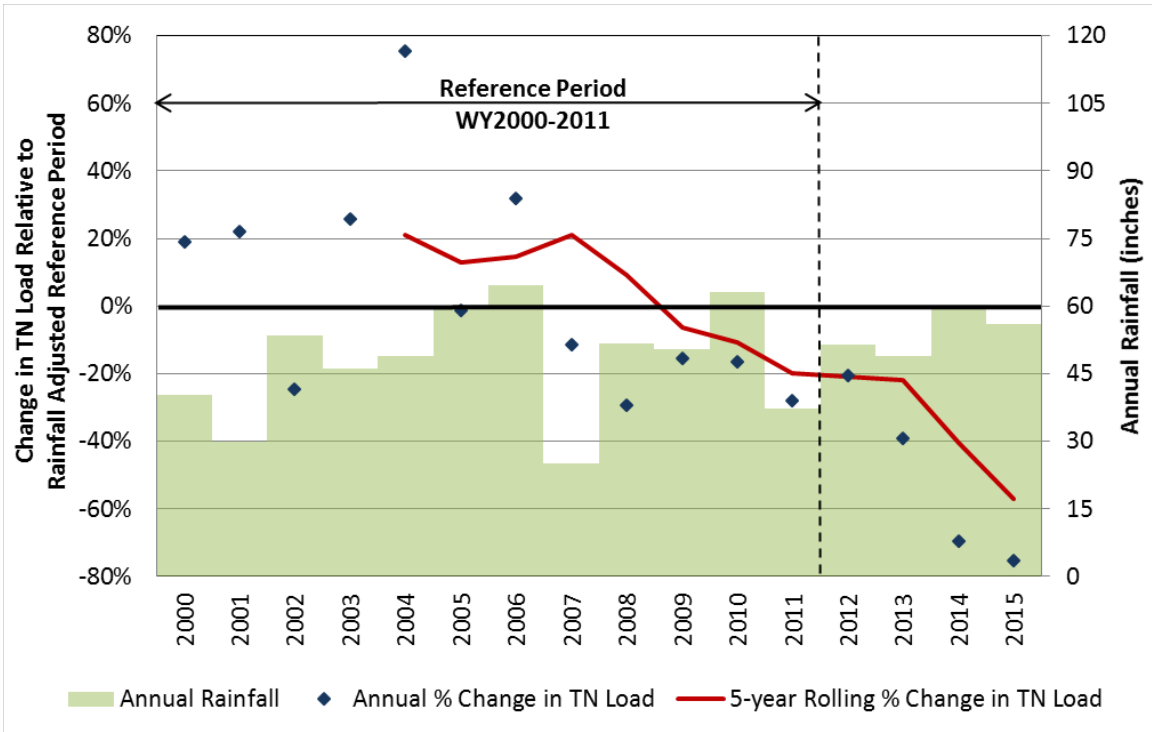


Figure 72. Ten Mile Creek Basin: Upper plot - annual percentage change in TP load from reference period and five-year rolling average, with annual rainfall. Lower plot - TP observed annual FWMC and five-year rolling average.



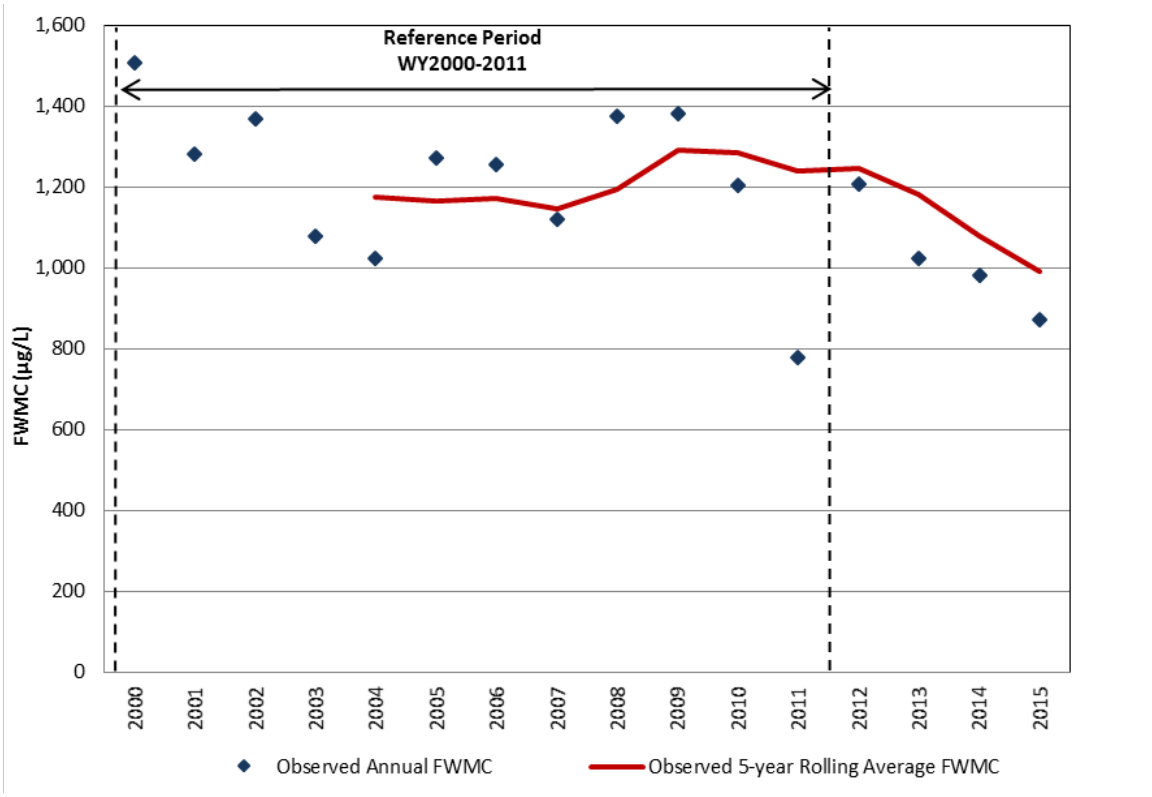


Figure 73. Ten Mile Creek Basin: Upper plot - annual percentage change in TN load from reference period and five-year rolling average, with annual rainfall. Lower plot - TN observed annual FWMC and five-year rolling average.

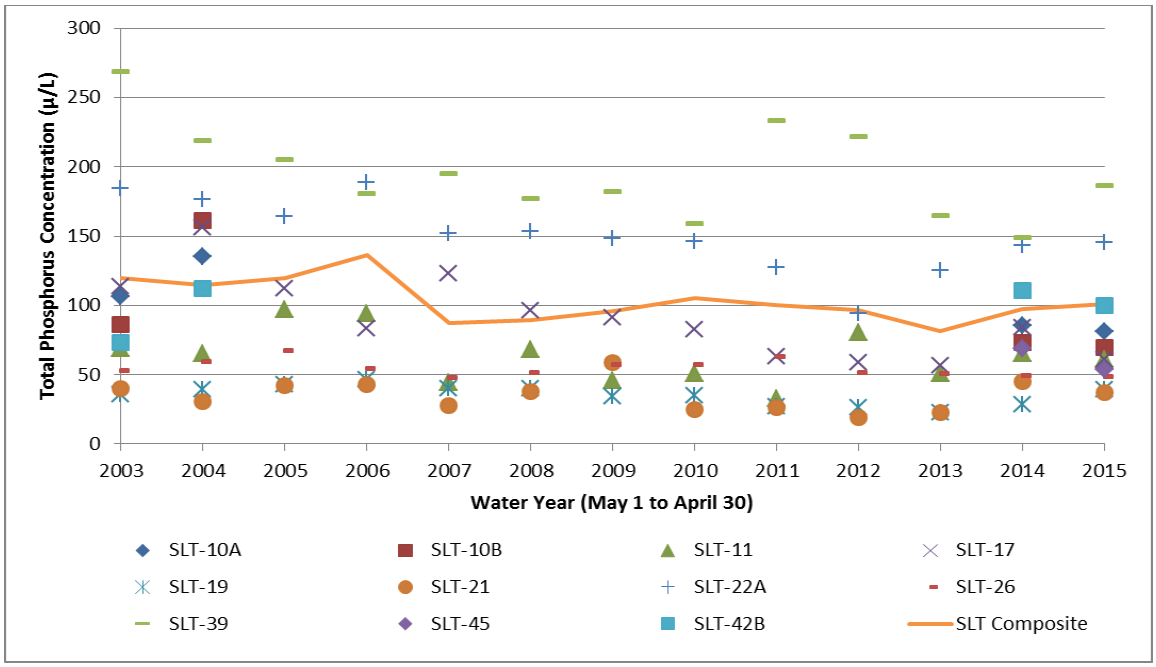


Figure 74. North Fork tributaries observed TP concentrations.

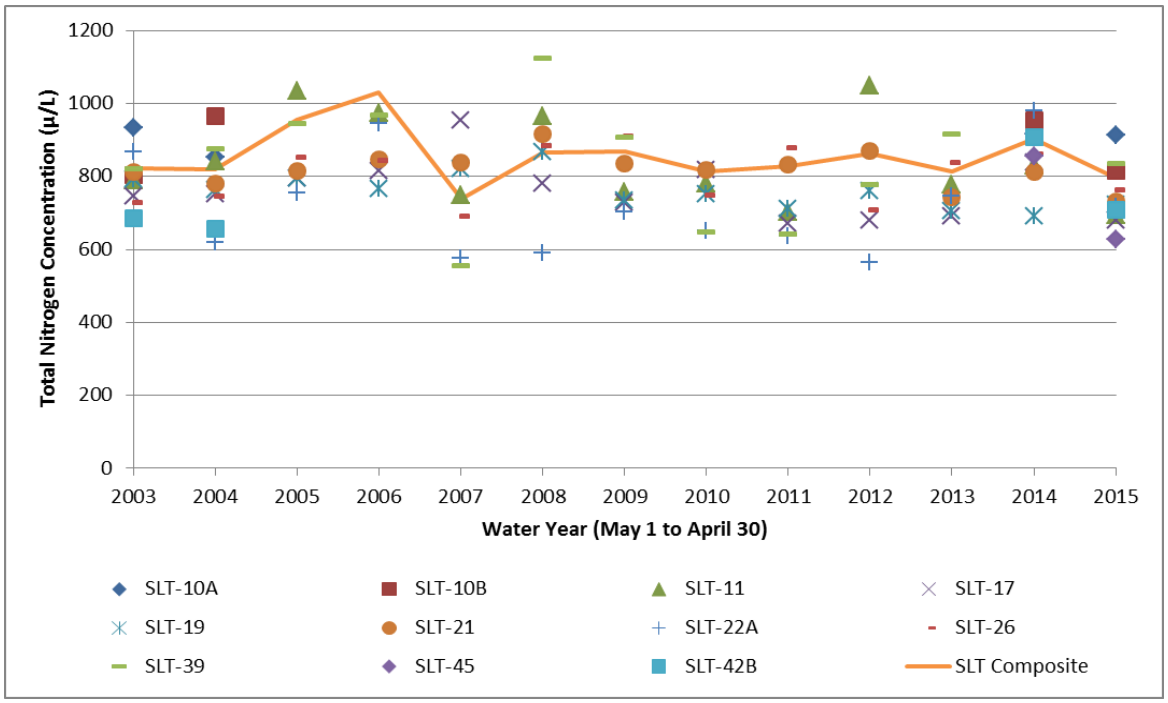


Figure 75. North Fork tributaries observed TN concentrations.

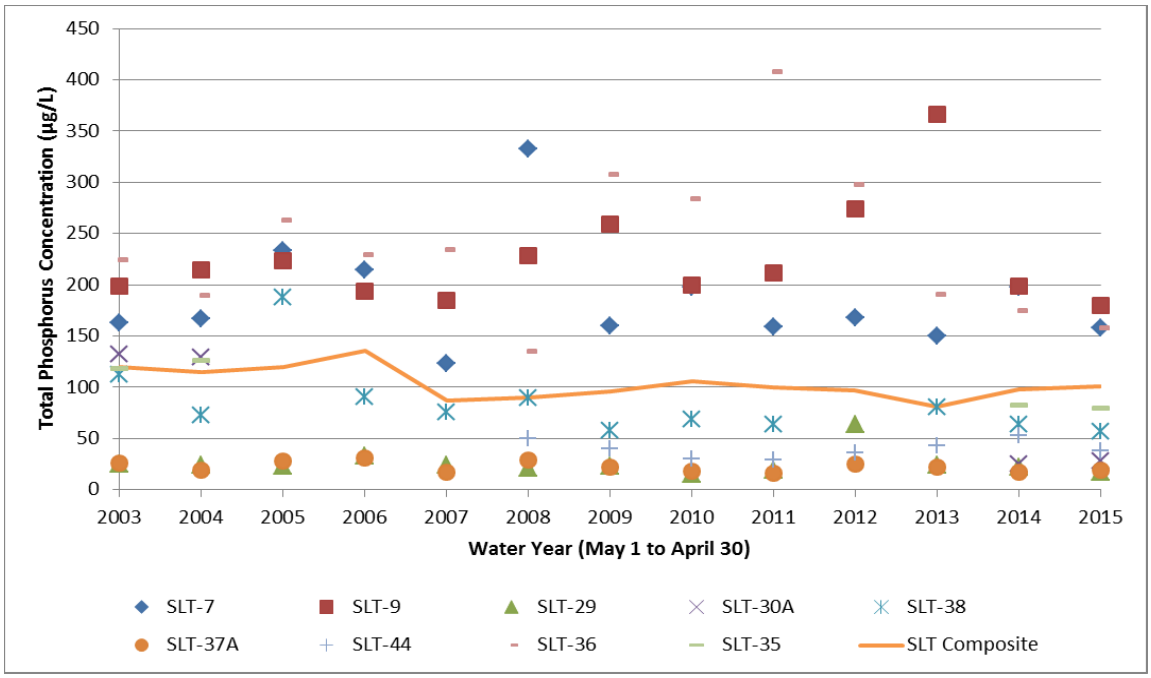


Figure 76. Basin 4-5-6, South Mid-Estuary, North Mid-Estuary, and South Coastal tributaries observed TP concentrations.

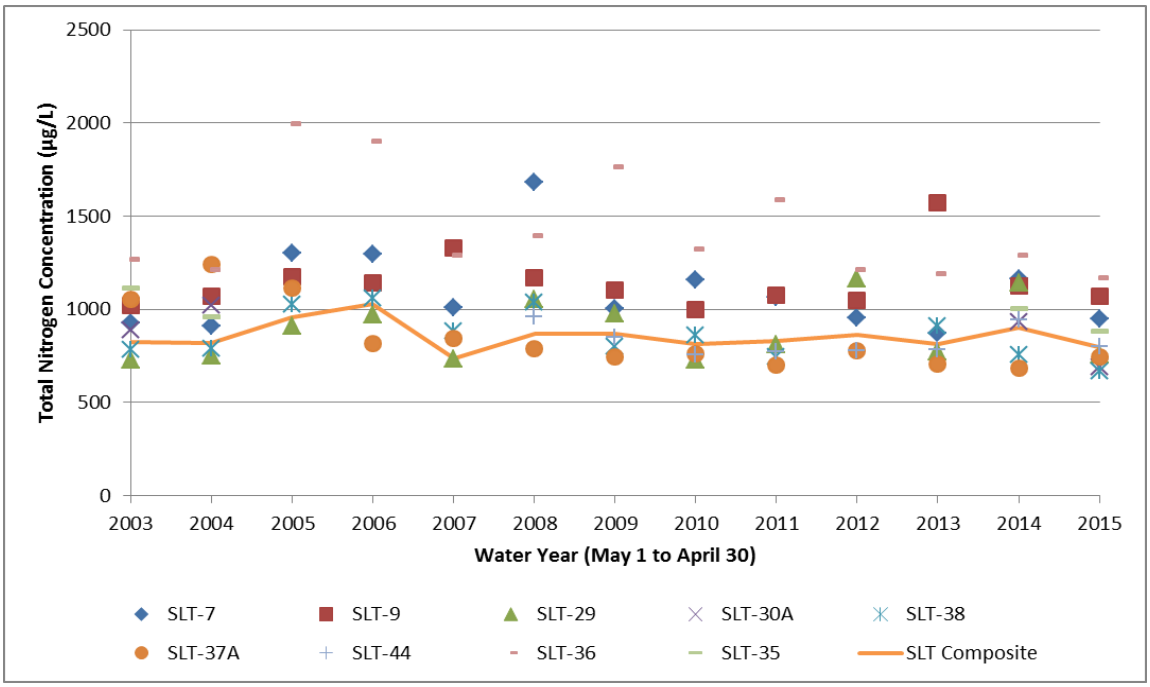


Figure 77. Basin 4-5-6, South Mid-Estuary, North Mid-Estuary, and South Coastal tributaries observed TN concentrations.

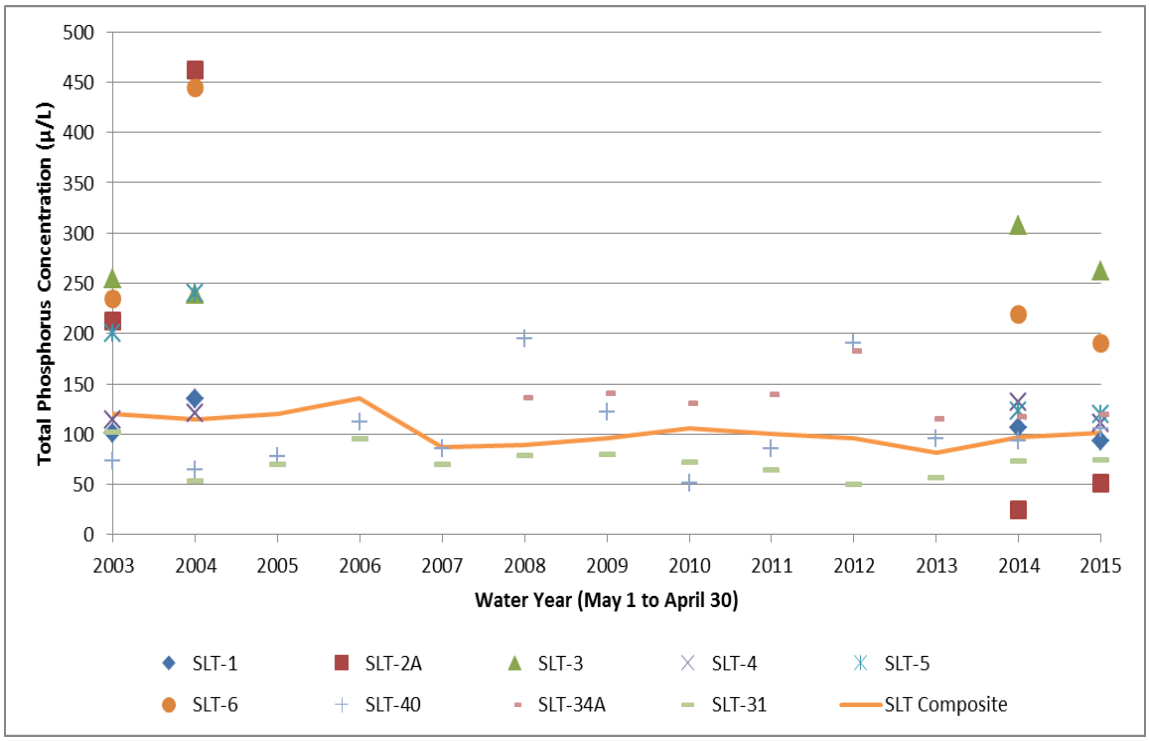


Figure 78. South Fork tributaries observed TP concentrations.

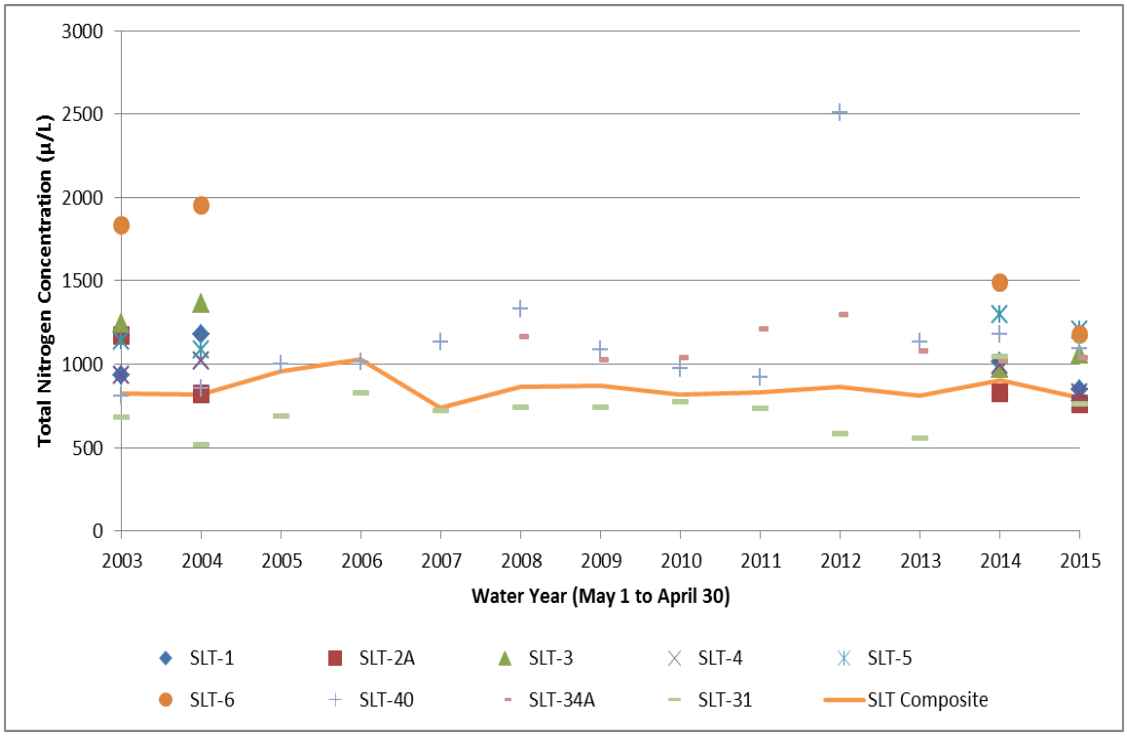
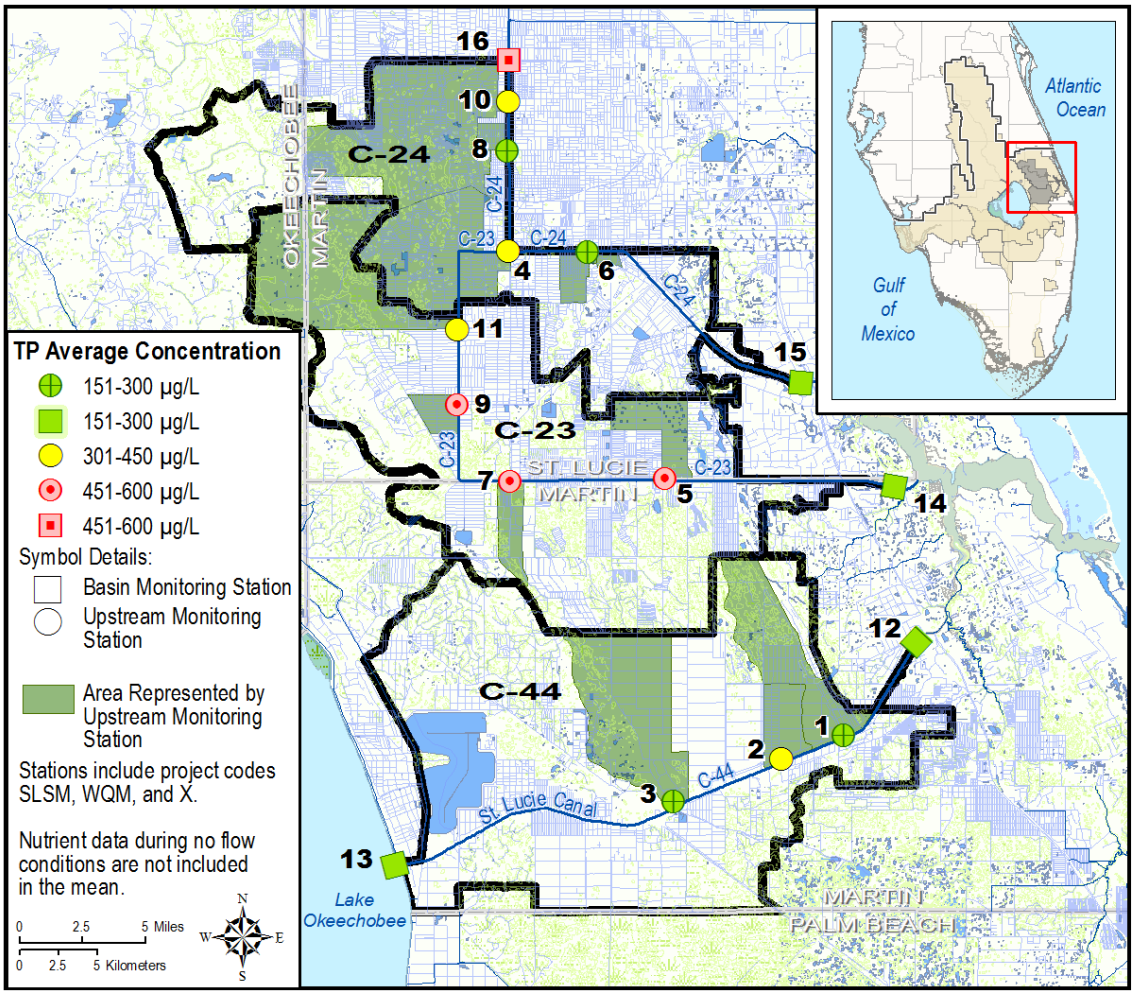


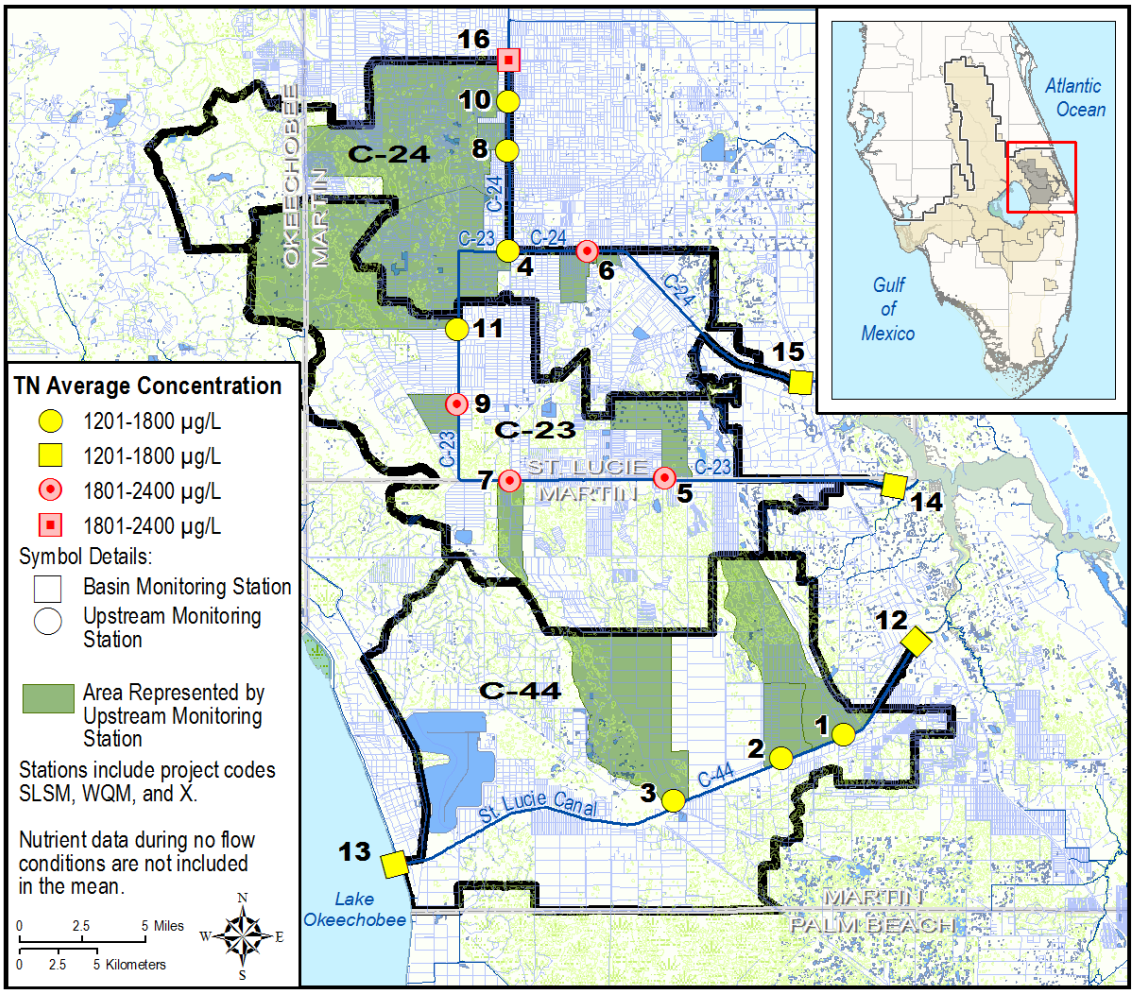
Figure 79. South Fork tributaries observed TN concentrations.



St. Lucie River Watershed		# of Samples	TP Concentration (µg/L)		
Map ID	Station		Average	Min	Max
1	C44SC4	12	207	99	439
2	C44SC6	4	420	121	881
3	C44SC14	6	232	119	304
4	G79	10	405	68	1043
5	PC22C23	7	553	295	1203
6	PC26C24	4	266	145	512
7	PC32C23	4	575	372	695
8	PC38C24	3	225	138	341
9	PC41C23	2	546	391	700
10	PC41C24	7	313	119	475
11	PC49C23	4	369	159	617
12	S80	57	164	72	458
13	S308[1]	18	168	97	270
14	S48	57	296	102	759
15	S49	34	246	57	540
16	G81[2]	2	451	241	661
NA	C-44 Basin[3]	-	250	-	-
NA	C-23 Basin[3]	-	442	-	-
NA	C-24 Basin[3]	-	323	-	-

[1]S308 is operated to flow to and from Lake Okeechobee. Concentrations reported in this summary table represent discharges from Lake Okeechobee, since this is the dominant direction of flow.
[2]G81 is operated to flow to and from the C-24 basin. Concentrations reported in this summary table represent discharges from the C-24 basin, since this is the dominant direction of flow.
[3]Concentration reported is the basin's annual flow weighted mean concentration calculated based on the basin's monitoring station(s), flows and loads.

Figure 80. St. Lucie River Watershed average TP concentrations for WY2015.



St. Lucie River Watershed		# of Samples	TN Concentration (µg/L)		
Map ID	Station		Average	Min	Max
1	C44SC4	12	1389	1028	1900
2	C44SC6	4	1398	903	1790
3	C44SC14	6	1512	1380	1620
4	G79	10	1644	1026	2000
5	PC22C23	7	2247	1550	3150
6	PC26C24	4	1895	1540	2150
7	PC32C23	4	1938	1410	2270
8	PC38C24	3	1527	1310	1840
9	PC41C23	2	2345	2140	2550
10	PC41C24	7	1529	1150	1837
11	PC49C23	4	1691	1515	1910
12	S80	15	1289	986	1563
13	S308[1]	18	1471	1135	1772
14	S48	57	1251	755	1860
15	S49	15	1396	905	1833
16	G81[2]	2	2025	1580	2470
NA	C-44 Basin[3]	-	2082	-	-
NA	C-23 Basin[3]	-	1533	-	-
NA	C-24 Basin[3]	-	1452	-	-

[1]S308 is operated to flow to and from Lake Okeechobee. Concentrations reported in this summary table represent discharges from Lake Okeechobee, since this is the dominant direction of flow.
[2]G81 is operated to flow to and from the C-24 basin. Concentrations reported in this summary table represent discharges from the C-24 basin, since this is the dominant direction of flow.
[3]Concentration reported is the basin's annual flow weighted mean concentration calculated based on the basin's monitoring station(s), flows and loads.

Figure 81. St. Lucie River Watershed average TN concentrations for WY2015.

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HDR Engineering, Inc. 2011b. Data Analysis and Performance Measure Development for the St. Lucie River Watershed Source Control Program, Deliverable 6.1, Collective Source Control Performance Measures for C-23, C-24, C-25/25E, and C-44 Sub-watersheds Technical Report. Submitted to the South Florida Water Management District, West Palm Beach, FL.