5-Year Review of the Caloosahatchee Estuary Basin Management Action Plan

Division of Environmental Assessment and Restoration
Water Quality Restoration Program
Florida Department of Environmental Protection

with participation from the
Caloosahatchee Estuary Stakeholders

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Acknowledgments

The *Caloosahatchee Estuary Basin Management Action Plan*, adopted in November 2012, was prepared as part of a statewide watershed management approach to restore and protect Florida's water quality. This *2017 5-Year Review for the Caloosahatchee Estuary Basin Management Action Plan* was prepared in partial fulfilment of Section 373.4595(4)(b), Florida Statutes. Both documents were prepared by the Florida Department of Environmental Protection with participation from the Caloosahatchee Estuary stakeholders identified below.

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Executive Summary

Background

In 2005, after years of water quality data collection and analysis, the Florida Department of Environmental Protection (DEP) identified the Caloosahatchee Estuary as impaired for dissolved oxygen and nutrients. Using this and additional information, DEP adopted a science-based water quality restoration goal for the Caloosahatchee Estuary, called a Total Maximum Daily Load (TMDL), in December 2009. This TMDL established a reduction target for total nitrogen (TN) in the Caloosahatchee River and Estuary downstream of the Franklin Lock and Dam.

To achieve restoration, DEP developed a comprehensive restoration plan in collaboration with local stakeholders. This plan, called a Basin Management Action Plan (BMAP), identifies projects and strategies designed to achieve the required reductions. The plan is reviewed annually to track changes in water quality as a result of those projects.

The Caloosahatchee Estuary BMAP was adopted in November 2012. The BMAP is designed to be implemented in a phased approach of 5-year increments to allow for adaptive management. This and future 5-Year Reviews provide updates on the status of implementation and recommendations for future phases of the BMAP.

Summary of Load Reductions

Through May 31, 2017, 73 projects have been completed. An additional 15 projects have been added to the BMAP, which are underway or planned. The projects completed to date are estimated to achieve total reductions of 218,542 lbs/yr of TN, or 56 percent of the reductions needed to meet the portion of the TMDL allocated to the Tidal Caloosahatchee Basin. **Figure ES-1** shows progress toward the TN TMDL load reductions.

Water Quality and Biological Monitoring

The existing Caloosahatchee BMAP monitoring network consists of 81 stations monitored by numerous stakeholders, including both state and local entities. These stations are currently organized into a 4-tier system; however, a recommendation is being made to revise the network to a 3-tier system. This new tier system will help prioritize stations used to track water quality trends in the BMAP. In addition, South Florida Water Management District (SFWMD) conducts biological sampling for oysters and seagrass, and DEP staff conduct quarterly sampling for seagrass as part of the BMAP monitoring plan.

To help track implementation progress for the Caloosahatchee BMAP, a water quality evaluation was completed using data available as of May 31, 2017. Trend analyses were conducted as part of the 5-Year Review to track changes in individual freshwater tributaries in the Tidal Caloosahatchee Watershed and in the impaired Caloosahatchee Estuary Waterbody Identification numbers (WBID). While it is difficult to detect any changes in TN in the estuarine waters, some statistically significant decreasing trends for total phosphorus (TP) were detected in the estuary. In the freshwater tributaries to the Caloosahatchee Estuary, three decreasing trends in TN were identified.

Recommendations for Future Implementation

The BMAP implements phased TN reductions according to Section 403.067(7)(a)1., Florida Statutes (F.S.), for the portion of loading generated in the Tidal Caloosahatchee Basin, downstream of S-79. The purpose of this 5-Year Review is to evaluate implementation activities that have taken place during the first 5-year phase and make recommendations for future implementation activities that may be incorporated into a revised BMAP.

This first phase included significant restoration efforts by stakeholders, and the implementation process will continue in order to help meet the TMDL. This 5-Year Review recommends implementation milestones as required in Subparagraph 403.067(7)(a)6., F.S., and describes progress toward the first 5-year milestone. The milestones are established in 5-year increments in collaboration with stakeholders through the submission of project information, and with the goal of achieving the TMDL in 20 years (Paragraph 373.4595[4][b], F.S). DEP will adopt the implementation schedule into a revised BMAP and will continue to review the implementation status every five years to determine whether progress is being made toward these milestones.

DEP is currently reviewing the assigned allocations to determine whether changes are appropriate to reflect anticipated updated modeling results. As better information on loading in the portion of the watershed upstream of S-79 becomes available, the BMAP boundary may be expanded to include those sources.

Finally, DEP and participating stakeholders recommend revisions to the BMAP monitoring network to help prioritize monitoring resources and improve the way in which progress is tracked.

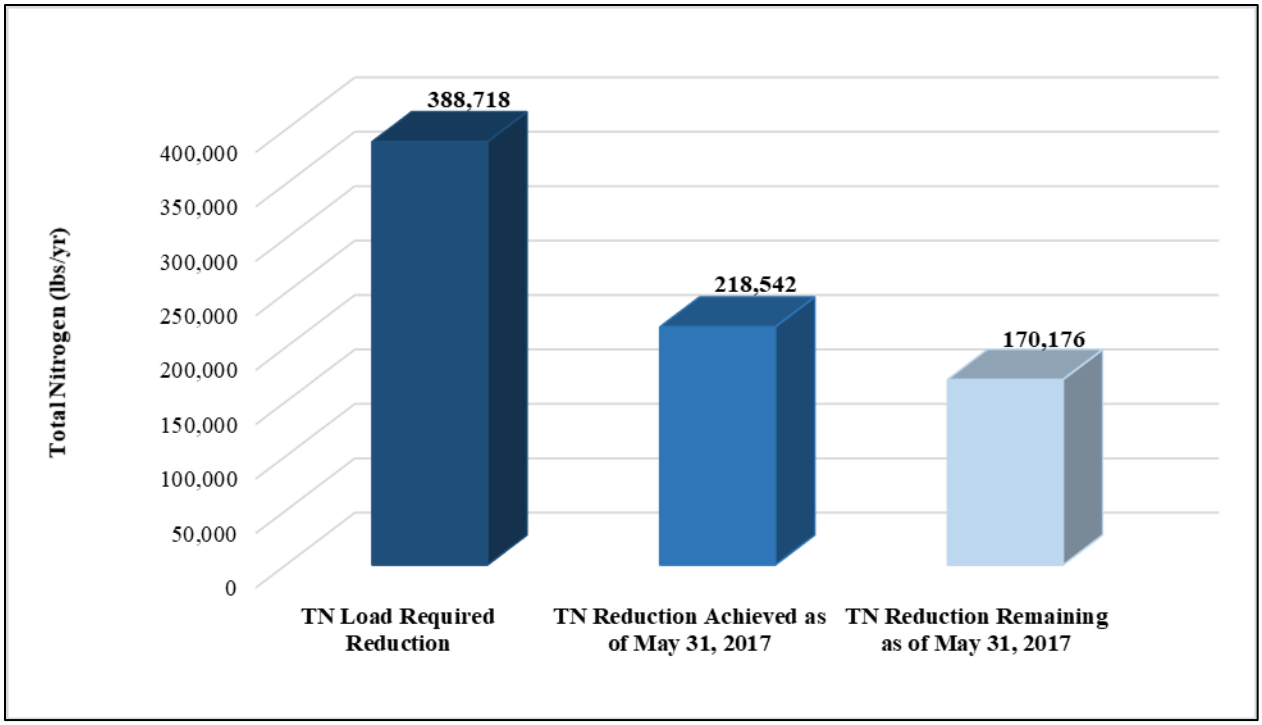

Figure ES-1. Estimated progress toward meeting the portion of the TMDL allocated to the Tidal Caloosahatchee Basin. Reductions are associated with projects completed through May 31, 2017.

Chapter 1: Background Information

1.1 Water Quality Standards and Total Maximum Daily Loads (TMDLs)

Florida's water quality standards are designed to ensure that surface waters fully support their designated uses, such as drinking water, aquatic life, recreation and agriculture. Currently, most surface waters in Florida, including those in the Caloosahatchee Estuary, are categorized as Class III waters, meaning they must be suitable for recreation and must support fish consumption and the propagation and maintenance of a healthy, well-balanced population of fish and wildlife. **Table 1** lists all designated use classifications for Florida surface waters.

Table 1. Designated use attainment categories for Florida surface waters

[1] Class I, I-Treated and II waters additionally include all Class III uses.
[2] Class I-Treated classification was approved by the Environmental Regulation Commission on July 26, 2016. However, the classification has not yet been approved by the U.S. Environmental Protection Agency (EPA) and is therefore not currently in effect for Clean Water Act purposes.

Classification	Description
Class I[1]	Potable water supplies
Class I-Treated[1,2]	Treated potable water supplies
Class II[1]	Shellfish propagation or harvesting
Class III	**Fish consumption; recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife**
Class III-Limited	Fish consumption, recreation or limited recreation, and/or propagation and maintenance of a limited population of fish and wildlife
Class IV	Agricultural water supplies
Class V	Navigation, utility and industrial use (*no current Class V designations*)

Section 303(d) of the federal Clean Water Act requires that every two years each state must identify its "impaired" waters, including estuaries, lakes, rivers and streams, that do not meet their designated uses. Staff in DEP's Division of Environmental Assessment and Restoration are responsible for assessing Florida's waters for inclusion on the Verified List of Impaired Waters and Study List, which is then provided to EPA as an annual update to the state "303(d) list." In 2005, DEP identified the Caloosahatchee Estuary as impaired for dissolved oxygen (DO) and nutrients.

1.1.1 Caloosahatchee Estuary TMDL

DEP develops and adopts TMDLs for waterbody segments it has identified as impaired. A TMDL is the maximum amount of a specific pollutant that a waterbody can assimilate while maintaining its designated uses. In December 2009, DEP adopted the Caloosahatchee Estuary TMDL for TN, which is linked to high chlorophyll *a* concentrations in the Caloosahatchee River and Estuary downstream of the Franklin Lock and Dam (S-79). The TMDL includes the three segments with WBIDs that make up the Caloosahatchee Estuary: WBIDs 3240A, 3240B and 3240C.

Adopted TMDLs must establish reasonable and equitable allocations that will alone, or in conjunction with other management and restoration activities, attain the TMDLs. Allocations may

be to individual sources, source categories, or basins that discharge to the impaired waterbody. The allocations identify either the amount of pollutant discharge (such as pounds per year [lbs/yr]) or the percent of its loading the source designation must reduce (reduction allocation). Currently, the TMDL allocation categories are as follows:

- **Wasteload allocation (WLA)** is the allocation to point sources permitted through the National Pollutant Discharge Elimination System (NPDES) Program, including the following:
    - **Wastewater allocation** is the allocation to industrial and domestic wastewater facilities.
    - **NPDES stormwater allocation** is the allocation to NPDES stormwater permittees that operate municipal separate storm sewer systems (MS4s).
- **Load allocation (LA)** is the allocation to nonpoint sources, including agricultural sources.

During TMDL development, a comparison of the existing condition with the TMDL and background conditions, as well as previous research in the estuary, demonstrated that a 23 percent TN load reduction is required to meet the TMDL. This meant reducing the stormwater runoff load in the Tidal Caloosahatchee Basin (**Figure 1**) of 1,690,084 lbs/yr by 388,719 lbs/yr. **Table 2** lists the TMDL and pollutant load allocations adopted by rule (Rule 62-304.800, Florida Administrative Code [F.A.C.], effective August 13, 2009) for the Tidal Caloosahatchee Basin (based on updates to the watershed loading effective August 26, 2010).

The TMDL includes estimates of TN loading in the Tidal Caloosahatchee Basin from watershed stormwater sources, point source facilities and mainstem upstream inputs (Lake Okeechobee and Caloosahatchee River). The upstream inputs will be addressed by separate TMDLs (existing and future) for loads generated above Control Structure S-79. The adopted TMDL focuses on load reductions from stormwater sources below S-79.

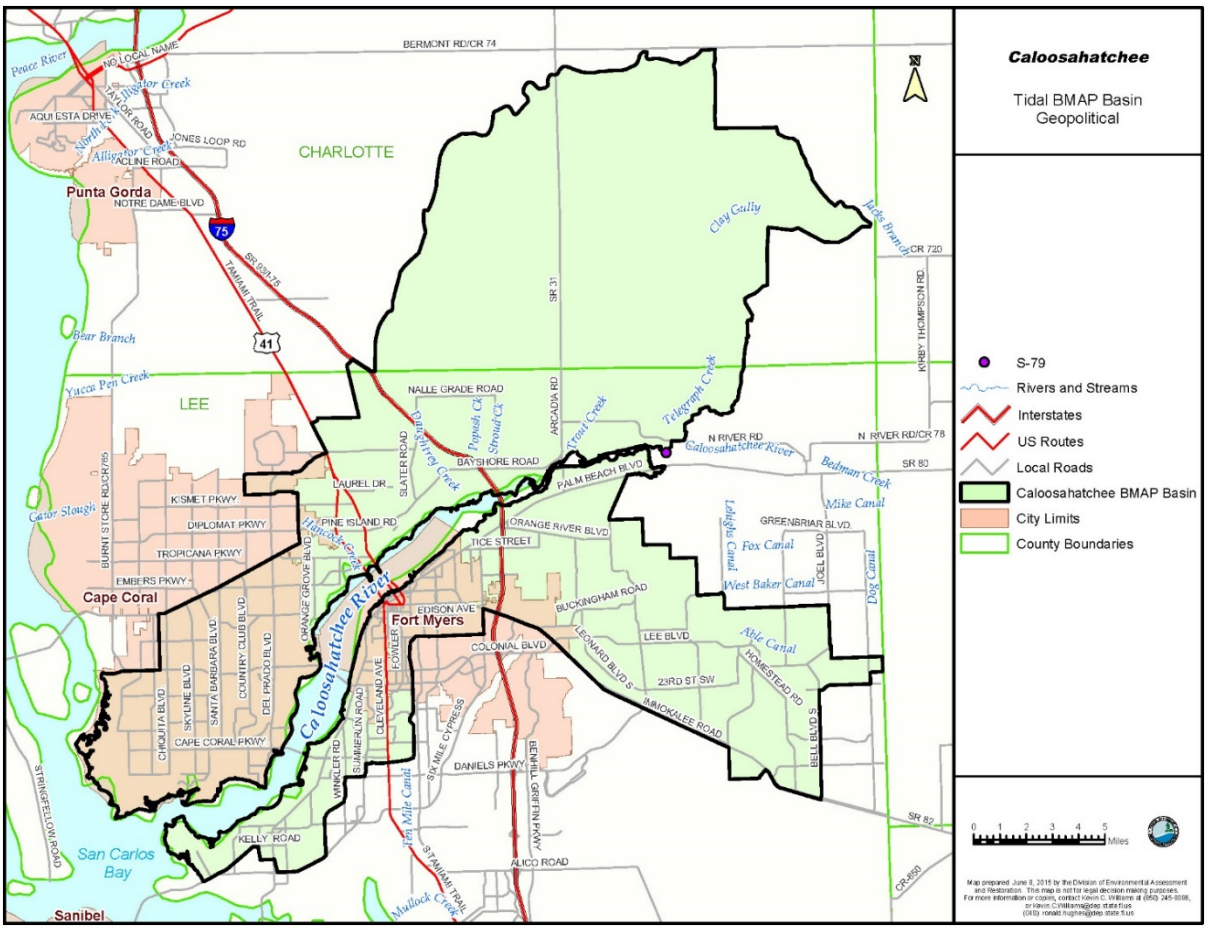

Figure 1. Tidal Caloosahatchee Basin

Table 2. Caloosahatchee Estuary TMDL

[1] The domestic wastewater treatment plant and stormwater loads have been updated since the original TMDL report.
[2] The TMDL load applies only to stormwater loads and is based on loads that have been updated since the original TMDL report.

Parameter	WLA for Wastewater (lbs/yr)	Current Domestic Wastewater Loading (lbs/yr)[1]	WLA for NPDES Stormwater (% Reduction)	LA (% Reduction)	Current Stormwater Loading (lbs/yr)[1]	TMDL Load (lbs/yr)[2]
TN	Permitted loads	64,158	23	23	1,690,084	1,301,365

1.2 Caloosahatchee Estuary Basin Management Action Plan (BMAP)

Rule-adopted TMDLs may be implemented through BMAPs, which contain strategies to reduce and prevent pollutant discharges through various cost-effective means. During the TMDL process, DEP and affected stakeholders jointly develop BMAPs or other implementation approaches. Stakeholder involvement is critical to restoring impaired waters, and involvement varies with each phase of implementation to achieve different purposes. The BMAP development process is structured to achieve cooperation and consensus among a broad range of interested parties. DEP,

SFWMD, Florida Department of Agriculture and Consumer Services (FDACS), and stakeholders representing other agencies, governments, and interested parties helped in the preparation of the BMAP.

1.2.1 Caloosahatchee BMAP Pollutant Reduction and Discharge Allocations

Under Section 403.067, F.S. (Florida Watershed Restoration Act), the TMDL allocation adopted by rule may be an "initial" allocation among point and nonpoint sources. In such cases, the "detailed" allocation to specific point sources and specific categories of nonpoint sources must be established in the BMAP. Both initial and detailed allocations must be determined based on several factors listed in the Florida Watershed Restoration Act, including cost-benefit, technical and environmental feasibility, implementation time frames and others. **Table 3** lists the existing loads and required TMDL reductions.

Table 3. TN required reductions in the Tidal Caloosahatchee Basin

[1] The domestic wastewater treatment plant (WWTP) loads have been updated from the original TMDL report.
[2] The stormwater runoff load is the load below S-79 and has been updated from the original TMDL report.
[3] The required reduction is based on the 23 percent defined in the original TMDL report.

Tidal Caloosahatchee Basin	Domestic WWTP Point Sources (lbs/yr)	Stormwater Runoff Load (lbs/yr)	Total Load (lbs/yr)
TN Existing Load	64,158[1]	1,690,084[2]	1,754,242
Required Reduction[3]	0	388,719	388,719

During the initial stages of BMAP development, DEP worked with stakeholders to disaggregate the total TN load by entity. The acreage and loading information for each stakeholder was calculated using output from the Hydrologic Simulation Program-Fortran (HSPF) model. Geographic information system (GIS) coverage was then used to help determine allocations.

In the TMDL, wastewater treatment facilities (WWTFs) in the basin were required to maintain compliance with their permits. Therefore, the BMAP only assigned detailed allocations for the stormwater sources in the Tidal Caloosahatchee Basin. The load reduction was allocated based on a stakeholder's percentage of the developed load. More details on detailed allocations are available in the 2012 BMAP. **Table 4** lists the allocation of the load reductions for entities in the Caloosahatchee Estuary BMAP area.

The management actions and adaptive management approach described in the BMAP will address TN reductions until the TMDL is attained. The phased BMAP approach allows for the implementation of projects over multiple years designed to achieve incremental reductions, while simultaneously monitoring and conducting studies to better understand the water quality dynamics (sources and response variables) in the watershed.

Additional details about the sources, modeling development process, and implementation assumptions and considerations are provided in the 2009 TMDL report and 2012 BMAP.

Table 4. Required load reductions by entity

Entity	TN Nonbackground Load (lbs/yr)	TN Allowable Load (lbs/yr)	TN Load Reduction (lbs/yr)
Agriculture	76,821	21,224	55,597
Charlotte County	1,303	360	943
City of Cape Coral	142,892	39,478	103,414
City of Fort Myers	56,547	15,623	40,924
Florida Department of Transportation (FDOT)	12,601	3,481	9,119
Lehigh Acres Municipal Services Improvement District (LA-MSID)/formerly East County Water Control District (ECWCD)	52,141	14,405	37,736
Lee County	194,623	53,770	140,853
Lucaya Community Development District (CDD)	183	51	132
Total	**537,111**	**148,392**	**388,719**

Chapter 2: Assessing Progress

2.1 Projects to Achieve the TMDL

DEP annually reviews each entity's progress toward completing projects listed in the BMAP and achieving the assigned allocations based on the details described in the current TMDL and BMAP. These details may be refined as part of the modeling that is currently being updated for this watershed. **Table 5** lists the number of projects submitted by each entity during the first 5-year phase. **Table 6** outlines the number of projects that each entity has committed to in the BMAP and annual progress reports, along with the status of those projects as of May 31, 2017. Project status definitions are provided in **Appendix A**. **Table 7** summarizes the required reductions for each entity in the BMAP and the total reductions associated with projects completed by each entity as of May 31, 2017.

Table 5. Projects submitted by year

* FDACS project is a continual project that will enroll applicable agricultural acreages in FDACS Best Management Practice (BMP) Enrollment Program. Updates on enrolled acres have been submitted to DEP annually.

Lead Entity	2012	2013	2014	2015	2016	2017	Total Projects
Agriculture/FDACS*	1	*	*	*	*	*	1
Charlotte County	1	0	0	0	0	0	1
City of Cape Coral	13	0	1	1	1	0	16
City of Fort Myers	10	0	1	0	0	0	11
FDOT	8	0	0	0	0	0	8
LA-MSID	6	0	0	0	1	3	10
Lee County	23	0	0	2	3	12	40
Lucaya CDD	1	0	0	0	0	0	1
Total	**63**	**0**	**2**	**3**	**5**	**15**	**88**

Table 6. Projects to achieve the TMDL

* FDACS project is a continual project that will enroll applicable agricultural acreages in FDACS BMP Enrollment Program.

Lead Entity	Total Projects	Completed	Underway	Planned
Agriculture/FDACS*	1	1	0	0
Charlotte County	1	1	0	0
City of Cape Coral	16	16	0	0
City of Fort Myers	11	11	0	0
FDOT	8	8	0	0
LA-MSID	10	7	3	0
Lee County	40	28	9	3
Lucaya CDD	1	1	0	0
Total	**88**	**73**	**12**	**3**

Table 7. Reductions toward the TMDL

* Reductions to date include estimated TN reductions associated with projects completed as of May 31, 2017.

Lead Entity	TN Required Reduction (lbs/yr)	Estimated TN Reduction to Date* (lbs/yr)	% Toward Required Reduction
Agriculture/FDACS	55,597	30,744	55
Charlotte County	943	381	40
City of Cape Coral	103,414	84,744	82
City of Fort Myers	40,924	21,533	53
FDOT	9,119	11,490	126
LA-MSID	37,736	23,532	62
Lee County	140,853	46,118	33
Lucaya CDD	132	0	0
Total	**388,718**	**218,542**	**56**

2.2 Other Coordinating Agency Efforts

FDACS and the SFWMD are coordinating with DEP to focus their efforts on achieving the TMDL and maintaining compliance with state water quality standards. These efforts are briefly summarized below.

2.2.1 Agriculture/Florida Department of Agriculture and Consumer Services

Beyond enrolling producers in the FDACS BMP Program and verifying implementation, FDACS is working with DEP to improve the data used to estimate agricultural land uses in the watershed. FDACS is also working with producers to identify and implement a suite of agricultural projects and research agricultural technologies on properties where they are deemed technically feasible and where funding can be made available. The implementation of these projects would require funding as well as more detailed design based on site-specific information, such as applicable acreages and willing landowners.

FDACS Office of Agricultural Water Policy (OAWP) has also provided $29,369 in cost-share assistance for cross fencing, which facilitates rotational grazing, on a 1,000-acre cow/calf operation. An additional $21,030 will be provided to complete the fencing initiative. In Fiscal Year FY 2017–18, FDACS will provide more funding to install livestock watering facilities on the same operation. **Appendix D** contains more detailed information on agricultural enrollment, reductions and activities in the basin.

2.2.2 South Florida Water Management District

State-appropriated funds coupled with SFWMD resources were used to advance numerous restoration activities in the Caloosahatchee River Watershed during the BMAP reporting period. Regional projects with both water storage and water quality benefits progressed. Highlights of advancements made in key SFWMD-involved projects in the watershed upstream of the BMAP area during the BMAP reporting period (through May 31, 2017) are listed below.

Caloosahatchee River (C-43) West Basin Storage Reservoir Project

The purpose of this project is to aid in capturing regulatory releases from Lake Okeechobee and to collect and store runoff from the basin that is currently discharged to the river. Water will be released when needed during the dry season to the estuary to help provide essential flows that will aid in stabilizing the salinity regime. In 2015, SFWMD issued the first of four construction packages. State appropriations have been substantial and reliable, allowing SFWMD to adjust the construction schedule ahead by two years, targeting 2022 for completion.

C-43 Water Quality Treatment and Testing Facility (WQTTF) Project

SFWMD and Lee County are partners in the development and implementation of this project. The project goals are to demonstrate and implement cost-effective, wetland-based strategies for reducing pollutant loadings to the Caloosahatchee River and its downstream estuarine ecosystems, particularly the recalcitrant fraction of dissolved organic nitrogen (DON) that is more difficult to remove than other forms ordinarily found in fertilizers. Phase I, initiated in 2015, includes bioassays and mesocosms. Bioassays are being performed to determine the fraction of biologically available DON in the Caloosahatchee River. These results will inform the mesocosm design. Mesocosms are being used to assess potential surface water nitrogen removal rates using different plant communities and hydrologic loading rates. Phase I mesocosm construction was completed in June 2016, and mesocosm operations, maintenance, and monitoring are planned through December 2018.

Lake Hicpochee Hydrologic Enhancement – North Project (Phase 1)

The objective of this project is to provide shallow water storage, rehydrate a portion of the lake bed to promote habitat restoration, and increase capacity for ancillary water quality enhancements. The project includes a shallow storage feature and a spreader canal to deliver excess stormwater runoff from the C-19 Canal to the northern portion of Lake Hicpochee as needed. The final regulatory authorizations for Phase I of this project were completed in January 2017. Construction began in March 2017 and is scheduled to be completed by September 2018.

2.3 Water Quality Monitoring and Evaluation

The Caloosahatchee Estuary BMAP monitoring plan was designed to enhance the understanding of basin loads, identify areas with high nutrient concentrations, and track water quality trends. The information gathered through the monitoring plan measures progress toward achieving the TMDL and provides a better understanding of watershed loading. The adopted BMAP monitoring plan consists of ambient water quality sampling and biological monitoring.

2.3.1 Ambient Water Quality Monitoring

Focused objectives are critical for a monitoring strategy to provide the information needed to evaluate implementation success. The primary and secondary objectives of the monitoring strategy for the Caloosahatchee Estuary are described below. These objectives are used to evaluate the success of the BMAP, help interpret the data collected, and provide information for potential future refinements of the BMAP. All BMAP data providers have agreed to upload ambient water quality

data to the STOrage and RETrieval (STORET) database at least once every six months, upon completion of the appropriate quality assurance/quality control (QA/QC) checks. In 2017, the primary repository of ambient water quality data for DEP transitioned to the Watershed Information Network (WIN), and data providers have begun uploading data to WIN instead of STORET.

Primary Objective

- To enhance the understanding of basin loads, identify areas with high nutrient concentrations and track water quality trends. This information will measure progress toward achieving the TMDL and provide a better understanding of the watershed loading.

Secondary Objective

- To identify areas or tributaries in the watershed with high loadings of nutrients to better focus management efforts.

To achieve the objectives above, the monitoring strategy focuses on two types of indicators to track water quality trends: core and supplemental (**Table 8**). The core indicators have been directly linked to the parameters identified in the adopted TMDL. Supplemental parameters are monitored primarily to support model development and refinement, and will also be used for the interpretation of core water quality parameters.

Table 8. Water quality indicators and field parameters

* Should be monitored as a core parameter in WBIDs with DO impairments.

Core Parameters	Supplemental Parameters
Chlorophyll *a* (Corrected)	Biochemical Oxygen Demand (BOD5)*
Dissolved Oxygen (DO)	Color
Nitrate/Nitrite as N	Dissolved Organic Carbon (DOC)
pH – Field	Total Organic Carbon (TOC)
Specific Conductance/Salinity	Turbidity
Temperature	
Total Kjeldahl Nitrogen (TKN)	
Total Phosphorus (TP)	
Total Suspended Solids (TSS)	

During the first phase of BMAP implementation, Cape Coral continued water quality monitoring in the basin and uploaded the data to STORET. The City of Fort Myers and Lee County also continued water quality monitoring in the basin, and the monitoring data for the reporting period were uploaded into STORET. SFWMD continued monitoring at 10 stations in the BMAP area, and the monitoring data for the reporting period were uploaded to WIN in July 2017 (further information on this monitoring and associated data results are reported in the *2017 South Florida Environmental Report* – Volume I, Chapter 8C). DEP continued water quality monitoring at 15 stations in the basin, and the data are available in STORET or WIN. **Appendix C** lists the stations in the adopted BMAP monitoring network.

2.3.2 Biological Monitoring

In addition to the water quality parameters, biological monitoring is being conducted to assess the overall health of the Caloosahatchee Estuary, especially as estimates of load reductions approach the reductions required in the BMAP. SFWMD conducts biological sampling for oysters and seagrass in the Caloosahatchee Estuary and San Carlos Bay. Seagrass monitoring is carried out between March and September, and two sites are also monitored in December. Oyster recruitment at all four sites is monitored monthly, and density is measured biannually. **Table C-3** in **Appendix C** summarizes SFWMD biological monitoring at basin stations, and further information on this monitoring and associated data results is reported in the *2017 South Florida Environmental Report* – Volume I, Chapter 8C. DEP continues to carry out seagrass monitoring in the basin at the stations listed in **Table C-4** in **Appendix C**.

2.3.3 Water Quality Evaluation

To help track implementation progress for the Caloosahatchee BMAP, a water quality evaluation was completed using data available as of May 31, 2017. As part of the recommended revisions in **Section 3.3**, stations in the BMAP monitoring network are prioritized into three tiers (Tier 1, Tier 2 and Tier 3) based on their importance for tracking water quality in the basin throughout BMAP implementation. In addition to the revised tier system, all stations are assigned a general location in the BMAP area: estuary, tributary or bay. This water quality evaluation is based on these recommended revisions to the monitoring network, and all references in this section and **Appendix E** refer to the revised network.

STORET has served as the primary repository of ambient water quality data for the state, and in 2017, the primary repository of ambient water quality data for DEP transitioned to WIN. For these analyses, most data were available in STORET and some data were obtained from WIN. Only recommended Tier 1 stations were included in this water quality evaluation, based on the higher level of data availability (i.e., the number of data points within a year and the number of years of data available) and sampling frequency compared with the Tier 2 and Tier 3 stations. The Tier 2 or 3 stations may be used as part of other future efforts once sufficient data become available.

Since this evaluation considers trends during a specified period of record (POR), the POR was selected to best represent the time frame when a majority of the implementation activities were completed. Projects completed on or after January 1, 2000, were given credit in this BMAP, and a majority of projects were completed after 2006. To include these activities and ensure a sufficient data period to perform trend analyses for this first 5-Year Review, an overall POR from May 1, 2007, to April 30, 2017 (Water Year 2008 to Water Year 2017) was established. Evaluating data on a Water Year basis follows the standard practice used by other coordinating agencies and allows for more consistent reporting in the Caloosahatchee Watershed. As subsequent analyses are conducted, the beginning of the overall POR for those analyses will be May 1, 2007. As additional data become available, the results of the analysis may change, and improvements to the process may be appropriate.

Trend analyses were conducted as part of the 5-Year Review to track changes in individual tributaries in the Tidal Caloosahatchee Watershed and in the impaired Caloosahatchee Estuary WBIDs (**Figure 2**). The results from the water quality trend analyses for select stations and WBIDs are described below, and **Appendix E** describes the methods used to retrieve, process and analyze the data.

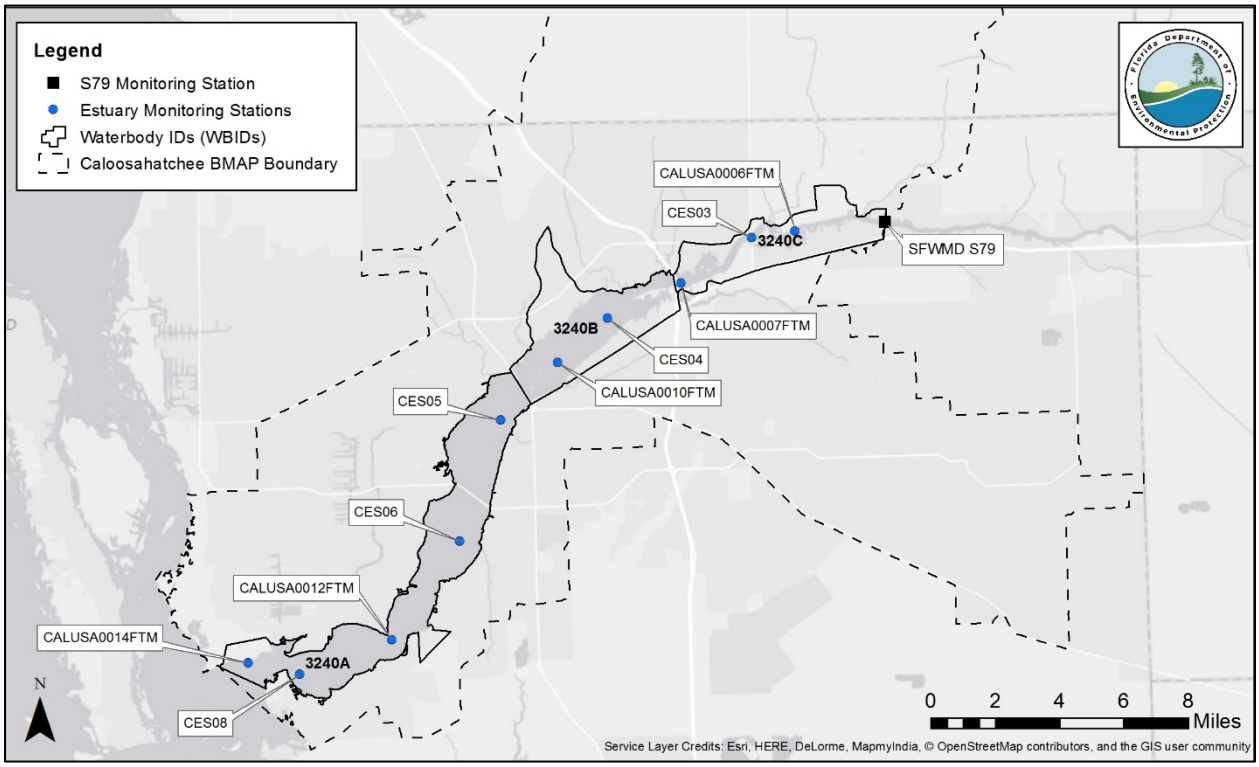

Figure 2. Monitoring stations in the Caloosahatchee Estuary WBIDs

Mann-Kendall Trend Results for Individual Stations

Tables 9 and **10** and **Figures 3** and **4** summarize the trend analysis results of Mann-Kendall tests for TN and TP, respectively, for individual stations. In addition, the tables list the potential for seasonal patterns that may affect the trend analysis result. It should be noted that even if the p-value is statistically significant (less than 0.05), the result may not be ecologically significant. For example, if a trend is found to be significantly declining (negative trend), but the slope is near 0, then it may not be realistic to assume an improvement in water quality that may have a measurable ecological effect in any reasonable time frame (i.e., years to decades).

When potential seasonality patterns were observed from the autocorrelation function (ACF) analysis, then the gap-filled and seasonally adjusted trend data were used for trend analyses. If the converse were true, where no obvious seasonality pattern was observed from the ACF analysis, then the nongap-filled and nondecomposed data were used for trend analysis, referred to as the "nondecomposed" datasets. This is an important consideration when performing trend analyses,

since the two datasets are quite different, and a false positive or false negative significance value could result if the incorrect dataset is used for trend analysis.

Of the 20 stations analyzed for TN, none had statistically significant increasing trends, 3 had statistically significant decreasing trends, and 17 stations showed no statistically significant trends. Of the 14 stations analyzed for TP, 1 had a statistically significant increasing trend, 3 had statistically significant decreasing trends, and 10 stations showed no statistically significant trends.

Mann-Kendall Trend Results for Estuary WBIDs

Tables 11 and **12** summarize the Mann-Kendall trend analysis results for TN and TP concentrations for the Caloosahatchee Estuary WBIDs and Station S79, respectively. Of the three estuary WBIDs, none had statistically significant trends for TN, while all three had statistically significant decreasing trends for TP. Station S79 did not have a statistically significant trend for TN and had a statistically significant decreasing trend for TP.

In addition to trend analysis, the time series for the estuary WBIDs were compared with the individual estuary station, S79, as shown in **Figures 5** and **6**. The results from the comparison of time series of the estuary WBIDs and Station S79 show that Station S79 has had higher TN concentrations than the other WBIDs since at least 2014, although most of the datasets seem to have similar patterns. WBID 3240B had one very high value for TN and TP that may have been an outlier. The outliers were not removed, since Mann-Kendall analyses are not affected by outliers.

Table 9. Summary of Mann-Kendall trend analysis results for TN concentrations at tributary stations

Note: P-values listed in bold indicate statistical significance ($p<0.05$).
mg/L = Milligrams per liter.
[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) but the slope is near 0, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. Based on the review of ACF and time series decomposition (TSD) results.
[2] A negative trend indicates a downward or decreasing trend, which may suggest an improvement in water quality. The opposite is true for a positive trend, which may indicate an increase and possibly a decline in water quality.
[3] Based on the review of ACF and TSD analysis results.
[4] If "Decomposed," then a potential seasonality pattern was observed from the ACF and/or TSD results. Therefore, gap-filled, seasonally adjusted, decomposed trend data were used for the trend analyses.
[5] If "Nondecomposed," then no obvious seasonality pattern was observed; therefore, a regular processed dataset (not gap-filled or decomposed) was used for the trend analyses.
[6] If "Nondecomposed*" or "Decomposed" series contained serial correlation, the slope was calculated with the initial series. First order differencing was applied to remove serial correlation, and the *italicized tau* and *p-values* were calculated from the resulting series.

Station	Parameter	Tau[6]	P-value[6]	Slope[1]	Statistical Trend Test Interpretation[2]	Data Series Used[3, 4, 5, 6]
300	TN (mg/L)	*-0.034*	*0.609*	-0.0430	No significant trend	Nondecomposed*
400	TN (mg/L)	*-0.017*	*0.799*	-0.0346	No significant trend	Nondecomposed*
470	TN (mg/L)	*-0.026*	*0.698*	-0.0027	No significant trend	Nondecomposed*
540	TN (mg/L)	*-0.022*	*0.755*	-0.0333	No significant trend	Nondecomposed*
590	TN (mg/L)	*-0.057*	*0.398*	0.0000	No significant trend	Nondecomposed*
600	TN (mg/L)	*-0.064*	*0.372*	0.0000	No significant trend	Nondecomposed*
22-7GR	TN (mg/L)	-0.073	0.266	-0.0121	No significant trend	Decomposed
16-3GR	TN (mg/L)	-0.083	0.203	-0.0068	No significant trend	Decomposed
20-9GR	TN (mg/L)	-0.196	**0.003**	-0.0294	Negative significant trend	Decomposed
23-5GR	TN (mg/L)	0.043	0.509	0.0052	No significant trend	Decomposed
24-7GR	TN (mg/L)	-0.061	0.354	-0.0087	No significant trend	Decomposed
27-6GR	TN (mg/L)	-0.056	0.391	-0.0088	No significant trend	Decomposed
POWLGR20	TN (mg/L)	-0.164	**0.012**	-0.0273	Negative significant trend	Decomposed
18-6GR	TN (mg/L)	*-0.014*	*0.856*	0.0192	No significant trend	Nondecomposed*
25-GR20	TN (mg/L)	*-0.013*	*0.871*	0.0471	No significant trend	Nondecomposed*
27O-GR20	TN (mg/L)	-0.231	< **0.001**	-0.0396	Negative significant trend	Decomposed
CALUSA0024FTM	TN (mg/L)	0.044	0.581	0.0037	No significant trend	Decomposed
CALUSA0025FTM	TN (mg/L)	-0.020	0.808	0.0000	No significant trend	Nondecomposed
DEEPGR10	TN (mg/L)	*-0.012*	*0.861*	-0.0086	No significant trend	Nondecomposed*
BILLGR20	TN (mg/L)	*-0.012*	*0.859*	-0.0473	No significant trend	Nondecomposed*

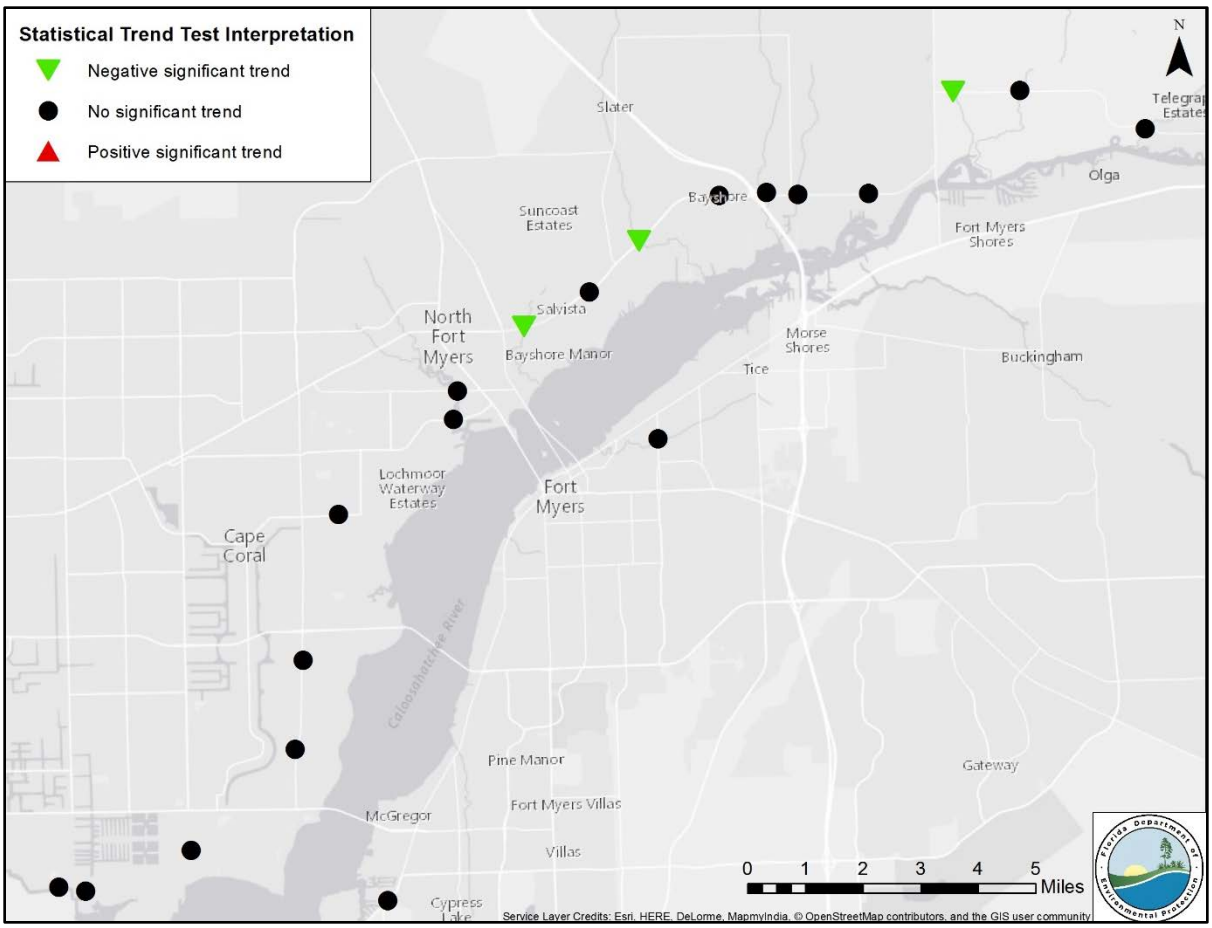

Figure 3. Trend analysis results for TN concentrations at tributary stations

Table 10. Summary of Mann-Kendall trend analysis results for TP concentrations at tributary stations

Note: P-values listed in bold indicate statistical significance ($p<0.05$).
mg/L = Milligrams per liter.
[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) but the slope is near 0, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. Based on the review of ACF and TSD results.
[2] A negative trend indicates a downward or decreasing trend, which may suggest an improvement in water quality. The opposite is true for a positive trend, which may indicate an increase and possibly a decline in water quality.
[3] Based on the review of ACF and TSD results.
[4] If "Decomposed," then a potential seasonality pattern was observed from the ACF and/or TSD analysis. Therefore, gap-filled, seasonally adjusted, decomposed trend data were used for the trend analyses.
[5] If "Nondecomposed," then no obvious seasonality pattern was observed; therefore, a regular processed dataset (not gap-filled or decomposed) was used for the trend analyses.
[6] If "Nondecomposed*" or "Decomposed" series contained serial correlation, the slope was calculated with the initial series. First order differencing was applied to remove serial correlation, and the *italicized tau* and *p-values* were calculated from the resulting series.

Station/WBID	Parameter	Tau[6]	P-value[6]	Slope[1]	Statistical Trend Test Interpretation[2]	Data Series Used[3, 4, 5, 6]
22-7GR	TP (mg/L)	0.042	0.551	0.0003	No significant trend	Nondecomposed
16-3GR	TP (mg/L)	-0.121	0.063	-0.0016	No significant trend	Decomposed
20-9GR	TP (mg/L)	-0.129	**0.047**	-0.0026	Negative significant trend	Decomposed
23-5GR	TP (mg/L)	-0.052	0.427	-0.0013	No significant trend	Decomposed
24-7GR	TP (mg/L)	-0.396	< **0.001**	-0.0061	Negative significant trend	Decomposed
27-6GR	TP (mg/L)	0.036	0.583	0.0005	No significant trend	Nondecomposed
POWLGR20	TP (mg/L)	-0.058	0.384	-0.0028	No significant trend	Nondecomposed
18-6GR	TP (mg/L)	*0.038*	*0.615*	-0.0051	No significant trend	Nondecomposed*
25-GR20	TP (mg/L)	-0.348	< **0.001**	-0.0095	Negative significant trend	Decomposed
27O-GR20	TP (mg/L)	-0.100	0.128	-0.0006	No significant trend	Decomposed
CALUSA0024FTM	TP (mg/L)	0.009	0.911	0.0001	No significant trend	Decomposed
CALUSA0025FTM	TP (mg/L)	0.305	< **0.001**	0.0038	Positive significant trend	Decomposed
DEEPGR10	TP (mg/L)	0.030	0.646	0.0001	No significant trend	Decomposed
BILLGR20	TP (mg/L)	*0.006*	*0.925*	0.0000	No significant trend	Nondecomposed*

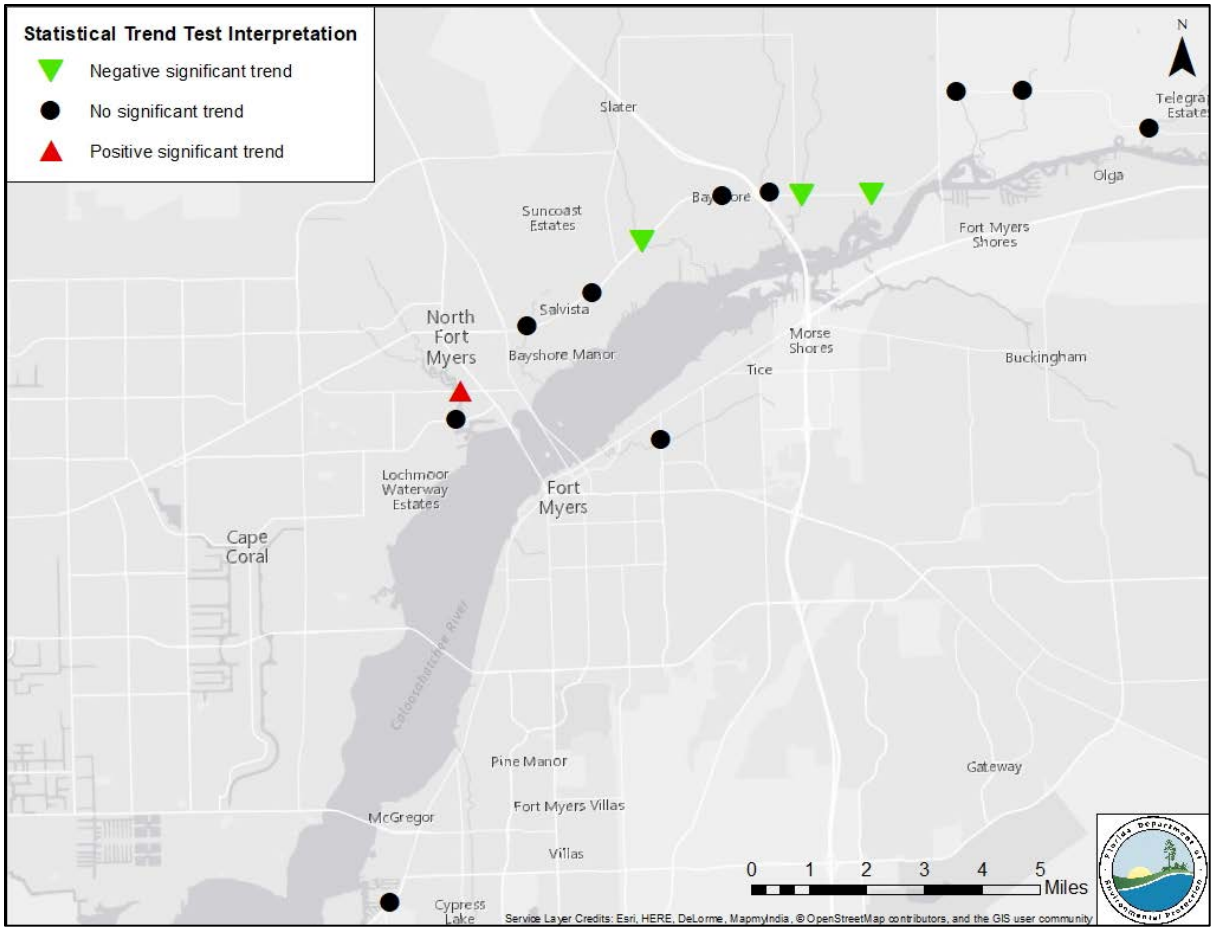

Figure 4. Trend analysis results for TP concentrations at tributary stations

Table 11. Summary of Mann-Kendall trend analysis results for TN concentrations in Caloosahatchee Estuary WBIDs and at Station S79

mg/L = Milligrams per liter.
[1] Even if the P-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) but the slope is near 0, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. Based on the review of ACF and TSD results.
[2] A negative trend indicates a downward or decreasing trend, which may suggest an improvement in water quality. The opposite is true for a positive trend, which may indicate an increase and possibly a decline in water quality.
[3] Based on the review of ACF and TSD results.
[4] If "Decomposed," then a potential seasonality pattern was observed from the ACF and/or TSD analysis. Therefore, gap-filled, seasonally adjusted, decomposed trend data were used for the trend analyses.
[5] If "Nondecomposed," then no obvious seasonality pattern was observed; therefore, a regular processed dataset (not gap-filled or decomposed) was used for the trend analyses.
[6] If "Nondecomposed*" or "Decomposed" series contained serial correlation, the slope was calculated with the initial series. First order differencing was applied to remove serial correlation, and the *italicized tau* and *p-values* were calculated from the resulting series.

Station/ WBID	Parameter	Tau[6]	P-value[6]	Slope[1]	Statistical Trend Test Interpretation[2]	Data Series Used[3, 4, 5, 6]
3240A	TN (mg/L)	0.058	0.351	0.0030	No significant trend	Decomposed
3240B	TN (mg/L)	-0.039	0.561	-0.0051	No significant trend	Nondecomposed
3240C	TN (mg/L)	*0.013*	*0.840*	-0.0262	No significant trend	Nondecomposed*
S79	TN (mg/L)	*0.013*	*0.862*	-0.0145	No significant trend	Nondecomposed*

Table 12. Summary of Mann-Kendall trend analysis results for TP concentrations in Caloosahatchee Estuary WBIDs and at Station S79

Note: P-values listed in bold indicate statistical significance ($p<0.05$).
mg/L = Milligrams per liter.
[1] Even if the p-value is determined to be statistically significant, the result may not be ecologically significant. For example, if a trend is statistically significantly declining (negative trend) but the slope is near 0, then it may not be realistic to assume that an improvement in water quality by reductions in TN or TP may positively impact the ecological system in a measurable way. Based on the review of ACF and TSD analysis results.
[2] A negative trend indicates a downward or decreasing trend, which may indicate an improvement in water quality. The opposite is true for a positive trend, which may indicate an increase and possibly a decline in water quality.
[3] Based on the review of ACF and TSD analysis results.
[4] If "Decomposed," then a potential seasonality pattern was observed from the ACF and/or TSD analysis. Therefore, gap-filled, seasonally adjusted, decomposed trend data were used for the trend analyses.

Station/WBID	Parameter	Tau	P-value	Slope[1]	Statistical Trend Test Interpretation[2]	Data Series Used[3, 4]
3240A	TP (mg/L)	-0.273	< **0.001**	-0.0015	Negative significant trend	Decomposed
3240B	TP (mg/L)	-0.725	< **0.001**	-0.0095	Negative significant trend	Decomposed
3240C	TP (mg/L)	-0.633	< **0.001**	-0.0105	Negative significant trend	Decomposed
S79	TP (mg/L)	-0.428	< **0.001**	-0.0063	Negative significant trend	Decomposed

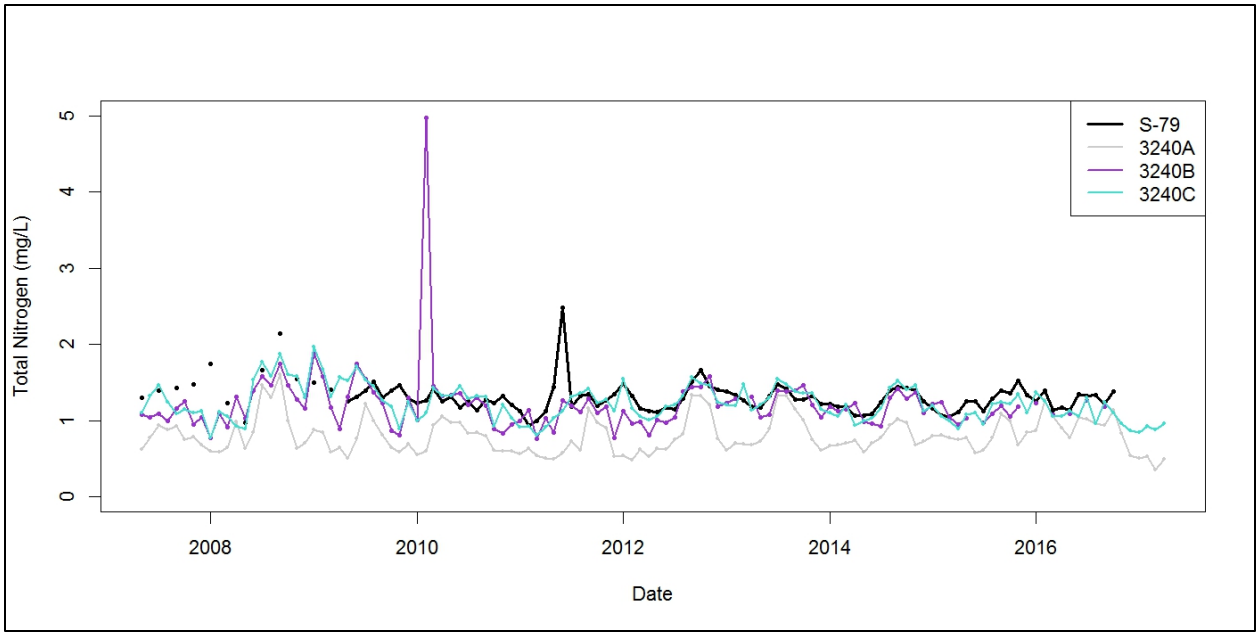

Figure 5. Comparison of TN time series for estuary WBIDs and Station S79

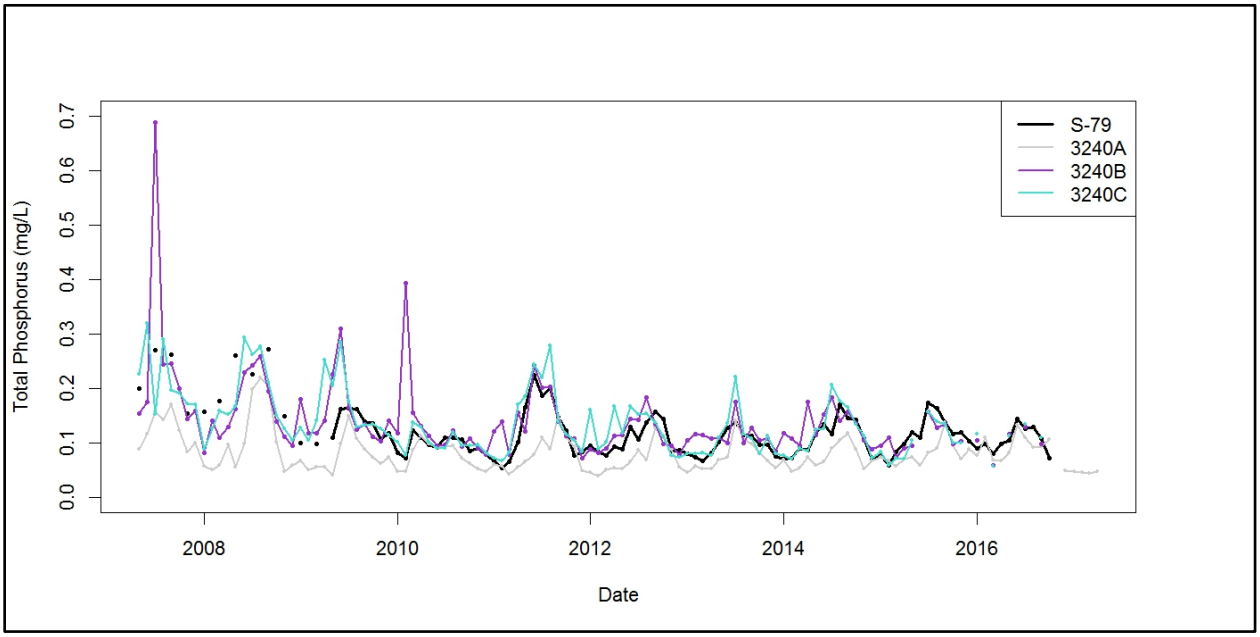

Figure 6. Comparison of TP time series for estuary WBIDs and Station S79

Chapter 3: Recommendations

The BMAP implements phased TN reductions according to Section 403.067(7)(a)1., F.S., for the portion of loading generated in the Tidal Caloosahatchee Basin, downstream of S-79. The purpose of this 5-Year Review is to evaluate implementation activities that have taken place during the first 5-year phase. The recommendations included here are for future implementation activities that may be incorporated into a revised BMAP and adopted by Secretarial Order.

This first phase included significant restoration efforts by stakeholders, and the implementation process will continue in order to help meet the TMDL. The projects and other activities, collected through stakeholder participation, are estimated to achieve TN reductions of 218,542 lbs/yr (or 56 percent) by the end of the first 5-year phase. The milestones described here were developed in collaboration with stakeholders through the submission of project information.

DEP is also currently reviewing the assigned allocations to determine what changes are appropriate to reflect anticipated updated modeling results. DEP and participating stakeholders also recommend revisions to the BMAP monitoring network to help prioritize monitoring resources and improve the way in which progress is tracked.

3.1 Milestones

The Caloosahatchee Estuary BMAP is governed by Section 373.4595, F.S., as a part of the Northern Everglades and Estuaries Protection Program (NEEPP). Section 373.4595(4)(b), F.S., states:

> *"The department shall develop an implementation schedule establishing 5-year, 10-year, and 15-year measurable milestones and targets to achieve the total maximum daily load no more than 20 years after adoption of the plan. The initial implementation schedule shall be used to provide guidance for planning and funding purposes and is exempt from chapter 120. Upon the first 5-Year Review, the implementation schedule shall be adopted as part of the plans. If achieving the total maximum daily load within 20 years is not practicable, the implementation schedule must contain an explanation of the constraints that prevent achievement of the total maximum daily load within 20 years, an estimate of the time needed to achieve the total maximum daily load, and additional 5-year measurable milestones, as necessary."*

The 5-Year Review summarizes and documents information related to the assessment of progress and allows for stakeholder involvement in the methods of assessing progress and revising the BMAP as appropriate. The projects and activities in the BMAP are key to reducing TN in the estuary. The estimated benefits of these implemented activities should be tracked to show stakeholder efforts by determining a percentage toward the total required reductions that should be achieved at each milestone. These project reduction estimates are based on the same simulated

loads generated for the TMDL. To meet TMDL reductions within 20 years of BMAP adoption, the following percent reduction goals are proposed for each milestone:

- 5-year milestone (Years 1 to 5, including projects completed after 2000): 50 percent or 194,360 lbs/yr TN.
- 10-year milestone (Years 6 to 10): 80 percent or 310,975 lbs/yr TN.
- 15-year milestone (Years 11 to 15): 95 percent or 369,283 lbs/yr TN.

Of the 88 projects submitted toward the 5-year milestone, 73 have been completed, for a total estimated reduction of 218,542 lbs/yr TN (**Figure 7**). Fifteen projects were submitted for completion by the 10-year milestone for the Caloosahatchee Estuary BMAP. Of those submitted projects, 8 were quantified, with estimated reductions totaling 93,629 lbs/yr TN (a cumulative 10-year total of 312,171 or 80 percent). Two projects were submitted for completion by the 15-year milestone.

Sufficient information regarding the estimated reductions for these projects has not been identified but will be included in future reports. During the annual review of BMAP implementation efforts, project-specific information may be revised and updated, resulting in changes to the estimated reductions for those projects. The revisions may increase or decrease estimated reductions, and DEP will work with stakeholders to address revisions as they are identified. **Appendix B** contains more information on the funding status of these future projects.

Projects included in this review are necessary components for restoration in the basin. **Section 3.2** discusses the current efforts toward the application of the HSPF and Environmental Fluid Dynamics Code (EFDC) models in the basin that may lead to future revisions of the detailed stakeholder allocations. Many projects are not far enough along in their development to quantify TN reductions or to have obtained full funding when this review was published. Based on the current and future project information provided by stakeholders, DEP anticipates that it is practicable to achieve reductions sufficient to meet the TMDL within 20 years.

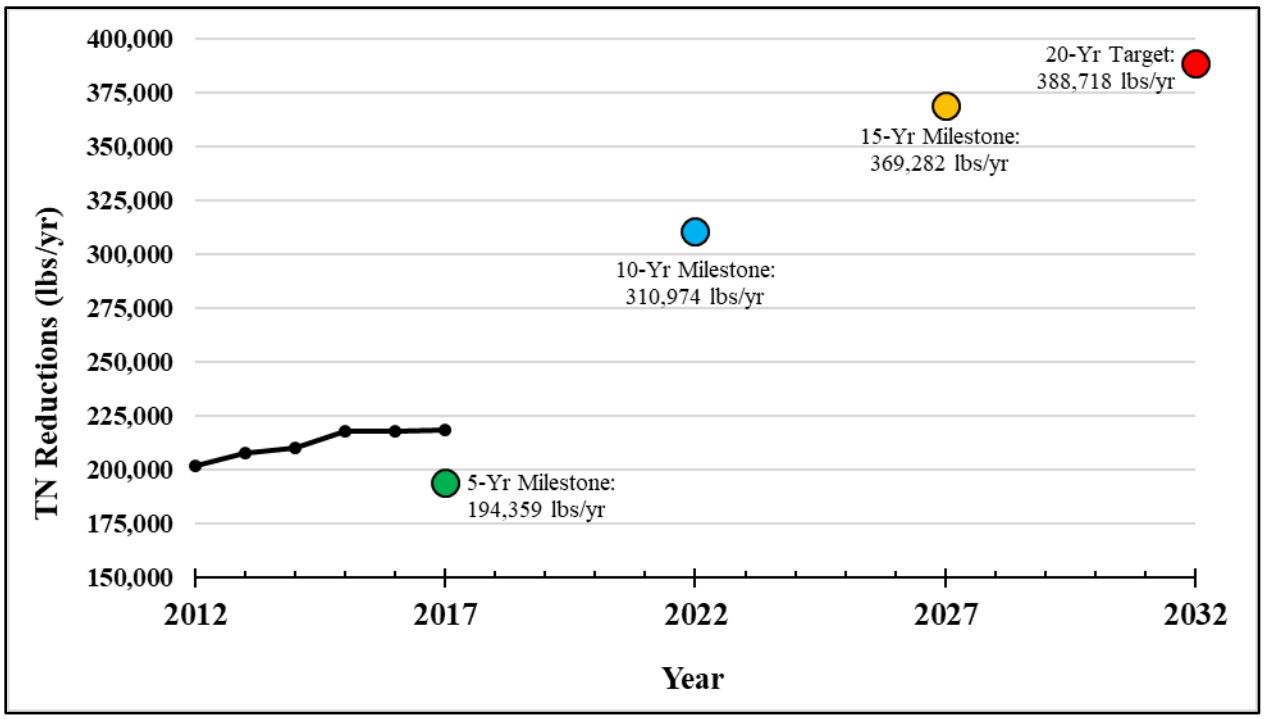

Figure 7. Estimated progress toward the Caloosahatchee Estuary BMAP milestones

3.2 Modeling and Allocations

During the BMAP process, several items were identified that should be addressed in future implementation phases for the consideration of the load reductions for stakeholders below S-79 to ensure that the most accurate information is used in future BMAPs. DEP has agreed to update the TMDL model or evaluate whether this is necessary in the next BMAP phase (Years 6 through 10). To begin this evaluation, DEP's TMDL Program has been leading discussions with stakeholders regarding model refinement and the path forward in the Caloosahatchee Watershed. In May 2017, DEP produced an initial report on the preliminary model results and incorporated stakeholder feedback into the model simulations.

The HSPF model (**Figure 8**) has been used to simulate overland processes and stream geochemistry in the Caloosahatchee Watershed. DEP is currently working on a focused HSPF model to investigate causative pollutant(s) and the path forward for TMDLs in impaired tributaries in the East Caloosahatchee, West Caloosahatchee and S-4 Basins.

The EFDC model (**Figure 9**) has been used to simulate three-dimensional hydrodynamics and estuary geochemistry in the Caloosahatchee Estuary, and EFDC (paired with HSPF) is being used to evaluate whether an update to the estuary TMDL is necessary. In response to stakeholder feedback, additional model versions were developed following the May 2017 report. DEP and stakeholders are currently working together to decide on the most appropriate EFDC model scenarios and a path forward for the estuary TMDL.

The revised HSPF and EFCD models have been improved with additional data and input provided by stakeholders. Based on the outcome of the modeling applications in the Caloosahatchee Watershed and Estuary, adjustments to the detailed allocations and the BMAP boundary may be appropriate for continued restoration. It is recommended that the model refinements be completed prior to adopting allocation or boundary changes into a revised BMAP.

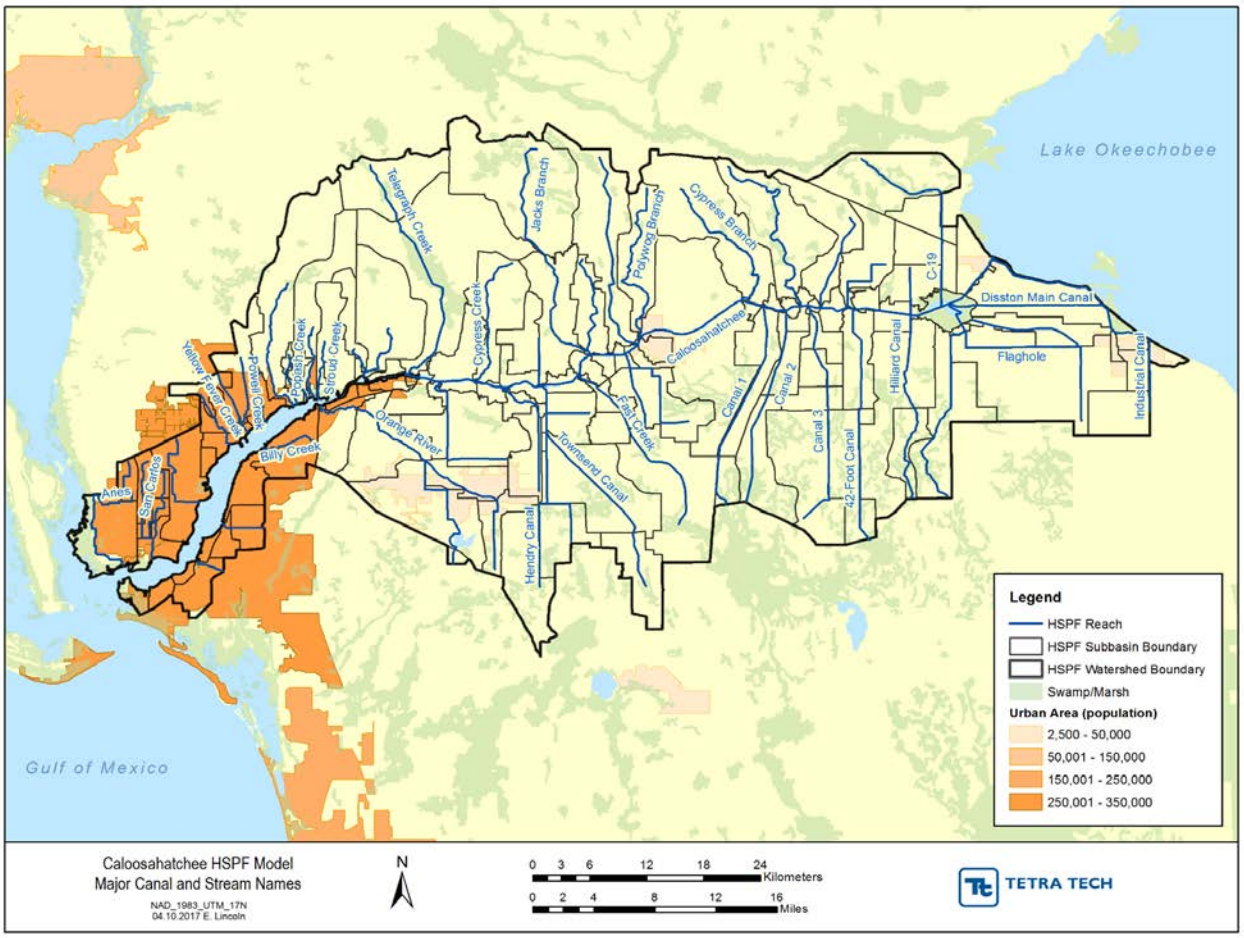

Figure 8. 2017 HSPF model extent

Figure 9. 2017 EFDC model grid

3.3 Water Quality Monitoring

The 5-Year Review of the Caloosahatchee Estuary BMAP provides an opportunity to improve key components of the plan and make further progress to achieve the TMDL. DEP and participating stakeholders recommend revising the adopted BMAP monitoring network to help prioritize monitoring and track BMAP progress. Recommendations for the monitoring network include implementing a new tier system for the sampling stations, adding or removing several stations, and transitioning the primary repository of ambient water quality data to WIN. The proposed changes will go into effect once a revised BMAP is adopted by DEP's Secretary.

3.3.1 Revised Tier System

The following revisions to the tier system are recommended:

1. Tier 1 stations will be the primary/priority stations used to track BMAP progress over the long term. If at any point it is necessary to reduce efforts in the basin, these stations should be the last stations impacted.

2. Tier 2 stations can be used for regional analyses or other secondary analyses.

3. Tier 3 stations are owned by the U.S. Geological Survey (USGS) or the Sanibel-Captiva Conservation Foundation (SCCF). Data from these stations are not expected to be uploaded into STORET/WIN and can be used for other purposes as designated by DEP.

In addition to the revised tier system, all stations will be assigned a general location in the BMAP area. This location will be used to sort stations during water quality evaluations. Stations in the estuary WBIDs (3240A, 3240B and 3240C) will be designated as "Estuary" stations. Monitoring sites located in tributaries in the Tidal Caloosahatchee Basin will be designated as "Tributary" stations. Stations outside the BMAP boundary and in San Carlos Bay will be designated as "Bay" stations.

Specific recommended changes include the following:

- Adding the CALUSA0006FTM, CALUSA0007FTM and CALUSA0010FTM stations to the Tier 1 class as soon as sufficient TN data and POR are available.

- Replacing the CALUSA0023FTM station, which is used to monitor a portion of the Orange River, with CALUSA0054FTM.

- Removing the CALUSA0009FTM and CALUSA0011FTM stations, which are near SFWMD Tier 1 Stations CES04 and CES05, respectively.

- Changing the CES03 station's classification to Tier 1 to capture temporal changes in that segment of the Caloosahatchee River.

- Incorporating LA-MSID Stations 22 and 27 into the revised monitoring network in Tier 2. These stations collect data in the BMAP area for many of the core parameters listed in the BMAP. LA-MSID Stations 11, 14 and 15 are outside the current BMAP boundary but can be incorporated as Tier 2 stations as they are in the Caloosahatchee Watershed and may provide pertinent data.

If the recommended revisions to the BMAP monitoring network are implemented, TN concentrations will be monitored at 99 stations: 22 in the Caloosahatchee Estuary, 68 in the tributaries and 9 in San Carlos Bay. **Appendix C** contains details on the adopted and recommended Caloosahatchee Estuary BMAP monitoring networks.

DEP impaired waters assessments have been based on water quality data from STORET, which served as the primary repository of ambient water quality data for the state until 2017. Ambient water quality data collected as part of the BMAP were uploaded into STORET for long-term storage and availability by BMAP stakeholders, who agreed to upload ambient water quality data to STORET at least once every six months, upon completion of the appropriate QA/QC checks. In 2017, the primary repository of ambient water quality data for DEP transitioned to WIN. Along with the revisions to the monitoring network, a revised BMAP should update data provider expectations and commitments to WIN.

3.3.2 Recommended Additional Monitoring

The Caloosahatchee Estuary TMDL is calculated as a load, combining concentration and flow data. Flow monitoring is currently being performed at two locations in the BMAP area: USGS at Whiskey Creek and SFWMD at S-79. To better track progress in load reductions in the tributaries, flow monitoring stations should be installed in additional estuarine tributaries. The level of effort necessary to track progress in load reductions is still to be determined, and additional monitoring is contingent upon the availability of funding. Also, the specific entities conducting the recommended monitoring have not been identified at this time.

Data from ongoing modeling efforts were reviewed to identify tributaries with the highest volumes contributing to the Caloosahatchee Estuary. Discharge data from USGS stations were available for a period of 6.5 years and were reviewed to compare discharge rates in 5 tributaries. Based on simulated (**Figure 10**) and historical measured data (**Figure 11**), tributaries with the highest flows to the estuary are Orange River and Telegraph Creek. Therefore, DEP recommends monitoring flow on these tributaries, at a minimum (**Figure 12**).

In addition to monitoring the tributaries with high flows, monitoring flow at sites representative of various land use types or conditions is recommended. Specifically, installing a flow monitoring site in Popash Creek is recommended because of its physical characteristics and combination of land uses. The Popash Creek and Telegraph Creek sites would provide information about

agricultural areas. Sites in the South Spreader Canal and either Manuel Branch or Billy Creek would provide information about areas with primarily urban land use.

Funding estimates for new flow monitoring stations are currently being obtained and evaluated, and preliminary estimates indicate costs of approximately $15,000 per station annually. Funding sources and lead agencies for this monitoring have not yet been identified.

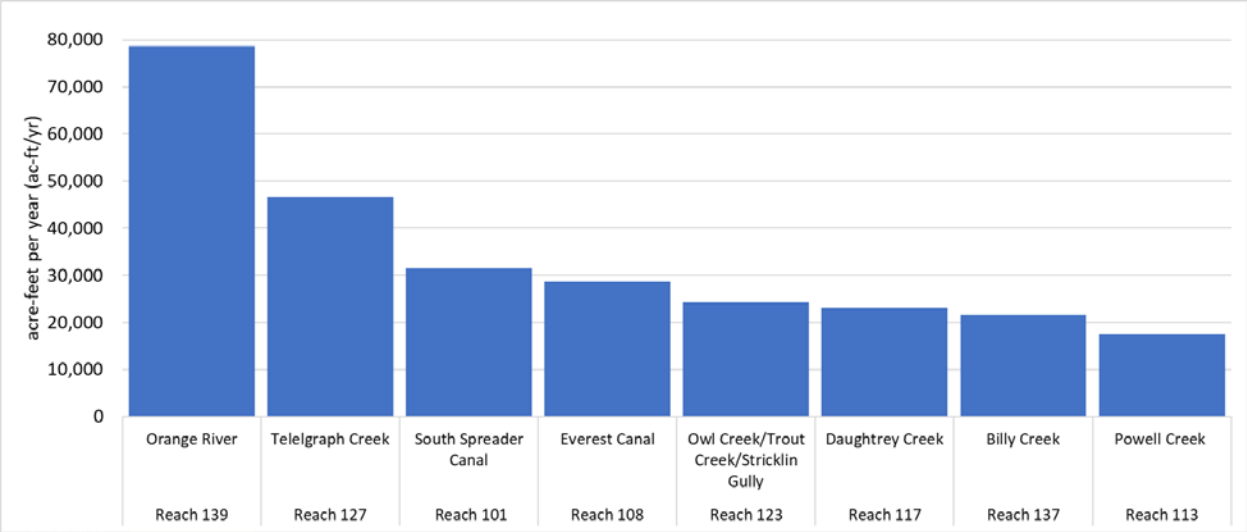

Figure 10. Highest HSPF-simulated volumes for Caloosahatchee Estuary tributaries, 1997–2014

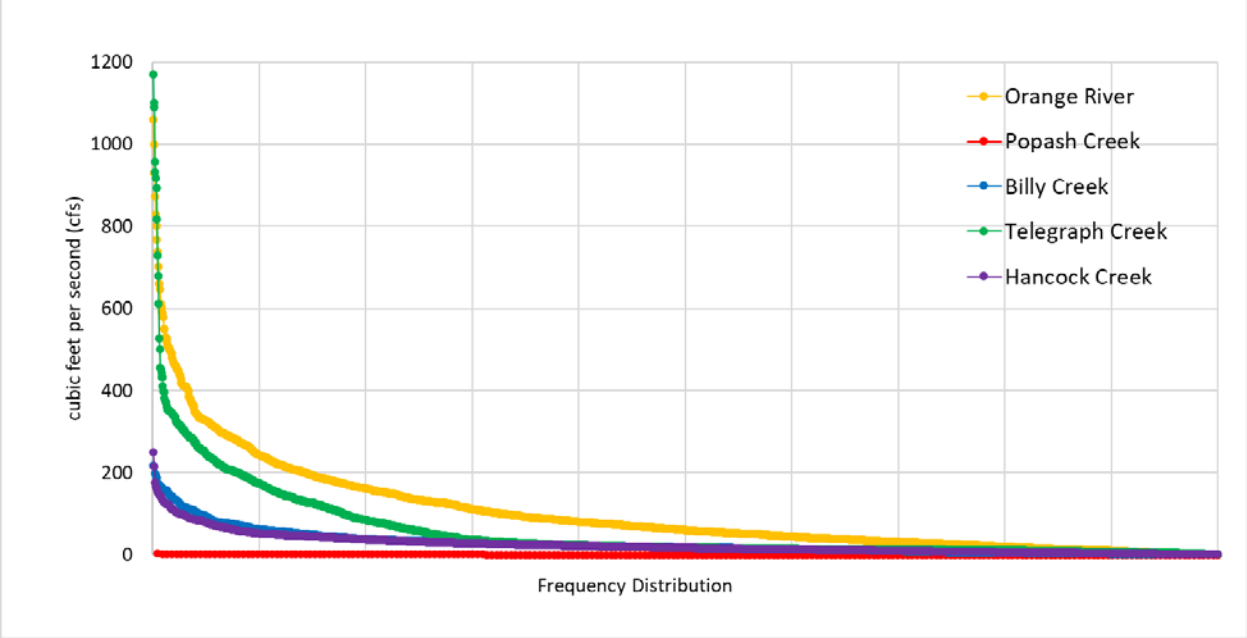

Figure 11. Frequency distribution of daily mean discharge (tidally filtered) at USGS stations, 2007–13

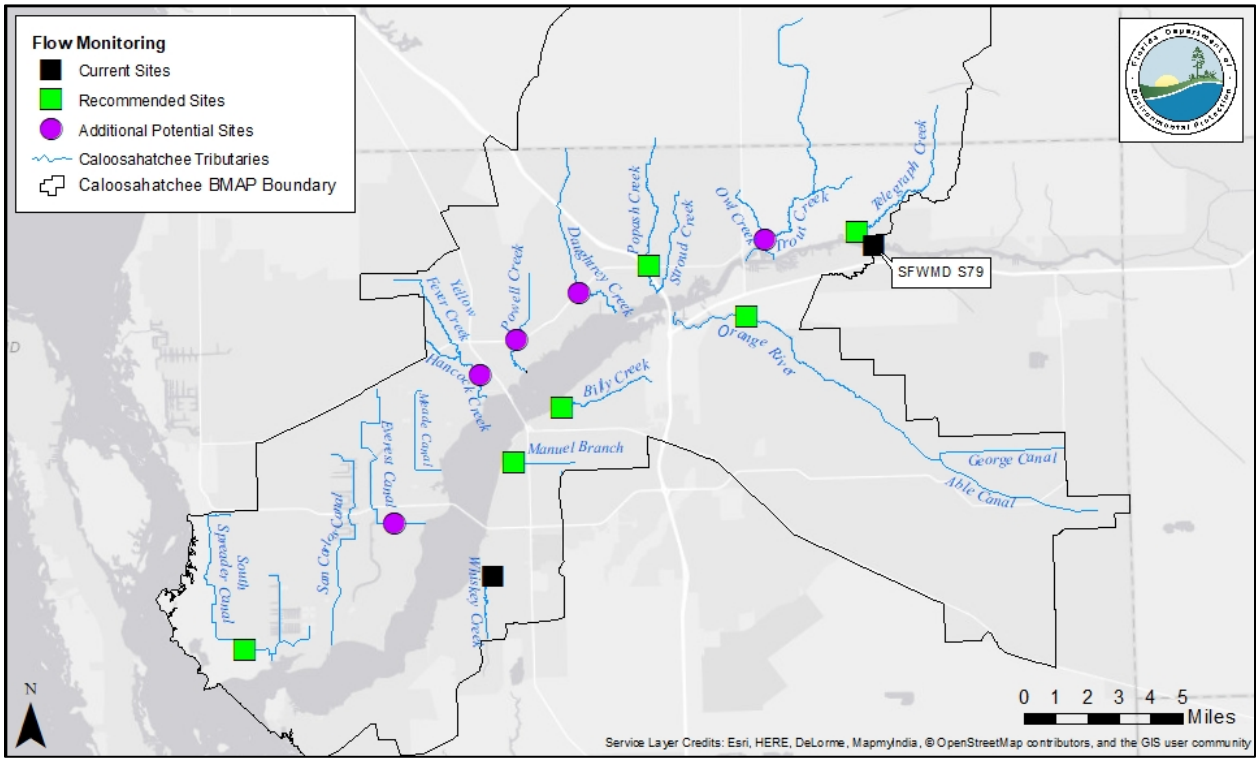

Figure 12. Current and recommended flow monitoring locations

Appendices

Appendix A: BMAP Projects

The tables in this appendix list the implementation status of the BMAP projects as of May 31, 2017. The tables list the nitrogen reduction (in lbs/yr) attributable to each individual project. These projects were submitted to provide reasonable assurance to DEP that each entity has a plan on how to meet its allocation. However, the list of projects is meant to be flexible enough to allow for changes that may occur over time. During the annual review of BMAP implementation efforts, project-specific information may be revised and updated, resulting in changes to the estimated reductions for those projects. The revisions may increase or decrease estimated reductions, and DEP will work with stakeholders to address revisions as they are identified.

The project status column is standardized into four categories: planned, underway, completed and canceled. Definitions for the four categories are as follows:

- **Canceled**: Project or activity that was planned but will no longer take place. This includes the cessation of ongoing activities.
- **Completed**: Project, activity or task that is finished. This includes fully implemented activities (i.e., ongoing activities) that must continue indefinitely to maintain assigned credits (such as street sweeping, BMP cleanout, catch basin cleanout, public education, fertilizer cessation/reduction and vegetation harvesting).
- **Planned**: Project or activity that is conceptual or proposed.
- **Underway**: Project or activity that has commenced or initiated, but is not completed and is not yet reducing nutrient loads from the treated area.

Prior to reporting project information, DEP contacts each lead entity to gather new information on projects and confirm previously reported information. The terms used throughout the project tables are defined as follows:

- **Information not provided**: Denotes that information was requested by DEP but was not provided by the lead entity.
- **TBD**: To be determined. Denotes that information is not currently available but will be provided by the stakeholder when it is available.
- **N/A**: Not applicable. Denotes that information for that category is not relevant to that project.
- **0**: Zero. Denotes the numeric value for that category as zero.

These project tables are based on current information, and as further information becomes available project details may be updated.

Table A-1. Charlotte County projects

O&M = Operations and maintenance
N/A = Not applicable

Completion Date	Project Number	Project Name	Description	Project Type	Project Status	Acres Treated	TN Reduction (lbs/yr)	DEP Contract Agreement Number	Cost	Cost Annual O&M	Funding Source	Partners
Prior to 2012	**CH-01**	Education Efforts	Florida Yards and Neighborhoods (FYN) Program, landscaping ordinance, irrigation ordinance, fertilizer ordinance, pamphlets, public service announcements (PSAs), website, inspection/illicit discharge program.	Education Efforts	Completed	N/A	381	N/A	Information not provided	Information not provided	Information not provided	Information not provided

Total Project Reduction = 381 lbs/yr

Total TN Reduction Required = 943 lbs/yr

Table A-2. City of Cape Coral projects

[1] Projects were listed but had unproven credit.
O&M = Operations and maintenance; N/A = Not applicable

Completion Date	Project Number	Project Name	Description	Project Type	Project Status	Acres Treated	TN Reduction (lbs/yr)	DEP Contract Agreement Number	Cost	Cost Annual O&M	Funding Source	Partners
N/A	**CC-01**	Education Efforts	FYN, landscaping ordinance, irrigation ordinance, fertilizer ordinance, pet waste ordinance, pamphlets, PSAs, website, illicit discharge program.	Education Efforts	Completed	N/A	15,429	N/A	N/A	$2,000	Cape Coral	University of Florida Institute of Food and Agricultural Sciences (IFAS)
Prior to 2012	**CC-02**	SE-1 Swale/Inlet Replacement	Installed raised inlets to provide additional water quality in roadside swales.	Grass Swales with Swale Blocks or Raised Culverts	Completed	Information not provided	0	N/A	Information not provided	Information not provided	Cape Coral	N/A
Prior to 2012	**CC-03**	SW-1 Swale/Inlet Replacement	Installed raised inlets to provide additional water quality in roadside swales.	Grass Swales with Swale Blocks or Raised Culverts	Completed	Information not provided	0	N/A	Information not provided	Information not provided	Cape Coral	N/A
Prior to 2012	**CC-04**	SW-2 Swale/Inlet Replacement	Installed raised inlets to provide additional water quality in roadside swales.	Grass Swales with Swale Blocks or Raised Culverts	Completed	Information not provided	0	N/A	Information not provided	Information not provided	Cape Coral	N/A
Prior to 2012	**CC-05**	SW-3 Swale/Inlet Replacement	Installed raised inlets to provide additional water quality in roadside swales.	Grass Swales with Swale Blocks or Raised Culverts	Completed	Information not provided	0	N/A	Information not provided	Information not provided	Cape Coral	N/A
Prior to 2012	**CC-06**	SW-4 Swale/Inlet Replacement	Installed raised inlets to provide additional water quality in roadside swales.	Grass Swales with Swale Blocks or Raised Culverts	Completed	Information not provided	0	N/A	Information not provided	Information not provided	Cape Coral	N/A
Prior to 2012	**CC-07**	SW-5 Swale/Inlet Replacement	Installed raised inlets to provide additional water quality in roadside swales.	Grass Swales with Swale Blocks or Raised Culverts	Completed	Information not provided	0	N/A	Information not provided	Information not provided	Cape Coral	N/A
Prior to 2012	**CC-08**	SE Pipe Replacement	SE pipe replacement.	Stormwater System Rehabilitation	Completed	Information not provided	0	N/A	Information not provided	Information not provided	Cape Coral	N/A
Prior to 2012	**CC-09**	Unit 23–SE 8th Street Drainage	Unit 23–SE 8th Street drainage.	Stormwater System Rehabilitation	Completed	Information not provided	0	N/A	Information not provided	Information not provided	Cape Coral	N/A
Prior to 2012	**CC-10**	Freshwater Canal Detention	Regulation of freshwater canals through existing control structures.	Control Structure	Completed	10,702	39,971	N/A	Information not provided	Information not provided	Cape Coral	N/A
Prior to 2012	**CC-11**	Freshwater Canal Irrigation	Pump stormwater stored in canals into irrigation supply network.	Stormwater Reuse	Completed	Information not provided	27,670	N/A	Information not provided	Information not provided	Cape Coral	N/A
Prior to 2012	**CC-12**	Weir #6 Elevation/ Basin 12	Installed riser on weir in freshwater canal system to provide	Control Structure	Completed	932	0	N/A	Information not provided	Information not provided	Cape Coral	N/A

Completion Date	Project Number	Project Name	Description	Project Type	Project Status	Acres Treated	TN Reduction (lbs/yr)	DEP Contract Agreement Number	Cost	Cost Annual O&M	Funding Source	Partners
			additional retention volume in canals.									
Prior to 2012	**CC-13**	Weir #1 Elevation/ Basin 15	Installed riser on weir in freshwater canal system to provide additional retention volume in canals.	Control Structure	Completed	1,314	0	N/A	Information not provided	Information not provided	Cape Coral	N/A
N/A	**CC-14**	Street Sweeping	Street sweeping of downtown area, alleys and commercial roads.	Street Sweeping	Completed	N/A	1,084	N/A	Information not provided	$360,000	Cape Coral	N/A
2015	**CC-15**	Septic to Sewer Phase Out Project	Phase out septic tanks in Southwest 6/7 area.	Wastewater Service Area Expansion	Completed	2,560	TBD	N/A	Information not provided	Information not provided	Cape Coral	N/A
2015	**CC-16**	Catch Basin Cleanout	Catch basin cleanouts from Caloosahatchee Watershed areas.	Catch Basin Insert/ Inlet Filter Cleanout	Completed	Information not provided	590	N/A	Information not provided	$170,000	Cape Coral	N/A

Total Project Reduction = 84,744 lbs/yr

Total TN Reduction Required = 103,414 lbs/yr

Table A-3. City of Fort Myers projects

O&M = Operations and maintenance; N/A = Not applicable

Completion Date	Project Number	Project Name	Description	Project Type	Project Status	Acres Treated	TN Reduction (lbs/yr)	DEP Contract Agreement Number	Cost	Cost Annual O&M	Funding Source	Partners
Prior to 2012	**FM-01**	Manuel's Branch Watershed Improvements	Exfiltration trenches.	Exfiltration Trench	Completed	125	836	Information not provided	Information not provided	Information not provided	Information not provided	Information not provided
N/A	**FM-02**	Education Efforts	FYN, fertilizer ordinance, pamphlets, PSAs, website, illicit discharge program.	Education Efforts	Completed	N/A	2,101	Information not provided	Information not provided	Information not provided	Information not provided	Information not provided
Prior to 2012	**FM-03**	Utility and Streetscape Improvements	Installation of Stormceptors™.	Stormceptor™ Unit	Completed	118	40	Information not provided	Information not provided	Information not provided	Information not provided	Information not provided
Prior to 2012	**FM-04**	Manuel's Branch Siltation Structures	Installation of siltation structure designed to receive incoming flow, reduce its velocity and allow for settling of suspended particles.	Control Structure	Completed	643	1,078	Information not provided	Information not provided	Information not provided	Information not provided	Information not provided
Prior to 2012	**FM-05**	Manuel's Branch Control Structures	Series of two weirs constructed along Manuel's Branch between Royal Palm Avenue and Grand Avenue that act as detention structures for purpose of increasing storage and attenuation in canal.	Control Structure	Completed	438	2,202	Information not provided	Information not provided	Information not provided	Information not provided	Information not provided
Prior to 2012	**FM-06**	Billy's Creek Wetland	Filter marsh park.	Filter Marsh	Completed	1,632	4,025	Information not provided	Information not provided	Information not provided	Information not provided	Information not provided
2013	**FM-07**	Brookhill Utility Drainage Improvement	Installation of Stormceptors™.	Stormceptor™ Unit	Completed	Information not provided	11	Information not provided	Information not provided	Information not provided	Information not provided	Information not provided
N/A	**FM-08**	Street Sweeping	Four zones swept at varying frequencies based on pollutant accumulation.	Street Sweeping	Completed	N/A	2,582	Information not provided	Information not provided	Information not provided	Information not provided	Information not provided
2015	**FM-09**	Ford Street Preserve	Constructed wetland treatment system that removes pollutants from Ford Street Canal, which serves 811 acres of highly urbanized watershed.	Wetland Treatment	Completed	811	7,293	Information not provided	Information not provided	Information not provided	Information not provided	Information not provided
2013	**FM-10**	Riverfront Development Phase 1	Wet detention pond.	Wet Detention Pond	Completed	Information not provided	90	Information not provided	Information not provided	Information not provided	Information not provided	Information not provided
2014	**FM-11**	Carrell Canal Water Quality Retrofit	Two detention areas, five filter marshes and golf course renovation.	BMP Treatment Trains	Completed	Information not provided	1,275	Information not provided	Information not provided	Information not provided	Information not provided	Information not provided

Total Project Reduction = 21,533 lbs/yr

Total TN Reduction Required = 40,924 lbs/yr

Table A-4. LA-MSID projects

O&M = Operations and maintenance; N/A = Not applicable; TBD = To be determined
Note: On June 10, 2015, the ECWCD became LA-MSID. Projects in the BMAP document beginning with "EC" now refer to LA-MSID.

Completion Date	Project Number	Project Name	Description	Project Type	Project Status	Acres Treated	TN Reduction (lbs/yr)	DEP Contract Agreement Number	Cost	Cost Annual O&M	Funding Source	Partners
N/A	**EC-01**	Education/Fertilizer	Education.	Education Efforts	Completed	N/A	1,646	N/A	Information not provided	Information not provided	Information not provided	Information not provided
Prior to 2012	**EC-02**	Freshwater Canal Detention	Regulation of freshwater canals through existing control structures.	Control Structure	Completed	32,555	7,940	N/A	Information not provided	Information not provided	Information not provided	Information not provided
Prior to 2012	**EC-03**	Weir Elevation Improvements	Replacement of weir structures at increase control elevations to provide additional attenuation.	Control Structure	Completed	32,555	7,543	N/A	Information not provided	Information not provided	Information not provided	Information not provided
Prior to 2012	**EC-04**	Harn's Marsh Phases I and II	Replacement of weir structures and redirection of flows into filter marsh.	Control Structure	Completed	32,555	4,682	N/A	Information not provided	Information not provided	Information not provided	Information not provided
Prior to 2012	**EC-05**	Jim Flemming Eco-Park	Wetland rehydration and treatment.	Hydrologic Restoration	Completed	5	39	N/A	Information not provided	Information not provided	Information not provided	Information not provided
2013	**EC-06**	Mirror Lake Phase I	Detention pond.	Wet Detention Pond	Completed	32,555	1,357	N/A	Information not provided	Information not provided	Information not provided	Information not provided
2017	**EC-07**	Aquifer Benefit and Storage for Orange River Basin (Southwest Lehigh Weirs)	Increase canal control elevations and local groundwater levels by constructing 25 new weirs.	Control Structure	Underway	5,760	1,975	S0721	$2,532,311	Information not provided	DEP/FDOT	DEP/FDOT
2017	**EC-08**	S-AW-1 Weir Elevation Improvements	Replacement of weir structures at increase control elevations to provide additional attenuation.	Control Structure	Completed	640	325	N/A	$400,000	$15,000	LA-MSID	N/A
2018	**EC-09**	Mirror Lake Phase 2	Detention pond.	Wet Detention Pond	Underway	32,555	4,938	N/A	$500,000	TBD	LA-MSID/SFWMD	SFWMD
2020	**EC-10**	West Marsh Preserve	Wetland rehydration and treatment.	Hydrologic Restoration/ Filter Marsh	Underway	32,555	2,015	N/A	$12,000,000	TBD	LA-MSID/FDOT/ Lee County	FDOT/Lee County

Total Project Reduction = 23,532 lbs/yr

Total TN Reduction Required = 37,736 lbs/yr

Table A-5. FDOT projects

O&M = Operations and maintenance; N/A = Not applicable

Completion Date	Project Number	Project Name	Description	Project Type	Project Status	Acres Treated	TN Reduction (lbs/yr)	DEP Contract Agreement Number	Cost	Cost Annual O&M	Funding Source	Partners
Prior to 2012	**FDOT-01**	Existing Stormwater Dry Ponds	Dry detention pond.	Dry Detention Pond	Completed	6	55	N/A	Information not provided	Information not provided	Information not provided	Information not provided
Prior to 2012	**FDOT-02**	Discontinuing Fertilization	No longer fertilizing rights of way in watershed.	Fertilizer Cessation	Completed	465	1,941	N/A	Information not provided	Information not provided	Information not provided	Information not provided
N/A	**FDOT-03**	Education Efforts	Pamphlets, PSAs, illicit discharge program.	Education Efforts	Completed	N/A	232	N/A	Information not provided	Information not provided	Information not provided	Information not provided
N/A	**FDOT-04**	Street Sweeping	2,992 pavement miles swept annually.	Street Sweeping	Completed	N/A	577	N/A	Information not provided	Information not provided	Information not provided	Information not provided
Prior to 2012	**FDOT-05**	Ditch Blocked Swales	Swales with ditch blocks.	Grass Swales with Swale Blocks or Raised Culverts	Completed	166	826	N/A	Information not provided	Information not provided	Information not provided	Information not provided
Prior to 2012	**FDOT-06**	Swales without Ditch Blocks	Swales without blocks.	Grass Swales without Swale Blocks or Raised Culverts	Completed	1,353	4,949	N/A	Information not provided	Information not provided	Information not provided	Information not provided
Prior to 2012	**FDOT-07**	Existing Stormwater Wet Ponds	Wet detention pond.	Wet Detention Pond	Completed	155	2,646	N/A	Information not provided	Information not provided	Information not provided	Information not provided
Prior to 2012	**FDOT-08**	State Road (SR) 78 Project	Wet detention pond.	Wet Detention Pond	Completed	80	264	N/A	Information not provided	Information not provided	Information not provided	Information not provided

Total Project Reduction = 11,490 lbs/yr

Total TN Reduction Required = 9,119 lbs/yr

Table A-6. Lucaya CDD projects

O&M = Operations and maintenance; N/A = Not applicable

Completion Date	Project Number	Project Name	Description	Project Type	Project Status	Acres Treated	TN Reduction (lbs/yr)	DEP Contract Agreement Number	Cost	Cost Annual O&M	Funding Source	Partners
Prior to 2012	**LU-1**	Education/ Fertilizer	Education	Education Efforts	Completed	N/A	0	N/A	Information not provided	Information not provided	Information not provided	Information not provided

Total Project Reduction = 0 lbs/yr

Total TN Reduction Required = 132 lbs/yr

Table A-7. Lee County projects

O&M = Operations and maintenance; N/A = Not applicable; TBD = To be determined
[1] Project was listed but had unproven credit.

Completion Date	Project Number	Project Name	Description	Project Type	Project Status	Acres Treated	TN Reduction (lbs/yr)	DEP Contract Agreement Number	Cost	Cost Annual O&M	Funding Source	Partners
Prior to 2012	**LC-01**	Yellow Fever Creek Preserve	Land purchase and conversion to conservation land use.	Land Acquisition	Completed	220	32	N/A	$3,323.506.74	$11,703	Lee County	N/A
Prior to 2012	**LC-02**	Billy's Creek Preserve	Land purchase and conversion to conservation land use.	Land Acquisition	Completed	51	17	N/A	$2,500,000	N/A	Lee County	N/A
Prior to 2012	**LC-03**	Six Mile Cypress Preserve	Land purchase and conversion to conservation land use.	Land Acquisition	Completed	1,219	13	N/A	$71,475,196	$149,212	Lee County/ SFWMD	SFWMD
Prior to 2012	**LC-04**	Bob Jane's Preserve	Land purchase and conversion to conservation land use.	Land Acquisition	Completed	1,979	0	N/A	$41,538,620	$639,924	Lee County/ SFWMD/National Oceanic and Atmospheric Administration (NOAA)	SFWMD/NOAA
Prior to 2012	**LC-05**	Buckingham Trails Preserve	Land purchase and conversion to conservation land use.	Land Acquisition	Completed	576	13	N/A	$12,584,000	$18,708	Lee County	N/A
Prior to 2012	**LC-06**	Caloosahatchee Creeks Preserve	Land purchase and conversion to conservation land use.	Land Acquisition	Completed	911	15	N/A	$8,175,706	$81,323	Lee County	Florida Communities Trust
Prior to 2012	**LC-07**	Deep Lagoon Preserve	Land purchase and conversion to conservation land use.	Land Acquisition	Completed	117	3	N/A	$4,475,664	$9,915	Lee County	N/A
Prior to 2012	**LC-08**	Hickory Swamp Preserve	Land purchase and conversion to conservation land use.	Land Acquisition	Completed	67	3	N/A	$467,000	$3,856	Lee County	N/A
Prior to 2012	**LC-09**	Orange River Preserve	Land purchase and conversion to conservation land use.	Land Acquisition	Completed	59	3	N/A	$1,755,000	$2,966	Lee County	N/A
Prior to 2012	**LC-10**	Prairie Pines Preserve	Land purchase and conversion to conservation land use.	Land Acquisition	Completed	331	3	N/A	$11,790,530	$190,454	Lee County	Florida Communities Trust
Prior to 2012	**LC-11**	Telegraph Creek Preserve	Land purchase and conversion to conservation land use.	Land Acquisition	Completed	1,715	0	N/A	$23,900,000	$54,639	Lee County	N/A
Prior to 2012	**LC-12**	West Marsh Preserve	Land purchase and conversion to conservation land use.	Land Acquisition	Completed	218	3	N/A	$4,631,625	N/A	Lee County	N/A
Prior to 2012	**LC-13**	Yellow Fever Creek Preserve	Land purchase and conversion to conservation land use.	Land Acquisition	Completed	118	0	N/A	$3,323,507	$11,703	Lee County	N/A
N/A	**LC-15**	Education Efforts	FYN, landscaping ordinance, irrigation ordinance, fertilizer ordinance, pamphlets, PSAs, website, illicit discharge program.	Education Efforts	Completed	N/A	20,445	N/A	$392,441	N/A	Lee County	IFAS–Lee County Extension
N/A	**LC-16**	Street Sweeping	Materials from roadway and gutter sweeping.	Street Sweeping	Completed	N/A	490	N/A	$694,176	N/A	Lee County	N/A
2013	**LC-17**	North Fort Myers Surface Water Restoration: Powell Creek Extension and Lost Lane Levee	Conveyance improvements to increase residence time, rehydrate off-site wetlands on adjacent properties, and accommodate off-site flows.	Hydrologic Restoration	Completed	397	2,976	N/A	$3,485,817	$17,101	Lee County	N/A
Prior to 2012	**LC-18**	Whiskey Creek Weir Reconstruction	Retention lake weir repairs to restore originally intended design and operation.	Control Structure	Completed	550	3,364	N/A	Information not provided	Information not provided	Lee County	N/A
Prior to 2012	**LC-19**	Caloosahatchee Creeks	Hydrologic restoration.	Hydrologic Restoration	Completed	6,567	4,251	N/A	Information not provided	Information not provided	Lee County/	SFWMD/USFWS

Completion Date	Project Number	Project Name	Description	Project Type	Project Status	Acres Treated	TN Reduction (lbs/yr)	DEP Contract Agreement Number	Cost	Cost Annual O&M	Funding Source	Partners
											SFWMD/U.S. Fish and Wildlife Service (USFWS)	
2013	**LC-20**	Powell Creek Filter Marsh	Created wetland areas, boardwalks, and trails and stabilized crossing of Powell Creek.	Filter Marsh	Completed	1,170	1,693	S0606	$1,440,000	$38,395	Lee County/ SFWMD/DEP	DEP/SFWMD
TBD	**LC-21**	Nalle Grade Stormwater Park	Dry retention and wet detention ponds.	Stormwater Treatment Area	Underway	720	TBD	S0727	$3,500,000	TBD	Lee County/DEP	DEP
Prior to 2012	**LC-22**	Deep Lagoon Hydrologic Restoration	Hydrologic restoration and enhancement, water conservation, wildlife habitat enhancement, and flood protection for surrounding area.	Hydrologic Restoration	Completed	1,022	3,097	N/A	$210,959	Information not provided	Lee County/ SFWMD	SFWMD
Prior to 2012	**LC-23**	Popash Creek Restoration	Hydrologic restoration to more natural flow regime by increasing water storage on property and improving both on-site and off-site flows.	Hydrologic Restoration	Completed	3,517	6,596	LP6838	$1,726,625	$16,920	Lee County/DEP	DEP
Prior to 2012	**LC-24**	Billy's Creek Wetland	Billy Creek Filter Marsh Park.	Filter Marsh	Completed	1,632	2,684	N/A	$2,500,000	N/A	Lee County/ City of Fort Myers	City of Fort Myers
2016	**LC-25**	Caloosahatchee Creeks Preserve– West Restoration	Hydrologic restoration.	Hydrologic Restoration	Completed	1,295	110	S0849	$250,000	Information not provided	Lee County/DEP	DEP
TBD	**LC-26**	Yellow Fever Creek – Gator Slough Transfer Facility	Return historical flow from Gator Slough Canal system to Yellow Fever Creek.	Hydrologic Restoration	Underway	TBD	TBD	S0840	TBD	TBD	Lee County/DEP	DEP
TBD	**LC-27**	Prairie Pines Preserve Restoration	Restoration of historical flows and enhancement and restoration of wetlands.	Hydrologic Restoration	Planned	2,334	TBD	S0895	$500,000	$28,295	Lee County/DEP	DEP
2017	**LC-28**	BMAP Plan Development – Basin Study	Basin study to identify pollutant sources and identify further actions to reach reduction goals.	Studies	Completed	N/A	N/A	N/A	$195,831	N/A	Lee County	N/A
TBD	**LC-29**	Caloosahatchee River-North Fort Myers Nutrient and Bacteria Source Identification Study	Watershed study to investigate interactions between on-site sewage treatment and disposal systems, groundwater, and surface water in Caloosahatchee Estuary.	Studies	Underway	N/A	N/A	N/A	$181,352	N/A	Lee County	N/A
2012	**LC-30**	Waterway Estates WWTF Closure	Closure of facility with direct discharge to Caloosahatchee.	WWTF Diversion to Reuse	Completed	N/A	307	N/A	$61,565	N/A	Lee County	N/A
Information not provided	**LC-31**	Six Mile Cypress Preserve North Hydrologic Restoration	Wetland creation, addition of control structures, berms, berm breaches to connect natural and created wetlands, and restoration of historical hydrologic conditions to reduce discharge into Caloosahatchee River.	Hydrologic Restoration	Completed	Information not provided	TBD	N/A	TBD	TBD	Lee County/ SFWMD/FDOT	SFWMD/FDOT

Completion Date	Project Number	Project Name	Description	Project Type	Project Status	Acres Treated	TN Reduction (lbs/yr)	DEP Contract Agreement Number	Cost	Cost Annual O&M	Funding Source	Partners
Information not provided	**LC-32**	Bob Jane's Preserve Environmental Restoration	Hydrologic improvements in portion of preserve via berms, beaches and ditch blocks.	Hydrologic Restoration	Completed	Information not provided	TBD	S0871	Information not provided	Information not provided	Lee County/ DEP/SFWMD	DEP/SFWMD
Information not provided	**LC-33**	Telegraph Creek Preserve	Ditch blocks and native plantings in conveyances.	Hydrologic Restoration	Completed	Information not provided	TBD	S0873	$107,337	$54,639	Lee County/DEP	DEP
TBD	**LC-34**	West Marsh Preserve Filter Marsh	Creation and enhancement of wetland marsh ecosystem, including hydraulic connection for water quality improvement and stormwater attenuation.	Filter Marsh	Underway	TBD	TBD	N/A	TBD	TBD	Lee County/ LA-MSID	LA-MSID/FDOT
TBD	**LC-35**	C-43 Water Quality Treatment and Testing Facility Project (study/ land acquisition)	Project to demonstrate and implement cost-effective, wetland-based strategies for reduction of DON.	Studies	Underway	N/A	N/A	N/A	$10,000,000	N/A	Lee County/DEP/ SFWMD	SFWMD/DEP
TBD	**LC-36**	Fichter's Creek Restoration Project	Restoration of hydroperiod and water quality in Fichter's Creek.	Hydrologic Restoration	Underway	TBD	1,453	S0893	$2,000,000	TBD	Lee County/ SFWMD/DEP	DEP/SFWMD
TBD	**LC-37**	Spanish Creek at Daniel's Preserve Restoration	Restoration of wetland hydroperiod and sheet flow attenuation.	Hydrologic Restoration	Underway	TBD	112	S0732	$400,000	TBD	Lee County/DEP	DEP
TBD	**LC-38**	Deep Lagoon Pollutant Load Reduction Phase 2-Watershed Analysis Report	Basin study to identify pollutant sources and identify further actions to reach reduction goals.	Studies	Underway	N/A	N/A	N/A	$70,000	N/A	Lee County	Information not provided
TBD	**LC-39**	North Fort Myers FPL Feasibility Study	Study to identify areas of high nutrient loads and potential BMPs to improve water quality and reduce flooding.	Studies	Underway	N/A	N/A	S0894	$200,000	N/A	Lee County/DEP	DEP
TBD	**LC-40**	Sunniland/Nine Mile Run Drainage Improvements	Replacement of failing water control structures and reconnection of flow ways to Hickory Swamp and Buckingham Trails Preserve.	Hydrologic Restoration	Planned	TBD	TBD	LP3602B	$2,000,000	TBD	Lee County/DEP	DEP
TBD	**LC-41**	Caloosahatchee Tributary Canal Rehabilitation: L-3	Reshaping canal banks, littoral planting and possibly adding control structure(s).	Regional Stormwater Treatment	Planned	TBD	TBD	N/A	$500,000	TBD	Lee County/ City of Fort Myers	City of Fort Myers

Total Project Reduction = 46,118 lbs/yr

Total TN Reduction Required = 140,853 lbs/yr

Table A-8. FDACS notice of intent (NOI) enrollment reduction estimates as of March 31, 2017

[1] Some acres may be enrolled in multiple FDACS BMP Programs, but acres are reported in this table under only one land use as determined by the HSPF model. Therefore, this acreage differs from **Table D-2**.

TMDL Model Agricultural Land Use	Acreage[1]	TN Load Delivered (lbs/yr)	TN Reduction Estimate (%)	TN Reduction (lbs/yr)
Citrus	142	895	10	90
Cropland/Improved Pasture/Tree Crops	18,486	122,617	25	30,654
Total	**18,628**	**123,512**		**30,744**

Total TN Reduction Required = 55,597 lbs/yr

Appendix B: Future BMAP Projects

In accordance with Chapter 2016-1, Laws of Florida, every new and revised BMAP will be required to include more detailed project information than was previously included in BMAPs and annual progress reports. Chapter 403.067, F.S., directs new and revised BMAPs to include the following:

- A list of projects in priority ranking with a planning-level cost estimate and estimated date of completion for each project.
- The source and amount of financial assistance to be made available by DEP, a water management district or other entity for each project, if applicable.
- A planning-level estimate of each project's expected load reduction, if applicable.

The BMAP requires stakeholders to implement their projects to achieve reductions as soon as practicable. However, the full implementation of the BMAP will be a long-term process. While some of the projects and activities contained in the BMAP were recently completed or are currently ongoing, several projects (**Table B-1**) require more time to design, secure funding and construct. While funding for the projects may not have been identified yet, funding limitations do not affect the requirement that every entity must implement the activities listed in the BMAP.

Since BMAP implementation is a long-term process, the TMDL established for this basin will not be achieved in the next five years; nor will it be achieved by the actions of the stakeholders in the Tidal Caloosahatchee Basin alone. It is understood that all waterbodies can respond differently to the implementation of reduced loadings to meet applicable water quality standards. Continued coordination and communication by the stakeholders will be essential to ensure management strategies continue to meet the implementation milestones.

As a first step toward compiling the lists of projects that will be required in a revised Caloosahatchee Estuary BMAP, DEP requested information from lead entities on future projects with the potential for additional load reductions in the basin. Funding has not yet been identified for many of these future projects (listed in **Table B-1**), and the continual funding of projects is a key part of meeting reductions required to achieve the TMDL. This list will be updated as project collection and verification efforts are refined.

Table B-1. Future BMAP projects for planning and funding purposes

O&M = Operations and maintenance; N/A = Not applicable; TBD = To be determined

Lead Entity	Project Number	Project Name	Description	Project Type	Project Status	Acres Treated	TN Reduction (lbs/yr)	Cost	Cost Annual O&M	Funding Source	Funding Status
Lee County	**F-01**	Florida Power & Light Powerline Easement – Water Quality Improvement	Hydrologic reconnection of watershed for water quality improvement. Reconnect flow-ways in Popash Creek Preserve at south end, terminating at Caloosahatchee River.	Hydrologic Restoration	Future	TBD	0	TBD	TBD	TBD	Unfunded
Lee County	**F-02**	Filter Marshes in Priority Watersheds	Filter marshes in priority tributaries.	Filter Marsh	Future	TBD	64,067	TBD	TBD	TBD	Unfunded
Lee County	**F-03**	Six Mile Cypress Slough Rehydration	Restoration of historical watershed boundaries and historical flow patterns, and rehydration of slough.	Hydrologic Restoration	Future	17,636	15,634	$3,843,270	TBD	TBD	Unfunded
Lee County	**F-04**	GS-10 Caloosahatchee Crosslink Project	Regional project to balance freshwater flows, improve regional water quality, restore habitat, and reduce TN load to Caloosahatchee.	Regional Stormwater Treatment	Future	TBD	9,855	TBD	TBD	Lee County/ LA-MSID	Unfunded
Lee County	**F-05**	North East Caloosahatchee Tributaries Restoration Project	Improve water quality, water storage and attenuation, flood protection, and habitat restoration in several highly disturbed watersheds in northeastern Lee County.	Hydrologic Restoration	Future	TBD	TBD	TBD	TBD	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States (RESTORE) Act	Partially funded through RESTORE Act, but total costs have not been determined
Lee County	**F-06**	Olga Shores Preserve and Filter Marsh	Located directly on Caloosahatchee, project would provide water quality treatment for local drainage features and/or directly from river.	Filter Marsh	Future	TBD	1,981	$2,659,059	TBD	TBD	Reported cost is land acquisition only; construction cost TBD
Lee County	**F-07**	Pet Waste Ordinance	Pet waste ordinance to establish requirements for proper disposal of pet waste.	Regulations, Ordinances and Guidelines	Future	N/A	1,840	N/A	N/A	Lee County	Unfunded
Lee County	**F-08**	Lee Civic Center Revitalization	Pervious pavers, vegetated natural buffers, rain gardens and pond rehabilitation.	Pervious Pavement	Future	TBD	217	TBD	TBD	Lee County	Unfunded
Lee County	**F-09**	Aquatic Vegetation Harvesting	Aquatic vegetation harvesting.	Aquatic Vegetation Harvesting	Future	TBD	TBD	TBD	TBD	Lee County	Fully funded

Lead Entity	Project Number	Project Name	Description	Project Type	Project Status	Acres Treated	TN Reduction (lbs/yr)	Cost	Cost Annual O&M	Funding Source	Funding Status
Lee County	**F-10**	Fiesta Village Advanced Wastewater Treatment Facility (AWWTF) – Construction of Deep Injection Well	AWWTF effluent disposal is currently reuse and permitted outfall to Caloosahatchee. Addition of deep injection well will be used as wet weather disposal to eliminate discharges to Caloosahatchee.	WWTF Disposal Site	Future	TBD	TBD	TBD	TBD	Lee County Utilities	Unfunded
Lee County	**F-11**	North Fort Myers Septic to Sewer Conversions	Septic to sewer conversions.	Wastewater Service Area Expansion	Future	TBD	TBD	TBD	TBD	Lee County Utilities	Unfunded
Lee County	**F-12**	Constructed project based on study results from C-43 WQTTF Project	Implement cost-effective, wetland-based strategies determined by C-43 WQTTF Project to reduce TN.	TBD	Future	TBD	TBD	TBD	TBD	TBD	Unfunded
Charlotte County	**F-13**	Pet Waste Ordinance	Pet waste ordinance.	Regulations, Ordinances and Guidelines	Future	N/A	35	TBD	TBD	TBD	Unfunded
Charlotte County	**F-14**	Pond	Construct pond in Caloosahatchee BMAP area.	TBD	Future	TBD	TBD	TBD	TBD	TBD	Unfunded
Charlotte County	**F-15**	Street Sweeping	Street sweeping.	Street Sweeping	Future	N/A	TBD	TBD	TBD	TBD	Unfunded
LA-MSID (formerly ECWCD)	**F-16**	Mirror Lakes Golf Course Phase I	Purchase 70-acre golf course.	Land Acquisition	Future	70	TBD	TBD	TBD	TBD	Unfunded
LA-MSID (formerly ECWCD)	**F-17**	Mirror Lakes Golf Course Phase II	Convert 70-acre golf course into wetland detention facility.	Hydrologic Restoration/ Filter Marsh	Future	1,600	TBD	TBD	TBD	TBD	Unfunded

Appendix C: Adopted BMAP Monitoring Network and Recommended Revisions

The adopted Caloosahatchee Estuary BMAP monitoring plan was designed to enhance the understanding of basin loads, identify areas with high nutrient concentrations, and track water quality trends. The adopted BMAP monitoring plan consists of the ambient water quality sampling described below.

The monitoring stations are organized into a tiered sampling design, as follows:

- **Tier 1:** Stations listed in the BMAP monitoring plan as essential and mandatory for tracking water quality trends both in the Caloosahatchee River and in documenting watershed pollutant reductions. Stations should be sampled monthly for all core parameters. Sampling stations, parameters, frequency, and other elements of this strategy may be modified as appropriate to match changing environmental conditions and funding resources. However, any modifications made must not affect the ability of the monitoring network to fulfill the objectives noted below.

- **Tier 2:** Stations that are currently sampled either in the BMAP area or in a tributary contributing to the overall load. These stations will help in understanding the total load in the watershed, and DEP supports continued monitoring.

- **Tier 3:** Nonstakeholder sampling stations. Data from these stations are extremely useful, and DEP supports continued monitoring.

- **Tier 4:** Florida (DEP/SFWMD) sampling stations.

TN concentrations are monitored at 92 stations in the adopted BMAP monitoring network (excluding Tier 3 stations): 21 in the Caloosahatchee Estuary, 64 in the tributaries and 7 in San Carlos Bay. The network of stations is listed in **Table C-1** and shown in **Figures C-1 and C-2**.

Table C-1. Adopted BMAP monitoring network

[1] NPDES outfall. Data from stations currently listed as NPDES outfall stations will not be included in any ambient monitoring analysis.
[2] Discontinued April 1, 2013.
[3] Formerly CALUSA0023FTM and 28020109.

Agency	Site Name	Tier	River or Watershed Station
City of Cape Coral	210	2	Watershed
City of Cape Coral	242	2	River
City of Cape Coral	243	2	Watershed
City of Cape Coral	262	2	Watershed
City of Cape Coral	275	2	Watershed
City of Cape Coral	280	2	Watershed
City of Cape Coral	290	2	Watershed
City of Cape Coral	295	2	Watershed
City of Cape Coral	300	1	Watershed
City of Cape Coral	310	2	Watershed
City of Cape Coral	315	2	Watershed
City of Cape Coral	350	1	River
City of Cape Coral	355	2	Watershed
City of Cape Coral	390	2	Watershed
City of Cape Coral	400	1	Watershed
City of Cape Coral	430	2	Watershed
City of Cape Coral	470	1	Watershed
City of Cape Coral	510	2	Watershed
City of Cape Coral	540	1	Watershed
City of Cape Coral	550	2	Watershed
City of Cape Coral	590	1	Watershed
City of Cape Coral	600	1	Watershed
City of Fort Myers	BCP1-10	2	Watershed
City of Fort Myers	BCP4-10	2	Watershed
City of Fort Myers	CFMBILLY3	2	Watershed
City of Fort Myers	CFMBILLY6	2	Watershed
City of Fort Myers	CFMCARRELL	2	Watershed
City of Fort Myers	CFMMANUEL	1	Watershed
City of Fort Myers	CFMWINKLER	1	Watershed
DEP	28020110	4	River
DEP	28020111	4	River
DEP	CALUSA0005FTM	4	River
DEP	CALUSA0006FTM	4	River
DEP	CALUSA0007FTM	4	River
DEP	CALUSA0008FTM	4	River
DEP	CALUSA0009FTM	4	River
DEP	CALUSA0010FTM	4	River
DEP	CALUSA0011FTM	4	River

Agency	Site Name	Tier	River or Watershed Station
DEP	CALUSA0012FTM	4	River
DEP	CALUSA0013FTM	4	River
DEP	CALUSA0014FTM	4	River
DEP	CALUSA0054FTM[3]	4	Watershed
DEP	CALUSA0024FTM	4	Watershed
DEP	CALUSA0025FTM	4	Watershed
Lee County	16-18GR	2	Watershed
Lee County	16-3GR	1	Watershed
Lee County	18-6GR	1	Watershed
Lee County	20-29GR	2	Watershed
Lee County	20-9GR	1	Watershed
Lee County	20A-11GR	2	Watershed
Lee County	20A-19GR	2	Watershed
Lee County	21-7GR	2	Watershed
Lee County	22-18GR	2	Watershed
Lee County	22-7GR	2	Watershed
Lee County	23-27GR	2	Watershed
Lee County	23-5GR	1	Watershed
Lee County	24-19GR	2	Watershed
Lee County	24-7GR	1	Watershed
Lee County	25-GR20	2	Watershed
Lee County	26-GR20	2	Watershed
Lee County	27-6GR	1	Watershed
Lee County	27O-GR20	1	Watershed
Lee County	28-5GR	1	Watershed
Lee County	29-8GR	1	Watershed
Lee County	40-18GR	2	Watershed
Lee County	40-32GR	2	Watershed
Lee County	BILLGR20	2	Watershed
Lee County	BILLGR60[1]	2	Watershed
Lee County	DEEPGR10	1	Watershed
Lee County	DEEPGR50	1	Watershed
Lee County	DEEPGR90	2	Watershed
Lee County	GATOR91	2	Watershed
Lee County	PI-01	1	River
Lee County	PI-02	1	River
Lee County	PI-13	2	River
Lee County	PI-14	1	River
Lee County	POWLGR20	1	Watershed
Lee County	POWLGR51[1]	1	Watershed
Lee County	POWLGR81	2	Watershed

Agency	Site Name	Tier	River or Watershed Station
Lee County	WHISGR10[1]	1	Watershed
Lee County	WHISGR50[1]	2	Watershed
Lee County	YFC-CI[1]	2	Watershed
SCCF	RECON-Fort Myers	3	River
SCCF	RECON-Gulf of Mexico	3	River
SCCF	RECON-Shell Point	3	River
SCCF	RECON-Tarpon Bay	3	River
SFWMD	CES03	4	River
SFWMD	CES04	4	River
SFWMD	CES05	4	River
SFWMD	CES06	4	River
SFWMD	CES07	4	River
SFWMD	CES08	4	River
SFWMD	CES09	4	River
SFWMD	CES11	4	River
SFWMD	ROOK471 (former Point Ybel)	4	River
SFWMD	S79	4	River
USGS	Billy's Creek[2]	3	Watershed
USGS	Caloosahatchee River at Marker #52[2]	3	River
USGS	Caloosahatchee River at Punta Blanca[2]	3	River
USGS	Caloosahatchee River at Shell Point[2]	3	River
USGS	Hancock Creek[2]	3	Watershed
USGS	McIntyre Creek at Sanibel Island	3	River
USGS	Orange River[2]	3	Watershed
USGS	Popash Creek[2]	3	Watershed
USGS	Telegraph Creek[2]	3	Watershed
USGS	Whiskey Creek	3	Watershed

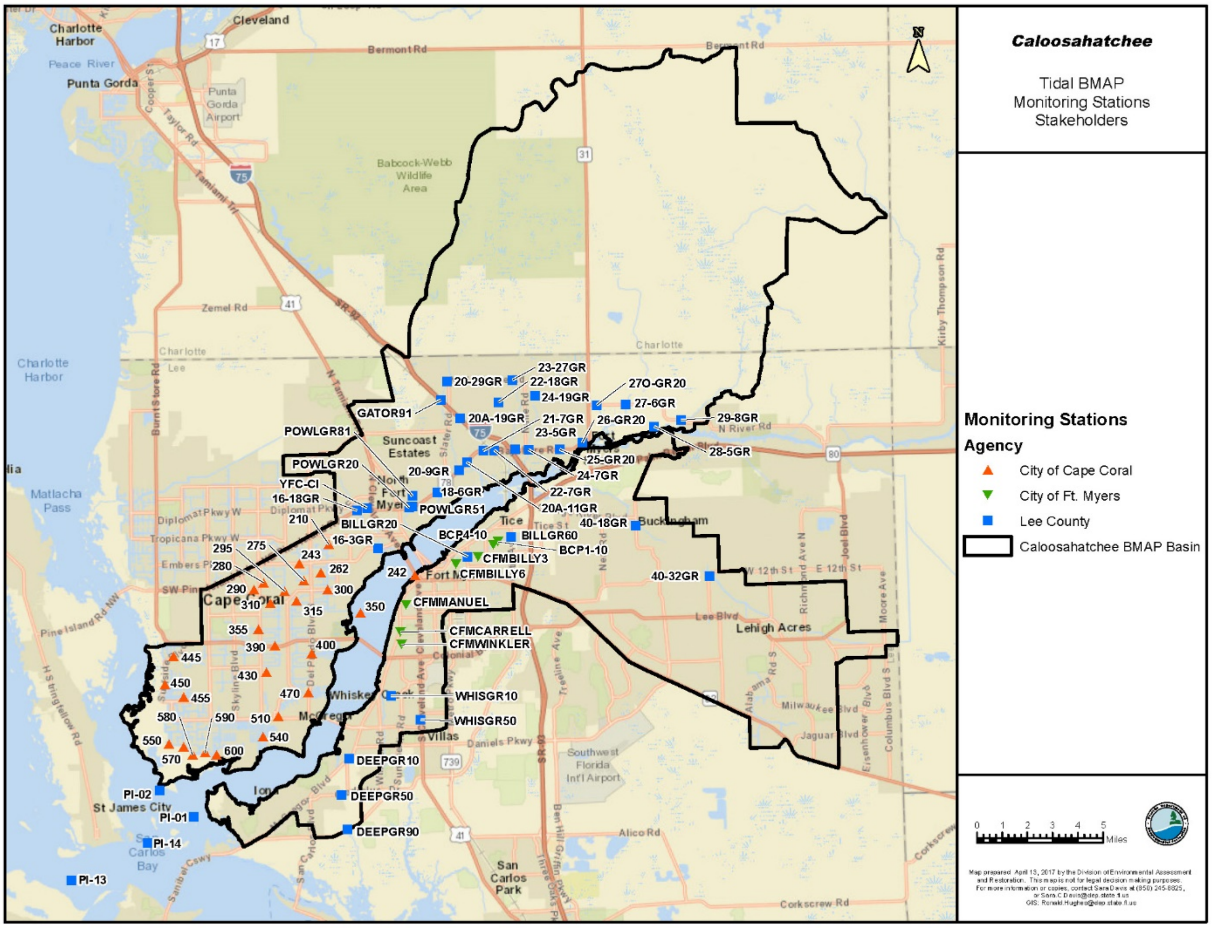

Figure C-1. Tidal Caloosahatchee BMAP stations monitored by City of Cape Coral, City of Fort Myers, and Lee County in Tiers 1 and 2 of the adopted monitoring network

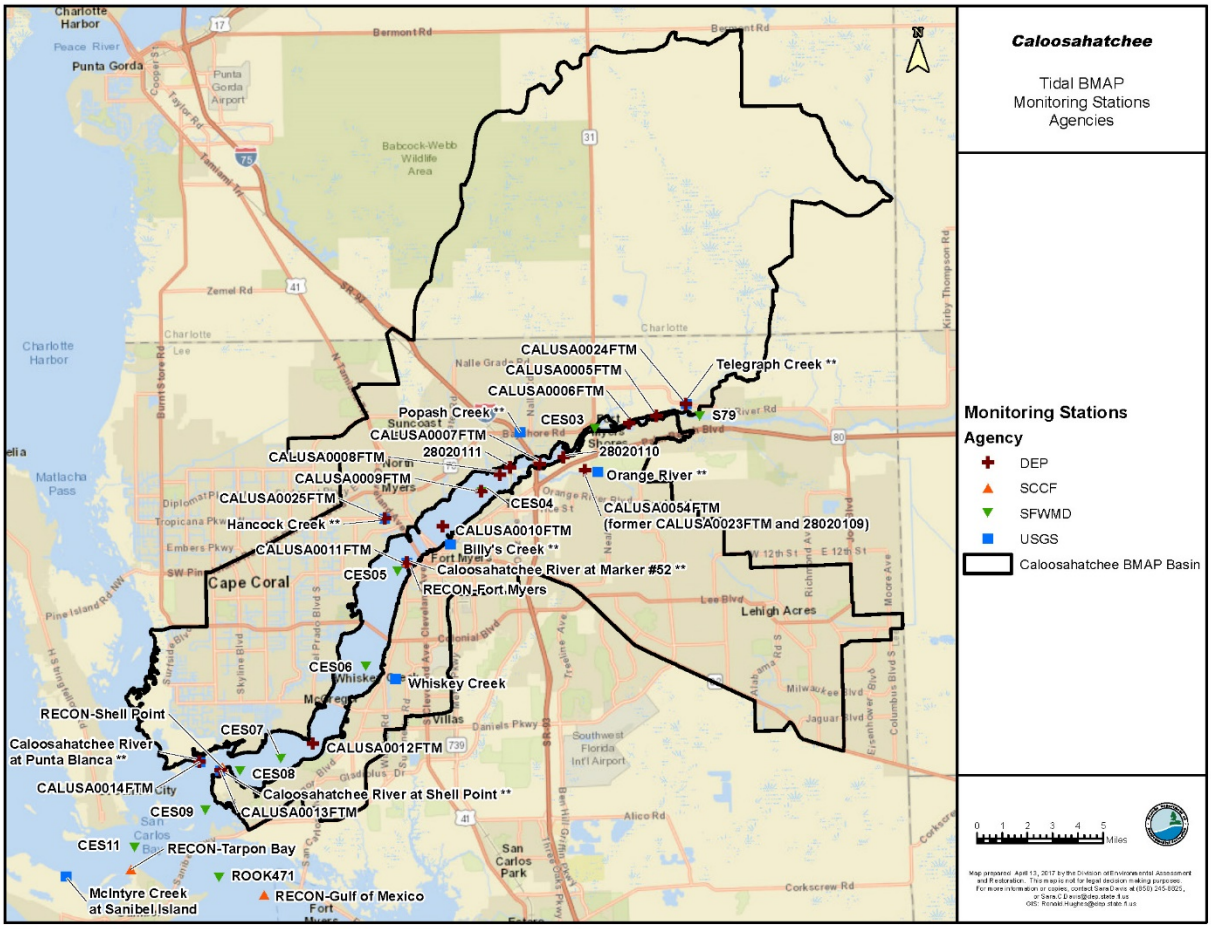

Figure C-2. Tidal Caloosahatchee BMAP stations monitored by DEP, SCCF, SFWMD, and USGS in Tiers 3 and 4 of the adopted monitoring network

Recommended Revisions

For future implementation phases, one recommendation is to reorganize the ambient water quality monitoring stations into a three-tiered system, as follows:

- **Tier 1:** Stations that will be the primary/priority stations used to track BMAP progress over the long term. If at any point it is necessary to reduce efforts in the basin, these stations should be the last stations impacted.

- **Tier 2:** Stations that can be used for regional analyses or other secondary analyses.

- **Tier 3:** Stations owned by USGS or SCCF that are not currently uploaded into DEP databases. Data from these stations may be used for other monitoring purposes as necessary.

In addition to the revised tier system, it is recommended that all stations should be assigned a general location in the BMAP area to use for organizing stations during water quality evaluations. Stations in the estuary WBIDs (3240A, 3240B and 3240C) will be designated as "Estuary" stations. Monitoring sites located in tributaries in the Tidal Caloosahatchee Basin will be designated as "Tributary" stations. Stations outside the BMAP boundary and in San Carlos Bay will be designated as "Bay" stations.

If the recommended revisions to the BMAP monitoring network are adopted, TN concentrations will be monitored at 99 stations: 22 in the Caloosahatchee Estuary, 68 in the tributaries and 9 in San Carlos Bay. The recommended revisions to the network of stations are listed in **Table C-2** and shown in **Figures C-3, C-4** and **C-5**.

Table C-2. Recommended revisions to the BMAP monitoring network

[1] NPDES outfall. Data from stations currently listed as NPDES outfall stations will not be included in any ambient monitoring analysis.
[2] Discontinued April 1, 2013. **Section 3.3.2** describes recommendations for additional flow monitoring at these locations.
[3] Formerly CALUSA0023FTM and 28020109.
[4] Stations are in the Caloosahatchee Watershed but outside the current BMAP area boundary.
Notes: N/A = Not applicable. **Bold** denotes that a change is recommended for the station. Remove = Recommended that station be excluded from revised network.

Agency	Site Name	Current Tier	River or Watershed Station (current)	Tier Recommendation	Bay, Estuary or Tributary (revised)
City of Cape Coral	210	2	Watershed	2	Tributary
City of Cape Coral	242	2	River	2	Estuary
City of Cape Coral	243	2	Watershed	2	Tributary
City of Cape Coral	262	2	Watershed	2	Tributary
City of Cape Coral	275	2	Watershed	2	Tributary
City of Cape Coral	280	2	Watershed	2	Tributary
City of Cape Coral	290	2	Watershed	2	Tributary
City of Cape Coral	295	2	Watershed	2	Tributary
City of Cape Coral	300	1	Watershed	1	Tributary
City of Cape Coral	310	2	Watershed	2	Tributary
City of Cape Coral	315	2	Watershed	2	Tributary
City of Cape Coral	**350**	**1**	**River**	**2**	**Estuary**
City of Cape Coral	355	2	Watershed	2	Tributary
City of Cape Coral	390	2	Watershed	2	Tributary
City of Cape Coral	400	1	Watershed	1	Tributary
City of Cape Coral	430	2	Watershed	2	Tributary
City of Cape Coral	470	1	Watershed	1	Tributary
City of Cape Coral	510	2	Watershed	2	Tributary
City of Cape Coral	540	1	Watershed	1	Tributary
City of Cape Coral	550	2	Watershed	2	Tributary
City of Cape Coral	590	1	Watershed	1	Tributary
City of Cape Coral	600	1	Watershed	1	Tributary
City of Fort Myers	BCP1-10	2	Watershed	2	Tributary

Agency	Site Name	Current Tier	River or Watershed Station (current)	Tier Recommendation	Bay, Estuary or Tributary (revised)
City of Fort Myers	BCP4-10	2	Watershed	2	Tributary
City of Fort Myers	CFMBILLY3	2	Watershed	2	Tributary
City of Fort Myers	CFMBILLY6	2	Watershed	2	Tributary
City of Fort Myers	**CFMCARRELL**	**2**	**Watershed**	**1**	**Tributary**
City of Fort Myers	CFMMANUEL	1	Watershed	1	Tributary
City of Fort Myers	CFMWINKLER	1	Watershed	1	Tributary
DEP	**28020110**	**4**	**River**	**2**	**Estuary**
DEP	**28020111**	**4**	**River**	**2**	**Estuary**
DEP	**CALUSA0005FTM**	**4**	**River**	**2**	**Estuary**
DEP	**CALUSA0006FTM**	**4**	**River**	**1**	**Estuary**
DEP	**CALUSA0007FTM**	**4**	**River**	**1**	**Estuary**
DEP	**CALUSA0008FTM**	**4**	**River**	**2**	**Estuary**
DEP	**CALUSA0009FTM**	**4**	**River**	**Remove**	**N/A**
DEP	**CALUSA0010FTM**	**4**	**River**	**1**	**Estuary**
DEP	**CALUSA0011FTM**	**4**	**River**	**Remove**	**N/A**
DEP	**CALUSA0012FTM**	**4**	**River**	**1**	**Estuary**
DEP	**CALUSA0013FTM**	**4**	**River**	**1**	**Estuary**
DEP	**CALUSA0014FTM**	**4**	**River**	**1**	**Estuary**
DEP	**CALUSA0054FTM[3]**	**4**	**Watershed**	**1**	**Tributary**
DEP	**CALUSA0024FTM**	**4**	**Watershed**	**1**	**Tributary**
DEP	**CALUSA0025FTM**	**4**	**Watershed**	**1**	**Tributary**
Lee County	16-18GR	2	Watershed	2	Tributary
Lee County	16-3GR	1	Watershed	1	Tributary
Lee County	18-6GR	1	Watershed	1	Tributary
Lee County	20-29GR	2	Watershed	2	Tributary
Lee County	20-9GR	1	Watershed	1	Tributary
Lee County	20A-11GR	2	Watershed	2	Tributary
Lee County	20A-19GR	2	Watershed	2	Tributary
Lee County	21-7GR	2	Watershed	2	Tributary
Lee County	22-18GR	2	Watershed	2	Tributary
Lee County	**22-7GR**	**2**	**Watershed**	**1**	**Tributary**
Lee County	23-27GR	2	Watershed	2	Tributary
Lee County	23-5GR	1	Watershed	1	Tributary
Lee County	24-19GR	2	Watershed	2	Tributary
Lee County	24-7GR	1	Watershed	1	Tributary
Lee County	**25-GR20**	**2**	**Watershed**	**1**	**Tributary**
Lee County	26-GR20	2	Watershed	2	Tributary
Lee County	27-6GR	1	Watershed	1	Tributary
Lee County	27O-GR20	1	Watershed	1	Tributary
Lee County	**28-5GR**	**1**	**Watershed**	**2**	**Estuary**

Agency	Site Name	Current Tier	River or Watershed Station (current)	Tier Recommendation	Bay, Estuary or Tributary (revised)
Lee County	**29-8GR**	**1**	**Watershed**	**2**	**Tributary**
Lee County	40-18GR	2	Watershed	2	Tributary
Lee County	40-32GR	2	Watershed	2	Tributary
Lee County	**BILLGR20**	**2**	**Watershed**	**1**	**Tributary**
Lee County	BILLGR60[1]	2	Watershed	2	Tributary
Lee County	DEEPGR10	1	Watershed	1	Tributary
Lee County	**DEEPGR50**	**1**	**Watershed**	**2**	**Tributary**
Lee County	DEEPGR90	2	Watershed	2	Tributary
Lee County	GATOR91	2	Watershed	2	Tributary
Lee County	PI-01	1	River	1	Bay
Lee County	PI-02	1	River	1	Bay
Lee County	PI-13	2	River	2	Bay
Lee County	PI-14	1	River	1	Bay
Lee County	POWLGR20	1	Watershed	1	Tributary
Lee County	**POWLGR51[1]**	**1**	**Watershed**	**2**	**Tributary**
Lee County	POWLGR81	2	Watershed	2	Tributary
Lee County	**WHISGR10[1]**	**1**	**Watershed**	**2**	**Tributary**
Lee County	WHISGR50[1]	2	Watershed	2	Tributary
Lee County	YFC-CI[1]	2	Watershed	2	Tributary
LA-MSID	**Station 11[4]**	**N/A**	**N/A**	**2**	**Tributary**
LA-MSID	**Station 14[4]**	**N/A**	**N/A**	**2**	**Tributary**
LA-MSID	**Station 15[4]**	**N/A**	**N/A**	**2**	**Tributary**
LA-MSID	**Station 22**	**N/A**	**N/A**	**2**	**Tributary**
LA-MSID	**Station 27**	**N/A**	**N/A**	**2**	**Tributary**
SCCF	RECON-Fort Myers	3	River	3	Estuary
SCCF	RECON-Gulf of Mexico	3	River	3	Bay
SCCF	RECON-Shell Point	3	River	3	Estuary
SCCF	RECON-Tarpon Bay	3	River	3	Bay
SFWMD	**CES03**	**4**	**River**	**1**	**Estuary**
SFWMD	**CES04**	**4**	**River**	**1**	**Estuary**
SFWMD	**CES05**	**4**	**River**	**1**	**Estuary**
SFWMD	**CES06**	**4**	**River**	**1**	**Estuary**
SFWMD	**CES07**	**4**	**River**	**2**	**Estuary**
SFWMD	**CES08**	**4**	**River**	**1**	**Estuary**
SFWMD	**CES09**	**4**	**River**	**2**	**Bay**
SFWMD	**CES11**	**4**	**River**	**1**	**Bay**
SFWMD	**ROOK471 (former Point Ybel)**	**4**	**River**	**1**	**Bay**
SFWMD	**S79**	**4**	**River**	**1**	**Estuary**
USGS	**Billy's Creek**	**3**	**Watershed**	Discontinued[2]	**Tributary**

Agency	Site Name	Current Tier	River or Watershed Station (current)	Tier Recommendation	Bay, Estuary or Tributary (revised)
USGS	**Caloosahatchee River at Marker #52**	**3**	**River**	Discontinued[2]	**N/A**
USGS	**Caloosahatchee River at Punta Blanca**	**3**	**River**	Discontinued[2]	**N/A**
USGS	**Caloosahatchee River at Shell Point**	**3**	**River**	Discontinued[2]	**N/A**
USGS	**Hancock Creek**	**3**	**Watershed**	Discontinued[2]	**N/A**
USGS	**McIntyre Creek at Sanibel Island**	**3**	**River**	Discontinued[2]	**N/A**
USGS	**Orange River**	**3**	**Watershed**	Discontinued[2]	**N/A**
USGS	**Popash Creek**	**3**	**Watershed**	Discontinued[2]	**N/A**
USGS	**Telegraph Creek**	**3**	**Watershed**	Discontinued[2]	**N/A**
USGS	Whiskey Creek	3	Watershed	3	Tributary

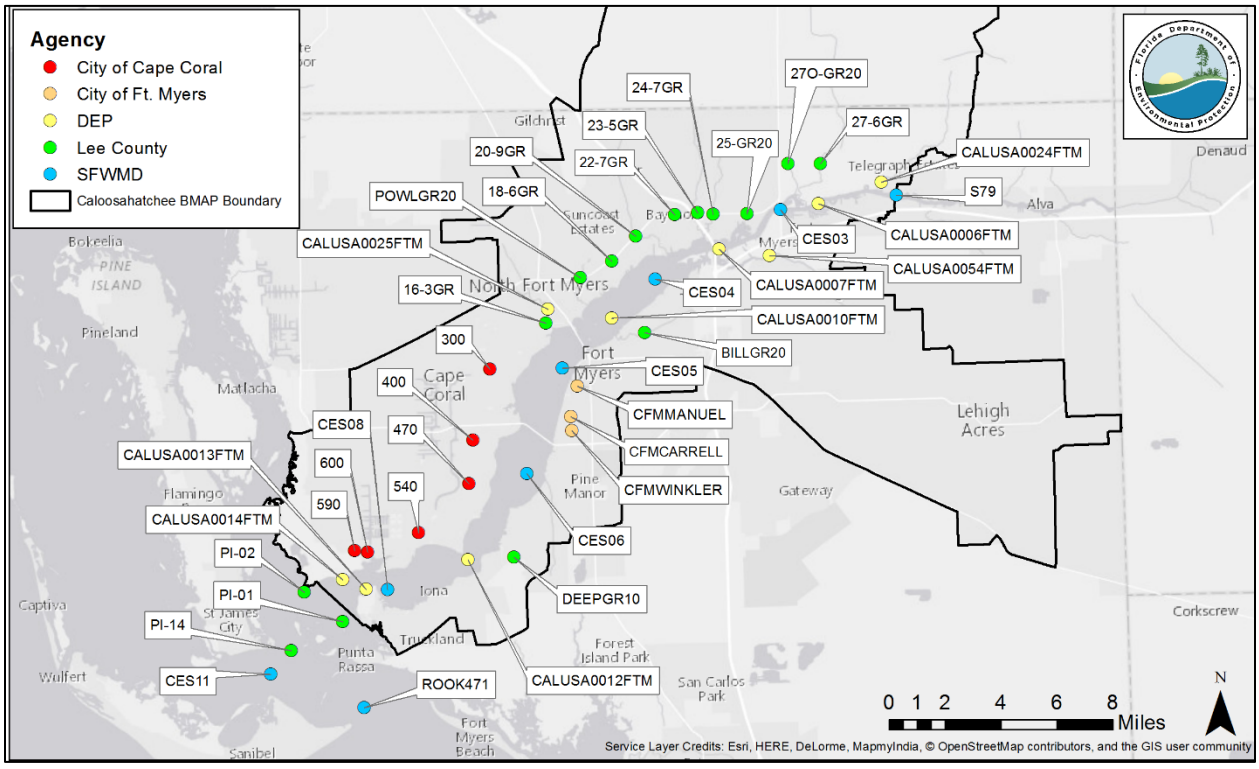

Figure C-3. Recommended Tier 1 Tidal Caloosahatchee BMAP stations

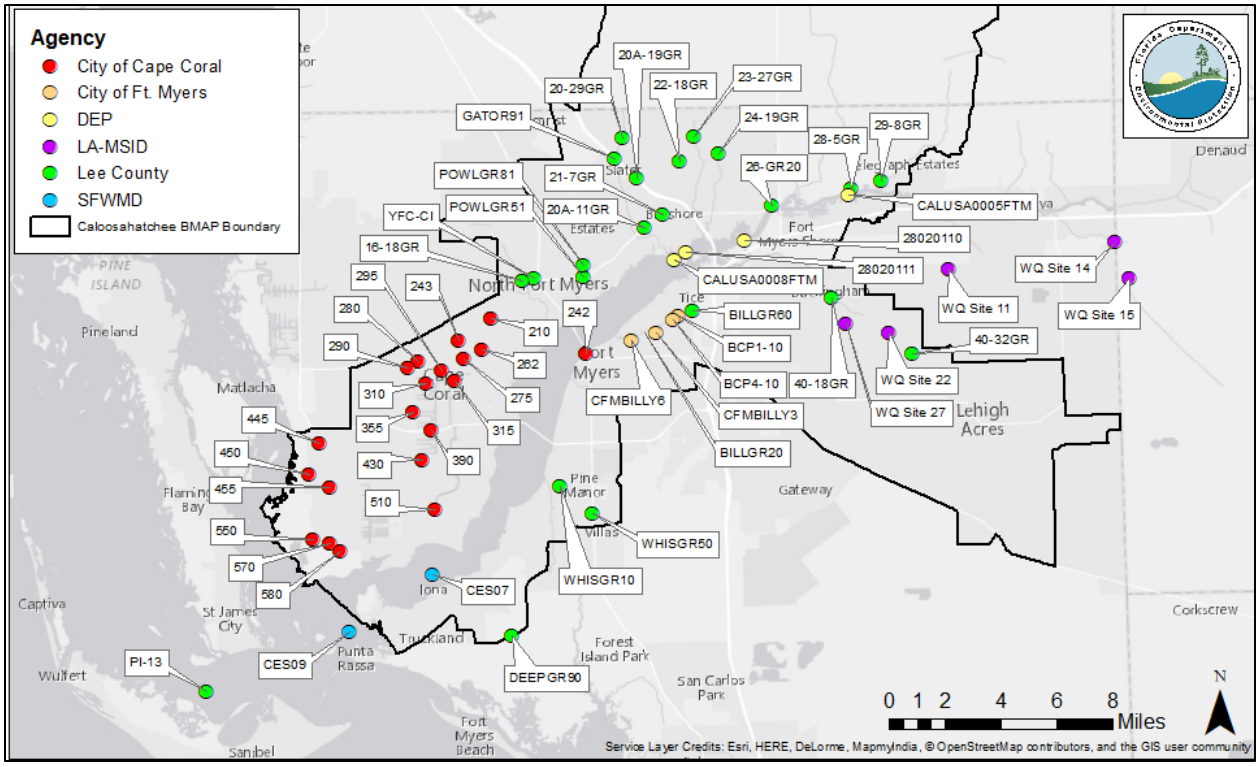

Figure C-4. Recommended Tier 2 Tidal Caloosahatchee BMAP stations

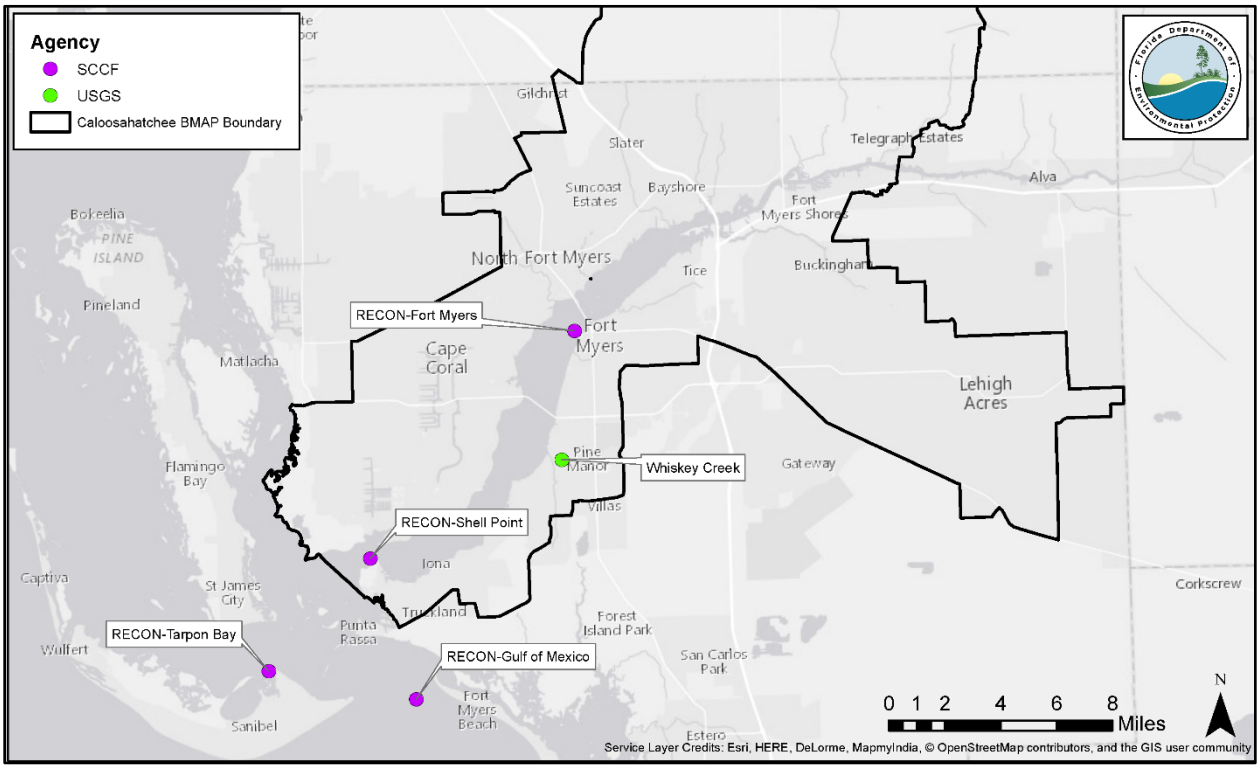

Figure C-5. Recommended Tier 3 Tidal Caloosahatchee BMAP stations

Biological Monitoring

Currently, the SFWMD conducts biological sampling for oysters and seagrass in the Caloosahatchee Estuary and San Carlos Bay, and DEP conducts seagrass monitoring in the basin. No changes to the biological monitoring are being recommended as a part of this review, and the monitoring should continue as described in **Tables C-3** and **C-4**.

Table C-3. SFWMD biological monitoring

[1] Sampling frequencies are projected target dates but subject to change based on actual field conditions. Current available POR for oyster data is December 2012 to December 2016.
[2] 20 randomly generated points in the upper Caloosahatchee River Estuary (CRE). Points are generated monthly depending on the previous month's results.
[3] 3-meter x 3-meter quadrant divided into 9 square-meter quadrants.
[4] 30 randomly generated points within a ~1-2-acre polygon at each site and assessed using a 1-square-meter quadrat.
[5] Monthly parameters are recruitment reproductive condition, infection intensity of Dermo, and oyster condition index.
[6] Biannual parameter is live oyster density.

Project	Station Name	Target Sampling Frequency[1]
Estuary Patch Scale Seagrass Monitoring	Upper CRE1	March, May, Jul, and September – 20 Quadzilla (Quads)[2,3]
Estuary Patch Scale Seagrass Monitoring	CRE_2	March, April, May, June, July, August, September and December – 30 Quads[4]
Estuary Patch Scale Seagrass Monitoring	CRE_4	March, May, July and September – 30 Quads
Estuary Patch Scale Seagrass Monitoring	CRE_5	March, May, July and September – 30 Quads
Estuary Patch Scale Seagrass Monitoring	CRE_6B	March, May, July and September – 30 Quads
Estuary Patch Scale Seagrass Monitoring	CRE_7	March, May, July and September – 30 Quads
Estuary Patch Scale Seagrass Monitoring	CRE_8	March, April, May, June, July, August, September and December – 30 Quads
Oyster Monitoring	Pepper Tree Pointe	Monthly
Oyster Monitoring	Iona Cove	Monthly[5]; Biannually[6]
Oyster Monitoring	Bird Island	Monthly[5]; Biannually[6]
Oyster Monitoring	Kitchel Key	Monthly[5]; Biannually[6]

Table C-4. DEP biological monitoring

Project	Station Name	Sampling Frequency
Seagrass Monitoring	CR02	Quarterly
Seagrass Monitoring	CR04	Quarterly
Seagrass Monitoring	CR05	Quarterly
Seagrass Monitoring	SC03	Quarterly
Seagrass Monitoring	MP04	Quarterly
Seagrass Monitoring	MP05	Quarterly

Appendix D: Agricultural Enrollment and Reductions

All agricultural nonpoint sources in the Caloosahatchee Estuary BMAP area are statutorily required either to implement FDACS-adopted BMPs or to conduct water quality monitoring prescribed by DEP or the applicable water management district that demonstrates compliance with water quality standards (Section 403.067[7][b], F.S.). Under Section 403.067(7)(c), F.S., the implementation of FDACS-adopted, DEP-verified BMPs in accordance with FDACS rules provides a presumption of compliance with state water quality standards.

FDACS OAWP Role in BMP Implementation and Follow-Up

FDACS OAWP works with producers to submit NOIs to implement the BMPs applicable to their operations, provides technical assistance to growers, and distributes cost-share, as available, to eligible producers for selected practices. The OAWP follows up with growers through site visits to evaluate the level of BMP implementation and record keeping, identify areas for improvement, if any, and discuss cost-share opportunities.

When DEP adopts a BMAP that includes agriculture, it is the agricultural producer's responsibility to implement BMPs adopted by FDACS to help achieve load reductions. The model used for the 2009 TMDL and 2012 BMAP combines all agricultural land uses into two categories: "citrus" and "cropland/improved pasture/tree crops." The HSPF model estimates that there are 30,244 agricultural acres in the Tidal Caloosahatchee Basin. Of those, 19,084 were enrolled in the FDACS BMP Program as of March 31, 2017, which equates to 63 percent enrollment of the agricultural acreage based on the HSPF model in the Tidal Caloosahatchee Basin covered by the FDACS BMP Program. The reductions associated with the enrollment through March 31, 2017, are estimated to be 30,743 lbs/yr TN, or 55 percent of the reductions required for agricultural lands in the BMAP area.

The HSPF model also estimates that the TN load to the basin is 214,153 lbs/yr. Using that base TN loading for agriculture and applying a reduction of 25 percent for all enrolled lands designated as "cropland/improved pasture/tree crops" and 10 percent for all enrolled lands designated as "citrus," FDACS developed a preliminary estimate of load reductions associated with 100 percent enrollment. Based on these assumptions, if all the agricultural lands identified in the HSPF model can be enrolled in the BMP Program and producers implement these BMPs, the expected nutrient reduction is 52,628 lbs/yr TN.

If land use acreage corrections and BMP implementation do not fully account for the current agricultural load reduction allocation, it may be necessary to develop and implement cost-assisted field- or regional-level treatment options that remove nutrients from farms and other nonpoint sources. In that case, FDACS will work with DEP and SFWMD to identify appropriate options for achieving further agricultural load reductions.

FDACS OAWP Implementation Assurance (IA) Program

The OAWP formally established the IA Program in 2005 in the Suwannee River Basin as part of the multi-agency/local stakeholder Suwannee River Partnership. In early 2014, the OAWP began to streamline the IA Program to ensure consistency statewide and across commodities and BMP manuals. This effort resulted in a single IA site-visit form, which is currently used by the OAWP.

Additional emphasis was given to verification of implementation of BMPs by enrolled producers with the enactment of Chapter 2016-1, Laws of Florida. That law directed the OAWP to formalize the Implementation Verification Program into rule. In December 2016, the OAWP published a notice of rule development, and Chapter 5M-1, F.A.C., became effective November 1, 2017. This rule provides the structure for a statewide uniform implementation verification system, including the assessment of implementation status, compliance assistance to aid producers in achieving full implementation, and referral to DEP for producers who are not implementing BMPs.

Table D-1. Agricultural acreage in the Tidal Caloosahatchee Basin

[1] FDACS staff-adjusted acreage for purposes of enrollment is based on a review of more recent aerial imagery in the basin and local staff observations.
N/A = Not applicable

2004 SFWMD Land Use	2004 Acres	FDACS-Adjusted Acres[1]
Citrus	817.7	359.1
Dairies	37.9	37.9
Fallow Cropland	1,499.3	N/A
Fruit Orchards/Other Groves	154.1	154.1
Horse Farm	24.3	24.3
Ornamentals	285.1	285.1
Pasture (2100, 2110, 2120, 2130)	29,890.2	28,981.2
Row/Field/Mixed Crops	6,081.9	6,041.3
Specialty Farms	67.2	67.2
Tree Nurseries	230.3	230.3
Total	**39,088.0**	**36,181.5**

Table D-2. BMP enrollment in the Tidal Caloosahatchee Basin as of March 31, 2017

[1] Acreage enrolled as part of the Babcock Ranch cow/calf operation was not classified as agricultural land use in the model land use coverage.
[2] A single parcel may be enrolled under multiple BMP manuals. Acres are reported in this table under all related programs; therefore, this acreage differs from **Table A-8**.

Related FDACS BMP Programs	Acreage Enrolled	Related NOIs	TMDL Model Agricultural Land Use Acres with NOIs[2]
Citrus	19.8	1	19.2
Cow/Calf Operations[1]	69,053.6	11	18,162.1
Nurseries	536.6	23	399.5
Sod Operations	452.2	1	427.6
Specialty Fruit and Nut	28.6	1	21.3
Vegetable and Agronomic Crops	121.2	1	54.8
	70,212.0	**38**	**19,084.5**

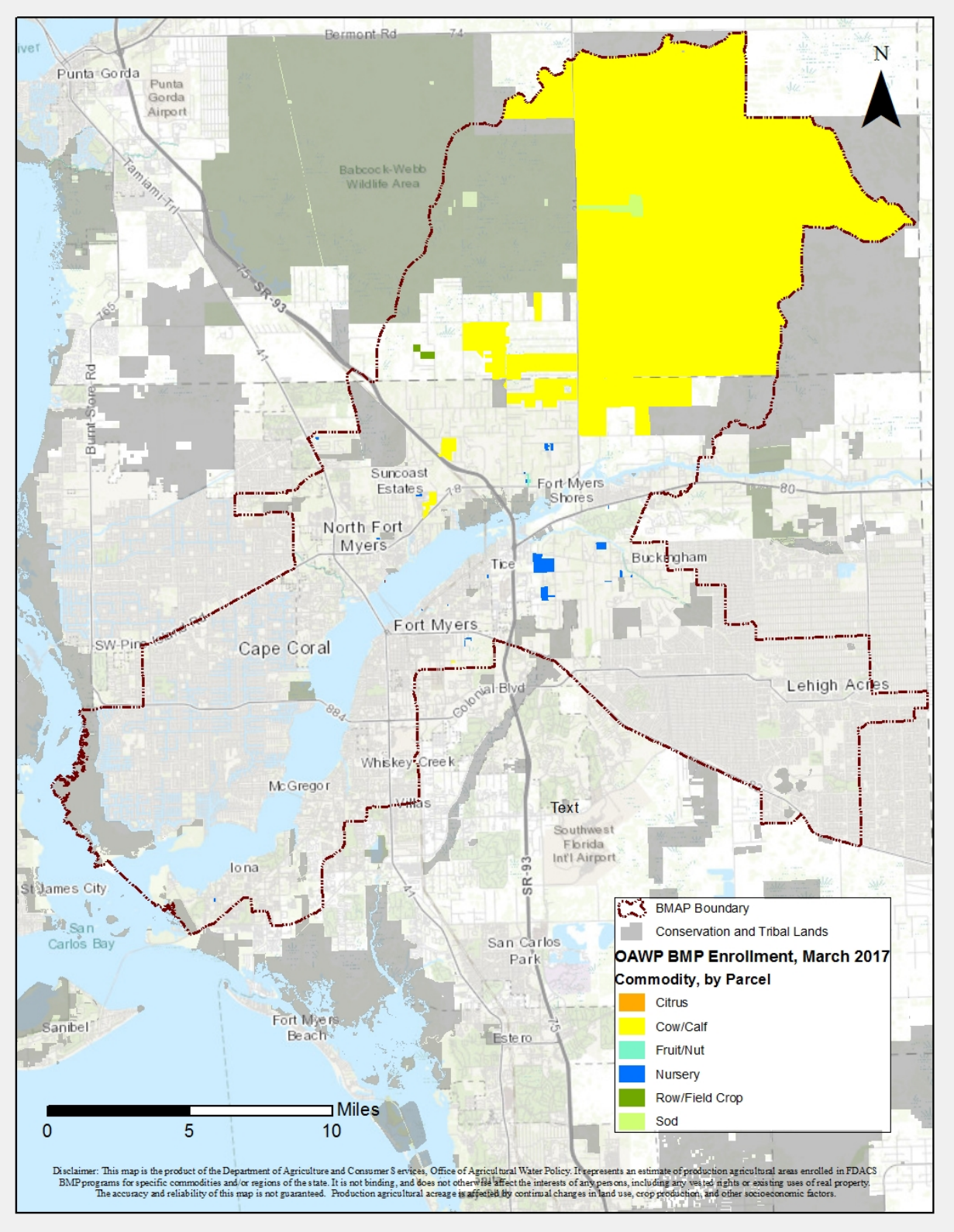

Figure D-1. BMP enrollment in the Tidal Caloosahatchee Watershed as of March 31, 2017

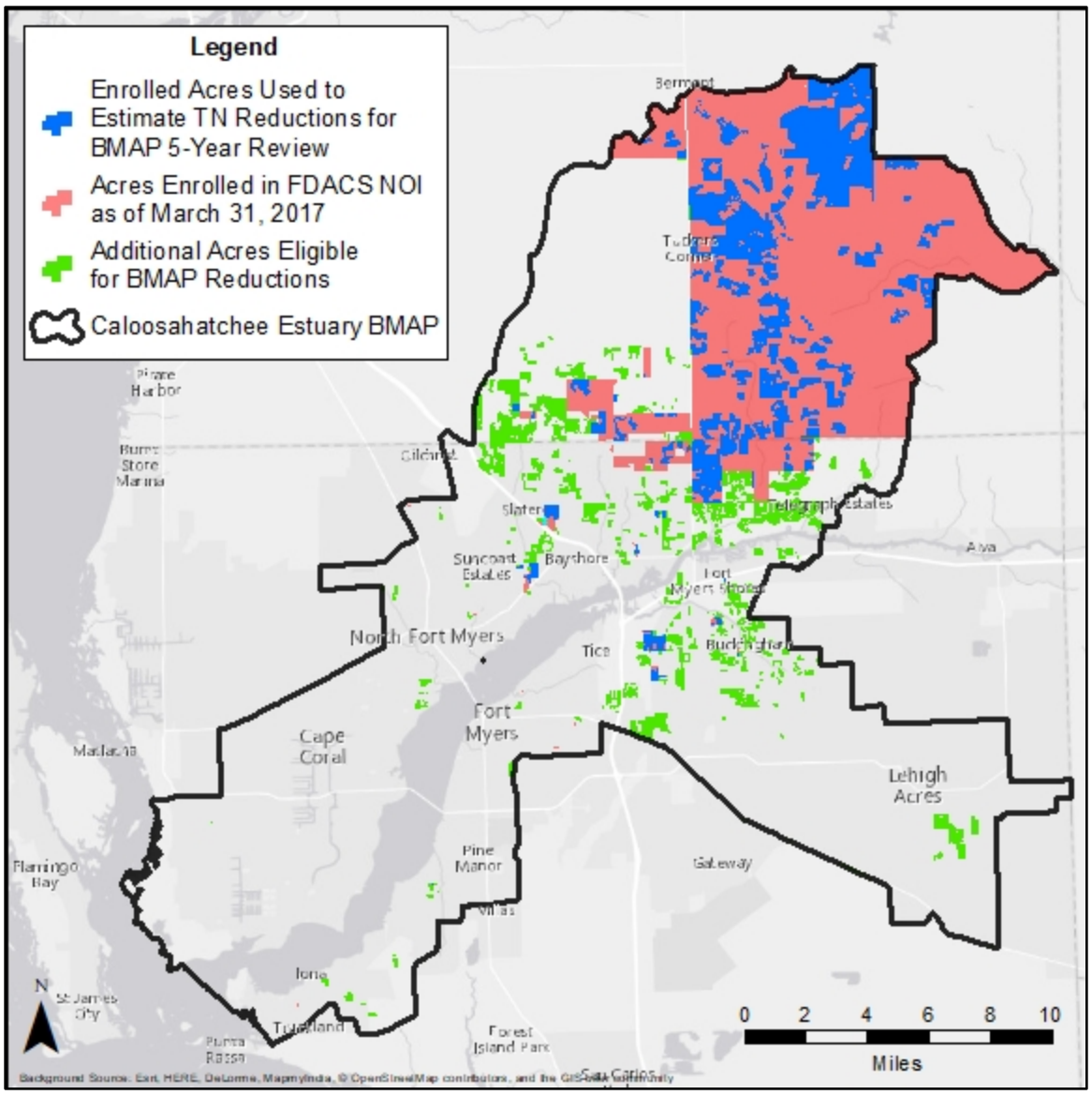

Figure D-2. Enrolled acres used to estimate TN reductions

Appendix E: Water Quality Data Processing and Analysis Methods

For this 5-Year Review, trend analyses were conducted on available data within an overall POR from May 1, 2007 to April 30, 2017, using stations recommended as Tier 1 in the revised Caloosahatchee Estuary BMAP network. STORET and WIN data were processed using the methods described below, and only data that met QC objectives were used in the analyses. Nonparametric statistical techniques were used to identify monotonic trend analyses in a statistically rigorous way with the Mann-Kendall trend test. Data are not required to conform to a particular distribution for nonparametric analyses. Nonparametric tests are also robust against outliers and large data gaps. **Section 2.3** in the main report summarizes the results; additional details on the methods are provided below.

Data Management and Processing

The Tier 1 tributary stations in the watershed were processed on an individual station basis to determine if the datasets were sufficient to meet the requirements for trend analysis. Stations that met the criteria were analyzed for trends. The Tier 1 estuary station data were aggregated into groups by WBIDs, processed, and then analyzed for trends on a WBID basis. All data from the Tier 1 stations in each of the three TMDL WBIDs (3240A, 3230B and 3240C) were pooled to develop an aggregated dataset on a WBID basis. **Table E-1** lists the stations initially selected for processing, including the data provider, latitude, longitude, waterbody type and whether the station was grouped by WBID or analyzed on an individual station basis.

The WY established for this region is May 1 to April 30. May 1, 2007 to April 30, 2017 was selected as the general working POR for these water quality analyses to assess trends, and included a five-year data period prior to and after BMAP adoption in November 2012. The POR for some stations had to be modified to account for significant missing data (greater than one year).

Parameters selected for analysis were TN (or the required nitrogen species that allow for the calculation of TN) and TP. TN and TP data were retrieved from STORET for the stations listed in **Table E-1**, except for SFWMD Stations S79, CES03, CES04, CES05, CES06 and CES08, which were retrieved from WIN. After data were retrieved from STORET and WIN, the data were processed and analyzed using several QC checks (and industry standard statistical diagnostics) that addressed the following items: depths of data collection, fatal qualifier codes, temporal independence, serial correlation and seasonality.

During data processing of the initial set of Tier 1 tributary stations, an assessment was performed to determine data sufficiency by counting the number of viable data points (after the data were processed for QC), to assess major data gaps and approximate sampling frequencies. **Table E-2** lists the POR and the number of samples collected at each individual station or in the WBIDs selected for analysis. Although May 2007 was initially selected as the working POR, none of the individual tributary stations had available data prior to May 2008 for TN or TP. Therefore, the working POR was shortened for the individual tributary stations to nine years for most of the

stations with longer PORs. **Table E-3** lists the POR and the number of samples compiled for each of the WBID datasets and Station S79 selected for analysis.

Based on a more detailed review of the individual station PORs and data gaps, it was found that four stations (Stations CALUSA0054FTM, CFMCARRELL, CFMMANUEL and CFMWINKLER) had a number of data points collected in at least a five-year period. However, there were large data gaps in the PORs, and it was determined that those stations did not have enough data points in a five-consecutive year period, which is a minimum requirement for trend analysis. Therefore, those four stations were not used in further analyses (**Table E-2**). In addition, the data quality for TP was insufficient for six stations in STORET (Stations 300, 400, 470, 540, 590 and 600). Therefore, only TN was further processed and analyzed for trends at those six stations. Two stations, CALUSA0024FTM and CALUSA0025FTM, had no data available prior to 2011. However, sufficient data were available to conduct further analyses, and so a shorter POR was analyzed for those stations. Finally, one station (18-6GR) had wide data gaps between November 2014 and April 2017. Data from June 2008 to November 2014 still met the minimum five-year data requirement, and that POR was used for subsequent processing and trend analysis.

After QC processing was completed and a near-final dataset was prepared for each station (or WBID), monthly means were calculated for datasets with more than one data point available in one given month. The monthly means were calculated to aid other analyses that were needed to further assess the data prior to trend analysis completion. These analyses included various time series analysis techniques, such as ACF and TSD, to review the potential for serial correlation and/or seasonality (i.e., seasonal patterns) that may affect the results of the trend analysis.

If months of data were missing from the specific time series for a dataset POR, then a variety of methods were used to fill the data gaps before the TSD analysis could be completed. The gap-filling methods used depended on the number of data points that had to be filled, and included multiple imputation and interpolation. **Appendix E** contains complete details of the specific steps and methodologies used for data processing and analysis.

Statistical Analyses

Only datasets that met the QC objectives mentioned above and described in **Appendix E** were ultimately used for trend analysis. Nonparametric statistical techniques were used to identify monotonic trends with the Mann-Kendall trend test. Nonparametric tests such as Mann-Kendall are robust against outliers and large data gaps, and data are not required to conform to a particular distribution for nonparametric analyses.

Prior to running trend analyses, it was necessary to conduct an ACF analysis to assess whether seasonality or serial correlation was impacting the data. For data showing seasonal pattern a TSD analysis was conducted to parse out any potential impacts of seasonality on the trend analyses. TSD requires the time series dataset to be complete, with no data gaps. Thus, before decomposing time series into seasonal and trend components, all data gaps should be filled with an appropriate value. For the purpose of these analyses, linear interpolation and the multiple imputation (MI) method were used to backfill datasets so that a TSD analysis could be conducted. MI backfilling

was only required for one station (22-7GR). **Appendix E** contains additional details on the MI methodology.

Data Download

- TN and TP data from WIN and STORET:
  - Station S79.
  - Tier 1 Estuary WBIDs:
    - 3240A (Stations: CALUSA0012FTM, CALUSA0014FTM, CES05, CES06, CES08).
    - 3240B (Stations: CALUSA0010FTM, CES04).
    - 3240C (Stations: CALUSA0006FTM, CALUSA0007FTM, CES03).
  - Tier 1 Tributary Stations: 300, 400, 470, 540, 590, 600, 16-3GR, 18-6GR, 20-9GR, 22-7GR, 23-5GR, 24-7GR, 25-GR20, 27-6GR, 27O-GR20, DEEPGR10, POWLGR20, BILLGR20, CFMMANUEL, CFMWINKLER, CFMCARRELL, CALUSA0025FTM, CALUSA0054FTM, CALUSA0024FTM.
- Station data were retrieved from STORET and WIN for the designated POR for Tier 1 estuary and tributary stations:
  - POR:
    - Overall POR was May 1, 2007 to April 30, 2017.

Data Processing (in order of operation)

- Nutrient Characteristic Selection:
  - TP: Phosphorus as P.
  - TN: TN, Nitrogen Ion:
    - If Nitrogen Ion not available: TN=TKN + (NO_2 + NO_3), TN=TKN+NO_3, TN =TKN+NO_2, or TN=TKN (best available).
- Sample Depth:
  - If "surface water," "midwater" and "bottom" samples were collected at a station for the same parameter on the same day, then only the "surface water" sample was retained for analysis:
    - Only surface samples, which included samples collected at depths equal to/less than 1.0 meter (m), were used in the analyses.
- Data Qualifiers:
  - Data with result qualifiers of "A," "F," "G," "H," "K," "L," "N," "O," "T," "V," "Y," or "?" were not used in the analysis, as per Table 1, Data Qualifier Codes, in Rule 62-160.700, F.A.C., Quality Assurance.
  - Data with result qualifier of "I" were only used if a corresponding minimum detection level (MDL) was listed.
  - Data with value of "*Present<QL" were not used in the analysis.
  - Data with result qualifier of "U" were reviewed:

        - If not already present, result qualifier of "U" was assigned to any data with a result value of "*Nondetect."
        - Data with result value of "*Not Reported" were deleted unless they also had a value qualifier of "U."
        - Data with result value or qualifier that indicated values were below the MDL were reviewed within the dataset's POR. If it was determined that the analytical methods were changed during the POR, resulting in differences in the MDL, the highest MDL value was used as the uniform MDL for the entire POR.
        - Data with result qualifier of "U" were processed in accordance with Rule 62-303.320(12), F.A.C., Aquatic Life-Based Water Quality Criteria Assessment. Results reported by a laboratory with the "U" data qualifier code were assessed as half the reported result or half the criterion (whichever was lower).
    - Field blank samples were removed from Cape Coral station datasets (list of blanks provided by City of Cape Coral).
- Estuary Data:
    - Station data were combined by WBID (parameters kept separate) for processing and analysis.
- Tributary Data:
    - Station data were processed and analyzed on an individual basis.
- Temporal Processing:
    - Same Day Average: If multiple surface water data points were collected on the same day, then values were averaged (including duplicates).
    - Monthly Time Series: If multiple data points existed within a month, the monthly average was calculated for each month.
- Processing for Statistical Tests:
    - Data were processed according to the needs of each statistical test and formatted for use in the R statistical program. Specifically, R-Packages “Kendall” and “wql” were used to compute Mann-Kendall test statistics and Sen slope.
    - Sampling Frequency:
        - Monthly data series were used for analysis.
        - Missing data entries were populated with NA values to provide an equal number of points for each station and parameter.
    - Data Gap Filling:
        - If a test did not require continuous series, missing values were left as NA.
        - Linear interpolation:

- For tests that required continuous data series (e.g., TSD), linear interpolation was used to backfill the missing data for all gaps that were one month long.

- MI:
  - For tests that required a continuous data series (e.g., TSD), gaps larger than one month, but less than one year, were filled using MI (only needed for 22-7GR TN). Unlike simple linear interpolation or a linear regression methodology, the MI method involves backfilling missing data with a set of plausible values (instead of just one value) based on Bayesian (probability-based) relationships. Rubin (1987) and Su et al. (2011) provide theoretical and implementation details about using MI for backfilling data gaps:
    - Six sets of probable values were produced for each missing value using MI.
    - The average of the six probable values was used to fill in the corresponding missing value.
    - Appropriate pre- and post-diagnostic checks were done to ensure the statistically valid implementation of multiple imputation method.
- For tests that required a continuous data series, if data gaps of more than one year existed, then the series was truncated, and the longest available continuous series was used for trend analysis.
- If a series did not have at least five years of continuous data, it was not used for trend analysis.

Statistical Analyses

- Spatial Associations:
  - Time series plots of estuary WBIDs versus Station S79.
- Trend Analysis:
  - ACF:
    - Autocorrelation was conducted to evaluate seasonal patterns and/or serial correlation (monthly/bimonthly, quarterly or annual seasons).
      - ACF was conducted first on monthly, nongap-filled series to determine seasonality.
      - It was run again on the gap-filled and decomposed (see below) trend component of time series data to check for any serial correlation.
  - TSD:
    - If seasonality was evident from ACF plots on nongap-filled data, the time series was first backfilled using linear interpolation or MI (see Data Gap Filling) and subsequently decomposed into trend and seasonal components

(based on annual seasonality patterns and assuming a fixed seasonal component).

- The trend component from the TSD was extracted, checked for serial-correlation (no stations were found to have serial correlation in the trend component), and the Mann-Kendall test was conducted to determine the presence of monotonic trends.

- Mann-Kendall Test:
  - Before running the Mann-Kendall test, the time series data were checked for serial correlation and seasonality using ACF.
  - If serial correlation was evident in ACF, first-order differencing (i.e., creating a new time-series by the subtraction of consecutive terms in the time-series) was done to remove serial correlation prior to conducting the Mann-Kendall test:
    - Mann-Kendall tests were conducted on monthly, nongap-filled, and nondecomposed series if no seasonality was evident (after the removal of serial correlation if present).
      - The slope value was obtained from conducting Mann-Kendall on the initial nongap-filled, nondecomposed series.
      - The tau and p-value were obtained from conducting Mann-Kendall on the first order differencing resultant series.
    - For time-series with evident seasonality, the Mann-Kendall test was conducted on the decomposed trend component to identify positive or negative significant trends independent of seasonal effects.

Table E-1. Initial list of stations selected for processing

Data Provider	Station ID	Latitude	Longitude	Waterbody Type	Grouped by WBID or Analysis Type
SFWMD	S79	26.72293	-81.6932	Estuary	Individual Estuary
DEP	CALUSA0014FTM	26.529	-82.0177	Estuary	Grouped – 3240A
DEP	CALUSA0013FTM	26.52389	-82.0044	Estuary	Grouped – 3240A
DEP	CALUSA0012FTM	26.53831	-81.9452	Estuary	Grouped – 3240A
SFWMD	CES05	26.6366	-81.8887	Estuary	Grouped – 3240A
SFWMD	CES06	26.5823	-81.9102	Estuary	Grouped – 3240A
SFWMD	CES08	26.5233	-81.992	Estuary	Grouped – 3240A
DEP	CALUSA0010FTM	26.662	-81.8594	Estuary	Grouped – 3240B
SFWMD	CES04	26.6817	-81.8338	Estuary	Grouped – 3240B
DEP	CALUSA0007FTM	26.69683	-81.7965	Estuary	Grouped – 3240C
DEP	CALUSA0006FTM	26.71933	-81.7386	Estuary	Grouped – 3240C
SFWMD	CES03	26.71669	-81.7606	Estuary	Grouped – 3240C
City of Cape Coral	400	26.60004	-81.9412	Tributary	Individual Tributary
City of Cape Coral	470	26.57763	-81.9438	Tributary	Individual Tributary
City of Cape Coral	540	26.55265	-81.9734	Tributary	Individual Tributary
City of Cape Coral	300	26.63661	-81.9305	Tributary	Individual Tributary
City of Cape Coral	590	26.54393	-82.0107	Tributary	Individual Tributary
City of Cape Coral	600	26.54282	-82.0033	Tributary	Individual Tributary
City of Fort Myers	CFMMANUEL	26.62714	-81.88	Tributary	Individual Tributary
City of Fort Myers	CFMWINKLER	26.60407	-81.8838	Tributary	Individual Tributary
City of Fort Myers	CFMCARRELL	26.6114	-81.884	Tributary	Individual Tributary
DEP	CALUSA0054FTM (former CALUSA0023FTM and 28020109)	26.69287	-81.7674	Tributary	Individual Tributary
DEP	CALUSA0024FTM	26.73004	-81.7017	Tributary	Individual Tributary
DEP	CALUSA0025FTM	26.6671	-81.8965	Tributary	Individual Tributary
Lee County	27-6GR	26.74015	-81.7369	Tributary	Individual Tributary
Lee County	20-9GR	26.70413	-81.8447	Tributary	Individual Tributary
Lee County	27O-GR20	26.74029	-81.7557	Tributary	Individual Tributary
Lee County	23-5GR	26.71575	-81.8086	Tributary	Individual Tributary
Lee County	24-7GR	26.71507	-81.7998	Tributary	Individual Tributary
Lee County	POWLGR20	26.68313	-81.8774	Tributary	Individual Tributary
Lee County	18-6GR	26.69142	-81.8589	Tributary	Individual Tributary
Lee County	DEEPGR10	26.53916	-81.9185	Tributary	Individual Tributary
Lee County	16-3GR	26.65997	-81.8977	Tributary	Individual Tributary
Lee County	22-7GR	26.71514	-81.822	Tributary	Individual Tributary
Lee County	25-GR20	26.71496	-81.78	Tributary	Individual Tributary
Lee County	BILLGR20	26.65424	-81.8404	Tributary	Individual Tributary

Table E-2. Summary of POR and data availability for tributary stations

Note: N/A = Not applicable.
*Only includes useful POR start/end. Other data exist past this endpoint but were not used in analyses.
**Station did not have five consecutive years of data in STORET. Data were not used for trend analysis from these stations.

WBID	Station	Parameter	POR Start	POR End	Number of Samples
3240A2	300	TN	May-08	Mar-17	107
3240A2	300	TP	N/A	N/A	0
3240A1	400	TN	May-08	Mar-17	105
3240A1	400	TP	N/A	N/A	0
3240A1	470	TN	May-08	Mar-17	106
3240A1	470	TP	N/A	N/A	0
3240A1	540	TN	May-08	Mar-17	102
3240A1	540	TP	N/A	N/A	0
3240A1	590	TN	May-08	Mar-17	106
3240A1	590	TP	N/A	N/A	0
3240A1	600	TN	May-08	Mar-17	98
3240A1	600	TP	N/A	N/A	0
3240O	16-3GR	TN	May-08	Apr-17	106
3240O	16-3GR	TP	May-08	Apr-17	106
3240O	18-6GR	TN	Jun-08	Nov-14*	86
3240O	18-6GR	TP	Jun-08	Nov-14*	86
3240F	20-9GR	TN	May-08	Apr-17	107
3240F	20-9GR	TP	May-08	Apr-17	107
3240F	22-7GR	TN	May-08	Jan-17	96
3240F	22-7GR	TP	May-08	Jan-17	96
3240Q	23-5GR	TN	May-08	Apr-17	107
3240Q	23-5GR	TP	May-08	Apr-17	107
3240M	24-7GR	TN	May-08	Apr-17	107
3240M	24-7GR	TP	May-08	Apr-17	107
3240M	25-GR20	TN	May-08	Nov-14*	78
3240M	25-GR20	TP	May-08	Nov-14*	78
3240M	27-6GR	TN	May-08	Apr-17	107
3240M	27-6GR	TP	May-08	Apr-17	107
3240M	27O-GR20	TN	May-08	Feb-17	106
3240M	27O-GR20	TP	May-08	Feb-17	106
3240J	BILLGR20	TN	May-08	Apr-17	108
3240J	BILLGR20	TP	May-08	Apr-17	108
3236A	CALUSA0024FTM	TN	Jan-11	Apr-17	76
3236A	CALUSA0024FTM	TP	Jan-11	Apr-17	76
3236A	CALUSA0025FTM	TN	Jan-11	Apr-17	76
3236A	CALUSA0025FTM	TP	Jan-11	Apr-17	76
3236A	CALUSA0054FTM	TN	Mar-13	Apr-17**	9
3236A	CALUSA0054FTM	TP	Mar-13	Apr-17**	9

WBID	Station	Parameter	POR Start	POR End	Number of Samples
3236A	CFMCARRELL	TN	Jan-13	Dec-16**	48
3236A	CFMCARRELL	TP	May-08	Dec-16**	74
3236A	CFMMANUEL	TN	May-08	Dec-16**	74
3236A	CFMMANUEL	TP	May-08	Dec-16**	74
3236A	CFMWINKLER	TN	Jan-13	Dec-16**	48
3236A	CFMWINKLER	TP	May-08	Dec-16**	74
3236A	DEEPGR10	TN	May-08	Apr-17	108
3236A	DEEPGR10	TP	May-08	Apr-17	108
3236A	POWLGR20	TN	May-08	Apr-17	105
3236A	POWLGR20	TP	May-08	Apr-17	105

Table E-3. Summary of POR and data availability for WBID datasets

WBID	Parameter	POR Start	POR End	Number of Samples
3240A	TN	May-07	Apr-17	120
3240A	TP	May-07	Apr-17	119
23240B	TN	May-07	Sep-16	106
23240B	TP	May-07	Sep-16	107
3240C	TN	May-07	Sep-16	120
3240C	TP	May-07	Sep-16	107
S79	TN	May-07	Oct-16	102
S79	TP	May-07	Oct-16	102