FINAL

BASIN MANAGEMENT ACTION PLAN

for the Implementation of Total Maximum Daily Loads for Nutrients and Dissolved Oxygen by the Florida Department of Environmental Protection in the St. Lucie River and Estuary Basin

developed by the
St. Lucie River and Estuary Basin Technical Stakeholders

in cooperation with the
Division of Environmental Assessment and Restoration
Bureau of Watershed Restoration
Florida Department of Environmental Protection
Tallahassee, FL 32399

May 2013

ACKNOWLEDGMENTS

The *St. Lucie River and Estuary Basin Management Action Plan* was prepared as part of a statewide watershed management approach to restore and protect Florida's water quality. It was developed by the St. Lucie River and Estuary Basin stakeholders, identified below, with participation from affected local, regional, and state governmental interests; elected officials and citizens; and private interests.

ST. LUCIE RIVER AND ESTUARY BASIN PARTICIPANTS

- = Empty cell/no data

ALLOCATION ENTITIES	AGENCIES	OTHER INTERESTED PARTIES
Agricultural Producers	Florida Department of Agriculture and Consumer Services	Florida Fruit and Vegetable Association
Martin County	Florida Department of Environmental Protection	Florida Oceanographic Society
Okeechobee County	South Florida Water Management District	Harbor Branch Oceanographic Institute
St. Lucie County	-	St. Lucie West Services District
City of Fort Pierce	-	-
City of Port St. Lucie	-	-
City of Stuart	-	-
Copper Creek Community Development District	-	-
Florida Department of Transportation – District 4	-	-
Florida Turnpike	-	-
Hobe St. Lucie Conservancy District	-	-
North St. Lucie River Water Control District	-	-
Pal Mar Water Control District	-	-
Town of Sewall's Point	-	-
Tradition Community Development District	-	-
Troup-Indiantown Water Control District	-	-
Verano Community Development District	-	-

For additional information on Total Maximum Daily Loads and the watershed management approach in the St. Lucie River and Estuary Basin, contact:

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BMAP	Basin Management Action Plan
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
CDD	Community Development District
CDS	Continuous Deflective Separation (Unit)
Department	Florida Department of Environmental Protection
DO	Dissolved Oxygen
EMC	Event Mean Concentration
EPA	U.S. Environmental Protection Agency
ERP	Environmental Resource Permit
EWIP	Eastern Watershed Improvement Project
F.A.C.	Florida Administrative Code
FDACS	Florida Department of Agriculture and Consumer Services
FDOT	Florida Department of Transportation
FPL	Florida Power & Light
F.S.	Florida Statutes
FSA	Florida Stormwater Association
FSU	Florida State University
FWRA	Florida Watershed Restoration Act
FYN	Florida Yards and Neighborhoods
GIS	Geographic Information System
HWTT	Hybrid Wetland Treatment Technology
IRL	Indian River Lagoon
IRL-S	Indian River Lagoon South
IWR	Impaired Surface Waters Rule
lbs/yr	Pounds Per Year
LID	Low Impact Development
LOPA	Lake Okeechobee Protection Act
MAPS	Managed Aquatic Plant System
MEP	Maximum Extent Practicable
mg/L	Milligrams Per Liter
MS4	Municipal Separate Storm Sewer System
MT/yr	Metric Tons Per Year
NEEPP	Northern Everglades and Estuaries Protection Program
NELAC	National Environmental Laboratory Accreditation Conference
NELAP	National Environmental Laboratory Accreditation Program
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
O&M	Operations and Maintenance
OAWP	Office of Agricultural Water Policy
POTW	Publicly Owned Treatment Works
PSA	Public Service Announcement
QA/QC	Quality Assurance/Quality Control
ROC	Runoff Coefficient
SFWMD	South Florida Water Management District

SLRWPP	St. Lucie River Watershed Protection Plan
SOP	Standard Operating Procedure
STA	Stormwater Treatment Area
STORET	STOrage and RETrieval (Database)
SWIM	Surface Water Improvement and Management
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
TT	Treatment Train
UF	University of Florida
UF–IFAS	University of Florida–Institute of Food and Agricultural Sciences
USGS	U.S. Geological Survey
WBID	Waterbody Identification (Number)
WCD	Water Control District

EXECUTIVE SUMMARY

ST. LUCIE RIVER AND ESTUARY BASIN

The St. Lucie River and Estuary Basin is located in southeast Florida in Martin, St. Lucie, and Okeechobee Counties (see **Figure ES-1**). The St. Lucie Estuary is a major tributary to the Southern Indian River Lagoon (IRL-S). The basin is an economically important area where water quality is affected by freshwater runoff from agricultural and urban sources in the watershed and Lake Okeechobee (South Florida Water Management District [SFWMD] 2012a).

The inland portion of the St. Lucie Estuary is composed of the South Fork and the North Fork. The two forks converge at the Roosevelt Bridge to form a single waterbody that extends eastward, where it joins the IRL-S. Historically, this area included a much smaller natural watershed that directly contributed to the river system. However, with the construction of drainage improvements in inland areas, the effective drainage area of the St. Lucie Estuary and IRL-S expanded to include almost all of Martin and St. Lucie Counties. The C-44 canal and its associated locks and water control structures were constructed to provide a navigable connection between the east and west coasts of Florida. The C-44 canal also serves as a flood control conveyance for Lake Okeechobee and transports water from the lake into the South Fork. In addition, the C-44 canal transports runoff from the C-44/S-153 sub-basin. The construction of Canals C-23 and C-24 (in addition to C-44) provided connections between their respective sub-basins. The C-23 and C-24 canals discharge to the North Fork (Florida Department of Environmental Protection 2008).

The overall St. Lucie River and Estuary Basin was divided into six sub-basins for this Basin Management Action Plan. These sub-basins, which also comprise some of the sub-watersheds in the SFWMD St. Lucie River Watershed Protection Plan (SLRWPP) and the associated 2012 SLRWPP Update, are as follows:

- *Basins 4, 5, and 6.*
- *C-23.*
- *C-24.*
- *C-44 and S-153.*

- *North Fork.*
- *South Fork.*

TOTAL MAXIMUM DAILY LOADS

TMDLs are water quality targets that are based on state water quality standards for specific pollutants, such as excessive nitrogen and phosphorus. The Department identified nine segments with waterbody identification (WBID) numbers in the St. Lucie River and Estuary Basin as impaired by nutrients. This determination was made based on concentrations of chlorophyll-*a*, dissolved oxygen (DO), and/or biochemical oxygen demand (BOD) in each of the WBIDs. In March 2009, the Department adopted the St. Lucie Basin TMDL for total phosphorus (TP), total nitrogen (TN), and BOD. **Table ES-1** lists the TMDLs and pollutant load allocations adopted by rule for the WBIDs in the St. Lucie River and Estuary Basin. TMDL loads in upstream WBIDs were calculated based on achieving the same target concentrations (0.72 milligrams per liter [mg/L] for TN and 0.081 mg/L for TP) as in the St. Lucie Estuary. The TMDLs were used as the basis for the BMAP targets and allocation calculations.

ST. LUCIE RIVER AND ESTUARY BASIN MANAGEMENT ACTION PLAN

Paragraph 403.067(7)(a)1, Florida Statutes (F.S.), authorizes the Department to adopt BMAPs that provide for phased implementation of the strategies necessary to ultimately achieve the associated TMDLs. This approach allows stakeholders to incrementally plan, budget, and execute projects while simultaneously monitoring and conducting studies to better understand the water quality dynamics (sources and response variables) in the watershed. For the St. Lucie River and Estuary Basin, the total required reductions are spread over a 15-year timeframe. Reductions will be implemented in three five-year BMAP iterations, which align with the Department's approach to evaluate basin health every five years. This BMAP is the first five-year iteration for the St. Lucie River and Estuary Basin.

During BMAP development, various stakeholders in the basin raised concerns about the BMAP model and required reductions. The Department plans to refine the BMAP model during this first five-year iteration. Therefore, the Department requested that the stakeholders provide information on activities and projects that would reduce a portion of the nutrient loading identified in the model. In this first BMAP phase, the activities identified are not expected to achieve the TMDLs. Rather, this BMAP calls

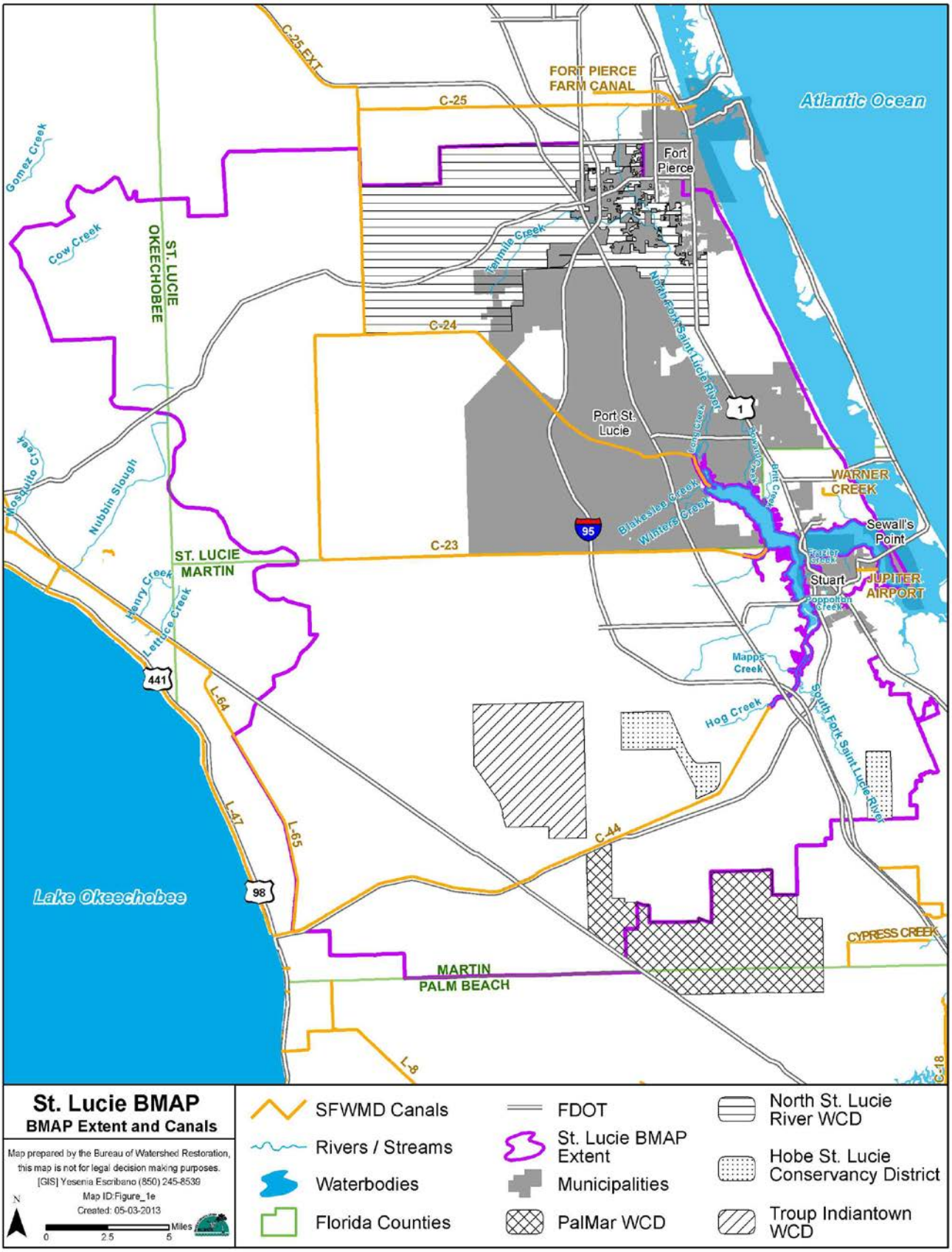

FIGURE ES-1: ST. LUCIE RIVER AND ESTUARY BASIN

TABLE ES-1: TMDLS IN THE ST. LUCIE RIVER AND ESTUARY BASIN

[1] Concentration in mg/L
[2] National Pollutant Discharge Elimination System

WBID	WATERBODY	PARAMETER	ANNUAL TMDL TARGET (POUNDS OR [CONCENTRATION[1]])	NPDES[2] STORMWATER (% REDUCTION)	LOAD ALLOCATION (% REDUCTION)
3193	St. Lucie Estuary	TN	[0.720]	21.4%	21.4%
3193	St. Lucie Estuary	TP	[0.081]	41.3%	41.3%
3194	North Fork	TN	140,134	25.0%	25.0%
3194	North Fork	TP	15,765	42.2%	42.2%
3194	North Fork	BOD	[2.0]	74.0%	74.0%
3194B	North Fork	TN	103,747	28.8%	28.8%
3194B	North Fork	TP	11,672	58.1%	58.1%
3197	C-24 Canal	TN	348,957	51.8%	51.8%
3197	C-24 Canal	TP	39,258	72.2%	72.2%
3197	C-24 Canal	BOD	[2.0]	33.3%	33.3%
3200	C-23 Canal	TN	242,202	51.7%	51.7%
3200	C-23 Canal	TP	27,248	78.6%	78.6%
3210	South Fork	TN	24,463	38.4%	38.4%
3210	South Fork	TP	2,752	57.2%	57.2%
3210A	South Fork	TN	90,471	47.1%	47.1%
3210A	South Fork	TP	10,178	61.8%	61.8%
3211	Bessey Creek	TN	29,981	23.9%	23.9%
3211	Bessey Creek	TP	3,373	51.2%	51.2%
3218	C-44 Canal	TN	242,929	51.2%	51.2%
3218	C-44 Canal	TP	27,330	55.0%	55.0%
3218	C-44 Canal	BOD	[2.0]	69.7%	69.7%

for projects and activities necessary to achieve reductions of 316,024.2 pounds per year (lbs/yr) (143.4 metric tons per year [MT/yr]) of TN and 121,249.8 lbs/yr (55.0 MT/yr) of TP, which is 30% of the TMDL required reductions, by the end of the first 5-year iteration. After the first phase of BMAP implementation, the Department and the stakeholders will evaluate progress and make adjustments using adaptive management, as needed, to meet the remainder of the reductions to achieve the TMDLs.

An important consideration for the restoration of the St. Lucie River and Estuary is that approximately 42% of the freshwater inflows from canals that discharge into the St. Lucie Estuary are from Lake Okeechobee, based on data from 1996 through 2012. These releases carry significant nutrient loads, which have a known impact on the St. Lucie River and Estuary Basin. Lake Okeechobee has its own TMDL for TP, and the Department is developing a separate BMAP to address those required reductions.

The implementation of activities to meet the Lake Okeechobee BMAP will likely have a positive effect on TN, as well.

In 2007, the Lake Okeechobee Protection Act (LOPA) was expanded to include the St. Lucie and Caloosahatchee River watersheds. The legislation was renamed the Northern Everglades and Estuaries Protection Program (NEEPP) and required the SLRWPP to include a pollutant load reduction implementation plan consistent with the St. Lucie River and Estuary BMAP (Section 373.4595, F.S.). As a result, during the TMDL and BMAP development, SFWMD staff collaborated with the Department to ensure consistency between the two plans. While the nutrient loading analyses used by the Department and SFWMD were different, similar results were identified, corroborating the need for nutrient load reductions in the basin. The coordinating agencies, the Department, SFWMD, and Florida Department of Agriculture and Consumer Services (FDACS), will continue to work closely to further align the BMAP and SLRWPP information for future iterations of the BMAP and the SLRWPP Updates.

KEY ELEMENTS OF THE BMAP

This BMAP addresses the key elements required by the Florida Watershed Restoration Act (FWRA), Chapter 403.067, F.S., including the following:

- *Document how the public and other stakeholders were encouraged to participate or participated in developing the BMAP (Section **1.3.1**).*
- *Equitably allocate pollutant reductions in the basin (**Chapter 4**).*
- *Identify the mechanisms by which potential future increases in pollutant loading will be addressed (**Section 1.5**).*
- *Document management actions/projects to achieve the TMDLs (**Chapter 5** and **Appendix D**).*
- *Document the implementation schedule, funding, responsibilities, and milestones (**Appendix D**).*
- *Identify monitoring, evaluation, and a reporting strategy to evaluate reasonable progress over time (**Section 6.3**).*

ANTICIPATED OUTCOMES OF BMAP IMPLEMENTATION

Through the implementation of projects, activities, and additional source assessment in this BMAP, stakeholders expect the following outcomes:

- *Modest improvements in water quality trends in the watershed tributaries and the St. Lucie River and Estuary.*
- *Decreased loading of the target pollutants (TP, TN, and BOD).*
- *Increased coordination between state and local governments and within divisions of local governments in problem solving for surface water quality restoration.*
- *Determination of effective projects through the stakeholder decision-making and priority-setting processes.*
- *Enhanced public awareness of pollutant sources, pollutant impacts on water quality, and corresponding corrective actions.*
- *Enhanced understanding of basin hydrology, water quality, and pollutant sources.*

BMAP COST

Costs were provided for approximately 29.3% of the activities identified in the BMAP, with an estimated total cost of more than $242.6 million. Of this figure, $229,971,331 has been spent on completed projects in the basin since 2000, and $7,254,928 has been spent and will be expended over the course of this first iteration on ongoing projects. An estimated $5,432,525 will be spent on planned projects in the basin during the first five-year iteration. It is important to note that many BMAP projects were built to achieve multiple objectives, not just nutrient reductions; therefore, multiple objectives should be acknowledged when estimating a cost per pound of nutrient removal from these projects. Some of these cost estimates may include operations and maintenance. The funding sources for the projects range from local contributions to legislative appropriations. Stakeholders will continue to explore new opportunities for funding assistance to ensure that the activities listed in this BMAP can be maintained at the necessary level of effort.

BMAP FOLLOW-UP

The Department will work with the stakeholders to organize the monitoring data and track project implementation. The results of these efforts will be used to evaluate whether the BMAP is effective in reducing TP and TN loads in the watershed. The stakeholders will meet at least every 12 months after

BMAP adoption to follow up on plan implementation, share new information, and continue to coordinate on TMDL-related issues. More frequent meetings may be held at the request(s) of the stakeholders.

COMMITMENT TO BMAP IMPLEMENTATION

The stakeholders have committed to implementing the projects and activities included in this BMAP.

Chapter 1: CONTEXT, PURPOSE, AND SCOPE OF THE PLAN

The St. Lucie River and Estuary Basin is located in southeast Florida in Martin, St. Lucie, and Okeechobee Counties. The St. Lucie Estuary is a major tributary to the Southern Indian River Lagoon (IRL-S). The basin is an economically important area where water quality is affected by freshwater runoff from agricultural and urban sources in the watershed and Lake Okeechobee (South Florida Water Management District [SFWMD] 2012a). To address the nutrient impacts in this important basin, the Florida Department of Environmental Protection adopted Total Maximum Daily Loads to reduce the watershed nutrient inputs to the river and estuary.

This Basin Management Action Plan represents the joint efforts of multiple stakeholders to prepare a blueprint for water quality restoration for the St. Lucie River and Estuary to work towards achieving the adopted TMDLs to restore the waterbodies in the basin. The BMAP includes projects to reduce watershed nutrient loading and a monitoring plan to guide effective long-term restoration efforts. The BMAP was developed as part of Florida's TMDL Program. Stakeholder involvement is critical to the success of the TMDL Program.

Stakeholder involvement is particularly essential to develop, gain support for, and secure commitments in a BMAP. The Department invited all interested stakeholders to participate in the St. Lucie River and Estuary BMAP development and facilitated participation to ensure that all voices were heard and opinions considered. This approach resulted in the use of a 15-year, phased implementation process to achieve TMDL targets. The first five-year BMAP iteration is expected to achieve discernible results through the actions outlined in this document.

This chapter describes the TMDL Program, stakeholder involvement in BMAP development, BMAP purpose and scope, BMAP approach, TMDLs addressed, assumptions and considerations identified during BMAP development, and future growth in the basin.

1.1 WATER QUALITY STANDARDS AND TMDLS

Florida's water quality standards are designed to ensure that surface waters can be used for their designated purposes, such as drinking water, recreation, and agriculture. Currently, most surface waters in Florida, including those in the St. Lucie River and Estuary Basin, are categorized as Class III waters,

which means they must be suitable for recreation and must support the propagation and maintenance of a healthy, well-balanced population of fish and wildlife. **Table 1** shows all designated use categories.

TABLE 1: DESIGNATED USE ATTAINMENT CATEGORIES FOR FLORIDA SURFACE WATERS

* Class I and II waters include the uses of the classifications listed below them.
** Surface water classification for waters in the St. Lucie River and Estuary Basin.

CATEGORY	DESCRIPTION
Class I*	Potable water supplies
Class II*	Shellfish propagation or harvesting
Class III**	**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*)

Under Section 303(d) of the federal Clean Water Act, every two years each state must identify its "impaired" waters, including estuaries, lakes, rivers, and streams, that do not meet their designated uses and are not expected to improve within the subsequent two years. The Department is responsible for developing this "303(d) list" of impaired waters.

Florida's 303(d) list identifies waterbody segments that do not meet the state's water quality standards and are thus considered impaired. In Florida, the three most common water quality concerns are nutrients, oxygen-demanding substances, and fecal coliforms. The 303(d)-listed waterbody segments are candidates for more detailed assessments of water quality to determine whether they are impaired according to state statutory and rule criteria. The Department develops and adopts TMDLs for the waterbody segments it identifies as impaired and for which a causative pollutant has been identified. A TMDL is the maximum amount of a specific pollutant that a waterbody can assimilate while maintaining its designated uses.

The water quality evaluation and decision-making processes for listing impaired waters and establishing TMDLs are authorized by Section 403.067, Florida Statutes (F.S.), known as the Florida Watershed Restoration Act (FWRA), and contained in Florida's Identification of Impaired Surface Waters Rule (IWR) (Rule 62-303, Florida Administrative Code [F.A.C.]). The impaired waters in the St. Lucie River and Estuary Basin addressed in this BMAP are all Class III waters. TMDLs, which address the amount of total nitrogen (TN), total phosphorus (TP), and biochemical oxygen demand (BOD) these waters can receive and still maintain Class III designated uses, have been established for these waters.

TMDLs are developed and implemented as part of a watershed management cycle that rotates through the state's 52 river basins every five years (see **Appendix A**) to evaluate waters, determine impairments, and develop and implement management strategies to restore impaired waters to their designated uses. **Table 2** summarizes the five phases of the watershed management cycle.

TABLE 2: PHASES OF THE WATERSHED MANAGEMENT CYCLE

PHASE	ACTIVITY
Phase 1	Preliminary evaluation of water quality.
Phase 2	Strategic monitoring and assessment to verify water quality impairments.
Phase 3	Development and adoption of TMDLs for waters verified as impaired.
Phase 4	Development of management strategies to achieve the TMDL(s).
Phase 5	Implementation of TMDL(s), including monitoring and assessment.

1.2 TMDL IMPLEMENTATION

Rule-adopted TMDLs may be implemented through BMAPs, which contain strategies to reduce and prevent pollutant discharges into impaired waterbodies through various cost-effective means. During Phase 4 of the watershed management cycle, the Department and the affected stakeholders in the various basins jointly develop BMAPs or other implementation approaches. Based on practical considerations, a basin may have more than one BMAP. The FWRA contains provisions that guide the development of BMAPs and other TMDL implementation approaches. **Appendix B** summarizes the statutory provisions related to BMAP development.

Stakeholder involvement is critical to the success of the TMDL Program and 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. Under statute, the Department invites stakeholders to participate in the BMAP development process and encourages public participation to the greatest practicable extent. The Department must hold at least one noticed public meeting in the basin to discuss and receive comments during the planning process. Stakeholder involvement is essential to develop, gain support for, and secure commitments to implement the BMAP.

1.3 ST. LUCIE RIVER AND ESTUARY BMAP

The St. Lucie River Watershed Protection Plan (SLRWPP) and the St. Lucie River and Estuary BMAP are both requirements of the Northern Everglades and Estuaries Protection Program (NEEPP) (Section 373.4595, F.S.) and have water quality goals of restoring the St. Lucie River and Estuary. As a result, during the TMDL development and BMAP preparation, the SFWMD staff collaborated frequently with

the Department. This close coordination between the Department and SFWMD staff during BMAP development minimized duplicative efforts between the agencies and improved consistency between these two NEEPP-related efforts. The SFWMD is considered a collaborative partner with the Department in the preparation of this BMAP. Other agencies, governments, and interested parties also helped in the preparation of this BMAP.

1.3.1 STAKEHOLDER INVOLVEMENT

The BMAP process engages local stakeholders and promotes coordination and collaboration to address the reductions for TP and TN to achieve the St. Lucie River and Estuary TMDL. The following organizations and entities are key stakeholders with assigned load reductions in the St. Lucie River and Estuary BMAP:

- *Agriculture.*
- *City of Fort Pierce.*
- *City of Port St. Lucie.*
- *City of Stuart.*
- *Copper Creek Community Development District (CDD).*
- *Florida Department of Transportation (FDOT) District 4.*
- *Florida Turnpike.*
- *Hobe St. Lucie Conservancy District.*
- *Martin County.*
- *North St. Lucie River Water Control District (WCD).*
- *Okeechobee County.*
- *Pal Mar WCD.*
- *St. Lucie County.*
- *Town of Sewall's Point.*
- *Tradition CDD.*
- *Troup-Indiantown WCD.*

- *Verano CDD.*

In July 2009, the Department initiated the BMAP development process and held a series of technical meetings involving key stakeholders and the general public. The purpose of these meetings was to consult with key stakeholders to gather information on the impaired segments with waterbody identification (WBID) numbers and their contributing areas to aid in the BMAP development process and identify specific management actions that would reduce TP and TN loading. Technical meetings were held to gather information; identify potential sources; conduct field reconnaissance; define programs, projects, and actions currently under way; and develop the BMAP contents and actions that will reduce TP, TN, and BOD with the ultimate goal of achieving the TMDL targets. Technical meetings were held regularly throughout the BMAP development process on the following dates:

- *July 21, 2009.*
- *March 25, 2010.*
- *August 18, 2010.*
- *March 29, 2011.*
- *May 24, 2011.*
- *November 16, 2011.*
- *March 16, 2012.*
- *November 29, 2012.*
- *December 12, 2012.*
- *January 16, 2013.*
- *February 13, 2013.*
- *March 13, 2013.*

In addition to technical meetings, the Department also met with stakeholders in one-on-one meetings. The purpose of these meetings was to discuss project-specific information with stakeholders. The Department also held policy briefings to obtain feedback on the BMAP process from the policy makers from the interested responsible entities. The policy briefings were held on the following dates:

- *April 10, 2013.*
- *April 18, 2013.*
- *April 24, 2013.*
- *May 6, 2013.*
- *May 7, 2013.*

All technical meetings and policy briefings were open to the public and noticed in the *Florida Administrative Weekly*, now known as the *Florida Administrative Register*. Public comment was invited during the policy briefings, and technical meetings were open to anyone interested in participating in the technical discussions. In addition, a public workshop on the BMAP was held on April 10, 2013.

Except as specifically noted in subsequent sections, this BMAP document reflects the input of the stakeholders, along with public input from workshops and meetings held to discuss key aspects of the TMDL and BMAP development.

1.3.2 Other Support and Interested Parties

In addition to the key stakeholders previously mentioned, several other interested parties and entities participated in the St. Lucie River and Estuary BMAP meetings, as follows:

- *Florida Department of Agriculture and Consumer Services (FDACS).*
- *Florida Fruit and Vegetable Association.*
- *Florida Oceanographic Society.*
- *Harbor Branch Oceanographic Institute.*
- *SFWMD.*
- *St. Lucie West Services District.*

1.3.3 Plan Purpose and Scope

The purpose of this BMAP is to implement TP, TN, and related BOD load reductions to achieve the TMDLs for the St. Lucie River and Estuary Basin. This plan outlines specific projects that have provided or will provide load reductions and a schedule for implementation for the first five-year iteration of the BMAP. The BMAP also details a monitoring approach to measure progress towards

meeting load reductions and to report on how this portion of the TMDLs is being accomplished. The stakeholders will meet at least annually to review progress made towards achieving the TMDLs.

In 2009, the Department adopted nutrient and BOD TMDLs for portions of the St. Lucie River and Estuary. TP and TN TMDLs were developed for WBIDs 3193 (St. Lucie Estuary), 3194 (North Fork St. Lucie River), 3194B (North Fork St. Lucie Estuary), 3197 (C-24 Canal), 3200 (C-23 Canal), 3210 (South Fork St. Lucie Estuary), 3210A (South Fork St. Lucie River), 3211 (Bessey Creek), and 3218 (C-44 Canal). WBIDs 3194, 3197, and 3218 also have TMDLs for BOD. The BMAP encompasses these WBIDs, which cover most of Martin and St. Lucie Counties as well as a small part of the eastern portion of Okeechobee County. The focus of this BMAP is the 514,648.8-acre basin, shown in **Figure 1**, which discharges to the St. Lucie Estuary.

In order to align the BMAP process with the SLRWPP and to take a holistic watershed approach, it was decided that the BMAP would focus on the St. Lucie River and Estuary rather than on the WBIDs from the TMDL document. Thus, the overall St. Lucie River and Estuary Basin was divided into six sub-basins (see **Figure 2**) for the BMAP. These sub-basins, which are also some of the major contributing sub-basins used in the water quality analysis for the SFWMD's SLRWPP and associated 2012 SLRWPP Update, are as follows:

- *Basins 4, 5, and 6.*
- *C-23.*
- *C-24.*
- *C-44 and S-153.*
- *North Fork.*
- *South Fork.*

The 2012 SLRWPP Update states that seven sub-watersheds, which are the same was the sub-basins used in the BMAP, in the St. Lucie River watershed drain directly into the St. Lucie River or Estuary: Basins 4, 5, and 6; C-23; C-24; C-44 and S-153; North Fork; South Fork; and a portion of the South Coastal sub-watershed. The South Coastal sub-watershed was not included in the BMAP boundaries for this iteration of the BMAP because of a lack of nutrient loading data in the area. However, the boundaries may be revised in the next iteration of the BMAP to include this sub-basin. The SLRWPP

also includes the Basin 1, C-25, and C-25 East sub-watersheds that mostly drain to the Indian River Lagoon (IRL) (SFWMD 2012a). Thus, these sub-watersheds were not included in the boundaries for this BMAP effort.

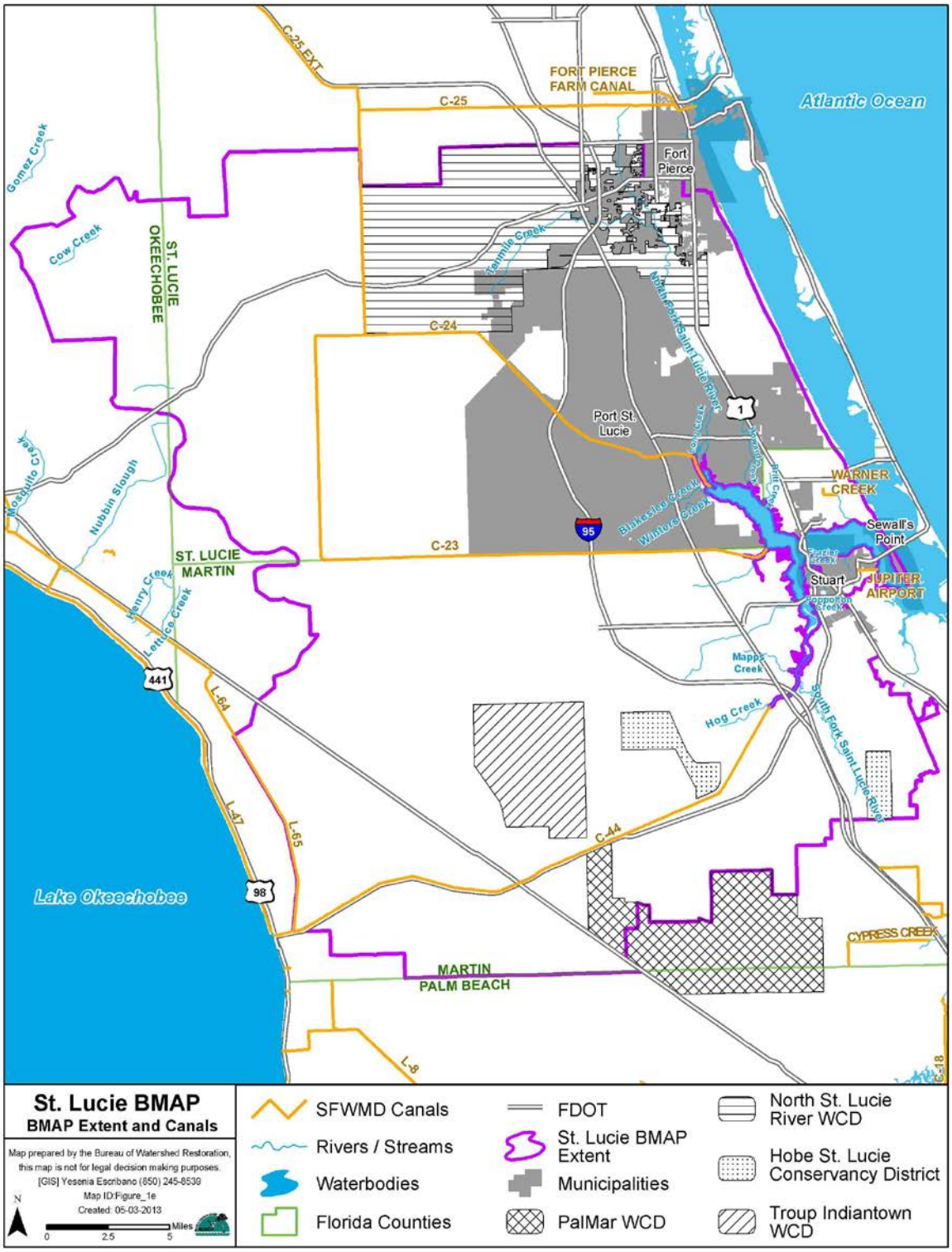

FIGURE 1: ST. LUCIE RIVER AND ESTUARY BASIN

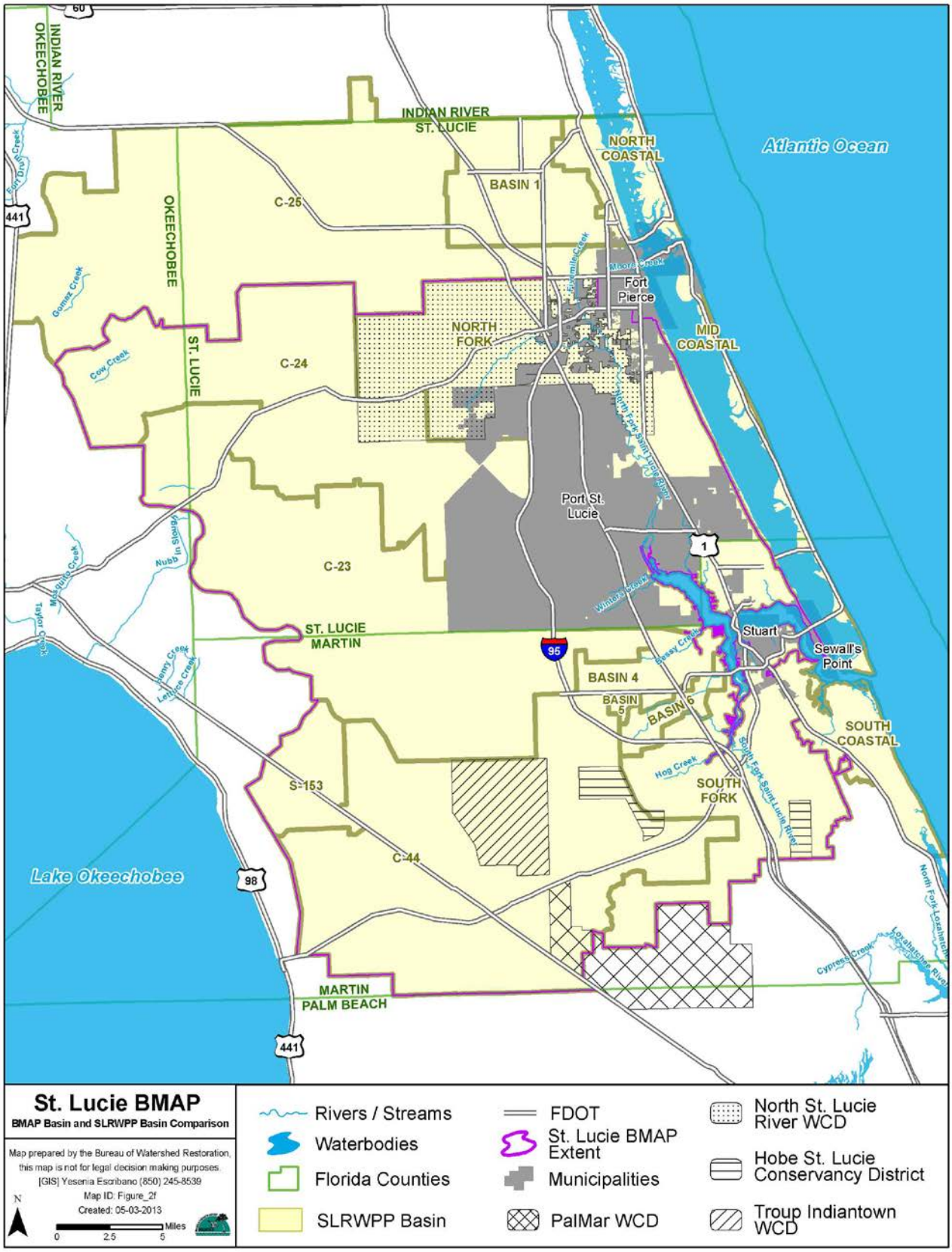

FIGURE 2: ST. LUCIE RIVER AND ESTUARY BMAP BASIN COMPARED WITH SLRWPP BASIN

1.3.4 BMAP APPROACH

The BMAP provides for phased implementation under Paragraph 403.067(7)(a)1, F.S. The management actions and adaptive management approach described in the BMAP will address TP and TN reductions, and the process will continue until the TMDLs are attained. It is assumed that by addressing the TP and TN reductions, the dissolved oxygen (DO) and BOD reductions listed in the TMDL document will also be addressed; therefore, this BMAP does not specifically contain efforts that are designed to address BOD alone. The phased BMAP approach allows for the implementation of projects 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. The total reductions for the St. Lucie River and Estuary TMDLs are spread over 15 years.

During BMAP development, various stakeholders in the basin raised concerns about the BMAP model and required reductions. The Department plans to refine the BMAP model during this first five-year iteration. Therefore, the Department requested that the stakeholders provide information on activities and projects that would reduce a portion of the nutrient loading. For the first BMAP iteration, projects that have been completed since 2000 or are expected to be completed within the first five-year iteration were given project credits. In this first phase, the activities identified are not expected to achieve the TMDLs. Rather, the BMAP only calls for projects and activities necessary to achieve reductions of 316,024.2 pounds per year (lbs/yr) (143.4 metric tons per year [MT/yr]) of TN and 121,249.8 lbs/yr (55.0 MT/yr) of TP, which is 30% of the TMDL-required reductions, by the end of the first five-year iteration.

After the first phase of BMAP implementation, the Department and the stakeholders will evaluate progress and make adjustments using adaptive management, as needed, to meet the remainder of the reductions to achieve the TMDLs. Projects implemented during this first five-year iteration count toward the total required reductions. For entities that have exceeded 30% of the required reductions in the first BMAP iteration, the additional reductions achieved will be credited toward the overall required reductions. In addition, projects in the South Coastal sub-basin and Mid Coastal sub-basins will receive credits in the second iteration of the BMAP, as the BMAP boundary may be expanded to include these areas. At the time this BMAP was developed, any projects in these sub-basin are included in **Appendix D**, but project credits have not been calculated.

1.3.5 POLLUTANT REDUCTION AND DISCHARGE ALLOCATIONS

1.3.5.1 Categories for Rule Allocations

The rules adopting 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 in rule identify either how much pollutant discharge in lbs/yr each source designation may continue to contribute (discharge allocation), or the lbs/yr or percentage of its loading the source designation must reduce (reduction allocation). Currently, the TMDL allocation categories are as follows:

- ***Wasteload Allocation*** *is the allocation to point sources permitted under the National Pollutant Discharge Elimination System (NPDES) Program. It includes the following:*
  - Wastewater Allocation is the discharge 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). These permittees are treated as point sources under the TMDL Program.
- ***Load Allocation*** *is the allocation to nonpoint sources, including agricultural runoff and stormwater from areas that are not included in an MS4 permit.*

The 15 permitted NPDES wastewater facilities in the St. Lucie River and Estuary Basin are permitted to discharge only during a 25-year/72-hour storm event amounting to a minimal and highly irregular impact on nutrient discharges. Facilities that have permitted discharges above this level are cooling or dewatering, processes that effectively discharge ambient water. Since the TMDLs are based on ambient conditions in the watershed, the infrequent discharge from these facilities was not given a wasteload allocation. If conditions change in the future, a wasteload allocation may be assigned (Department 2008).

1.3.5.2 Initial and Detailed Allocations

Under the FWRA, a 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. The FWRA further states that the BMAP may make detailed allocations to individual "basins" (i.e., sub-basins) or to all basins as a whole,

as appropriate. Both initial and detailed allocations must be determined based on a number of factors listed in the FWRA, including cost-benefit, technical and environmental feasibility, implementation time frames, and others (see **Appendix B**).

1.3.6 St. Lucie River and Estuary Basin TMDLs

The Department adopted the nutrient and BOD TMDLs for the St. Lucie River and Estuary Basin in March 2009. This BMAP includes all of the WBIDs listed below, which are the same TMDLs listed in the rule-adopted TMDL. **Table 3** lists the TMDL and pollutant load allocations adopted by rule in the watershed. TMDL loads in upstream WBIDs were calculated based on achieving the same target concentrations (0.72 mg/L for TN and 0.081 mg/L for TP) as in the St. Lucie Estuary. The TMDLs were used as the basis for the BMAP targets and allocation calculations.

Table 3: St. Lucie River and Estuary TMDLs

[1] Concentration in mg/L

WBID	Waterbody	Parameter	Annual TMDL Target (pounds or [concentration])[1]	NPDES Stormwater (% Reduction)	Load Allocation (% Reduction)
3193	St. Lucie Estuary	TN	[0.720]	21.4%	21.4%
3193	St. Lucie Estuary	TP	[0.081]	41.3%	41.3%
3194	North Fork	TN	140,134	25.0%	25.0%
3194	North Fork	TP	15,765	42.2%	42.2%
3194	North Fork	BOD	[2.0]	74.0%	74.0%
3194B	North Fork	TN	103,747	28.8%	28.8%
3194B	North Fork	TP	11,672	58.1%	58.1%
3197	C-24 Canal	TN	348,957	51.8%	51.8%
3197	C-24 Canal	TP	39,258	72.2%	72.2%
3197	C-24 Canal	BOD	[2.0]	33.3%	33.3%
3200	C-23 Canal	TN	242,202	51.7%	51.7%
3200	C-23 Canal	TP	27,248	78.6%	78.6%
3210	South Fork	TN	24,463	38.4%	38.4%
3210	South Fork	TP	2,752	57.2%	57.2%
3210A	South Fork	TN	90,471	47.1%	47.1%
3210A	South Fork	TP	10,178	61.8%	61.8%
3211	Bessey Creek	TN	29,981	23.9%	23.9%
3211	Bessey Creek	TP	3,373	51.2%	51.2%
3218	C-44 Canal	TN	242,929	51.2%	51.2%
3218	C-44 Canal	TP	27,330	55.0%	55.0%
3218	C-44 Canal	BOD	[2.0]	69.7%	69.7%

1.4 ASSUMPTIONS AND CONSIDERATIONS REGARDING TMDL IMPLEMENTATION

The water quality impacts of BMAP implementation are based on several fundamental assumptions about the pollutants targeted by the TMDLs, modeling approaches, waterbody response, and natural processes. In addition, there are important considerations about the nature of the BMAP and its long-term implementation. These assumptions and considerations are discussed below.

1.4.1 ASSUMPTIONS

The following assumptions were used during the BMAP process:

- *Reductions in TN and TP loading to the St. Lucie River and Estuary will increase DO concentrations and reduce chlorophyll-a concentrations to improve the water quality conditions in these waterbodies.*
- *The allocations do not include required load reductions from areas identified as natural land use areas in the 2004 SFWMD land use coverage. These loads are considered uncontrollable, background sources, and the stakeholders are not required to make reductions on natural lands. The focus of the TMDL allocations is on urban and agricultural stormwater sources in the basin.*
- *Achieving the St. Lucie River and Estuary TMDLs is contingent on reductions from the Lake Okeechobee Basin, and in the St. Lucie River and Estuary TMDLs it was assumed that the Lake Okeechobee TMDL had been met. A separate BMAP is under development for the Lake Okeechobee Basin.*
- *The SLRWPP and the BMAP acknowledge that only 76.5% of the runoff in the C-44/ S-153 sub-basin runoff flows to the St. Lucie Estuary, while the remaining 23.5% of the runoff flows to Lake Okeechobee. Therefore, only 76.5% of the C-44/S-153 sub-basin runoff was applied in the St. Lucie River and Estuary BMAP allocations.*
- *Certain best management practices (BMPs) were assigned provisional credit for load reductions in this iteration of the BMAP while additional research is conducted to quantify their effectiveness (refer to **Section 0** for more details). These estimated reductions may change in future BMAP iterations, as additional research results become available.*

1.4.2 CONSIDERATIONS

This BMAP requires stakeholders to implement their projects to achieve reductions within the specified period to achieve reductions. However, the full implementation of this BMAP will be a long-term process, adaptively managed in five-year cycles. While some of the projects and activities contained in the BMAP were recently completed or are currently ongoing, several projects require more time to design, secure funding, and construct. Although project funding can be problematic, funding limitations do not affect the requirement that every entity must implement the activities listed in the BMAP in order to cumulatively achieve water quality standards.

Since BMAP implementation is a long-term process, the TMDL established for this basin will not be achieved in the first five-year iteration. It is understood that all waterbodies can respond differently to the implementation of reduced loadings in order to meet applicable water quality standards. Regular follow-up and continued coordination and communication by the stakeholders will be essential to ensure the implementation of management strategies and assessment of incremental effects. Additional management actions similar to those included in this first iteration as well as regional projects required to achieve the TMDLs will, if necessary, be developed as part of the second and third BMAP iterations.

During the BMAP process, several items were identified that should be addressed in future watershed management cycles to ensure that future BMAPs use the most accurate information:

- ***Land Uses*** *– The loading estimates in the BMAP are based on land uses at a particular point in time, allowing the model to be validated and calibrated. Land uses, however, change over time and, depending on local trends, can change significantly. The loading estimates for this BMAP iteration were based on 2004 land use data. In the second iteration of the BMAP, the most up-to-date land use coverage should be used.*
- ***Basin Boundaries*** *– During BMAP development, the Department and SFWMD worked closely in consultation with the stakeholders to identify an appropriate basin boundary for both the BMAP and SLRWPP. However, for the next BMAP iteration, the Department and SFWMD will evaluate whether two additional sub-basins should be added to the basin boundary. This expanded area is called the BMAP study area and is shown in* ***Figure 3****. The figure depicts the sub-basins that need further study, the South Coastal and Mid Coastal sub-basins, as well as the existing boundaries used for allocations. The South Coastal sub-basin did not receive load reduction allocations in*

the first iteration of the BMAP due to lack of nutrient loading data. The Mid Coastal sub-basin is tidally connected to the St. Lucie Estuary and was included in the TMDL document as part of the Coastal planning unit. The BMAP monitoring plan includes stations to collect information in these areas to enhance the data available in these sub-basins and to promote their inclusion in future BMAP iterations. Overall, including both the South Coastal and Mid Coastal sub-basins will further assist in a better understanding of the connectivity of the St. Lucie Estuary and IRL over the next five years. In addition, stakeholders identified the need to include a portion of the C-25 East sub-basin, which is located to the north of the current basin boundary. This modification to the boundary will also be considered before the next BMAP iteration. The SFWMD recently completed a St. Lucie River sub-watershed boundary improvements study in February 2013. Where appropriate, these changes will be incorporated into the second iteration of the BMAP. Moving forward, the Department and SFWMD will continue to work together with stakeholders to further align the basin boundaries for all planning efforts.

- ***Jurisdictional Boundaries*** *– Martin County and the* ***c****ity of Stuart are currently in discussions about several parcels of land owned by the city that are located in the county. Once these discussions are concluded, changes to the boundaries and/or allocations for these stakeholders may be made that will be reflected in future BMAP iterations. In addition, St. Lucie County and Martin County are currently in discussions about the Beau Rivage neighborhood, which will be part of Martin County in summer 2013. This area will be added to Martin County's area in the next iteration of the BMAP.*

- ***CDD Responsibilities*** *– The Department has had several conversations with the city of Port St. Lucie and the numerous CDDs located in the city. CDDs were assigned allocations only if three criteria were met: (1) there is development—i.e., roads and infrastructure—on the CDD; (2) the CDD does not discharge to the* ***c****ity of Port St. Lucie's MS4; and (3) the CDD pays a stormwater fee and receives a refund of this fee. As further details are provided (e.g., discharge locations from these CDDs), revisions to the city's allocations and boundaries will be made in future BMAP iterations. Furthermore, some of the CDDs that did not receive an allocation in this BMAP iteration may receive allocations in future BMAP iterations.*

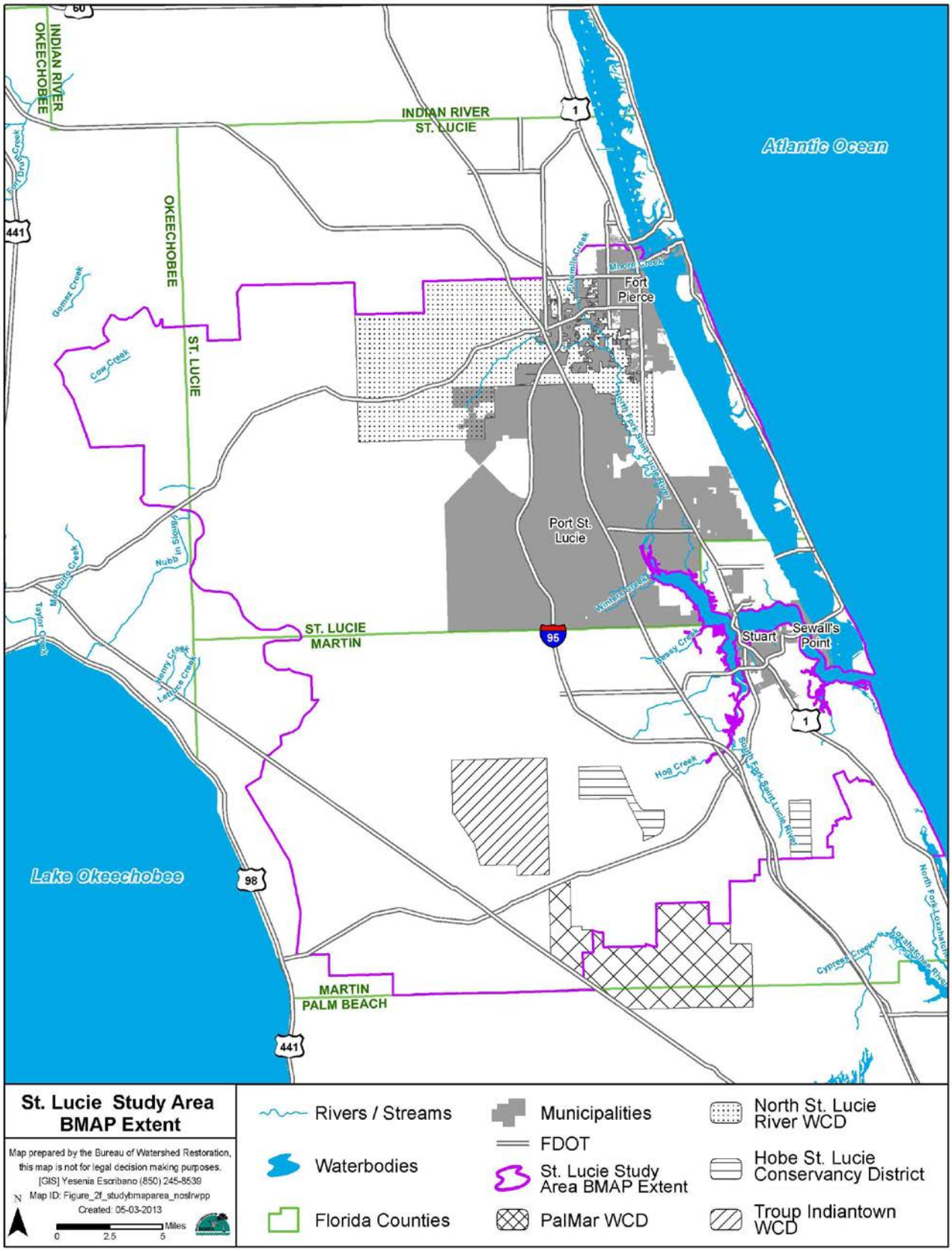

FIGURE 3: ST. LUCIE RIVER AND ESTUARY BMAP STUDY AREA

- ***Event Mean Concentrations (EMCs) and Runoff Coefficients (ROCs)*** *– Subsequent to the development of the BMAP model, additional information about the EMCs and ROCs in the basin was collected. Before the next BMAP iteration, the Department will review the available data and make adjustments to the EMCs and ROCs in the model as needed. In addition, the stakeholders noted that the current model uses EMCs that are based on untreated stormwater. The Department plans to work with stakeholders to incorporate EMCs for both treated and untreated stormwater in future iterations of the model to the extent practical.*

- ***Water Quality Standards/TMDL Modifications*** *– Stakeholders expressed concerns over current efforts to revise the state DO criterion. Once adopted, this criterion will be used in the St. Lucie River and Estuary Basin to determine whether impairments still exist. The required reductions in future BMAP iterations will also be adjusted as needed based on changes to the DO criterion. In addition, the TMDL document states that the St. Lucie River and Estuary Basin is a complex system and that the targets set by the TMDL can be revisited in the future. By revisiting the TMDL in the future, the Department will be able to re-evaluate the targets based on new data as well as any water quality improvements from implemented projects. This iterative TMDL approach allows for a protective yet mutable document that can be updated as knowledge and technology improve (Department 2008).*

- ***Legacy Loads*** *–Nutrient loads may still be present in the soils and waterbodies throughout the basin as a result of historical uses. It is unknown to what extent these legacy loads are affecting water quality in the basin. If additional information is gathered about legacy loading, this information can be included in future BMAPs.*

- ***Atmospheric Deposition*** *– Similar to legacy loads, the atmospheric deposition of TN and TP is an additional source of nutrients in the St. Lucie River and Estuary Basin. Changes in the amounts of atmospheric deposition, as well as the relative importance of air sources compared with local nutrient sources, may be considered in future BMAPs.*

- ***C-23 and C-24 Sub-basin Runoff*** *– Not all of the water in these sub-basins enters the North Fork of the St. Lucie Estuary. Some of the water enters the C-25 canal or is held and used for agricultural purposes. In the next BMAP iteration, the actual runoff that*

enters the St. Lucie Estuary from these two sub-basins should be calculated and a factor added into the model, as was done for the C-44/S-153 sub-basin.

1.5 FUTURE GROWTH IN THE WATERSHED

The FWRA (Paragraph 403.067[7][a][2], F.S.) requires that BMAPs "identify the mechanisms by which potential future increases in pollutant loading will be addressed." This BMAP does not include a specific allocation for new development because of Environmental Resource Permit (ERP) program requirements. The ERP Program requires that new discharges into the basin cannot increase existing loads. All ERP applications must include documentation demonstrating compliance with state water quality standards as well as showing that the project does not adversely affect the quality of receiving waters, resulting in violations of water quality standards. The St. Lucie River and Estuary Basin includes impaired waters that do not currently meet state water quality standards; therefore, new development in the basin cannot increase nutrient loads to these waters.

Starting on July 1, 2012, developers have the option of obtaining a general permit for construction of surface water management systems serving a project area of up to 10 acres, with less than two acres of impervious area and no wetland impacts. This "10/2" general permit is in lieu of an ERP for areas up to 10 acres. To obtain the general permit, the developer must demonstrate that the project does not cause adverse impacts, including violations of state water quality standards. This evaluation must be signed by a state of Florida registered professional; however, state agency review is not required. With this new rule in place, the local governments cannot require that the developer obtain a permit from a state or federal agency as a condition of issuing a permit. In addition, efforts are under way to streamline the ERP process; however, the implications of this streamlining are unknown as of the date of this BMAP.

Since the TMDL reductions are based on decreasing loads from past development, it is important that loads from new development are well controlled. Although future development may be meeting state stormwater standards, the development may still add a nutrient load to the St. Lucie River and Estuary. To ensure that future growth does not add to the degradation of these waterbodies, the local governments must be proactive in controlling loads from future growth.

Options to address future loading include low impact development (LID) standards and Florida-friendly landscaping to further minimize the impacts of existing development and new development through local development regulations. LID is an approach to development that employs land planning, design practices, and technologies to conserve natural resources and reduce infrastructure costs. These

activities could offset loads from future growth and therefore may reduce the reductions needed from the entities in future BMAP iterations. The Department will continue to research how nutrient reduction credits could be quantified for use of LID BMPs as projects in future iterations of the St. Lucie River and Estuary BMAP.

Chapter 2: St. Lucie River and Estuary Basin Setting

2.1 Land Use Coverage

Land use categories for the St. Lucie River and Estuary Basin were aggregated using the simplified Level 1 codes, which are shown in **Table 4**. The largest land use in the basin is agriculture, which makes up 55.6% of the area. The remaining anthropogenic land uses include urban and built-up (14.3% of the basin); barren land (0.3%); and transportation, communication, and utilities (2.8%). The remaining 27% of the basin is made up of largely natural land uses. **Figure 4** shows the distribution of land uses in the St. Lucie River and Estuary Basin.

Table 4: 2004 Land Uses in the St. Lucie River and Estuary Basin

- = Empty cell/no data

Level 1 Land Use Code	Land Use	Acres	% Total
1000	Urban and Built-Up	73,474.8	14.3%
2000	Agriculture	286,184.2	55.6%
3000	Upland Nonforested	22,834.1	4.4%
4000	Upland Forests	43,709.2	8.5%
5000	Water	11,389.9	2.2%
6000	Wetlands	61,283.2	11.9%
7000	Barren Land	1,311.3	0.3%
8000	Transportation, Communication, and Utilities	14,462.1	2.8%
-	**Total**	**514,648.8**	**100.0%**

2.2 Hydrology and Topography

In the St. Lucie River and Estuary Basin, all waterbodies drain directly to either the St. Lucie Estuary or the IRL-S. The inland portion of the St. Lucie Estuary is composed of the South Fork and the North Fork. The two forks converge at the Roosevelt Bridge to form a single waterbody that extends eastward, where it joins the IRL-S. Historically, this area included a much smaller natural watershed that directly contributed to the river system, and interior areas of Martin and St. Lucie Counties contained large expanses of poorly drained wetlands that did not feed directly into the river and estuary. With the construction of drainage improvements in inland areas, the effective drainage area of the St. Lucie Estuary and IRL-S expanded to include almost all of Martin and St. Lucie Counties (Department 2008).

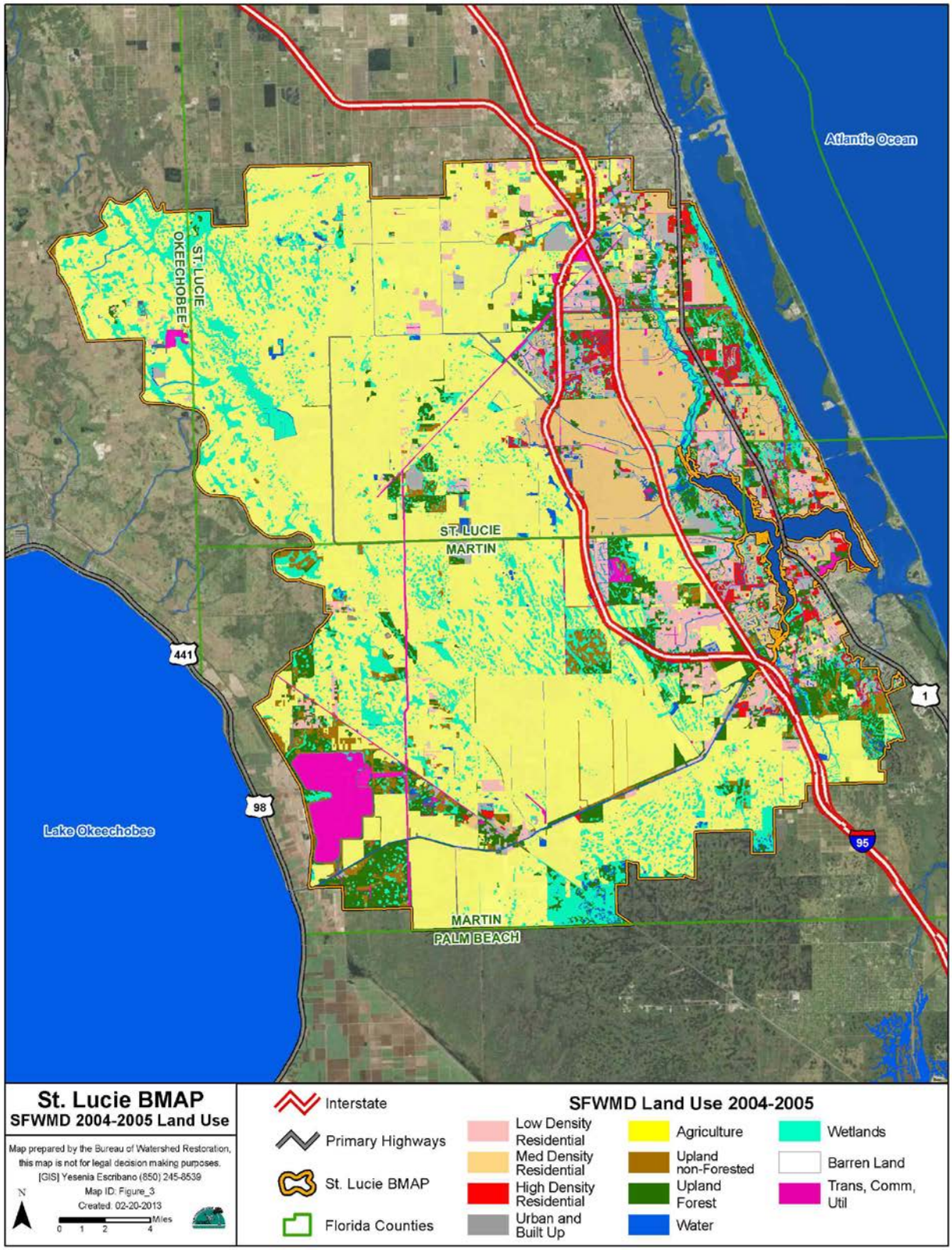

FIGURE 4: 2004 LAND USES IN THE ST. LUCIE RIVER AND ESTUARY BASIN

The C-44 canal connects Lake Okeechobee to the South Fork of the St. Lucie River. The canal and its associated locks and water control structures were constructed between 1916 and 1928. The C-44 canal provides a navigable connection between the east and west coasts of Florida. It also serves as a flood control conveyance for Lake Okeechobee and transports water from the lake into the South Fork. The U.S. Army Corps of Engineers is responsible for controlling the releases from Lake Okeechobee, with recommendations from SFWMD staff and Governing Board. The C-44 canal also transports runoff from urban and agricultural areas in the C-44/S-153 sub-basin.

The construction of Canals C-23 and C-24 (in addition to C-44) provided connections between their respective sub-basins. The C-23 and C-24 canals discharge to the North Fork. The C-25 canal receives agricultural runoff from northern St. Lucie County and areas to the north; it discharges directly into the Central IRL across from the Fort Pierce Inlet (Department 2008). There is occasional transfer between the C-25 and C-24 sub-basins, mostly from the C-25 to the C-24 (SFWMD 2012a). However, the C-25 canal is not included in this plan because it does not discharge directly into the St. Lucie Estuary. Rather, it discharges to the IRL and is accounted for in the Central IRL BMAP (Department 2008).

The St. Lucie Inlet is a man-made inlet that provides ocean access as well as tidal exchange between the estuary and the Atlantic Ocean (Sime 2005). Prior to the construction of the St. Lucie Inlet, the St. Lucie Estuary was a freshwater lagoon (Department 2003). Due to extensive urban and agricultural drainage projects in the watershed of the St. Lucie Estuary, the historical drainage basin has been expanded to almost 775 square miles (SFWMD 2003).

The topography of the St. Lucie Estuary and IRL-S watershed reflects its location in southeastern Florida. Elevations range between 10 and 15 feet above sea level in the western part of the basin and between 5 and 10 feet above sea level in the eastern part of the basin near the coast. The predominant soil types are moderately to well-drained shelly sand and clay and medium fine sand and silt (Department 2008).

2.3 WATER QUALITY TRENDS

As previously mentioned, this BMAP and the management measures it contains are designed to improve the water quality of the St. Lucie River and Estuary Basin. To accurately track the impacts of BMAP implementation, it is necessary to analyze water quality trends over time. As part of the SLRWPP Update (SFWMD 2012a), the SFWMD evaluated long-term trends in water quality on a calendar-year basis from 1995 to 2010. In the watershed, TN and TP concentrations at structures S-80, S-48, and S-49

showed large temporal variations, which were positively correlated with flows. Overall, most TN and TP concentrations at the structures were higher than the TMDL targets. Although concentrations from 2006 to 2010 were slightly higher than from 1995 to 2005, no significant change was observed between the two periods except for TP concentrations from S-80 (C-44/S-153 sub-watershed). A Seasonal Kendall Tau test indicated that neither TN nor TP concentrations showed long-term trends in nutrient concentrations and loads from 1995 to 2010 (SFWMD 2012a).

The total measured annual discharge and total annual nutrient loads to the St. Lucie Estuary are highly correlated. TN and TP loads at water control structures S-308, S-80, S-48, and S-49 exhibited large interannual variations, with higher loads in wet years (1995, 1998, and 2005) than in dry years (2000 and 2006). Both total average TN and TP loads were significantly lower from 2006 to 2010 than from 1995 to 2005. From the rainfall analysis, all sub-basins and Lake Okeechobee had significantly lower flows to the St. Lucie Estuary from 2006 to 2010 than from 1995 to 2005, which is why the TN and TP loads were lower even though the concentrations remained the same in both periods (SFWMD 2012a).

Significant differences in water quality between the two periods were also detected in downstream segments of the St. Lucie Estuary. Significant increases in salinity and decreases in TN occurred in all segments from 1995 to 2005 and from 2006 to 2010. In addition, TP decreased in all segments except the South Fork, where no significant change was detected. Similarly, chlorophyll *a* decreased in the Middle and Lower estuarine segments but not in the South Fork or North Fork, where concentrations did not differ between the two periods. Bottom DO decreased in the South Fork but increased in the other three segments (SFWMD 2012a).

Chapter 3: POLLUTANT SOURCES AND ANTICIPATED OUTCOMES

3.1 SUMMARY OF SOURCES IN THE TMDL

The TMDL includes estimates of TN and TP loading in the St. Lucie River and Estuary Basin from urban and agricultural stormwater sources, Lake Okeechobee (based on loading calculated in the Lake Okeechobee TMDL), and ground water. Ground water loading was included in the TMDL as part of the load measured at canal control structures and in water quality throughout the waterbodies. The Lake Okeechobee loading will be addressed through a separate BMAP, as discussed in **Section 1.4.1**. Therefore, the TMDLs focus on load reductions from stormwater sources within the watershed. Additional details about the sources included in this BMAP are provided in the subsections below.

3.1.1 MS4s

Many of the municipalities in the basin are regulated by the Florida NPDES stormwater program because they discharge stormwater and qualify as an MS4. An MS4 is a conveyance or system of conveyances such as roads with stormwater systems, municipal streets, catch basins, curbs, gutters, ditches, constructed channels, or storm drains that has the following characteristics:

- *Is owned or operated by a state, city, town, county, special district, association, or other public body (created by or under state law) having jurisdiction over the management and discharge of stormwater and that discharges to surface waters of the state.*
- *Is designed or used for collecting or conveying stormwater.*
- *Is not a combined sewer.*
- *Is not part of a Publicly Owned Treatment Works (POTW). POTW means any device or system used in the treatment of municipal sewage or industrial wastes of a liquid nature, which is owned by a state or municipality. This definition includes sewers, pipes, or other conveyances only if they convey wastewater to a POTW providing treatment.*

An MS4 can be operated by municipalities, counties, drainage districts, colleges, military bases, or prisons, to name a few examples. By definition, the components of an MS4 system do not include waters of the state of Florida or of the United States. Instead, the MS4 ultimately discharges into such waters.The basic requirements of the program serve as a foundation for the stormwater management efforts of these communities. The U.S. Environmental Protection Agency (EPA) developed the federal NPDES stormwater permitting program in two phases. Phase I, which began in 1990, addresses large

and medium MS4s located in incorporated areas and counties with populations of 100,000 or more, as well as specific industrial activities. Phase II, which started in 1999, addresses small MS4s that are designated according to population and other criteria established in federal and state rules. Small MS4s include MS4s located in an urbanized area that have a population of at least 50,000 people and/or serve a population of 1,000 or more people per square mile.

In October 2000, the EPA authorized the Department to implement the NPDES stormwater permitting program in the state. This permitting has remained separate from state stormwater/ERP programs and local stormwater/water quality programs, which have their own regulations and permitting requirements. Florida's rules for MS4s can be found in Rules 62-4, 62-620, 62-621 and 62-624, F.A.C.

3.1.1.1 Phase II MS4 Stormwater Permit Requirements

All of the MS4s in the St. Lucie River and Estuary Basin are Phase II, as listed in **Table 5**.

TABLE 5: LOCAL GOVERNMENTS IN THE ST. LUCIE RIVER AND ESTUARY BASIN DESIGNATED AS MS4S

PERMITTEE	PERMIT NUMBER
Martin County	FLR04E013
Okeechobee County	FLR04E140
St. Lucie County	FLR04E029
City of Fort Pierce	FLR04E065
City of Stuart	FLR04E083
City of Port St. Lucie	FLR04E001
FDOT District 4	FLR04E083
Florida Turnpike	FLR04E049
Town of Sewall's Point	FLR04E044

Under a generic permit, operators of regulated Phase II MS4s must develop a stormwater management program that includes BMPs with measurable goals to effectively implement the following six minimum control measures:

- ***Public Education and Outreach*** *– Perform educational outreach regarding the harmful impacts of polluted stormwater runoff.*
- ***Public Participation/Involvement*** *– Comply with state and local public notice requirements and encourage other avenues for citizen involvement.*

- ***Illicit Discharge Detection and Elimination*** *– Implement a plan to detect and eliminate any non-stormwater discharges to the MS4 and create a system map showing outfall locations. Subsection 62-624.200(2), F.A.C., defines an illicit discharge as "…any discharge to an MS4 that is not composed entirely of stormwater…," except discharges under an NPDES permit, or those listed in rule that do not cause a violation of water quality standards. Illicit discharges can include septic/sanitary sewer discharge, car wash wastewater, laundry wastewater, improper disposal of auto and household toxics, and spills from roadway accidents.*
- ***Construction Site Runoff Control*** *– Implement and enforce an erosion and sediment control program for construction activities.*
- ***Post construction Runoff Control*** *– Implement and enforce a program to address discharges of post construction stormwater runoff from new development and redevelopment areas. (**Note**: This minimum control is generally met through state stormwater permitting requirements under Part IV, Chapter 373, F.S., as a qualifying alternative program.)*
- ***Pollution Prevention/Good Housekeeping*** *– Implement a program to reduce pollutant runoff from municipal operations and property and perform staff pollution prevention training.*

The Phase II generic permit (Paragraph 62-621.300[7][a], F.A.C.) has a self-implementing clause, as follows, that compels a permittee to implement its stormwater pollutant load responsibilities within an adopted BMAP:

> *If a TMDL is approved for any waterbody into which the Phase II MS4 discharges, and the TMDL includes requirements for control of stormwater discharges, the operator must review its stormwater management program for consistency with the TMDL allocation. If the Phase II MS4 is not meeting its TMDL allocation, the operator must modify its stormwater management program to comply with the provisions of the TMDL Implementation Plan applicable to the operator in accordance with the schedule in the Implementation Plan.*

3.1.2 NONPOINT SOURCES

Reductions in loads carried by stormwater that are separate from discharges by a permitted MS4 were established in the "load allocation" component of the TMDL. Paragraph 403.067(7)(b)2.f, F.S., prescribes the pollutant reduction actions required for nonagricultural pollutant sources that are not subject to NPDES permitting. These "non-MS4 sources" must also implement the pollutant reduction requirements detailed in a BMAP and are subject to enforcement action by the Department or a water management district if they fail to implement their responsibilities under the BMAP. The nonpoint sources in the St. Lucie River and Estuary Basin are as follows:

- *Copper Creek CDD.*
- *Hobe St. Lucie Conservancy District.*
- *North St. Lucie River WCD.*
- *Pal Mar WCD.*
- *St. Lucie County non-MS4.*
- *Tradition CDD.*
- *Troup-Indiantown WCD.*
- *Verano CDD.*

Load reductions and the responsibility for meeting them were assigned to the entity that governs the permitted development on these non-MS4 urban lands, or, in the case of the WCDs, urban and agricultural lands in their jurisdiction and not part of a MS4 drainage system. Failure to reduce these loadings can result in enforcement action by the Department under Paragraph 403.067(7)(b)2(h), F.S.

The Department can designate an entity as a regulated Phase II MS4 if its discharges are determined to be a significant contributor of pollutants to surface waters of the state in accordance with Section 62-624.800, F.A.C. The designation of an entity as a Phase II MS4 can occur when a TMDL has been adopted for a waterbody or segment into which the entity discharges the pollutant(s) of concern. If an entity is designated as a regulated Phase II MS4, it is subject to the conditions of the Phase II MS4 Generic Permit.

3.1.3 AGRICULTURE

The primary agricultural land uses in the St. Lucie River and Estuary Basin watershed are cow/calf operations (pasture) and citrus. Other agricultural land uses include nurseries, row/field crops, and horse farms/specialty farms. The majority of the horse farms are small, noncommercial hobby farms, concentrated in Martin County. Due to urban encroachment, citrus health issues (freeze/disease), and the downturn in the economy, a large number of citrus operations have been destroyed or abandoned, or have significantly lowered their production acreage. In recent years, some of this acreage may have been shifted to other commodities or to non-agricultural/urban uses.

Agricultural enforcement for BMAP actions is based on the FWRA, which states that nonpoint source dischargers who fail either to implement the appropriate BMPs or conduct water quality monitoring prescribed by the Department or a water management district may be subject to enforcement action by either of those agencies.

3.1.4 AQUACULTURE

Under the Clean Water Act, aquaculture activities are defined as a point source. Starting in 1992, the Department and/or the water management districts regulated all aquaculture facilities through a general fish farm permit authorized by Section 403.814, F.S. In 1999, the Florida Legislature amended Chapter 597, F.S., Florida Aquaculture Policy Act, to create a program within FDACS that requires Floridians who sell aquatic species to annually acquire an Aquaculture Certificate of Registration and implement Rule 5L-3, F.A.C., Aquaculture Best Management Practices. This requirement is not an option for aquaculturists, and they may not sell their production unless they are certified. In the St. Lucie River and Estuary Basin, 194.6 acres of aquaculture are under certification with the Division of Aquaculture.

3.2 ANTICIPATED OUTCOMES OF BMAP IMPLEMENTATION

With the implementation of the projects outlined in this BMAP, reductions in the nutrient loads to the St. Lucie River and Estuary Basin are expected to decrease the contribution of TN and TP to the St. Lucie Estuary. The following outcomes are expected from BMAP implementation:

- *Modest improvement in water quality trends in the watershed tributaries and the St. Lucie River and Estuary.*
- *Decreased loading of the target pollutants (TN, TP, and BOD).*

- *Increased coordination among state and local governments and within divisions of local governments in problem solving for surface water quality restoration.*
- *Determination of effective projects through the stakeholder decision-making and priority-setting processes.*
- *Enhanced public awareness of pollutant sources, pollutant impacts on water quality, and corresponding corrective actions.*
- *Enhanced understanding of basin hydrology, water quality, and pollutant sources.*

Chapter 4: DETAILED ALLOCATIONS

This chapter describes the process used to calculate each entity's allocation. Each entity's allocation was determined using a Geographic Information System (GIS)–based process, which used the input data to the TMDL to account for the loads from each entity. The GIS data file for the St. Lucie River and Estuary Basin was used as the base map; this data file contains the 2004 land use/land cover information, ROCs, EMCs, 2011 soils data, and average rainfall for each sub-basin.

4.1 COLLABORATING WITH ST. LUCIE RIVER WATERSHED PROTECTION PLAN EFFORTS

The SLRWPP and BMAP efforts each have models; however, the models each serve different purposes. The SLRWPP's model exists to calculate remaining loads after applying estimated load reductions from projects within the St. Lucie River watershed and to calculate BMP efficiencies (SFWMD 2012a). The Department developed a spreadsheet model for this BMAP effort to determine load allocations for specific entities. Despite the differences in the model purposes, the two agencies worked together to ensure that, where possible, the models were similar (SFWMD 2012a), including the following considerations:

- ***Unit Loads*** *– A unit load is the estimated nutrient runoff in pounds per acre per year expected from a specified land use. The Department uses unit loads in its watershed loading estimates and allocations, while the SFWMD uses unit loads in its BMP efficiency estimates. The two agencies collaborated on one set of unit loads that was used for BMAP calculations.*
- ***Watershed Boundaries*** *– As discussed in* ***Chapter 1****, the watershed boundaries were aligned to be as similar as possible.*
- ***Period of Record*** *– The SLRWPP and the BMAP now use the same water quality data period of record from 1996 to 2005.*
- ***Land Use*** *– Both plans currently use the 2004 land use coverage.*
- ***C-44/S-153 Sub-basin Runoff*** *– Both plans acknowledge that only 76.5% of the runoff in the C-44/S-153 sub-basin flows to the St. Lucie Estuary, while the remaining 23.5% of the runoff flows to Lake Okeechobee. Therefore, only 76.5% of the C-44/S-153 sub-basin runoff was applied in the St. Lucie River and Estuary BMAP allocations.*

4.2 CALCULATING STARTING LOADS

To determine the starting loads, the Department clipped and erased from the BMAP model GIS base map to create separate shapefiles with each entity's responsible acres by sub-basin. This clipping was done using the jurisdictional boundaries provided by each entity. The individual entity shapefiles were created by clipping out areas sequentially, as follows:

- *Natural lands, associated with land cover codes 3000 (upland nonforested; not including 3300), 4000 (upland forests), 5000 (water), and 6000 (wetlands).*
- *WCDs and other special districts.*
- *Agriculture, associated with land cover codes 2000 (agriculture) and 3300 (rangeland).*
- *FDOT and Florida Turnpike roads and rights-of-way.*
- *CDDs.*
- *MS4 areas for municipalities and counties.*
- *Florida Power & Light (FPL) cooling pond.*
- *Non-MS4 areas for municipalities.*
- *Remaining areas assigned to each county.*

Using the model factors associated with each land cover type and each sub-basin, the TN and TP starting loads were calculated. **Table 6** and **Table 7** show the TN and TP starting loads, respectively, for each entity. **Table 8** shows the acres for each entity in each sub-basin. Note that the total acreage listed in **Table 8** is 514,646 acres, which is slightly different than the acreage total in **Section 2.1** of 514,648.8 acres. This difference of 2.8 acres is the result of rounding factors that were used in the model.

TABLE 6: TN STARTING LOADS BY ENTITY

- = Empty cell/no data

ENTITY	BASINS 4, 5, AND 6 (LBS/YR)	C-23 (LBS/YR)	C-24 (LBS/YR)	C-44 S-153 (LBS/YR)	NORTH FORK (LBS/YR)	SOUTH FORK (LBS/YR)	TOTAL (LBS/YR)	TOTAL (MT/YR)
Agriculture	17,051	470,081	574,852	350,703	24,355	126,080	1,563,122	709.02
Copper Creek CDD	-	-	14	-	-	-	14	0.01
FDOT District 4	952	1,510	950	1,176	4,277	3,649	12,514	5.68
Fort Pierce MS4	-	-	-	-	17,041	-	17,041	7.73
FPL Pond	-	-	-	41,022	-	-	41,022	18.61
Hobe St. Lucie Conservancy District	-	-	-	13,374	-	10,819	24,193	10.97
Martin County MS4	26,394	5,947	-	8,243	19,806	40,423	100,813	45.73
Natural Lands	15,128	14,991	24,792	49,942	43,326	26,980	175,159	79.45
North St. Lucie River WCD	-	-	37,251	-	160,152	-	197,403	89.54
Okeechobee County MS4	-	3,184	121	-	-	-	3,305	1.50
Pal Mar WCD	-	-	-	6,758	-	22	6,780	3.08
Port St. Lucie MS4	-	1,515	8,275	-	146,691	-	156,481	70.98
Sewall's Point MS4	-	-	-	-	1,771	-	1,771	0.80
St. Lucie County MS4	-	-	-	-	18,114	-	18,114	8.22
St. Lucie County Non-MS4	-	1,594	16,757	-	5,409	-	23,760	10.78
Stuart MS4	-	-	-	-	1,614	12,384	13,998	6.35
Tradition CDD	-	1	7,057	-	31		7,089	3.22
Troup-Indiantown WCD	-	-	-	62,219	-	-	62,219	28.22
Turnpike	789	51	-	-	2,651	1,286	4,777	2.17
Verano CDD	-	-	257	-	-	-	257	0.12
TOTAL	**60,314**	**498,874**	**670,326**	**533,437**	**445,238**	**221,643**	**2,429,832**	**1,102.18**

TABLE 7: TP STARTING LOADS BY ENTITY

- = Empty cell/no data

ENTITY	BASINS 4, 5, AND 6 (LBS/YR)	C-23 (LBS/YR)	C-24 (LBS/YR)	C-44 S-153 (LBS/YR)	NORTH FORK (LBS/YR)	SOUTH FORK (LBS/YR)	TOTAL (LBS/YR)	TOTAL (MT/YR)
Agriculture	3,920	150,255	136,471	66,809	5,988	26,869	390,312	177.04
Copper Creek CDD	-	-	3	-	-	-	3	0.00
FDOT District 4	200	464	226	175	818	659	2,542	1.15
Fort Pierce MS4	-	-	-	-	3,879	-	3,879	1.76
FPL Pond	-	-	-	8,361	-	-	8,361	3.79
Hobe St. Lucie Conservancy District	-	-	-	2,689	-	2,563	5,252	2.38
Martin County MS4	5,930	2,250	-	1,431	4,339	8,419	22,369	10.15
Natural Lands	3,383	19,795	11,341	3,525	9,639	5,054	52,737	23.92
North St. Lucie River WCD	-	-	9,063	-	36,821	-	45,884	20.81
Okeechobee County MS4	-	937	38	-	-	-	975	0.44
Pal Mar WCD	-	-	-	1,008	-	4	1,012	0.46
Port St. Lucie MS4	-	518	2,206	-	32,292	-	35,016	15.88
Sewall's Point MS4	-	-	-	-	384	-	384	0.17
St. Lucie County MS4	-	-	-	-	4,127	-	4,127	1.87
St. Lucie County Non-MS4	-	838	3,961	-	1,273	-	6,072	2.75
Stuart MS4	-	-	-	-	379	2,727	3,106	1.41
Tradition CDD	-	-	1,903	-	7	-	1,910	0.87
Troup-Indiantown WCD	-	-	-	12,623	-	-	12,623	5.73
Turnpike	170	16	-	-	506	233	925	0.42
Verano CDD	-	-	63	-	-	-	63	0.03
TOTAL	**13,603**	**175,073**	**165,275**	**96,621**	**100,452**	**46,528**	**597,552**	**271.03**

TABLE 8: ACRES BY ENTITY

- = Empty cell/no data

ENTITY	BASINS 4, 5, AND 6 (ACRES)	C-23 (ACRES)	C-24 (ACRES)	C-44 S-153 (ACRES)	NORTH FORK (ACRES)	SOUTH FORK (ACRES)	TOTAL (ACRES)
Agriculture	2,445	84,744	63,488	65,937	3,967	18,176	238,757
Copper Creek CDD	-	-	2	-	-	-	2
FDOT District 4	171	306	137	270	864	636	2,384
Fort Pierce MS4	-	-	-	-	3,706	-	3,706
FPL Pond	-	-	-	6,501	-	-	6,501
Hobe St. Lucie Conservancy District	-	-	-	2,949	-	1,945	4,894
Martin County MS4	4,989	1,738	-	2,231	4,378	7,763	21,099
Natural Lands	7,830	23,706	15,701	37,163	33,129	18,987	136,516
North St. Lucie River WCD	-	-	4,028	-	32,491	-	36,519
Okeechobee County MS4	-	574	30	-	-	-	604
Pal Mar WCD	-	-	-	1,161	-	4	1,165
Port St. Lucie MS4	-	326	1,258	-	34,118	-	35,702
Sewall's Point MS4	-	-	-	-	457	-	457
St. Lucie County MS4	-	-	-	-	3,995	-	3,995
St. Lucie County Non-MS4	-	763	2,172	-	1,146	-	4,081
Stuart MS4	-	-	-	-	353	2,386	2,739
Tradition CDD	-	-	923	-	6	-	929
Troup-Indiantown WCD	-	-	-	13,649	-	-	13,649
Turnpike	147	10	-	-	528	226	911
Verano CDD	-	-	36	-	-	-	36
TOTAL	**15,582**	**112,167**	**87,775**	**129,861**	**119,138**	**50,123**	**514,646**

4.3 NATURAL LAND USES AND FPL COOLING POND

The stakeholders are not expected to make reductions in areas that have natural land uses. Therefore, the acres and loadings associated with the natural land uses were set aside in the allocations. The target loads per acre, allocations, and required reductions described below were based on the anthropogenic (human) land uses.

In addition, the acreage and loading associated with the FPL cooling pond were set aside in the allocations. FPL withdraws water from the C-44 canal for facility cooling processes, and the water is then discharged to the cooling pond for circulation and reuse. During the circulation and storage process in the cooling pond, seepage is directed through portions of the west berm of the cooling pond and is discharged to the L-65 canal, which then returns the water to the C-44 canal. The cooling pond is directly discharged to the C-44 canal only when necessary after excessive rain events and twice per year during the spillway gate tests. Additional nutrient reductions are not required in the cooling pond.

4.4 *DE MINIMUS* DETERMINATION

The starting loads were sorted for TN and TP loads, from highest to lowest, to determine whether any entity had loads low enough so that reductions from these areas would not have a significant impact on the required reductions in the first BMAP iteration. Those entities whose total TN and TP loads were low enough (less than 0.5% of the total starting load for both TN and TP) were considered *de minimus*. **Table 9** and **Table 10** present the sorted data, and the shaded cells signify the *de minimus* load contributions.

Seven entities, each of which contributed less than 0.5% of the total load for TN and less than 0.5% of the load for TP, are considered to be *de minimus*: Copper Creek CDD, Okeechobee County, Pal Mar WCD, Tradition CDD, Sewall's Point, Turnpike, and Verano CCD. Combined, they contribute approximately 1% of the total load for TN and 1% of the total load for TP. The *de minimus* entities were not assigned an allocation for either TN or TP for the first phase of the BMAP, and the loads associated with these entities were not reallocated to the other stakeholders in the basin.

TABLE 9: TN *DE MINIMUS* DETERMINATION

*De minimus stakeholder

ENTITY	TN STARTING LOAD (LBS/YR)	% OF TOTAL TN STARTING LOAD
Agriculture	1,563,122	70.6%
North St. Lucie River WCD	197,403	8.9%
Port St. Lucie MS4	156,481	7.1%
Martin County MS4	100,813	4.6%
Troup-Indiantown WCD	62,219	2.8%
Hobe St. Lucie Conservancy District	24,193	1.1%
St. Lucie County Non-MS4	23,760	1.1%
St. Lucie County MS4	18,114	0.8%
Fort Pierce MS4	17,041	0.8%
Stuart MS4	13,998	0.6%
FDOT District 4 MS4	12,514	0.6%
Pal Mar WCD*	6,780	0.3%
Tradition CDD*	7,089	0.3%
Turnpike*	4,777	0.2%
Okeechobee County*	3,305	0.1%
Sewall's Point MS4*	1,771	0.1%
Verano CDD*	257	0.0%
Copper Creek CDD*	14	0.0%

TABLE 10: TP *DE MINIMUS* DETERMINATION

**De minimus* stakeholder

ENTITY	TP STARTING LOAD (LBS/YR)	% OF TOTAL TP STARTING LOAD
Agriculture	390,312	72.8%
North St. Lucie River WCD	45,884	8.6%
Port St. Lucie MS4	35,016	6.5%
Martin County MS4	22,369	4.2%
Troup-Indiantown WCD	12,623	2.4%
Hobe St. Lucie Conservancy District	5,252	1.0%
St. Lucie County Non-MS4	6,072	1.1%
St. Lucie County MS4	4,127	0.8%
Fort Pierce MS4	3,879	0.7%
Stuart MS4	3,106	0.6%
FDOT District 4 MS4	2,542	0.5%
Tradition CDD*	1,910	0.4%
Pal Mar WCD*	1,012	0.2%
Okeechobee County*	975	0.2%
Turnpike*	925	0.2%
Sewall's Point MS4*	384	0.1%
Verano CDD*	63	0.0%
Copper Creek CDD*	3	0.0%

The *de minimus* status is only for the first BMAP iteration and will be reviewed with each subsequent BMAP cycle. In future BMAP iterations, TN and TP reductions may be needed from the *de minimus* entities; therefore, although they do not currently have a reduction responsibility, this does not prevent these entities from having reduction requirements in future BMAPs. Any actions taken by these entities during the first BMAP iteration that result in TN and/or TP reductions should be documented by those entities for credit against any reduction requirements allocated in subsequent BMAP iterations.

4.5 TARGET LOAD PER ACRE

Allocations to each entity were assigned using a target load per acre for both TN and TP. These target loads were calculated by determining the percent reduction needed in each sub-basin to achieve the target nutrient concentrations. The percent reduction was multiplied by the current anthropogenic load per acre in each sub-basin, which is the total anthropogenic loading for the sub-basin from the model divided by the total anthropogenic acres in the sub-basin. The current anthropogenic load per acre minus the needed reduction in loading equals the target load per acre for each sub-basin, as shown in **Table 11** and **Table 12**.

TABLE 11: TN TARGET LOADS PER ACRE

CATEGORY	BASINS 4, 5, AND 6	C-23	C-24	C-44/ S-153	NORTH FORK	SOUTH FORK
Estimated Concentration (mg/L)	1.11	1.51	1.53	1.36	1.18	1.30
Target Concentration (mg/L)	0.72	0.72	0.72	0.72	0.72	0.72
Reduction Required (%)	35%	52%	53%	47%	39%	45%
Estimated Load Per Acre (lbs/acre)	5.83	5.47	8.96	5.13	4.67	6.25
TARGET LOAD PER ACRE (LBS/ACRE)	**3.77**	**2.60**	**4.21**	**2.72**	**2.85**	**3.45**

TABLE 12: TP TARGET LOADS PER ACRE

CATEGORY	BASINS 4, 5, AND 6	C-23	C-24	C-44/ S-153	NORTH FORK	SOUTH FORK
Estimated Concentration (mg/L)	0.25	0.53	0.38	0.24	0.27	0.27
Target Concentration (mg/L)	0.081	0.081	0.081	0.081	0.081	0.081
Reduction Required (%)	68%	85%	79%	66%	70%	70%
Estimated Load Per Acre (lbs/acre)	1.32	1.76	2.14	0.98	1.06	1.33
TARGET LOAD PER ACRE (LBS/ACRE)	**0.43**	**0.27**	**0.46**	**0.33**	**0.32**	**0.39**

4.6 ALLOCATIONS AND REQUIRED REDUCTIONS

The TN and TP targets load per acre were then multiplied by each entity's acreage in each sub-basin to calculate the allocations. The difference between the starting loads and allocations for each entity are the required reductions, which are shown in **Table 13** and **Table 14**.

TABLE 13: TN ALLOCATIONS AND TOTAL REQUIRED REDUCTIONS

- = Empty cell/no data

ENTITY	TN ALLOCATION (LBS/YR)	TN ALLOCATION (MT/YR)	TOTAL TN REQUIRED REDUCTION (LBS/YR)	TOTAL TN REQUIRED REDUCTION (MT/YR)
Agriculture	750,198	340.28	812,924	368.74
FDOT District 4	7,408	3.36	5,106	2.32
Fort Pierce MS4	10,562	4.79	6,479	2.94
Hobe St. Lucie Conservancy District	14,731	6.68	9,462	4.29
Martin County MS4	68,655	31.14	32,158	14.59
North St. Lucie River WCD	109,557	49.69	87,846	39.85
Port St. Lucie MS4	103,380	46.89	53,101	24.09
St. Lucie County MS4	11,386	5.16	6,728	3.05
St. Lucie County Non-MS4	14,394	6.53	9,756	4.43
Stuart MS4	9,238	4.19	4,760	2.16
Troup-Indiantown WCD	37,125	16.84	25,094	11.38
Copper Creek CDD – *de minimus*	-	-	-	-
Okeechobee County MS4 – *de minimus*	-	-	-	-
Pal Mar WCD – *de minimus*	-	-	-	-
Sewall's Point MS4 – *de minimus*	-	-	-	-
Tradition CDD – *de minimus*	-	-	-	-
Turnpike – *de minimus*	-	-	-	-
Verano CDD – *de minimus*	-	-	-	-
TOTAL	**1,136,633**	**515.57**	**1,053,414**	**477.82**

TABLE 14: TP ALLOCATIONS AND TOTAL REQUIRED REDUCTIONS

- = Empty cell/no data

ENTITY	TP ALLOCATION (LBS/YR)	TP ALLOCATION (MT/YR)	TOTAL TP REQUIRED REDUCTION (LBS/YR)	TOTAL TP REQUIRED REDUCTION (MT/YR)
Agriculture	83,253	37.76	307,059	139.28
FDOT District 4	833	0.38	1,709	0.78
Fort Pierce MS4	1,186	0.54	2,693	1.22
Hobe St. Lucie Conservancy District	1,732	0.79	3,520	1.60
Martin County MS4	7,779	3.53	14,590	6.62
North St. Lucie River WCD	12,250	5.56	33,634	15.26
Port St. Lucie MS4	11,585	5.25	23,431	10.63
St. Lucie County MS4	1,278	0.58	2,849	1.29
St. Lucie County Non-MS4	1,572	0.71	4,500	2.04
Stuart MS4	1,044	0.47	2,062	0.94
Troup-Indiantown WCD	4,504	2.04	8,119	3.68
Copper Creek CDD – *de minimus*	-	-	-	-
Okeechobee County MS4 – *de minimus*	-	-	-	-
Pal Mar WCD – *de minimus*	-	-	-	-
Sewall's Point MS4 – *de minimus*	-	-	-	-
Tradition CDD – *de minimus*	-	-	-	-
Turnpike – *de minimus*	-	-	-	-
Verano CDD – *de minimus*	-	-	-	-
TOTAL	**127,016**	**57.61**	**404,166**	**183.33**

4.7 ALLOCATIONS BY SOURCE

For this first BMAP iteration, the stormwater entities are required to achieve 30% of the total required reductions, which are 316,024.2 lbs/yr (143.4 MT/yr) of TN and 121,249.8 lbs/yr (55.0 MT/yr) of TP. These reductions for the stormwater entities are described in the subsections below.

4.7.1 MS4s

The required reductions in this BMAP iteration for the MS4s are shown in **Table 15**.

TABLE 15: TN AND TP REDUCTIONS FOR THE MS4S

ENTITY	30% TN REDUCTIONS (LBS/YR)	30% TN REDUCTIONS (MT/YR)	30% TP REDUCTIONS (LBS/YR)	30% TP REDUCTIONS (MT/YR)
FDOT District 4 MS4	1,531.8	0.69	512.7	0.23
Fort Pierce MS4	1,943.7	0.88	807.9	0.37
Martin County MS4	9,647.4	4.38	4,377.0	1.99
Port St. Lucie MS4	15,930.3	7.23	7,029.3	3.19
St. Lucie County MS4	2,018.4	0.92	854.7	0.39
Stuart MS4	1,428.0	0.65	618.6	0.28

4.7.2 NONPOINT SOURCES

Table 16 shows the required reductions in this BMAP iteration for the non-MS4s. The reductions for the special districts include loadings from agricultural lands within their boundaries.

TABLE 16: TN AND TP REDUCTIONS FOR NONPOINT SOURCES

ENTITY	30% TN REDUCTIONS (LBS/YR)	30% TN REDUCTIONS (MT/YR)	30% TP REDUCTIONS (LBS/YR)	30% TP REDUCTIONS (MT/YR)
Hobe St. Lucie Conservancy District	2,838.6	1.29	1,056.0	0.48
North St. Lucie River WCD	26,353.8	11.95	10,090.2	4.58
St. Lucie County Non-MS4	2,926.8	1.33	1,350.3	0.61
Troup-Indiantown WCD	7,528.2	3.41	2,435.7	1.10

4.7.3 AGRICULTURE

Table 17 shows the required reductions for all agricultural lands in this BMAP iteration. This table combines the required reductions for agriculture as an entity (243,877.2 lbs/yr of TN and 92,117.7 lbs/yr of TP) and for agricultural lands in the special districts.

TABLE 17: TN AND TP REDUCTIONS FOR AGRICULTURE

ENTITY	30% TN REDUCTIONS (LBS/YR)	30% TN REDUCTIONS (MT/YR)	30% TP REDUCTIONS (LBS/YR)	30% TP REDUCTIONS (MT/YR)
Agriculture	277,508.7	125.9	104,516.9	47.4

Chapter 5: MANAGEMENT ACTIONS

"Management actions" refers to the suite of activities that the St. Lucie River and Estuary BMAP allocation entities will be conducting to achieve the required TN and TP reductions. These actions include structural and nonstructural activities.

Management actions had to meet several criteria to be considered eligible for credit under the BMAP. All projects, programs, and activities were required to address nutrient (TN and TP) loads to receive credit. Projects completed after January 1, 2000, were eligible for BMAP credit, based on the water quality data used to establish the TMDL. Management actions were only given credit for the portion of the load reduction that was over and above ERP requirements. This criterion was needed since permit conditions are established to maintain the current condition—i.e., prevent further impacts from new development—and do not contribute to the improvement of water quality in the St. Lucie River and Estuary.

Based on these eligibility requirements, the entities submitted structural and nonstructural projects to reduce the nonpoint stormwater loading. These projects were submitted to provide reasonable assurance to the Department that each entity has a plan on how to meet its allocations. The sections below outline the projects submitted by the MS4s, non-MS4s, and agriculture.

Appendix D contains the BMP efficiencies that were used to calculate the project credit calculations. Where project-specific data were available, these data were used to assign efficiencies and corresponding reductions.

5.1 MS4 PROJECTS TO MEET ALLOCATIONS

All NPDES permits, including MS4 permits, must be consistent with the requirements of adopted TMDLs. Paragraph 403.067(7)(b), F.S., prescribes the criteria for TMDL implementation. In accordance with this section, the implementation of a TMDL or BMAP for holders of NPDES MS4 permits must be achieved to the maximum extent practicable (MEP), through the use of BMPs or other management measures. These management measures include but are not limited to the following:

- *Non-regulatory and incentive-based programs, including BMPs, cost-sharing, waste minimization, pollution prevention, and public education.*
- *Nonstructural BMPs.*

- *Water quality management and restoration activities.*
- *Public works, including capital facilities.*
- *Land acquisition.*
- *Local ordinances.*
- *Regulatory incentive programs.*

To comply with the MEP standard, the stormwater management program must be designed and implemented to reduce the discharge of pollutants to surface waters of the state. The implementation of BMPs consistent with the provisions of the stormwater management program required under an MS4 permit constitutes compliance with the standard of reducing pollutants to the MEP for discharges to unimpaired waters. However, MS4s must also continue to assess and adjust their list of approved projects (**Appendix D**) to achieve the greatest reduction of pollutants practicable to protect receiving waters in accordance with an adopted TMDL or BMAP.

Entities that fail to implement their list of approved projects in order to reduce pollutants to the MEP standard will be subject to enforcement action in accordance with Sections 403.061, 403.121, and 403.161, F.S., and Subsection 62-650.300(4), F.A.C. In addition, both Phase I and Phase II MS4 permits include provisions for revising the effluent limitations, monitoring requirements, and stormwater management programs to meet applicable TMDL allocations that are consistent with the assumptions and requirements of the adopted BMAP.

The projects and time frames for implementation submitted by the entities to achieve their first five-year BMAP reductions are summarized in **Table 18** and **Table 19** and detailed in **Appendix D**. These projects were submitted to provide reasonable assurance to the Department that each MS4 permittee has a plan on how to meet its allocation. However, this list of projects is meant to be flexible enough to allow for changes that may occur over time, provided that the reduction is still met within the specified period. New projects may be substituted for those identified in **Appendix D** during the annual BMAP progress report process.

TABLE 18: SUMMARY OF MS4 LOAD REDUCTIONS FOR TN BY PROJECT TYPE

N/A = Not applicable

ENTITY	STRUCTURAL STORMWATER (LBS/YR)	NONSTRUCTURAL STORMWATER (LBS/YR)	PUBLIC EDUCATION (LBS/YR)	STREET SWEEPING (LBS/YR)	TOTAL (LBS/YR)	CREDIT FOR FUTURE BMAPS (LBS/YR)
FDOT District 4 MS4	577.7	N/A	31.3	1,419.0	**2,028.0**	496.2
Fort Pierce MS4	685.2	4,300.0	170.4	5,569.0	**10,724.6**	8,780.9
Martin County MS4	8,075.5	397.0	6,048.7	108.0	**14,629.2**	4,981.8
Port St. Lucie MS4	6,991.6	7,927.4	9,388.9	676.0	**24,983.9**	9,053.6
Sewall's Point MS4	165.0	N/A	8.9	25.0	**198.9**	198.9
St. Lucie County MS4	2,628.0	1,351.9	1,086.8	210.6	**5,277.3**	3,258.9
Stuart MS4	2,580.1	221.3	839.9	275.0	**3,916.3**	2,488.3
Turnpike MS4	23.2	N/A	N/A	N/A	**23.2**	23.2
TOTAL	**21,726.3**	**14,197.6**	**17,574.9**	**8,282.6**	**61,781.4**	**29,281.8**

TABLE 19: SUMMARY OF MS4 LOAD REDUCTIONS FOR TP BY PROJECT TYPE

N/A = Not applicable

ENTITY	STRUCTURAL STORMWATER (LBS/YR)	NONSTRUCTURAL STORMWATER (LBS/YR)	PUBLIC EDUCATION (LBS/YR)	STREET SWEEPING (LBS/YR)	TOTAL (LBS/YR)	CREDIT FOR FUTURE BMAPS (LBS/YR)
FDOT District 4 MS4	158.1	N/A	6.4	910.0	**1,074.5**	561.8
Fort Pierce MS4	282.0	2,641.0	38.8	3,571.0	**6,532.8**	5,724.9
Port St. Lucie MS4	3,168.9	3,200.1	2,100.9	434.0	**8,903.9**	1,874.6
Martin County MS4	3,564.9	161.0	1,342.1	69.0	**5,137.0**	760.0
Sewall's Point MS4	44.7	N/A	1.9	16.0	**62.6**	62.6
St. Lucie County MS4	1,033.2	616.1	247.6	135.2	**2,032.1**	1,177.4
Stuart MS4	1,231.4	58.9	186.4	176.0	**1,652.7**	1,034.1
Turnpike MS4	3.4	N/A	N/A	N/A	**3.4**	3.4
TOTAL	**9,486.6**	**6,677.1**	**3,924.1**	**5,311.2**	**25,399.0**	**11,198.8**

5.2 NONPOINT SOURCE PROJECTS

The reductions from the non-MS4 projects submitted are summarized in **Table 20** and **Table 21** and detailed in **Appendix D**. **Section 5.5.6** discusses further the agricultural BMPs/land use change credits in these tables.

TABLE 20: SUMMARY OF NONPOINT SOURCE LOAD REDUCTIONS FOR TN BY PROJECT TYPE

N/A = Not applicable

ENTITY	STRUCTURAL STORMWATER (LBS/YR)	NONSTRUCTURAL STORMWATER (LBS/YR)	PUBLIC EDUCATION (LBS/YR)	STREET SWEEPING (LBS/YR)	AGRICULTURAL BMPS/ LAND USE CHANGE (LBS/YR)	TOTAL (LBS/YR)	CREDIT FOR FUTURE BMAPS (LBS/YR)
Hobe St. Lucie Conservancy District	N/A	N/A	N/A	N/A	10,288.2	**10,288.2**	7,449.6
North St. Lucie River WCD	2,695.9	N/A	N/A	N/A	63,440.2	**66,136.1**	39,782.3
Pal Mar WCD	N/A	N/A	N/A	N/A	962.2	**962.2**	962.2
St. Lucie County Non-MS4	997.9	1,658.1	1,425.7	113.4	N/A	**4,175.1**	1,248.3
Troup-Indiantown WCD	N/A	N/A	N/A	N/A	25,055.3	**25,055.3**	17,527.1
TOTAL	**3,693.8**	**1,658.1**	**1,425.7**	**113.4**	**99,745.9**	**106,616.9**	**66,969.5**

TABLE 21: SUMMARY OF NONPOINT SOURCE LOAD REDUCTIONS FOR TP BY PROJECT TYPE

N/A = Not applicable

ENTITY	STRUCTURAL STORMWATER	NONSTRUCTURAL STORMWATER	PUBLIC EDUCATION	STREET SWEEPING	AGRICULTURAL BMPS/ LAND USE CHANGE	TOTAL (LBS/YR)	CREDIT FOR FUTURE BMAPS (LBS/YR)
Hobe St. Lucie Conservancy District	N/A	N/A	N/A	N/A	3,302.1	**3,302.1**	2,246.1
North St. Lucie River WCD	127.0	N/A	N/A	N/A	18,166.1	**18,293.1**	8,202.9
Pal Mar WCD	N/A	N/A	N/A	N/A	91.7	**91.7**	91.7
St. Lucie County Non-MS4	390.3	656.9	364.3	72.8	N/A	**1,484.3**	134.3
Troup-Indiantown WCD	N/A	N/A	N/A	N/A	7,942.5	**7,942.5**	5,506.8
TOTAL	**517.3**	**656.9**	**364.3**	**72.8**	**29,502.4**	**31,113.7**	**16,181.8**

5.3 PROVISIONAL BMPS

Several of the BMP activities included in the project lists were assigned provisional reduction estimates for this first iteration of the BMAP. The provisional BMPs are floating islands, public education and outreach efforts, muck removal, aquatic plant harvesting, water control structures, and septic tank phase out. Studies to estimate the efficiencies of these BMPs currently being conducted across the state will provide better information for use in the next iteration of the BMAP to revise the project reductions. If the new BMP information indicates lower efficiencies than what was estimated for this BMAP, the entities that listed these BMPs in their project tables may need to provide additional projects to make up

for the difference in reductions. If the new BMP information indicates higher efficiencies, the entities will receive additional credit if they included these BMPs on their project list.

5.3.1 FLOATING ISLANDS

As a treatment train feature, credit for floating islands was assigned as a 20% reduction in both the TN and TP load remaining after treatment by the stormwater pond. As of the time of BMAP adoption, none of the stakeholders included floating islands in the project tables; however, the stakeholders do have the option of adding these efforts to their list of projects in the future.

5.3.2 PUBLIC EDUCATION AND OUTREACH

Up to a 6% reduction in the baseline anthropogenic load for both TN and TP was assigned based on the education and outreach efforts conducted by each entity. The 6% load reduction estimate was determined from the Center for Watershed Protection Watershed Treatment Model. Credit was given for the following applicable educational activities:

1. *Local funding to implement the Florida Yards and Neighborhoods (FYN) program in the city or county.*
2. *Local land development codes or ordinances that require Florida-friendly landscaping on all new developments; require commercial landscapers to obtain training and certification through the Green Industry BMP program; require irrigation systems per Sections 125.568, 166.048, and 373.185, F.S.; and specify fertilizer application rates and types. Local ordinances that control pet waste and require that residents pick up and properly dispose of pet wastes.*
3. *Implementation of public service announcements (PSAs) on local cable or commercial television and radio stations.*
4. *Informational pamphlets on pollution prevention, fertilizer application, Florida-friendly landscaping, water conservation, septic tank maintenance, etc. Presentations on these topics to civic groups, local businesses, students, and the general public.*
5. *Websites to provide information on reducing nutrient pollution for homeowners and businesses.*
6. *Inspection program and public call-in number to address illicit discharges.*

Credit was assigned to the entities for the above efforts as follows:

- *If an entity conducted all 6 types of activities, then the full 6% reduction was assigned.*
- *An entity that only had FYN received a 3% reduction credit.*
- *An entity that only had the Florida-friendly ordinances (irrigation, landscaping, fertilizer, and pet waste management) received a 2% reduction.*
- *An entity that only had the PSAs, websites, brochures, and inspection program received a 1% reduction credit.*
- *Other combinations of efforts were analyzed on a case-by-case basis for credit.*

Appendix D summarizes the public education activities conducted by each entity and the associated load reductions.

5.3.3 MUCK REMOVAL

A guidance document provided to the stakeholders details the requirements to receive muck removal project credit. In summary, it is recommended that the muck deposit be an average minimum thickness of 30 centimeters, the muck must be removed to the natural substrate, and the muck material must be stored away from surface waters so that the material cannot be washed back into the waterbody. The credit for muck removal is calculated by multiplying the area of muck removed by the difference in the nutrient flux rate of the muck and natural substrate. Stakeholders that receive credit for muck removal must measure post project muck deposition rates every five years and report this information to the Department. Project credit will be assigned for a period of up to ten years after an area is dredged. If adequate source controls are not in place in the watershed, muck will re-accumulate at a faster rate than if the watershed loads are being controlled.

5.3.4 AQUATIC PLANT HARVESTING

A guidance document provided to the stakeholders details the requirements to receive credit for aquatic vegetation harvesting. In summary, credit is assigned based on the type of vegetation removed, the amount of plant material removed, the nutrient content for that type of plant, and the percent dry weight of material collected. Stakeholders that harvest aquatic vegetation will determine an annual average TN and TP load removal, to be included in the BMAP as credit. **Appendix D** summarizes the aquatic plant harvesting projects submitted by the stakeholders.

5.3.5 WATER CONTROL STRUCTURES

Credit for certain water control structures, such as tilting weir gates, was assigned a 5% TN reduction based on the load that drains to the canal containing the control structure. Available data did not show that reductions in TP occurred with the tilting weir gates. **Appendix D** summarizes the water control structure projects submitted by the stakeholders.

5.3.6 SEPTIC TANK PHASE OUT

Credit for septic tank phase out will be calculated using the ArcNLET model, which was created for the Department by Florida State University (FSU). The ArcNLET model uses information on ground water depths, soil types, and locations of septic tanks to estimate the TN loading from septic tanks to surface waters. Several of the stakeholders submitted information on septic tank phase out projects (refer to the project tables in **Appendix D**), and FSU is in the process of running the ArcNLET model to determine the associated credit for these projects. The credit for the septic tank phase out projects will likely be included in the first annual BMAP progress report.

5.4 REGIONAL PROJECTS

The C-44 Reservoir and Stormwater Treatment Area (STA), which is located north of the C-44 canal in the C-44 and S-153 sub-basin, includes the construction of a 3,400-acre reservoir and an adjacent 6,300-acre STA in southern Martin County (SFWMD 2012a). The U.S. Army Corps of Engineers is responsible for construction of the project. The design and construction of the reservoir and STA are being implemented in phases. Currently, the construction of the first phase, which includes some of the infrastructure necessary to complete the reservoir, is not scheduled for completion until 2014. Project credits will be assigned to this project in future iterations of the BMAP.

5.5 AGRICULTURE

Land use data are helpful as a starting point for estimating agricultural acreage and developing BMP implementation strategies; however, their inherent limitations must be noted. To begin with, the time of year when land use data are collected (through aerial photography) affects the accuracy of photo interpretation. This can result in inappropriate analysis of the data and can hamper decision making. Another limitation is that the specific agricultural activity being conducted is not always apparent. For example, some acreage under the improved pasture classification may be used for cattle grazing, some may consist of forage grass that is periodically harvested and sold for hay, and/or some may comprise a fallow vegetable field awaiting planting. Operations that may fall into this land use category fertilize at different rates (e.g., hay operations and some other commodities typically fertilize at or below rates

recommended by the University of Florida–Institute of Food and Agricultural Sciences [UF–IFAS]); therefore, it would be meaningful for the purposes of evaluating potential nutrient impacts to know specific land uses.

A breakdown of agricultural land uses in the St. Lucie River and Estuary Basin, according to 2004 SFWMD land use data, modified to remove acreage within WCD boundaries, is provided in **Table 22**. The agricultural acreage is slightly less than the agricultural acreage used in the allocations (**Table 8**) because aquaculture is not listed in the table below (see the discussion on aquaculture in **Section 3.1.4**). **Figure 5** shows the approximate location of these agricultural lands in the basin.

Land use data are helpful as a starting point for estimating agricultural acreage and developing BMP implementation strategies; however, their inherent limitations must be noted. To begin with, the time of year when land use data are collected (through aerial photography) affects the accuracy of photo interpretation. This can result in inappropriate analysis of the data and can hamper decision making. Another limitation is that the specific agricultural activity being conducted is not always apparent. For example, some acreage under the improved pasture classification may be used for cattle grazing, some may consist of forage grass that is periodically harvested and sold for hay, and/or some may comprise a fallow vegetable field awaiting planting. Operations that may fall into this land use category fertilize at different rates (e.g., hay operations and some other commodities typically fertilize at or below rates recommended by the University of Florida–Institute of Food and Agricultural Sciences [UF–IFAS]); therefore, it would be meaningful for the purposes of evaluating potential nutrient impacts to know specific land uses.

TABLE 22: AGRICULTURAL LAND USES IN THE ST. LUCIE RIVER AND ESTUARY BASIN OUTSIDE WCD BOUNDARIES, 2004 SFWMD LAND USE DATA

- = Empty cell/no data

LAND USE CODE	CODE DESCRIPTION	TOTAL ACRES
2110	Improved Pasture	101,734.1
2120	Unimproved Pasture	14,639.1
2130	Woodland Pasture	24,182.4
3300	Mixed Rangeland	2,415.5
2140	Row Crop	12,325.8
2150	Field Crops	2,803.2
2156	Sugar Cane	821.6
2210	Citrus	76,357.9
2230	Other Groves	34.3
2310	Cattle Feeding Operation	100.9
2320	Poultry Feeding Operation	106.8

2410	Tree Nurseries	422.0
2420	Sod Farms	294.1
2430	Ornamentals	1,027.5
2500	Specialty Farms	108.7
2510	Horse Farm	784.4
2520	Dairies	404.5
-	**TOTAL**	**238,562.8**

Because of error in the collection and characterization of land use data and changes in land use over time, the land use acreages are subject to adjustment, as discussed later in this section.

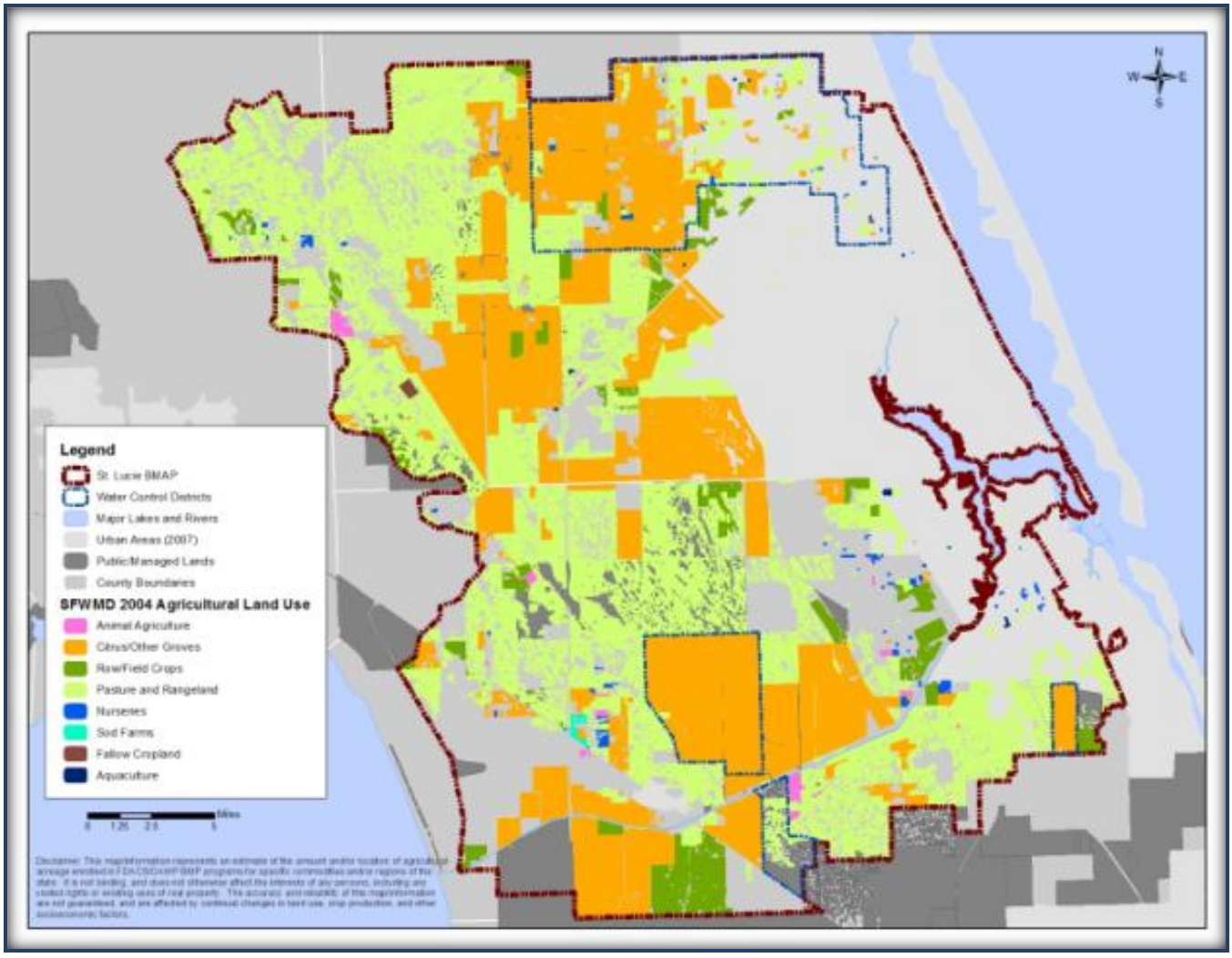

FIGURE 5: 2004 AGRICULTURAL LANDS IN THE ST. LUCIE RIVER AND ESTUARY BASIN

5.5.1 AGRICULTURAL PRODUCERS' RESPONSIBILITIES UNDER THE FWRA

Paragraph 403.067(7)(b), F.S., requires that nonpoint pollutant sources (such as agriculture) included in a BMAP demonstrate compliance with pollutant reductions needed to meet a TMDL, either by

implementing appropriate BMPs (adopted by FDACS or the Department, as applicable), or conducting water quality monitoring prescribed by the Department or the applicable water management district. If these pollutant sources do not either implement BMPs or conduct monitoring, they may be subject to enforcement by the Department or the applicable water management district.

Under Paragraph 403.067(7)(c), F.S., the implementation of FDACS-adopted, Department-verified BMPs in accordance with FDACS rule provides a presumption of compliance with state water quality standards. Through the Office of Agricultural Water Policy (OAWP), the Florida Forest Service, and Division of Aquaculture, FDACS develops, adopts, and assists producers in implementing agricultural BMPs to improve water quality and water conservation. Producers who implement BMPs may be eligible for cost-share from FDACS, the water management district, or others.

5.5.2 AGRICULTURAL BMPS

BMPs are individual or combined practices determined through research, field testing, and expert review to be the most effective and practicable means for improving water quality, taking into account economic and technological considerations.

FDACS BMPs fall into two categories: structural and management. Structural BMPs involve the installation of structures or changes to the land, usually are more costly, and often require cost-share for them to be economically feasible. They include water control structures, fencing, and tailwater recovery systems, among other things. Management BMPs, such as nutrient and irrigation management, comprise the majority of the practices and often are not readily observable. Nutrient management addresses fertilizer type, amount, placement, and application timing, and includes practices such as soil and tissue testing to determine crop nutrient needs, application methods, and setbacks from water resources. Irrigation management is the maintenance, scheduling, and overall efficiency rating of irrigation systems. In several areas of the state, FDACS-funded Mobile Irrigation Labs identify and demonstrate irrigation efficiency techniques to producers. The implementation of these recommendations saves billions of gallons of water throughout the state and helps reduce nutrient runoff and leaching.

By definition, BMPs are technically and economically feasible. However, FDACS BMP manuals contain some BMPs that may be affordable only with financial assistance. The BMP checklists allow producers to indicate whether a BMP is not economically feasible, on a case-by-case basis. As BMP cost-share becomes available to the basin, FDACS will work with producers to implement applicable

key BMPs that otherwise are not affordable. The key management and structural BMPs that most likely would be applicable to agricultural operations in the basin are as follows:

- *Determining Nutrient Needs:*
    - **Soil and Tissue Testing**: Used to base fertilizer applications on plant needs and available nutrients in the soil; helps prevent the over application of fertilizer.
    - **Nutrient Budgeting**: Adjustment of fertilizer regime to account for other nutrient sources, such as biosolids, legumes, manure, and nutrient-laden irrigation water; helps prevent the over application of fertilizer.
- *Managing Nutrient Application:*
    - **Precision Application of Nutrients**: Use of specialized equipment for precise placement of nutrients on targeted areas at specified rates; reduces total amount used and prevents stray applications.
    - **Equipment Calibration/Maintenance**: Ensures proper functioning of equipment; prevents the misapplication or over application of fertilizer materials.
    - **Split Fertilizer Applications**: Multiple applications timed with optimal growth stages; allows plants to assimilate nutrients more efficiently; reduces nutrient loss in leaching and runoff.
    - **Fertigation**: Application of fertilizer through irrigation water; allows for direct nutrient application to the crop root zone and more efficient assimilation by plants, reducing nutrient loss in leaching and runoff.
    - **Controlled-Release Fertilizer**: Use of fertilizer formulations that have a controlled nutrient release curve; reduces nutrient loss to leaching and runoff.
    - **Fertilizer Application Setbacks from Waterbodies (wetlands, watercourses, sinks, springs, etc.)**: Establishes a zone where no fertilizer will be applied; reduces nutrient loadings to waterbodies.
- *Managing Irrigation:*
    - **Irrigation Scheduling**: Planning when to irrigate to reduce water and nutrient losses, based on available soil moisture content, evapotranspiration levels, recent rainfall, and time of day.

- **Monitoring Soil Moisture and Water Table**: Use of devices that measure the water table level and the amount of water in the soil; is a key component of proper irrigation scheduling.
- **Tailwater Recovery**: Use of downgradient catchment ponds to trap irrigation tailwater to be reused on cropland; reduces offsite transport of nutrients and conserves water.
- **Water Control Structures**: To slow and/or direct the flow of stormwater
- **Retention/Detention Ponds**: To capture and filter or otherwise treat stormwater onsite.
- **Filter Strips**: Vegetated strips of land designed to reduce nutrients and sediments in surface water runoff from fields, pastures, and livestock high-intensity areas before it reaches downstream waterbodies.
- **Vegetative Buffers**: Establishment of riparian and/or wetland buffers to attenuate and assimilate nutrient- or sediment-laden surface flows coming from cropped/grazed areas.
- **Ditch Maintenance and Retrofits**: Use of rip-rap, sediment traps, staging structures, and permanent vegetative bank cover to minimize the erosion and transport of nutrient-laden sediments.

– *Livestock Management (applicable to cow/calf and equine operations):*

- **Alternative Water Sources**: Use of upland livestock watering ponds and/or water troughs; minimizes manure deposition in waterbodies.
- **Rotational Grazing**: Movement of cattle to different grazing areas on a planned basis; prevents concentrated waste accumulations and denuding of pasture areas. May involve fencing.
- **High-Intensity Areas Location**: Siting of cowpens, supplemental feed areas, etc., away from waterbodies to minimize nutrient loadings.

– *Operations Management:*

- **Fertilizer Storage**: Proper location/storage of bulk fertilizer products to prevent nutrient loadings.
- **Fertilizer Mix/Load**: Use of appropriate dedicated or temporary mix/load areas located away from waterbodies to prevent nutrient loading.
- **Employee Training**: Training provided to farm workers on how to implement BMPs.

- **Record Keeping**: Proper record keeping provides accountability in the implementation of BMPs and assists the producer in making nutrient and irrigation management decisions.

OAWP BMPs and staff contact information are available at http://www.floridaagwaterpolicy.com. Printed BMP manuals can be obtained in the local extension office at county agricultural extension centers, or by contacting OAWP field staff.

5.5.3 FDACS OAWP Role in BMP Implementation and Follow-Up

5.5.3.1 BMP Implementation

Through field staff and contracted service providers, OAWP works with producers to submit notices of intent (NOIs) to implement the BMPs appropriate for their operations. Depending on the region of the state, service providers include the soil and water conservation districts, UF–IFAS, and natural resource development and conservation councils. They also give technical assistance to producers and, as funding allows, help implement cost-share programs that leverage regional, state, and federal funds.

OAWP will recruit producers in the St. Lucie River and Estuary Basin to enroll in adopted BMP programs applicable to their operations. OAWP staff and contractors will identify existing growers, to the greatest extent possible, through grower associations, information on county agricultural exemptions, field staff knowledge, and other means. Staff/contractors will assist producers in selecting the appropriate BMPs, with emphasis on nutrient management, irrigation management, sediment/erosion control, stormwater management, and record keeping. The water control districts that are receiving an agricultural load allocation under this BMAP will assist FDACS in identifying and providing outreach to producers within their boundaries for purposes of BMP enrollment and implementation.

5.5.3.2 Follow-Up and Reporting on BMP Enrollment and Implementation

In addition to enrolling targeted operations in the relevant BMP programs, the OAWP will do the following:

- *Document the submitted NOIs, which will include a list of the BMPs to be implemented.*
- *Document the amount of total agricultural acreage covered by the NOIs.*
- *Assist growers in understanding and implementing BMPs properly.*

- *On a rotating basis by program, mail written surveys to all operations in the St. Lucie River and Estuary Basin under an active FDACS NOI to evaluate the level of BMP implementation and update information on ownership, land use, acreage, etc.*
- *Through regional field staff and contractors, follow up on identified areas/operations of particular concern.*
- *Participate in annual BMAP reporting on enrollment efforts and estimated load reductions, new manuals adopted, and any new efforts planned.*

The FWRA requires that, where water quality problems are demonstrated despite the proper implementation of adopted agricultural BMPs, FDACS must re-evaluate the practices, in consultation with the Department, and modify them if necessary. Continuing water quality problems will be detected through the BMAP monitoring component and other Department and SFWMD activities. If a re-evaluation of the BMPs is needed, FDACS will also include SFWMD and other partners in the process.

5.5.4 Department and SFWMD Roles in BMP Implementation

The FWRA states that nonpoint source dischargers who fail either to implement the appropriate BMPs or conduct water quality monitoring prescribed by the Department or a water management district may be subject to enforcement action by either of those agencies.

5.5.5 BMP Enrollment Goals and Load Reduction Estimates

5.5.5.1 BMP Enrollment Goals

The land use data figures for agriculture in the BMAP area, the acreage associated with commodity types addressed by BMP manuals, the acres enrolled in BMP programs, and the goal for enrolling additional acres in the basin are summarized in **Table 23**. The acreage used to calculate the starting point agricultural nutrient load is based on 2004 SFWMD land use information. Based on aerial imagery and local staff observations, FDACS adjusted these figures to reflect more accurately the current agricultural land use acreage. The FDACS-adjusted acreage shows approximately 20% less total acreage than indicated in the 2004 figures, due primarily to citrus freeze/disease issues. In addition, some of the acreage is no longer in production and would not be appropriate to enroll in BMPs. The first five-year enrollment goal is 90% of the adjusted agricultural acres. **Figure 6** contains a map of the acres enrolled in BMPs as of December 31, 2012.

It is important to understand that even if all targeted agricultural operations are enrolled, not all of the acreage listed as agriculture in **Table 23** will be included in enrollment figures. The NOIs will document the estimated total number of acres on which applicable BMPs are implemented, not the entire parcel acreage. This is because land use data can contain nonproduction acres (such as buildings, parking lots, and fallow acres) that will not be counted on the NOIs submitted to FDACS.

There also may be significant amounts of acreage that do not need to be enrolled, such as lands that are not actively involved in commercial agriculture (operations conducted as a business). These areas often are low-density residential uses on large parcels of grassed land, or land that was but is no longer in commercial agricultural production. This information frequently is impossible to discern in the photo interpretation process used to generate land use data.

In addition, FDACS BMPs are not targeted toward noncommercial agricultural activities, such as equine ranchettes, that would be addressed more appropriately by local government or Department regulation or BMPs. Equine ranchettes, in particular, are numerous in the basin, and many have issues with manure storage and disposal, denuded areas, etc., but not the acreage to resolve these issues. A joint effort between local government, the Department, and UF–IFAS may be needed to address these more urban operations. The Department is in the process of completing a small farms equine BMP manual, along with related materials.

As of December 31, 2012, 148 NOIs representing 136,236 acres had been submitted to OAWP for operations within the BMAP area but outside the WCD boundaries. Within WCD boundaries, 98 NOIs representing 14,561 acres had been submitted. No producers in the basin are conducting water quality monitoring in lieu of implementing BMPs at this time.

TABLE 23: AGRICULTURAL ACREAGE, BMP ENROLLMENT, AND FUTURE ENROLLMENT GOALS FOR THE ST. LUCIE RIVER AND ESTUARY BMAP AREA

N/A = Not applicable
[1] These figures do not include the agricultural land use or enrollment acreage within WCD boundaries.
[2] 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.
[3] Some properties include pasture and other agricultural lands outside the operation footprint, on which BMPs are implemented—hence, the additional enrolled acres. See the discussion in **Section 5.5.5.1**.
[4] See the discussion on BMP enrollment goals (**Section 5.5.5.1**).

2004 SFWMD LAND USE	2004 ACRES[1]	FDACS ADJUSTED ACRES[2]	RELATED FDACS BMP PROGRAMS	ACREAGE ENROLLED	RELATED NOIS
Pasture and Mixed Rangeland	142,971.0	143,143.2	Cow/Calf; Future (hay)	89,384.1	39
Row/Field/Mixed Crops	15,950.6	15,815.0	Vegetable/Agronomic Crops	2,986.5	5
Sod Farms	294.1	294.1	Statewide Sod	311.7	2
Horse Farm	784.4	814.2	Equine	4.7	1
Citrus	76,357.9	27,559.7	Ridge Citrus; Flatwoods Citrus[3]	41,270.3	64
Fruit Orchards/Other Groves	34.3	34.3	Specialty Fruit and Nut	10.0	1
Tree Nurseries	422.0	422.0	Future Nursery; Specialty Fruit and Nut	0.0	N/A
Ornamentals	1,027.5	1,027.5	Container Nursery	1,340.0	34
Specialty Farms	108.7	108.7	Conservation Plan Rule	N/A	N/A
Dairies	404.5	404.5	Conservation Plan Rule/ Lake Okeechobee Protection Program[3]	929.1	2
Cattle Feeding Operations	100.9	100.9	Conservation Plan Rule	N/A	N/A
Poultry Feeding Operations	106.8	106.8	Conservation Plan Rule	N/A	N/A
TOTAL	**238,562.7**	**189,830.9**	**N/A**	**136,236.4**	**148**
5-YEAR ENROLLMENT GOAL (90%)	**N/A**	**170,847.8**	**N/A**	**N/A**	**N/A**
ACREAGE ENROLLED (AS OF DECEMBER 31, 2012)	**N/A**	**136,236.4**	**N/A**	**N/A**	**N/A**
REMAINING ACRES TO ENROLL[4]	**N/A**	**34,611.4**	**N/A**	**N/A**	**N/A**

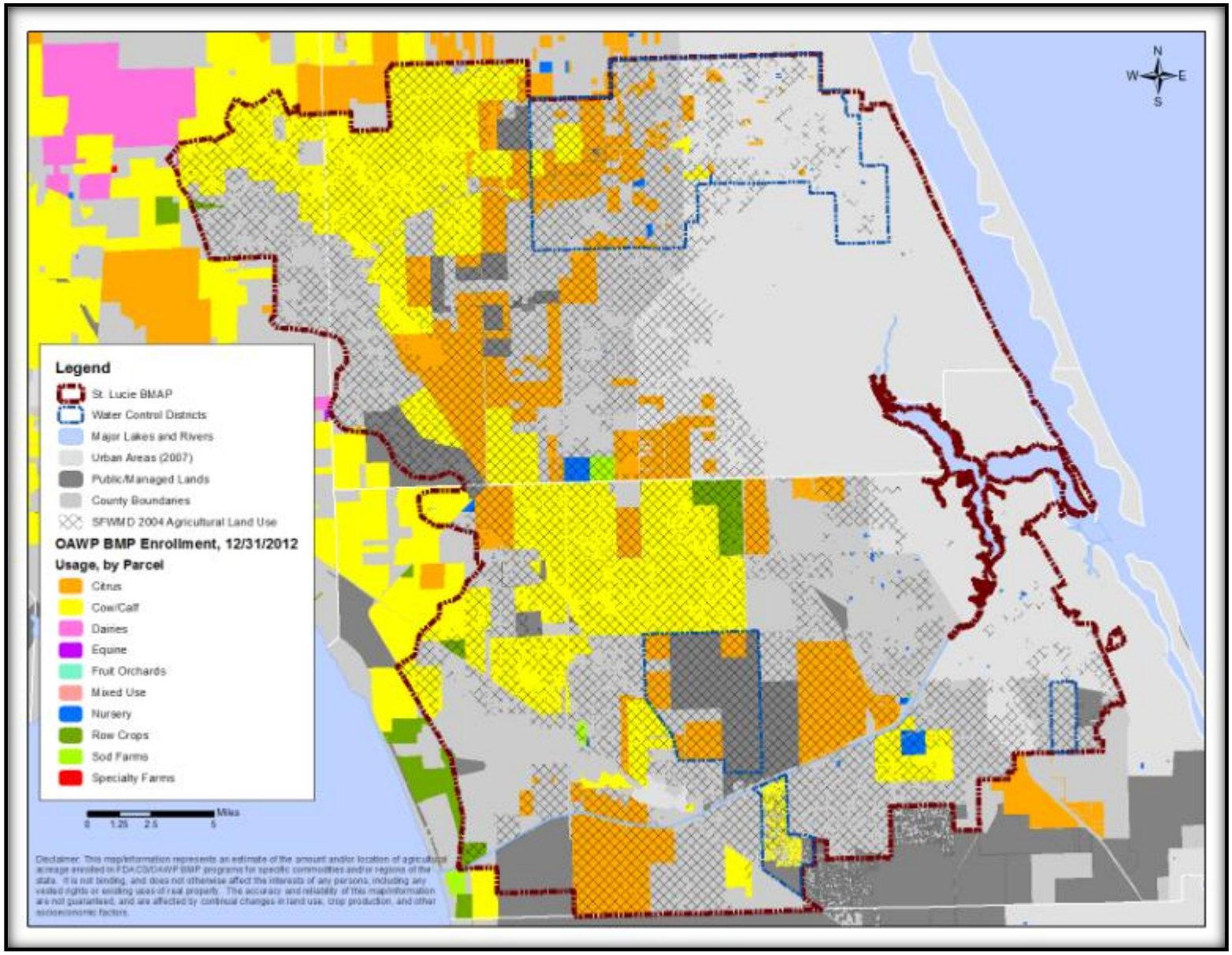

FIGURE 6: BMP ENROLLMENT IN THE ST. LUCIE RIVER AND ESTUARY BASIN AS OF DECEMBER 31, 2012

5.5.5.2 Agricultural Load Reduction Allocation and BMP Load Reduction Estimates

The agricultural load estimates for nutrients used in establishing the TMDLs and the reductions required of agricultural land uses in the St. Lucie River and Estuary Basin are provided in **Table 24**. The acreage used to calculate the starting point agricultural nutrient load is based on 2004 SFWMD land use information. Using recent aerial imagery and local field staff knowledge, FDACS adjusted this estimate to reflect more accurately the current agricultural land use acreage. The FDACS-adjusted acreage shows approximately 48,732 (20%) fewer acres of agricultural land use than the 2004 data.

Due to reductions in agricultural acreage, the estimated total load for agriculture shown in **Table 24** is greater than an estimate based on more current data. The region is expected to continue shifting from agricultural to residential land uses, which will further reduce the agricultural load. More precise information will be incorporated into the next iteration of the TMDL, and the estimated agricultural load will be adjusted based on the updated acreage figure. During the first phase of BMAP implementation, FDACS will work with the Department to determine the agricultural load more accurately and recalculate the remaining reductions needed.

The estimates of TN and TP load reductions due to the implementation of BMPs, shown in **Table 24**, are based on commodity-specific methods developed for the Lake Okeechobee watershed. These values may assume conditions, such as typical phosphorus fertilization rates, that differ from actual field conditions. **Table 24** also includes a reduction "credit" based on the approximate number of acres that are fallow or out of production or have been converted to urban/nonagricultural uses in the basin, compared with the agricultural acreage identified in the 2004 land use/land cover data.

TABLE 24: AGRICULTURAL TN AND TP LOAD REDUCTION ALLOCATIONS AND ESTIMATED REDUCTIONS IN TN AND TP LOADS IN THE FIRST FIVE YEARS

[1] Load reduction estimates/credits do not include agricultural lands within WCDs.

ESTIMATED LOADS	TN (LBS/YR)	TP (LBS/YR)
Agricultural Starting Load	1,563,122.0	390,312.0
Agricultural Required Reduction	812,924.0	307,059.0
Required Reduction for First Phase of BMAP	243,877.2	92,117.7
Estimated Load Reductions via BMPs, 90% Target Enrollment[1]	197,216.6	40,442.0
Estimated Load Reduction Credit for Land Use Changes[1]	171,776.4	54,191.1
TOTAL ESTIMATED REDUCTIONS	**368,993.0**	**94,663.1**
REMAINING LOAD REDUCTIONS NEEDED FOR FIRST PHASE OF BMAP	**-125,115.8 (CREDIT)**	**-2,515.4 (CREDIT)**

5.5.6 WCD AGRICULTURAL ALLOCATIONS

In keeping with the intent of the FWRA, FDACS is the statewide lead agency for agriculture in the development of TMDLs and BMAPs, and in adopting and assisting with the implementation of agricultural BMPs. Agriculture is seen as a whole in determining loadings, allocating load reductions, and calculating reduction credits. However, in sub-allocating agricultural load reductions to the WCDs, the expectation is that the WCDs will assist FDACS in identifying and contacting producers within their boundaries for purposes of participating in the relevant FDACS BMP programs. The WCDs also will work with FDACS, the Department, SFWMD, and others to explore potential projects and funding sources to reduce agricultural loadings not realized through BMP implementation. **Table 25** shows the required reductions associated with all agricultural lands in the basin, including those in the WCDs, and the total estimated reduction credits for agricultural BMP implementation and changes in agricultural land use.

TABLE 25: ALL AGRICULTURAL LANDS TN AND TP LOAD REDUCTION ALLOCATIONS AND ESTIMATED CREDITS IN THE FIRST FIVE YEARS

Note: This table combines the required reductions and estimated credits for all agricultural lands in the St. Lucie River and Estuary Basin, including those within WCD boundaries. Therefore, this table includes the required reductions and credits for agriculture that are shown in the WCD allocations in **Chapter 4** and the project tables in **Chapter 5** and **Appendix D**.

ESTIMATED LOADS	TN (LBS/YR)	TP (LBS/YR)
Total Required Reduction for All Agricultural Lands	925,029.1	348,389.8
Total Required Reduction for First Phase of BMAP	277,508.7	104,516.9
Estimated Load Reductions via BMPs, 90% Target Enrollment	217,170.0	44,522.4
Credit for Land Use Change to Less Intensive/Fallow Agriculture	223,775.9	71,920.9
Credit for Land Use Change to Urban Development	27,757.0	7,692.2
TOTAL ESTIMATED REDUCTION CREDITS	**468,702.9**	**124,135.5**
REMAINING LOAD REDUCTIONS NEEDED FOR FIRST PHASE OF BMAP	**-191,194.2 (CREDIT)**	**-19,618.6 (CREDIT)**

5.5.7 BEYOND BMPS

Under the FWRA, when the Department adopts a BMAP that includes agriculture, it is the agricultural producers' responsibility to implement the FDACS-adopted BMPs applicable to them. If acreage adjustments and BMP implementation do not account fully for the agricultural load reduction allocations, it may be necessary to develop and implement cost-assisted field- and/or regional-level treatment options that remove nutrients from agricultural discharges.

In addition to producer implementation of traditional BMPs in the St. Lucie River and Estuary BMAP area, the Department, FDACS, Natural Resources Conservation Service (NRCS), and SFWMD are involved in cooperative and complementary efforts aimed at further reducing pollutant loads on agricultural lands. Examples of these efforts include the following:

- *The SFWMD, working with local citrus producers, has identified water storage opportunities and alternatives for abandoned citrus groves. The preliminary study has been completed, and the SFWMD plans to move forward with pilot projects in the area.*
- *The SFWMD has established the Northern Everglades Payment for Environmental Services Program. The goal of this program is to contract with private landowners to provide either nutrient removal or water retention services on their property. The effect of these services will be to reduce flows and nutrient loads from the watersheds to Lake Okeechobee and the estuaries. At the present time, these services are being sought from cattle ranches within the NEEPP area.*
- *The NRCS Wetland Reserve Program offers landowners an opportunity to establish long-term conservation and wildlife protection. The program provides technical and financial support to landowners to assist with their wetlands restoration efforts.*
- *FDACS Rule 5M-3, F.A.C, addresses the land application of animal manure in the Northern Everglades, which includes the St. Lucie River and Estuary BMAP area. The rule contains minimum setbacks from wetlands and all surface waters. In addition, landowners who apply more than one ton of manure per acre must develop a conservation plan approved by NRCS. The plan must specifically address the application of animal wastes and include the use of soil testing to demonstrate the need for manure application. The use of animal manure must be documented in the operation's overall nutrient management plan.*

- *The Ideal Grove Hybrid Wetland Treatment Technology (HWTT) project, located in western St. Lucie County, treats runoff from the surrounding grove using floating wetland plants and chemical treatment to remove nutrients. Estimated reductions from the project will be included in annual progress reports and deducted from the overall agricultural load reduction allocation and credited toward the North St. Lucie River WCD load reduction allocation.*

If additional measures, such as regional treatment projects, become necessary to achieve the agricultural load reduction allocation for the basin, FDACS will work with the Department, SFWMD, WCDs, and other appropriate entities to identify appropriate and feasible options.

5.6 SFWMD Pollutant Source Control Program

As described in the St Lucie River Watershed Protection Plan (SFWMD 2012a), the SFWMD is amending its existing 40E-61 Works of the District Regulatory Source Control Program (Rule 40E-61, F.A.C.) to include source controls for nitrogen and phosphorus in the St. Lucie watershed. The Regulatory Source Control Program is a multifaceted approach for improving the management of pollution sources in the Northern Everglades watersheds under NEEPP. Requirements under the Regulatory Source Control Program will complement those being implemented by the coordinating agencies, including BMPs, on-site treatment technologies, stormwater and wastewater infrastructure upgrades, master planning, and regulatory programs focused on water quality and quantity. The goal of the Regulatory Source Control Program is to ensure the full implementation of source controls, including success indicators and schedules for implementation.

The existing Regulatory Nutrient Source Control Program was adopted in 1989, as a result of the Lake Okeechobee Surface Water Improvement and Management (SWIM) Plan, to provide a regulatory source control program specifically for phosphorus. The NEEPP legislation expanded the program boundary to the river watersheds and included nitrogen, in addition to phosphorus, as the focus of nutrient source controls. The program applies to new and existing activities with the goal of reducing nutrients in offsite discharges.

The SFWMD is proposing to modify Rule 40E-61, F.A.C., to be compatible with the amendments to NEEPP. As reported in the 2012 SLRWPP Update, the SFWMD will coordinate with the Office of Fiscal Accountability and Regulatory Reform prior to initiating rule development. The rule development process will be closely coordinated with stakeholders via technical and regulatory

workshops with the goal of having a regulatory program in place within five years. The SFWMD will continue to annually report progress. While specific rule language will be completed during the rule development and consultation process, the amended rule is expected to accomplish the following:

- *Implement a nutrient source control program using BMPs for all land uses in the Northern Everglades, including the St. Lucie watershed.*
- *Recognize agricultural lands that are participating in the FDACS BMP program as meeting the intent of the proposed rule, to prevent duplication of effort.*
- *Define the monitoring network necessary to gauge the collective effectiveness of the source control programs implemented by the coordinating agencies, to make water quality performance determinations as necessary, to identify priority areas of water quality concern, and to provide data to evaluate and enhance the performance of downstream treatment facilities.*
- *Establish water quality performance criteria specific to the collective source control programs, and develop a plan for optimizing the collective BMP programs, should the expected water quality performance criteria not be met.*
- *Establish nutrient concentration limits for sites used for septage application or disposal.*
- *Ensure that the rule is consistent with the SLRWPP.*
- *Include incentives to participate in nutrient reduction demonstration and research projects that will provide valuable data for expanding, accelerating, and optimizing the implemented BMPs to meet water quality objectives and for further refinement of the source control programs, as necessary.*

Chapter 6: ASSESSING PROGRESS AND MAKING CHANGES

Successful BMAP implementation requires commitment and follow-up. In the Commitment to Plan Implementation (see **Chapter 7**), stakeholders have expressed their intention to carry out the plan, monitor its effect, and continue to coordinate within and across jurisdictions to achieve water quality targets. The FWRA requires that an assessment be conducted every five years to determine whether there is reasonable progress in implementing the BMAP and achieving pollutant load reductions. This chapter contains the water quality monitoring component sufficient to make this evaluation.

6.1 TRACKING IMPLEMENTATION

The Department will work with the stakeholders to track project implementation. In addition, the Department, SFWMD, and stakeholders will organize the monitoring data collected each year. The project and monitoring information will be presented in an annual report. The stakeholders have agreed to meet at least every 12 months after the adoption of the BMAP to follow up on plan implementation, share new information, and continue to coordinate on TMDL-related issues. The following types of activities may occur at annual meetings:

- *Implementation Data and Reporting –*
    - Collect project implementation information from the stakeholders and MS4 permit reporting and compare with the BMAP schedule.
    - Discuss the data collection process, including any concerns and possible improvements to the process.
    - Review the monitoring plan implementation, as detailed in **Section 6.3**.
- *Sharing New Information –*
    - Report on results from water quality monitoring and trend information.
    - Provide updates on new projects and programs in the watershed that will help reduce nutrient loading.
    - Identify and review new scientific developments on addressing nutrient loads and incorporate any new information into annual progress reports.

- *Coordinating TMDL-Related Issues –*
    - Provide updates from the Department on the basin cycle and activities related to any impairments, TMDLs, and BMAP.
    - Obtain reports from other basins where tools or other information may be applicable to the St. Lucie River and Estuary TMDL.

Covering all of these topics is not required for the annual meetings, but this list provides examples of the types of information that should be considered for the agenda to assist with BMAP implementation and improve coordination among the agencies and stakeholders.

6.2 ADAPTIVE MANAGEMENT MEASURES

Adaptive management involves setting up a mechanism for making adjustments in the BMAP when circumstances change or feedback indicates the need for a more effective strategy. Adaptive management measures include the following:

- *Procedures to determine whether additional cooperative strategies are needed.*
- *Criteria/processes for determining whether and when plan components need revision due to changes in costs, environmental impacts, social effects, watershed conditions, or other factors.*
- *Descriptions of the stakeholders' role after BMAP completion.*

Key components of adaptive management to share information and expertise are tracking plan implementation, monitoring water quality and pollutant loads, and holding periodic meetings. BMAP execution will be a long-term process. Some projects will extend beyond the first phase of the BMAP cycle. The Department and the stakeholders will track implementation efforts and monitor water quality to measure effectiveness and ensure BMAP compliance. The stakeholders will meet at least every 12 months to discuss implementation issues, consider new information, and, if the watershed is not projected to meet the TMDL, determine additional corrective actions. Project implementation as well as program and activity status will be collected annually from the participating entities. The stakeholders will review these reports to assess progress towards meeting the BMAP's goals.

6.3 WATER QUALITY MONITORING

6.3.1 MONITORING OBJECTIVES

Focused objectives are critical for a monitoring strategy to provide the information needed to evaluate implementation success. The primary objective of the monitoring strategy for the St. Lucie River and Estuary is described below, and will be used to evaluate the success of the BMAP:

- ***Primary Objective*** *– Track trends in TN and TP loads in the major canals and tributaries, as well as the St. Lucie River and Estuary.*

6.3.2 MONITORING PARAMETERS, FREQUENCY, AND NETWORK

To achieve the objective above, the monitoring strategy focuses on the following suggested parameters:

- *TP.*
- *Orthophosphate as P.*
- *Nitrate/Nitrite as N.*
- *N, Ammonia.*
- *Total Kjeldahl Nitrogen.*
- *DO.*
- *BOD.*
- *Chlorophyll-a.*
- *pH.*
- *Temperature.*
- *Specific Conductance.*
- *Total Suspended Solids.*
- *Turbidity.*
- *Alkalinity.*

These parameters will be monitored at the sites listed in **Table 26**. However, it should be noted that not all parameters are measured at each of the sites. The monitoring network for this plan builds on existing efforts in the basin by the following entities:

- *North St. Lucie River WCD.*
- *Port St. Lucie.*
- *SFWMD.*
- *St. Lucie County.*
- *St. Lucie West Services District.*
- *U.S. Geological Survey (USGS).*

The stations included in the BMAP monitoring network are listed in **Table 26**. These stations are not specifically BMAP stations—i.e., they are designed for other purposes—but the data collected at these sites will be used to monitor the effectiveness of the BMAP. The water quality monitoring will be conducted in accordance with the frequencies below. The stations in the monitoring network are also shown in **Figure 7** through **Figure 9**.

TABLE 26: BMAP MONITORING NETWORK

- = Empty cell/no data

SAMPLING ENTITY	STATION ID	STATION NAME	STATION TYPE	FREQUENCY	SITE ESTABLISHED
Hobe St. Lucie Conservancy District	Sample III	III	Grab	Annual	1974
Hobe St. Lucie Conservancy District	Sample 6	6	Grab	Annual	1974
Hobe St. Lucie Conservancy District	Sample 7	7	Grab	Annual	1974
Hobe St. Lucie Conservancy District	Sample 8	8	Grab	Annual	1974
North St. Lucie River WCD	1	Structure 23-1 Sager and Oleander	Grab	Quarterly	01/2011
North St. Lucie River WCD	2	North Fork St. Lucie River at Midway Road – White City Park pier	Grab	Quarterly	01/2011
North St. Lucie River WCD	3	Five Mile Creek at Edwards Road –Bridge at Kirby Loop Road	Grab	Quarterly	01/2011
North St. Lucie River WCD	6	South of Riser 40-1-2 NW corner Okeechobee Road and Kings Highway	Grab	Quarterly	01/2011
North St. Lucie River WCD	7	Structure 71-1-4 Ten Mile Creek & C-96 (bridge on Gordy Road)	Grab	Quarterly	01/2011
North St. Lucie River WCD	8	McCarty Road and Ten Mile Creek	Grab	Quarterly	01/2011
North St. Lucie River WCD	9	McCarty Road and Stetson Road	Grab	Quarterly	01/2011
Port St. Lucie	C-106	C-106	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	C-107	C-107	Grab	1 or 2 times/yr	06/2004
Port St. Lucie	C-108	C-108	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	Sagamore WW	Sagamore WW	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	Degan WW	Degan WW	Grab	1 or 2 times/yr	10/2004
Port St. Lucie	D-14	D-14	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	D-21	D-21	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	Elcam In	Elcam In	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	Elcam Spillway	Elcam Spillway	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	Kingsway WW	Kingsway WW	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	A23	A23	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	A24	A24	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	A25	A25	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	Burrow	Burrow	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	E8	E8	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	Monterrey WW	Monterrey WW	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	U16-D016	U16-D016	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	H-16	H-16	Grab	1 or 2 times/yr	02/2004
Port St. Lucie	Blackwell Pump Station	Blackwell Pump Station	Grab	1 or 2 times/yr	02/2004

Sampling Entity	Station ID	Station Name	Station Type	Frequency	Site Established
Port St. Lucie	B-33	B-33	Grab	1 or 2 times/yr	03/2005
Port St. Lucie	B-95-3	B-95-3	Grab	1 or 2 times/yr	03/2005
SFWMD	C23S48	WQM	Grab	Weekly	01/1979
SFWMD	C23S48	WQM	Autosampler	Weekly	10/1996
SFWMD	C24S49	WQM	Grab	Weekly	01/1979
SFWMD	C24S49	WQM	Autosampler	Weekly	09/1997
SFWMD	C44S80	WQM	Grab	Weekly	01/1979
SFWMD	C44S80	WQM	Autosampler	Weekly	04/1999
SFWMD	G81	WQM	Grab	Biweekly	07/2012
SFWMD	GORDYRD	WQM	Grab	Weekly	08/1999
SFWMD	GORDYRD	WQM	Autosampler	Weekly	08/1999
SFWMD	SLT-1	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-10A	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-10B	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-11	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-17	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-19	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-21	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-22A	SLT	Grab	Biweekly	05/2012
SFWMD	SLT-26	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-29	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-2A	SLT	Grab	Biweekly	05/2013
SFWMD	SLT-3	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-30A	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-31	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-34A	SLT	Grab	Biweekly	05/2007
SFWMD	SLT-35	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-36	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-37A	SLT	Grab	Biweekly	01/2003
SFWMD	SLT-38	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-38A	SLT	Grab	Biweekly	05/2012
SFWMD	SLT-39	SLT	Grab	Biweekly	02/2003
SFWMD	SLT-4	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-40	SLT	Grab	Biweekly	01/2003
SFWMD	SLT-40A	SLT	Grab	Biweekly	05/2012
SFWMD	SLT-42B	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-44	SLT	Grab	Biweekly	05/2007
SFWMD	SLT-45	SLT	Grab	Biweekly	05/2013
SFWMD	SLT-5	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-6	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-7	SLT	Grab	Biweekly	11/2001
SFWMD	SLT-9	SLT	Grab	Biweekly	11/2001

Sampling Entity	Station ID	Station Name	Station Type	Frequency	Site Established
SFWMD	HR1	SE	Grab	Monthly	06/1994
SFWMD	SE 01	SE	Grab	Monthly	10/1990
SFWMD	SE 02	SE	Grab	Monthly	10/1990
SFWMD	SE 03	SE	Grab	Monthly	10/1990
SFWMD	SE 08B	SE	Grab	Monthly	12/2003
SFWMD	SE 09	SE	Grab	Monthly	10/1990
SFWMD	SE 11	SE	Grab	Monthly	06/1997
SFWMD	SE06B	SE	Grab	Monthly	10/1990
SFWMD	SE12B	SE	Grab	Monthly	07/2003
SFWMD	SE13B	SE	Grab	Monthly	07/2003
St. Lucie County	Platt's Creek Influent	Platt's Creek Influent	Grab	Triweekly	01/2008
St. Lucie County	Platt's Creek Effluent	Platt's Creek Effluent	Grab	Triweekly	01/2008
St. Lucie County	Indian River Estates Influent	Indian River Estates Influent	Grab	Triweekly	03/2009
St. Lucie County	Indian River Estates Effluent	Indian River Estates Effluent	Grab	Triweekly	03/2009
St. Lucie West Services District	Gate 7	7B	Outfall structure	-	08/2011
St. Lucie West Services District	Gate 8	7A	Outfall structure	-	08/2011
St. Lucie West Services District	Gate 6	6B	Outfall structure	-	08/2011
St. Lucie West Services District	Gate 4	4E	Outfall structure	-	08/2011
St. Lucie West Services District	Gate 3	3B	Outfall structure	-	08/2011
St. Lucie West Services District	Gate 2	2C	Outfall structure	-	08/2011
St. Lucie West Services District	Gate 1	1E	Outfall structure	-	08/2011
St. Lucie West Services District	Gate 5	5	Outfall structure	-	08/2011
USGS	2277100	St Lucie River at Speedy Point, Stuart, FL	Flow gage	Daily	08/1997
USGS	2277110	St Lucie River at A1A (Steele Point), Stuart, FL	Flow gage	Daily	08/1997
USGS	2276870	St Lucie Canal at Lake Okeechobee	Flow gage	Daily	03/1941
USGS	272524080221800	Five Mile Canal above S-29-1-4 near Ft Pierce	Flow gage	Daily	12/2002

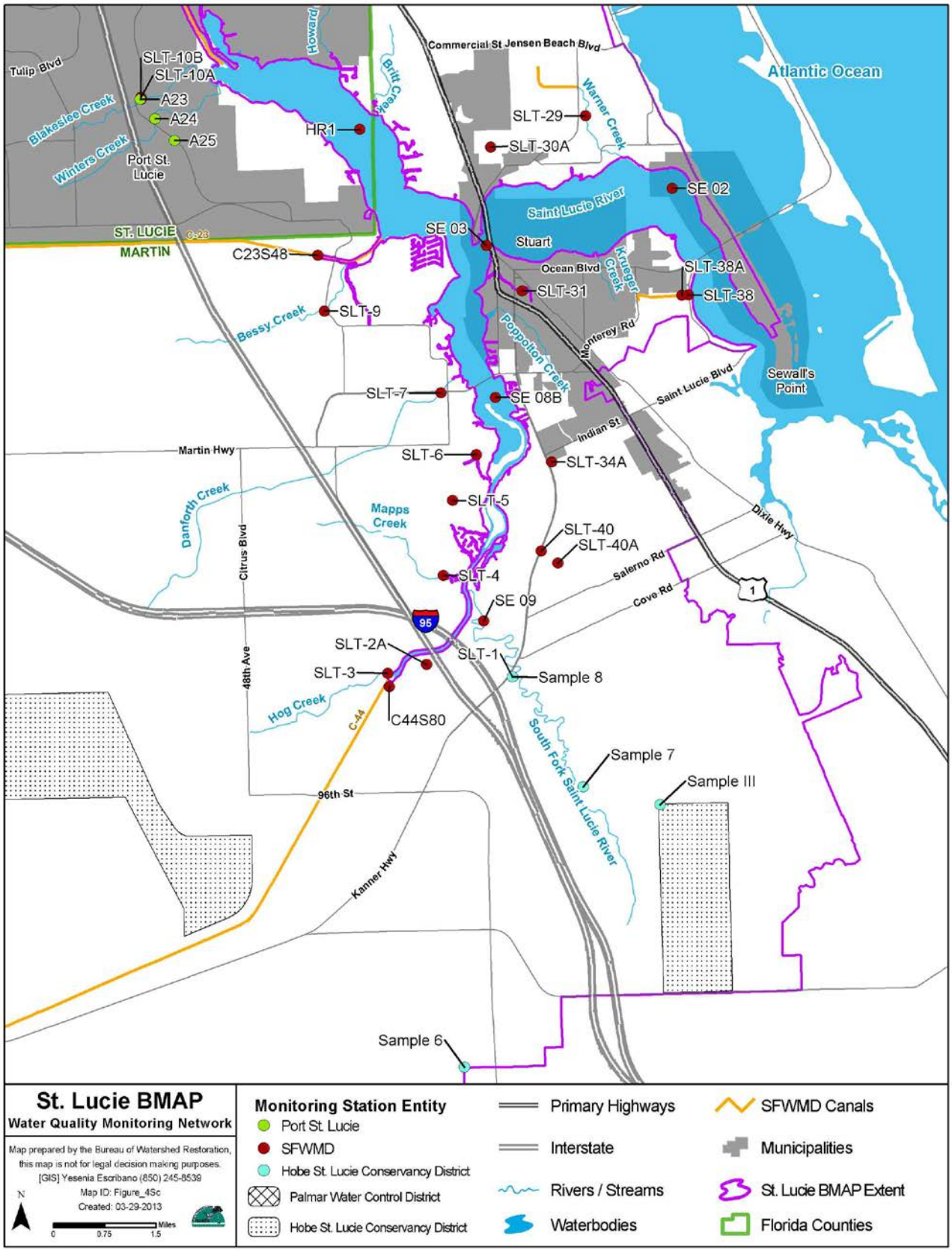

FIGURE 7: WATER QUALITY MONITORING NETWORK FOR THE SOUTHERN PART OF THE ST. LUCIE RIVER AND ESTUARY

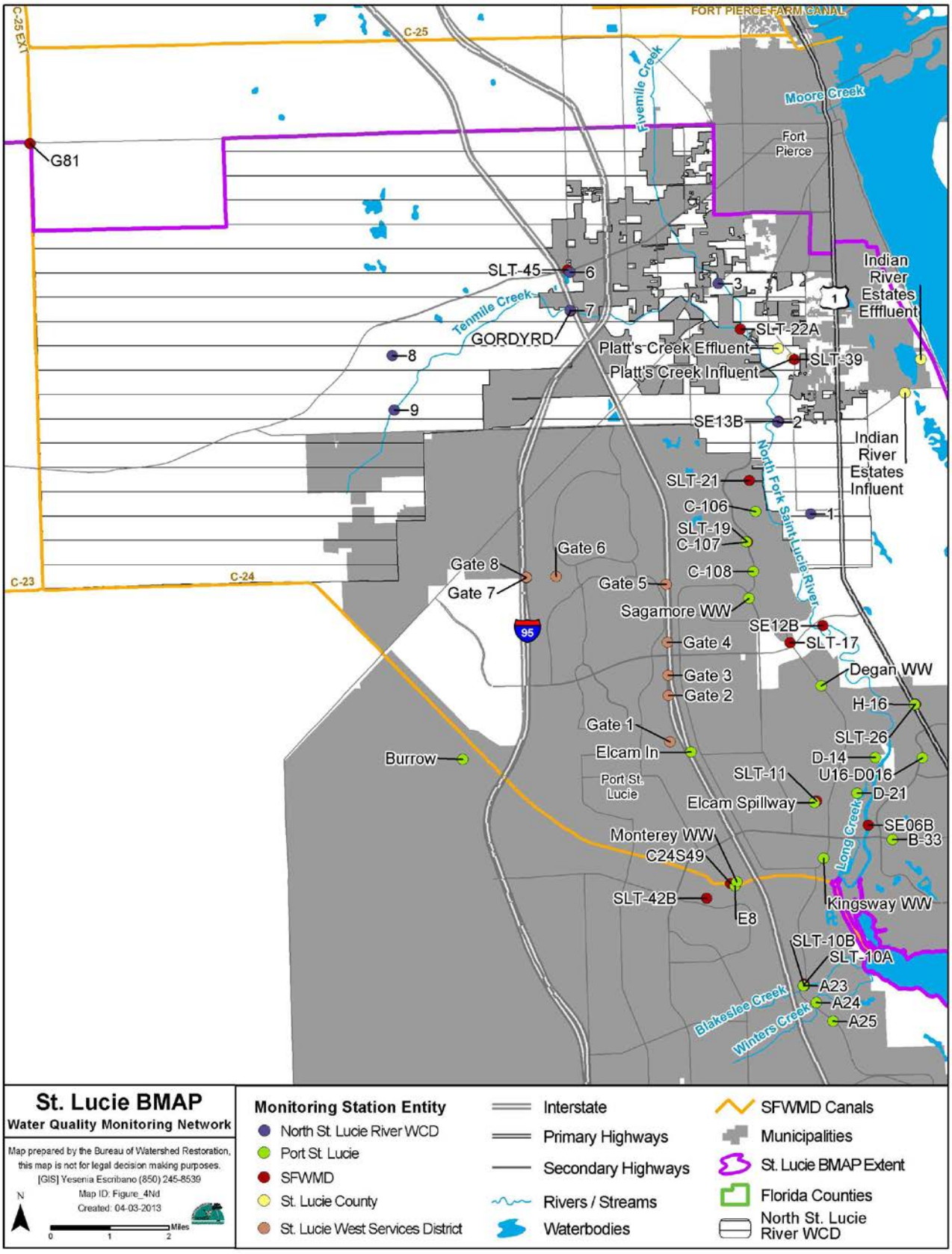

FIGURE 8: WATER QUALITY MONITORING NETWORK FOR THE NORTHERN PART OF THE ST. LUCIE RIVER AND ESTUARY

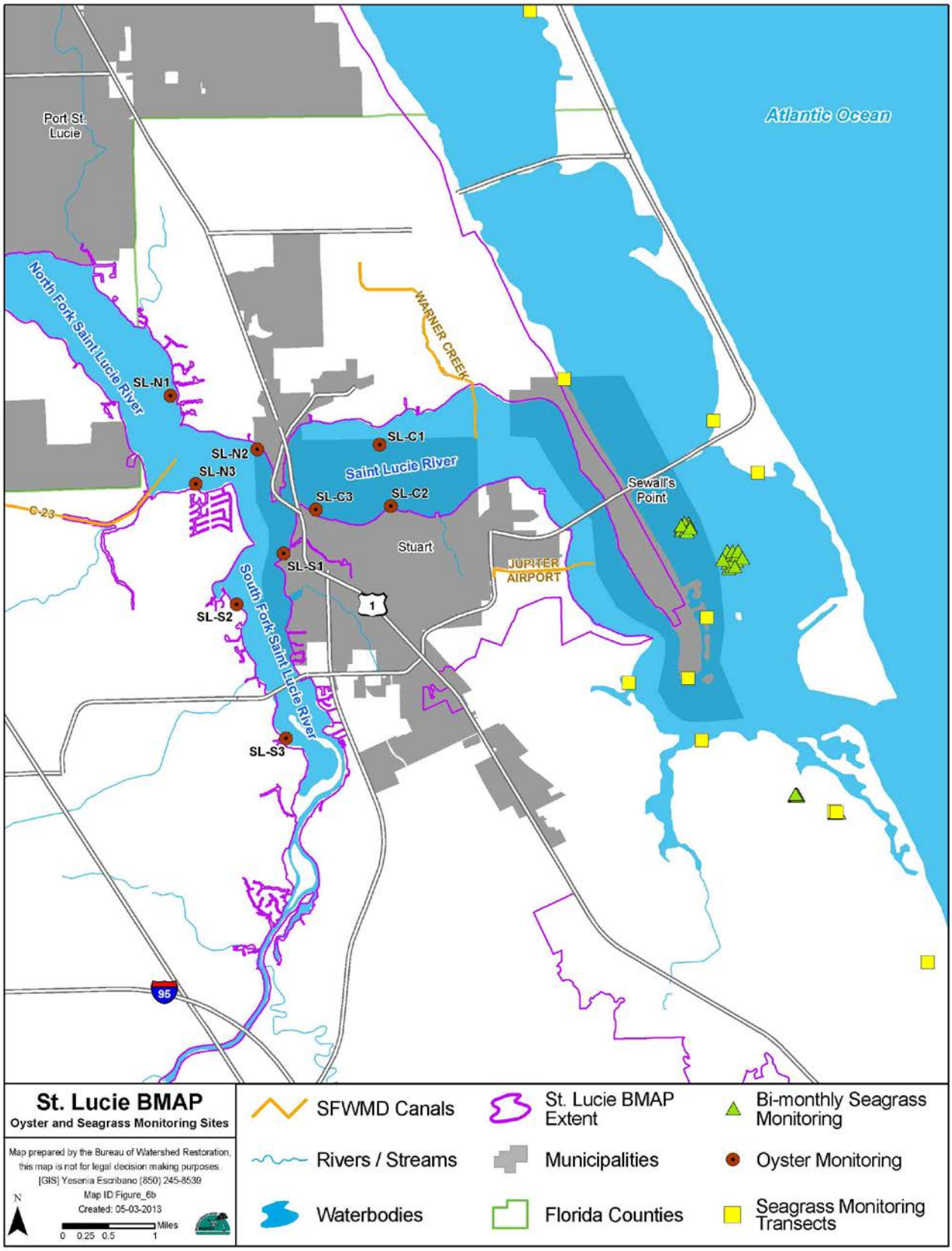

FIGURE 9: FLOW MONITORING NETWORK FOR THE ST. LUCIE RIVER AND ESTUARY

6.3.3 BIOLOGICAL MONITORING

In addition to the water quality parameters, the biological monitoring to assess the overall health of the St. Lucie River and Estuary is conducted. This monitoring includes evaluation of seagrass and oysters, as summarized in **Table 27** and shown in **Figure 10**. These stations are not specifically BMAP stations—i.e., they are designed for other purposes—but the data collected at these sites will be used to monitor the effectiveness of the BMAP.

TABLE 27: BIOLOGICAL MONITORING

SAMPLING ENTITY	PROJECT	NUMBER OF STATIONS	LOCATION	FREQUENCY	PROJECT START DATE
SFWMD	Seagrass Monitoring and Mapping	20	Transects in all lagoon segments	Semiannually	1994
SFWMD	Seagrass Monitoring and Mapping	Lagoonwide maps	Entire lagoon from St. Lucie Estuary upstream to Roosevelt Bridge (US 1)	Every 2 to 5 years	1986
SFWMD	Seagrass Monitoring and Mapping	10	IRL-S	Bimonthly (3 sites near St. Lucie Estuary monitored monthly)	2008
SFWMD	Oyster Monitoring and Mapping	9	St. Lucie Estuary	Semiannually	2005

6.3.4 DATA MANAGEMENT AND ASSESSMENT

The Florida STORET database serves as the primary repository of ambient water quality data for the state of Florida. The Department pulls water quality data used for impaired water evaluations and TMDL development directly from the STORET database. Ambient water quality data collected as part of the BMAP will be uploaded into STORET for long-term storage and availability. The Department and some local stakeholders currently upload water quality data into STORET. All BMAP data providers, with the exception of the SFWMD, have agreed to upload ambient water quality data to STORET at least once every six months, upon completion of the appropriate quality assurance/quality control (QA/QC) checks. The SFWMD uploads its data to DBHYDRO, and the Department can access this database for any BMAP evaluations.

Other data, such as biological and storm event, may also be collected, but the STORET database is not equipped to store these types of data. Stakeholders agree to provide these data to other BMAP partners on request and when appropriate for inclusion in BMAP data analyses and adaptive management evaluations.

The water quality data will be analyzed after four years of BMAP implementation to determine trends in water quality. A wide variety of statistical methods is available for trend analyses. The selection of an

appropriate data analysis method depends on the frequency, spatial distribution, and period of record available from existing data. Specific statistical analyses were not identified during BMAP development; however, commonly accepted methods of data analysis will be used that are consistent with the TMDL model.

6.3.5 QA/QC

Stakeholders participating in the monitoring plan must collect water quality data in a manner consistent with the Department's standard operating procedures (SOPs) for QA/QC. The most current version of these procedures can be downloaded from http://www.dep.state.fl.us/water/sas/sop/sops.htm. For BMAP-related data analyses, entities should use National Environmental Laboratory Accreditation Conference (NELAC) National Environmental Laboratory Accreditation Program (NELAP)–certified laboratories (http://www.dep.state.fl.us/labs/cgi-bin/aams/index.asp) or other labs that meet the certification and other requirements outlined in the SOPs.

6.4 RESEARCH PRIORITIES

During the BMAP process, the stakeholders identified several research priorities they would like to pursue, if funding becomes available. These research topics, which are also identified in the 2012 SLRWPP Update (SFWMD 2012a), include the following:

- ***Nutrient Budget*** *– This research includes dry season benthic flux measurements and a St. Lucie Estuary nutrient budget. Additional work is needed to look at wet season fluxes. The nutrient budget would estimate/quantify major sources and sinks of nutrient inputs.*
- ***DO Dynamics*** *– This research includes DO data analyses to characterize DO variability and identify the factors causing DO impairments in the St. Lucie Estuary.*

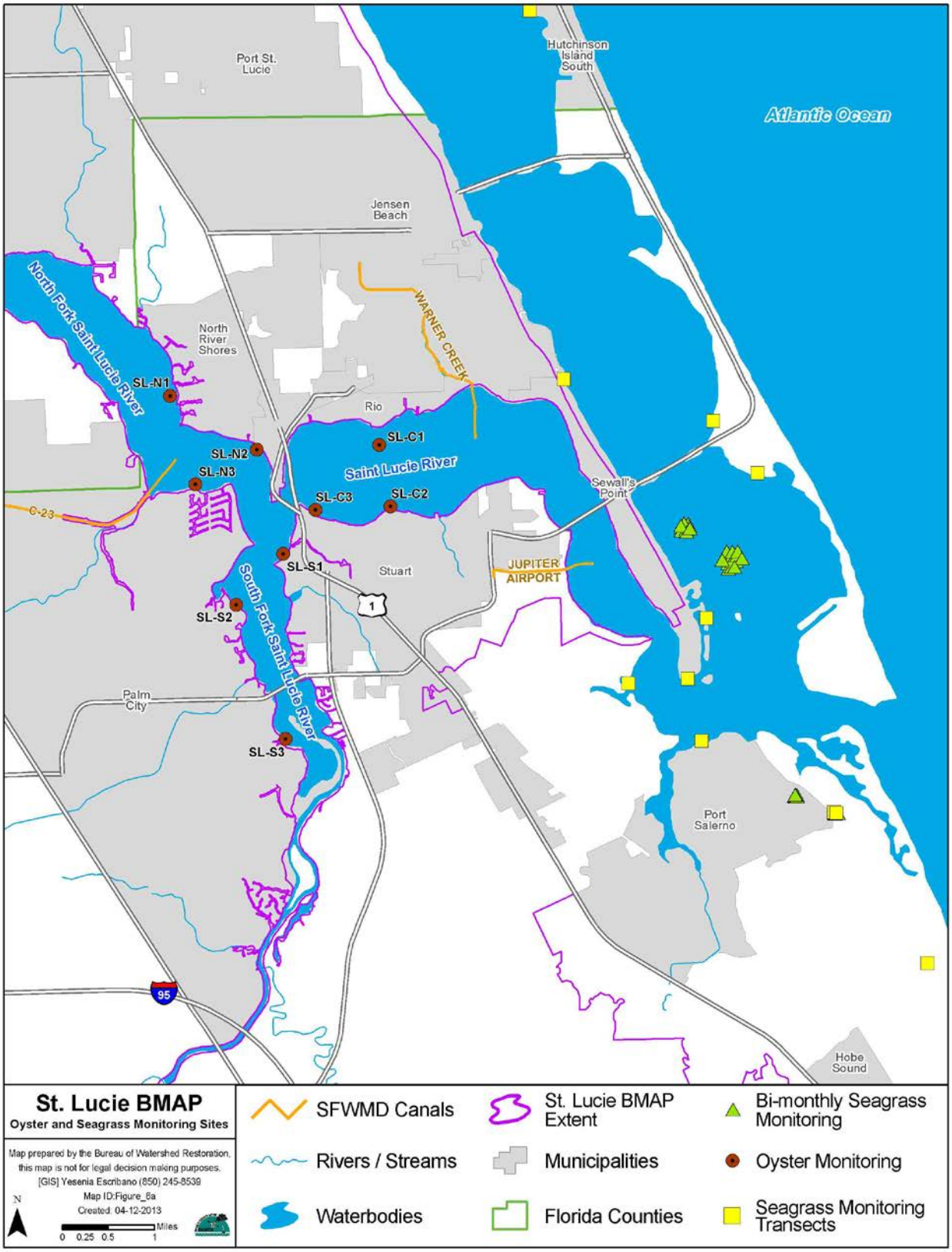

FIGURE 10: BIOLOGICAL MONITORING NETWORK FOR THE ST. LUCIE RIVER AND ESTUARY

Chapter 7: COMMITMENT TO PLAN IMPLEMENTATION

Paragraph 403.067(7), F.S., lays out the mechanisms for BMAP implementation *(*see **Appendix B***)*. While the BMAP is linked by statute to permitting and other enforcement processes that target individual entities, successful implementation mandates that local stakeholders willingly and consistently work together to attain adopted TMDLs. This collaboration fosters the sharing of ideas, information, and resources. The stakeholders have demonstrated their willingness to confer with and support each other in their efforts.

APPENDICES

APPENDIX A: TMDL BASIN ROTATION SCHEDULE

TMDLs are developed, allocated, and implemented through a watershed management approach (managing water resources within their natural boundaries) that addresses the state's 52 major hydrologic basins in five groups on a rotating schedule. **Table A-1** shows the hydrologic basins within each of the five groups, with the Department District office of jurisdiction.

TABLE A-1: MAJOR HYDROLOGIC BASINS BY GROUP AND DEPARTMENT DISTRICT OFFICE

DEPARTMENT DISTRICT	GROUP 1 BASINS	GROUP 2 BASINS	GROUP 3 BASINS	GROUP 4 BASINS	GROUP 5 BASINS
NW	Ochlockonee–St. Marks	Apalachicola–Chipola	Choctawhatchee–St. Andrews Bay	Pensacola Bay	Perdido Bay
NE	Suwannee	Lower St. Johns	Not applicable	Nassau–St. Marys	Upper East Coast
Central	Ocklawaha	Middle St. Johns	Upper St. Johns	Kissimmee	Indian River Lagoon
SW	Tampa Bay	Tampa Bay Tributaries	Sarasota Bay–Peace–Myakka	Withlacoochee	Springs Coast
S	Everglades West Coast	Charlotte Harbor	Caloosahatchee	Fisheating Creek	Florida Keys
SE	Lake Okeechobee	St. Lucie–Loxahatchee	Lake Worth Lagoon–Palm Beach Coast	Southeast Coast–Biscayne Bay	Everglades

Each group will undergo a cycle of five phases on a rotating schedule:

Phase 1: *Preliminary evaluation of water quality.*

Phase 2: *Strategic monitoring and assessment to verify water quality impairments.*

Phase 3: *Development and adoption of TMDLs for waters verified as impaired.*

Phase 4: *Development of BMAP to achieve the TMDL.*

Phase 5: *Implementation of the BMAP and monitoring of results.*

The St. Lucie–Loxahatchee Basin is a Group 2 basin. As such, the Cycle 1 list of verified impaired waters was developed in 2004, and the Cycle 2 list was developed in 2009. The Department will reevaluate impaired waters every five years to determine whether improvements are being achieved and to refine loading estimates and TMDL allocations using new data. If any changes in a TMDL are required, the applicable TMDL rule may be revised. Changes to a TMDL would prompt revisions to the applicable BMAP, which will be revisited at least every five years and modified as necessary, regardless of whether the TMDL is modified.

APPENDIX B: SUMMARY OF STATUTORY PROVISIONS GUIDING BMAP DEVELOPMENT AND IMPLEMENTATION

SECTIONS 403.067(6) AND (7), FLORIDA STATUTES - SUMMARY OF EXCERPTS

ALLOCATIONS

- *The TMDL shall include reasonable and equitable allocations of the TMDL between or among point and nonpoint sources that will alone, or in conjunction with other management and restoration activities, provide for the attainment of pollutant reductions established pursuant to paragraph (a) to achieve applicable water quality standards.*
- *The allocations may establish the maximum amount of the pollutant that may be discharged or released in combination with other discharges or releases.*
- *Allocations may also be made to individual basins and sources or as a whole to all basins and sources or categories of sources of inflow to the water body or water body segments.*
- *An initial allocation of allowable pollutant loads may be developed as part of the TMDL; in such cases detailed allocations to specific point sources and categories of nonpoint sources shall be established in the BMAP.*
- *The initial and detailed allocations shall be designed to attain pollutant reductions established pursuant to paragraph (a) and shall be based on consideration of:*
    1. *Existing treatment levels and management practices.*
    2. *BMPs established and implemented pursuant to paragraph (7)(c).*
    3. *Enforceable treatment levels established pursuant to state or local law or permit.*
    4. *Differing impacts pollutant sources may have on water quality.*
    5. *The availability of treatment technologies, management practices, or other pollutant reduction measures.*
    6. *Environmental, economic, and technological feasibility of achieving the allocation.*
    7. *The cost benefit associated with achieving the allocation.*
    8. *Reasonable timeframes for implementation.*
    9. *Potential applicability of any moderating provisions such as variances, exemptions,*

and mixing zones.

10. *The extent to which non-attainment of water quality standards is caused by pollution sources outside of Florida, discharges that have ceased, or alterations to water bodies prior to the date of this act.*

GENERAL IMPLEMENTATION

- ***DEP is the lead agency** in coordinating TMDL implementation, through existing water quality protection programs.*
- ***Application of a TMDL by a water management district** does not require WMD adoption of the TMDL.*
- *TMDL implementation may include, but is not limited to:*
    - Permitting and other existing regulatory programs.
    - Non-regulatory and incentive-based programs.
    - Other water quality management and restoration activities, such as Surface Water Improvement and Management (SWIM) plans or basin management action plans.
    - Pollutant trading or other equitable economically based agreements.
    - Public works.
    - Land acquisition.

BASIN MANAGEMENT ACTION PLAN DEVELOPMENT

- *The Department may develop a BMAP that addresses some or all of the watersheds and basins tributary to a TMDL waterbody.*
- *A BMAP shall:*
    - Integrate appropriate management strategies available to the state through existing water quality protection programs.
    - Equitably allocate pollutant reductions to individual basins, all basins, each identified point source, or category of nonpoint sources, as appropriate.
    - Identify the mechanisms by which potential future increases in pollutant loading will be addressed.

- Specify that for nonpoint sources for which BMPs have been adopted, the initial requirement shall be BMPs developed pursuant to paragraph (c).
- Establish an implementation schedule.
- Establish a basis for evaluating plan effectiveness.
- Identify feasible funding strategies.
- Identify milestones for implementation and water quality improvement, and an associated water quality monitoring component to evaluate reasonable progress over time.
- Be adopted in whole or in part by Department Secretarial Order, subject to chapter 120.

– *A BMAP **may**:*

- Give load reduction credits to dischargers that have implemented load reduction strategies (including BMPs) prior to the development of the BMAP. (Note: this assumes the related reductions were not factored into the applicable TMDL.)
- Include regional treatment systems or other public works as management strategies.
- Provide for phased implementation to promote timely, cost-effective actions.

– *An assessment of progress in achieving milestones shall be conducted every five years and the BMAP revised, as appropriate, in cooperation with basin stakeholders, and adopted by secretarial order.*

– *The Department shall assure that key stakeholders are invited to participate in the BMAP development process, holding at least one noticed public meeting in the basin to receive comments, and otherwise encouraging public participation to the greatest practicable extent.*

– *A BMAP shall not supplant or alter any water quality assessment, TMDL calculation, or initial allocation.*

BASIN MANAGEMENT ACTION PLAN IMPLEMENTATION

– *NPDES Permits*

- Management strategies related to a discharger subject to NPDES permitting shall be included in subsequent applicable NPDES permits or permit modifications when the

permit expires (is renewed), the discharge is modified (revised), or the permit is reopened pursuant to an adopted BMAP.

- Absent a detailed allocation, TMDLs shall be implemented through NPDES permit conditions that include a compliance schedule. The permit shall allow for issuance of an order adopting the BMAP within five years. (Note: Intended to apply to individual wastewater permits – not MS4s)
- Once the BMAP is adopted, the permit shall be reopened, as necessary, and permit conditions consistent with the BMAP shall be established.
- Upon request by a NPDES permittee, the Department may establish individual allocations prior to the adoption of a BMAP, as part of a permit issuance, renewal, or modification (revision).
- To the maximum extent practicable, MS4s shall implement a TMDL or BMAP through the use of BMPs or other management measures.
- A BMAP does not take the place of NPDES permits or permit requirements.
- Management strategies to be implemented by a Department permittee shall be completed according to the BMAP schedule, which may extend beyond the five-year term of an NPDES permit.
- Management strategies are not subject to challenge under chapter 120 when they are incorporated in identical form into a NPDES permit or permit modification (revision).

– *Management strategies assigned to nonagricultural, non-NPDES permittees (state, regional, or local) shall be implemented as part of the applicable permitting programs.*

– *Nonpoint source dischargers (e.g., agriculture) included in a BMAP shall demonstrate compliance with the applicable TMDLs by either implementing appropriate BMPs established under paragraph 7(c), or conducting water quality monitoring prescribed by* ***Department or a WMD****. (****Note****: this is not applicable to MS4s, as they are considered point sources under the federal Clean Water Act and TMDL Program.)*

– *Failure to implement BMPs or prescribed water quality monitoring may be subject to* ***Department or WMD*** *enforcement action.*

– *Responsible parties who are implementing applicable BMAP strategies shall not be required to implement additional pollutant load reduction strategies, and shall be*

deemed in compliance with this section. However, this does not limit DEP's authority to amend a BMAP.

BEST MANAGEMENT PRACTICES

- *The Department, in cooperation with WMDs and other interested parties, may develop interim measures, BMPs, or other measures for non-agricultural nonpoint sources to achieve their load reduction allocations.*
- *These measures may be adopted by **Department or WMD** rule. If adopted, they shall be implemented by those responsible for non-agricultural nonpoint source pollution.*
- *DACS may develop and adopt by rule interim measure, BMPs, or other measures necessary for agricultural pollutant sources to achieve their load reduction allocations.*
    - These measures may be implemented by those responsible for agricultural pollutant sources. The Department, the WMDs, and FDACS shall assist with implementation.
    - In developing and adopting these measures, FDACS shall consult with the Department, Florida Department of Health, the WMDs, representatives of affected farming groups, and environmental group representatives.
    - The rules shall provide for a notice of intent to implement the practices and a system to ensure implementation, including recordkeeping.
- *Verification of Effectiveness and Presumption of Compliance -*
    - The Department shall, at representative sites, verify the effectiveness of BMPs and other measures adopted by rule in achieving load reduction allocations.
    - The Department shall use best professional judgment in making the initial verification of effectiveness, and shall notify FDACS and the appropriate WMD of the initial verification prior to the adoption of a rule proposed pursuant to this paragraph.
    - Implementation of rule-adopted BMPs or other measures initially verified by the Department to be effective, or verified to be effective by monitoring at representative sites, provides a presumption of compliance with state water quality standards for those pollutants addressed by the practices.
- *Reevaluation –*

- Where water quality problems are demonstrated despite implementation, operation, and maintenance of rule-adopted BMPs and other measures, the Department, a WMD, or FDACS, in consultation with the Department, shall reevaluate the measures. If the practices require modification, the revised rule shall specify a reasonable time period for implementation.

APPENDIX C: SUMMARY OF ENVIRONMENTAL PROTECTION AGENCY-RECOMMENDED ELEMENTS OF A COMPREHENSIVE WATERSHED PLAN

The following is an excerpt on the nine elements of a watershed plan from the EPA's "Draft Handbook for Developing Watershed Plans to Restore and Protect Our Waters." Additional information regarding these elements can be found in the full version of the handbook located online at: http://www.epa.gov/owow/nps/watershed_handbook/.

NINE MINIMUM ELEMENTS TO BE INCLUDED IN A WATERSHED PLAN FOR IMPAIRED WATERS FUNDED USING INCREMENTAL SECTION 319 FUNDS

Although many different components may be included in a watershed plan, EPA has identified a minimum of nine elements that are critical for achieving improvements in water quality. EPA requires that these nine elements be addressed for watershed plans funded using incremental section 319 funds and strongly recommends that they be included in all other watershed plans that are intended to remediate water quality impairments.

The nine elements are provided below, listed in the order in which they appear in the guidelines. Although they are listed as *a* through *i*, they do not necessarily take place sequentially. For example, element *d* asks for a description of the technical and financial assistance that will be needed to implement the watershed plan, but this can be done only after you have addressed elements *e* and *i*.

Explanations are provided with each element to show you what to include in your watershed plan.

NINE ELEMENTS

1. *Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve needed load reductions, and any other goals identified in the watershed plan. Sources that need to be controlled should be identified at the significant subcategory level along with estimates of the extent to which they are present in the watershed (e.g., X number of dairy cattle feedlots needing upgrading, including a rough estimate of the number of cattle per facility; Y acres of row crops needing improved nutrient management or sediment control; or Z linear miles of eroded streambank needing remediation).*

What does this mean?

Your watershed plan should include a map of the watershed that locates the major sources and causes of impairment. Based on these impairments, you will set goals that will include (at a minimum) meeting the appropriate water quality standards for pollutants that threaten or impair the physical, chemical, or biological integrity of the watershed covered in the plan.

2. *An estimate of the load reductions expected from management measures.*

What does this mean?

You will first quantify the pollutant loads for the watershed. Based on these pollutant loads, you'll determine the reductions needed to meet the water quality standards.

You will then identify various management measures (see element *c* below) that will help to reduce the pollutant loads and estimate the load reductions expected as a result of these management measures to be implemented, recognizing the difficulty in precisely predicting the performance of management measures over time.

Estimates should be provided at the same level as that required in the scale and scope component in paragraph *a* (e.g., the total load reduction expected for dairy cattle feedlots, row crops, or eroded streambanks). For waters for which EPA has approved or established TMDLs, the plan should identify and incorporate the TMDLs.

Applicable loads for downstream waters should be included so that water delivered to a downstream or adjacent segment does not exceed the water quality standards for the pollutant of concern at the water segment boundary. The estimate should account for reductions in pollutant loads from point and nonpoint sources identified in the TMDL as necessary to attain the applicable water quality standards.

3. *A description of the nonpoint source management measures that will need to be implemented to achieve load reductions in paragraph 2, and a description of the critical areas in which those measures will be needed to implement this plan.*

What does this mean?

The plan should describe the management measures that need to be implemented to achieve the load reductions estimated under element *b*, as well as to achieve any additional pollution prevention goals called out in the watershed plan. It should also identify the critical areas in which those measures will be needed to implement the plan. This can be done by using a map or a description.

4. *Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan.*

What does this mean?

You should estimate the financial and technical assistance needed to implement the entire plan. This includes implementation and long-term operation and maintenance of management measures, I/E activities, monitoring, and evaluation activities. You should also document which relevant authorities might play a role in implementing the plan. Plan sponsors should consider the use of federal, state, local, and private funds or resources that might be available to assist in implementing the plan. Shortfalls between needs and available resources should be identified and addressed in the plan.

5. *An information and education component used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented.*

What does this mean?

The plan should include an I/E component that identifies the education and outreach activities or actions that will be used to implement the plan. These I/E activities may support the adoption and long-term operation and maintenance of management practices and support stakeholder involvement efforts.

6. *Schedule for implementing the nonpoint source management measures identified in this plan that is reasonably expeditious.*

What does this mean?

You need to include a schedule for implementing the management measures outlined in your watershed plan. The schedule should reflect the milestones you develop in 7.

7. *A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented.*

What does this mean?

You'll develop interim, measurable milestones to measure progress in implementing the management measures for your watershed plan. These milestones will measure the implementation of the management measures, such as whether they are being implemented on schedule, whereas element *h* (see below) will measure the effectiveness of the management measures, for example, by documenting improvements in water quality.

8. *A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards.*

What does this mean?

Using the milestones you developed above, you'll develop a set of criteria (or indicators) with interim target values to be used to determine whether progress is being made toward reducing pollutant loads. These interim targets can be direct measurements (e.g., fecal coliform concentrations) or indirect indicators of load reduction (e.g., number of beach closings). You must also indicate how you'll determine whether the watershed plan needs to be revised if interim targets are not met and what process will be used to revise the existing management approach. Where a nonpoint source TMDL has been established, interim targets are also needed to determine whether the TMDL needs to be revised.

9. *A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item h immediately above.*

What does this mean?

The watershed plan must include a monitoring component to determine whether progress is being made toward attainment or maintenance of the applicable water quality standards. The monitoring program must be fully integrated with the established schedule and interim milestone criteria identified above. The monitoring component should be designed to determine whether loading reductions are being achieved over time and substantial progress in meeting water quality standards is being made. Watershed-scale monitoring can be used to measure the effects of multiple programs, projects, and trends over time. Instream monitoring does not have to be conducted for individual BMPs unless that type of monitoring is particularly relevant to the project.

APPENDIX D: BMP EFFICIENCIES AND PROJECTS TO ACHIEVE THE TMDL

The BMP efficiencies used in the BMAP project credit calculations are summarized below in two tables: (1) standard stormwater BMPs, and (2) provisional stormwater BMPs. The standard stormwater BMPs are those that have sufficient, Florida-specific data available to estimate the nutrient removal efficiencies. The provisional stormwater BMPs are those in which further studies are under way or are needed to gather Florida-specific data to better refine the nutrient removal efficiencies. The efficiencies assigned to the provisional stormwater BMPs may be revised based on newer data for future iterations of the BMAP.

The tables below summarize the projects and time frames for implementation submitted by the entities to reduce their TP and TN loading for the first iteration of the BMAP . Additional reductions may be necessary in future BMAP iterations to meet the loads specified in the TMDL. The tables provide information on the nutrient reduction attributed to each individual project, shown in pounds per year. These projects were submitted to provide reasonable assurance to the Department that the entity has a plan on how it will address the first iteration TP and TN reductions; however, this list of projects is meant to be flexible enough to allow for changes that may occur over time, provided that the reduction is still met within the specified period.

TABLE D-1: EFFICIENCIES FOR STANDARD STORMWATER BMPS

N/A = Not applicable
[1] Available at http://www.dep.state.fl.us/water/nonpoint/docs/nonpoint/SW_TreatmentReportFinal_71907.pdf.
[2] Available at http://publicfiles.dep.state.fl.us/dwrm/stormwater/stormwater_rule_development/docs/ah_rule_draft_031710.pdf.

STANDARD BMPS	TP % REDUCTION	TN % REDUCTION	DATA SOURCE
Off-line Retention 0.25" treatment volume	40%	40%	Harper, H., and D. Baker. 2007. *Evaluation of Current Stormwater Design Criteria within the State of Florida*[1]
Off-line Retention 0.50" treatment volume	62%	62%	
Off-line Retention 0.75" treatment volume	75%	75%	
Off-line Retention 1.00" treatment volume	84%	84%	
On-line Retention 0.25" treatment volume	30%	30%	
On-line Retention 0.50" treatment volume	52%	52%	
On-line Retention 0.75" treatment volume	65%	65%	
On-line Retention 1.00" treatment volume	74%	74%	
Wet detention ponds	Reduction from Figure 13.2 given project's residence time	Reduction from Figure 13.3 given project's residence time	Figures 13.2 and 13.3 in *Draft Stormwater Treatment Applicant's Handbook*[2]
BMP treatment trains using a combination of BMPs	Use BMP Treatment Train (TT) equation: BMP TT Efficiency = $Eff_1 + ((1-Eff_1)*Eff_2)$	Use BMP Treatment Train (TT) equation: BMP TT Efficiency = $Eff_1 + ((1-Eff_1)*Eff_2)$	*Draft Stormwater Treatment Applicant's Handbook*[2]
Dry detention	10%	10%	Harper, H., and D. Baker. 2007. *Evaluation of Current Stormwater Design Criteria within the State of Florida*[1]
Baffle box	2.3%	0.5%	Final Report Contract S0236 Effectiveness of Baffle Boxes
Nutrient baffle box (2^{nd} generation)	15.5%	19.05%	Final Report Contract S0236 Effectiveness of Baffle Boxes
Grass swales with swale blocks or raised culverts	Use on-line retention BMPs above	Use on-line retention BMPs above	Evaluation of Harper and Baker data
Grass swales without swale blocks or raised culverts	50% of value for grass swales with swale blocks or raised culverts	50% of value for grass swales with swale blocks or raised culverts	Evaluation of Harper and Baker data

STANDARD BMPS	TP % REDUCTION	TN % REDUCTION	DATA SOURCE
Alum injection	90%	50%	Evaluation of Harper and Baker data
Stormwater reuse	Estimate amount of water not discharged annually because used for irrigation	Estimate amount of water not discharged annually because used for irrigation	Evaluated on case-by-case basis
Stormceptor	13%	2%	Final Report Contract S0095 Sanford Stormceptor project
Continuous deflective separation (CDS) units	10%	N/A	Final Report Contract WM793 Broadway Outfall Project
Street sweeping	Determine dry weight/volume of material collected annually and multiply by values provided by Florida Stormwater Association (FSA) University of Florida (UF) MS4 BMP project	Determine dry weight/volume of material collected annually and multiply by values to be provided by FSA UF MS4 BMP project	Final Report of FSA UF MS4 BMP Project
Catch basin inserts/inlet filters	Determine dry weight/volume of material collected annually and multiply by values to be provided by FSA UF MS4 BMP project	Determine dry weight/volume of material collected annually and multiply by values to be provided by FSA UF MS4 BMP project	Final Report of FSA UF MS4 BMP Project

TABLE D-2: EFFICIENCIES FOR PROVISIONAL STORMWATER BMPS

PROVISIONAL BMPS	TP % REDUCTION	TN % REDUCTION	DATA SOURCE
Public education	1% to 6%, depending on extent of program	1% to 6%, depending on extent of program	Evaluation of Center for Watershed Protection. 2002. *Watershed Treatment Model Version 3.1*. See separate calculation spreadsheet.
Floating islands/ managed aquatic plant systems (MAPS)	20%	20%	Chapter 14, *Draft Stormwater Treatment Applicant's Handbook*
Muck removal/ restoration dredging	Case by case depending on nutrient flux of muck	Case by case depending on nutrient flux of muck	*Department Muck Removal Credit Guidance* (developed for IRL BMAPs)
Aquatic vegetation harvesting	Based on total mass of material collected, type of plant(s), and associated nutrient content in dry material	Based on total mass of material collected, type of plant(s), and associated nutrient content in dry material	*Department Removal of Aquatic Vegetation for Nutrient Credits* (developed for IRL BMAPs)
Septic tank phase out	N/A	Based on values from ArcNLET model	Available: http://people.sc.fsu.edu/~mye/ArcNLET/index.html

TABLE D-3: CITY OF FORT PIERCE PROJECTS

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

PROJECT NUMBER	PROJECT NAME	PROJECT TYPE	ACRES TREATED	PROJECT COST	ANNUAL O&M COSTS	END DATE	STATUS	TN REDUCTION (LBS/YR)	TP REDUCTION (LBS/YR)
FP-1	Heathcote Botanical Gardens Treatment Train	Alum	161.4	$5,432,525	$35,000	06/2015	Planned	350.0	144.4
FP-2	Moore's Creek Retrofit – Phases 3 and 4	Wet detention	71.9	$825,000	N/A	03/2008	Completed	102.1	38.5
FP-3	Street Sweeping – 4,314 Cubic Yards	Street sweeping	N/A	N/A	N/A	Ongoing	Ongoing	5,569.0	3,571.0
FP-4	Inlet Cleaning – 2,762 Cubic Yards	Inlet cleaning	N/A	N/A	N/A	Ongoing	Ongoing	4,300.0	2,641.0
FP-5	Stormwater Education Shows, Pamphlets, Presentations, Storm Drain Stenciling, Illicit Discharge Program	Education and outreach	N/A	N/A	N/A	Ongoing	Ongoing	170.4	38.8
FP-6	Virginia Avenue Outfall Canal	Wet detention	161.4	$3,462,572	$1,500	02/2008	Completed	233.1	99.1
N/A	**TOTAL PROJECT REDUCTIONS**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**10,724.6**	**6,532.8**
N/A	**TOTAL BMAP I REQUIRED REDUCTIONS**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**1,943.7**	**807.9**
N/A	**CREDIT FOR FUTURE BMAPS**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**8,780.9**	**5,724.9**

TABLE D-4: CITY OF PORT ST. LUCIE MS4 PROJECTS

N/A = Not applicable

PROJECT NUMBER	PROJECT NAME	PROJECT TYPE	ACRES TREATED	PROJECT COST	END DATE	STATUS	TN REDUCTION (LBS/YR)	TP REDUCTION (LBS/YR)
PSL-1	Woodstork Trail Design Districts 7, 8, and 9	1st generation baffle box	228.8	$3,300,000	07/2007	Completed	3.8	4.0
PSL-2	Wood Stork Trail Design District 6	1st generation baffle box	81.0	$825,500	11/2008	Completed	2.7	2.3
PSL-3	Howard Creek Stormwater Treatment Area (STA)	Wet detention	435.8	Included in PSL-4	12/2010	Completed	523.0	212.2
PSL-4	Eastern Watershed Improvement Project (EWIP)	Wet detention ponds	849.5	$36,000,000	12/2011	Completed	618.3	360.9
PSL-5	B-1 and B-2 Water Control Structures (WCS)	Water control structure	1,747.5	$1,800,000	05/2007	Completed	2,526.6	993.8
PSL-6	B-3 WCS	Water control structure	1,640.6	Included in PSL-5	05/2007	Completed	2,372.3	931.7
PSL-7	E-8 Waterway Phase 1 Water Quality Retrofit	Wet detention – STAs	1,610.2	$400,000	11/2010	Completed	763.7	664.0
PSL-8	E-17 Canal WCS	Water control structure	983.6	$437,000	07/2008	Completed	181.2	0.0
PSL-10	Water and Wastewater Expansion	Septic tank phaseout	N/A	$91,075,666	Varies	Ongoing	Not quantified	Not quantified
PSL-11	Street Sweeping	Street sweeping	N/A	N/A	Ongoing	Ongoing	676.0	434.0
PSL-12	Swale Maintenance	Sediment removal	N/A	N/A	Ongoing	Ongoing	7,649.0	3,097.0
PSL-13	Catch Basin Cleaning	Catch basin cleaning	N/A	N/A	Ongoing	Ongoing	21.0	13.0
PSL-14	FYN; Fertilizer, Landscaping, Irrigation, and Pet Waste Ordinances; PSAs, Stormwater Educational Shows, Website, Outreach Programs, Stencil Program, Stormwater Pollution Hotline	Education and outreach	N/A	N/A	Ongoing	Ongoing	9,388.9	2,100.9
PSL-15	Tiffany Channel	Stormwater reuse	N/A	N/A	Ongoing	Ongoing	32.9	7.6
PSL-16	Patio STA	Stormwater reuse	N/A	N/A	Ongoing	Ongoing	11.4	2.6
PSL-17	Mary STA	Stormwater reuse	N/A	N/A	Ongoing	Ongoing	7.6	1.7
PSL-18	Leithgow STA	Stormwater reuse	N/A	N/A	Ongoing	Ongoing	7.4	1.7
PSL-19	Cane Slough 1/Elks STA	Stormwater reuse	N/A	N/A	Ongoing	Ongoing	33.2	7.3
PSL-20	Cane Slough 2/Azzi STA	Stormwater reuse	N/A	N/A	Ongoing	Ongoing	23.9	5.2
PSL-21	Loutus STA	Stormwater reuse	N/A	N/A	Ongoing	Ongoing	22.5	4.8
PSL-22	Howard Creek STA	Stormwater reuse	N/A	N/A	Ongoing	Ongoing	33.9	7.1
PSL-23	Bur St, STA	Stormwater reuse	N/A	N/A	Ongoing	Ongoing	0.6	0.1

Project Number	Project Name	Project Type	Acres Treated	Project Cost	End Date	Status	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)
PSL-24	St. Lucie West Services District Aquatic Harvesting	Aquatic harvesting	N/A	$669,600	Ongoing	Ongoing	Not quantified	Not quantified
PSL-25	St. Lucie West Services District Catch Basin Cleaning	Catch basin cleaning	N/A	$185,600	Ongoing	Ongoing	84.0	52.0
PSL-26	St. Lucie West Services District Wastewater Facility Upgrade	Wastewater facility upgrade	N/A	Unknown	04/2015	Planned	Not quantified	Not quantified
N/A	**Total Project Reductions**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**24,983.9**	**8,903.9**
N/A	**Total BMAP I Required Reductions**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**15,930.3**	**7,029.3**
N/A	**Credit for Future BMAPs**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**9,053.6**	**1,874.6**

TABLE D-5: CITY OF STUART PROJECTS

N/A = Not applicable

PROJECT NUMBER	PROJECT NAME	PROJECT TYPE	ACRES TREATED	PROJECT COST	END DATE	STATUS	TN REDUCTION (LBS/YR)	TP REDUCTION (LBS/YR)
S-1	Poppleton Creek – Phase II and III	Wet detention pond	629.1	$4,371,250	10/2008	Completed	1,299.3	575.9
S-2	Airport Ditch Project	Retention/detention	893.7	$766,756	08/2003	Completed	899.7	532.2
S-3	Crescent Basin Project	Stormwater retention	58.5	$180,000	03/2003	Completed	197.6	41.6
S-4	Krueger Creek Project	1st generation baffle boxes	309.6	$432,000	11/2001	Completed	7.0	6.8
S-5	Street Sweeping – 260 tons/yr	Street sweeping	N/A	N/A	Ongoing	Ongoing	275.0	176.0
S-6	Sediment Removal from Storm Systems – 50 tons/yr	BMP cleanout	N/A	N/A	Ongoing	Ongoing	54.0	33.0
S-7	FYN; Landscaping, Irrigation, Fertilizer, Pet Waste Ordinances; Brochure, Website, Information Inserts, City Calendar, Doggie Pot Stations, Neighborhood Cleanup Program	Education and outreach	N/A	N/A	Ongoing	Ongoing	839.9	186.4
S-8	North Point CRA Drainage Basin	1st generation baffle box	1,083.8	N/A	Unknown	Completed	24.0	22.8
S-9	Anchorage Drainage Basin	1st generation baffle box	21.3	N/A	Unknown	Completed	0.5	0.4
S-10	Downtown Drainage Basin	1st generation baffle boxes	116.6	N/A	Unknown	Completed	2.4	2.3
S-11	Hildebrad Basin	CDS unit	66.9	N/A	Unknown	Completed	0.0	6.1
S-12	Landfill Basin	Closed basin	71.0	N/A	N/A	Completed	167.3	25.9
S-13	South Fork Drainage Basin	1st generation baffle boxes	662.8	N/A	Unknown	Completed	16.0	16.2
S-14	Neighborhood Initiated Sewer Expansion Program	Removal of septic tanks	N/A	N/A	Ongoing	Ongoing	Not quantified	Not quantified
S-15	Eldorado Heights	Retention/closed basin	29.8	N/A	Unknown	Completed	133.6	27.1
N/A	**TOTAL PROJECT REDUCTIONS**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**3,916.3**	**1,652.7**
N/A	**TOTAL BMAP I REQUIRED REDUCTIONS**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**1,428.0**	**618.6**
N/A	**CREDIT FOR FUTURE BMAPS**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**2,488.3**	**1,034.1**

TABLE D-6: FDOT DISTRICT 4 PROJECTS

N/A = Not applicable
* These projects are located in the South Coastal sub-basin, which is outside the current BMAP boundary. However, they will be considered for credit in the next BMAP iteration.
** These projects are located in the Mid Coastal sub-basin, which is outside the current BMAP boundary. However, they will be considered for credit in the next BMAP iteration.

PROJECT NUMBER	PROJECT NAME	PROJECT TYPE	ACRES TREATED	END DATE	STATUS	TN REDUCTION (LBS/YR)	TP REDUCTION (LBS/YR)
FDOT-1	FM# 230108-1 (Pond 3)	Wet detention	2.0	02/2005	Completed	2.7	0.9
FDOT-2	FM# 230108-1 (Pond 4)	Wet detention	4.0	02/2005	Completed	2.9	1.3
FDOT-3	FM# 230262-4	Dry detention	102.0	07/2008	Completed	69.2	18
FDOT-4	FM# 230262-5	Dry detention	123.7	04/2010	Completed	60.0	15.3
FDOT-5	FM# 230262-3	Dry detention	195.1	05/2012	Completed	168.4	37.8
FDOT-6	FM# 230262-2	Dry detention	238.4	06/2014	Started	109.8	35.6
FDOT-7	FM# 230295-1	Dry detention	17.1	03/2003	Completed	8.6	1.6
FDOT-8	SPN 99004-1585	Dry detention	30.8	01/2003	Completed	15.5	2.9
FDOT-9	SPN 99004-1585 (Lake 3)	Wet detention	13.1	01/2003	Completed	14.4	5.2
FDOT-10	FM# 228819-1 (Basin A and B)	Wet detention	2.0	05/2007	Completed	0.2	0.1
FDOT-11	FM# 228821-1 (West 1 A)	Exfiltration trench	2.2	04/2001	Completed	5.1	1.1
FDOT-12	FM# 228821-1 (East)	Exfiltration trench	1.0	04/2001	Completed	1.8	0.4
FDOT-16	FM# 228831-1	Dry detention	9.1	03/2000	Completed	3.2	0.9
FDOT-14	FM# 228801-1	Dry detention	2.0	11/2003	Completed	1.0	0.2
FDOT-15	FM# 405504-1	Dry detention	53.6	02/2005	Completed	23.9	4.9
FDOT-16	FM# 230288-2	Wet detention	44.4	05/2009	Completed	62.9	22.3
FDOT-17	FM# 419890-1	Wet and dry detention	42.0	01/2010	Completed	1.9	1.7
FDOT-18	Street Sweeping	Street sweeping	N/A	Ongoing	Ongoing	1,419.0	910.0
FDOT-19	Pamphlets	Education	N/A	Ongoing	Ongoing	31.3	6.4
FDOT-20	FM# 230978-1 Indian Street Bridge (Pond East)	Dry detention	20.7	06/2013	Started	1.7	0.4
FDOT-21	FM# 230978-1 Indian Street Bridge (Pond West)	Wet detention	33.6	06/2013	Started	0.1	0.0
FDOT-22	State Road 615 Midway Road to Edwards Road (Basin B-1)	Wet detention	7.8	10/2009	Completed	5.4	1.8
FDOT-23	State Road 615 Midway Road to Edwards Road (Basin E)	Wet detention	9.3	10/2009	Completed	5.8	2.0
FDOT-24	FM# 410717-1 State Road 70 Widening Kings Highway to Jenkins Road (West Basin)	Dry detention	6.2	11/2012	Completed	3.1	0.6
FDOT-25	State Road 713 (King's Highway) Turn Lanes	Swales	0.6	Unknown	Completed	0.0	0.0
FDOT-26	Johnson Honda of Stuart Turn Lane (Basin A and B)	Exfiltration trench	0.1	10/2010	Completed	0.1	0.0

Project Number	Project Name	Project Type	Acres Treated	End Date	Status	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)
FDOT-27	FM# 228852-1 State Road 76 Drainage Improvements at Cabana Point (Pond 9A)	Wet detention	4.8	01/2006	Completed	9.7	3.1
FDOT-28	FM# 228852-1 Osprey Ridge Planned Unit Development (PUD) – State Road 76 Improvements	Exfiltration trench	0.1	02/2007	Completed	0.1	0.0
FDOT-29	FM# 228852-1 State Road 76 Improvements – Kanner Professional Center	Exfiltration trench	0.4	03/2009	Completed	0.2	0.0
FDOT-30*	FM# 228851-1 (Basin A)	Dry detention	14.12	11/2004	Completed	Not quantified	Not quantified
FDOT-31*	FM# 228851-1	Dry detention	25.72	11/2004	Completed	Not quantified	Not quantified
FDOT-32**	FM# 230132-1 (System No. 1)	Dry detention	2.8	05/2001	Completed	Not quantified	Not quantified
FDOT-33**	FM# 228758-1	Dry detention	18.55	01/2006	Completed	Not quantified	Not quantified
FDOT-34**	FM# 228819-1 (Basin C)	Dry detention	16.2	05/2007	Completed	Not quantified	Not quantified
FDOT-35**	FM# 228819-1 (Basin D)	Exfiltration trench	4.41	05/2007	Completed	Not quantified	Not quantified
FDOT-36**	FM# 228819-1 (Basin E)	Exfiltration trench	4.79	05/2007	Completed	Not quantified	Not quantified
FDOT-37**	FM# 405167-1	Dry retention	30.07	04/2005	Completed	Not quantified	Not quantified
FDOT-38**	FM# 230296-1	Dry swales	88.91	03/2009	Completed	Not quantified	Not quantified
FDOT-39**	FM# 230297-1 State Road A1A Roadway Improvements Phase 3	Exfiltration trench	6.38	08/2010	Completed	Not quantified	Not quantified
FDOT-40**	FM# 228758-1 State Road 702 Jensen Beach Causeway	Dry detention	33.60	01/2008	Completed	Not quantified	Not quantified
N/A	**Total Project Reductions**	**N/A**	**N/A**	**N/A**	**N/A**	**2,028.0**	**1,074.5**
N/A	**Total BMAP I Required Reductions**	**N/A**	**N/A**	**N/A**	**N/A**	**1,531.8**	**512.7**
N/A	**Credit for Future BMAPs**	**N/A**	**N/A**	**N/A**	**N/A**	**496.2**	**561.8**

Table D-7: Hobe St. Lucie Conservancy District Projects

N/A = Not applicable

Project Number	Project Name	Project Type	Acres Treated	Status	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)
HSL-1	Hobe Sound Polo Club	Wet detention, dry detention	1,736.3	Completed	3,097.2	1,013.8
HSL-2	Changes in Agricultural Land Uses	Land use change	N/A	Completed	7,000.0	2,258.8
HSL-3	90% Implementation Agricultural BMPs	Agricultural BMPs	N/A	Ongoing	191.0	29.5
N/A	**Total Project Reductions**	**N/A**	**N/A**	**N/A**	**10,288.2**	**3,302.1**
N/A	**Total BMAP I Required Reductions**	**N/A**	**N/A**	**N/A**	**2,838.6**	**1,056.0**
N/A	**Credit for Future BMAPs**	**N/A**	**N/A**	**N/A**	**7,449.6**	**2,246.1**

TABLE D-8: MARTIN COUNTY PROJECTS

N/A = Not applicable
* These projects are located in the South Coastal sub-basin, which is outside the current BMAP boundary. However, they will be considered for credit in the next BMAP iteration.

PROJECT NUMBER	PROJECT NAME	PROJECT TYPE	ACRES TREATED	PROJECT COST	END DATE	STATUS	TN REDUCTION (LBS/YR)	TP REDUCTION (LBS/YR)
MC-1	Cedar Point Water Quality Retrofit	Wet detention and swales	31.4	$398,027	10/2004	Completed	71.5	33.6
MC-2	Indian River Drive Baffle Boxes	2nd generation baffle boxes	39.1	$741,827	05/2010	Completed	30.8	5.6
MC-3	Warner Creek/Leilani Heights Water Quality Retrofit Phase I	Exfiltration trenches and swales	69.8	$541,854	08/2011	Completed	229.9	49.3
MC-4	Warner Creek Phase II	Dry detention	15.1	$1,750,338	07/2012	Completed	6.3	1.4
MC-5	Warner Creek Phase III – Beacon 21	Wet detention	1,353.8	$2,122,935	07/2012	Completed	1,291.1	597.1
MC-6	Manatee Creek Water Quality Retrofit Phases I, II, and III	Wet detention	16.0	$419,948	07/2012	Completed	6.0	3.8
MC-7	Rio/St. Lucie Water Quality Retrofit – Phase 1	Exfiltration trenches and swales	8.1	$354,161	09/2006	Completed	41.1	11.0
MC-8	Rio/St. Lucie Water Quality Retrofit – Phase 2	Wet detention	119.8	$998,170	09/2008	Completed	190.0	73.7
MC-9	Salerno Creek Water Quality Retrofit	Wet detention	207.9	$4,715,074	06/2003	Completed	407.6	134.0
MC-10	Coral Gardens Water Quality Retrofit	Wet detention	2,008.0	$2,321,860	05/2005	Completed	1,376.1	936.2
MC-11	Fern Creek Water Quality Retrofit	Wet detention	607.1	$2,660,200	04/2005	Completed	684.7	257.9
MC-12	Old Palm City Water Quality Retrofit Phases I, II, and III	Wet detention, swales	141.4	$1,544,600	03/2004	Completed	244.4	95.5
MC-13	North River Shores Baffle Boxes	1st generation baffle boxes	187.3	$1,310,000	03/2002	Completed	3.6	3.8
MC-14	Palm Lake Park Water Quality Retrofit	Wet detention	80.1	$1,741,098	02/2003	Completed	107.9	41.6
MC-15	Tropical Farms Water Quality Retrofit	Wet detention	469.8	$4,045,470	12/2010	Completed	944.5	308.5
MC-16	Septic to Central Sewer Conversions	Septic to sewer conversion	N/A	$28,678,946	Varies	Completed	Not quantified	Not quantified
MC-17	Danforth Creek – Phase 1	Wet detention	2,459.3	$1,981,799	04/2013	Construction	2,434.7	1,010.7
MC-18	Street Sweeping	Street sweeping	N/A	N/A	Ongoing	Ongoing	108.0	69.0
MC-19	Baffle Box and Structure Cleanout	Clean out	N/A	N/A	Ongoing	Ongoing	397.0	161.0

Project Number	Project Name	Project Type	Acres Treated	Project Cost	End Date	Status	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)
MC-20	FYN; Landscaping, Irrigation, Fertilizer, and Pet Waste Ordinances; PSAs, Pamphlets, Website, Illicit Discharge Program	Education and outreach	N/A	N/A	Ongoing	Ongoing	6,048.7	1,342.1
MC-21	FM# 230978-1 Indian Street Bridge (Pond East)	Dry detention	20.7	Unknown	06/2013	Started	5.1	1.1
MC-22	FM# 230978-1 Indian Street Bridge (Pond West)	Wet detention	33.6	Unknown	06/2013	Started	0.2	0.1
MC-23*	Golden Gate Water Quality Retrofit Phases I, II	Dry detention	202	$2,046,145	10/2003	Completed	Not quantified	Not quantified
MC-24*	Golden Gate Water Quality Retrofit Phase III	2nd generation baffle boxes and wet detention	27	$584,371	03/2004	Completed	Not quantified	Not quantified
MC-25*	Hibiscus Park Water Quality Retrofit Phases I and II	Wet detention	4.5	$757,085	07/2007	Completed	Not quantified	Not quantified
MC-26*	Poinciana Gardens Water Quality Retrofit Phases I and II	Wet detention	188	$2,960,547	07/2003	Completed	Not quantified	Not quantified
MC-27*	Willoughby Creek Muck Dredging	Muck removal	N/A	$13,200,000	07/2012	Completed	Not quantified	Not quantified
MC-28*	Manatee Pocket Dredging	Muck removal	N/A	$1,000,000	07/2012	Completed	Not quantified	Not quantified
N/A	**Total Project Reductions**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**14,629.2**	**5,137.0**
N/A	**Total BMAP I Required Reductions**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**9,647.4**	**4,377.0**
N/A	**Credit for Future BMAPs**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**4,981.8**	**760.0**

TABLE D-9: NORTH ST. LUCIE RIVER WCD PROJECTS

N/A = Not applicable

PROJECT NUMBER	PROJECT NAME	PROJECT TYPE	ACRES TREATED	PROJECT COST	END DATE	STATUS	TN REDUCTION (LBS/YR)	TP REDUCTION (LBS/YR)
NSLRWCD-1	SLRIT Grant 2000–2001: Vegetation Control & Bank Restoration	Control structures	4,173	$929,000	05/2003	Completed	982.9	0.0
NSLRWCD-2	SLRIT Grant 2007–2008: Water Control Structure Retrofits	Control structure	4,701	$77,000	03/2010	Completed	1,372.0	0.0
NSLRWCD-3	Canals 23 and 28 Retrofit for Stormwater Treatment and Attenuation	Control structure	44	Unknown	05/2009	Completed	11.0	0.0
NSLRWCD-4	Canal Maintenance Program	Vegetation harvesting	66,225	$4,200,000	Ongoing	Ongoing	Not quantified	Not quantified
NSLRWCD-5	Changes in Agricultural Land Uses	Land use change	N/A	N/A	N/A	Completed	45,621.1	14,444.7
NSLRWCD-6	90% Implementation Agricultural BMPs	Agricultural BMPs	N/A	Unknown	Ongoing	Ongoing	16,979.9	3,513.4
NSLRWCD-7	Change from Agricultural to Urban	Land use change	N/A	N/A	N/A	Completed	839.2	208.0
NSLRWCD-8	Ideal Grove Hybrid Wetland Treatment Technology	Wetlands, chemical treatment	238	$217,929	Ongoing	Ongoing	330.0	127.0
N/A	**TOTAL PROJECT REDUCTIONS**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**66,136.1**	**18,293.1**
N/A	**TOTAL BMAP I REQUIRED REDUCTIONS**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**26,353.8**	**10,090.2**
N/A	**CREDIT FOR FUTURE BMAPS**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**39,782.3**	**8,202.9**

TABLE D-10: PAL MAR WCD PROJECTS

N/A = Not applicable

PROJECT NUMBER	PROJECT NAME	PROJECT TYPE	END DATE	STATUS	TN REDUCTION (LBS/YR)	TP REDUCTION (LBS/YR)
PM-1	90% Implementation Agricultural BMPs	Agricultural BMPs	Ongoing	Ongoing	926.2	91.7
N/A	**TOTAL PROJECT REDUCTIONS**	**N/A**	**N/A**	**N/A**	**926.2**	**91.7**
N/A	**TOTAL BMAP I REQUIRED REDUCTIONS**	**N/A**	**N/A**	**N/A**	**0.0**	**0.0**
N/A	**CREDIT FOR FUTURE BMAPS**	**N/A**	**N/A**	**N/A**	**926.2**	**91.7**

TABLE D-11: ST. LUCIE COUNTY MS4 PROJECTS

N/A = Not applicable

PROJECT NUMBER	PROJECT NAME	PROJECT TYPE	ACRES TREATED	PROJECT COST	END DATE	STATUS	TN REDUCTION (LBS/YR)	TP REDUCTION (LBS/YR)
SLC-1	Platt's Creek Stormwater Treatment Facility	Wet detention with alum injection	311.0	$3,539,475	06/2008	Completed	676.0	306.4
SLC-2	Indian River Estates Stormwater Improvements (Phase I and II)	Wet detention with alum injection	1,004.4	$4,471,114	01/2009	Completed	1,841.2	706.6
SLC-3	Prima Vista	2nd generation baffle box	96.8	$323,483	11/2006	Completed	76.2	13.9
SLC-4	Bay Street	2nd generation baffle box	44.3	Included in SLC-3	11/2006	Completed	34.6	6.3
SLC-5	FYN; Pet Waste, Landscape, Irrigation, and Fertilizer Ordinances; PSAs, Website, Illicit Discharge Program, Eco-Center, Clean Stormwater–Clean River Program	Education and outreach	N/A	N/A	Ongoing	Ongoing	1,086.8	247.6
SLC-6	Street Sweeping	Street sweeping	N/A	N/A	Ongoing	Ongoing	210.6	135.2
SLC-7	Catch Basin Cleanout	Clean out	N/A	N/A	Ongoing	Ongoing	170.3	104.6
SLC-8	Platt's Creek Sump Cleanout	Clean out	N/A	N/A	Ongoing	Ongoing	1,181.6	511.5
N/A	**TOTAL PROJECT REDUCTIONS**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**5,277.3**	**2,032.1**
N/A	**TOTAL BMAP I REQUIRED REDUCTIONS**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**2,018.4**	**854.7**
N/A	**CREDIT FOR FUTURE BMAPS**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**3,258.9**	**1,177.4**

TABLE D-12: ST. LUCIE COUNTY NON-MS4 PROJECTS

N/A = Not applicable

PROJECT NUMBER	PROJECT NAME	PROJECT TYPE	ACRES TREATED	PROJECT COST	END DATE	STATUS	TN REDUCTION (LBS/YR)	TP REDUCTION (LBS/YR)
SLC-1	Platt's Creek Stormwater Treatment Facility	Wet detention with alum injection	563.5	Included in MS4 table	06/2008	Completed	906.7	364.6
SLC-9	White City – Citrus/Seager Stormwater Improvement	Wet detention with polyacrylamide logs	38.9	$1,862,859	2012	Completed	71.2	25.7
SLC-10	FYN; Pet Waste, Landscape, Irrigation, and Fertilizer Ordinances; PSAs, Website, Illicit Discharge Program, Eco-Center, Clean Stormwater–Clean River Program	Education and outreach	N/A	N/A	Ongoing	Ongoing	1,425.7	364.3
SLC-11	Street Sweeping	Street sweeping	N/A	N/A	Ongoing	Ongoing	113.4	72.8
SLC-12	Catch Basin Cleanout	Clean out	N/A	N/A	Ongoing	Ongoing	91.7	56.4
SLC-13	Platt's Creek Sump Cleanout	Clean out	N/A	N/A	Ongoing	Ongoing	1,566.4	600.5
N/A	**TOTAL PROJECT REDUCTIONS**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**4,175.1**	**1,484.3**
N/A	**TOTAL BMAP I REQUIRED REDUCTIONS**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**2,926.8**	**1,350.0**
N/A	**CREDIT FOR FUTURE BMAPS**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**1,248.3**	**134.3**

TABLE D-13: TOWN OF SEWALL'S POINT PROJECTS

N/A = Not applicable
* These projects are located in the Mid Coastal sub-basin, which is outside the current BMAP boundary. However, they will be considered for credit in the next BMAP iteration.

PROJECT NUMBER	PROJECT NAME	PROJECT TYPE	ACRES TREATED	END DATE	STATUS	TN REDUCTION (LBS/YR)	TP REDUCTION (LBS/YR)
SP-1	Ridgeland Court Retrofit	Baffle box	5.9	10/2002	Completed	0.1	0.1
SP-2	Palm Court/Knowles	Baffle box	12.9	09/2000	Completed	0.2	0.2
SP-3	Captain Cove	Baffle box	4.9	09/2000	Completed	0.1	0.1
SP-4	Quail Run Park	Dry detention	0.4	09/2000	Completed	0.1	0.0
SP-5	Heritage Park	Dry retention	5.2	09/2000	Completed	7.0	1.5
SP-6	Via Lucindia	Exfiltration	2.7	09/2000	Completed	8.4	1.9
SP-7	Rio Vista Park	Baffle box	24.2	01/2002	Completed	0.5	0.5
SP-8	India Lucie	Wet retention	31.1	09/2003	Completed	43.6	17.8
SP-9	India Lucie	Baffle box	5.6	09/2006	Completed	0.1	0.1
SP-10	Periwinkle	Baffle box	15.7	09/2000	Completed	0.3	0.2
SP-11	Palm Road	Swales	0.8	12/2008	Completed	0.5	0.1
SP-12	Riverview	Baffle box	9.6	01/2002	Completed	0.2	0.2
SP-13	Pineapple Lane	Exfiltration	5.5	01/2002	Completed	0.0	0.0
SP-14	Copaire	Baffle box	1.8	10/2002	Completed	0.0	0.0
SP-15	Homewood Park/South Sewall's Point Road	Retention	13.9	06/2009	Completed	45.6	10.2
SP-16	Pedway/Greenway	Exfiltration/ pervious paver	1.6	N/A	Construction	6.2	1.4
SP-17	State Road A1A	Exfiltration	12.1	01/2012	Completed	52.1	10.4
SP-18	Fertilizer Ordinance	Education	N/A	Ongoing	Ongoing	8.9	1.9
SP-19	Street Sweeping – 19 Cubic Yards	Street sweeping	N/A	Ongoing	Ongoing	25.0	16.0
SP-20*	Delano Lane	Exfiltration	1.2	08/2000	Completed	Not quantified	Not quantified
SP-21*	Town Commons Park	Dry detention	1.0	01/2002	Completed	Not quantified	Not quantified
SP-22*	Island Road	Baffle box	4.9	01/2002	Completed	Not quantified	Not quantified
SP-23*	Highpoint West	Baffle box	7.9	09/2000	Completed	Not quantified	Not quantified
SP-24*	Mandalay (Marguerita)	Baffle box	15.4	09/2000	Completed	Not quantified	Not quantified
SP-25*	Highpoint East	Baffle box	15.6	09/2000	Completed	Not quantified	Not quantified
SP-26*	High Point Exfiltration	Exfiltration/swales	6.4	Unknown	Planned	Not quantified	Not quantified
SP-27*	Extend Pedway/Greenway	Exfiltration/ pervious paver	28.2	Unknown	Construction	Not quantified	Not quantified

Project Number	Project Name	Project Type	Acres Treated	End Date	Status	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)
SP-28*	Mandalay (Marguerita)	Dry detention	15.4	Unknown	Construction	Not quantified	Not quantified
SP-29*	Baffle Boxes	1st and 2nd generation baffle boxes	18.0	Unknown	Construction	Not quantified	Not quantified
N/A	**Total Project Reductions**	**N/A**	**N/A**	**N/A**	**N/A**	**198.9**	**62.6**
N/A	**Total BMAP I Required Reductions**	**N/A**	**N/A**	**N/A**	**N/A**	**0.0**	**0.0**
N/A	**Credit for Future BMAPs**	**N/A**	**N/A**	**N/A**	**N/A**	**198.9**	**62.6**

Table D-14: Troup-Indiantown WCD Projects

N/A = Not applicable

Project Number	Project Name	Project Type	Acres Treated	Status	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)
TI-1	C-44 Conservation Area	Conservation	9,135.1	Completed	23,199.0	7,496.7
TI-2	90% Implementation Agricultural BMPs	Agricultural BMPs	N/A	Ongoing	1,856.3	445.8
N/A	**Total Project Reductions**	**N/A**	**N/A**	**N/A**	**25,055.3**	**7,942.5**
N/A	**Total BMAP I Required Reductions**	**N/A**	**N/A**	**N/A**	**7,528.2**	**2,435.7**
N/A	**Credit for Future BMAPs**	**N/A**	**N/A**	**N/A**	**17,527.1**	**5,506.8**

Table D-15: Turnpike Authority Projects

N/A = Not applicable

Project Number	Project Name	Project Type	Acres Treated	Status	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)
T-1	Project 420735-1 Port St. Lucie Interchange Pond A	Dry detention	3.6	Completed	1.8	0.3
T-2	Project 420735-1 Port St. Lucie Interchange Pond B	Wet detention	20.6	Completed	16	2.1
T-3	Thomas B. Manuel Bridge North Pond	Dry detention	9.8	Completed	5.4	1.0
N/A	**Total Project Reductions**	**N/A**	**N/A**	**N/A**	**23.2**	**3.4**
N/A	**Total BMAP I Required Reductions**	**N/A**	**N/A**	**N/A**	**0.0**	**0.0**
N/A	**Credit for Future BMAPs**	**N/A**	**N/A**	**N/A**	**23.2**	**3.4**

APPENDIX E: GLOSSARY OF TERMS

303(d) List: The list of Florida's waterbodies that do not meet or are not expected to meet applicable water quality standards with technology-based controls alone.

305(b) Report: Section 305(b) of the federal Clean Water Act requires states to report biennially to the EPA on the quality of the waters in the state.

Background: The condition of waters in the absence of human-induced alterations.

Baffle Box: An underground stormwater management device that uses barriers (or baffles) to slow the flow of untreated stormwater, allowing particulates to settle out in the box before the stormwater is released into the environment.

Baseline Loading: The quantity of pollutants in a waterbody, used as a basis for later comparison.

Basin Management Action Plan (BMAP): The document that describes how a specific TMDL will be implemented; the plan describes the specific load and wasteload allocations as well as the stakeholder efforts that will be undertaken to achieve an adopted TMDL.

Basin Status Report: For the St. Lucie – Loxahatchee Basin, this document was published in 2003 by the Department. The report documents the water quality issues, list of water segments under consideration for a TMDL and data needs in the basin.

Best Available Technology (BAT) Economically Achievable: As defined by 40 CFR, §125.3, outlines technology-based treatment requirements in permits.

Best Management Practices (BMPs): Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from nonpoint sources.

Coliforms: Bacteria that live in the intestines (including the colon) of humans and other animals, used as a measure of the presence of feces in water or soil.

Clean Water Act (CWA): The Clean Water Act is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States.

Continuous Deflective Separation (CDS) Unit: A patented stormwater management device that uses the available energy of the storm flow to create a vortex to cause a separation of solids from fluids. Pollutants are captured inside the separation chamber, while the water passes out through the separation screen.

Designated Use: Uses specified in water quality standards for each waterbody or segment (such as drinking water, swimmable, fishable).

Detention Pond: A stormwater system that delays the downstream progress of stormwater runoff in a controlled manner, typically by using temporary storage areas and a metered outlet device.

Domestic Wastewater: Wastewater derived principally from dwellings, business buildings, institutions and the like; sanitary wastewater; sewage.

Effluent: Wastewater that flows into a receiving stream by way of a domestic or industrial discharge point.

Environmental Protection Agency (EPA): The agency was created in December 1970 to address the nation's environmental problems and to protect the public health. The majority of the Department's regulatory programs has counterparts at the EPA or is delegated from the EPA.

Event Mean Concentration (EMC): The flow-weighted mean concentration of an urban runoff pollutant measured during a storm event.

Exfiltration: Loss of water from a drainage system as the result of percolation or absorption into the surrounding soil.

External Loading: Pollutants originating from outside a waterbody that contribute to the pollutant load of the waterbody.

Florida Department of Environmental Protection (Department): The Department is Florida's principal environmental and natural resources agency. The Florida Department of Natural Resources and the Florida Department of Environmental Regulation were merged together to create the Department effective July 1, 1993.

Ground Water or Groundwater: Water below the land surface in the zone of saturation where water is at or above atmospheric pressure.

Impairment: The condition of a waterbody that does not achieve water quality standards (designated use) due to pollutants or an unknown cause.

Load Allocations (LA): The portions of a receiving water's loading capacity that are allocated to one of its existing or future nonpoint sources of pollution.

Load Capacity: The greatest amount of loading that a waterbody can receive without violating water quality standards.

Loading: The total quantity of pollutants in stormwater runoff that contributes to the water quality impairment.

Margin of Safety (MOS): An explicit or implicit assumption used in the calculation of a TMDL, which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality. An explicit MOS is typically a percentage of the assimilative capacity or some other specific amount of pollutant loading (e.g., the loading from an out-of-state source). Most Department-adopted TMDLs include an implicit MOS based on the fact that the predictive model runs incorporate a variety of conservative assumptions (they examine worst-case ambient flow conditions, worst-case temperature, and assume that all permitted point sources discharge at their maximum permittable amount).

National Pollutant Discharge Elimination System (NPDES): The permitting process by which technology based and water quality–based controls are implemented.

Nonpoint Source (NPS): Diffuse runoff without a single point of origin that flows over the surface of the ground by stormwater and is then introduced to surface or ground water. NPS includes atmospheric deposition and runoff or leaching from agricultural lands, urban areas, unvegetated lands, on-site treatment disposal systems (OSTDS), and construction sites.

Nonpoint Source Pollution: Nonpoint source pollution is created by the flushing of pollutants from the landscape by rainfall and the resulting stormwater runoff, or by the leaching of pollutants through the soils into the ground water.

Organic Matter: Carbonaceous waste contained in plant or animal matter and originating from domestic or industrial sources.

Outfall (general): The place where a sewer, drain, or stream discharges.

Outfall (MS4): A point source at the location where a MS4 discharges to water of the state and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels, or other conveyances which connect segments of the same stream or other waters of the state and are used to convey waters of the state.

Pollutant Load Reduction Goals (PLRGs): PLRGs are defined as the estimated numeric reductions in pollutant loadings needed to preserve or restore designated uses of receiving waterbodies and maintain water quality consistent with applicable state water quality standards. PLRGs are developed by the water management districts.

Point Source: An identifiable and confined discharge point for one or more water pollutants, such as a pipe, channel, vessel, or ditch.

Pollutant: Generally any substance, such as a chemical or waste product, introduced into the environment that adversely affects the usefulness of a resource.

Pollution: An undesirable change in the physical, chemical, or biological characteristics of air, water, soil, or food that can adversely affect the health, survival, or activities of humans or other living organisms.

Removal Efficiency: A description of how much of a given substance (metals, sediment, etc.) has been extracted from another substance.

Retention Pond: A stormwater management structure whose primary purpose is to permanently store a given volume of stormwater runoff, releasing it by infiltration and /or evaporation.

Reuse: The deliberate application of reclaimed water for a beneficial purpose. Criteria used to classify projects as “reuse” or “effluent disposal” are contained in Subsection 62-610.810, F.A.C.

Quality Assurance (QA): An integrated system of management activities involving planning, implementation, documentation, assessment, reporting, and quality improvement to ensure that a process, product, or service meets defined standards of quality.

Quality Control (QC): The overall system of technical activities that measures the attributes and performance of a process, product, or service against defined standards to verify that they meet the established data quality objectives.

Septic Tank: A watertight receptacle constructed to promote the separation of solid and liquid components of wastewater, to provide the limited digestion of organic matter, to store solids, and to allow clarified liquid to discharge for further treatment and disposal in a soil absorption system.

STORET: The EPA's STOrage and RETrieval database, used nationally for water quality data storage.

Stormwater Runoff: The portion of rainfall that hits the ground and is not evaporated, percolated, or transpired into vegetation, but rather flows over the ground surface seeking a receiving waterbody.

Surface Water: Water on the surface of the earth, whether contained in bounds created naturally or artificially or diffused. Water from natural springs is classified as surface water when it exits the spring onto the earth's surface.

Total Maximum Daily Load (TMDL): The sum of the individual wasteload allocations for point sources and the load allocations for nonpoint sources and natural background. Prior to determining individual wasteload allocations and load allocations, the maximum amount of a pollutant that a waterbody or waterbody segment can assimilate from all sources while still maintaining its designated use must first be calculated. TMDLs are based on the relationship between pollutants and instream water quality conditions.

Wasteload Allocations (WLAs): Pollutant loads allotted to existing and future point sources, such as discharges from industry and sewage facilities.

Wastewater: The combination of liquid and pollutants from residences, commercial buildings, industrial plants, and institutions, together with any ground water, surface runoff, or leachate that may be present.

Waterbody Identification (WBID) Numbers: WBIDs are numbers assigned to hydrologically based drainage areas in a river basin.

Water Quality Standards (WQSs): (1) Standards that comprise the designated most beneficial uses (classification of water), the numeric and narrative criteria applied to the specific water use or

classification, the Florida Anti-degradation Policy, and the moderating provisions contained in Rules 62-302 and 62-4, F.A.C. (2) State-adopted and EPA-approved ambient standards for waterbodies. The standards prescribe the use of the waterbody (such as drinking, fishing and swimming, and shellfish harvesting) and establish the water quality criteria that must be met to protect designated uses.

Watershed: Topographic area that contributes or may contribute runoff to specific surface waters or an area of recharge.

Watershed Management Approach: The process of addressing water quality concerns within their natural boundaries, rather than political or regulatory boundaries. The process draws together all the participants and stakeholders in each basin to decide what problems affect the water quality in the basin, which are most important, and how they will be addressed.

APPENDIX F: BIBLIOGRAPHY OF KEY REFERENCES AND WEBSITES

KEY REFERENCES

Florida Department of Environmental Protection:

— 2003. *Basin status report: St. Lucie and Loxahatchee.* Tallahassee, FL: Watershed Planning and Coordination Section, Bureau of Watershed Management.

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Sime, P. 2005. St. Lucie Estuary and Indian River Lagoon Conceptual Ecological Model. *Wetlands 25 (4): 898–907.*

South Florida Water Management District:

— 2003. *CERP Monitoring and Assessment Plan*. Appendix A: Conceptual Ecological Models.

— 2009. *St. Lucie River Watershed Protection Plan.*

— 2012a. P. Balci, L. Bertolotti, K. Carter, and C. Conrad. Appendix 10-1: St. Lucie River Watershed Protection Plan Update. In: *2012 South Florida environmental report,* Appendix 10-1.

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STORMWATER AND WATER QUALITY PROTECTION WEBSITES

TABLE F-1: LOCAL AND REGIONAL STORMWATER AND WATER QUALITY PROTECTION WEBSITES

- = Empty cell/no data

SITE	WEBSITE LINK
SFWMD	http://my.sfwmd.gov/portal/page/portal/sfwmdmain/home%20page
South Florida Environmental Report	http://my.sfwmd.gov/portal/page/portal/xweb%20about%20us/agency%20reports
SLRWPP, January 2009	http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/ne_slrwpp_main_123108.pdf
SLRWPP Update, 2012	http://www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/slrwpp_2012update_sfer_voli_app10_1.pdf

TABLE F-2: STATE STORMWATER AND WATER QUALITY PROTECTION WEBSITES

- = Empty cell/no data

SITE	WEBSITE LINK
General Portal for Florida	http://www.myflorida.com
Department	http://www.dep.state.fl.us/
Watershed Management	http://www.dep.state.fl.us/water/watersheds/index.htm
TMDL Program	http://www.dep.state.fl.us/water/tmdl/index.htm
BMPs, Public Information	http://www.dep.state.fl.us/water/nonpoint/pubs.htm
NPDES Stormwater Program	http://www.dep.state.fl.us/water/stormwater/npdes/index.htm
Nonpoint Source Funding Assistance	http://www.dep.state.fl.us/water/nonpoint/319h.htm
Surface Water Quality Standards	http://www.dep.state.fl.us/legal/Rules/shared/62-302/62-302.pdf
Identification of Impaired Surface Waters Rule	http://www.dep.state.fl.us/legal/Rules/shared/62-303/62-303.pdf
St. Lucie–Loxahatchee Basin Assessment Report	http://www.dep.state.fl.us/water/basin411/stlucie/assessment.htm
STORET Program	http://www.dep.state.fl.us/water/storet/index.htm
Criteria for Surface Water Quality Classifications	http://www.dep.state.fl.us/water/wqssp/classes.htm
FDACS Office of Agricultural Water Policy	http://www.floridaagwaterpolicy.com/

TABLE F-3: NATIONAL STORMWATER AND WATER QUALITY PROTECTION WEBSITES

- = Empty cell/no data

SITE	WEBSITE LINK
Center for Watershed Protection	http://www.cwp.org/
EPA Office of Water	http://www.epa.gov/water
EPA Region 4 (Southeast United States)	http://www.epa.gov/region4
Clean Water Act History	http://www.epa.gov/lawsregs/laws/cwahistory.html
USGS: Florida Waters	http://sofia.usgs.gov/publications/reports/floridawaters/#options