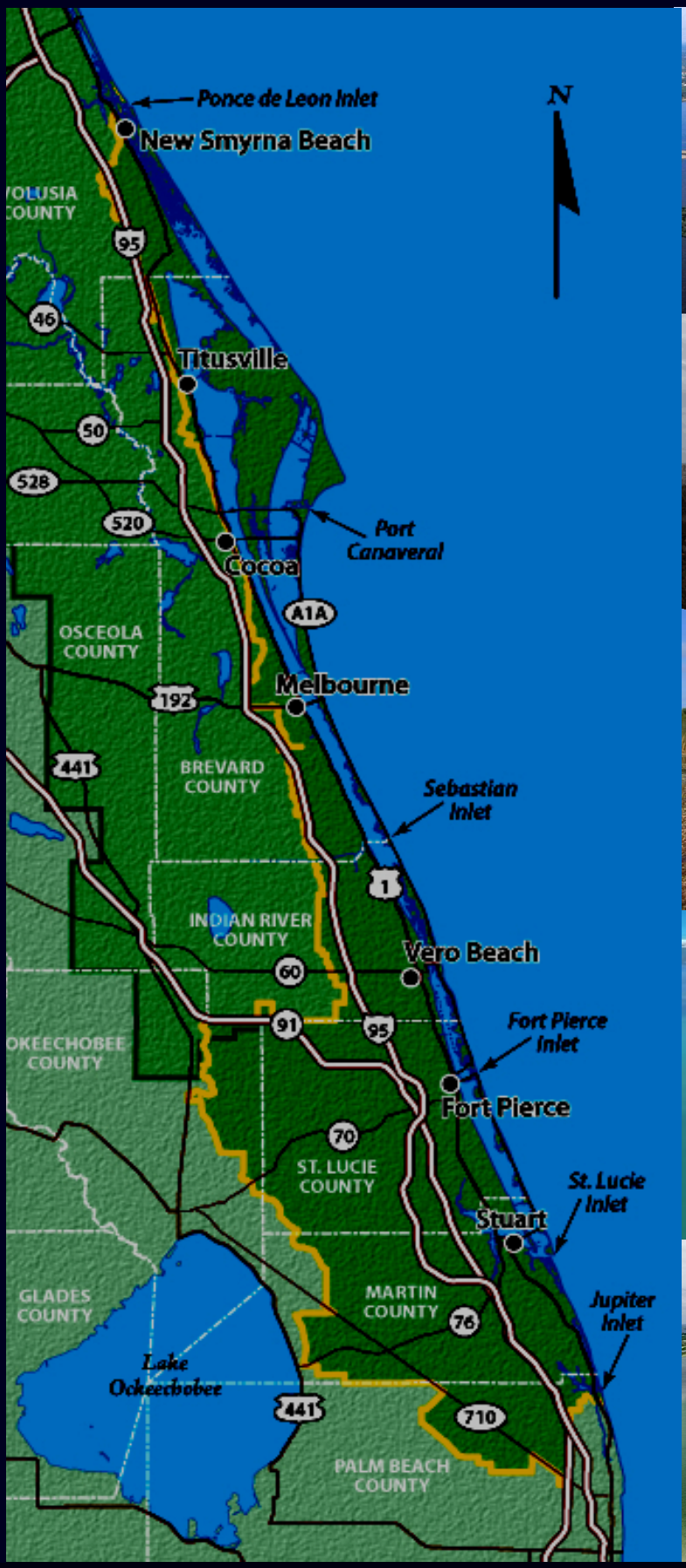
Impediments to Implementation of the Indian River Lagoon Basin Management Action Plans



Prepared by the East Central Florida Regional Planning Council and the Treasure Coast Regional Planning Council for the Florida Department of Economic Opportunity

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Impediments to Implementation of the Indian River Lagoon Basin Management Action Plans

Introduction

This report is part of a cooperative effort by East Central Florida Regional Planning Council (ECFRPC) and Treasure Coast Regional Planning Council (TCRPC) to provide a regional evaluation and assessment related to the Indian River Lagoon and St. Lucie River and Estuary Basin Management Action Plans (BMAPs). The work is intended to assist the state and local governments in Volusia, Brevard, Indian River, St. Lucie, and Martin counties by providing a better understanding of the challenges associated with implementing BMAPs. This report identifies the impediments to BMAP implementation through direct discussions with and surveys of local government representatives involved with the design and development of projects to implement the BMAPs. The ultimate goal of this report is to provide recommendations that will assist local governments and other entities to fully implement the BMAPs and improve the ecological health and economic value of the Indian River Lagoon and St. Lucie River estuarine systems.

Background

The Indian River Lagoon is a 156-mile long estuary separating the barrier island from the mainland on the east coast of Florida. It extends from the Ponce Inlet in Volusia County to the Jupiter Inlet in Palm Beach County, and completely traverses Brevard, Indian River, St. Lucie, and Martin counties. The lagoon has historically been characterized by extensive seagrass beds in the shallow waters and tidal swamp forests dominated by mangroves along the shoreline. The natural communities contribute to the lagoon's role as a major spawning and nursery ground for fish and marine life and are a major reason why the lagoon is recognized as one of the most species-diverse estuaries in North America (Indian River Lagoon National Estuary Program 1996, 2008). Furthermore, the recreational uses and economic contributions of the lagoon to the residents and visitors of the adjacent communities are well documented. These estuarine systems have been estimated to have an annual economic value of over 3.7 billion dollars (Hazen and Sawyer 2008).

In the past century the Indian River Lagoon has been affected by many activities including the creation of inlets, dredging of navigational channels, impoundment of mangroves for mosquito control, shoreline development, and alteration of the watershed basins draining into the lagoon. Today, water quality degradation is the single most important issue impacting the lagoon. The decline in water quality is attributed to an increase in nutrient input, sedimentation, turbidity, atmospheric deposition, nutrient releases from legacy muck deposits, and changes in salinity due to freshwater discharges. The issue is complex because the impact to the lagoon comes from a variety of sources, including non-point sources of stormwater entering the lagoon through major canal systems as well as through smaller creeks, tributaries, and individual outfall structures.

The Florida Department of Environmental Protection (FDEP) Total Maximum Daily Load (TMDL) program is a statewide watershed-based management approach to restore and protect water quality in Florida. TMDLs are developed, allocated, and implemented through phased

approach, which includes the development of a BMAP. Each BMAP contains a comprehensive set of strategies for restoring impaired waters by reducing pollutant loadings to meet the allowable loadings established in a TMDL. TMDLs are water quality targets based on state water quality standards for specific pollutants, such as excessive nitrogen and phosphorus. BMAPs are broad-based plans that are developed with local stakeholders and rely on local input and local commitment for implementation. Each BMAP is designed to address key elements required by the Florida Watershed Restoration Act (Section 403.067, Florida Statutes). The BMAPs are adopted by Secretarial Order to be enforceable.

There are currently 20 adopted BMAPs in the State of Florida covering over 7,325,000 acres (Exhibit 1). Portions of the Indian River Lagoon are addressed by four of the adopted BMAPs, which cover an area over 990,000 acres (Exhibit 2). These BMAPs are spread across boundaries of five counties and two regional planning councils (Table 1).

Table 1. BMAPs that include a portion of the Indian River Lagoon.

BMAP	County	Regional Planning Council
North Indian River Lagoon	Brevard, Volusia	East Central Florida
Banana River Lagoon	Brevard	East Central Florida
Central Indian River Lagoon	Brevard, Indian River, St. Lucie	East Central Florida, Treasure Coast
St. Lucie River and Estuary*	Martin, St. Lucie	Treasure Coast

* A portion of eastern Okeechobee County also is included in the St. Lucie River and Estuary BMAP.

There are several key differences between these BMAPs. The purpose of the North Indian River and Banana River lagoon BMAPs is to implement total nitrogen and total phosphorus TMDLs to achieve specified seagrass median depth limit targets (Table 2). These plans outline specific projects that have provided or are expected to provide load reductions and a schedule for implementation for the first five-year iteration of the BMAPs.

Table 2. TMDL Total Required Reductions (Pounds/Year).

BMAP	Total Nitrogen	Total Phosphorus
North Indian River Lagoon	221,863.9	52,057.2
Banana River Lagoon	192,708.0	38,647.0
Central Indian River Lagoon*	836,713.0	144,453.0
St. Lucie River and Estuary	1,053,414.0	404,166.0
Total	2,304,698.9	639,323.2

* Reduction allocations were not calculated when this BMAP was developed, but TMDL's have been set.

The North Indian River and Banana River lagoon BMAPs outline specific actions and an implementation schedule for load reductions. The goal of the TMDL for the Central Indian River Lagoon BMAP is also to recover the deeper seagrass habitats. However, all of the project zones in the Central Indian River Lagoon BMAP were meeting the TMDL seagrass depth limits at the time of BMAP development. Therefore, the purpose of this BMAP is to document the completed projects that contributed to this success and to identify future projects to continue seagrass improvement. The St. Lucie River and Estuary BMAP is different in that it is based directly on the monitoring of water quality rather than monitoring seagrasses. The purpose is to implement

the nutrient load reductions necessary to achieve the TMDLs for the St. Lucie River and Estuary Basin. This plan outlines specific projects that have provided or are expected to provide load reductions and a schedule for implementation for the first five-year iteration of the BMAP. All four of the plans are similar in that they intended to be implemented in three five-year periods with the total required reductions spread over a 15-year time frame.

Exhibit 1. Map showing the 20 adopted BMAPs in the State of Florida.

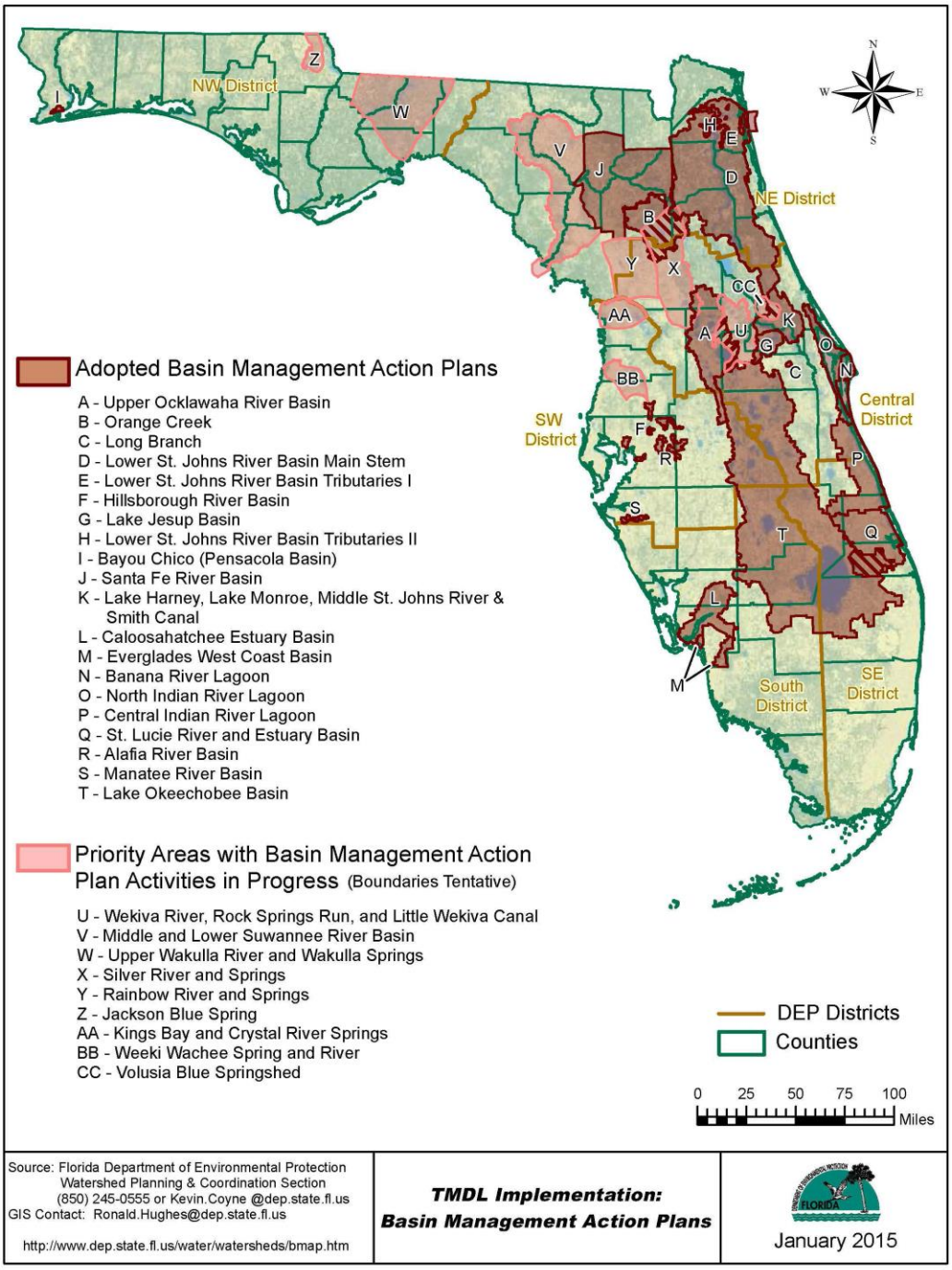
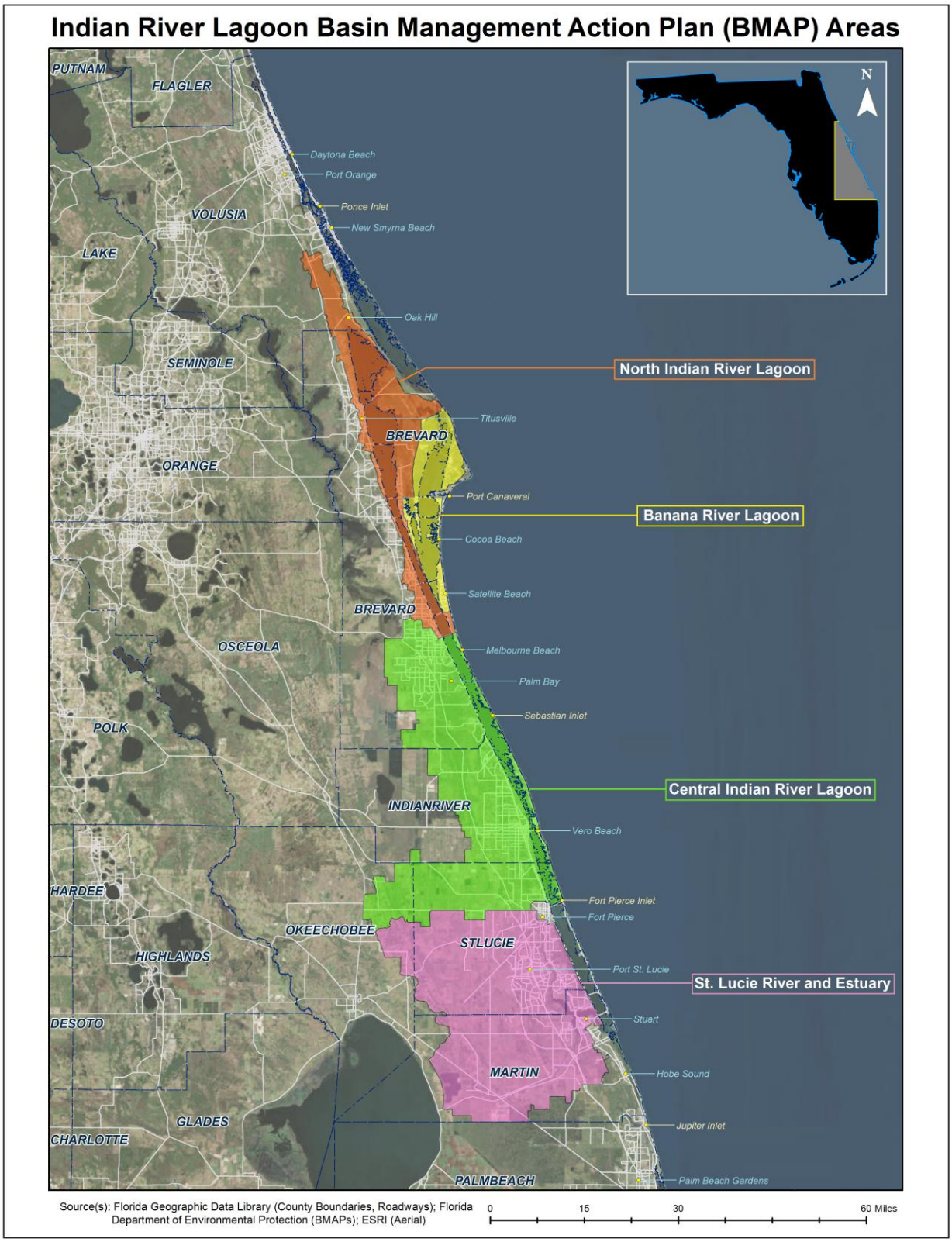


Exhibit 2. Map showing the four BMAPs that cover a portion of the Indian River Lagoon.



Methods

In order to identify and evaluate impediments to BMAP implementation, Council staff interviewed county staff and representatives responsible for identifying projects to achieve nutrient reductions. Separate meetings were held with individuals from Martin County on April 2; Brevard County on April 7; Indian River County on April 8; and St. Lucie County on April 8, 2015. Volusia County staff chose not to meet to discuss impediments to BMAP implementation, because Volusia County does not have a required nutrient reduction in the North Indian River Lagoon BMAP and the county has no projects for BMAP implementation at this time.

Based on the information provided in the meetings with local government representatives, Council staff compiled a list of possible BMAP impediments. This list was then sent back to the staff of the five counties and they were asked to use their best professional judgment and experience with the BMAP program to assign a score to each of the items in the list. They were asked to score each item based on the perception of how the impediment may impact the ability of their organization to implement the BMAPs. They were asked to assign a score of 2 if the item is viewed as a major impediment; a score of 1 if the item is viewed as a minor impediment; or a score of 0 if the item is not viewed as an impediment for their particular jurisdiction. After assigning the scores, the list of impediments was then returned to Council staff for tabulation and analysis. As a final step, the same list of possible impediments was sent to representatives of the municipalities identified in the FDEP Indian River Lagoon BMAP distribution list. The representatives from the municipalities were asked to score the impediments using the same method as the counties and return the list to Council staff.

Impediments to Implementing the BMAPs

Discussions with county staff and representatives resulted in the identification of 15 impediments to implementing the BMAPs. Council staff received completed surveys scoring the importance of each impediment from Brevard, Indian River, Martin and St. Lucie counties and six municipalities. The survey results are discussed along with each impediment. The impediments are listed in order of importance with those being viewed as major impediments occurring higher in the following list:

1. **Inadequate funding**. This was identified as a major impediment by all of the local governments surveyed. Brevard County has estimated that it would take $1.3 billion to implement the three BMAPs that apply to Brevard, Volusia, and Indian River counties as well as the municipalities, Florida Department of Transportation districts, and water control districts within the BMAP watersheds. Since 2000, Martin County has invested $50 million in over 25 stormwater retrofit projects. However, they will need to continue to invest in water quality treatment projects in order to remain in compliance with the BMAP. The *Stormwater/Water Quality Needs Assessment (2015 Update)* by Martin County has identified future project costs totaling $191,227,942.

   Another way of examining the potential costs involved in implementing the Indian River Lagoon and St. Lucie River and Estuary BMAPs is to use the cost of existing projects to estimate the future costs necessary to achieve the total required nutrient reductions in

these basins. The total cost of 57 completed county projects, which had adequate nutrient reduction data listed in the BMAPs, was $59,338,647. This cost yielded total nitrogen reduction of 29,564 pounds/year and total phosphorus reduction of 10,078 pounds/year. This provides an estimated cost of $2,007/pound for total nitrogen removal and $5,888/pound for total phosphorus removal. Applying these costs to the total required nutrient reductions in Table 2 yields an estimated cost of $4.6 billion to accomplish the required nutrient reductions in all four of the BMAPs. This analysis underscores the importance of financial limitations and the magnitude of this impediment.

2. **Nutrient loading from muck is not being addressed**. This was identified as a major impediment by Brevard County, Martin County, City of Satellite Beach, and City of Vero Beach. It was identified as minor impediment by St. Lucie County, and cities of Edgewater, Fort Pierce, and Port St. Lucie. Nutrient loading from muck is believed to be significant in the river and lagoon system. Legacy nutrient loading from muck may have contributed to the severity of recent large algal blooms in the lagoon. However, BMAP credits calculated for muck removal projects are too costly for most entities to pursue. For example, Martin County has completed muck removal projects, but FDEP has not given the county nutrient reduction credits, because they have not gone through the process of bathymetric surveys and measurement of the muck. Entities are not including muck removal in their action plans, because of the expense of doing muck removal and operation and maintenance schedules required for BMAP credits.

3. **Nutrient loading from groundwater is not being addressed.** This was identified as a major impediment by Brevard County, Martin County, and City of Satellite Beach. It was identified as a minor impediment by St. Lucie County, and cities of Edgewater, Fort Pierce, and Port St. Lucie. This includes the potential nutrient loading from septic tanks and other sources in groundwater. The North Indian River Lagoon, Banana River Lagoon, and Central Indian River Lagoon BMAPs note that groundwater input from the Floridan aquifer does not represent a significant portion of the water budget for the IRL system but, depending on the season, input from the surficial aquifer could be important. The nutrient loading from the surficial aquifer was implicitly included in the modeling as part of the watershed flow and loadings (FDEP 2009). The St. Lucie River and Estuary BMAP indicates groundwater loading was included in the TMDL as part of the load measured at canal control structures and in water quality throughout the waterbodies. Stakeholders have expressed concerns that the groundwater loads were not differentiated from stormwater runoff loads in the modeling process. FDEP has indicated that in future iterations of the Indian River Lagoon BMAPs they will evaluate available groundwater data and utilize this information in the modeling where possible.

4. **No incentive for innovative stormwater management.** This was identified as a major impediment by Brevard County, Indian River County, and City of Fellsmere. It was identified as minor impediment by St. Lucie County, and cities of Edgewater, Satellite Beach, and Vero Beach. Current technologies to remove nutrient inflow to the lagoon and estuary have limited effectiveness in achieving the TMDL targets. More effective tools for removing nutrients may exist, but conservative BMAP credit calculations do not provide incentives to develop new measures to achieve nutrient reductions. Examples of

several innovative stormwater management systems recently developed or envisioned by Indian River County include the mechanical pollution control system and algal turf scrubber systems. More innovative ways to address the legacy load from muck could be important in achieving the TMDL targets.

5. **Incomplete water quality data.** This was identified as a major impediment by the City of Edgewater and a minor impediment by all other local governments responding to the survey except Brevard County, which did not identify it as an impediment. There is a limited number of water quality monitoring stations throughout all the BMAP basins, leading to gaps in the water quality data. Water quality data could be improved through the use of a greater number of water quality monitoring stations that supply measurements on a continuous schedule throughout the year. This would be an important component of a regional water quality monitoring program designed to provide more complete water quality data.

6. **Inadequate water quality monitoring.** This was identified as a major impediment by the City of Satellite Beach and a minor impediment by all of the local governments responding to the survey except the City of Fellsmere, which did not identify it as an impediment. In the North Indian River Lagoon, Banana River Lagoon, and Central Indian River Lagoon basins, water quality monitoring is designed to track seagrass distribution and identify long-term water quality trends in response to BMAP project implementation. The BMAPs indicate that sampling stations, parameters, frequency, and other elements of this strategy may be modified as appropriate to match changing environmental conditions, funding resources, and understanding of the lagoon. In the St. Lucie River and Estuary basin, Martin County noted the South Florida Water Management District (SFWMD) has a fairly extensive monitoring program for water quality, seagrasses, and oysters. This is an ambient monitoring program and does not look at point source outfalls, unless they are from large canals such as those operated by the SFWMD. The TMDL for the St. Lucie River and Estuary is based upon this ambient monitoring program. Maintaining long term monitoring at existing station network sites is extremely important for measuring trends and progress.

7. **Unequal treatment of public and private entities, agriculture, and water control districts.** This was identified as a major impediment by Indian River County and City of Port St. Lucie. It was identified as a minor impediment by Brevard County, Martin County, and cities of Fellsmere, Fort Pierce, and Satellite Beach. The main concern is that public entities have a greater financial burden and do not share the same responsibilities under the Florida Watershed Restoration Act. For example, the Act requires nonpoint pollutant sources such as agriculture included in a BMAP to demonstrate compliance with pollutant reductions needed to meet a TMDL, either by implementing approved Best Management Practices (BMPs) appropriate for their operations, or by conducting water quality monitoring prescribed by FDEP or the applicable water management district. If the entity provides a notice of intent to implement the BMPs, no water quality monitoring is required whereas public entities transporting stormwater through Municipal Separate Storm Sewer Systems (MS4s) are required to follow permitting through the National Pollutant Discharge Elimination

System (NPDES) program, which requires additional expenses for water quality monitoring and requires operation and maintenance schedules to receive nutrient reduction credits in the BMAP. There is also concern that the approved BMPs, especially for agriculture, may not be as effective as once thought in reducing nutrient loading.

8. **Onerous conditions attached to BMAP projects.** This was identified as a major impediment by Indian River County and a minor impediment by Brevard County, Martin County, St. Lucie County, and cities of Edgewater, Fellsmere, and Port St. Lucie. Indian River County representatives noted that expensive monitoring is often required on water quality improvement projects. In some situations, the monitoring program is not consistent with the objectives of the permitted project. Also, representatives from Martin County noted that continuous water quality monitoring and bathymetric survey requirements for muck removal projects prevent these types of projects from receiving credits for nutrient reductions. Greater flexibility in the permitting process when justified could reduce project costs and encourage more types of BMAP projects to be implemented.

9. **Inadequate technology to meet TMDL goals.** This was identified as a major impediment by Brevard County and City of Satellite Beach. It was identified as a minor impediment by Martin County and City of Edgewater. Nutrient loading from groundwater, legacy loading from muck, and trends in atmospheric deposition are not being addressed in the BMAP process. It is possible that existing efforts to reduce and eliminate nutrient flows from point sources and storm water management systems are not adequate to achieve the TMDL goals. Additional research is needed to advance the technology to address nutrient loading from sources beyond what is currently accounted for in the TMDL models (FDEP 2008, 2009).

10. **BMAPs are based on flawed TMDLs.** This was identified as a major impediment by Brevard County and City of Satellite Beach. It was identified as a minor impediment by Martin County and City of Vero Beach. The underlying assumptions of the TMDL models adopted by FDEP (2008, 2009) may not be accurate. The Pollutant Loading Screening Model used to develop the Indian River Lagoon TMDL does not differentiate stormwater nutrient loads from groundwater loads. Furthermore, there may be other inaccuracies related to how the model treats land use, soils, and atmospheric deposition. In addition, the growth of seagrasses, on which the TMDL is based, may respond to factors outside stakeholder control such as nutrient flux from muck, nutrient release from dying drift algae, and the redistribution of muck during storm events. These flawed assumptions may impact the ability of the entities responsible for implementing the BMAP load reductions to achieve the desired seagrass restoration targets.

11. **Trends in nutrient loading from the atmosphere are not being considered.** This was identified as a minor impediment by Brevard County, Martin County, St. Lucie County, and cities of Edgewater, Port St. Lucie, and Satellite Beach. Atmospheric deposition is treated as a constant in the North Indian River Lagoon, Banana River Lagoon, and Central Indian River Lagoon BMAPs, but not in the St. Lucie River and Estuary BMAP. The northern three BMAPs do not require load reductions from atmospheric deposition,

because it is considered a background, uncontrollable source. The focus of the TMDL allocations is on the point source facilities and urban and agricultural stormwater sources in these basins. The St. Lucie River and Estuary BMAP indicates that atmospheric deposition of total nitrogen and total phosphorus is an additional source of nutrients in the 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. Atmospheric deposition of nutrients may be affected by emissions from power plants and other anthropogenic activities. Future changes in atmospheric deposition of nutrients may impact the ability for stakeholders to achieve the TMDL standards identified in the BMAPs.

12. **Legacy Loading in Lake Okeechobee.** This was identified as a major impediment by Martin County and City of Vero Beach. The C-44 canal serves as a flood control conveyance for Lake Okeechobee and transports water from the lake into the South Fork of the St. Lucie River. Approximately 42 percent of the freshwater inflows from canals that discharge into the St. Lucie Estuary are from Lake Okeechobee (St. Lucie River and Estuary Basin Technical Stakeholders 2013). 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 to reduce nutrients and FDEP has recently completed a separate BMAP for Lake Okeechobee. 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. It is likely that TMDL standards in the St. Lucie River and Estuary BMAP will not be achieved if the standards for Lake Okeechobee BMAP are not met.

13. **Lack of operations and maintenance monitoring.** This was identified as a major impediment by Martin County. The state is responsible for permitting and regulating a variety of activities related to the storage, conveyance and discharge of stormwater into the lagoon and estuaries. Funding for monitoring and enforcement of operation and maintenance activities for agricultural BMPs and state (FDEP and Water Management District) permitted development is lacking. This may result in reduced effectiveness of BMPs over time and prevent stakeholders from achieving TMDL target goals.

14. **Load allocation process is not consistent between BMAPs.** This was identified as a minor impediment by Brevard and Martin counties. During the North Indian River Lagoon BMAP process, stakeholders requested that FDEP remove undeveloped land use types from the allocation process, because nutrient reductions are not required on these lands. When the undeveloped lands were removed from the allocations, stakeholders with mainly undeveloped lands received reduction requirements that seemed disproportionally high given their small amount of development. To compensate for this, FDEP modified the allocation process to assign reductions using a target-load-per-acre approach that included all land uses except water in the allocations. FDEP is planning to consider allocating any required reductions needed to achieve the seagrass depth limit targets using an allocation approach that does not include the undeveloped land uses in the next BMAP iteration (North Indian River Lagoon Stakeholders 2013).

15. **Incomplete knowledge of existing infrastructure.** This was identified as a minor impediment by Brevard County and City of Fellsmere. Brevard County is unique in that it has a large number of small outfalls and many of them have not been mapped. The county is actively working to identify stormwater conveyance infrastructure that was installed prior to the time modern permits were required. In some cases, this involves mapping the travel path and outfall locations within basins. The identification of this infrastructure is necessary to achieve a complete understanding of the watershed and reduce nutrient loading to the lagoon.

Other Concerns

After identifying and scoring the impediments described above, Martin County identified several additional concerns that may also be considered impediments to implementing the BMAP program. First, in some situations there may be inadequate availability of land at the most beneficial location to enable a nutrient reduction project. This is most likely to be a concern in urban areas that were originally developed without sufficient infrastructure for stormwater treatment. A second concern expressed by Martin County is uncertainty related to final compliance with the BMAP program. It may be possible for an entity to complete all the projects necessary to attain its nutrient reduction requirements, but water quality monitoring data still shows impaired water bodies. In this situation, will the entity continue to be required to spend additional money on new water quality projects? It would be desirable for the allocation entities to have clarification on when their responsibility ends under the BMAP program. Also, the City of Satellite Beach has expressed a concern that the U.S. Environmental Protection Agency (EPA) definition of “nonpoint source” excludes pipes and ditches, which limits the eligibility of local governments to qualify for certain types of funding to implement the BMAP program. The city also noted that in addition to nutrients, there are other pollutants, such as herbicides, insecticides, and horticultural chemicals that may be damaging the lagoon, but these are not being addressed in the BMAP program. Other pollutants causing harm to sea turtles and marine mammals include asbestos from brake linings, oils and greases, and pharmaceuticals. Petroleum product runoff from roads and parking areas are not being addressed by the TMDLs.

Discussion

Brevard County

Brevard County is unique in that it is a key stakeholder in three BMAPs: the North Indian River Lagoon BMAP, Banana River Lagoon BMAP, and Central Indian River Lagoon BMAP. The Indian River Lagoon system refers to the aggregate of waterbodies comprising the Indian River proper, Banana River, and Mosquito Lagoon (Indian River Lagoon National Estuary Program 1996, 2008). Brevard County has no open inlets connecting the lagoon system to the Atlantic Ocean. The only connection to the Atlantic Ocean is by way of Port Canaveral. However, the Canaveral Lock prevents the free flow of water between the Banana River Lagoon and the Atlantic Ocean. West of Port Canaveral, the Canaveral Barge Canal traverses Merritt Island and provides a connection between the Banana River Lagoon to the east and the Indian River Lagoon to the west. Another important connection between major waterbodies is the Haulover Canal, which is a waterway north of Merritt Island. The Haulover Canal provides a connection between the Indian River Lagoon to the west and the Mosquito Lagoon to the east. Brevard County also has many small creeks, tributaries, and canals that connect to the lagoon system.

North Indian River Lagoon BMAP. Within the North Indian River Lagoon BMAP, the only local governments in Brevard County that were assigned load allocations and total required reductions in the first iteration of the BMAP were: Brevard County (30,595 acres), City of Cocoa (2,098 acres), City of Melbourne (9,662 acres), City of Rockledge (3,823 acres), City of Titusville (6,330 acres), and Town of Indialantic (168 acres) (Table 3).

Table 3. North Indian River Lagoon BMAP Nutrient Allocations and Total Required Reductions (Pounds/Year)

Entity	Total Nitrogen Allocation	Total Phosphorus Allocation	Total Nitrogen Required Reduction	Total Phosphorus Required Reduction
Brevard County	116,024.7	16,395.7	49,858.1	8515.0
City of Cocoa	9,235.4	1,355.3	16,063.4	3,714.8
City of Melbourne	42,531.2	6,241.5	44,923.3	13,122.7
City of Rockledge	16,831.0	2,470.0	13,969.6	3,957.1
City of Titusville	14,797.1	1,729.4	44,342.0	9,650.7
Town of Indialantic	741.1	108.8	949.4	200.7

These reductions are required to be accomplished over a 15 year period. The North Indian River Lagoon BMAP calls for projects and activities necessary to achieve 15 percent of the required reductions listed in the Table 3 by the end of the first 5-year iteration. After the first phase of BMAP implementation, FDEP and the stakeholders will evaluate progress and make adjustments to meet the seagrass restoration targets of the TMDLs.

The North Indian River Lagoon BMAP lists 56 projects by Brevard County to be considered for credit in current and future iterations of the BMAP. The total reductions by the Brevard County

projects resulted in receiving a credit of 33,250.0 pounds/year of total nitrogen and 10,333.1 pounds/year of total phosphorus for future BMAP iterations. The BMAP lists 10 projects by the City of Cocoa to be considered for credits in achieving nutrient reduction goals, or will be considered for credits in future iterations of the BMAP. The total reductions by the City of Cocoa projects resulted in achieving the 15 percent reduction goal and receiving a credit of 1,957.5 pounds/year of total nitrogen and 909.9 pounds/year of total phosphorus for future BMAP iterations. The BMAP lists 11 projects by the City of Melbourne to be considered for credits in achieving nutrient reduction goals, or will be considered for credits in future iterations of the BMAP. The total reductions by the City of Melbourne projects resulted in achieving the 15 percent reduction goal and receiving a credit of 1,304.5 pounds/year of total nitrogen and 946.9 pounds/year of total phosphorus for future BMAP iterations. The BMAP lists 23 projects by the City of Rockledge to be considered for credits in achieving nutrient reduction goals, or will be considered for credits in future iterations of the BMAP. The total reductions by the City of Rockledge projects resulted in achieving the 15 percent reduction goal and receiving a credit of 3,423.6 pounds/year of total nitrogen and 1,612.5 pounds/year of total phosphorus for future BMAP iterations. The BMAP lists 10 projects by the City of Titusville to be considered for credits in achieving nutrient reduction goals, or will be considered for credits in future iterations of the BMAP. The total reductions by the City of Titusville projects resulted in achieving the 15 percent reduction goal and receiving a credit of 1,409.7 pounds/year of total nitrogen and 1,242.9 pounds/year of total phosphorus for future BMAP iterations. The BMAP lists 3 projects by the Town of Indialantic to be considered for credits in achieving nutrient reduction goals, or will be considered for credits in future iterations of the BMAP. The total reductions by the Town of Indialantic projects resulted in achieving the 15 percent reduction goal and receiving a credit of 198.6 pounds/year of total nitrogen and 29.3 pounds/year of total phosphorus for future BMAP iterations.

Banana River Lagoon BMAP. Within the Banana River Lagoon BMAP, the only local governments in Brevard County that were assigned load allocations and total required reductions in the first iteration of the BMAP were those located in the southern sub-basin of the lagoon known as Banana River Lagoon B. The local governments included: Brevard County (5,393 acres), City of Cape Canaveral (610 acres), City of Cocoa Beach (1,709 acres), City of Indian Harbour Beach (1,101 acres), and City of Satellite Beach (1,525 acres) (Table 4).

Table 4. Banana River Lagoon BMAP Nutrient Allocations and Total Required Reductions (Pounds/Year)

Entity	Total Nitrogen Allocation	Total Phosphorus Allocation	Total Nitrogen Required Reduction	Total Phosphorus Required Reduction
Brevard County	21,949	4,584.0	42,287	9,919.0
City of Cape Canaveral	2,484	519.0	5,909	1,468.4
City of Cocoa Beach	6,954	1,452.0	11,346	2,359.5
City of Indian Harbour Beach	4,482	936.0	6,784	1,165.2
City of Satellite Beach	6,206	1,296.0	10,486	1,987.9

These reductions are required to be accomplished over a 15 year period. The Banana River Lagoon BMAP calls for projects and activities necessary to achieve 15 percent of the required reductions listed in the Table 4 by the end of the first 5-year iteration. After the first phase of BMAP implementation, FDEP and the stakeholders will evaluate progress and make adjustments to meet the seagrass restoration targets of the TMDLs.

The Banana River Lagoon BMAP lists 28 projects by Brevard County to be considered for credit in current and future iterations of the BMAP. The total reductions by the Brevard County projects resulted in receiving a credit of 142 pounds/year of total nitrogen and 183.1 pounds/year of total phosphorus for future BMAP iterations. The BMAP lists 15 projects by the City of Cape Canaveral to be considered for credit in future iterations of the BMAP. The total reductions by the City of Cape Canaveral projects resulted in receiving a credit of 934.6 pounds/year of total nitrogen and 393.0 pounds/year of total phosphorus for future BMAP iterations. The BMAP lists 39 projects by the City of Cocoa Beach to be considered for credit in future iterations of the BMAP. The total reductions by the City of Cocoa Beach projects resulted in receiving a credit of 1,067.1 pounds/year of total nitrogen and 428.1 pounds/year of total phosphorus for future BMAP iterations. The BMAP lists 12 projects by the City of Indian Harbour Beach to be considered for credit in future iterations of the BMAP. The total reductions by the City of Indian Harbour Beach projects resulted in receiving a credit of 7.9 pounds/year of total nitrogen and 114.5 pounds/year of total phosphorus for future BMAP iterations. The BMAP lists 40 projects by the City of Satellite Beach to be considered for credit in future iterations of the BMAP. The total reductions by the City of Satellite Beach projects resulted in receiving a credit of 848.1 pounds/year of total nitrogen and 278.4 pounds/year of total phosphorus for future BMAP iterations.

Central Indian River Lagoon BMAP. Along with Brevard County, eight of the municipalities in the county (cities of Melbourne, Palm Bay, West Melbourne, and towns of Grant-Valkaria, Indialantic, Malabar, Melbourne Beach, and Melbourne Village) are stakeholders in the Central Indian River Lagoon BMAP. Stakeholders were not assigned load allocations and were not required to make nutrient reductions in the first iteration of the Central Indian River Lagoon BMAP, because the seagrass targets were achieved. However, recent analysis of seagrasses by FDEP indicates that these project zones have failed the compliance measurement. Draft allocations were provided to entities in the Central Indian River Lagoon BMAP in May 2015. Nutrient reductions are expected to be required in the next iteration of the BMAP.

The Central Indian River Lagoon BMAP indicates that the stakeholders provided information on projects completed in the basin since 2000 and planned for the first 5-year BMAP iteration. Since additional reductions are not required in the first BMAP iteration, future projects submitted are not a requirement of the BMAP. The future projects will help to improve water quality in the lagoon, which should allow seagrass to grow to deeper depths to maintain compliance with the TMDL seagrass depth limit targets. Credit for submitted projects will be applied toward reductions in the next BMAP iteration. When reductions are required, the projects conducted during the first BMAP iteration will count toward the reduction of credit required in the second BMAP iteration of Central Indian River Lagoon BMAP. This BMAP lists 82 projects by local governments in Brevard County that will be considered for nutrient reduction credits in the next iteration of the BMAP.

Future Implementation Strategy. Brevard County staff indicated they have developed a modeling process for prioritizing hydrologic basins that are responsible for generating the greatest amount of pollutant loading to the Indian River Lagoon. Based on 16 years of watershed loading simulation, the county has identified an initial 31 basins that would have the greatest impact on meeting TMDL targets for unincorporated Brevard County in the future.

The survey results from Brevard County identified the following impediments to implementing the BMAP:

Major Impediments
- Inadequate funding
- Inadequate technology to meet TMDL goals
- No incentive for innovative stormwater management
- BMAPs are based on flawed TMDLs
- Nutrient loading from muck is not being addressed
- Nutrient loading from groundwater is not being addressed

Minor Impediments
- Inadequate water quality monitoring
- Incomplete knowledge of existing infrastructure
- Unequal treatment of public and private entities, agriculture, and water control districts
- Onerous conditions attached to BMAP projects
- Load allocation process is not consistent between BMAPs
- Nutrient loading from the atmosphere is not being considered

The survey results from the City of Satellite Beach identified the following impediments to implementing the BMAP:

Major Impediments
- Inadequate funding
- Inadequate water quality monitoring
- Inadequate technology to meet TMDL goals
- BMAPs are based on flawed TMDLs
- Nutrient loading from muck is not being addressed
- Nutrient loading from groundwater is not being addressed

Minor Impediments
- Incomplete water quality data
- No incentive for innovative stormwater management
- Unequal treatment of public and private entities, agriculture, and water control districts
- Nutrient loading from the atmosphere is not being considered

In addition, the City of Satellite Beach has expressed a concern that there may be other pollutants, such as herbicides and horticultural chemicals that may be damaging the lagoon, but these are not being addressed in the BMAP program. Also, the U.S. EPA definition of "nonpoint source" excludes pipes and ditches, which reduces the eligibility of local governments to qualify for certain types of funding to implement the BMAP program.

Indian River County

Indian River County is a key stakeholder in the Central Indian River Lagoon BMAP. The county is characterized by two main systems: the Indian River Lagoon, which traverses the county generally north-south along the Atlantic coastline; and the South Prong of the St. Sebastian River, which flows from south to north in northeastern Indian River County. The Sebastian Inlet provides a connection between the Indian River Lagoon and the Atlantic Ocean. Indian River County also has a number of smaller creeks, tributaries, and canals that connect to the lagoon and river. The largest of these canals are the South, Main, and North Relief Canals. These canals are managed by the Indian River Farms Water Control District (IRFWCD). These canals provide irrigation for agricultural operations and flood protection. Structures control the discharge of water from these canals to the Indian River Lagoon.

Along with Indian River County, all five of the municipalities in the county (cities of Fellsmere, Sebastian, and Vero Beach; and towns of Indian River Shores, and Orchid) are stakeholders in the Central Indian River Lagoon BMAP. However, stakeholders were not assigned load allocations and were not required to make nutrient reductions in the first iteration of the Central Indian River Lagoon BMAP, because the seagrass targets were achieved even though the TMDLs were not. Load allocations and nutrient reductions may be required in the next iteration of the BMAP.

The Central Indian River Lagoon BMAP indicates that the stakeholders provided information on projects completed in the basin since 2000 and planned for the first 5-year BMAP iteration. Since additional reductions are not required in this BMAP iteration, future projects submitted are not a requirement of the BMAP. The future projects will help to continue to improve water quality in the lagoon, which should allow seagrass to grow to deeper depths to maintain compliance with the TMDL seagrass depth limit targets. Credit for submitted projects will be applied toward reductions in the next BMAP iteration if needed. If reductions are required, the projects conducted during this first BMAP iteration would count for reduction credit for 10 years from the adoption of the Central Indian River Lagoon BMAP. This BMAP lists 34 projects by local governments in Indian River County that will be considered for nutrient reduction credits in the next iteration of the BMAP.

Indian River County staff indicated they are using the East Indian River County Master Stormwater Management Plan to assist in setting priorities for stormwater quality projects. This plan indicates that about half of the discharge from the IRFWCD flows through the Main Relief Canal. The North and South Relief Canals each contribute about a quarter of the total flow from IRFWCD. The county is concentrating its efforts on the IRFWCD's three large relief canals. The combined average daily flow from those three relief canals is approximately 100 million gallons per day.

The survey results from Indian River County identified the following impediments to implementing the BMAP:

Major Impediments

- Inadequate funding

- No incentive for innovative stormwater management
- Unequal treatment of public and private entities, agriculture, and water control districts
- Onerous conditions attached to BMAP projects

Minor Impediments
- Incomplete water quality data
- Inadequate water quality monitoring

The survey results from the City of Fellsmere identified the following impediments to implementing the BMAP:

Major Impediments
- Inadequate funding
- No incentive for innovative stormwater management

Minor Impediments
- Incomplete water quality data
- Incomplete knowledge of existing infrastructure
- Unequal treatment of public and private entities, agriculture, and water control districts
- Onerous conditions attached to BMAP projects

The survey results from the City of Vero Beach identified the following impediments to implementing the BMAP:

Major Impediments
- Inadequate funding
- Legacy Loading in Lake Okeechobee
- Nutrient loading from muck is not being addressed

Minor Impediments
- Incomplete water quality data
- Inadequate water quality monitoring
- No incentive for innovative stormwater management
- BMAPs are based on flawed TMDLs

Martin County

Martin County is a key stakeholder in the St. Lucie River and Estuary BMAP. The basin is characterized by two main systems: the Indian River Lagoon, which traverses the county generally north-south along the Atlantic coastline; and the St. Lucie River and Estuary, which flows from western inland areas of Martin and St. Lucie counties and joins the Indian River Lagoon in northeastern Martin County. The St. Lucie River and Estuary connects to the Atlantic Ocean through the St. Lucie Inlet near the City of Stuart. The St. Lucie Canal (C-44) is a major east-west waterway connecting to Lake Okeechobee in western Martin County. The St. Lucie Lock is located along the St. Lucie Canal, approximately 15.5 miles upstream of the junction of the St. Lucie River and the Indian River Lagoon. The St. Lucie Lock was built for navigation and flood control purposes. The lock also has a connecting spillway structure that was built for flood and regulatory flow control through the St. Lucie Canal, which is used by the U.S. Army Corps of Engineers to manage the water level in Lake Okeechobee. The structure also functions as a salinity barrier. Martin County also has a number of smaller creeks, tributaries, and canals that connect to the lagoon and river. The largest of these canals is the C-23 Canal, which flows from west to east along the boundary of Martin and St. Lucie counties and discharges into the North Fork of the St. Lucie River at Bessy Creek. The SFWMD manages operable gates for flood control on the C-23 Canal, but the weirs also function to prevent saltwater intrusion and protect wells located inland. The C-23 canal is used for agriculture, so the SFWMD maintains suitable water levels in this canal for irrigation.

Martin County and the City of Stuart are the only local governments in Martin County that were assigned load allocations and total required reductions in the first iteration of the St. Lucie River and Estuary BMAP (Table 5). Martin County accounts for 21,099 acres and the City of Stuart accounts for 2,739 acres of the total 514,646-acres in the St. Lucie River and Estuary basin.

Table 5. Nutrient Allocations and Total Required Reductions (Pounds/Year)

Entity	Total Nitrogen Allocation	Total Phosphorus Allocation	Total Nitrogen Required Reduction	Total Phosphorus Required Reduction
Martin County	68,655	7,779	32,158	14,590
Stuart	9,238	1,044	4,760	2,062

The St. Lucie River and Estuary BMAP calls for projects and activities necessary to achieve 30 percent of the TMDL required reductions by the end of the first 5-year iteration. After the first phase of BMAP implementation, FDEP and the stakeholders will evaluate progress and make adjustments to meet the remainder of the reductions to achieve the TMDLs. The St. Lucie River and Estuary BMAP lists 28 projects by Martin County and 15 projects by the City of Stuart that were considered for credits in achieving nutrient reduction goals, or will be considered for credits in future iterations of the BMAP. The total reductions by the Martin County projects resulted in achieving the 30 percent reduction goal and receiving a credit of 4,981.8 pounds/year of total nitrogen and 760.0 pounds/year of total phosphorus for future BMAP iterations. The total reductions by the City of Stuart projects resulted in achieving the 30 percent reduction goal and

receiving a credit of 2,488.3 pounds/year of total nitrogen and 1,034.1 pounds/year of total phosphorus for future BMAP iterations.

Martin County has developed a *Stormwater/Water Quality Needs Assessment* to assist in implementing the BMAP. County staff has indicated they use water quality monitoring data provided by SFWMD to identify "hot spots" to assist in prioritizing stormwater quality projects. First priority projects are primarily stormwater quality projects that could help Martin County meet the TMDL goal, are located within the BMAP boundary, and are eligible for project credit under the BMAP. These are projects that can be retrofitted for optimization of nutrient reductions and have the best dollar value for nutrient reduction. The survey results from Martin County identified the following impediments to implementing the BMAP:

<u>Major Impediments</u>

- Inadequate funding
- Lack of operations and maintenance monitoring
- Legacy Loading in Lake Okeechobee
- Nutrient loading from muck is not being addressed
- Nutrient loading from groundwater is not being addressed

<u>Minor Impediments</u>

- Incomplete water quality data
- Inadequate water quality monitoring
- Inadequate technology to meet TMDL goals
- Unequal treatment of public and private entities, agriculture, and water control districts
- Onerous conditions attached to BMAP projects
- Load allocation process is not consistent between BMAPs
- BMAPs are based on flawed TMDLs
- Nutrient loading from the atmosphere is not being considered

In addition, Martin County representatives identified several additional concerns that may also be considered impediments to implementing the BMAP program. First, in some situations there may be inadequate availability of land at the most beneficial location to enable a nutrient reduction project. Second, there is uncertainty related to final compliance with the BMAP program.

St. Lucie County

St. Lucie County is a key stakeholder in the St. Lucie River and Estuary BMAP and the Central Indian River Lagoon BMAP. The county is characterized by two main systems: the Indian River Lagoon, which traverses the county generally north-south along the Atlantic coastline; and the North Fork of the St. Lucie River, which flows from north to south in the southeastern portion of the county. The Fort Pierce Inlet provides a connection between the Indian River Lagoon and the Atlantic Ocean. St. Lucie County also has a number of smaller creeks, tributaries, and canals that connect to the lagoon and river. The largest of these canals are the C-23, C-24, and C-25 canals. The C-23 Canal flows from west to east along the boundary of Martin and St. Lucie counties and discharges into the North Fork of the St. Lucie River at Bessy Creek. The SFWMD manages operable gates on the C-23 Canal for flood control. However, the weirs also function to prevent saltwater intrusion and protect wells located inland. The SFWMD maintains suitable water levels in this canal to provide for agricultural irrigation. The C-24 Canal flows from central western portion area of the county and joins the North Fork of the St. Lucie River about one mile upstream from the estuary. This canal is also managed by the SFWMD for a variety of uses. The C-25 canal, also known as the Belcher Canal, is a major east-west canal that discharges stormwater directly into the Indian River Lagoon. The C-25 Canal and the Fort Pierce Farms Water Control District Canal No. 1 both discharge through the mouth of Taylor Creek, which connects to the lagoon just north of the Port of Fort Pierce. The C-25 canal connects to the lagoon just north of the Port of Fort Pierce. The C-25 canal is also managed by the SFWMD for a variety of uses. The C-23 and C-24 canal sub-basins are included in the St. Lucie River and Estuary BMAP. The C-25 Canal sub-basin is included in the Central Indian River Lagoon BMAP.

St. Lucie County and the cities of Fort Pierce and Port St. Lucie are the only local governments in St. Lucie County that were assigned load allocations and total required reductions in the first iteration of the St. Lucie River and Estuary BMAP (Table 6). None of these local governments were assigned load allocations or were required to make reductions in the first iteration of the Central Indian River Lagoon BMAP. St. Lucie County accounts for 8,076 acres, the City of Fort Pierce accounts for 3,706 acres, and the City of Port St. Lucie accounts for 35,702 acres of the total 514,646-acres in the St. Lucie River and Estuary basin.

Table 6. Nutrient Allocations and Total Required Reductions (Pounds/Year)

Entity	Total Nitrogen Allocation	Total Phosphorus Allocation	Total Nitrogen Required Reduction	Total Phosphorus Required Reduction
St. Lucie County	25,780	2,850	16,484	7,349
Fort Pierce	10,562	1,186	6,479	2,693
Port St. Lucie	103,380	11,585	53,101	23,431

These reductions are required to be accomplished over a 15 year period. The St. Lucie River and Estuary BMAP calls for projects and activities necessary to achieve 30 percent of the TMDL required reductions listed in the Table 6 by the end of the first 5-year iteration. After the first

phase of BMAP implementation, FDEP and the stakeholders will evaluate progress and make adjustments to meet the remainder of the reductions to achieve the TMDL targets.

The St. Lucie River and Estuary BMAP lists 13 projects by St. Lucie County, 6 projects by the City of Fort Pierce, and 26 projects by the City of Port St. Lucie that were considered for credits in achieving nutrient reduction goals, or will be considered for credits in future iterations of the BMAP. The total reductions by the St. Lucie County projects resulted in achieving the 30 percent reduction goal and receiving a credit of 4,507.2 pounds/year of total nitrogen and 1,311.7 pounds/year of total phosphorus for future BMAP iterations. The total reductions by the City of Fort Pierce projects resulted in achieving the 30 percent reduction goal and receiving a credit of 8,780.9 pounds/year of total nitrogen and 5,724.9 pounds/year of total phosphorus for future BMAP iterations. The total reductions by the City of Port St. Lucie projects resulted in achieving the 30 percent reduction goal and receiving a credit of 9,053.6 pounds/year of total nitrogen and 1,874.6 pounds/year of total phosphorus for future BMAP iterations.

St. Lucie County staff indicated they use St. Lucie tributary water quality monitoring data provided by SFWMD to identify target areas for stormwater quality projects. The survey results from St. Lucie County identified the following impediments to implementing the BMAP:

<u>Major Impediments</u>
- Inadequate funding

<u>Minor Impediments</u>
- Incomplete water quality data
- Inadequate water quality monitoring
- No incentive for innovative stormwater management
- Onerous conditions attached to BMAP projects
- Nutrient loading from muck is not being addressed
- Nutrient loading from groundwater is not being addressed
- Nutrient loading from the atmosphere is not being considered

The survey results from the City of Fort Pierce identified the following impediments to implementing the BMAP:

<u>Major Impediments</u>
- Inadequate funding

<u>Minor Impediments</u>
- Incomplete water quality data
- Inadequate water quality monitoring
- Unequal treatment of public and private entities, agriculture, and water control districts
- Nutrient loading from muck is not being addressed
- Nutrient loading from groundwater is not being addressed

The survey results from the City of Port St. Lucie identified the following impediments to implementing the BMAP:

Major Impediments

- Inadequate funding
- Unequal treatment of public and private entities, agriculture, and water control districts

Minor Impediments

- Incomplete water quality data
- Inadequate water quality monitoring
- Onerous conditions attached to BMAP projects
- Nutrient loading from muck is not being addressed
- Nutrient loading from groundwater is not being addressed
- Nutrient loading from the atmosphere is not being considered

Volusia County

Volusia County is a stakeholder in the North Indian River Lagoon BMAP. The county is located at the north end of the Indian River Lagoon. A relatively small portion of the county is located within the BMAP. The primary drainage features in this area are Turnbull Creek and Coot Creek, which flow south from Volusia County into the Indian River Lagoon. Both of these creeks flow through a portion of the Merritt Island National Wildlife Refuge. The Turnbull Hammock Conservation Area and the cities of Edgewater and Oak Hill are located in Volusia County north of the refuge and within the basin of the North Indian River Lagoon BMAP.

Volusia County was assigned load allocations, but does not have a required nutrient reduction in the first iteration of the North Indian River Lagoon BMAP (Table 7). The City of Edgewater was assigned load allocations and has a required reduction for total nitrogen, but not total phosphorus. Volusia County accounts for 23,351 acres, and the City of Edgewater accounts for 1,182 acres of the total 141,308 acres in the North Indian River Lagoon basin.

Table 7. Nutrient Allocations and Total Required Reductions (Pounds/Year)

Entity	Total Nitrogen Allocation	Total Phosphorus Allocation	Total Nitrogen Required Reduction	Total Phosphorus Required Reduction
Volusia County	49,644.6	5,487.5	0	0
Edgewater	2,512.9	277.8	162.2	0

The North Indian River Lagoon BMAP lists one project by Volusia County to be considered for credit in future iterations of the BMAP. The total reductions by the Volusia County project resulted in receiving a credit of 515.0 pounds/year of total nitrogen and 58.9 pounds/year of total phosphorus for future BMAP iterations. The BMAP lists one project by the City of Edgewater to be considered for credits in achieving nutrient reduction goals, or will be considered for credits in future iterations of the BMAP. The total reductions by the City of Edgewater project resulted in achieving the 15 percent reduction goal and receiving a credit of 49.7 pounds/year of total nitrogen and 9.8 pounds/year of total phosphorus for future BMAP iterations.

Volusia County did not to respond to the survey on impediments to BMAP implementation. The survey results from the City of Edgewater identified the following impediments to implementing the BMAP:

Major Impediments
- Inadequate funding
- Incomplete water quality data

Minor Impediments
- Inadequate water quality monitoring
- Inadequate technology to meet TMDL goals
- No incentive for innovative stormwater management

- Onerous conditions attached to BMAP projects
- Nutrient loading from muck is not being addressed
- Nutrient loading from groundwater is not being addressed
- Nutrient loading from the atmosphere is not being considered

Recommendations

BMAP Project Implementation Funding

Lack of adequate funding has been identified as probably the most significant impediment to meeting BMAP and TMDL goals. According to FDEP 2014, nearly $269 million has been spent across the four BMAP basins on constructing and implementing Phase 1 BMAP strategies and TDML reduction projects. Much of these funds were expanded in the five counties over the last 15 years by the public and private sector.

With two, five-year phases remaining, it is unlikely that BMAP participants will be able to achieve TMDL goals. This is likely the case with the 16 other adopted BMAPs around the state. In fact, meeting adopted TMDL targets in the five-county BMAP area is estimated to cost $4.6 billion. This cost will further increase as projects are implemented to meet the new 2015 TMDL targets for the Central Indian River Lagoon.

Currently, local funds are the main funding source for carrying out TMDL reduction strategies and construction projects. Primary funding sources to augment and defray local implementation costs are the Clean Water State Revolving Loan Fund, the TMDL Water Quality Restoration Grant program, the EPA Section 319(h) Grant program, and special legislative appropriations. Unfortunately, only $9 million is available annually from the state's grant and loan programs.

Last year, Florida voters approved a constitutional amendment to ensure annual investment in a Land Acquisition Trust Fund. The trust fund is to be used to acquire, restore, improve, and manage conservation lands including wetlands and forests; fish and wildlife habitat; lands protecting water resources and drinking water sources, including the Everglades and the water quality of rivers, lakes and streams; beaches and shores; outdoor recreational lands; working farms and ranches; and historic resources. Based on the voter approved ballot language, BMAP/TMDL projects should be eligible for financial assistance from the trust fund. The trust fund goes into effect July 1, 2015.

1. FDEP and all affected local governments should support an annual allocation of state funds to be dedicated to the implementation of BMAP strategies for achieving TMDLs for the Indian River Lagoon and St. Lucie River and Estuary.

2. FDEP should establish a matching grant program specifically designed to equitably define and distribute allocated trust fund monies for implementing BMAP strategies achieving TMDLs.

Comprehensive Water Quality Monitoring Program

Calculation and allocation of TMDLs from the various land uses in a BMAP basin and establishment of future TMDL goals for BMAPs are primarily calculated using mathematical water quality modeling. Throughout the five-county region there have been disputes about how many TMDL reduction credits should be assigned to BMAP projects and BMPs due to lack of actual water quality monitoring data. When long term, continuous water quality monitoring is

feasible, it is the most reliable way to determine: 1) ambient load to basin water bodies and water body segments; and 2) how much credit should be assigned to various pollutant load reduction projects and BMPs in a BMAP basin. Water quality monitoring can be costly. BMAPs are established by FDEP Secretarial Order and therefore are enforceable.

1. FDEP should establish and fund a comprehensive water quality monitoring program as part of its overall statewide BMAP program. The purpose of such a comprehensive program would be to: 1) establish actual daily loading and water quality status at numerous points of outfall within each BMAP region; 2) establish consistency and certainty in assigning credits for pollutant load reduction projects and BMPs; 3) improve accuracy in determining the actual water quality improvement values/credits assigned to various BMPs and TMDL reduction projects; 4) remove the onerous conditions related to water quality monitoring often attached to BMAP projects undertaken by MS4 entities; 5) create some incentive for innovative stormwater management techniques; and 6) better determine and assess progress or meeting of TMDL and BMAP goals.

Time Frames for Achieving TMDL Reductions

The four BMAPs for the region contain several water quality management strategies designed to achieve TMDL reductions for the estuaries. BMAP implementation for the region is scheduled in three, five-year phases. The region is in the first five-year phase of BMAP implementation. Nearly all of the projects receiving credit in the first five year phase were completed prior to adoption of the BMAPs.

Over the last 15 years, hundreds of millions of dollars have been invested by the public and private sector in the five-county BMAP area to build water quality improvement projects and implement best management practices. With two, five-year phases remaining it is unlikely that BMAP participants will be able to achieve TMDL goals. Even if there were adequate funds available, the necessary water quality improvement projects could not be planned, permitted, and developed in time. This is likely the case with the 16 other BMAPs adopted around the state.

In addition, imperiled water bodies with connections to large legacy sources of nutrients may never achieve TMDL goals. This is particularly true for the St. Lucie River and Estuary BMAP where the ability to meet TMDL goals is significantly impaired by regular discharges from Lake Okeechobee to the estuary.

1. By January 1, 2018, the FDEP or an independent authority should conduct a comprehensive audit of program goals and progress to determine: a) whether the time frames for accomplishing BMAP strategies and TMDL goals are realistically achievable; and b) what, if any, adjustments to BMAPs are necessary regarding implementation time frames and schedules.

2. Consider establishing an end point or a process for establishing BMAP completion dates for MS4 entities participating in the program that are presumed to have completed the equitable share of TMDL reduction projects required to meet TMDL goals.

Level and Stabilize the Playing Field for Granting BMAP Credits for Pollutant Load Reduction Projects and Best Management Practices

Agricultural and non-agricultural participating entities under the BMAP program are addressed differently. For agricultural producers there is a presumption of compliance with water quality standards if a producer signs a notice of intent (NOI) and implements BMPs appropriate for the commodity. Monitoring and compliance of NOI requirements to assure proper implementation and the continued operation and maintenance of agricultural BMPs remains a concern of some BMAP participants. In addition, recent data suggests that BMPs designed for agricultural producers as a whole may only achieve an overall 10 to 25 percent load reduction from contributing sources. Stakeholders are concerned that the burden of cleaning up the remaining load contributions from agricultural entities and meeting a basin's TMDL goals may be left to downstream participants.

For non-agricultural entities, obtaining BMAP credits and compliance with water quality standards is not as presumptive and often requires entities to propose specific pollutant load reduction projects in addition to implementing BMPs. Innovative projects frequently come with FDEP requirements for continuous water quality monitoring, bathymetric surveys, sea grass monitoring and operation and maintenance schedule commitments. Compounding this inequity, some actions that appear to be productive in reducing pollutant loads do not receive enough credit. For BMAP credit purposes, exfiltration and dry retention projects which were presumed to remove 100 percent of the nutrients from treated stormwater may no longer receive full credit. In addition, public education programs, muck removal projects, and lands purchased for wetland rehydration and additional water storage may not receive enough credit.

BMAPs are part of the TMDL program, which was implemented in 2000. Since then, large amounts of taxpayer and private sector dollars have been and will continue to be invested in improving water quality and productivity of the region's estuaries. Equity issues between agricultural and non-agricultural participating entities; and certainty, predictability, and stability in the program related to issuing BMAP credits should be resolved before beginning the second phase of the BMAP process.

1. Prior to starting the second phase of the BMAP process, FDEP and the Florida Department of Agriculture and Consumer Services should work with all participating entities to rectify any flaws or concerns raised by the region's BMAP participants related to: a) monitoring and enforcement of the NOI process; and b) finalizing presumptive criteria for granting BMAP credits for BMPs and pollutant load reduction projects.

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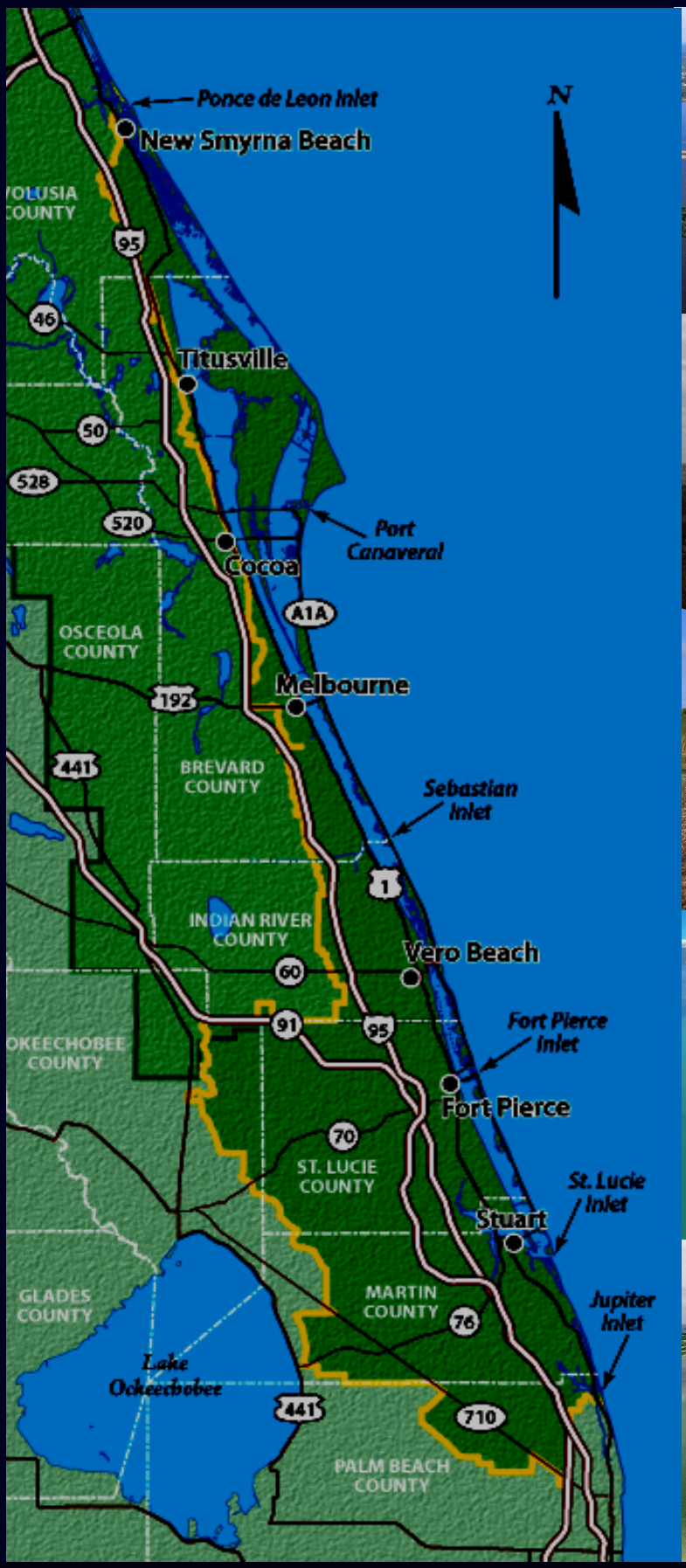

Graphics Courtesy of Sea Turtle Conservancy; Coastal Tech Corp, UFL IFAS, Brevard County, Volusia County, Martin County Coastal

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