

**North Indian River Lagoon (IRL)
Basin Management Action Plan (BMAP)
Policy Briefing**

Wednesday, February 1, 2012

9:00 AM – 11:15 AM

*Brevard Community College –Cocoa Campus
Vocational Auditorium, Building 14-104
1519 Clearlake Road, Cocoa, FL 32922*

AGENDA

- 9:00 AM WELCOME AND OPENING REMARKS (*Vivian Garfein*)
- Welcome and meeting purpose
 - Stakeholder introductions (*All*)
 - Value and importance of the Indian River Lagoon
- 9:15 AM INDIAN RIVER LAGOON TOTAL MAXIMUM DAILY LOADS (TMDLs) (*Tom Frick and Xueqing Gao*)
- Regulatory framework for TMDLs and Florida's approach for integration of TMDLs and numeric nutrient criteria
 - TMDL basics
 - Indian River Lagoon TMDLs
 - Questions and answers (*All*)
- 9:45 AM NORTH INDIAN RIVER LAGOON BMAP (*Tom Frick*)
- BMAP approach
 - Project zones
 - Types of sources and responsible stakeholders
 - Seagrass deep edge target
 - Questions and answers (*All*)
 - Comments (*All*)
- 10:00 AM PUBLIC COMMENTS
- 10:15 AM BMAP PROGRESS TO DATE (*Mary Paulic*)
- Evaluation of seagrass target compliance
 - Allocation approach
 - Identification of *de minimus* stakeholders
 - Stakeholder allocations by project zone
 - Types of projects eligible for BMAP credit
 - Costs and benefits of the BMAP for the stakeholders (*Tom Frick*)
 - Questions and answers (*All*)
 - Comments (*All*)
- 10:50 PM NEXT STEPS (*Mary Paulic*)
- Credits for submitted projects and additional project collection
 - Alternate allocation approaches
 - Monitoring plan development

- Production of BMAP document
- BMAP adoption process and role of the stakeholders

11:00 AM PUBLIC COMMENTS AND WRAP UP (*Vivian Garfein*)

11:15 AM ADJOURN

Please note the FTP site for documents pertaining to the technical meetings:

<http://publicfiles.dep.state.fl.us/DEAR/BMAP/IndianRiverLagoon/>. For more information, contact Mary Paulic, 850-245-8560 or Mary.Paulic@dep.state.fl.us.

**Indian River Lagoon (IRL)
Basin Management Action Plans (BMAPs) Fact Sheet**

Improving Water Quality and Seagrass Depths in the Lagoon

Overview of Total Maximum Daily Loads

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 meet applicable water quality standards within the subsequent two years. The Florida Department of Environmental Protection (FDEP) is responsible for developing this “303(d) list” of impaired waters. FDEP develops and adopts total maximum daily loads (TMDLs) for the waterbody segments it identifies as impaired.

A TMDL is the maximum amount of a pollutant that a waterbody can absorb and still meet state water quality standards. Water quality standards vary depending on the type of waterbody, which include fishable and swimmable, recreational purposes, water supply needs, agriculture, and shellfish harvesting. A TMDL consists of: (1) a restoration target based upon state water quality standards, and (2) a required reduction of the pollutants to meet the target. 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 Indian River Lagoon (IRL) Basin is impaired for the nutrients total nitrogen (TN) and total phosphorus (TP). FDEP adopted the nutrient TMDL for the main stem of the lagoon in March 2009. Once a TMDL is adopted, the stakeholders in the watershed are required to implement projects to address their portion of the responsibility for the impairment. The stakeholders must commit the necessary funding to achieve the TMDL; meeting water quality standards is not optional.

The water quality target for the IRL main stem TMDL focuses on the water quality conditions necessary for seagrass re-growth at depth limits that seagrass historically grew in the basin. The amount of seagrass coverage in the IRL Basin has greatly decreased over the years due to changes in water quality conditions. As polluted runoff reaches the lagoon, it prevents the seagrasses from growing in deeper water. To determine the amount of nutrient reductions needed to improve lagoon water quality, the TMDL used a restoration target of 10% less than the historical seagrass depth limit coverage, as allowed by Florida’s Water Quality Criteria, Rule 62-302, F.A.C. This restoration target should result in nutrient reductions that allow seagrass coverage to recover almost to the depths previously seen in the area.

The required TN and TP reductions calculated for each waterbody segment in the basin resulted in a percent reduction from current loadings. To keep track of impaired waterbody segments FDEP assigns a waterbody identification number or “WBID” to each one. A WBID is a portion of a waterbody that has different water quality characteristics than the surrounding waters. FDEP uses the WBID approach to focus on each section of a waterbody to assess the health of the waters, and if they are not meeting the necessary water quality standards, the potential causes of the impairment.

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Types of Responsible Entities

There are several types of stakeholders in the basin that are responsible sources and can receive detailed allocations. These entities include:

- Wastewater treatment facilities (WWTFs);
- Municipal separate storm sewer systems (MS4s);
- Urban areas outside of an MS4;
- Water control and improvement districts;
- Agriculture;
- Transportation;
- Other nonpoint sources; and
- Federal facilities.

The BMAP actions are enforceable for point source entities (WWTFs and MS4s) through their National Pollutant Discharge Elimination System (NPDES) permits. The actions for nonpoint sources are enforceable through the Secretarial-adopted BMAP. Agricultural producers are required to implement appropriate best management practices (BMPs) for their crops or livestock activities or implement FDEP designed water quality monitoring to show they are not having an impact on the water quality of the lagoon.

Relationship Between Nutrients and Seagrass

A necessity for seagrass growth is sunlight. However, high concentrations of nutrients currently enter the lagoon causing algae growth to increase because the nutrients act as fertilizer on the algae. The algae form mats or blooms on the surface of the water, which prevent sunlight from reaching the seagrass on the lagoon bottom. In addition, algae can grow on the blades of the seagrass, smothering it and affecting its normal functions. Polluted runoff contributes to darker and less transparent water, which further prevents sunlight from reaching the deeper seagrass beds. The goal of this TMDL is to reduce the amount of nutrients entering the lagoon, which, in turn, will reduce algal growth and allow more sunlight to reach the seagrass.

BMAP Approach

To implement the IRL TMDLs for the main stem, FDEP is developing a Basin Management Action Plan (BMAP). A BMAP outlines the characteristics of the basin, impairments, sources of the pollutants, and a list of projects that will reduce the pollutants to meet the TMDL. Major components of a BMAP include:

- TMDLs being implemented;
- Reductions assigned to responsible sources;
- Projects to meet the TMDL and the funding sources;
- Monitoring plan to determine water quality improvements and progress towards the TMDL;
- Responsible parties commitment to the implementation timeline for their efforts the BMAP; and
- Adoption by the FDEP Secretary.

FDEP is working with the stakeholders in the basin to develop the BMAP. The IRL BMAP will be

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phased, meaning only a portion of the total reductions will need to be met in the first 5 years of implementation; however, the BMAP will include a discussion of the remaining reductions and a timeline to achieve the TMDL. This phasing allows new information to be considered in future requirements, including adjustments to allocations.

Because the IRL Basin is large with many stakeholders, the basin is divided into 3 subbasins:

- North IRL;
- Central IRL; and
- Banana River Lagoon (BRL).

A separate BMAP is planned for each of these subbasins. As a first step in the development of these BMAPs, FDEP has been holding technical meetings in the subbasins. The purpose of the technical meetings is fact-finding and compilation and review of data to provide supporting information for the BMAP. Additionally, policy briefings will be held for each subbasin, as needed. The agendas at the policy briefings are designed for management-level representatives to provide feedback to FDEP on the BMAP contents as the BMAP is developed. Both the technical meetings and policy briefings are open to the public. All meetings are publicly noticed and meeting summaries are prepared and distributed.

Project Zones

Although the overall IRL Basin was divided into 3 subbasins to capture the lagoon's variability, there are still major hydrological differences within those subbasins due to differing water residence times, which is the amount of time it takes for water to flush out of the system. The longer the residence time, the longer the pollutants stay in the lagoon system and impact seagrasses. To provide a good representation of loads throughout the watershed and to address the varied hydrological responses to management actions, the Central IRL and North IRL are further subdivided into "project zones." The project zones will assist in achieving restoration targets because they will ensure that the distribution of restoration activities match the hydrology of the basin. Additionally, the project zones will provide flexibility for stakeholders to partner on projects within project zones to achieve the most cost effective load reductions.

In the Central IRL, there are 3 project zones:

- Central IRL A - from the Melbourne Causeway to Grant Farm Island (Figure 1);
- Central IRL SEB - from Grant Farm Island to Wabasso Causeway, CR 510 (Figure 2); and
- Central IRL B - from the Wabasso Causeway to the C-25 canal in St. Lucie County (Figure 3).

In the North IRL, there are 2 project zones:

- North IRL A – from Turnbull Creek to the NASA Causeway, SR 405 (Figure 4); and
- North IRL B - from the NASA Causeway to the Melbourne Causeway, US 192 (Figure 5).

The Banana River Lagoon (Figure 6) does not exhibit the variability in residence time as do the Central and North IRL. Therefore, the entire Banana River Lagoon is one project zone.

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Evaluation of Seagrass Depth Limits

The intent of the TMDLs is to recover the deeper water seagrass habitats with the biological response of the seagrass being the most important factor in evaluating the success of achieving the TMDL targets. To assess progress towards the seagrass depth limit targets for the IRL Basin, FDEP used a 2-step process to compare the TMDL seagrass data to more recent data on seagrass depths. This evaluation was conducted for each project zone to determine the extent of compliance with the seagrass depth limit targets. A seagrass depth limit target evaluation for the BMAP was conducted in March 2011 and compared the data used to establish the TMDLs with the latest available seagrass mapping from 2003, 2005, 2006, and 2007.

From this evaluation, FDEP found that BRL and both North IRL project zones were not yet compliant with the seagrass depth limit targets, whereas all 3 Central IRL project zones were found to be compliant. Based on these findings, the stakeholders in the BRL and North IRL subbasins were assigned detailed allocations to continue reducing TN and TP loads to lagoon in an effort to further improve water quality and seagrass depth limits. The stakeholders in the Central IRL subbasin were not assigned specific allocations for the first iteration of the BMAP because these project zones are currently achieving the seagrass depth limit targets. However, the Central IRL stakeholders were asked to submit projects to demonstrate the water quality improvements necessary to maintain or improve the seagrass depth limits.

Allocation Approach to Responsible Entities

Detailed allocations for the nutrient reductions were assigned to the stakeholders in the BRL, North A, and North B project zones. The steps to calculate each entity's allocation for the BMAP are a Geographic Information System (GIS) based process, which uses the input data to the TMDL model to account for the loads from each jurisdiction. The Pollutant Load Screening Model (PLSM) GIS data for each subbasin was used as the base map. GIS data include the 2000 land uses, soil, data, runoff coefficients, event mean concentration (EMCs), and the 30-year average rainfall for each identified area.

The base map was clipped into the project zones to create separate maps. From the project zone maps, the following areas were removed sequentially and then saved as its own dataset to determine loading from those areas:

- Florida Department of Transportation (FDOT) roads, right-of-ways, and stormwater ponds;
- Areas occupied by water control and special districts (where applicable);
- Areas with agricultural land uses outside water control district boundaries;
- All areas occupied by cities, towns, and federal facilities; and
- Remaining areas clipped to each county's boundary.

The project zone maps and associated model data were used to calculate each project zone's starting point load and each entity's starting point load. A target load per acre was calculated using the target load for the project zone from the TMDL. The allowable load for each entity was calculated by multiplying its total load-generating acres by the target load per acre. The required reduction for each entity is the entity's starting point load minus its allowable load.

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As part of the allocation calculation process, *de minimus* loading values for TN and TP were determined. The entities with TN and TP starting point loads below the *de minimus* values were not assigned an allocation in this iteration of the BMAP; however, these entities do submit pertinent project information.

Project Credit

To achieve the required reductions for the first phase of each of the BRL and North IRL BMAPs, each responsible entity is providing a list of projects and programs that reduce nutrient loading to the IRL. The Central IRL stakeholders were also asked to submit projects for the first BMAP iteration to continue seagrass success. Credit will be assigned for projects completed after 2000, since 2000 is the base year used in the TMDL model. These projects will only receive credit for the portion of treatment above and beyond permit requirements. Entities can also provide information on projects planned for five years from BMAP adoption to meet their load reduction. In addition, provisional credit will be assigned for education and outreach efforts. These credits are considered provisional because studies are underway to gather Florida-specific data that can be used to refine the reduction estimates. Any changes to the assigned credits for these activities will be made in future iterations of the BMAP.

Project credit can also be assigned for larger scale regional projects. Stakeholders within a project zone may wish to partner on a regional project if they do not have enough project opportunities within their jurisdiction or if the regional project provides more cost effective nutrient reductions. Credits for participation will be based on the relative contribution of funding from each participating entity.

Basin Website

FDEP will post agendas, summaries, handouts, and presentations to their website at:
<http://publicfiles.dep.state.fl.us/DEAR/BMAP/IndianRiverLagoon/>.

Contact

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Phone: (850) 245-8560

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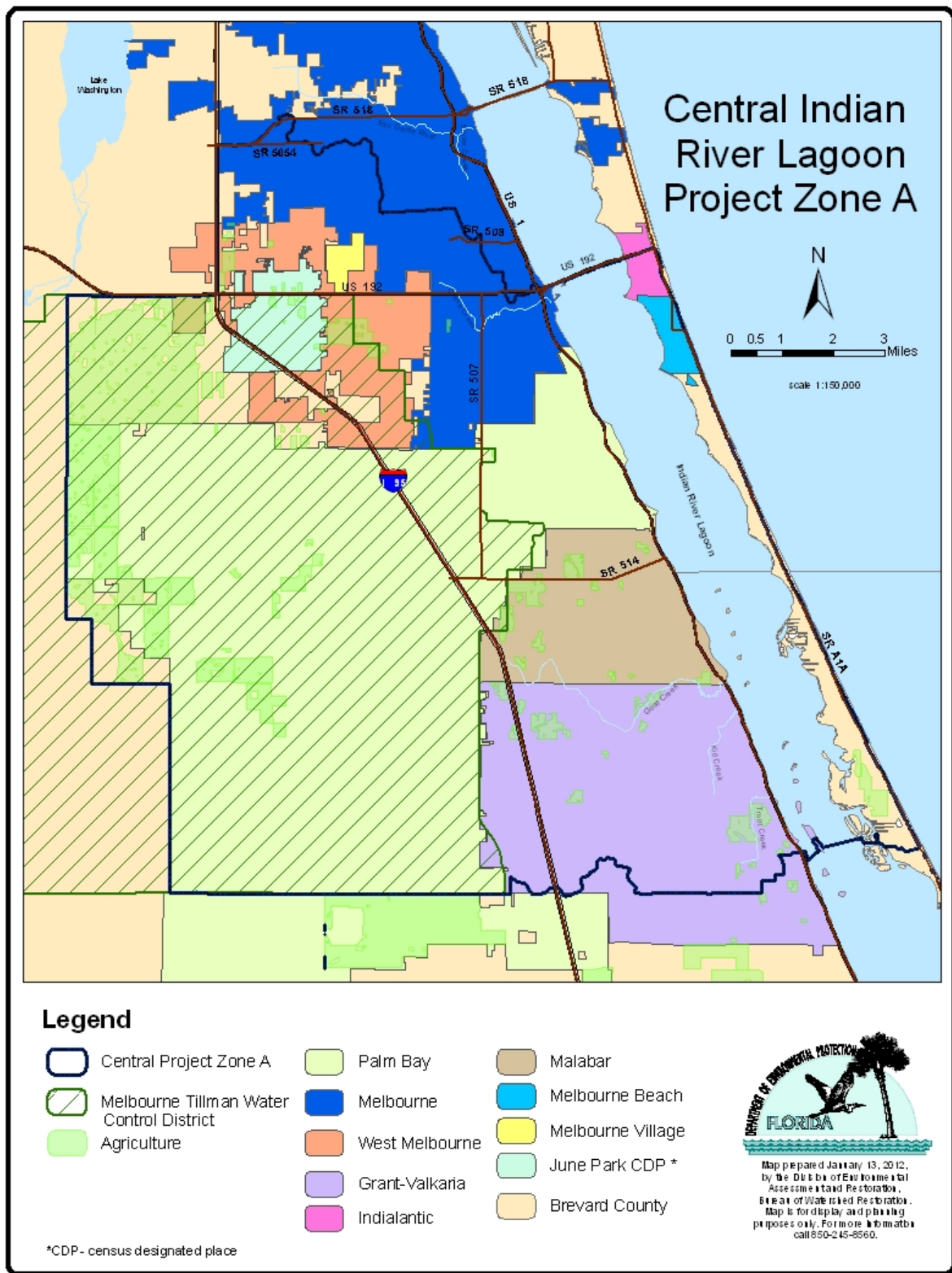


FIGURE 1: IRL CENTRAL A PROJECT ZONE AREA

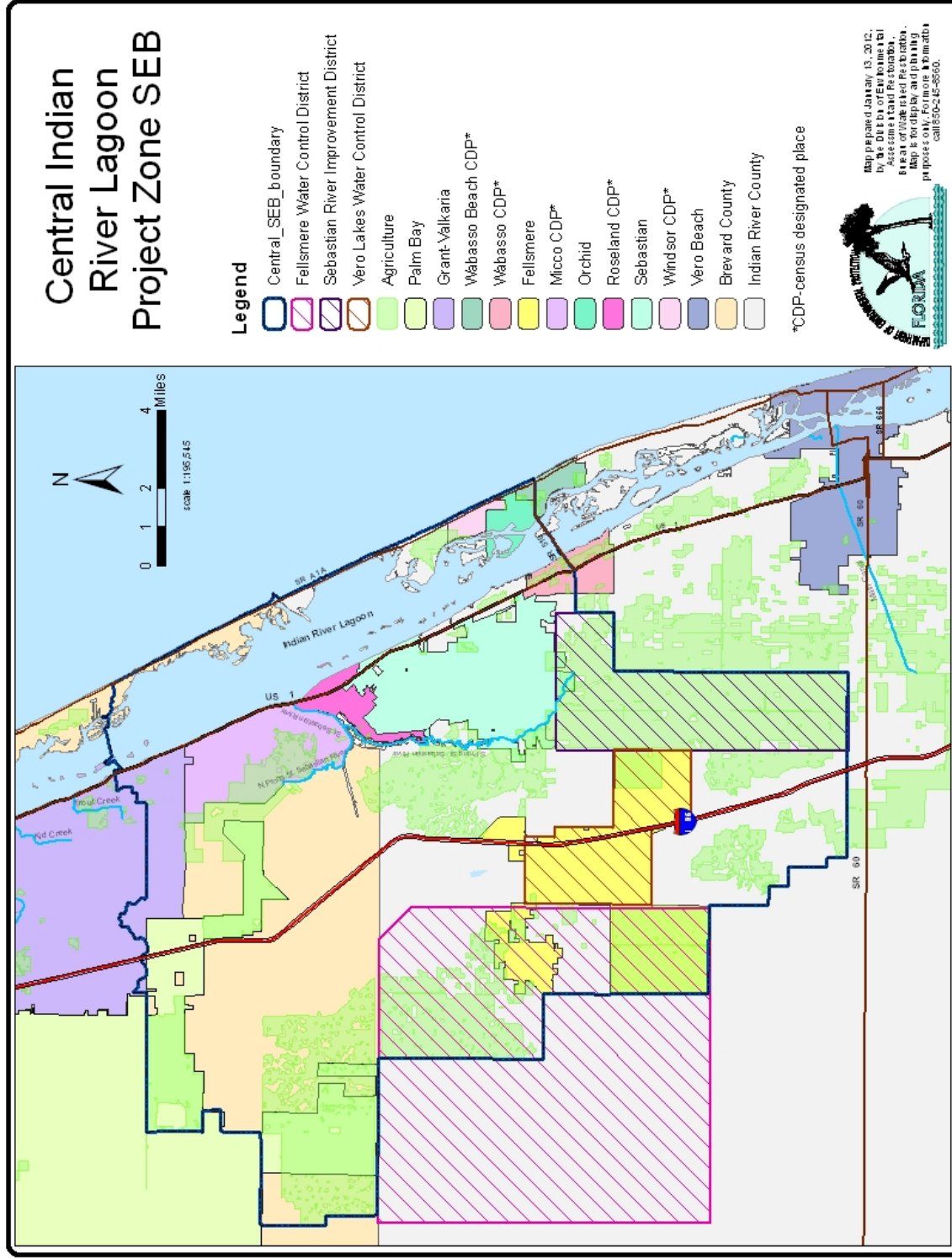


FIGURE 2: IRL CENTRAL SEB PROJECT ZONE AREA

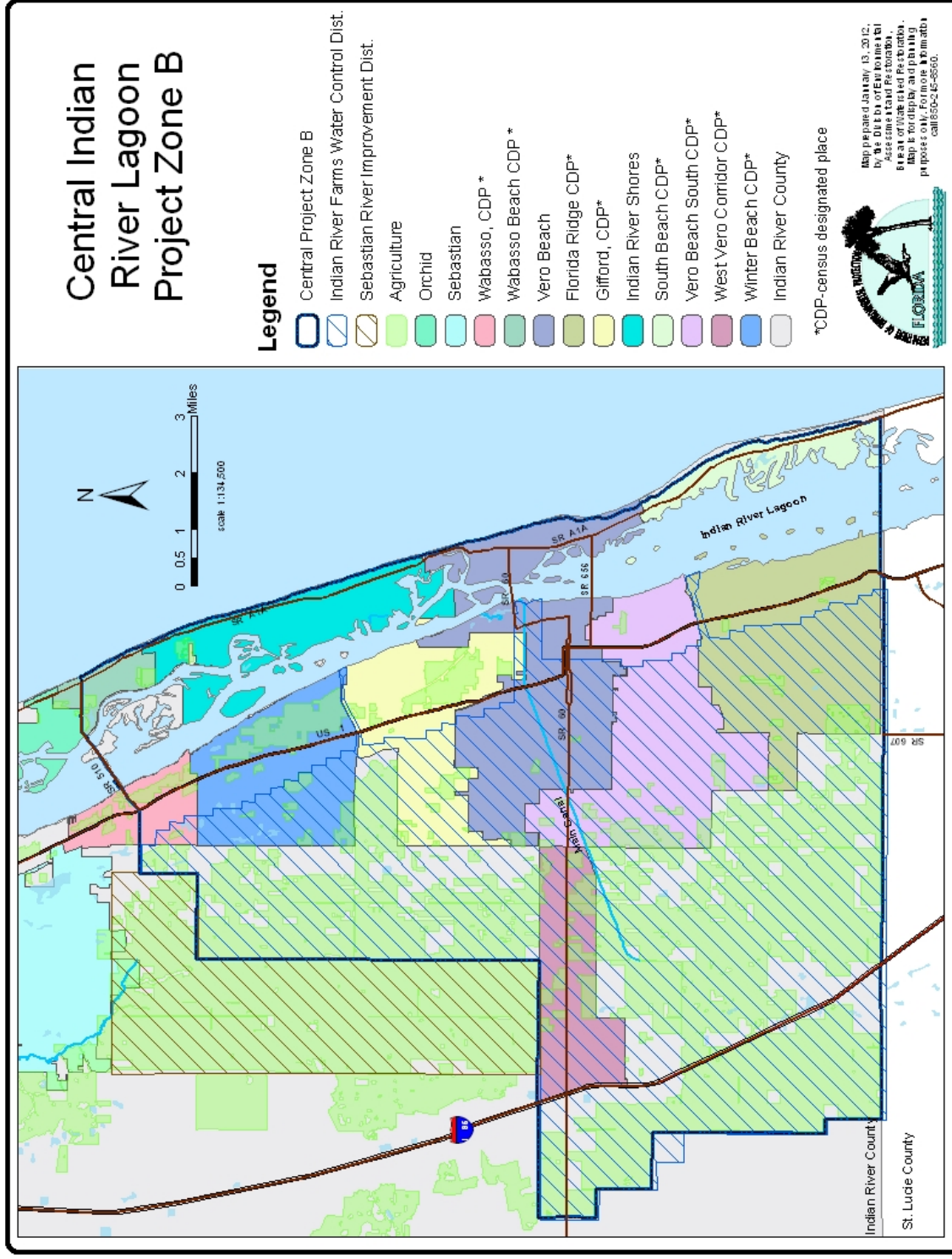


FIGURE 3: IRL CENTRAL B PROJECT ZONE AREA

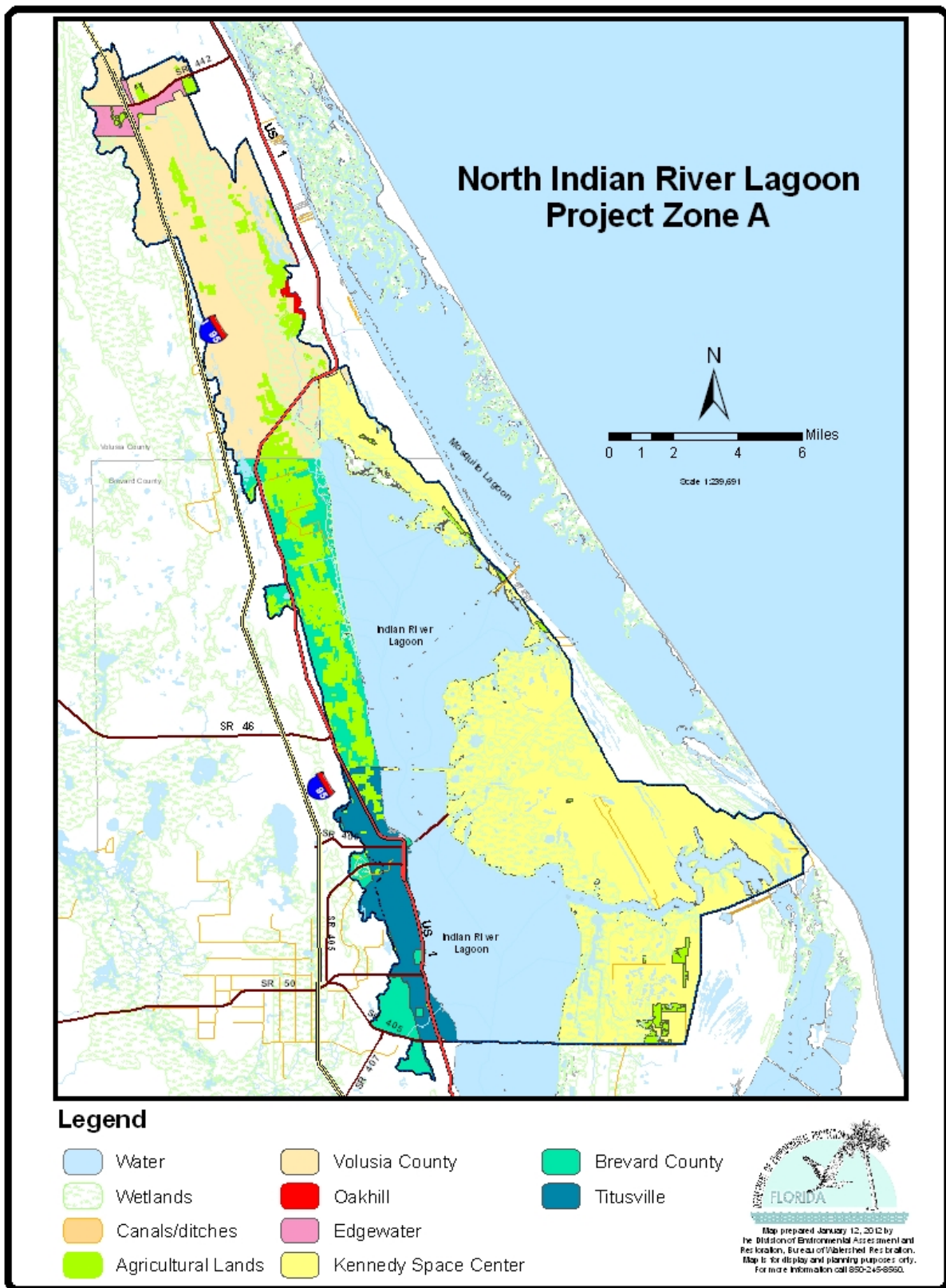


FIGURE 4: IRL NORTH A PROJECT ZONE AREA

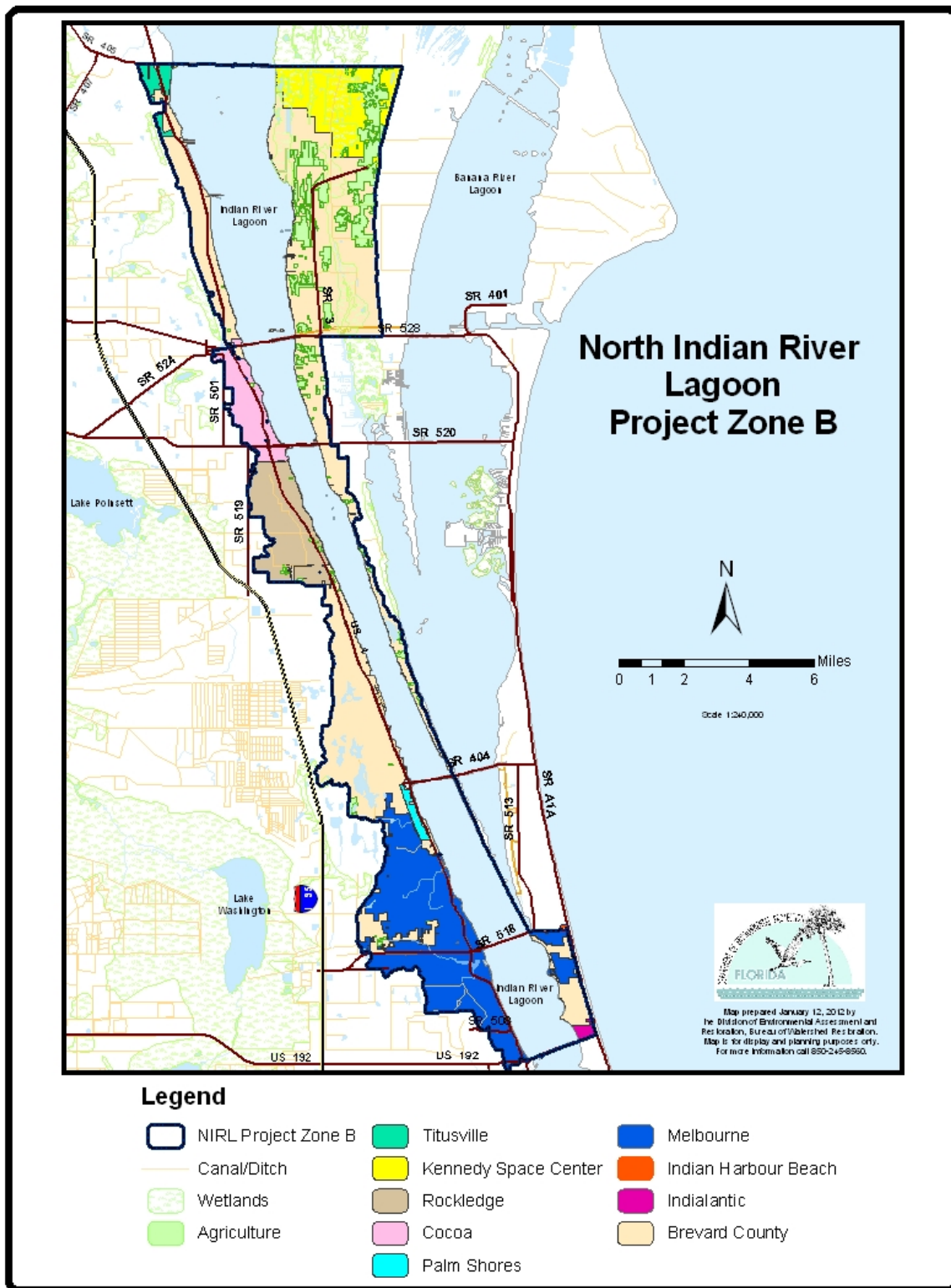


FIGURE 5: IRL NORTH B PROJECT ZONE AREA

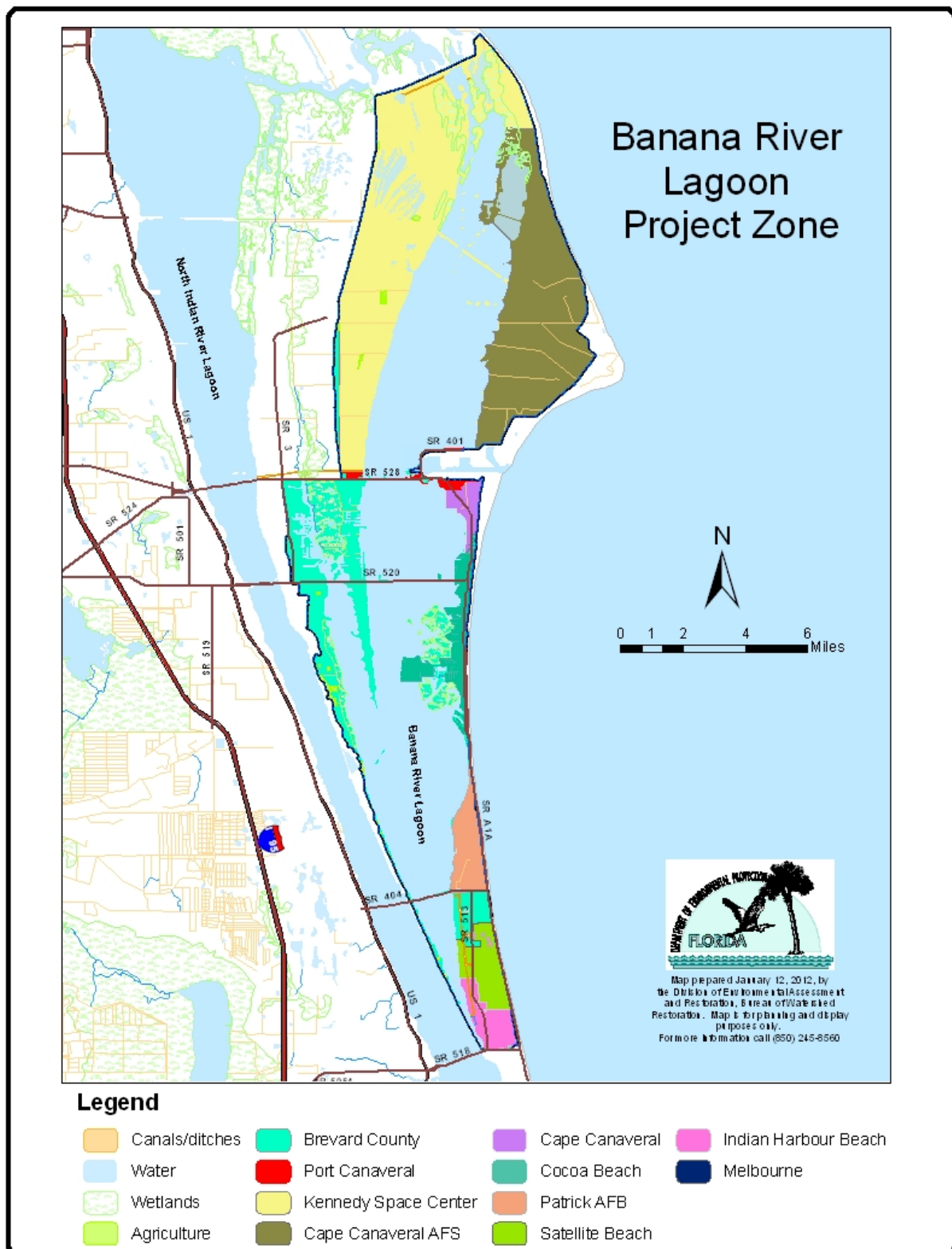


FIGURE 6: BANANA RIVER LAGOON BMAP AREA

Process for Measuring Seagrass Deep Edge Compliance North Indian River Lagoon Basin Management Action Plan February 1, 2012

BIOLOGICAL RESPONSE GOAL: SEAGRASS DEPTH RECOVERY

The basic premise of the Indian River Lagoon (IRL) total maximum daily loads (TMDLs) is that reduced loadings of total nitrogen (TN) and total phosphorus (TP) will result in the recovery of deeper-water seagrass habitat. The TMDLs set specific targets for allowable loadings of TN and TP and do require reductions in loadings to meet those targets, but the full measure of their successful implementation is the biological response of seagrasses to those reductions. A statistical relationship was established for TN and TP loadings and seagrass depth targets that was used to determine loading limits.

The biological response of the seagrasses is the most important factor for the evaluation of success of the TMDLs. Seagrass deeper-water habitat recovery success is measured on whether the seagrasses can grow at sufficient water depths that meet TMDL depth limit targets. The full reductions in TN and TP specified by the TMDL may not be needed to achieve success of seagrass recovery if seagrass response is sufficient to meet depth limit targets.

SCALE FOR MEASURING SUCCESS: PROJECT ZONES

Success in achieving the TMDL depth limit targets will be assessed on a project zone scale. The IRL Basin, as defined for the basin management action plans (BMAPs), is divided into three sub-lagoons: Banana River Lagoon (BRL), North IRL, and Central IRL. These sub-lagoons are important units but they are large areas that do not account for hydrological distinctions within these sub-lagoons. While the Florida Department of Environmental Protection (FDEP) desires to have all three sub-lagoons achieve seagrass recovery, it is possible to have success in smaller assessment areas, and for those areas within the sub-lagoons that have not fully recovered to continue to make nutrient reductions. For the purposes of the BMAPs, the sub-lagoons were divided into project zones: one zone in BRL, two zones in North IRL, and three zones in Central IRL. Project zones are hydrologically connected areas and incoming loads are expected to affect the entire area. The project zone, therefore, is a reasonable scale by which to judge target success.

TWO-STEP MEASUREMENT OF SUCCESS

FDEP defines success in meeting the TMDL seagrass depth limit targets using a two-step assessment approach. The two steps are used to address the following concerns:

1. Determination of seagrass recovery should take into account inter-annual variability and allow for some years to have less seagrass depth than others.
2. An evaluation of seagrass recovery should not allow one very good year to over-influence the evaluation of otherwise limited seagrass depths.

Step 1: Cumulative Frequency Distribution Analysis

To address the first concern, the Step 1 analysis is applied using a Geographic Information Systems (GIS) based process. This involves taking the four most recent mapped seagrass datasets and creating a combined map or coverage of the seagrass distribution. Using this combined coverage, a 15-meter wide buffer zone, that includes water depth data, is applied to the perimeter of the coverage to create the deep edge of the seagrass beds. This buffered coverage shows the deepest edge that seagrass grew at any time during the data period, and is used to create a cumulative frequency distribution curve of the

depths at which seagrasses exist within the project zone. This curve is then compared to the TMDL depth limit target curve, which is a combined coverage of seagrass data from 1943, 1986, 1989, 1992, 1994, 1996 and 1999. Using all these years' data provides a coverage of all possible locations and water depths where seagrasses grew historically. The TMDLs use a restoration target that is 10% less than the historical seagrass depth limit coverage, as allowed by Florida's Water Quality Criteria, Rule 62-302, Florida Administrative Code. Successful seagrass compliance in Step 1 is reached when 50% or more of the assessment years' frequency distribution curve (including its 50th percentile value) for the project zone lies on or to the right of the TMDL depth limit target curve. If a project zone is compliant with Step 1, then the compliance evaluation continues.

Step 2: Median Depth Limit Comparison for Each Data Year

Step 2 calculates the median depth of seagrass growth for each year of the four most recent datasets, and then each year's median is compared to the TMDL median depth limit target. Three of the four medians of the assessment years' seagrass coverages must meet or exceed the median TMDL depth limit target in order for a project zone to be Step 2 compliant.

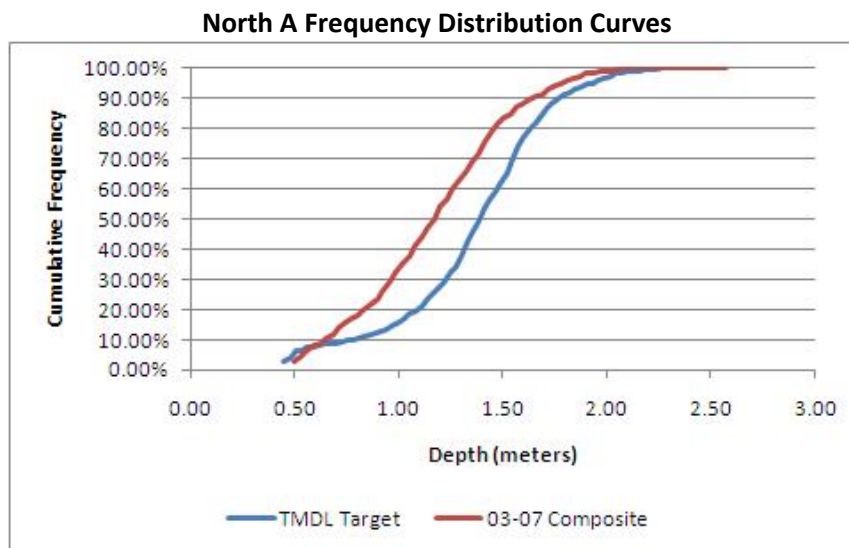
If a project zone is compliant based on the Step 1 and Step 2 analyses, then the project zone is considered to be meeting the TMDL seagrass depth limit target. If a project zone fails to meet either Step 1 or Step 2, then it is not considered to be meeting the TMDL seagrass depth limit target for that set of assessment years.

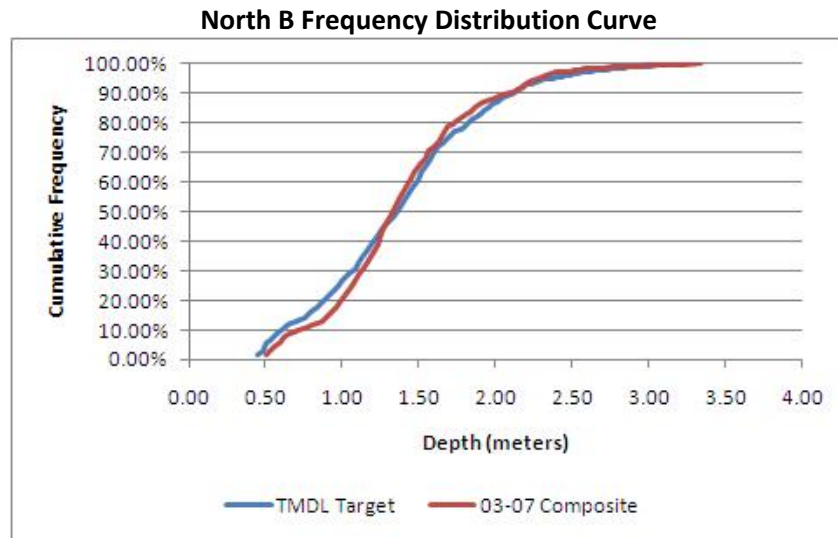
2011 SEAGRASS COMPLIANCE EVALUATION

Following the steps described above, FDEP evaluated the most recent available data (mapping years 2003, 2005, 2006, and 2007) to determine if any of the project zones are achieving the seagrass depth limit targets.

North IRL Evaluation

Based on the Step 1 analysis, neither of the two North IRL project zones is compliant as shown in the frequency distribution curves below. The blue line shows the TMDL target depth limit cumulative frequency distribution curve. The red line shows the combined assessment years curve for the most recent data years.





For the Step 2 analysis, both project zones were again found to be non-compliant. The TMDL median deep edge seagrass depth and the medians for each year, by project zone, are presented below.

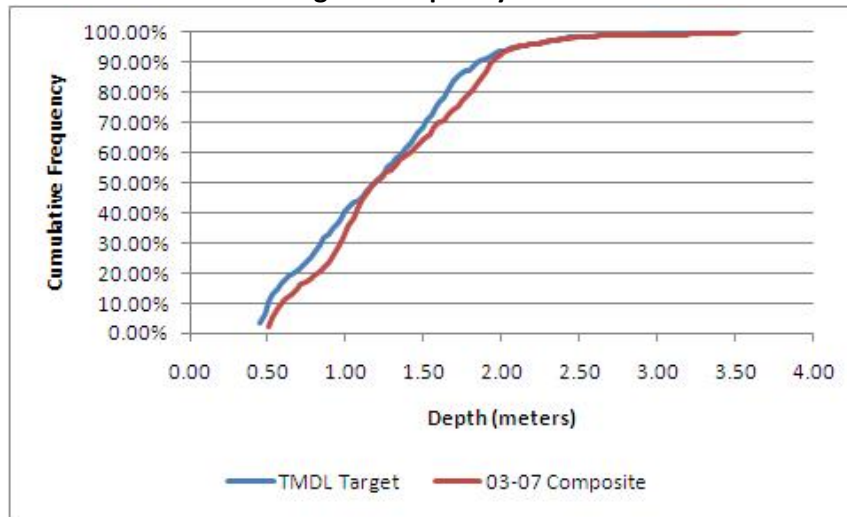
Year	North A	North B
TMDL Median	1.41	1.37
2003	0.96	1.26
2005	1.08	1.26
2006	1.08	1.32
2007	1.08	1.29
Step 2 Compliant?	No	No

Therefore, stakeholders in the North A and North B project zones will be required to achieve TN and TP reductions in this first five-year BMAP period because these areas are not meeting the TMDL depth limit targets. In year four of the BMAP, TMDL depth limit targets will be reassessed using 2009, 2011, and 2013 mapping data for these project zones. If these project zones are compliant using the 2007-2013 mapping years, FDEP will not ask stakeholders to make additional TN and TP reductions in the next iteration of the BMAP. Then, data from the 2015 and 2017 seagrass mapping years will be evaluated to determine if the project zones continue to meet the TMDL target. If the project zones do not pass the Step 1 and Step 2 assessments for compliance, then FDEP will ask stakeholders to make further nutrient reductions.

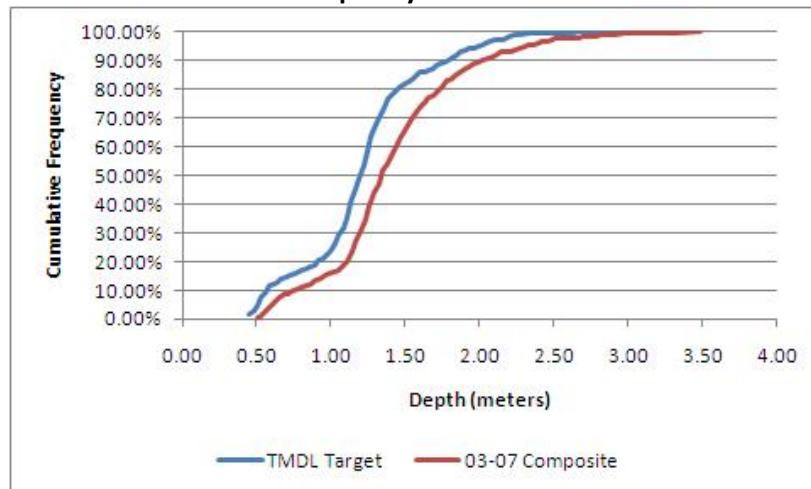
BRL and Central IRL Evaluations

The results of the Step 1 analysis, shown in the figures below, indicate that BRL and all three project zones in Central IRL are Step 1 compliant.

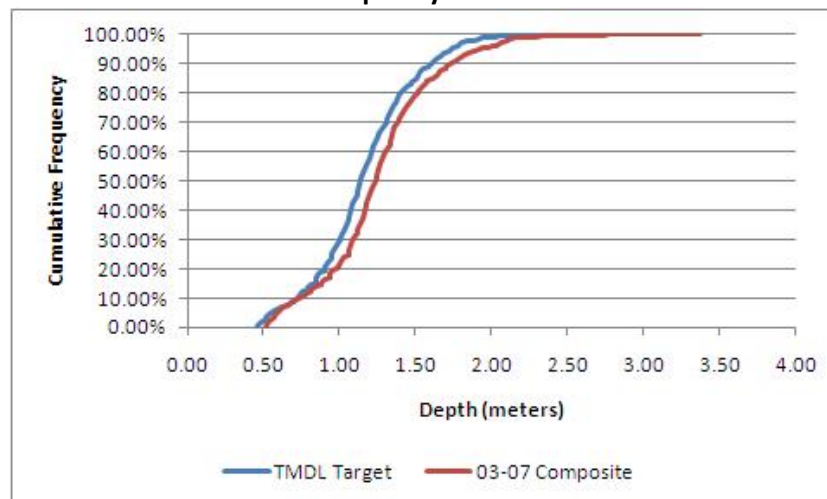
Banana River Lagoon Frequency Distribution Curves



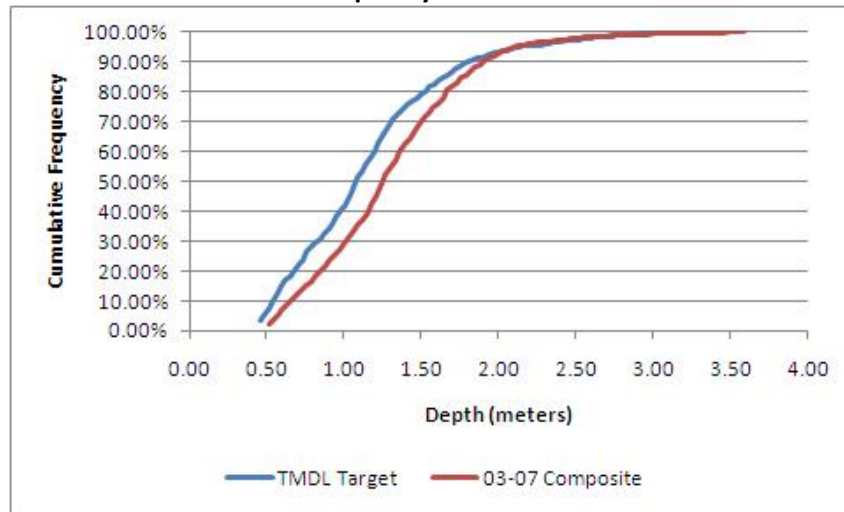
Central A Frequency Distribution Curves



Central SEB Frequency Distribution Curves



Central B Frequency Distribution Curves



For the Step 2 analysis, the BRL was not compliant but all three Central IRL project zones are compliant as shown in the table below.

Year	BRL	Central A	Central SEB	Central B
TMDL Median	1.19	1.22	1.15	1.09
2003	1.11	1.23	1.12	1.12
2005	1.11	1.20	1.15	1.12
2006	1.14	1.23	1.18	1.12
2007	1.17	1.32	1.21	1.24
Step 2 Compliant?	No	Yes	Yes	Yes

BRL is not fully compliant because both Step 1 and Step 2 were not met. Therefore, stakeholders in the BRL will have to make reductions in a BMAP, and the same evaluation process as outlined above for the North IRL will be applied to the BRL.

Central A, Central SEB, and Central B are determined to be fully compliant because these project zones met both Step 1 and Step 2 for the most recent years of data. The stakeholders in the Central IRL project zones are meeting TMDL depth limit targets and will not be assigned additional reductions in the first iteration of the BMAP. However, FDEP asked the stakeholders to provide completed and planned projects to characterize TN and TP reductions that have occurred and will be achieved during the first BMAP cycle. Documenting known load reductions will further the understanding of how compliance was achieved and will be maintained.

FDEP will use the 2009 and 2011 seagrass mapping data, when available, to reassess whether these project zones continue to be compliant. If these project zones continue to meet the TMDL depth limit targets, there will be six mapping years or nine calendar years (2003 – 2011) indicating a trend of success. If during this assessment the project zones are no longer meeting targets, FDEP would then ask for stakeholders to make nutrient reductions.

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North Indian River Lagoon Basin Management Action Plan

February 2012

Proposed Allocation Calculations for Total Nitrogen and Total Phosphorus

BACKGROUND

In establishing the detailed allocations for the Indian River Lagoon (IRL) Basin Management Action Plans (BMAPs) and the reductions required by the total maximum daily loads (TMDLs) for total nitrogen (TN) and total phosphorus (TP), the Florida Department of Environmental Protection (FDEP) considered the best approach to allocate to the appropriate stakeholders in a manner that is reasonable and equitable. This paper outlines the approach that FDEP proposed to calculate allocations and presents the allocations for the North IRL BMAP. Basin stakeholders have requested that FDEP compare this approach with other allocation methods and that evaluation is in progress.

CALCULATING BASELINE LOADS

Baseline loadings were generated from a land use based Pollutant Load Screening Model (PLSM), which is a Geographic Information System (GIS) based model. This model uses soil, rainfall, runoff data, and TN/TP land use relationships to generate TN and TP loadings for each basin land use. The baseline loadings were generated from year 2000 land use data.

To determine the BMAP allocations, the first step was to remove the areas associated with the land use land cover code 5400, which is used to identify the lagoon's surface area, from the PLSM data file for the North IRL. The resulting file was then clipped to the North A and North B project zone boundaries. (Note: Additional IRL drainage area has been added to Titusville, Cocoa, and Rockledge at the request of these stakeholders.) For each project zone shapefile, the individual entity data files were created by clipping out each entity's jurisdiction, as follows:

- Florida Department of Transportation (FDOT) roads and right-of-ways.
- Areas with agricultural land uses; 2000 series of Florida land use codes.
- Municipalities and federal facilities, each to its own jurisdictional boundary.
- The remaining area was assigned to the counties using the jurisdictional boundaries.

The TP TMDL for the North IRL was based on loadings from the Hydrologic Simulation Program – FORTRAN (HSPF) model, not the PLSM. To account for the differences in loading between the two models, a factor was calculated based on the proportion of the HSPF model TP loads to the PLSM TP loads for each lagoon segment. These factors were then multiplied by the TP baseline loads for each polygon in the PLSM. The resulting total load by entity is the adjusted TP baseline load, which was used in the allocation calculations.

Loads Associated with Water

The purpose of the IRL TMDLs is to reduce anthropogenic loads from the surrounding watershed in urban and agricultural areas; it is not the intent of the TMDLs to require load reductions from within surface waters. Therefore, the loading and acreages from the land use land cover code 5000 were removed from each entity's baseline load and total acreages and set aside because this land use category is surface waters and is not considered an anthropogenic land use in the TMDL process. FDEP predicts that internal loading in the surface waters will decrease with the flushing of cleaner watershed runoff once the pollutant loading from the watershed is controlled. Since the focus of these reductions is on the external, watershed loading, the loading from the 5000 land uses was set aside and reductions

from the stakeholders will not be required for these loads.

Net Loads

Tables 1 and 2 show the TN and TP loads for the baseline loads, 5000 land use loads, and the net load (baseline loads minus 5000 land use loads) for each entity in North A and North B, respectively.

Table 1. Net Loads by Entity in North A

Entity	Area (Acres)	5000 Land Use Acres	Net Acres	TN Baseline Load (lbs/yr)	5000 Land Use TN Load (lbs/yr)	TN Net Load (lbs/yr)	TP Adjusted Baseline Load (lbs/yr)	5000 Land Use TP Load (lbs/yr)	TP Net Load (lbs/yr)
Agriculture	8,069	0	8,069	62,810	0	62,810	9611.3	0.0	9,611.3
Brevard County	8,305	108	8,197	37,051	194	36,857	4205.7	27.4	4,178.3
Edgewater	1,244	62	1,182	3,266	181	3,085	346	22.8	323.2
FDOT D5	354	0	354	3,917	0	3,917	1130.9	0.0	1,130.9
Kennedy Space Center (KSC)	44,295	3,711	40,584	84,095	2,161	81,934	10277	224.8	10,052.2
Oak Hill	127	0	127	218	0	218	15.3	0.0	15.3
Titusville	5,776	34	5,742	64,967	113	64,854	12102.2	26.0	12,076.2
Volusia County	23,605	254	23,351	32,375	1,169	31,206	2632.4	110.8	2,521.6
Total	91,776	4,169	87,607	288,699	3,818	284,881	40,320.8	411.8	39,909.0

Table 2. Net Loads by Entity in North B

Entity	Area (Acres)	5000 Land Use Acres	Net Acres	TN Baseline Load (lbs/yr)	5000 Land Use TN Load (lbs/yr)	TN Net Load (lbs/yr)	TP Adjusted Baseline Load (lbs/yr)	5000 Land Use TP Load (lbs/yr)	TP Net Load (lbs/yr)
Agriculture	3,692	0	3,692	24,477	0	24,477	5,504.2	0.0	5,504.2
Brevard County	23,829	1,431	22,398	144,429	5,318	139,111	22,517.4	803.9	21,713.5
Cocoa	2,111	13	2,098	26,319	40	26,279	5,224.1	7.7	5,216.4
FDOT D5	929	3	926	8,743	12	8,731	2,804.1	1.7	2,802.4
Indialantic	168	0	168	1,756	0	1,756	318.4	0.0	318.4
Indian Harbour Beach	1	0	1	11	0	11	1.7	0.0	1.7
KSC	4,136	159	3,977	5,707	366	5,341	975.3	46.4	928.9
Melbourne	9,920	258	9,662	91,888	1,045	90,843	20,074.0	151.2	19,922.8
Palm Shores	267	2	265	1,700	6	1,694	311.3	1.3	310.0
Rockledge	3,892	69	3,823	32,175	181	31,994	6,648.3	35.8	6,612.5
Titusville	588	0	588	3,013	0	3,013	279.6	0.0	279.6
Total	49,535	1,935.0	47,600	340,218	6,968	333,250	64,658.4	1,048.0	63,610.4

DE MINIMUS CALCULATIONS

The net loads from Tables 1 and 2 were then sorted for TN and TP loads, from highest to lowest, to determine whether any entity had loads low enough that reductions from these areas would have essentially no significant impact on the required reductions in the first phase of the BMAP. Tables 3 and 4 present the sorted data for North A and Tables 5 and 6 present the data for North B, and the shaded cells signify the *de minimus* load contributions.

Table 3. TN *De Minimus* Determination for North A

Entity	TN Net Load (lbs/yr)	% of TN Net
KSC	81,934	28.76%
Titusville	64,854	22.77%
Agriculture	62,810	22.05%
Brevard County	36,857	12.94%
Volusia County	31,206	10.95%
FDOT D5	3,917	1.37%
Edgewater	3,085	1.08%
Oak Hill	218	0.08%

Table 4. TP *De Minimus* Determination for North A

Entity	TP Net Load (lbs/yr)	% of TP Net
Titusville	12,076.2	30.26%
KSC	10,052.2	25.19%
Agriculture	9,611.3	24.08%
Brevard County	4,178.3	10.47%
Volusia County	2,521.6	6.32%
FDOT D5	1,130.9	2.83%
Edgewater	323.2	0.81%
Oak Hill	15.3	0.04%

Table 5. TN *De Minimus* Determination for North B

Entity	TN Net Load (lbs/yr)	% of TN Net
Brevard County	139,111	41.74%
Melbourne	90,843	27.26%
Rockledge	31,994	9.60%
Cocoa	26,279	7.89%
Agriculture	24,477	7.34%
FDOT D5	8,731	2.62%
KSC	5,341	1.60%
Titusville	3,013	0.90%
Indialantic	1,756	0.53%
Palm Shores	1,694	0.51%
Indian Harbour Beach	11	0.00%

Table 6. TP *De Minimus* Determination for North B

Entity	TP Net Load (lbs/yr)	% of TP Net
Brevard County	21,713.5	34.14%
Melbourne	19,922.8	31.32%
Rockledge	6,612.5	10.40%
Agriculture	5,504.2	8.65%
Cocoa	5,216.4	8.20%

Entity	TP Net Load (lbs/yr)	% of TP Net
FDOT D5	2,802.4	4.41%
KSC	928.9	1.46%
Indialantic	318.4	0.50%
Palm Shores	310.0	0.49%
Titusville	279.6	0.44%
Indian Harbour Beach	1.7	0.00%

In the North A project zone, Oak Hill was determined to be *de minimus* because the TN and TP loads were less than 0.1% of the total loads in North A. In the North B project zone, Indian Harbour Beach is *de minimus* because the TN and TP loads are approximately 0.0% of the total loads in North B. These entities will not be assigned an allocation for either TN or TP for the first phase of the BMAP. This *de minimus* designation does not preclude these entities from submitting project information, implementing reductions in the near term future, or from being assigned allocations in future BMAP iterations.

CALCULATING THE TARGET LOADS PER ACRE AND ALLOCATIONS

The target loads per acre were calculated by dividing the TMDL target load by the total non-water area (based on the acreage within the original PLSM boundary) in the North A and North B project zones, as shown in Tables 7 and 8, respectively.

Table 7. Calculated Target Loads per Acre for TN and TP for North A

Category	TN	TP
Non-water acres	86,667	86,667
TMDL Target Load (lbs)	184,254	20,349
Target Load (lbs/acre)	2.126	0.235

Table 8. Calculated Target Loads per Acre for TN and TP for North B

Category	TN	TP
Non-water acres	42,786	42,786
TMDL Target Load (lbs)	188,341	27,638
Target Load (lbs/acre)	4.402	0.646

The target load per acre is used to calculate the allowable or acceptable loadings of TN and TP for each entity. It is the loading allocation assigned to each entity. The amount of loading that each entity must reduce is the difference between the allocated loading and the baseline loading.

When using these target loads to determine loading for each entity, some of the stakeholders had a negative value for required reductions, which indicates that the net (existing) load from the PLSM is lower than the allocation based on the target load per acre. Therefore, these entities are not required to make reductions. In the North A project zone, both KSC and Volusia County had lower net TN loads than the allowable loads and Volusia County also had a lower net TP load than the allowable load. In the North B project zone, KSC's net TN and TP loads were lower than the allowable load, and Titusville's net TP load was lower than the allowable load.

To ensure that greater reductions were not assigned than required by the TMDL, this difference

between the allowable load and net load for KSC, Volusia County, and Titusville was spread out to the other entities based on their percentage of the net load. This adjustment reduced the stakeholders' required reductions from the initial reductions that were calculated. For the adjustment in the North A project zone, both Edgewater and KSC were initially assigned more allocation than their TP required reduction. Therefore, the adjustment for these two entities was made by assigning them the portion of the TP load they needed to meet their required reduction. The rest of the stakeholders received a portion of the remaining TP load based on their percentage of the net load.

BMAP CONSIDERATIONS

The required load reductions will be phased over a 15-year period. In recognition of observed improvements in seagrass growth, the allocation approach will require that 15% of the reductions be achieved in the first 5-year BMAP period. In the second phase of the BMAP, the TMDL will be updated with more current land use, seagrass depth limit target evaluations, and water quality data. These revisions may result in a change to required reductions in future BMAP iterations. Stakeholders have also expressed concern over uncertainties in the TMDL, such as the relationship between TN and TP reductions and the seagrass target, salinity and algae influences on the system, and basin-specific data for model calibration. This phased approach helps to ensure that FDEP does not ask the stakeholders to reduce more than is necessary by using adaptive management principles to evaluate progress towards the TMDL seagrass depth limit targets. It must be noted that the TMDL requirements have not changed, and additional reductions may be required in subsequent iterations of the BMAP to meet the TMDL depth limit targets.

BMAP Phase 1 Allocations

The allocations for Phase 1 of the North IRL BMAP are shown in Tables 9 and 10 for North A and Tables 11 and 12 for North B.

Table 9. BMAP Phase 1 TN Required Reductions for North A

Entity	Area (Acres)	TN Target Load per Acre (lbs/ac/yr)	TN Allocation (lbs/yr)	TN Net Load (lbs/yr)	TN Required Reduction (lbs/yr)	Portion of Volusia County and KSC Load Reduction (lbs/yr)	Revised TN Required Reduction (lbs/yr)	15% of TN Required Reduction (lbs/yr)
Agriculture	8,069	2.126	17,155.1	62,810	45,654.9	8,343.9	37,311.0	5,596.6
Brevard County	8,197	2.126	17,427.4	36,857	19,429.6	4,896.2	14,533.3	2,180.0
Edgewater	1,182	2.126	2,512.9	3,085	572.1	409.8	162.2	24.3
FDOT D5	354	2.126	752.6	3,917	3,164.4	520.3	2,644.1	396.6
KSC	40,584	2.126	86,281.1	81,934	-4,347.1	-	0.0	0.0
Titusville	5,742	2.126	12,207.8	64,854	52,646.2	8,615.4	44,030.7	6,604.6
Volusia County	23,351	2.126	49,644.6	31,206	-18,438.6	-	0.0	0.0
Oak Hill – <i>de minimus</i>	127	2.126	270.5	218	-	-	-	-
Total	87,607	N/A	186,252.2	284,881	98,681.3	22,785.7	98,681.3	14,802.2

Table 10. BMAP Phase 1 TP Required Reductions for North A

Entity	Area (Acres)	TP Target Load per Acre (lbs/ac/yr)	TP Allocation (lbs/yr)	TP Net Load (lbs/yr)	TP Required Reduction (lbs/yr)	Portion of Volusia County Load Reduction (lbs/yr)	Revised TP Required Reduction (lbs/yr)	15% of TP Required Reduction (lbs/yr)
Agriculture	8,069	0.235	1,896.3	9,611.3	7,715.0	856.4	6,858.6	1,028.8
Brevard County	8,197	0.235	1,926.4	4,178.3	2,251.9	372.3	1,879.6	281.9
Edgewater	1,182	0.235	277.8	323.2	45.4	45.4	0.0	0.0
FDOT D5	354	0.235	83.2	1,130.9	1,047.7	100.8	946.9	142.0
KSC	40,584	0.235	9,537.2	10,052.2	515.0	515.0	0.0	0.0
Titusville	5,742	0.235	1,349.4	12,076.2	10,726.8	1,076.0	9,650.7	1,447.6
Volusia County	23,351	0.235	5,487.5	2,521.6	-2,965.9	0.0	0.0	0.0
Oak Hill – <i>de minimus</i>	127	0.235	29.9	15.3	-	-	-	-
Total	87,607	N/A	20,587.6	39,909.0	19,336.0	2,965.9	19,336.0	2,900.4

Table 11. BMAP Phase 1 TN Required Reductions for North B

Entity	Area (Acres)	TN Target Load per Acre (lbs/ac/yr)	TN Allocation (lbs/yr)	TN Net Load (lbs/yr)	TN Required Reduction (lbs/yr)	Portion of KSC Load Reduction (lbs/yr)	Revised TN Required Reduction (lbs/yr)	15% of TN Required Reduction (lbs/yr)
Agriculture	3,692	4.402	16,252.7	24,477	8,224.3	908.3	7,316.0	1,097.4
Brevard County	22,398	4.402	98,597.3	139,111	40,513.7	5,162.1	35,351.6	5,302.7
Cocoa	2,098	4.402	9,235.4	26,279	17,043.6	975.2	16,068.5	2,410.3
FDOT D5	926	4.402	4,075.8	8,731	4,655.2	324.0	4,331.2	649.7
Indialantic	168	4.402	741.1	1,756	1,014.9	65.2	949.8	142.5
KSC	3,977	4.402	17,508.5	5,341	-12,167.5	-	0.0	0.0
Melbourne	9,662	4.402	42,531.2	90,843	48,311.8	3,371.0	44,940.8	6,741.1
Palm Shores	265	4.402	1,165.7	1,694	528.3	62.9	465.4	69.8
Rockledge	3,823	4.402	16,831.0	31,994	15,163.0	1,187.2	13,975.8	2,096.4
Titusville	588	4.402	2,589.3	3,013	423.7	111.8	311.9	46.8
Indian Harbour Beach - <i>de minimus</i>	1	4.402	6.3	11	-	-	-	-
Total	47,600	N/A	209,534.4	333,250	123,710.9	12,167.5	123,710.9	18,556.6

Table 12. BMAP Phase 1 TP Required Reductions for North B

Entity	Area (Acres)	TP Target Load per Acre (lbs/ac/yr)	TP Allocation (lbs/yr)	TP Net Load (lbs/yr)	TP Required Reduction (lbs/yr)	Portion of KSC and Titusville Load Reduction (lbs/yr)	Revised TP Required Reduction (lbs/yr)	15% of TP Required Reduction (lbs/yr)
Agriculture	3,692	0.646	2,385.1	5,504.2	3,119.1	153.6	2,965.5	444.8
Brevard County	22,398	0.646	14,469.3	21,713.5	7,244.2	605.8	6,638.4	995.8
Cocoa	2,098	0.646	1,355.3	5,216.4	3,861.1	145.5	3,715.6	557.3
FDOT D5	926	0.646	598.1	2,802.4	2,204.3	78.2	2,126.1	318.9
Indialantic	168	0.646	108.8	318.4	209.6	8.9	200.8	30.1
KSC	3,977	0.646	2,569.4	928.9	-1,640.5	-	0.0	0.0
Melbourne	9,662	0.646	6,241.5	19,922.8	13,681.3	555.8	13,125.5	1,968.8
Palm Shores	265	0.646	171.1	310.0	138.9	8.6	130.3	19.5
Rockledge	3,823	0.646	2,470.0	6,612.5	4,142.5	184.5	3,958.0	593.7
Titusville	588	0.646	380.0	279.6	-100.4	-	0.0	0.0
Indian Harbour Beach - <i>de minimus</i>	1	0.646	0.9	1.7	-	-	-	-
Total	47,600	N/A	30,749.5	63,610.4	32,860.1	1,740.9	32,860.1	4,929.0

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Indian River Lagoon (IRL) Basin Management Action Plans (BMAPs)

Types of Projects Eligible for Credit

February 1, 2012

Reductions in the loadings of total nitrogen (TN) and total phosphorus are needed to improve seagrass depth limit coverage in the IRL Basin. To accomplish this goal, stakeholders were asked to submit projects and programs that reduce nutrient loading to the lagoon. Completed projects since January 1, 2000 were eligible for BMAP credit because the land uses in the total maximum daily load (TMDL) model are based on circa 2000 data; therefore, benefits of management actions since January 1, 2000 were not reflected in the TMDL model. Projects were only given credit for the portion of the load reduction that was over and above any permit requirements for that project. This criterion was needed since permit conditions are established to maintain the current condition (prevent further impacts from the development) and do not contribute to the improvement of water quality in the lagoon.

Several project categories were eligible to receive credit in the BMAP. The first category is standard stormwater treatment best management practices (BMPs) used in Florida, which include:

- Retention BMPs (on-line and off-line systems, basins, and exfiltration trenches);
- Wet detention ponds;
- Dry detention;
- Baffle boxes;
- Nutrient (2nd generation) baffle boxes;
- Catch basin inserts/inlet filters;
- Swales;
- Alum injection;
- Stormwater reuse;
- Stormceptor units;
- Continuous deflective separation (CDS) units;
- Street sweeping; and
- Treatment trains using a combination of BMPs.

Some BMPs were assigned provisional nutrient reduction estimates for the purposes of the first iteration of the BMAPs. Studies to estimate the efficiencies of these BMPs are being conducted across the state, which will provide better information on the expected reductions from these BMPs for use in the next iteration of the BMAP. Provisional credit is assigned for:

- Floating islands/managed aquatic plant systems (MAPS); and
- Public education and outreach efforts.

Based on feedback from the stakeholders, the Florida Department of Environmental Protection (FDEP) is currently researching the nutrient reduction potential of several other types of BMPs. If these projects are found to reduce nutrients, credit can be assigned for these efforts in the BMAPs. These other BMP types include:

- Muck/sediment removal;
- Vegetation and algal harvesting; and
- Tilting weir gates in canals or other changes in water management that improve water quality.