

# An Environmental Restoration Success Story: Implementing a Reasonable Assurance Plan

June 18, 2026

**Benjamin Bartlett**  
Public Works Director  
Volusia County

**Jon Perry**  
Environmental Scientist V  
ESA

**Brett Cunningham**  
Managing Director  
Jones Edmunds

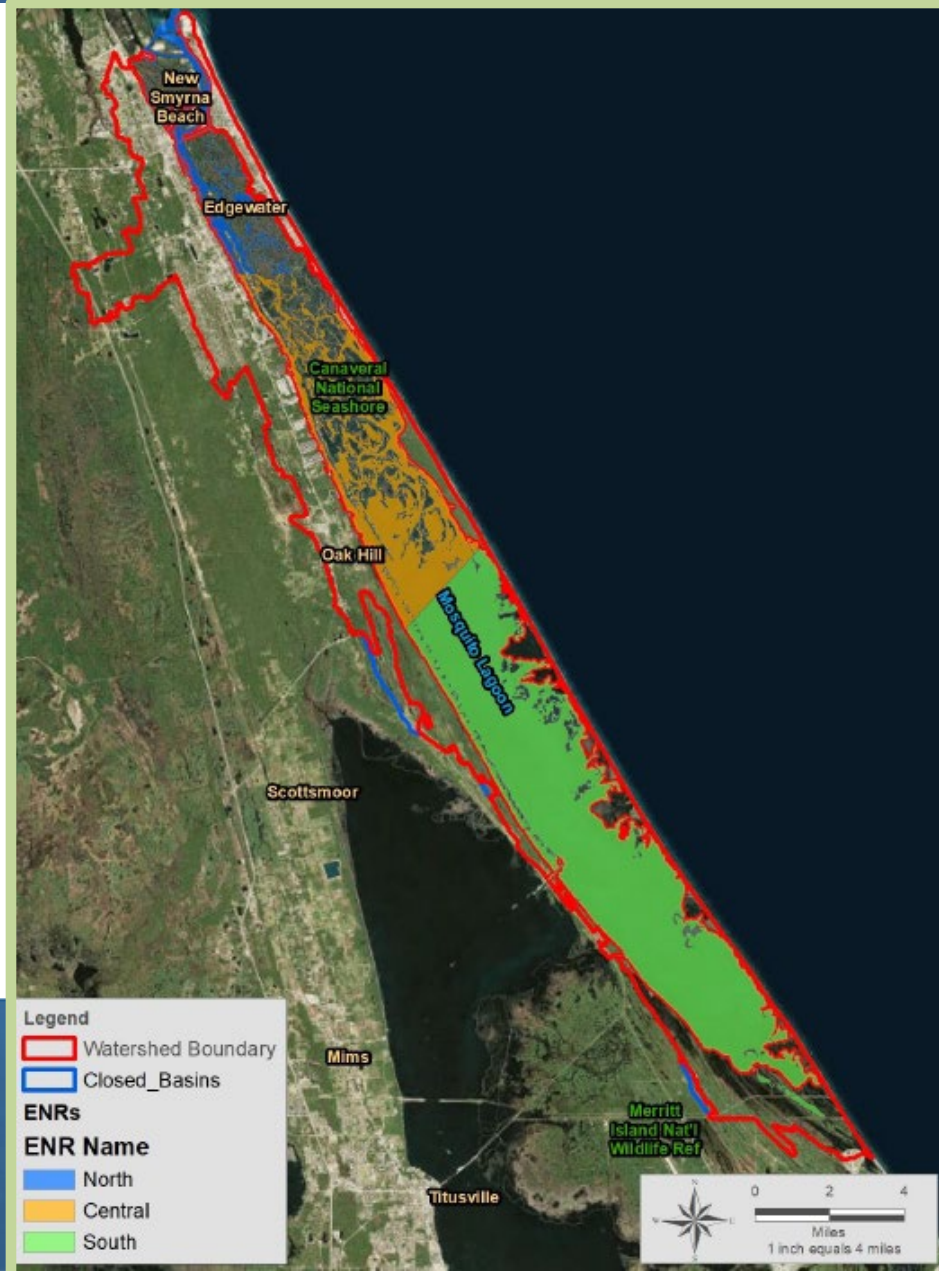


*JonesEdmunds*

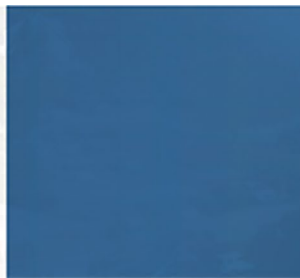


# Mosquito Lagoon Watershed

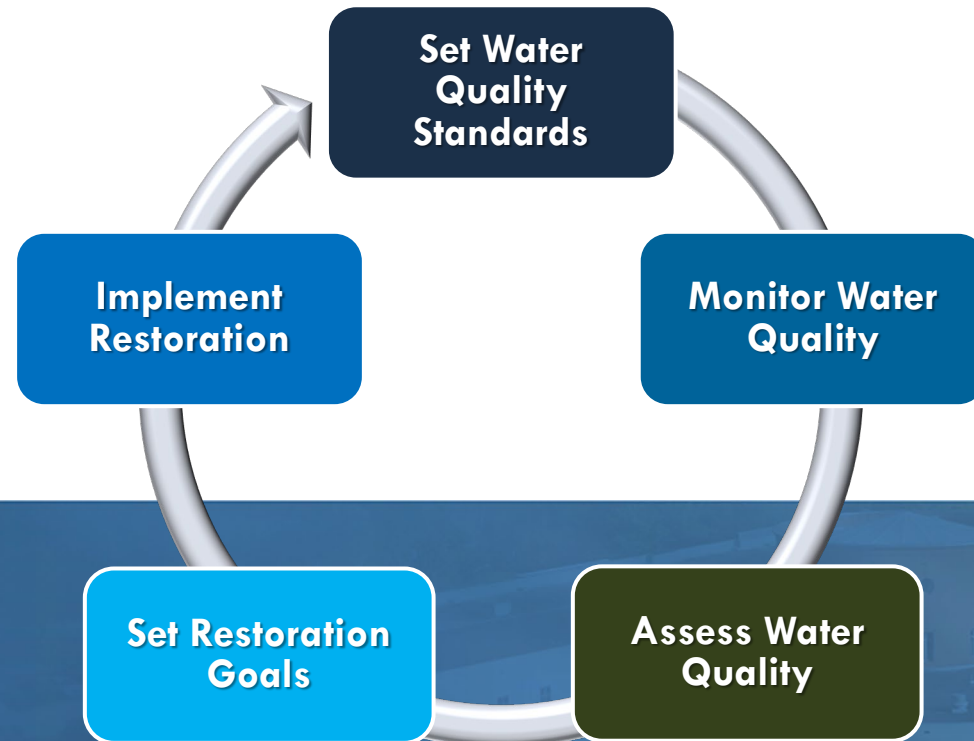
- Distinct section of the larger Indian River Lagoon system
- Approx. 36 miles long stretching across north Brevard County and south Volusia County
- Comprises the Canaveral National Seashore and Mosquito Lagoon Aquatic Preserve, which are Outstanding Florida Waters



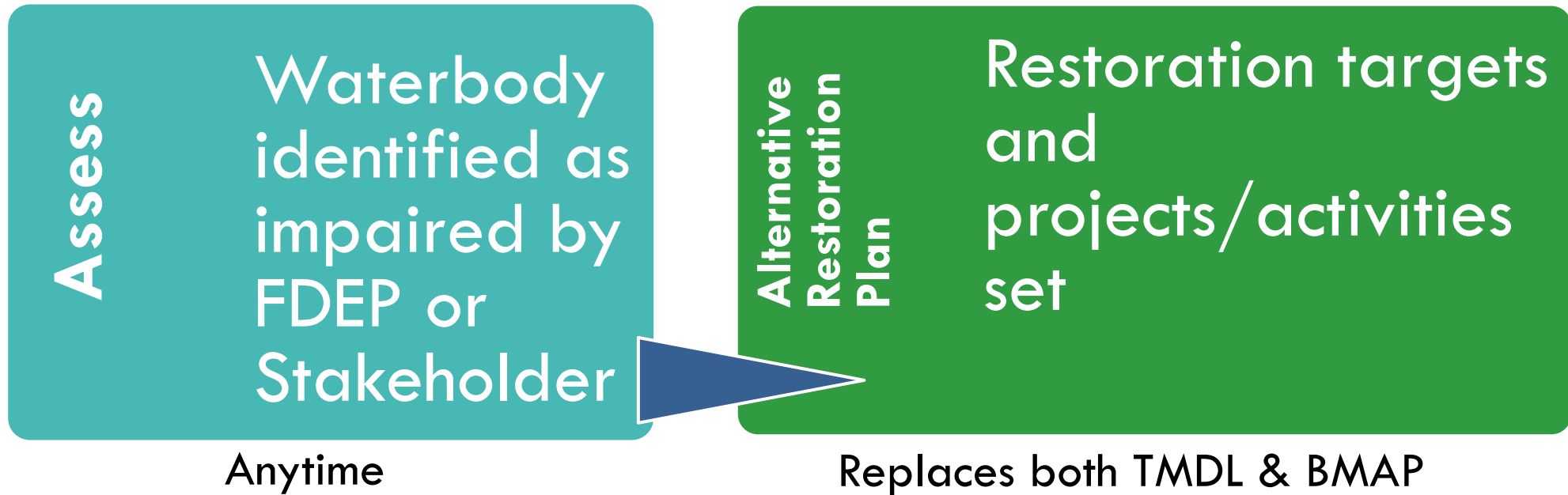
- FDEP subdivided into 3 Estuary Nutrient Regions (ENRs) for developing nutrient criteria (North, Central, South)
- Protected under the Indian River Lagoon System and Basin Act



# Traditional Approach: TMDL & BMAP



# Reasonable Assurance Plan Alternative



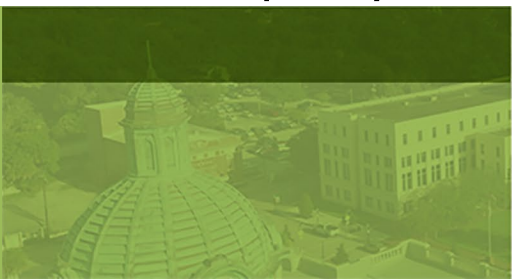
- Stakeholder Driven Process
- Implemented prior to FDEP developing a TMDL



# Reasonable Assurance Plan Inception

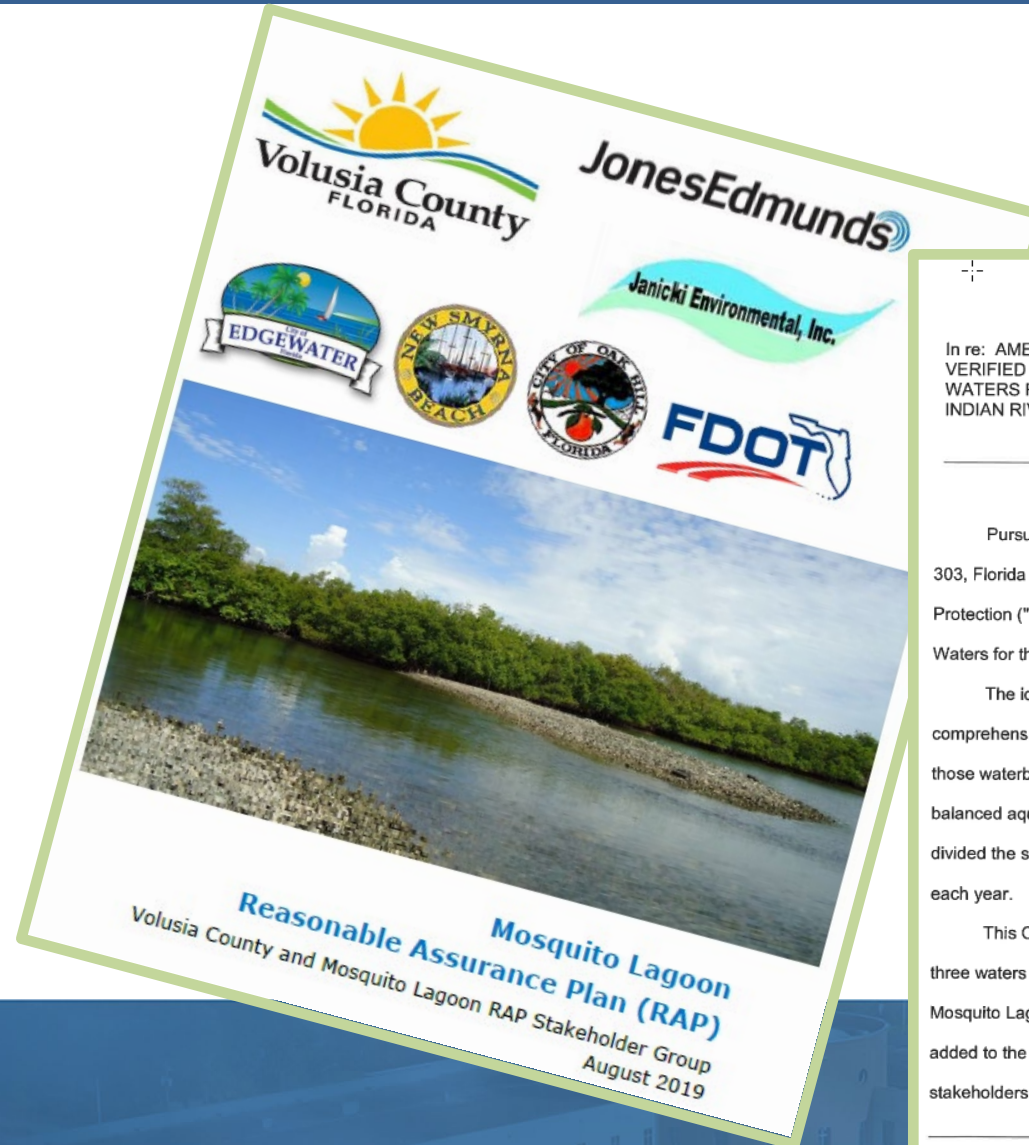


- Anticipated impairment declaration:
  - Multiple algal blooms observed since 2011
- June 2014 Volusia County Water Quality Workshop
  - Hosted by the Volusia County Council and included multiple cities
  - Joint Project Agreements in place by early 2016
  - Volusia County lead agency
- Public process with FDEP assistance and RAP Stakeholders:
  - City of Edgewater
  - City of New Smyrna Beach
  - City of Oak Hill
  - Florida Department of Transportation
  - Volusia County
- RAP provides a more cost-effective and locally driven path toward attaining water quality standards within 15 years



# Reasonable Assurance Plan Adoption

- Adopted by FDEP Secretarial Order on September 17, 2019
- Removed 3 waterbody segments from the Verified List of Impaired Waters and placed them into assessment Category 4B
- Developed local restoration goals and proposed management actions
- Identified projects and reductions of over 31,000 lbs/yr of TN and nearly 2,700 lbs/yr of TP



STATE OF FLORIDA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

In re: AMENDMENTS TO THE VERIFIED LIST OF IMPAIRED WATERS FOR THE GROUP 5 INDIAN RIVER LAGOON BASIN

OGC Nos.: 19-1072 – 19-1077

ORDER

Pursuant to Section 403.067(4), Florida Statutes ("Fla. Stat."), and Chapter 62-303, Florida Administrative Code ("F.A.C."), the Florida Department of Environmental Protection ("department") is adopting amendments to the Verified List of Impaired Waters for three waterbodies in the Group 5 Indian River Lagoon basin.

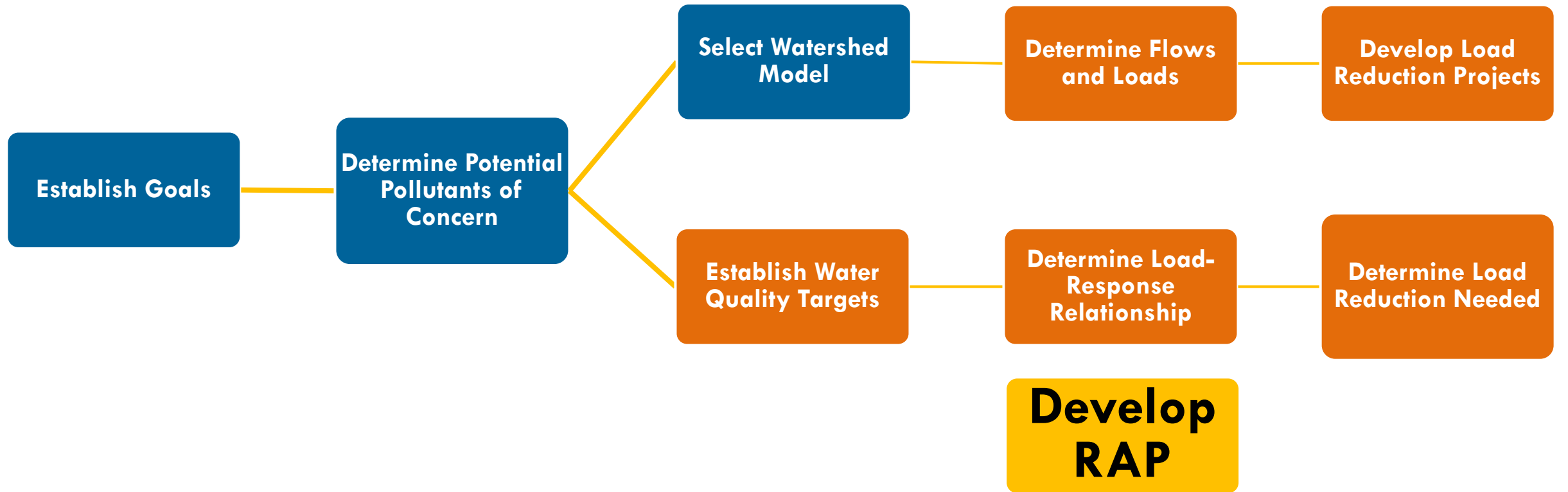
The identification of impaired waters is a critical component of the department's comprehensive process to scientifically assess Florida's surface waters and restore those waterbodies not meeting their designated uses (e.g., recreation, a healthy, well-balanced aquatic ecosystem, etc.). To facilitate this process, the department has divided the surface waters of the State into five groups, with one group being assessed each year.

This Order addresses amendments to the Verified List of Impaired Waters for three waters in the Group 5 Indian River Lagoon Basin<sup>1</sup> due to the approval of the Mosquito Lagoon Reasonable Assurance Plan. In June 2018 Mosquito Lagoon was added to the Verified List of Impaired Waters for nutrients and chlorophyll-*a*. At the time, stakeholders had initiated development of a reasonable assurance plan (RAP) intended

<sup>1</sup> The department initially adopted the Group 5 Verified List in May 2009. The Group 5 Verified List was subsequently amended in January 2010, February 2012, January 2014 and June 2018.

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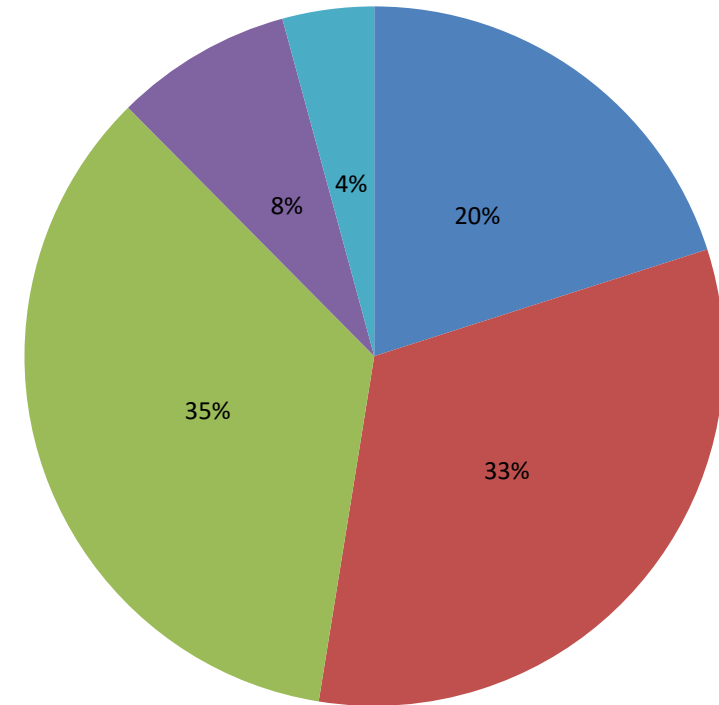
# Technical Framework



# Watershed Model: SIMPLE

- **Met selection criteria**
- **Transparency with Stakeholders**
- **Time-Enabled Data**
- **Flexible for Analyses of Options**

TN for North Lagoon (ENR 1) (2004-2015)



■ Atmospheric Deposition ■ Baseflow ■ Direct Runoff ■ Point Source ■ Septic



# Loading Targets

- **Define the nutrient loading targets that are needed to restore and protect estuarine health**
- **Definition of nutrient loading targets generally follows one of three alternative approaches**
  - **Empirical Modeling**
  - **Mechanistic Modeling**
  - **Reference Period**

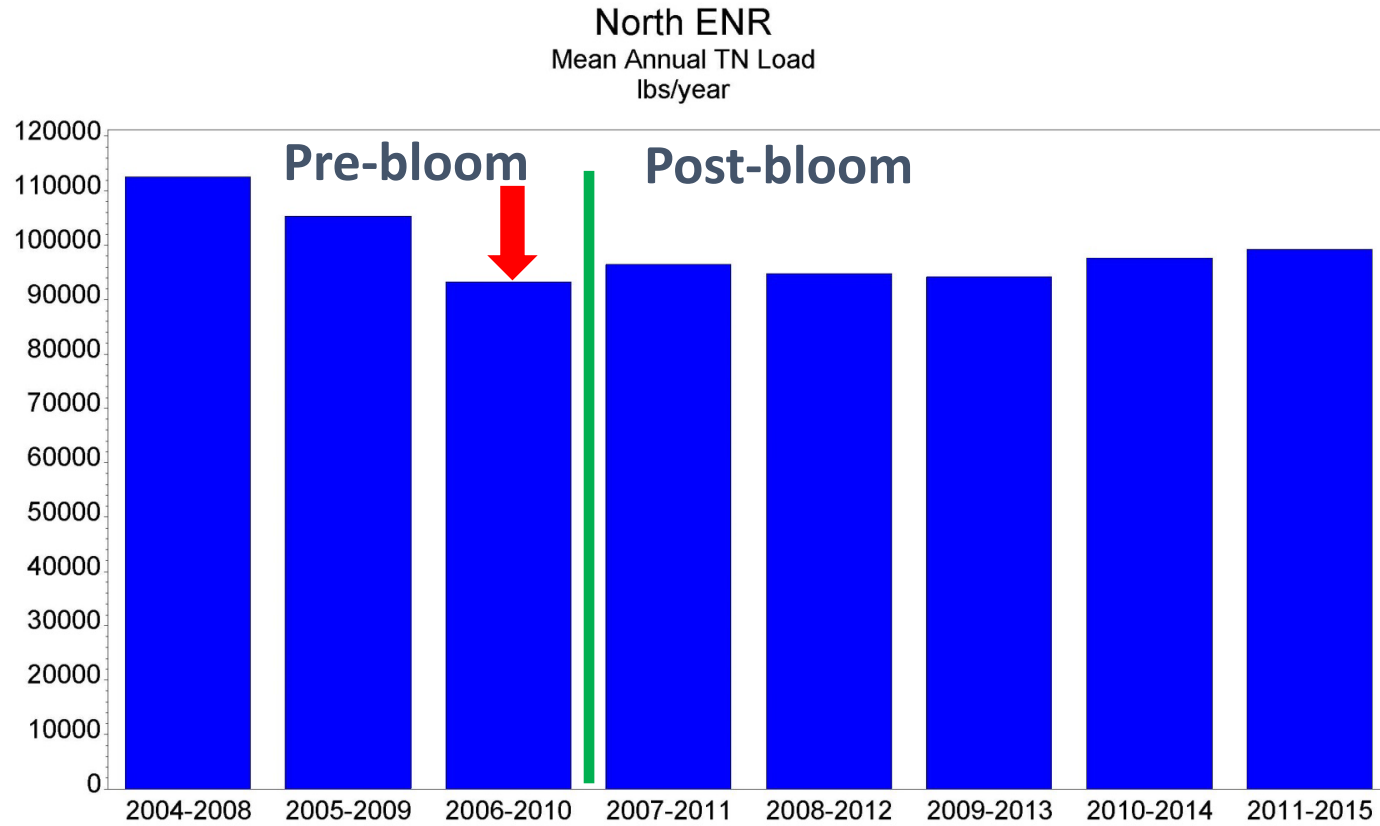


# Reference Period Approach

- **A reference period approach was used to establish the current NNCs for Mosquito Lagoon**
- **That reference period was defined as 2004-2008**
- **Examine the nutrient loading for that period and compare to other potential reference periods**



# Reference Period Approach



# Reference Period Approach

- **Four criteria:**
  - **Conservative, i.e., protective**
  - **Avoids the bloom period**
  - **Is not biased by excessively high or low rainfall**
  - **If possible, be reflective of management actions that have already been achieved**



# Proposed Nutrient Loading Targets (lbs/year)

## TN Loads

ENR	Baseline	Target	% Reduction
North	110,059	93,328	15
Central	102,905	88,557	14
South	173,125	146,245	16

## TP Loads

ENR	Baseline	Target	% Reduction
North	12,370	10,538	15
Central	8,000	7,343	8
South	8,314	7,492	10

# Proposed Nutrient Loading Targets (lbs/year)

## Treatable TN Loads

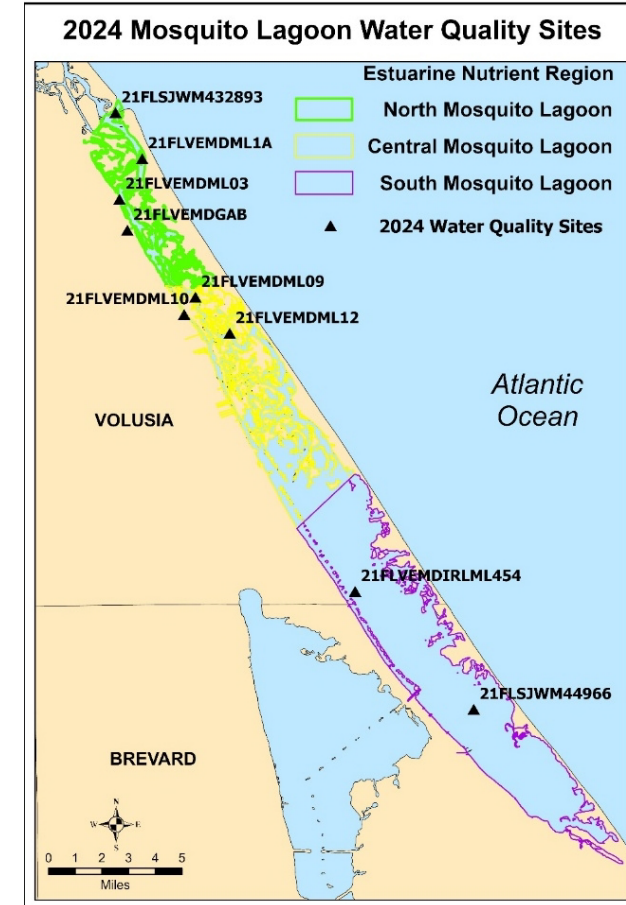
ENR	Mean 2006-2010	% Reduction	Load Reduction
North	77,096	15	11,564
Central	7,520	14	7,520
South	77,441	16	12,391

## Treatable TP Loads

ENR	Mean 2006-2010	% Reduction	Load Reduction
North	10,195	15	1,529
Central	6,620	8	530
South	6,125	10	613

# Monitoring Compliance and Reporting

- **Annual**
  - Ambient water quality monitoring
- **5-Year Updates**
  - Nutrient loading
  - Seagrass
  - Project Tracking
  - Progress in existing projects
  - Identification of new projects



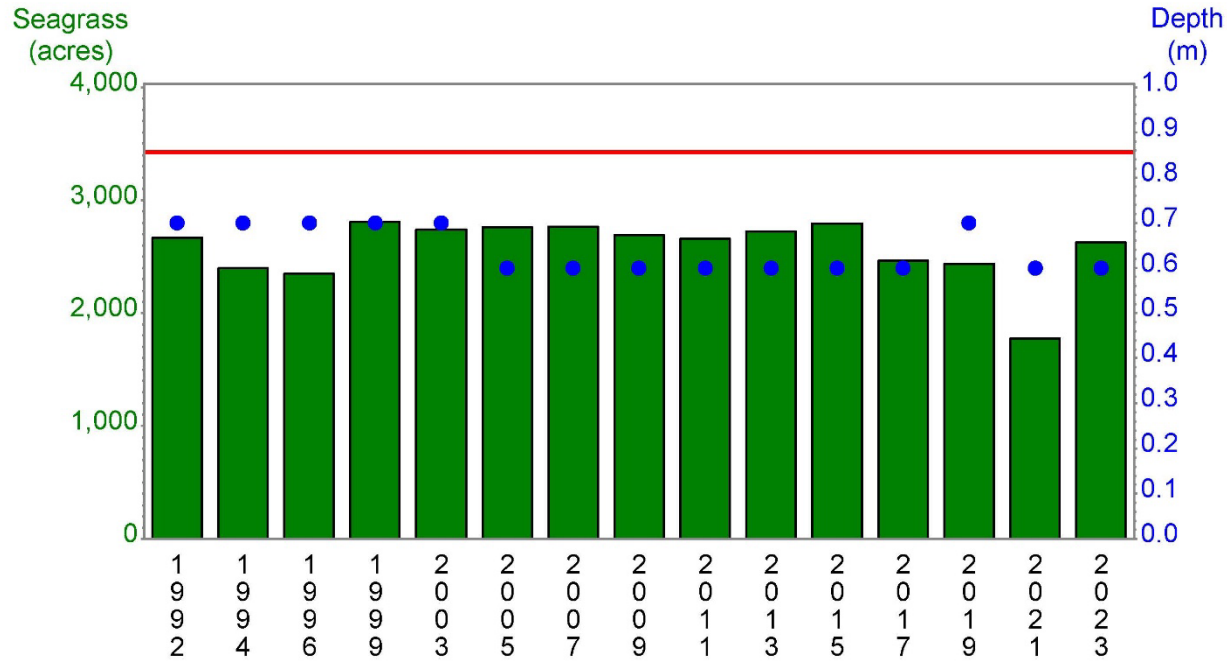
# Results

- **Successfully assessed and documented current water quality and biological conditions**
- **Established appropriate and measurable indicators, endpoints, goals, and targets**
- **Identified and prioritized appropriate prevention or restoration projects**

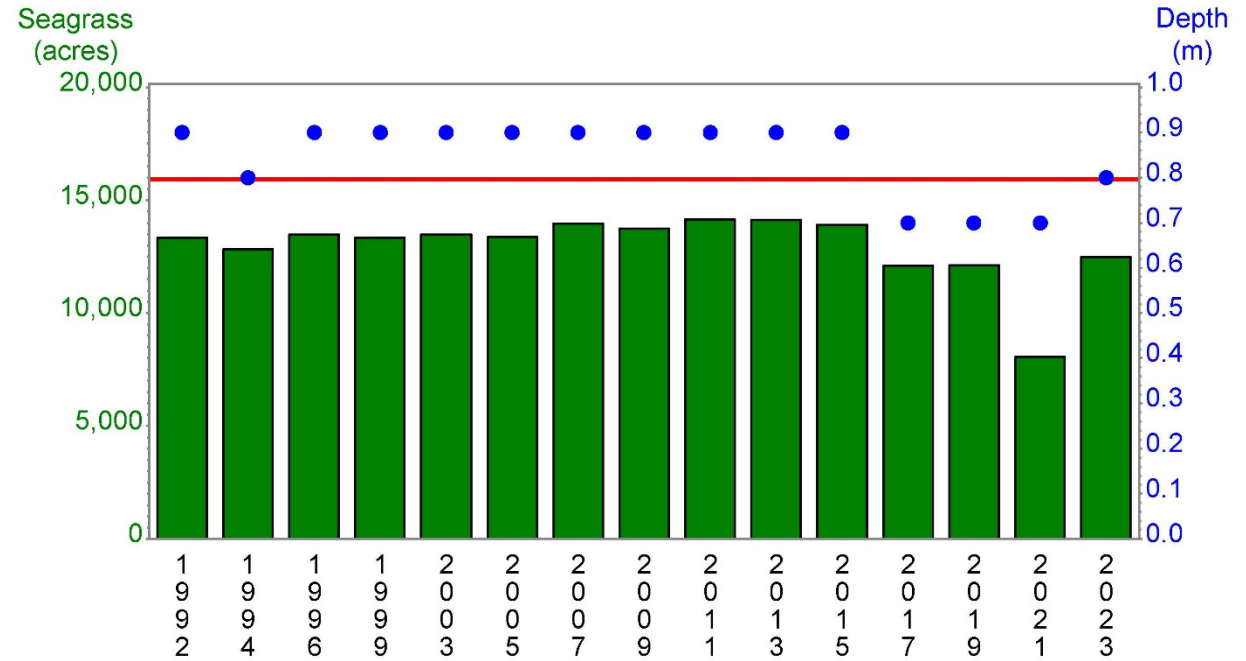


# Results

Central Mosquito Lagoon  
Annual Seagrass Coverage & Median Deep-edge Depth

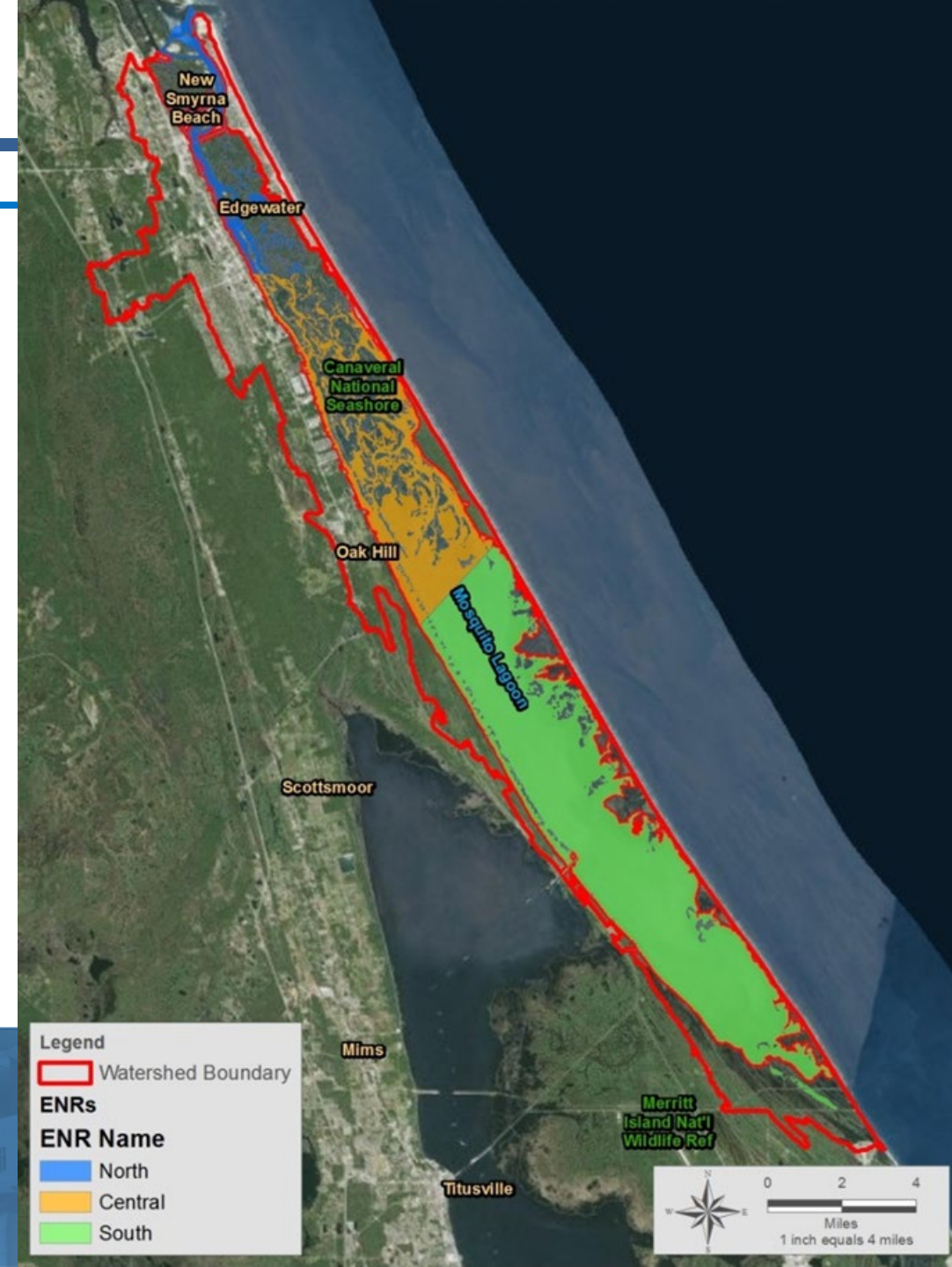


South Mosquito Lagoon  
Annual Seagrass Coverage & Median Deep-edge Depth



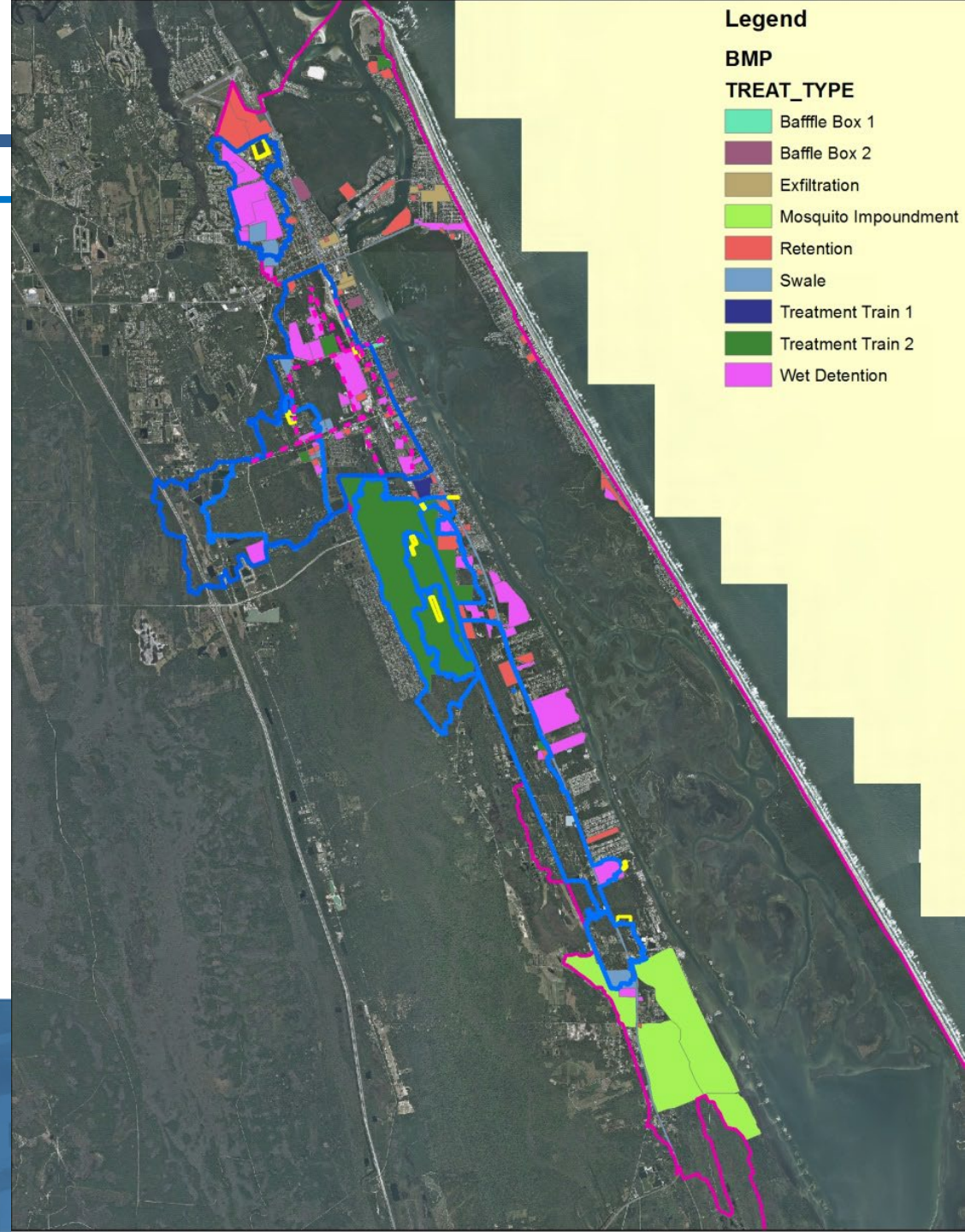
# Watershed Characteristics

- **36 Miles Long, 117 Square Miles**
- **Three ENRs**
- **Aquatic Preserve over South ENR**
- **Connected to Ponce Inlet and North IRL**
- **Watershed: Waterbody**
- **Small Subwatersheds**



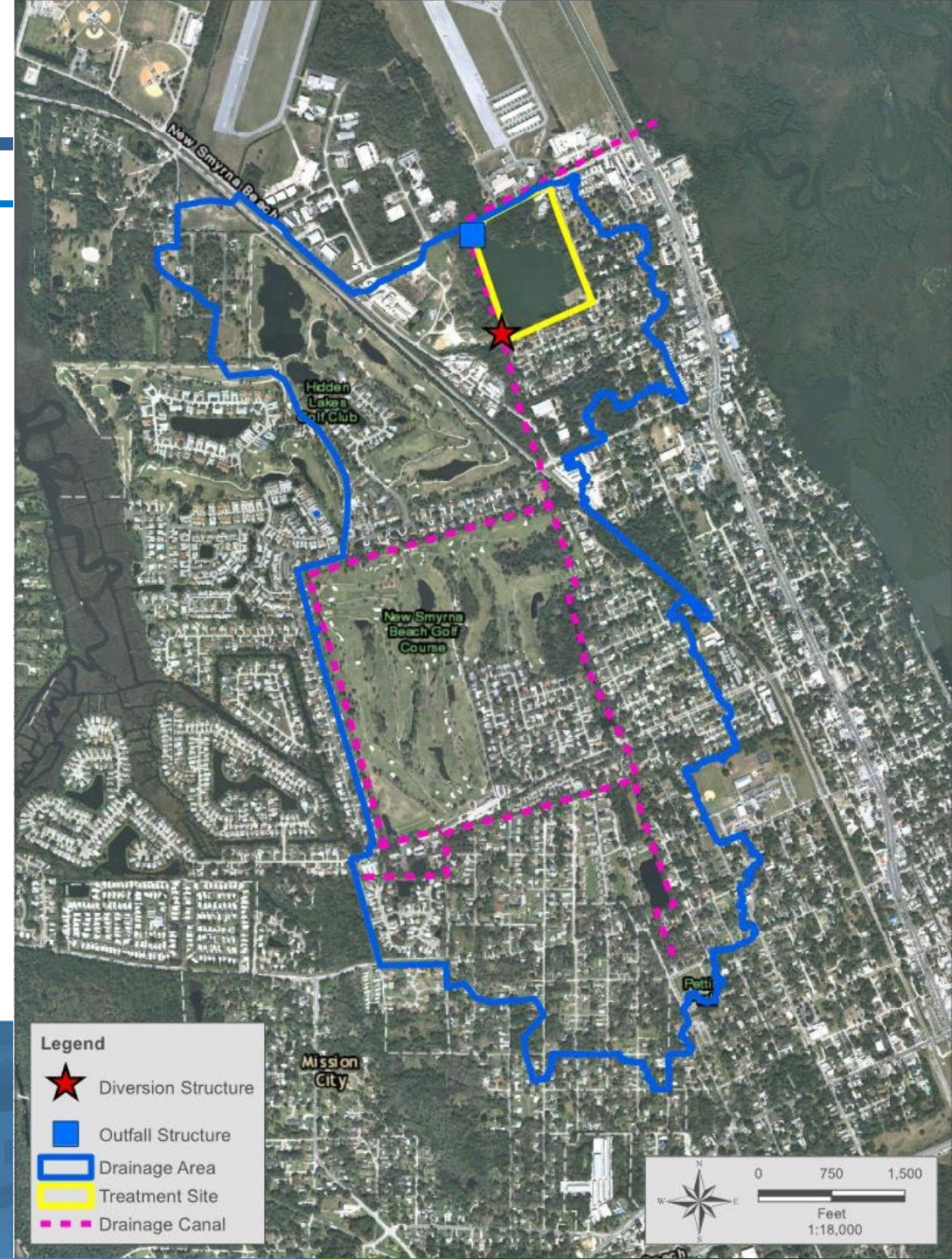
# Project Options Overview

- **Large Treatment Areas**
- **Economies of Scale**
- **Untreated Areas**
- **Spread Across Stakeholders**
- **Flexibility**
- **Lowest Life-Cycle Costs**
- **31,500 lb/yr TN**



# 1: Diversion to Borrow Pit

- Avoids Large Excavation
- Base Flow and Runoff
- Treats 640 Acres
- 1,300 lb/yr TN
- \$20/lb TN



# 2: 10th Street Facility

- **Base Flow and Runoff**
- **BAM Filtration System**
- **Treats 4,600 Acres**
- **5,600 lb/yr TN**
- **\$20/lb TN**



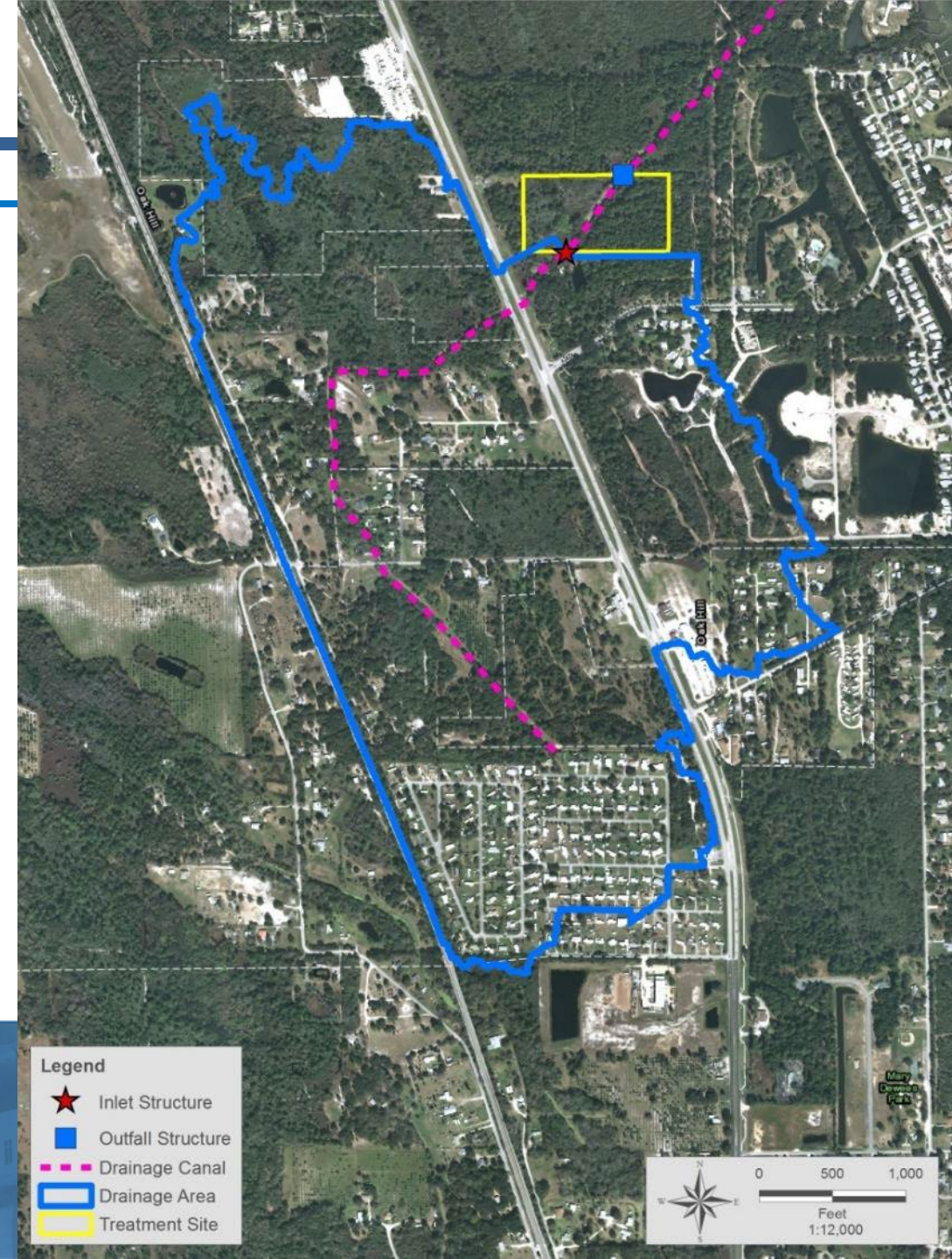
# 9: Ariel Canal

- **Retrofit of a Retrofit**
- **BAM Outfall**
- **Treats 1,500 Acres**
- **1,300 lb/yr TN**
- **\$90 lb/yr TN**



# 10: Lighthouse Cove

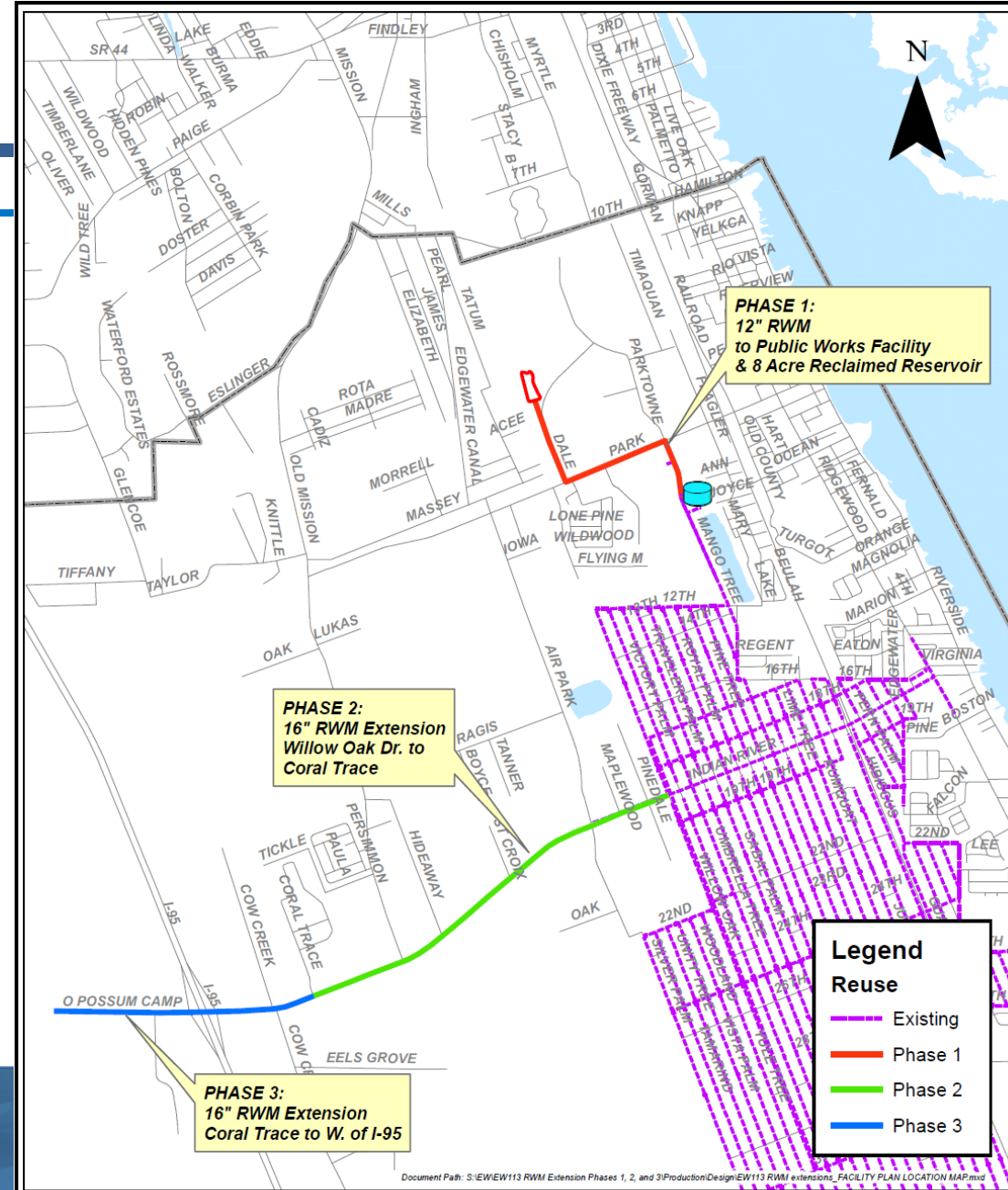
- **Base Flow and Runoff**
- **Treats 420 Acres**
- **760 lb/yr TN**
- **\$80/lb TN**





# 14: Reclaimed Extensions

- 4900 lb/yr TN
- \$80/lb TN



QUENTIN L. HAMPTON ASSOCIATES, INC.  
CONSULTING ENGINEERS  
FLORIDA CERTIFICATE OF AUTHORIZATION NUMBER: 626  
FAX: 386.761.3977  
P.O. DRAWER 290247 PORT ORANGE, FL 32129-0247  
PHONE: 386.761.6810

CITY OF EDGEWATER  
RECLAIMED WATER  
MAIN EXTENSIONS  
PHASES 1, 2 & 3  
WW FACILITY PLAN UPDATE

**FIGURE 1**  
RECLAIMED WATER MAIN  
EXTENSIONS  
LOCATION MAP



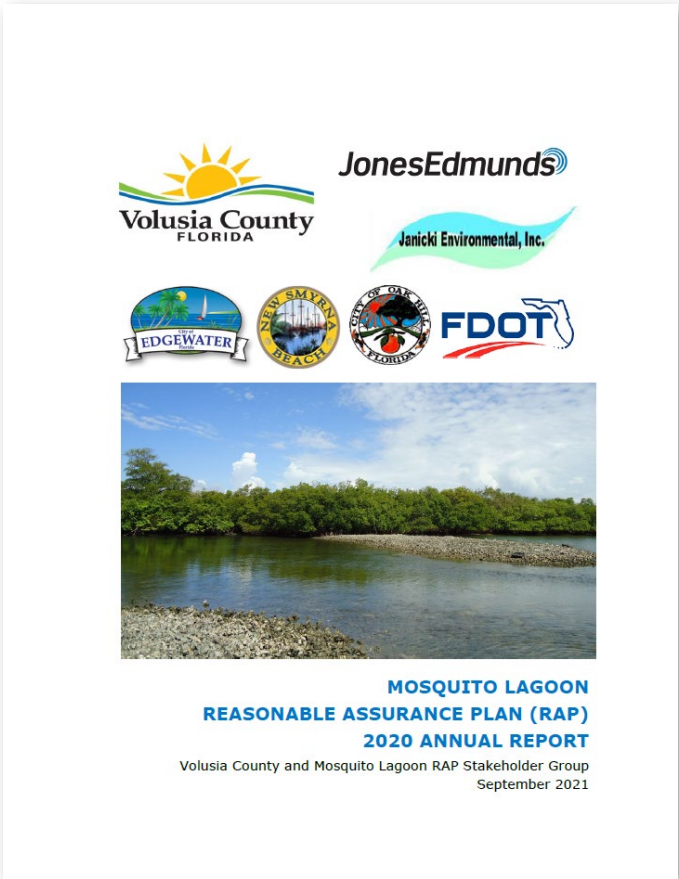
# 13: Programmatic Changes

- **3% Current Reduction: 2,100 lb/yr TN**
- **6% Reduction with FYN: 4,100 lb/yr TN**



# Restoration Timeline

- June 2014** → County Council Workshop
- Adopts Resolution ← **September 2014**
- February 2015** → County Council Adopts a Water Quality Plan
- Funding for RAP ← **September 2015**
- February 2016** → Joint Project Agreement
- Approved RAP ← **September 2019**



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# Results

Segment	Year	TN	TP	Chlorophyll <i>a</i>
North Mosquito Lagoon	2020	0.48	0.058	3.6
	2021	0.40	0.058	3.3
	2022	0.47	0.057	3.9
	2023	0.35	0.064	2.3
	2024	0.45	0.070	2.4
Central Mosquito Lagoon	2020	0.65	0.056	4.8
	2021	0.61	0.057	5.1
	2022	0.60	0.056	5.4
	2023	0.37	0.055	2.7
	2024	0.44	0.046	2.5
South Mosquito Lagoon	2020	1.21	0.045	9.2
	2021	1.15	0.049	13.4
	2022	0.98	0.048	9.5
	2023	0.73	0.042	5.4
	2024	0.99	0.043	5.6



# Restoration Timeline

- **Complete, Except for One Project**
- **All Projects Grant-funded!**
- **TN Targets are being met**
- **Chlorophyll-a being in met 2 of 3 segments**
- **Increases in seagrass**

Segment	Year	TN	TP	Chlorophyll <i>a</i>
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