

Mosquito Lagoon Draft Reasonable Assurance Plan

October 19, 2018

Origin - Water Quality Workshop

June 26, 2014 - County Council hosts a water quality workshop

Agenda:

- Priority Surface Waters
- Water Quality Overview
 - Surface Water Quality Monitoring
 - Common Pollutants and Sources
- **Regulatory Protections of Water Bodies**
- Volusia County Stormwater Management
- Wastewater/Septic Infrastructure
- City Presentations:
 - Daytona Beach, Daytona Beach Shores, Deland, Deltona, Edgewater, Lake Helen, New Smyrna Beach, Orange City, Ormond Beach, Ponce Inlet, Port Orange, South Daytona



Stakeholders

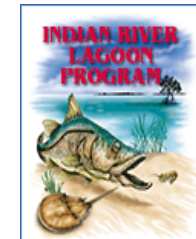
Stakeholders within the Mosquito Lagoon Watershed:

- Volusia County
- City of Oak Hill
- City of Edgewater
- City of New Smyrna Beach
- Florida Department of Transportation



And collaboration with:

- Florida Department of Environmental Protection (FDEP)
- Indian River Lagoon Council
- St. Johns River Water Management District (SJRWMD) and others





Benefits of Stakeholder Restoration Plans

Provides a faster path to restoration

Allows stakeholders to control their destiny

Developing a plan prior to state/federal action provides the best way for stakeholders to plan for efficient and effective management

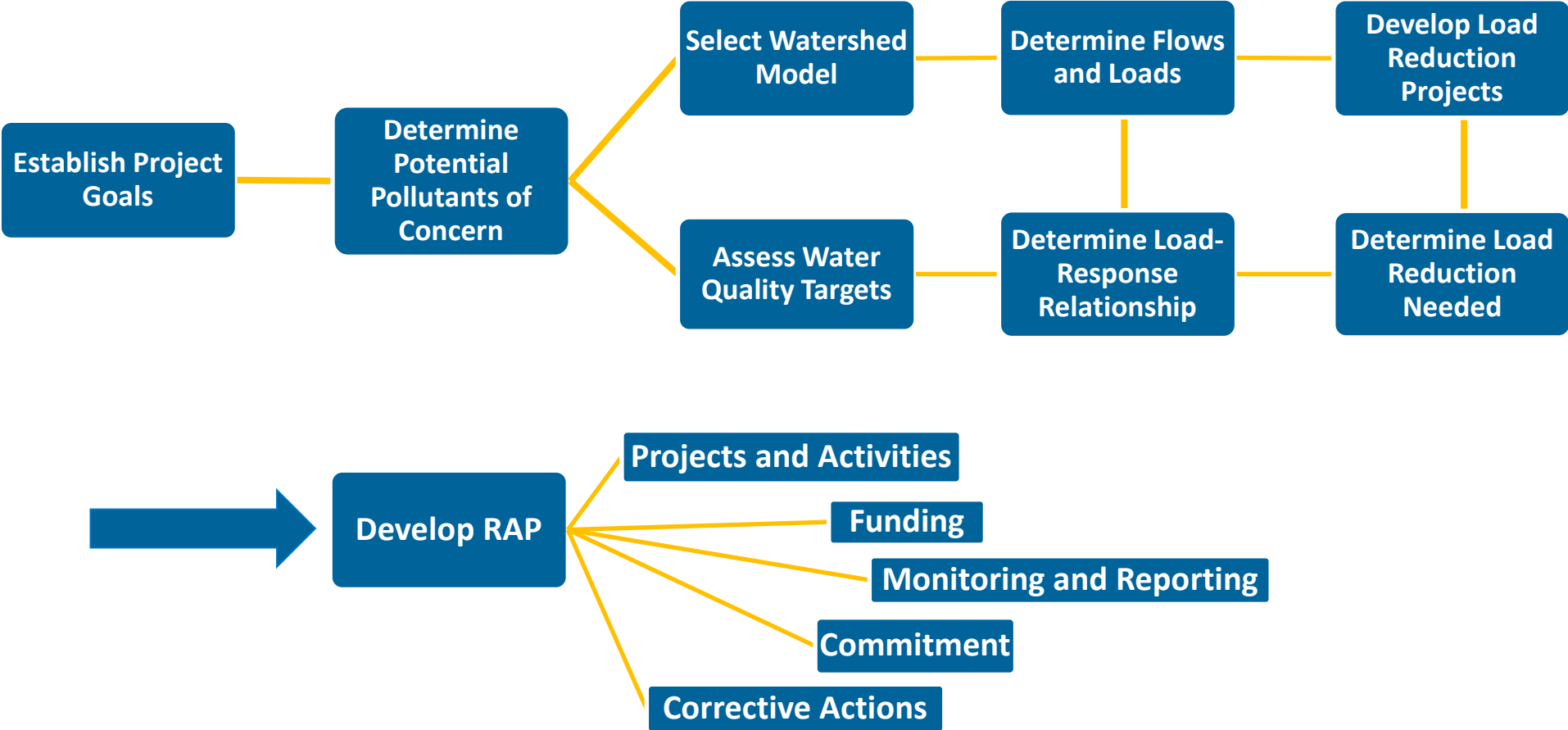
Acknowledges proactive efforts

Stakeholders receive credit for pollutant reductions
Benefits to downstream impaired waters

Provides time for good targets to be developed

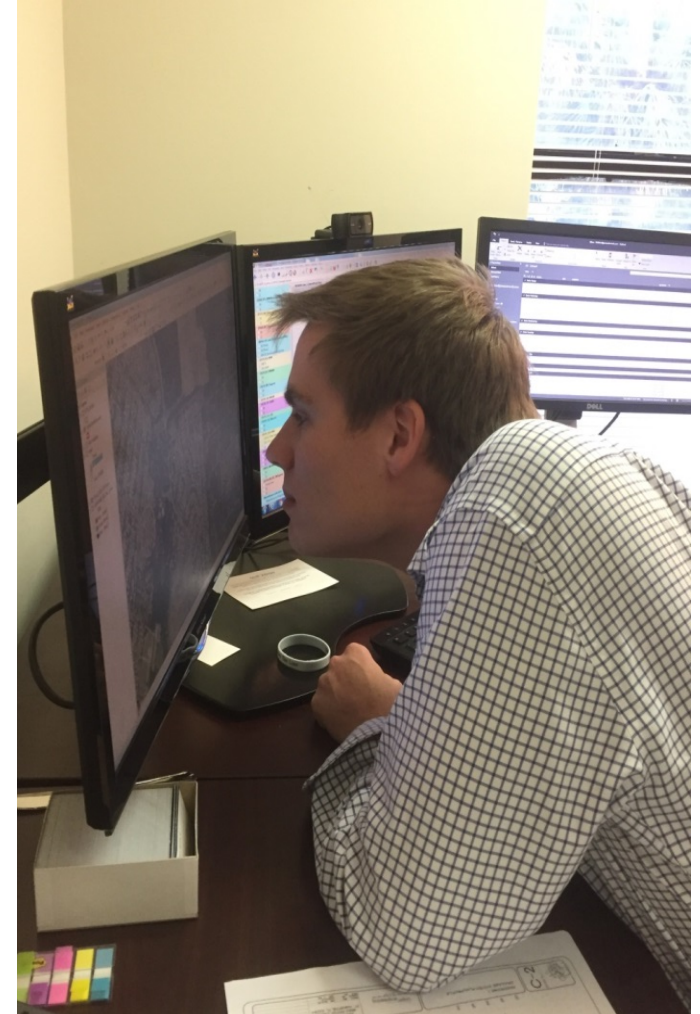
Enhances public relations

RAP Framework

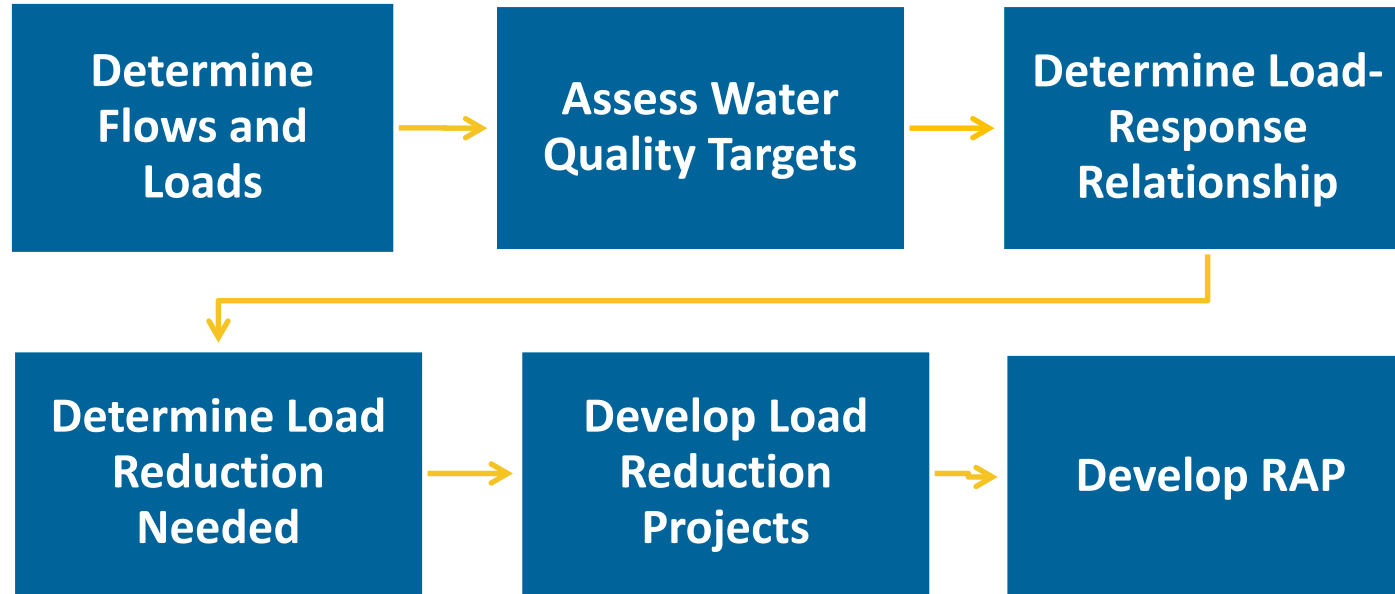


Importance of Transparency and Documentation

- 15 Progress Meetings
- Collaboration Site
- Discussion and documentation of each significant step
- Written and verbal responses to report comments

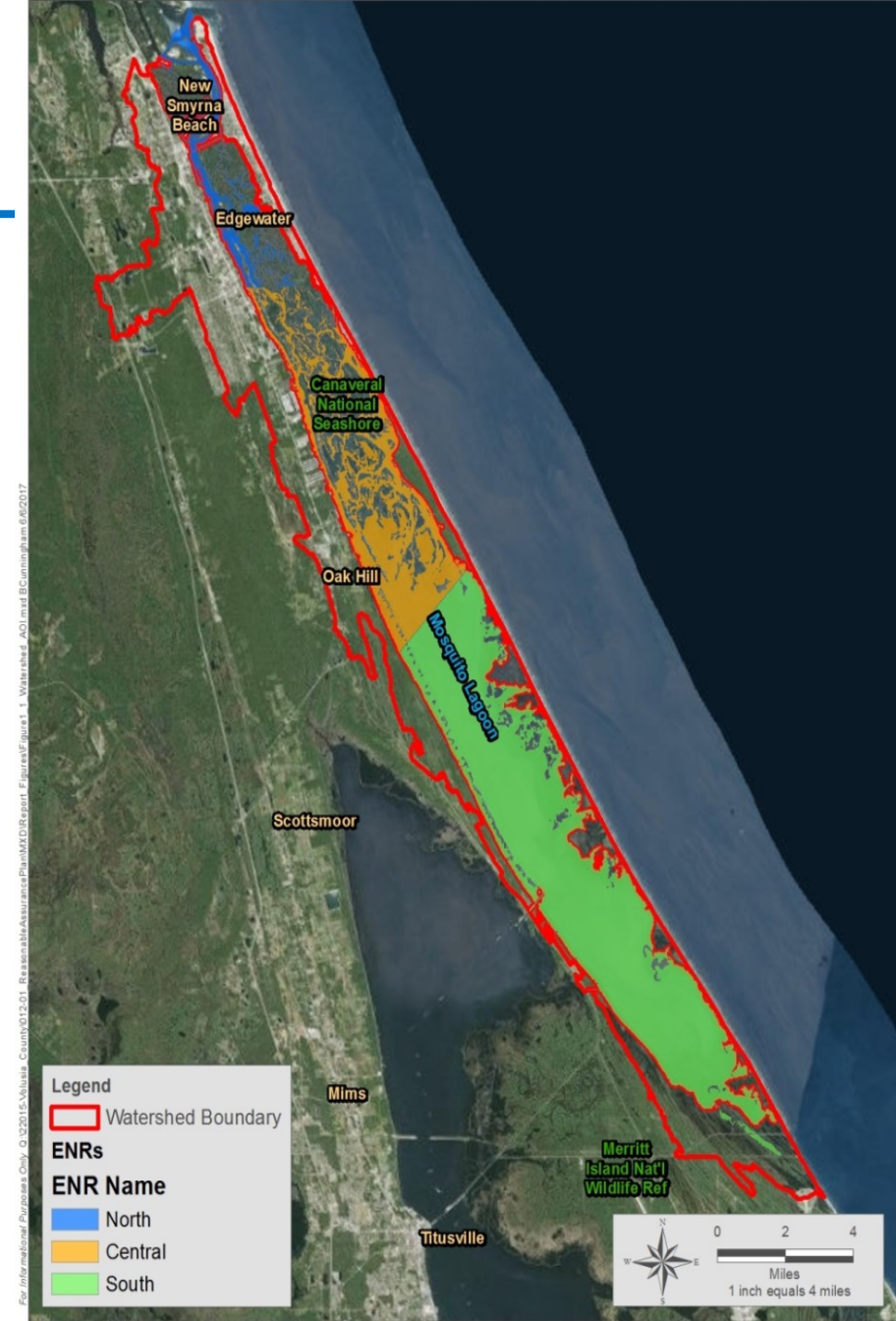


Presentation Outline



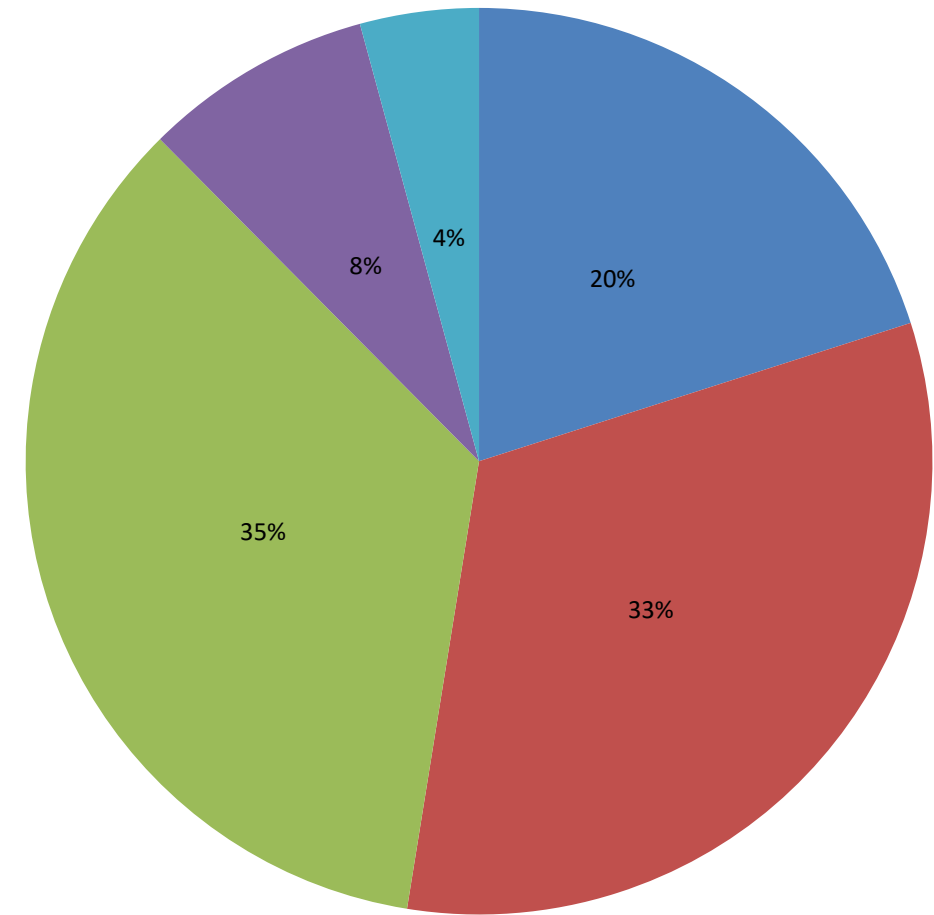
Watershed and Estuary Nutrient Regions (ENRs)

- Ratio of land to water is very small
- Urbanized in northern half
- More well-drained soils in northern half
- Three ENRs
- Connections at Ponce Inlet and Haulover Canal



North ENR Total Nitrogen (TN) Results

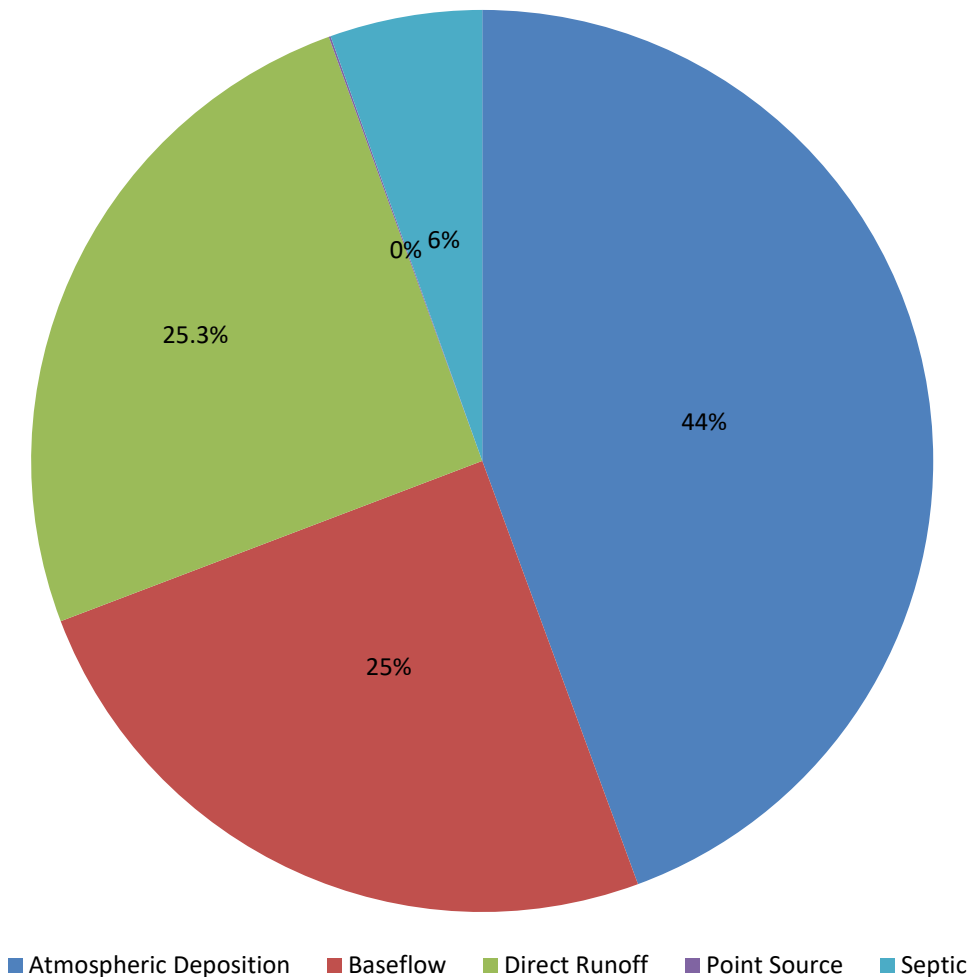
TN for North Lagoon (ENR 1) (2004-2015)



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

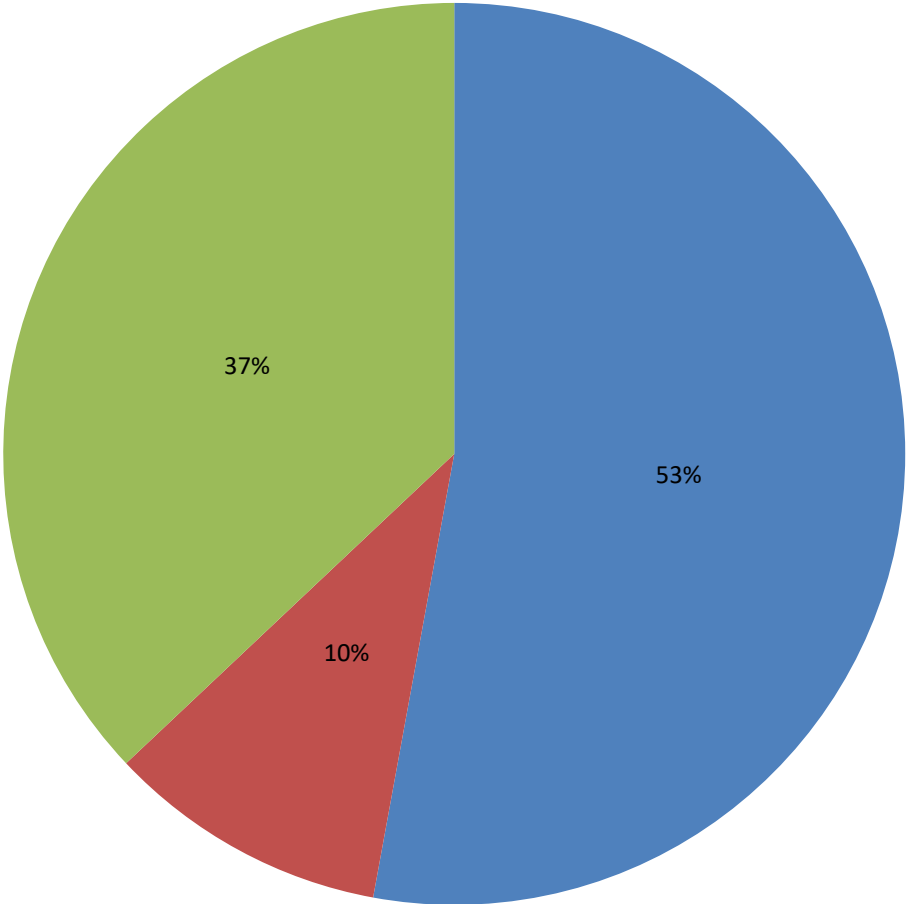
Central ENR TN Results

TN for Central Lagoon (ENR 2) (2004-2015)



South ENR TN Results

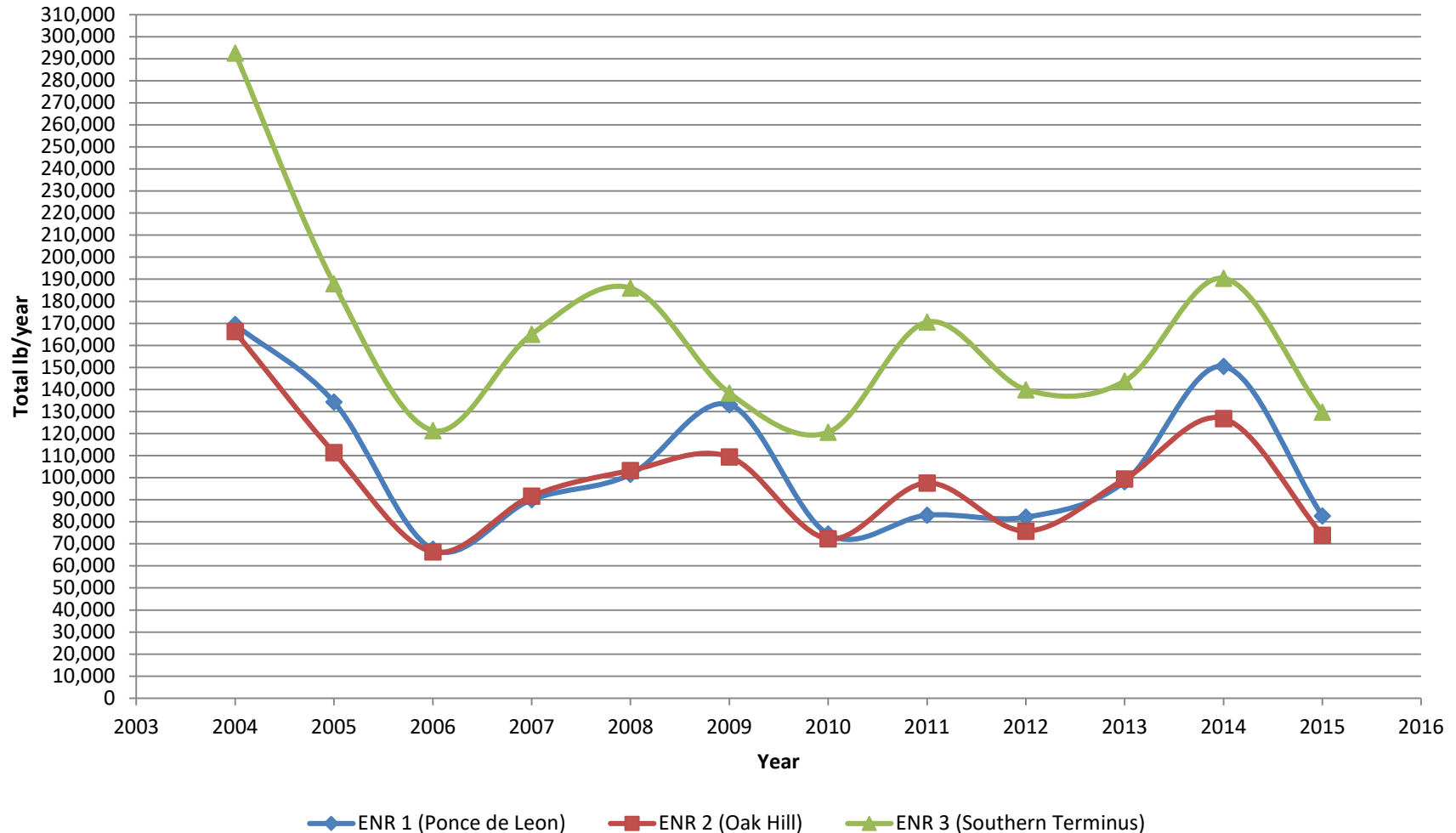
TN for South Lagoon (ENR 3) (2004-2015)



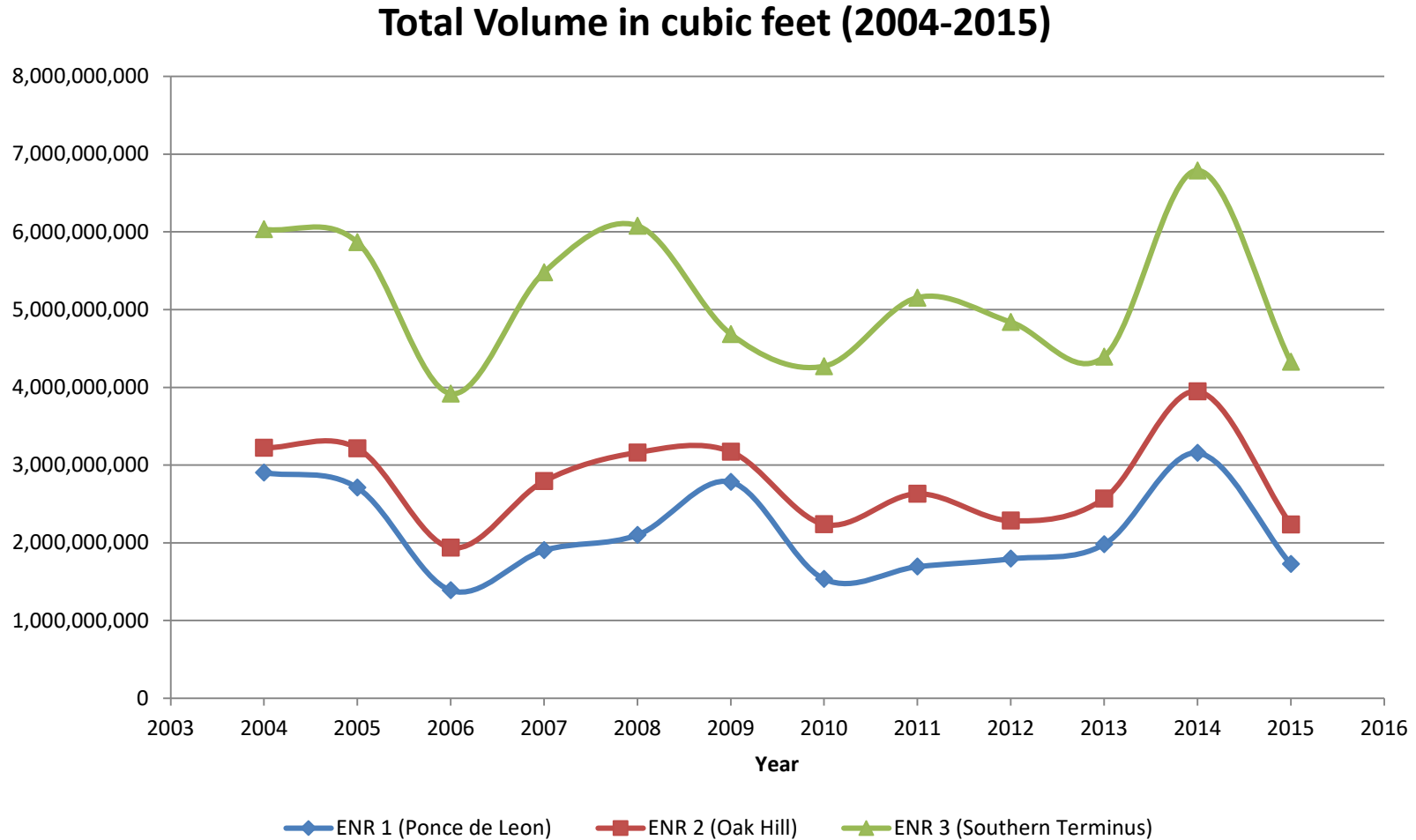
■ Atmospheric Deposition ■ Baseflow ■ Direct Runoff

TN Results

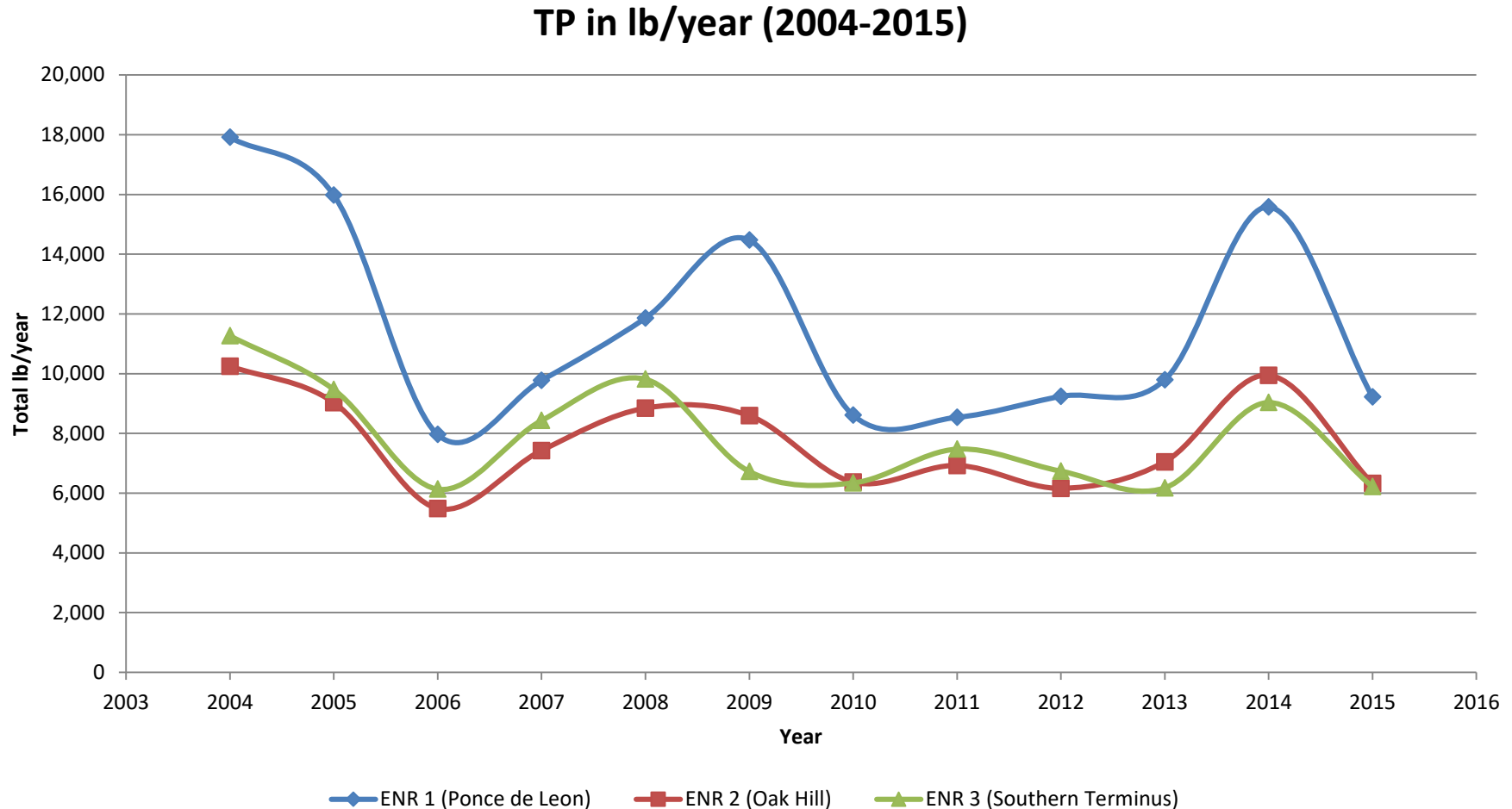
TN in pounds per year (lb/year) (2004-2015)



Total Volume Results

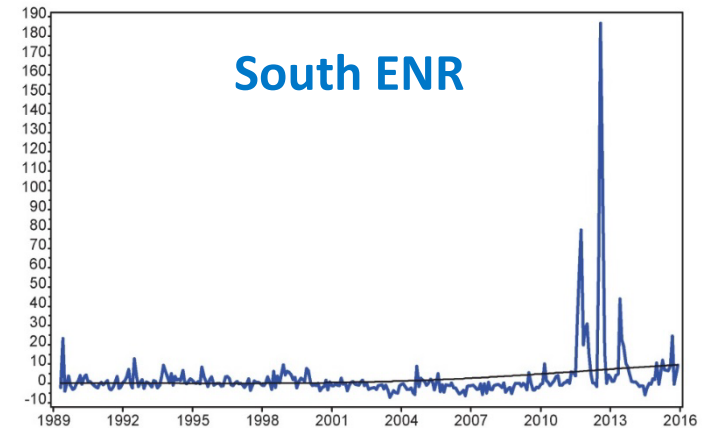
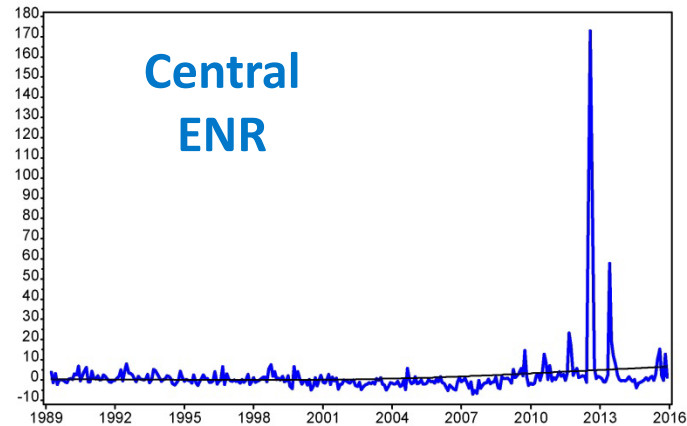
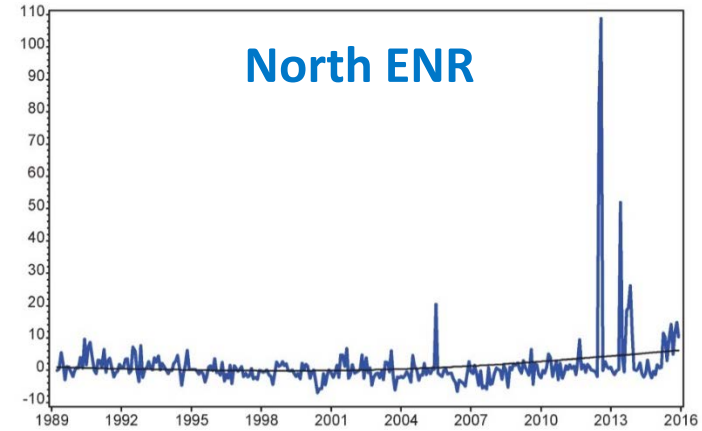


Total Phosphorus (TP) Results



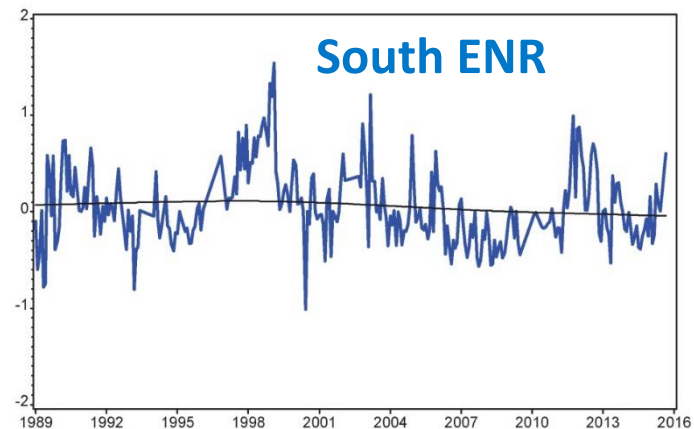
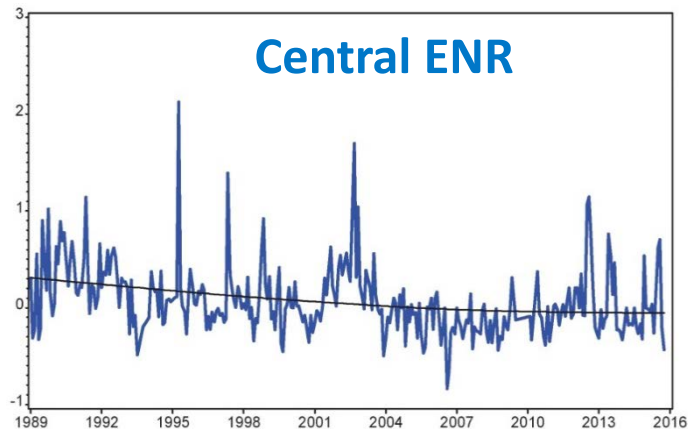
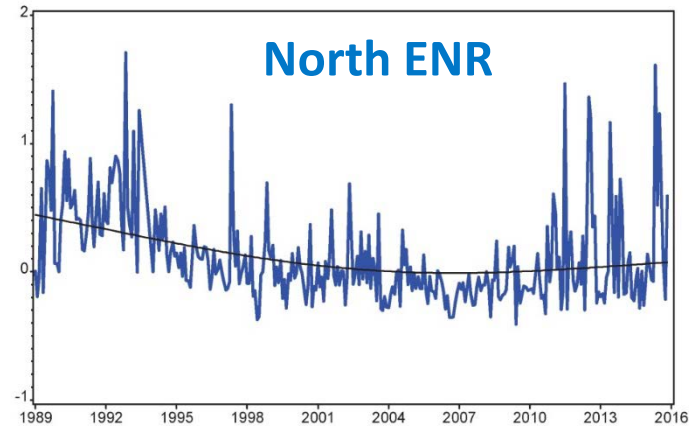
Water Quality Trends

Chlorophyll a



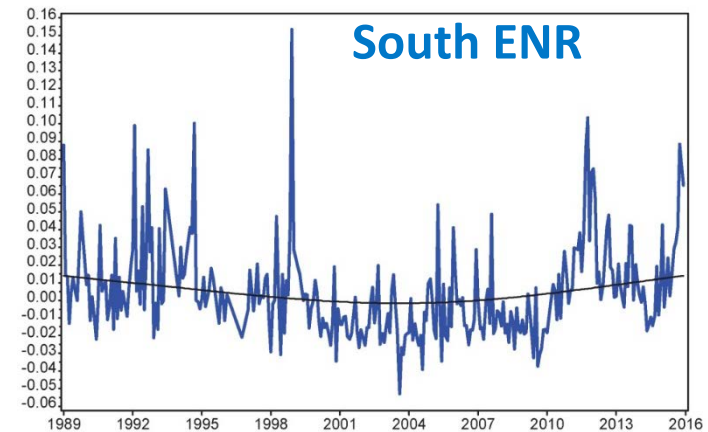
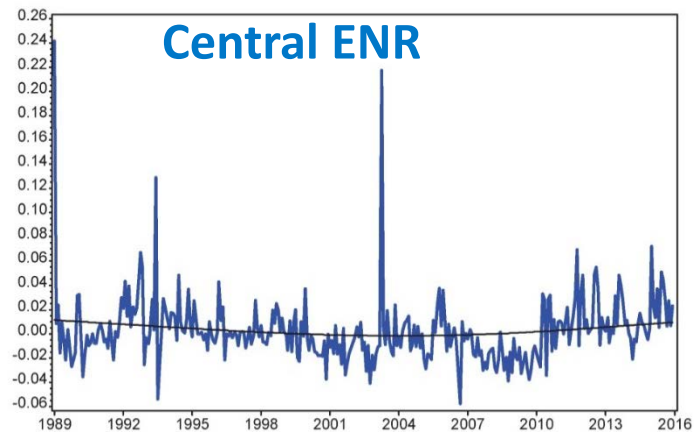
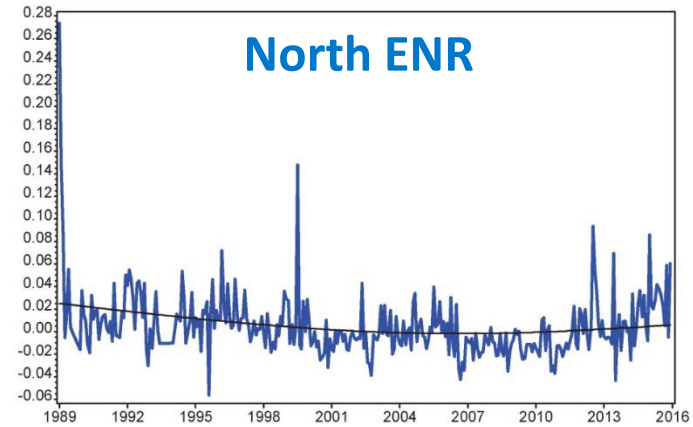
Water Quality Trends

Total Nitrogen

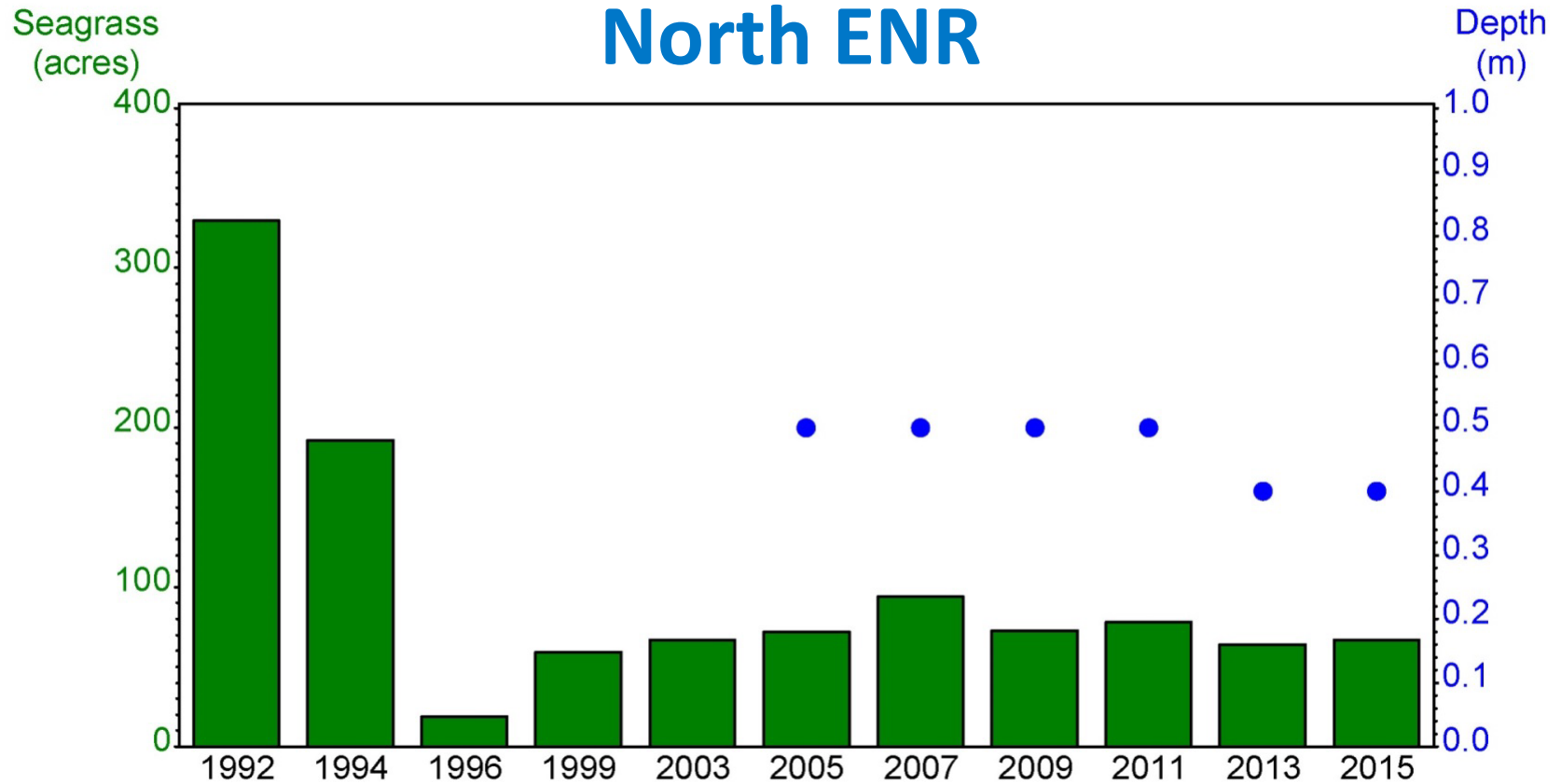


Water Quality Trends

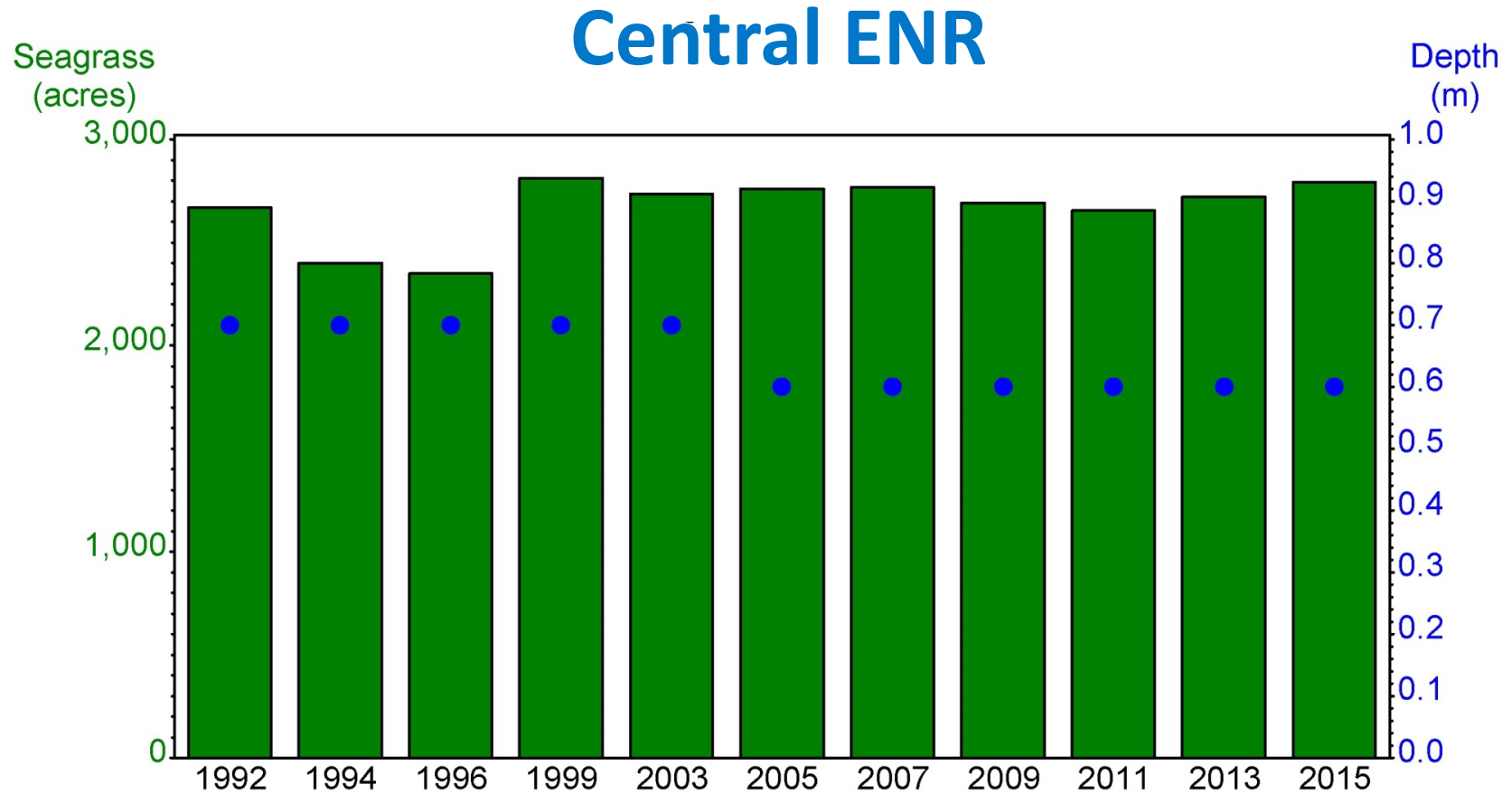
Total Phosphorus



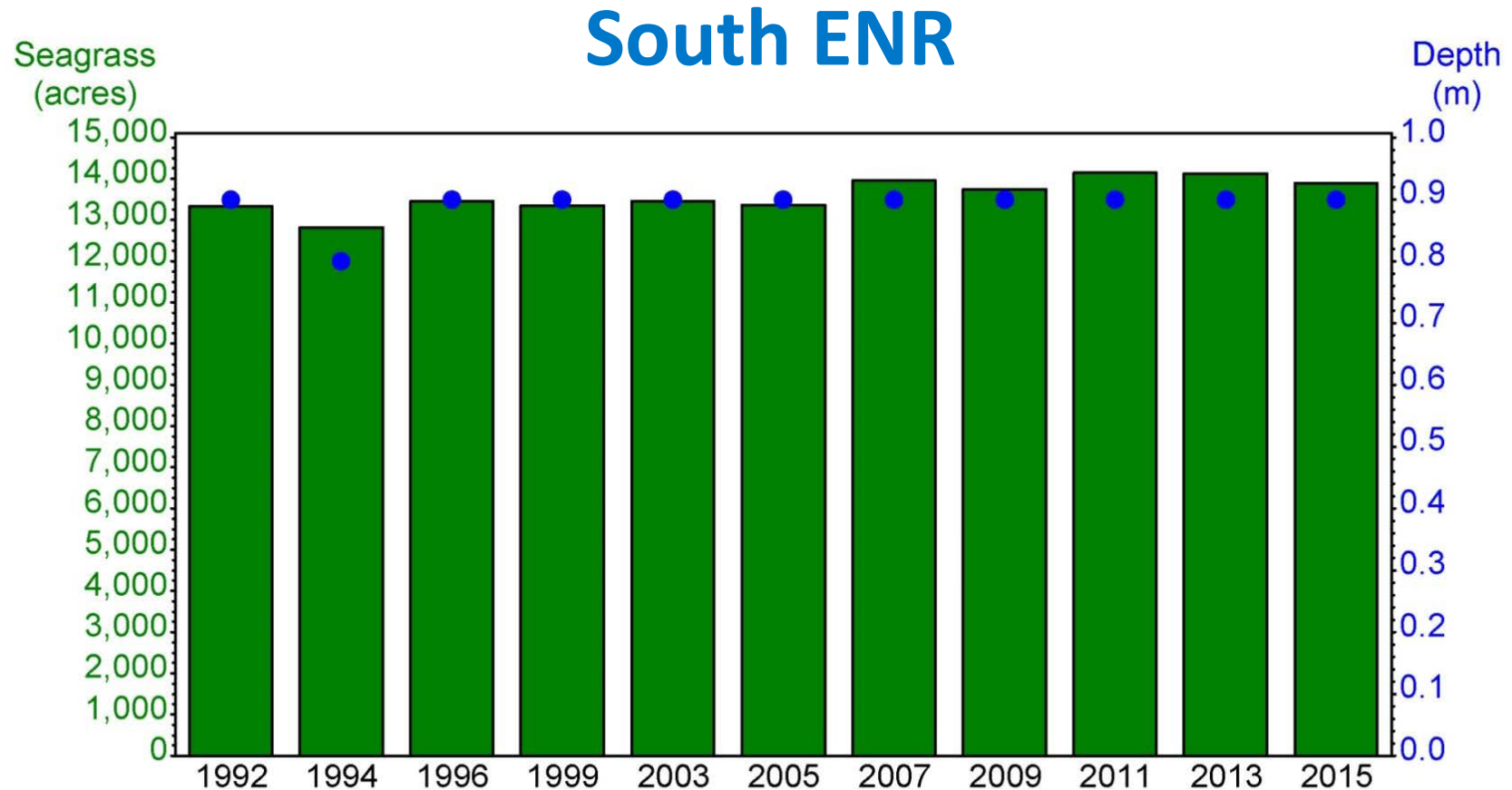
Seagrass Trends



Seagrass Trends

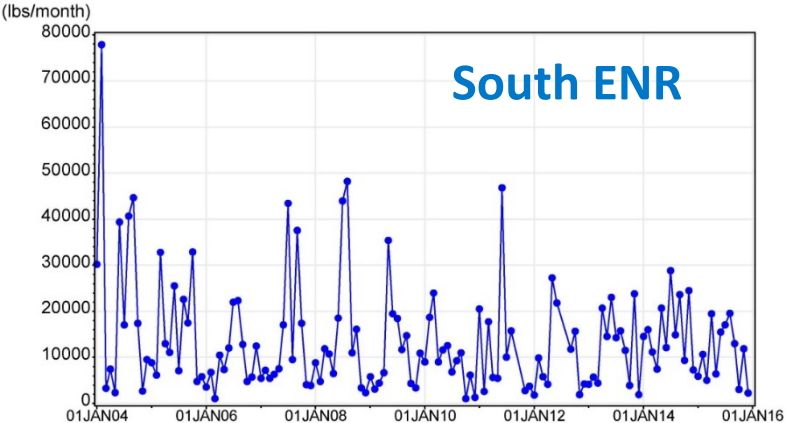
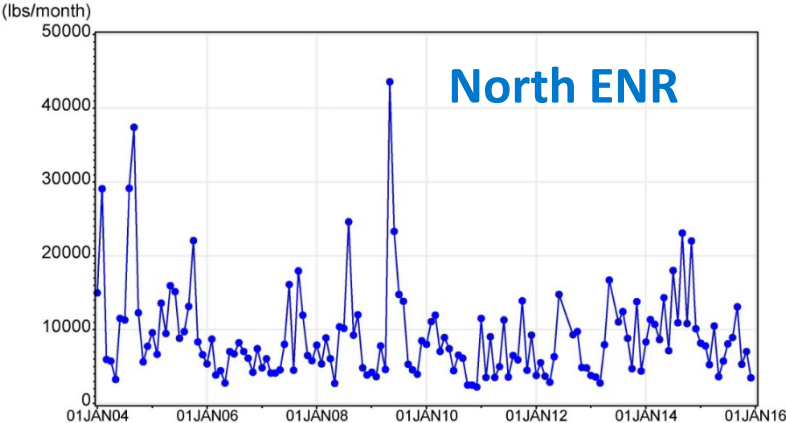
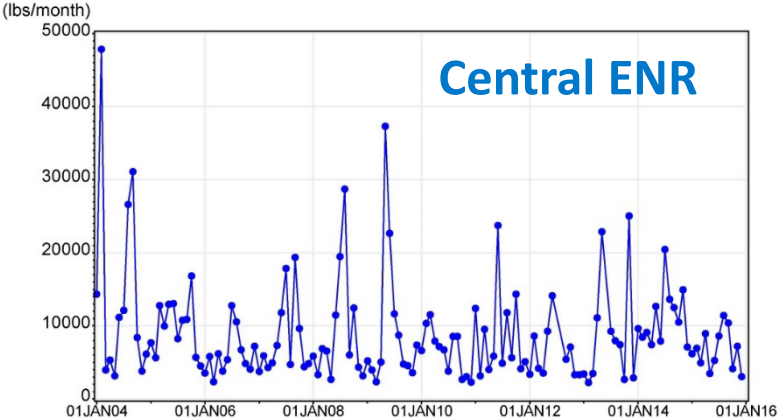


Seagrass Trends



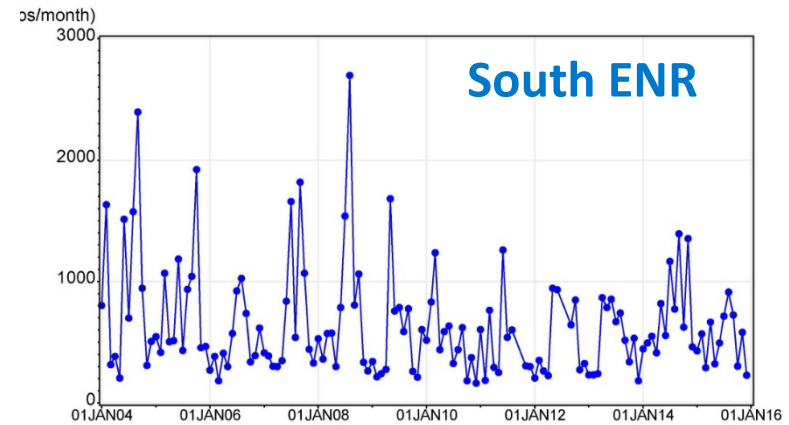
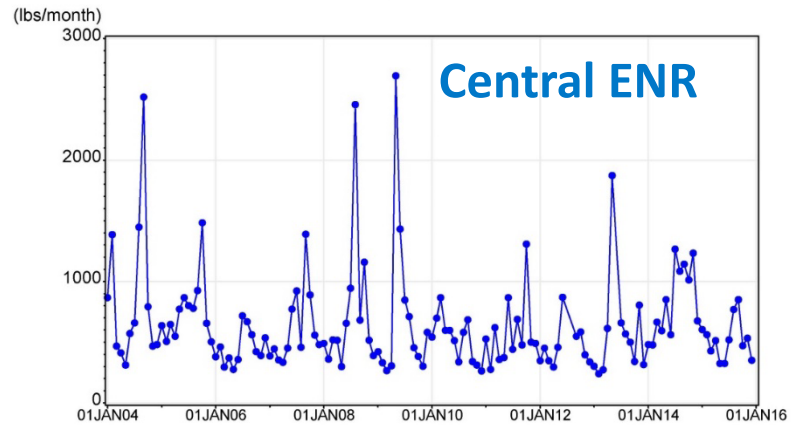
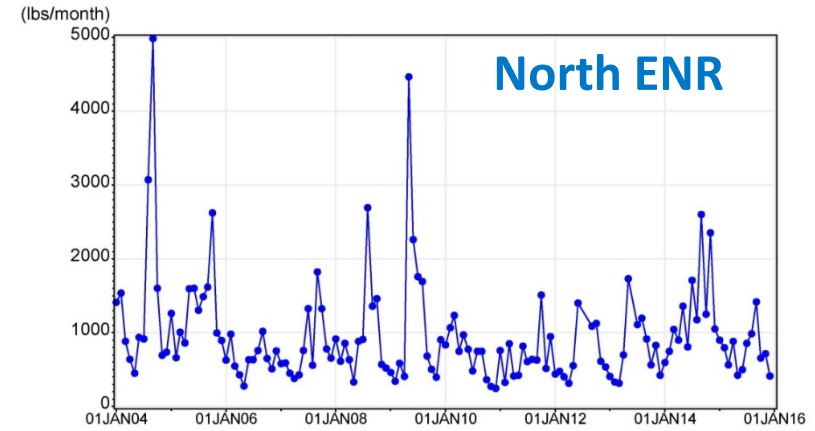
Loading Trends

Total Nitrogen Loads



Loading Trends

Total Phosphorus Loads



Water Quality Targets

- Reasonable Assurance Plan provides focus for the management actions to restore and protect Mosquito Lagoon
- Important to neither fall short of the actions necessary to protect the Lagoon nor to exceed those actions adequate to protect the Lagoon
- Apply the best science

Water Quality Targets

- Water quality targets in estuaries typically based on the protection of seagrasses and other aquatic life
- Seagrass health depends upon adequate light
- Water clarity driven by ambient water quality conditions including chlorophyll and nutrient concentrations

Loading Targets

- A primary objective in establishing a Reasonable Assurance Plan is to define the nutrient loading targets, which in this case are load reductions, that are needed to restore and protect estuarine health

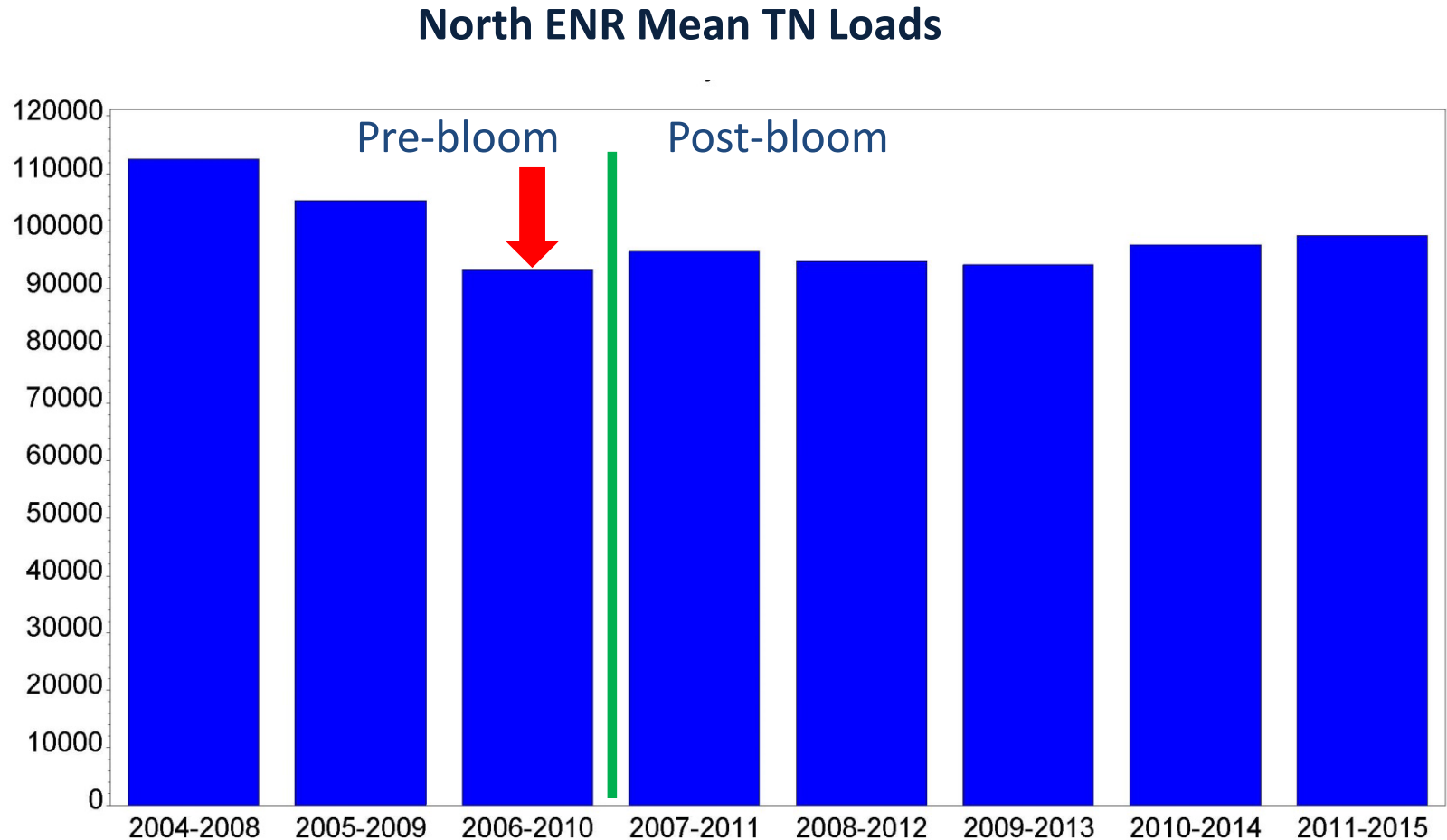
Approaches to Define Nutrient Loading Targets

- Series of empirical relationships were examined using the available ambient water quality data and nutrient loading estimates
- Current efforts to develop a mechanistic model building upon the existing EFDC hydrodynamic model are underway by the SJRWMD
- Given the complexity of Mosquito Lagoon this tool may be what is necessary to define the relationships between ambient water quality and nutrient loads

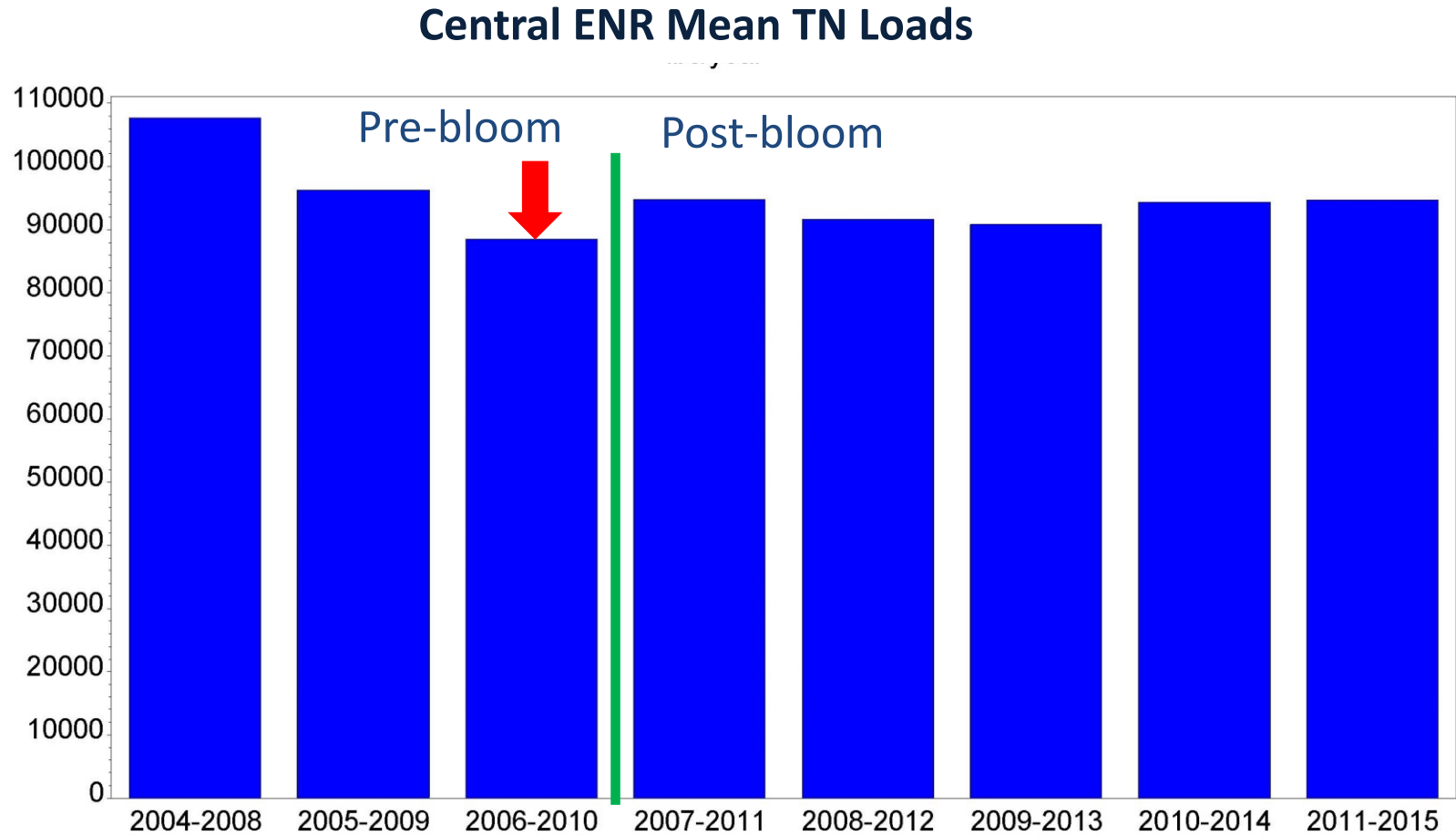
Reference Period Approach

- Selection Criteria:
 - Primarily, conservative, i.e., protective
 - Is not biased by excessively high or low rainfall
 - If possible, be reflective of management actions that have already been achieved

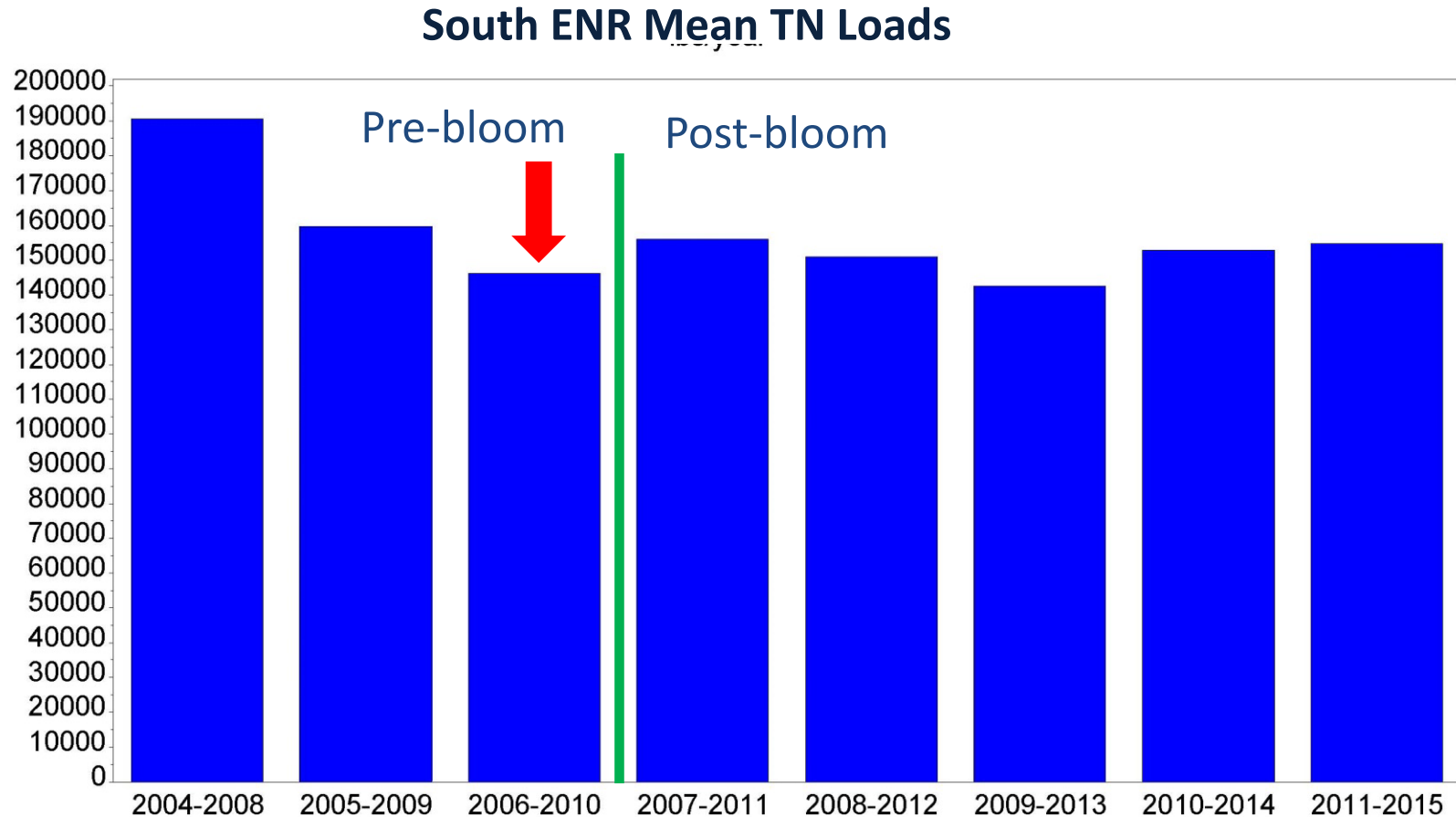
Reference Period Approach



Reference Period Approach



Reference Period Approach



Treatable Loads

- Total nutrient loads are the sum of:
 - Runoff
 - Baseflow
 - OSDS
 - Point Sources
 - Atmospheric Deposition
- Need to translate the % load reduction in terms of the portion of the total nutrient loads that can be treated locally as part of the RAP

Proposed Nutrient Loading Targets (lb/year)

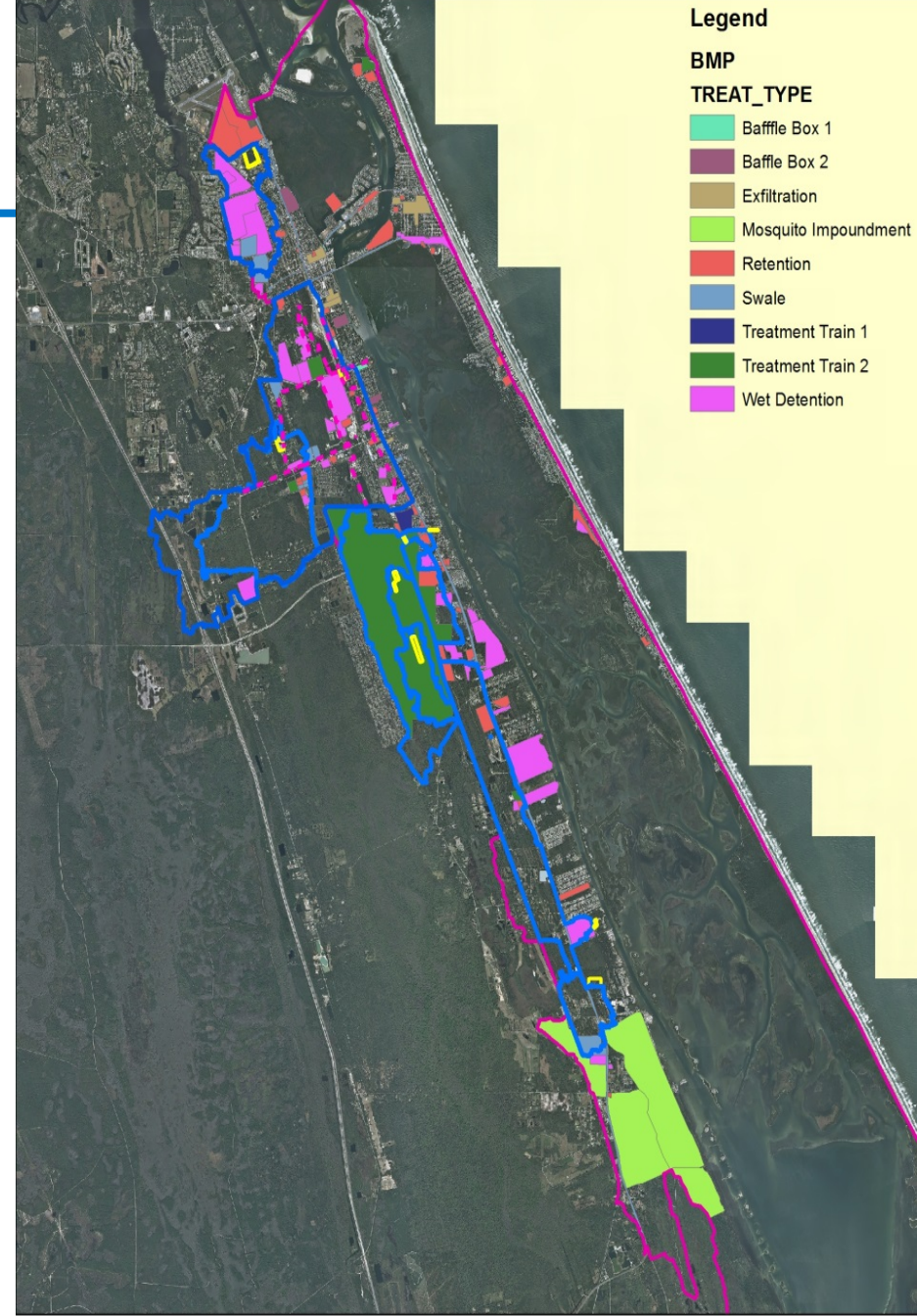
Treatable TN Loads		
ENR	% Reduction	Load Reduction
North	15	11,564
Central	14	7,520
South	16	12,391

Proposed Nutrient Loading Targets (lbs/year)

Treatable TP Loads		
ENR	% Reduction	Load Reduction
North	15	1,529
Central	8	530
South	10	613

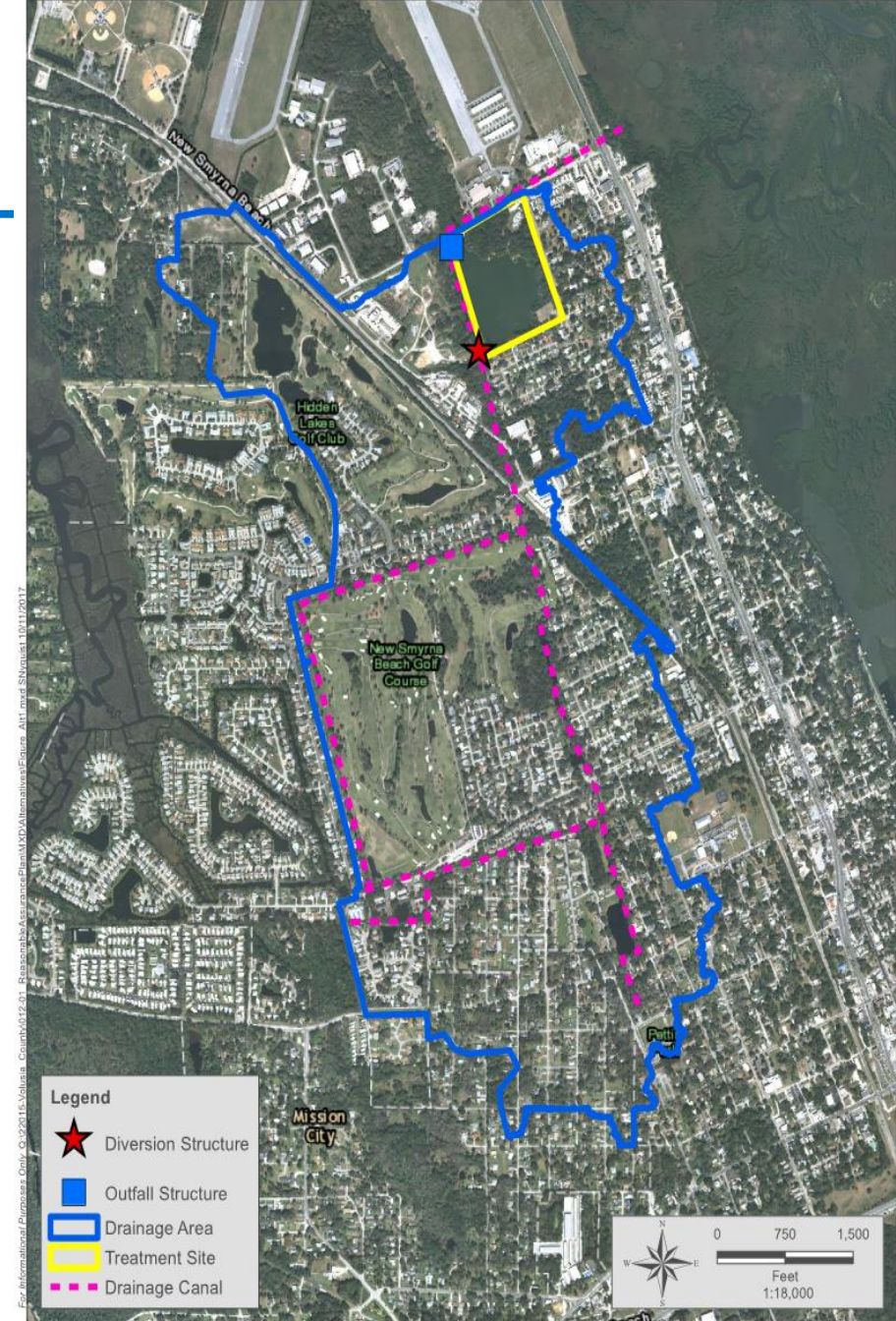
Project Options Overview

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



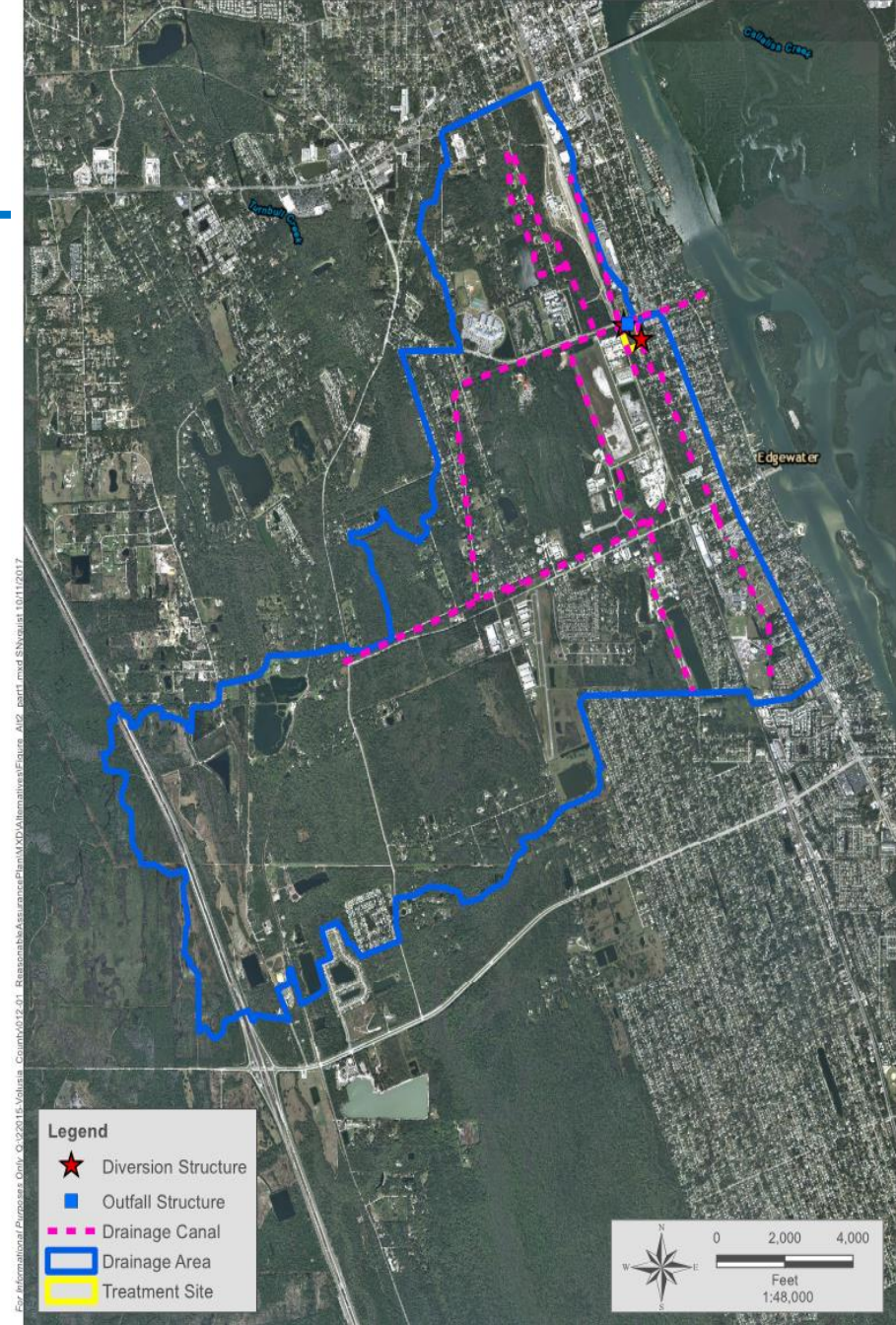
Option 1: Diversion to Borrow Pit South

- Avoids Large Excavation
- Federal Aviation Administration (FAA) Concerns
- Base Flow and Runoff
- Treats 640 acres
- 1,300 lb/yr TN
- \$700,000 +/-
- \$20/lb TN



Option 2: 10th Street Treatment Facility

- Part of a Larger Project
- Base Flow and Runoff
- Treats 4,600 acres
- 5,600 lb/yr TN
- \$3,450,000 +/-
- \$20/lb TN

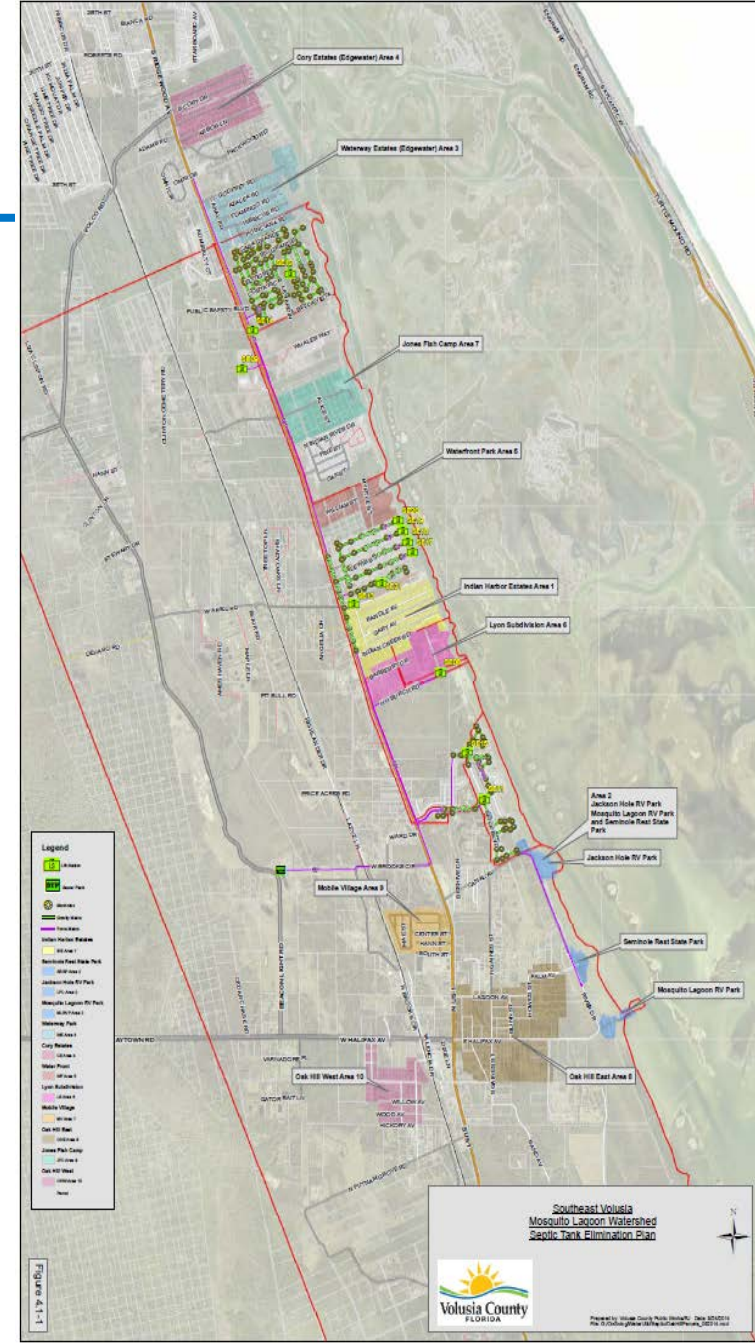


Option 4: East Indian River Boulevard Bioreactor

- Existing Swale and Wet Detention Treatment
- Treats 2,200 acres
- Mostly Base Flow
- Pumped System
- \$2,200,000 +/-
- \$50/lb TN

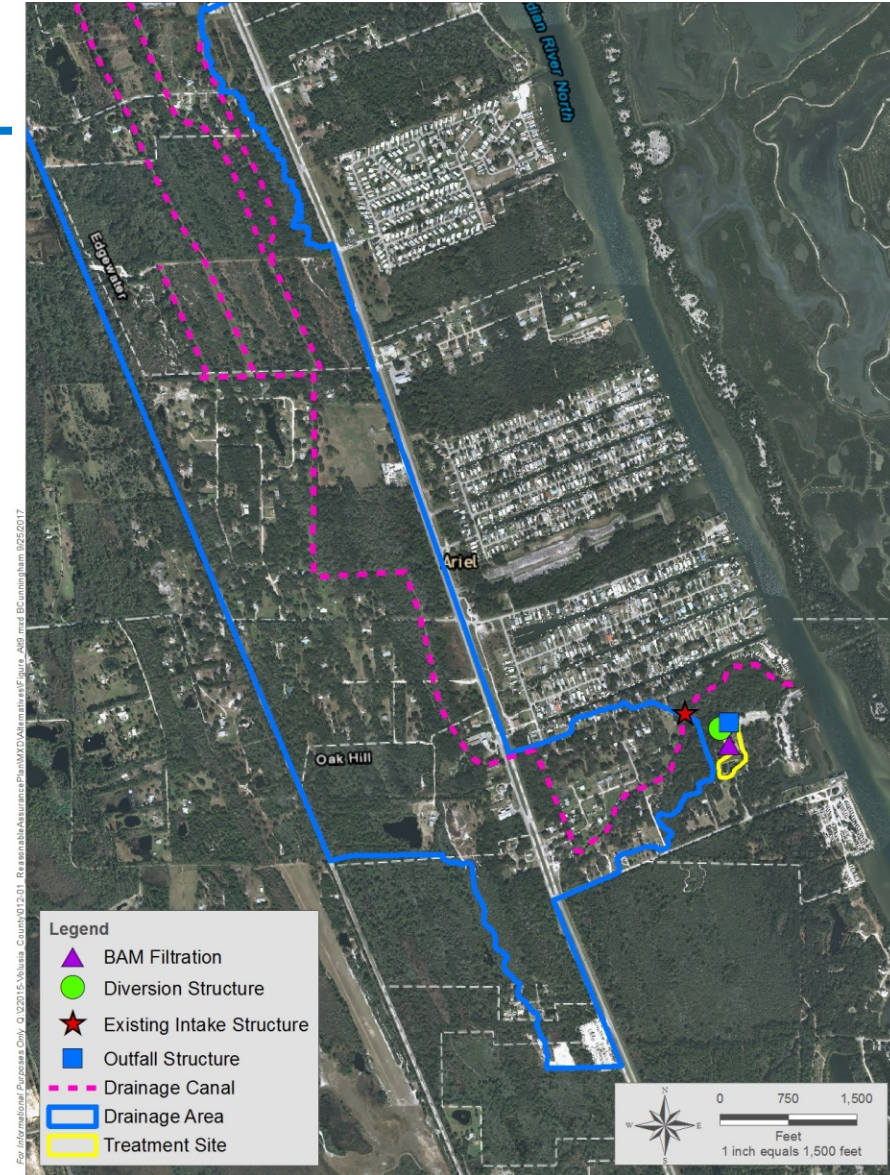


- Generally several times less cost-effective than large stormwater projects
- \$420,000 - \$6,190,000
- 1,000s of lb/yr TN
- Tied to Funding



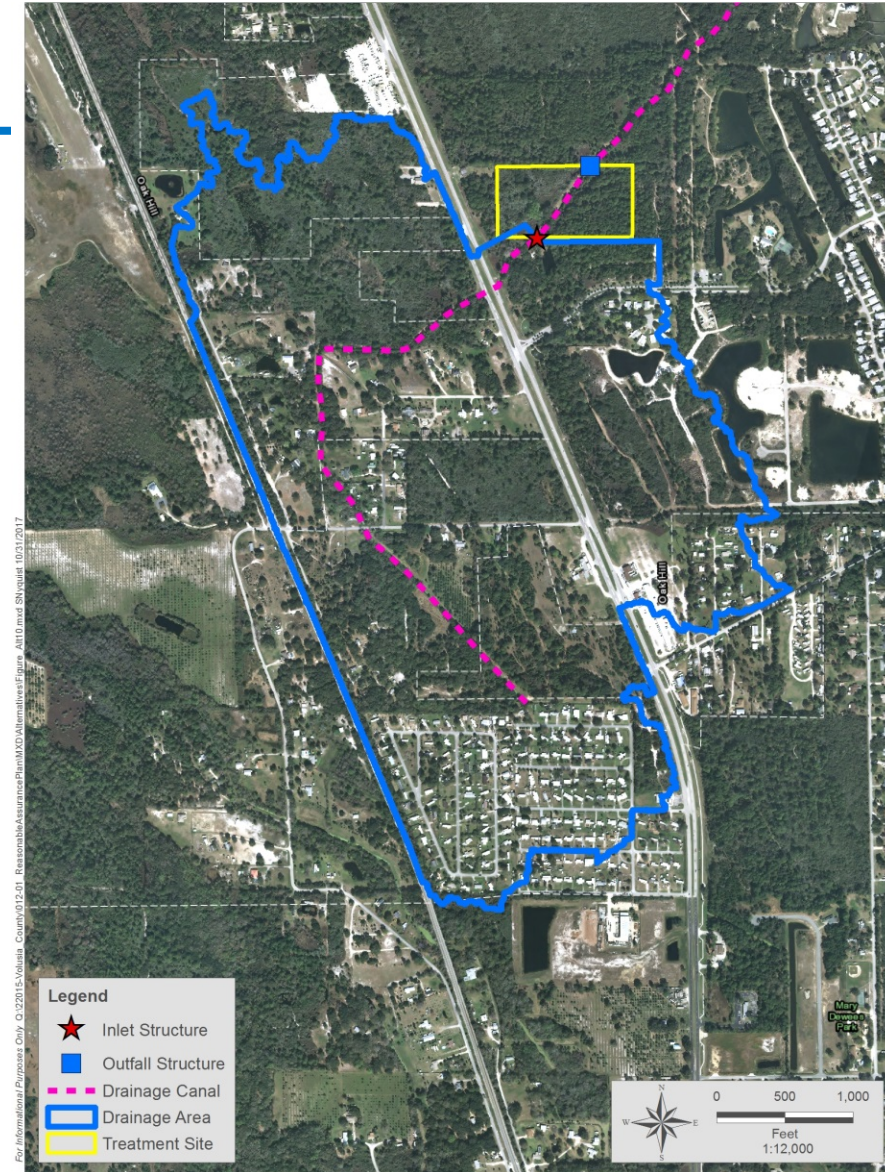
Option 9: Aerial Canal Water Quality Improvement

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



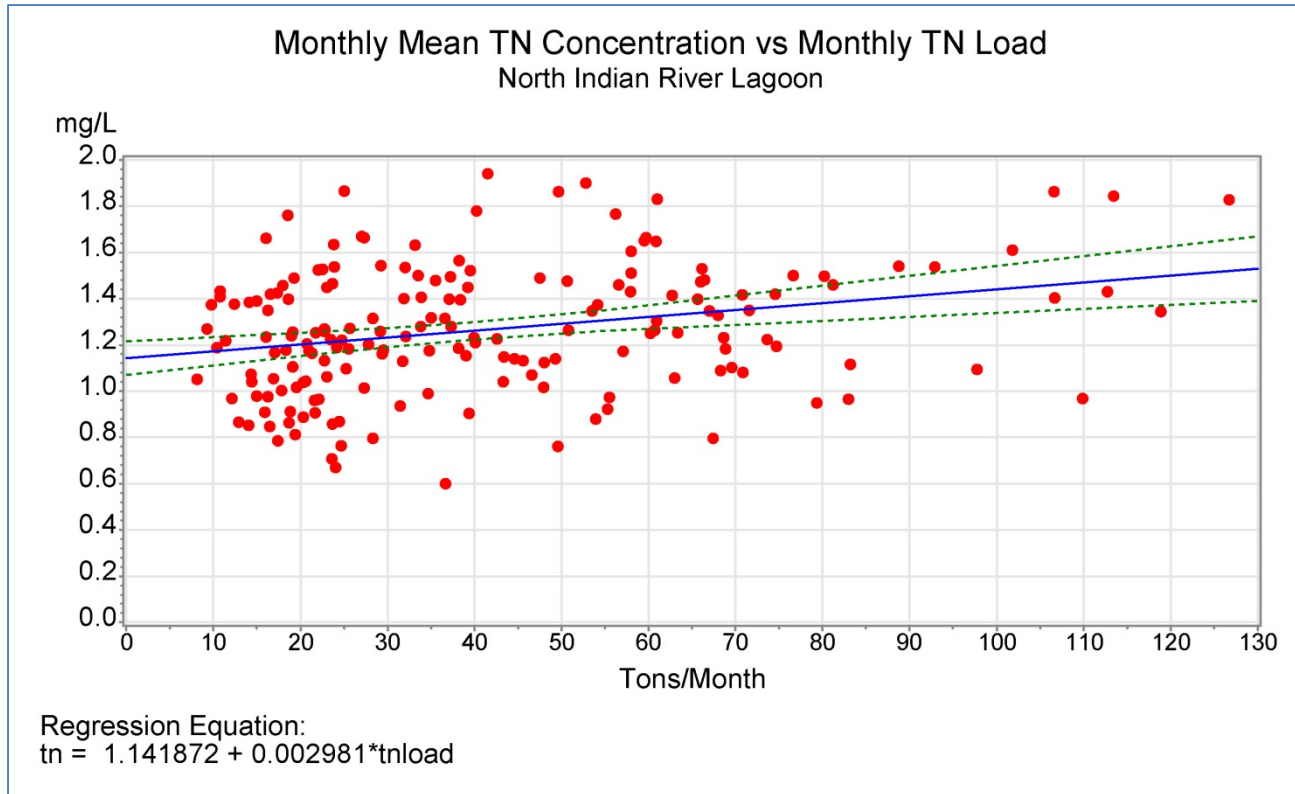
Option 10: Lighthouse Cove Treatment Facility

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



Option 12: Reduced Flux from North IRL

- 22.5% IRL load reduction
- 6% Indian River Lagoon (IRL) concentration reduction
- 120,000 lb/yr TN reduction
- >> 12,391 South ENR target



Option 13: Programmatic Changes

- 3% Current Reduction: 2,100 lb/yr TN
 - 1% for Florida Department of Transportation
- 6% Reduction with Source Control Programs (e.g., Florida Yards & Neighborhoods [FYN]): 4,100 lb/yr TN

Management Actions

Project Option Number and Name	ENR	TN Reduction (lb/yr)	TP Reduction (lb/yr)	Schedule (Years After Plan Adoption)
Option 1: Diversion to Borrow Pit South of New Smyrna Beach Airport	North	1,300	320	5-10
Option 2: 10th Street Treatment Facility	North	5,600	1,400	1-5
Option 4: East Indian River Boulevard Bioreactor	North	3,900	730	5-10
Option 9: Ariel Canal Water Quality Improvement Enhancement	Central	1,300	210	1-5
Option 10: Lighthouse Cove Treatment Facility	Central	760	180	5-10
Option 12: Reduced Flux from North IRL	South	> Goal	> Goal	
Option 13: Programmatic Changes	North, Central	4,100	570	
Other: Septic to Sewer, Small Retrofits, etc.	North, Central	Tracked	Tracked	

TN Loading Reductions (lb/year)

TN Loads		
ENR	Target Load Reduction	Planned Load Reduction
North/Central	19,084	16,960+
South	12,391	>>12,391

+Does not include septic to sewer and smaller stormwater retrofits currently planned

TP Loading Reductions (lb/year)

TP Loads		
ENR	Target Load Reduction	Planned Load Reduction
North/Central	2,059	3,410+
South	613	>>613

+Does not include septic to sewer and smaller stormwater retrofits currently planned

Monitoring, Compliance Assessment and Reporting

Reporting

- Annual
 - Results of the water quality and seagrass assessments
 - Explanation of deficiencies in achieving targets
 - Status of the monitoring plan
 - Updates on the status of project implementation
 - Estimates of the load reductions made to date
- 5-Year Updates
 - Results of the water quality and seagrass assessments
 - An update of the annual pollutant loads
 - Explanation of deficiencies in achieving targets.
 - Status of the monitoring plan
 - Updates on the status of project implementation
 - Estimates of the load reductions made to date
 - Any additional projects needed to meet the load-reduction requirements

Monitoring, Compliance Assessment and Reporting

Monitoring

- Water Quality Monitoring
 - Maintain current level of spatial resolution in the North and Central ENRs
 - Expand the spatial distribution in the South ENR to include two additional sites not under the direct influence of the Haulover Canal
 - Revert to monthly sampling, as had been achieved before 2010
- Seagrass Monitoring
 - Maintain current level
 - The Central and South ENRs have seagrass acreage and depth colonization targets that would be useful to assess when new data become available

Monitoring, Compliance Assessment and Reporting

- Verification of Compliance

- Based on evaluating the ambient water quality, seagrass extent, and pollutant-loading targets.
- On an annual basis, ENR-specific annual geometric means (AGMs) will be estimated following the methods required by the Impaired Waters Rule or Chapter 62-303 of the Florida Administrative Code (FAC). These values will be compared to the water quality targets that will be adopted as NNC as part of this plan. Following the methods used by FDEP, compliance will be achieved if the water quality targets are met at least twice in every 3-year period.
- A seagrass assessment will be conducted as additional data become available. Comparisons of seagrass coverage (area) and mean deep-edge depth to established seagrass targets will be conducted in each of the three ENRs.
- Every 5 years, the pollutant-loading estimates will be compared to the proposed targets.

Commitment to Corrective Actions

Assessment Step	Result	Action
I. Determine the ENR-specific AGM for TN, TP, and chlorophyll a concentrations for assessing water quality target attainment.	Yes	Stakeholder Action 1
	No	Go to II.
II. Review data and determine if an anomalous event(s) influenced non-attainment of the ENR specific criteria.	Yes	Stakeholder Action 2
	No	Go to III.
III. Determine if the ENR specific criteria have been exceeded more than once in a 3-year period.	Yes	Go to IV.
	No	Stakeholder Action 1.
IV. Determine if the ENR specific loading criteria have been achieved.	Yes	Stakeholder Action 3
	No	Go to V.
V. For a given year or for multiple years, compile and report source loads compared to the reasonable assurance target load.	Compile and Report	Stakeholder Action 4

Commitment to Corrective Actions

Stakeholder Actions	
Stakeholder Action #	Stakeholder Action
1	A report assessing attainment of ENR-specific AGM TN, TP, and chlorophyll a concentrations is delivered to FDEP
2	A report of the anomalous event(s) or data that influenced the ENR specific exceedance(s) is delivered to FDEP upon review of the stakeholders
3	Consider re-evaluation of the ENR-specific assimilative capacity based on non-attainment of region-specific criteria while meeting the annual loading targets
4	If loading targets are not achieved, compile the results including a hydrologic evaluation for FDEP's review, and identify potential further actions needed to achieve reasonable assurance for ENR loading targets