FSA 2020 Annual Conference
July 17, 2020
Track B

A Faster Road to Water Quality Restoration

Florida Department of Environmental Protection

Janicki Environmental, Inc.

JonesEdmunds

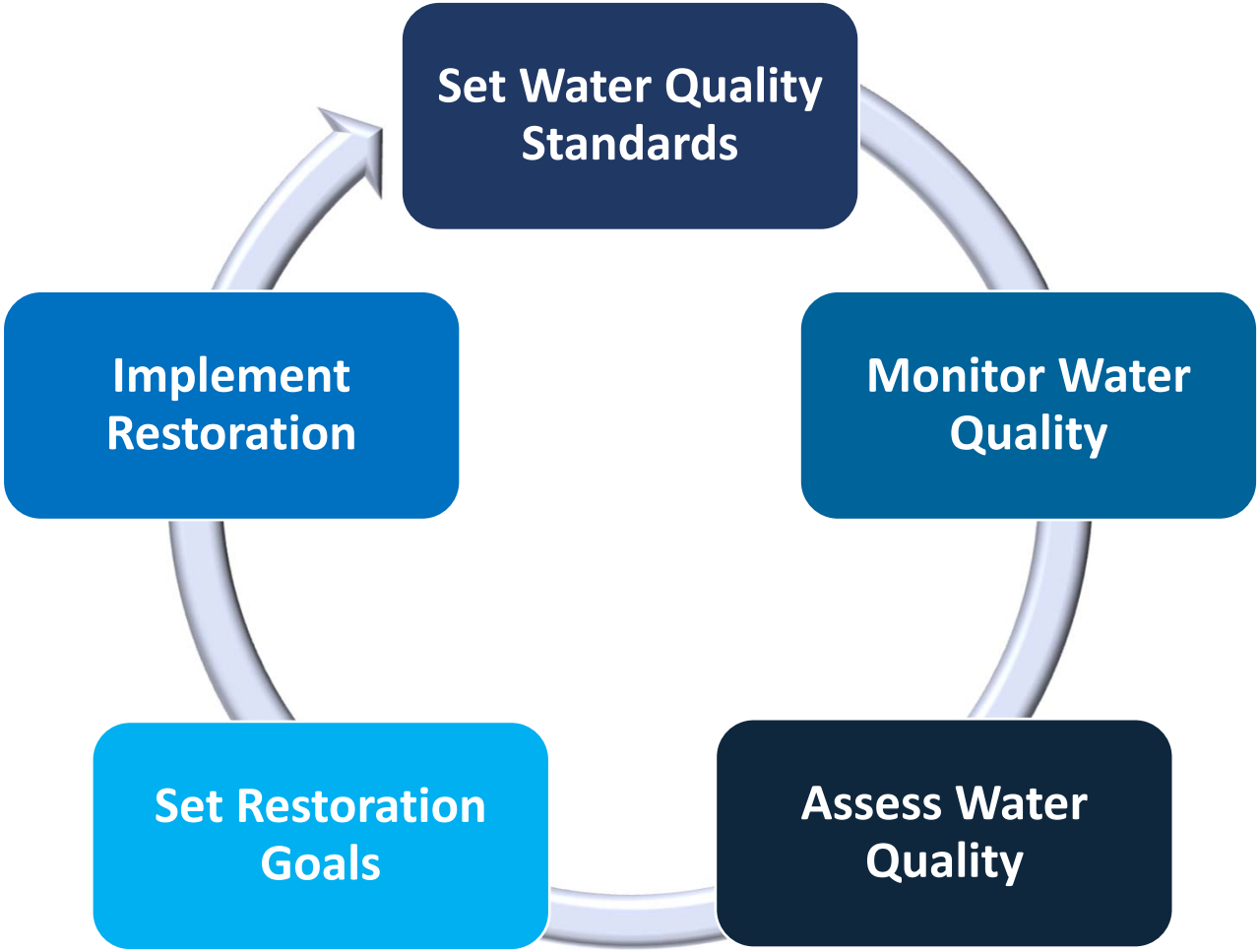
Presentations by:

- Julie Espy
- Brett Cunningham
- Tony Janicki

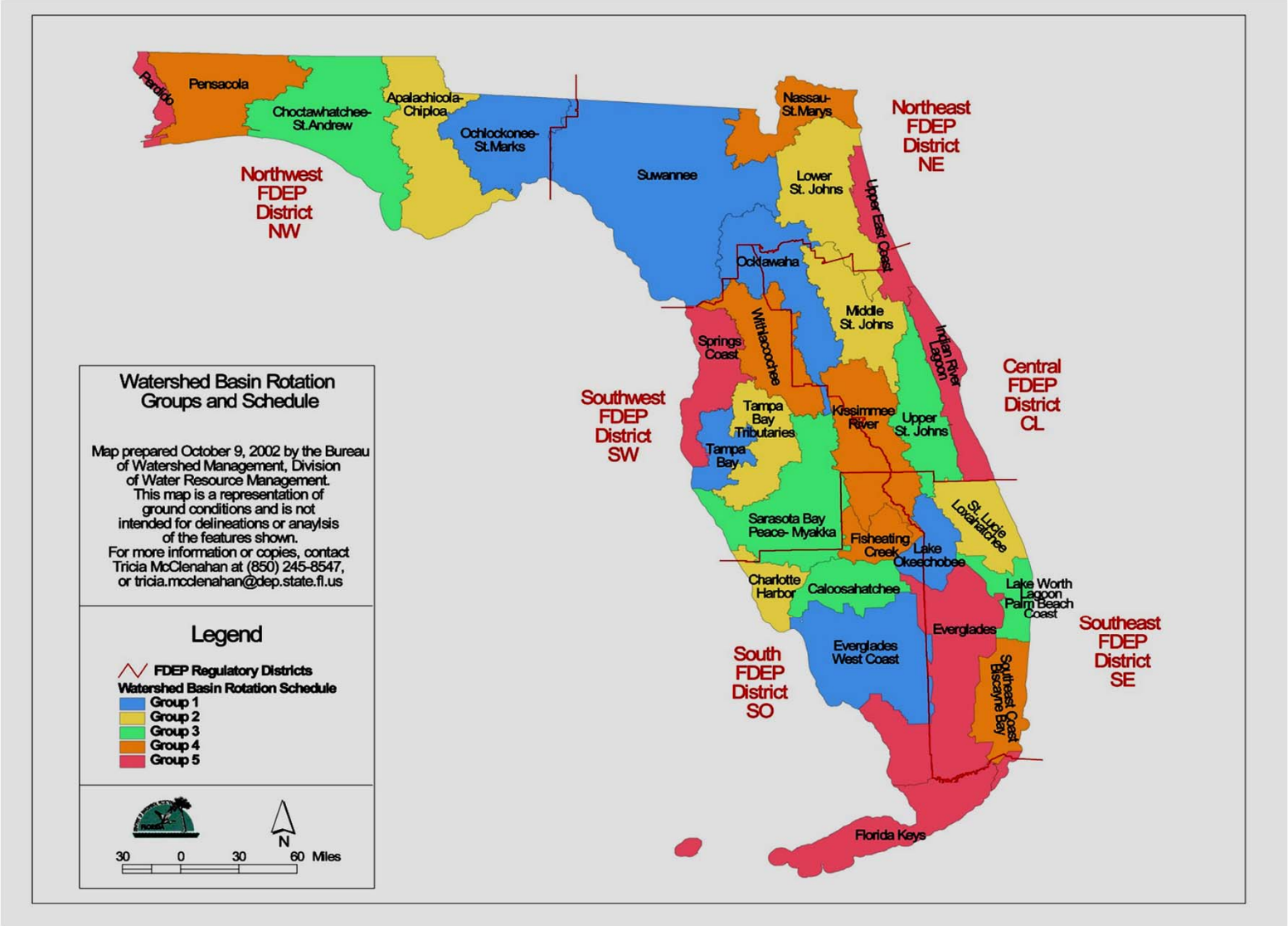
Florida's Water Quality Responsibilities

- Section 303(d) of the Federal CWA
- Florida statute 403.067 established the Florida Watershed Restoration Act in 1999
- Surface Water Quality Standards Rule 62-302, F.A.C.
- Impaired Waters Rule (IWR) 62-303, F.A.C.

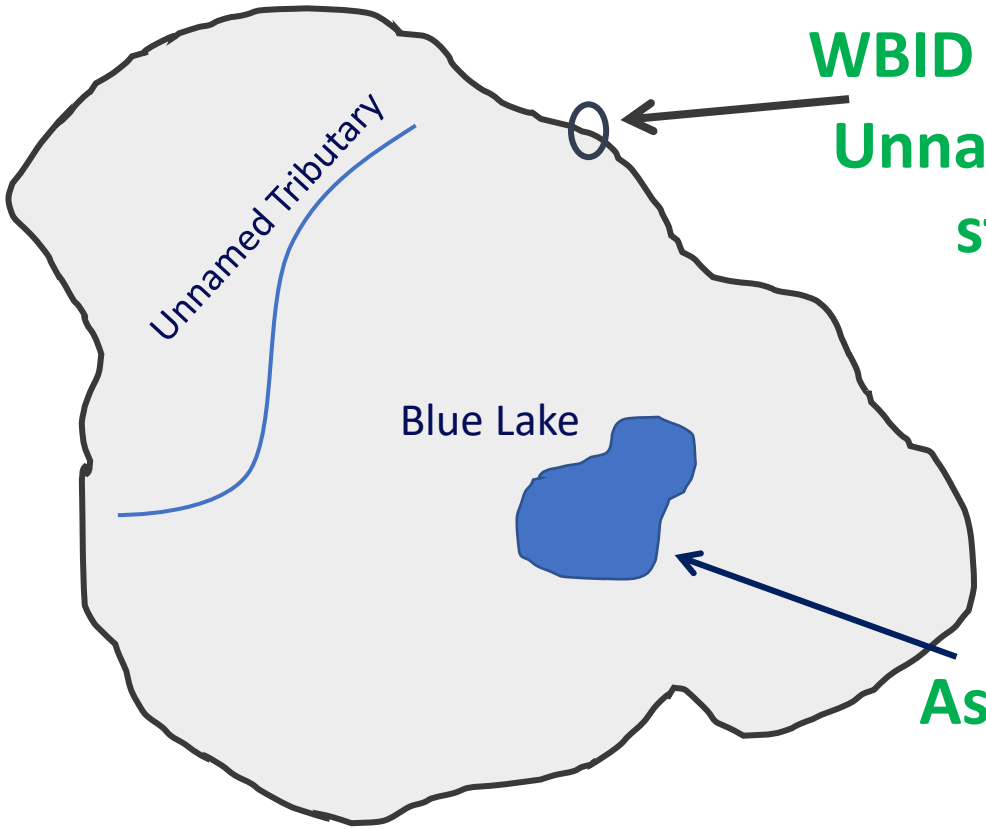
Watershed Management Approach



Basin Rotation Cycle



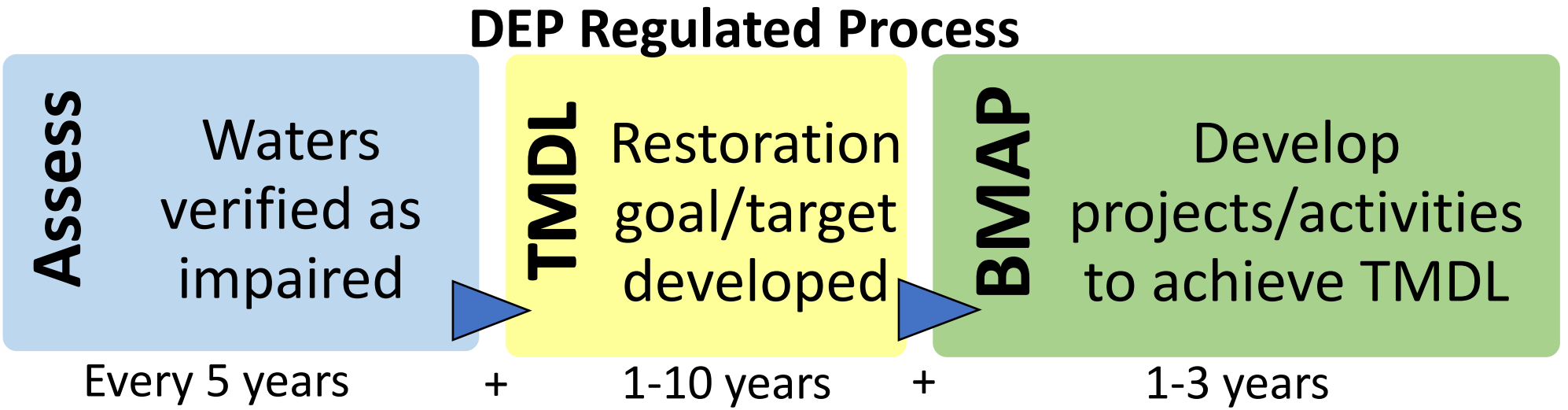
Waterbody Identification Number - WBID



WBID Boundary Line for Unnamed Tributary, a stream WBID

Assessment Unit and WBID line for Blue Lake

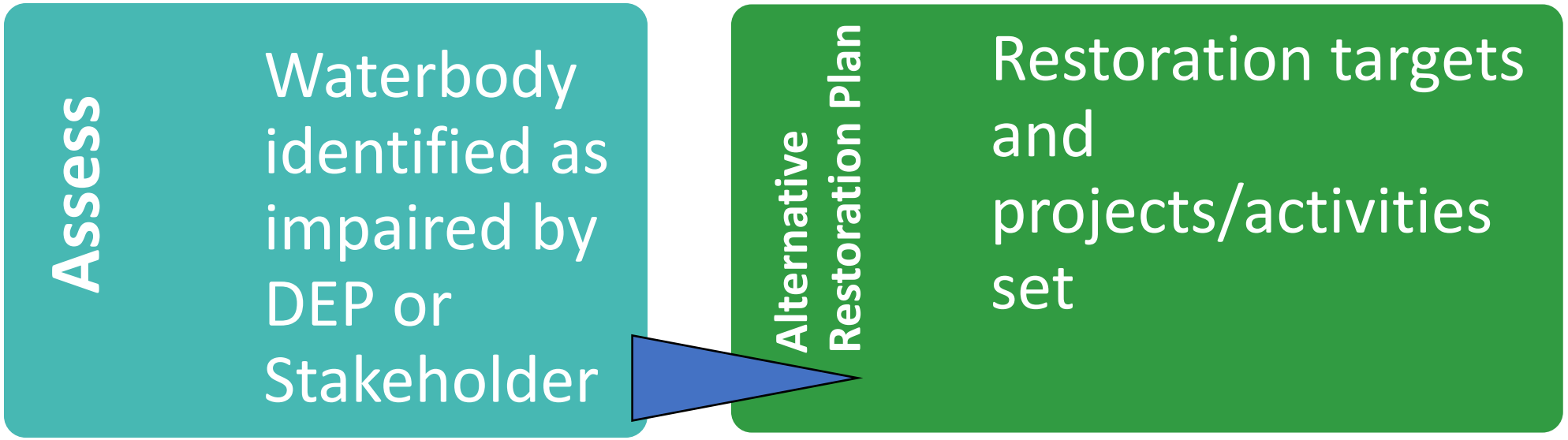
Water Quality Restoration Process



It can take awhile

Water Quality Restoration Alternative

Stakeholder Driven Process



Anytime

Replaces a TMDL and BMAP

Benefits of an Alternative Restoration Plan

- Provides a faster path to restoration
- Allows stakeholders to control their destiny
  - Developing a plan prior to state or federal action provides the best way for stakeholders to plan for efficient and effective management
  - Avoid TMDL-related regulatory requirements
- 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

Reasonable Assurance Plans

Reasonable Assurance plans (4b) provide an implementation schedule and resource commitments that there are, or will be, pollutant loading reductions that will result in the waterbody achieving water quality targets to attain and maintain the designated use.

Primary requirements of a Reasonable Assurance Plan:

- a restoration target (e.g. water quality, pollutant load)
- a list of projects and/or activities that will achieve the restoration target
- an implementation schedule that can span multiple years
- funding commitments
- requires EPA approval
- commitment to corrective actions

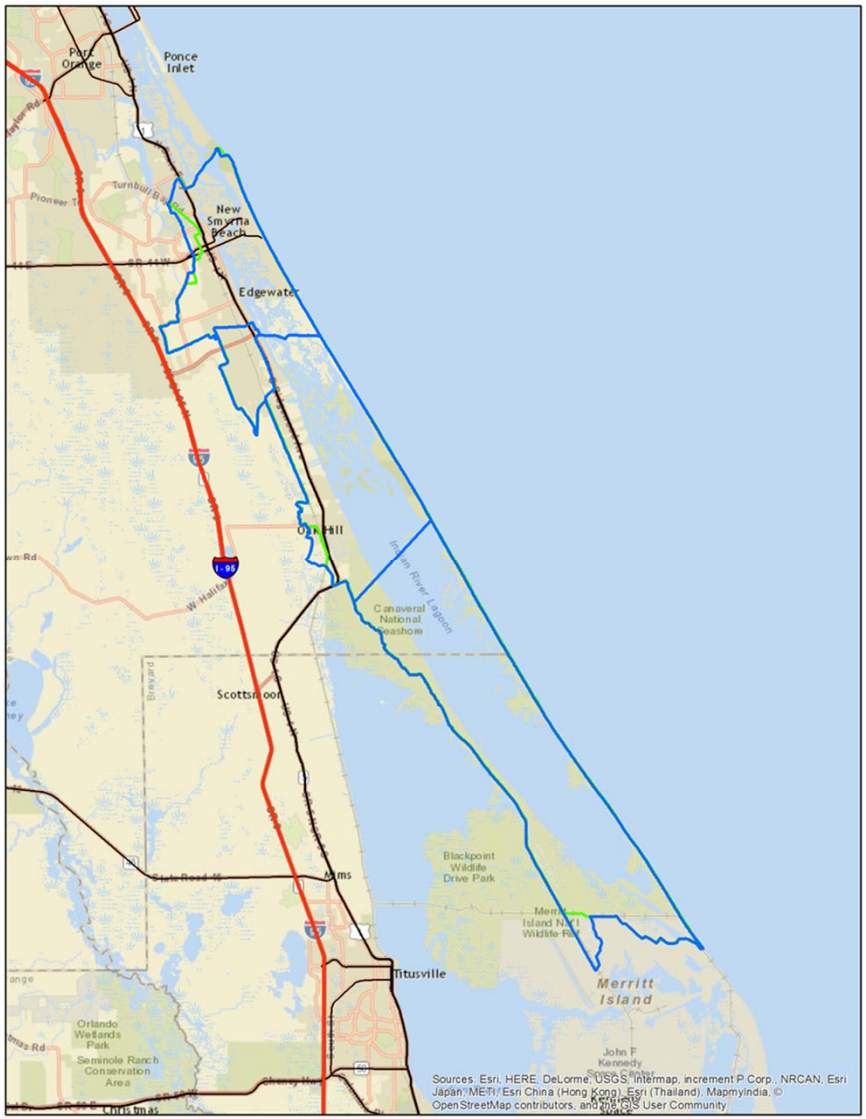
Lessons Learned

- Time and project commitments are necessary
- Technical support is beneficial
- Data limitations often affect management decisions
- Local leadership and control of the process is valuable

Mosquito Lagoon

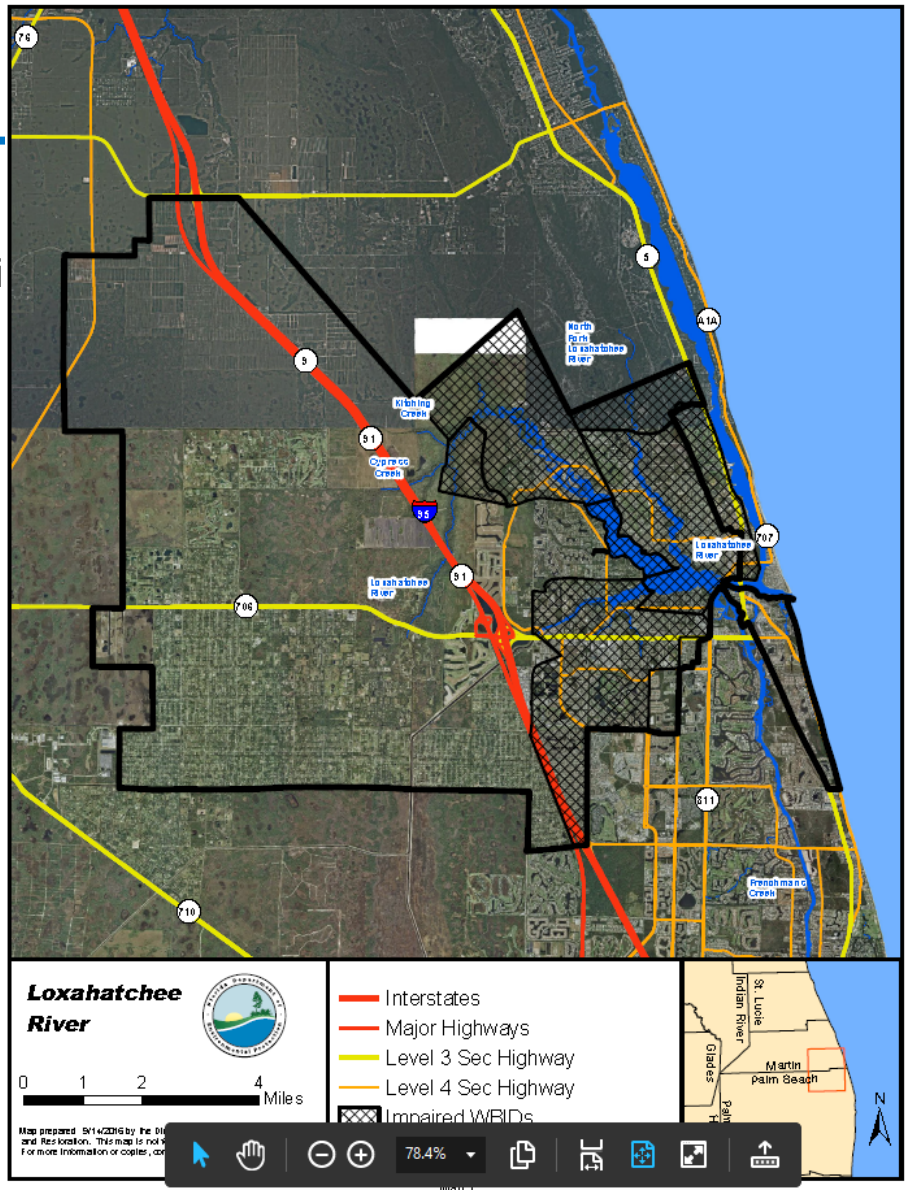
RAP Sponsors:

- Edgewater
- Florida Department of Transportation (FDOT)
- New Smyrna Beach
- Oak Hill
- Volusia County

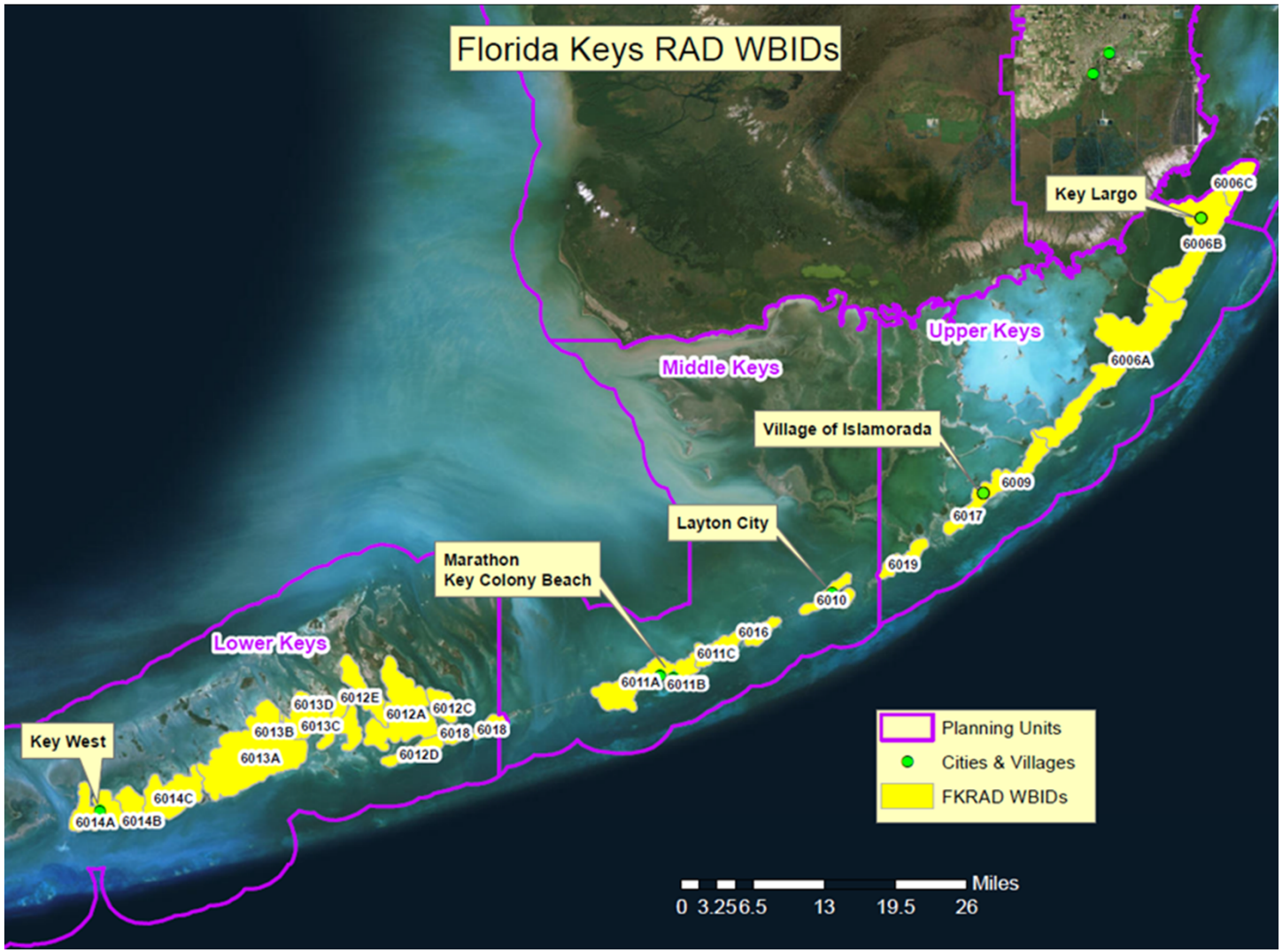


Loxahatchee River

- RAP Sponsor: Loxahatchee River Coordinating Counci



Florida Keys



DEP Role in RAPs

- Guidance
- Feedback
- Adoption
- Transmit plan
- Support EPA approval
- Facilitation support

Role of Facilitation

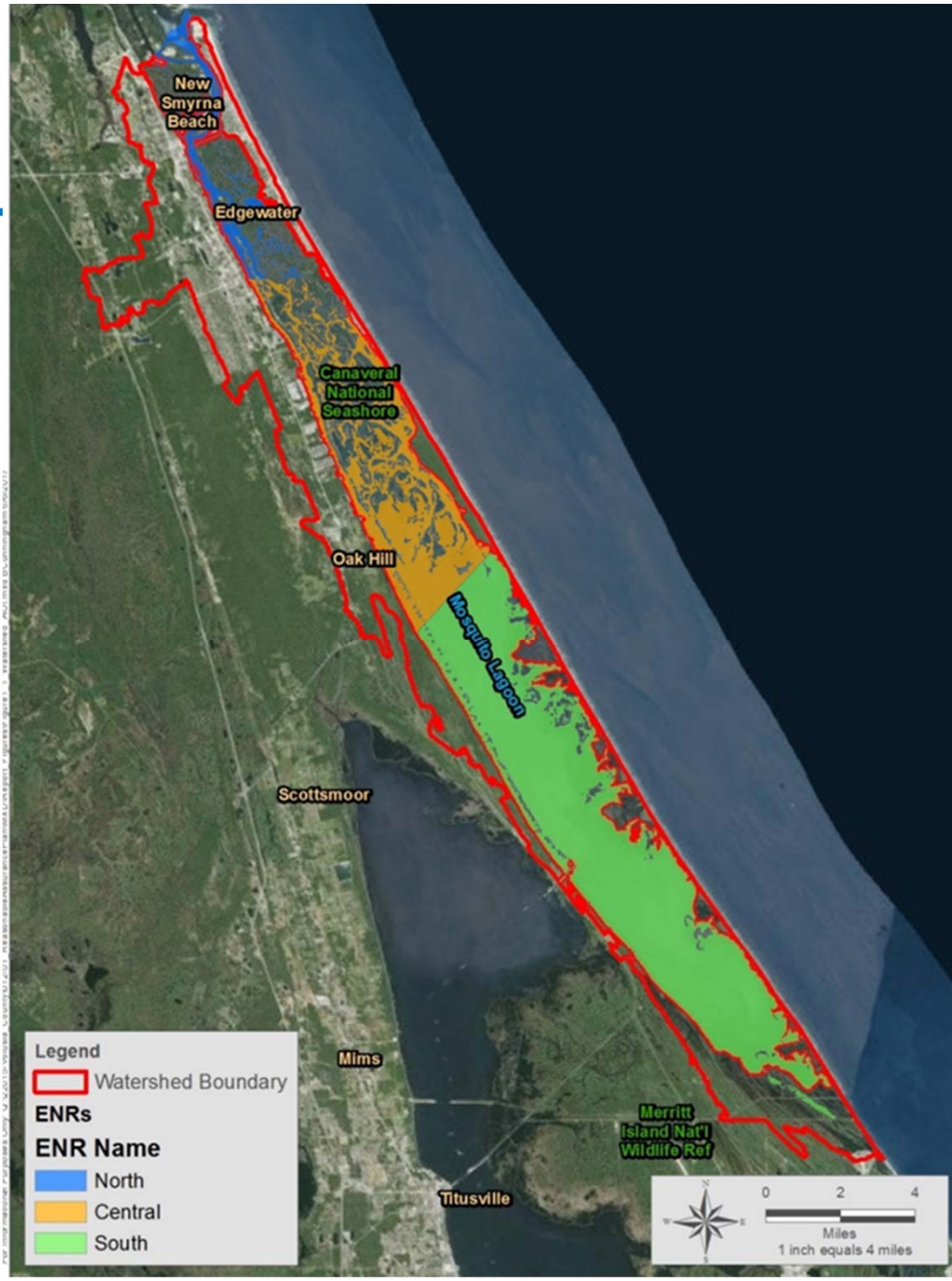
- Neutral party
- Action items
- Meetings
- Plan document
- Feedback

Some Lessons Learned

- Time and project commitments are necessary
- Technical support is beneficial
- Data limitations often affect management decisions
- Valuable to have local control of the process

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



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:

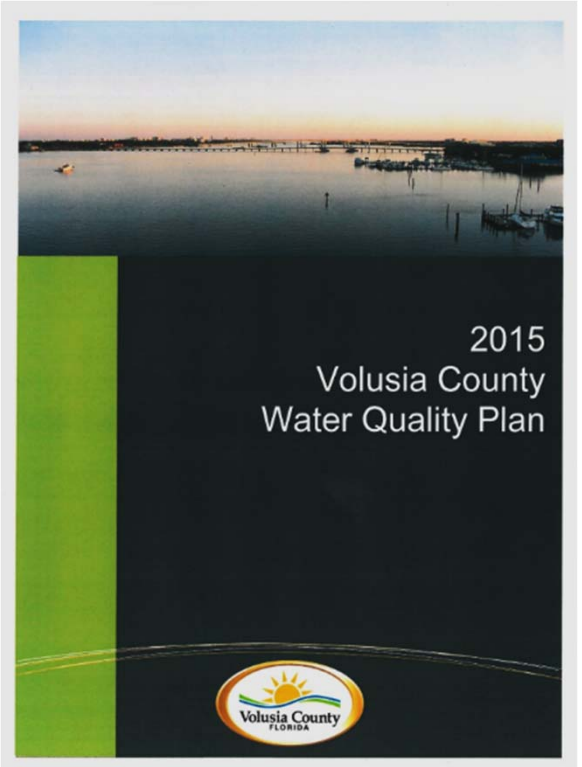
  Daytona Beach, Daytona Beach Shores, Deland, Deltona, Edgewater, Lake Helen, New Smyrna Beach, Orange City, Ormond Beach, Ponce Inlet, Port Orange, South Daytona

Regulatory Protections

- Water Quality appeared to be declining
  - Pollutant sources: stormwater runoff; fertilizer; septic tanks; wastewater discharge
- Not considered impaired through the Total Maximum Daily Load (TMDL) regulatory process
- Implement proactive process to stop the decline and improve water quality

Water Quality Plan Updates

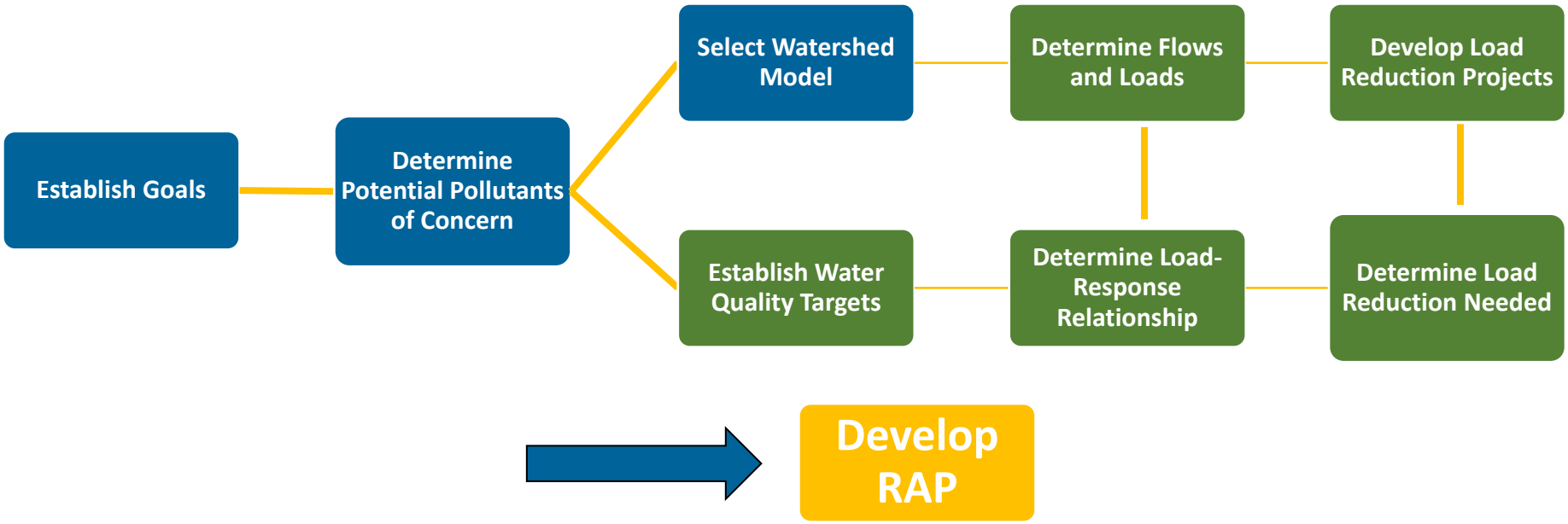
- September 18, 2014 – County Council adopts Resolution 2014-132 setting forth goals to improve water quality
- February 5, 2015 – County Council adopts a Water Quality Plan with specific goals and actions to implement water quality improvements
- September 18, 2015 – Funding for development of the Mosquito Lagoon Reasonable Assurance Plan (RAP) was approved.



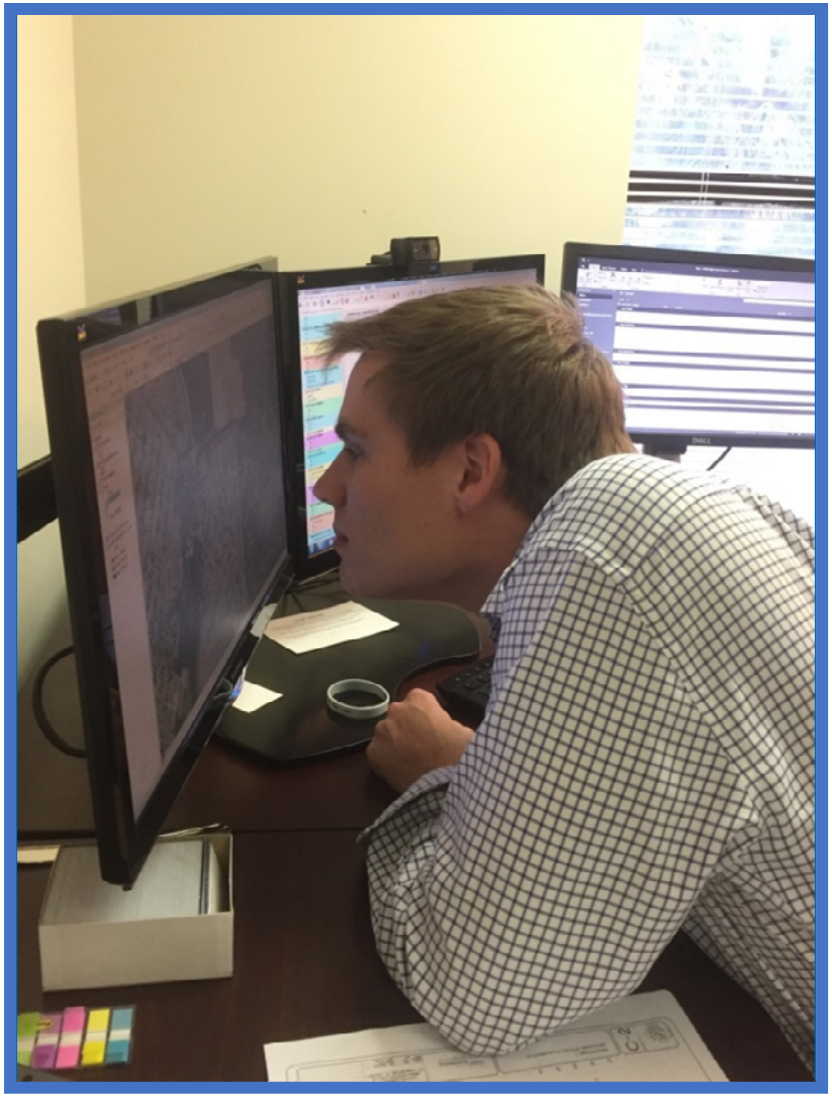
Joint Project Agreement

- Requires participation and funding from all stakeholders within the Mosquito Lagoon Watershed
- Between Volusia County and the cities of Edgewater, New Smyrna Beach and Oak Hill
- Separate funding agreement between FDOT and County

Technical Framework

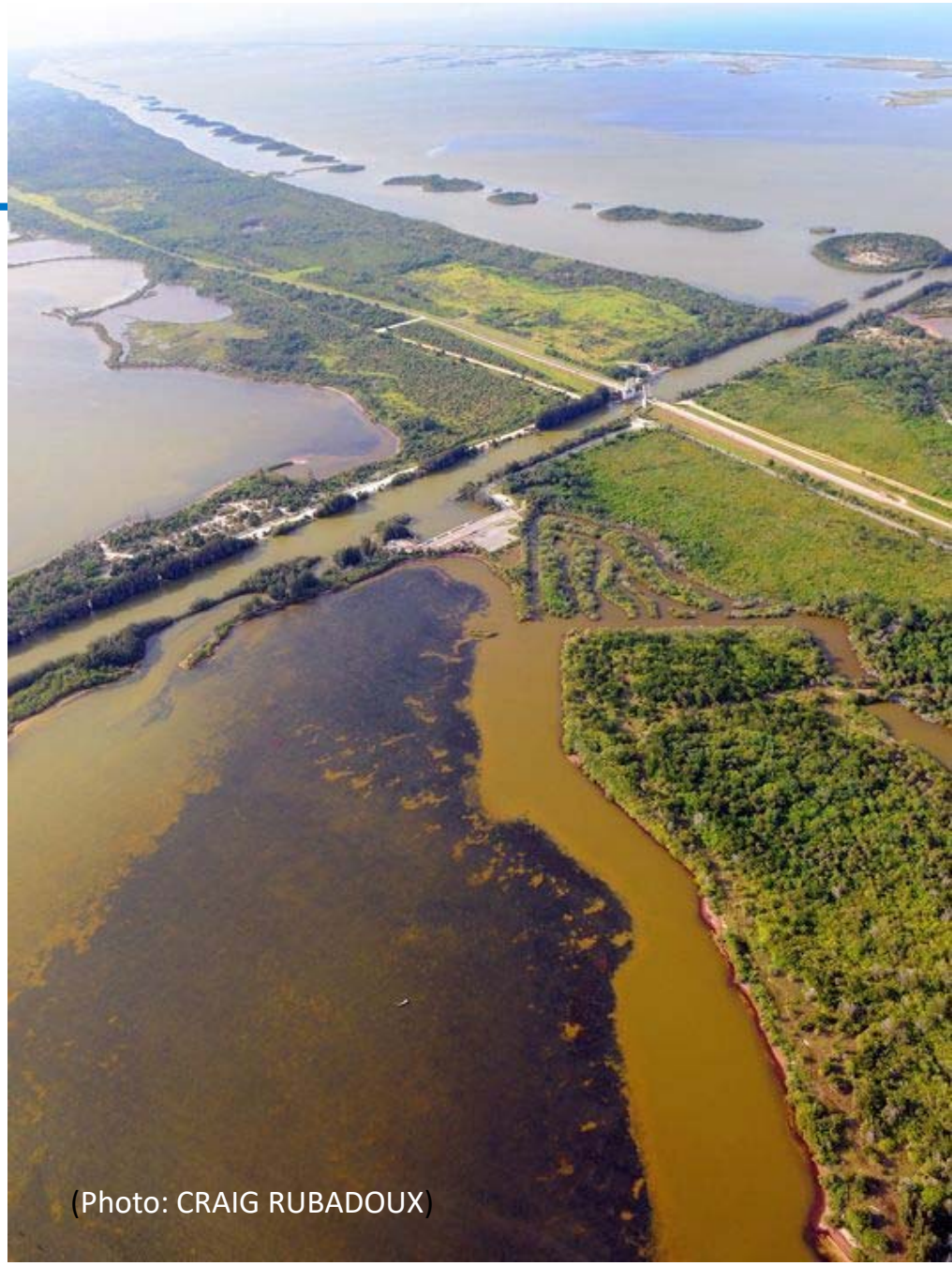


Importance of Transparency and Documentation



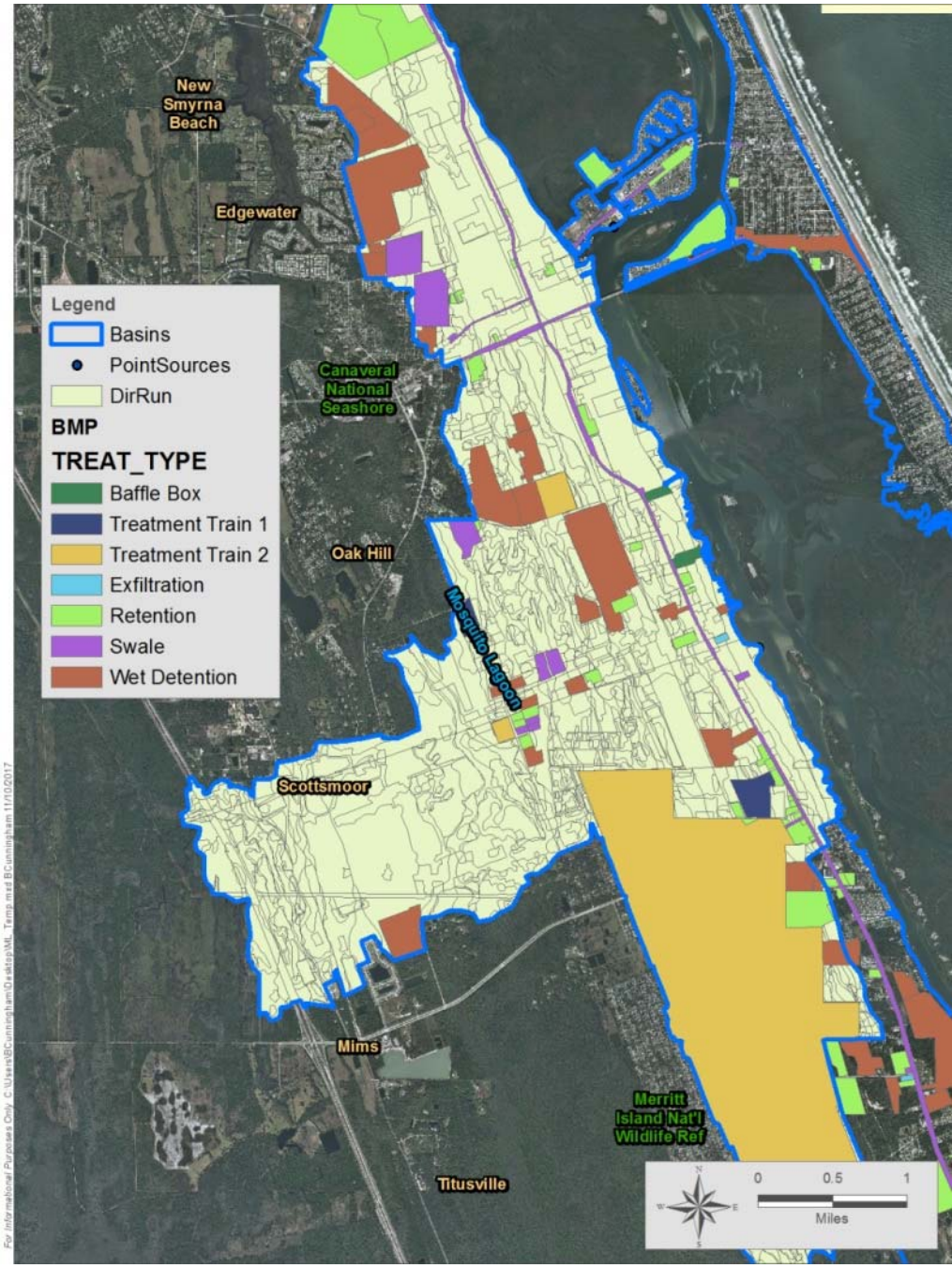
Potential Pollutants of Concern

- Total Nitrogen (TN)
- Total Phosphorus (TP)



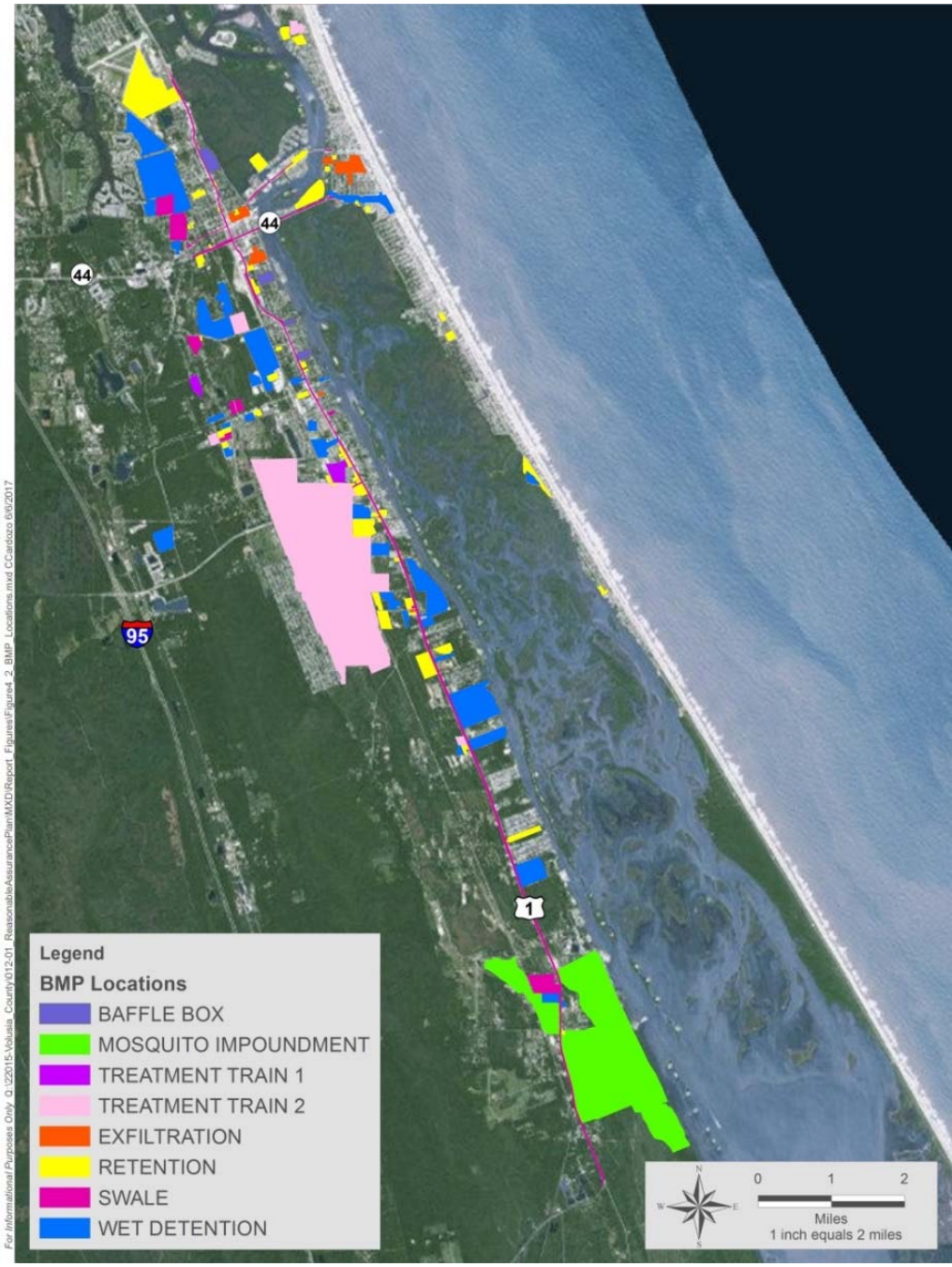
Watershed Model: SIMPLE

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



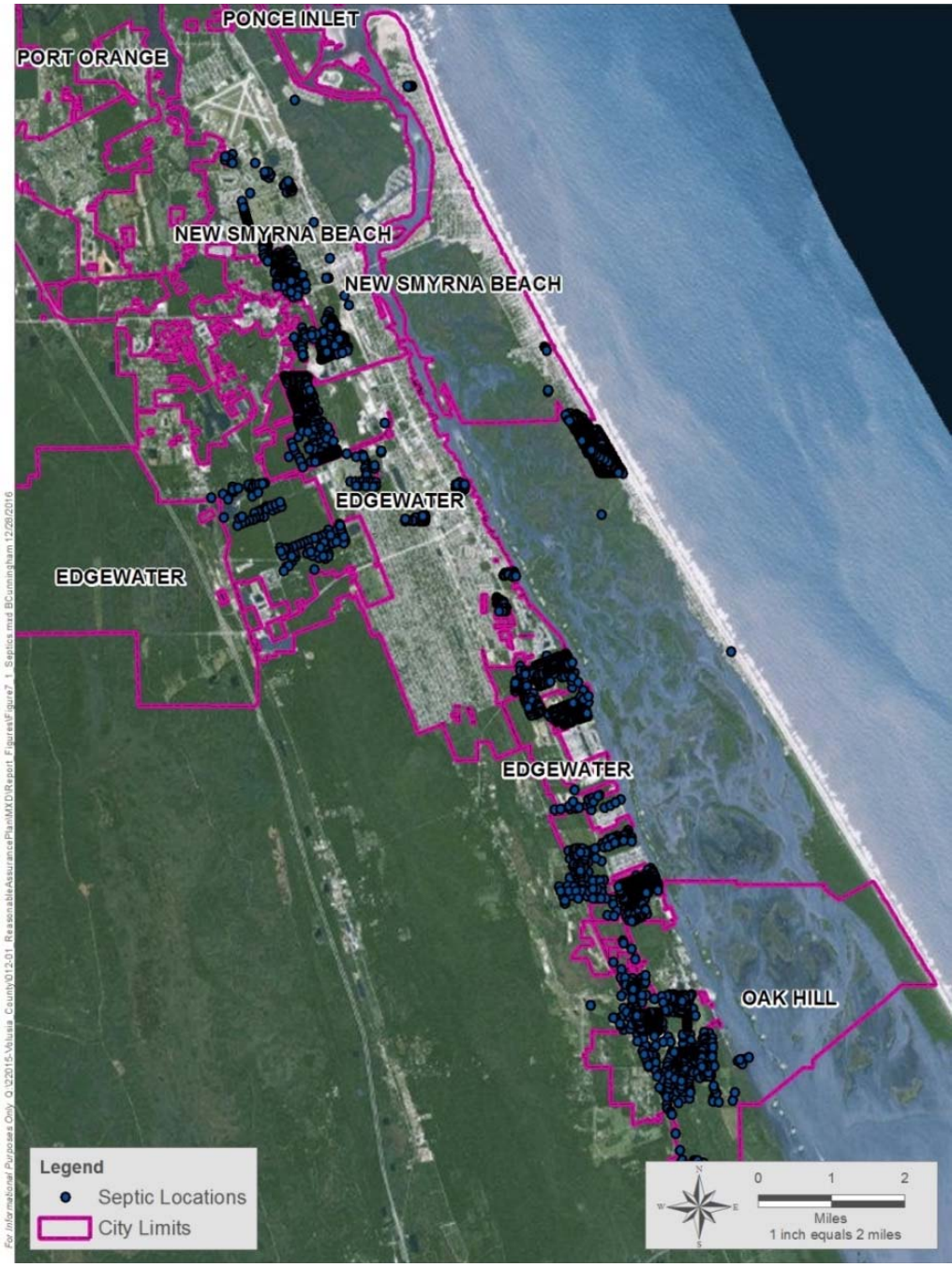
Best Management Practices

- Spatial Coverage
- Type
- Year Built



Septic Systems and Point Sources

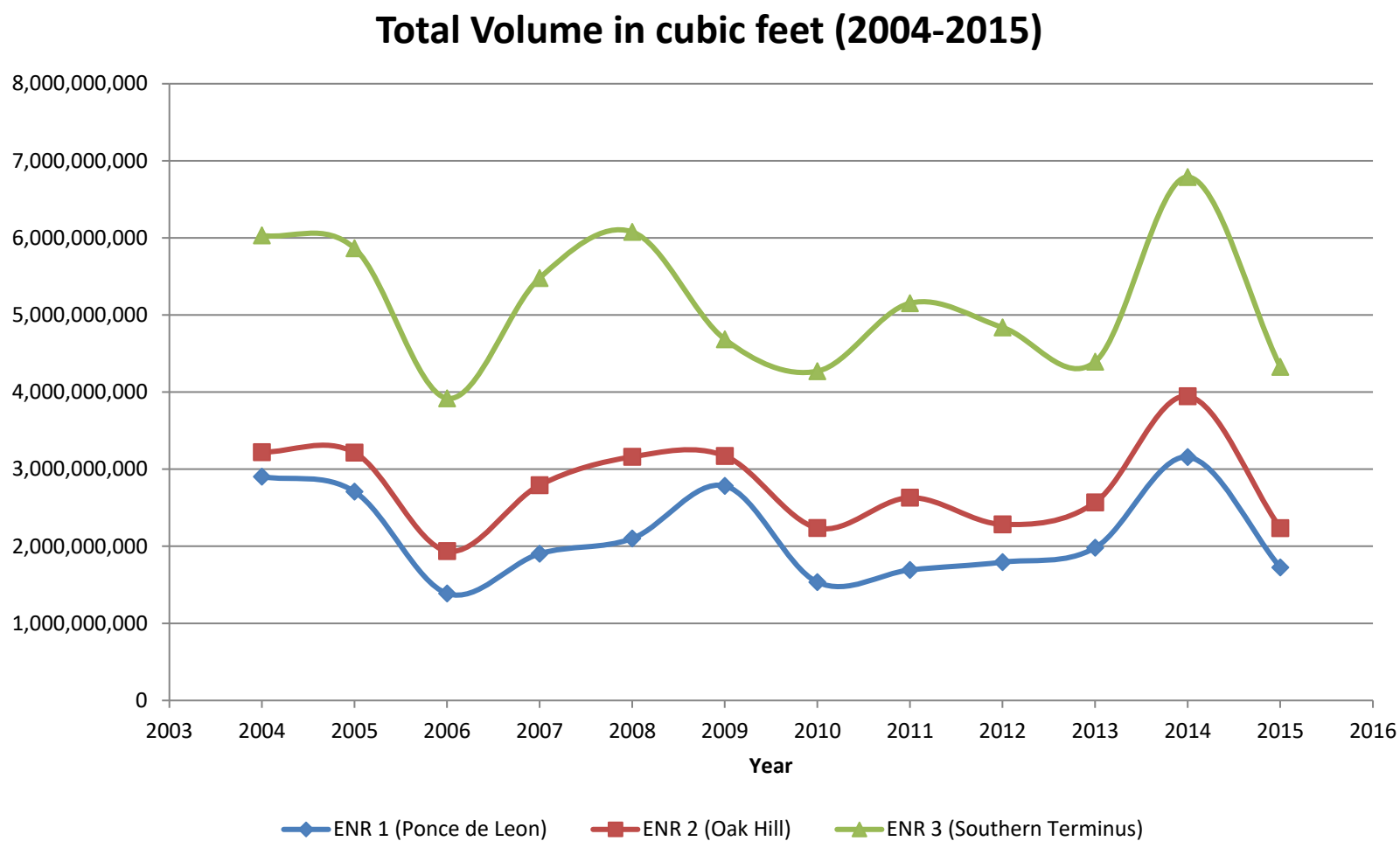
- ~2,800 Septic Systems
- Proximity to Waterbody
- Failure Rate
- Return Fraction



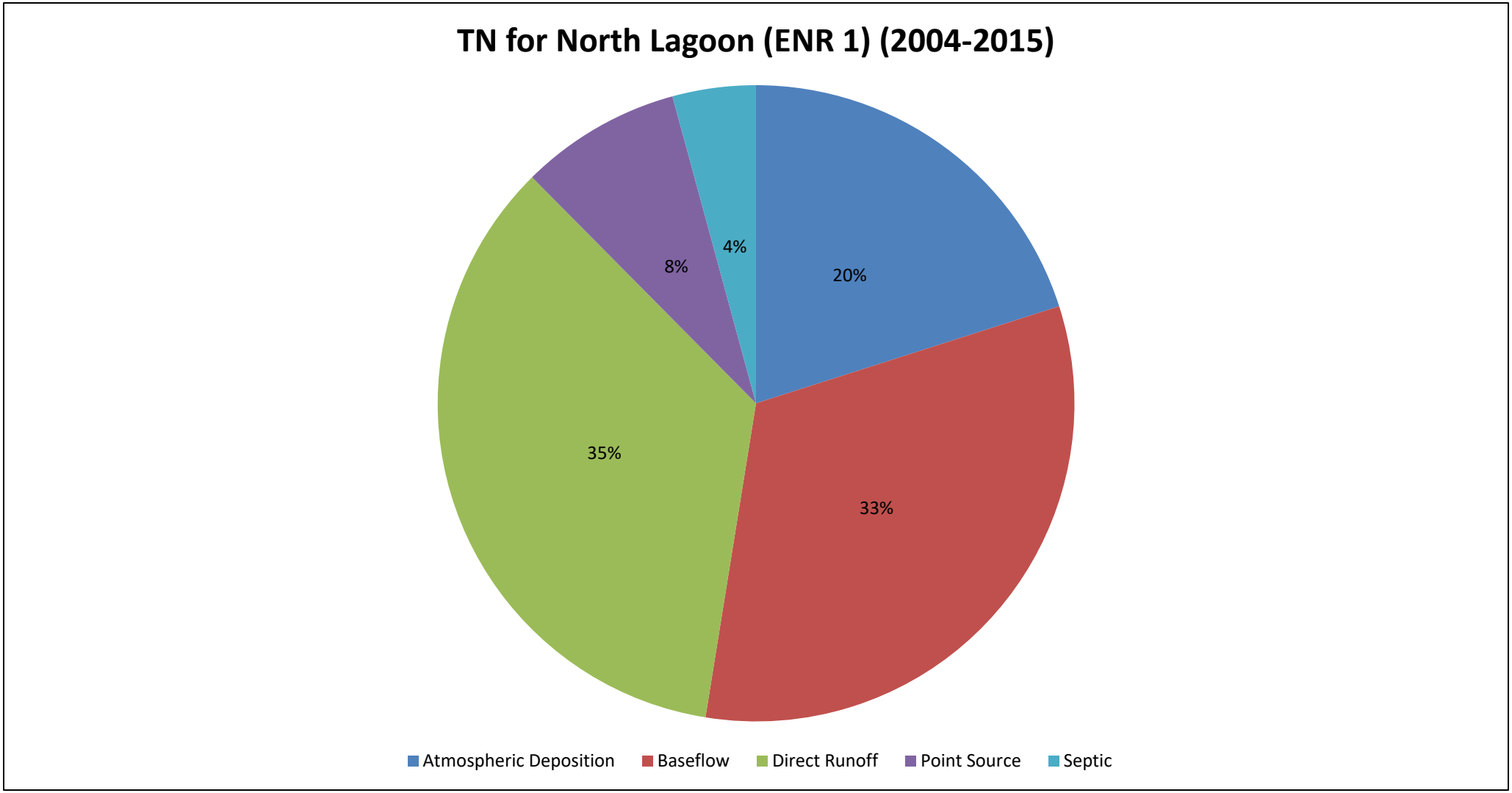
Atmospheric Deposition

- Four Rain Gages
- National Atmospheric Deposition Program Site FL99 at the Kennedy Space Center
- SJRWMD Site IRL141 (wet deposition) at Coconut Point in Sebastian Inlet
- Clean Air Status and Trends Network (CASTNET) (dry deposition) at the same location

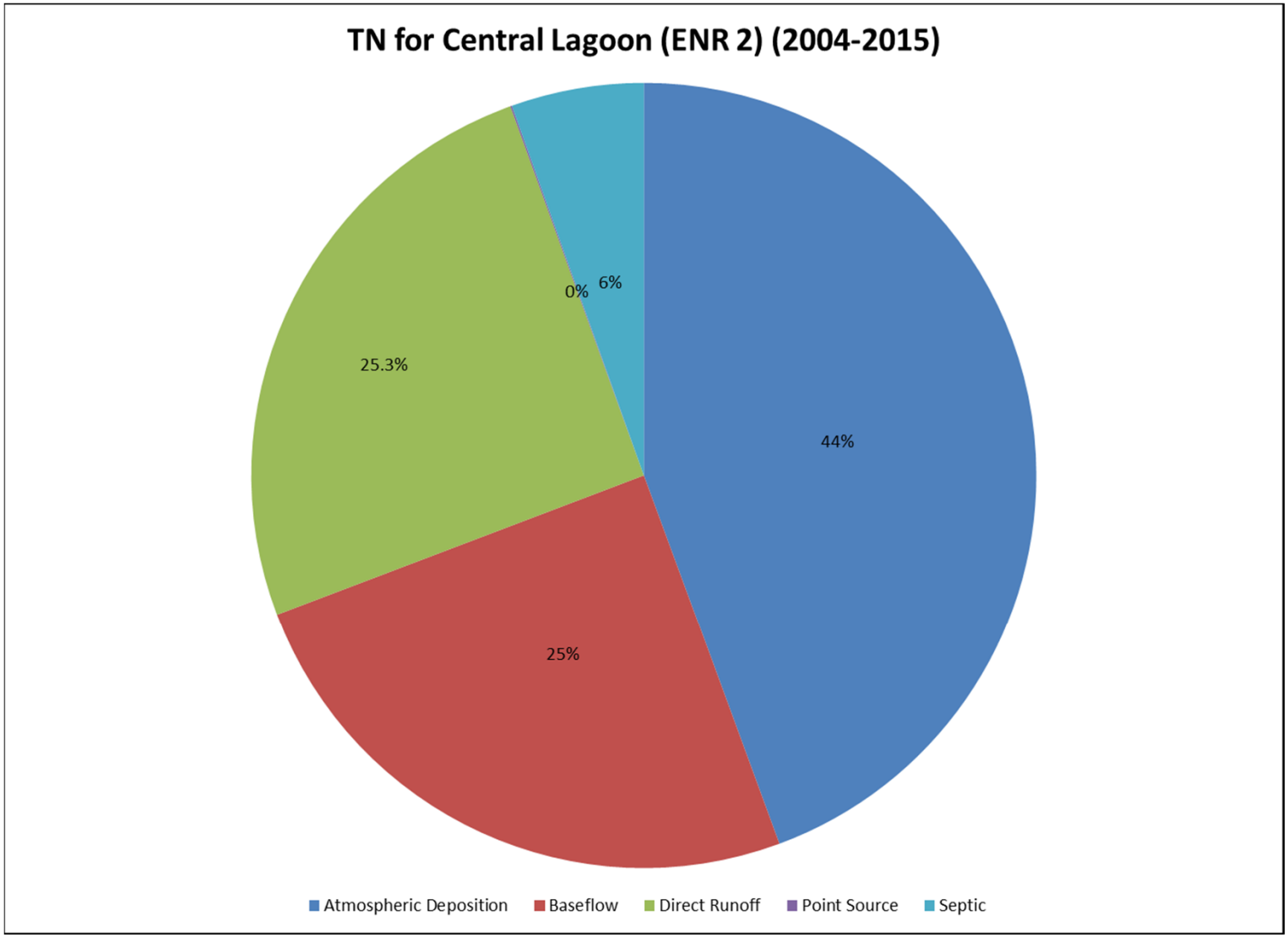
Total Volume Results



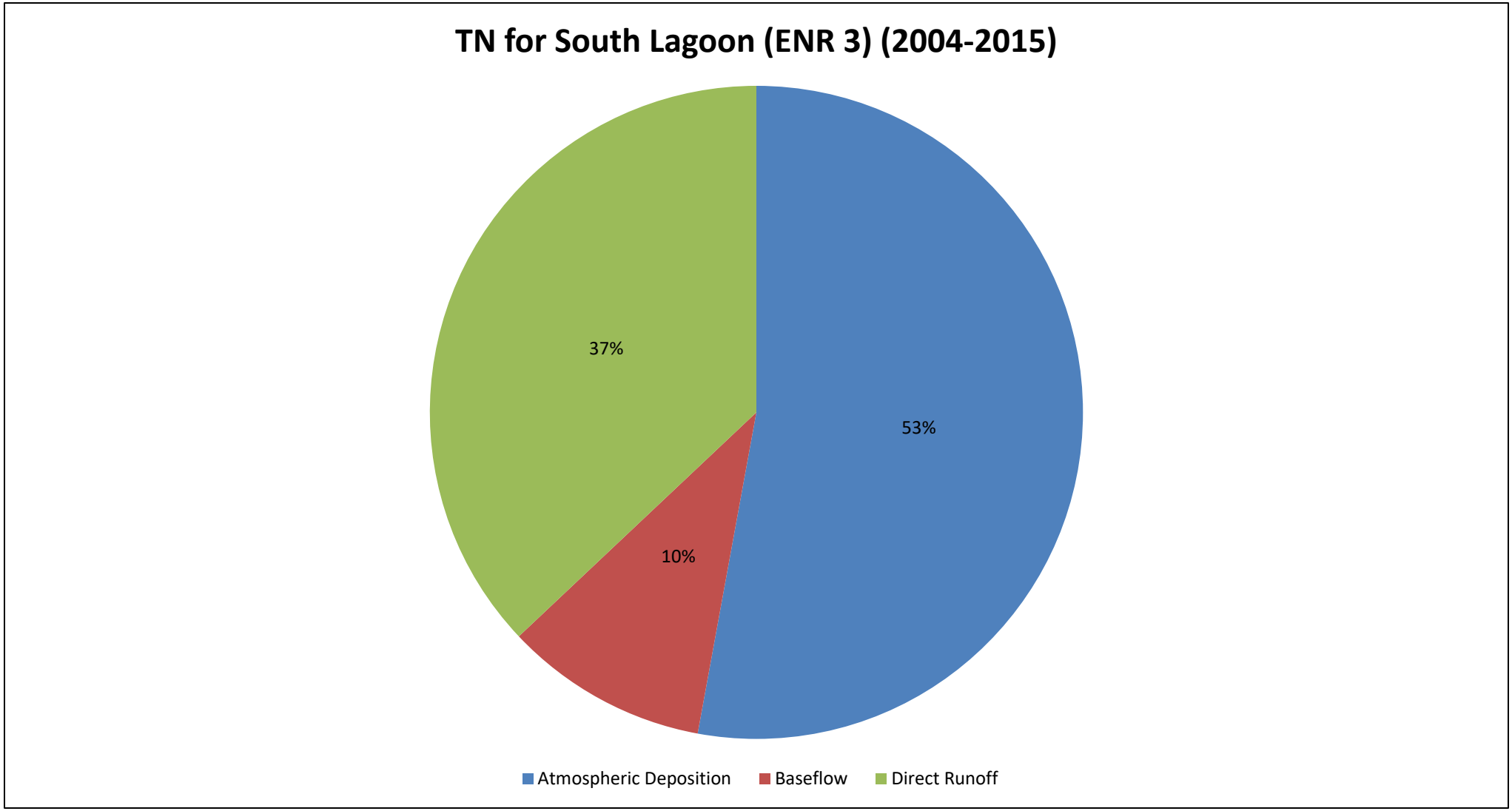
North ENR Total Nitrogen Results



Central ENR Total Nitrogen Results

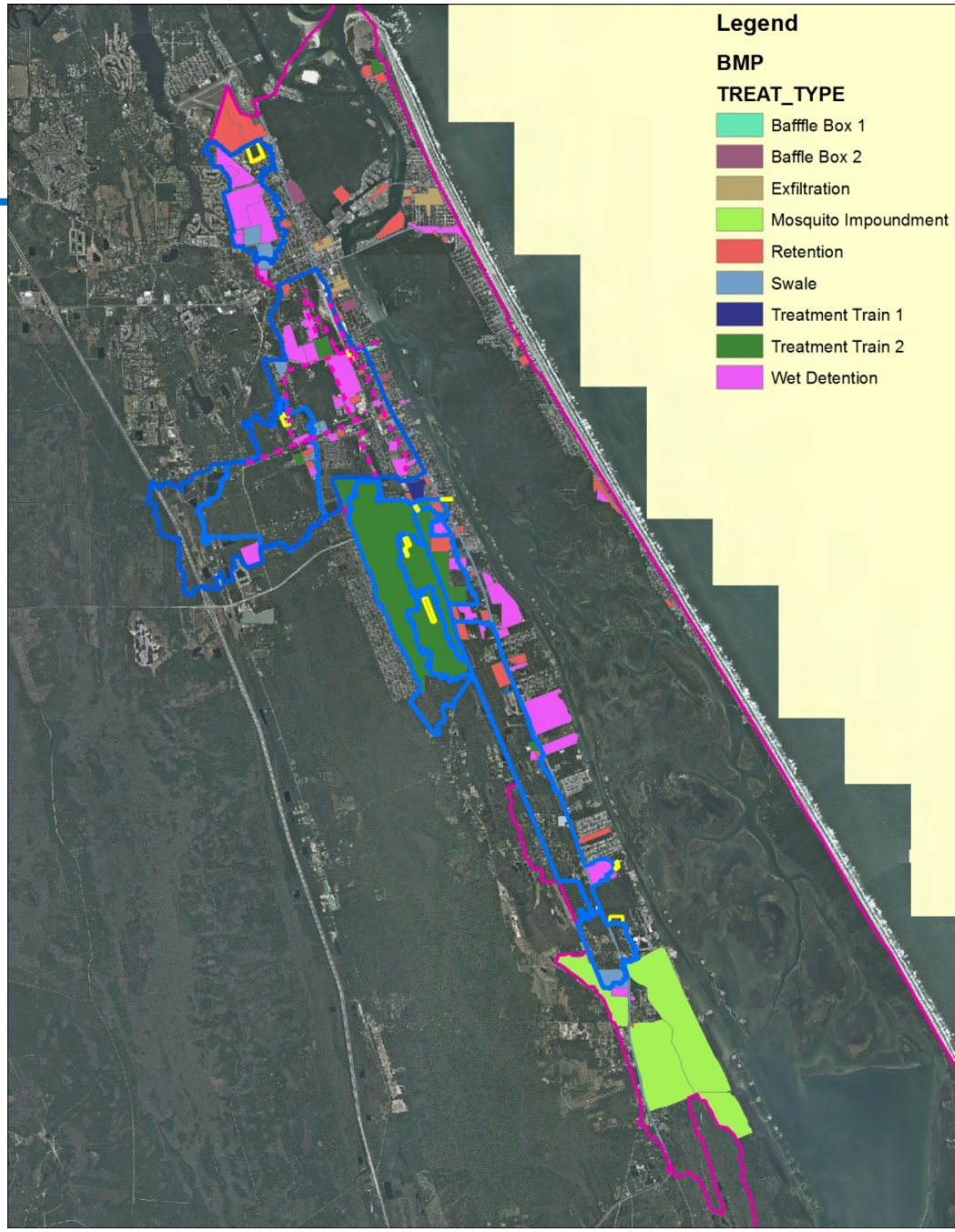


South ENR Total Nitrogen Results



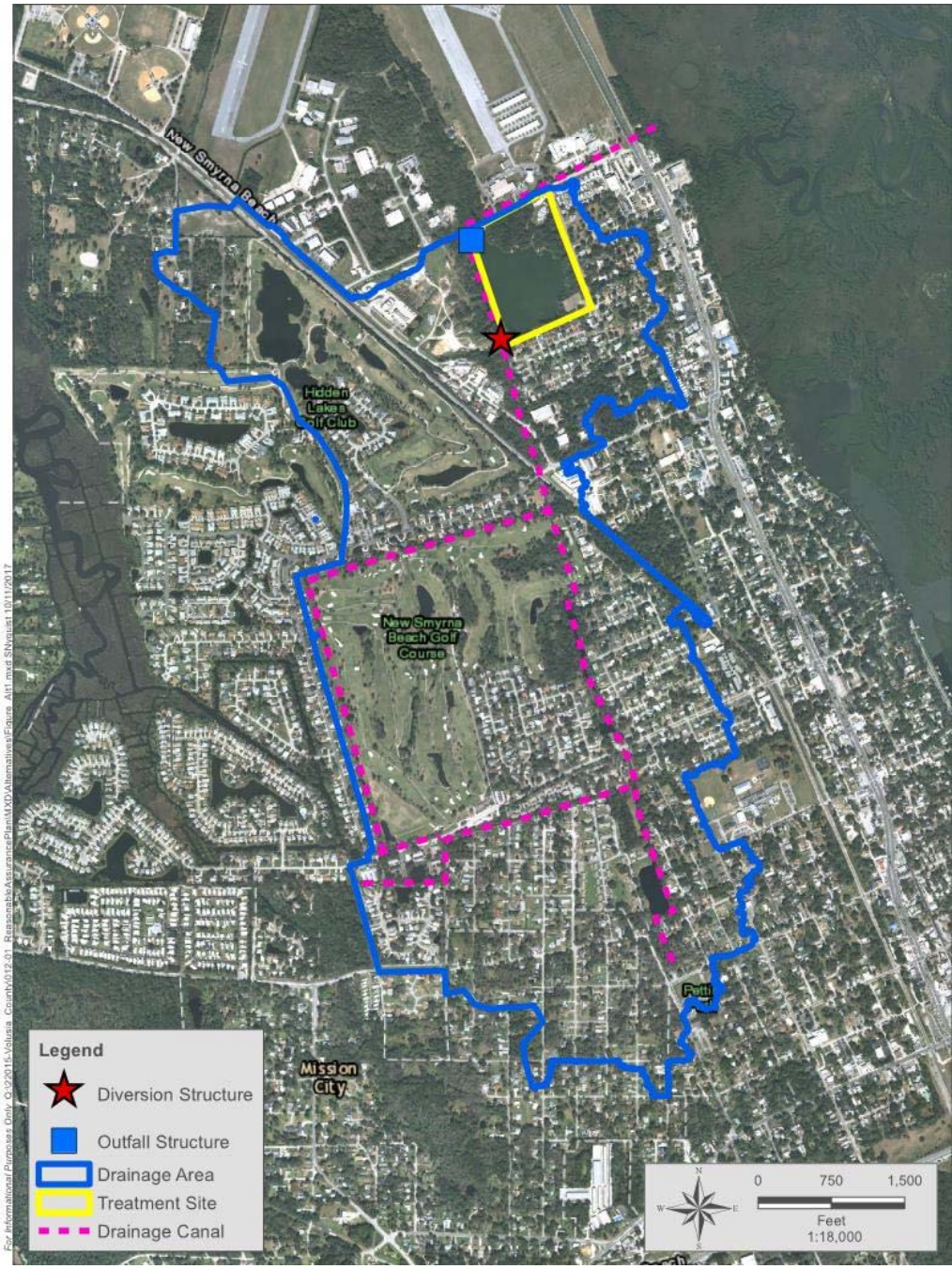
Project Options Overview

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



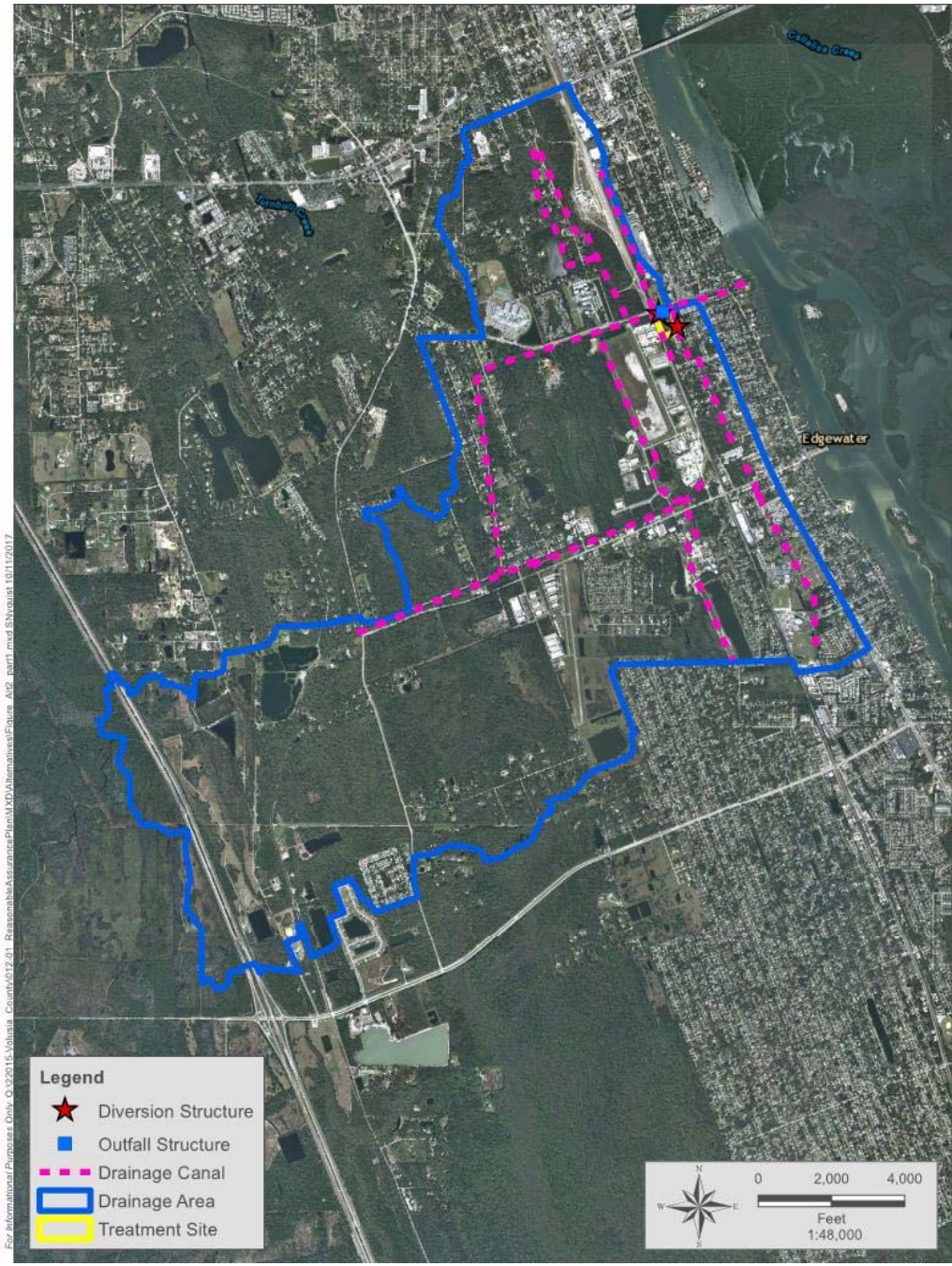
Project 1: Diversion to Borrow Pit South

- Avoids Large Excavation
- FAA Concerns
- Base Flow and Runoff
- Treats 640 acres
- 1,300 lb/yr TN
- $20/lb TN



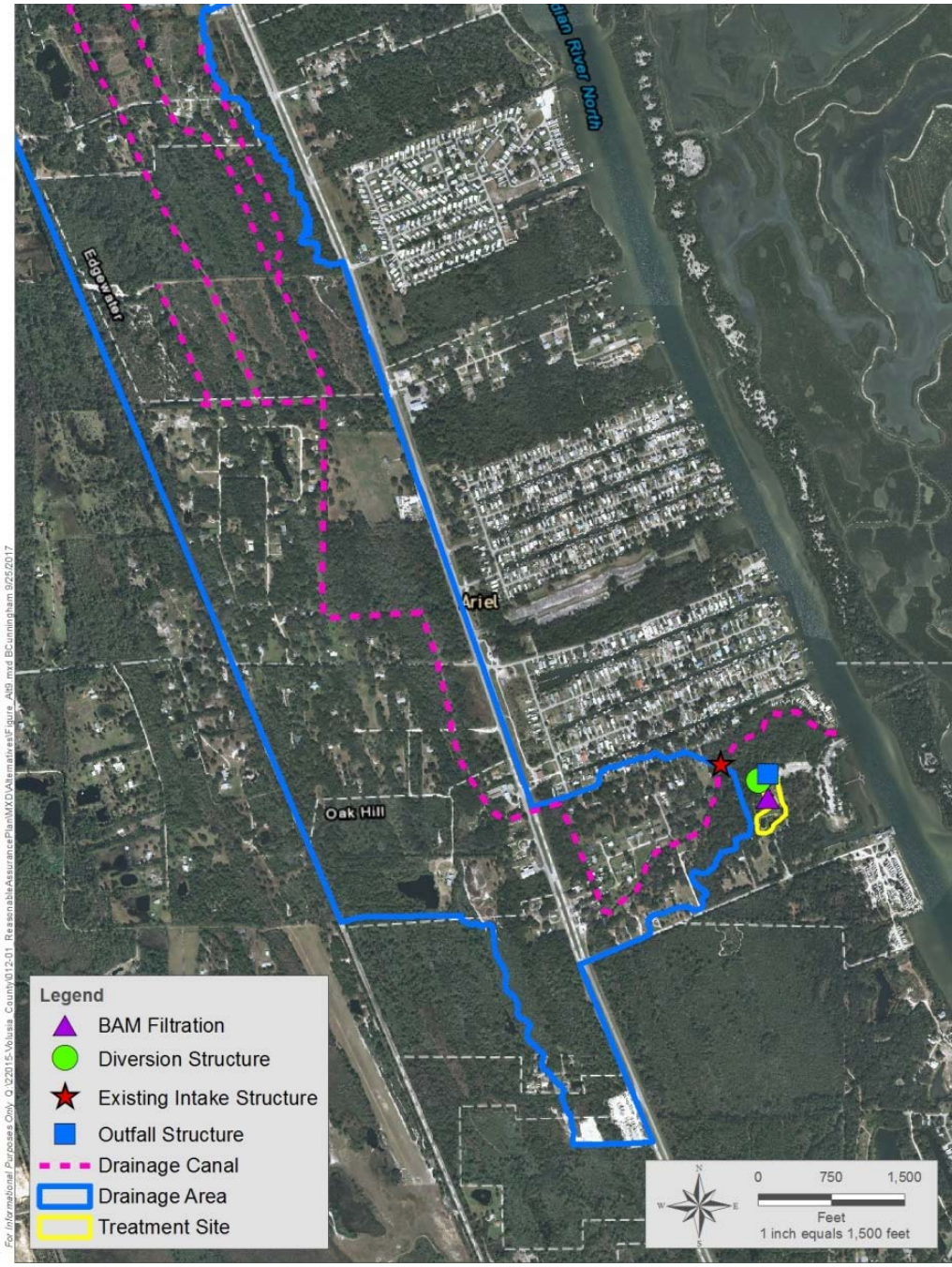
Project 2: 10th Street Treatment Facility

- Part of a Larger Project
- Base Flow and Runoff
- BAM filtration system
- Treats 4,600 acres
- 5,600 lb/yr TN
- $20/lb TN



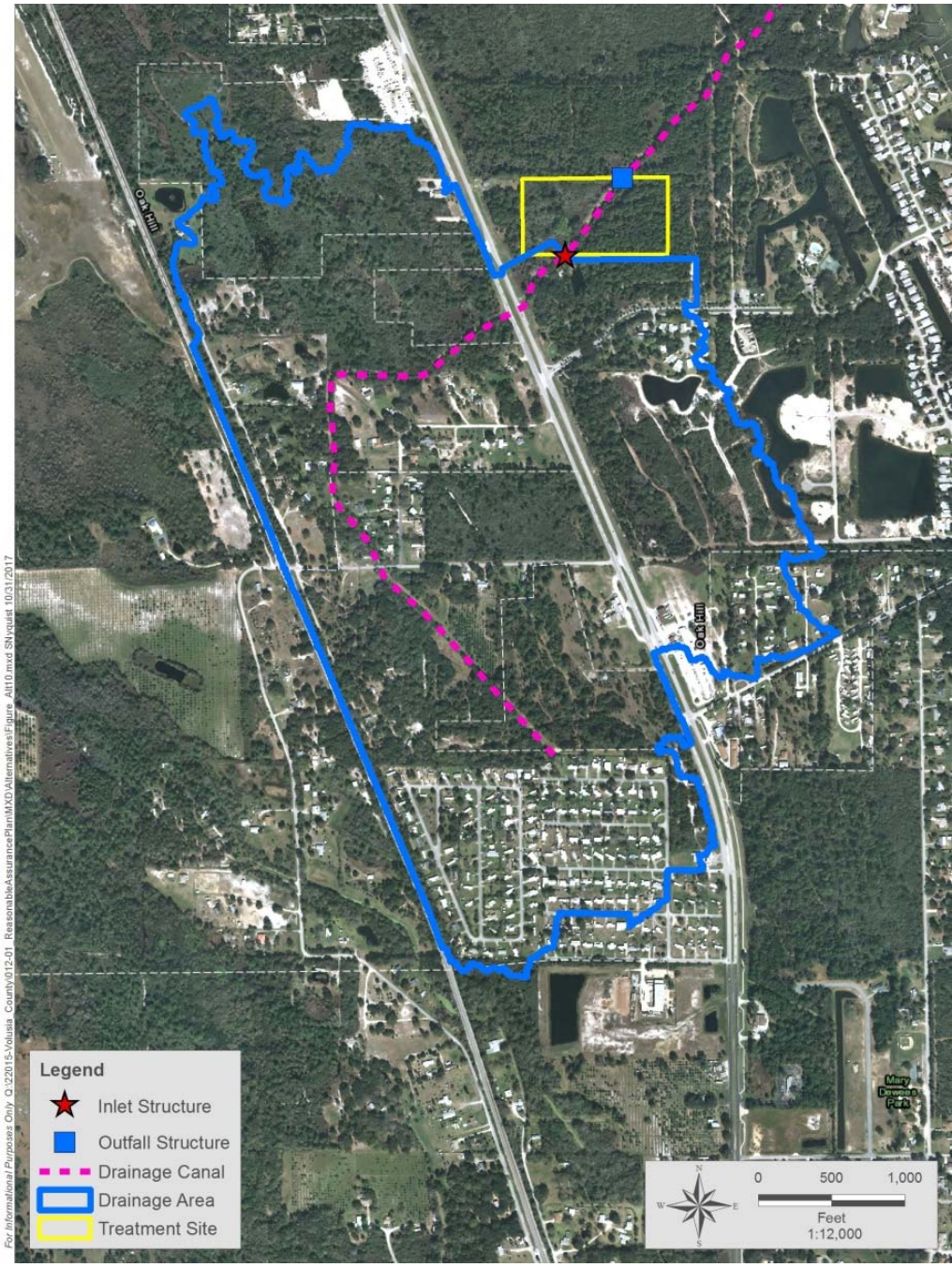
Project 9: Aerial Canal Water Quality Improvement

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



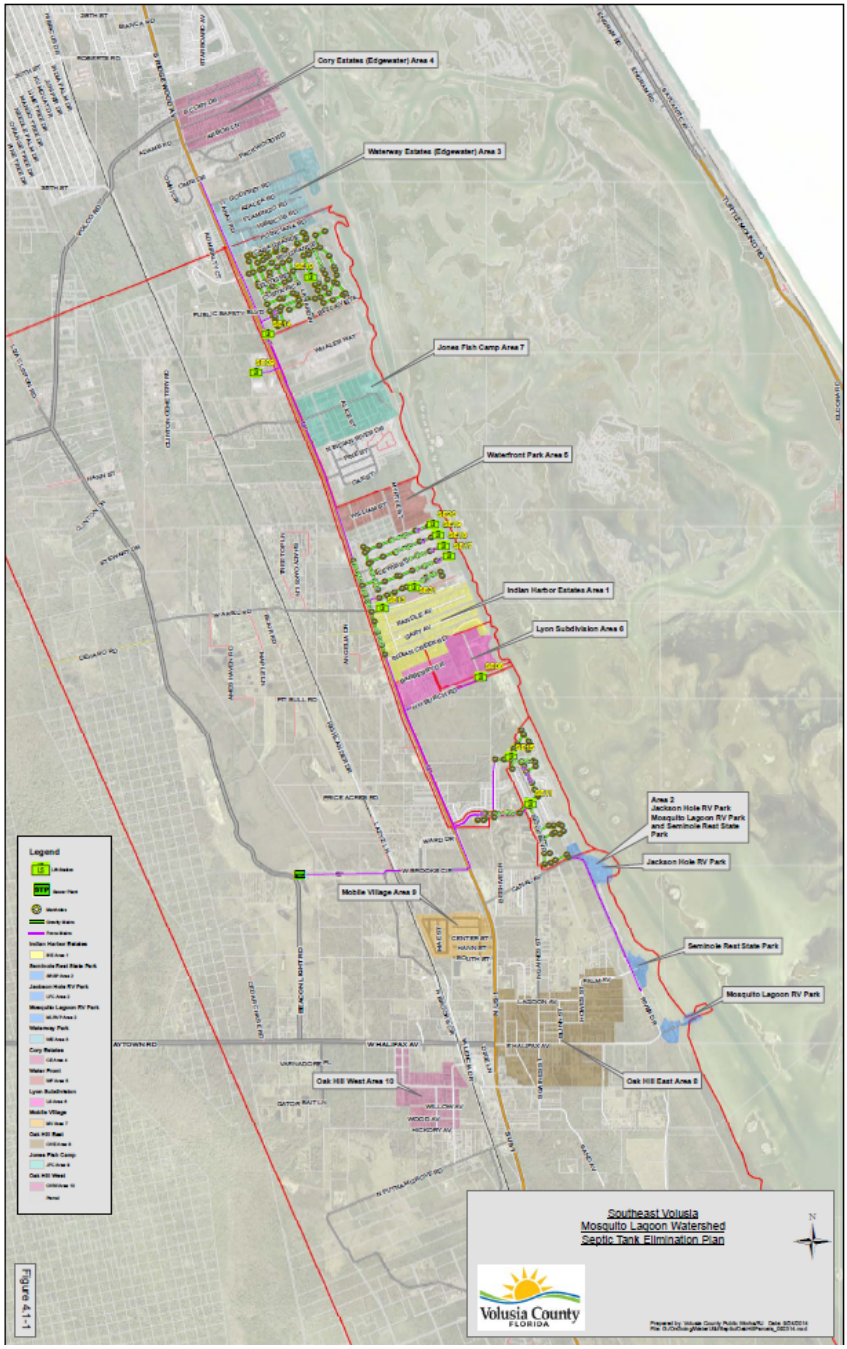
Project 10: Lighthouse Cove Treatment Facility

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



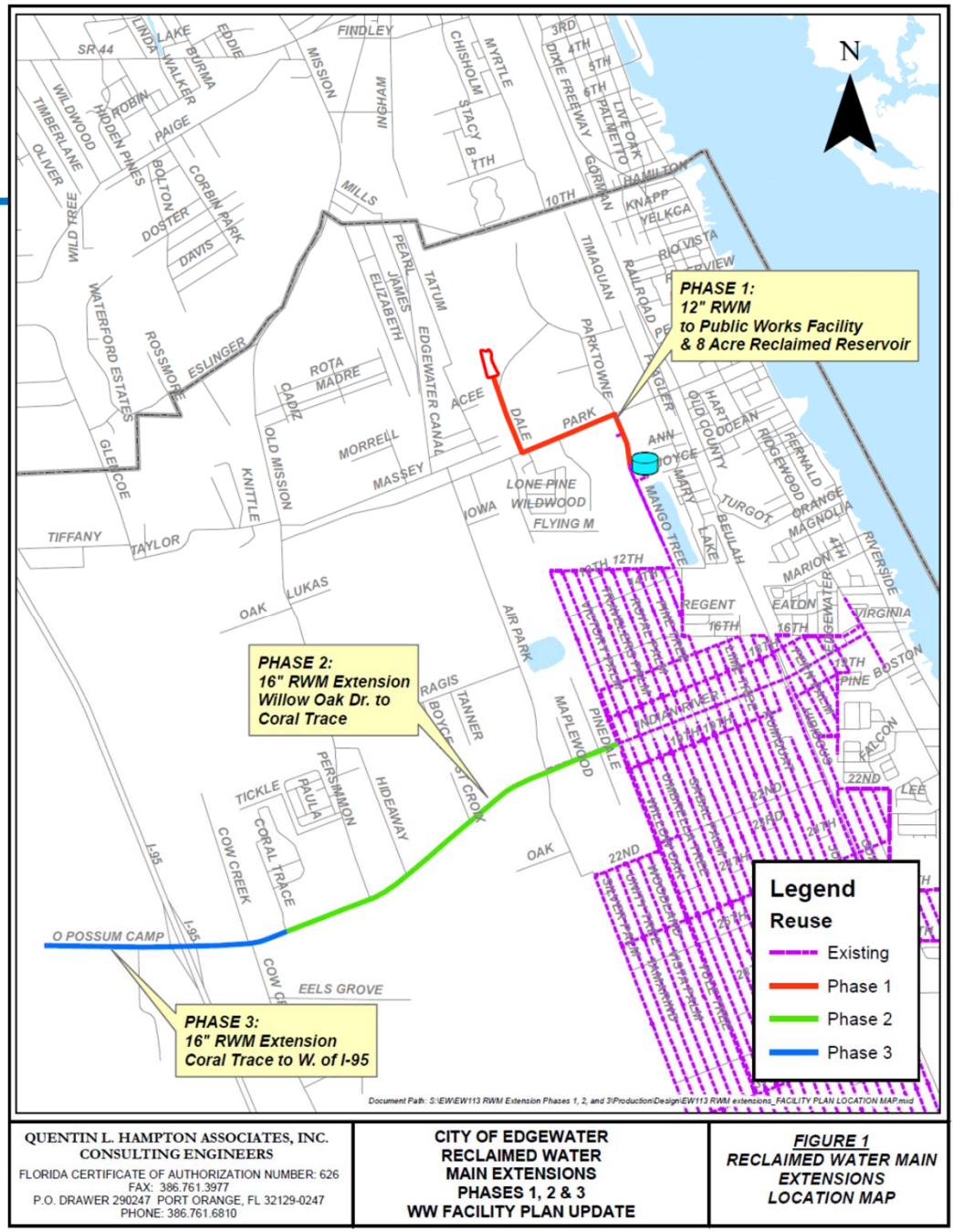
Project 8: Septic to Sewer

- 15 to 25 lb/yr TN for Close Proximity to Waterbody
- $900-$1,500/lb/yr TN w/no WWTP Upgrades
- Large Stormwater Projects ~$500 lb/yr TN
- 1000s of lb/yr TN
- Tied to Funding



Project 14: Reclaimed Water Main Extension Phases 1, 2 and 3

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



Project 13: Programmatic Changes

- 3% Current Reduction: 2,100 lb/yr TN
  - 1% for DOT
- 6% Reduction w/FYN: 4,100 lb/yr TN

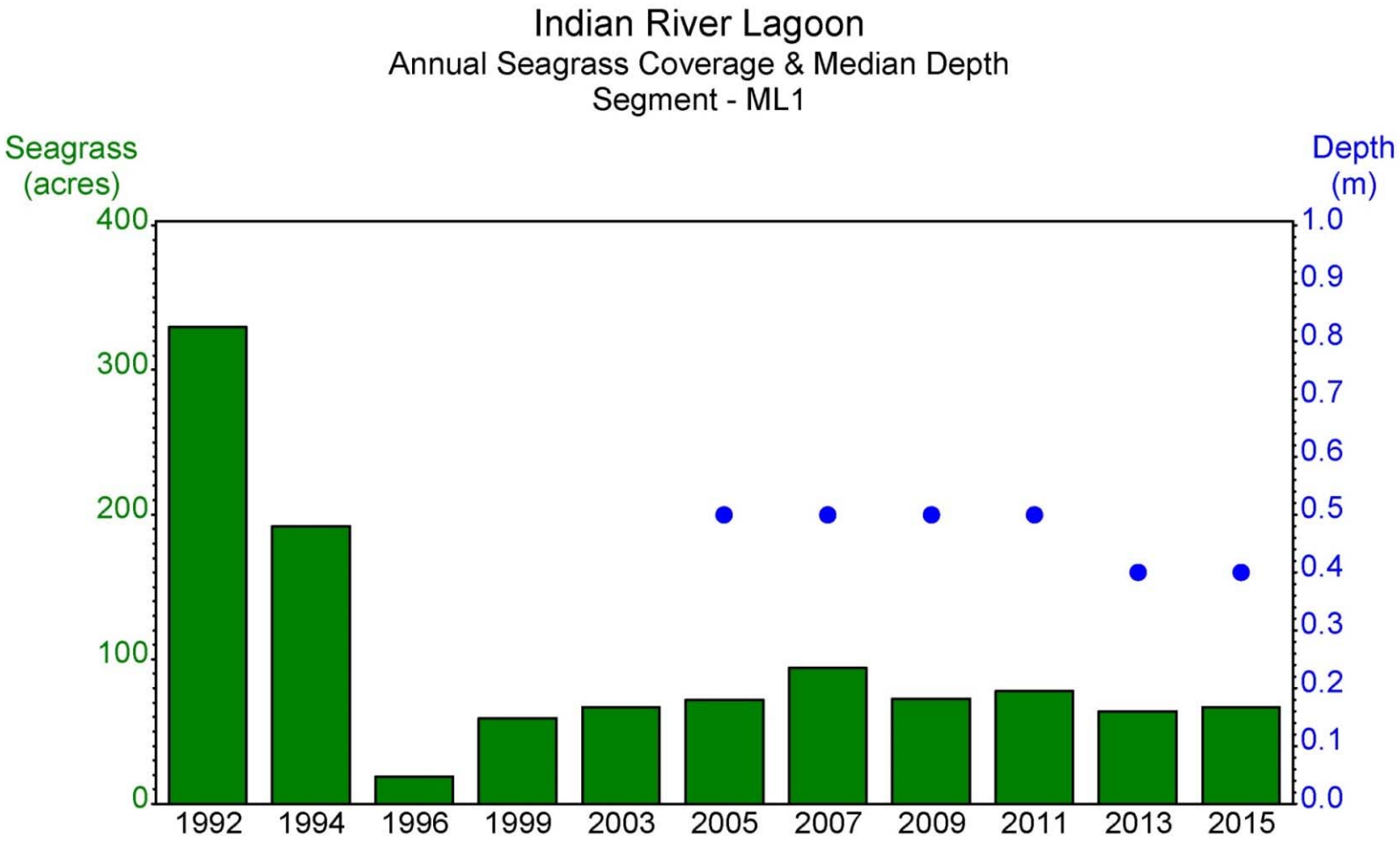
Project 12: Reduced Flux from North IRL

>>12,400 lb/yr TN and 613 lb/yr TP

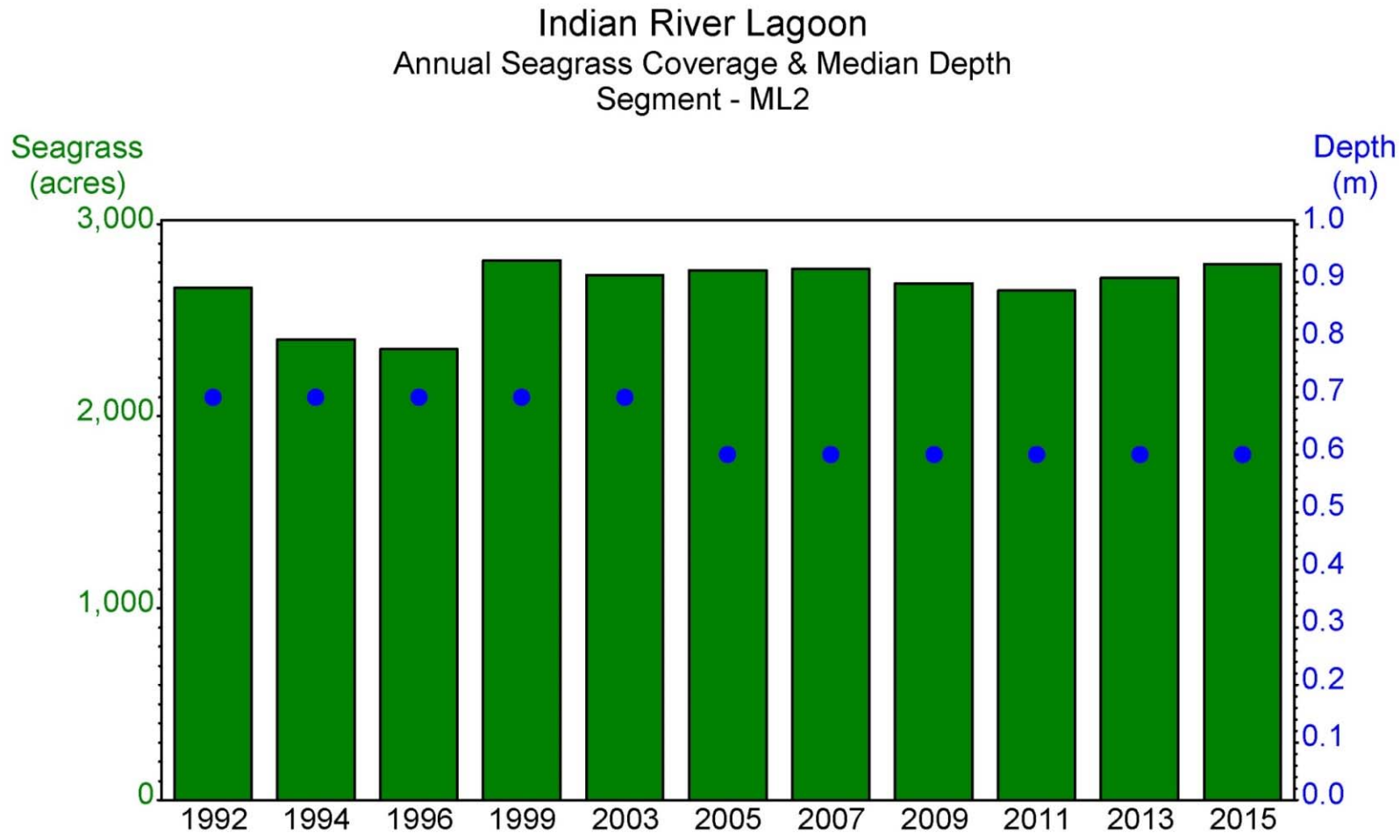
Mosquito Lagoon RAP

- Seagrasses
- NNC – water quality targets
- Stressor-response relationships
- Loading targets

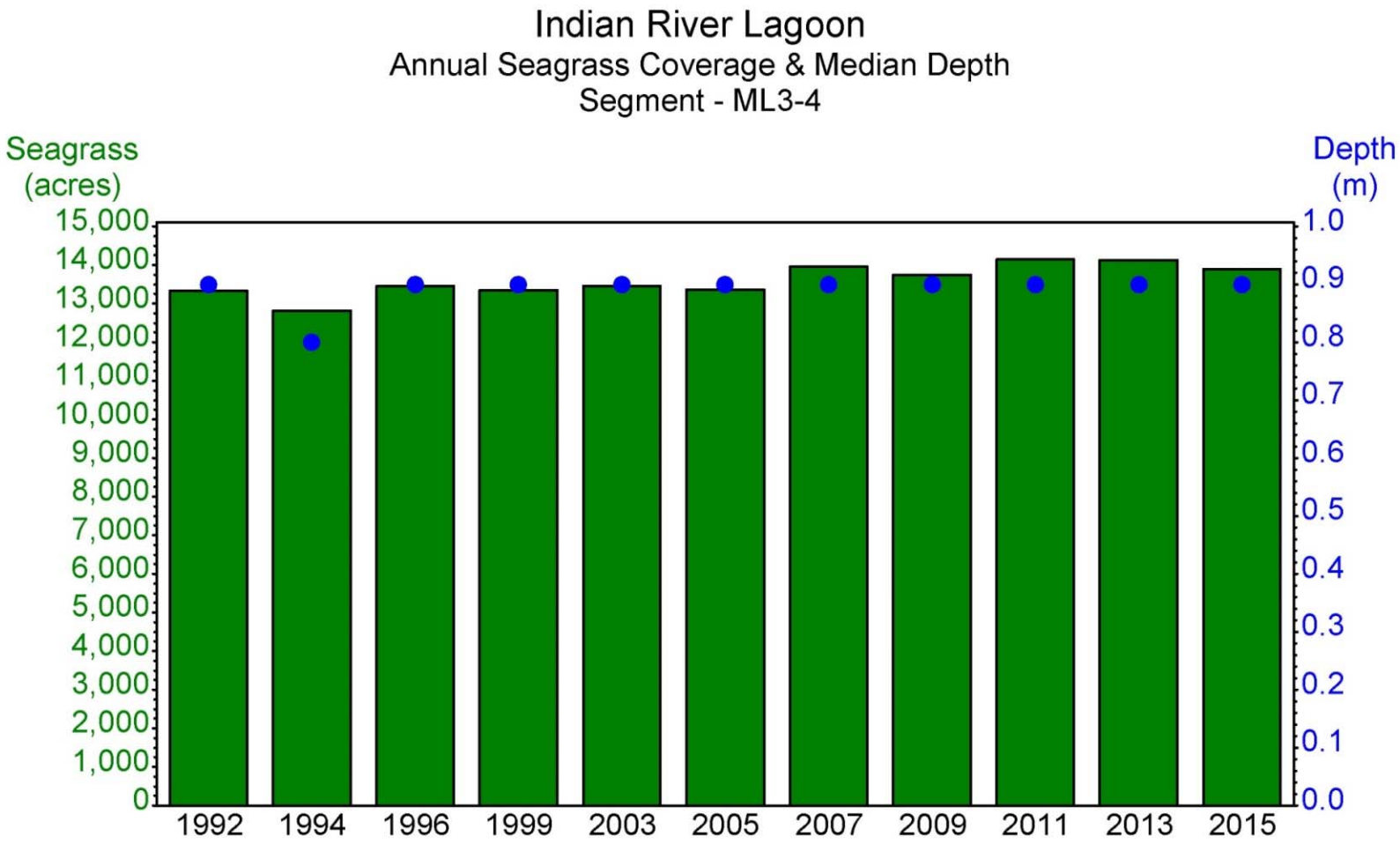
Seagrass


Indian River Lagoon
Annual Seagrass Coverage & Median Depth
Segment - ML1
Seagrass (acres)
Depth (m)
400
300
200
100
0
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1992
1994
1996
1999
2003
2005
2007
2009
2011
2013
2015

Seagrass


Indian River Lagoon
Annual Seagrass Coverage & Median Depth
Segment - ML2
Seagrass (acres)
Depth (m)
3,000
2,000
1,000
0
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1992
1994
1996
1999
2003
2005
2007
2009
2011
2013
2015

Seagrass


Indian River Lagoon
Annual Seagrass Coverage & Median Depth
Segment - ML3-4
Seagrass (acres)
Depth (m)
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1992
1994
1996
1999
2003
2005
2007
2009
2011
2013
2015

Water Quality Targets

- Establishment of water quality criteria that protect critical aquatic resources is a necessary element of the Reasonable Assurance Plan

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

- Best science

Water Quality Targets

- In 2014, FDEP set criteria built on data analysis by the St. Johns River Water Management District (2010)

Estuarine Nutrient Region	Parameter	FDEP (2014)
North	TN (mg/L)	0.51
	TP (mg/L)	0.05
	Chlorophyll a (µg/L)	4.0
Central	TN (mg/L)	0.65
	TP (mg/L)	0.05
	Chlorophyll a (µg/L)	3.4
South	TN (mg/L)	1.14
	TP (mg/L)	0.03
	Chlorophyll a (µg/L)	2.5

Loading Targets

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

Loading Targets

- Definition of nutrient loading targets generally follows one of three alternative approaches
  - Empirical Modeling
  - Mechanistic Modeling
  - Reference Period

Loading Targets

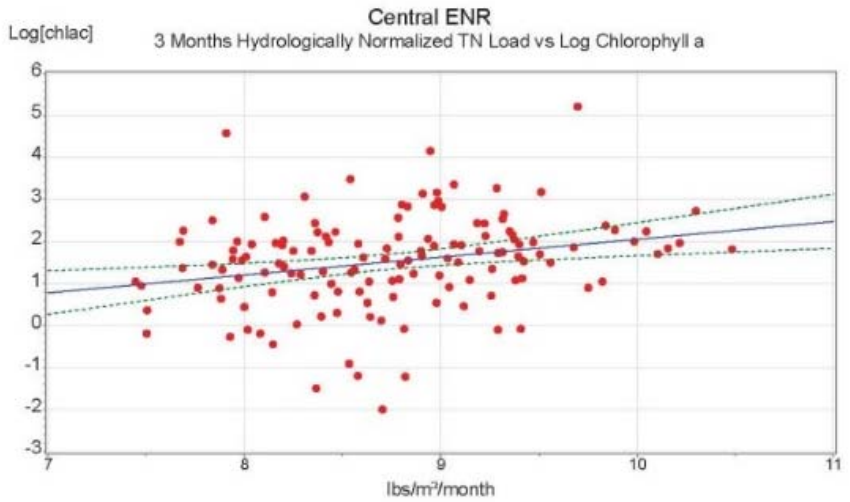
- Series of empirical relationships were examined using the available ambient water quality data and nutrient loading estimates
- Applied statistical techniques to define the relationships quantitatively for multiple temporal and spatial scales
- Confounding factors

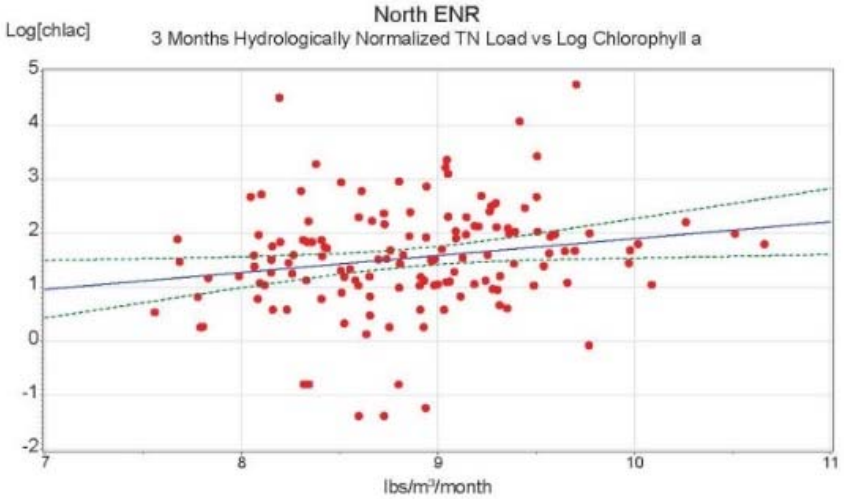
Loading Targets

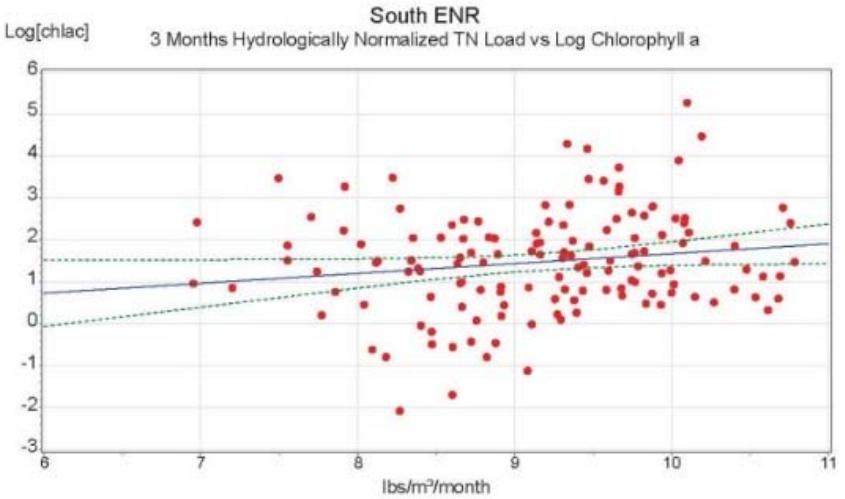
- Factors examined include:
  - Nutrient (TN and TP) concentrations
  - Nutrient (TN and TP) loadings
  - Lag effects of nutrient loading
  - Effects of residence time
  - Effects of fluxes

Empirical Modeling

TN Load – Chlorophyll Relationships

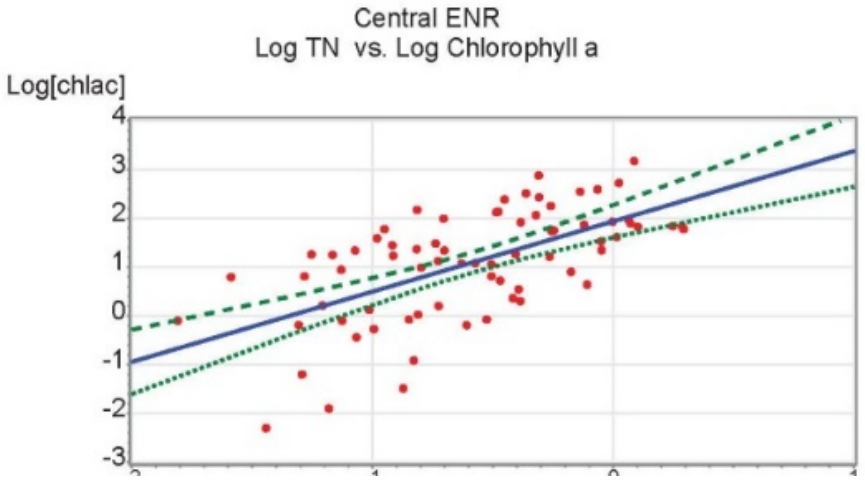


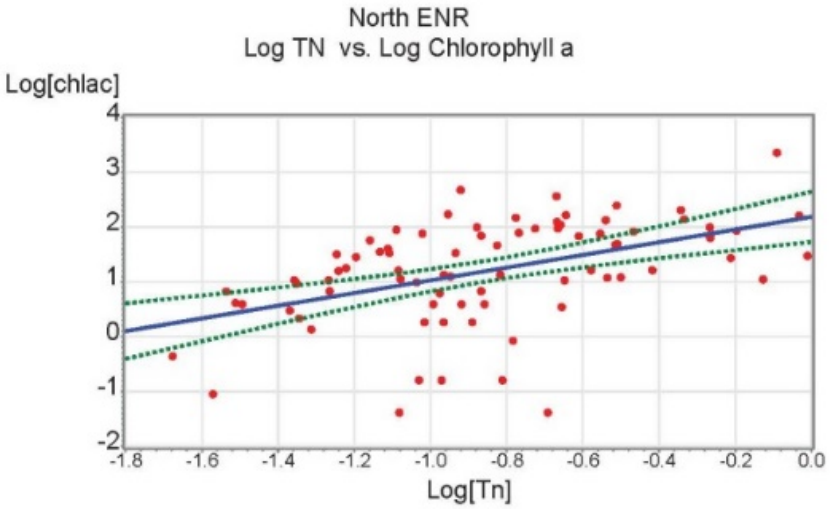


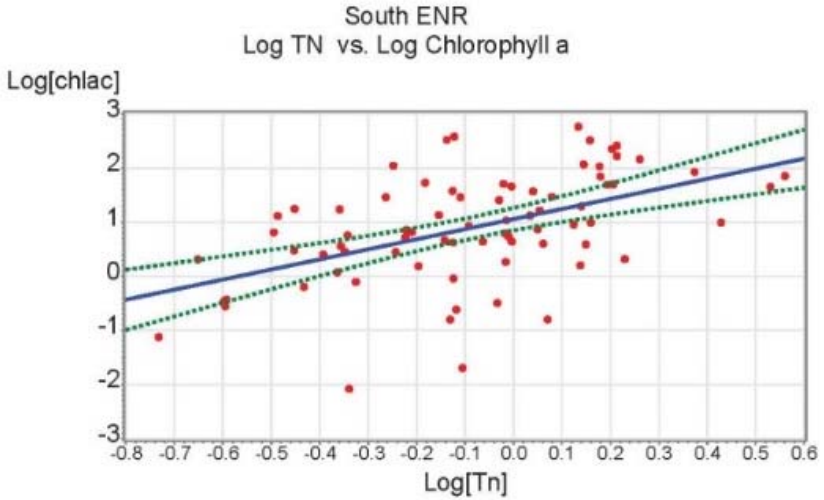


Empirical Modeling

[TN] – Chlorophyll Relationships

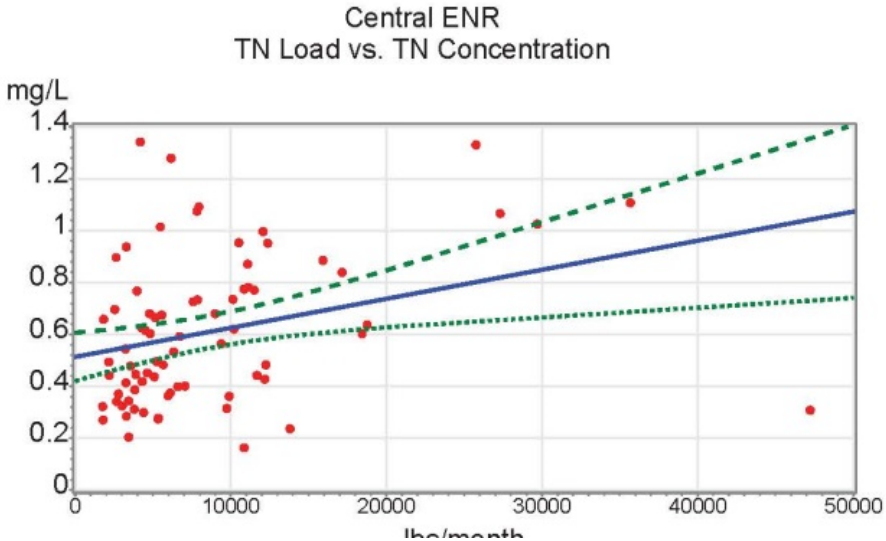


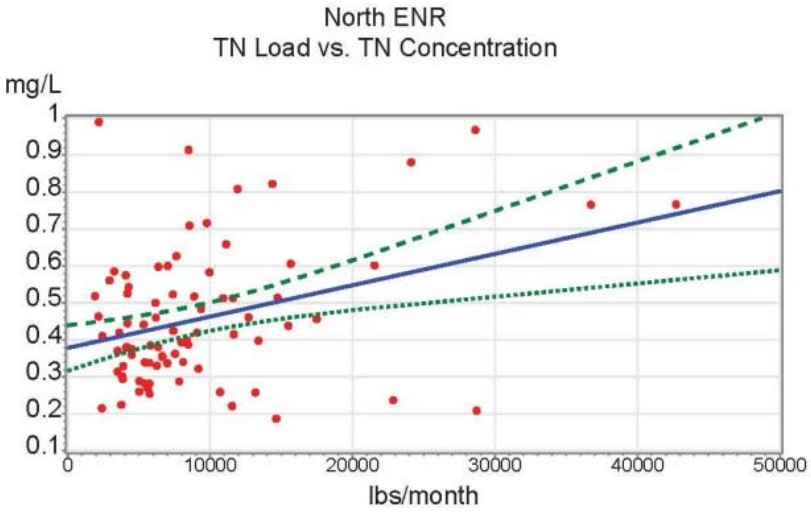


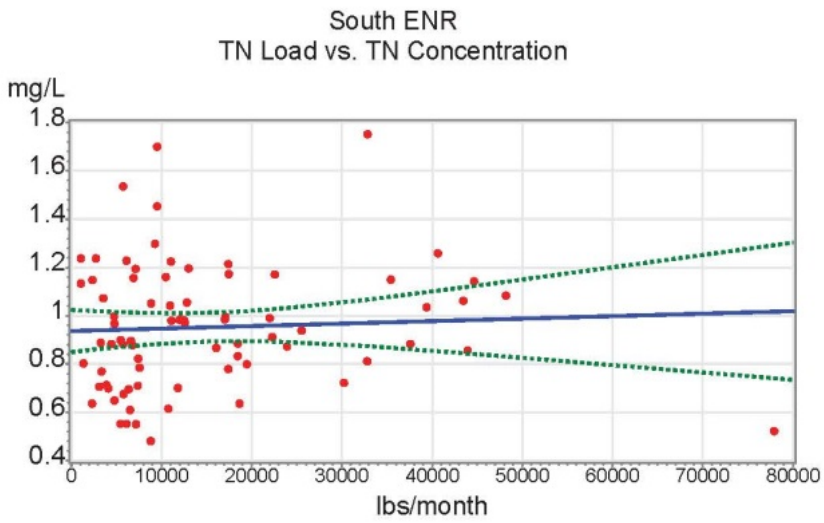


Empirical Modeling

TN Load - [TN] Relationships







Empirical Modeling Conclusions

- No significant quantitative relationships between ambient water quality and nutrient loads were found
- It should not be inferred that chlorophyll is not dependent upon nutrient conditions
- Therefore, an alternative approach is needed to define nutrient loading targets

Other Approaches to Define Nutrient Loading Targets

- 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

- The timing of the availability of the model is uncertain

- Therefore, the Reference Period approach, i.e., the third commonly used alternative approach to establishing nutrient loading targets is recommended

Other Approaches to Define Nutrient Loading Targets

- However, the timing of the availability of the model is uncertain

- Therefore, the Reference Period approach, i.e., the third commonly used alternative approach to establishing nutrient loading targets is recommended

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

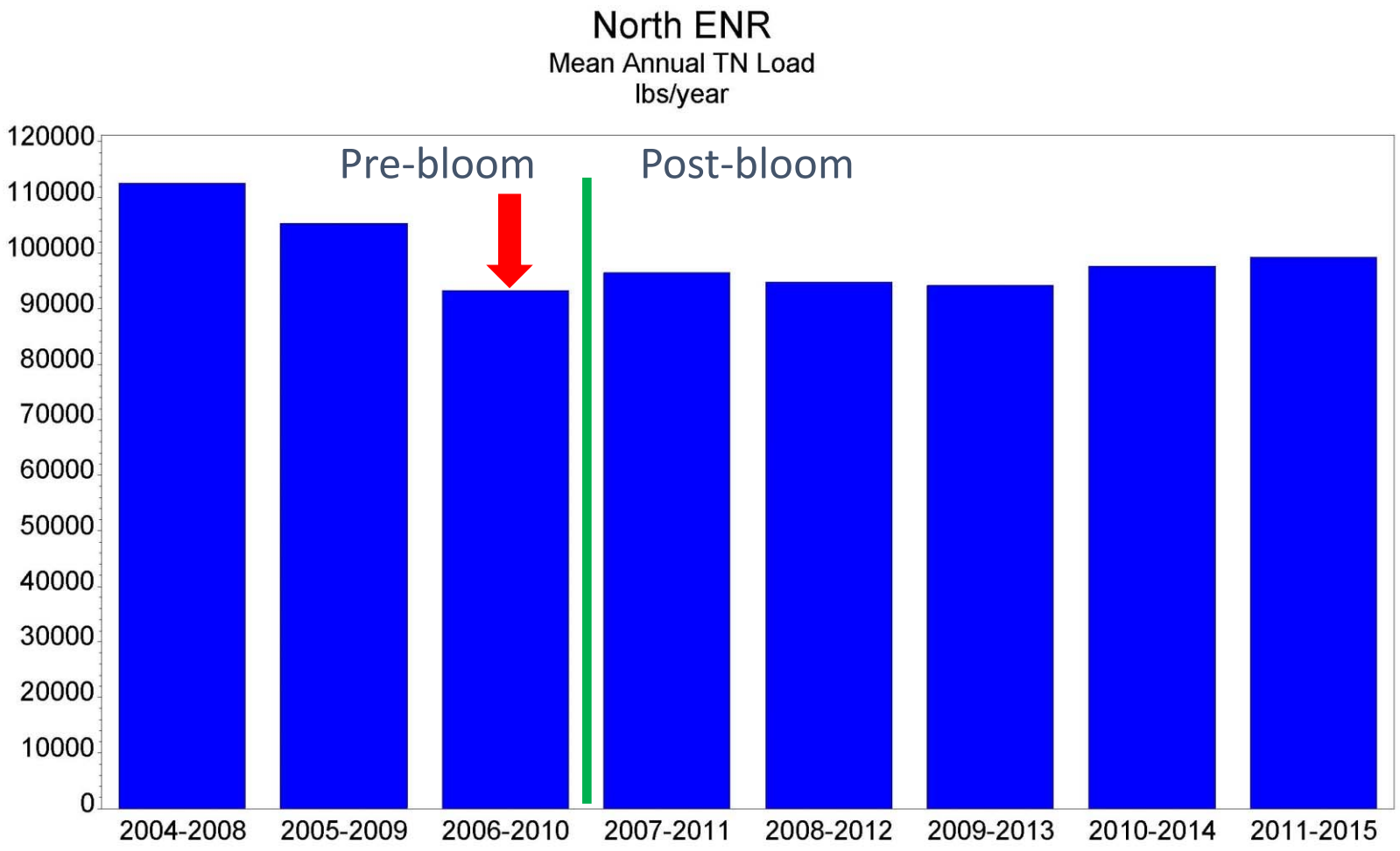
- However, the timing of the availability of the model is uncertain

- Therefore, the Reference Period approach, i.e., the third commonly used alternative approach to establishing nutrient loading targets is recommended

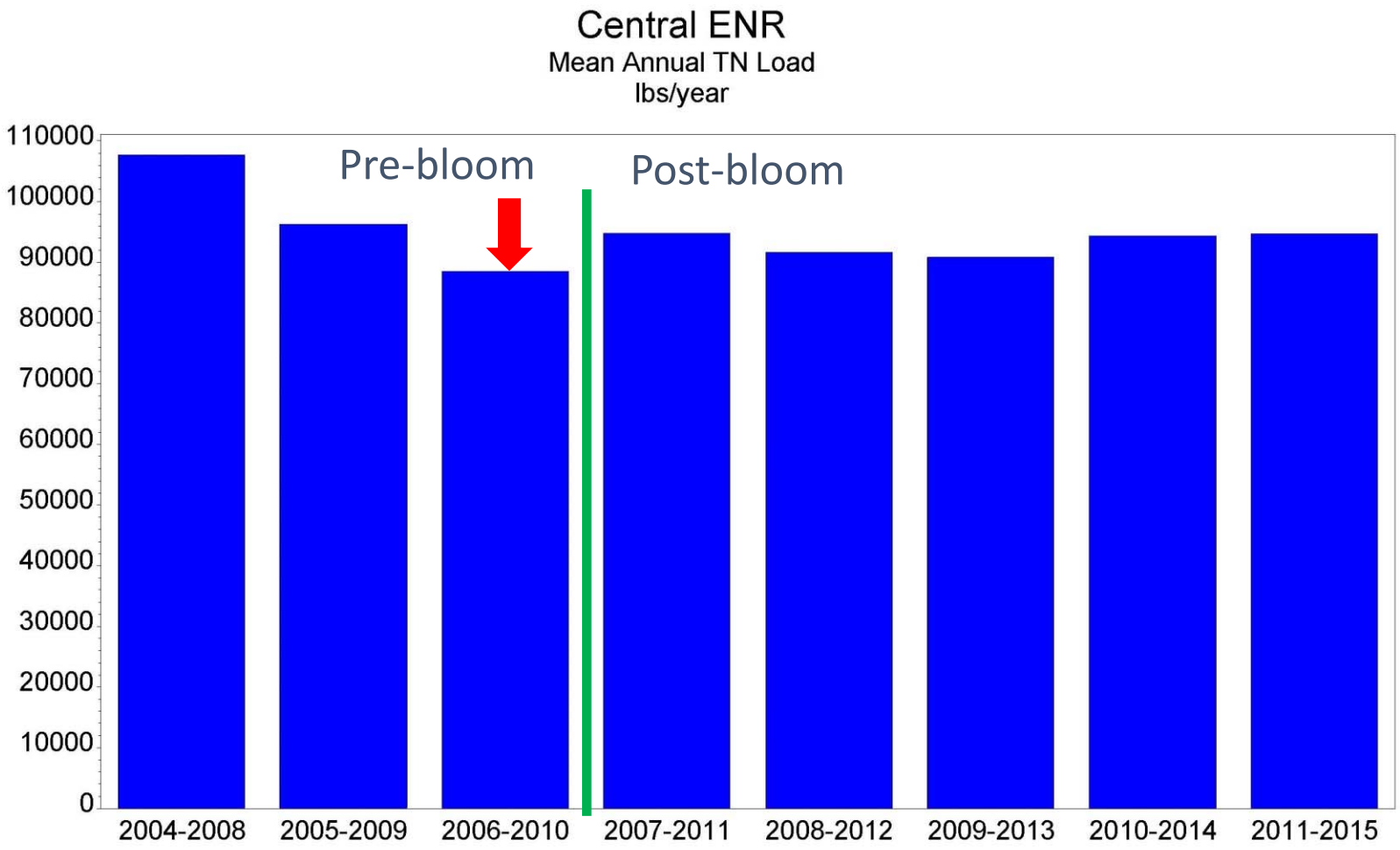
Reference Period Approach

- 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

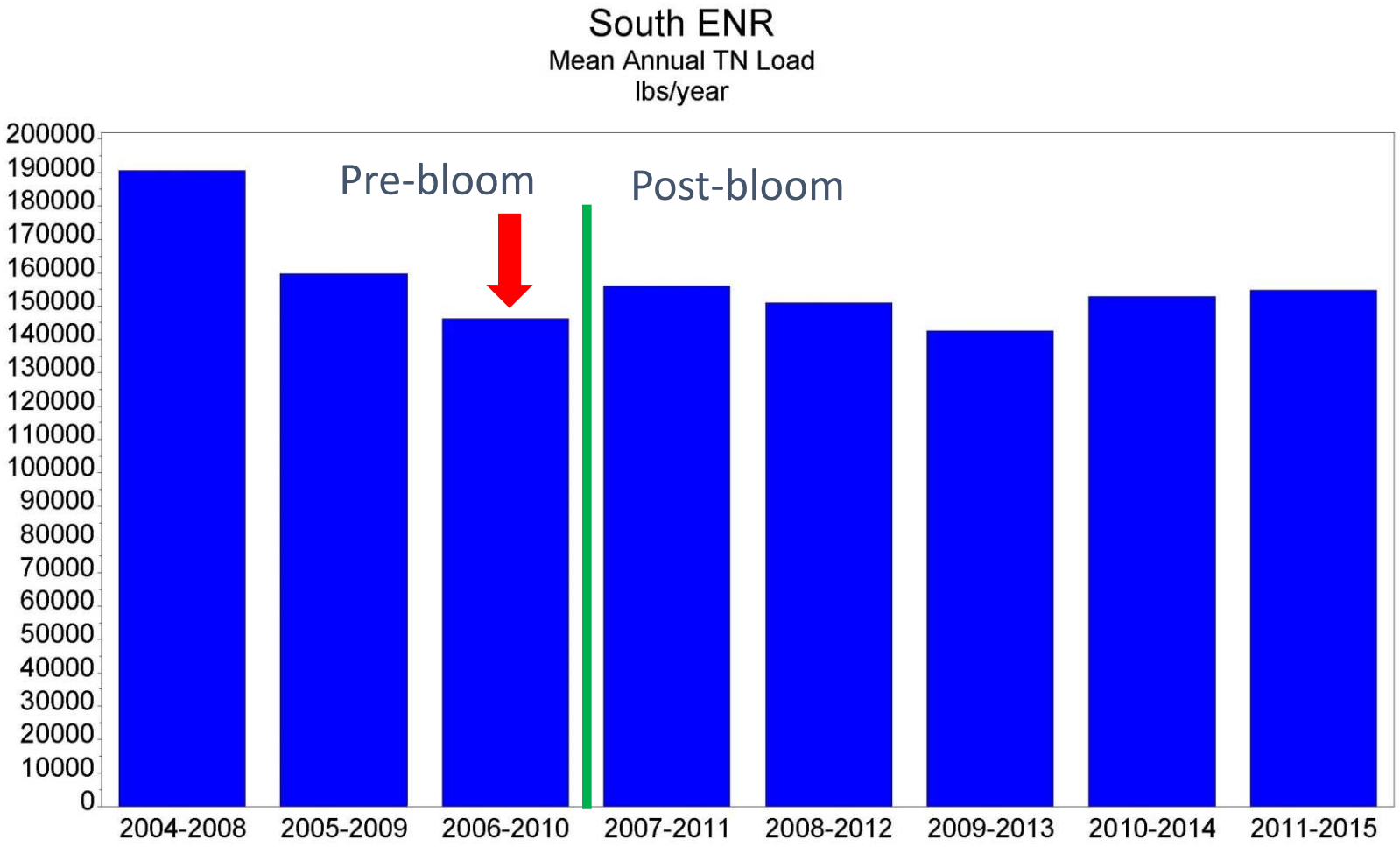
Reference Period Approach



Reference Period Approach



Reference Period Approach



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

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 (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

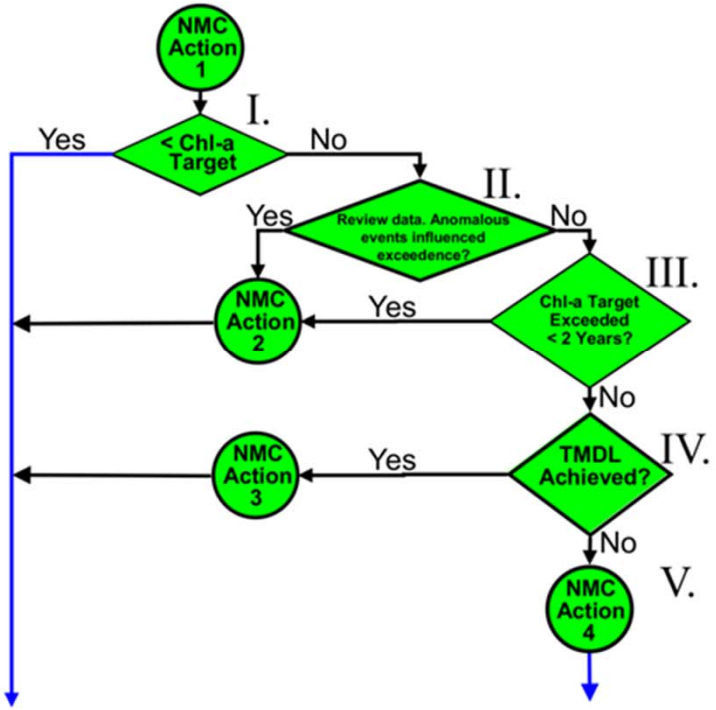
Monitoring Compliance and Reporting

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

Year	Old Tampa Bay	Hillsbor-ough Bay	Middle Tampa Bay	Lower Tampa Bay
1974	No	No	No	Yes
1975	No	No	No	Yes
1976	No	No	No	Yes
1977	No	No	No	No
1978	No	No	No	Yes
1979	No	No	No	No
1980	No	No	No	No
1981	No	No	No	No
1982	No	No	No	No
1983	No	No	No	No
1984	Yes	Yes	No	Yes
1985	No	No	No	Yes
1986	No	No	Yes	Yes
1987	No	Yes	No	Yes
1988	Yes	Yes	Yes	Yes
1989	No	Yes	Yes	Yes
1990	No	Yes	Yes	Yes
1991	Yes	Yes	Yes	Yes
1992	Yes	Yes	Yes	Yes
1993	Yes	Yes	Yes	Yes
1994	No	No	No	No
1995	No	No	No	Yes
1996	Yes	Yes	Yes	Yes
1997	Yes	Yes	Yes	Yes
1998	No	No	No	No
1999	Yes	Yes	Yes	Yes
2000	Yes	Yes	Yes	Yes
2001	Yes	Yes	Yes	Yes
2002	Yes	Yes	Yes	Yes
2003	No	Yes	Yes	Yes
2004	No	Yes	Yes	Yes
2005	Yes	Yes	Yes	No
2006	Yes	Yes	Yes	Yes
2007	Yes	Yes	Yes	Yes
2008	Yes	Yes	Yes	Yes
2009	No	Yes	Yes	Yes
2010	Yes	Yes	Yes	Yes
2011	No	Yes	Yes	Yes
2012	Yes	Yes	Yes	Yes
2013	Yes	Yes	Yes	Yes
2014	Yes	Yes	Yes	Yes
2015	No	Yes	Yes	Yes
2016	Yes	Yes	Yes	Yes

Adaptive Management

- **Develop a series of "what ifs" and responses**



NMC Action 1: Document annual bay segment specific chlorophyll-a levels relative to regulatory thresholds using the long-term EPCHC monitoring dataset.

NMC Action 2: A full report of the anomalous event(s) or data which influenced the annual bay segment chlorophyll-a exceedence will be delivered to regulatory agencies after TBNMC review.

NMC Action 3: Consider re-evaluation of the bay segment assimilative capacity based on nonattainment of bay segment chlorophyll-a threshold while meeting federally-recognized TMDL.

NMC Action 4: If federally-recognized TMDL not achieved, compile nitrogen load data for regulatory review and identify potential further actions needed to achieve reasonable assurance for bay segment nitrogen load

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

DISCUSSION

- **THANK YOU**