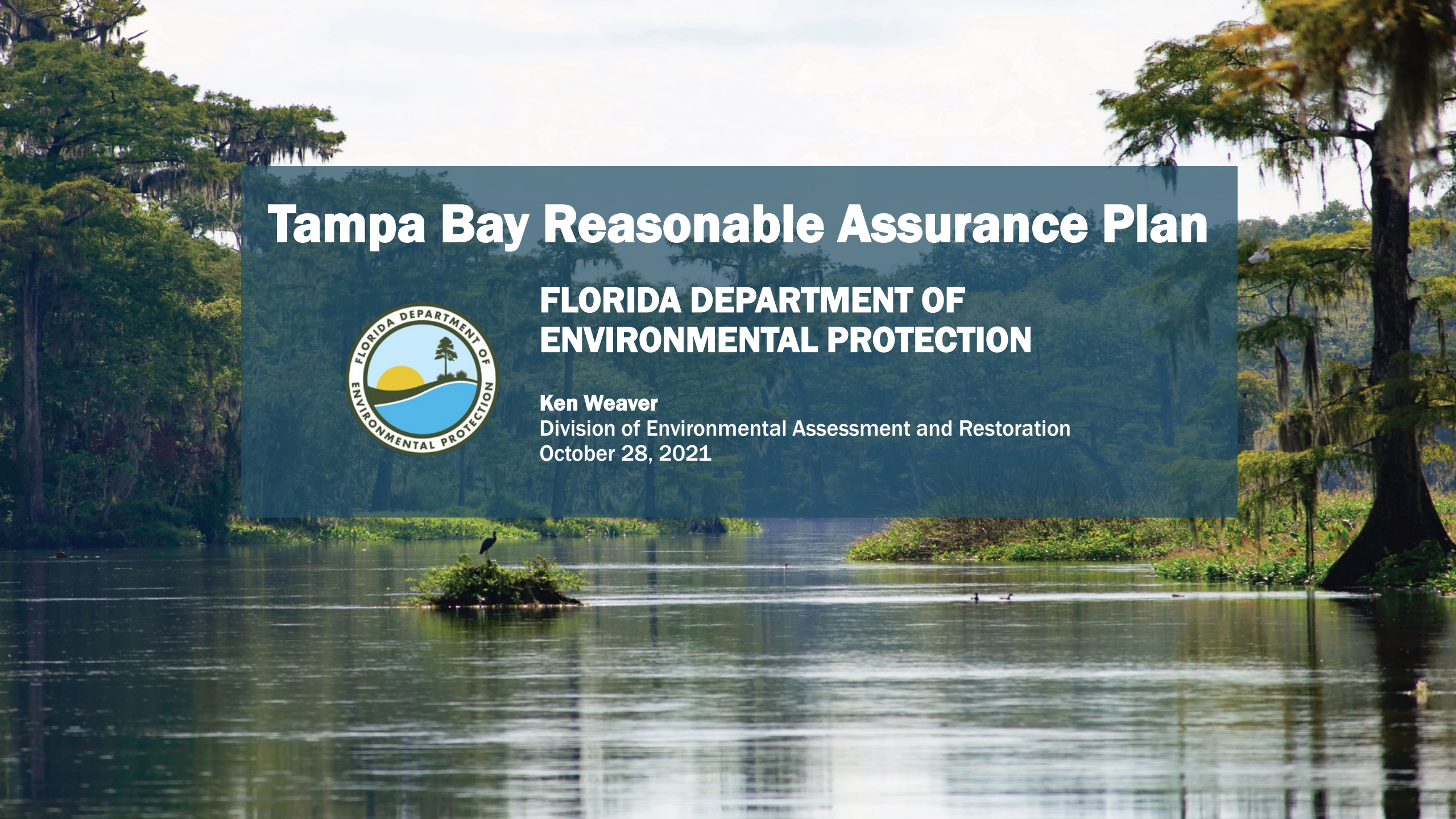


Tampa Bay Reasonable Assurance Plan

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Ken Weaver
Division of Environmental Assessment and Restoration
October 28, 2021

TAMPA BAY WATERSHED

SIZE:

- **TAMPA BAY PROPER:** 400 SQUARE MILES
- **TAMPA BAY WATERSHED:** 2,200 SQUARE MILES

AVERAGE DEPTH: 11 FEET

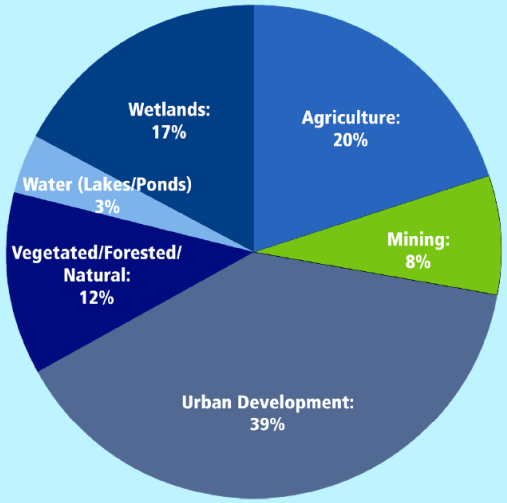
MAXIMUM DEPTH: 43 FEET (MAIN SHIPPING CHANNEL)

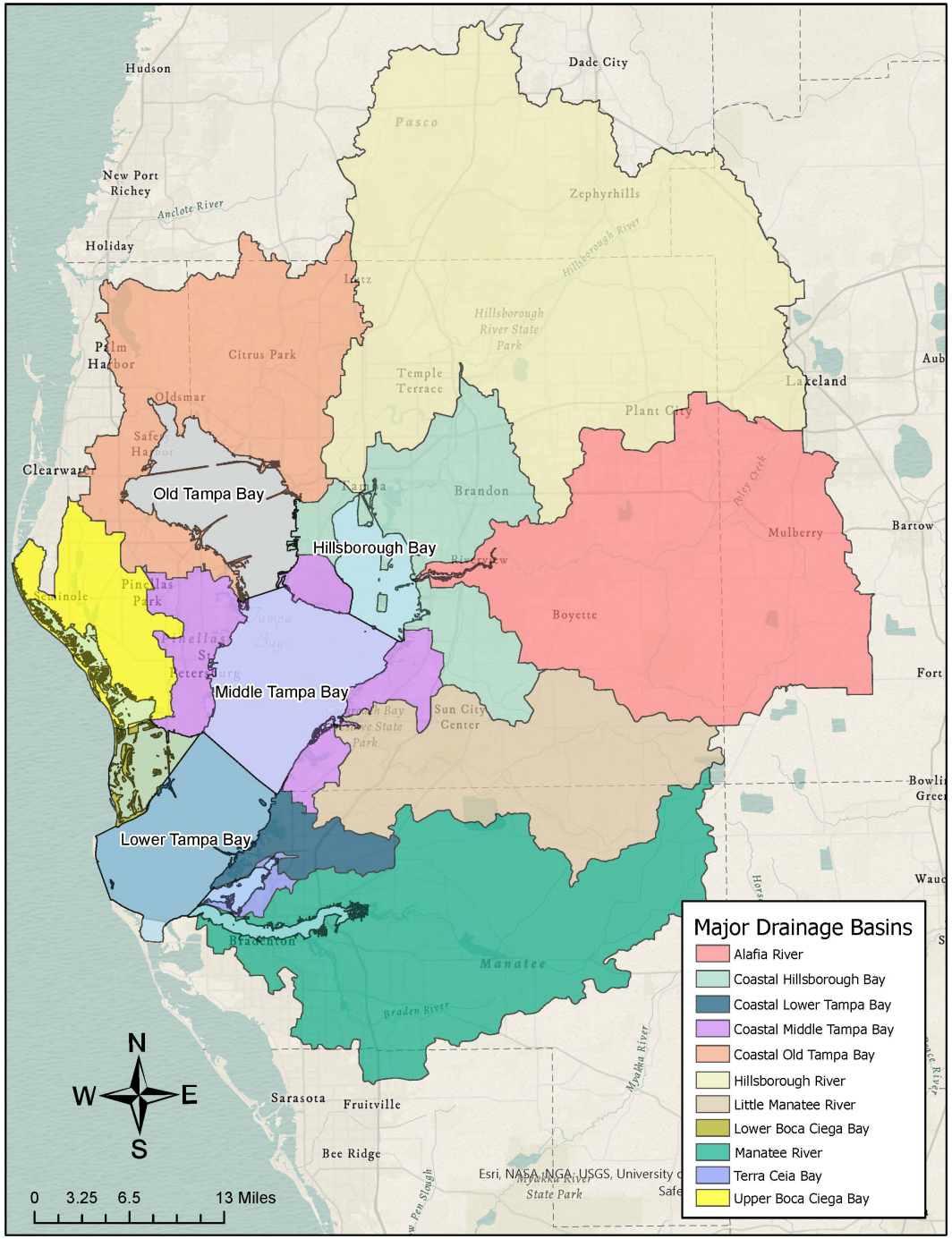
SALINITY RANGE: >20–35 PARTS PER THOUSAND IN BAY PROPER; <1–25 PARTS PER THOUSAND IN TIDAL TRIBUTARIES

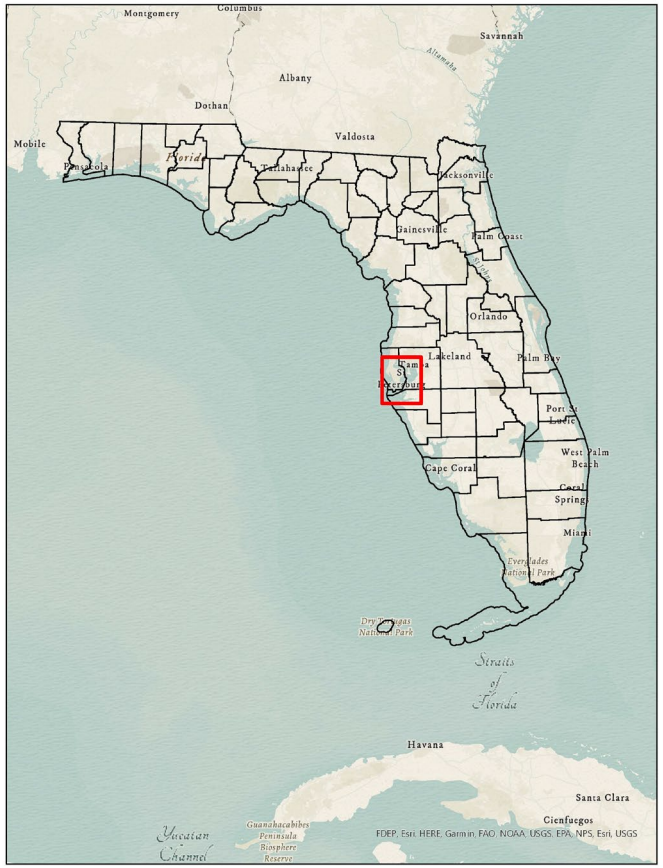
POPULATION IN WATERSHED: 2.7 MILLION (2010 CENSUS)

MAJOR TRIBUTARIES: HILLSBOROUGH, ALAFIA, LITTLE MANATEE AND MANATEE RIVERS

Land Use in the Watershed



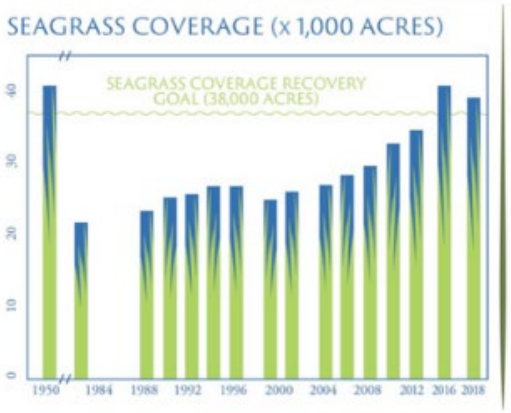




Defining the Problem

- Water clarity in Tampa Bay declined markedly in the 1950s, 60s, and 70s as rapid population growth led to increased discharges of partially treated sewage with large amounts of nitrogen.
- Algae blooms and fish kills were common and almost 50% of seagrass in the bay died off as a result of insufficient light.
- Unregulated dredge and fill operations contributed to the problem by further clouding the water.

BACK TO 1950 A Story of Success: TAMPA BAY SEAGRASS LEVELS REBOUND TO 1950s LEVELS



Seagrasses need sunlight to grow. In Tampa Bay, seagrasses typically flourish in waters six feet deep. With improving water clarity they can grow in deeper waters.

FROM 1992-2018 TAMPA BAY REGAINED 14,865 ACRES OF SEAGRASSES—ENOUGH TO COVER AN AREA THE SIZE OF MANHATTAN.


TURTLE GRASS

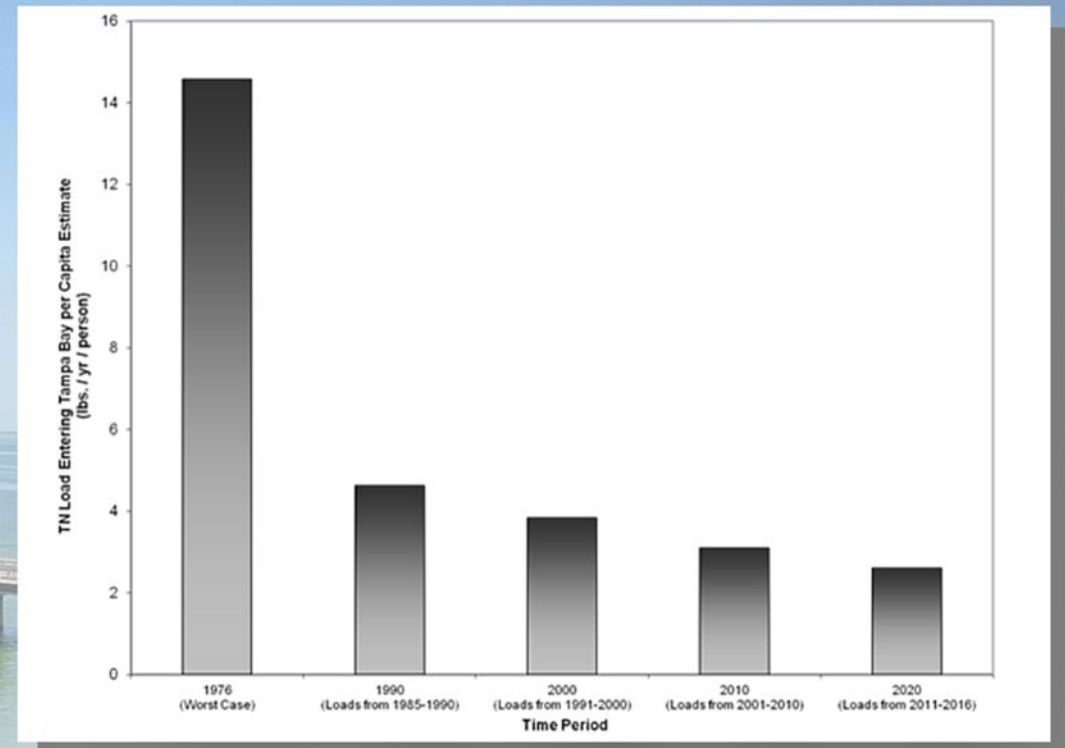

SHOAL GRASS


MANATEE GRASS

A healthy Tampa Bay contributes 13%, or **$22 billion,** of the total economic activity within the six counties in the bay's watershed.

An adult manatee can eat **100 POUNDS** of seagrass a day.

About **70%** of the fish we catch for food or fun in Florida spend part of their lives in seagrasses.



Despite an ever increasing population in the Tampa Bay metropolitan area, per capita TN loading to the bay continues to decrease over time (ancillary figure below), and the amount of TN delivered per unit water has also decreased over time in each of the major bay segments. To date, hydrologically-normalized total loads to Tampa Bay are at the lowest levels since they have been estimated

Tampa Bay Estuary Program (TBEP)

- Created in 1991.
- Intergovernmental partnership coordinating the overall restoration of the bay according to a comprehensive management plan adopted in 1997.
- One of 28 National Estuary Programs.
- Partnership of Hillsborough, Manatee, Pinellas, and Pasco counties, the cities of Clearwater, St. Petersburg, and Tampa, the Florida Department of Environmental Protection (DEP), the Southwest Florida Water Management District, and U.S. Environmental Protection Agency (EPA).

Tampa Bay Nitrogen Management Consortium (NMC)

- Local governments and private industries joined together in 1996 to form the Tampa Bay NMC.
- Proactively manages nitrogen loads entering the bay.
- Together, these partners implement various projects to “hold-the-line” on nutrient pollution and improve water quality for the benefit of seagrass habitat in Tampa Bay.
- https://tbep.org/our-work/boards-committees/nitrogen-management-consortium/

A HISTORY OF TAMPA BAY

KEY MILESTONES IN THE RESTORATION OF TAMPA BAY, 1950–2016.

Courtesy Florida State Archives

1950s
Population less than ¼ of today.

1960s
Bay degradation is recognized.

JOR Johansson photo

1967
Environmental Protection Commission of Hillsborough County (EPCHC) established.

1970s
Save Our Bays and other citizen groups call for legislative action to reduce pollution discharges.

1972
EPA Clean Water Act approved.

1972
Florida's Wilson-Grizzle Act requires wastewater plants discharging to Tampa Bay to upgrade to Advanced Wastewater Treatment (AWT) standards, or enact 100% reclaimed.

SWFWMD photo

1974
EPCHC initiates baywide water quality monitoring program.

1982
Statewide Stormwater Rule is enacted, requiring nutrient management from municipal stormwater systems.

1979
City of Tampa's Howard F. Curren Wastewater Treatment Plant (WWTP) achieves AWT standard, reduces nitrogen loadings by 90%. City of St Petersburg implements 100% reclaimed water from their direct discharge, with similar reductions. Other WWTPs in the region implement nutrient reductions.

1985
The Tampa Bay Regional Planning Council convenes the region to develop the Future of Tampa Bay report, including specific actions to reduce pollution and recover habitats in Tampa Bay. The Agency on Bay Management is established to support the report's recommen-dations.

1982
The first Bay Area Science Information Symposium (BASIS) is conducted by the Tampa Bay Regional Planning Council.

1991
Tampa Bay is recognized by EPA as an "estuary of national significance," and the Tampa Bay National Estuary Program is created to develop a Comprehensive Conservation and Management Plan.

1987
The State's Water Management Districts establish Surface Water Implementation and Management (SWIM) programs to restore and protect priority water bodies within each District. Tampa Bay is identified as the Southwest Florida Water Management District's priority water body.

1996
TBNEP's CCMP is approved by local partners, the Governor, and the EPA Administrator. Numeric goals for habitat restoration and water quality improvement are adopted.

1996
The public/ private Tampa Bay Nitrogen Management Consortium (TBNMC) is formed to assist in meeting nitrogen management targets needed to meet seagrass goals.

1998
The TBNMC develops an Action Plan (Partnership for Progress) to meet nutrient management targets.

1998
An Interlocal Agreement between the TBNEP partners forms a new Independent Special District of the State of Florida, the Tampa Bay Estuary Program. TBEP partners commit to implementing projects to assist in meeting numeric goals, and to support a funding schedule.

2006
First year that all bay segments achieve TBEP water quality targets.

2009
TBNMC develops voluntary nutrient loading limits for all sources, to continue to meet water quality targets. Federal and state regulatory agencies adopt limits to meet regulatory requirements.

2014
Tampa Bay surpasses seagrass recovery goal of 38,000 acres.

2016
Seagrass coverage increases to 41,655 acres.

Credit: TPBEP

Tampa Bay TMDL

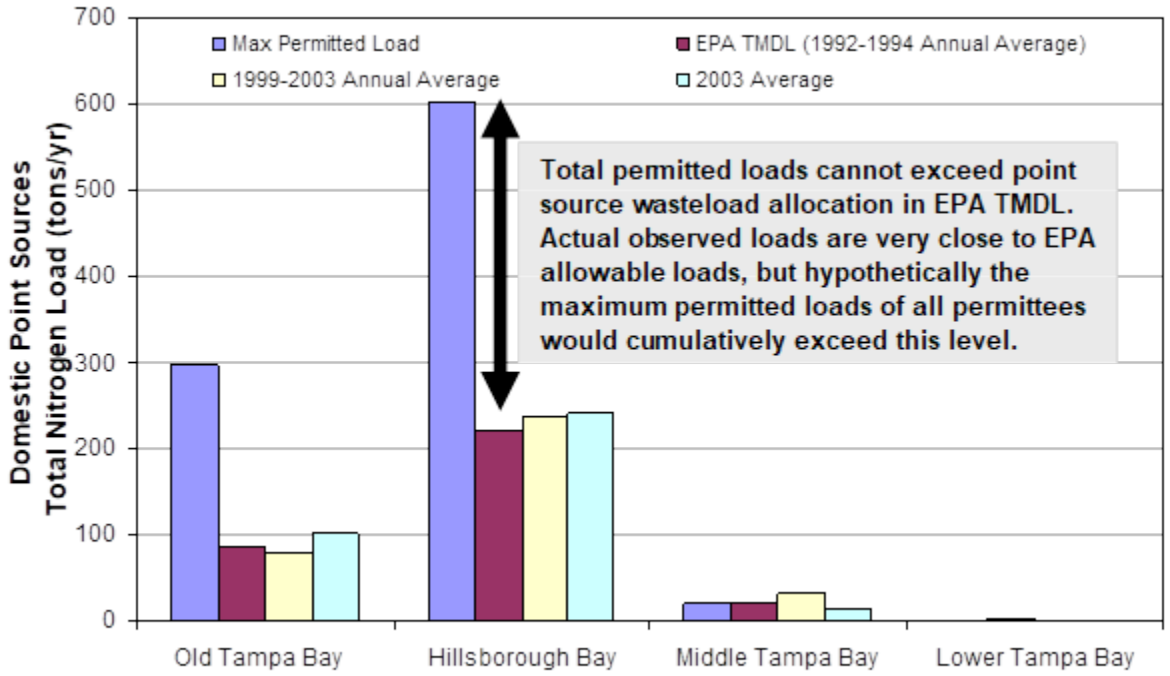
- DEP developed TMDL for Tampa Bay approved in 1998.
  - TMDL based on TBEP's nitrogen targets for each bay segment.
  - Goal of "holding the line" on nitrogen loading to the bay at 1992-94 levels to meet seagrass, clarity, and chlorophyll-a targets by offsetting projected increased stormwater loads from growth.
- Did not include individual allocations (WQBELs).
- The TMDL pre-dated the 1999 Florida Watershed Restoration Act (FWRA) and the TMDL was never adopted into state rule.
  - Florida considers it a federal TMDL

Initial Reasonable Assurance (RA) Determination

- In November 2002, the DEP approved the Reasonable Assurance plan developed by the NMC.
- DEP developed individual WQBELs (allocations) under TMDL.
- DEP did not list Tampa Bay as impaired in 2002 because there was Reasonable Assurance that the target loads would be met.
- Submitted this position to EPA as part of 2002 303(d) Impaired Waters List.
    - EPA did not take a position on RA determination because they said there was already a TMDL.

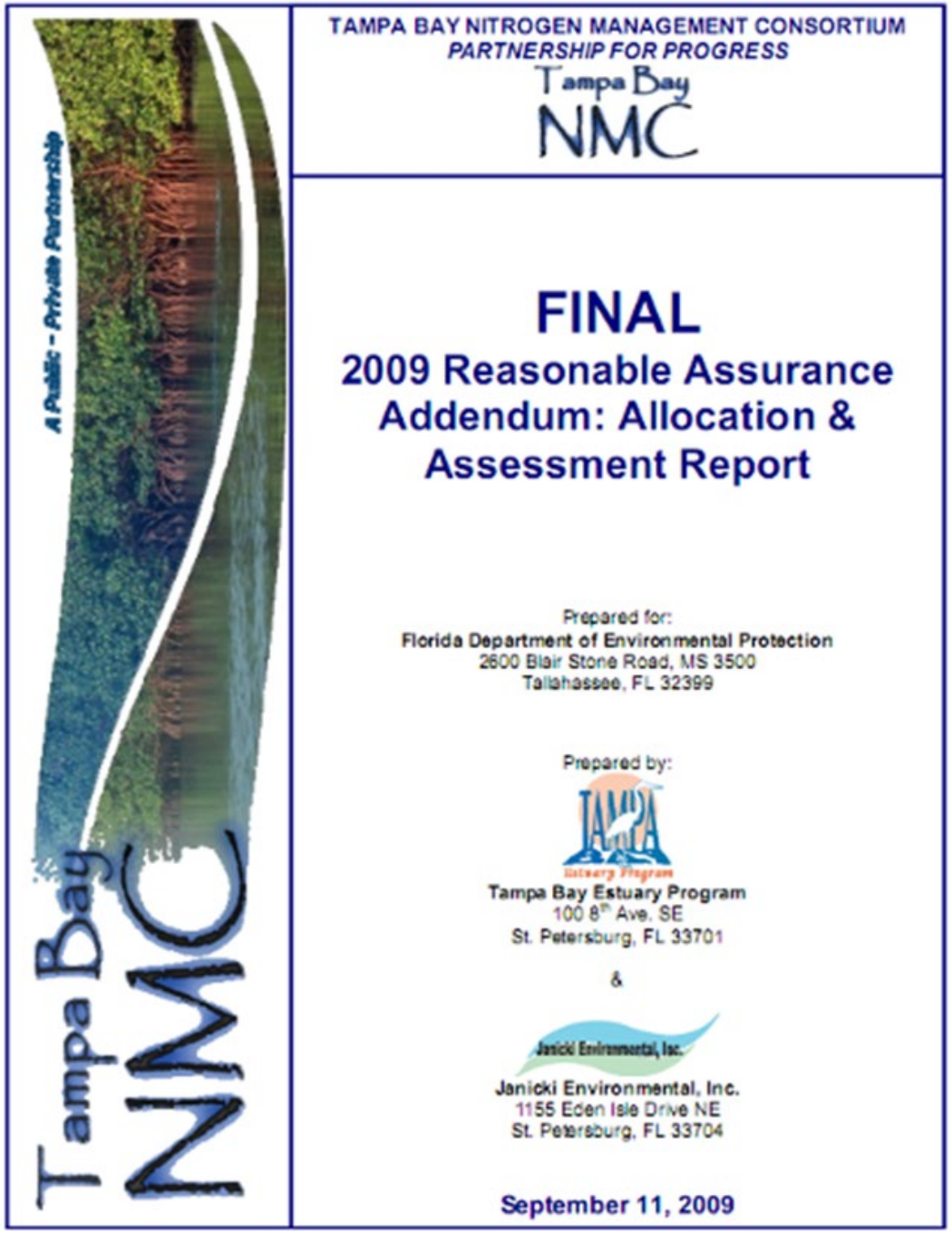
Permitting Concerns - 2004

- EPA and DEP advised the NMC that existing and future surface water discharge permit limits must not cumulatively exceed the TMDL.
  - Could not issue renewals or new permits.
- RA renewal required specific allocations for all permitted sources.



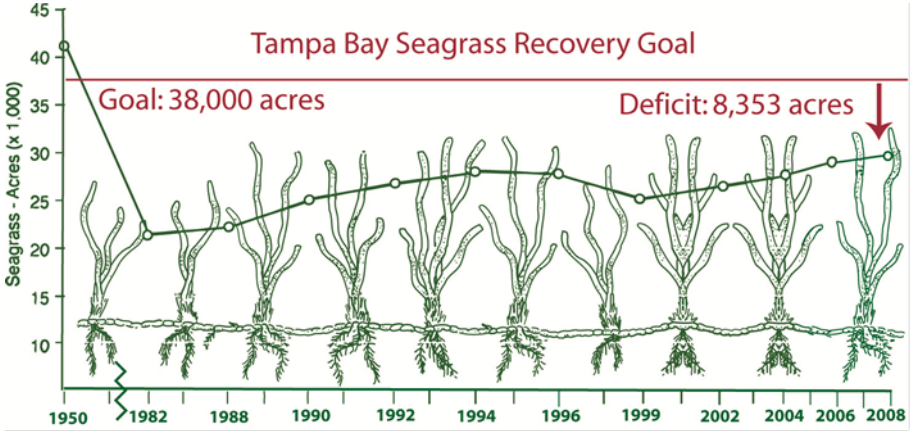
Tampa Bay RA

- In December 2007, the NMC submitted to the DEP the "Declaration of Cooperation of the Tampa Bay Nitrogen Management Consortium."
  - Committed an equitable process for the development of load allocations for all sources.
- 40+ public and private partners throughout watershed.
- Consortium developed and agreed to limits on nitrogen loads for 189 sources in September 2009.
- Incorporated Load Allocations into permits as WQBEL.
  - Florida DEP approved the WQBEL on November 16, 2010.

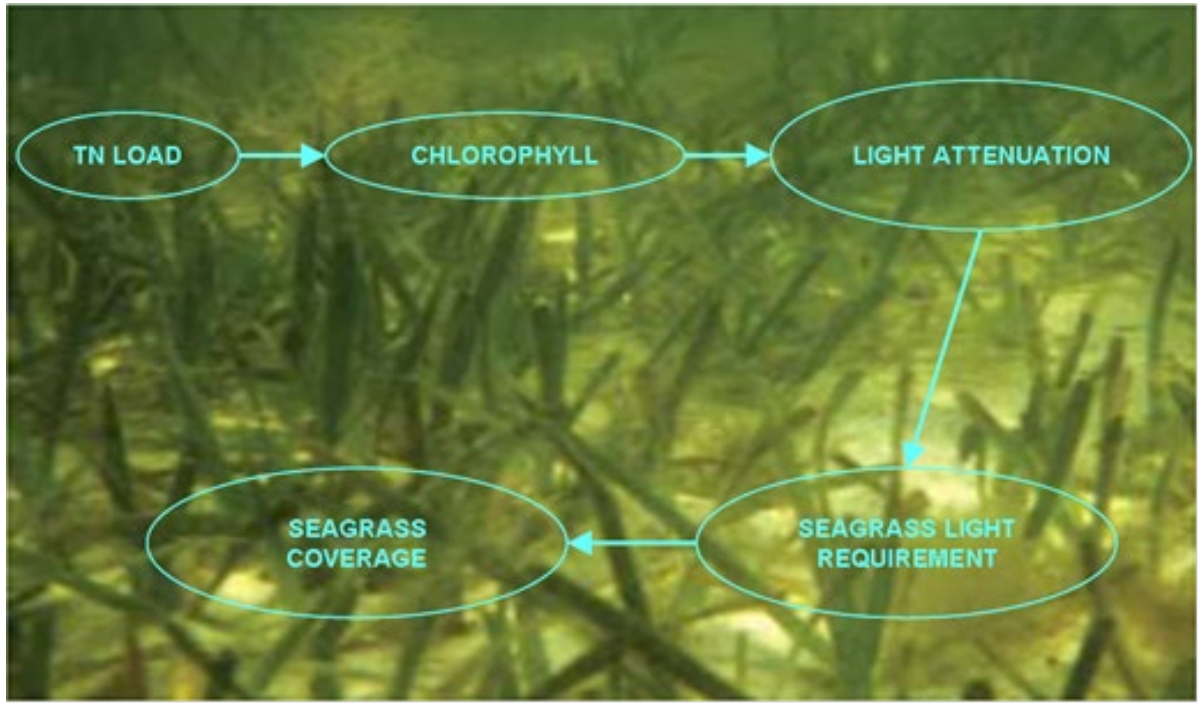


Restoration Targets - Seagrass

- A primary goal was to restore seagrass back to estimated 1950s acreage, a total of 38,000 acres across the bay.
  - Goal included preservation of the existing acreage, 29,647 acres in 2008, and recovery of an additional 8,353 acres.
- TBEP's and the NMC, adopted a goal of maintaining nitrogen loadings to the bay at the 1992-1994 average annual loads.
- This "hold-the-line" approach was expected to be commensurate with water quality conditions sufficient to allow continued recovery of seagrasses.



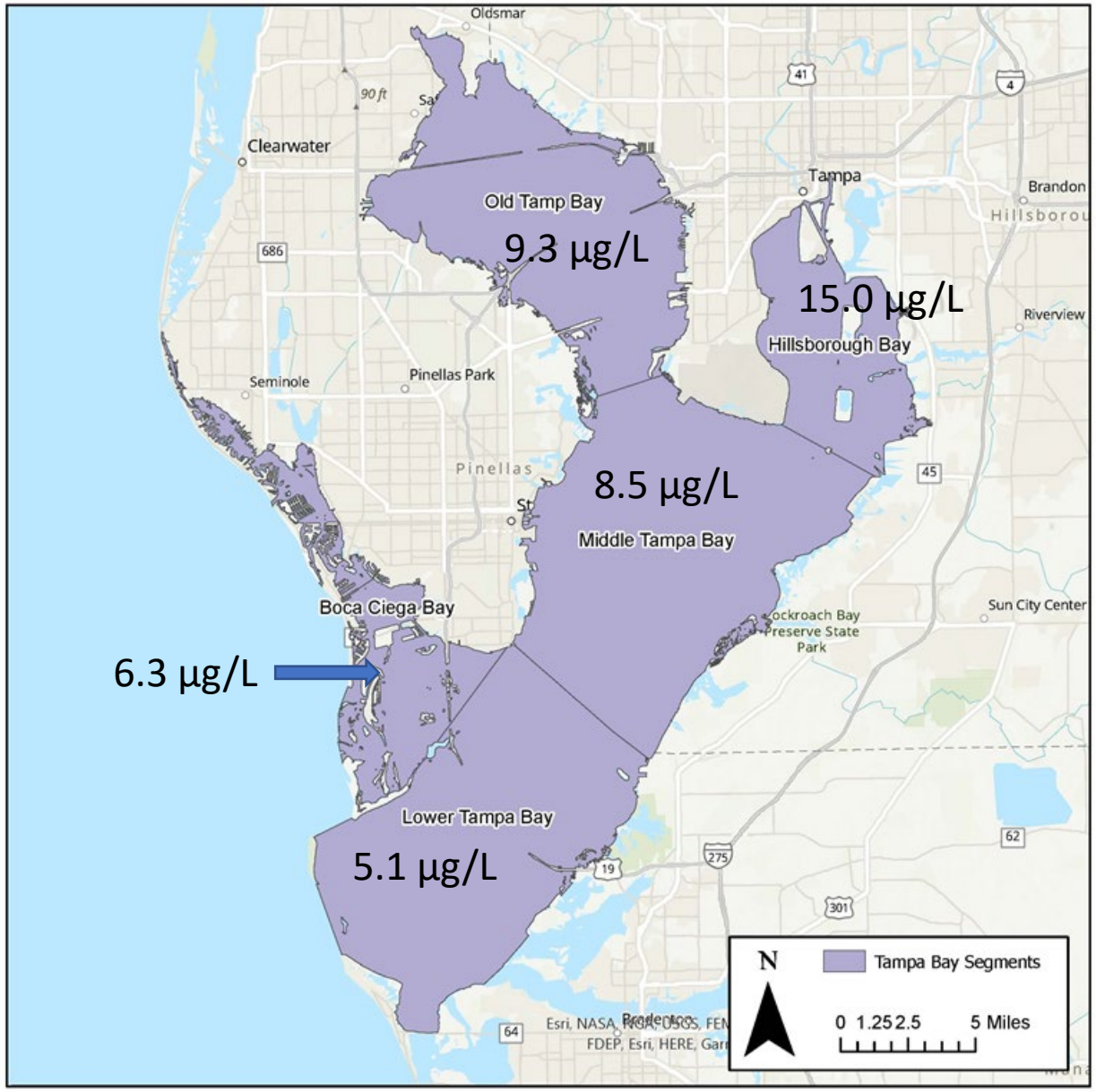
Development of Chlorophyll a Thresholds



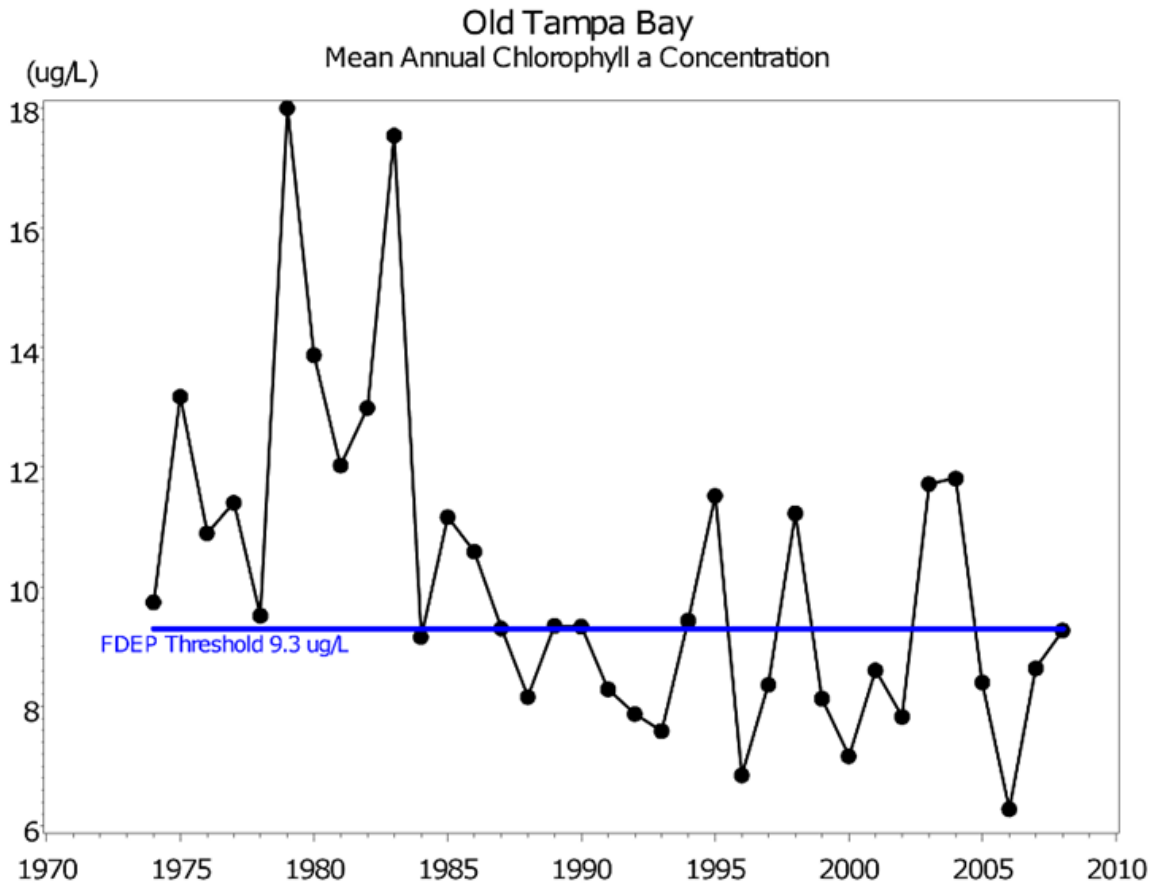
- Janicki and Wade (1996) developed empirical relationships between:
  - External TN loads and resulting average chlorophyll-a concentrations, and
  - Chlorophyll-a, turbidity, and color and resulting subsurface light conditions.
- Relationships were developed for the Old Tampa Bay, Hillsborough Bay, Middle Tampa Bay, and Lower Tampa Bay segments.

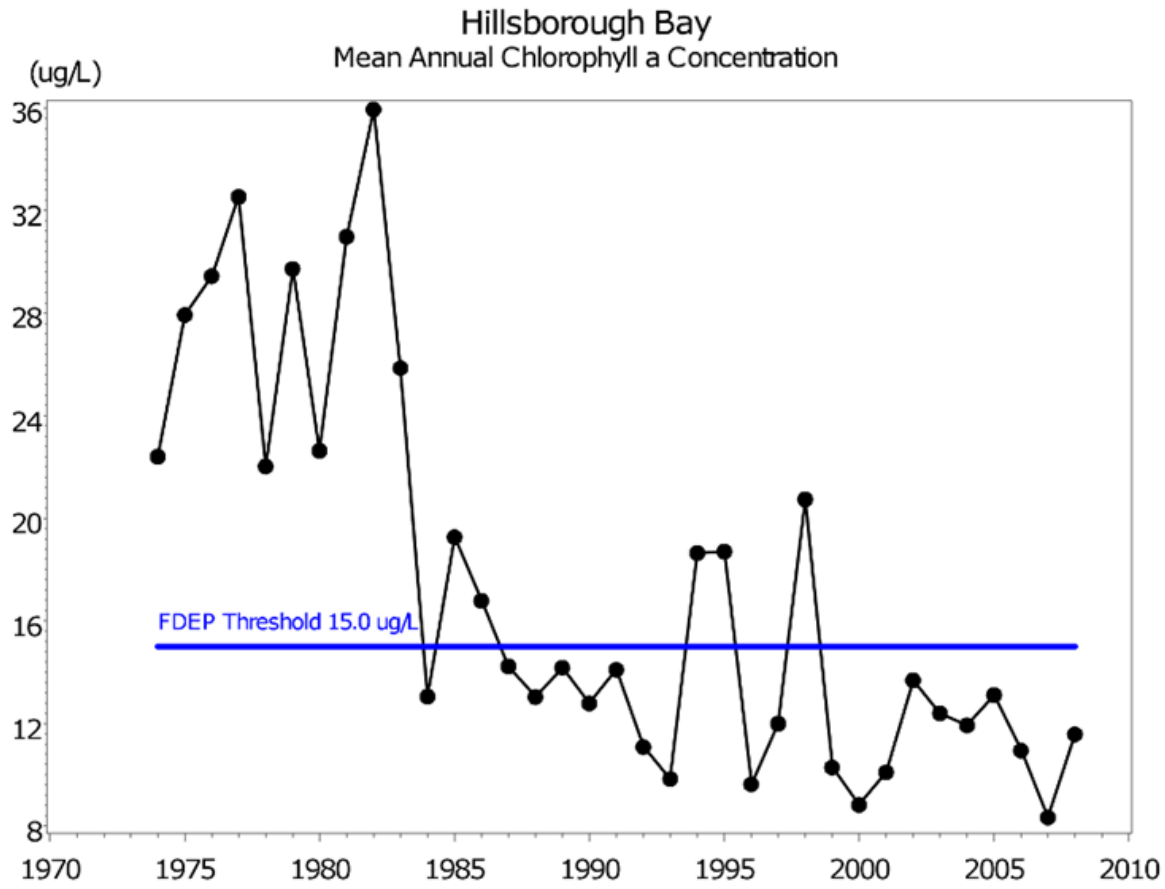
Modeling Results

- Seagrass restoration goals could be met by constraining chlorophyll-a concentrations to remain at the estimated average levels of 1992-1994.
- Chlorophyll-a targets expressed as annual averages.
- Subsequently (2012) adopted as numeric nutrient criteria by DEP.
  - Added Boca Ciega Bay.

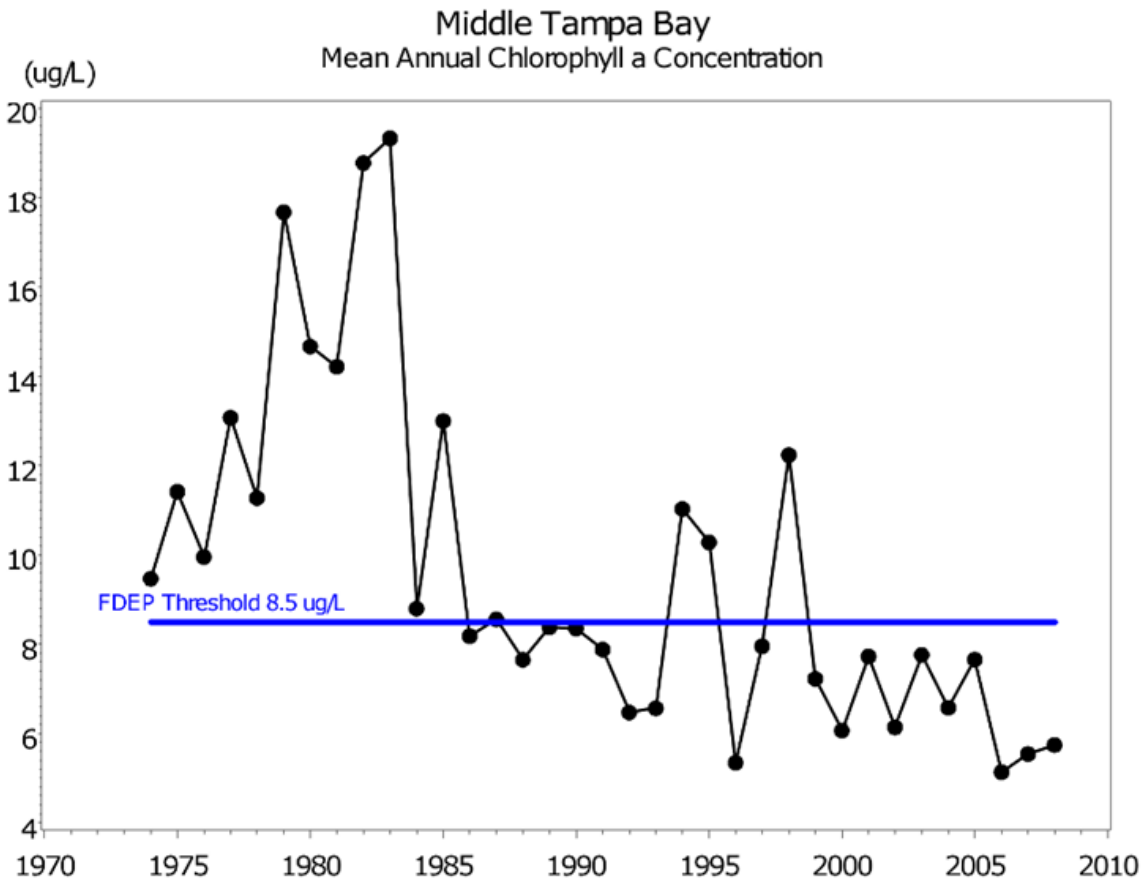


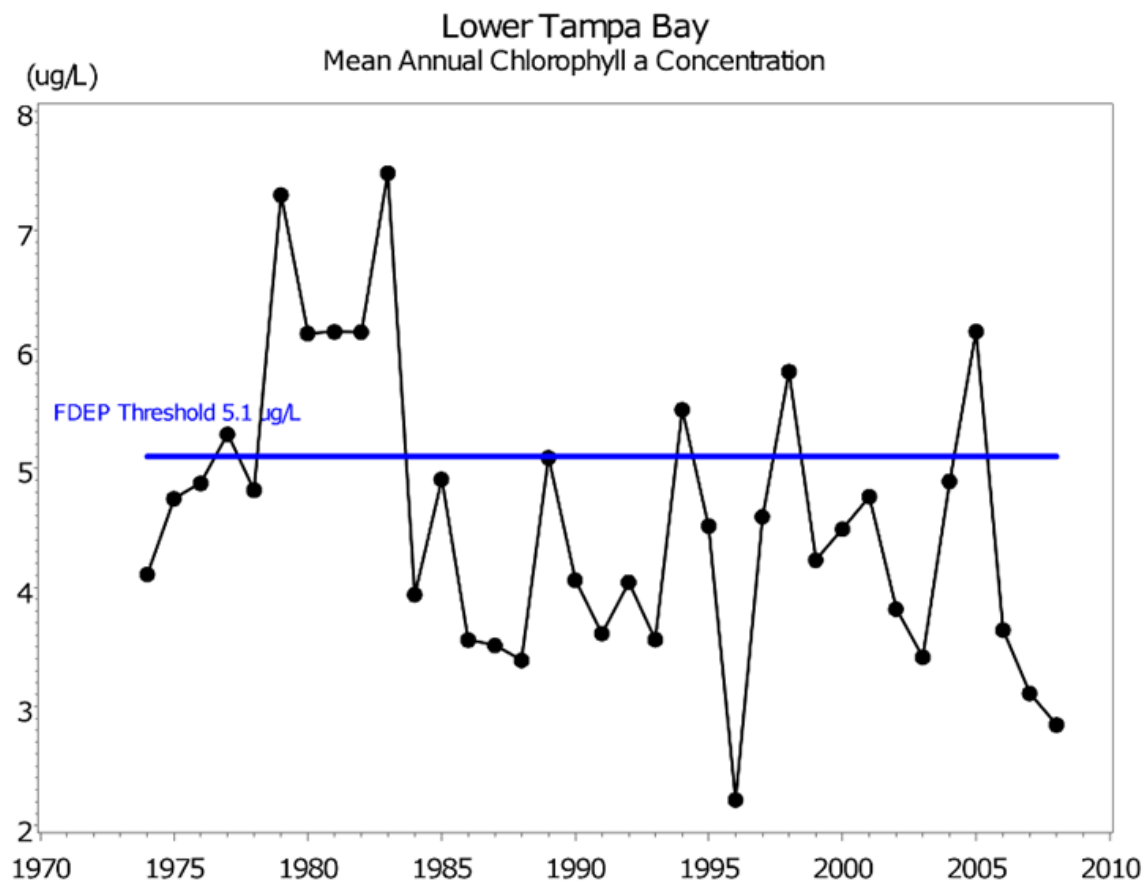
Temporal Trends in Chlorophyll-a
2009 RA Addendum





Temporal Trends in Chlorophyll-a
2009 RA Addendum

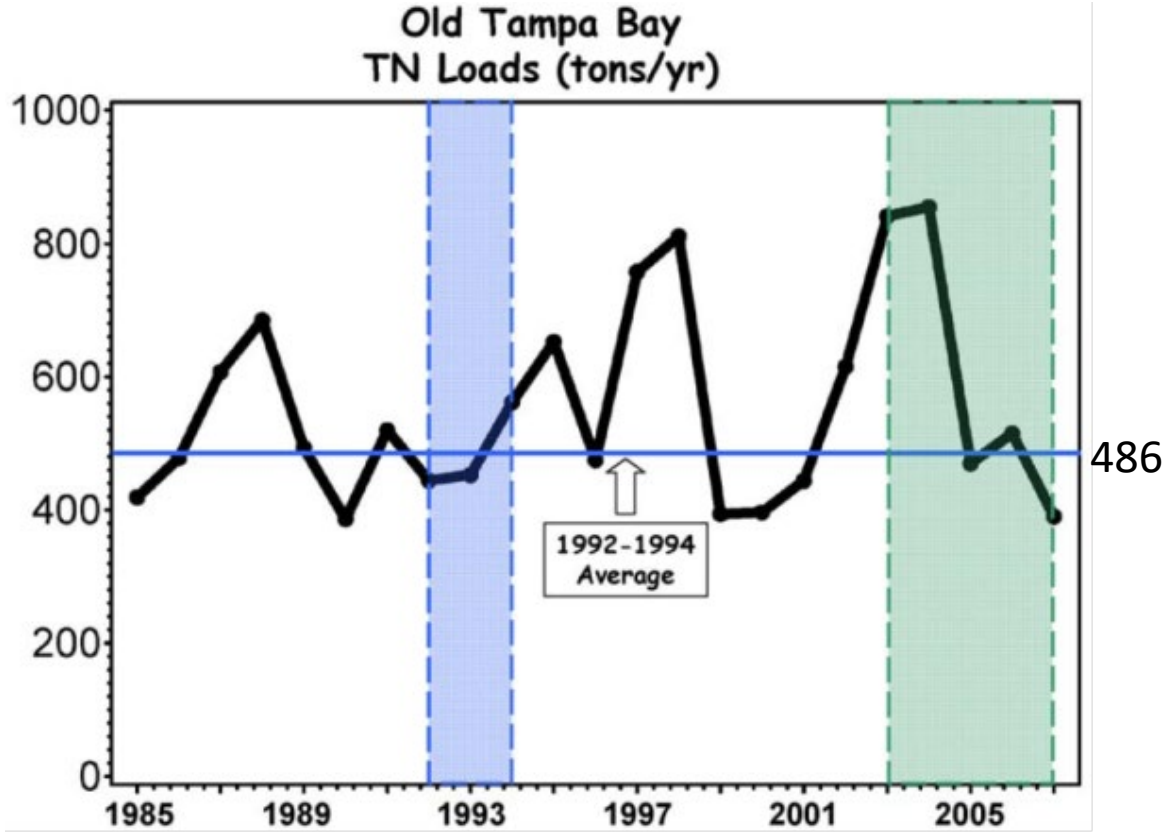




Nitrogen Loads to Tampa Bay

- Estimated TN loads from all major sources to Tampa Bay were developed for 1985-2007.
- Loads were developed for each bay segment, and for six source categories within each segment. These source categories include the following:
  - Nonpoint Sources (Stormwater).
  - Direct Atmospheric Deposition (only that which falls directly on the bay water surface).
  - Domestic Wastewater.
  - Industrial Wastewater.
  - Fertilizer Material Losses.
  - Groundwater and Springs.

Temporal Trends in TN



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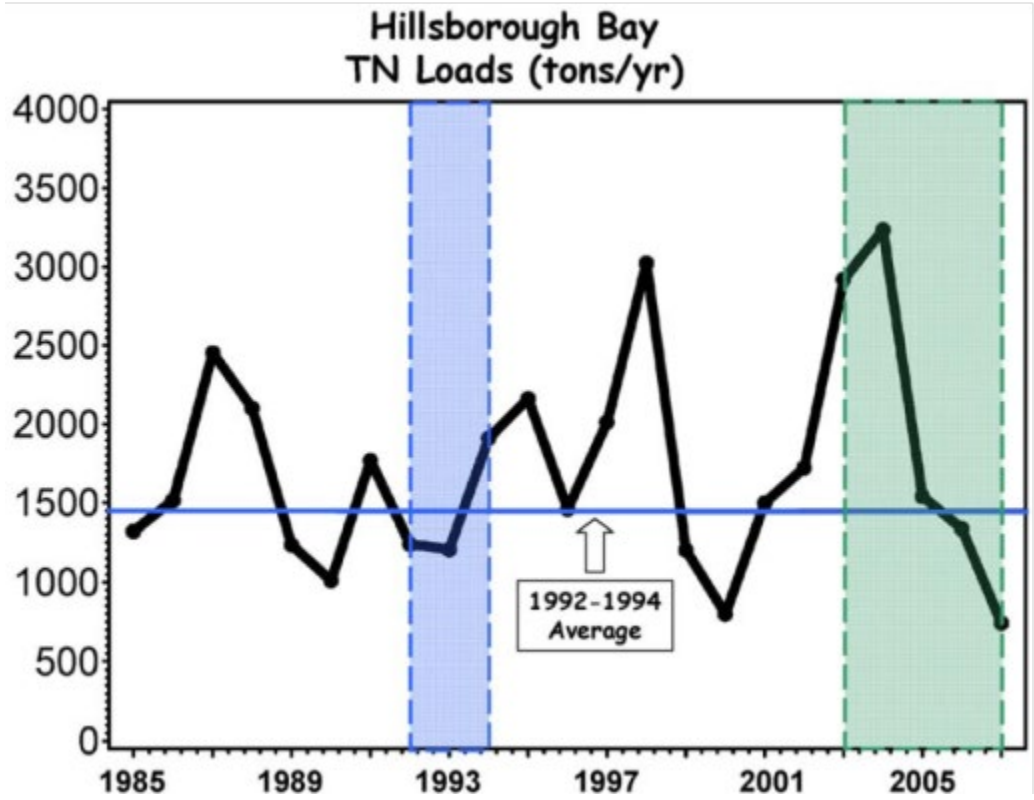

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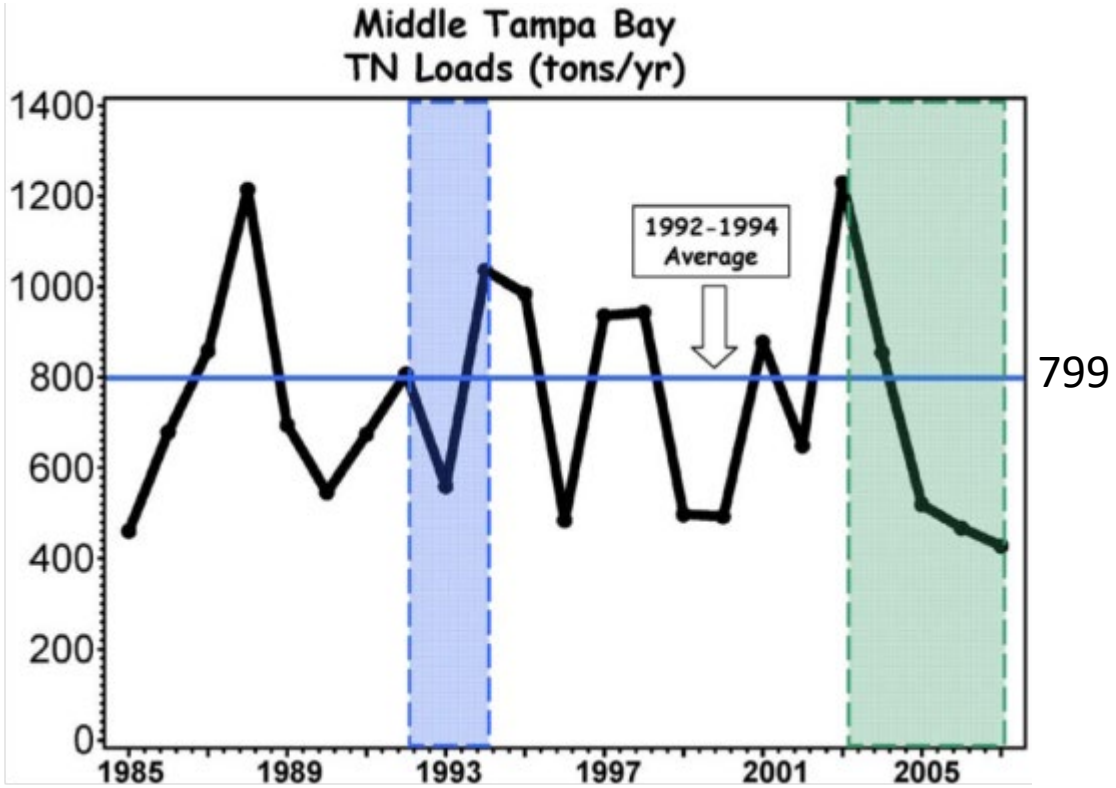
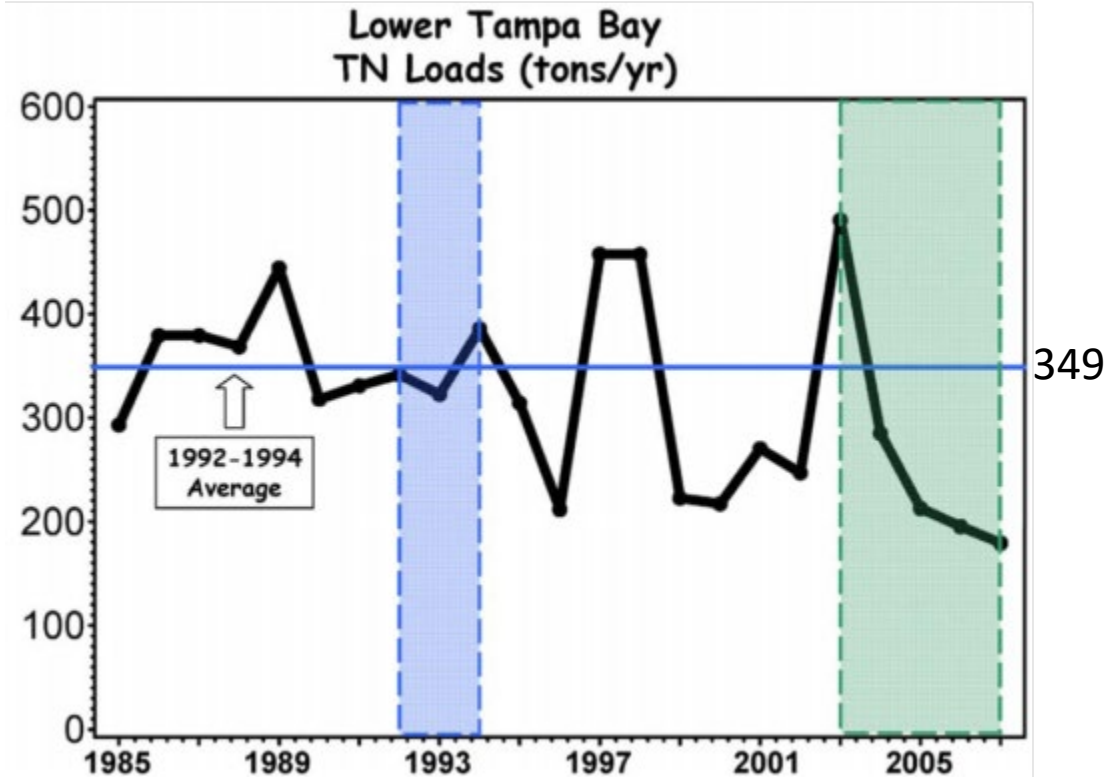
Temporal Trends in TN

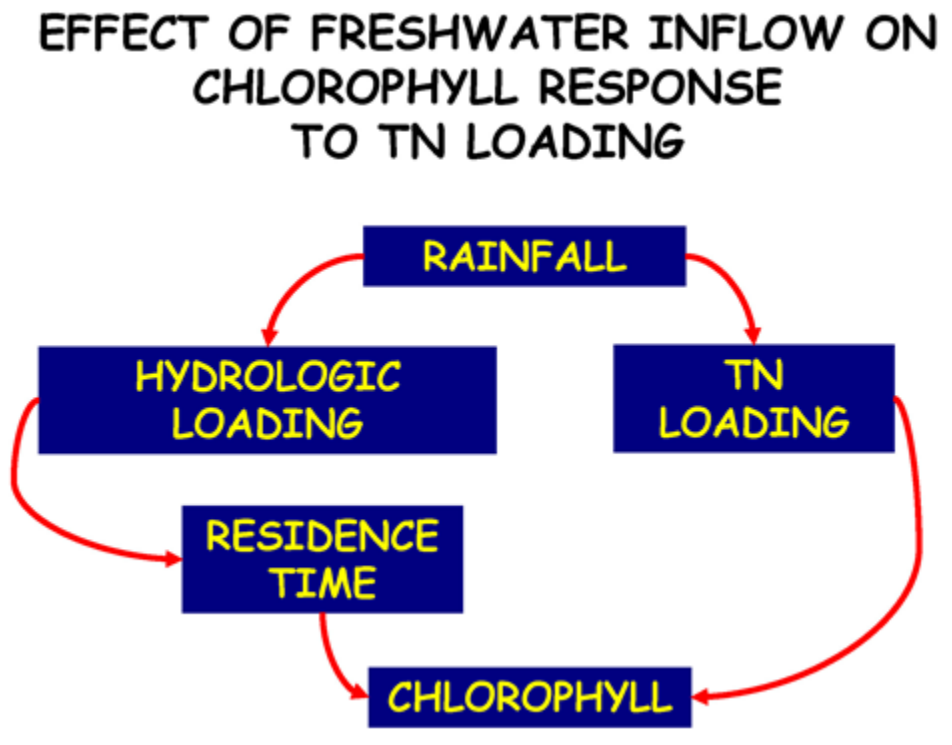




Total Nitrogen Target Loads

- Capped the segment TN loads at levels that would ensure adequate water clarity and light to sustain seagrass recovery based on annual average 1992-1994 TN loads by bay segment:
  - Old Tampa Bay: 486 tons/year.
  - Hillsborough Bay: 1451 tons/year.
  - Middle Tampa Bay: 799 tons/year.
  - Lower Tampa Bay: 349 tons/year.
- Loads were commensurate with good water quality that would promote seagrass recovery.

Hydrologic (Residence Time) Adjustment

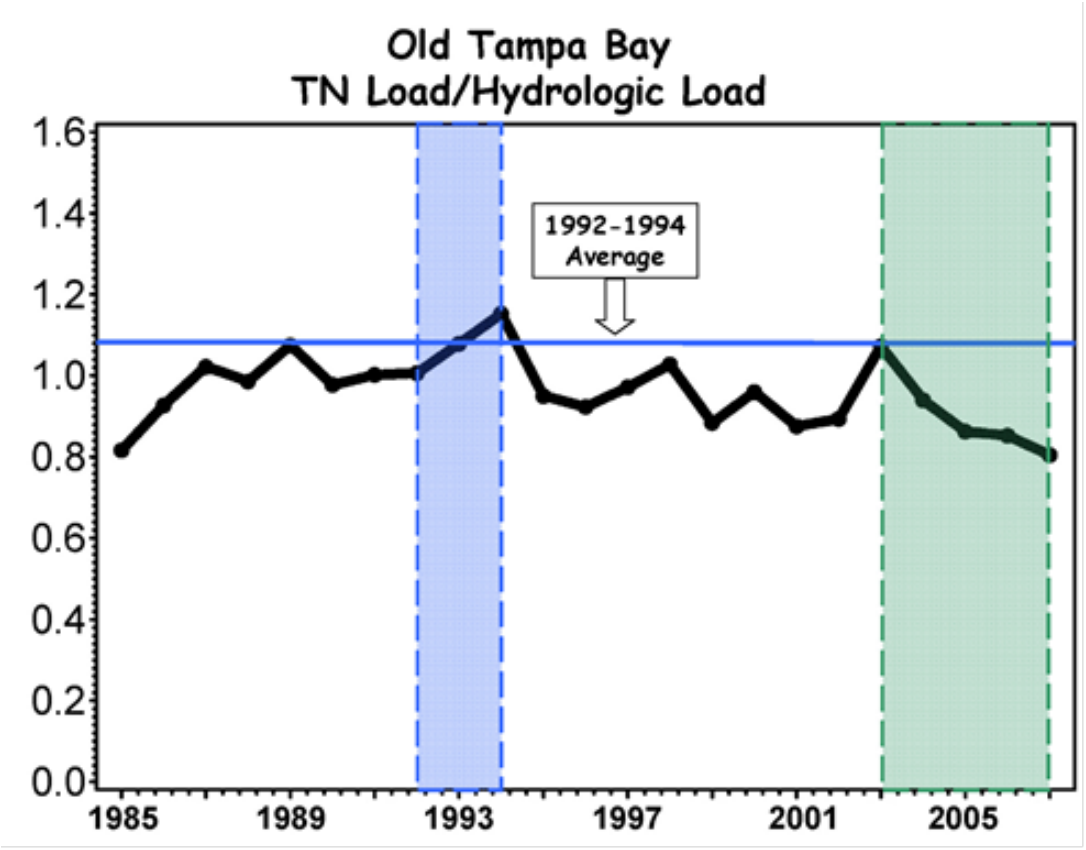


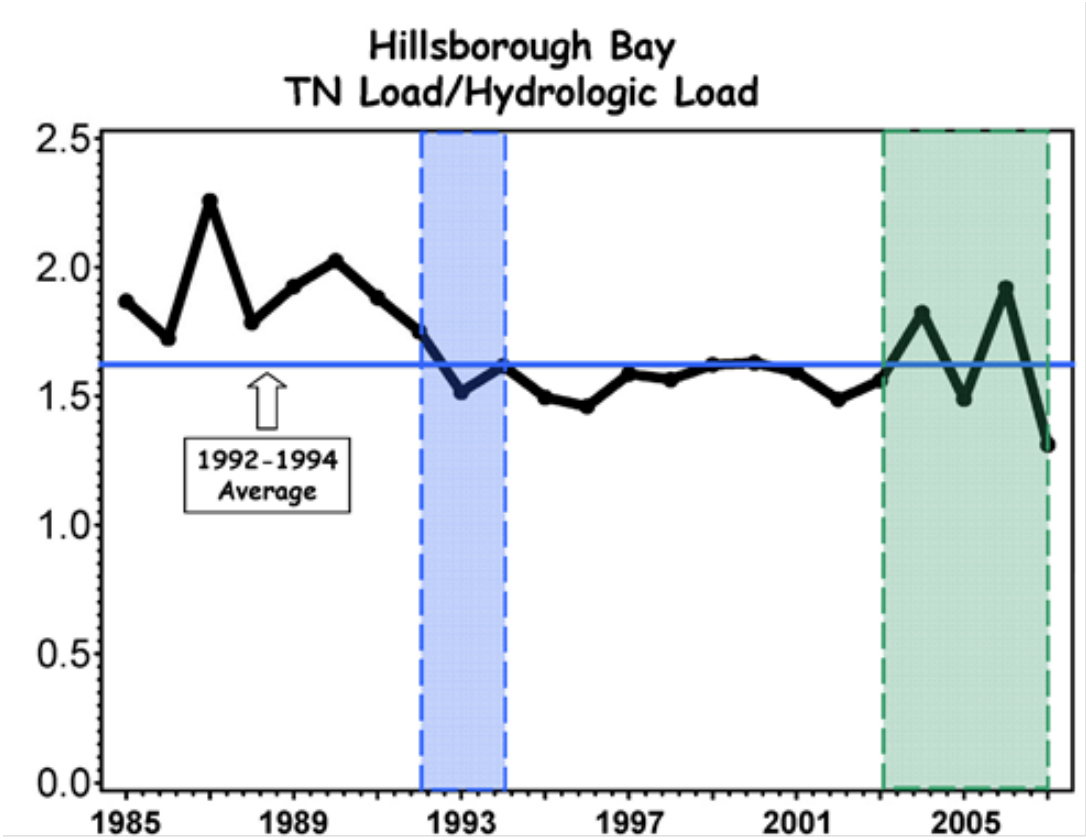
- Residence time was shown to influence the chlorophyll response.
  - As residence time shortens, and loadings move more quickly out of the estuary, biological processes have less time to convert nutrients to chlorophyll-a.
  - As residence time lengthens, loadings remain within the system longer, and thus more nutrients can be converted to chlorophyll-a.
- Given the same nutrient loads, different residence times within the system can result in different chlorophyll-a responses.

Nitrogen Delivery Ratio

- The amount of TN delivered per unit water delivered to the bay was determined to be a more reliable predicator of good water quality.
  - Denoted as the Nitrogen Delivery Ratio.
  - Defined as the amount of TN delivered, in tons, per million m^3 of freshwater delivered.
  - Units of the Nitrogen Delivery Ratio are tons TN/million m^3.
- Nitrogen Delivery Ratios:
  - Old Tampa Bay: 1.08 tons TN/million m^3.
  - Hillsborough Bay: 1.62 tons TN/million m^3.
  - Middle Tampa Bay: 1.24 tons TN/million m^3.
  - Lower Tampa Bay: 0.97 tons TN/million m^3.
  - Remainder of Lower Tampa Bay: 1.59 tons TN/million m^3.

Example Hydrologic Loads





WQBEL Development

- The WQBELs were based on nitrogen load allocations developed and approved as part of the 2009 RA Addendum for Tampa Bay.
- RA Addendum expressed allocations as:
  - Set load for domestic wastewater sources and several industrial wastewater sources.
  - Set load for the combined discharge of small source facilities (<0.1 MGD).
  - Percentage method was applied to rainfall-driven sources.
    - Atmospheric deposition.
    - Groundwater and springs.
    - Stormwater discharges including Municipal Separate Storm Sewer Systems (“MS4”).
    - Any remaining industrial wastewater sources and nonpoint sources.

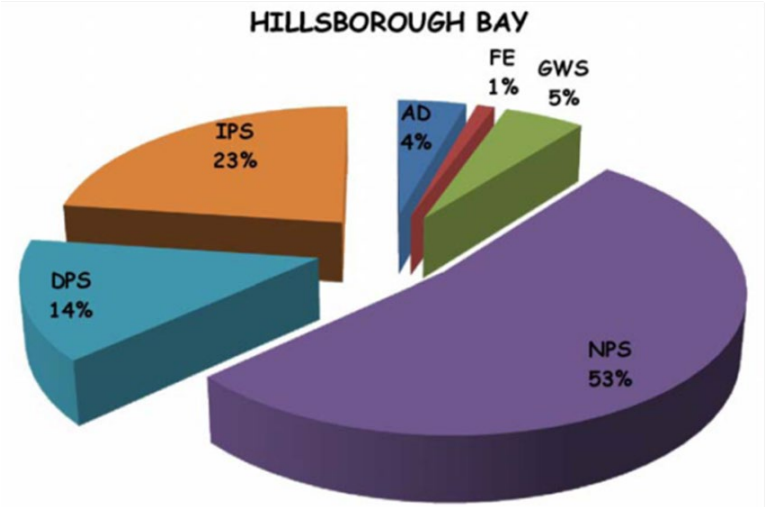
WBQEL – Allocation Approach

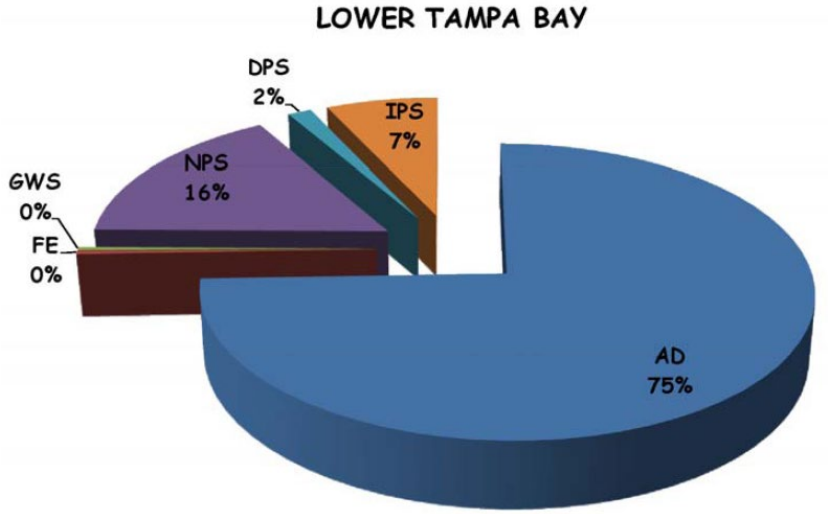
Allocations for a given entity/source within a segment were derived in a 4-step process, as follows:

1. Estimate mean 2003-2007 bay segment TN load.
2. Estimate mean 2003-2007 Set Allocations.
3. Calculate Remaining Load as the difference between the segment TN load and the Set Allocations. This provides the segment TN load remaining after the Set Allocations are removed.
4. Estimate the percentage contribution for a given entity/source as the ratio of the entity/source 2003-2007 average annual TN load to the Remaining Load for the segment.

Step 1: Estimate 2003-2007 Segment Loads

- 2003-2007 loads reduced from baseline.
  - TECO installed air pollution controls to reduce nitrogen oxide.
  - Surface water withdraws by Tampa Bay Water for drinking water.
  - Industrial facility closures.
- Segment load estimates were based on six major sources:
  - Nonpoint Sources (Stormwater, NPS).
  - Direct Atmospheric Deposition (AD).
  - Domestic Wastewater (DPS).
  - Industrial Wastewater (IPS).
  - Fertilizer Material Losses (FE).
  - Groundwater and Springs (GWS).





Step 2: Set Allocations

- Sources that have less-rainfall related variability.
- Set allocations were primarily for those domestic wastewater facilities which are already at AWT treatment standards and/or discharge for reuse (irrigation).
- All domestic point sources facilities discharging >0.1 MGD.
- Additional set allocations:
  - Material loss facilities (phosphate mines).
  - Small point sources received aggregate set allocations as developed by DEP.
- Set Allocations were derived as the average annual load for the 2003-2007 period for direct surface water discharge loads and estimated loads associated with reuse discharges.

Step 3: Calculate Remaining Load

- Calculated Remaining Load as the difference between the actual bay segment TN load and the Set Allocations for the 2003-2007 period.
- Provided the segment TN load remaining after the Set allocations were removed:

Remaining Segment Load = Total Segment Load – Sum (Segment Set Allocations)

Step 4: Estimate Percentage Contributions

- Percentage contributions developed for sources with more highly variable rainfall-related loadings.
- Sources other than permitted point sources and MS4 sources.
- These sources included:
  - Atmospheric Deposition.
  - Groundwater and Springs.
  - Non-MS4/Non-Agricultural Lands.
  - Conservation Lands.
  - Agricultural Land.

Step 4: Estimate Percentage Contributions

- Entity loads were calculated based on land use-specific TN concentrations and areal extent.
- Estimate the percentage contribution for a given source as the ratio of the source 2003-2007 average annual TN load to the Remaining Load for the segment:

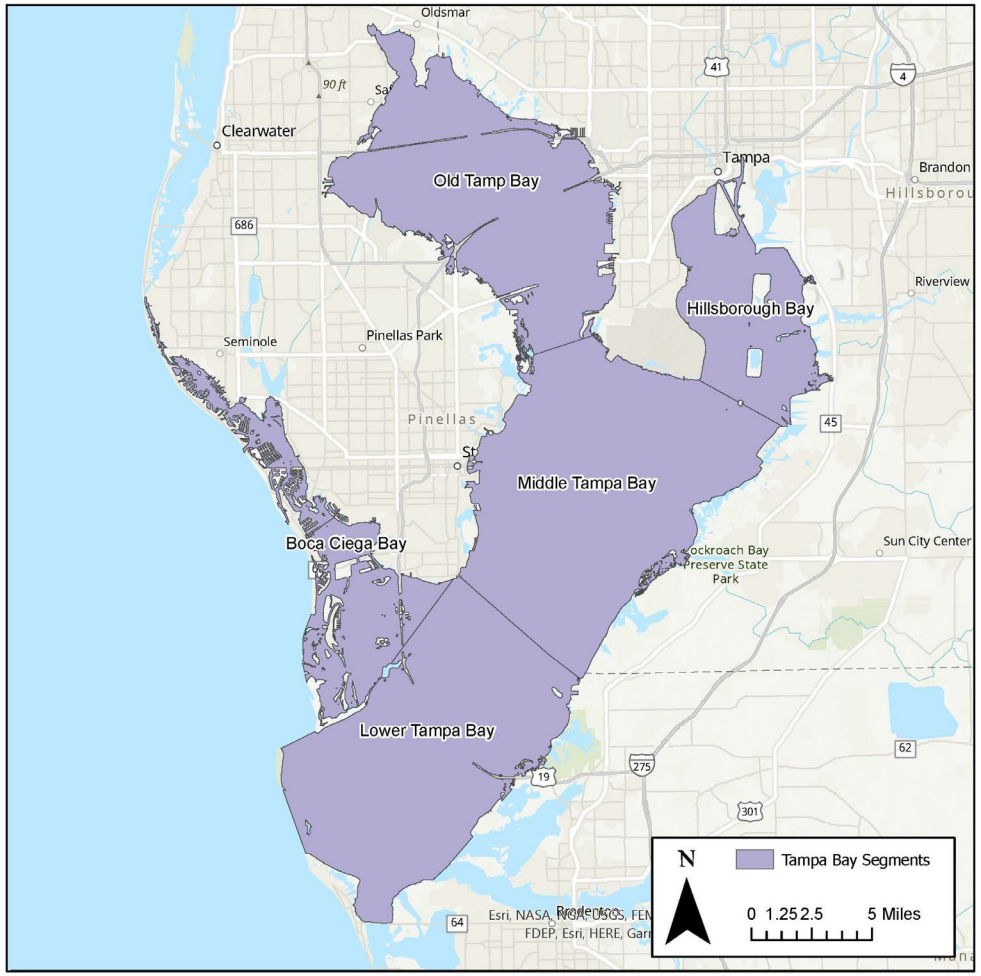
  Percentage Contribution = 100 Entity Load / Remaining Segment Load*

- Percentage allocations associated with regulated entities were converted to set loads.

Example Nitrogen Load Allocation Table Middle Tampa Bay

SW=Surface water discharge allocations, RE=Reuse discharge allocations

Entity	Source	5-yr Annual Average Allocation	
		Proposed Set Allocations (tons/year)	Proposed Remaining Source Allocation of Remaining Load (%)
Harbor Bay	NPS		<0.1%
Hillsborough County	MS4		9.9%
	Point Source - South County RE	0.5	
MacDill Air Force Base	MS4		1.0%
	Point Source – WWTP RE	0.7	
Manatee County	MS4		3.0%
Pinellas County	MS4		0.5%
City of Pinellas Park	MS4		0.7%
City of St. Petersburg	MS4		6.5%
	Point Source – St. Pete Facilities RE	20.8	
Mosaic	Point Source - Four Corners SW		4.1%
TECO Big Bend*	Point Source – SW*	56.5*	
	Point Source - RE	2.1	
Non-MS4/Non-Ag NPS			0.5%
Atmospheric Deposition			35.2%
Other (Groundwater, Springs, Conservation)			5.1%
FDACS (Agriculture)			33.4%
Small Sources		2.4	
Total		**83.0**	**100%**



403 tons/yr remaining for Percent Allocations

WQBEL Compliance Assessment

- Rolling 5-year average of annual TN loads is used to demonstrate compliance.
- Compliance for percent allocations uses a hydrologic normalization.
  - The method is utilized to normalize observed annual TN loads based on differences in observed hydrologic loads from the observed 1992-1994 hydrologic load.

Hydrologic Normalization

- TN loads from 1995-2007 exceeded the target loads established in the federally-recognized TMDL in 48% of the bay segment/year combinations.
- However, the chlorophyll-a concentration thresholds were met in 81% of the bay segment/year combinations during the same years.
- By converting the percentage allocations to set loads and subsequently normalizing the set loads to the hydrologic load observed in 1992-1994, the observed TN load was reconciled with the chlorophyll-a threshold monitoring.
- Therefore, percentage allocations were converted to hydrologically-normalized set loads.

Hydrologic Normalized TN Load

For any calendar year, the normalized annual TN load is calculated as follows:

Normalized Annual TN Load =

$$\frac{[\text{Observed Annual TN load} \times (\text{1992-94 hydrologic load})]}{\text{Observed hydrologic load}}$$

where:

Observed Annual TN Load = reported calendar year load.

Observed Hydrologic Load = to be calculated by major bay segment.

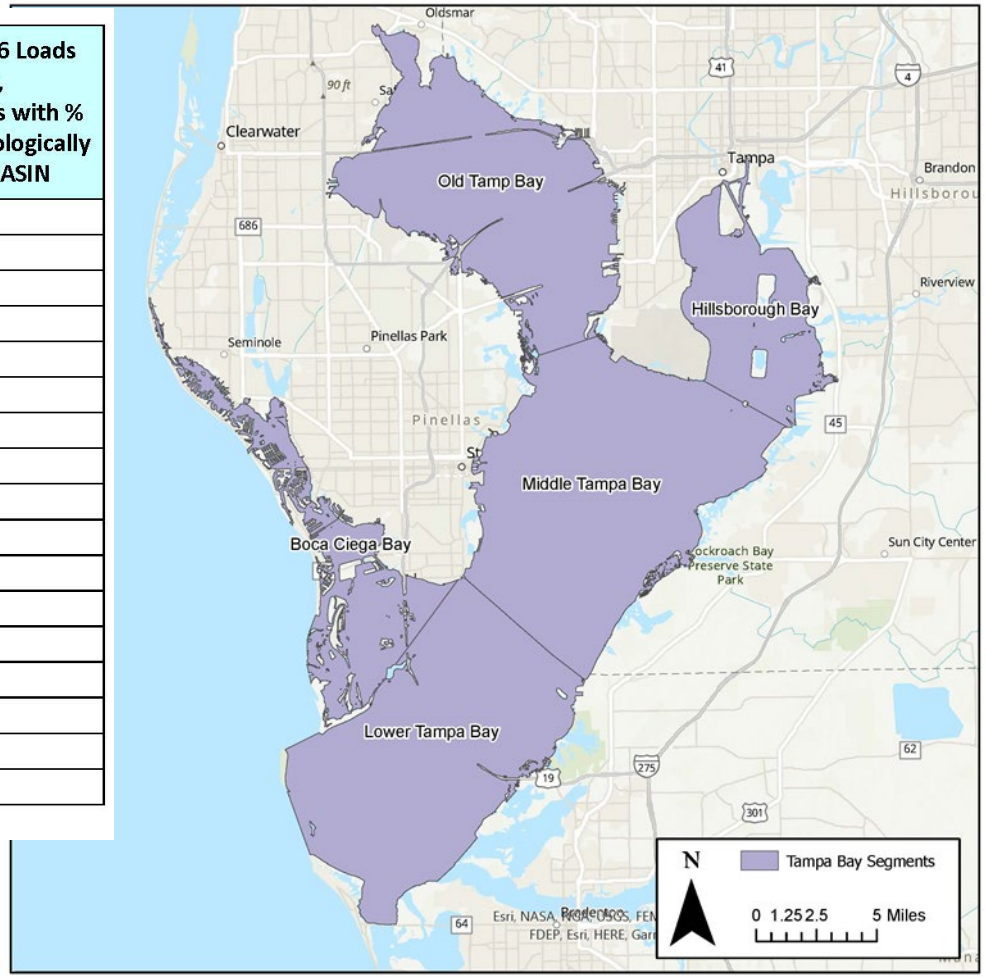
1992-94 Hydrologic Load by Major Bay Segment=

- Old Tampa Bay = 449.44 million cubic meters/year.
- Hillsborough Bay = 895.62 million cubic meters/year.
- Middle Tampa Bay = 645.25 million cubic meters/year.
- Lower Tampa Bay = 361.19 million cubic meters/year.
- Expanded Lower Tampa Bay = 422.71 million cubic meters/year.

Example WBEL Compliance- Middle Tampa Bay (2012 – 2016)

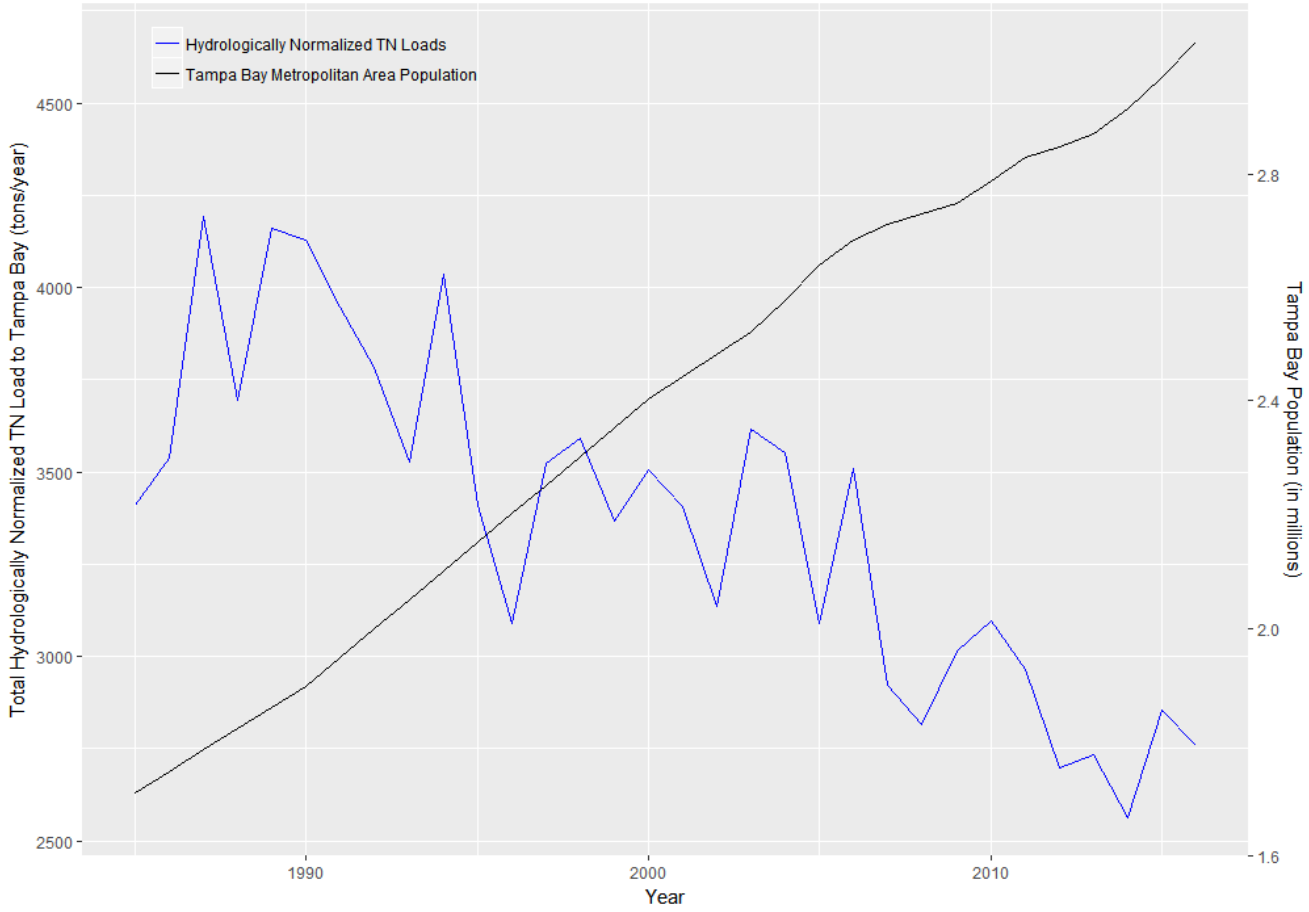
(SW=Surface water discharge allocations, RE=Reuse discharge allocations)

Entity	Source	% Allocation (Based on Percentage of Remaining Load)	Allocated TMDL Load (tons/yr)	Mean 2012-2016 Loads (tons/yr), Entities/Facilities with % Allocations Hydrologically Normalized BASIN
Harbor Bay	MS4	0.03%	0.2	0.5
Hillsborough County	Point Source - South County RE		0.5	0.5
	MS4	9.91%	70.9	72.2
	TOTAL		71.4	72.7
MacDill Air Force Base	Point Source - MacDill AFB RE		0.7	0.7
	MS4	0.97%	7.0	3.2
	TOTAL		7.7	3.9
Manatee County	MS4	3.05%	21.8	20.8
Pinellas County	MS4	0.45%	3.2	2.1
City of Pinellas Park	MS4	0.74%	5.3	3.5
City of St. Petersburg	Point Source - St. Pete Facilities RE		20.8	17.1
	MS4	6.49%	46.5	27.3
	TOTAL		67.3	44.4
Mosaic	Point Source - Four Corners	4.09%	29.3	30.1
TECO Big Bend	Point Source - Big Bend SW		56.5	52.8
	Point Source - Big Bend RE		2.1	0.0
	TOTAL		58.6	52.8



2017 Reasonable Assurance Update

- Hydrologically-normalized total loads to Tampa Bay were at the lowest levels.
- Allocations for interim, new and transferred sources were reviewed and updated during the update.
  - Led to formal NMC concurrence of allocations assigned to each entity for the 2017-2021 Reasonable Assurance implementation period.
  - Total allocations continue to remain within the TMDL limits for the Tampa Bay segments recognized under the 2002-2012 RA periods.
- Provided Allocation (WQBEL) assessment for the 2012-2016 period.



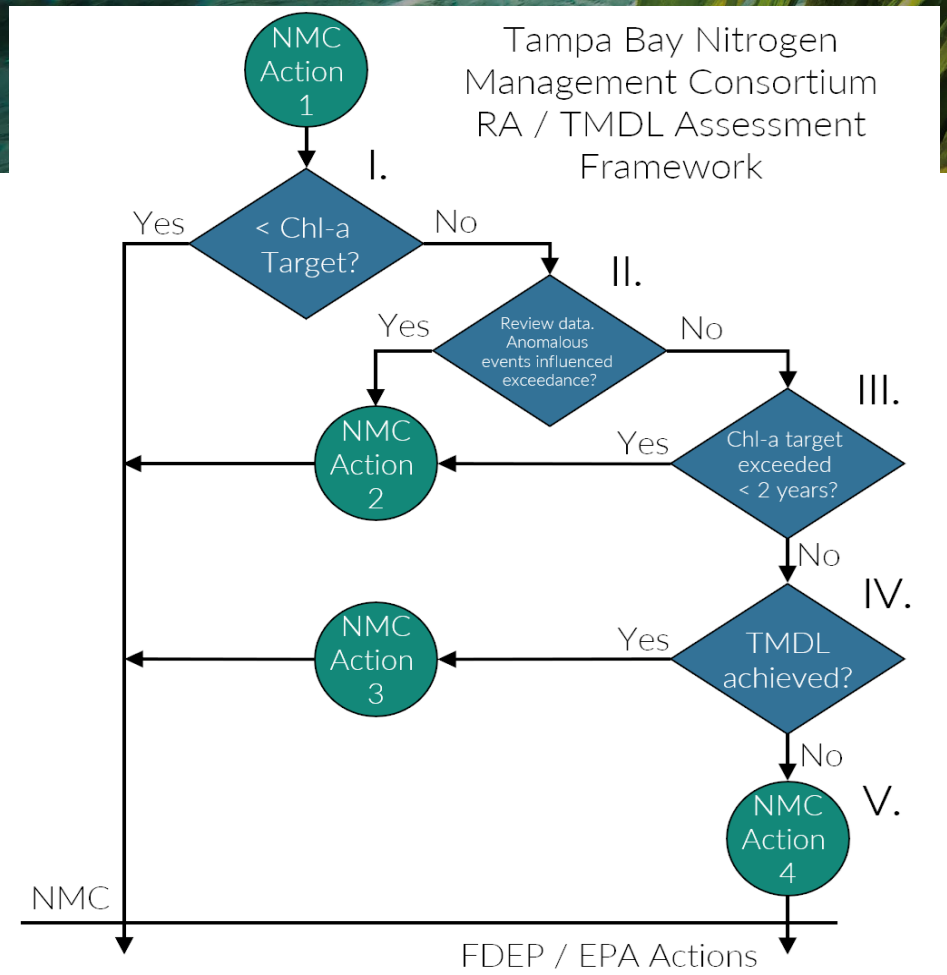
2022 RA Update

- Old Tampa Bay Working Group Research and Recommendations.
  - (Met 1/2020, 6/2020; 11/2020; 8/2021; Complete by Fall 2021 – Summer 2022).
- 2017-21 Loading Updates.
  - (Complete by early 2022).
- 2017-21 Allocation Assessment.
  - (Complete by mid-2022).
- Action Plan Projects Update.
  - (Complete by late 2022).
- Updating 2022-2026 Allocation / Assimilative Capacity Recommendations.
  - (Complete by late-2022).
- Submit 2022 RA Update to DEP/EPA.
  - (Complete by 12/31/2022).

Ken Weaver

Kenneth.Weaver@FloridaDEP.gov

Annual TBNMC RA Assessment



Assessment Step	Result	Action
I. Determine annual bay segment specific chlorophyll-a FDEP threshold attainment as traditionally assessed using the Decision Matrix management strategy developed by the TBEP (TBEP Technical Publication 04-00).	**Yes**	**NMC Action 1**
	No	**NMC Action 1**
II. Review data and determine if an anomalous event(s) influenced non-attainment of the bay segment specific chlorophyll-a threshold.	**Yes**	**NMC Action 2**
	No	**Go to III.**
III. Determine if the chlorophyll-a thresholds have been exceeded for <2 consecutive years.	**Yes**	**NMC Action 2**
	No	**Go to IV.**
IV. Determine if the bay segment specific federally-recognized TMDL has been achieved using the hydrologically-adjusted compliance assessment outlined in NMC Decision Memo #11 (Appendix 2-11).	**Yes**	**NMC Action 3**
	No	**Go to V.**
V. For a given year or for multiple years, compile and report entity-specific combined source loads in comparison to 5-yr annual average reasonable assurance allocation.	**Compile & Report**	**NMC Action 4**

NMC Actions

- **Action 1**: A report assessing attainment of bay segment specific chlorophyll-a thresholds, as traditionally assessed using the Decision Matrix management strategy developed by the TBEP will be delivered to DEP and EPA.
- **Action 2**: A report of the anomalous event(s) or data which influenced the bay segment chlorophyll-a exceedance will be delivered to DEP and EPA, upon review by NMC participants.
- **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.
- **Action 4**: If federally-recognized TMDL not achieved, compile results of hydrologic evaluation for DEP's review and identify potential further actions needed to achieve reasonable assurance for bay segment allocations.

2017 - 2021 RA Compliance Period Results

Bay Segment	Chl-a Criteria (µg/L)	2022 Reasonable Assurance Update Period				
		2017	2018	2019	2020	2021
Old Tampa Bay	9.3	9.5	9.2	9.8	*9.5	?
Hillsborough Bay	15.0	9.7	13.9	11.0	*10.5	?
Middle Tampa Bay	8.5	5.8	7.0	5.7	*5.5	?
LTB / Remainder LTB	5.1	3.3	4.7	3.9	*3.0	?

*April and May 2020 samples were not collected & analyzed due to COVID-19 pandemic

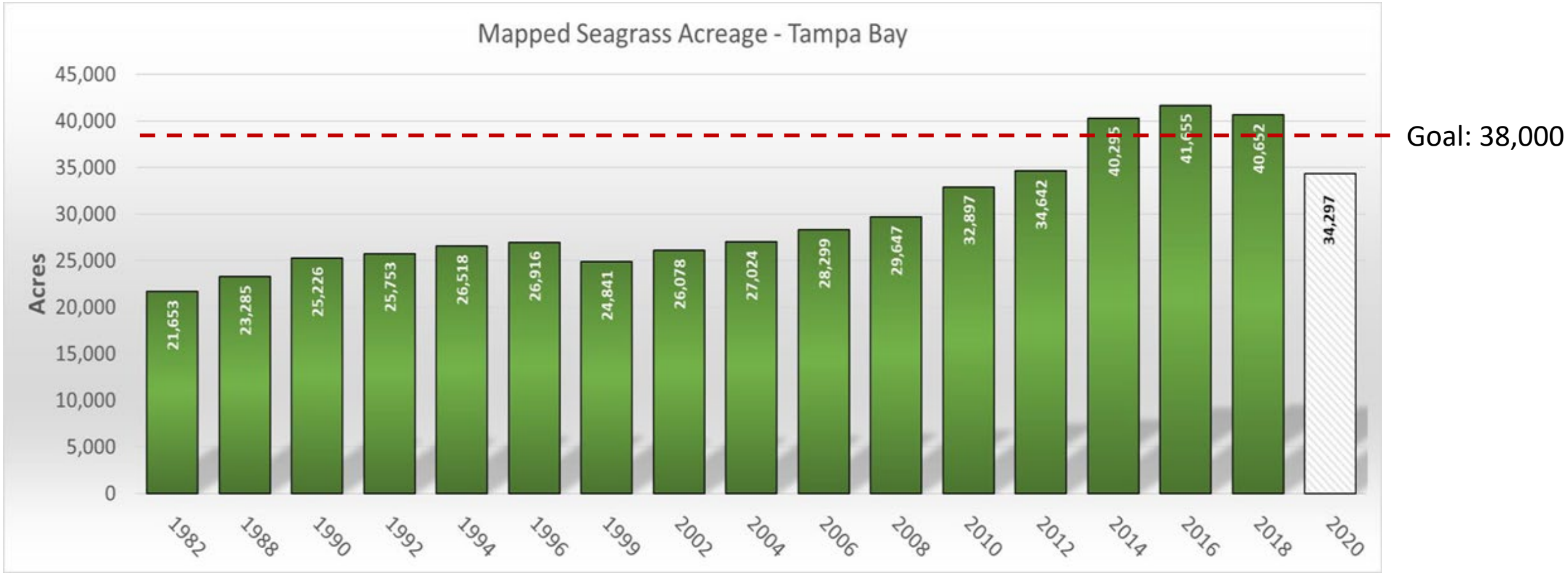
Credit: Ed Sherwood, TBEP Executive Director

Additional RA Assessment Steps for OTB

Bay Segment Reasonable Assurance Assessment Steps	DATA USED TO ASSESS ANNUAL REASONABLE ASSURANCE					OUTCOME
	Year 1 (2017)	Year 2 (2018)	Year 3 (2019)	Year 4 (2020)	Year 5 (2021)	
NMC Action 1: Determine if observed chlorophyll-*a* exceeds FDEP threshold, 9.3 μg/L	9.5 μg/L (Yes)	9.2 μg/L (No)	9.8 μg/L (Yes)	9.5** μg/L (Yes**)		2nd concurrent exceedance, but data gaps in 2020 estimate.
YES → **NMC Action 2: Determine if any observed chlorophyll-*a* exceedances occurred for 2 consecutive years, review / report on any anomalous events and data.**	No	No	No	Yes**		Two month (Apr. - May) gap most likely influenced exceedence. Other data sources have proven to be poor surrogates for those months.
NO → **NMC Action 3: Determine if observed hydrologically-normalized total load exceeds federally-recognized TMDL of 486 tons/year**	No* (332)	No* (346)	No* (369)	No* (355)		**Prep. for NMC Action 3: Assemble 2020 loading info; Further scrutinize data; *Assess re-evaluation of bay segment assimilative capacity***
NMC Action 4: Determine if any entity/source/facility specific exceedances of 5-yr average allocation occurred during implementation period						

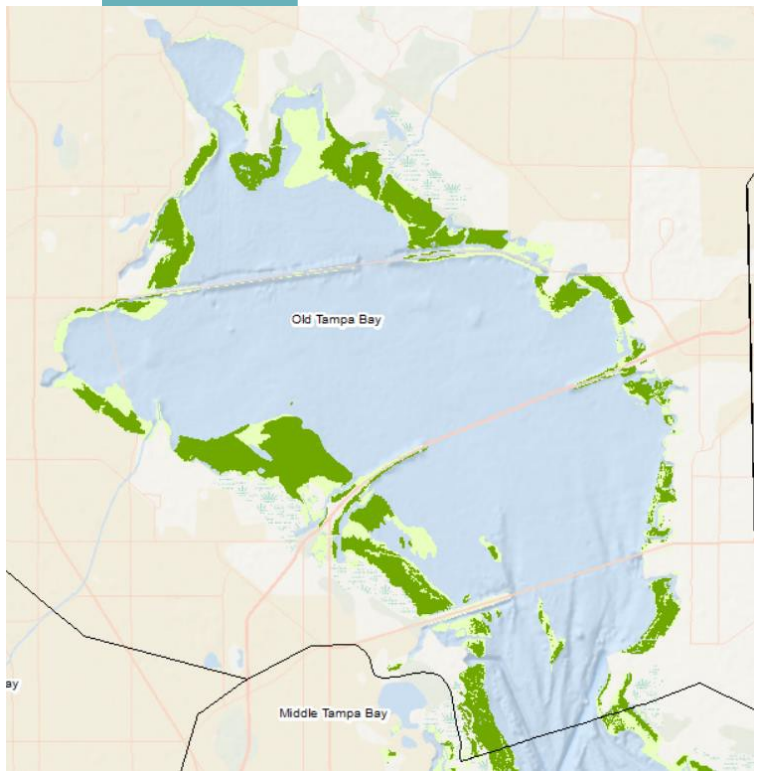
*Provisional loading data; **April-May data not collected & analyzed due to COVID-19 pandemic

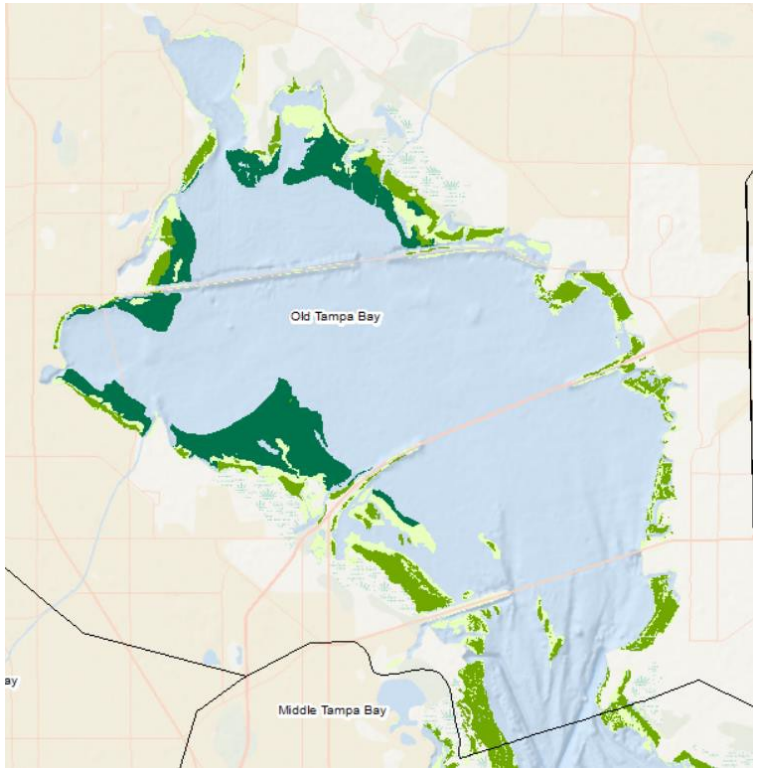
Seagrass Coverage – Recent vs. Goal



Credit: Chris Anastasiou, Southwest Florida Water Management District

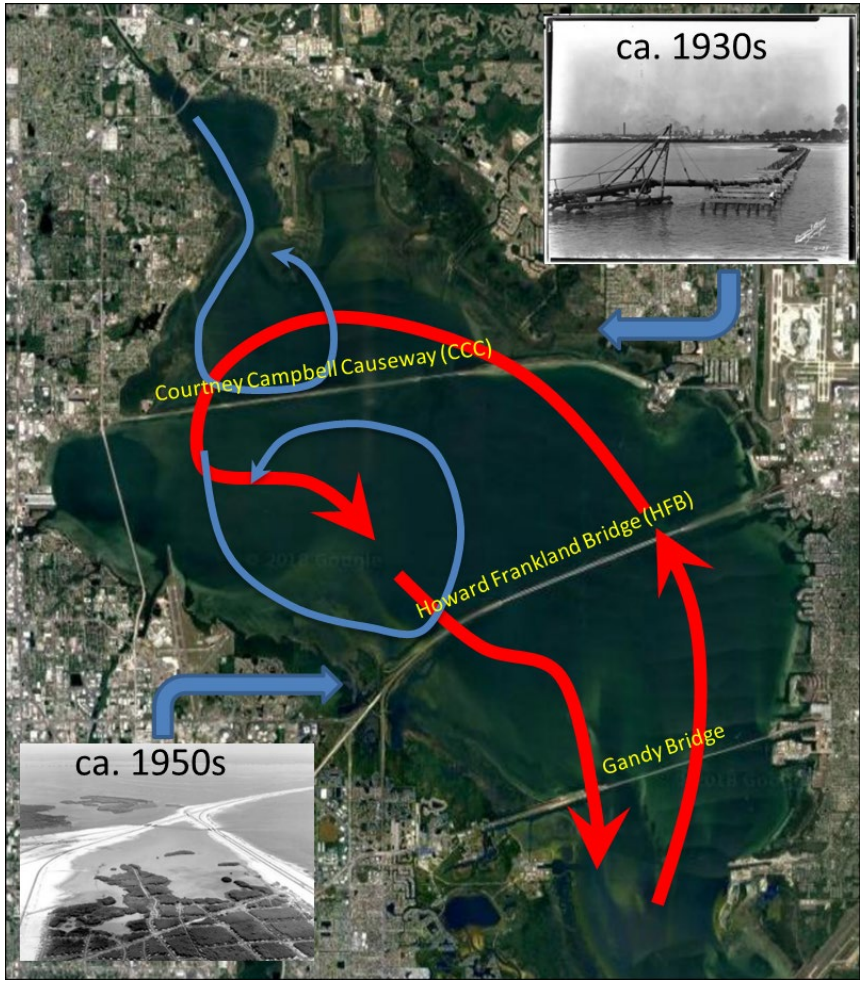
Greatest Loss in Old Tampa Bay





Year	Patchy Seagrass	Continuous Seagrass	Total Seagrass	Attached Algae
2020	3,405	3,296	6,701	4,122
2018	4,190	6,551	10,742	0
	-785	-3,255	-4,041	+4,122

Old Tampa Bay Working Group
Evaluating Conditions and other Drivers



Credit: Ed Sherwood, TBEP Executive Director