

# 2011 Tampa Bay Water Quality Assessment

A Tampa Bay Estuary Program Initiative to Maintain and Restore the Bay's Seagrass Resources

## Background

Light availability to seagrass is the guiding paradigm for TBEP's Nitrogen Management Strategy. Because excessive nitrogen loads to the bay generally lead to increased algae blooms (higher chlorophyll-a levels) (Figure 1) and reduce light penetration to seagrass, an evaluation method was developed to assess whether load reduction strategies are achieving desired water quality results (i.e. reduced chlorophyll-a concentrations and increased water clarity).

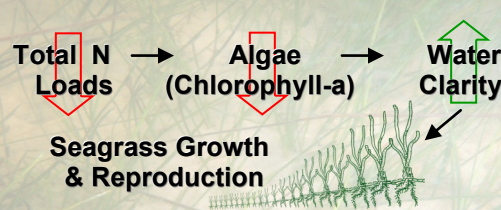


Figure 1: Guiding paradigm for Tampa Bay seagrass restoration through the management of nitrogen loads.

## Decision Support Approach

Year to year algae abundance (measured as chlorophyll-a concentrations) and visible light penetration through the water column (depth of secchi disk visibility) have been identified as critical water quality indicators in Tampa Bay. Tracking the attainment of bay segment specific targets for these indicators provides the framework from which bay management actions are developed & initiated. TBEP management actions adopted in response to the annually-assessed decision support results are as follows:

Green	"Stay the Course." Continue planned projects. Report data via annual progress reports and Bay-wide Environmental Monitoring Report.
Yellow	"Caution Alert." Review monitoring data and nitrogen loading estimates. Begin/continue TAC and Management Board development of specific management recommendations.
Red	"On Alert." Finalize development and implement appropriate management actions to get back on track.

## 2011 Decision Matrix Results

A decline in water quality was observed in 2011 for both Old Tampa Bay (OTB) and Middle Tampa Bay (MTB). Large magnitude exceedences of both chlorophyll-a and light penetration targets in OTB and a small magnitude exceedence in chlorophyll-a was observed in MTB. Average 2011 chlorophyll-a concentrations in all segments rose from 2010 levels (Fig. 2), and more individual stations exceeded their respective bay segment targets in 2011 relative to previous years (Fig. 3). A widespread *Pyrodinium bahamense* bloom in OTB that transitioned into a harmless diatom bloom in MTB & LTB during the late summer months led to higher chlorophyll-a levels.

Observed water quality indicators & management outcomes for 2011. \*Small & \*\*large magnitude exceedences.

Bay Segment	Chlorophyll-a (ug/L)		Effective Light Penetration (m <sup>-1</sup> )		Management Response
	2011	Target	2011	Target	
OTB	11.4**	8.5	0.91**	0.83	Red
HB	11.2	13.2	1.00	1.58	Green
MTB	8.0*	7.4	0.66	0.83	Yellow
LTB	4.3	4.6	0.49	0.63	Green



For additional info visit:

[www.tbep.tech.org](http://www.tbep.tech.org)

### Original Reference:

Janicki, A., D. Wade, & R.J. Pribble. 2000. Developing & Establishing a Process to Track the Status of Chlorophyll-a Concentrations and Light Attenuation to Support Seagrass Restoration Goals in Tampa Bay. Tampa Bay Estuary Program Technical Report # 04-00.

### Historic Results:

Year	Old TB	Hills. Bay	Middle TB	Lower TB
1976	Red	Red	Red	Yellow
1977	Red	Red	Red	Red
1978	Red	Red	Red	Yellow
1979	Red	Red	Red	Red
1980	Red	Red	Red	Red
1981	Red	Red	Red	Red
1982	Red	Red	Red	Red
1983	Red	Yellow	Red	Red
1984	Red	Green	Red	Yellow
1985	Red	Red	Red	Yellow
1986	Red	Yellow	Red	Green
1987	Red	Yellow	Red	Green
1988	Yellow	Green	Yellow	Green
1989	Red	Yellow	Red	Yellow
1990	Red	Green	Red	Yellow
1991	Green	Yellow	Yellow	Yellow
1992	Yellow	Green	Yellow	Yellow
1993	Yellow	Green	Yellow	Yellow
1994	Yellow	Yellow	Red	Red
1995	Red	Yellow	Red	Yellow
1996	Yellow	Green	Yellow	Green
1997	Yellow	Green	Red	Yellow
1998	Red	Red	Red	Red
1999	Yellow	Green	Yellow	Yellow
2000	Green	Green	Yellow	Yellow
2001	Yellow	Green	Green	Green
2002	Yellow	Green	Green	Green
2003	Red	Yellow	Green	Yellow
2004	Red	Green	Green	Yellow
2005	Green	Green	Yellow	Yellow
2006	Green	Green	Green	Green
2007	Green	Green	Green	Green
2008	Yellow	Green	Green	Yellow
2009	Yellow	Yellow	Green	Green
2010	Green	Green	Green	Green
2011	Red	Green	Yellow	Green



Continuing water quality monitoring support provided by the EPCHC.

Consulting support provided by Janicki Environmental, Inc.

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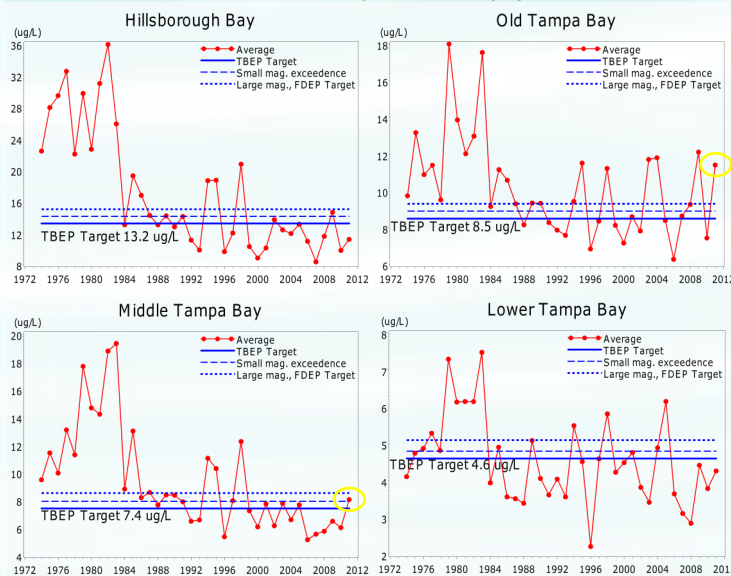


Figure 2: Historic chlorophyll-a annual averages for the four bay segments. Chlorophyll-a concentrations in all 4 bay segments increased from 2010 levels.

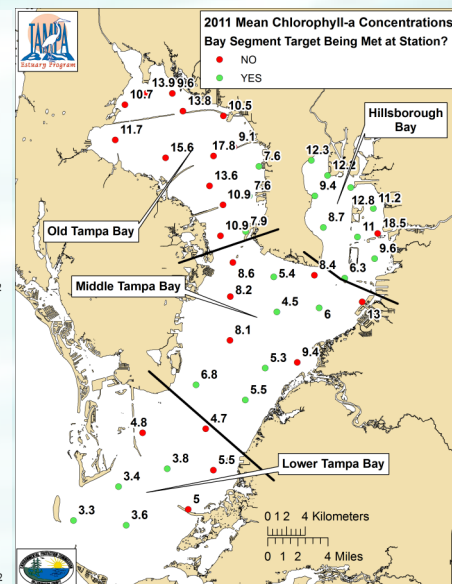


Figure 3: Map depicting individual station chlorophyll-a exceedences in Tampa Bay.

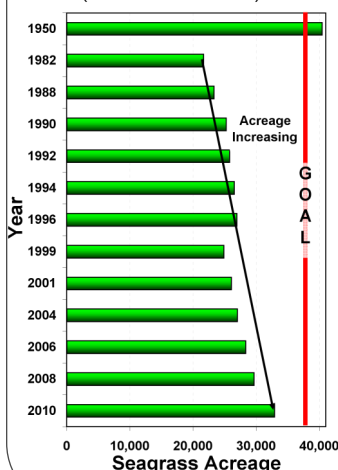
# Progress Towards Meeting Regulatory Goals

An initiative of the Tampa Bay Nitrogen Management Consortium (NMC)

## FDEP Targets Met:

Year	Old TB	Hills. Bay	Mid. TB	Low. TB
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

Historic seagrass acreage estimates for Tampa Bay from 1950-2010 (Source: SWFWMD).

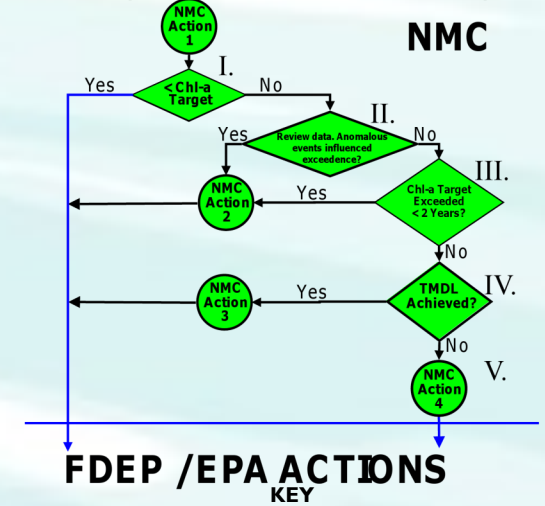


## Attaining FDEP Reasonable Assurance & EPA TMDLs

In December 2010, then-FDEP Secretary Drew signed a Final Order approving and adopting the "Tampa Bay Nitrogen Management Consortium's 2009 Reasonable Assurance Addendum: Allocation and Assessment Report." With adoption of this order, the Consortium provided the state reasonable assurance that Tampa Bay will meet water quality criteria related to nutrients through the 2011 period in each of the major bay segments. EPA's acknowledgment and acceptance of the state's determination for Tampa Bay is still pending.

At the end of 2012, the region will once again be required to submit a 2007-2011 update on Tampa Bay's Reasonable Assurance designation to FDEP. The TBEP, in partnership with the Tampa Bay Nitrogen Management Consortium, will submit this update to: a) summarize any significant changes, projects, or partner action plans completed since 2007 and provide a summary of nutrient load reductions for each bay segment based on the updated Partner Action Plan; b) summarize the most recent 5 years of water quality data (2007-2011) for the bay; and c) compile and report 2007-2011 estimates of TN loads and hydrologic loads relative to the established 2009 allocations and nitrogen delivery ratios for each major bay segment.

## NMC Compliance Framework for future RA Updates.



NMC Action I: Report attainment of bay segment specific chlorophyll-a thresholds to FDEP and EPA over the 2007-2011 period.

NMC Action II: Report anomalous event(s) or data which influenced a chlorophyll-a exceedance in 2 consecutive years over the 2007-2011 period to FDEP & EPA.

NMC Action III: Consider re-evaluation of bay segment assimilative capacities.

NMC Action IV: Compile loading evaluations & identify potential further actions needed to achieve reasonable assurance for adopted bay segment allocations.

## 2011 Chl-a Monthly Variation Compared to 1974-2010

Chlorophyll-a concentrations were evaluated within the bay spatially (Fig. 3) and monthly (Fig. 4) during 2011 and compared to prior years' levels. Observed 2011 monthly chlorophyll-a averages were elevated during the summer months in OTB and MTB. In August 2011, chlorophyll-a levels in OTB and MTB were influenced by both the remnants of the summer *Pyrodinium bahamense* bloom and a subsequent, harmless diatom bloom.

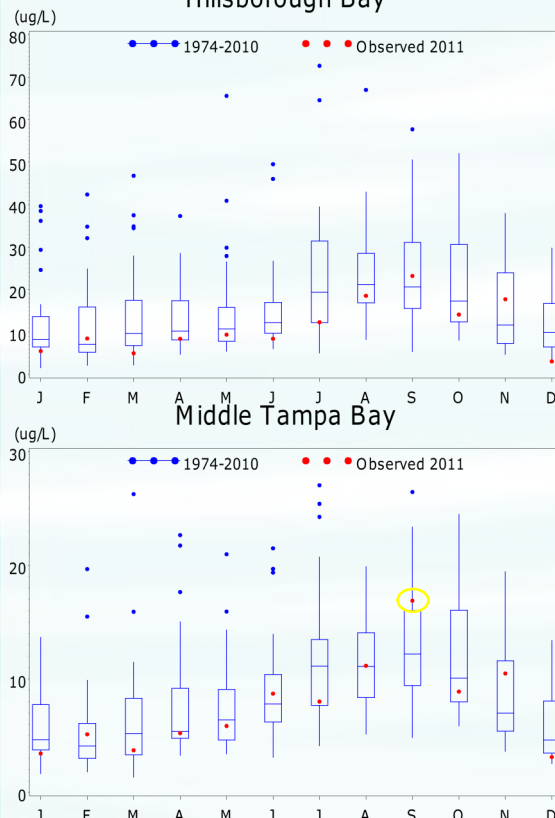


Figure 4: 2011 monthly chlorophyll-a bay segment averages (red dots) compared to monthly distributions from 1974-2010 (blue box plots). Boxes encompass the 25th and 75th percentiles, while whiskers bound the interquartile range. Blue dots represent outliers.