

2015 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).

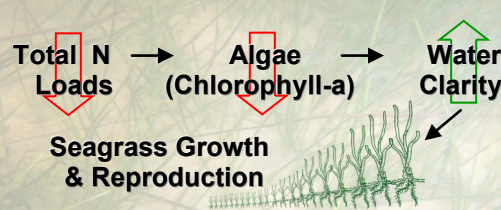


Figure 1: Guiding paradigm for Tampa Bay seagrass restoration through the management of nitrogen loads.

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 Baywide 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.

2015 Decision Matrix Results

Bay water quality slightly declined in 2015. Both Old Tampa Bay (OTB) and Middle Tampa Bay (MTB) segments exceeded chlorophyll-a targets (Table 1; Figure 2). The nuisance algae, *Pyrodinium bahamense*, was reported in Old Tampa Bay throughout the Summer and Fall 2015, and exceptionally high summer rainfall conditions contributed to emergency domestic discharges to waterways leading to Old, Middle and Lower Tampa Bays. These two factors may have influenced the observed chlorophyll-a exceedances observed in OTB and MTB in 2015. Further, individual station exceedances were primarily in upper MTB and throughout OTB (Figure 3).

Table 1: Observed water quality indicators & management outcomes for 2015.

Bay Segment	Chlorophyll-a (ug/L)		Effective Light Penetration (m ⁻¹)		Management Response
	2015	Target	2015	Target	
OTB	10.7	8.5	0.56	0.83	Yellow
HB	9.0	13.2	0.90	1.58	Green
MTB	8.1	7.4	0.59	0.83	Yellow
LTB	3.9	4.6	0.62	0.63	Green

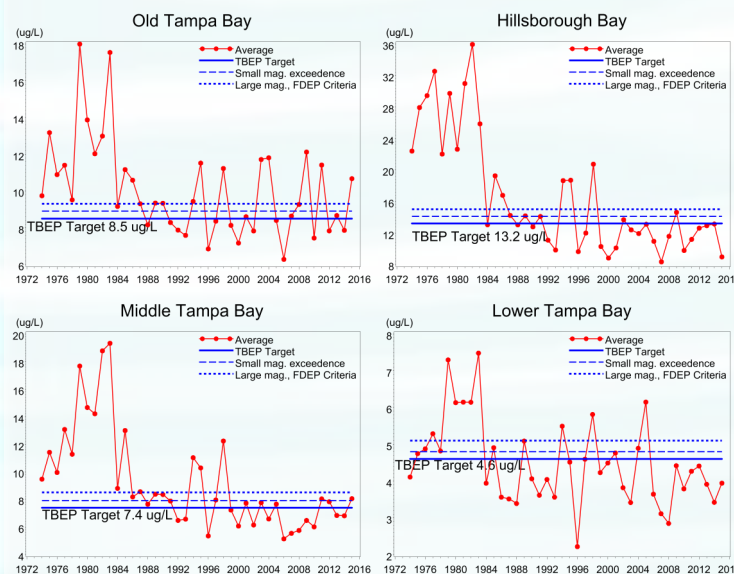


Figure 2: Historic chlorophyll-a annual averages for the four bay segments. Chlorophyll-a concentrations were below target levels for each bay segment.

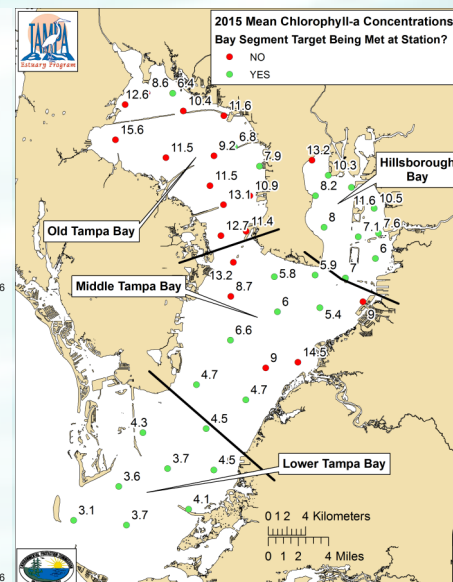


Figure 3: Map depicting individual station chlorophyll-a annual exceedances in Tampa Bay.



For additional info visit:

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
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	Yellow	Yellow
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
2012	Green	Green	Green	Green
2013	Green	Green	Green	Green
2014	Green	Green	Green	Green
2015	Yellow	Green	Yellow	Green



Continuing water quality monitoring support provided by the EPCHC.

Consulting support provided by Janicki Environmental, Inc.

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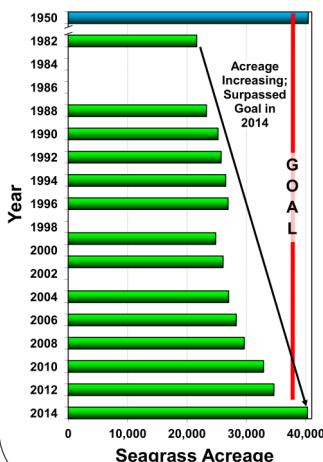
Progress Towards Meeting Regulatory Goals

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

FDEP Criteria Met:

Year	Old TB	Hills. Bay	Mid. TB	Low. TB
1978	No	No	No	No
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

Figure 4: Historic seagrass acreage estimates for Tampa Bay from 1950-2014 (Source: SWFWMD).



Maintaining Reasonable Assurance & TMDL Compliance

In April 2013, the FDEP approved the 2012 Reasonable Assurance Update and concluded that there has been reasonable progress towards the attainment of designated uses for waterbody segments in the Tampa Bay basin that were previously identified as impaired for nutrients (chlorophyll-a) pursuant to Chapters 62-303, FAC. As such, the FDEP placed Hillsborough Bay segments (WBIDs 1558D & 1558E) and Old Tampa Bay Segments (WBIDs 1558H & 1558I) in EPA assessment category 4b for nutrients (chlorophyll-a) rather than EPA category 5 (impaired). Furthermore, two Lower Tampa Bay segments (WBIDs 1558A & 1558BZ) were moved to EPA category 2 (attains standards) because these WBIDs now attain chlorophyll-a thresholds and the general increase in baywide seagrass coverage demonstrates a healthy biological community (Fig. 4).

The TBEP, in partnership with the Tampa Bay Nitrogen Management Consortium, will submit the fourth compliance assessment report for the 2012-16 Reasonable Assurance (RA) Period to the FDEP in March 2016. Consortium participants continue to input load reduction projects into the Action Plan Database which was ported to an online, web-based reporting system (Figure 5). Planned and budgeted projects for the 2012-16 Reasonable Assurance Implementation period are expected to reduce TN loading by about 77 tons/yr in the future.

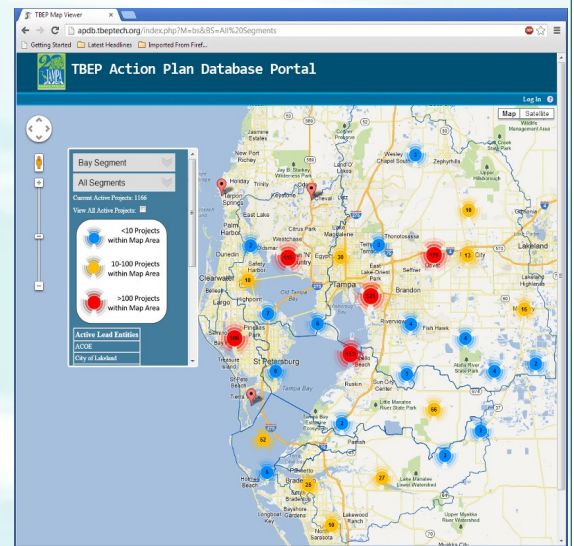


Figure 5: Screenshot of the online Tampa Bay Action Plan Database (<http://apdb.tbepetech.org>) showing the approximate spatial locations of projects implemented in the watershed.

2015 Chl-a Monthly Variation Compared to 1974-2015

Chlorophyll-a concentrations were evaluated within the bay on a monthly basis (Figure 6) during 2015 and compared to prior years' levels. Elevated concentrations in Old Tampa Bay were primarily due to *Pyrodinium bahamense* blooms, while in Middle Tampa Bay, elevated concentrations in September may have been primarily due to excessive runoff from higher than normal summer rainfall (highlighted by the yellow ovals below).

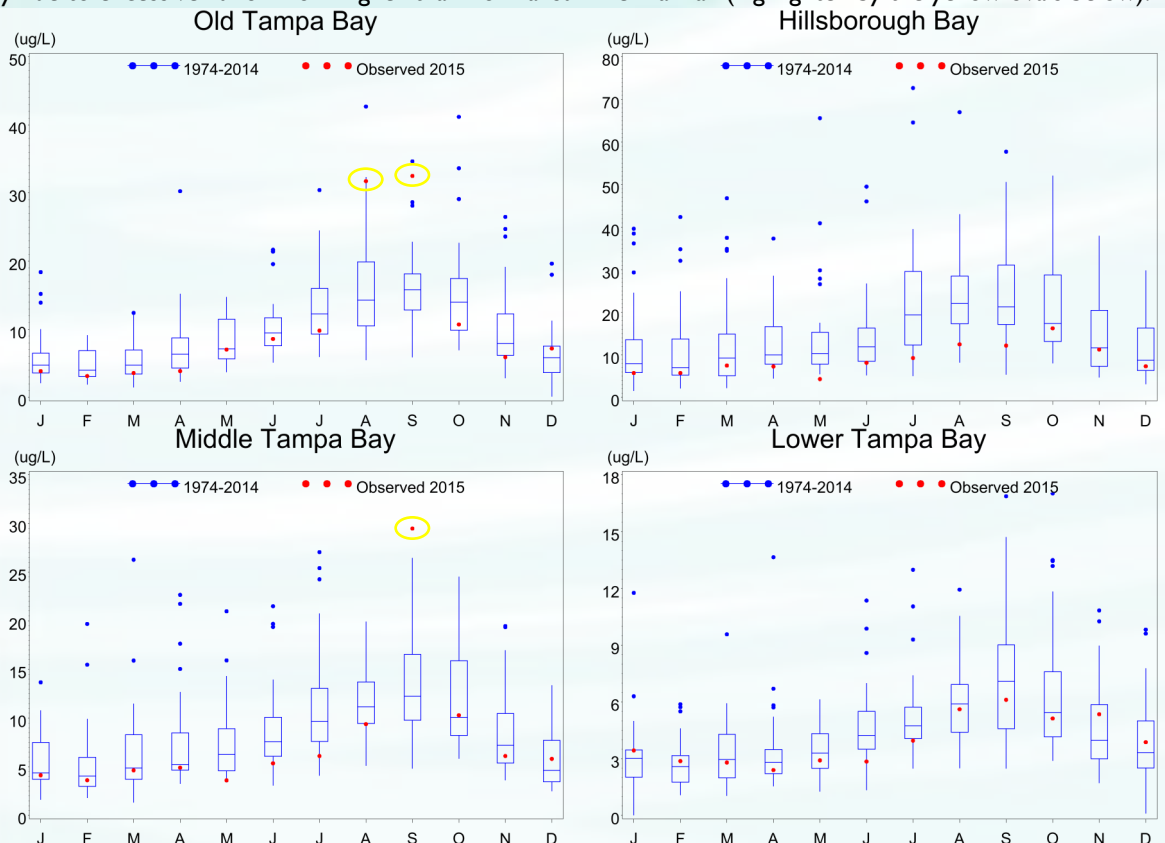


Figure 6: 2014 monthly chlorophyll-a bay segment averages (red dots) compared to monthly distributions from 1974-2013 (blue box plots). Boxes encompass the 25th and 75th percentiles, while whiskers bound the interquartile range. Blue dots represent outliers.