

2017 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).

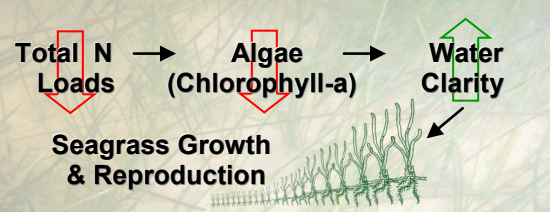


Figure 1: Guiding paradigm for Tampa Bay seagrass restoration through the management of nitrogen loads.

For additional info visit:

www.tbep.tech.org

Original Reference:

Janicki, A., D. Wade, & R.J. Pribble. 2000.

TBEP Technical Report # 04-00.

Historic Results:

Year	Old TB	Hills. Bay	Middle TB	Lower TB
1975	Red	Red	Red	Green
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	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
2016	Yellow	Green	Green	Green
2017	Yellow	Green	Green	Green

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 shown to the right.

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.

2017 Decision Matrix Results

Water quality as measured by chl-a remained acceptable compared to FDEP criteria for Hillsborough Bay, Middle Tampa Bay (MTB), and Lower Tampa Bay (LTB)(Table 1; Figure 2). The nuisance algae, *Pyrodinium bahamense*, was again reported in Old Tampa Bay throughout the Summer and Fall 2017, contributing to an OTB large magnitude chl-a exceedence in that segment (matrix to the left). Furthermore, individual station exceedences throughout OTB were observed in relation to the bloom event (Figure 3). Effective light penetration was at acceptable levels in all bay segments (Table 1).

Table 1: Observed water quality indicators & recommended management outcomes for 2017.

Bay Segment	Chlorophyll-a (ug/L)		Effective Light Penetration (m ⁻¹)		Management Response
	2017	Target	2017	Target	
OTB	9.5	8.5	0.68	0.83	Yellow
HB	9.7	13.2	1.02	1.58	Green
MTB	5.8	7.4	0.48	0.83	Green
LTB	3.3	4.6	0.50	0.63	Green

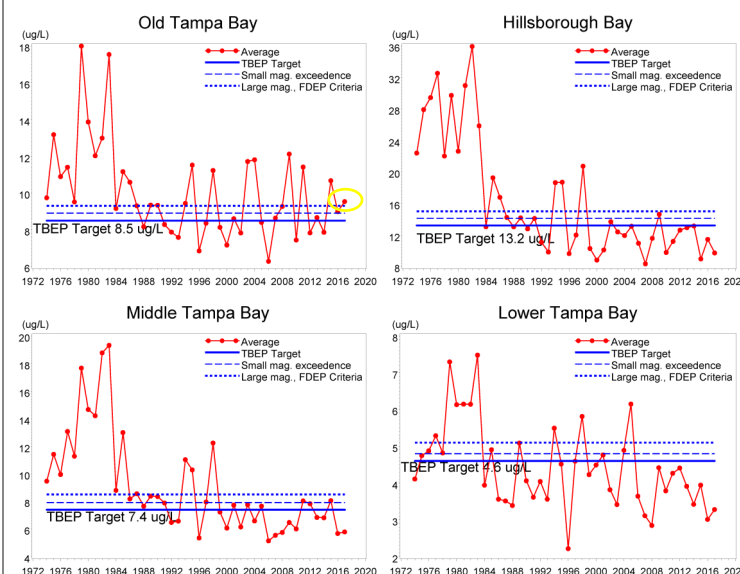


Figure 2: Historic chlorophyll-a annual averages for the four bay segments. Chlorophyll-a concentrations exceeded FDEP criteria for Old Tampa Bay in 2017.

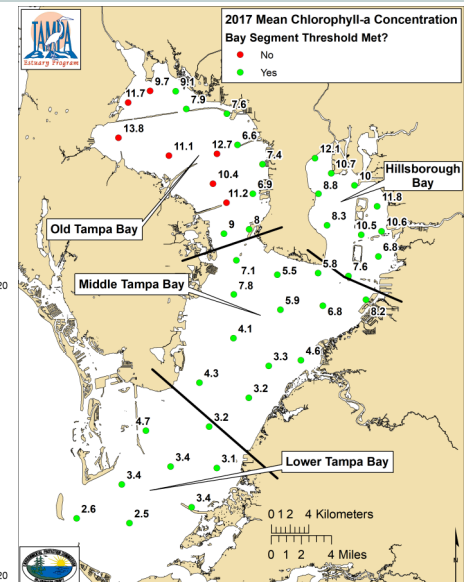


Figure 3: Map depicting 2017 individual station chlorophyll-a annual values in Tampa Bay.



Continuing water quality monitoring support provided by the EPHC.

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	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
2017	No	Yes	Yes	Yes

Maintaining Reasonable Assurance & TMDL Compliance

In November 2017, the FDEP accepted the Final Reasonable Assurance Update (RA Update) as submitted by TBEP in partnership with the Tampa Bay Nitrogen Management Consortium. FDEP concluded that the RA Update demonstrated both attainment of seagrass targets and total nitrogen numeric criteria for 2012-2016. During 2017, three of four bay segments (excluding OTB) were in compliance with the FDEP regulatory criteria for chlorophyll-a concentrations (matrix to the left). The first compliance report for the 2017-2021 period will be submitted by March 2018.

2017 Chl-a Monthly Variation Compared to 1974-2016

Chlorophyll-a concentrations were evaluated within the bay on a monthly basis (Figure 4) during 2017 and compared to prior years' levels. Eight of the twelve months for OTB had chl-a concentrations higher than long-term median values, while Hillsborough Bay had elevated concentrations in October. Elevated concentrations in Old Tampa Bay were primarily due to *Pyrodinium bahamense* blooms. High monthly values are highlighted by the yellow ovals below.

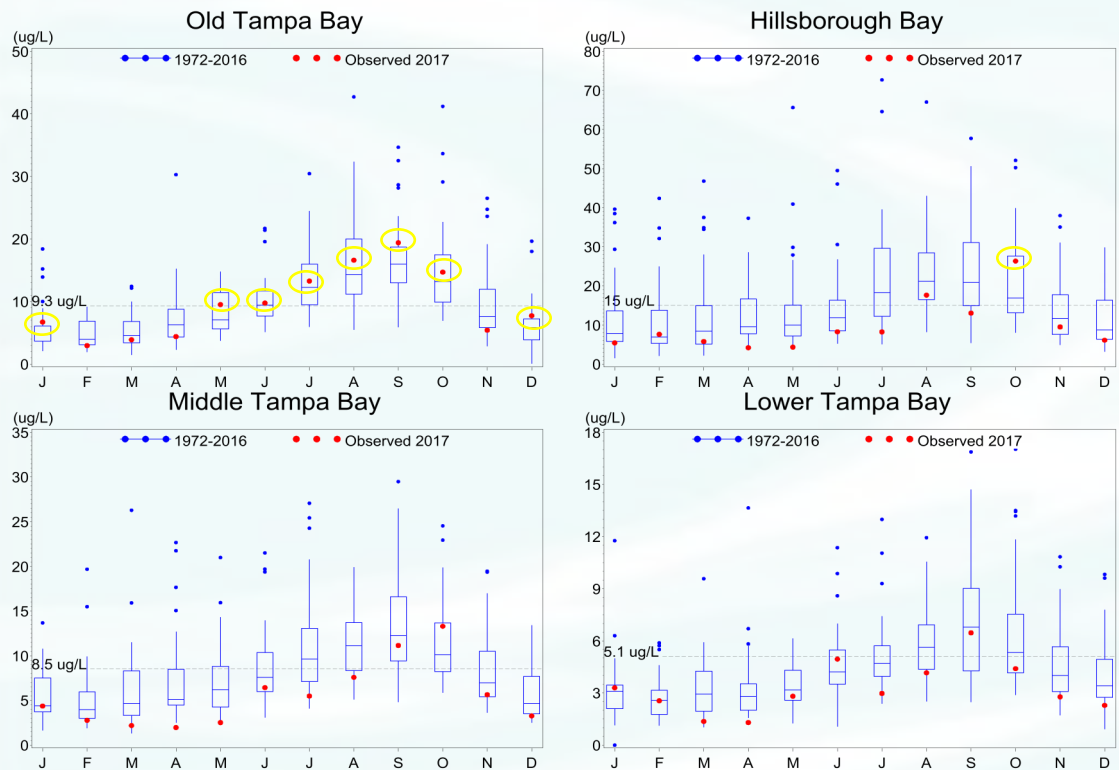


Fig. 4: 2017 monthly chlorophyll-a bay segment averages (red dots) compared to monthly distributions from 1974-2016 (blue box plots). Boxes encompass the 25th and 75th percentiles, while whiskers bound points within 1.5 interquartiles from the box. Blue dots represent outliers.

Tampa Bay Seagrass Coverage Continues to Increase

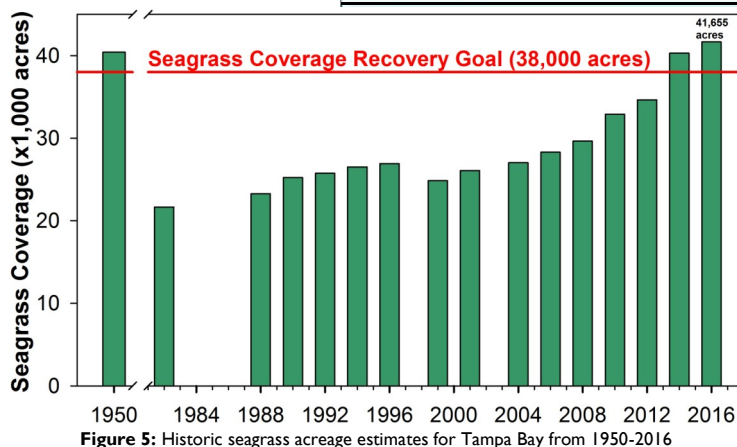


Figure 5: Historic seagrass acreage estimates for Tampa Bay from 1950-2016

(Source: TBEP & SWFWMD).

Tampa Bay's seagrass recovery continued on a positive trajectory, as an additional 1,360 acres of seagrass coverage was reported from 2014 to 2016. The baywide coverage is now estimated to be 41,655 acres as of 2016 (Figure 5). For the first time, seagrass coverage exceeded both the baywide target (38,000 acres) and the total estimated seagrass coverage in the 1950s (40,420 acres). It should be noted that the 2016 estimates were derived from aerial photography acquired prior to rainfall and unanticipated sewer releases during summer of 2016 and runoff effects of Hurricane Irma in September 2017. The next SWFWMD seagrass coverage estimates will be developed from aerial photographs acquired over the winter 2017/18 period. More information on the Bay's seagrass recovery utilizing transect monitoring data can be found in the recent [TBEP Technical Publication #08-16](#).