

2009 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).

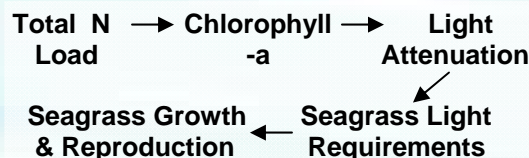


Figure 1: Guiding paradigm for Tampa Bay seagrass restoration through the management of nitrogen loads.

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;" partners continue with planned projects to implement the CCMP. Data summary and reporting via the Baywide Environmental Monitoring Report and annual assessment and progress reports.
Yellow	TAC and Management Board on caution alert; review monitoring data and loading estimates; attempt to identify causes of target exceedences; TAC report to Management Board on findings and recommended responses needed.
Red	TAC, Management and Policy Boards on alert; review and report by TAC to Management Board on recommended types of responses. Management and Policy Boards take appropriate actions to get the program back on track.

2009 Decision Matrix Results

A decline in water quality was observed in 2009 for Old Tampa Bay (OTB) and Hillsborough Bay (HB). A large magnitude exceedence of the chlorophyll-a threshold in OTB and a small magnitude exceedence in HB were observed (Fig. 2). Site-specific exceedences of the TBEP bay segment chlorophyll-a targets were prevalent in OTB and HB (Fig. 3). A persistent algae bloom occurred from May-August during 2009 in the upper bay segments, and observed summer monthly chlorophyll-a averages far exceeded normal historical levels (Fig. 4, page 2). In response, an assessment & action plan will be developed starting in the Fall 2010.

Table 1. Observed water quality indicators & management outcomes for 2009. *Small & **large magnitude exceedence.

Bay Segment	Chlorophyll-a (ug/L)		Effective Light Penetration (m ⁻¹)		Management Response
	2009	Target	2009	Target	
OTB	12.1**	8.5	0.81	0.83	Yellow
HB	14.6*	13.2	1.10	1.58	Yellow
MTB	6.5	7.4	0.65	0.83	Green
LTB	4.4	4.6	0.56	0.63	Green

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
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

Continuing water quality monitoring support provided by the EPCHC.

Consulting support provided by Janicki Environmental, Inc.

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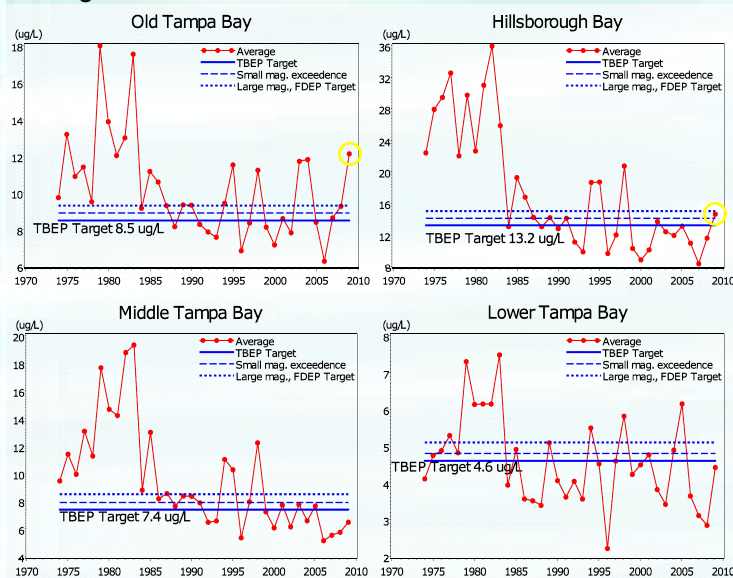


Figure 2: Historic chlorophyll-a annual averages for the four bay segments. Old Tampa Bay and Hillsborough Bay's 2009 exceedences are highlighted in yellow.

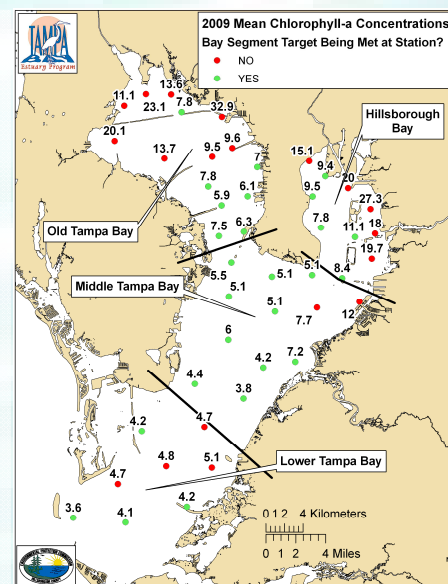


Figure 3: Map depicting individual station chlorophyll-a exceedences in Tampa Bay.

Progress Towards Meeting Regulatory Goals

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

Attaining FDEP Reasonable Assurance & EPA TMDLs

FDEP Targets Met:

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

Starting in December 2007, public and private participants in the Tampa Bay Nitrogen Management Consortium (NMC) proactively committed to develop an equitable process to allocate nitrogen loads among all sources discharging to the bay in order to support continued attainment of bay management targets (Table 1 & Fig. 5), FDEP's 2002 Reasonable Assurance determination and chlorophyll-a targets (matrix to the left), and the EPA's 1998 total maximum daily load (TMDL) limits. The Consortium includes representatives of every major government in the Tampa Bay watershed, as well as key industries such as utilities, fertilizer manufacturers, commercial agriculture and regulatory agencies.

In Sept. 2009, the Consortium participants finalized and approved their technical process, and proposed TN allocations to 189 point and nonpoint sources within the Tampa Bay watershed. The proposed nitrogen load limits developed from the NMC agreement have been endorsed by more than 40 area government and private industry representatives and defines how much nitrogen can enter Tampa Bay through stormwater, air pollution, treated wastewater, and industrial discharges through 2012. The limits will maintain nitrogen loadings to the bay at existing levels—and consequently require any future additional nitrogen inputs to be offset through added pollution controls. For example, communities that hold permits to discharge more treated wastewater than they currently are must “hold the line” on existing discharge levels – unless they can prove they have lowered nitrogen pollution elsewhere in their communities. Participating private sector partners must meet the same restrictions.

In December 2009, FDEP provided its concurrence with the technical basis and allocations developed by the Consortium. This accomplishment has been recognized by local media (Tampa Tribune editorial Sept. 24, 2009) and regulators:

“Tampa Bay’s cooperative and proactive approach to watershed management continues to serve as a successful model for communities throughout our region and nation” — Jim Giattina, Director of the Water Protection Division for the U.S. Environmental Protection Agency’s Region 4 office in Atlanta.

2009 Chl-a Monthly Variation Compared to 1974-2008

Based upon the yellow cautionary management response for some of the bay segments in 2009, chlorophyll-a concentrations were evaluated within the bay (Fig. 3) and monthly during 2009 (Fig. 4) to discern where and when target exceedences occurred, respectively. Observed 2009 monthly averages were generally within the range of historic levels except during the summer months in 2009 (Fig. 4, circled in yellow).

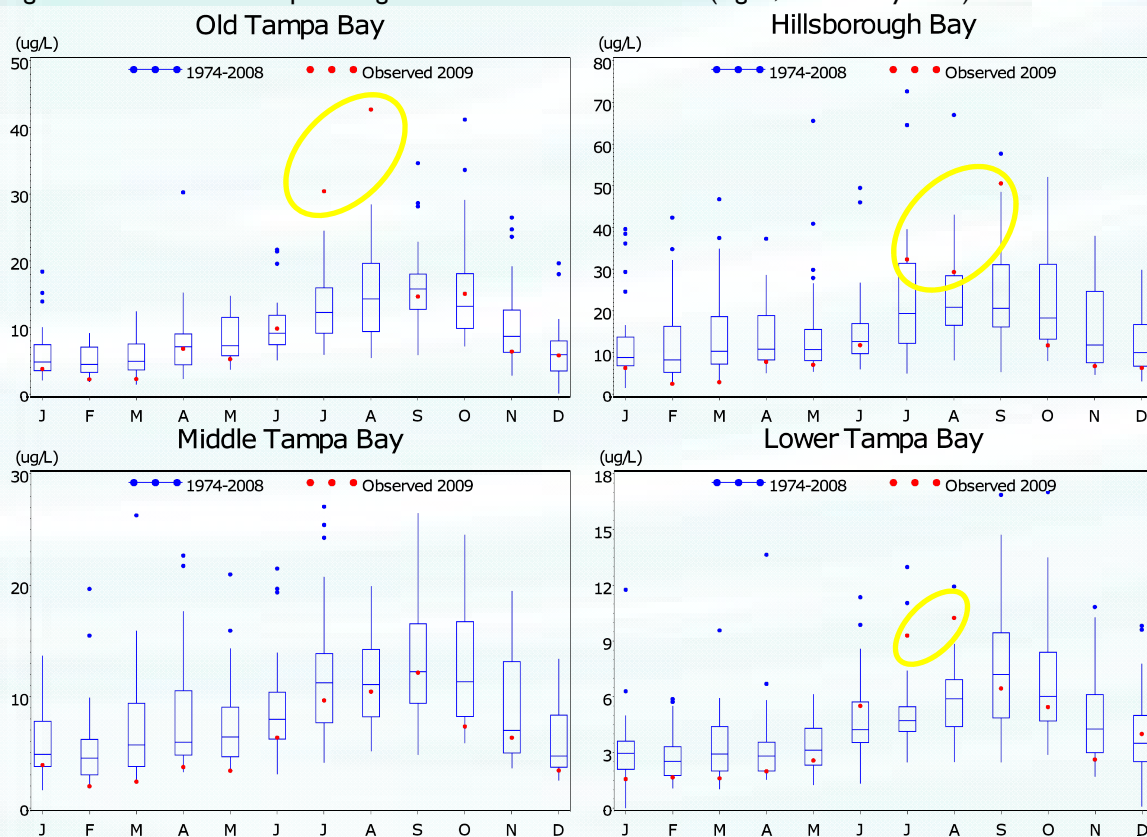


Figure 4: 2009 monthly chlorophyll-a bay segment averages (red dots) compared to monthly distributions from 1974-2008 (blue box plots). Boxes encompass the 25th and 75th percentiles, while whiskers bound the interquartile range. Blue dots represent outliers.

Figure 5: Historic seagrass acreage estimates for Tampa Bay from 1950-2008 (Source: SWFWMD).

