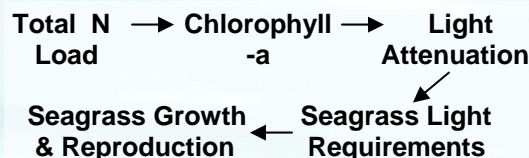


# 2008 Tampa Bay Water Quality Assessment

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 (measured as secchi depth 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.

## 2008 Decision Matrix Results

A decline in water quality was observed in 2008 for Old Tampa Bay (OTB) and Lower Tampa Bay (LTB). Small magnitude exceedences of the chlorophyll-a threshold in OTB (Fig. 2) and of light penetration in LTB were observed. Site-specific exceedences of the TBEP bay segment chlorophyll-a targets were most prevalent in OTB compared to the other bay segments (Fig. 3). A persistent algae bloom occurred during the summer months of 2008 in this bay segment, and observed summer monthly chlorophyll-a averages far exceeded normal historic levels (Fig. 4, page 2). The observed light penetration exceedence in LTB is still being investigated.

**Table 1.** Observed water quality indicators & management outcomes for 2008. \*Small magnitude exceedence.

Bay Segment	Chlorophyll-a (ug/L)		Effective Light Penetration (m <sup>1</sup> )		Management Response
	2008	Target	2008	Target	
OTB	9.27*	8.5	0.69	0.83	Yellow
HB	11.58	13.2	1.13	1.58	Green
MTB	5.75	7.4	0.68	0.83	Green
LTB	2.85	4.6	0.66*	0.63	Yellow



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:

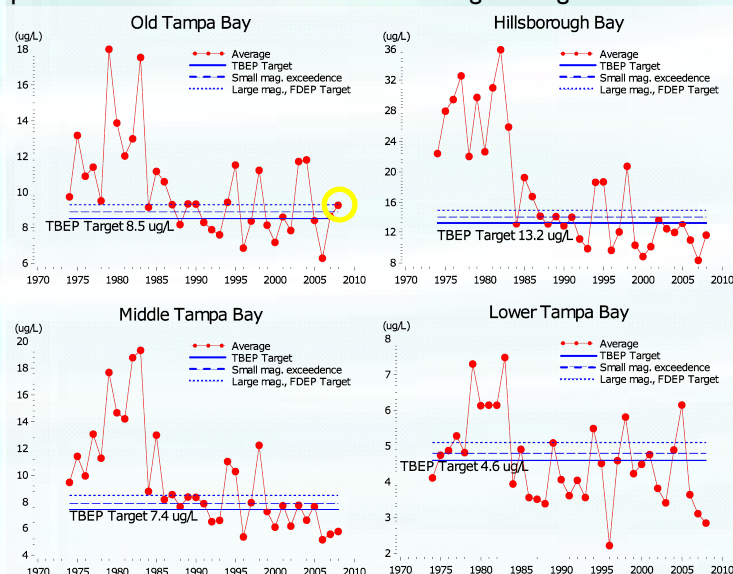
Year	Old TB	Hills. Bay	Middle TB	Lower TB
1975	Red	Red	Red	Green
1976	Red	Red	Red	Yellow
1977	Red	Red	Red	Red
1978	Red	Red	Red	Yellow
1979	Red	Red	Red	Red
1980	Red	Red	Red	Red
1981	Red	Red	Red	Red
1982	Red	Red	Red	Red
1983	Red	Yellow	Red	Red
1984	Red	Green	Red	Yellow
1985	Red	Red	Red	Yellow
1986	Red	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



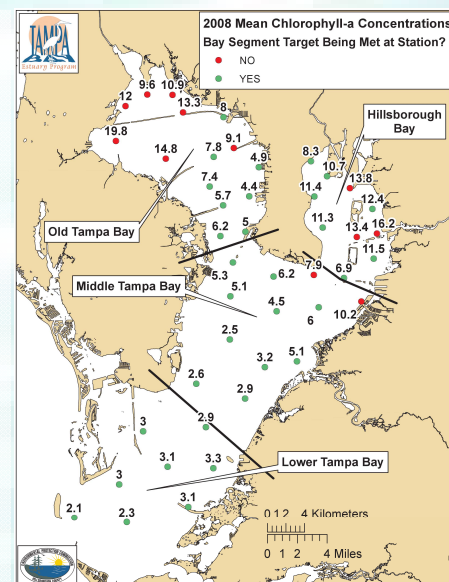
Continuing water quality monitoring support provided by the EPCHC.

Consulting support provided by Janicki Environmental, Inc.

Janicki Environmental, Inc.



**Figure 2:** Historic chlorophyll-a annual averages for the four bay segments. Old Tampa Bay's 2008 small magnitude exceedence value is 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)

## 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	Yes	No	No	Yes
1988	Yes	Yes	Yes	Yes
1989	Yes	No	Yes	Yes
1990	Yes	No	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	Yes	No	Yes	Yes
2004	Yes	No	Yes	Yes
2005	Yes	Yes	Yes	No
2006	Yes	Yes	Yes	Yes
2007	Yes	Yes	Yes	Yes
2008	Yes	Yes	Yes	Yes

## FDEP Reasonable Assurance for Tampa Bay

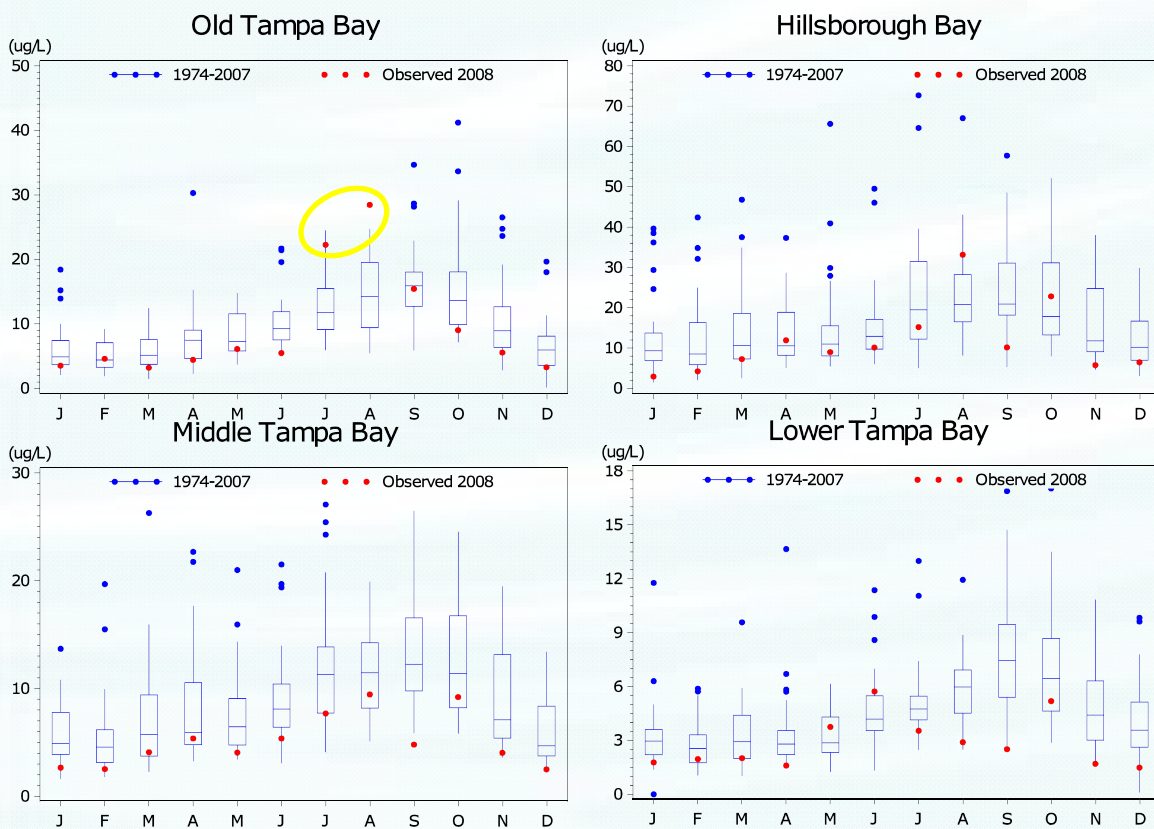
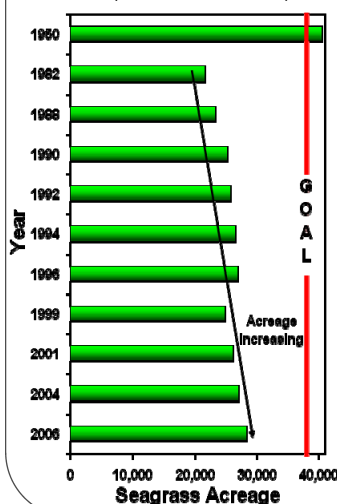
In November 2002, the Florida Department of Environmental Protection (FDEP) concluded that the Tampa Bay Estuary Program's (TBEP) nitrogen management strategy provided "Reasonable Assurance" (RA) that the state water quality criteria for nutrients would be met. The U.S. Environmental Protection Agency (EPA) in the meantime continues to recognize a 1998 action by FDEP that proposed a total maximum load of nitrogen that could be discharged to the bay annually and still meet state water quality criteria. Both FDEP's reasonable assurance determination and the total maximum nitrogen loading recognized by EPA are based on statistical modeling and data analyses conducted by the TBEP and its partners. Efforts are continuing through 2009 to meet both regulatory goals established by FDEP and EPA based upon FDEP acceptance of the TBEP's RA update submitted in January 2008.

The recovery of the Tampa Bay ecosystem after decades of decline is unique among urban estuaries worldwide. The rebound in water quality and ecological health of the bay has been maintained despite continuing population growth during the recovery period. FDEP, EPA, the NMC and other partners in the TBEP want to continue the success of the collaborative nitrogen management strategy spearheaded by the TBEP and the Consortium. To achieve this, FDEP used the TBEP-defined "large magnitude difference thresholds" rather than the chlorophyll-a management targets listed on page 1, as indicators of impairment for future assessments of the Tampa Bay segments. These are: Old Tampa Bay, 9.3 ug/L; Hillsborough Bay, 15.0 ug/L; Middle Tampa Bay, 8.5 ug/L; and Lower Tampa Bay, 5.1 ug/L. As noted in the figure to the left, all bay segments in Tampa Bay have met the regulatory goals established by FDEP annually since 2006. These annual water quality assessments in concert with tracking increases in seagrass acreage in the bay (Fig. 5) have served to maintain FDEP "Reasonable Assurance" that water quality criteria are being met for Tampa Bay.

## 2008 Chl-a Monthly Variation Compared to 1974-2007

Based upon the yellow cautionary management response for some of the bay segments in 2008, chlorophyll-a concentrations were evaluated within the bay (Fig. 3) and monthly during 2008 (Fig. 4) to discern where and when target exceedences occurred, respectively. Observed 2008 monthly averages were generally within the range of historic levels except for in OTB during July and August 2008 (Fig. 4, circled in yellow).

**Figure 5:** Historic seagrass acreage estimates for Tampa Bay from 1950-2006 (Source: SWFWMD).



**Figure 4:** 2008 monthly chlorophyll-a bay segment averages (red dots) compared to monthly distributions for 1974-2007 (blue box plots). Boxes encompass the 25th and 75th percentiles, while whiskers bound the interquartile range. Blue dots represent outliers.