2021 Tampa Bay Water Quality Assessments

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

Historic results:

	OTB	HB	MTB	LTB
1975	R	R	R	G
1976	R	R	R	Y
1977	R	R	R	R
1978	R	R	R	Y
1979	R	R	R	R
1980	R	R	R	R
1981	R	R	R	R
1982	R	R	R	R
1983	R	Y	R	R
1984	R	G	R	Y
1985	R	R	R	Y
1986	R	Y	R	G
1987	R	Y	R	G
1988	Y	G	Y	G
1989	R	Y	R	Y
1990	R	G	R	Y
1991	G	Y	Y	Y
1992	Y	G	Y	Y
1993	Y	G	Y	Y
1994	Y	Y	R	R
1995	R	Y	R	Y
1996	Y	G	Y	G
1997	Y	G	R	Y
1998	R	R	R	R
1999	Y	G	Y	Y
2000	G	G	Y	Y
2001	Y	G	Y	Y
2002	Y	G	G	G
2003	R	Y	G	Y
2004	R	G	G	Y
2005	G	G	Y	Y
2006	G	G	G	G
2007	G	G	G	G
2008	Y	G	G	Y
2009	Y	Y	G	G
2010	G	G	G	G
2011	R	G	Y	G
2012	G	G	G	G
2013	G	G	G	G
2014	G	G	G	G
2015	Y	G	Y	G
2016	Y	G	G	G
2017	Y	G	G	G
2018	Y	G	G	G
2019	Y	G	G	G
2020	Y	G	G	G
2021	Y	G	G	G

Figure 1: Decision matrix results for 1975 to 2021 (April, May data missing for 2020).

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 2) and reduced 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).

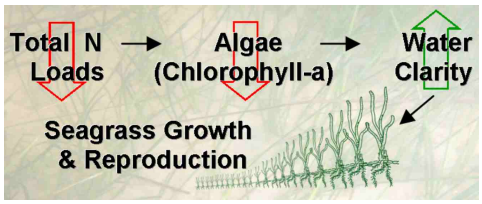

Figure 2: Seagrass restoration with N management.

Decision Support Approach

Year to year algae abundance (measured as chlorophyll-a concentrations) and visible light penetration through the water column (secchi disk 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 for developing and initiating bay management actions. TBEP management actions adopted in response to the annually-assessed decision support results are shown to the right.

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

2021 Decision Matrix Results

Water quality remained supportive of seagrass in Hillsborough Bay (HB), Middle Tampa Bay (MTB), and Lower Tampa Bay (LTB)(Table 1, Figure 3). The nuisance alga, *Pyrodinium bahamense*, was again reported in Old Tampa Bay (OTB) during June - Sept 2021, contributing to a large magnitude chlorophyll-a exceedance that has persisted for a long duration (7 yrs). Light penetration was still supportive of seagrass in all bay segments using existing targets (Table 1). However, given recent losses, light attenuation requirements for OTB seagrasses are under investigation.

Table 1: Water quality outcomes for 2021.

Segment	Chl-a (ug/L)		Light Penetration (m^{-1})	
	2021	target	2021	target
OTB	9.4	8.5	0.78	0.83
HB	9.9	13.2	1.03	1.58
MTB	5.0	7.4	0.58	0.83
LTB	3.2	4.6	0.63	0.63

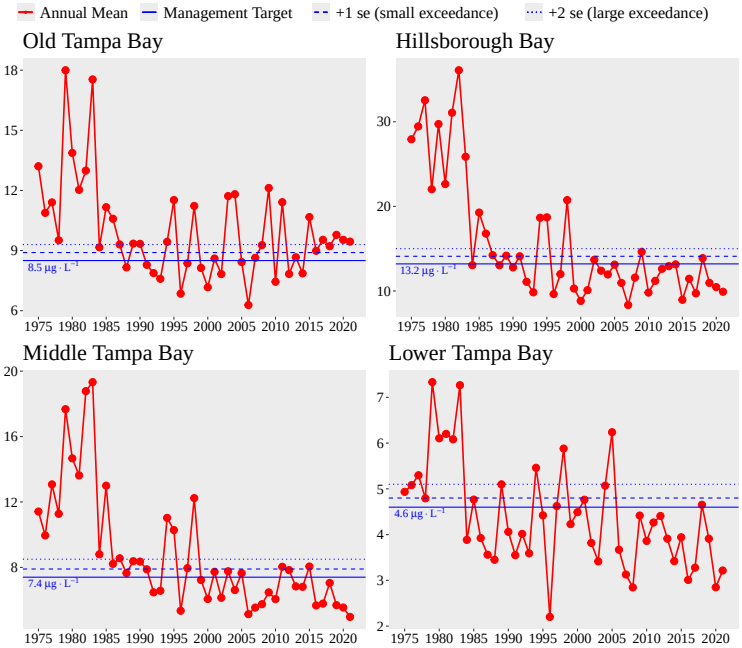

Figure 3: Historic chlorophyll-a annual averages for the four bay segments.

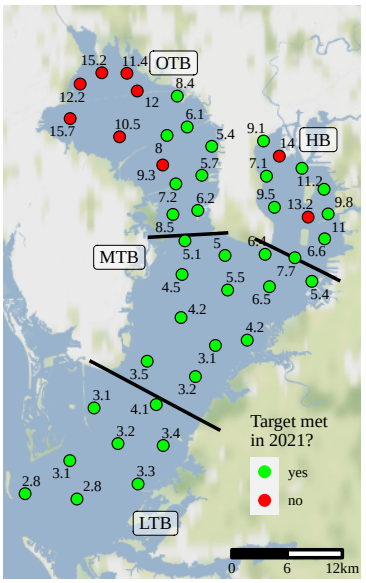

Figure 4: Chlorophyll attainment outcomes by site for 2021.

***Note**: Continuing water quality monitoring support provided by the Environmental Protection Commission of Hillsborough County. Consulting support provided by Janicki Environmental, Inc. Full methods in Janicki et al. 2000. TBEP Technical Report #04-00. Points in map above show site-specific attainment of a bay segment target and are for reference only.*

Progress Towards Meeting Regulatory Goals

An Initiative of the Tampa Bay Nitrogen Management Consortium to Maintain and Restore the Bay's Resources

FDEP Criteria:

	OTB	HB	MTB	LTB
1975	R	R	R	G
1976	R	R	R	G
1977	R	R	R	R
1978	R	R	R	G
1979	R	R	R	R
1980	R	R	R	R
1981	R	R	R	R
1982	R	R	R	R
1983	R	R	R	R
1984	G	G	R	G
1985	R	R	R	G
1986	R	R	G	G
1987	R	G	R	G
1988	G	G	G	G
1989	R	G	G	G
1990	R	G	G	G
1991	G	G	G	G
1992	G	G	G	G
1993	G	G	G	G
1994	R	R	R	R
1995	R	R	R	G
1996	G	G	G	G
1997	G	G	G	G
1998	R	R	R	R
1999	G	G	G	G
2000	G	G	G	G
2001	G	G	G	G
2002	G	G	G	G
2003	R	G	G	G
2004	R	G	G	G
2005	G	G	G	R
2006	G	G	G	G
2007	G	G	G	G
2008	G	G	G	G
2009	R	G	G	G
2010	G	G	G	G
2011	R	G	G	G
2012	G	G	G	G
2013	G	G	G	G
2014	G	G	G	G
2015	R	G	G	G
2016	G	G	G	G
2017	R	G	G	G
2018	G	G	G	G
2019	R	G	G	G
2020	R	G	G	G
2021	R	G	G	G

Figure 5: Bay segment attainment of chlorophyll criteria from 1975 to 2021 (April, May data missing for 2020).

Maintaining Reasonable Assurance & TMDL Compliance

In 2021, all bay segments met FDEP criteria for chlorophyll, except Old Tampa Bay. The criteria was exceeded for the third year in a row, requiring additional actions by the Tampa Bay Nitrogen Management Consortium to ensure water quality criteria are met under the 2017 Reasonable Assurance Update (RA Update). The fifth RA annual assessment report for the 2017-2021 period will be submitted in April 2022.

2021 Chl-a Monthly Variation Compared to 1974-2020

Chlorophyll-a concentrations were evaluated within the bay on a monthly basis during 2021 and compared to prior years' levels (Figure 6). Elevated concentrations in Old Tampa Bay were primarily due to *Pyrodinium bahamense* during the late summer months. Additionally, unanticipated release of legacy fertilizer process water and mixed seawater from the Piney Point facility in the spring introduced an estimated 205 tons of nitrogen to Lower Tampa Bay. A subsequent red tide event occurred in Middle and Lower Tampa Bay later in the summer.

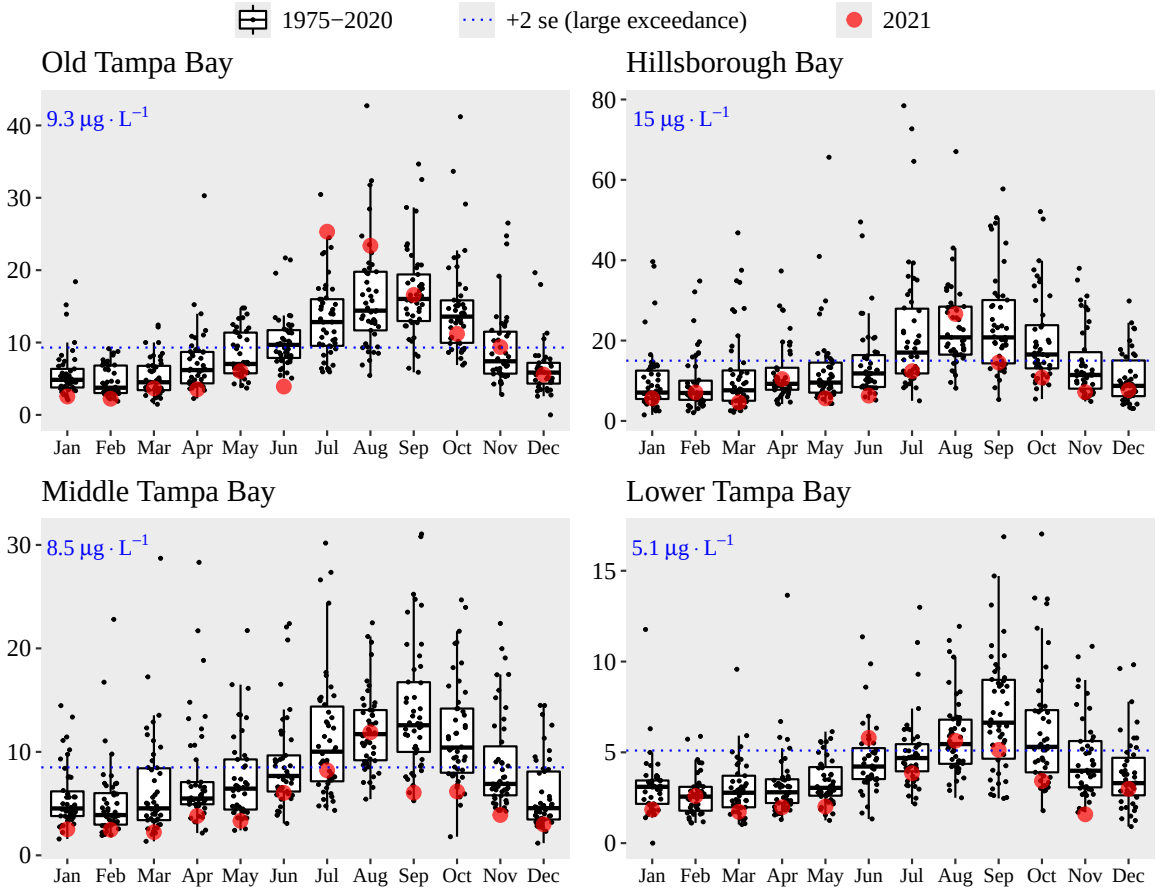

Figure 6: Chlorophyll-a monthly averages from 1975-2020 for the four bay segments. The monthly averages for 2021 are shown in red.

Tampa Bay Seagrass Recovery

2020 results showed that Tampa Bay's seagrass coverage fell below the 40,000 acre recovery goal defined in the Habitat Master Plan Update. The 2020 baywide estimate was 34,298 acres, representing a decrease of 6,354 acres from 2018 (Figure 7). Large decreases were observed in Old Tampa Bay, especially in the Feather Sound area. Increases in the attached algae *Caulerpa prolifera* have also been noted in this region and elsewhere. Research and management plans are currently being developed to address these losses. More information on the bay's seagrass trends using transect monitoring data can be found at https://shiny.tbep.org/seagrasstransect-dash/ and using the coverage estimates from SWFWMD can be found at https://shiny.tbep.org/seagrass-analysis/.

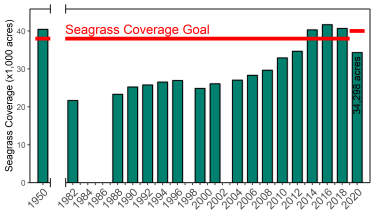

Figure 7: Seagrass estimates from 1950-2020 (Source: TBEP & SWFWMD)

***Note**: 2021 nutrient management compliance assessment available from Sherwood, E., Burke, M., Beck, M.W. 2022. TBEP Technical Report #xx-22. Please cite this document as Beck, M.W., Burke, M., Raulerson, G. 2022. 2021 Tampa Bay Water Quality Assessment. TBEP Technical Report #01-22, St. Petersburg, FL.*