2020 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

Figure 1: Decision matrix results for 1975 to 2020 (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 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).

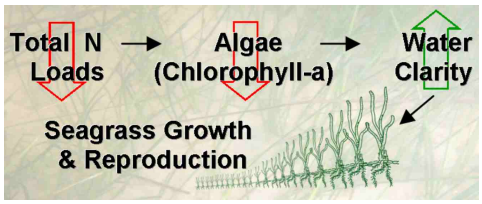

Figure 2: Seagrass restoration with N management.

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.

2020 Decision Matrix Results

Water quality (chlorophyll-a and light penetration) 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 2020, contributing to a large magnitude chlorophyll-a exceedance that has persisted for a long duration (6 yrs). However, it should be noted that effective light penetration was still observed to be supportive of seagrass in all bay segments, including OTB (Table 1).

Table 1: Water quality outcomes for 2020.

Segment	Chl-a (ug/L)		Light Penetration (m^{-1})	
	2020	target	2020	target
OTB	9.5	8.5	0.77	0.83
HB	10.5	13.2	1.03	1.58
MTB	5.5	7.4	0.55	0.83
LTB	2.8	4.6	0.54	0.63

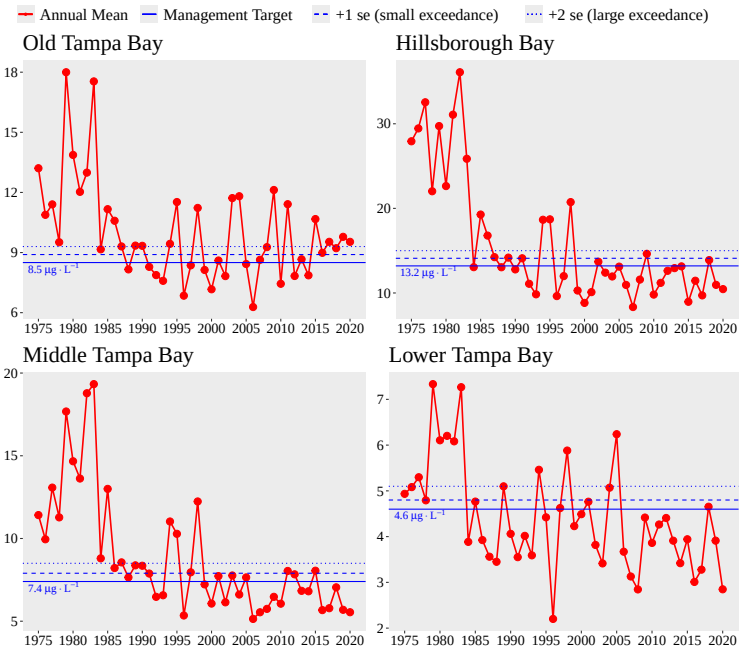

Figure 3: Historic chlorophyll-a annual averages for the four bay segments.

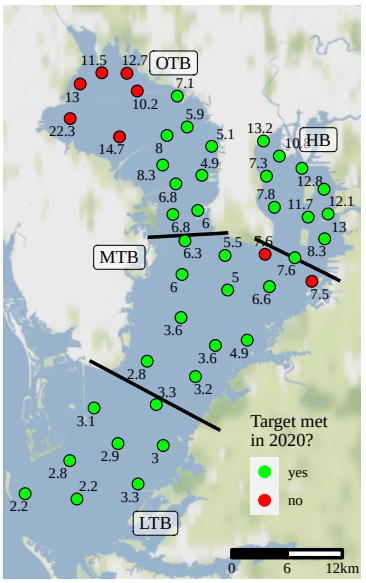

Figure 4: Chlorophyll attainment outcomes by site for 2020.

***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

Figure 5: Attainment of bay segments for chlorophyll criteria from 1975 to 2020 (April, May data missing for 2020).

Maintaining Reasonable Assurance & TMDL Compliance

During 2020, the COVID-19 pandemic precluded water quality data collection in April and May. As a result, compliance determinations have not been made for any bay segments. Results shown in Figure 5 depict chlorophyll-a concentrations in relation to regulatory criteria, as calculated without observations from the months noted above. The fourth RA annual assessment report for the 2017-2021 period will be submitted in April 2021.

2020 Chl-a Monthly Variation Compared to 1974-2019

Chlorophyll-a concentrations were evaluated within the bay on a monthly basis during 2020 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.

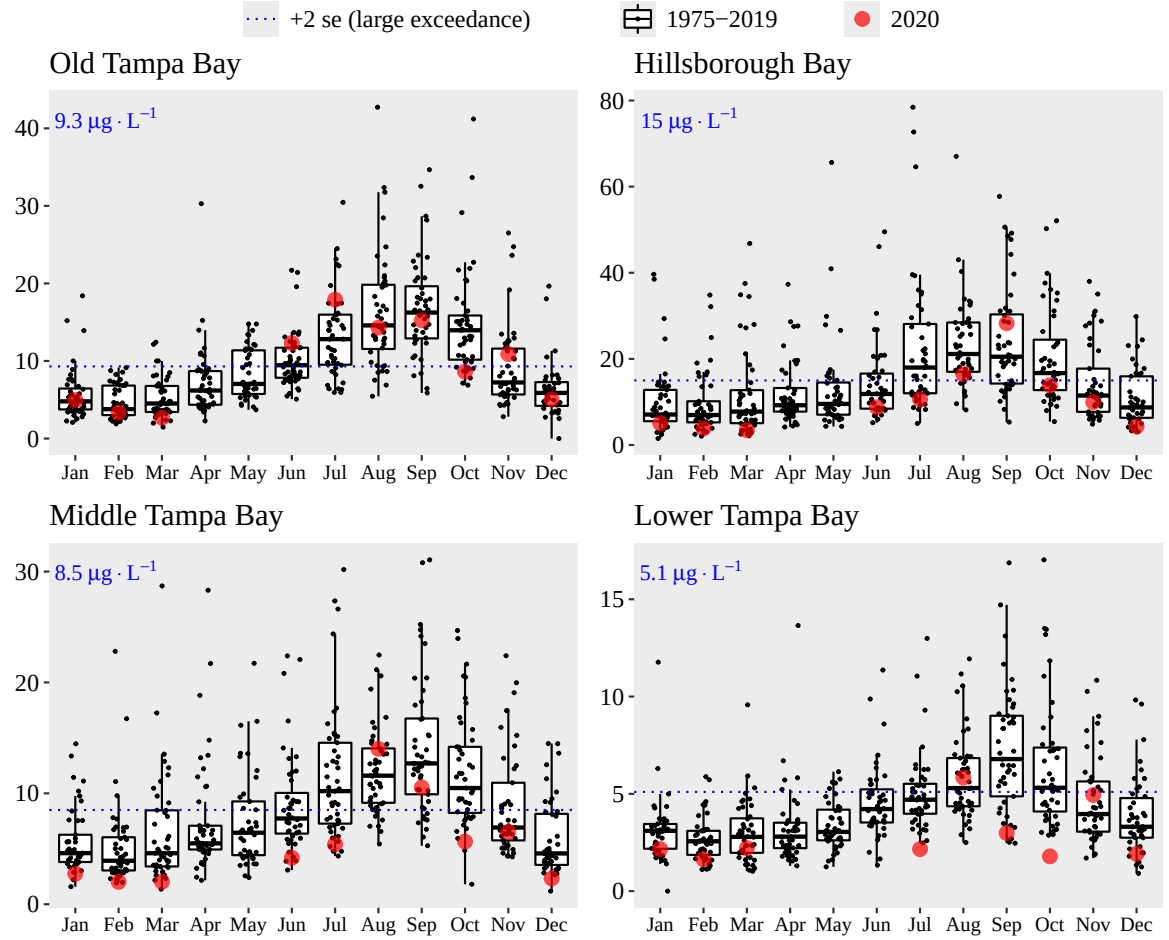

Figure 6: Chlorophyll-a monthly averages from 1975-2019 for the four bay segments. The monthly averages for 2020 are shown in red.

Tampa Bay Seagrass Recovery

Tampa Bay's total seagrass coverage remains above the recovery goal, though a slight decrease was observed from 2016 to 2018. The 2018 baywide coverage was estimated at 40,652 acres (Figure 7). As in 2016, coverage remains above the target (40,000 acres) and the estimated historic coverage of the 1950s (40,420 acres). SWFWMD coverage estimates from the winter 2019-20 period will be available in spring 2021. More information on assessments of the bay's seagrass recovery 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/seagrasscoverage-dash/.

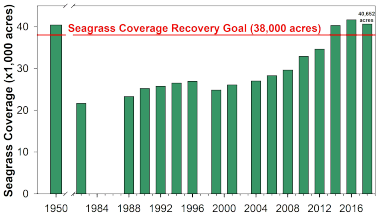

Figure 7: Seagrass estimates from 1950-2018 (Source: TBEP & SWFWMD)

***Note**: 2020 nutrient management compliance assessment available from Sherwood, E., Burke, M., Beck, M.W. 2021. TBEP Technical Report #06-21. Please cite this document as Beck, M.W., Burke, M., Raulerson, G. 2021. 2020 Tampa Bay Water Quality Assessment. TBEP Technical Report #05-21, St. Petersburg, FL.*