

2019 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 |

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. |

2019 Decision Matrix Results

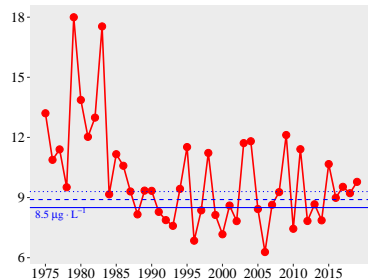
Water quality (chlorophyll-a and light penetration) remained supportive of seagrass in Hillsborough Bay (HB), Middle Tampa Bay (MTB), and Lower Tampa Bay (LTB)(Table 1, Figure 3). The nuisance algae, *Pyrodinium bahamense*, was again reported in Old Tampa Bay (OTB) during May - September 2019, contributing to a large magnitude chlorophyll-a exceedance that has persisted for a long duration (5yrs). 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 2019.

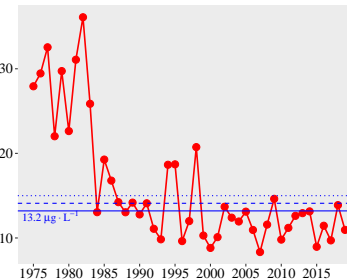
| Segment | Chl-a (ug/L) | | Light Penetration (m^{-1}) | |
|---------|--------------|--------|--------------------------------|--------|
| | 2019 | target | 2019 | target |
| OTB | 9.8 | 8.5 | 0.74 | 0.83 |
| HB | 11.0 | 13.2 | 0.95 | 1.58 |
| MTB | 5.7 | 7.4 | 0.56 | 0.83 |
| LTB | 3.9 | 4.6 | 0.62 | 0.63 |

— Annual Mean — Management Target — +1 se (small exceedance) — +2 se (large exceedance)

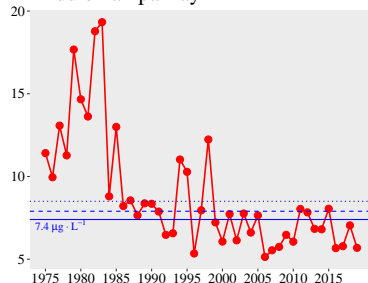
Old Tampa Bay



Hillsborough Bay



Middle Tampa Bay



Lower Tampa Bay

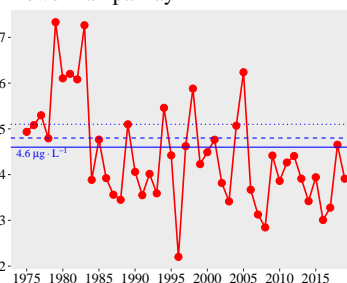


Figure 3: Historic chlorophyll-a annual averages for the four bay segments.

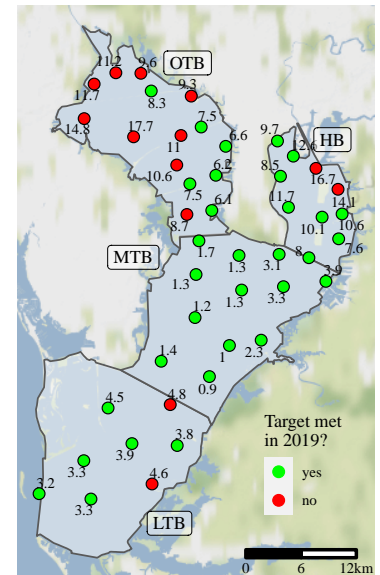


Figure 4: Chlorophyll attainment outcomes by site for 2019.

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 #0400. Points in map above show site-specific attainment of a bay segment target and are for reference only.

Figure 1: Decision matrix results for 1975 to 2019.

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 |

Figure 5: Attainment of bay segments for chlorophyll criteria from 1975 to 2019.

Maintaining Reasonable Assurance & TMDL Compliance

In November 2017, the Florida Department of Environmental Protection (FDEP) accepted the 2017 Reasonable Assurance Update (2017 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 nutrient criteria for 2012-2016. During 2019, all bay segments, excluding Old Tampa Bay, were in compliance with the FDEP regulatory criteria for chlorophyll-a concentrations (Figure 5). The third RA compliance assessment report for the 2017-2021 period was submitted March 2020.

2019 Chl-a Monthly Variation Compared to 1974-2018

Chlorophyll-a concentrations were evaluated within the bay on a monthly basis during 2019 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. Lower Tampa Bay also showed elevated concentrations in August 2019, potentially due to non-harmful algae blooms.

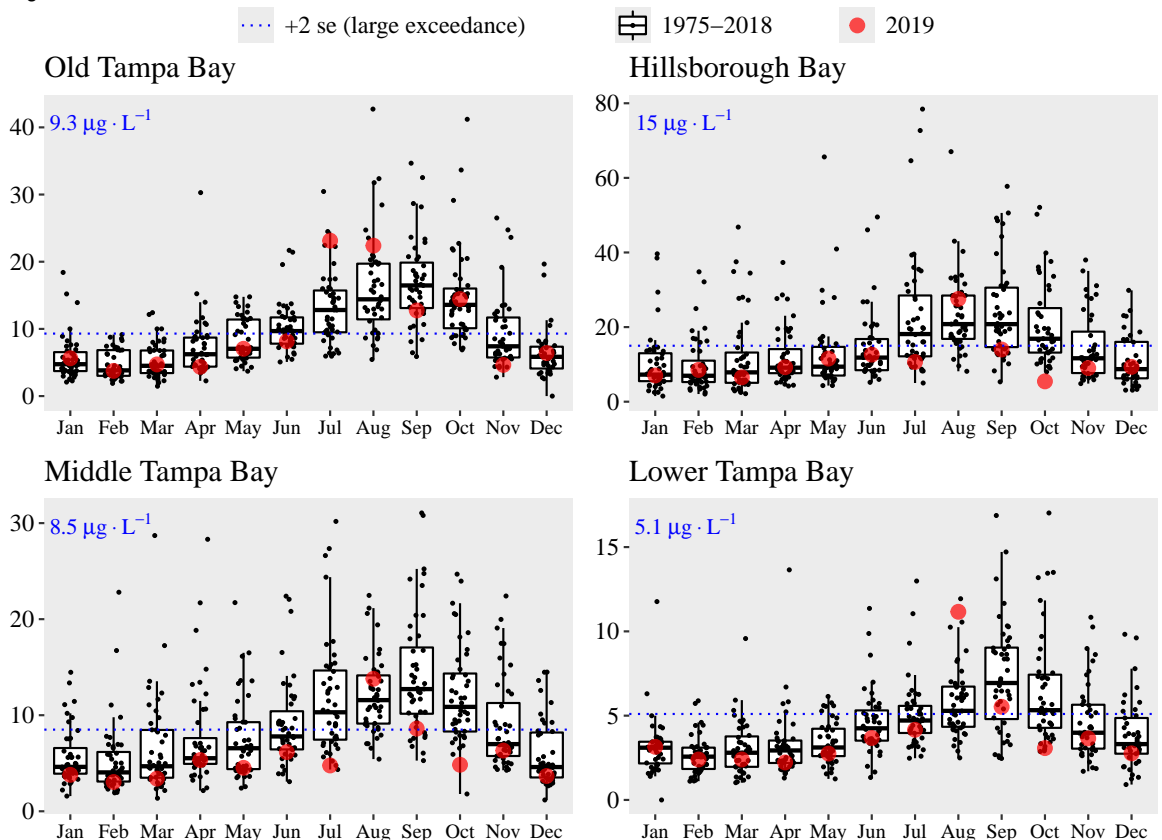


Figure 6: Chlorophyll-a monthly averages from 1975-2018 for the four bay segments. The monthly averages for 2019 are shown in red. Historic chlorophyll-a annual averages for the four bay segments.

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 (38,000 acres) and the estimated historic coverage of the 1950s (40,420 acres). The next SWFWMD coverage estimates will be developed from aerial photographs acquired over the winter 2019-20 period, following the extensive red tide event observed throughout 2018 (note: the 2018 coverage estimate was developed prior this event). More information on assessments of the Bay's seagrass recovery using transect monitoring data can be found in TBEP technical publication #08-16 and #09-17.



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

Note: 2019 nutrient management compliance assessment available from Sherwood, E., Burke, M. 2019. TBEP Technical Report #11-19. Please cite this document as Beck, M.W., Burke, M., Raulerson, G. 2020. 2019 Tampa Bay Water Quality Assessment. Tampa Bay Estuary Program Technical Report #01-20, St. Petersburg, FL.