# 2024 TAMPA BAY REASONABLE ASSURANCE COMPLIANCE ASSESSMENT REPORT

# Table of contents

# 1 The Tampa Bay Nitrogen Management Consortium Partnership for Progress


| | |
|---|---|
| TO: | Adam Blalock, FDEP |
| | Kevin J. McOmber, US EPA Region 4 |
| FROM: | Ed Sherwood, TBEP Executive Director (NMC Facilitator) |
| DATE: | Jan. 19, 2025 |
| SUBJECT: | 2024 Tampa Bay Nutrient Management Compliance Assessment Results |
| cc | Ken Weaver, Jessica Mostyn, Ben Ralys, Kevin O'Donnell, Kimberly Shugar (FDEP Tallahssee) |
| | Ramandeep Kaur, Jorge Perez, Lance Kautz, Jessica Pein, Erica Peck (FDEP Tampa) |
| | Jeaneanne M. Gettle, Wade Lehmann, Cindy Barger, Nancy Laurson, Felicia Burks, Tom McGill (EPA Region 4/HQ) |
| | Michele Duggan, Santino Provenzano (TBNMC) |
| | Ed Sherwood, Maya Burke, Marcus Beck (TBEP) |

Source content: here

On behalf of the Tampa Bay Nitrogen Management Consortium, please find attached the 2024 update on water quality and seagrass resources in the Tampa Bay estuary. This update has been developed in accordance with the compliance assessment adopted through FDEP's

Tampa Bay Reasonable Assurance determination on December 22, 2010, FDEP's subsequent approval of the 2022 RA Update, and the federally-recognized TMDL for Tampa Bay. The formal annual compliance assessment utilized by the Consortium is detailed in Section VIII.B of the Final 2009 Reasonable Assurance Addendum: Allocation and Assessment Report.

Chlorophyll-a concentrations for all four major bay segments were below FDEP-approved numeric nutrient criteria thresholds in 2024. Additionally, concentrations for the Remainder Lower Tampa Bay segment that includes Boca Ciega Bay South, Terra Ceia Bay, and Manatee River were also below the criteria. The approved chlorophyll-a thresholds were adopted as part of FDEP's 2002 Reasonable Assurance determination for Tampa Bay, and, at that time, it was determined that Tampa Bay's seagrass restoration goals could be achieved if annual, uncorrected chlorophyll-a concentrations remained below these thresholds. If a bay segment's chlorophyll-a concentration remains above thresholds for 2 concurrent years, additional compliance assessment steps are required by the Consortium. This nutrient management strategy has been consistently used by the TBEP and Consortium in their Annual Decision Matrix and Assessment reports (Beck, Burke, and Sherwood 2025).

Seagrass coverage in Tampa Bay increased by 1,409 acres between 2022 and 2024. The Southwest Florida Water Management District's (SWFWMD) 2024 baywide seagrass coverage estimate is 31,546 acres, below the baywide target of 40,000 acres (Figure 3.4). Gains were observed in all bay segments, except Old Tampa Bay where a loss was observed. Additional research, assimilative capacity assessments, and restoration initiatives are being conducted in response to this localized trend. The Consortium's approved nutrient management strategy remains a necessary tool to adaptively manage and address nutrient loading to the Tampa Bay estuary. For all Tampa Bay segments, water quality remained supportive of seagrass resources in 2024, though continued seagrass losses in the Old Tampa Bay segment continue to be examined. Annual seagrass transect surveys for Old Tampa Bay show a shift from rooted macroalgae (*Caulerpa prolifera*) to cyanobacteria and green drift algae, suggesting that nutrient loading continues to be a problem for this bay segment.

Thank you again for your continued participation in the Consortium's process. Please contact Ed Sherwood (esherwood@tbep.org) with any questions about the Consortium's Annual Compliance Assessment.

# 2 2024 Tampa Bay Estuary Nutrient Management Compliance Assessment

On December 22, 2010, then FDEP Secretary Drew signed a Final Order accepting and approving the 2009 Reasonable Assurance Addendum for the Tampa Bay estuary. The final order found that the Nitrogen Management Consortium (NMC) provided FDEP reasonable assurance that: 1) completed and proposed management actions in the 2009 RA Addendum will result in the continued attainment of the estuarine nutrient criteria within Tampa Bay, and 2) compliance with the allocations in the 2009 RA Addendum ensures reasonable progress towards continued attainment of the estuarine nutrient criteria and associated Class III designated uses. Furthermore, the FDEP finalized a WQBEL for the Tampa Bay estuary in accordance with the allocations developed under the 2009 RA Addendum in November 2010. The Consortium completed subsequent RA Updates in 2012, 2017, and 2022 maintaining allocations and expanding upon projects originally defined in the 2002 RA Submittal, 2007 RA Update, 2009 RA Addendum, 2012 RA Update, 2017 RA Update and 2022 RA Update.

As part of the compliance assessment stipulated under the 2009 RA Addendum, the NMC committed to annually assess the water quality and seagrass conditions within Tampa Bay and annually report these to FDEP and EPA. The Consortium's assessment responsibilities are shown in green in Figure 2.1. It should be noted that the Consortium's reasonable assurance assessment strategy begins with the observation of water quality conditions in the bay for a particular year. As is recommended in numerous EPA guidance documents for the development of numeric nutrient criteria, the Consortium's assessment strategy attempts to apply a stressor-response rationale for the determination of nitrogen load allocation reasonable assurance in the estuary.

The framework is applied on a bay-segment basis, and is predicated on assessing annual attainment of the bay segment chlorophyll-a concentration threshold as the initial step. If the bay segment-specific chlorophyll-a threshold is met, the Consortium annually reports the results to FDEP and EPA and additional assessment steps are not required by the Consortium (by June of the following year). If annual average chlorophyll-a thresholds are not met in one or more bay segments, additional assessment steps are required by the Consortium as noted in the framework and assessment process (Figure 2.1, Table 2.1).

Regardless of the assessment results, the Consortium will annually report (by June of the following year) whether the bay segment specific chlorophyll-a thresholds are met using the

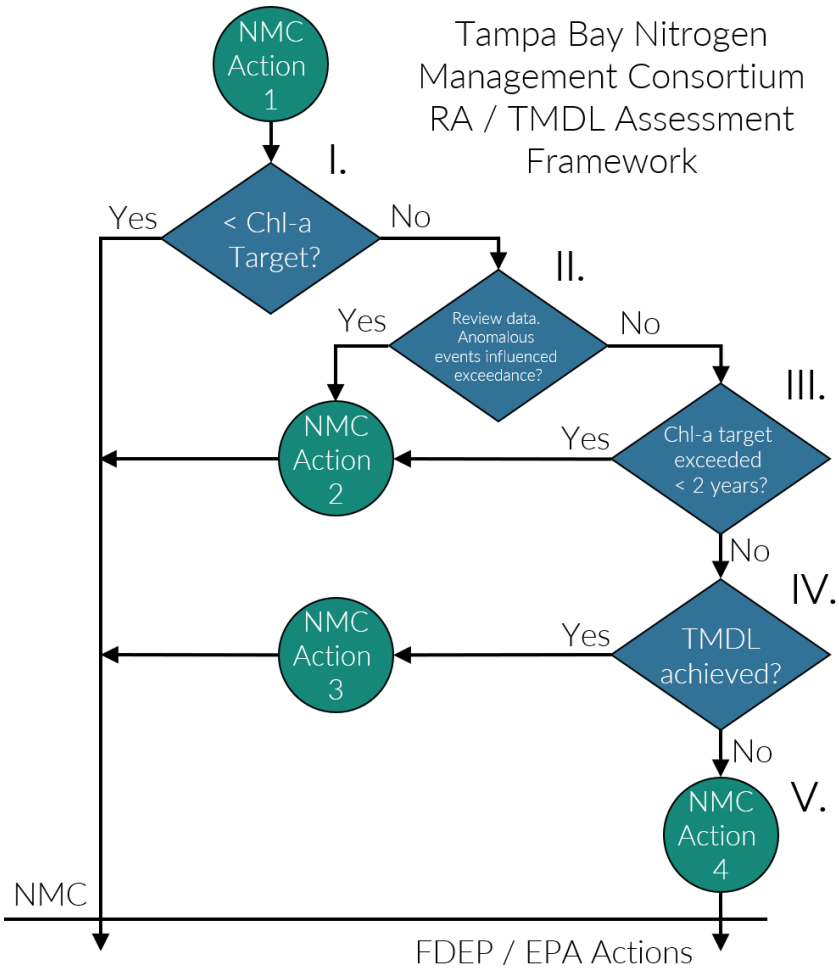


Figure 2.1: Nitrogen Management Consortium decision framework to assess future reasonable assurance of adopted allocations. Actions and steps to be conducted by the NMC are shown in the circles and diamonds. Steps, decision points, and actions are outlined in Table 2.1 (below) according to the Roman numerals listed in the figure.

Environmental Protection Commission of Hillsborough County (EPCHC) dataset, as traditionally assessed using the "Decision Matrix" management strategy developed by the TBEP (Janicki, Wade, and Pribble 2000) and will deliver this to FDEP and EPA (Figure 2.1; NMC Action 1 in the Framework). Additional data from Pinellas and Manatee County are used to determine if chlorophyll thresholds in the Remainder Lower Tampa Bay segment (Boca Ciega Bay South, Terra Ceia Bay, and Manatee River) are met in these areas. If an annual, individual exceedence of a bay segment chlorophyll-a threshold is observed, an addendum report outlining the anomalous event(s) or data which influenced the bay segment chlorophyll-a exceedence will be delivered to FDEP and EPA upon review by NMC participants by September of the following year (Figure 2.1; NMC Action 2 in the Framework). An evaluation of the bay segment assimilative capacity (i.e. revision to the federally-recognized TMDL) is formally considered (if not already considered by the NMC) when bay segment chlorophyll-a thresholds are not met in 2 concurrent years, and hydrologically normalized loads for those years meet the federally-recognized TMDL (Figure 2.1; NMC Action 3 in the Framework). This was the case for the Old Tampa Bay segment during the 2019-2021 period and an assimilative capacity assessment is being conducted in 2024. Alternatively, when bay segment chlorophyll-a thresholds are not met in 2 concurrent years and hydrologically normalized loads for those years also do not meet the federally-recognized TMDL, the Consortium will deliver a full loading report to FDEP and EPA comparing the observed, combined entity/source annual or multiple year loadings to the sources' 5-yr annual average allocation by September of the following year. This report will identify any exceedences among combined entity/source load categories after taking into consideration "set allocation" sources and hydrologically-normalized sources, and if necessary, whether exceedences were observed for individual MS4 or unpermitted (LA) sources (Figure 2.1; NMC Action 4 in the Framework). It is noted that FDEP will independently assess individual entities for compliance with their allocations.

Table 2.1: Assessment steps linked to the Nitrogen Management Consortium's decision framework, as depicted in the flowchart above.

| **Assessment Step** | **Result** | **Action** |
|---|---|---|
| **I.** Determine annual bay segment specific chlorophyll-a FDEP threshold attainment as traditionally assessed using the Decision Matrix management strategy developed by the TBEP (Janicki, Wade, and Pribble 2000). | **Yes** | **NMC Action 1** |
| | **No** | **NMC Action 1** |
| | **Yes** | **NMC Action 2** |

| | | |
|---|---|---|
| **II.** Review data and determine if an anomalous event(s) influenced non-attainment of the bay segment specific chlorophyll-a threshold. | **No** | **Go to III** |
| **III.** Determine if the chlorophyll-a thresholds have been exceeded for <2 consecutive years. | **Yes** | **NMC Action 2** |
| | **No** | **Go to IV** |
| **IV.** Determine if the bay segment specific federally-recognized TMDL has been achieved using the hydrologically-adjusted compliance assessment outlined in NMC Decision Memo #11 (Appendix 2-11). | **Yes** | **NMC Action 3** |
| | **No** | **Go to V** |
| **V.** For a given year or for multiple years, compile and report entity-specific combined source loads in comparison to 5-yr annual average reasonable assurance allocation. | **Compile & Report** | **NMC Action 4** |

NMC actions outlined in Figure 2.1 and Table 2.1 performed during RA Implementation Period (2022-2026) are as follows:

NMC Action 1 - A report assessing attainment of bay segment specific chlorophyll-a thresholds using the EPCHC dataset, as traditionally assessed using the Decision Matrix management strategy developed by the TBEP (Janicki, Wade, and Pribble 2000) will be delivered to FDEP and EPA (this report).

NMC Action 2 - A report of the anomalous event(s) or data which influenced the bay segment chlorophyll-a exceedence will be delivered to FDEP and EPA, upon review by NMC participants (this report).

NMC Action 3 - Consider re-evaluation of the bay segment assimilative capacity based on nonattainment of bay segment chlorophyll-a threshold while meeting federally-recognized TMDL.

NMC Action 4 - If federally-recognized TMDL not achieved, compile results of hydrologic evaluation for FDEP's review and identify potential further actions needed to achieve reasonable assurance for bay segment allocations.

# 3 2024 Results Summary

Results from 2024 indicate that all RA bay segments met chlorophyll-a thresholds accepted by the FDEP to maintain FDEP Reasonable Assurance for Tampa Bay and to comply with the EPA TMDL (Figure 3.1) and estuarine numeric nutrient criteria for Tampa Bay (EPA Amended Approval Letter Jun. 28, 2013). Chlorophyll-a concentrations were elevated throughout the bay during late summer/fall months in 2024 due to the influence of several tropical storms on the region (Figure 3.3). Mixed-assemblage algae blooms were reported in Hillsborough Bay, Old Tampa Bay, and Middle Tampa Bay, while low concentrations of *Karenia brevis* continued to be observed in Lower Tampa Bay into the winter months. Although understanding and mitigating blooms of *Pyrodinium bahamense* in OTB continues to be a focus of research and management efforts, summer concentrations in Old Tampa Bay were lower compared to prior years and the chlorophyll-a criteria was met for the third consecutive year of the RA period. Preliminary recommendations from the assimilative capacity assessment for Old Tampa Bay to evaluate the existing management paradigm and assess the potential need to adopt alternative indicators and/or load allocations to address recurring water quality issues in that bay segment are underway (Stantec Consulting Services, Inc. 2024, 2025).

The TBEP, in partnership with the Southwest Florida Water Management District, has previously developed an integrated ecosystem model to evaluate the net environmental benefits that may result from implementing various management actions in Old Tampa Bay including: reducing point sources, nonpoint sources, and causeway obstructions in Old Tampa Bay (Sherwood et al. 2015). Management actions that proximate and respond to current Old Tampa Bay conditions will be further evaluated under the Old Tampa Bay assimilative capacity assessment project. Furthermore, the TBEP funded research conducted by the Florida Fish and Wildlife Research Institute to improve understanding of the cell physiology and behavior of *Pyrodinium bahamense* and evaluate the potential for using shellfish to mitigate these algal blooms in Old Tampa Bay. A water quality dashboard (https://shiny.tbep.org/wq-dash) continues to be available to further synthesize available data, assess additional water quality metrics (phytoplankton counts), and inform Consortium participants and other resource managers on the status of water quality in Tampa Bay. The dashboard allows for proactive response to anomalous water quality conditions on a month-to-month basis by the community. As part of the Old Tampa Bay assimilative capacity assessment, potential modifications to existing modeling tools and the application of additional models will be finalized in 2025.

Between 2022 and 2024, seagrasses throughout Tampa Bay increased by 1,409 acres. After several consecutive years of losses, aerial photographs taken in December 2023 - February 2024 indicate that Tampa Bay now harbors 31,546 acres of seagrass. Seagrass acreage showed

the greatest increases in Hillsborough Bay (+756 acres), accounting for more than half of the increase observed baywide. Despite modest gains elsewhere, Old Tampa Bay lost an additional 327 acres of seagrass, the lowest estimate ever recorded for this bay segment. These trends are generally corroborated by annual transect surveys conducted by TBEP and its partners (shown in the seagrass transect dashboard). Additional research and discussion is being pursued by the Southwest Florida Seagrass Working Group to better understand the underlying mechanisms influencing these observations. Analysis of the role of long-term temperature increases and salinity reductions related to climate change and the potential relationships with seagrass declines since 2016 was published in 2024 (Beck et al. 2024). The next SWFWMD seagrass coverage estimate will be developed from aerial photographs acquired over the winter 2025-26 period.

Detailed results for the 2022-2026 RA implementation period are provided in Tables 3.2, 3.3, 3.4, 3.5, and 3.6 for each bay segment. Notably, results for the Remainder Lower Tampa Bay segment (Boca Ciega Bay South, Terra Ceia Bay, Manatee River) are included for the first time in this annual assessment. As of the 2024 reporting period, NMC Actions 2-5 are not necessary based upon observed water quality conditions within Tampa Bay, though additional work is being pursued by the TBEP and TBNMC to understand the most recent trends in seagrass coverage and Old Tampa Bay's current assimilative capacity. Individual annual reports of the bay's conditions from 2024 can be found on the TBEP website, as specified in the following link (Beck, Burke, and Sherwood 2025) and the water quality dashboard. A summary of historic attainment of the regulatory chlorophyll-a thresholds for each of the bay segments is depicted in Figure 3.5.

Lastly, annual hydrologic conditions among all the major bay segments in 2024 were above 1992-1994 levels (Table 3.1). Therefore, hydrologic adjustments for evaluating compliance with individual entity load allocations/permitting targets should be applied for each major segment (Janicki Environmental, Inc. 2012, 2016). The estimated hydrologic loads for each bay segment relative to observed 1992-1994 levels are indicated in the table below. The estimated compliance load adjustment factors (if applicable) are also specified. A tool to calculate the hydrologic estimates and adjustment factors by bay segment is available online through an interactive dashboard and automatically updated as provisional hydrologic estimates are approved by monitoring agencies (https://shiny.tbep.org/tbnmc_hydrologic_estimates/).

Table 3.1: Hydrologic load estimates in 2024 relative to 1992-1994 levels and estimated compliance load adjustment factors for the major bay segments.

| Bay Segment | 1992 - 1994 Hydrology (95% Prediction Interval, million m3) | Hydrology Estimate (million m3) | Compliance Load Adjustment Factor |
|---|---|---|---|
| Old Tampa Bay | 383 - 548 | 983.67 | 2.19 |

| Bay Segment | 1992 - 1994 Hydrology (95% Prediction Interval, million m3) | Hydrology Estimate (million m3) | Compliance Load Adjustment Factor |
|---|---|---|---|
| Hillsborough Bay | 753-1110 | 1,878.90 | 2.07 |
| Middle Tampa Bay | 524-756 | 763.00 | 1.18 |
| Lower Tampa Bay | 312-402 | 504.79 | 1.40 |

Table 3.2: Demonstration of reasonable assurance assessment steps for Old Tampa Bay. Green and red squares indicate outcomes of decision points outlined in the Consortium's reasonable assurance assessment framework.

| Bay Segment | DATA USED TO ASSESS ANNUAL REASONABLE ASSURANCE | | | | | |
|---|---|---|---|---|---|---|
| Reasonable Assurance Assessment Steps | Year 1 (2022) | Year 2 (2023) | Year 3 (2024) | Year 4 (2025) | Year 5 (2026) | OUTCOME |
| **NMC Action 1:** Determine if observed chlorophyll-a exceeds FDEP threshold of 9.3 ug/L | No (7.1) | No (6.2) | No (8.8) | | | All years below threshold so far, not necessary for NMC Actions 2-5 |
| **NMC Action 2:** Determine if any observed chlorophyll-*a* exceedences occurred for 2 consecutive years | No | No | No | | | All years met threshold, not necessary for NMC Actions 3-5 |
| **NMC Action 3:** Determine if observed hydrologically-normalized total load exceeds federally-recognized TMDL of 486 tons/year | N/A | N/A | N/A | | | Not necessary due to observed water quality and seagrass conditions in the bay segment |
| **NMC Actions 4-5:** Determine if any entity/source/facility specific exceedences of 5-yr average allocation occurred during implementation period | | | | | | Not necessary when chlorophyll-*a* threshold met |

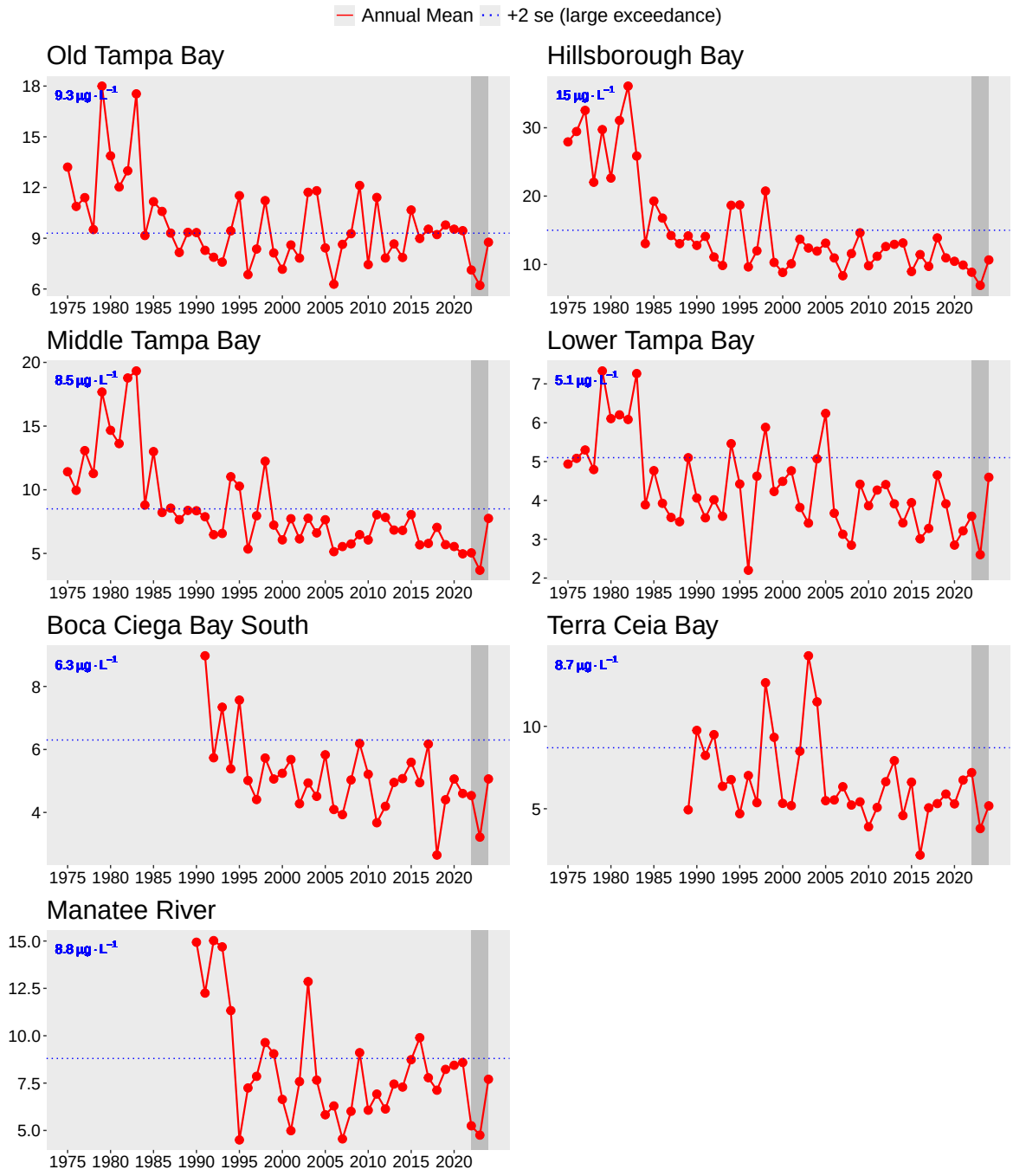


Figure 3.1: Historic chlorophyll-a annual averages for the four major bay segments of Tampa Bay and those that include the Remainder Lower Tampa Bay segment (Boca Ciega Bay South, Terra Ceia Bay, Manatee River). Annual averages in 2024 were below the regulatory thresholds developed under the Tampa Nitrogen Management Consortium's nutrient management strategy in all bay segments. Vertical grey bars indicate the portion of the 2022-2026 Reasonable Assurance compliance assessment period covered by the results.

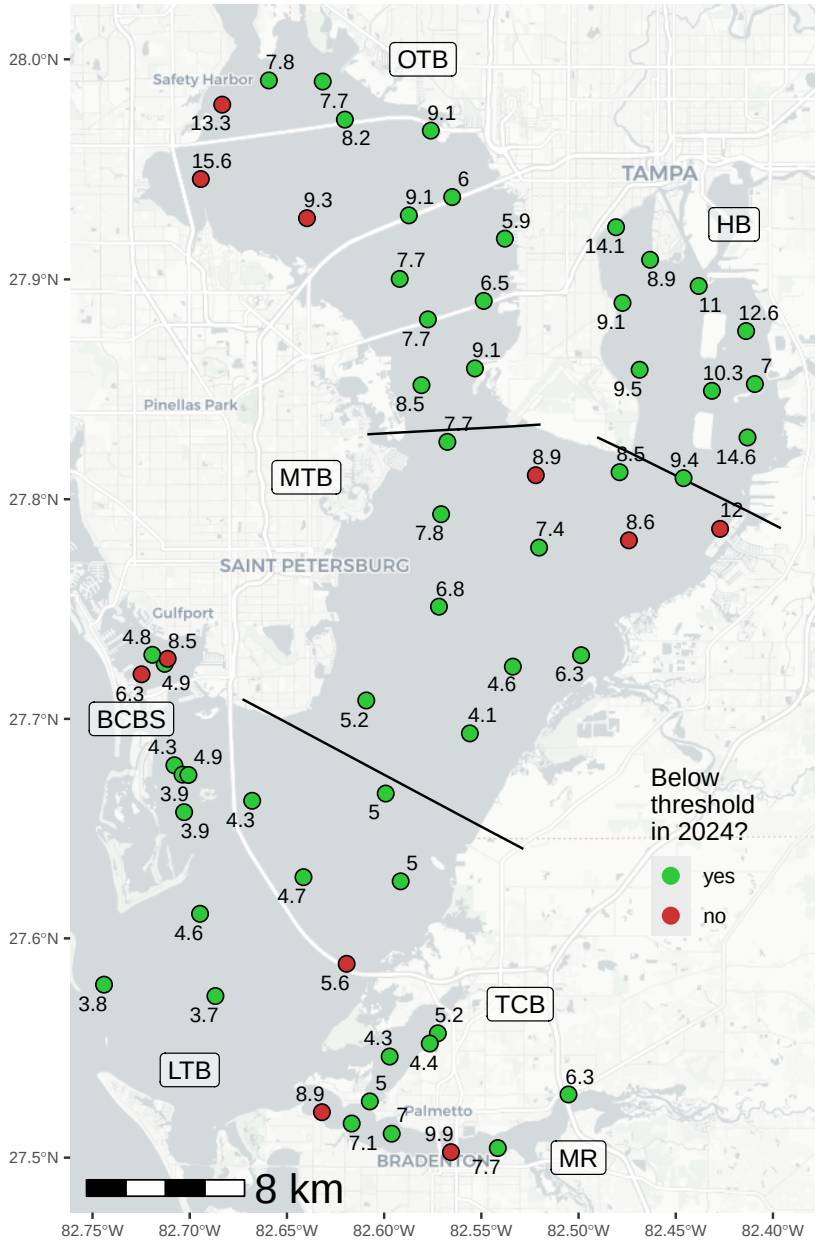


Figure 3.2: Map depicting individual station chlorophyll-a exceedences in Tampa Bay relative to FDEP regulatory thresholds for chlorophyll-a in 2024. *Note individual station exceedences do not indicate failed compliance at the bay segment scale.*

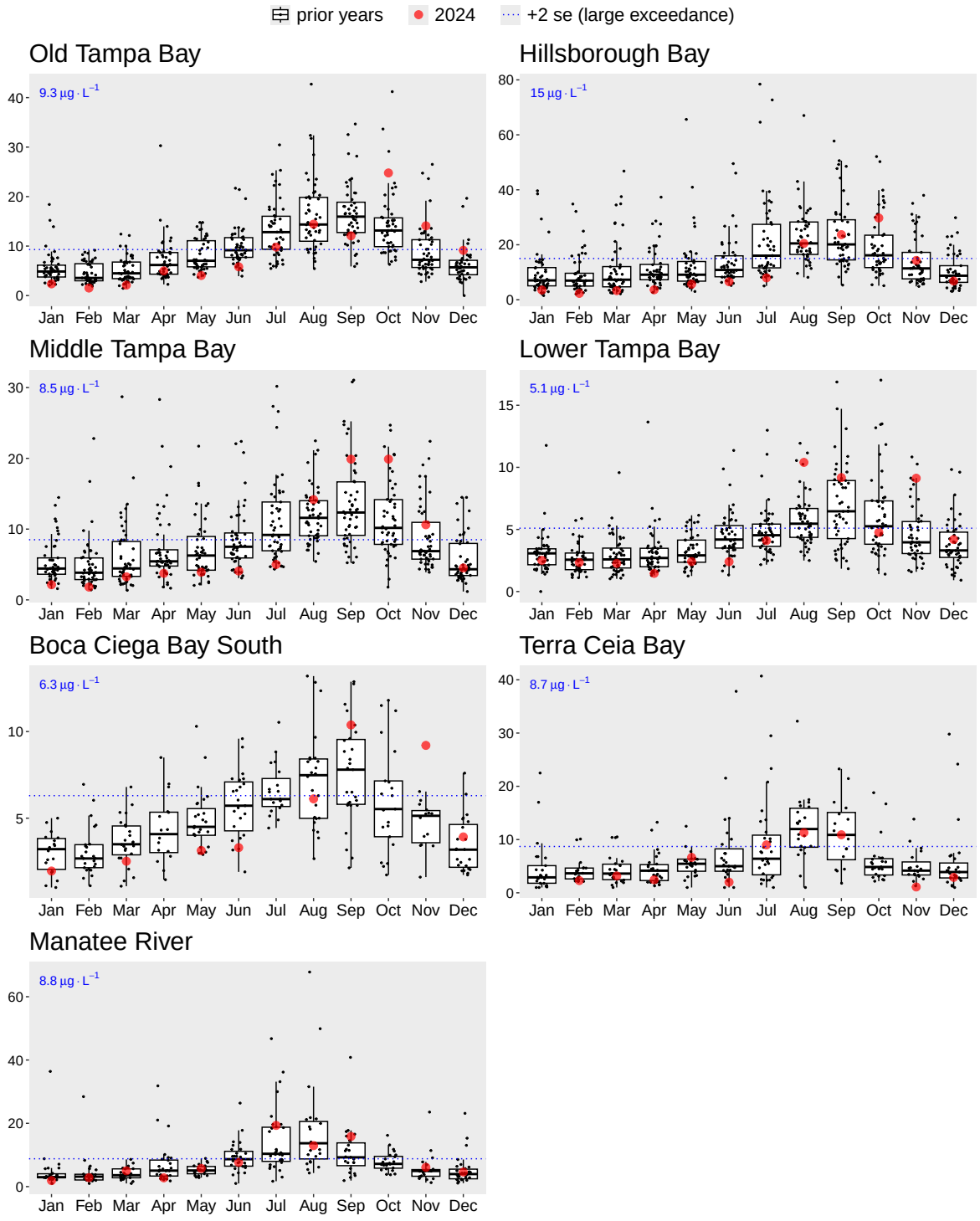


Figure 3.3: 2024 monthly chlorophyll-a bay segment means (red dots) compared to monthly distributions from prior years (box plots and black dots). Prior years extend to 1975 for Old Tampa Bay, Hillsborough Bay, Middle Tampa Bay, and Lower Tampa Bay, 1991 for Boca Ciega Bay South, 1989 for Terra Ceia Bay, and 1990 for Manatee River. Note that Pinellas and Manatee County data are used for Boca Ciega Bay South, Terra Ceia Bay, and Manatee River and has less frequent sampling intervals than data from the Environmental Protection Commission of Hillsborough County used for the other bay segments. Boxes encompass the 25th and 75th percentiles, while whiskers bound the interquartile range. Dots beyond the whiskers represent outliers throughout the 1975-2023 sample period.

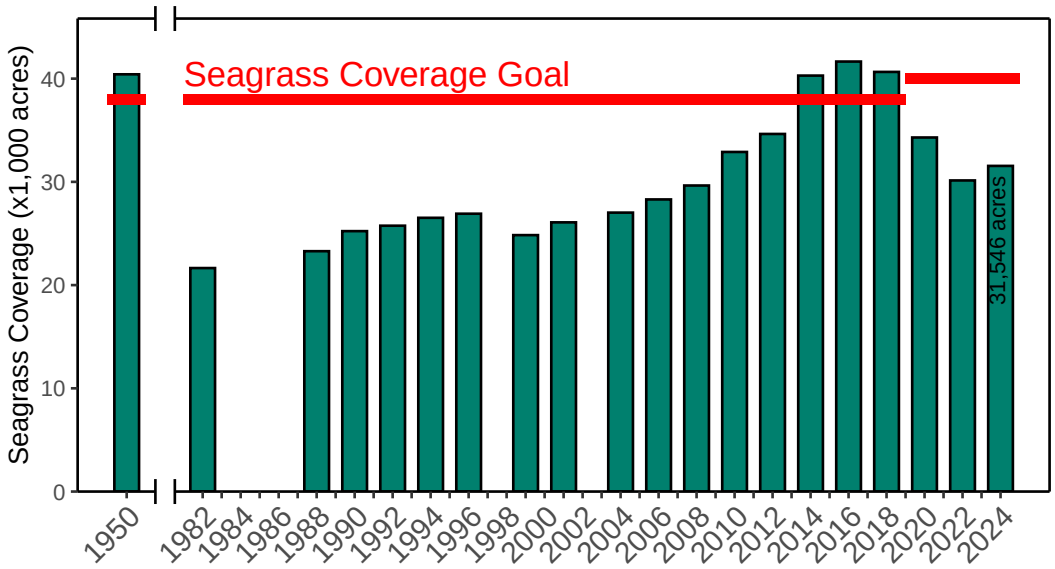


Figure 3.4: Historic seagrass coverage estimates for Tampa Bay. The target coverage of 38,000 acres was changed to 40,000 acres in 2020 to reflect programmatic goals in the 2020 Habitat Master Plan Update (TBEP #07-20). Data source: TBEP & SWFWMD.

Table 3.3: Demonstration of reasonable assurance assessment steps for Hillsborough Bay. Green and red squares indicate outcomes of decision points outlined in the Consortium's reasonable assurance assessment framework.

| Bay Segment | DATA USED TO ASSESS ANNUAL REASONABLE ASSURANCE | | | | | |
|---|---|---|---|---|---|---|
| Reasonable Assurance Assessment Steps | Year 1 (2022) | Year 2 (2023) | Year 3 (2024) | Year 4 (2025) | Year 5 (2026) | OUTCOME |
| **NMC Action 1:** Determine if observed chlorophyll-a exceeds FDEP threshold of 15 ug/L | No (8.9) | No (6.9) | No (10.7) | | | All years below threshold so far, not necessary for NMC Actions 2-5 |
| **NMC Action 2:** Determine if any observed chlorophyll-*a* exceedences occurred for 2 consecutive years | No | No | No | | | All years met threshold, not necessary for NMC Actions 3-5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **NMC Action 3:** Determine if observed hydrologically-normalized total load exceeds federally-recognized TMDL of 1451 tons/year | N/A | N/A | N/A | | | Not necessary due to observed water quality and seagrass conditions in the bay segment |
| **NMC Actions 4-5:** Determine if any entity/source/facility specific exceedences of 5-yr average allocation occurred during implementation period | | | | | | Not necessary when chlorophyll-*a* threshold met |

Table 3.4: Demonstration of reasonable assurance assessment steps for Middle Tampa Bay. Green and red squares indicate outcomes of decision points outlined in the Consortium's reasonable assurance assessment framework.

| Bay Segment | DATA USED TO ASSESS ANNUAL REASONABLE ASSURANCE | | | | | |
|---|---|---|---|---|---|---|
| Reasonable Assurance Assessment Steps | Year 1 (2022) | Year 2 (2023) | Year 3 (2024) | Year 4 (2025) | Year 5 (2026) | OUTCOME |
| **NMC Action 1:** Determine if observed chlorophyll-a exceeds FDEP threshold of 8.5 ug/L | No (5) | No (3.7) | No (7.8) | | | All years below threshold so far, not necessary for NMC Actions 2-5 |
| **NMC Action 2:** Determine if any observed chlorophyll-*a* exceedences occurred for 2 consecutive years | No | No | No | | | All years met threshold, not necessary for NMC Actions 3-5 |
| **NMC Action 3:** Determine if observed hydrologically-normalized total load exceeds federally-recognized TMDL of 799 tons/year | N/A | N/A | N/A | | | Not necessary due to observed water quality and seagrass conditions in the bay segment |

| | |
|---|---|
| **NMC Actions 4-5:** Determine if any entity/source/facility specific exceedences of 5-yr average allocation occurred during implementation period | Not necessary when chlorophyll-*a* threshold met |

Table 3.5: Demonstration of reasonable assurance assessment steps for Lower Tampa Bay. Green and red squares indicate outcomes of decision points outlined in the Consortium's reasonable assurance assessment framework.

| Bay Segment | DATA USED TO ASSESS ANNUAL REASONABLE ASSURANCE | | | | | |
|---|---|---|---|---|---|---|
| Reasonable Assurance Assessment Steps | Year 1 (2022) | Year 2 (2023) | Year 3 (2024) | Year 4 (2025) | Year 5 (2026) | OUTCOME |
| **NMC Action 1:** Determine if observed chlorophyll-a exceeds FDEP threshold of 5.1 ug/L | No (3.6) | No (2.6) | No (4.6) | | | All years below threshold so far, not necessary for NMC Actions 2-5 |
| **NMC Action 2:** Determine if any observed chlorophyll-*a* exceedences occurred for 2 consecutive years | No | No | No | | | All years met threshold, not necessary for NMC Actions 3-5 |
| **NMC Action 3:** Determine if observed hydrologically-normalized total load exceeds federally-recognized TMDL of 349 tons/year | N/A | N/A | N/A | | | Not necessary due to observed water quality and seagrass conditions in the bay segment |
| **NMC Actions 4-5:** Determine if any entity/source/facility specific exceedences of 5-yr average allocation occurred during implementation period | | | | | | Not necessary when chlorophyll-*a* threshold met |

Table 3.6: Demonstration of reasonable assurance assessment steps for Remainder Lower Tampa Bay. Green and red squares indicate outcomes of decision points outlined in the Consortium's reasonable assurance assessment framework.

| Bay Segment | DATA USED TO ASSESS ANNUAL REASONABLE ASSURANCE | | | | | |
|---|---|---|---|---|---|---|
| Reasonable Assurance Assessment Steps | Year 1 (2022) | Year 2 (2023) | Year 3 (2024) | Year 4 (2025) | Year 5 (2026) | OUTCOME |
| **NMC Action 1:** Determine if observed chlorophyll-a exceeds FDEP threshold of 5.1 ug/L | No (3.6) | No (2.6) | No (4.6) | | | All years below threshold so far, not necessary for NMC Actions 2-5 |
| **NMC Action 2:** Determine if any observed chlorophyll-*a* exceedences occurred for 2 consecutive years | No | No | No | | | All years met threshold, not necessary for NMC Actions 3-5 |
| **NMC Action 3:** Determine if observed hydrologically-normalized total load exceeds federally-recognized TMDL of 349 tons/year | N/A | N/A | N/A | | | Not necessary due to observed water quality and seagrass conditions in the bay segment |
| **NMC Actions 4-5:** Determine if any entity/source/facility specific exceedences of 5-yr average allocation occurred during implementation period | | | | | | Not necessary when chlorophyll-*a* threshold met |

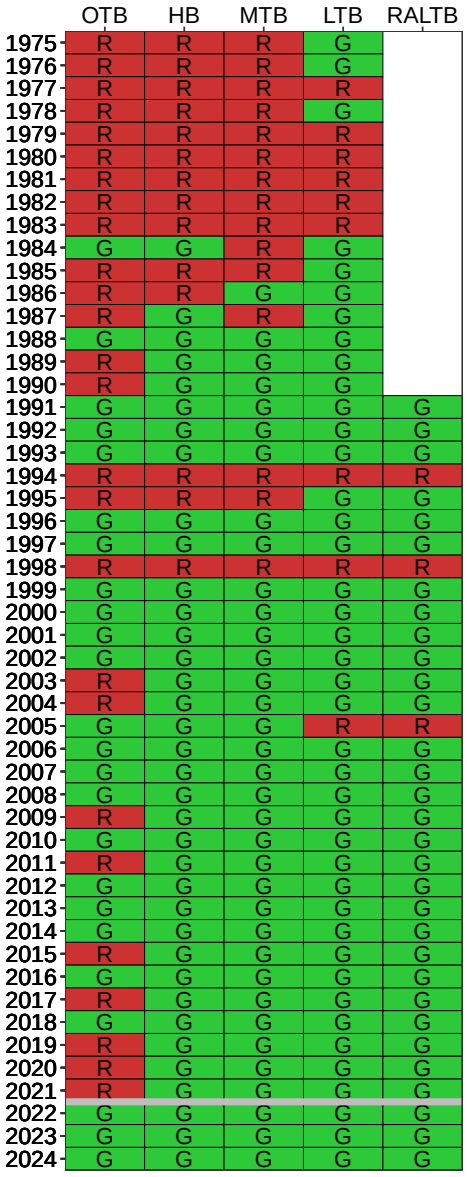


Figure 3.5: Attainment of adopted chlorophyll-a thresholds (1975 - 2024) in the four major bay segments and Remainder Lower Tampa Bay segment (Boca Ciega Bay South, Terra Ceia Bay, Manatee River). Green (yes) indicates that average annual chlorophyll-a thresholds were met; red (no) indicates that threshold levels were not met. Grey line is the beginning of the current Reasonable Assurance implementation period.

# References


Beck, M. W., M. C. Burke, and E. T. Sherwood. 2025. "2024 Tampa Bay Water Quality Assessment." 03-25. St. Petersburg, Florida: Tampa Bay Estuary Program. https://drive.google.com/file/d/1jZwjt6c0LdiGL3Arl6uFVIn25Iji4ITx/view?usp=sharing.

Beck, M. W., K. E. Flaherty-Walia, S. Scolaro, M. C. Burke, B. T. Furman, D. J. Karlen, C. Pratt, C. J. Anastasiou, and E. T. Sherwood. 2024. "Hot and Fresh: Evidence of Climate-Related Suboptimal Water Conditions for Seagrass in a Large Gulf Coast Estuary." *Estuaries & Coasts* 47: 1475–97. https://doi.org/https://doi.org/10.1007/s12237-024-01385-0.

Janicki, A., D. Wade, and J. R. Pribble. 2000. "Developing and Establishing a Process to Track the Status of Chlorophyll-a Concentrations and Light Attenuation to Support Seagrass Restoration Goals in Tampa Bay." 04-00. St. Petersburg, Florida: Tampa Bay Estuary Program. https://drive.google.com/file/d/1XMULU8w4syWcSv_ciOUOhnC_G4xt6GIF/view?usp=drivesdk.

Janicki Environmental, Inc. 2012. "Development of a Screening Level Tool for Estimating Annual Hydrologic Loadings to Tampa Bay." 05-12. St. Petersburg, Florida: Tampa Bay Estuary Program. https://drive.google.com/file/d/1C6Arwat9IxYs8jeTZpcmBB6WBTpeQ2nw/view?usp=drivesdk.

———. 2016. "Update on the Development of a Screening Level Tool for Estimating Annual Hydrologic Loadings to Tampa Bay." 03-16. St. Petersburg, Florida: Tampa Bay Estuary Program. https://drive.google.com/file/d/11NT0NQ2WbPO6pVZaD7P7Z6qjcwO1jxHw/view?usp=drivesdk.

Sherwood, E., H. Greening, L. Garcia, K. Kaufman, T. Janicki, R. Pribble, B. Cunningham, et al. 2015. "Development of an Integrated Ecosystem Model to Determine Effectiveness of Potential Watershed Management Projects on Improving Old Tampa Bay." 10-15. St. Petersburg, Florida: Tampa Bay Estuary Program. https://drive.google.com/file/d/1BCviGfLykVX-p1tA3b0306deP3pKMagr/view?usp=drivesdk.

Stantec Consulting Services, Inc. 2024. "Old Tampa Bay (OTB) Assimilative Capacity Assessment Project: Task 1 Evaluating Existing Management Paradigm and Assessing Alternatives." 09-24. St. Petersburg, Florida: Tampa Bay Estuary Program. https://drive.google.com/file/d/1IfVUTLE20wzVgzULuyeRGWapEFT3DhQ0/view?usp=drive_link.

———. 2025. "Old Tampa Bay Assimilative Capacity Study: Task 2 Evaluation of Eutrophication Indicator Targets, Thresholds, and Numeric Nutrient Criteria and Proposed Adjustments." 05-25. St. Petersburg, Florida: Tampa Bay Estuary Program. https://drive.google.com/file/d/12xYfSs-4bxhLa1ZVQbmhQSv5Jo4Jf-oY/view?usp=sharing.