



January 31, 2023

Borja Crane-Amores
Program Administrator, NPDES Stormwater Section
Florida Department of Environmental Protection
2600 Blair Stone Road – MS2500
Tallahassee, Florida 32399-2400

Subject: City of St. Petersburg Municipal Separate Storm Sewer System
FLS000007-005(Cycle 5)
Annual Report Year 3 (July 1, 2021 – June 30, 2022)

Dear Mr. Crane-Amores,

Enclosed is the City of St. Petersburg's MS4 Permit Cycle 5, Year 4 annual report for the period of July 1, 2021 – June 30, 2022.

If you have any questions, please do not hesitate to contact me at Roger.Johnson@stpete.org or by telephone at 727-892-5380 or Ramon Rodriguez at Ramon.Rodriguez@stpete.org.

Sincerely,

Roger Johnson, P.E.
Engineering Design Manager



City of St. Petersburg
P.O. Box 2842
St. Petersburg, FL 33731-2842

City of St. Petersburg
FLS000007-005
Annual Report
Cycle 5, Year 4
July 1, 2021 – June 30, 2022

January 2023

st.petersburg
www.stpete.org



Annual Report Form For Individual NPDES Permits For Municipal Separate Storm Sewer Systems (RULE 62-624.600(2), F.A.C.)

- This Annual Report Form must be completed and submitted to the Department to satisfy the annual reporting requirements established in Rule 62-624.600, F.A.C.
- Submit this fully completed and signed form and any REQUIRED attachments by email to the NPDES Stormwater Program Administrator or to the MS4 coordinator (<https://floridadep.gov/water/stormwater/content/npdes-stormwater-permitting-program-contacts>). Files larger than 10MB may be placed on the FTP site at: ftp://ftp.dep.state.fl.us/pub/NPDES_Stormwater/. After uploading files, email the MS4 coordinator or NPDES Program Administrator to notify them the report is ready for downloading; or by mail to the address in the box at right.
- Refer to the Form Instructions for guidance on completing each section.
- **Please print or type information in the appropriate areas below.**

Submit the form and attachments to:
 Florida Department of Environmental Protection
 Mail Station 3585
 2600 Blair Stone Road
 Tallahassee, Florida 32399-2400

SECTION I. BACKGROUND INFORMATION

A.	Permittee Name: City of St. Petersburg		
B.	Permit Name: City of St. Petersburg MS4		
C.	Permit Number: FLS000007-005		
D.	Annual Report Year: ☐ Year 1 ☐ Year 2 ☐ Year 3 ☒ Year 4 ☐ Year 5 ☐ Other, specify Year:		
E.	Reporting Time Period (month/year): 07 / 21 through 06 / 22		
F.	Name of the Responsible Authority: Roger Johnson, PE		
	Title: Engineering Design Manager		
	Mailing Address: One 4 th St N		
	City: St. Petersburg	Zip Code: 33701	County: Pinellas
	Telephone Number: 727-892-5380		Fax Number:
	E-mail Address: Roger.Johnson@stpete.org		
G.	Name of the Designated Stormwater Management Program Contact (if different from Section I.F above):		
	Title:		
	Department:		
	Mailing Address:		
	City:	Zip Code:	County:
	Telephone Number:		Fax Number:
	E-mail Address:		

SECTION II. MS4 MAJOR OUTFALL INVENTORY (Not Applicable In Year 1)

A.	Number of outfalls ADDED to the outfall inventory in the current reporting year (insert "0" if none): 0 (Does this number include non-major outfalls? ☐ Yes ☐ No ☐ Not Applicable)
B.	Number of outfalls REMOVED from the outfall inventory in the current reporting year (insert "0" if none): 0 (Does this number include non-major outfalls? ☐ Yes ☐ No ☐ Not Applicable)
C.	Is the change in the total number of outfalls due to lands annexed or vacated? ☐ Yes ☐ No ☒ Not Applicable

SECTION III. PART V.B. ASSESSMENT PROGRAM

Provide a brief statement as to the status of water quality monitoring plan implementation. Status may include sampling frequency changes, monitoring location changes, or sampling waiver conditions.
DEP Note: If permittee participates in a collaborative monitoring plan, permittee may refer to a joint response as defined by the interlocal agreement.

Name and date of the approved plan: FDEP Number FL S000007
Status: Ongoing

- A.** The following and Attachment B presents the 2022 Water Quality Report Card, a water quality reporting tool the city uses to report the results of annual water quality monitoring in a concise and informative way. This report utilizes ambient water quality data collected by the City for calendar Year 2021, as well as environmental and human health data through June 2022. In addition to the Report Card reporting tool, this report also includes an analysis of trends in water quality from the City's ambient monitoring locations, the results of which provide the City with an "early warning system" and should best be used with the results of the report card analyses of compliance with water quality standards and criteria.

Provide a brief discussion of the monitoring and loading results to date which includes a summary of the water quality monitoring data and / or stormwater pollutant loading changes from the reporting year.

DEP Note: Results must be specific to the permittee's SWMP.

Janicki Environmental developed Attachment A, an analysis of pollutant loads from 2017-2021, compared against loads from 2012-2016. For the most recent 5-year period (2017-2021), total loads for all parameters were lower than the 2012-2016 period.

Attachment B is the Water Quality Report Card. The following summarizes the most recent status of the City's monitoring stations in regards to environmental health as represented by nutrients, dissolved oxygen and chlorophyll a. Recommendations are provided based on our evaluation of the data collected by the environmental health ambient monitoring program.

- The scores for the majority of stations examined on the Boca Ciega and Middle Tampa Bay report cards indicated nutrient (total nitrogen and total phosphorus) concentrations have met the established thresholds during all years of examination. Exceptions to this occurred in Lake Maggiore where total nitrogen data for two of the three stations were scored as out of compliance in 2021n with one of the three out of compliance in 2022. The recently added Golf Creek (GC-01) station also failed to meet target concentrations for total phosphorus. Trend tests for all sampling locations indicated either a lack of a significant trend or a significant decreasing (improving) trend for both total nitrogen and total phosphorus.
- B.**
- Most stations met the established thresholds for dissolved oxygen on the report cards for both Boca Ciega Bay and Middle Tampa Bay. However, one station in Boca Ciega Bay (CB-01) and one in Middle Tampa Bay (SC-01) did not meet established criteria. In the Boca Ciega Bay Basin, a significant, increasing trend in dissolved oxygen was observed for Bear Creek and Frenchmans Creek, as well as for the 34th Street station when data through June 2022 were included. Two stations (Little Bayou and Booker Creek) in Middle Tampa Bay exhibited a significant increasing trend in dissolved oxygen while all four stations in the E7 segment and three stations in the E6 segment exhibited decreasing trends.
 - In terms of chlorophyll a, the report card indicates that two of the 13 stations in Boca Ciega Bay, were either marginal ("Yellow") or failed ("Red") during 2021 and first half of 2022. Seven of 12 stations in Middle Tampa Bay scored as "red" for 2021, indicating a failure to meet established thresholds in more than one of the current and previous two years periods. These scorings are also indicated for the preliminary 2022 report cards. The majority of failing stations were in lakes.

Two stations in Boca Ciega Bay (Clam Bayou [East Drainage] and Frenchmans Creek) were characterized by increasing trends in chlorophyll. However, when data only through 2021, Frenchmans Creek still exhibited an increasing trend, but Clam Bayou East Drainage did not and Bear Creek was characterized by an increasing trend; the remaining stations in Boca Ciega Bay exhibited no significant trends. No significant trends in chlorophyll were detected for Middle Tampa Bay stations. Thus, it is anticipated that, shortly, the more estuarine/open water sites are expected to maintain a passing status on the report card. This highlights the efforts of the TBEP and its partners (including the City) to implement nutrient reduction programs, resulting in increased water clarity and vastly improved seagrass coverages.

- C.** Attach a monitoring data summary as required by the permit. An analysis of the data discussing changes in water quality and/or stormwater pollutant loading from previous reporting years.
DEP Note: Analysis must be specific to the permittee's SWMP.

Please see Attachment B for the monitoring Data summary

SECTION IV. FISCAL ANALYSIS

A.	Total expenditures for the NPDES stormwater management program for the current reporting year: \$20,409,014.00
B.	Total budget for the NPDES stormwater management program for the subsequent reporting year: \$21,590,977.17
C.	Did the current reporting year resources decrease from the previous year? Y ☐ / N ☒ If program resources decreased, provide a discussion of the impacts on the implementation of the SWMP.

SECTION V. MATERIALS TO BE SUBMITTED WITH THIS ANNUAL REPORT FORM

Only the following materials are to be submitted to the Department along with this fully completed and signed Annual Report Form (check the appropriate box to indicate whether the item is attached or is not applicable):

<u>Attached</u>	<u>N/A</u>	Required Attachments	Permit Citation	Attachment Number/Title
☐	☒	Any additional information required to be submitted in this current annual reporting year in accordance with Part III.A of your permit that is not otherwise included in Section VII below.	Part III.A	
☐	☒	If program resources have decreased from the previous year, a discussion of the impacts on the implementation of the SWMP.	Part II.F	
☐	☒	An explanation of why the minimum inspection frequency in Table II.A.1.a. was not met, if applicable.	Part II.A.1	
☐	☒	A list of the flood control projects that did not include stormwater treatment and an explanation for each of why it did not (if applicable).	Part III.A.4	
☒	☐	A monitoring data summary as directed in Section III.C above and in accordance with Rule 62-624.600(2)(c), F.A.C.	Part V.B.3	Attachment A -2022 Water Quality Report Cards
☐	☒	YEAR 1 ONLY: An inventory of all known major outfalls and a map depicting the location of the major outfalls (hard copy or CD-ROM) in accordance with Rule 62-624.600(2)(a), F.A.C.	Part III.A.1	
☐	☒	YEAR 2: A summary review of codes and regulations to reduce the stormwater impact from development.	Part III.A.2	
☐	☒	YEAR 2: A copy of the adopted Florida-Friendly Fertilizer ordinance (if applicable).	Part III.A.6	
☐	☒	Year 3 ONLY: The estimates of pollutant loadings and event mean concentrations for each major outfall or each major watershed in accordance with Rule 62-624.600(2)(b), F.A.C.	Part V.A	
☐	☒	YEAR 3: Summary of TMDL Monitoring Results (if applicable).	Part VIII.B.2	
☐	☒	YEAR 3: Bacteria Pollution Control Plan (if applicable).	Part VIII.B.3	
☐	☒	YEAR 4: A follow-up report on plan implementation of changes to codes and regulations to reduce the stormwater impact from development.	Part III.A.2	No changes
☐	☒	YEAR 4: A report on any amendments to the applicable legal authority (if applicable).	Part III.A.7.a	No Amendments
☐	☐	YEAR 4: Permit re-application information in accordance with Rule 62-624.420(2), F.A.C. - The assessment program (with revisions, if applicable). - If the total annual pollutant loadings have not decreased over the past two permit cycles, revisions to the SWMP, as appropriate.	Part V.B.3 Part V.A.3	Attachment B - Pollutant Load Estimates
☐	☒	YEAR 4: TMDL Supplemental SWMP (if applicable).	Part VIII.B.3	

DO NOT SUBMIT ANY OTHER MATERIALS
(such as records and logs of activities, monitoring raw data, public outreach materials, etc.)

SECTION VI. CERTIFICATION STATEMENT AND SIGNATURE

The Responsible Authority listed in Section I.F above must sign the following certification statement, as per Rule 62-620.305, F.A.C:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name of Responsible Authority (type or print): Brejesh Prayman, PE

Title: Director, Engineering and Capital Improvements

Signature: Brejesh Prayman.

Date: 1/31/23

SECTION VII. STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE									
A.	B.					C.	D.	E.	F.
Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity					Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
Part III.A.1	Structural Controls and Stormwater Collection Systems Operation								
	Report the current known inventory. Report the number of inspection and maintenance activities conducted for each applicable type of structure included in Table II.A.1.a, and the percentage of the total inventory of each type of structure inspected and maintained. <i>Note: Delete structures that are not in your MS4's inventory. The permittee may choose its own unit of measurement (miles, linear feet, acres, etc.) for each structural control to be consistent with the unit of measurement in the documentation.</i>								
	Type of Structure	Number of Structures	Number of Inspections	Percent Inspected	Number of Maintenance Activities	Percent Maintained			
	Dry retention systems	68	27	40	0 (Note 1)	100	Engineering Inspection Records	Engineering	Note 1: Facilities receive routine maintenanc e on a regular schedule. No maintenanc e needs identified through inspections.
	Underdrain filter systems	10	8	80	0 (Note 1)	100	Engineering Inspection Records	Engineering	See Note 1
	Wet detention systems	13	4	31	0 (Note 1)	100	Engineering Inspection Records	Engineering	See Note 1
	Alum Injection systems	7	52	100	364	100	SPTO Records (WAM)	SPTO	C. Allen emails
	Pollution control boxes	12	36	100	36	100	SPTO Records (WAM)	SPTO	C. Allen emails
	Pump stations	4	52	100	208	100	SPTO Records (WAM)	SPTO	C. Allen emails
	Major outfalls	295	295	100	295	100	SPTO Records (WAM)	SPTO	Structures are inspected with

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Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity					Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
	Weirs or other control structures Pipes / culverts (miles) Canals Inlets / catch basins / grates Ditches / conveyance swales (miles)								routine maintenance activities
		39	39	100	0	100	SPTO Records (WAM)	SPTO	C. Allen emails
		525	2995 ft	10	5	10	SPTO Records (WAM)	SPTO	C. Allen emails
		15	180	100	180	100	SPTO Records (WAM)	SPTO	C. Allen emails
		18900	1314	7	1314	7	SPTO Records (WAM)	SPTO	C. Allen emails
		103	31	30	31	30	SPTO Records (WAM)	SPTO	C. Allen emails
	If the minimum inspection frequencies set forth in Table II.A.1.a. were not met, provide an explanation of why they were not and a description of the actions that will be taken to ensure that they will be met.	☐							

SECTION VII. STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE					
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Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
Part III.A.1 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.3 of the permit.				
	Strengths: The MS4 is inspected and maintained by the city's Stormwater, Pavement and Traffic Operation Department and is supported by a stormwater utility fee.				
	Limitations: Staff turnover				
	SWMP revisions implemented to address limitations: There has been changes in staff in Engineering over the reporting period, but staff are getting up to speed on operations				
Part III.A.2	Areas of New Development and Significant Redevelopment				
	Report the number of significant development projects, including new and redevelopment, reviewed and approved by the permittee for post-development stormwater considerations.				
	Number of significant development projects reviewed	33	Application Status Record	Engineering and	N. Davis email 9/9/22
	Number of significant development projects approved	16	Application Status Record	Planning & Development	N. Davis email 9/9/22
	Provide in the Year 2 Annual Report the summary report of the review activity. Provide in the Year 4 Annual Report the follow-up report on plan implementation.				
	Year 2 ONLY: Attach the summary report of the review activity	☐			
	Year 4 ONLY: Attach the follow-up report on plan implementation	☐			
Part III.A.2 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.2 of the permit.				
	Strengths: The city's Construction Services and Permitting Division and Engineering and Capital Improvements Department review new and redevelopment plans for storm water quantity, storm water quality, and erosion control.				
	Limitations: None				
	SWMP revisions implemented to address limitations: None				
Part III.A.3	Roadways				
	Report on the litter control program, including the frequency of litter collection, an estimate of the total number of road miles cleaned or amount of area covered by the activities, and an estimate of the quantity of litter collected. <i>Note: If the permittee does not contract activities, delete CONTRACTOR activities.</i>				
	PERMITTEE Litter Control: Frequency of litter collection	Daily	Trash Detail Run	SPTO	C. Hargrove email
	PERMITTEE Litter Control: Estimated amount of area maintained (miles)	9125	Trash Detail Run	SPTO	C. Hargrove email
	PERMITTEE Litter Control: Estimated amount of litter collected (cy)	563.5	Trash Detail Run	SPTO	C. Hargrove email
	OPTIONAL: If an Adopt-A-Road or similar volunteer program is implemented, report the total number of road miles cleaned and an estimate of the quantity of litter collected. If you do not participate in an Adopt-A-Road program, report "0".				
	Trash Pick-up Events: Total miles cleaned	323	ROW litter data	SPTO	
	Trash Pick-up Events: Estimated amount of litter collected (lb.)	225,522.11	Keep Pinellas	KPB	Patricia

SECTION VII. STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE					
A.	B.	C.	D.	E.	F.
Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
	Adopt-A-Road: Total miles cleaned Adopt-A-Road: Estimated amount of litter collected (lb.)		Beautiful Report		Deplasco email 12/22/22, KPB Report
		690	Keep Pinellas Beautiful Report	KPB	Patricia Deplasco email 12/22/22, KPB Report
		54,682.77	Keep Pinellas Beautiful Report	KPB	Patricia Deplasco email 12/22/22, KPB Report
	Report on the street sweeping program, including the frequency of the sweeping, total miles swept, an estimate of the quantity of sweepings collected, and the total nitrogen and total phosphorus loadings that were removed by the collection of sweepings. If no street sweeping program is implemented, provide the explanation of why not in column F.				
	Frequency of street sweeping	Monthly/entire City	Street Sweeping SOP	Stormwater Operations	C. Allen email 12/13/22
	Total miles swept	38,395.50	Street Sweeping SOP	Stormwater Operations	C. Allen email 12/13/22
	Estimated quantity of sweeping material collected (cy / tons)	18,075.50	Street Sweeping SOP	Stormwater Operations	C. Allen email 12/13/22
	Total phosphorous loadings removed (pounds)	25,279	FSA MS4 Assessment Tool	Engineering	
	Total nitrogen loadings removed (pounds)	13,758	FSA MS4 Assessment Tool	Engineering	
	Report the equipment yards and maintenances shops that support road maintenance activities, and the number of inspections conducted for each facility.				
Name of Facility		Number of Inspections			
Fleet Maintenance		12	Inspection Records	Fleet Management	

SECTION VII. STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE					
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Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
Part III.A.3 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.3 of the permit.				
	Strengths: The City maintains a strong street sweeping and litter removal program throughout the City.				
	Limitations: None				
	SWMP revisions implemented to address limitations: None				
Part III.A.4	Flood Control Projects				
	Report the total number of flood control projects that were constructed by the permittee during the reporting period and the number of those projects that did NOT include stormwater treatment. Provide a list of the projects where stormwater treatment was not included with an explanation for each of why it was not.				
	Report on any stormwater retrofit planning activities and the associated implementation of retrofitting projects to reduce stormwater pollutant loads from existing drainage systems that do not have treatment BMPs.				
	Flood control projects completed during the reporting period	0	Engineering Records	Engineering	R. Johnson email 12/29/22
	Flood control projects completed that did <u>not</u> include stormwater treatment	0	Engineering Records	Engineering	R. Johnson email 12/29/22
	Stormwater retrofit projects planned/under construction	0	Engineering Records	Engineering	R. Johnson email 12/29/22
	Stormwater retrofit projects completed	0	Engineering Records	Engineering	R. Johnson email 12/29/22
	If there were projects that did not include stormwater treatment, provide as an attachment a list of the projects and an explanation for each of why it did not.	☐			
Part III.A.4 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.3 of the permit.				
	Strengths: The city's flood control program is supported by capital improvement funds and the city's storm water utility. The city has a storm water management master plan that is being followed for flood control improvements. Improvement projects include storm water quality.				
	Limitations: None				
	SWMP revisions implemented to address limitations: None				

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Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
Part III.A.5	Municipal Waste Treatment, Storage, and Disposal Facilities Not Covered by an NPDES Stormwater Permit				
	Report the applicable facilities and the number of the inspections conducted for each facility.				
	Name of Facility	Number of Inspections			
	Brush Site #1	1	Engineering Records	Engineering	Inspected on 12/8/21
	Brush Site #2	1	Engineering Records	Engineering	Inspected on 12/8/21
	Brush Site #3	1	Engineering Records	Engineering	Inspected on 12/8/21
	Brush Site #4	1	Engineering Records	Engineering	Inspected on 12/8/21
	Brush Site #6	1	Engineering Records	Engineering	Inspected on 12/8/21
	Sanitation Yard	1	Engineering Records	Engineering	Inspected on 12/8/21
Part III.A.5 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.3 of the permit.				
	Strengths: Sites are in compliance.				
	Limitations: None				
	SWMP revisions implemented to address limitations: None				
Part III.A.6	Pesticides, Herbicides, and Fertilizer Application				
	Report the number of permittee personnel applicators and contracted commercial applicators of pesticides and herbicides who are FDACS certified / licensed.				
	PERSONNEL: FDACS public applicators of pesticides/herbicides	27, 30	Parks and Rec Records	Parks and Rec	Roxana Hazrati email 12/21/22, E. Hammond email 1/10/23
	CONTRACTORS: FDACS commercial applicators of pesticides/ herbicides	1	Contractor Records	Morelli Landscaping	E. Hammond email 1/10/23
	Report the number of permittee personnel who have been trained through the Green Industry BMP Program and the number of contracted commercial applicators of fertilizer who are FDACS certified / licensed.				
	PERSONNEL: Green Industry BMP Program training completed	2, 7	Parks and Rec Records	Parks and Rec	Roxana Hazrati email 12/21/22, E. Hammond email 1/10/23
	CONTRACTORS: FDACS certified / licensed applicators of fertilizer	7	Contractor Records	Morelli Landscaping	E. Hammond email 1/10/23
	Provide a copy of the adopted ordinance with the Year 2 Annual Report. If this provision is not applicable because the permittee is not within the watershed of a nutrient-impaired water body, indicate that in Column F.				

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Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
	Year 2 ONLY: Attach copy of adopted Florida-friendly ordinance	☐			
	Report on the public education and outreach activities that are performed or sponsored by the permittee within the permittee's jurisdiction to encourage citizens to reduce their use of pesticides, herbicides and fertilizers including the type and number of activities conducted, the type and number of materials distributed, and the number of website visits (if applicable).				
	Brochures/Flyers/Fact sheets distributed	4	St. Pete Extra May-August (via utility bill insert)	Marketing	Bennett Brzycki email via Ramon Rodriguez 12/9/22
	Neighborhood presentations: Number conducted	1	Green Thumb Festival	Engineering	Via R. Rodriguez
	Neighborhood presentations: Number of participants	30,000	City website	Engineering	Overall festival attendance
	Newspapers & newsletters: Number of articles/notices published	9	1 Twitter, 1 Facebook, 4 Nextdoor posts, 3 website pages		Bennett Brzycki email via Ramon Rodriguez 12/9/22
	Newsletters: Number of newsletters distributed	18,079	Water Wise eSplash, Rainwater Guardian News, Sensible Sprinkling Solutions	Water Resources	C. Claus email 11/17/22
	Public displays (e.g., kiosks, storyboards, posters, etc.)	3	1. Library Self- Checkout Kiosk Digital Ad, 2. Rec Center Lobby Digital Ad, 3. Digital Billboard May- Sept.	Marketing	Bennett Brzycki email via Ramon Rodriguez 12/9/22
	Radio or television Public Service Announcements (PSAs)	1	Press Release on St. Pete website (5/10/22)	Marketing	Bennett Brzycki email via Ramon Rodriguez 12/9/22
	School presentations: Number conducted	0			
School presentations: Number of participants	0				

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Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
	Seminars/Workshops: Number conducted	0			
	Seminars/Workshops: Number of participants	0			
	Number of visitors to stormwater-related pages	92, 363	TBRPC records	TBRPC	Facebook engagements and Google clicks
Part III.A.6 Summary	Provide an evaluation of the Stormwater Management Program according to Part VI.B.3 of the permit.				
	Strengths: Continue to enforce the landscape maintenance and fertilizer use ordinance				
	Limitations: COVID issues have limited in-person seminars and presentations				
	SWMP revisions implemented to address limitations: None				
Part III.A.7.a	Illicit Discharges and Improper Disposal — Inspections, Ordinances, and Enforcement Measures				
	Report amendments to legal authority in Year 4.				
	Year 4 ONLY: Attach a report on amendments to applicable legal authority	No changes ☐	N/A	N/A	N/A
Part III.A.7.c	Illicit Discharges and Improper Disposal — Investigation of Suspected Illicit Discharges and/or Improper Disposal				
	Report on the proactive inspection program, including the number of inspections conducted by the permittee, the number of illicit activities found, and the number and type of enforcement actions taken.				
	Proactive inspections for suspected illicit discharges	4,286	Illicit Discharge Findings	Fire Department	Ramon Rodriguez email 12/9/22
	Illicit discharges found during a proactive inspection	0	Illicit Discharge Findings	Fire Department	Ramon Rodriguez email 12/9/22
	NOV/WL/citation/fines issued for illicit discharges found during proactive inspection	0	Illicit Discharge Findings	Fire Department	No illicit discharges found during proactive inspection. Ramon Rodriguez email 12/9/22
	Report on the reactive investigation program as it relates to responding to reports of suspected illicit discharges, including the number of reports received, the number of investigations conducted, the number of illicit activities found, and the number and type of enforcement actions taken.				
	Reports of suspected illicit discharges received	211	Illicit Discharge Findings	Fire Department	M. Bowman email, 1/26/23
	Reactive investigations of reports of suspected illicit discharges etc.	211	Illicit Discharge Findings	Fire Department	M. Bowman email, 1/26/23
	Illicit discharges etc. found during reactive investigation	7	Illicit Discharge Findings	Fire Department	M. Bowman email, 1/26/23

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Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
	NOV/WL/citation/fines issued for illicit discharges etc. found during reactive investigation	0	Illicit Discharge Findings	Fire Department	M. Bowman email, 1/26/23
	Report the type of training activities, and the number of permittee personnel and contractors trained (both in-house and outside training) within the reporting year.				
	Personnel trained	5	Engineering Database	Engineering	R. Rodriguez
	Contractors trained	0	Engineering Database	Engineering	R. Rodriguez
Part III.A.7.d	Illicit Discharges and Improper Disposal — Spill Prevention and Response				
	Report on the spill prevention and response activities, including the number of spills addressed.				
	Hazardous and non-hazardous material spills responded to	266	Haz Waste Findings	Fire Department	M. Bowman email, 1/26/23
	Report the type of training activities, and the number of permittee personnel and contractors trained (both in-house and outside training) within the reporting year.				
	Personnel trained	0	Engineering Database	Engineering	R. Rodriguez
	Contractors trained	0	Engineering Database	Engineering	R. Rodriguez
Part III.A.7.e	Illicit Discharges and Improper Disposal — Public Reporting				
	Report on the public education and outreach activities that are performed or sponsored by the permittee within the permittee's jurisdiction to encourage the public reporting of suspected illicit discharges and improper disposal of materials, including the type and number of activities conducted, the type and number of materials distributed, and the number of website visits (if applicable).				
	Publicized the Complaint Hotline	365	Website	Marketing	Continuous on website
	Brochures/Flyers/Fact sheets distributed	70,000 – 80,000	Marketing Records	Marketing	Sent to Utility customers
	Neighborhood presentations: Number conducted	1	Green Thumb Festival	Engineering	Via R. Rodriguez
	Neighborhood presentations: Number of participants	30,000	City website	Engineering	Overall festival attendance
	Newspapers & newsletters: Number of articles/notices published	21	Water Wise eSplash, Rainwater Guardian News, Sensible Sprinkling Solutions	Water Resources	C. Claus email 11/17/22
	Newsletters: Number of newsletters distributed	18,079	Water Wise eSplash, Rainwater	Water Resources	C. Claus email 11/17/22

SECTION VII. STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE					
A.	B.	C.	D.	E.	F.
Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
	Public displays (e.g., kiosks, storyboards, posters, etc.) Radio or television Public Service Announcements (PSAs) School presentations: Number conducted School presentations: Number of participants Seminars/Workshops: Number conducted		Guardian News, Sensible Sprinkling Solutions		
		0			
		0			
		0			
		0			
		27	(Virtual) Rainwater Guardian Workshop, Water Wise Living, Selecting Drought Tolerant Plants, Getting to Know Your Sprinkler System, Water Wise – Do's, Don'ts, and How-to's, Overcoming Landscape Challenges	Water Resources	Christine Claus email 11/17/22
		466	(Virtual) Rainwater Guardian Workshop, Water Wise Living, Selecting Drought Tolerant Plants, Getting to Know Your Sprinkler System, Water Wise – Do's, Don'ts, and How-to's, Overcoming Landscape Challenges	Water Resources	Christine Claus email 11/17/22
	Seminars/Workshops: Number of participants				

SECTION VII. STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE					
A.	B.	C.	D.	E.	F.
Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
	Number of visitors to stormwater-related pages	4,357, 205,573	Challenges Be Floridian Website	TBEP	Total page views on Be Floridian Website, and engagements/ impressions on Be Floridian Facebook
Part III.A.7.f	Illicit Discharges and Improper Disposal — Oils, Toxics, and Household Hazardous Waste Control				
	Report on the public education and outreach activities that are performed or sponsored by the permittee within the permittee's jurisdiction to encourage the proper use and disposal of oils, toxics, and household hazardous waste, including the type and number of activities conducted, the type and number of materials distributed, the amount of waste collected / recycled / properly disposed, and the number of website visits (if applicable).				
	Brochures/Flyers/Fact sheets distributed	70,000 – 80,000	Marketing Records	Marketing	Sent to Utility customers
	Household Hazardous Waste (HHW) Drop-off Events	1	Sanitation Records	Sanitation	Jack Crooks email 1/5/23
	HHW Drop-off Events: Amount of waste collected/recycled/disposed (tons)	8.54	Sanitation Records	Sanitation	Jack Crooks email 1/5/23
	Neighborhood presentations: Number conducted	10	Sanitation Records	Sanitation	Jack Crooks email 1/5/23
	Neighborhood presentations: Number of participants	0	Sanitation Records	Sanitation	Sign-in not tracked
	Newspapers & newsletters: Number of articles/notices published	1	Sanitation Records	Sanitation	St. Pete Extra – June Jack Crooks email 1/5/23
	Newsletters: Number of newsletters distributed	3	St. Pete Extra Dec 2021-Feb 2022 (via utility bill insert)	Marketing	Bennett Brzycki email via Ramon Rodriguez 12/9/22
	Public displays (e.g., kiosks, storyboards, posters, etc.)	0		Marketing	B. Bryscki email
	Radio or television Public Service Announcements (PSAs)	12	Marketing Records	Marketing	Informational slides on St. Pete TV
	School presentations: Number conducted	0			
	School presentations: Number of participants	0			
	Seminars/Workshops: Number conducted	0			
	Seminars/Workshops: Number of participants	0			

SECTION VII. STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE						
A.	B.		C.	D.	E.	F.
Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity		Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
	Storm sewer inlets newly marked/replaced		0			No stormdrain marking events
	Number of visitors to stormwater-related pages		4,357, 205,573	Be Floridian Website	TBEP	Total page views on Be Floridian Website, and engagements/impressions on Be Floridian Facebook
Part III.A.7.g	Illicit Discharges and Improper Disposal — Limitation of Sanitary Sewer Seepage					
	Report on the type and number of activities undertaken to reduce or eliminate SSOs and inflow/ infiltration, the number of SSOs or inflow / infiltration incidents found and the number resolved, and the name of the owner of the sanitary sewer system within the permittee's jurisdiction. Report only the SSOs and inflow / infiltration incidents into the MS4.					
	Owner of the sanitary sewer system		City of St. Petersburg			
	Activity to reduce/eliminate SSOs and I&I: (description)		Inspection and maintenance of the City's sanitary sewer system			
	Activity to reduce/eliminate SSOs and I&I: (description)		Lining of the sewer lines to address I/I			
	SSO incidents discovered		22	SSO Summary	Water Resources	J. Stanley email 11/28/22
	SSO incidents resolved		22	SSO Summary	Water Resources	J. Stanley email 11/28/22
	Inflow / infiltration incidents discovered		N/A	N/A	N/A	N/A
	Inflow / infiltration incidents resolved		N/A	N/A	N/A	N/A
Part III.A.7 Summary	For activities required by Part III.A.7: Provide an evaluation of the Stormwater Management Program according to Part VI.B.3 of the permit. Strengths: Education and outreach program reaches large number of residents. SSOs and I/I fully addressed in Phase II of Wet Weather Overflow Mitigation Program Report Limitations: COVID issues have limited in-person seminars and presentations SWMP Revisions implemented to address limitations: None					
Part III.A.8.a	Industrial and High-Risk Runoff — Identification of Priorities and Procedures for Inspections					
	Report on the high-risk facilities inventory, including the type and total number of high-risk facilities.					
	Report on the high-risk facilities inspection program, including the number of inspections conducted and the number and type of enforcement actions taken.					
	Type of Facility	Number of Facilities	Number of Inspections	Enforcement Actions		

SECTION VII. STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE							
A.	B.		C.		D.	E.	F.
Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity		Number of Activities Performed		Documentation / Record	Entity Performing the Activity	Comments
	Operating municipal landfills	0	N/A	N/A	N/A	N/A	N/A
	Hazardous waste treatment, storage, disposal and recovery (HWTSDR) facilities	0	N/A	N/A	N/A	N/A	N/A
	EPCRA Title III, Section 313 facilities (TRI)						
	Facilities determined as high risk by the permittee	22	22	0	Sampling & Inspection Records	Water Resources	Anthony White email 12/21/22
Part III.A.8.b	Industrial and High-Risk Runoff — Monitoring for High Risk Industries						
	Report the number of high-risk facilities sampled.						
	High risk facilities sampled		22		Sampling & Inspection Records	Water Resources	Anthony White email 12/21/22 Industrial User Facilities Sampling & Inspection Schedule
Part III.A.8 Summary	For activities required by Part III.A.8: Provide an evaluation of the Stormwater Management Program according to Part VI.B.3 of the permit.						
	Strengths: Staff are trained to perform inspections. Inspectors in the City’s pretreatment program visited their sites routinely and have familiarity with sites.						
	Limitations: None						
	SWMP revisions implemented to address limitations: None						
Part III.A.9.a	Construction Site Runoff — Site Planning and Non-Structural and Structural Best Management Practices						
	Report the number of permittee and private pre-construction site plans reviewed for stormwater, erosion, and sedimentation controls, and the number approved.						
	PERMITTEE SITES: Construction site plans reviewed		0				
	PERMITTEE SITES: Construction site plans approved		0				
	PRIVATE SITES: Construction site plans reviewed		231		Engineering Plan Review Records	Engineering	Nancy Davis email 11/28/22
	PRIVATE SITES: Construction site plans approved		121		Engineering Plan Review Records	Engineering	Nancy Davis email 11/28/22
	Report the number of development permit applicants notified of the ERP and CGP, and the number of applicants who confirmed ERP and CGP coverage.						
	Notified of ERP stormwater permit requirements		79		Engineering Plan Review Records	Engineering	Nancy Davis email 11/28/22
	Confirmed ERP coverage		79		Engineering Plan Review Records	Engineering	Nancy Davis email 11/28/22
	Notified of CGP stormwater permit requirements		33		Engineering	Engineering	Nancy Davis

SECTION VII. STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE					
A.	B.	C.	D.	E.	F.
Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
	Confirmed CGP coverage		Plan Review Records		email 11/28/22
		33	Engineering Plan Review Records	Construction Services and Permitting	Karen Freggens email
Part III.A.9.b	Construction Site Runoff — Inspection and Enforcement				
	Report on the inspection program for privately-operated and permittee-operated construction sites, including the number of active construction sites during the reporting year, the number of inspections of active construction sites, the percentage of active construction sites inspected, and the number and type of enforcement actions / referrals taken.				
	PERMITTEE SITES: Active construction sites	0			
	PERMITTEE SITES: Pre-, During, and Post inspections of active construction sites for E&S and waste control BMPs	0			
	PERMITTEE SITES: Percentage of active construction sites inspected	0			
	PRIVATE SITES: Active construction sites	9	Construction Services and Permitting Navline database	Construction Services and Permitting	K. Freggens email 1/9/23
	PRIVATE SITES: Pre-, During, and Post inspections of active construction sites for E&S and waste control BMPs	113	Construction Services and Permitting Navline database	Construction Services and Permitting	K. Freggens email 1/9/23
	PRIVATE SITES: Percentage of active construction sites inspected	100	Construction Services and Permitting Navline database	Construction Services and Permitting	K. Freggens email 1/9/23
	Enforcement Action	2	Construction Services and Permitting Navline database	Construction Services and Permitting	K. Freggens email 1/9/23
Part III.A.9.c	Construction Site Runoff — Site Operator Training				
	Report the type of training activities, the number of inspectors, site plan reviewers and site operators trained (both in-house and outside training).				
		DEP Certification	Annual Training		
	Permittee construction site inspectors	5	5		
	Permittee construction site plan reviewers		0		

SECTION VII. STORMWATER MANAGEMENT PROGRAM (SWMP) SUMMARY TABLE					
A.	B.	C.	D.	E.	F.
Permit Citation/ SWMP Element	Permit Requirement/Quantifiable SWMP Activity	Number of Activities Performed	Documentation / Record	Entity Performing the Activity	Comments
	Permittee construction site operators	0			
Part III.A.9 Summary	For activities required by Part III.A.9: Provide an evaluation of the Stormwater Management Program according to Part VI.B.3 of the permit.				
	Strengths: FDEP certified Inspectors visit sites daily for erosion control				
	Limitations: Some uncertainty on reporting				
	SWMP revisions implemented to address limitations: Rewriting SOP to clarify chain of command and ensure training in Year 5				

SECTION VIII. CHANGES TO THE STORMWATER MANAGEMENT PROGRAM (SWMP) ACTIVITIES (Not Applicable In Year 4)		
A.	Permit Citation/ SWMP Element	Proposed Changes to the Stormwater Management Program Activities Established as Specific Requirements Under Part III.A of the Permit (Including the Rationale for the Change) — REQUIRES DEP APPROVAL PRIOR TO CHANGE IF PROPOSING TO REPLACE OR DELETE AN ACTIVITY.
B.	Permit Citation/ SWMP Element	Changes to the Stormwater Management Program Activities NOT Established as Specific Requirements Under Part III.A of the Permit (Including the Rationale for the Change)

SECTION IX. TMDL Status Report

A.	YEAR 1 Provide a table summarizing the status of the TMDL process. Include a list of prioritized TMDLs and their monitoring and implementation schedule; and include the Identification number of the outfall prioritized for TMDL monitoring.							
	WBID Number	Segment/ Waterbody/ Basin	Pollutant of Concern	TMDL DEP / EPA	Percent Reduction (WLA)	Priority Rank	Monitoring Summary / BPCP Due Date	Supplemental SWMP Due Date
				☐ / ☐		1	(Year 3 AR)	(Year 4 AR; N/A) if BPCP)
				☐ / ☐				
B.	YEAR 3 and annually thereafter, provide a summary of the estimated load reductions that have occurred for the pollutant(s) of concern being discharged from the MS4 to the TMDL water body during the reporting period and cumulatively since the date the Supplemental SWMP was implemented. Year 3: Submit a Monitoring data summary or BPCP (if applicable). Attachments A & B Year 4: Submit a Supplemental SWMP (if applicable). N/A <i>Note: Previously prioritized waterbodies with approved TMDL Implementation Plans shall be reported in this section.</i>							
	WBID Number	Pollutant of Concern	Monitoring Summary / BPCP Submitted	Supplemental SWMP Submitted	Projected load reductions OR Actual load reductions to date			
			(Year 3 AR)	(Year 4 AR; N/A if BPCP)				
C.	Provide a brief statement as to the status of TMDL implementation according to Part VIII.B. of the permit (e.g. status of monitoring to validate WLA):							

Part VI.C.: Please submit an evaluation of the SWMP that includes:

- An evaluation of the effectiveness of the SWMP in reducing pollutant loading from the MS4 utilizing information generated in Part V. (see Assessment Requirements, Part V.A.1-3 and Part V.B.2-3);
- A description of whether stormwater pollutant loadings discharged from the MS4 have decreased during the permit cycle based on the Assessment Program results; and
- The identification of recommended SWMP revisions for elements in Part III as a result of the SWMP evaluation.

The City's SWMP has been an effective tool to manage pollutant loading within the City, even as development increases. As part of the C5Y4 annual report, pollutant loadings from 26 watersheds/catchments throughout the City were evaluated. The loadings were estimated for the most recent five-year cycle (2017-2021) and compared against the previous five-year cycle (2012-2016). The full methodology of estimating and evaluation of the loadings can be found in **Attachment A**.

Overall pollutant loads for total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS), and biochemical oxygen demand (BOD), were evaluated. For all parameters loadings from 2017-2021 were lower than 2012-2016, in some cases by more than half.

Comparing 2021 to 2020 data:

- TN loads were lower in 25 of the 26 catchments
- TP loads were lower in 24 of the 26 catchments
- TSS loads were lower in 25 of the 26 catchments
- BOD loads were lower in 25 of the 26 catchments

Though the City SWMP has been effective, and no major revisions are planned, there are two minor recommended SWMP improvements that the City will be making:

- Ensure staff training programs are conducted, and tracked, annually.
- Rewriting the Standard Operations Procedures for construction site inspections as well as construction site plan reviews to clarify chain of command and ensure training is up to date.

City of St. Petersburg
FLS000007-005
Annual Report
Cycle 5, Year 4
July 1, 2021 – June 30, 2022

Attachment A
Pollutant Load Estimates

March 2023

st.petersburg
www.stpete.org

TECHNICAL MEMORANDUM

Subject: Summary of Pollutant Loadings Within the City of Saint Petersburg

INTRODUCTION

This technical memorandum provides an estimate of pollutant loadings from 26 watersheds (catchments) in the City of Saint Petersburg (City) area. These watersheds (catchments) are listed in Table 1 with an assigned name (general location descriptor) and the locations are identified in Figure 1. Loadings are presented for the most recent five-year period, and comparison to the prior five-year period is made.

Table 1. Catchments in the City of Saint Petersburg region for which pollutant loads were estimated.	
Catchment ID	Catchment Descriptor
1	ROOSEVELT CREEK
2	SAWGRASS LAKE
3	TINNEY CREEK
4	NE ST PETERSBURG
5	NE ST PETERSBURG
6	70TH AVE NORTH CANAL
7	54TH AVE EAST CANAL
8	JOES CREEK
9	LONG BAYOU
10	PASADENA LAKE
11	SW ST PETERSBURG
12	BEAR CREEK
13	BOOKER CREEK
14	NORTH COFFEE POT
15	45TH AVE NORTH EAST CANAL
16	COFFEE POT BAYOU
17	ALBERT WHITTED
18	34TH STREET
19	CLAM BAYOU
20	GULFPORT
21	FRENCHMAN CREEK
22	LAKE MAGGIORE/SALT CREEK
23	BIG BAYOU
24	LITTLE BAYOU CREEK
25	PINELLAS POINT
26	LAKE MAGGIORE

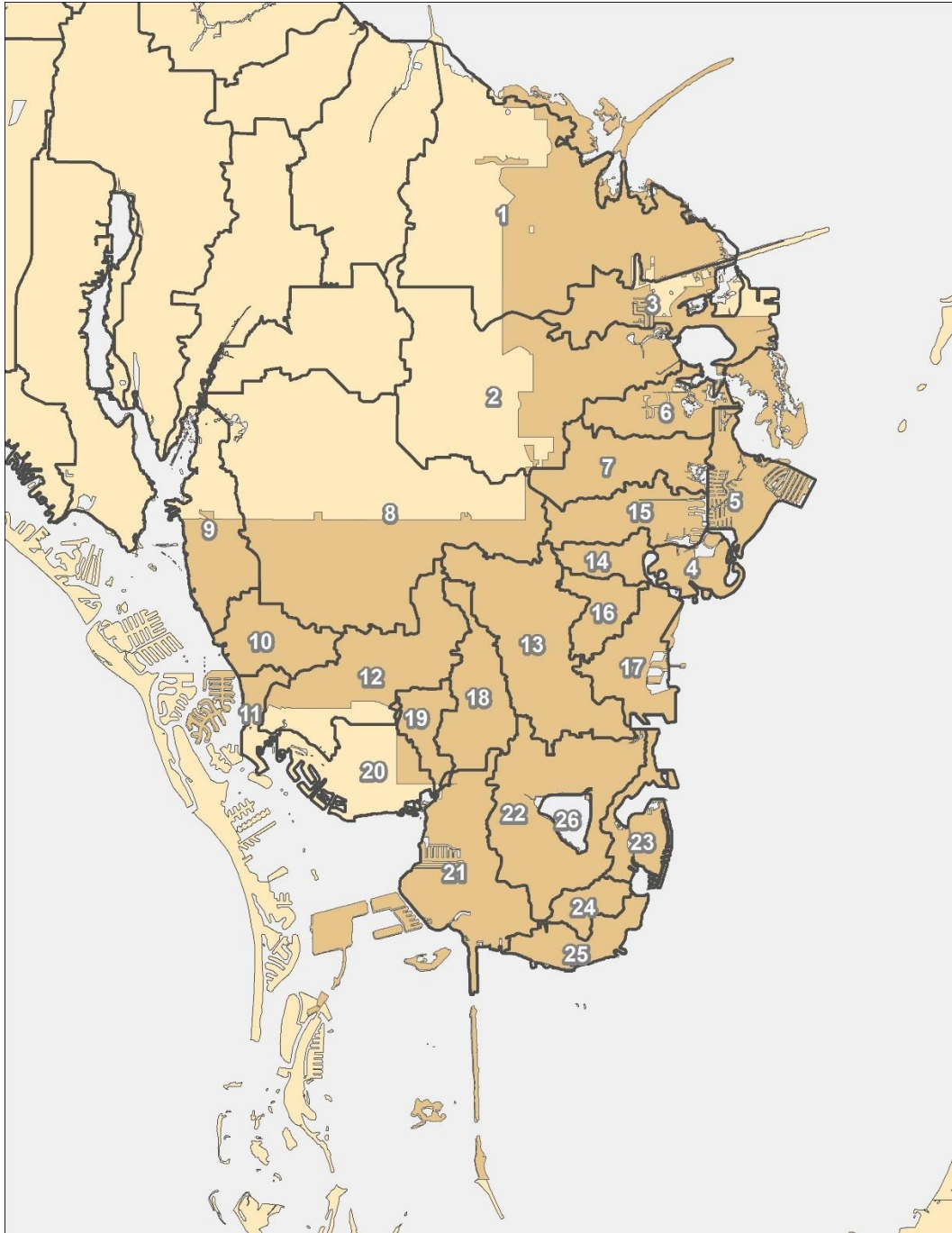


Figure 1. Locations of catchments in the City of Saint Petersburg region for which pollutant loads were estimated.

LOADING METHODOLOGY

Loadings were estimated for the most recent 5-year period (2017-2021). The estimates were produced with the method previously developed for the Tampa Bay Estuary Program. This model provides monthly and annual loads of water, total nitrogen, total phosphorus, total suspended solids, and

biochemical oxygen demand to the seven segments of Tampa Bay. The estimates from this model can be further broken down to assign loadings to the catchments identified in Figure 1. Load sources include atmospheric deposition directly to the surface of the bay, industrial and domestic wastewater facilities from direct discharge to the bay or its tributaries, and from loadings resulting from land application, materials handling losses at port facilities, springs, groundwater inputs along the bay's shoreline, and nonpoint sources (runoff).

Data for estimating atmospheric deposition directly to the bay include rainfall from a set of National Weather Service sites and nitrogen concentrations in rainfall collected at the Verna Wellfield site by the National Atmospheric Deposition Program. Previous work done in Tampa Bay provides for estimation of dry deposition loads based on the calculated wet deposition loads. Data for domestic and industrial point source loadings are obtained from individual facilities and entities, as are data for estimating materials handling loadings. Spring loads are estimated using measured spring flows and water quality constituent concentrations. Groundwater loads along the shoreline of the bay are estimated from the surficial, intermediate, and Floridan aquifers using available data for seasonal potentiometric surfaces and nutrient concentration data from the Southwest Florida Water Management District (SWFWMD) Ambient Ground Water Monitoring Program.

Nonpoint source loading estimates from the Tampa Bay watershed are based on measured flow and water quality data, National Weather Service rainfall data, GIS coverages for land use, soils, and subbasin boundaries. Measured flow data are obtained from the United States Geological Survey (USGS), SWFWMD, Manatee County, City of Bradenton, and Tampa Bay Water. Observed water quality data are obtained from USGS, Hillsborough County, Pinellas County, and Manatee County. The methodology applied for estimating nonpoint source loadings from a given watershed is dependent on data availability, with three methods used.

The first method is applied to those basins with measured streamflow and water quality. Pollutant loads are estimated by multiplying measured monthly flows and measured pollutant concentrations. The resulting load estimate incorporates loads from all sources upstream of the flow gage, so that the total nonpoint source loads is estimated as the calculated pollutant load less any loads from point sources or springs upstream of the gage.

The second method is applied to those basins with measured streamflow but no measured water quality data. Model-based pollutant concentrations are estimated based on wet and dry season land use- and soil type-specific runoff coefficients, and land use-specific water quality concentrations. Land use information obtained from SWFWMD is classified according to the Florida Land Use and Cover Classifications System (FLUCCS), and these land uses are aggregated into 21 categories for loading calculations.

The third method for nonpoint source loading estimation is applied to those basins without measured flow or water quality data. National Weather Service rainfall data are used to develop basin-specific monthly rainfall data and are combined with the land use-specific water quality concentrations and the

land use- and soil type-specific runoff coefficients to estimate nonpoint source loadings.

RAINFALL

Rainfall data from the National Oceanographic and Atmospheric Administration (NOAA) were obtained and reviewed for the station at Albert Whitted airport. Figure 2 illustrates the time-series of total annual rainfall from 2012-2021, encompassing the most recent and prior five-year periods for which loadings were investigated for this memorandum. A box and whisker plot comparing the two five-year periods is provided in Figure 3. Rainfall during the most recent five-year period (2017-2021) were overall lower than the preceding five-year period. In addition, a greater range in total annual precipitation was evident during the most recent five-year period.

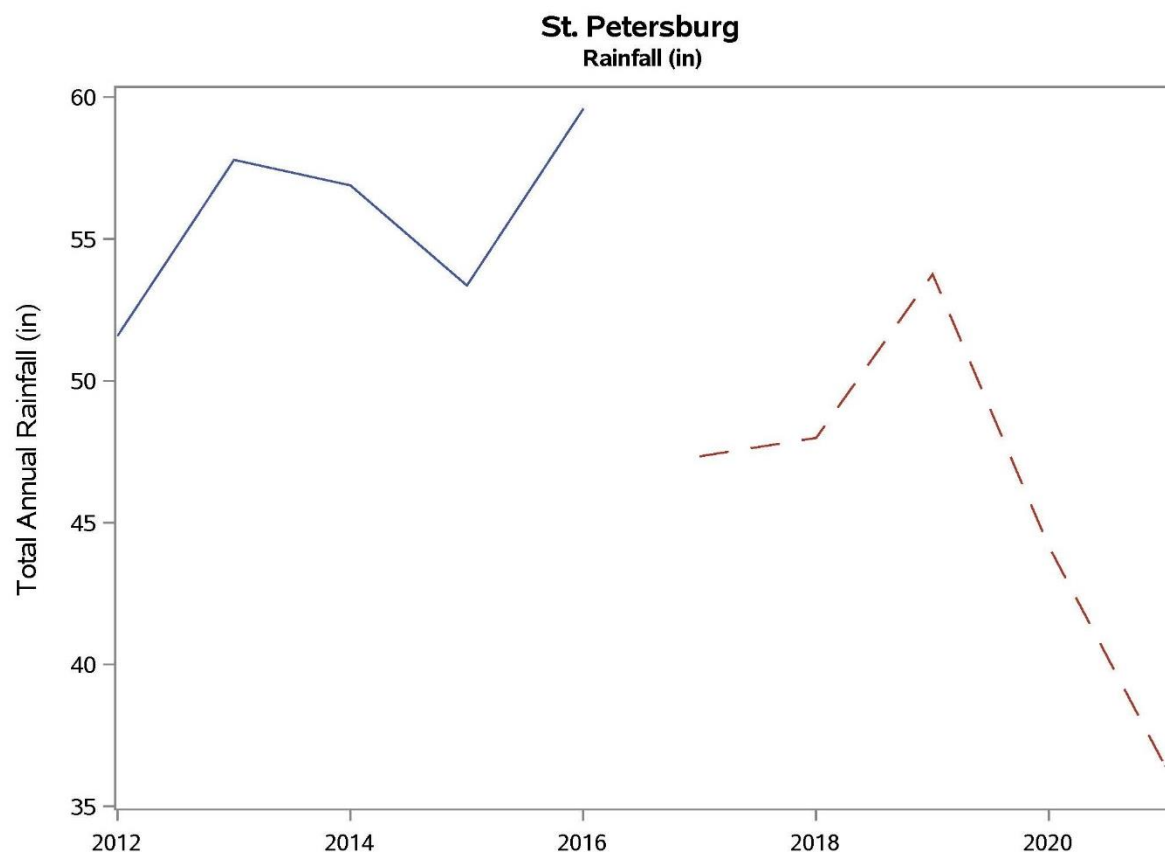


Figure 2. Time-series of total annual precipitation (in) for the period 2012-2021, measured at Albert Whitted Airport in St. Petersburg.

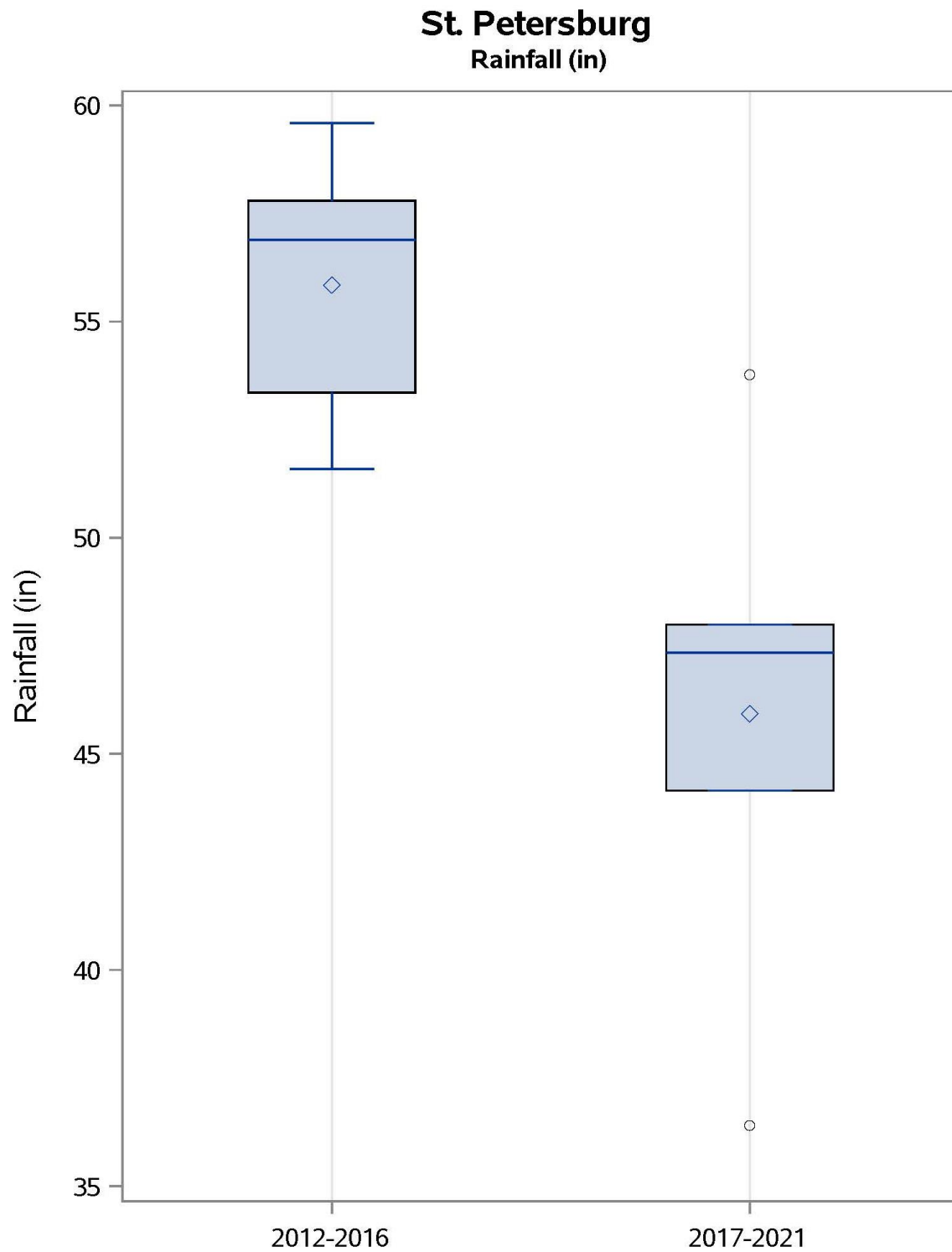


Figure 3. Box and whisker plots of total annual precipitation (in) for each five-year period.

MOST RECENT 5-YEAR PERIOD LOADINGS

Annual loadings were estimated for each catchment and for each year in the 2017-2021 period for total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS) and biological oxygen demand (BOD). The estimated annual loads for each parameter are provided in Tables 2 through 5, respectively.

Interannual patterns were similar across catchments and between years. Pollutant loads increased from 2017 to a peak in 2019 before exhibiting a decline again. For most catchments and pollutants, 2021 values were lower than 2020 values, while others were characterized by the reverse. Nonpoint source loadings are largely dependent on rainfall, as well as landuse type and soil composition. The differences between years may be largely due to the observed differences in rainfall between years (Figure 2).

Table 2. Estimated annual total nitrogen loads (kg/year) in each Saint Petersburg region catchment.

Catchment	2017	2018	2019	2020	2021
1	7,197	9,995	12,606	6,578	7,369
2	2,436	3,999	7,379	3,726	3,246
3	2,784	4,121	6,163	3,165	3,161
4	729	1,196	2,207	1,115	971
5	1,336	2,193	4,046	2,044	1,780
6	1,243	2,041	3,766	1,902	1,657
7	1,746	2,867	5,289	2,671	2,327
8	5,398	8,183	14,397	7,197	6,788
9	1,494	2,257	3,961	1,979	1,874
10	1,644	2,483	4,358	2,178	2,062
11	311	470	825	412	390
12	3,063	4,628	8,126	4,061	3,843
13	3,318	5,438	10,024	5,061	4,416
14	601	986	1,819	919	800
15	1,505	2,469	4,554	2,300	2,004
16	795	1,305	2,409	1,216	1,059
17	1,463	2,402	4,431	2,238	1,949
18	1,981	3,042	5,396	2,702	2,514
19	849	1,282	2,251	1,125	1,065
20	308	465	816	408	386
21	2,668	4,056	7,122	3,644	3,370
22	3,263	5,341	9,839	4,971	4,339
23	993	1,630	3,007	1,519	1,323
24	525	861	1,588	803	699
25	741	1,188	2,155	1,111	973
26	374	614	1,133	572	498

Table 3. Estimated annual total phosphorus loads (kg/year) in each Saint Petersburg region catchment.

Catchment	2017	2018	2019	2020	2021
1	1,377	1,884	2,390	1,246	1,400
2	419	686	1,267	640	558
3	513	749	1,114	572	576
4	125	205	379	192	167
5	230	376	695	351	306
6	214	350	647	327	285
7	300	491	908	459	400
8	903	1,367	2,408	1,203	1,135
9	250	377	662	330	313
10	275	414	728	364	344
11	52	78	138	69	65
12	512	772	1,357	678	642
13	571	932	1,721	869	758
14	103	169	312	158	138
15	259	423	782	395	344
16	137	224	414	209	182
17	252	412	761	384	335
18	333	510	907	454	422
19	142	214	376	188	178
20	51	78	136	68	65
21	445	675	1,187	607	561
22	561	915	1,688	853	745
23	171	279	517	261	227
24	90	148	273	138	120
25	126	201	366	188	165
26	64	105	195	98	86

Table 4. Estimated annual total suspended solids loads (kg/year) in each Saint Petersburg region catchment.

Catchment	2017	2018	2019	2020	2021
1	224,158	306,967	389,589	203,115	228,091
2	78,446	128,515	237,023	119,882	104,458
3	87,763	128,910	194,188	99,714	99,495
4	23,468	38,447	70,909	35,865	31,250
5	43,018	70,474	129,976	65,740	57,282
6	40,043	65,600	120,988	61,194	53,320
7	56,234	92,122	169,898	85,931	74,878
8	176,501	267,610	470,109	235,398	221,981
9	48,883	73,859	129,446	64,785	61,323
10	53,782	81,262	142,421	71,279	67,470
11	10,184	15,387	26,967	13,497	12,775
12	100,203	151,467	265,540	132,906	125,744
13	106,901	174,825	322,100	162,880	142,162
14	19,339	31,682	58,431	29,554	25,751
15	48,482	79,364	146,306	73,993	64,521
16	25,607	41,951	77,372	39,133	34,098
17	47,110	77,178	142,341	71,994	62,731
18	64,614	99,190	175,684	88,123	82,003
19	27,776	41,968	73,553	36,812	34,845
20	10,069	15,214	26,663	13,345	12,631
21	83,669	127,179	223,370	114,071	105,675
22	104,959	171,490	315,761	159,767	139,496
23	31,970	52,375	96,597	48,857	42,571
24	16,876	27,614	50,887	25,763	22,455
25	22,870	36,696	66,708	34,337	30,065
26	12,045	19,733	36,393	18,407	16,039

Table 5. Estimated annual biological oxygen demand loads (kg/year) in each Saint Petersburg region catchment.

Catchment	2017	2018	2019	2020	2021
1	43,400	59,445	75,439	39,343	44,175
2	14,454	23,696	43,659	22,096	19,252
3	16,689	24,471	36,676	18,849	18,865
4	4,324	7,089	13,061	6,610	5,760
5	7,926	12,994	23,941	12,117	10,557
6	7,378	12,096	22,286	11,279	9,827
7	10,361	16,986	31,295	15,838	13,800
8	31,788	48,212	84,672	42,409	39,986
9	8,795	13,292	23,289	11,658	11,034
10	9,677	14,624	25,623	12,827	12,141
11	1,832	2,769	4,852	2,429	2,299
12	18,031	27,262	47,780	23,920	22,629
13	19,687	32,219	59,303	30,007	26,188
14	3,563	5,842	10,763	5,447	4,746
15	8,931	14,630	26,944	13,635	11,889
16	4,718	7,735	14,252	7,213	6,284
17	8,680	14,230	26,219	13,269	11,562
18	11,679	17,939	31,766	15,940	14,827
19	4,997	7,553	13,233	6,624	6,270
20	1,812	2,738	4,797	2,401	2,273
21	15,420	23,448	41,128	21,053	19,481
22	19,341	31,622	58,166	29,451	25,712
23	5,891	9,657	17,793	9,005	7,846
24	3,113	5,097	9,382	4,753	4,143
25	4,294	6,887	12,489	6,443	5,642
26	2,219	3,638	6,704	3,393	2,956

COMPARISON WITH PRIOR 5-YEAR PERIOD

Total loads for the 2017-2021 period were compared with total loads from the prior 5-year period (Table 6). For all parameters, total loads during the most recent 5-year period were lower than those during the prior 5-year period (2012-2016). In many cases, total loads were half that, or lower, than those from the prior 5-year period. These differences were also apparent in the rainfall comparison between periods (Figure 3) which is likely the largest driver in loadings differences between the periods.

Table 6. Total loadings per 5-year period for four pollutants in each Saint Petersburg region catchment.

Catchment	Total Nitrogen (kg)		Total Phosphorus (kg)		Total Suspended Solids (kg)		Biological Oxygen Demand (kg)	
	2012-2016	2017-2021	2012-2016	2017-2021	2012-2016	2017-2021	2012-2016	2017-2021
1	62,071	43,744	11,752	8,296	1,900,465	1,351,920	368,988	261,802
2	42,651	20,785	7,332	3,570	1,369,388	668,324	252,225	123,157
3	32,961	19,393	5,933	3,524	1,035,461	610,071	195,394	115,549
4	12,760	6,218	2,193	1,068	409,671	199,938	75,456	36,844
5	23,389	11,398	4,020	1,958	750,932	366,489	138,313	67,536
6	21,771	10,610	3,742	1,822	699,004	341,146	128,748	62,866
7	30,571	14,899	5,255	2,559	981,535	479,063	180,785	88,280
8	76,527	41,963	12,787	7,016	2,496,240	1,371,600	449,406	247,066
9	20,963	11,565	3,497	1,931	684,376	378,295	123,058	68,068
10	23,064	12,724	3,848	2,124	752,976	416,214	135,393	74,891
11	4,367	2,409	729	402	142,576	78,810	25,637	14,181
12	43,030	23,721	7,180	3,961	1,404,668	775,860	252,613	139,622
13	57,846	28,257	9,938	4,850	1,857,796	908,869	342,036	167,403
14	10,514	5,124	1,807	880	337,585	164,757	62,179	30,361
15	26,304	12,832	4,521	2,203	844,650	412,666	155,545	76,029
16	13,923	6,785	2,393	1,165	447,012	218,162	82,334	40,202
17	25,614	12,482	4,403	2,144	822,370	401,354	151,471	73,961
18	29,118	15,635	4,891	2,626	947,018	509,614	171,221	92,151
19	11,911	6,571	1,987	1,097	388,872	214,953	69,923	38,677
20	4,318	2,382	720	398	140,969	77,922	25,348	14,021
21	38,388	20,861	6,396	3,474	1,202,535	653,964	221,460	120,529
22	56,744	27,753	9,745	4,761	1,820,257	891,474	335,288	164,291
23	17,382	8,471	2,988	1,455	558,083	272,370	102,792	50,192
24	9,170	4,476	1,575	768	293,835	143,594	54,168	26,488
25	12,308	6,168	2,092	1,046	381,583	190,676	71,389	35,755
26	6,549	3,191	1,126	548	210,259	102,616	38,727	18,910

EVENT MEAN CONCENTRATIONS

The event mean concentration (EMC) represents an average pollutant concentration for a given stormwater event. For this technical memorandum, an EMC is operationally defined as the ratio of a pollutant load to the hydrologic load, calculated for each catchment. The average for the most recent five-year period was used in the ratios.

The EMC values for total phosphorus exhibited a narrow range between catchments (0.26-0.29 kg/1000 m³). While greater ranges in EMC values occurred for the other pollutants, similar spatial patterns were apparent for all four pollutants examined. The greatest EMC values occurred in the western portion of the City (catchments 8-12 and 18-20). These catchments include Joes Creek and Long Bayou, as well as watersheds southward to Gulfport, Clam Bayou, and 34th Street. The lowest EMC values occurred in the more northern regions of the City (catchments 1 and 3; Roosevelt Creek and Tinney Creek) and the more southern points (catchments 25 and 21; Pinellas Point and Frenchman Creek).

Table 7. Event mean concentrations (kg/1,000 m³) by catchment for each pollutant.

Catchment	Total Nitrogen	Total Phosphorus	Total Suspended Solids	Biological Oxygen Demand
1	1.36	0.26	42.02	8.14
2	1.65	0.28	52.99	9.77
3	1.47	0.27	46.37	8.78
4	1.65	0.28	52.99	9.77
5	1.65	0.28	52.99	9.77
6	1.65	0.28	52.99	9.77
7	1.65	0.28	52.99	9.77
8	1.75	0.29	57.12	10.29
9	1.75	0.29	57.33	10.32
10	1.75	0.29	57.33	10.32
11	1.75	0.29	57.33	10.32
12	1.75	0.29	57.31	10.31
13	1.65	0.28	53.08	9.78
14	1.65	0.28	52.99	9.77
15	1.65	0.28	53.03	9.77
16	1.65	0.28	52.99	9.77
17	1.65	0.28	52.99	9.77
18	1.73	0.29	56.39	10.20
19	1.75	0.29	57.33	10.32
20	1.75	0.29	57.33	10.32
21	1.58	0.26	49.45	9.11
22	1.65	0.28	52.84	9.74
23	1.65	0.28	52.99	9.77
24	1.64	0.28	52.60	9.70

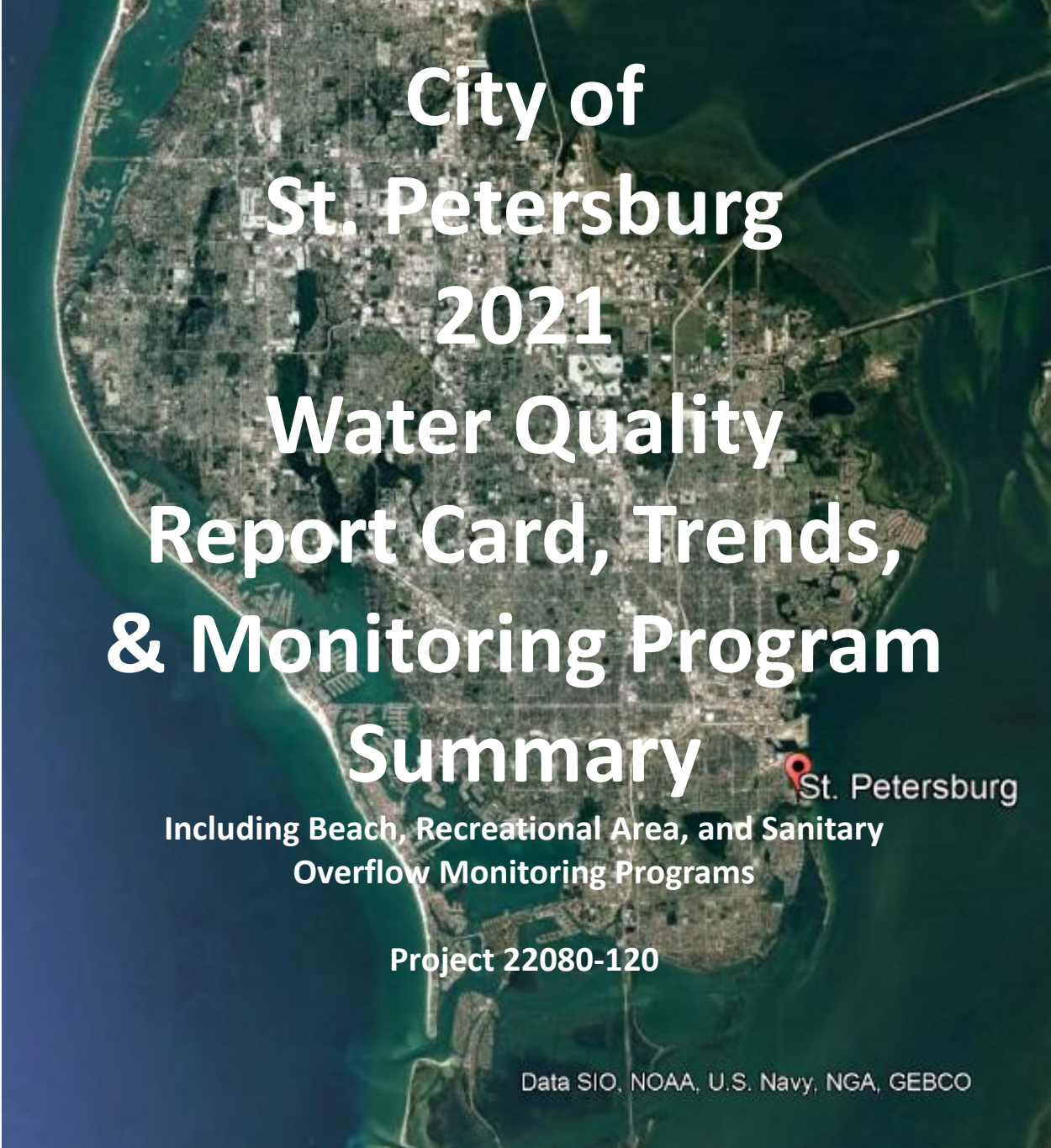
Table 7. Event mean concentrations (kg/1,000 m ³) by catchment for each pollutant.				
Catchment	Total Nitrogen	Total Phosphorus	Total Suspended Solids	Biological Oxygen Demand
25	1.51	0.26	46.78	8.77
26	1.65	0.28	52.99	9.77

City of St. Petersburg
FLS000007-005
Annual Report
Cycle 5, Year 4
July 1, 2021 – June 30, 2022

Attachment B
Water Quality Report Card

March 2023

st.petersburg
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City of St. Petersburg 2021 Water Quality Report Card, Trends, & Monitoring Program Summary

Including Beach, Recreational Area, and Sanitary
Overflow Monitoring Programs

Project 22080-120

Data SIO, NOAA, U.S. Navy, NGA, GEBCO



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2021 Water Quality Report Card

INTRODUCTION

The City of St. Petersburg Municipal Separate Storm Sewer System (MS4) is currently operating under a National Pollutant Discharge Elimination System (NPDES) Permit (# FLS000007-005) regulated by the Florida Department of Environmental Protection (DEP). An annual report must be generated to comply with permit requirements. Annual reporting includes documentation of MS4 activities with the City and is designed to reduce the impact of stormwater runoff in washing harmful pollutants into local surface waters. The annual report incorporates a Water Quality Report Card approach.

The following presents the Water Quality Report Card through the end of 2021. The Report Card presents information for two central themes related to water quality – Environmental Health and Human Health. The City has implemented a series of water quality monitoring programs that provide critical insights to the status and trends in water quality as they pertain to these two themes. Each of these monitoring programs are presented, including a description of the program (i.e., what, where, why, and how) and a summary of the data collected by that program. In addition, environmental health data are included for the first half of 2022.

2021 Water Quality Report Card

ENVIRONMENTAL HEALTH

WHY IS WATER QUALITY IMPORTANT?

To residents of the Tampa Bay area, it is obvious that the health of the Tampa Bay ecosystem, specifically its water quality, is important in terms of regional environmental values. What is less commonly considered is the importance of the Bay's healthy ecosystem in terms of the region's economic health and residents' well-being and quality of life.

Economic Value

The Tampa Bay Estuary Program (TBEP) and its partners, including the City of St. Petersburg, established ecosystem goals, and developed methods for achieving the goals, as defined in the Comprehensive Conservation and Management Plan (CCMP) originally published in 1996. The goals were related to improving the health of the Tampa Bay ecosystem, with quantifiable targets established for living resources based on bay conditions found in the 1950s, when the bay area population was ~25% of that currently. As noted by the TBEP, the CCMP "...reflected broad-based input from citizens, groups, and communities with a common interest in a healthy bay as the cornerstone of a prosperous economy" (see the Program description on the TBEP website, TBEP.org).

The Tampa Bay area includes parts or all of six counties with a population of approximately 3 million, and employment of approximately 1.4 million. The TBEP and the Tampa Bay Regional Planning Council (TBRPC) completed a study which quantified the Bay's economic value (TBEP and TBRPC, 2014). This valuation identified bay-area business categories as either "Bay Influenced" or "Non-Bay Influenced", with a portion of the "Bay Influenced" category sub-classified as "Healthy Bay Dependent". Those business categories determined to be "Healthy Bay Dependent" include tourism-related ventures as well as real estate and shopping businesses, as examples.

The study found that "Bay-Influenced" businesses accounted for 47% of the total within the Tampa Bay watershed, and that "Healthy Bay Dependent" businesses accounted for 21% of the total. The job totals for "Bay-Influenced" businesses were 660,000, while the subset of these which were "Healthy Bay Dependent" totaled about 300,000.

These findings indicate that the "Healthy Bay Dependent" businesses and associated jobs account for about 1 in every 5 businesses and jobs in the Tampa Bay watershed. The monetary value associated with these jobs was estimated as representing \$22 billion (13% of total six-county

GDP), and that half the jobs in the Bay watershed, corresponding to \$51 billion, are associated with "Bay Influenced" positions.

The study also provided an estimate of the monetary benefits of ecosystem services provided by Bay habitats, including seagrasses. It was estimated that Bay area residents would have to pay additional fees of \$20-\$100 million/year for stormwater and wastewater treatment without the treatment provided by seagrasses. Additional modeling of the impacts of saving \$24 million/year in treatment indicated an estimated economic impact (due to spending on other purchases) of almost 500 jobs and \$223 million in personal income within Hillsborough, Pinellas, and Pasco counties. Additional study results quantified the premiums associated with housing, hotels, and food service associated with Bay and non-Bay locations.

Quality of Life

Another study quantified the Tampa Bay area's Human Well-being Index (HWBI), related to health, quality of life, clean water and air, and availability of food and recreational opportunities. The HWBI was developed by the USEPA's Office of Research and Development as a means of quantifying the influence of social, economic, and environmental service flows on human well-being (Smith et al., 2012).

The HWBI includes 8 components (domains) of human well-being that can be linked to ecosystem services via their relationship to economic, environmental, and societal well-being. The 8 domains (Education, Health, Leisure Time, Living Standards, Cultural Fulfillment, Safety and Security, Social Cohesion, and Connection to Nature), along with 25 indicators and 80 metrics were used to calculate the scores for each domain. The HWBI methodology can be applied to any size population. Applied to the Tampa Bay area, the HWBI indicates a slightly higher well-being in the Bay area than in Florida as a whole, but below the national average. Individual domain scores are also provided for each of the five main counties of the Bay area (Hillsborough, Manatee, Pasco, Pinellas, and Polk).

AMBIENT WATER QUALITY MONITORING PROGRAM

The City's Ambient Water Quality Monitoring Program collects data to allow assessment of the quality of the City's surface waters. Data collected assist the City in its environmental stewardship efforts, aiding the City in accomplishing the following:

- determination of overall effectiveness of the City's Stormwater Management Program (SWMP);
- identification and prioritization of portions of the City's stormwater system requiring additional pollution reduction controls;
- evaluation of load reductions due to in-ground projects and other management actions implemented in the City's drainage area;
- identification of local sources where urban stormwater is adversely affecting surface water resources; and
- meeting the requirements of the City's MS4 (Municipal Separate Storm Sewer Systems) permit No. FLS000007. The MS4 permit is the means by which the Florida Department of Environmental Protection and Environmental Protection Agency regulate stormwater discharges to surface waters and directs the permit holder (the City) to "...reduce the discharge of pollutants...to the Maximum Extent Practicable".

Since 2001, the City's stormwater monitoring requirements were accomplished utilizing data collected by the Southwest Florida Water Management District from Lake Maggiore and Pinellas County data for the inland and coastal sites. Monitoring of the coastal sites and some of the inland sites originally sampled by Pinellas County from 1991 through 2012 within City boundaries were taken over by the City in 2013. In the summer of that year, the City began water quality sampling at a number of sites within its boundaries that had been sampled by the County, and in several additional water bodies (Table 1 and Figure 1). The City's sampling routine follows that implemented by the County.

The City's monitoring program includes streams and ditches, two lakes, and coastal waters in Tampa Bay adjacent to the City shoreline (Table 1 and Figure 1). Fixed monitoring sites in streams and ditches upstream of tidal influences are sampled for water quality and flow measurements, with five freshwater sampling sites (classified as "Stream" in Table 1). Additional water quality samples are collected from marine portions of streams, creeks, and channels (those classified as "Estuary" in Table 1). Fixed monitoring sites include lake monitoring sites in Lake Maggiore and Crescent Lake.

Coastal water sites are also sampled by the City within nearshore regions of Tampa Bay off the City's coastline. The City monitors four sites in each of two coastal segment in Tampa Bay (E-6 north of the former Pier location and E-7 south of the former Pier location, see Figure 1). The city

collects samples from these sites and from all fixed sites approximately every six weeks in the wet season and every seven weeks in the dry season, or a total of eight times per year. The City's accredited water quality laboratory performs all analyses in-house. All monitoring sites are sampled for a full suite of water quality constituents, including the following:

- Physical constituents (salinity, specific conductance, pH, and temperature),
- Nutrients (nitrogen and phosphorus),
- Chlorophyll *a* (phytoplankton biomass),
- Dissolved oxygen and oxygen demanding materials,
- Water clarity (Secchi disc),
- Enteric bacteria (*Enterococci*, *E. coli*), and
- Constituents affecting water clarity (TSS and Turbidity).

Table 1. City water quality sampling stations.

Basin	WBID	WBID Name	Sample Station	Water Type	Sampling Period
BOCA CIEGA BAY					
10	1668F	Pasadena Lake Outlet	GC-01	Stream	2019-2022
9	1694C	Direct Runoff to Bay	JL-01	Estuary	2019-2022
18	1716A	34th Street Basin	45-03	Stream	2008-2022
19	1716B	Clam Bayou Drain	46-03	Stream	2008-2022
Estuary	1716A	34th Street Basin	578	Stream	2016-2022
21	1709F	Frenchmans Creek - Basin U	48-03	Estuary	2008-2022
21	1716C	Clam Bayou (East Drainage)	CB-01	Estuary	2014-2022
21	1716C	Clam Bayou (East Drainage)	North Canal	Estuary	2016-2022
21	1716C	Clam Bayou (East Drainage)	South Canal	Estuary	2016-2022
21	1716C	Clam Bayou (East Drainage)	Central Canal	Estuary	2016-2022
12	1701	Bear Creek	39-02	Estuary	2008-2022
Estuary	1716D	Clam Bayou Drain (Tidal)	580	Estuary	2016-2022
Estuary	1716D	Clam Bayou Drain (Tidal)	CBD-01	Estuary	2016-2022
MIDDLE TAMPA BAY					
13	1696	Booker Creek	40-02	Stream	2008-2022
26	1731A	Lake Maggiore	LM-1	Lake	2013-2022
26	1731A	Lake Maggiore	LM-2	Lake	2013-2022
26	1731A	Lake Maggiore	LM-3	Lake	2013-2022
22	1731B	Salt Creek	SC-01	Estuary	2019-2022
16	1700A	Crescent Lake	CL-01	Lake	2013-2022
16	1700A	Crescent Lake	CL-02	Lake	2013-2022
24	1709D	Little Bayou - Basin Q	51-02	Estuary	2008-2022
Estuary	1683	Smacks Bayou	32-03	Estuary	2008-2022
Estuary	1700	Coffeepot Bayou	44-02	Estuary	2008-2022
Estuary	1558B	Tampa Bay (Middle Segment)	E6-1	Estuary	2003-2022
Estuary	1558C	Tampa Bay (Middle Segment)	E6-2	Estuary	2003-2022
Estuary	1558C	Tampa Bay (Middle Segment)	E6-3	Estuary	2003-2022
Estuary	1558C	Tampa Bay (Middle Segment)	E6-4	Estuary	2003-2022
Estuary	1558B	Tampa Bay (Middle Segment)	E7-1	Estuary	2003-2022
Estuary	1558B	Tampa Bay (Middle Segment)	E7-2	Estuary	2003-2022
Estuary	1558B	Tampa Bay (Middle Segment)	E7-3	Estuary	2003-2022
Estuary	1558B	Tampa Bay (Middle Segment)	E7-4	Estuary	2003-2022

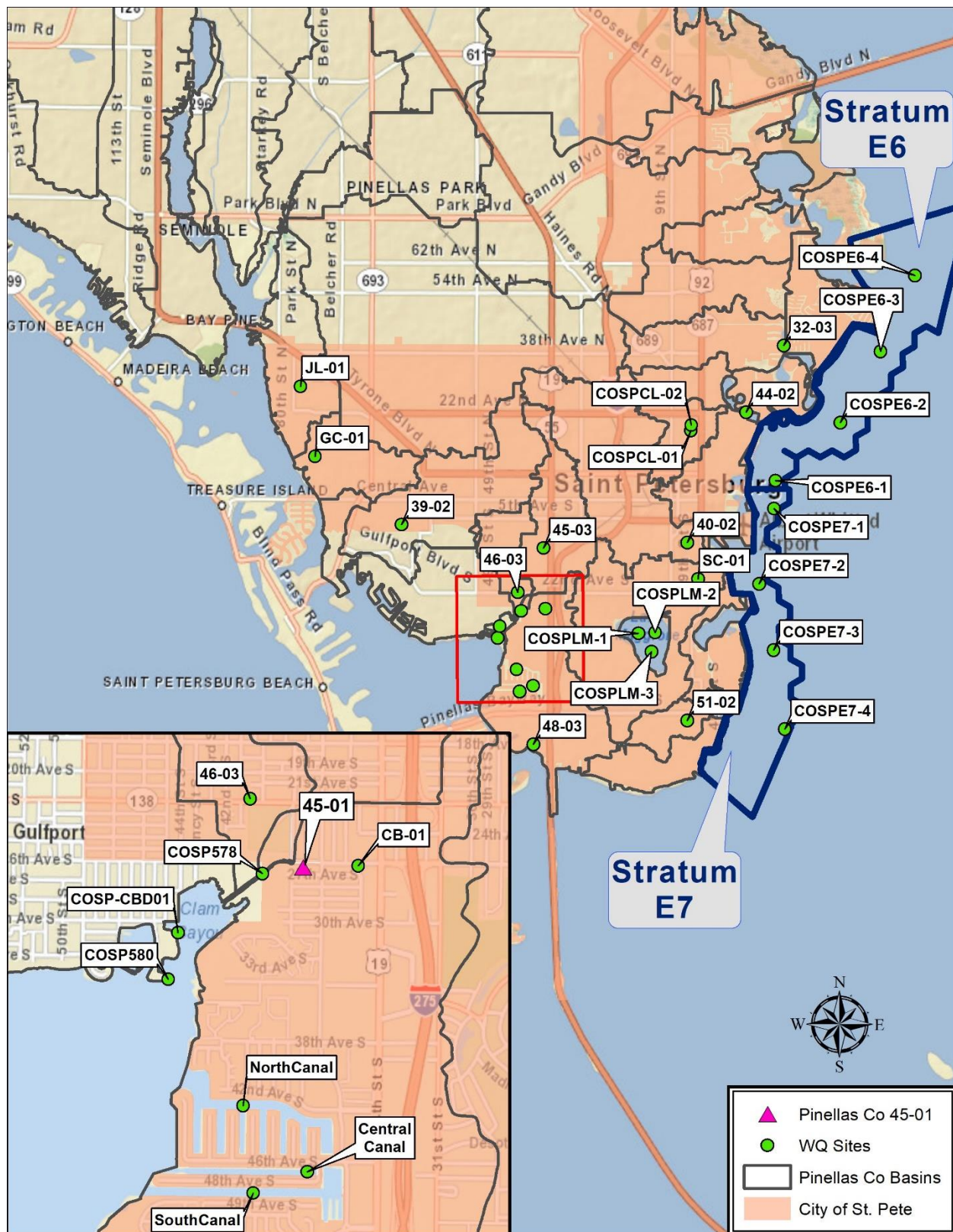


Figure 1. City of St. Petersburg Ambient Water Quality Monitoring Program sampling sites.

REGULATORY STATUS

The FDEP assesses water bodies against a series of regulatory criteria as defined by the Impaired Water Rule (FAC 62-303). If a water body is confirmed to exceed Impaired Water Rule thresholds for a given parameter, the water body is determined to be impaired for that parameter. Currently, there are several waterbodies within the boundaries of the City that are listed as impaired (Figure 2), though not every impaired WBID is regularly monitored by the City as part of its Ambient Monitoring Program. These include impairments for dissolved oxygen, chlorophyll a, and nutrients in Bayou Creek. Multiple WBIDs within the City's boundaries are currently listed as verified impaired for various bacteria (Smacks Bayou, Coffeepot Bayou, Booker Creek, Bayou Creek, Frenchmans Creek, Salt Creek, Bear Creek, Clam Bayou [Drain and East Drainage-North]).

Smacks Bayou and Coffee Pot Bayou were the subjects of State and Federal Total Maximum Daily Load (TMDL) development, with proposed TMDLs calling for reductions in loadings of TN, TP, and BOD to address perceived DO problems. Working closely with FDEP to review the data used in the data evaluation led FDEP staff to agree that FDEP was justified in no longer pursuing development of nutrient or DO TMDLs for Smacks Bayou or Coffee Pot Bayou. Both water bodies were delisted from the 1998 303(d) list and the State's Verified List (a listing of impaired water bodies). Additionally, Crescent Lake was previously listed as impaired for chlorophyll and nutrients (total phosphorus) but the Lake has been delisted and is being placed in category 4e due to ongoing restoration activities. Tinny Creek was identified as having insufficient data for dissolved oxygen based on the number of exceedances for the sample size but is being placed in category 4d per 62-303.720(2)(o), F.A.C. Biochemical Oxygen Demand was identified as the causative pollutant.

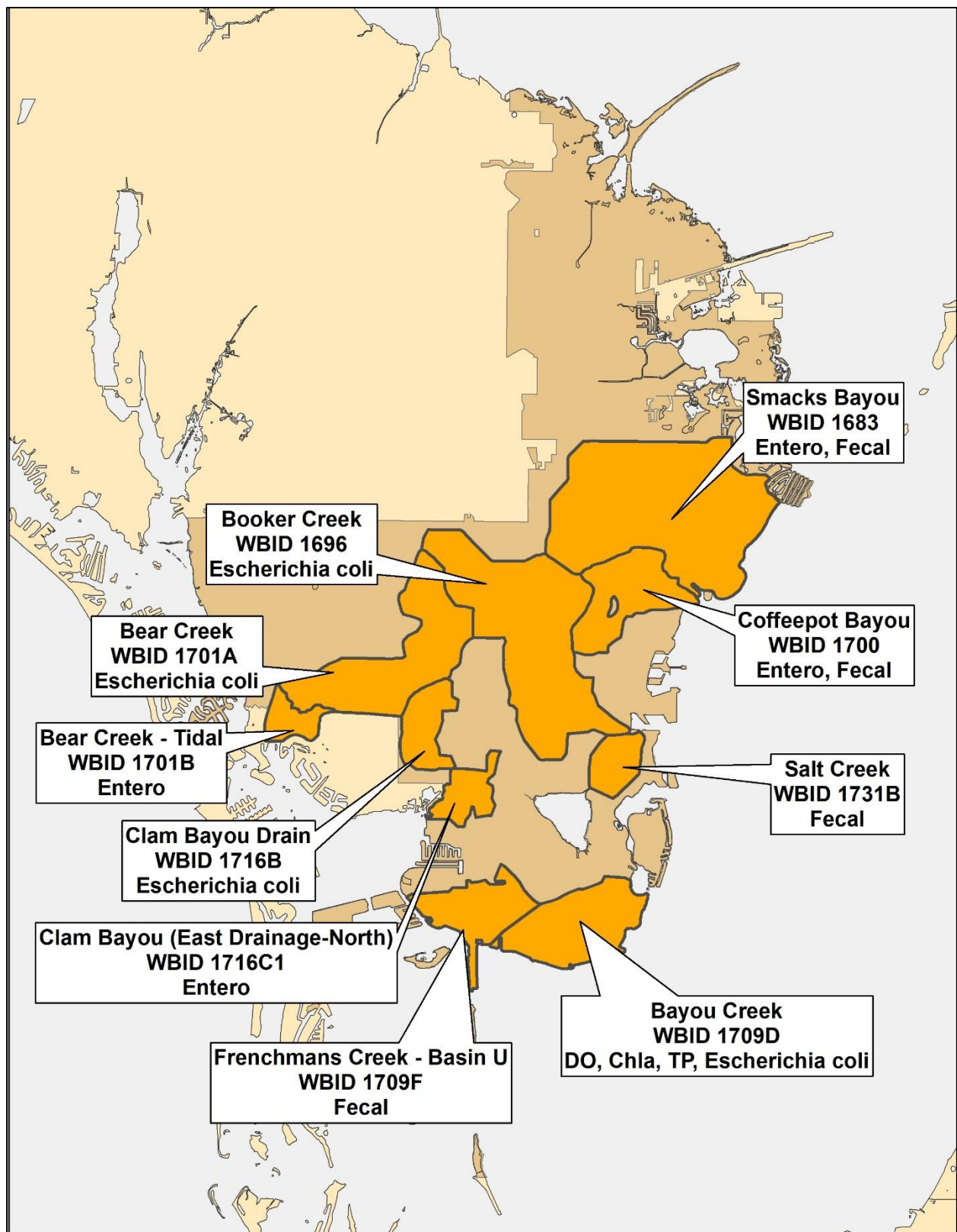


Figure 2. FDEP Impaired WBIDs within the City of St. Petersburg.

TAMPA BAY REASONABLE ASSURANCE PLAN

Through the process of developing the Reasonable Assurance Plan (RAP), nitrogen loading allocations for the City were developed. Allocations were developed for both point source and non-point source nitrogen loads. Ongoing or planned/proposed City projects to reduce nitrogen loading to Tampa Bay include expanding and improving its reclaimed water system, street sweeping programs, stormwater system enhancements, Clean Marina Program, central sewer expansion, support for the Florida Yards and Neighborhoods Program, etc. *The City has met its allocated nitrogen loads from both point sources and its MS4 since establishment of allocations as part of the 2009 Reasonable Assurance Update.*

Several of the impaired City water bodies are linked to nutrient pollution, in many cases nitrogen more so than phosphorus. These key nutrients can be added to a water body through both point source (direct discharge) and non-point source (e.g., surface runoff) loadings. A key focus of the TBEP has been to establish nitrogen loading targets for Tampa Bay to encourage seagrass recovery. In 1996, local government (including the City) and agency partners in the TBEP approved a long-term goal to restore 95% of the seagrass coverage observed in 1950 (38,000 acres). Also in 1996, the Tampa Bay Nitrogen Management Consortium (NMC) was formed. The NMC includes local governments (including the City) and agencies participating in the TBEP, as well as industrial, utility, and agricultural interests in the Tampa Bay watershed. These entities have pledged to work cooperatively in a voluntary framework to assist with the maintenance of nitrogen loads to support seagrass restoration in Tampa Bay. Combined efforts of the TBEP and its partners (including the City) to reduce nitrogen loading are resulting in more than sufficient water quality for the expansion of seagrasses (Tampa Bay NMC, 2017). Seagrass coverage in Tampa Bay increased between 2012 and 2016 by 7,013 acres. In 2016, Tampa Bay seagrass acreage exceeded both the TBEP's initial recovery goal, as well as the 1950 benchmark estimate. The 2018 estimate of total seagrass meadow coverage in Tampa Bay was 40,653 acres, which represented a decline from earlier estimates, but still above the 1950 benchmark estimate (ESA 2020).

CITY AMBIENT WATER QUALITY REPORT CARD

A report card scoring system was developed by Janicki Environmental (2017), using a color-coded scoring system that could be used to evaluate each monitoring station or group of stations (stratum) on an annual basis. As part of the development of the reporting tool, the City was divided into 2 major basins – those sites that drain to either Middle Tampa Bay or Boca Ciega Bay. These major basins correspond to existing delineations of areas used by the City, Pinellas County or by other local intergovernmental agencies including the Tampa Bay Estuary Program to report on watershed management actions and the FDEP to evaluate water quality with respect to established standards. The major basins are depicted in Figure 3. Four water quality parameters are evaluated for the water quality report card:

- Dissolved Oxygen % Saturation (DO %sat),
- Chlorophyll *a* (µg/L) (Chla),
- Total Nitrogen (mg/L) (TN), and
- Total Phosphorus (mg/L) (TP).

A short description of each of these parameters and the justification for their inclusion in the City's monitoring and reporting is described below. Where possible, the thresholds chosen to evaluate City water quality data for the reporting tool are consistent with numeric criteria and standards promulgated by FDEP to evaluate compliance with these standards.

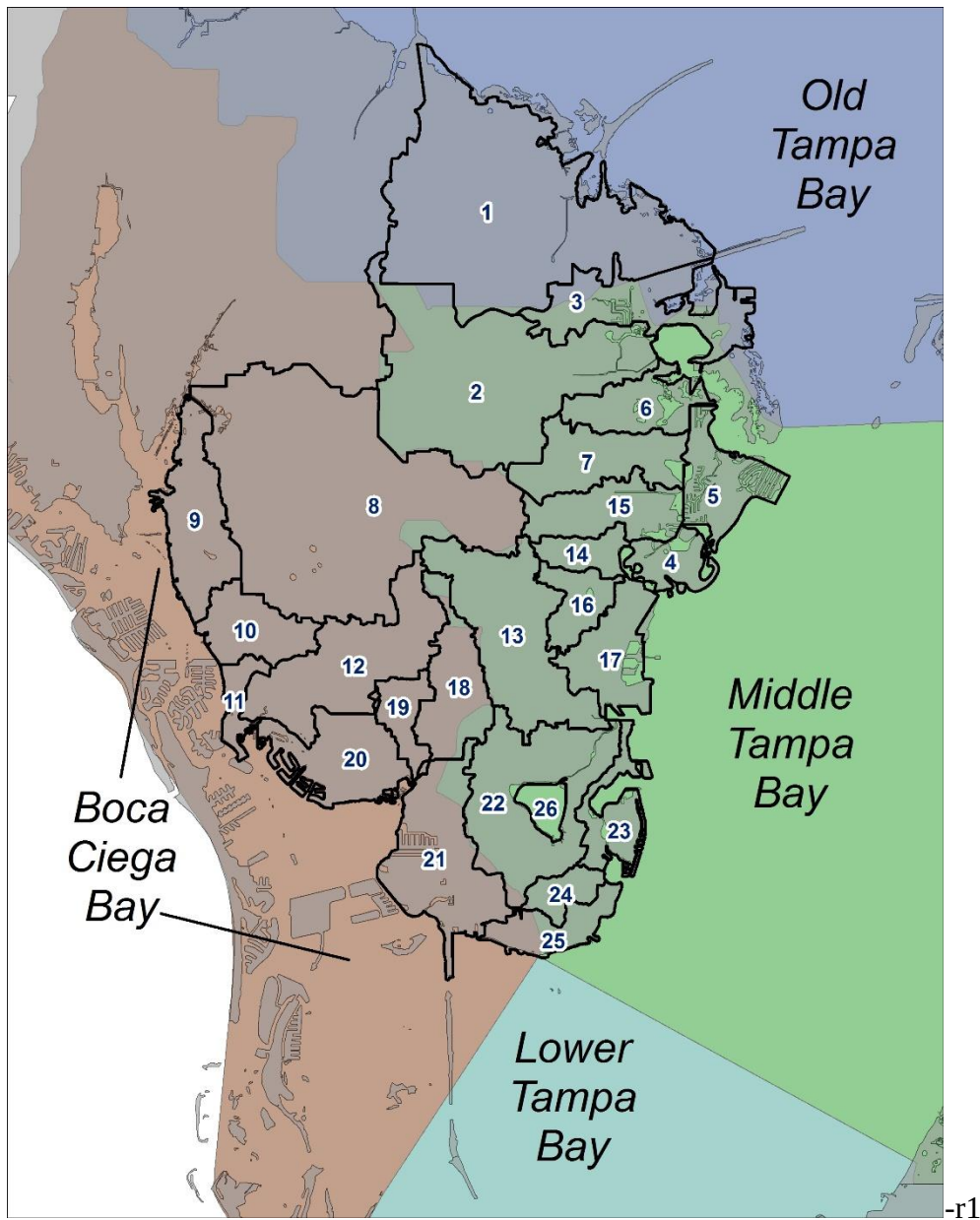


Figure 3. Bay segments and the basins that drain to them. Basin labels coincide with those reported in Table 1.

Dissolved Oxygen Saturation

Dissolved oxygen is a measure of the amount of oxygen available in the water to living creatures. The amount available depends upon the amount of algae and decomposing organic matter and determines habitats for fish and bottom-dwelling organisms. Additionally, oxygen levels are influenced by water temperature, with colder water able to “hold” more oxygen than warmer water and salinity.

To establish thresholds for the reporting tool, established Florida Administrative Code rules (FAC 62-303.530 and 62-303.533) were used for City streams, lakes and estuaries. The thresholds differ depending upon the water body type and its designated use according to Florida rules. For predominantly freshwaters that are designated as potable water supply, fish consumption, recreation, or the propagation and maintenance of a healthy well-balanced population of fish and wildlife, no more than 10% of the daily average percent dissolved oxygen saturation values shall be below 38%. For predominantly marine waters, no more than 10% of the daily average percent dissolved oxygen saturation values shall be below 42%.

Chlorophyll *a*

Chlorophyll *a* is the pigment that makes plants and algae green. This pigment is what allows plants and algae to use energy from sunlight to produce organic carbon. Chlorophyll *a* concentrations provide a measure of the amount of algae in the water. Algae occur at the base of the food chain and provide a food source for the organisms higher in the aquatic food chain. Additionally, algae add oxygen to the water as a by-product of photosynthesis. However, too much chlorophyll *a* is indicative of an algal bloom which decreases available light and lowers dissolved oxygen values (via decomposition of dead algae).

For the report card tool, the threshold values for chlorophyll *a* concentrations varied. In general, for freshwaters including lakes and streams an annual geometric mean concentration of 20 (µg/L) was used. The estuary strata in Middle Tampa Bay were evaluated against an arithmetic annual mean of 8.5 (µg/L) (Janicki Environmental, 2011a). There are samples collected by the City in tidal streams for which Chlorophyll *a* concentration criteria have not currently been established by FDEP. In these cases an annual geometric mean of 11 (µg/L) was used to evaluate threshold exceedances.

Total Nitrogen and Total Phosphorus

Total nitrogen and total phosphorus are essential nutrients for plants and animals, but in excessive amounts can cause algal blooms which decrease available light and dissolved oxygen levels. As a result, excess nutrients can cause changes in shifts in algal and plant species communities, diebacks of seagrass, reduced populations of fish and shellfish, and losses of acceptable aquatic habitats. Sources of nitrogen include wastewater treatment plants, runoff from fertilized lawns and croplands, and failing septic systems. The Tampa Bay region has extensive phosphate deposits and both fresh and estuarine waters of the region can be enriched with phosphate. Compared to other estuaries, the levels of nitrogen relative to phosphorus in Tampa Bay are relatively low, and algae are therefore suggested to be limited by nitrogen (the addition of nitrogen can fuel algal growth). While naturally occurring in Florida soils, increased levels of phosphorus can also cause algal

blooms in excessive amounts. In addition to naturally occurring concentrations, phosphorus may enter a water body via wastewater discharges, or drainage from the surrounding watershed.

The FDEP and the Environmental Protection Agency (EPA) have recently developed water quality standards for nutrients. These are typically expressed as annual geometric mean concentrations. However, for the estuarine waters of Boca Ciega Bay and Middle Tampa Bay, geometric mean concentrations reported as management level thresholds for total nitrogen and total phosphorus in technical support documents used in the development of the criteria (Janicki Environmental 2011a, b) were used for the report card tool. Therefore, for freshwater the nutrient criteria used for the report card was:

- TP = a geometric annual mean of 0.12 (mg/L)
- TN = a geometric annual mean of 1.54 (mg/L).

For the open bay estuarine segments, the nutrient thresholds used for the report card are reported as annual geometric means:

- TP = 0.29 (mg/L)
- TN = 0.87 (mg/L)

There are samples collected by the City in tidal streams for which numeric nutrient criteria have not currently been established by FDEP. In these cases, for the report card tool, are assumed to be in compliance.

The thresholds described above for each monitored water quality parameter were used to establish a color-coded scoring system that could be used to evaluate each monitored station or stratum on an annual basis. The scoring system is defined below:

- If the annual data for a particular station or stratum were in compliance with (i.e., did not exceed) the established threshold then that station/stratum was assigned a color code of Green.
- If the annual data for a particular station or stratum were in exceedance of the established threshold then that station/stratum was assigned a color code of Yellow.
- If more than one in a rolling three-year period (the evaluation year and the two previous years), annual data for a particular station or stratum were in exceedance of the established threshold then that station/stratum was assigned a color code of Red.

2021 Report Card Evaluations

Report card evaluations for the most recent year of water quality sampling (2021), as well as results for the first half of 2022 (and are thus preliminary for 2022), are shown in Figure 4 for Boca Ciega

Bay and Middle Tampa Bay stations/strata. Report cards for each individual station or stratum, showing annual results for 2003-2021, are shown in Figure 5 through Figure 29.

All stations/strata (Figure 4) for Boca Ciega Bay were in compliance (scored as “Green”) for total nitrogen and total phosphorus in 2021 and the first half of 2022, with the exception of total phosphorus at the recently added Golf Creek station (GC-01) which was scored as out of compliance (“Red”) and the 34th Street Basin (station 578) which was scored as Marginal (“Yellow”) for data through 2021 and, for the first half of 2022, scored as “Red”. A “Red” score indicates more than one exceedance in the three-year period including the year of evaluation and the two years prior to the year of evaluation. Report card results for all years between 2003-2020 for total nitrogen and total phosphorus were also listed as “Green” for all stations (except GC-01) in Boca Ciega Bay, with the exception of one marginal value (“Yellow”) in 2011, indicating compliance with established thresholds. For Middle Tampa Bay, total phosphorus values were in compliance (“Green”) at all stations in 2021 and the first half of 2022. However, for total nitrogen, values for two stations in Lake Maggiore were out of compliance (“Red”) for data through 2021, while only one Lake Maggiore station was out of compliance when data through June 2022 were included. Remaining stations in Middle Tampa Bay were all in compliance (“Green”) for total nitrogen in 2021 and the first half of 2022. Stations outside of Lake Maggiore were also in compliance for these parameters for all years with available data prior to 2021.

Report card results for dissolved oxygen were largely “Green” indicating compliance with established thresholds in 2021 and the first half of 2022, with the exception of one station in Boca Ciega Bay (Clam Bayou CB-01) which was scored as “Red” and the newly added Jungle Lake station (JL-01) which was scored as “Yellow” for 2021 and “Red” for the first half of 2022. All stations in Middle Tampa Bay, with the exception of the recently added Salt Creek station (SC-01), were in compliance (“Green”) for 2021 and the first half of 2022. The Boca Ciega Bay station (CB-01) has been scored as “Red” in years prior to 2021 (Figure 11). Another station in Boca Ciega Bay (39-02 Bear Creek) had previously been found out of compliance (“Red”; 2009-2016) but in recent years (2017-2021) has been scored as “Green”, or in compliance. The majority of stations in Middle Tampa Bay have consistently been scored as in compliance, with a rare marginal value (“Yellow”). One station in Little Bayou (51-02) has previously been found out of compliance (“Red”; 2011-2016) but has shown improvement in more recent years.

In terms of chlorophyll *a*, the report card indicates that all but two of the stations in Boca Ciega were in compliance (“Green”) during 2021 and the first half of 2022. The recently added Jungle Lake station was scored as marginal during 2021 (“Yellow”) and preliminarily out of compliance (“Red”) during the first half of 2022. Station CB-01 was scored as “Red” for both 2021 and the first half of 2022. In Middle Tampa Bay, seven of the 12 stations were graded as “Red” during 2021, including the recently added Salt Creek station SC-01 (Figure 4), indicating there has been more than one exceedance in the three-year period 2019-2021. These stations also include

Crescent Lake, Lake Maggiore and Little Bayou (51-02). The majority of the failing stations in 2021 and the first half of 2022 were lake stations. The Lake Maggiore (Figure 26 through Figure 28) and Crescent Lake (Figure 23) stations did not have data available prior to 2013. However, all annual report cards for Lake Maggiore stations, and a majority of years for Crescent Lake, have displayed a score other than green. Data for Little Bayou (Figure 21) extend back to 2008, but only one year during this period (2012) has been scored with a passing “Green”.

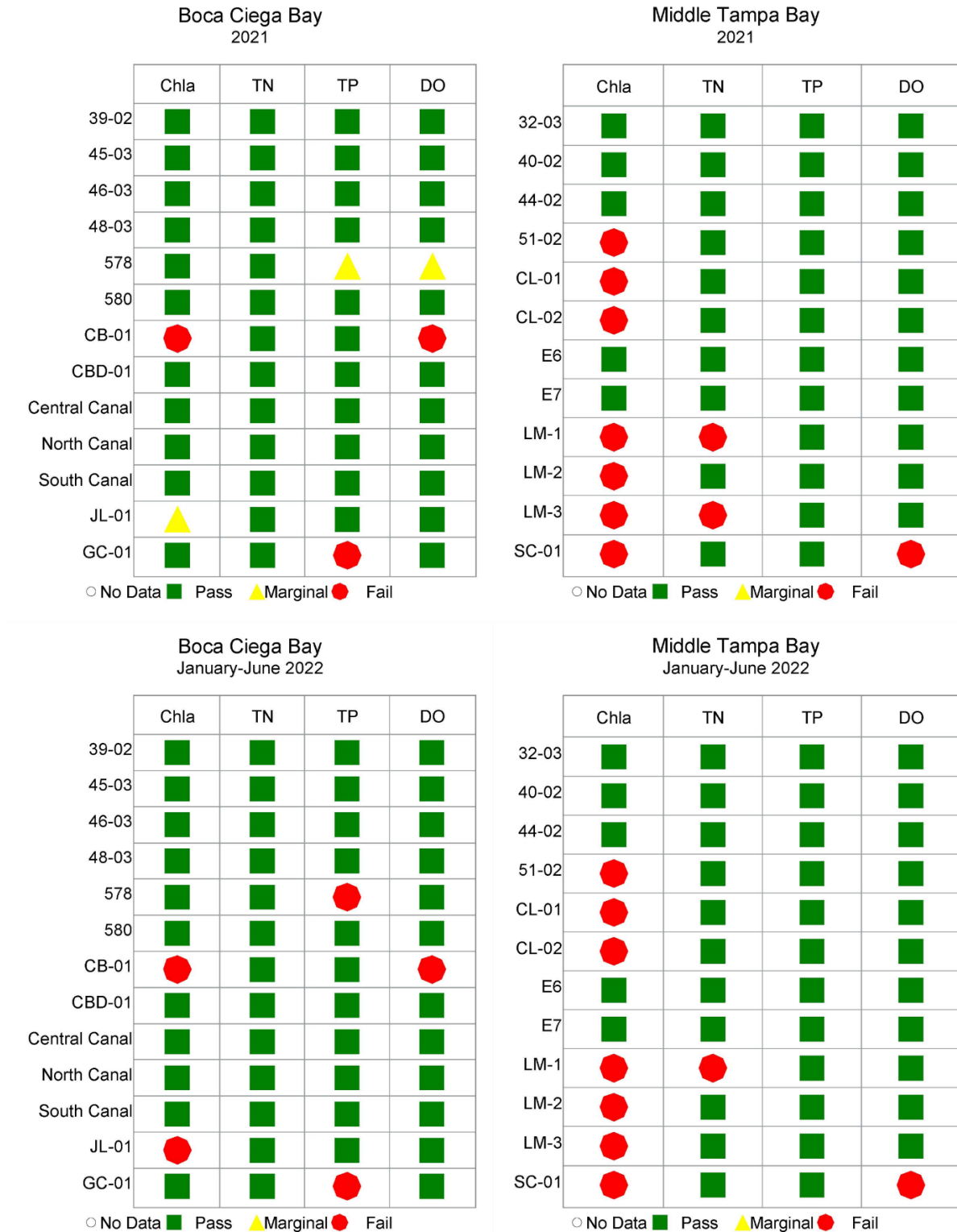


Figure 4. Report Card outcomes for year 2021 and the first half of 2022 in Boca Ciega Bay and Middle Tampa Bay.

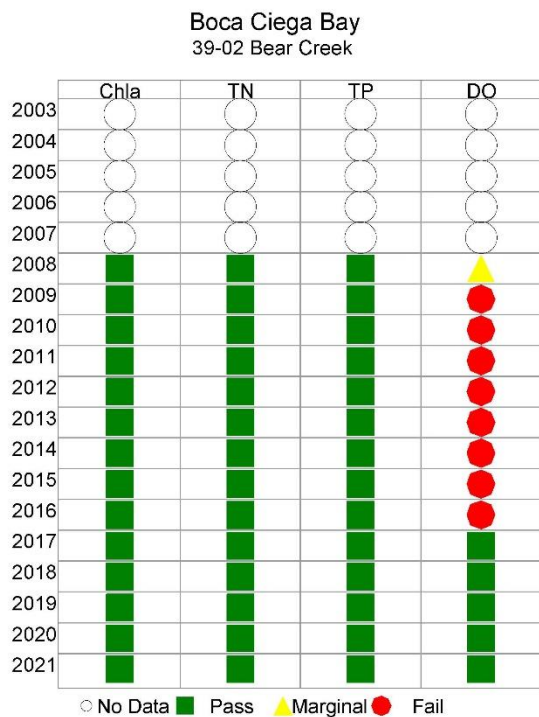


Figure 5. Station 39-02 Report Card.

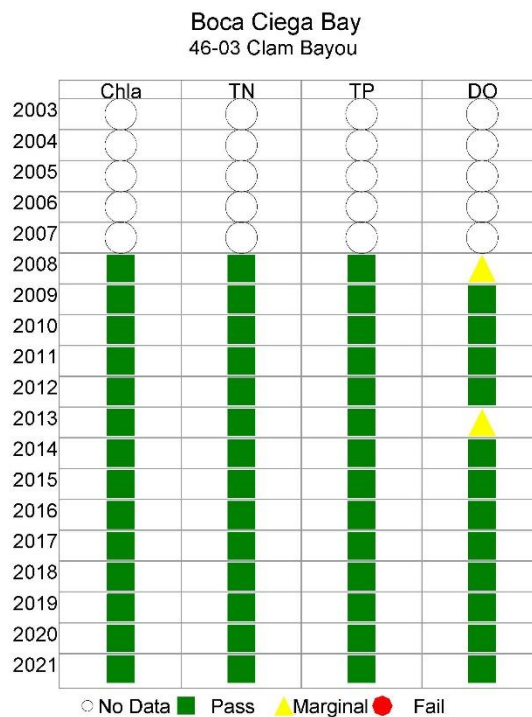


Figure 7. Station 46-03 Report Card.

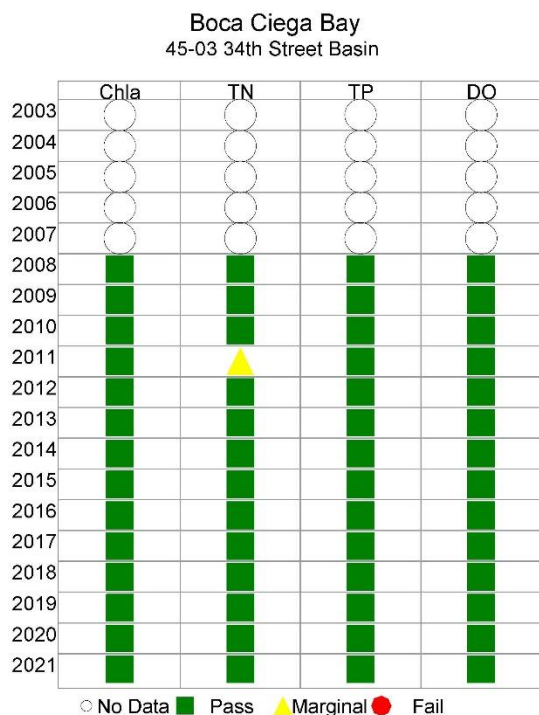


Figure 6. Station 45-03 Report Card.

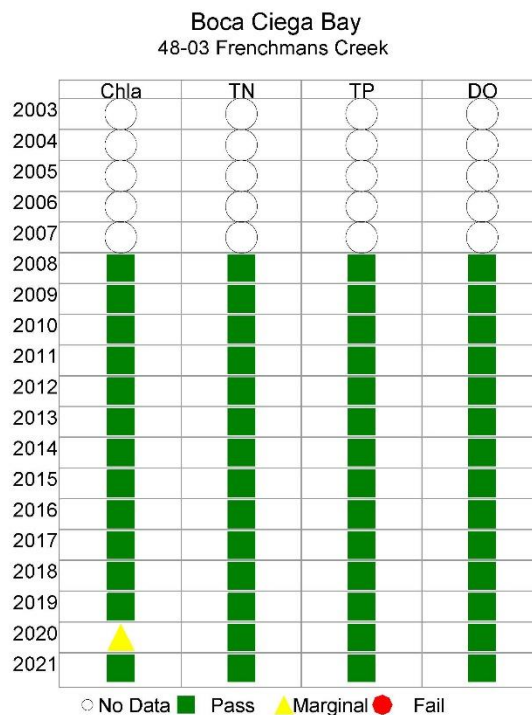


Figure 8. Station 48-03 Report Card.

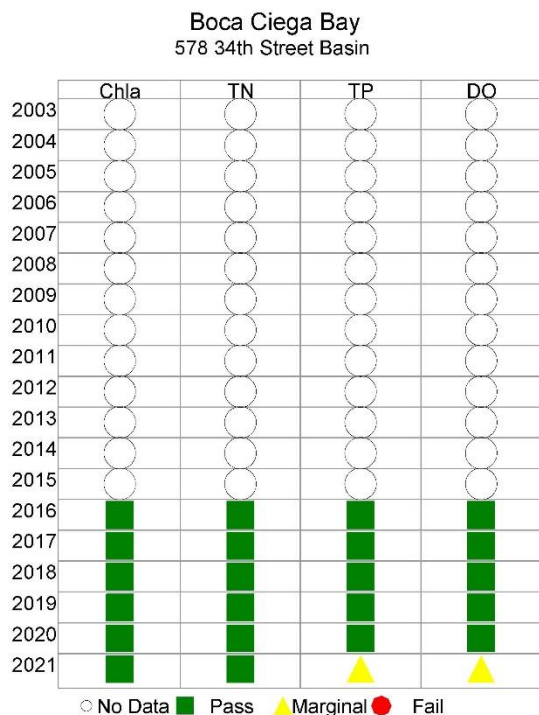


Figure 9. Station 578 Report Card.

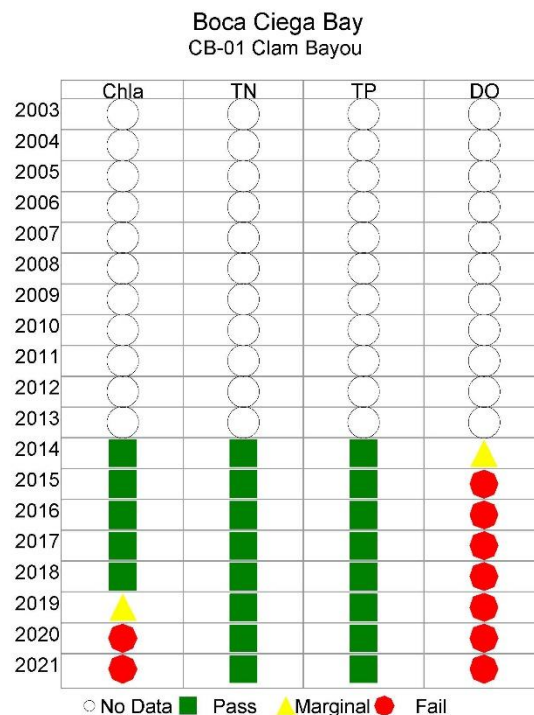


Figure 11. Station CB-01 Report Card.

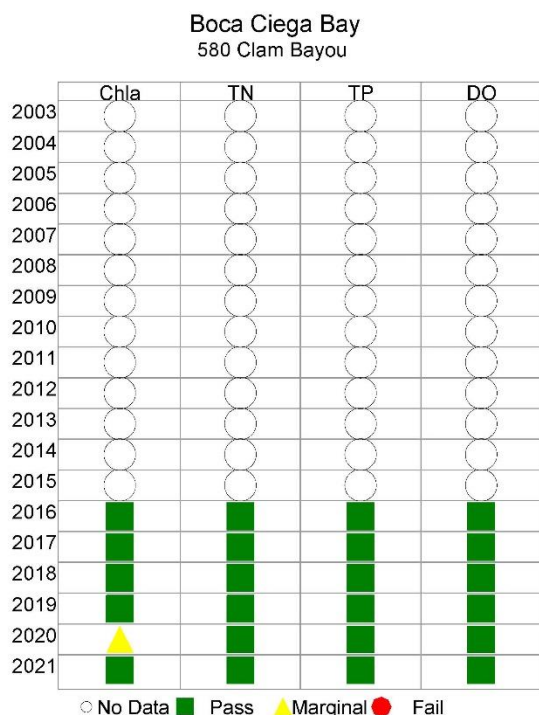


Figure 10. Station 580 Report Card.

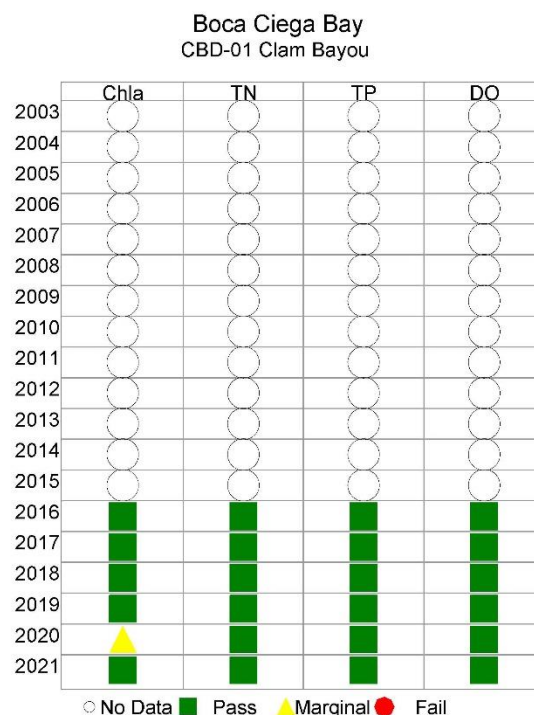


Figure 12. Station CBD-01 Report Card.

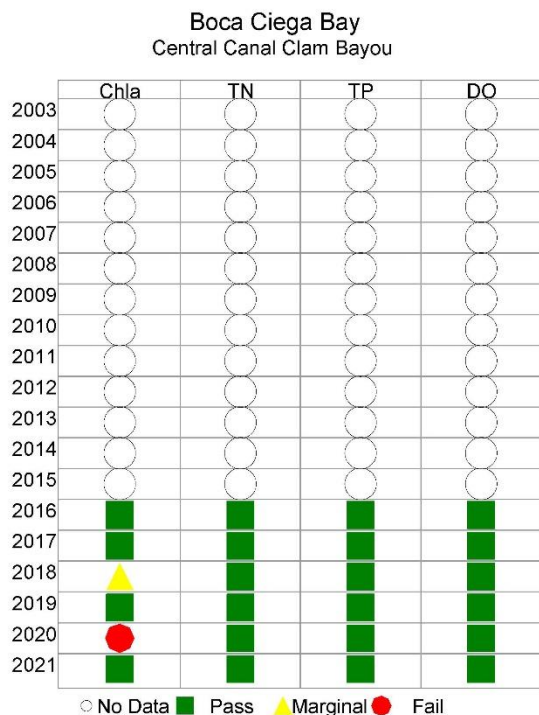


Figure 13. Central Canal Report Card.

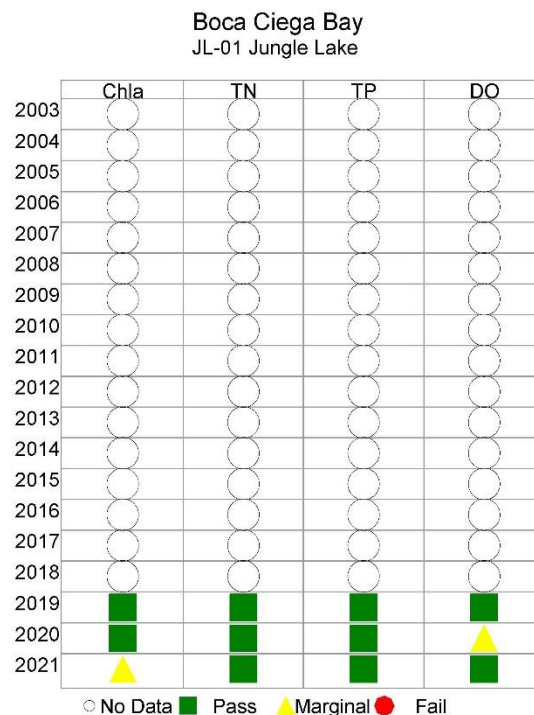


Figure 15. Jungle Lake Report Card

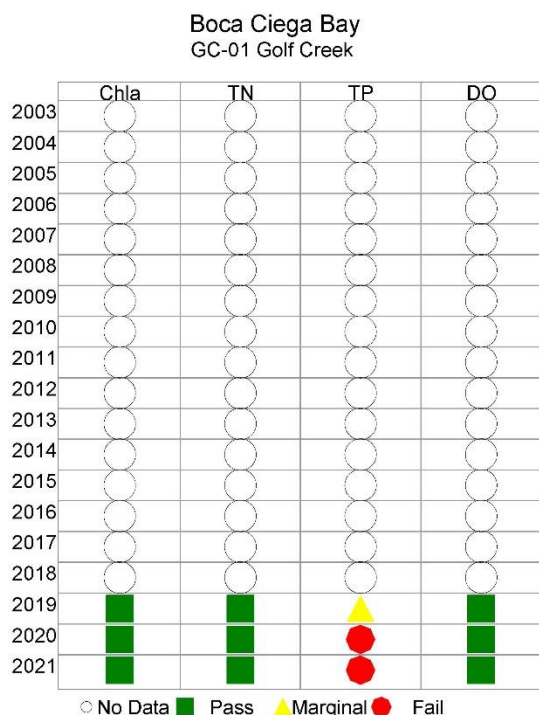


Figure 14. Golf Creek Report Card

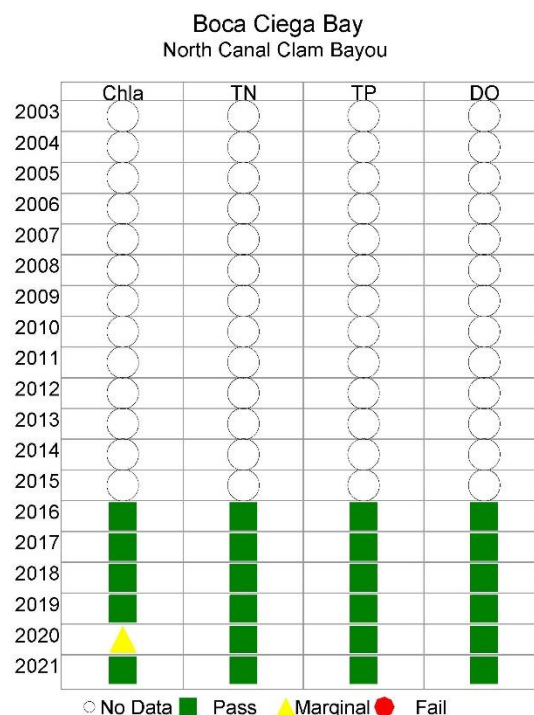


Figure 16. North Canal Report Card.

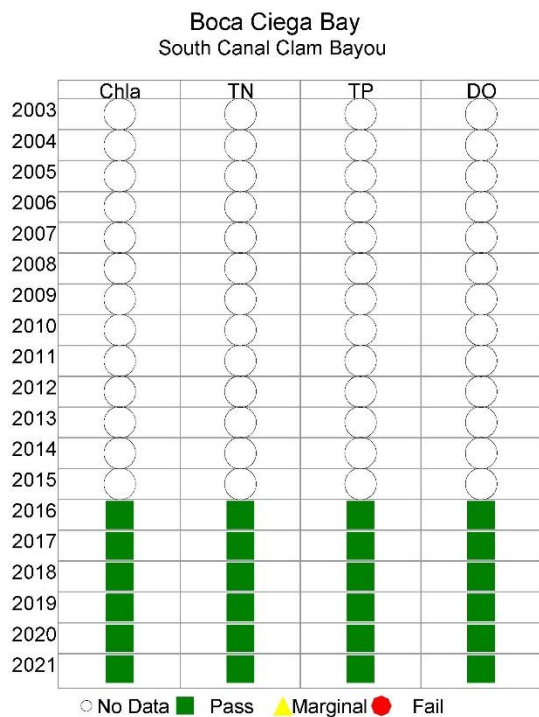


Figure 17. South Canal Report Card.

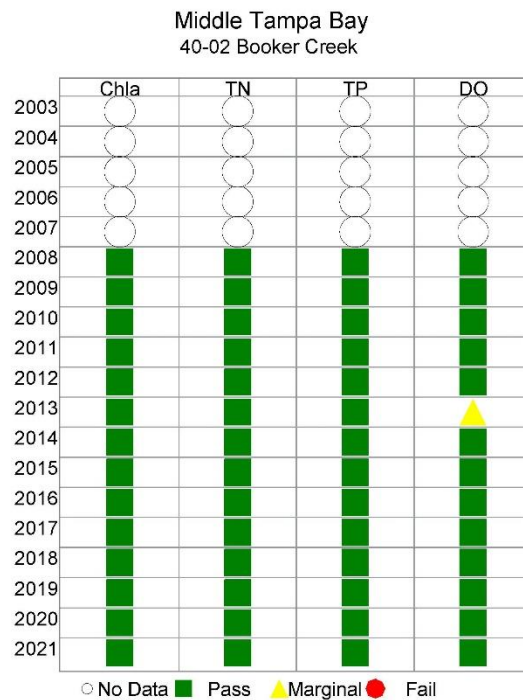


Figure 19. Station 40-02 Report Card

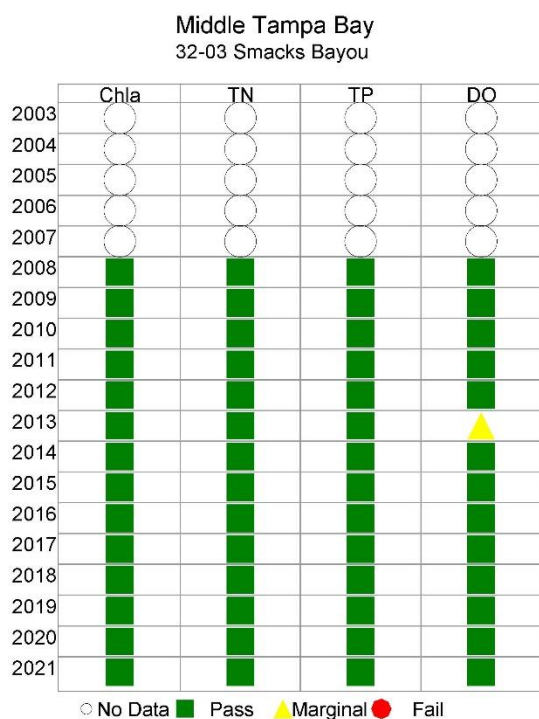


Figure 18. Station 32-03 Report Card.

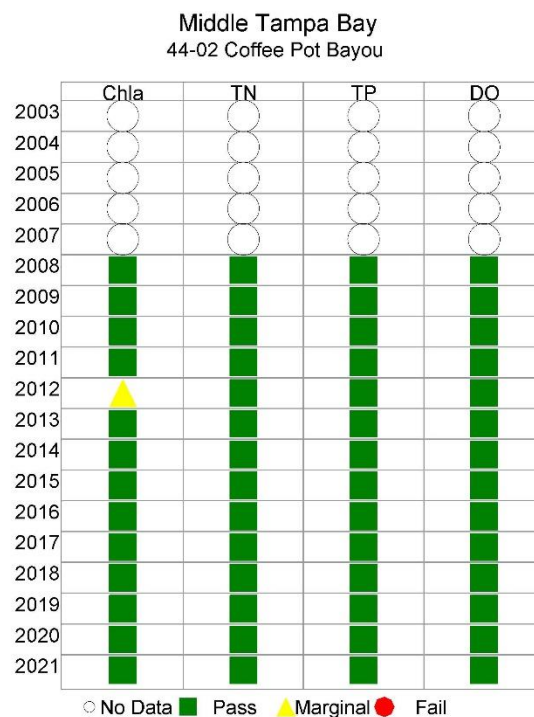


Figure 20. Station 44-02 Report Card

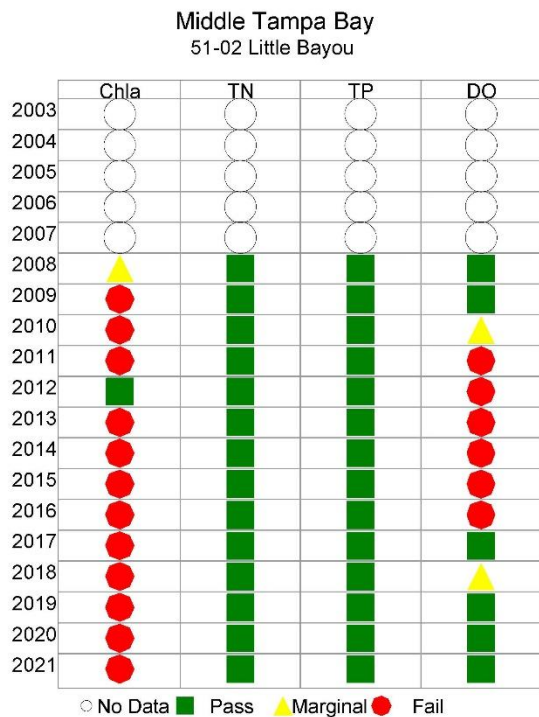


Figure 21. Station 51-02 Report Card

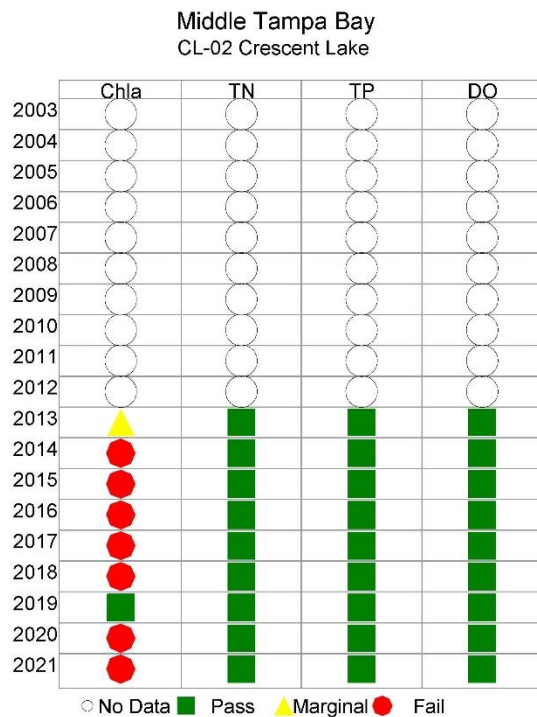


Figure 23. Station CL-02 Report Card.

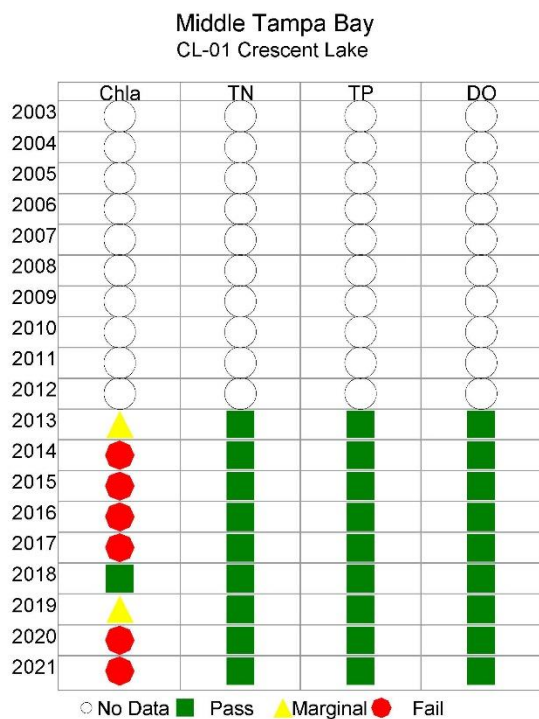


Figure 22. Station CL-01 Report Card



Figure 24. E6 Stations Report Card.

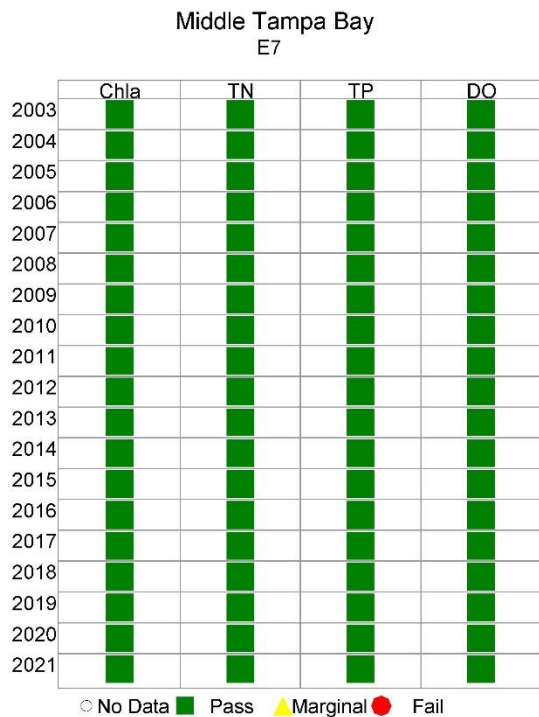


Figure 25. E7 Stations Report Card.

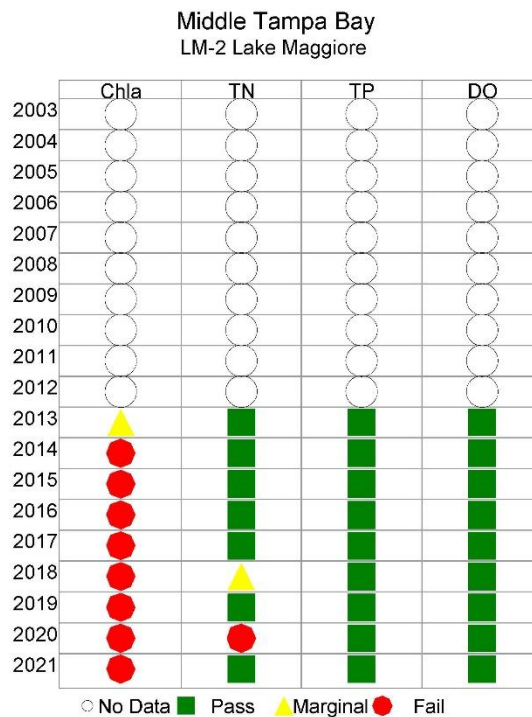


Figure 27. Station LM-2 Report Card.

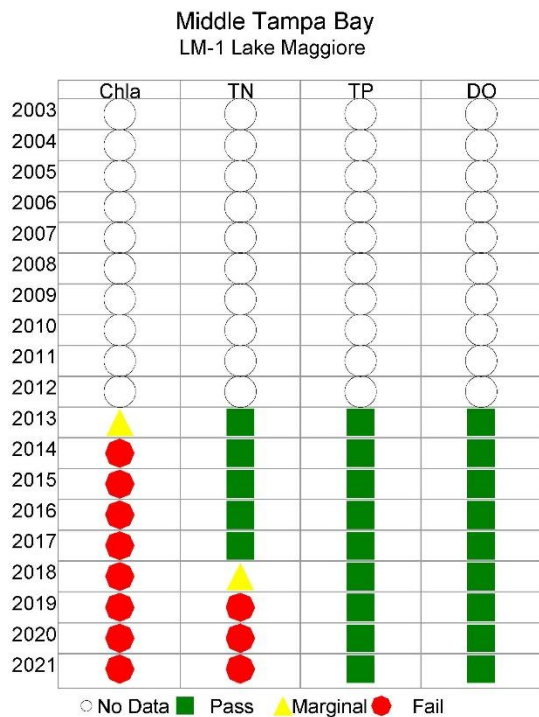


Figure 26. Station LM-1 Report Card.

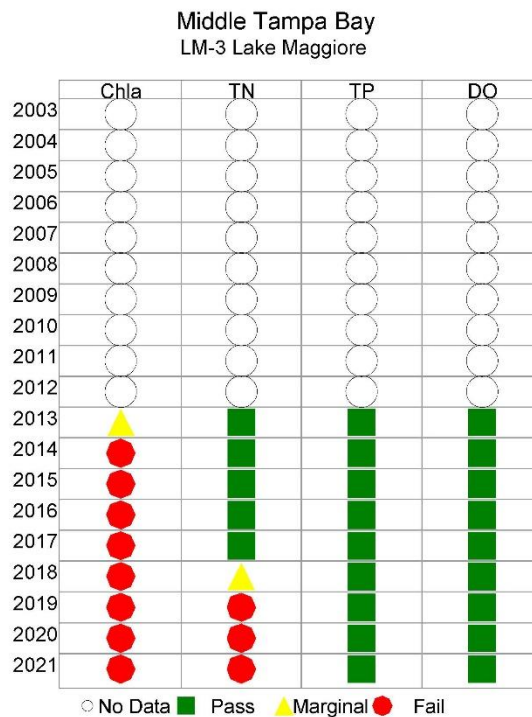


Figure 28. Station LM-3 Report Card.

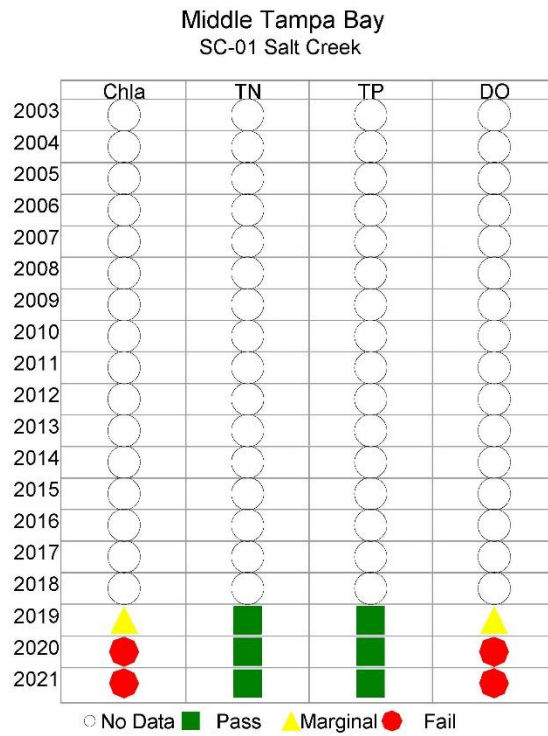


Figure 29. Salt Creek Report Card

TRENDS IN WATER QUALITY

Trend analysis of a time-series of data is the practice of collecting information and attempting to spot a pattern over time. In terms of the City's water quality monitoring program, the use of trend tests allows managers to identify degradation in water quality conditions preferably prior to an actual exceedance of a regulatory standard, or before significant harm occurs to aquatic habitats. Thus, the results of analyses of trends in water quality provide the City with an "early warning system" and should best be used with the results of the report card analyses of compliance with water quality standards and criteria. A significant increasing trend in a pollutant need not imply non-compliance, rather the City should respond to such a result before such trends lead to an eventual non-compliance.

For the sake of a simple interpretation of the results of the trend tests, several points should be considered. First, the water quality parameters include parameters such as nitrogen and phosphorus and those parameters that are indicative of the status of the water bodies "health" including chlorophyll *a* and dissolved oxygen. Secondly, the direction of any significant trends is important to note. For most parameters investigated, increasing trends can be considered to be negative or undesirable. These particularly include the nutrients and chlorophyll *a*. In contrast, increasing dissolved oxygen is a positive result as low dissolved oxygen conditions are undesirable as the support of most aquatic fauna require adequate dissolved oxygen conditions.

Results of trend tests performed for each monitored station (see Figure 1 and Table 1) are shown in Figure 30 to Figure 33. Summary information for each parameter analyzed is also provided below each Figure. For the purposes of this report, "small trends" are defined as statistically significant trends with a rate of change less than 10% of the median value per year, and "large trends" are defined as statistically significant trends with a rate of change greater than or equal to 10% of the median value per year. Thus, "small trends" represent water quality conditions that are changing (either increasing or decreasing) at a lesser rate of change than for "large trends." The terms "large" and "small" do not imply either ecological significance or the lack of ecological significance. The trend tests were run on data collected between 2003 and June of 2022. Results that differed from the shorter dataset through December 2021 have been noted. Such a difference occurred infrequently.

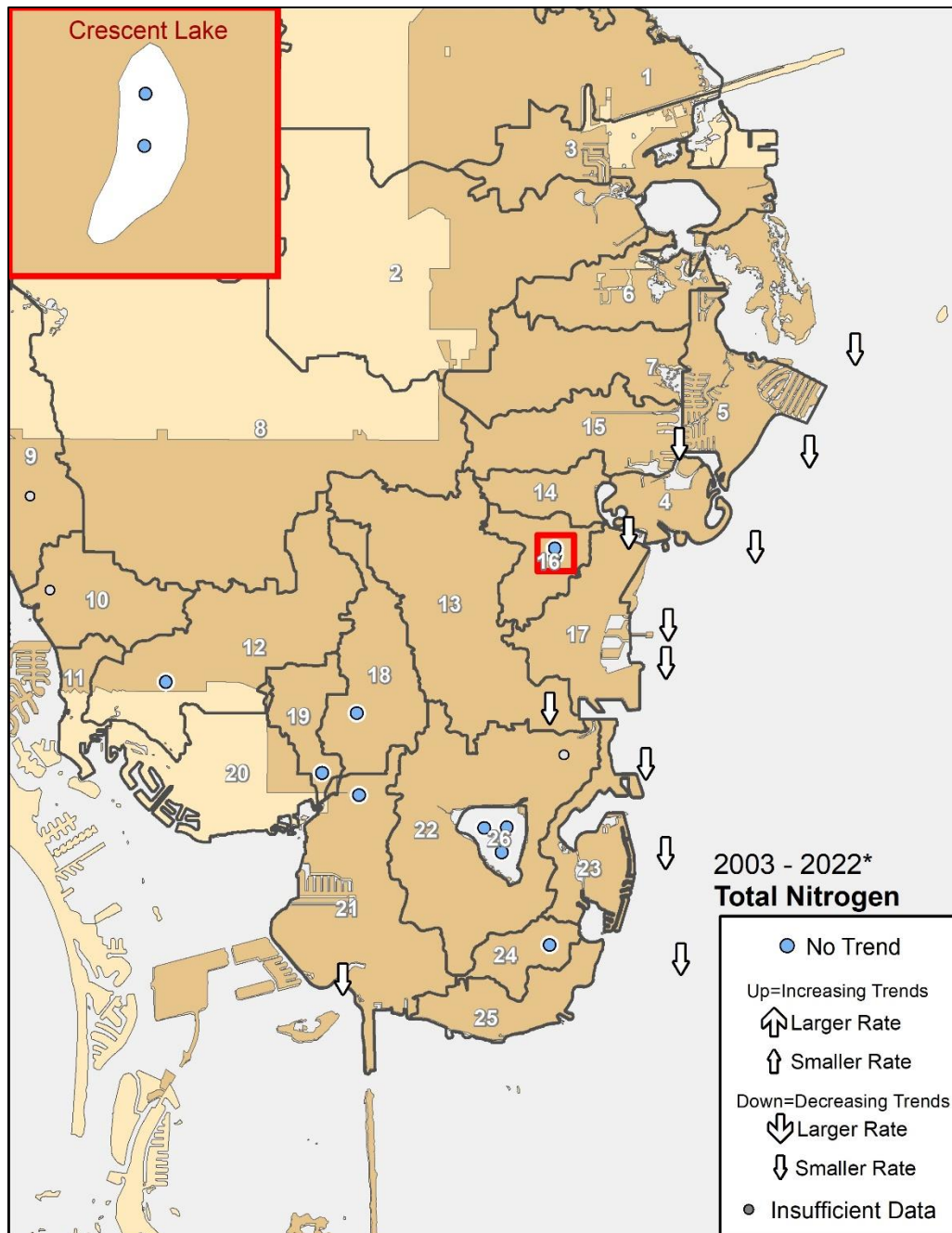


Figure 30. Trend test results for Total Nitrogen.

- Nearly all stations in Middle Tampa Bay were characterized by significant decreasing trends in total nitrogen; the remainder had no apparent trend.
- For Boca Ciega Bay, Frenchmans Creek was characterized by decreasing trends while Bear Creek was characterized by a decreasing trend through 2021 but no trend was detected when data through June 2022 were included. Remaining Boca Ciega Bay stations had no detected trend in total nitrogen.

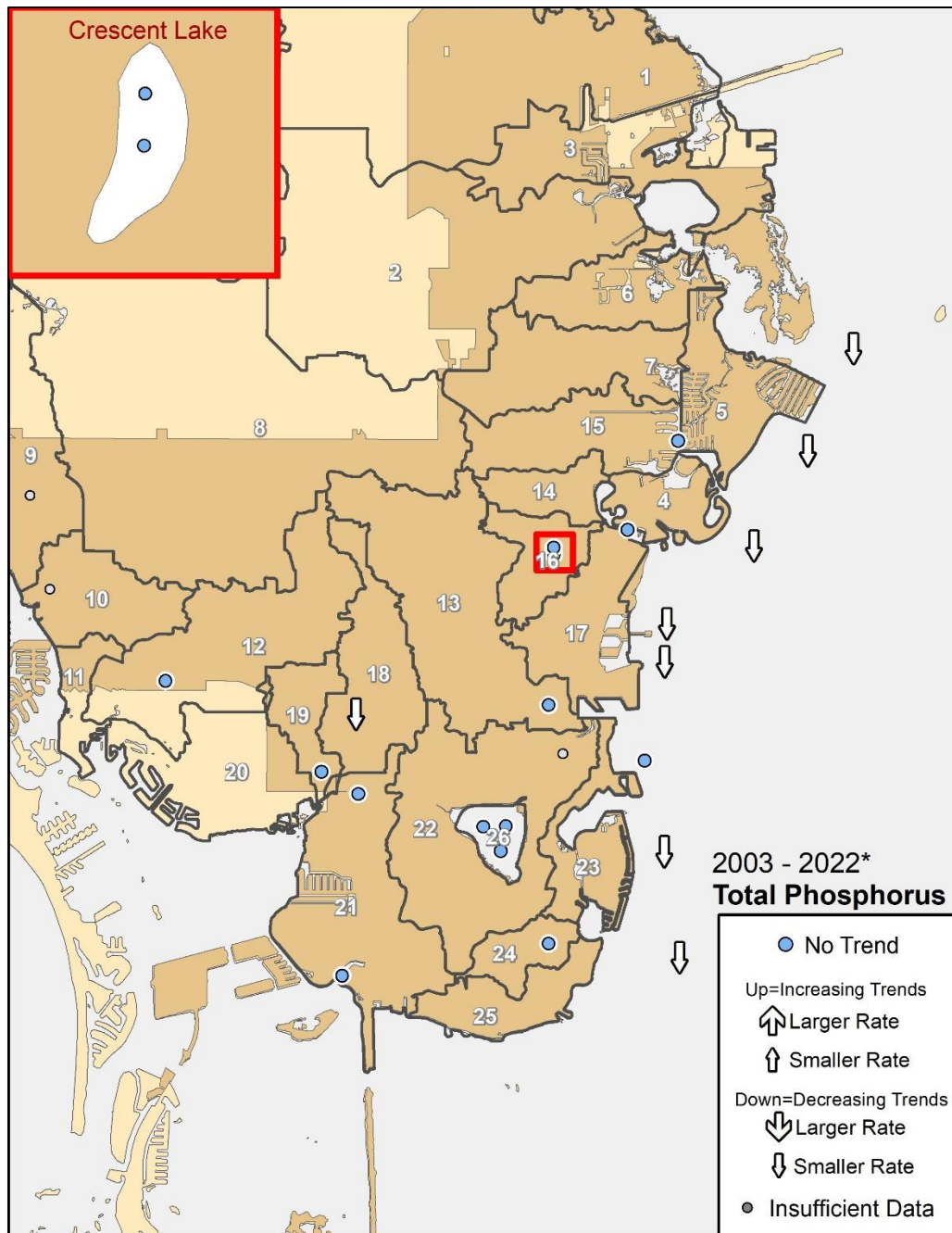


Figure 31. Trend test results for Total Phosphorus.

- One stations in Boca Ciega Bay (34th Street) was characterized by a decreasing trend in total phosphorus; the remainder had no detectable trend.
- In Middle Tampa Bay, stations had either decreasing trends or no trend. Trends were equivalent between data through 2021 and for data through June 2022 with the exception of Brooker Creek which shifted from a decreasing trend to no detectable trend with the addition of the 2022 data.

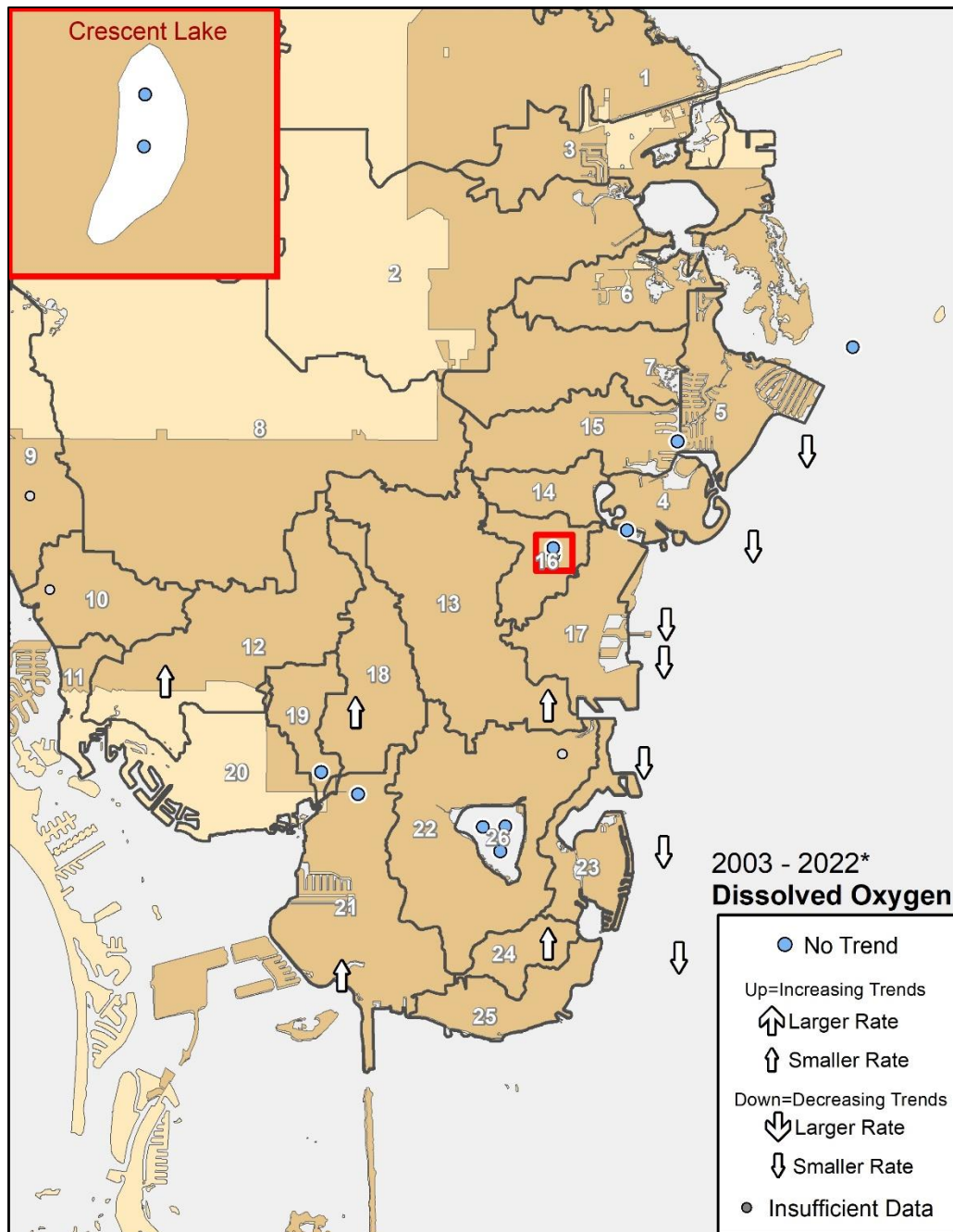


Figure 32. Trend test results for Dissolved Oxygen.

- In the Boca Ciega Bay Basin, a significant, increasing trend in dissolved oxygen was observed for Bear Creek and Frenchmans Creek, as well as for the 34th Street station when data through June 2022 were included.
- Two stations (Little Bayou and Booker Creek) in Middle Tampa Bay exhibited a significant increasing trend in dissolved oxygen while all four stations in the E7 segment and three stations in the E6 segment exhibited decreasing trends.
- The remaining stations had no significant trends for dissolved oxygen.

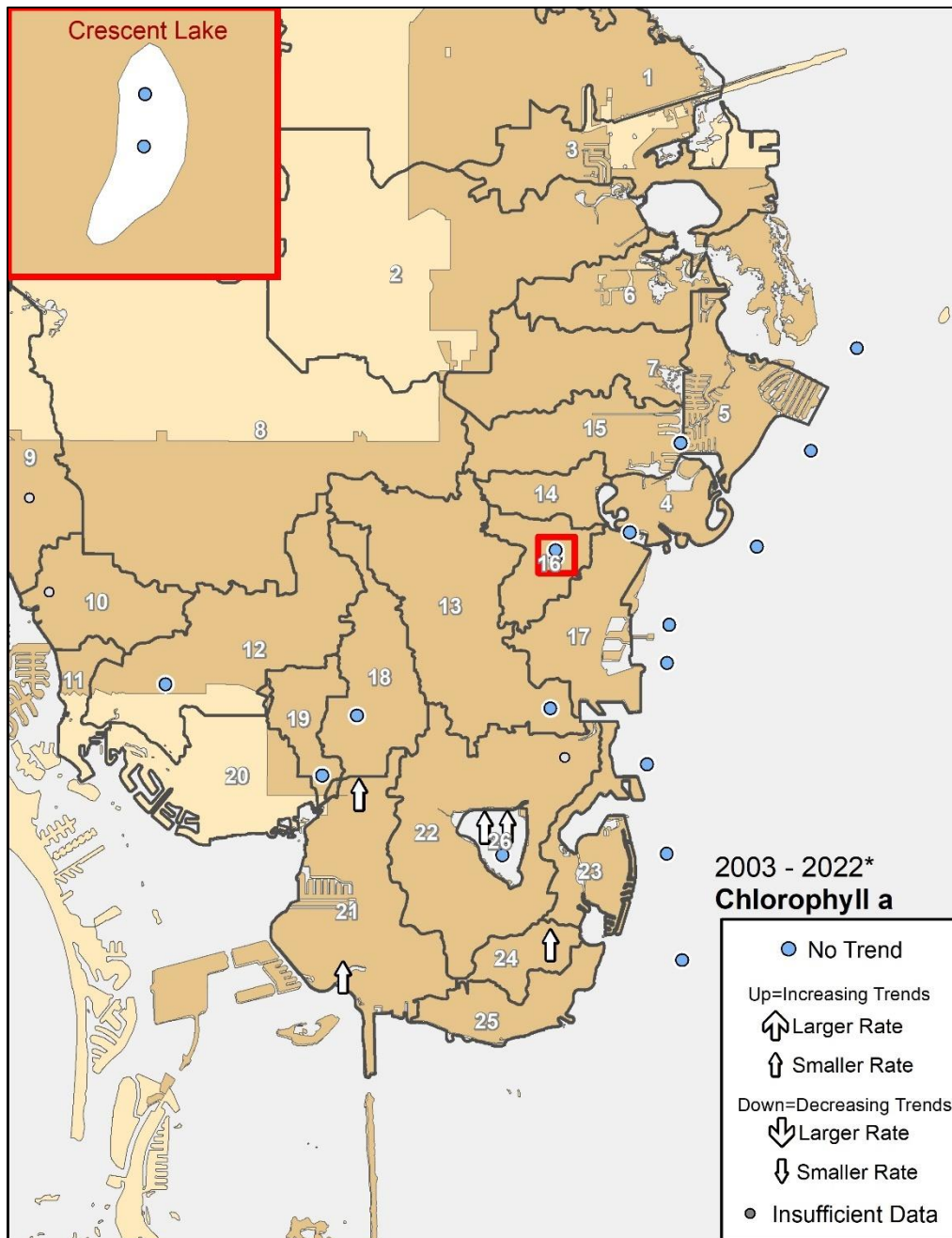


Figure 33. Trend test results for chlorophyll a.

- When data through June 2022 were evaluated, two stations in Boca Ciega Bay (Clam Bayou [East Drainage] and Frenchmans Creek) were characterized by increasing trends in chlorophyll. However, when data only through 2021, Frenchmans Creek still exhibited an increasing trend, but Clam Bayou East Drainage did not and Bear Creek was characterized by an increasing trend; the remaining stations in Boca Ciega Bay exhibited no significant trends.
- All stations in Middle Tampa Bay exhibited no significant trend.

CONCLUSIONS

The following summarizes the status of the City's monitoring stations in regard to environmental health as represented by nutrients, dissolved oxygen and chlorophyll *a*. Recommendations are provided based on our evaluation of the data collected by the environmental health ambient monitoring program.

- The report card scores for the majority of stations examined on the Boca Ciega and Middle Tampa Bay report cards indicated nutrient (total nitrogen and total phosphorus) concentrations have met the established thresholds during all years of examination. Exceptions to this occurred in Lake Maggiore where total nitrogen data for two stations were scored as out of compliance in 2021 and one station was out of compliance for preliminary 2022 data. The GC-01 station also failed for total phosphorus and the 34th Street Basin stations was scored as marginal for 2021 and preliminarily failed for 2022. Trend tests for all sampling locations indicated either a lack of a significant trend or a significant decreasing (improving) trend for both total nitrogen and total phosphorus.
- Most stations met the established thresholds for dissolved oxygen on the report cards for both Boca Ciega Bay and Middle Tampa Bay. However, the recently added station JL-01 was scored as “Yellow” for 2021 and preliminarily as “Red” for the first half of 2022. In addition, another station in Boca Ciega Bay was scored as having failed to meet established criteria for more than 1 year in the rolling-three year period of 2019-2021. Trend tests for dissolved oxygen at stations in Boca Ciega Bay were either statistically significantly increasing or illustrated no trend. All stations in Middle Tampa Bay, with the exception of the recently added Salt Creek station (SC-01), were in compliance (“Green”) for 2021 and preliminarily for the first half of 2022. Dissolved oxygen levels do not appear to have significantly decreased over time for the majority of non-estuarine segment sample locations but appear to be declining in the estuarine Middle Tampa Bay segments sampled.
- All but two stations in Boca Ciega Bay were in compliance (“Green”) for chlorophyll *a* during 2021 and the first half of 2022. When data through June 2022 were evaluated, two stations in Boca Ciega Bay were characterized by increasing trends in chlorophyll. However, when data only through 2021, one station (Frenchmans Creek) still exhibited an increasing trend, but Clam Bayou East Drainage did not and Bear Creek was characterized by an increasing trend; the remaining stations in Boca Ciega Bay exhibited no significant trends. Seven of 12 stations in Middle Tampa Bay scored as “red” for 2021, indicating a failure to meet established thresholds in more than 1 of the current and previous 2 years period. The majority of these stations were in lakes. All stations in Middle Tampa Bay exhibited no significant trend. Thus, it is anticipated that, for the near-future, the more estuarine/open water sites are expected to maintain a passing status on the report card. This highlights the efforts of the TBEP and its partners (including the City) to implement

nutrient reduction programs, resulting in increasing water clarity and improved seagrass coverages.

- It is recommended that the City continue the Ambient Water Quality Monitoring Program as currently designed and implemented.

2021 Water Quality Report Card

HUMAN HEALTH

The monitoring most relevant to human health issues is what is known as enteric bacteria monitoring. Enteric bacteria are those that normally inhabit the intestinal tract of humans and animals and can be indicative of stormwater runoff, sewage flows, pets, and wildlife. The City of St Petersburg collects three forms of bacteria samples: fecal coliforms, *Escherichia coli* (*E. coli*) in fresh waters and *Enterococci* in marine waters. Until February 2016, fecal coliforms were the primary indicator bacteria but the fact that fecal coliforms reside in all warm blooded animals made it difficult to distinguish between human (pet waste, farms, sewage) or natural (nesting areas, bat colonies) sources. While no longer the accepted standard, many organizations continue to monitor fecal coliforms since they have long historical records.

The US EPA issued guidance regarding the use of *E. coli* and *Enterococci* for fresh and saline waters, respectively. The Florida Department of Health and the Florida Department of Environmental Protection both adopted the new USEPA guidance as criteria and began assessing surface waters with the new standards (Table 2).

The Florida Department of Health takes the assessment a step further when looking at bathing areas such as beaches through the Healthy Beaches Program whose protocols are followed by the City. Beaches are sampled for *Enterococci*; waters that don't meet the standard are considered moderate. When samples exceed 70 colony forming units (cfu)/100 mL, they are considered poor, and an advisory will be posted when a confirming value is collected the following day. The City does not wait for a confirming value but posts an advisory when the results exceed 70 cfu/100 mL. The results from the City's monitoring are provided to the Pinellas County Water Atlas ([Welcome - Pinellas.WaterAtlas.org \(usf.edu\)](https://www.pinellaswateratlas.org)).

Table 2. FDEP bacteriological criteria for various class waters from 62-302.530 F.A.C.

(6)(a) Bacteriological Quality (Fecal Coliform Bacteria) (Class II Waters)	Number per 100 ml (Most Probable Number (MPN) or Membrane Filter (MF))	MPN or MF counts shall not exceed a median value of 14 with not more than 10% of the samples exceeding 43 (for MPN) or 31 (for MF), nor exceed 800 on any one day. To determine the percentage of samples exceeding the criteria when there are both MPN and MF samples for a waterbody, the percent shall be calculated as $100 * (n_{mpn} + n_{mf}) / N$, where n_{mpn} is the number of MPN samples greater than 43, n_{mf} is the number of MF samples greater than 31, and N is the total number of MPN and MF samples.
(6)(b) Bacteriological Quality (<i>Escherichia coli</i> Bacteria) (Class I and Class I-Treated Waters)	Number per 100 ml (Most Probable Number (MPN) or Membrane Filter (MF))	MPN or MF counts shall not exceed a monthly geometric mean of 126 nor exceed the Ten Percent Threshold Value (TPTV) of 410 in 10% or more of the samples during any 30-day period. Monthly geometric means shall be based on a minimum of 5 samples taken over a 30-day period.
(6)(b) Bacteriological Quality (<i>Escherichia coli</i> Bacteria) (Class III Predominantly Fresh Waters)	Number per 100 ml (Most Probable Number (MPN) or Membrane Filter (MF))	MPN or MF counts shall not exceed a monthly geometric mean of 126 nor exceed the Ten Percent Threshold Value (TPTV) of 410 in 10% or more of the samples during any 30-day period. Monthly geometric means shall be based on a minimum of 10 samples taken over a 30-day period.
(6)(c) Bacteriological Quality (<i>Enterococci</i> Bacteria) (Class III Predominantly Marine Waters)	Number per 100 ml (Most Probable Number (MPN) or Membrane Filter (MF))	MPN or MF counts shall not exceed a monthly geometric mean of 35 nor exceed the Ten Percent Threshold Value (TPTV) of 130 in 10% or more of the samples during any 30-day period. Monthly geometric means shall be based on a minimum of 10 samples taken over a 30-day period.

The City of St. Petersburg has implemented a series of monitoring programs whose primary focus is on water quality as it relates to human health. These are described in the subsections below. The City has recently added microbial source tracking (MST) to investigate possible sources of indicator bacteria. Analyses of source indicators (e.g., human, dog, bird) are conducted for several recreational and background monitoring sites and results of these analyses are included in the respective subsections below. Results are included for human-associated markers (HF183 and H8 markers) and are summarized as whether a marker was present or absent from a sample.

BEACHES MONITORING PROGRAM

The City has several beach areas with relatively heavy recreational use, including primary contact activities such as swimming. Monitoring bacterial concentrations in these waters provides for identification of potential threats to human health, with the City able to provide public warnings at the beaches when unsafe bacterial levels exist based on the monitoring data.

The objective of the Beach Monitoring Program is to monitor water quality where the public engages in activities classified as primary contact such as swimming. The City of St. Petersburg has been monitoring beach water quality for bacterial contamination since at least the mid-1970s, when monitoring included North Shore Beach, Spa Beach, and Maximo Beach. These sites were selected to include the most utilized beaches within the City limits and along with Lassing Park and Treasure Island Beach (Figure 34), are currently monitored by the City. Data collected since 2010 are included in the City's electronic database and are available for evaluation. Monitoring at the Spa Beach site ceased after mid-August 2017 when construction on the new Pier began, and the City picked up the Treasure Island Beach site at that time, with City monitoring there beginning in September 2017. Spa Beach sampling resumed in 2020.

The Beaches Monitoring Program sampling and laboratory analytical methodologies follow those of the Florida Healthy Beaches Program. Samples are collected on a weekly basis every Wednesday. As part of the initial implementation of the Beaches Monitoring Program fecal coliform concentrations were measured. Measurement of *Enterococci* concentrations was implemented in 2010. The State standard for enteric bacteria changed from fecal coliforms to *Enterococci* in marine waters in 2016.

The City has established a classification system for *Enterococci* concentrations as follows:

- Good conditions - 0-35 cfu/100 mL
- Moderate conditions - 36-70 cfu/100 mL
- Poor conditions >70 cfu/100 mL.

The City issues a beach advisory when the concentrations of *Enterococci* exceed 70 cfu/100 mL. The City then re-samples the site.

Table 3 through Table 6 present the frequency of *Enterococci* concentration exceedances of 70 cfu/100 mL and fecal coliform concentration exceedances of 800 cfu/100 mL in each of the beaches in the Beaches Monitoring Program for the period 2010 through 2021. Figure 35 through Figure 38 present the number of samples that were classified as Good, Moderate, or Poor at the same beaches and years.

The preponderance of samples was classified as Good in each of the beaches. There is no apparent temporal trend in the frequency of occurrence of Poor samples, with the exception of North Shore Beach where the number of poor samples has increased since 2014.



Figure 34. Beach Monitoring Program sampling sites.

Table 3. Enteric bacterial monitoring results from Maximo Beach.

Year	<i>Enterococci</i> (Exceedance > 70 (cfu/100ml))		Fecal Coliform (Exceedance > 800 (cfu/100ml))	
	Number of Samples	Number of Exceedances	Number of Samples	Number of Exceedances
2010	42	3	41	1
2011	48	6	47	1
2012	52	1	52	0
2013	53	2	53	0
2014	55	5	54	2
2015	62	9	59	4
2016	58	7	41	1
2017	56	4		
2018	57	6		
2019	60	8		
2020	50	1		
2021	59	10		
All	652	62	347	9

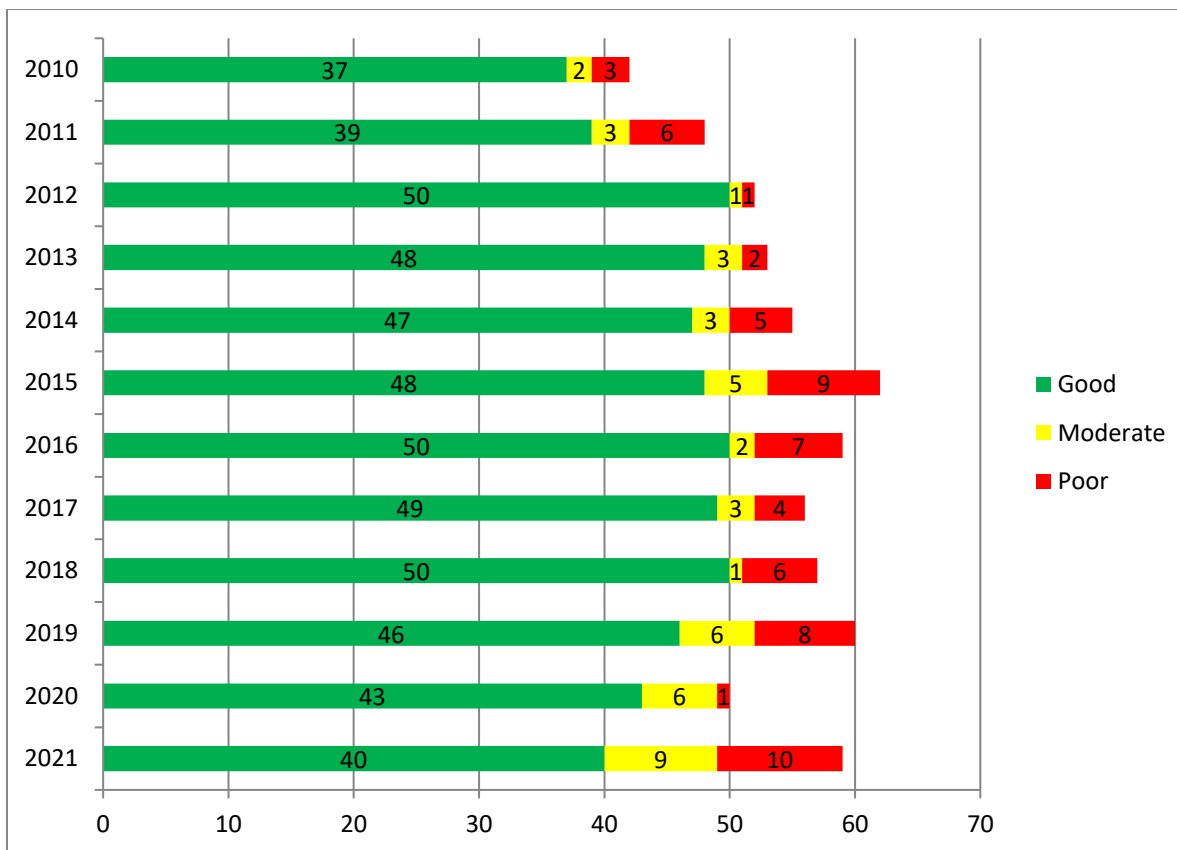


Figure 35. Number of Good, Moderate, and Poor conditions in relation to *Enterococci* concentrations in Maximo Beach.

Table 4. Enteric bacterial monitoring results from North Shore Beach.				
Year	<i>Enterococci</i> (Exceedance > 70 (cfu/100ml))		Fecal Coliform (Exceedance > 800 (cfu/100ml))	
	Number of Samples	Number of Exceedances	Number of Samples	Number of Exceedances
2010	46	7	46	2
2011	50	15	50	7
2012	55	8	61	7
2013	56	9	58	3
2014	57	7	59	3
2015	61	11	62	2
2016	65	15	44	2
2017	69	17		
2018	71	22		
2019	70	25		
2020	64	24		
2021	73	29		
All	737	189	380	26

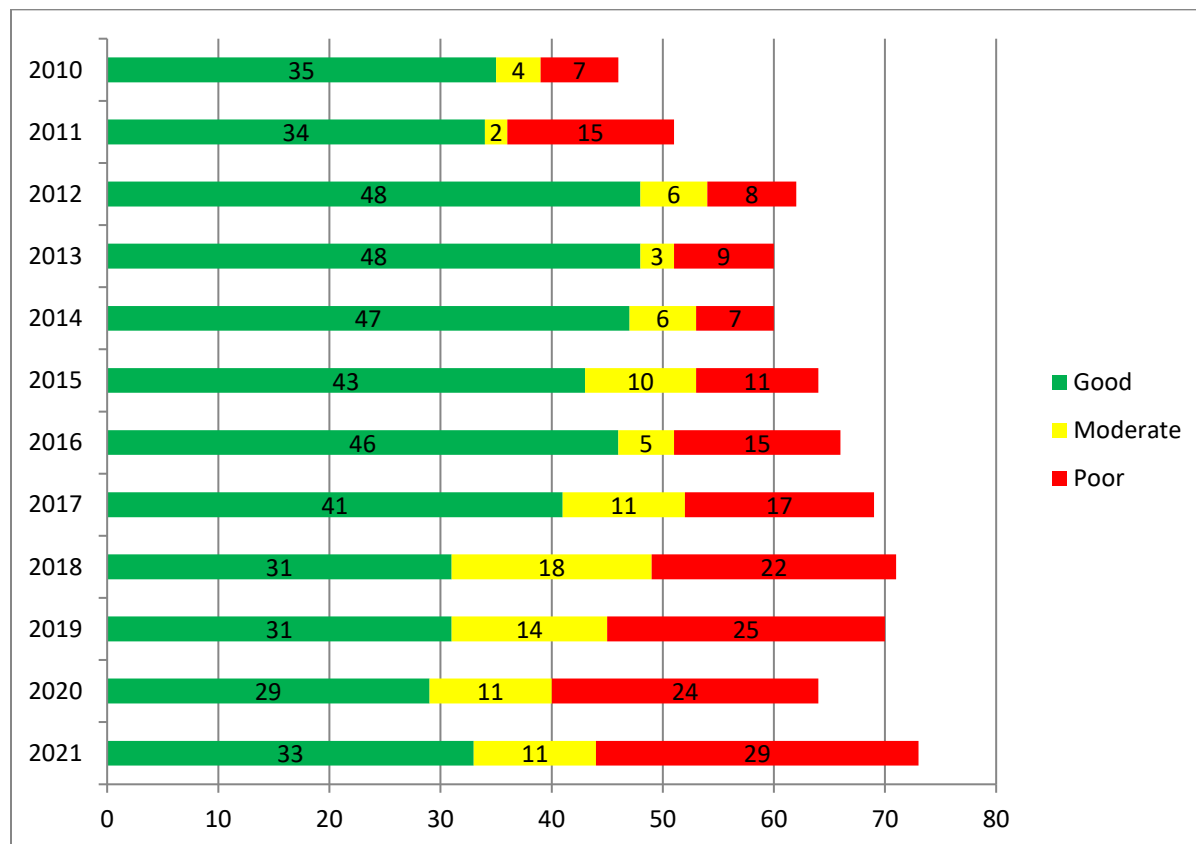


Figure 36. Number of Good, Moderate, and Poor conditions in relation to *Enterococci* concentrations in North Shore Beach.

Table 5. Enteric bacterial monitoring results from Treasure Island Beach.

Year	<i>Enterococci</i> (Exceedance > 70 (cfu/100ml))		Fecal Coliform (Exceedance > 800 (cfu/100ml))	
	Number of Samples	Number of Exceedances	Number of Samples	Number of Exceedances
2010	53	4	53	0
2011	45	2	26	0
2012	25	1		
2013	27	1		
2014	27	2		
2015	31	6		
2016	27	1		
2017	39	5		
2018	55	3		
2019	55	4		
2020	51	4		
2021	55	6		
All	490	39	79	0

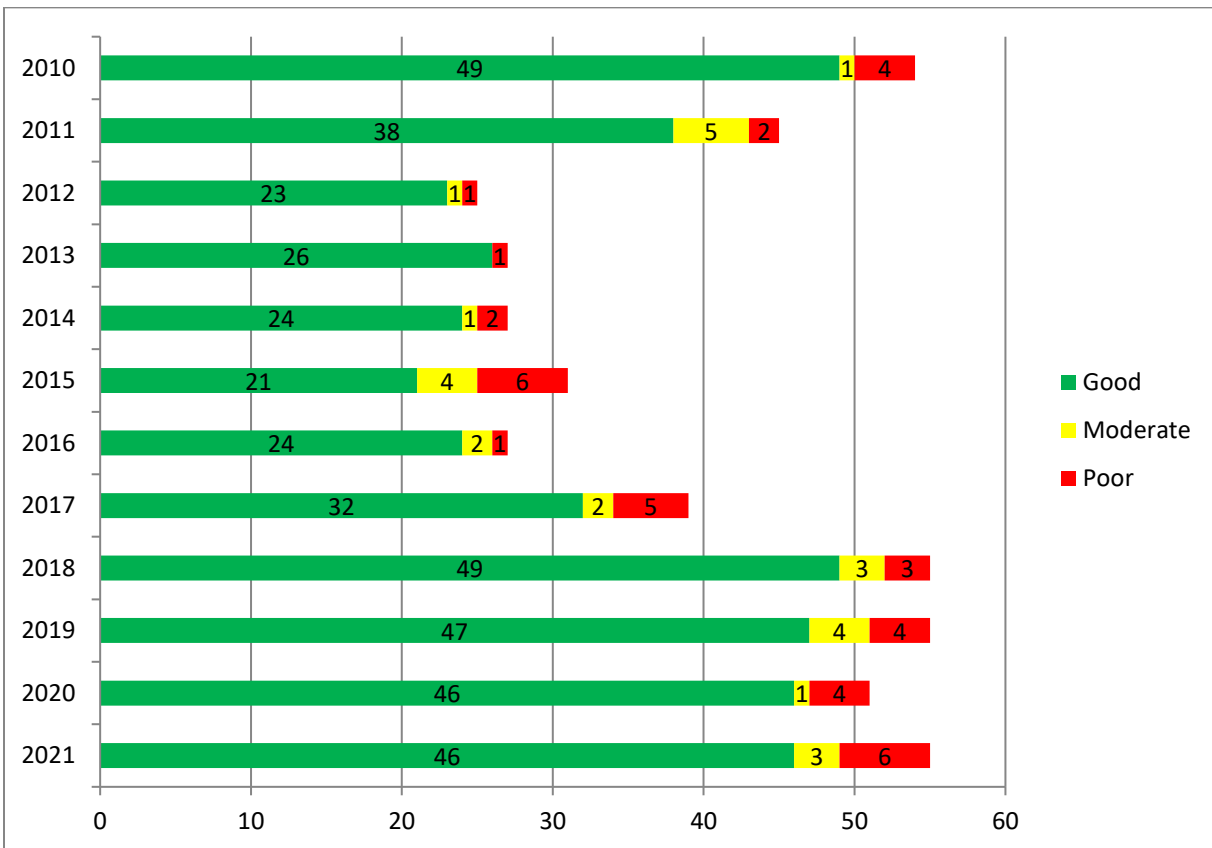


Figure 37. Number of Good, Moderate, and Poor conditions in relation to *Enterococci* concentrations in Treasure Island Beach.

Table 6. Enteric bacterial monitoring results from Spa Beach and Lassing Park.				
	<i>Enterococci</i> (Exceedance > 70 (cfu/100ml))		Fecal Coliform (Exceedance > 800 (cfu/100ml))	
	Number of Samples	Number of Exceedances	Number of Samples	Number of Exceedances
Spa Beach				
2016	14	0	1	0
2017	38	5		
2020	27	2		
2021	60	10		
All	139	17	1	0
Lassing Park				
2016	1	0		
2017	33	6		
2018	59	8		
2019	62	12		
2020	56	10		
2021	66	23		
All	277	59		

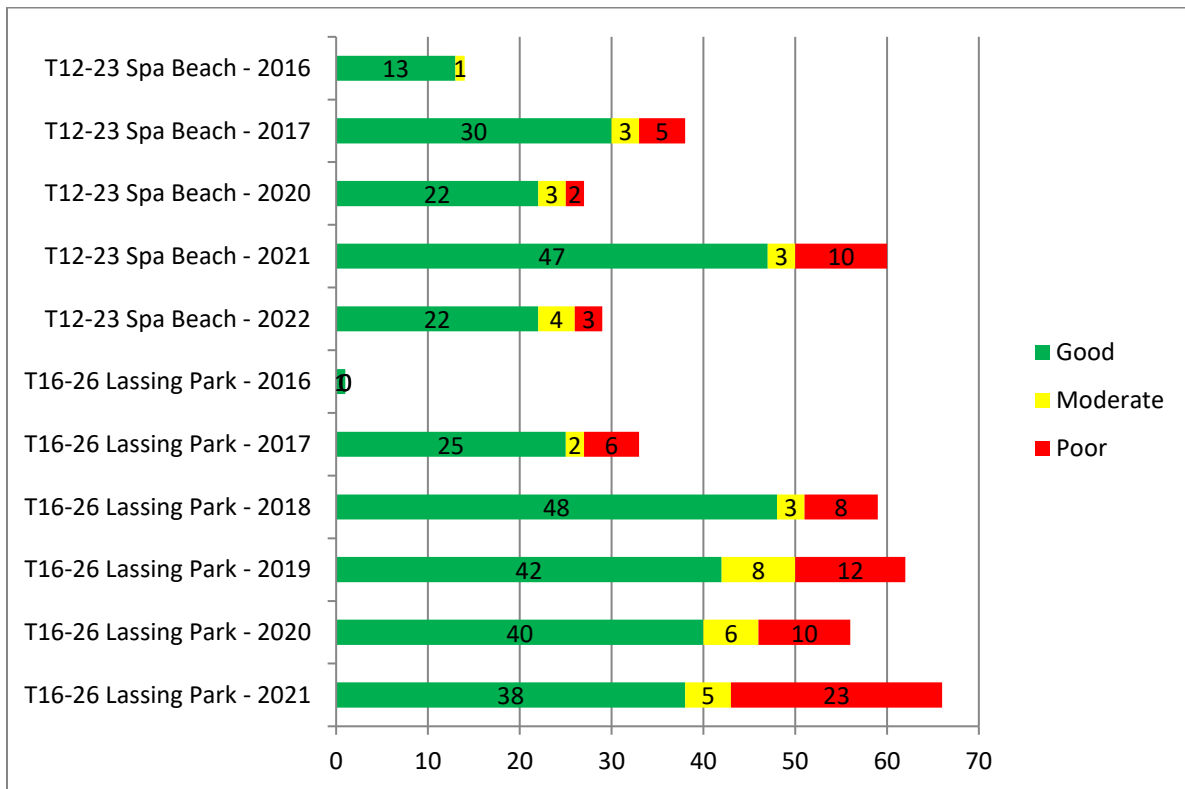


Figure 38. Number of Good, Moderate, and Poor conditions in relation to *Enterococci* concentrations in Spa Beach and Lassing Park.

RECREATIONAL AREA MONITORING PROGRAM

Many city parks are adjacent to or contain water bodies used for recreation other than swimming. These parks support secondary (non-submersive) contact with water during recreational activities, such as fishing, kayaking, boating, and paddle boarding. The objective of the Recreational Area Monitoring Program is to increase public awareness about the water quality conditions as they relate to human health within the City's recreational areas.

Monitoring of enteric bacteria in the recreational areas shown in Figure 39 was initiated in April 2017 stemming from public concerns following unplanned wastewater releases of 2015 and 2016. Prior to this time, several recreation sites were sampled as part of the City's Sanitary Sewer Overflows Monitoring Program and therefore data prior to April 2017 exist for selected sites.

Samples are collected monthly and *Enterococci* concentrations estimated. The results are compared to the City's classification system described above.

Table 7 presents the 2017-2021 sampling results from the Recreational Area Monitoring Program. This table presents results less than 35 CFU/100ml (classified by the city as "good") as green and values greater than 35 CFU/100 ml (classified by the City as either moderate or poor, i.e., "not good") as red. The greatest numbers of *Enterococci* values above 35 CFU/100 ml were found in Fossil Park Lake, Clam Bayou Kayak Launch, and Salt Creek (where all samples taken except for two indicated exceedances). Thus, investigating the sources of *Enterococci* in these systems is prudent.

Beginning in 2019, the city has conducted microbial source tracking for several recreational sites. Table 8 presents the 2019 through 2021 results for the presence or absence of the human-associated marker HF183; Table 9 presents the results during 2020 and 2021 for the presence or absence of the human associated marker H8 which allows the distinguishment between reclaimed water and sewage as an indicator bacteria source. The HF183 marker was absent from samples for Lake Maggiore, where MST was conducted only from February through July 2019. The HF183 marker was detected in 39% of the samples from Clam Bayou Kayak Launch but the H8 marker was detected only twice at this site, suggesting the human-associated source was typically not from sewage. However, in 2020 the HF8 marker was not detected in any sample from Clam Bayou Kayak Launch so continued monitoring is recommended. The HF183 marker was detected at a much greater frequency from Fossil Park Lake and Salt Creek sites during 2019-2021. Only two samples in 2021 indicated the presence of the H8 marker at Fossil Park Lake, while just 1 sample in 2021 from Salt Creek had the H8 marker present that would suggest a sewage source, rather than a reclaimed influence. This represents an improvement for Salt Creek from 2020 when six samples indicated the presence of the HF8 marker. Continued sampling and investigation is recommended.

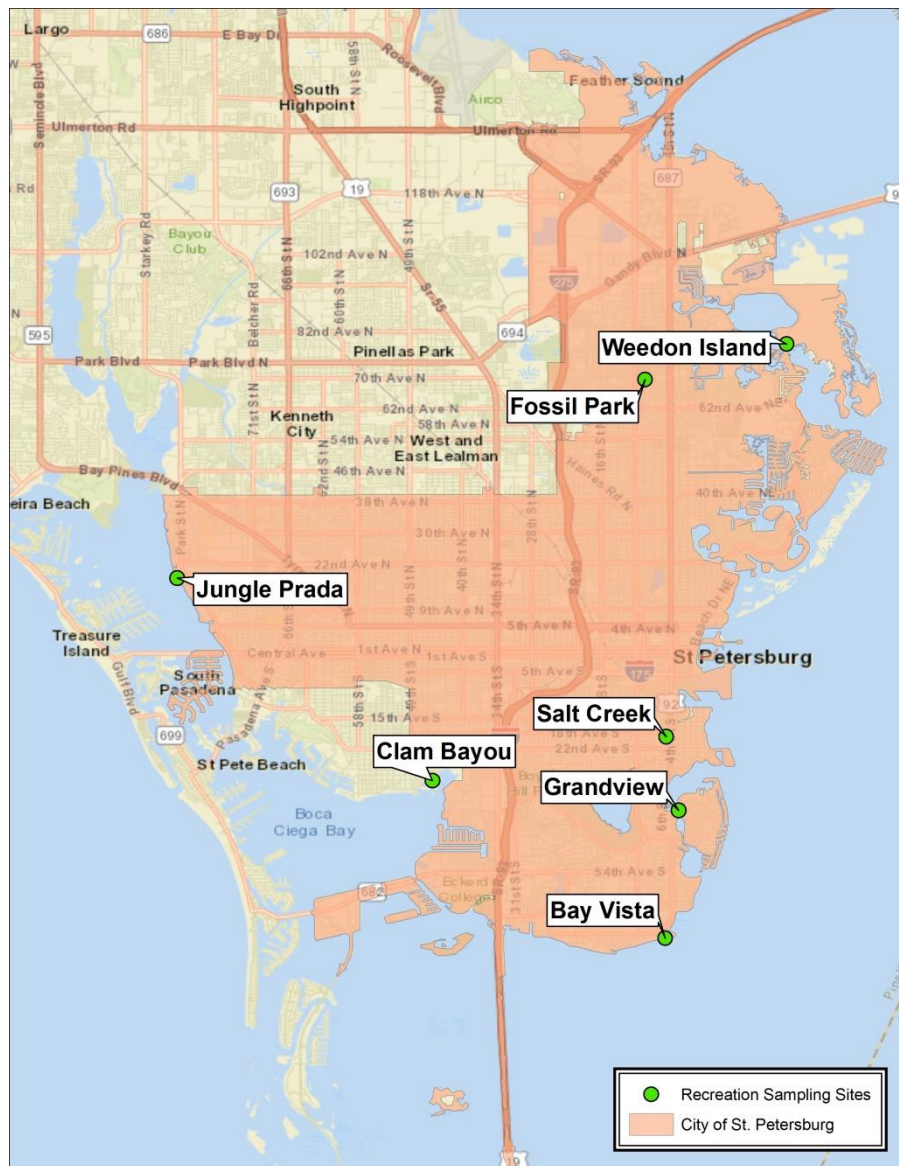


Figure 39. Recreational Area Monitoring Program sampling sites.

Table 7. Occurrence of Enterococci counts in excess of 35 (cfu/100mL) depicted as red “YES”. Those depicted as green “NO” indicate values less than 35 (cfu/100 ml) and blank cells depict no samples. Data collected by the Recreational Area Monitoring Program.

Sample Date	Bay Vista Park	Fossil Park Lake	Grandview Park	Jungle Prada Recreational Park	Salt Creek	Weedon Island	Clam Bayou Kayak Launch
19APR17	NO	YES	NO		YES		
10MAY17	NO	YES	NO		YES	NO	
07JUN17	YES	YES	YES	YES	YES	YES	
05JUL17	NO	YES	NO		YES		
10JUL17	YES						
23AUG17	NO	YES	NO		YES		
26SEP17	YES	YES	NO	YES	YES		
27SEP17	NO						
25OCT17	YES	YES	NO	YES	YES	NO	
08NOV17	NO	YES	YES	NO	YES	YES	
11DEC17	NO	YES	NO	NO	YES	NO	
10JAN18	NO	YES	YES	NO	YES	YES	
11JAN18			NO				
14FEB18	NO	YES	YES	NO	YES	NO	
14MAR18	NO	YES	NO	NO	YES		
15MAR18							YES
16MAR18							YES
25APR18	NO	YES	NO	NO	YES	NO	NO
03MAY18							
04MAY18							
07MAY18							
23MAY18	NO	YES	NO		YES	NO	YES
24MAY18							YES
13JUN18	NO	YES		NO	YES	NO	NO
25JUL18	NO	YES	YES	YES	YES		YES
26JUL18			YES	YES			NO
22AUG18	YES	YES		NO	YES	NO	NO
23AUG18	NO						
12SEP18	NO	YES	YES	NO	YES	NO	YES
13SEP18							YES
10OCT18	YES	YES	YES	YES	YES	YES	YES
12OCT18			YES	YES			YES
06NOV18	NO			NO			

Table 7. Occurrence of Enterococci counts in excess of 35 (cfu/100mL) depicted as red “YES”. Those depicted as green “NO” indicate values less than 35 (cfu/100 ml) and blank cells depict no samples. Data collected by the Recreational Area Monitoring Program.

Sample Date	Bay Vista Park	Fossil Park Lake	Grandview Park	Jungle Prada Recreational Park	Salt Creek	Weedon Island	Clam Bayou Kayak Launch
17JAN19	NO	YES	NO	NO		NO	NO
12FEB19		YES			YES		YES
14FEB19	NO		NO	NO		NO	
13MAR19		NO			YES		NO
14MAR19	NO		NO	NO		NO	NO
09APR19		NO			YES		YES
10APR19							YES
11APR19	NO		NO	NO		NO	
14MAY19		YES			YES		YES
15MAY19	NO		NO	NO		NO	NO
11JUN19		YES			YES		NO
12JUN19	NO		NO	NO		NO	NO
09JUL19		YES					
10JUL19							YES
11JUL19	NO		NO	NO		NO	
12AUG19	NO		NO	NO		NO	
13AUG19							YES
14AUG19							YES
10SEP19		NO					YES
11SEP19							YES
12SEP19	NO		NO	NO		NO	
08OCT19		YES			YES		NO
10OCT19	NO		NO	NO		NO	
11OCT19	NO						
12NOV19		YES			YES		YES
13NOV19	NO		NO	NO		NO	YES
14NOV19			NO				
10DEC19		YES			YES		YES
11DEC19							NO
12DEC19	NO		NO	NO		NO	
14JAN20		YES			YES		NO
15JAN20	NO		NO	NO		NO	
11FEB20		YES			YES		NO

Table 7. Occurrence of Enterococci counts in excess of 35 (cfu/100mL) depicted as red “YES”. Those depicted as green “NO” indicate values less than 35 (cfu/100 ml) and blank cells depict no samples. Data collected by the Recreational Area Monitoring Program.

Sample Date	Bay Vista Park	Fossil Park Lake	Grandview Park	Jungle Prada Recreational Park	Salt Creek	Weedon Island	Clam Bayou Kayak Launch
12FEB20	NO		NO	NO		NO	NO
10MAR20		NO			YES		YES
11MAR20	NO		NO	NO		NO	NO
14APR20		NO			NO		NO
15APR20	NO		NO	NO		NO	
12MAY20		NO			NO		NO
13MAY20	NO		NO	NO		NO	
09JUN20							NO
10JUN20	NO		NO	NO		NO	
14JUL20		YES			YES		NO
15JUL20	NO		NO	NO		NO	
11AUG20		YES			YES		NO
12AUG20	NO		YES	NO		NO	
13AUG20	NO		NO				
08SEP20							YES
09SEP20							YES
10SEP20	NO		NO	NO		NO	
13OCT20		YES			YES		NO
14OCT20	NO		NO	NO		NO	NO
09NOV20	NO		NO	NO		NO	
10NOV20		YES			YES		YES
12NOV20							YES
08DEC20		NO					YES
09DEC20	NO		NO	NO		NO	NO
12JAN21		YES			YES		YES
13JAN21	NO		NO	YES		NO	YES
09FEB21		YES			YES		YES
10FEB21							YES
11FEB21	NO		NO	NO		NO	
09MAR21		YES					YES
10MAR21	YES		NO	NO		NO	NO
13APR21		YES			YES		YES
14APR21	NO		NO	YES		NO	YES

Table 7. Occurrence of Enterococci counts in excess of 35 (cfu/100mL) depicted as red “YES”. Those depicted as green “NO” indicate values less than 35 (cfu/100 ml) and blank cells depict no samples. Data collected by the Recreational Area Monitoring Program.

Sample Date	Bay Vista Park	Fossil Park Lake	Grandview Park	Jungle Prada Recreational Park	Salt Creek	Weedon Island	Clam Bayou Kayak Launch
11MAY21		YES			YES		YES
12MAY21	NO		NO	YES		NO	YES
08JUN21		YES			YES		YES
09JUN21	NO		NO	NO		NO	NO
13JUL21		YES			YES		YES
14JUL21	YES		NO	NO		YES	YES
10AUG21		YES					NO
11AUG21	NO		NO	YES		NO	
12AUG21				YES			
14SEP21					YES		YES
15SEP21	YES		YES	YES		NO	YES
16SEP21			NO	YES			
12OCT21		YES			YES		YES
13OCT21	NO		YES	NO		NO	YES
09NOV21		YES					YES
10NOV21	NO		YES	NO		NO	YES
12NOV21							YES
13NOV21							YES
14DEC21		YES			YES		YES
15DEC21	NO		NO	YES		NO	

Table 8. Presence/Absence of the MST HF183 marker from recreational samples during 2019 through 2021.

SAMPDATE	Analyte	Fossil Park Lake	Lake Maggiore	Clam Bayou Kayak Launch	Salt Creek
12FEB2019	HF183	Absent	Absent	Absent	Present
13MAR2019	HF183	Absent	Absent	Absent	Present
09APR2019	HF183	Present	Absent	Absent	Present
14MAY2019	HF183	Absent	Absent	Absent	Present
11JUN2019	HF183	Present	Absent	Absent	Present
09JUL2019	HF183	Present	Absent	Present	Present
13AUG2019	HF183	Present		Present	Present
10SEP2019	HF183	Present		Present	Present
08OCT2019	HF183	Present			Present
12NOV2019	HF183	Present		Absent	Present
10DEC2019	HF183	Present		Present	Present
14JAN2020	HF183	Present		Absent	Present
11FEB2020	HF183	Present		Absent	Present
10MAR2020	HF183	Absent		Present	Present
14APR2020	HF183	Present			Present
12MAY2020	HF183				Present
09JUN2020	HF183			Absent	Absent
14JUL2020	HF183	Present			Present
11AUG2020	HF183	Present			Present
08SEP2020	HF183			Present	Absent
13OCT2020	HF183	Absent		Absent	Present
10NOV2020	HF183	Present		Absent	Present
08DEC2020	HF183	Present		Absent	
12JAN2021	HF183	Absent		Absent	Present
09FEB2021	HF183	Present		Absent	Present
09MAR2021	HF183	Present		Absent	
13APR2021	HF183	Present		Absent	Present
11MAY2021	HF183	Present		Present	Present
08JUN2021	HF183	Absent		Absent	Present
13JUL2021	HF183	Present		Present	Present
10AUG2021	HF183	Absent			Absent
14SEP2021	HF183	Present		Present	Present
12OCT2021	HF183	Absent		Present	Present
09NOV2021	HF183	Present		Present	Present
14DEC2021	HF183	Present			Present

Table 9. Presence/Absence of the MST HF8 marker from recreational samples during 2020 and 2021.

SAMPDATE	Analyte	Fossil Park Lake	Lake Maggiore	Clam Bayou Kayak Launch	Salt Creek
14JAN2020	H8	Absent		Absent	Present
11FEB2020	H8	Present		Absent	Present
10MAR2020	H8	Absent		Absent	Present
14APR2020	H8	Absent			Present
12MAY2020	H8				Absent
09JUN2020	H8			Absent	Absent
14JUL2020	H8	Absent			Present
11AUG2020	H8	Absent			Absent
08SEP2020	H8			Absent	Absent
13OCT2020	H8	Absent		Absent	Present
10NOV2020	H8	Absent		Absent	Absent
08DEC2020	H8	Absent		Absent	
12JAN2021	H8	Absent		Absent	Absent
09FEB2021	H8	Absent		Absent	Present
09MAR2021	H8	Absent		Absent	
13APR2021	H8	Present		Absent	Absent
11MAY2021	H8	Present		Absent	Absent
08JUN2021	H8	Absent		Absent	Absent
13JUL2021	H8	Absent		Present	Absent
10AUG2021	H8	Absent			Absent
14SEP2021	H8	Absent		Absent	Absent
12OCT2021	H8	Absent		Absent	Absent
09NOV2021	H8	Absent		Present	Absent
14DEC2021	H8	Absent			Absent

SANITARY SEWER OVERFLOWS MONITORING PROGRAM

Many urban areas with aging drainage and sanitary sewer infrastructure experience occasional Sanitary Sewer Overflow (SSO) events, commonly due to heavy rainfall and resultant runoff, conveyance pipe breakage, and flooding. The City has been responding to reports of SSOs since at least the mid-1970s and has been collecting bacterial data associated with these overflows (based on paper copies of reports within City archives).

The objective of the Sanitary Sewer Overflow Monitoring Program is to quantify and minimize the impacts to the environment and the public from SSO events. Monitoring provides information that assists the City in determining appropriate courses of action for mitigation or remediation (if needed). Monitoring sites are selected based on reported SSO events, with samples collected in response to the event. Each SSO location is sampled, if possible, at the immediate point of impact of the SSO on the receiving water body (stream, canal, lake/pond). If possible, samples are also collected upstream and downstream of the impact point. SSO monitoring sites visited since 2010 are shown in Figure 40. Data are available in the City's electronic database back through 2010.

Monitoring at a given sampling site continues daily until the enteric bacterial counts drop below background levels as defined by the Background Monitoring Program (described below) associated with that site, or until a level is reached deemed acceptable based on professional judgment.

The locations of all SSO sampling sites are provided in Figure 40; those sampled during the most recent year (2021) are identified separately from prior events. For this report card, an event is defined as one reported SSO at one location. During 2021, no single location experienced multiple events. This is unlike prior years where SSOs at several general locations were sampled during multiple events. These locations included 54th Ave N. Discharge, Albert Whitted Emergency Overflow, Clam Bayou Discharge, and Lake Maggiore. The events occurring in 2021 with bacterial samples, along with mean event bacterial concentrations for the point of entry (discharge location) are provided in Table 10.

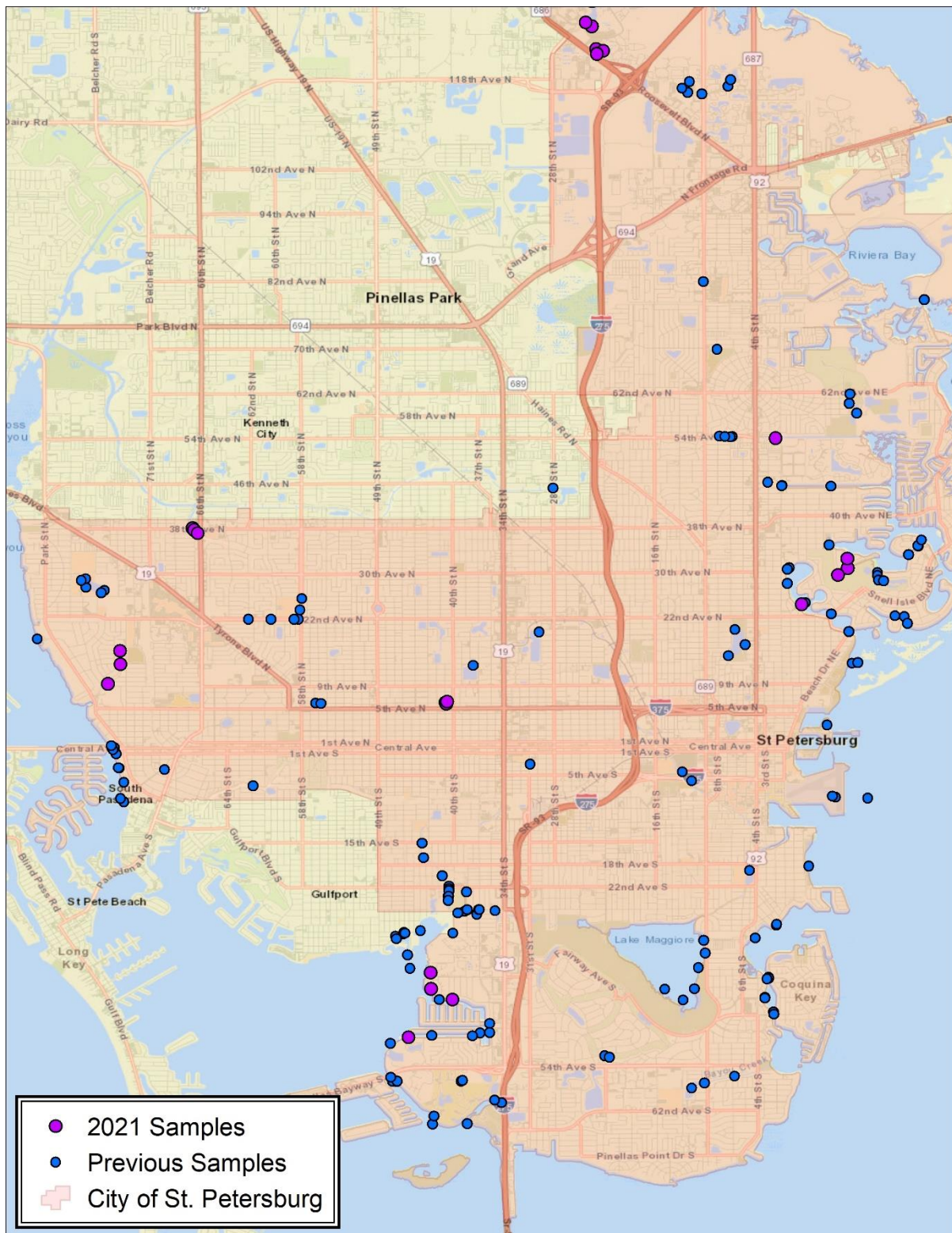


Figure 40. Sanitary Sewer Overflow (SSO) Monitoring Program sampling sites. Previous samples are from the period 2010-2020.

Table 10. Sampling associated with SSOs occurring in 2021, along with mean bacterial levels at the discharge location.

Event	Start Date	End Date	N <i>Enterococci</i>	Mean <i>Enterococci</i>	N <i>E. coli</i>	Mean <i>E. coli</i>
ID# 20210208 Carillon Pkwy E of Lake Ca	09FEB21	12FEB21			1	31
ID# 20210604 - 36th Ave North & 66th Way	05JUN21	06JUN21			2	189
ID # 2021 - 8th St & 31st Ave N	05JUL21	06JUL21	1	2900	1	1790
ID # 2021 - 31st Ave NE Bridge	19JUL21	10SEP21	4	342.5		

BACKGROUND CONDITION MONITORING PROGRAM

City staff identified that in order to meaningfully interpret the data collected by its Sanitary Sewer Overflows Monitoring Program that additional data collected in the same areas but in the absence of an overflow event could provide the appropriate baseline or background data. The objective, therefore, of the Background Monitoring Program is to provide location-specific "normal" bacterial levels in the absence of conditions influenced by an SSO.

Monitoring began in February 2017 at these sites for background conditions. Sampling frequency is variable and often coincides with Ambient Monitoring sample collection. Concentrations of *Enterococci*, *E. coli*, and total fecal coliforms were originally estimated in each sample. It is important to note that the State's bacterial standard has been redefined by *Enterococci* and *E. coli* concentrations. Fecal coliform data continued to be monitored through 2018 but have not since been collected for these sites.

Background monitoring sites were selected to coincide with locations where known SSO events occurred in the past and were, therefore, more likely to occur in the future (Figure 41). The selected sites include both marine and freshwater locations. For each site, background enteric bacterial concentrations are defined by the geometric mean of background concentrations observed in the absence of an SSO event.

Table 11 presents the calculated geometric mean of the enteric bacteria concentrations, i.e., the background concentrations, for each of the background monitoring sites. The highest geometric mean fecal coliform concentrations were previously found in the following sampling sites:

- T16-25 1st St. N. + 45th Ave
- T15-23 54th Ave N. + 1st St.
- T16-49 Joe's Creek 38th Ave N + 66th St.
- T16-51 Booker Creek 11th Ave S

The geometric mean *E. coli* concentrations were generally similar across the majority of the sampling sites ranging from 20 - 470 mpn/100mL. However, two sites had order of magnitude higher geometric means for *E. coli*: T16-25 1st St. N. + 45th Ave (9838 mpn/100mL) and T15-23 54th Ave N. + 1st St. (1718 mpn/100mL). Similar to the *E. coli* results, the *Enterococci* geometric means were highest at the T16-25 1st St. N. + 45th Ave and T15-23 54th Ave N. + 1st St. These results suggest that investigation into the potential sources of bacterial contamination at these two sites should be conducted.

The City began conducting MST for indicator bacteria in 2019 at the four background monitoring sites listed above as having the highest fecal coliform levels (two of which were also the highest for *E. coli* and *Enterococci*). Markers included those indicating human-associated bacteria (HF183

and H8). The marker HF183 was analyzed in samples from 2019-2021 (Table 12) while H8 was added in 2020 (**Error! Reference source not found.**) to distinguish between reclaimed water or sewage sources. The HF183 marker was detected as present in nearly all samples analyzed from these four stations during 201-2021. While the H8 marker was detected as present from 2020-2021 samples, the frequency of occurrence was lower for all stations than the HF183 marker and was absent from some samples where HF183 had been detected.



Figure 41. Background Monitoring Program sampling sites.

Table 11. Geometric mean concentrations of *Enterococci* , and *E. coli* from the Background Monitoring Program.

Sampling Site	N <i>E. coli</i>	<i>E. coli</i> (mpn/100ml)	<i>E. coli</i> Last Sample Date	N <i>Enterococci</i>	<i>Enterococci</i> (cfu/100ml)	<i>Enterococci</i> Last Sample Date
T15-23 54th Ave N. + 1st St.	9	1718	Aug 2021	49	545	Dec 2021
T16-19 2201 61st St. N. Canal	21	217	Dec 2018	1	290	Nov 2018
T16-25 1st St. N. + 45th Ave	6	9838	Aug 2021	52	560	Dec 2021
T16-43 WFP Outfall	57	144	Dec 2021	1	160	Nov 2018
T16-45 Sunset Dr. N. & Central	1	20	Nov 2018	57	36	Dec 2021
T16-46 Sunset Dr. S. & 3rd Ave	1	173	Nov 2018	24	31	Mar 2019
T16-49 Joe's Creek 38th Ave N + 66th St.	57	374	Dec 2021	1	390	Nov 2018
T16-50 Joe's Creek 45th Ave N + 28th St.	20	282	Nov 2018	2	226	Dec 2018
T16-51 Booker Creek 11th Ave S	53	470	Dec 2021	5	437	Nov 2021

Table 12. Presence/Absence of the MST HF183 marker from background samples during 2019 through 2021.

SAMPDATE	Analyte	T15-23 54th Ave N. + 1st St.	T16-25 1st St. N. + 45th Ave	T16-49 Joe's Creek 38th Ave N + 66th St.	T16-51 Booker Creek 11th Ave S
12FEB2019	HF183	Present	Present	Present	Absent
13MAR2019	HF183	Absent	Present	Absent	Absent
09APR2019	HF183	Present	Present	Present	Absent
14MAY2019	HF183	Present	Present	Present	Present
11JUN2019	HF183	Present	Absent	Present	Present
09JUL2019	HF183	Present	Present	Present	Present
13AUG2019	HF183	Present	Present	Present	Present
10SEP2019	HF183	Present	Present	Present	Present
08OCT2019	HF183	Present	Present	Present	Present
12NOV2019	HF183	Present	Present		
10DEC2019	HF183	Present	Present		
14JAN2020	HF183	Present	Present		
11FEB2020	HF183	Absent	Present		
10MAR2020	HF183	Present	Present		
14APR2020	HF183	Present	Present		
12MAY2020	HF183	Present		Absent	Present
09JUN2020	HF183		Present	Present	
14JUL2020	HF183	Present	Present	Present	
11AUG2020	HF183	Present	Present	Present	Present
08SEP2020	HF183	Present	Present	Present	Present
13OCT2020	HF183	Present	Present		Present
10NOV2020	HF183	Present	Present	Present	Present
08DEC2020	HF183	Present	Present		
12JAN2021	HF183	Present	Present		
09FEB2021	HF183	Absent	Absent		Present
09MAR2021	HF183	Present	Present		
13APR2021	HF183	Present	Present		
11MAY2021	HF183	Present	Present		Present
08JUN2021	HF183	Present	Present	Present	Present
13JUL2021	HF183	Present	Present		Present
10AUG2021	HF183	Present	Absent		Present
14SEP2021	HF183	Present	Present	Present	
12OCT2021	HF183	Present	Present		
09NOV2021	HF183	Present	Present		Present
14DEC2021	HF183	Present	Absent		Present

Table 13. Presence/Absence of the MST HF8 marker from background samples during 2020 and 2021.

SAMPDATE	Analyte	T15-23 54th Ave N. + 1st St.	T16-25 1st St. N. + 45th Ave	T16-49 Joe's Creek 38th Ave N + 66th St.	T16-51 Booker Creek 11th Ave S
14JAN2020	H8	Present	Present		
11FEB2020	H8	Present	Present		
10MAR2020	H8	Absent	Absent		
14APR2020	H8	Absent	Absent		
12MAY2020	H8	Absent		Present	Absent
09JUN2020	H8	Absent		Present	
14JUL2020	H8	Present	Present	Present	
11AUG2020	H8	Absent	Absent	Absent	Absent
08SEP2020	H8	Present	Absent	Absent	Present
13OCT2020	H8	Absent	Present		Present
10NOV2020	H8	Absent	Absent	Absent	Absent
08DEC2020	H8	Absent	Present		
12JAN2021	H8	Absent	Absent		
09FEB2021	H8	Absent	Absent		Absent
09MAR2021	H8	Absent	Absent		
13APR2021	H8	Absent	Absent		
11MAY2021	H8	Absent	Absent		Absent
08JUN2021	H8	Absent	Absent	Absent	Present
13JUL2021	H8	Absent	Absent		Present
10AUG2021	H8	Present	Absent		Present
14SEP2021	H8	Absent	Absent	Absent	
12OCT2021	H8	Absent	Absent		
09NOV2021	H8	Absent	Absent		Present
14DEC2021	H8	Absent	Absent		Present

CONCLUSIONS

The following summarizes the status of the City's monitoring in regard to human health as represented by enteric bacteria. Recommendations are provided based on our evaluation of the four human health monitoring programs.

- With the exception of the Beaches Monitoring Program, the remaining three human health programs (recreational, SSO and background conditions) were all instituted relatively recently. While the results from these three monitoring programs provide an overview of existing conditions, the limited period of record does not allow evaluation of temporal trends, i.e., whether human health conditions are improving or declining. It is recommended that the City continue implementation of all four programs which will allow analysis of long-term changes in human health conditions.
- In prior years, the Sanitary Sewer Overflows monitoring program identified specific areas where elevated bacterial concentrations have been observed during multiple events. These locations include the 54th Ave. N. and 1st St. location, Clam Bayou, and Lake Maggiore. It is recommended that the City continue a sampling protocol similar to that used in the Background Conditions Program in these areas, where multiple SSO events have been observed. Multiple events at a single location were not observed during 2021.
- For sites monitored as part of the Sanitary Sewer Overflows Monitoring Program, it is recommended that the focus be on obtaining samples from downstream receiving waterbodies where impacts are likely to be most important.
- With respect to the Recreational Areas Monitoring Program, the greatest numbers of *Enterococci* values greater than 35 (cfu/100ml), above which the City classifies as “poor” or “moderate”, were found in Fossil Park Lake, Clam Bayou Kayak Launch, and Salt Creek. Given these results, it would be prudent to continue to investigate the sources of *Enterococci* in these systems. Recently added MST analyses indicate that there are human-associated markers in the bacterial samples from several recreational sites and that the Salt Creek site, in particular, contained the H8 marker, though the number of samples indicating the H8 marker dropped in 2021 relative to 2020. Though there are limited data, the periodic/intermittent presence of H8 indicates a sewage source rather than reclaimed influence was present. Further sampling and investigation is recommended.

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