



WATER QUALITY IN THE GUANA TOLOMATO MATANZAS NATIONAL ESTUARINE RESEARCH RESERVE

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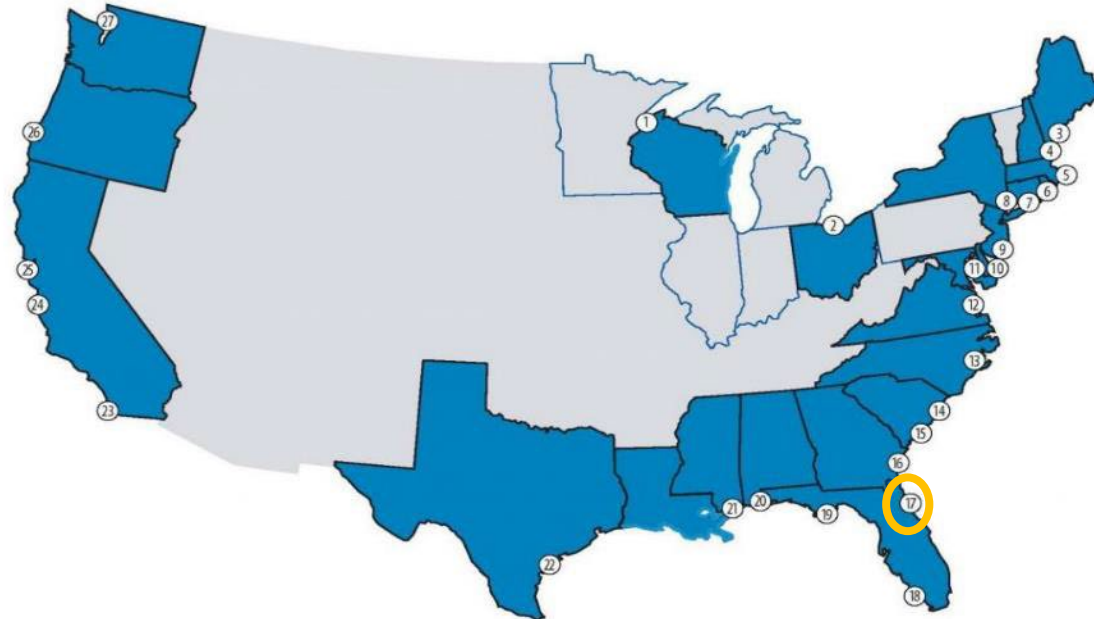
UF Water Institute Symposium | Feb. 20-21, 2024



NATIONAL ESTUARINE RESEARCH RESERVE (NERR)



NATIONAL ESTUARINE RESEARCH RESERVES



Great Lakes

1. Lake Superior, Wisconsin
2. Old Woman Creek, Ohio

Northeast

3. Wells, Maine
4. Great Bay, New Hampshire
5. Waquoit Bay, Massachusetts
6. Narragansett Bay, Rhode Island
7. Connecticut

Mid-Atlantic

8. Hudson River, New York
9. Jacques Cousteau, New Jersey
10. Delaware
11. Chesapeake Bay, Maryland
12. Chesapeake Bay, Virginia

Southeast

13. North Carolina
14. North Inlet-Winyah Bay, South Carolina
15. ACE Basin, South Carolina
16. Sapelo Island, Georgia
17. Guana Tolomato Matanzas, Florida

Gulf of Mexico

18. Rookery Bay, Florida
19. Apalachicola, Florida
20. Weeks Bay, Alabama
21. Grand Bay, Mississippi
22. Mission-Aransas, Texas

West

23. Tijuana River, California
24. Elkhorn Slough, California
25. San Francisco Bay, California
26. South Slough, Oregon
27. Padilla Bay, Washington
28. Kachemak Bay, Alaska

Pacific

29. He'eia, Hawai'i

Caribbean

30. Jobos Bay, Puerto Rico

PROPOSED

- Bay of Green Bay, Wisconsin
- Louisiana





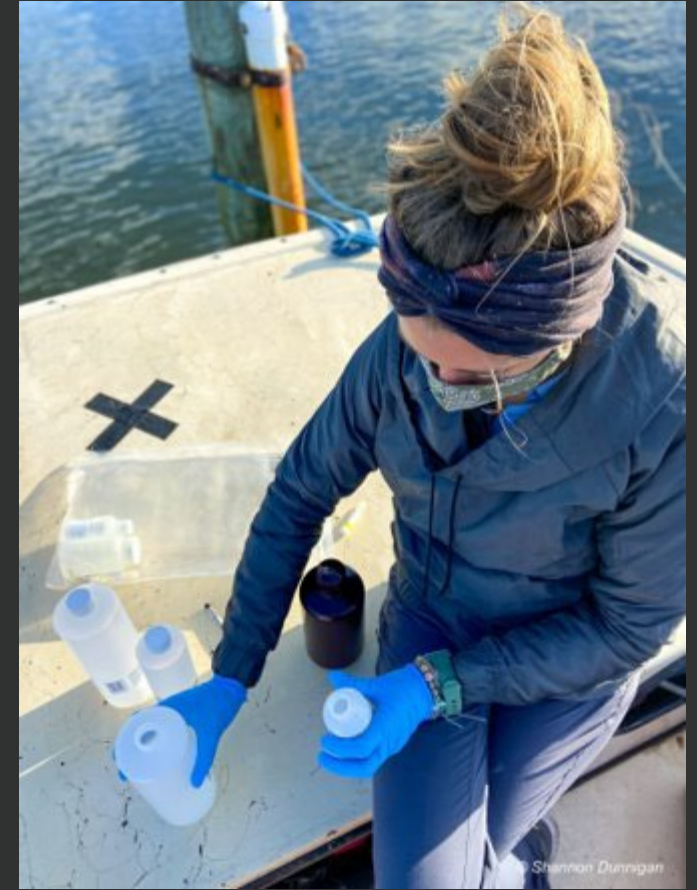
SYSTEM-WIDE MONITORING PROGRAM

Water Quality in the GTMNERR

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NATIONAL WEATHER AND WATER QUALITY MONITORING





ACCESSIBLE, QUALITY DATA

CENTRALIZED DATA MANAGEMENT OFFICE

www.nerrsdata.org

National Estuarine Research Reserve System
Centralized Data Management Office

Home About CDMO About Data Get Data Web Services Science Collaborative

View / Download Data

Real Time Monitoring Data

From the CDMO

View / Download Data

GTMPCMET
01/13/2022 15:45

10.2°C (50.4°F)
17 m/s (3.8 MPH)

75%
0 mm (0 in.)

The CDMO is excited to announce the launch of our new **SWMP Mobile application**. Near real-time SWMP data is now available on your smartphone or tablet at: www.nerrsdata.org/mobile

Our **Data Graphing and Export System** has been updated and now has enhanced graphing capabilities! Want to easily export or graph data? If so, check out our **Data Graphing and Export System**!

Department of Commerce | NOAA | National Ocean Service | Office for Coastal Management | NERRS | Webmaster
Site hosted by NOAA's National Estuarine Research Reserve System, Centralized Data Management Office



WATER QUALITY MONITORING STATIONS

Pine Island



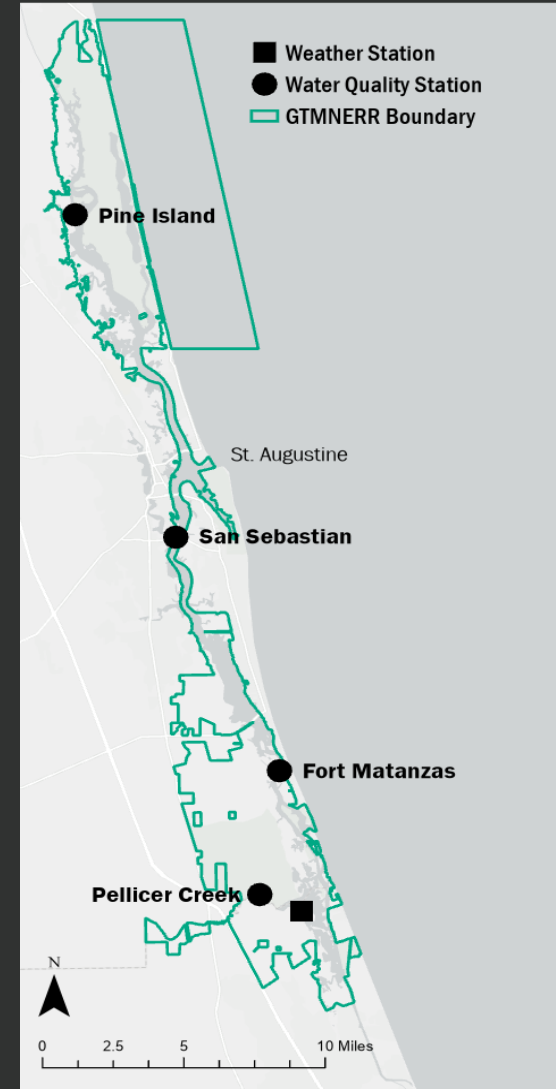
San Sebastian



Fort Matanzas



Pellicer Creek

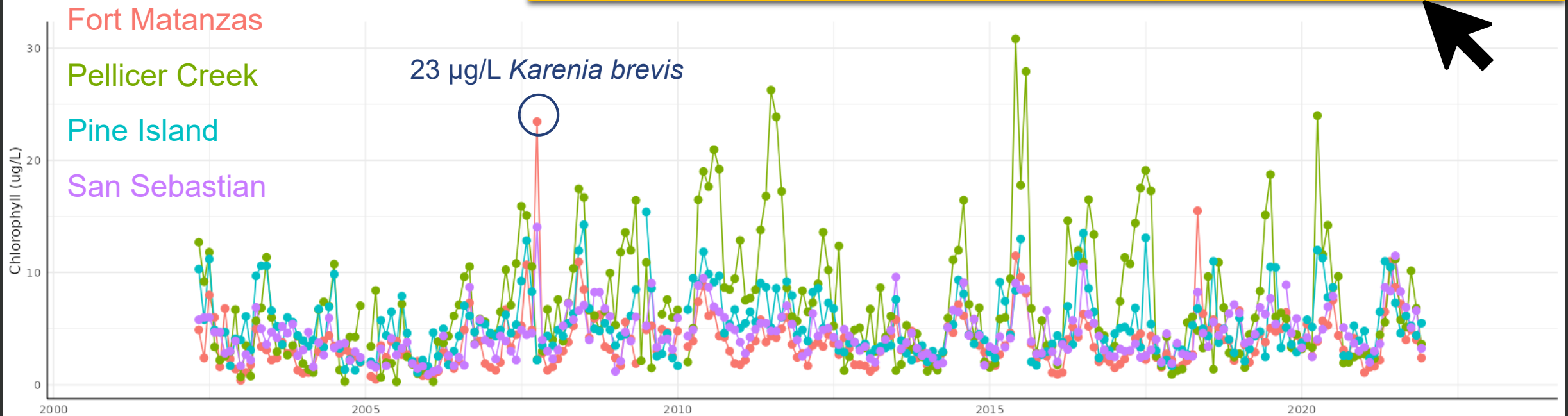




DATA SUMMARIES

CHLOROPHYLL *a* AT ALL STATIONS

<https://cdmo.baruch.sc.edu/get/swmp-rats.cfm>

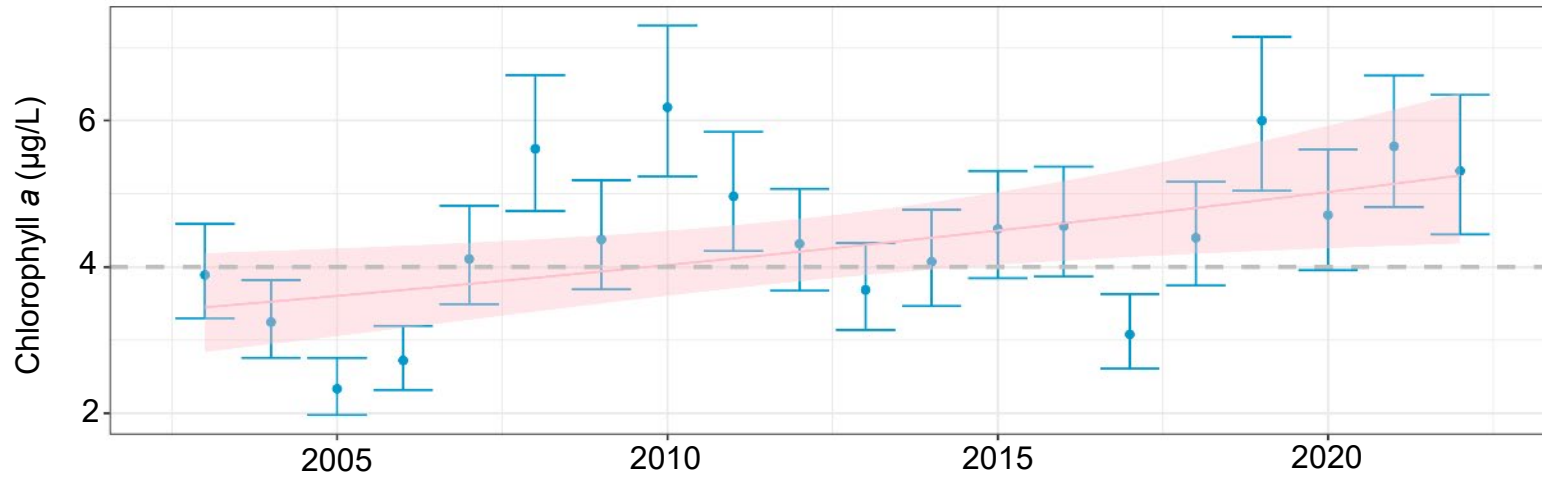




San Sebastian (SS)

Annual means with 95% confidence intervals.

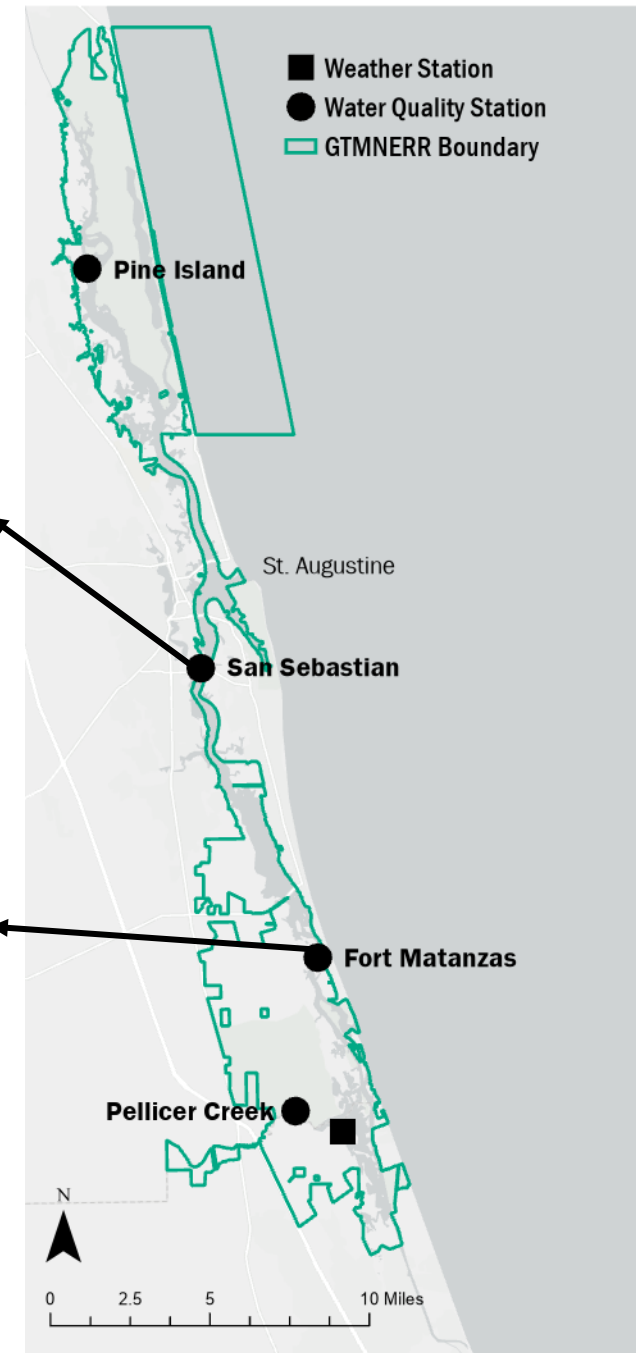
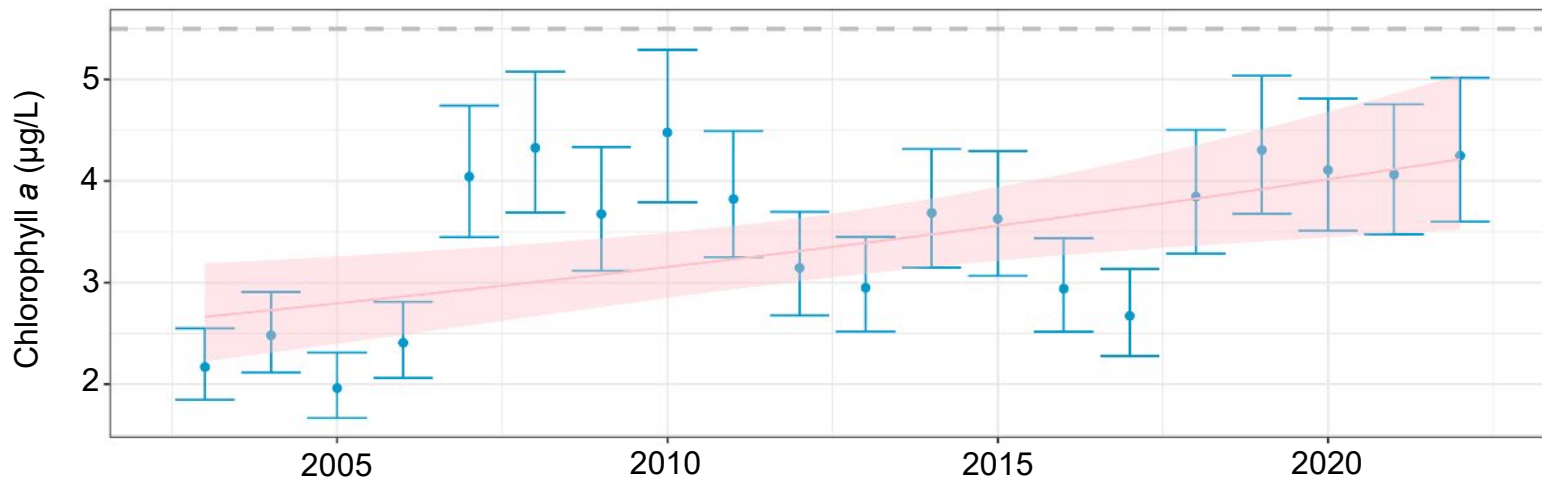
Trend from 2003 to 2022: approximate slope 0.09, log-slope 0.01 (0, 0.02), $p < 0.05$.



Fort Matanzas (FM)

Annual means with 95% confidence intervals.

Trend from 2003 to 2022: approximate slope 0.08, log-slope 0.01 (0, 0.02), $p < 0.01$.

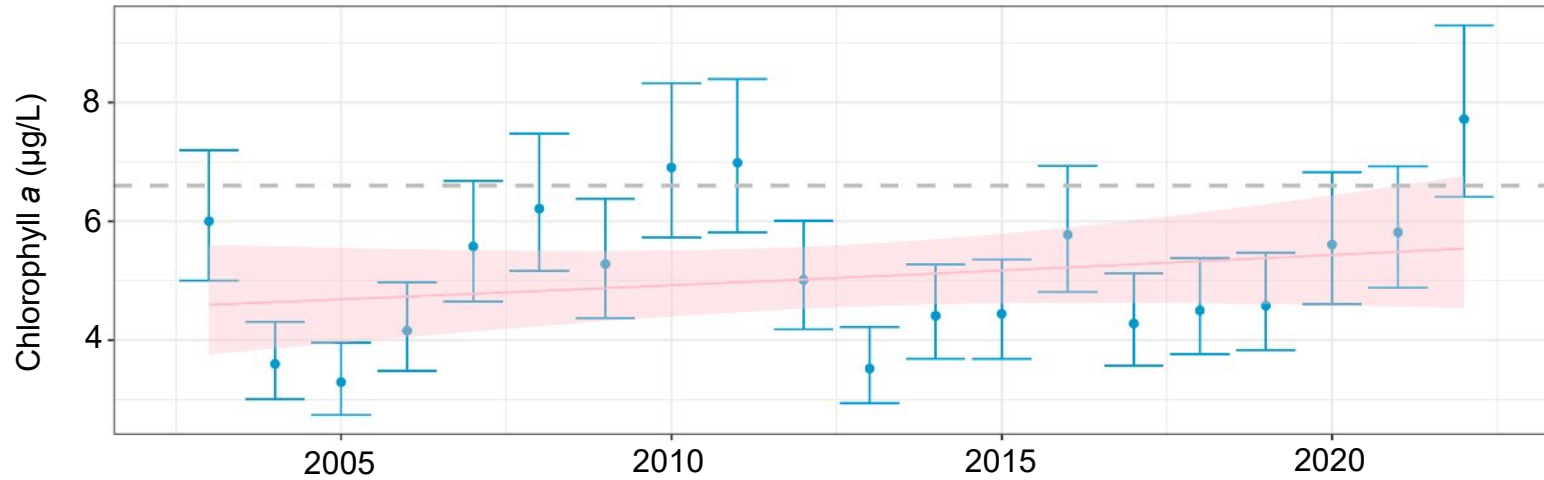




Pine Island (PI)

Annual means with 95% confidence intervals.

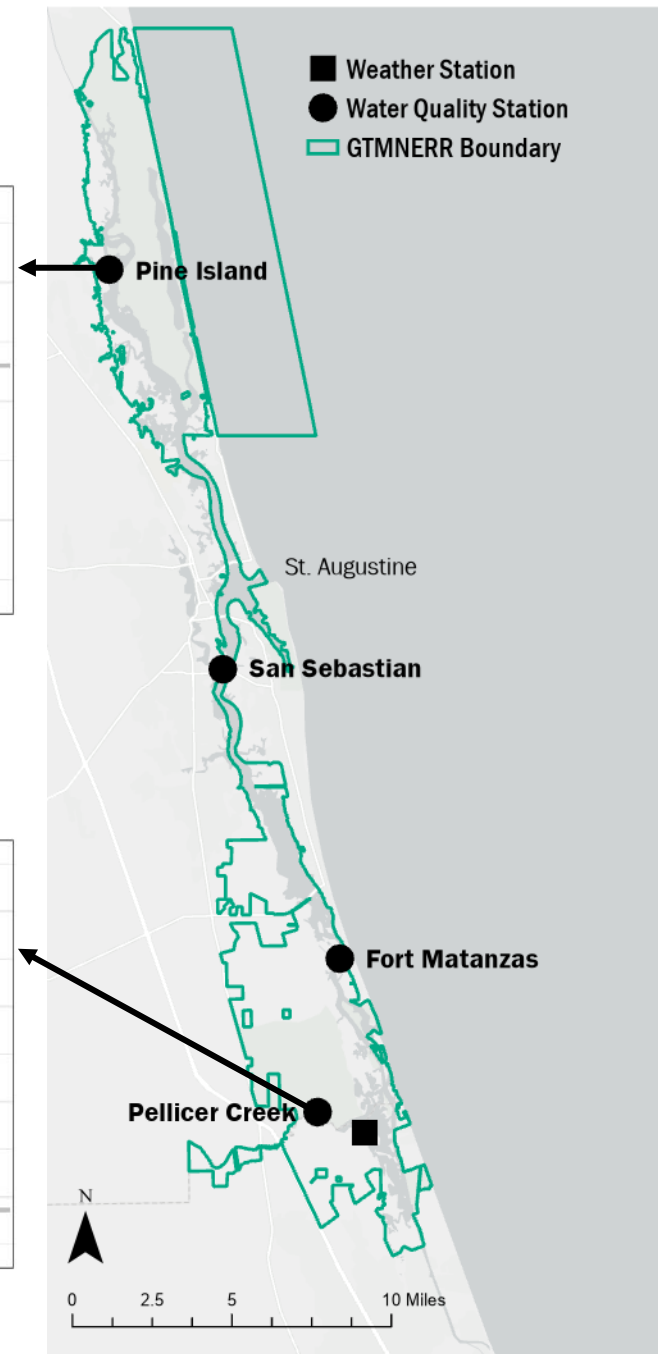
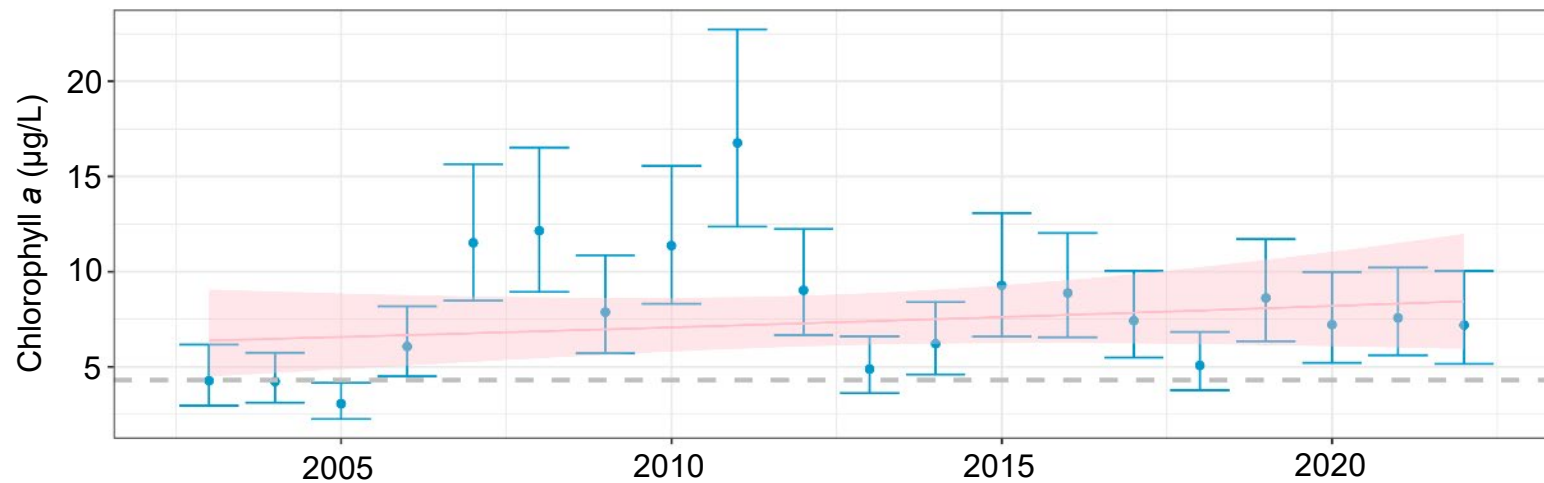
Trend from 2003 to 2022: approximate slope 0.05, log-slope 0 (0, 0.01), nonsignificant (ns).



Pellicer Creek (PC)

Annual means with 95% confidence intervals.

Trend from 2003 to 2022: approximate slope 0.11, log-slope 0.01 (-0.01, 0.02), ns.

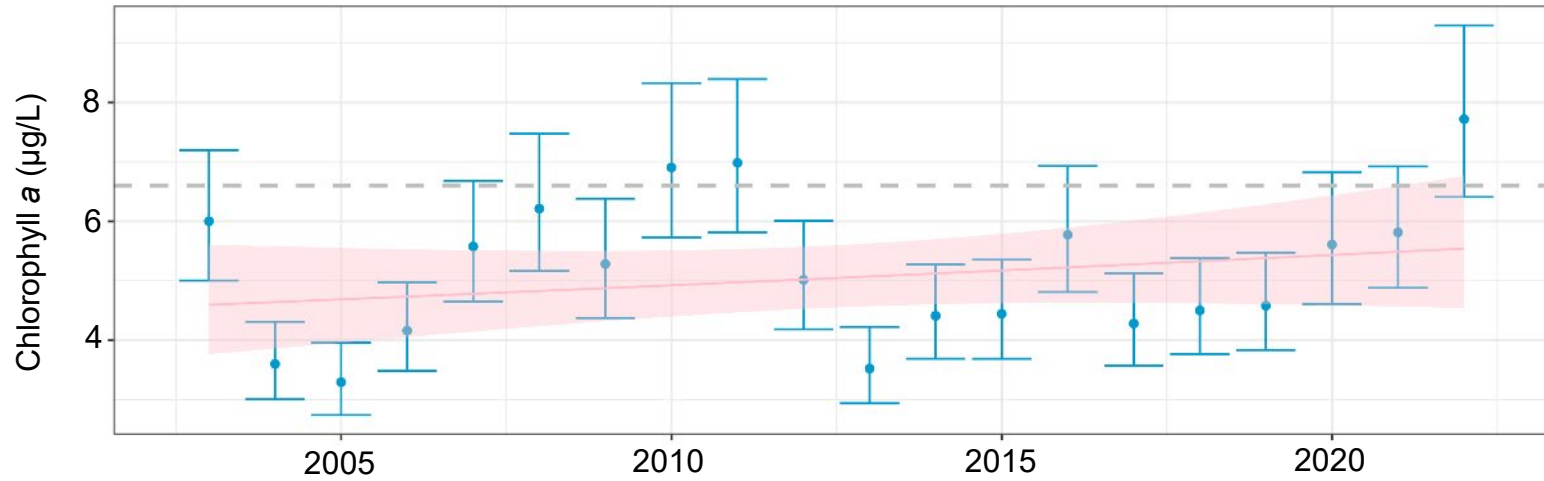




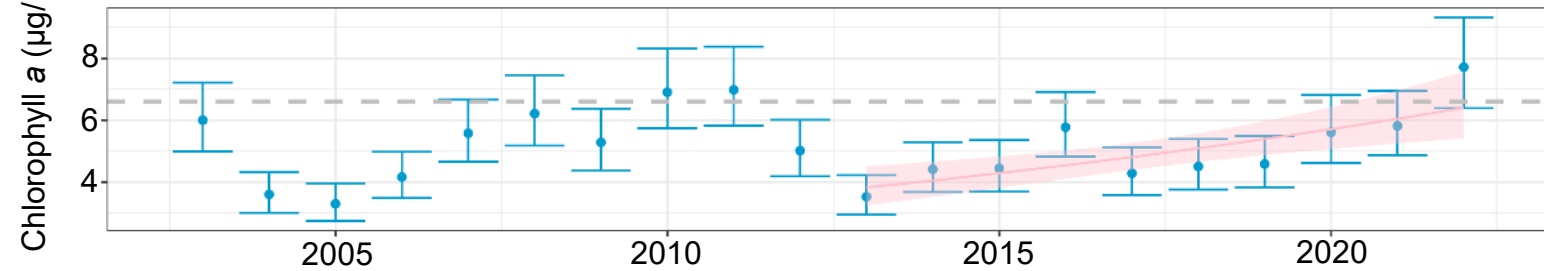
Pine Island (PI)

Annual means with 95% confidence intervals.

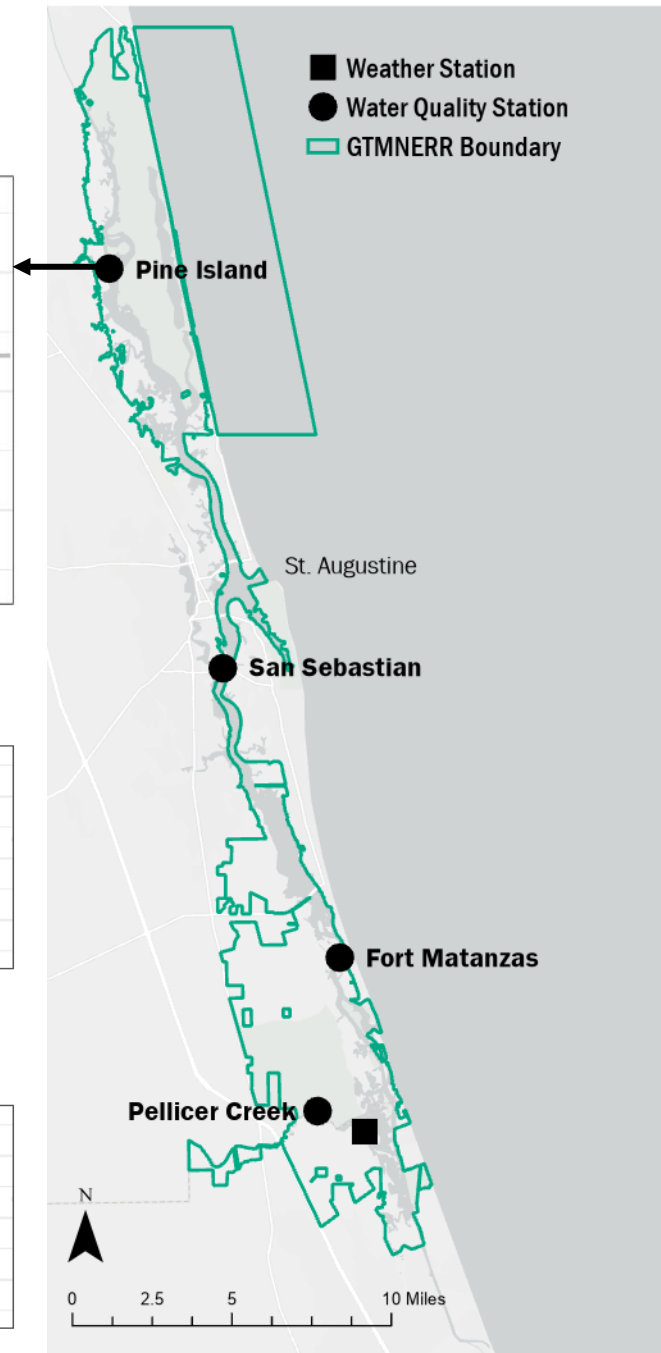
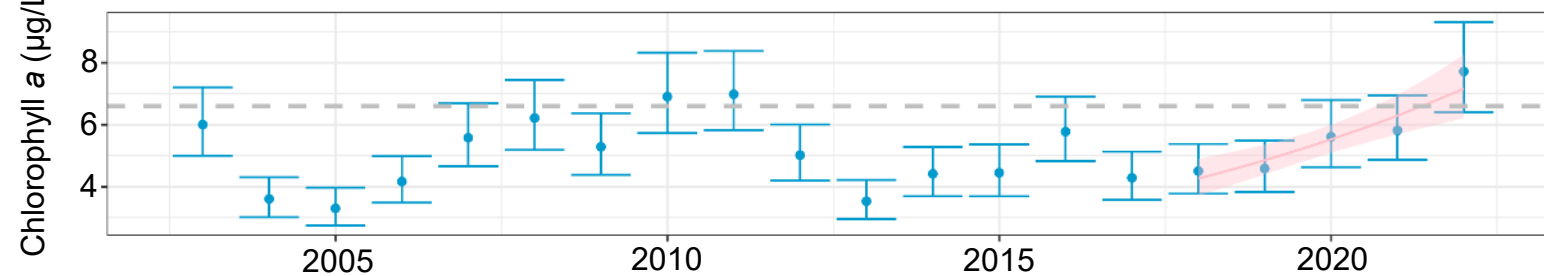
Trend from 2003 to 2022: approximate slope 0.05, log-slope 0 (0, 0.01), ns.



Trend from 2013 to 2022: approximate slope 0.29, log-slope 0.02 (0.01, 0.04), $p < 0.001$.



Trend from 2018 to 2022: approximate slope 0.72, log-slope 0.06 (0.03, 0.08), $p < 0.001$.





20 YEARS OF CHLOROPHYLL

SUMMARY

- No chronic blooms detected.
- Consistently high at PC.
- Increasing trends.

	2003-2022 (20 years)	2003-2012 (1 st 10 years)	2013-2022 (2 nd 10 years)	2018-2022 (5 years)
PI	↑	↑	↑	↑
SS	↑	↑	↑	↑
FM	↑	↑	↑	↑
PC	↑	↑	↑	↑

$p > 0.05$

$p < 0.05$

$p < 0.01$



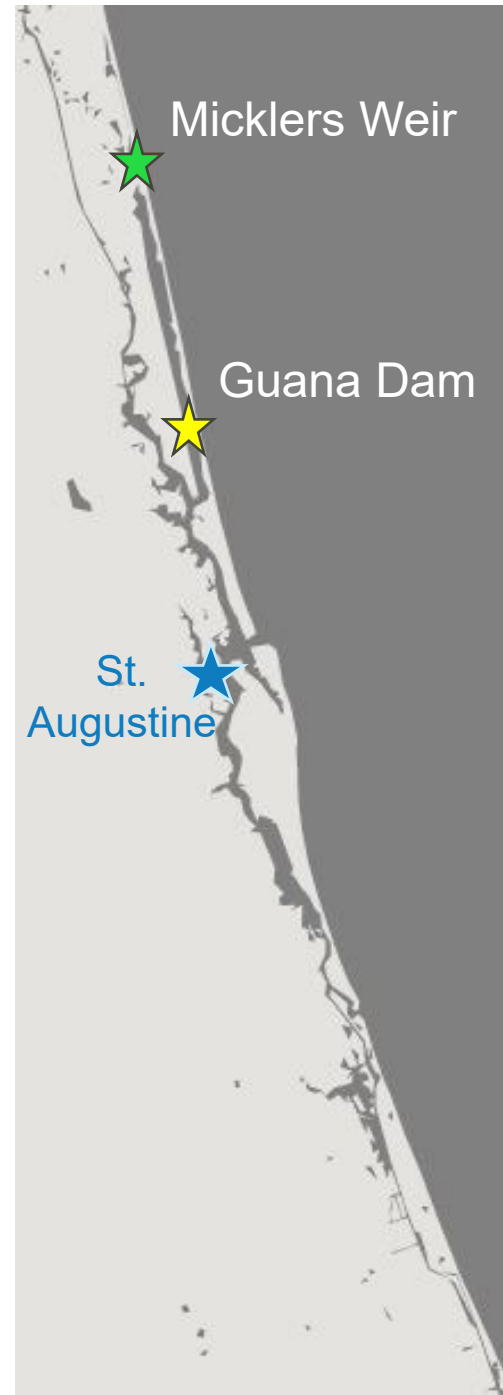
© 2021 Shannon Dunnigan

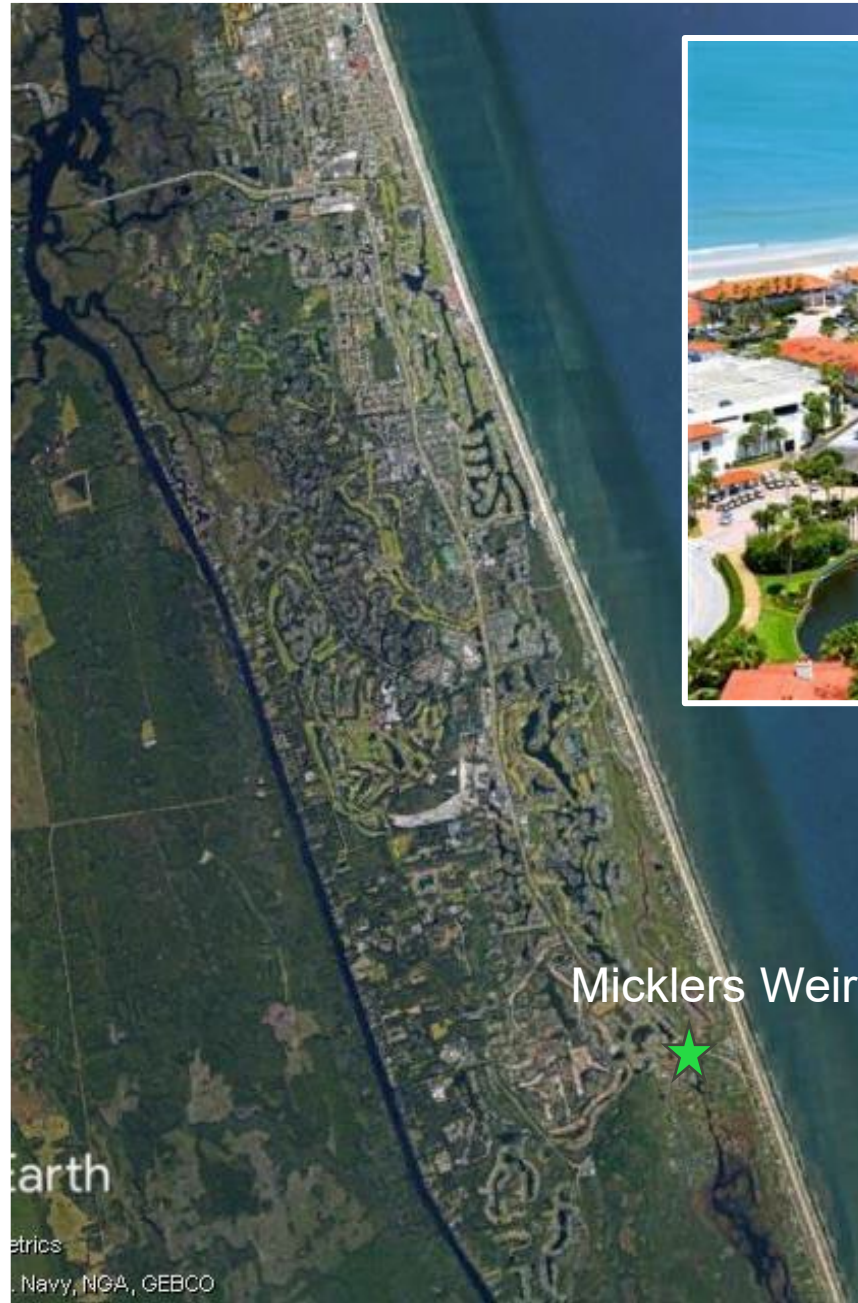
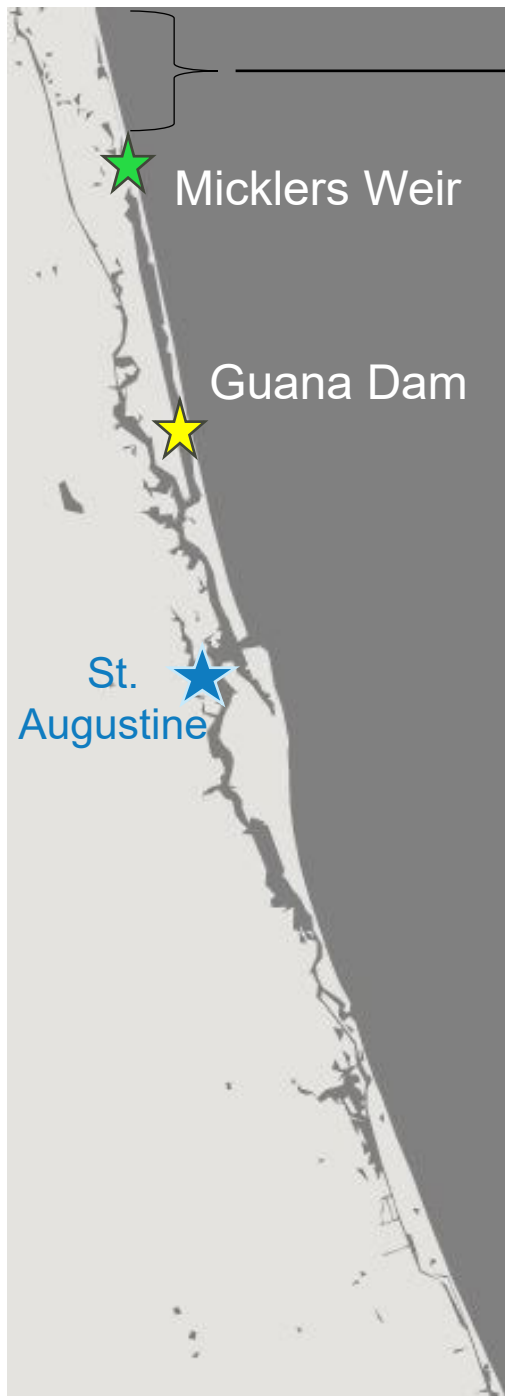


LOCAL MONITORING PROGRAM

Water Quality in the GTMNERR



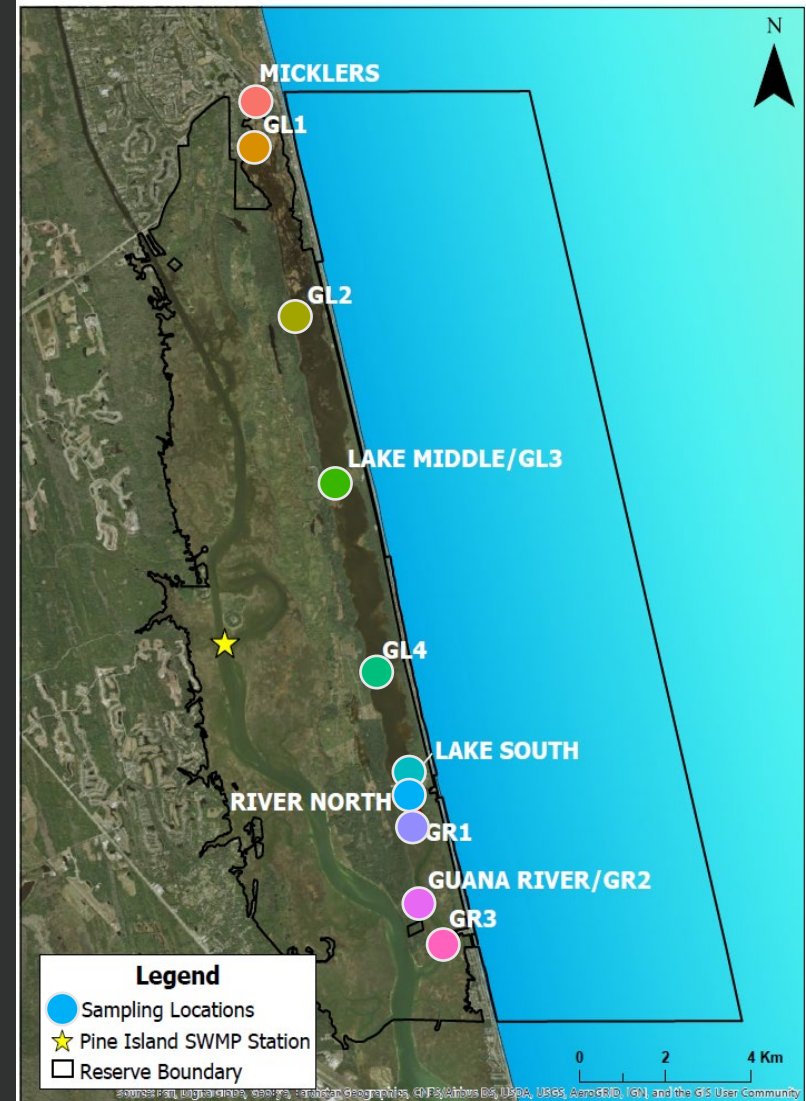






WATER QUALITY MONITORING

MONTHLY FROM JULY 2017 TO PRESENT

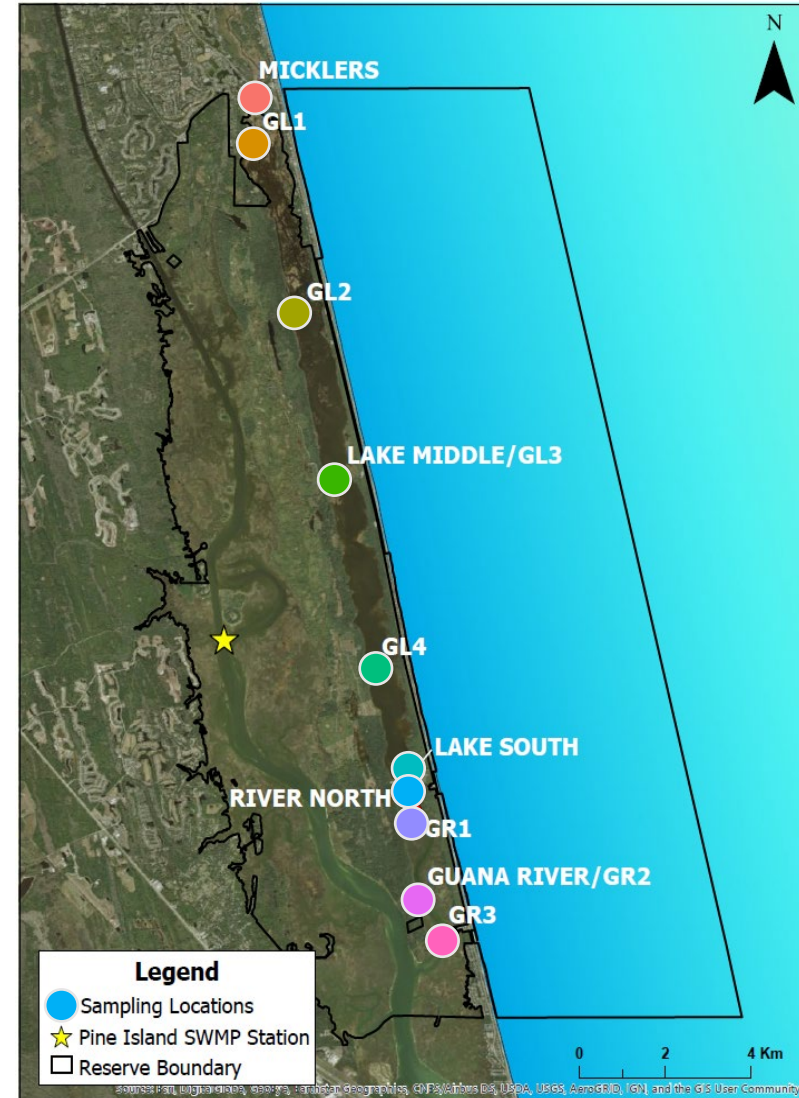
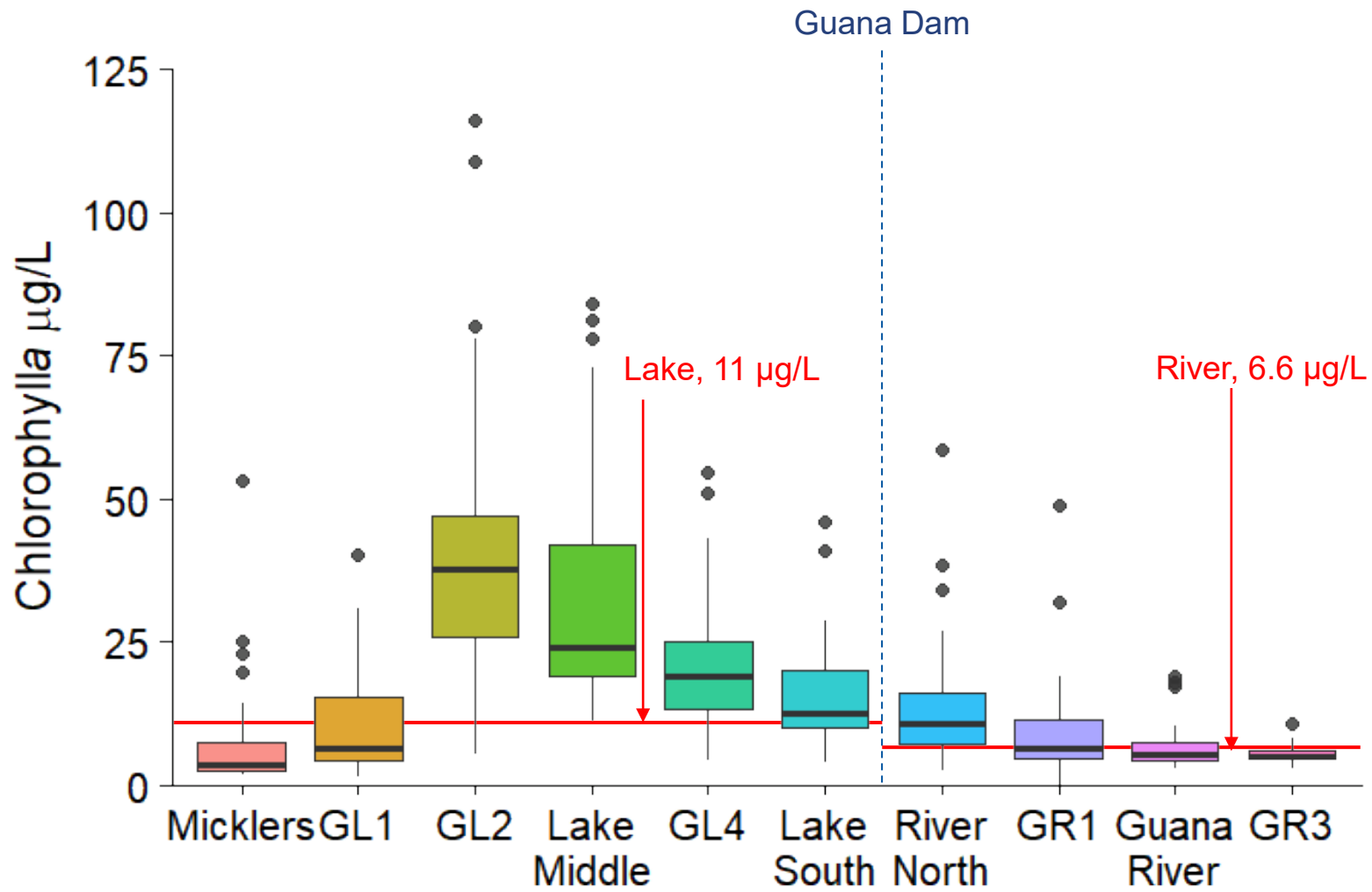




WATER QUALITY MONITORING

CHLOROPHYLL *a* AT ALL STATIONS

July 2017 – June 2022



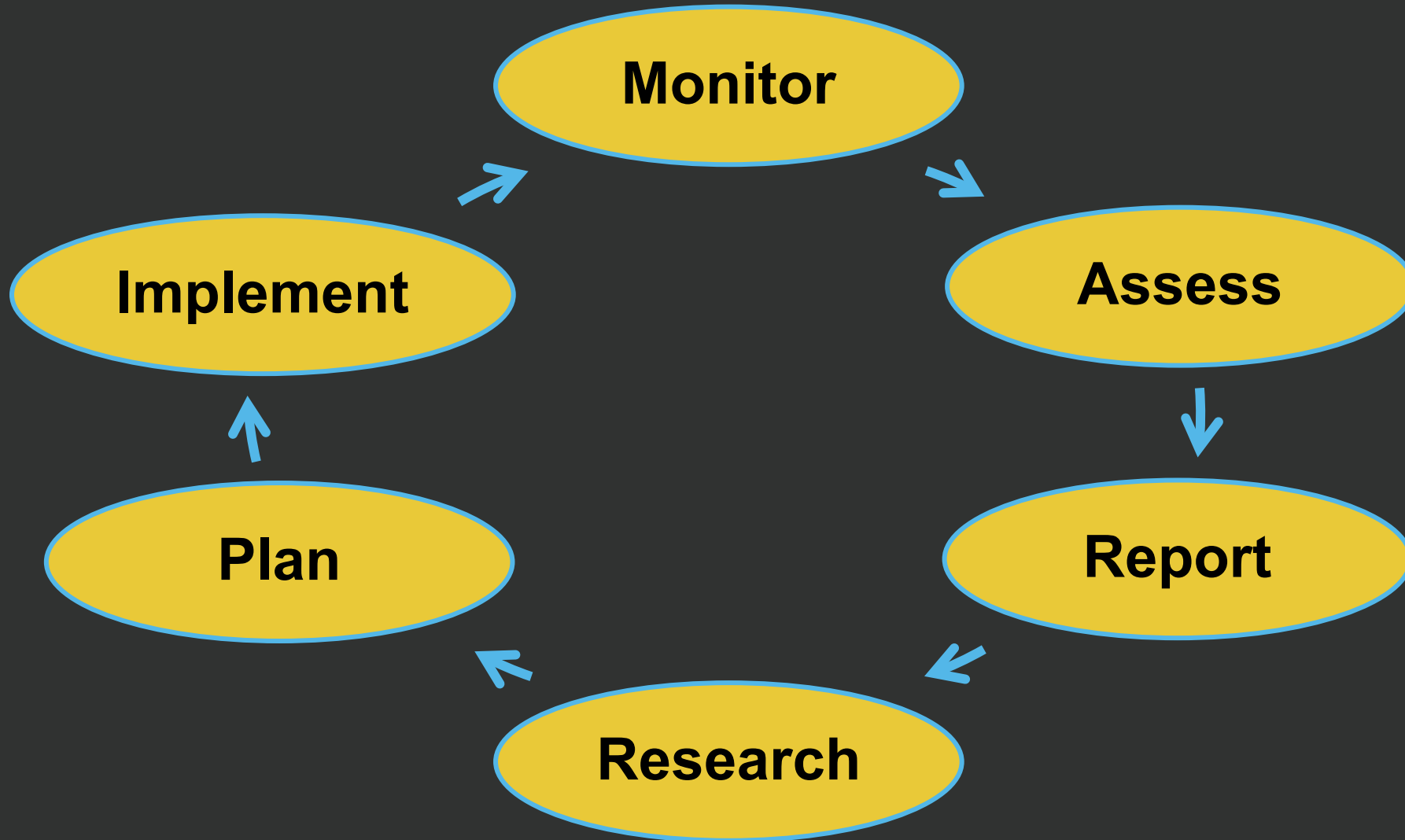


MONITORING TO MANAGEMENT

Water Quality in the GTMNERR



WATER QUALITY MANAGEMENT





WATER QUALITY MANAGEMENT

DIVISION OF ENVIRONMENTAL ASSESSMENT AND RESTORATION

Waterbody Class	Designated Use	Description
Class II	Shellfish Propagation or Harvesting	Generally coastal waters where shellfish harvesting propagation occurs.
Class III	Fish Consumption; Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife	The surface waters of the state are Class III unless described in Rule 62-302.400, F.A.C.

<https://floridadep.gov/dear/watershed-assessment-section>



GUANA ESTUARY IMPAIRMENTS AND NEXT STEPS FOR RESTORATION

WATERSHED MANAGEMENT

LOCAL IMPAIRMENTS: GUANA RIVER ESTUARY

In April 2022, the Florida Department of Environmental Protection (DEP) conducted a water quality assessment pursuant to the Clean Water Act and Florida Impaired Waters Rule. As a result, three waterbodies within the Guana River Estuary watershed were added to the impaired waterbodies list.

The goal of the Clean Water Act is to ensure “fishable, swimmable” waters across the United States. To that end, the Clean Water Act requires states to set water quality standards for pollutants and monitor water quality. When a waterbody fails to meet its quality standards, it is considered “impaired.”

States are required to restore impaired waterways. There are three types of restoration plans that can be used to restore impaired waterbodies: Basin Management Action Plans (BMAP), Reasonable Assurance Plans (RAP), and Pollutant Reduction Plans (PRP).



• Learn more about the plans on the back.



Three waterbodies within the Guana River Estuary watershed are impaired for chlorophyll-a, nitrogen, and/or phosphorus.

X impaired | X possible impairment, more data needed

NEXT STEPS FOR THE GUANA RIVER ESTUARY

- ✔ Set water quality standards
- ✔ Monitor water quality
- ✔ Assess water quality
- ⊖ Establish restoration plan
- ⊖ Implement restoration

TYPES OF RESTORATION PLANS

There are several ways to restore an impaired waterbody, each with its own pros and cons. The most common is a basin action management plan (BMAP), created by DEP. DEP must start by establishing a total maximum daily load (TMDL). The BMAP follows from the TMDL.

- **Total Maximum Daily Load (TMDL):** Maximum amount of a given pollutant that a surface water can handle to be healthy. A TMDL is a “pollutant diet”.
- **Basin Management Action Plan (BMAP):** A set of site-specific strategies to reduce or eliminate pollutant loadings and restore a specific waterbody to a healthy condition. A BMAP is a “pollutant diet plan.”

Instead of developing a TMDL and BMAP, community members may propose an alternative restoration plan (ARP).

ARPs offer some benefits over TMDLs and BMAPs. Establishing an ARP is a locally-driven process, so there is community input regarding how data is analyzed and what projects are included. Additionally, an ARP often can be developed and adopted much faster than a TMDL and BMAP.

	Basin Management Action Plan (BMAP)	Alternative Restoration Plans (ARP)	
		Reasonable Assurance Plan (RAP)	Pollutant Reduction Plan (PRP)
Cost to develop plan	\$\$\$	\$ \$	\$
Time to develop plan	⌚⌚⌚	⌚⌚	⌚
Restoration Strategies	State mandated	Locally driven	Locally driven
Responsible for Implementation	Local government	Local government	Local government
Eligibility for Financial Support for projects (i.e., grants, loans)	🏛️🏛️🏛️	🏛️🏛️🏛️	🏛️

HOW YOU CAN HELP

- View impairments in your area (<https://bit.ly/FLImpairedWaters>)
- Review approved Reasonable Assurance Plan (<https://bit.ly/FDEPRAP>)
- Review approved Pollutant Reduction Plan (<https://bit.ly/FDEPRP>)

This work is sponsored by the National Estuarine Research Reserve System Science Collaborative, which supports collaborative research that addresses coastal management problems important to the reserves. The Science Collaborative is funded by the National Oceanic and Atmospheric Administration and managed by the University of Michigan Water Center (NA19N054190058).

- » Learn more: <https://floridadep.gov/DEAR>
- » Get involved locally by contacting: collaboration@gtmnr.org





COLLABORATIVE SCIENCE TO INFORM MANAGEMENT



Guana Nutrients: Assessing the Current and Potential Role of Shellfish for Improving Water Quality, PI: Ashley Smyth, University of Florida.



High Resolution Surveys and Numerical Modeling to Optimize Guana Lake Levels, PIs: Alberto Canestrelli and Daniele Pinton, University of Florida.



Using Collaborative Open Science Tools to Improve Engagement with the Ecology of the Guana River Estuary, PI: Geraldine Klarenberg, University of Florida.



MONITORING TO MANAGEMENT



Ways to inform management and enhance relevance:

- Target data gaps
- Follow DEP protocols
 - Provide staff training
 - Use nationally accredited labs
- Enter data into the Watershed Information Network
- Produce data summaries and disseminate
- Conduct research on drivers of change and potential solutions
- Build relationships



THANK YOU

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National Estuarine Research Reserve

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