

Narragansett Bay Research Reserve

Continuously collecting water and weather data to better understand our waters.



Photo Credit: Daisy Durant, Ph.D.
South end, Prudence Island

Long-term monitoring data from the Reserve, together with efforts from other RI agencies, contributes to our understanding of the overall health of our estuary, Narragansett Bay.

Narragansett Bay National Estuarine Research Reserve (NBNERR)

NBNERR is part of a network of 30 reserves in the National Estuarine Research Reserve System (NERRS). NERRS is a partnership program between NOAA and the coastal states to protect more than 1.3 million acres of estuarine land and water.

NBNERR is located on four islands in the geographic center of Narragansett Bay in Rhode Island: Prudence, Patience, Hope, and Dyer.

The health of every reserve is continuously monitored by collecting and analyzing water and weather data through the System Wide Monitoring Program (SWMP), a guidance program from NERRS.

For more information, please visit www.nbnerr.org

2021 HIGHLIGHTS

.....
Warmer air and water temperatures

Temperatures were slightly higher during most of the year when compared to the long-term (2007-2021) daily average.

.....
No change in precipitation

Precipitation was comparable to the long-term (2007-2021) historical average.

.....
Seasonal high nutrient concentrations

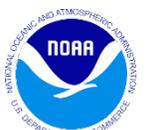
Dissolved inorganic nitrogen concentrations were higher during the fall at all sampling locations when compared to the other seasons.

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No algal bloom

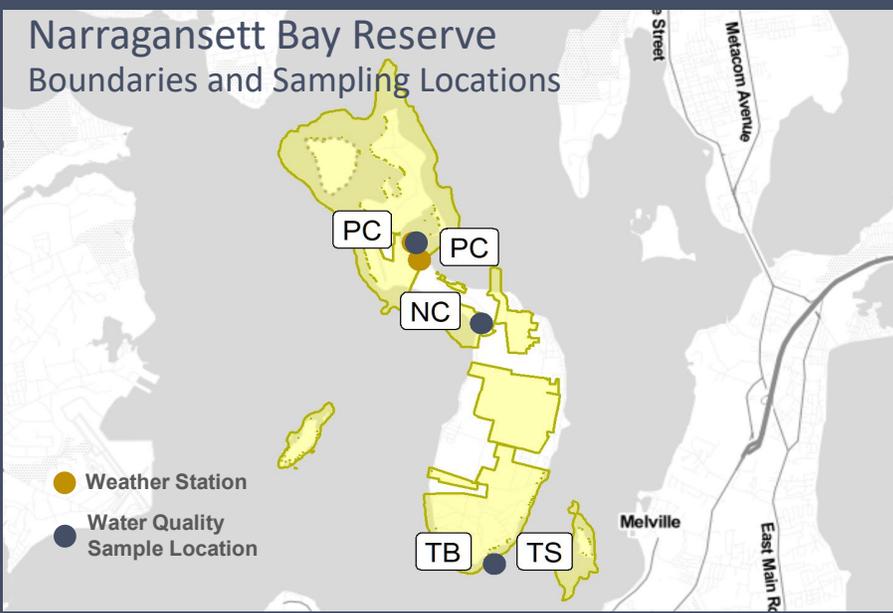
No significant algal bloom was observed at any of the sampling locations.



Water quality issues influence human and environmental health.
The more we **monitor** our **water**, the better we will be able to **recognize and prevent problems.**



Narragansett Bay Reserve Boundaries and Sampling Locations



Weather Can Have A Major Impact On Water Quality: Monitoring Is Crucial

Significant increasing trends* in air temperature, barometric pressure, and photosynthetically active radiation were found when analyzing long-term monitoring data (2007-2021) from the weather station on Prudence Island, which, contribute to the significant increasing trend* observed in water temperature around Prudence Island.

HOW IS OUR ESTUARY CHANGING IN TIME?

Statistical analysis* of long-term (2007-2021) monitoring data showed significant trends in:

Water temperature

Showed an increasing trend across all sampling locations

Dissolved oxygen

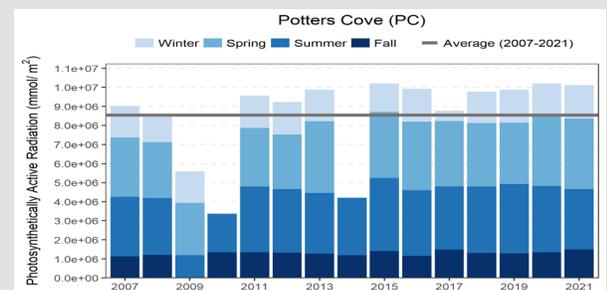
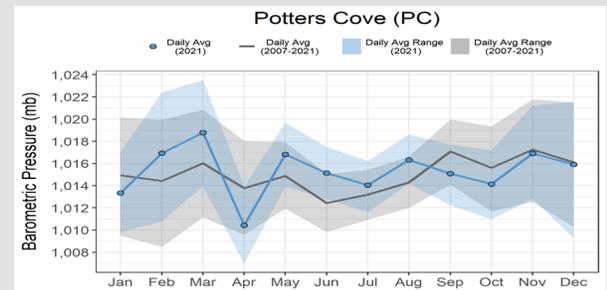
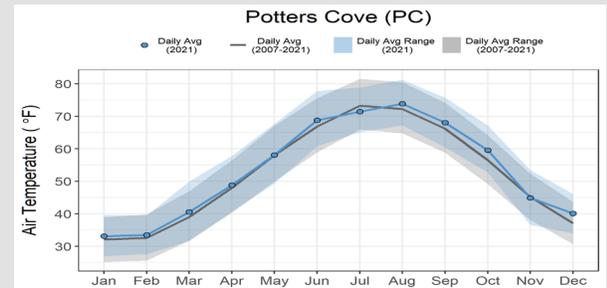
Showed a decreasing trend at two sampling locations

pH

Showed a decreasing trend at three sampling locations

Air temperature, and barometric pressure, photosynthetically active radiation

Showed an increasing trend



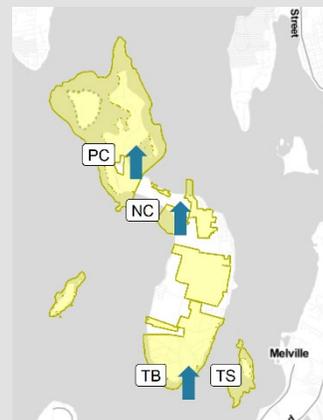
More Trends in Weather and Water Quality

Based on statistical analysis* of data collected from 2007-2021.

Location ID	Location Name	Air Temperature	Total Precipitation	Total Photosynthetic Active Radiation	Barometric Pressure	
PC	Potters Cove	↑	—	↑	↑	
Location ID	Location Name	Water Temperature	Salinity	Dissolved Oxygen	pH	Turbidity
NC	Nag Creek	↑	↑	—	↑	—
PC	Potters Cove	↑	—	—	↓	—
TB	T-Wharf Bottom	↑	—	↓	↓	—
TS	T-Wharf Surface	↑	—	↓	↓	—
Location ID	Location Name	Ortho-phosphate	Ammonium	Nitrite	Nitrate	Chlorophyll -a
NC	Nag Creek	—	—	↓	X	↑
PC	Potters Cove	—	—	↑	—	—
TB	T-Wharf Bottom	—	—	↑	—	—
TS	T-Wharf Surface	↑	—	↑	—	—

X Insufficient Data ↑ Increasing — Not Changing ↓ Decreasing

Increasing Trend in Water Temperature



All sampling locations on Prudence Island showed a significant increasing trend* in water temperature across years when analyzing long-term monitoring data from 2007-2021.

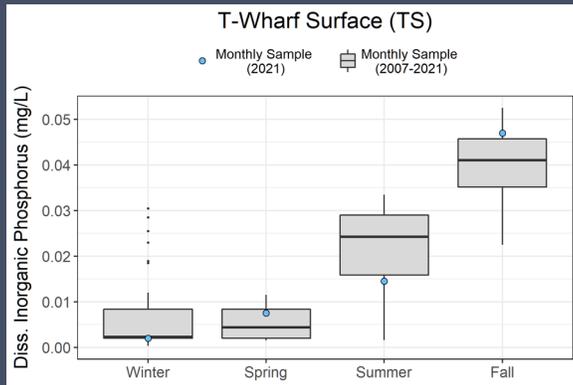
*Kendall Test for Monotonic Trends, p <0.05

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Do We Have Too Many Nutrients In The Water?

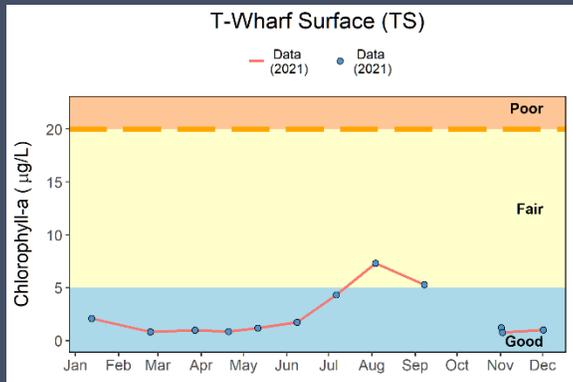
- Phosphorous and nitrogen are fundamental nutrients for algal and plant production. An excess of these nutrients can cause phytoplankton blooms which, in turn, can decrease the dissolved oxygen underwater life needs to survive, negatively impact human health, and close fishery harvest areas.
- In 2021, the combination of factors necessary for triggering an algal bloom were not observed in waters around Prudence Island.

Inorganic phosphorous



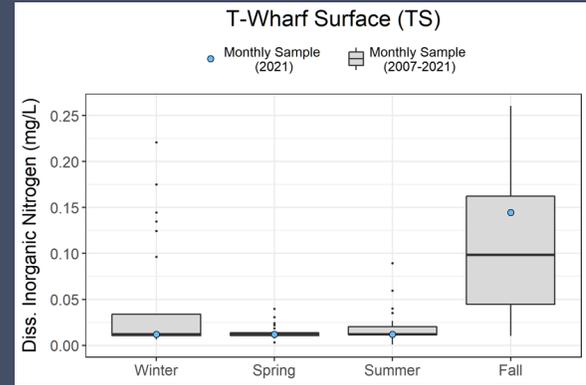
- During 2021, levels of dissolved inorganic phosphorus were slightly high in the fall (average ~ 0.048 mg/L).
 - >0.03 mg/L phosphorus stimulates plant growth to exceed natural growth, (EPA, Campbell and Wildberger, 1992).

Algal Bloom



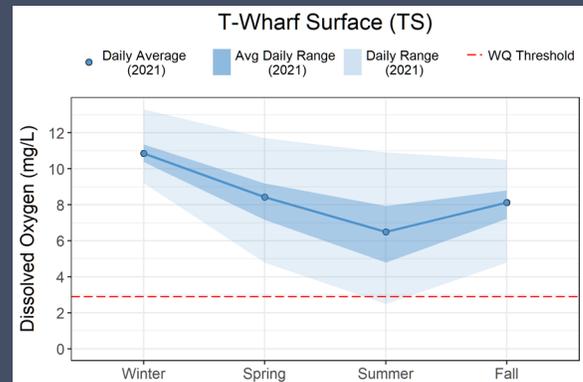
- Nutrient concentrations were low during 2021 for any significant algal bloom event.

Inorganic nitrogen



- Dissolved inorganic nitrogen concentration was considered low during 2021 (average of ~ 0.15 mg/L).
 - <1.0 mg/L is considered a normal concentration in unpolluted waters (EPA, Campbell and Wildberger, 1992).

Dissolved Oxygen



- With no significant algal bloom, dissolved oxygen in the water remained at a healthy level (>2.9 mg/L) in 2021.

Small Changes You Can Make To Help Lower Nutrient Concentrations In Our Waters

- Plant trees and rain gardens.
- Use compost as fertilizer in gardens.
- Limit use of fertilizers/pesticides.
- Redirect downspouts away from impervious surfaces like driveways and sidewalks.
- Collect pet droppings and dispose properly.
- Wash cars and boats on lawn and not the driveway.



Photo Credit: Daisy Durant, Ph.D. South end, Prudence Island

Why Estuaries Matter

Economic Impacts



Coastal shoreline counties provided 53 million jobs and contributed \$7.4 trillion (nearly 44%) of the nation's gross domestic product in 2012.

Community Benefits



Estuaries protect coastal communities by reducing flooding and storm surge impacts, enhancing water quality, and providing commercial and recreational benefits.

Healthy Ecosystems



Up to two-thirds of the nation's commercial fish and shellfish spend some part of their life cycle in an estuary or depend on this resource for food.

Habitat Diversity

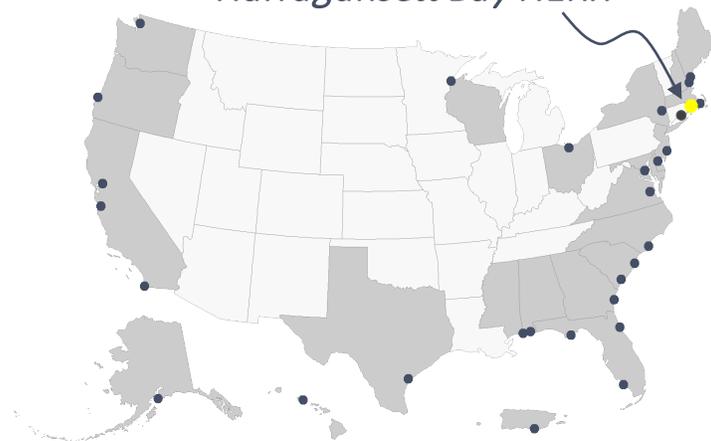


Habitat types include shallow open waters, freshwater/salt marshes, swamps, sandy beaches, mud/sand flats, rocky shores, oyster reefs, mangrove forests, river deltas, tidal pools and seagrasses.

Tracking The Health of Our Estuaries 24/7

The **NERRS** is a partnership program between NOAA and the coastal states to manage designated reserves. More than 1.3 million acres of estuarine land and water are protected. Each reserve is managed on a daily basis by a lead state agency or university with input from local partners. The health of every reserve is continuously monitored by the **System Wide Monitoring Program (SWMP)**. SWMP is a **robust, long-term, and versatile** monitoring program that uses the NERRS network to intensively study estuarine reference sites for evaluating ecosystem function and change. Reserve-generated data and information are available to local citizens and decision makers. For more information, go to: <https://coast.noaa.gov/nerrs/>

Narragansett Bay NERR



NERRS is a network of 30 coastal reserves established for long-term research, education and stewardship.

More Information...

For Stakeholders

Access data at the System Wide Monitoring Program (SWMP) Graphing Application website: <https://coast.noaa.gov/swmp/>

For Scientists

Access data at the Central Data Management Office (CDMO) website: <http://www.nerrsdata.org/>

Have Questions?

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Narragansett Bay NERR- providing the science needed for today and tomorrow

