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.
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, photosynthetic 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 | Nitrato | Chlorophyll-a
--- | --- | --- | --- | --- | --- | ---
NC | Nag Creek | — | — | — | — | X
PC | Potters Cove | — | — | — | — | —
TB | T-Wharf Bottom | — | — | — | — | —
TS | T-Wharf Surface | ↑ | — | — | — | —

*Insufficient Data | Increasing | Not Changing | Decreasing
--- | --- | --- | ---

*Kendall Test for Monotonic Trends, p < 0.05

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

Significant increasing trends* in air temperature, barometric pressure, and photosynthetic 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.

**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
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.

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**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/](https://coast.noaa.gov/nerrs/)

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**Narragansett Bay NERR**

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

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**More Information...**

**For Stakeholders**
Access data at the System Wide Monitoring Program (SWMP) Graphing Application website: [https://coast.noaa.gov/swmp/](https://coast.noaa.gov/swmp/)

**For Scientists**

**Have Questions?**
Contact Daisy Durant, Ph.D.
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Narragansett Bay NERR - providing the science needed for today and tomorrow