Narragansett Bay Research Reserve

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

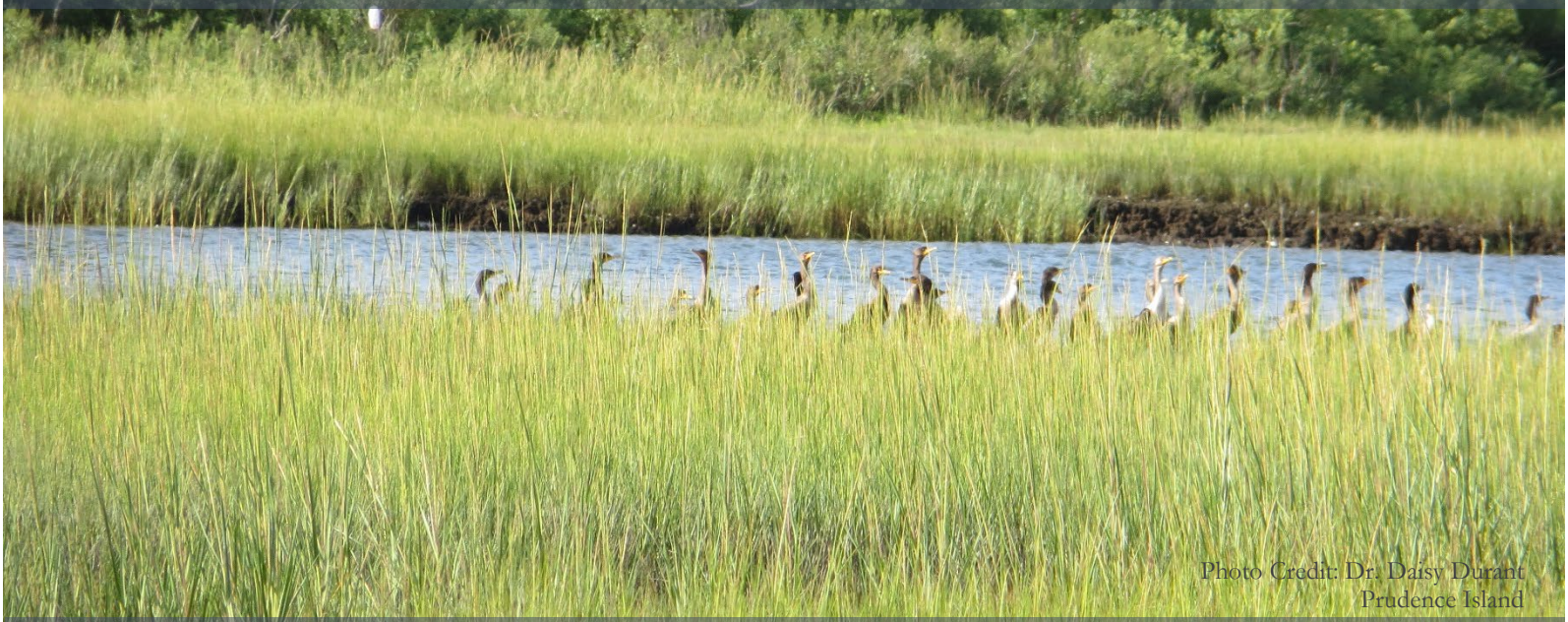


Photo Credit: Dr. Daisy Durant
Prudence Island

Data from the Reserve, together with efforts from other RI agencies, contribute to understand the overall health of our estuary, Narragansett Bay.

Narragansett Bay National Estuarine Research Reserve (NBNERR)

The Reserve is part of the National Estuarine Research Reserve System (NERRS), a collaborative initiative between NOAA and the coastal states aiming at safeguarding roughly 1.4 million acres of estuarine environments nationwide.

The Reserve 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 our website at **www.nbnerr.org**

2023 HIGHLIGHTS

More precipitation - precipitation was slightly above the long-term (2007-2023) historical average.

Warmer air and water temperatures - temperatures were slightly higher than the long-term (2007-2023) historical averages during most of the year.

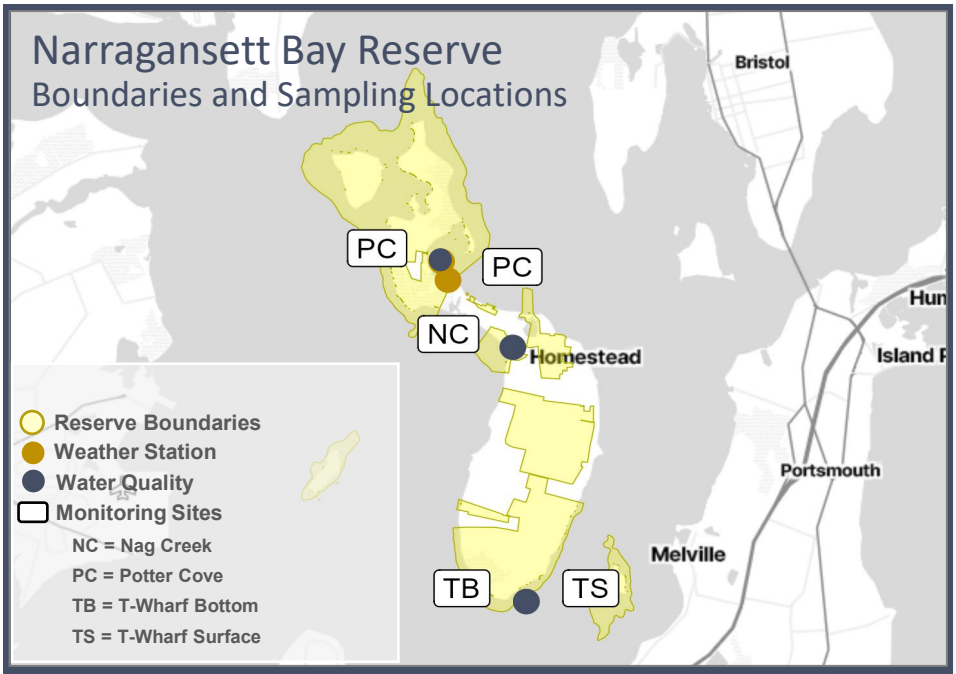
Higher nutrients - there was a slight seasonal increase in most nutrient species analyzed (ammonium, phosphates, nitrogen species) at all sampling locations.

Algal Bloom – algal blooms were not observed at any of the sampling locations.

Narragansett Bay Research Reserve

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**.

NOAA



HOW IS OUR ESTUARY CHANGING IN TIME?

Statistical analysis of long-term (2007-2023) water quality and weather data showed:

- *Air Temperature* and *Barometric Pressure* are increasing.
- *Total Precipitation* is not changing.
- *Dissolved Oxygen* and *pH* showed a decreasing trend at several sampling locations.
- *Nitrogen species* showed a decreasing trend in concentration at several sampling locations.
- *Algae* seem to be increasing only at one sampling location.

Trends in Weather & Water Quality*

**Based on data collected from 2007-2023.*

Location ID	Location Name	Air Temperature	Total Precipitation	Total Photosynthetic Active Radiation	Barometric Pressure
PC	Potter Cove	↑	—	↑	↑

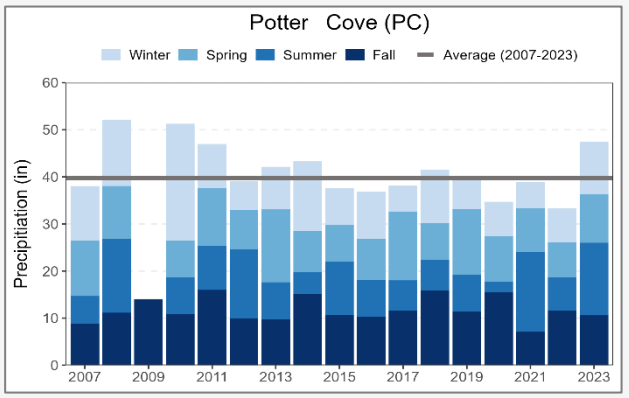
Location ID	Location Name	Water Temperature	Salinity	Dissolved Oxygen	pH	Turbidity
NC	Nag Creek	↑	↑	↓	↑	—
PC	Potter Cove	↑	—	—	↓	—
TB	T-Wharf Bottom	↑	—	↓	↓	—
TS	T-Wharf Surface	↑	—	↓	↓	—

Location ID	Location Name	Ortho-phosphate	Ammonium	Nitrite	Nitrate	Chlorophyll *a*
NC	Nag Creek	—	—	—	↓	↑
PC	Potter Cove	↑	—	↓	—	—
TB	T-Wharf Bottom	—	—	↓	—	—
TS	T-Wharf Surface	↑	—	↓	—	—

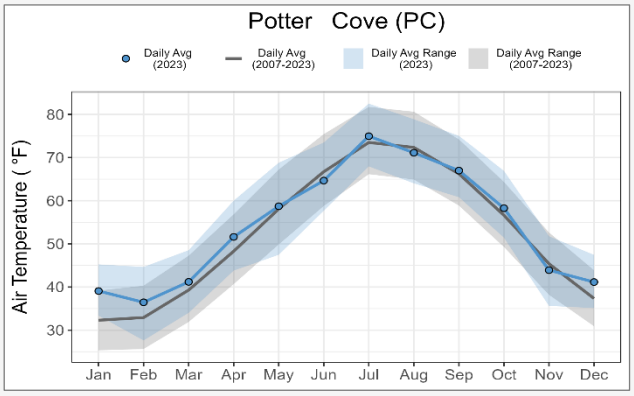
X Insufficient Data ↑ Increasing — Not Changing ↓ Decreasing

Weather Can Have A Major Impact On Water Quality

Precipitation & Air Temperature

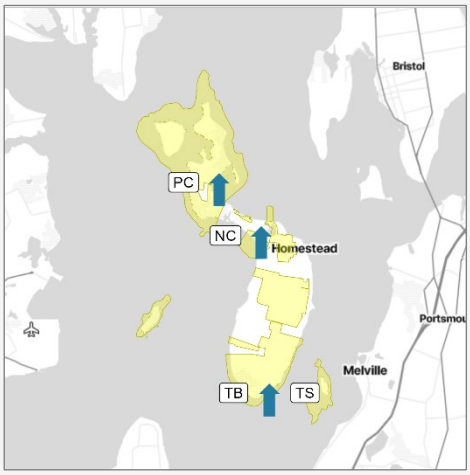


In 2023, precipitation was above the long-term (2007-2023) historical average. The graph shows more precipitation during the 2023 summer than during the other 2023 seasons.



Air temperature daily average for 2023 were higher than the historical average all year except for 3 months: Jun, Aug, and Nov.

Increasing Trend in Water Temperature

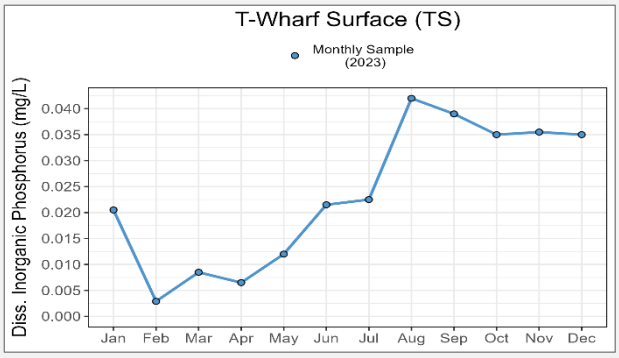


Statistical analysis of 2007-2023 water temperature data, showed a significant increasing trend across years (Kendall Test for Monotonic Trends, $p < 0.05$) on all long-term water quality monitoring sites, for the first time.

Do We Have Too Many Nutrients In The Water?

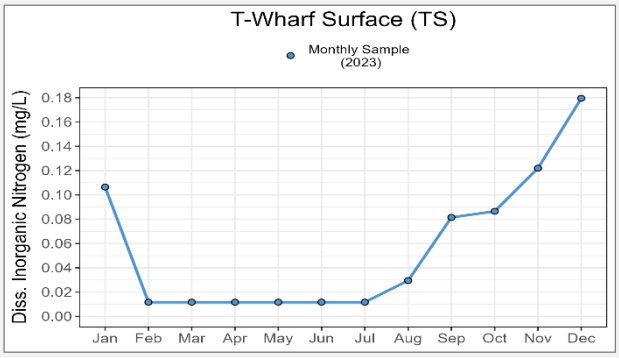
- Phosphorus and nitrogen are essential nutrients that support algal and plant production. However, an excess of these nutrients can lead to phytoplankton blooms, which can decrease the dissolved oxygen levels necessary for underwater life to thrive. This phenomenon can also have adverse effects on human health and may lead to the closure of fishery harvest areas.
- In 2023, the combination of nutrients necessary for triggering a significant algal bloom were not observed in waters around Prudence Island.

Inorganic phosphorous



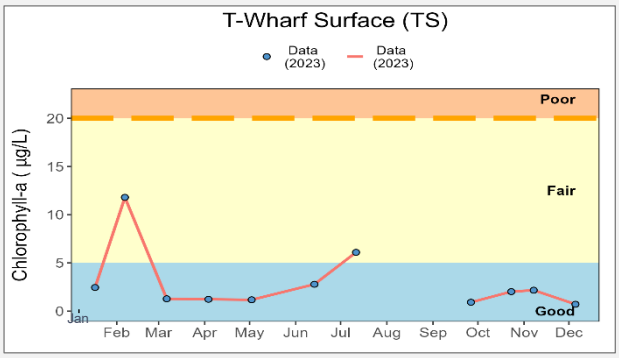
- In 2023, levels of dissolved inorganic phosphorus were higher in the summer and fall months at T-Wharf Surface compared to the rest of the year (>0.035 mg/L).
  - >0.03 mg/L phosphorus stimulates plant growth to exceed natural growth, (EPA, Campbell and Wildberger, 1992).

Inorganic nitrogen



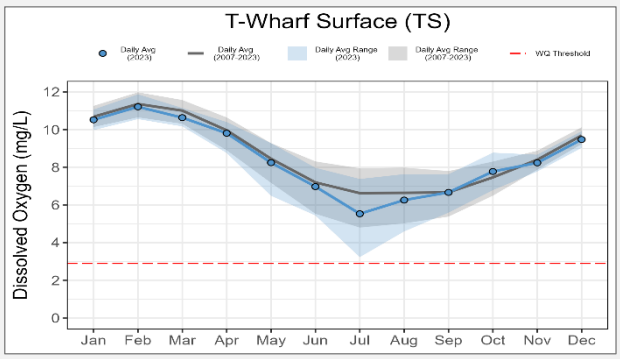
- Dissolved inorganic nitrogen concentration was low in 2023 (max. of ~ 0.18 mg/L).
  - <1.0 mg/L is considered a normal concentration in unpolluted waters (EPA, Campbell and Wildberger, 1992).

Algal Bloom



- Low nutrient concentrations in 2023 likely helped prevent significant algal bloom events.

Dissolved Oxygen



- With no significant algal bloom in 2023, dissolved oxygen in the water remained at a healthy level (>2.9 mg/L).

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 the lawn and not the driveway.

Photo Credit: Dr. Daisy Durant
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

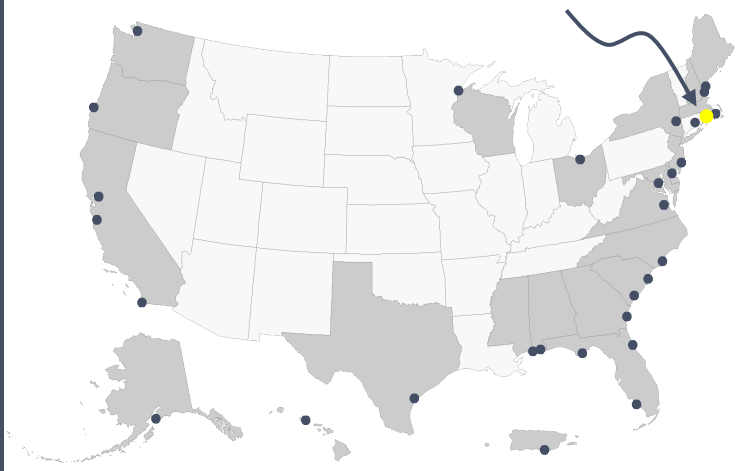
Habitat types include shallow open waters, freshwater/salt marshes, swamps, sandy beaches, mud/sand flats, rocky shores, oyster reefs, mangrove forests, river deltas, tidal pools and seagrasses.

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?

Contact Dr. Daisy Durant
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(401) 683-7368

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