

Narragansett Bay Research Reserve

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

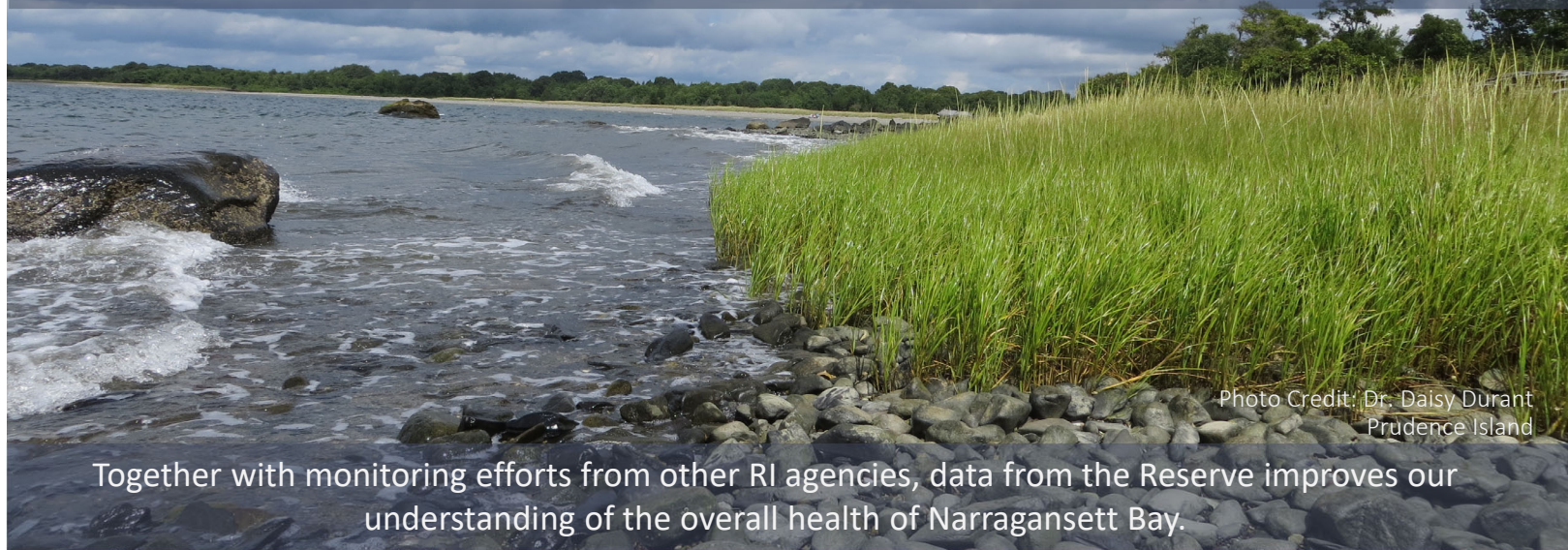


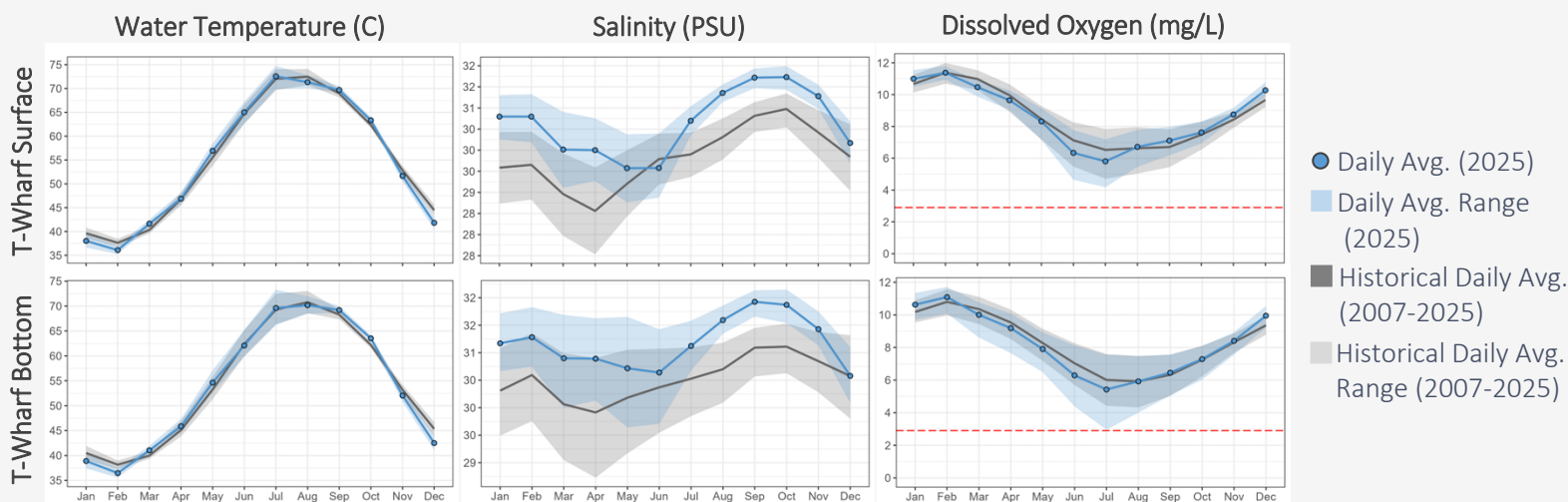
Photo Credit: Dr. Daisy Durant
Prudence Island

Together with monitoring efforts from other RI agencies, data from the Reserve improves our understanding of the overall health of Narragansett Bay.

2025 HIGHLIGHTS

Signs of Seasonal Stratification

In spring and summer 2025, T-Wharf Surface waters became warmer and fresher than T-Wharf Bottom waters, a pattern consistent with seasonal stratification. Differences peaked June 8, when the surface was 3.5°C warmer and the bottom 2.8 psu saltier, before weakening in fall. Temperature and dissolved oxygen generally followed historical patterns, while salinity was often higher than the 2007–2025 average. Although dissolved oxygen was generally lower near the bottom, no hypoxic or anoxic events were recorded (< 3 mg/L).



Narragansett Bay National Estuarine Research Reserve

The Reserve is part of the National Estuarine Research Reserve System (NERRS), a collaborative initiative between NOAA and the coastal states protecting about 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 the NERRS.

For more information, please visit our website at www.nbnerr.org

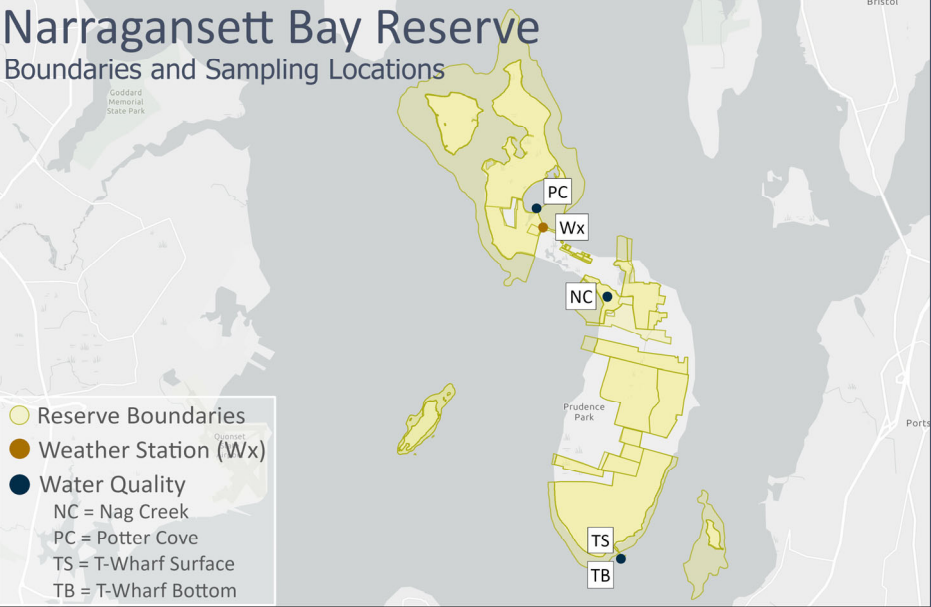
Water quality issues influence human and environmental health.

The more we monitor our water, the better we will be able to recognize and prevent problems.



Narragansett Bay
Research Reserve





HOW IS OUR ESTUARY CHANGING IN TIME?

Statistical analysis of long-term (2007-2024) water quality and weather show that:

- Air Temperature** and **Barometric Pressure** are increasing over time.
- Total Precipitation** is not changing.
- Dissolved Oxygen** and **pH** are decreasing over time at multiple sampling locations.
- Nitrogen species** concentrations showed mixed trends: ammonium increased, nitrite decreased, and nitrate remained stable.
- Algae** (as chlorophyll *a*) is increasing at one sampling location.

Trends in Weather & Water Quality*

*Based on data collected from 2007-2025.

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

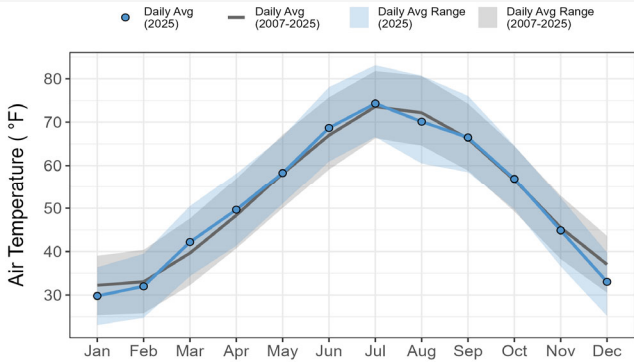
Location ID	Location Name	Water Temperature	Salinity	Dissolved Oxygen	pH	Turbidity
NC	Nag Creek	↑	↑	—	↑	—
PC	Potter Cove	↑	—	—	↓	—
TB	T-Wharf Bottom	↑	—	↓	↓	↑
TS	T-Wharf Surface	↑	—	↓	↓	—

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

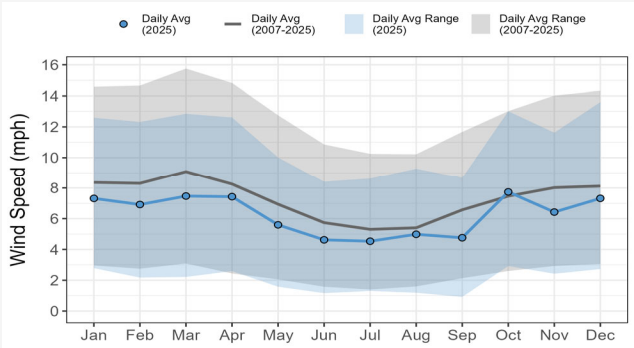
X Insufficient Data ↑ Increasing — Not Changing ↓ Decreasing

Weather Can Have A Major Impact On Water Quality

Air Temperature & Wind Speed

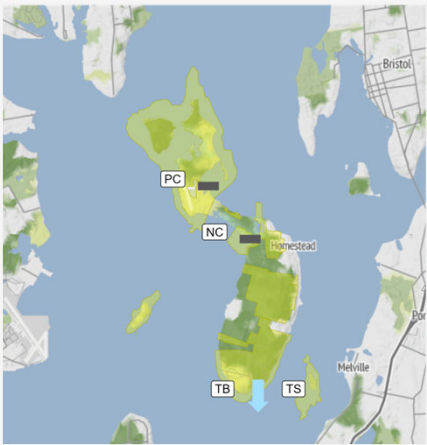


Air temperature followed the historical seasonal pattern in 2025, rising from a winter low to a July peak before cooling through December, while remaining within the historical range.



In 2025, average wind speeds were generally below the 2007–2025 historical average, with the calmest conditions occurring from June through September before winds increased in October.

Long-Term Decline in Dissolved Oxygen

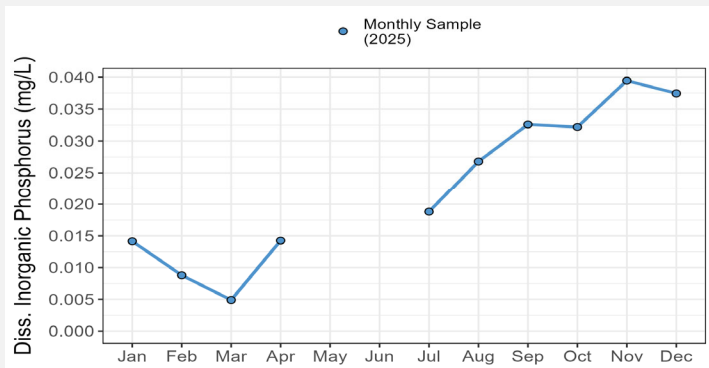


Dissolved oxygen (DO) declined significantly at both T-Wharf stations from 2007–2025 (Kendall’s test, $p < 0.05$). Concurrent trends toward warmer air temperatures and calmer winds may contribute to declining DO, as warmer surface waters hold less oxygen and calmer conditions may limit mixing and bottom-water oxygen replenishment.

Do We Have Too Many Nutrients In The Water?

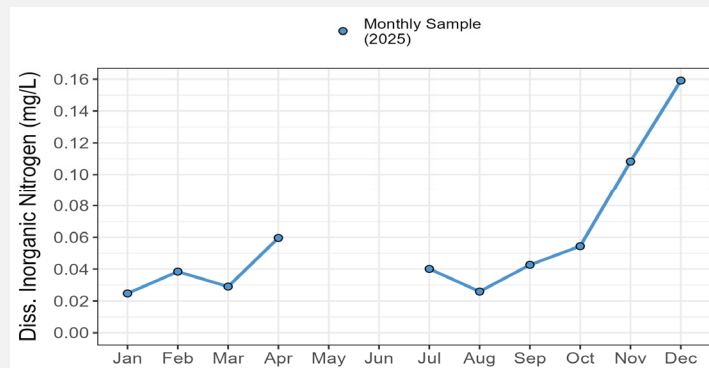
- Phosphorus and nitrogen support the growth of algae and aquatic plants, but excessive amounts can fuel phytoplankton blooms. As these blooms decompose, dissolved oxygen may decline, threatening aquatic life. Some harmful blooms can also affect human health and cause shellfish-harvest closures.
- Dissolved inorganic phosphorus and nitrogen increased in late 2025 but the increases did not coincide with elevated chlorophyll *a*. Chlorophyll remained in the good range as nutrients peaked in November and December, while dissolved oxygen recovered from its summer minimum and remained above 3 mg/L throughout the year.

Inorganic phosphorous



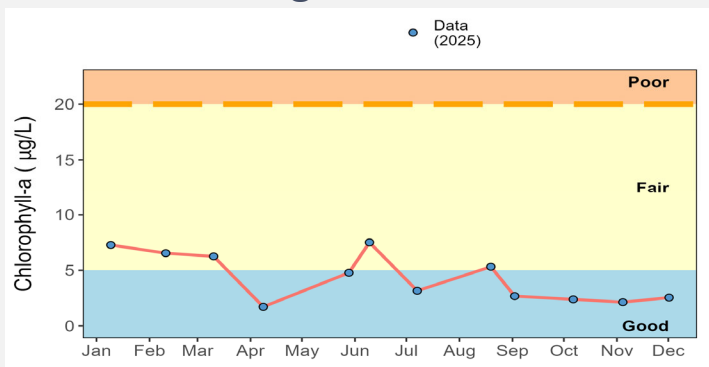
Plant-available dissolved inorganic phosphorus increased in fall, peaking near 0.04 mg/L, but did not coincide with elevated chlorophyll *a*.

Inorganic nitrogen



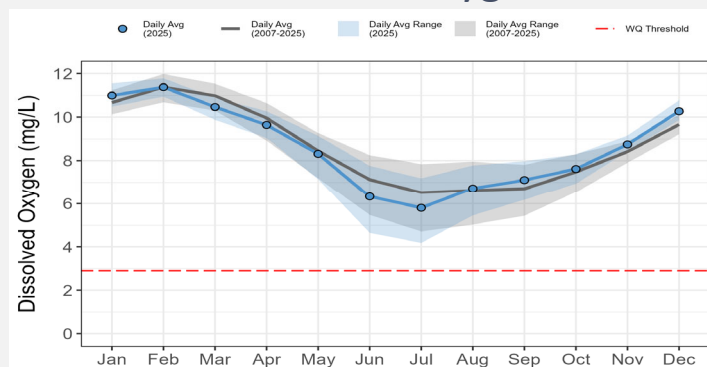
Plant-available dissolved inorganic nitrogen increased sharply in November and December but did not coincide with elevated chlorophyll *a*.

Algal Bloom



Chlorophyll varied between the good and fair categories, with no samples reaching the poor category.

Dissolved Oxygen



Dissolved oxygen reached its seasonal minimum in July but daily averages remained above the 3 mg/L threshold throughout 2025.

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.
- ✓ Collect pet droppings and dispose properly.
- ✓ Wash cars and boats on the lawn and not the driveway.
- ✓ Redirect downspouts away from impervious surfaces like driveways and sidewalks.

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



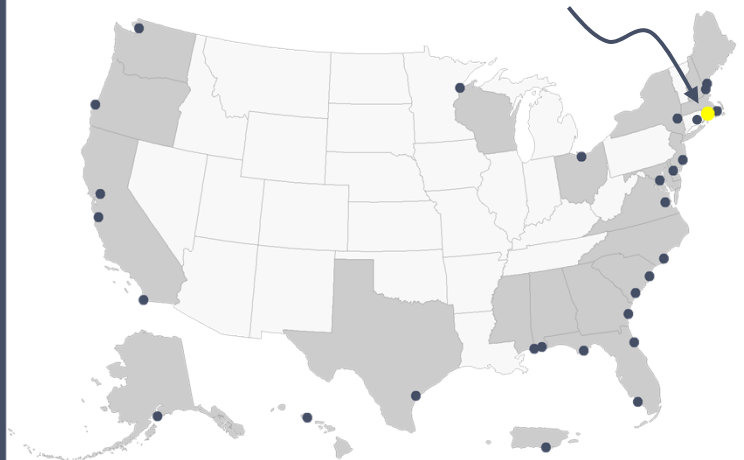
Habitat types include shallow open waters, freshwater/salt marshes, swamps, sandy beaches, mud/sand flats, rocky shores, oyster reefs, mangrove forests, river deltas, tidal pools and seagrasses.

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

