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 (2007-2020) data showed the following:

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

### Trends in Weather & Water Quality*

*Based on data collected from 2007-2020.

<table>
<thead>
<tr>
<th>Location ID</th>
<th>Location Name</th>
<th>Air Temperature</th>
<th>Precipitation</th>
<th>Max. Wind Speed</th>
<th>Barometric Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>Potters Cove</td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location ID</th>
<th>Location Name</th>
<th>Water Temperature</th>
<th>Salinity</th>
<th>Dissolved Oxygen</th>
<th>pH</th>
<th>Turbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC</td>
<td>Nag Creek</td>
<td></td>
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</tr>
<tr>
<td>PC</td>
<td>Potters Cove</td>
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</tr>
<tr>
<td>TB</td>
<td>T-Wharf Bottom</td>
<td></td>
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</tr>
<tr>
<td>TS</td>
<td>T-Wharf Surface</td>
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</tbody>
</table>

| Location ID | Location Name     | Orthophosphate | Ammonium | Nitrite | Nitrate | Chlorophyll |a |
|-------------|-------------------|----------------|----------|---------|---------|-------------|
| NC          | Nag Creek         |                |          |         |         |             |
| PC          | Potters Cove      |                |          |         |         |             |
| TB          | T-Wharf Bottom    |                |          |         |         |             |
| TS          | T-Wharf Surface   |                |          |         |         |             |

In 2020, precipitation was ~6 inches above the long-term (2007-2020) historical average; however, spring was dry across years.

Air temperature daily average for 2020 was higher in the winter, summer and fall than the historical average.

T-Wharf Surface and Bottom sampling sites showed an increasing trend in water temperature across years (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 2020, the combination of factors necessary for triggering an algal bloom were not observed in waters around Prudence Island.

**Inorganic phosphorous**

- During 2020, levels of dissolved inorganic phosphorus were slightly high in winter and fall (max. ~ 0.25 mg/L) at T-Wharf Surface.
  - >0.03 mg/L phosphorus stimulates plant growth to exceed natural growth, (EPA, Campbell and Wildberger, 1992).

**Inorganic nitrogen**

- Dissolved inorganic nitrogen concentration was considered low during 2020 (max. of ~ 0.25 mg/L).
  - <1.0 mg/L is considered a normal concentration in unpolluted waters (EPA, Campbell and Wildberger, 1992).

**Algal Bloom**

- Nutrient concentrations were not ideal during 2020 for a significant algal bloom event.

**Dissolved Oxygen**

- With no significant algal bloom, dissolved oxygen in the water remained at a healthy level (>2.9 mg/L) for 2020.

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: Dr. Daisy Durant

Potter Cove
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.

Why Estuaries Matter

Coastal shoreline counties provided 53 million jobs and contributed $7.4 trillion (nearly 44%) of the nation’s gross domestic product in 2012. Estuaries protect coastal communities by reducing flooding and storm surge impacts, enhancing water quality, and providing commercial and recreational benefits. 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 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/

NERRS is a network of 29 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.nerrsdatalt.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