Tracking Nitrogen Pollution in New Hampshire's Great Bay

Project Location

Great Bay National Estuarine Research Reserve, New Hampshire

Project Lead

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Targeted End Users and Products

- *Project final report*
- *Google map of Great Bay nitrogen sources and transport sites*

Project Partners

- *Great Bay Reserve*
- *Lamprey River Watershed Association*
- *New Hampshire Water Resources Center*
- *New Hampshire Department of Environmental Services*
- *Piscataqua Region Estuaries Partnership*
- *Southeast Watershed Alliance*
- *Trout Unlimited: Great Bay Chapter*
- *Town of Newmarke*

About the Science Collaborative
The National Estuarine Research Reserve System's Science Collaborative supports collaborative research that addresses coastal management problems important to the reserves. Learn more at *www.nerrs.noaa.gov.*

Overview

Stretching 15 miles inland, New Hampshire's Great Bay cuts through the heart of one of the state's most densely populated regions. Nitrogen concentrations in the bay have increased significantly, in part due to nonpoint sources of pollution such as poorly functioning septic systems and stormwater runoff. There is concern that this pollution will help usher Great Bay toward an ecological tipping point that, once crossed, will make recovery extremely challenging and costly. To inform science-based solutions that reduce nonpoint nitrogen and improve the health of the bay, an interdisciplinary team from the Great Bay reserve and the University of New Hampshire have investigated nitrogen "hot spots" throughout the watershed and studied the capacity of Great Bay's tributary rivers to mitigate the impact of this pollution.

Project Benefits

- Generated critical information that improved understanding of how nitrogen from nonpoint sources flows through the Great Bay watershed and has provided a foundation for several research and outreach efforts in the region.
- Partnered with a local watershed alliance to organize a symposium to present the project's results and foster multi-stakeholder discussion of nitrogen in Great Bay.
- Resources developed by this project informed a New Hampshire Department of Environmental Services study of nitrogen in the Great Bay area and the "Granite State Future and Regional Master Plan" for southeastern New Hampshire.
- Collaborated with the U.S. Environmental Protection Agency to conduct a pharmaceutical tracer analysis in the watershed.

Project Approach

A team from the Great Bay reserve and University of New Hampshire partnered with local resource managers to assess, model, and map nitrogen concentrations in surface waters to identify nitrogen 'hot spots' in the watershed.

- Mapping and Modeling: The Team conducted a series of analyses—isotopic analysis, mitochondrial DNA, and canine detection—to determine nonpoint sources of nitrogen that contribute to the hot spots, used chemical tracers to chart how this nitrogen moves through the watershed and evaluated the capacity of streams and rivers to retain nitrogen and reduce the amount flowing into the bay.
- Data integration: Team members integrated these results to provide local managers with a clear understanding of which sources of nitrogen, under which land use conditions, pose the greatest threat to the bay's water quality and inform appropriate management actions.
- Stakeholder Engagement: The team organized a stakeholder advisory board to refine research objectives and identify products that would be useful for decision-makers. They also worked with local graduate students to assess public awareness of nitrogen issues facing the bay and conducted experiential learning events.