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With Grant, UNH Researchers Will ID Great Bay's Pollution "Hot Spots"

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A new grant to University of New Hampshire researchers aims to pinpoint the major sources of nitrogen throughout the Great Bay watershed in New Hampshire.
Credit: Gary Samson, UNH Photographic Services.

DURHAM, N.H. – Rising levels of nitrogen are threatening New Hampshire's Great Bay, with algal blooms, reduced eelgrass coverage, depletion of dissolved oxygen, and reduced native oyster production all linked to the increase of nitrogen pollution. A new grant to University of New Hampshire researchers aims to pinpoint the major sources of nitrogen throughout the Great Bay watershed, ultimately informing nitrogen-reduction policies that will deliver the "biggest bang for the buck," says the principal investigator.

"The nutrient dynamics of Great Bay are complex, and we need to fill gaps in our basic understanding of how high nitrogen sources in the watershed are delivered if we are to reduce the nitrogen in the bay," says lead researcher Bill McDowell, professor of natural resources and the environment and director of the New Hampshire Water Resources Research Center at UNH.

With the $600,000, three-year grant from the National Estuarine Research Reserve System Science Collaborative (a partnership of the National Oceanic and Atmospheric Administration and coastal states), McDowell and UNH research scientist John Bucci will aim to identify hotspots of nonpoint source nitrogen (that which comes from diffuse sources like runoff) throughout the watershed. They will sample more than 250 sites in tributaries of the Lamprey, Exeter, Swampscott, and Cocheco rivers throughout southeastern New Hampshire and into Maine.

Nonpoint sources of nitrogen include fertilizer from agricultural crops as well as homeowner lawns, septic systems, manure, rain running off impervious surfaces like parking lots and the atmosphere. The study will look for chemical signatures that help track nitrogen back to various sources. "Which of these sources, and under what conditions, are the most efficient at delivering nitrogen into small streams?" says McDowell, who has studied the Lamprey River watershed extensively for more than a decade. He says that models from that system indicate that human population density is the best predictor for high nitrate concentration.

The research also will determine the effectiveness of the tributaries at removing nitrogen before it reaches major rivers or the bay. In the Lamprey watershed, says McDowell, only 14 percent of the nitrogen that gets delivered into the river basin makes it into the river.

Ultimately, this project will inform management strategies that target reducing nitrogen in Great Bay. One

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component of the grant will involve working with local stakeholders and watershed associations in the Great Bay region. "Our goal is to be honest brokers of information trying to lay out the scientific basis for any management decisions," McDowell says.

The University of New Hampshire, founded in 1866, is a world-class public research university with the feel of a New England liberal arts college. A land, sea, and space-grant university, UNH is the state's flagship public institution, enrolling 12,200 undergraduate and 2,300 graduate students.

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Photograph available to download: http://www.unh.edu/news/cj_nr/2010/dec/bp01greatbay_01.jpg
Caption: A new grant to University of New Hampshire researchers aims to pinpoint the major sources of nitrogen throughout the Great Bay watershed in New Hampshire.
Credit: Gary Samson, UNH Photographic Services.

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