

Myriad Uses of Great Bay Water Quality Data

The Great Bay Estuary contains 60 billion gallons of water at high tide, and the water's physical and chemical properties control key ecological processes. Its salinity, oxygen concentration, and nutrient load influence the distribution of plants and animals in the estuary as well as their ability to survive and thrive. Water quality conditions also affect human activities, such as swimming and fishing. Since water quality has important implications for the ecology and human use of Great Bay, tracking its changes is a high priority for the GBNERR.

Since 1995 the GBNERR has funded and managed a water quality monitoring program to gather high frequency data on water conditions within the estuary. The first monitoring station was established in the middle of Great Bay, and subsequent stations have been added in the Squamscott, Lamprey, and Oyster rivers. At each station, a multi-parameter datasonde records temperature, depth, salinity, turbidity, pH, and dissolved oxygen every 15 minutes. Dissolved inorganic nutrients, suspended solids, particulate organic matter, and chlorophyll-a are also measured monthly at each location. Further, a meteorological station in Greenland documents weather conditions, which aids interpretation of the water quality data.

The water quality monitoring program run by GBNERR is part of the NERRS' System-wide Monitoring Program (SWMP). Sampling protocols and quality assurance procedures used here are identical to those implemented by other National Estuarine Research Reserves around the country. Thus, the GBNERR is able to track water quality conditions in Great Bay and compare changes to those observed in other estuaries.

Locally, the water quality data collected by the GBNERR are available in real-time through a website sponsored by CICEET: www.greatbaydata.org.

Viewers can check current and recent weather and water conditions at locations throughout the estuary. Anglers are the most frequent users of the site; they can look at water temperature, dissolved oxygen, and turbidity data to identify favorable fishing spots. While the available data does not tell anglers where the fish are, it does provide clues of where they are not, and that's half the battle in fishing!

The GBNERR's water quality data are also widely used by other agencies and organizations for regulatory and management purposes. The NH Department of Environmental Services (NH DES) relies on the data to identify and report on impairments, as required by the Clean Water Act. The NH DES and Piscataqua Region Estuaries Partnership (PREP) have drawn upon data from the GBNERR monitoring program to develop numeric nutrient criteria for the estuary. In addition, PREP uses the data to track environmental indicators of water quality, including nitrogen and dissolved oxygen concentrations in Great Bay. These indicators provide local residents and decision-makers with an easy way to see trends in key factors, which can help guide personal actions and management decisions to improve water quality.

Furthermore, the GBNERR water quality monitoring program, coupled with additional monitoring efforts, provides baseline data that enable scientists to understand the dynamics of the ecosystem, including how water quality conditions change and what factors contribute to those changes. This solid scientific understanding and on-going monitoring are unusual in most estuaries, and their existence here enhances the value of Great Bay as a field site for scientific studies. For example, new monitoring sensors and other technologies are routinely tested in Great Bay since their performance can be evalu-

ated against known ecosystem dynamics and compared to data from existing monitoring platforms.

Finally, the GBNERR data contribute to national efforts to understand and track water quality in estuaries. All of the local data are part of the U. S. Integrated Ocean Observing System, through which it becomes accessible to public and private users across the country. It has also been used in national efforts such as NOAA's 2007 National Estuarine Eutrophication Assessment, which evaluated the status of estuaries based on current levels of nutrient enrichment and the effectiveness of management actions to reduce eutrophic conditions.

The GBNERR's water quality monitoring program provides valuable data that is used for a variety of purposes at local, regional, and national scales. Anglers, managers, scientists and many other groups rely on the availability of this water quality information as they plan their recreational pursuits, fulfill their regulatory requirements, devise new management approaches, or seek to better understand the dynamics of the estuary. Check out greatbaydata.org yourself and see what you learn about conditions in Great Bay right now!

Kathy Mills
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Volunteers in the Gulf of Mexico

Volunteer
Spotlight

Learning from the Oil Spill

In August our summer intern, Meagan Bonenfant, held a program on what would happen if an oil spill similar to the one in the Gulf of Mexico occurred on the NH Seacoast. Speakers from the NHDES, U.S. Coast Guard and NHF&G gave a presentation on the Gulf Spill. NHDES's Spill Response Supervisor, Richard Berry, described what NH's response would be to a local spill.

The response would include dredging, skimming, booming and volunteer clean-up efforts. The long term effects on the wildlife and plants were also described and the associated clean-up costs. One example used was the incident that took place in 1996 when a tanker spilled 850 gallons of #6 oil into the Piscataqua River. The cost for the clean-up was nearly \$1 million dollars.

The presentation made it clear to the audience that NH has a response team in place should an oil spill event occur on the Seacoast.

As I write this article in July, the oil from the Deep Horizon oil well is still gushing out and polluting

and destroying ecosystems all along the coasts of Louisiana, Alabama, Mississippi, Florida, and parts of Texas. The officials from the US government and British Petroleum are saying that the well will be capped by the middle of August. This man-made disaster is the most serious that environmental groups and the nation have ever faced. It has also drawn the largest number of volunteers to ever commit to any project.

The Gulf oil spill brought out 1000's of people who wanted to volunteer and help but, unlike natural disasters, the oil spill, for the most part, required trained workers and professionals to clean up the oil and to take care of wildlife. For many of the jobs hazmat suits were required or special safety equipment and specific training was necessary. Despite this, over 15,000 people from across the country signed up on BP's website and others signed up with environmental groups or state agencies to volunteer to go to the coast and to help in the clean up effort. The Sierra Club, Greenpeace, the National Wildlife Federation and other agencies all received thousands of offers of help from volunteers throughout the United States.

In Florida alone almost 8,000 people signed up with state agencies and another 5,000 signed up in Alabama for a training program that had volunteers photographing and documenting the effects of the spill on the shorelines. National Audubon anticipated over 13,000 volunteers would be used to do coastal bird surveys, collect data, photograph birds

and to help make nets and cages to assist professional wildlife workers with oiled bird rescue efforts. 1000's of volunteers in Louisiana walked the coast line of the main land, islands and the extensive estuarine shorelines checking on levels of oil and boom placements. Other volunteers set up shelters and food tents to serve the many workers who are part of the biggest clean-up in the history of oil drilling. As far away as San Francisco, volunteers made filler for booms by stuffing panty hose with human hair donated by beauty parlors and animal fur from groomers. Others have offered their expertise, marine equipment or boats to monitor the spill and to assist environmental agencies. As one of the officials of the Alabama agencies stated, "people want to feel that they are really part of saving the waters and the coasts."

For people who cannot pack up and head down to the area, there are so many agencies and organizations that could use financial support for their efforts to mitigate the terrible effects that the spill has had on the Gulf. Just logging on to the internet and googling "Gulf Oil Spill Rescue" will bring up the names of many of these and how and where you can donate. Here in New Hampshire one can donate money or perhaps the best way we can help is to stop using so much oil. If possible, purchase a fuel efficient car or carpool more often. If you use oil for home heating, turn down your thermostat and try to make your home more energy "smart" by using proper insulation and weather proofing. You can also support energy legislation that will reduce our nation's dependence on fossil fuels.

Sheila Roberge
Volunteer Coordinator,
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U.S. Environmental Service workers deploy containment booms to aid in oil cleanup in the gulf.