

Narragansett Bay Commission Monitors Water Quality in Upper Bay

By Chip Young

While the land along the upper part of Narragansett Bay becomes the focus of massive redevelopment and rehabilitation, there is and has been great attention paid to the waters of the upper Bay and the tributaries that feed into it.

The Narragansett Bay Commission (NBC), which runs the state's two largest wastewater treatment facilities (WWTF) at Field's Point in Providence and Bucklin Point in East Providence, has implemented an aggressive water quality monitoring program in the upper Bay that tracks not only the effects of its treatment facilities on the Bay, but also the effects of other pollution sources.

A key issue currently facing the NBC is the reduction of nitrogen discharges from its two treatment plants. The NBC began planning nitrogen reduction projects in the 1990s, and the Bucklin Point facility, designed to meet 8 parts per million (ppm) total nitrogen, was upgraded at a cost of \$70 million and went on-line in 2005 ahead of schedule and under budget. The design plan for upgrading the Field's Point facility had been on hold for years pending the completion of a R.I. Department of Environmental Management (RIDEM) project to establish a total maximum daily load (TMDL) for nitrogen discharges to the Bay. Unfortunately the TMDL development project was not successful, and concern over the August 2003 fish kill led RIDEM to issue new permits to the NBC for the Field's Point and Bucklin Point plants that limit total nitrogen discharge to 5 ppm. Building upgrades that will enable the NBC to meet this new, ratcheted-down goal could cost as much as \$100 million, according to Thomas Uva, NBC's director of planning, policy, and regulation.

The NBC has serious concerns about establishing permit limits without the completion of a TMDL—something required by federal regulations—because without a TMDL, it is not clear that the new limits will indeed achieve goals of water quality or eliminate fish

kills. Development of the TMDL would answer many questions regarding the loading sources of nutrients to the Bay and would account for the effects of other inputs, such as failing septic systems, atmospheric deposition, runoff, and discharges from Massachusetts into Narragansett Bay.

In many cases, Massachusetts treatment plants have less stringent regulations on their WWTF discharges than Rhode Island facilities. Since 60 percent of the Narragansett Bay watershed is in Massachusetts, this presents some environmental and regulatory problems. So discharges from Massachusetts sewage plants going into rivers, such as the Blackstone and Ten-Mile, will flow into the Seekonk and Providence rivers, which are tributaries for the upper Bay. And when Massachusetts WWTFs have less stringent discharge permits, it provides what Uva calls, "an injustice to the residents of Rhode Island."

As an example, the Ten-Mile River WWTF in Attleboro, Mass., was recently issued a permit that allows the plant to discharge 8 ppm of nitrogen, while most Rhode Island plants have more stringent limits. And most other treatment facilities located in Massachusetts do not even have nitrogen limits yet. This has caused the NBC to question the environmental as well as the economic soundness of undertaking millions of dollars of capital improvements in Rhode Island without a similar commitment from our neighbor to the north.

This message was delivered loud and clear to Robert Varney, director of the Environmental Protection Agency's (EPA) Region I office in Boston, during a meeting of the R.I. Bays, Rivers, and Watersheds Coordination Team in August 2006. While RIDEM issues Rhode Island's WWTF permits, in Massachusetts the responsibility is not the state's but the federal government's—in other words, the EPA is charged with this duty. At that meeting, Uva and then-NBC executive director Paul Pinault produced figures for Varney showing vastly higher percentages of nitrogen loadings to the upper Bay coming from Massachu-



Photo courtesy RIDEM.

setts, using a monitoring "snapshot" of nitrogen loadings at the tail end of flooding that hit Massachusetts in mid-May 2006. In fact, 85 percent of the nitrogen load over a one-week period originated in Massachusetts. The call was clear for EPA to start reexamining Massachusetts permits to respond to Rhode Island's efforts to reduce pollution of its waterways.

All of this leads back to the creation of the TMDL, "which could be a valuable tool for predicting water quality improvements in Narragansett Bay," according to Uva. Steps are now being taken to remedy the TMDL deficiency. In addition, Uva believes that not enough monitoring is being done to identify nutrient loading sources, including those coming across the borders of the state.

To be able to create valid TMDLs for nitrogen discharges, the NBC is working with researchers at the University of Rhode Island's (URI) Graduate School of Oceanography (GSO). Christopher Kincaid, URI oceanography professor, and Deanna Bergondo, a post-doctoral researcher working with Kincaid, are heading up the URI team to develop such a model and are using the ROMS model as a starting point. The ROMS model, or Regional Ocean Modeling System, is an internationally recognized hydrodynamic model that is being modified to create a physical-chemical-biological model for the upper Bay. The NBC is funding this two-year project and intends to share this tool with RIDEM. The model will allow scientists to do long-term profiles on a monthly basis to measure hydrodynamic flows in and out of the Bay, track the transport of

pollutants through the Bay, and evaluate how pollutant loadings affect water quality.

RIDEM based the recently issued NBC permits on an earlier GSO project conducted at the Marine Ecosystems Research Laboratory (MERL) in the 1980s. Since this MERL study was conducted in static tanks, it didn't address the Bay's hydrodynamics or flushing characteristics. The hydrodynamic model is currently being fine-tuned by the URI team, and biological components are being added to predict the effect on water quality from pollutant loadings in the Providence and Seekonk rivers. To date, while still wrestling with the complexities of biological reactions—especially what happens when nutrients are consumed by algae, which then die and consume oxygen—the model has passed the test of conserving water salinity and is being calibrated to meet RIDEM standards. While it is fair to say that creating TMDLs is complex, it provides for two of the most important aspects of monitoring and assessment: accountability and adaptive management. "The NBC must balance the dual accountabilities of our environmental responsibilities with our fiduciary responsibilities to our ratepayers. Ultimately, the money for all of the projects we are talking about here will come in the form of increased sewer fees for the individuals and businesses in our service area. And that's not a consideration to be taken lightly," Uva said.

Immeasurable time and effort is being dedicated to implementing the Metro Bay Special Area Management Plan and the state's Marine Resources Development Plan to guide development and rehabilitation in the upper Bay. NBC's work to upgrade its plants to meet new permit limits is simultaneous with its work on a massive combined sewer overflow project whose underground tunnel running beneath the capital city and upper Bay, is designed to further improve water quality (see article on page 31). And billions of dollars of investment along the upper Bay waterfront is dependent on making sure the region is environmentally healthy and remains a prime site for residential and business properties that can be an economic boon for the state.

Regularly monitoring the changes in the upper Bay will allow the state's water quality managers the flexibility to shift gears and focus on new solutions once measures to improve water quality are implemented. It will protect not only funding of projects by the state, city, and private sector to ensure they are sound financial investments, but also protect the public who are NBC ratepayers.

"It is important to the NBC and our ratepayers that we have a valuable tool such as the new model we are creating with URI," explains Uva. "There is a lot we don't know about. But as we go to 5 ppm of nitrogen, which will be a huge investment, we need to know it will have a positive impact on water quality improvements."

—Chip Young is Communications Liaison for the URI Coastal Institute.



NBC Monitoring Blankets Upper Bay

In addition to the NBC's focus on pollutant inputs coming into the Bay from Massachusetts, and the need for TMDLs to be fully established, the NBC is active throughout the upper Bay with a variety of other monitoring and assessment programs, and a range of partners:

Bay Window Monitoring Program (see 41°N Vol. 3, No. 1 2006) — Working with a number of partners tied into an extensive Bay-wide monitoring and assessment project, the NBC does continuous on-line monitoring using a stationary buoy at Bullock's Reach in the Providence River and a fixed-station site at the Phillipsdale Landing in the Seekonk River. The sondes (high-tech sensors) at these sites measure temperature, salinity, dissolved oxygen, pH, turbidity, chlorophyll, and depth. The information from these monitoring sites is available on-line at: www.narrabay.org.

Fecal Coliform Monitoring in Upper Bay and Urban Rivers — This weekly monitoring helps identify potential problems such as dry weather discharges. High fecal coliform levels observed in a river would immediately prompt an investigation by the NBC to determine the source, which could be a blocked sewer line or a leaky, broken pipe. This weekly monitoring initiative will also provide baseline data to compare to the improvements expected when the new combined sewer overflow tunnel comes on-line in October 2008.

Metals and Toxic Pollutants — Data show that there has been a 1 million pound reduction in heavy metals in the upper Bay and rivers since 1981. Toxic pollutants are monitored to identify "impaired waters" under EPA standards. The NBC provides the information to RIDEM, which in turn gives it to the EPA. If the waters are listed as "impaired," then RIDEM must establish TMDLs and create a plan for reducing the levels of pollutants. NBC monitoring of toxic pollutants has allowed RIDEM to remove the Seekonk and Providence rivers from the EPA 303d List of Impaired Waters.

NBC staff have been pleased that the monitoring program has had positive impacts on its ratepayers: "By spending money to monitor, we have saved industry millions in unnecessary new equipment costs. Without performing the monitoring, we would never have learned that the NBC receiving waters were meeting water quality standards for toxics," said the commission's Uva.