

A Familiar Problem Plagues Cape Cod Waters

Nitrogen enrichment is a pervasive issue around the world and, as we know from our experiences here in the Great Bay watershed, a costly and difficult problem to resolve. The water quality impacts on Cape Cod are similar to those observed in Great Bay, including low dissolved oxygen, declining invertebrate animal diversity, and loss of invaluable habitat that contribute to a healthy ecosystem and a vital tourism economy. Loss of eelgrass beds is identified as a sensitive indicator of nitrogen overload on the Cape.

This fall I joined five other scientists with extensive expertise on watershed and estuarine processes relative to nitrogen at the request of the Cape Cod Water Protection Collaborative (CCWPC) to review the science behind the TMDLs. Total Maximum Daily Loads or “TMDLs” are required by the federal Clean Water Act to resolve these problems. A TMDL identifies the pollutant causing a water quality problem and caps the pollutant load at a level that will meet a criterion or target that attains state water quality standards. To date, TMDLs addressing about 50 estuarine segments on Cape Cod have been adopted and approved by EPA.

Typical of estuarine systems, as nitrogen loads increase beyond optimal condition, eelgrass declines and ultimately a cascade of negative consequences unfolds as the habitat and stability that eelgrass affords are lost (See Figure). These consequences simply replace eelgrass with other plant forms of algae, including epiphytes that grow on the eelgrass blades themselves, and shade out the more desirable eelgrass. As shown in the figure, only by reducing nutrient loads is there hope that the ecosystem will be restored. At least 89 Cape Cod estuaries are at risk and will require some level of nitrogen management to repair the environment.

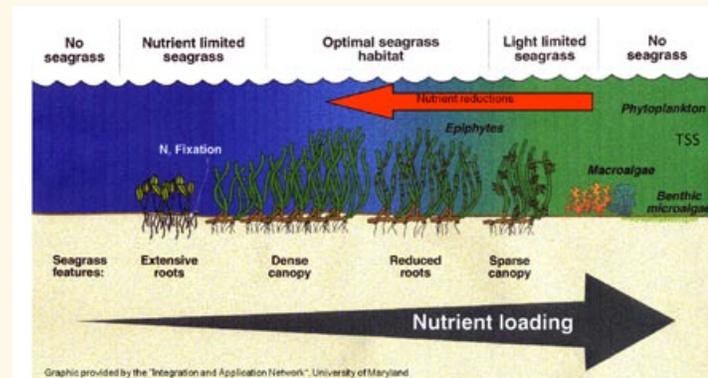
To develop effective plans, all the estuaries are being evaluated and modeled by a partnership of researchers from the University of Massachusetts at Dartmouth’s School for Marine Science and Technology and the Massachusetts Department of Environmental Protection known as the Massachusetts Estuary Project (MEP). During our review, I was disappointed to learn that a sister NERRS estuary at Waquoit Bay is already bereft of eelgrass, which had been in decline for many years.

Septic systems for wastewater disposal, fueled by continued development, are the primary source of nitrogen to Cape Cod’s estuaries. The porous, sandy soils that are prevalent on the Cape afford little treatment of nitrogen as it quickly moves from homes to the shores and into the estuaries that fringe Cape Cod. This restricts management options to either sewers or use of advanced technology septic systems that remove nitrogen – both are expensive propositions and, just as in the Great Bay watershed, raised concerns among the local populace who wanted assurance that the science supports the need for this potentially very costly fix.

After three days of analysis and discussion with the MEP, local experts and regulators, we entered a packed room to present our preliminary findings to the CCWPC and the public they represent. We concurred that the science was supportive of the nitrogen targets and the adopted TMDLs for the two estuaries that were the focus of our review – the Pleasant Bay System and the Great, Green and Bourne Pond Systems. We recommended that, because there is always

uncertainty in the realm of environmental science and management, implementation of the TMDL should embrace an adaptive management approach.

Adaptive management provides the opportunity to progress at a pace consistent with current scientific understanding. Continued monitoring, assessment



Graphic provided by the “Integration and Application Network”, University of Maryland

FOR FURTHER INFORMATION:

Cape Cod Water Protection Collaborative: <http://www.ccwpc.org/>

Massachusetts Estuary Project: <http://www.oceanscience.net/estuaries/>

Panel Preliminary Findings:

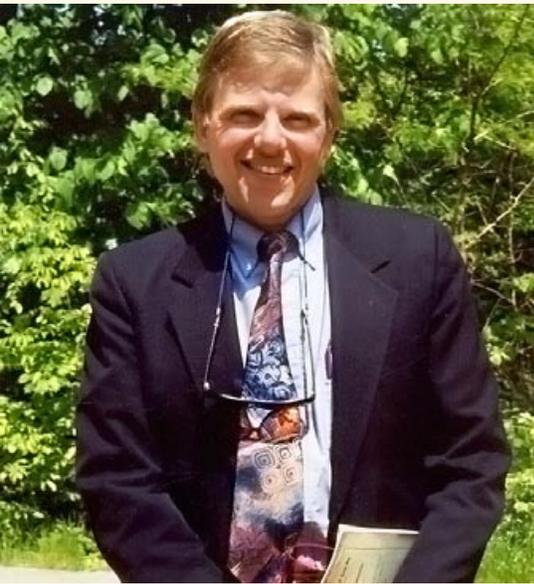
http://www.ccwpc.org/images/adminstructure/panel_presentation_11_16_11.pdf

and analysis of environmental improvement as pollutant loads are incrementally reduced allow adjustment of the management target as warranted. Most important, an adaptive approach does not unnecessarily delay action as scientific uncertainty is resolved. The quality of the science provided by the MEP combined with the stakeholder interest exhibited at the public meeting and the proactive planning already underway by the 15 municipalities that comprise the Cape Cod community bode well for a successful management outcome that protects and restores this very valuable and treasured resource. These lessons may have value for us as we move forward in the planning process to address Great Bay nitrogen management needs.

By Paul Stacey:

Research Coordinator, GBNERR

A Picture of Peter is Worth a Thousand Words



Peter Wellenberger at the 1996 dedication of the Sandy Point Discovery Center.

“All changes are more or less tinged with melancholy, for what we are leaving behind is part of ourselves.”

This quote is very appropriate as the Reserve faces the new year without Peter Wellenberger as our manager. It will be difficult for the staff and volunteers to not have Peter playing a part in our programs, events, meetings and special occasions.

When I began my job as Volunteer Coordinator, I spent a lot of time going through boxes of old photographs trying to organize them. It was like going back in Peter’s life. There he was working on the beginnings of the boardwalk, dirty but smiling. I saw him on board the model gundalow for a demonstration of raising the sail. Another photo of the dedication of the Discovery Center shows him looking very distinguished and young. Then there was one of him in a circle with some of the first volunteers being led in an activity by Jennifer Mattrick, the first Volunteer Coordinator. I even found one of him with Senator Bill Bradley who stopped by Great Bay when he was deciding

on whether or not to run for President. There were many of him at special events handing out awards and shaking hands and some at the GBNERR Annual Meetings show him in funny costumes.

It is interesting to see someone you’ve worked with for ten years as a much younger person just starting out on a career that becomes almost his life work and creating a legacy that will remain. Then I think of the many volunteers who started out with Peter and contributed their time and efforts to a totally new entity, the Great Bay National Estuarine Research Reserve. How gratifying it must be for them to see the growth of the Reserve both physically in the new buildings and enhanced grounds but also in how the Reserve is perceived in the community.

As the Reserve’s spokesperson, Peter was able to reach out beyond the Seacoast and the state to make sure that our work with UNH and other federal agencies was adequately funded and found appropriate sources for research on issues affecting the Bay. To have former Senator Judd Gregg become such an advocate for the Reserve and the Partnership, that has conserved and protected 1000’s of acres of land around the Bay, must be especially satisfying.

Many of our volunteers have their own photographs of Peter, dressed in funny outfits or on the trip to Ireland or at one of the Discovery Center’s Volunteer Dinners. The photos are part of what has been left behind but they aren’t really a part of him. The parts of himself that are left behind are the dedicated staff that Peter allowed to flourish and to be creative, the new positions that he lobbied for, the buildings with the energy saving features, all the behind the scenes work to maintain funding, a volunteer staff happy and involved while working for the

The Evelyn Browne Conservation Award

Great Bay Steward, Nate Hazen of Greenland, NH was the winner of the 2011 Evelyn Browne Conservation Award. Nate has been a UNH Marine Docent for many years and a Great Bay Coast Watch volunteer as well. He participates in the Chantey Nate and Helen Hazen at the 2011 GBDC volunteer recognition dinner

He is an invaluable volunteer for the Gundalow Company and has done work charting the Salmon Falls River for the Captain Adams Gundalow to make it up river for a host of programs.

Nate has volunteered for the Winnicut Watershed Coalition by doing water quality testing. He has done numerous presentations of his “Armchair Cruise on the Rivers.”

He is, and has been, involved in many programs and efforts to educate people about the importance of protecting the Great Bay Estuary. Thank you on behalf of the Great Bay National Estuarine Research Reserve!

Reserve, and his friendship.

We all wish him well and our good-byes are “tinged with melancholy.”

Sheila Roberge
Volunteer Coordinator,
GBNERR