

Reducing Excessive Nitrogen Loadings to Restore the Peconic Estuary

One of the “Last Great Places in the Western Hemisphere”

The east end of Long Island, New York is home to Peconic Bay—a vital economic, recreational, and scenic resource for residents and tourists alike. The Peconic Bay watershed, shown in Figure 1, has 340 miles of coastline that supports a variety of marine life, birds, and wildlife. The U.S.

Environmental Protection Agency (EPA) has designated Peconic Bay as an “estuary of national

significance” and The Nature Conservancy refers to it as one of the “last great places” in the western hemisphere. Essential to preserving this estuary of national significance is ensuring that the water quality throughout the entire estuary can

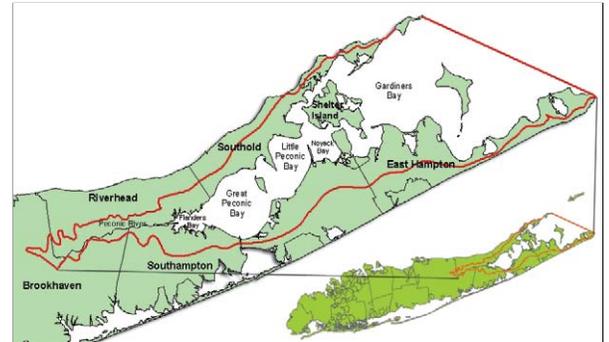


Figure 1. The Peconic Bay watershed.

adequately support the dependent marine life. Over the years, environmental quality in the Peconic Estuary System has declined, with low dissolved oxygen (DO) levels in tidal creeks and poorly flushed embayments as one of the primary problems. Low DO levels are harmful to aquatic life. Sampling performed by the Suffolk County Department of Health Services (SCDHS) showed frequent periods of low DO levels during the warm weather months in areas where there is limited circulation and high nutrient loadings—particularly nitrogen. These low levels of DO violate the State of New York’s water quality standards and result in impairment of the aquatic life designated use for Peconic Bay.

The TMDL addressed the key sources of nitrogen. A sophisticated computer model provided a better understanding of the complex links between nitrogen loading, water temperatures, plant growth, bottom sediments, water depths and DO levels. With this improved understanding, the Peconic Estuary Program (led primarily by the New York Department of Environmental Conservation (DEC), EPA, and Suffolk County) were able to develop a practical load reduction strategy and identify recommended implementation activities for all the key sources.

TMDL at a Glance: Peconic Bay Nitrogen TMDL (approved September 2007)

www.dec.ny.gov/chemical/23835.html

Factors causing impairment

Impaired aquatic life designated use due to low dissolved oxygen levels from excessive loadings of nitrogen

Sources contributing to impairment

Atmospheric deposition, groundwater, sewage treatment plants, and stormwater runoff

Restoration options

Establish achievable nitrogen loading rates from key sources

Stakeholder involvement

New York Department of Environmental Conservation, U.S. Environmental Protection Agency, the Suffolk County Department of Health Services, Peconic Estuary Program

Status of waterbody

Implementation phase; demonstrated water quality improvement is expected to take several years due to the severity of the problem

Benefits to stakeholders

Improved recreational opportunities, economic benefits, better aesthetics

What is a total maximum daily load (TMDL)?

It is a study or analysis that calculates the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. The TMDL establishes a pollutant budget and then allocates portions of the overall budget to the pollutant’s sources. For more information on TMDLs, visit EPA’s website at www.epa.gov/owow/tmdl.

How are TMDLs at work in Peconic Bay?

The Peconic Bay nitrogen TMDL provided a framework to analyze the large amounts of data collected by Suffolk County and the Peconic Estuary Program and identify a practical strategy for reducing nitrogen.

The Peconic Estuary Program is targeting full implementation of the TMDL by 2022. The schedule takes into account current expectations for full build-out and land acquisition programs, development and implementation of education and outreach programs, full participation in the agricultural stewardship program, implementation of Clean Air Act programs, and other necessary efforts.

Who were the participating stakeholders and key partners?

The Peconic Estuary Program developed the TMDL. The Program is a partnership of governments, environmental groups, businesses, industries, academic institutions, and citizens whose mission is to protect and restore the Peconic Estuary system. EPA, DEC, and the SCDHS were the agencies most involved with preparing the TMDL report, communicating the recommendations to the public, and ensuring that it met Clean Water Act (CWA) requirements.

How did stakeholders participate in the TMDL process?

The overall TMDL process includes the following elements: CWA section 303(d) listing decisions, TMDL development, and TMDL implementation. Each element of the TMDL process provided stakeholders with an opportunity to express concerns and share information about the water quality problems in the bay with DEC and other key partners. A description of each element of the TMDL process is provided below.

Section 303(d) Listing Decisions

If a waterbody does not meet water quality standards (i.e., numeric or narrative criteria) for one or more pollutants, it goes on a state's 303(d) list. Impaired waterbodies on this list require a TMDL for each pollutant contributing to the impairment. Stakeholders have the opportunity to provide input during the 303(d) listing process. Determining that a waterbody is not meeting its water quality standards is the first step in the TMDL process. A waterbody is impaired when it does not meet water quality standards for a particular pollutant and it goes on a list of impaired waters needing a TMDL. In the case of Peconic Bay three separate waters appeared on New York's 2006 303(d) list: Lower Peconic River and Tidal Tributaries; Western Flanders Bay and Lower Sawmill Creek; and Meetinghouse Creek, Terrys Creek and Tributaries.

TMDL Development

The Peconic Estuary Program has estimated that the load of nitrogen has increased 200 percent since the 1950s due to an increased human population and more pervasive use of highly soluble fertilizers, both for crops and on lawns and golf courses. Sources of nitrogen in the Bay include agricultural operations, golf courses, existing and new development—including associated on-site disposal systems (septic systems) and landscape maintenance—and sewage treatment plants. In addition, the TMDL identifies nitrogen loads transferred to Peconic Bay from the air through atmospheric deposition and takes this source into account in the analysis. Nitrogen reductions of approximately 38 percent in the winter (October 1 to April 30) and 43 percent in the summer (May 1 to September 30) will result in full compliance with water quality standards at most locations throughout the Bay. At a few locations where these reductions do not fully achieve water quality standards, the TMDL includes mechanical aeration.

Data from Suffolk County water quality monitoring efforts as well as data from studies funded by the Peconic Estuary Program were available to support TMDL development. The TMDL development process involved calibrating a sophisticated three-dimensional water quality model of the Bay using available data. A detailed assessment of current and projected future land use data, an analysis of groundwater nitrogen concentrations for different types of land uses, and available data for tributary inflows, sewage treatment plants, stormwater runoff, and atmospheric deposition helped to estimate nitrogen loads for the model. Through the modeling analysis, the TMDL process determined that atmospheric deposition is the largest source of nitrogen (56 percent), followed by contributions to groundwater from onsite disposal systems and fertilizer use (41 percent), tributary inflows, sewage treatment plants, and stormwater (1 percent each). The importance of the different sources varied by the individual waterbody, with groundwater often the most significant source to individual tributaries.

DEC made the draft TMDL report available for public review and received seven sets of comments. Responses were provided in a Response to Public Comments Document and comments were considered in finalizing the TMDL. DEC also held a public meeting to discuss and answer questions on the TMDL; the public meeting was attended by 25 stakeholders.

TMDL Implementation

Implementation of the TMDL will occur through a combination of regulatory and non-regulatory efforts. To achieve nitrogen load reductions from atmospheric deposition, Peconic Bay stakeholders will rely on existing regulatory programs under the Clean Air Act and several New York State initiatives, including adoption of low-emission-vehicle standards. The Long Island Agricultural Stewardship Program has begun to develop, demonstrate and implement a voluntary program to reduce nitrogen loadings to groundwater and surface water through best management practices including specialized fertilizer products. The TMDL also recommends requirements for better management of new housing developments, turf and landscapes, onsite wastewater systems, and stormwater.

Several activities led or supported by the Peconic Estuary Program have already occurred that will help to implement the TMDL. These include the following:

- Working cooperatively with 34 golf courses to reduce nitrogen loads to groundwater through improved management practices.
- Imposing limits on nutrient discharges from the major sewage treatment plants in the Estuary, and securing funding to construct treatment systems to remove nitrogen at publicly owned facilities.
- Working with the agricultural community and the Farm Bureau to reach an agreement which sets, as a goal, reducing the nitrogen load from agriculture by 25 percent and working to secure funding to develop and implement the necessary farm plans to achieve that goal.
- Evaluating the use of the effluent from the Riverhead Sewage Treatment Plan to irrigate and “fertigate” the County-owned Indian Island Golf Course, and supporting the allocation of funding to pilot test and fully implement this project.
- Working with the Association of Marine Industries to secure a Vessel Waste No Discharge Zone designation for the entire Peconic Estuary to eliminate this pollution source.

- Preserving thousands of acres of open space through town Community Preservation Funds (CPFs) and county and state programs. The CPFs are funded by a real estate transfer fee imposed on buyers and have generated \$526 million in revenues, approximately half of which has been invested in open space in the Peconic watershed.
- Imposing special permit requirements for municipal separate stormwater systems to reduce nitrogen loadings from stormwater discharges.
- Managing the use of fertilizers by conducting the following activities:
 - Enacting a county law banning the application of nitrogen-based fertilizers on turf grass between November 1 and April 1,
 - Prohibiting fertilizer use on county property at any time (except county golf courses, ballfields, the County farm, and newly seeded/sodded areas—in all these instances best management practices (BMPs) must also be followed);
 - Requiring licensed “home improvement contractors” (which includes landscapers) to complete a turf management course;
 - Mandating informational signs and brochures at retail establishments that sell fertilizers, as well as calling for an annual report on fertilizer sales; and
 - Establishing a public education effort.
- Developing and implementing detailed sub-watershed management plans that emphasize stormwater quality and quantity management, while also serving as focal points for intensive public participation efforts; four plans are complete and in the implementation phase with more plans scheduled for development.
- Restoring clam and scallop populations, important filter feeders that can improve water quality.
- Working to restore eelgrass beds, a valuable habitat for many species that also serves as an important reservoir for nutrients.

Implementation of this TMDL is overseen by the Peconic Estuary Program as part of a comprehensive and coordinated ecosystem-based management approach that is intended to be cost effective. For example, the sub-watersheds effort noted above is aimed primarily at implementing pathogen TMDLs to restore shellfishing waters that are impaired, but will also include actions to reduce nitrogen loads.

What is the current status of Peconic Bay as a result of the TMDL process?

The localized problems in Peconic Bay are the result of many years of excess loading, including legacy loadings from the numerous duck farms that surrounded the western estuary from the early 1900s to the 1970s (today only one duck farm remains). Stakeholders acknowledge that reversing the trends will take time and sustained effort. For example, the TMDL modeling indicates that reductions in nutrient loading will take approximately six years to have an effect due to the complicated relationship with bottom sediment. Nitrogen loadings are also only one challenge in the estuary. Other challenges include the degradation, fragmentation, and outright loss of open space and habitats, closed shellfish beds, harmful algal blooms, and reduced landings of fin fish and shellfish. The Peconic Estuary Program plans to track and report on progress in implementing and achieving this TMDL at five-year intervals with the goal of full implementation by 2022.

How did local stakeholders benefit from the TMDL process?

Management practices applied in the Peconic Bay watershed to achieve the TMDL targets and restore the Bay's beneficial uses are expected to provide the following benefits to the stakeholders:

- **Improved recreation.** Peconic Bay is a unique ecosystem that, while threatened, can be saved. Restoring the Bay to its full potential will yield significant benefits to local residents and tourists because of improved fishing, swimming, and boating opportunities.
- **Increased economic benefits.** Improved DO conditions in poorly flushed embayments and tidal creeks can help prevent fish kills and improve conditions for bait and juvenile fish, as well as other species that are commercially, recreationally and ecologically important. The bays of Long Island were once renowned for their production of bay scallops, providing up to 28 percent of the national harvest. Harmful algal blooms, degraded water quality and loss of habitat resulted in bay scallop harvests dropping to less than one percent of what they were until the mid 1980s. Figure 2 shows one of the signs used in the Peconic Bay to help educate the public about the importance of protecting a shellfish nursery area. Figure 3 shows bay scallops grown in a shellfish nursery in the Peconic Estuary. Meeting the goals of the TMDL has the potential to contribute to the restoration of these critical components of the local economy.
- **Improved aesthetics.** Peconic Bay and its coastline support a wide variety of marine life, birds, and wildlife. Implementing the TMDL has the potential to enhance the enjoyment of this unique ecosystem through clearer water, restored eelgrass beds, and fewer algal blooms.

■ Stakeholders Say...

"An old proverb tells us that 'If you don't change direction, you'll end up where you're heading.' The stakeholders in the Peconic Estuary have seen the impact that increased human populations have had on the bay and have chosen to take steps to change direction and address the challenges before them. This will involve both regulatory and voluntary initiatives affecting all segments of society, but the outcome—a healthy bay for this and future generations—makes it worthwhile."

—Kevin McDonald, Peconic Estuary Program
Citizens Advisory Committee Chair



Figure 2. Public education sign informing readers about shellfish nursery area protection.



Figure 3. Bay scallops from a Peconic Bay shellfish nursery.

Photos: Rick Balla



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For more information on the New York TMDL Program, visit www.dec.ny.gov/chemical/23835.html

For more information on the Peconic Estuary Program, visit www.peconicestuary.org/