Peconic Estuary TMDL Review
U.S. EPA, January 22, 2013

Pollutant of Concern: Nitrogen

Date of TMDL: September 2007

Summary: The Peconic Estuary is located between the north and south forks of eastern Long Island. The Peconic watershed, which includes the areas that contribute groundwater, surface water and stormwater runoff to the estuary, covers an area of 196 square miles. Over 125,000 acres of land and 158,000 acres of surface water are a part of the Peconic Study Area. The Peconic Estuary includes three identified nitrogen impaired water bodies: Lower Peconic River and Tidal Tributaries, Western Flanders Bay and Lower Sawmill Creek, and Meetinghouse Creek, Terrys Creek and Tributaries.

The Peconic Estuary TMDL for Nitrogen was submitted and approved in 2007. The Peconic Estuary Program seeks to have the TMDL fully implemented by 2022. Using modeling, the submittal calculated that in the average pre-implementation year, 5,357,364 pounds of nitrogen entered the Peconic Estuary. Most of this nitrogen, 56%, results from atmospheric deposition. An estimated 41% comes from groundwater (integrating inputs primarily from fertilizer use and on-site wastewater disposal systems), 1% from the Peconic River and seven western tidal creeks, 1% from three sewage treatment plants and another 1% from stormwater[1].

The TMDL is divided into winter and summer allowable amounts:

> TMDL (winter) = 37.5% nitrogen reduction from all sources + margin of safety
>
> TMDL (summer) = 42.3% nitrogen reduction from all sources + oxygen from mechanical aeration (if needed) + margin of safety.

Overall Assessment

The pace of implementation does not appear to be sufficient. In order to achieve the goals of the TMDL by 2022, the pace of implementation will need to be accelerated. Unfortunately, the 2007 TMDL and associated documentation did not provide detailed information on nonpoint source loads for particular sources or land use activities, such as agricultural operations, residential fertilizer use, on-site wastewater disposal systems and golf courses. To some degree, this has made it difficult in the implementation phase to assess the relative priority of sources. It is also important to continue to monitor surface water, groundwater, atmospheric deposition and point sources so that loads, current conditions and trends can be determined and evaluated. Further, there are other important environmental endpoints that are related to nutrient loads that were not fully addressed in this TMDL which emphasized achieving dissolved oxygen standards. These include the presence of harmful algal blooms (both micro algae and macro algae), direct impacts on eelgrass, and achieving human health drinking water standards. The role of nitrogen in these and other endpoints should continue to be evaluated.

In November 2012 the "Peconic Estuary Water Quality Status and Trends" was completed for Suffolk County. The report analyzed the monitoring data that has been collected by the Suffolk County

Department of Health Services since the 1960s. Overall, in regards to nitrogen, the report shows that the system is relatively stable, with more areas showing decreasing trends than increasing trends. The eastern embayments show lower levels of nitrogen and other pollutants because eastern embayments receive more exchange from the ocean and have less direct pollution inputs than the western embayments.

The report used the Mann-Kendall test, a commonly used trend analysis for environmental data, to evaluate trends in monitoring data for data collected between 1976 and 2008. While most of this data was collected before the creation of the Nitrogen TMDL, the trends can be helpful in determining which forms of nitrogen, and other pollutants, the Peconic Estuary Program should focus their efforts on. The report showed that total nitrogen showed no significant change at 50% of the stations, a significantly decreasing trend at 44% of the stations, and a significantly increasing trend at 6% of the stations[14].

The two largest sources of nitrogen to the estuary are atmospheric deposition, which accounts for 56% of the nitrogen, and groundwater which accounts for 41% of nitrogen loading. The Water Quality Status and Trends report looks at atmospheric ammonia deposition from 2003 – 2009, a period in which atmospheric ammonia, which comes from agriculture and combustion from vehicles and power plants, rose significantly[14]. When looking at atmospheric deposition from the start of the TMDL to present, however, there has been a lot of variation and no clear trend. The EPA has estimated that atmospheric deposition levels will be below the TMDL target by 2022.

Most of the nitrogen in groundwater comes from either onsite wastewater treatment systems or fertilizer. In 1999, Suffolk County estimated that groundwater loading was 6,500 pounds per day with most of that coming from agriculture, contributing 41% of the nitrogen, and residential development, contributing 40% of the nitrogen loading[14]. The Water Quality Status and Trends Report did not examine groundwater data and therefore could not determine the existence of any trends for nitrogen levels in groundwater. An examination of groundwater data would be extremely helpful in determining the success of the implementation of the TMDL.

EPA Recommendations

Any future modeling efforts should specify loads from particular sources or land use activities, in both the present time and at full implementation as envisioned under the practical load reduction scenario. This information would be useful in establishing priorities.

The data used in the study should be revisited and a study similar to the Water Quality Status and Trends report should be done that is more TMDL focused.

Continue to monitor surface water, groundwater, atmospheric deposition and point sources so that loads, current conditions, and trends can be determined and evaluated.

The role of nitrogen in achieving all environmental endpoints (i.e., beyond dissolved oxygen standards) should be considered.

EPA's assessment of the implementation of actions to reduce Nitrogen loads to the Peconic Estuary from specific source categories are presented below, along with recommendations to enhance implementation.

Sources of Nitrogen

A. Atmospheric Deposition

Atmospheric Deposition is the largest contributor of nitrogen to the Peconic Estuary. Atmospheric deposition is classified as either wet deposition or dry deposition. Nitrogen that enters the Peconic Estuary with precipitation is termed wet deposition as opposed to dry deposition, which is the settling of particles. Human activities have increased the amount of nitrogen in our atmosphere. Emissions from motor vehicles, electric utilities and industrial boilers are the largest contributors of atmospheric nitrogen oxides in our country. The nitrogen fertilizers that farmers apply to their land are a large contributor of ammonia into the atmosphere. Through the implementation of the Federal Clean Air Act, a 31.3% reduction from the baseline atmospheric load is expected by 2017 and beyond[1]. In addition to decreased atmospheric deposition due to the implementation of Federal Clean Air Act programs, New York State has several programs that can be expected to further reduce the atmospheric nitrogen loading.

TMDL Assumption and Goal

31.3% Load Reduction from base loading of 18.7 lbs/acre (21 kg/ha) to a loading of 12.8 lbs/acre (14.4 kg/ha)

The TMDL states that New York State's initiatives include:

1. Adoption of low-emission-vehicle standards for NOx and CO_2
2. Adoption of the Regional Greenhouse Gas Initiative
3. Initiation of the collaborative Renewable Energy Portfolio

Assessment

It is likely that the TMDL's goal of decreasing the atmospheric deposition loading to 12.8 lbs/acre, 14.35 kg/ha, will be reached.

There is a National Atmospheric Deposition Program (NADP) Monitoring Station in Cedar Beach, Southold. This monitoring station records wet deposition data but not dry deposition. Locally, dry deposition is not being monitored, however, the EPA estimates that 1/3 of total nitrogen deposition in the area is made up of dry deposition while the other 2/3rds is wet deposition[18].

The NADP data collected in Cedar Beach is shown in the following table:

Deposition in kg/ha by year	NH_4	NO_3	Inorganic N
2007	1.83	8.72	3.40
2008	1.74	9.75	3.55
2009	2.09	10.14	3.92
2010	1.35	6.47	2.51
2011	2.07	9.49	3.76

The values listed under inorganic nitrogen represent total nitrogen wet deposition by molecular weight. While these numbers show increased levels of nitrogen wet deposition in 2011, it is important to note that levels have not increased each year. 2010 showed the lowest levels of wet deposition since the nitrogen TMDL was approved[11].

The NADP site in Cedar Beach, Southold, was established using Federal National Estuary Program funding, which continues to fund the required sampling, shipping and analysis. A dry deposition station with the ability to monitor nitrogen would be prohibitively expensive, difficult to site due to urban sprawl, use a lot of electricity, and require trained operators, a full-time staff member and significant ongoing costs. So, the Peconic Estuary Program has begun looking into funding an Ammonia Gas Monitoring Network Station that would be added onto the existing wet deposition monitoring station. The station would measure NH_3 concentration, not deposition, in the dry air. This could provide information on the patterns of concentration of NH_3 in the air. Participating in the program costs $3,100 per site/ year and the site installation kit costs $250.

The Watershed Deposition Tool, which was developed by the EPA, estimates that the air deposition rate will be in the range of 4.6 to 9.09 lbs/acre in the Peconic Estuary by 2020. The Watershed Deposition Tool takes potential reductions in emissions due to the Clean Air Interstate Rule (CAIR), Clean Air Mercury Rule, Heavy Duty Diesel Rule, and the Non-road Diesel Rule into account when calculating future loads. If these levels are achieved by 2020 then we will have surpassed the TMDL's goal of reaching an atmospheric deposition rate of total nitrogen of 12.8 lbs/acre. These added reductions can provide an additional margin of safety to the original TMDL.

With regards to vehicle standards, any new light-duty passenger car, light-duty truck, or medium-duty passenger vehicle that is sold, leased, imported, delivered, purchased or acquired in New York State must be certified to the California emissions standards set forth in Title 13 of the California Code of Regulations[3]. This is significant because vehicles emit NOx. NOx is a generic term for the mono-nitrogen oxides nitric oxide (NO) and nitrogen dioxide (NO_2). These mono-nitrogen oxides form nitric acid when dissolved in atmospheric moisture. Nitric acid is a component of acid rain.

New York is one of ten states that participate in the Regional Greenhouse Gas Initiative[4]. The Regional Greenhouse Gas Initiative is a cooperative among ten states that is supported by the nonprofit called Regional Greenhouse Gas Initiative, Incorporated. Increasing the use of renewable energy will reduce NOx reductions.

New York has seen an increase in the proportion of renewable energy used by consumers ever since the Renewable Portfolio Standard was adopted in 2004. In 2010, the goals of the Renewable Portfolio Standard changed from calling for an increase in the proportion of renewable energy used by New York from 25% by 2013 to 30% by 2015[5]. In order to achieve the increase to 30%, the Renewable Portfolio Standard focuses on three groups: main tier or large scale generators, customer-sited tier, and other market activities. As of August 2011, about 49% of the main tier target (9.77 MWh per year) had been met, with 53 participating large-scale electricity generators[5]. On June 29, 2010 the new 2010 Customer-Sited Tier Plan was approved. The Plan authorized new programs such as one that focuses exclusively on Solar Thermal energy systems and one that encourages the installation of additional customer-sited installations in the downstate region[5].

EPA Recommendations

Continue to aggressively implement Federal and state initiatives that serve to reduce atmospheric nitrogen deposition loadings. Communicate the link between clean air and clean water programs to the public, regulators, and elected officials.

The PEP should continue to look into expanding the existing wet deposition monitoring station in Southold NY to include dry deposition monitoring.

B. Open Space Preservation/Critical Lands Protection

The population of the Peconic Estuary watershed continues to grow and former open spaces continue to be developed. Towns, under their Community Preservation Funds (CPFs), the County, State and local preservation groups (The Nature Conservancy and the Peconic Land Trust) are helping to preserve and protect land. Preserved non-agricultural open space should have no or very minor nitrogen loads associated with fertilizer applications and on-site disposal systems, and with no or little impervious surfaces, be extremely effective in the uptake of atmospherically deposited nitrogen.

TMDL Assumptions and Goals

50% of remaining farmland is preserved;

15% of vacant land is protected (30% in Meetinghouse Creek (MC) and Peconic River-East (PR-E) groundwater management zones);

15% of sub dividable land is protected (30% in MC and PR-E);

The rest of the agricultural, vacant and further subdividable land is developed with clustering and vegetation preservation requirements.

The TMDL states that open space acquisition programs that focus on areas in nitrogen impaired/stressed sub-watersheds could fortify efforts to restore the Peconic Estuary system and that emphasizing the use of transfer of development rights (TDR) credits in a way that reduces nitrogen loadings could also improve the health of the Peconic Estuary.

Assessment

A minimum of 1,178.67 acres of land has been documented by the PEP as acquired by Suffolk County and local Towns to be set aside as open space since the year 2007. To put this in perspective, as of 2001, about 25,000 acres (22% of the land in the Peconic Estuary's five eastern end towns) were still available for development[19]. This figure does not include land for which easements were acquired or properties that were preserved as agricultural land. In this time frame, the development rights to a minimum of 47.18 acres were purchased by Suffolk County or local towns for these properties to remain in agricultural uses. It is likely the amount of land that has been preserved and protected exceeds these acreages due to under reporting.

EPA Recommendations

State, county, town and village governments, as well as private entities, should continue to acquire and protect dwindling available open space.

The Clean Water and Drinking Water State Revolving Funds should be fully taken advantage of since funds can be used towards land acquisition. New York State has Clean Water SRF applications available for both municipal land acquisition projects and not-for-profit land acquisition projects.

Determining the amount of land that is *developed* annually could also help determine the amount of available open space that remains.

It is unknown how complete the PEP's documentation and reporting of open space acquisitions is. The PEP should evaluate the thoroughness of the existing reporting and if there is significant under reporting an improved methodology for land acquisition tracking and reporting should be instituted.

C. Agricultural Nutrient Management

Fertilizer containing nitrogen can leach into the groundwater after being applied to crops. This nitrogen rich groundwater then flows into other parts of the Peconic Estuary, further exacerbating the excess nitrogen problem. The TMDL offers several recommendations for dealing with the issue surrounding agriculture and the release of nitrogen.

TMDL Assumptions and Goals

A 25% total nitrogen reduction from all agricultural parcels (50% reduction in the MC and PR-E groundwater management zones)

The TMDL states that The Long Island Agricultural Stewardship Program, which is based on the Agricultural Environmental Management Program, should be fully implemented and that research and demonstration efforts evaluating practices to reduce nitrogen loading into groundwater should be conducted.

Assessment

It is unlikely that current levels of implementation and participation will achieve TMDL goals in the given timeframe (by 2022) if current trends continue.

The Suffolk County Agricultural Stewardship Program has been working with farmers on demonstration projects, research and implementing agricultural practices that decrease nitrogen loads. Participation in the demonstration projects has been increasing, though still estimated to be extremely modest in terms of the number of growers fully participating and the overall acreage involved. These demonstration projects have included:

1. Evaluation of fertilizer application rates as it relates to crop yield and quality
2. Effect of slow release nitrogen fertilizer application in nursery stock and vegetable crops
3. Evaluation of reduced rates of fertilizer application on the growth of ornamental plants

It is also likely that there are agricultural operators who are implementing practices outside of the agricultural stewardship program, though the extent to which this is occurring is not known.

Other research is ongoing at the Long Island Horticultural Research & Extension Center (LIHREC). The Long Island Horticultural Research & Extension Center is a part of Cornell University's College of Agriculture and Life Sciences. LIHREC studies a variety of topics including vegetable pathology, organic farming and parasite control on different crops[6]. The results of this research can help decrease the nitrogen load to the Peconic Estuary.

American Farmland Trust's New York State office is working with the Suffolk County Agricultural Stewardship Program on a crop indemnity program where farmers will be reimbursed for any losses incurred due to voluntarily integrating best management practices such as the use of controlled release fertilizer. The Agricultural Stewardship Program is running a BMP challenge, which includes crop indemnity insurance, where 10 sweet corn growers could participate in large on-farm demonstration projects comparing sweet corn growth using controlled release nitrogen fertilizers versus regular fertilizer. Participating farmers will be compensated for any yield loss up to $1,000/acre[6].

EPA Recommendations

1. Develop a cost estimate to fully develop implement, administer, and monitor a comprehensive agricultural nutrient management program
2. Perform the necessary research and development and demonstrations to develop additional BMPs for the most significant crops (in terms of acreage and nitrogen application rate/potential for nitrogen loss).
3. Provide funding for implementation as well as program coordination, reporting and monitoring.
4. Accelerate the rate of BMP adoption, especially where innovative BMPs are available
5. Investigate and implement innovative mechanisms to improve nitrogen management, such as indemnity programs

D. Sewage Treatment Plants/ Surface Water Discharges under SPDES

Sewage Treatment Plants (STPs) only contribute about 1% of the nitrogen entering the Peconic Estuary; however, as continuously discharging point sources, they can cause or contribute to locally significant water quality problems. This is especially true of the Riverhead Sewage Treatment Plant that discharges at a poorly flushed location. At the time of the TMDL, advanced treatment in the form of nutrient removal had already been installed at the Riverhead and Sag Harbor Sewage Treatment Plants. Nutrient removal technology at the Riverhead STP had, by 2007, already proven to reduce nitrogen concentration in the effluent[1], though not to a level that would achieve water quality standards.

TMDL Goals

STP	Riverhead (Oct. -April)	Riverhead (May – Sept.)	Sag Harbor	Shelter Island	Atlantis Marine World
WLA (lbs/day)	130	40	17	5	4

The TMDL established wasteload load allocations to limit nitrogen contributions from Sewage Treatment Plants/Surface Water Discharges that would be instituted under the State Pollution Discharge Elimination

System (SPDES). Nutrient limits will be imposed by the NYSDEC in permits for the Riverhead, Sag Harbor and Shelter Island Heights Sewage Treatment Plants[1]. These nutrient limits will be expressed in lbs/day. The TMDL discussed how further loads reductions at the Riverhead STP could be achieved through additional treatment or by using a significant portion of the effluent flow to irrigate the adjacent County-owned Indian Island Golf Course[1]; the load reduction could also be achieved by a combination of both approaches.

Assessment

DEC has imposed nitrogen limits in the permits of Shelter Island Heights Sewage Treatment Plant, Atlantis Marine World, and the Riverhead Sewage Treatment Plant (though limits at the Riverhead STP include a compliance schedule).

The Riverhead Sewer District is seeking a facility upgrade in order to achieve the revised limit. The documented cost of comprehensive upgrades at the Riverhead STP (including additional nutrient removal) is $20,548,000 as presented in the New York State Environmental Facility Corporation (EFC) Intended Use Plan (see the 2013 Final Intended Use Plan at: http://www.nysefc.org/Default.aspx?tabid=112). Funding through the EFC is currently not available to support this project. In addition to the treatment upgrade, the Riverhead Sewer District has also expressed an interest in continuing to pursue using a portion of their effluent to irrigate the adjoining County Golf Course. The Riverhead Sewer District has received a multi-million dollar award from New York State to pursue this beneficial reuse project. The Riverhead Sewer District has thoroughly studied the environmental, public health and technological aspects of the beneficial reuse project. If implemented, this effluent reuse project, even when coupled with additional wastewater treatment would have multiple benefits including:

- Eliminating or significantly reducing a direct discharge of treated effluent to the environmentally sensitive, impaired and poorly flushed tidal Peconic River
- Potentially eliminating or significantly decreasing fertilizer applications to the golf course due to the residual nutrient content of the applied effluent. This microapplication may result in extremely effective uptake of the residual nitrogen by the turf and other plants resulting in little or no nitrogen loading to groundwater. This could result in cost savings to the county golf course due to the elimination or reduction of fertilizer purchases and costs associated with fertilizer applications (both personnel and equipment)
- Reduced costs to County Golf Course due to the need to pump less water for irrigation

Since the amount of effluent likely exceeds the irrigation needs of the golf course, the Riverhead Sewer District could investigate other potential uses of the effluent to further reduce the direct discharge of their STP effluent to the Peconic River, such as irrigation of ornamental agricultural crops, non-play areas of the county golf course and other recreational areas.

Nutrient removal technology has been installed at the Sag Harbor Sewage Treatment Plant although the facility permit has not been updated to include the revised limits

EPA Recommendations

The Riverhead Sewage Treatment Plant discharges to a poorly flushed and environmentally sensitive segment of the Peconic Estuary. The Riverhead Sewer District should move expeditiously to implement its planned treatment upgrade. Financing through the NYS EFC should be pursued.

The Riverhead Sewer District and Suffolk County should promptly pursue the use of STP effluent from the Riverhead facility to irrigate the adjoining Indian Island County Golf Course.

DEC should include a nitrogen limit on the Sag Harbor Sewage Treatment Plant upon renewal.

E. Requirements for New Development

With around 22% of the Peconic Estuary study area still available for development at the time of the approval of the TMDL, the TMDL suggested various requirements for new development in an effort to reduce the negative effects that development could have on the Peconic Estuary.

TMDL Assumptions and Goals

37.5% TN reduction from existing agricultural, vacant and further subdividable land that is then developed with clustering and vegetation preservation requirements (50% reduction in MC and PR-E)

The TMDL makes several suggestions for new development requirements:

1. Revise zoning to reduce development densities
2. Impose vegetation preservation requirements to maintain existing vegetation and reduce potential lawn areas
3. Require the establishment of a suitable soil base where lawn areas are to be established
4. Encourage cluster development to reduce lawn areas
5. Evaluate the potential for centralized onsite disposal systems (OSDSs) with nitrogen removal

Less specifically, the TMDL also suggests that "smart growth" techniques be used where possible to reduce car usage.

Assessment

According to the Peconic Estuary Program's 2012 Program Evaluation, the ecological benefits of vegetation preservation requirements are now getting more attention after the realization that "even the well funded Community Preservation Funds of the 5 east end towns and other programs will at best preserve 10% of remaining open space[12]." Each of the 5 east end towns has vegetation preservation requirements (VPRs) more or less consistent with the PEP Critical Lands Strategy Report in their town codes; however, compliance with these VPRs is unknown. The 2012 Program Evaluation states that a report on VPRs is being prepared that will evaluate the adoption, expansion, and ecological and pollution prevention benefits of VPRs.

Vision Long Island is a non-profit that, with the help of other groups, promotes Smart Growth development. Vision Long Island has gotten involved in Riverhead. Smart Growth projects in Suffolk County seek to improve air quality by limiting the need for citizens to drive, encouraging cluster development, and more[7].

In January, 2011, a draft of an evaluation of onsite sewage disposal systems by the Suffolk County Department of Health Services was made available. According to the draft, "Suffolk County has begun a formal evaluation of innovative/alternative onsite sewage disposal systems capable of denitrification, ranging from home systems to small plants capable of servicing up to 100 dwelling units[8]." The results of the evaluation of OSDSs are not yet available.

In the fall of 2011, Suffolk County approved two new groundwater discharging wastewater treatment systems, the Nitrex system and the BESST system, for commercial and multi-residence projects. The Nitrex system was installed at Scully Estate County Park in western Suffolk County as part of a county study and Suffolk County Department of Health Services officials found that the system commonly reduced nitrogen to the range of 2-3 mg/L of wastewater discharge. This is well below New York State's standard of 10 mg/L nitrogen in wastewater discharge[9].

As a follow up to the studies involving the Nitrex and BESST systems, Suffolk County has committed to evaluating nitrogen-removal technologies that are more cost-effective for single-family homes that may achieve a standard level of 25 mg/L nitrogen in wastewater[9].

EPA Recommendations

Since new development could negate pollution reduction progress, new development requirements should be a priority consideration.

Sewage disposal systems should also continue to be pursued. Results of the onsite sewage disposal systems evaluation should be made publicly available. The study on cost-effective single-home technologies should be completed and also made publicly available. The installation of technologies with the most effective denitrification systems should be encouraged. The cost of sewering vs. on-site disposal systems should be examined. While analyzing the cost of sewering, the effects that sewering can have on the rate of development must be considered.

The Peconic Estuary Program should move to finalize the vegetation preservation requirement report. Towns should assess compliance of vegetation preservation requirements. The Peconic Estuary Program should develop model standards for suitable lawns and maximum areas of irrigated turf and it should address clustering, development densities, and minimum lot sizes. Eliminating or reducing turf fertilizer applications can result in significant decrease in nitrogen loading at effectively no cost.

F. Turf and Landscape Management (for Existing and New Development)

Many homeowners and commercial landscapers use nitrogen-containing fertilizer on lawns. The nitrogen from the fertilizers goes into groundwater or stormwater which then contaminates other areas of the Peconic Estuary. The TMDL provides several recommendations for dealing with turf and landscape management.

TMDL Assumptions and Goals

25% TN reduction from existing development (non-agricultural) parcels (33% reduction in MC and PR-E)

The TMDL implementation initiative for turf and landscape management includes the following:

1. Develop turf/landscaping recommendations for homeowners to eliminate or minimize fertilizer loses to groundwater or to stormwater
2. The PEP will pursue the implementation of an aggressive education and outreach program concerning residential fertilizer use
3. Determine residential yard care practices that have beneficial environmental impacts or minimize pollution of ground and surface water resources based on nitrogen loadings (immediate plan)
4. Developing incentives, including ones to: eliminate fertilizer application to frozen ground, and establishing labeling or signage requirements at retail establishments to inform consumers of the appropriateness of the range of fertilizer application practices (immediate plan)
5. The PEP plans to develop a recommended turf/landscaping protocol for homeowners using commercial landscapers
6. The PEP plans to implement targeted programs for commercial and industrial properties; for governmental and quasi-governmental properties
7. The PEP, with local governments, will investigate creating property tax incentives for eliminating/reducing turf coverage or for eliminating/reducing fertilizer use[1]

Assessment

In the absence of data distinguishing groundwater nitrogen sources, it's a reasonable assumption that as development increases in the Peconic Estuary, so does fertilizer application. Therefore, as development continues, it is unlikely that TMDL goals will be reached with regard to fertilizer use with the current rate of implementation.

The Suffolk County Fertilizer Law, which was approved on January 16, 2008 addresses many of the goals of the TMDL, including: a ban on the application of fertilizers between November 1st and April 1st, a ban on the use of all fertilizer on all county owned properties (except golf courses, athletic fields, and new turf along public works projects, where BMPs for nutrient management are required), the expansion of existing educational campaigns for consumers and retailers, and requiring that all licensed landscapers take an approved turf management course on the proper use and application of fertilizers and methods to minimize nitrogen leaching[17]. In 2009, Suffolk County passed a law that fertilizer may not be applied within 20 feet of a regulated surface water feature. New York State passed the Dishwasher Detergent and Nutrient Runoff Law in 2010 which, among other things, prohibits the application of lawn fertilizer on impervious surfaces, and similar to the Suffolk County law, prohibits the application of lawn fertilizer containing nitrogen between December 1st and April 1st[13]. Additionally, through their newsletter, PEP talk, the Peconic Estuary Program has been able to reach the public and educate them on fertilizer issues. PEP talk addresses issues like minimizing lawn areas and "bayscaping."

EPA Recommendations

Eliminating or reducing turf fertilizer applications can result in significant decrease in nitrogen loading at effectively no cost. The Peconic Estuary Program should expedite implementation of its planned homeowner rebate program which seeks to reimburse homeowners who undertake or install practices that

eliminate or reduce stormwater and pollution loadings; the PEP should also launch an effort to seek enrollment of landowners to participate in efforts to eliminate or reduce fertilizer use outside of the homeowner rebate program. These efforts should set annual goals for the number of participants. The overall effort should incorporate record keeping and follow up to determine the participation and effectiveness of these efforts over time.

Review implementation of the County fertilizer law and seek consistency with PEP recommendations regarding practices.

Other governmental (towns, villages) and quasi-governmental entities (schools, libraries) should adopt turf care requirements consistent with those of Suffolk County and also eliminate and/or reduce areas of maintained turf.

Develop and implement a methodology for assessing the extent of fertilizer use on turf areas and changes over time.

G. Individual On-site Wastewater Disposal Systems (OSDS)

On-site wastewater disposal systems are one of the largest contributors of nitrogen to the groundwater of the Peconic Estuary. It is important to ensure that systems are sited and working properly.

Goal

There is no numerical goal for On-site Wastewater Disposal Systems. The principal implementation initiative is to make sure that existing systems are working properly, there are no illegal or illicit interconnections and that new systems are working as they should and are properly sited. The TMDL also suggests ensuring systems operate properly upon property transfer and investigating new OSDS nutrient removal technologies. In the future, the need for traditional sewering and microsewering will need to be investigated[1].

Assessment

Suffolk County is currently pursuing innovative denitrifying OSDS technologies. As of Fall 2010, the PEP said they still needed to, "Require upgrades to on-site systems upon property transfer or some date certain; Identify areas for sewering/microsewering; Establish OSDS management districts for upgrades/replacements/operation and maintenance[9]." The State of Rhode Island is requiring systems be upgraded and could serve as a model or example for Suffolk County (see: http://www.nbnerr.org/cesspools.htm).

As mentioned above under "Requirements for New Development," Suffolk County has committed to evaluating nitrogen-removal technologies that are more cost-effective for single-family homes that may achieve a standard level of 25 mg/L nitrogen in wastewater.

EPA Recommendations

Suffolk County should continue moving forward with reviewing denitrifying technologies for individual and cluster development systems.

Review what Rhode Island implemented, regarding ensuring on-site systems operate properly and meet current standards upon property transfer, for application in Suffolk County.

Ensure that provisions for denitrifying systems don't result in a net increase in nitrogen loading due to increased densities.

A November 2012 report titled "Peconic Estuary Water Quality Status and Trends" that was prepared for the Suffolk County Department of Health Services by Cameron Engineering & Associates, LLP found that, "sewering could replace onsite system nitrogen discharges to groundwater at approximately 45 mg/L with treated effluent at 10 mg/L nitrogen[14]." Peconic Estuary Program should use this information and should consider the extent to which sewering could lead to higher rates of development. If sewering would not have a significant effect on development then funds should be used towards sewering. If it would cause increased development then funds should be used towards better OSDS technology and oversight.

H. Stormwater

As development increases and more roads, shopping centers and homes are built, stormwater runoff becomes a more pressing issue. When it precipitates, rain or snow falls to the ground but oftentimes this ground is rough, impermeable surface. The precipitation then flows along the surface, picking up debris, chemicals and other pollutants before it flows into a body of water. While some stormwater sources are not regulated as point sources, municipal separate storm sewer systems (MS4s) are regulated under either the Phase I or Phase II Stormwater Program.

Goal

15% reduction attributed to Peconic River and Flanders Bay and a 10% reduction to east of Flanders Bay

The TMDL states that MS4s will reach desired waste load reductions by implementing and enforcing Stormwater Management Programs (SWMPs). These SWMPs must describe Best Management Practices for the following minimum control measures:

1. Public education and outreach program to inform the public about the impacts of the stormwater on the receiving water quality.
2. Public involvement and participation.
3. Illicit discharge detection and elimination.
4. Construction site stormwater runoff control program for sites disturbing one or more acres.
5. Post-construction runoff control program for new development and redevelopment sites disturbing one or more acres.
6. Pollution prevention and good housekeeping operation and maintenance program.

Assessment

All Peconic municipalities, including Suffolk County and NYSDOT, are now covered by the MS4 permit (see the 2011 permit at: http://www.dec.ny.gov/docs/water_pdf/ms4gp2011.pdf). This permit specifies six "minimum control measures." Municipalities in the watersheds of the impaired waters have additional requirements called "Watershed Improvement Strategies" that further address nitrogen reductions. These strategies are specified on pages 84-86 of the 2011 permit

EPA Recommendations

Permitted entities should fully implement MS4 permit requirements. Property owners should implement practices to reduce volumes and pollutant loadings. Municipalities and others should aggressively implement "green infrastructure" projects watershed-wide.

I. Golf Courses

Fertilizer use at golf courses can likely be further reduced. The TMDL was based on data that estimated that there are 29 golf courses totaling over 2,600 acres in the watershed.

Goal

15% reduction attributed to Peconic River and Flanders Bay and a 10% reduction to east of Flanders Bay

The TMDL suggests the use of improved fertilizer management, including "fertigation" and improved compost management. "Fertigation" is the use of wastewater, in this case from the Riverhead STP, as irrigation water. The use of "fertigation" is being considered at the Indian Island Golf Course via STP effluent; this may reduce or eliminate fertilizer applications there.

Assessment

31 golf courses in and around the Peconic Estuary participate in the Nitrogen Management Challenge[15]. The Nitrogen Management Challenge prohibits fertilizer applications in 50 foot buffer zones adjacent to surface waters and wetland, encourages the implementation of best management practices so that each golf course will not contribute more than 2 mg/L of nitrogen to groundwater, and reduces the amount of land to which fertilizers are applied[16]. As participants in the challenge, golf courses personnel must have a nitrogen management plan, must set up site visits by either Cornell or United States Golf Association personnel, and must record annual fertilizer application. The extent of management plan development and implementation needs to be determined. "Fertigation" is currently not being used on the Indian Island Golf Course. However, the PEP and Suffolk County are both working to reduce the load from golf courses.

EPA Recommendations

Determine the extent of implementation of the nitrogen management plans among golf courses participating in the challenge. Suffolk County has allocated funding to support this effort.

As necessary, develop incentives for private golf courses to participate.

Ensure all municipal golf courses are implementing nutrient management practices.

J. Other Considerations

The TMDL includes other considerations that can be important for managing nutrients, such as shellfish restoration and eelgrass restoration; though no load allocations or reductions are cited. Bivalves can effectively filter large volumes of water and in the process remove suspended food (phytoplankton, zooplankton, algae and other water-borne nutrients and particles) converting them to harvestable shellfish

foods in the case of commercially, recreationally and culturally important species such as bay scallops, hard clams, oysters and mussels. Effective and high volume filter feeding can also help keep harmful algal blooms under control, including brown tide.

Similarly, eelgrass, a high quality submerged aquatic vegetation habitat in the Peconic Estuary, can effectively sequester nutrients that might otherwise be converted to harmful micro and macro algae. Some eelgrass restoration trials are underway in the Peconic Estuary, though restoration success has been limited and the restoration trials are costly. Effective eelgrass restoration would also support shellfish restoration efforts.

1. New York State. Department of Environmental Conservation. *Total Maximum Daily Load for Nitrogen in the Peconic Estuary Program Study Area, Including Waterbodies Currently Impaired Due to Low Dissolved Oxygen: the Lower Peconic River and Tidal Tributaries*; Western Flanders Bay and Lower Sawmill Creek; and Meetinghouse Creek, Terrys Creek and Tributaries. 2007. Print. <http://www.dec.ny.gov/docs/water_pdf/tmdlnitrpecn.pdf>.

2. "Peconic Estuary Program." Web. <http://www.peconicestuary.org/>.

3. "Low Emission Vehicle (LEV) Standards." U.S. Department of Energy Alternative Fuels Data Center. 14 Jan 2014. Web. <http://www.afdc.energy.gov/laws/law/NY/4627>.

4. "RGGI, Inc." Regional Greenhouse Gas Initiative. Web. <http://www.rggi.org/>.

5. "New York Renewable Portfolio Standard." New York State Energy Research & Development Authority. 24 Dec 2012. Web. <http://www.nyserda.ny.gov/Program-Planning/Renewable-Portfolio-Standard.aspx>.

6. "Long Island Horticultural Research and Extension Center." Cornell University College of Agriculture and Life Sciences. 9 Jan 2013. <http://www.longislandhort.cornell.edu/>.

7. "Riverhead: Making Development Decisions Fair, Predictable & Cost Effective." Visions Long Island. Web. <http://www.visionlongisland.org/sga/riverhead.html>.

8. Suffolk County. Department of Health Services. *Innovative/Alternative On-site Sewage Disposal Systems (OSDS) Study*. 2011. Web. <http://www.suffolkcountyny.gov/Portals/0/Documents and Forms/Health Services/environmental quality/SCDHS OSDS Study Overview.pdf>.

9. Suffolk County. Department of Health Services. *Suffolk County Approves Innovative Wastewater Disposal Systems for Commercial and Multi-residence Projects*. 2011. Web. <http://www.suffolkcountyny.gov/SuffolkCountyPressReleases/tabid/1418/itemid/217/amid/2954/suffolk-county-approves-innovative-wastewater-disposal-systems-for-commercial-a.aspx>.

10. "Nitrogen Management." PEP Talk 2010, Volume 6 Issue 3. Print. <http://peconice.ipower.com/pdf/Fall 2010 PEPTalk.pdf>.

11. United States. National Atmospheric Deposition Program. National Atmospheric Deposition Program/NTN Annual/Seasonal Depositions. Web. <http://nadp.sws.uiuc.edu/nadpdata/depoRep.asp?action=seasRep.asp&site=NY96&allSites=False&

wholestate=False&custom=False&startyr=2007&endyr=2012&DataType=kg/ha&reportType=html&Seas=105&useType=4&useDescription=Research&submit=Get Data&userid=28172>.

12. Peconic Estuary Program. *Peconic Estuary Program 2012 Program Evaluation*. 2012. Print. <http://www.peconicestuary.org/pep-admin/reports/edd8a1d008f8cf0eeb44bc0e5fa4a626fd6efa81.pdf>.

13. New York State. Department of Environmental Conservation. *Dishwasher Detergent and Nutrient Runoff Law*. 2012. Web. <http://www.dec.ny.gov/chemical/67239.html>.

14. Suffolk County. Department of Health Services Division of Environmental Quality. *Peconic Estuary Water Quality Status and Trends*. 2012. Print.

15. United States. Environmental Protection Agency. *Golf Courses Nitrogen Management Challenge*. 2010. Web. <http://www.epa.gov/Region2/p2/nitrogen_management/>.

16. United States. Environmental Protection Agency. *Peconic Estuary Region - Nutrient Management Challenge*. 2010. Web. <http://www.epa.gov/region2/p2/nitrogen_management/peconic.htm>.

17. Suffolk County. County Executive. *Resolution NO.1369-2007, Adopting Local Law NO. 41 -2007, A Local Law to Reduce Nitrogen Pollution by Reducing Use of Fertilizer in Suffolk County*. 2008. Web. <http://legis.suffolkcountyny.gov/resos2007/i2117-07.htm>.

18. United States. Environmental Protection Agency. CASTNET Total Nitrogen Deposition Map. Web. <http://epa.gov/castnet/javaweb/maps/castnet/0709/total_n-0709.png>.

19. Peconic Estuary Program. *Peconic Estuary Program Critical Lands Protection Plan*. 2004. Print. <http://www.peconicestuary.org/pep-admin/reports/0b6a9dd16bd1c3596e5cc42e6f4f023218aab301.pdf>.