



The Long Island Nitrogen Action Plan: 2017 A Year in Review

2017 saw significant advancement in many initiatives carried out in support of the Long Island Nitrogen Action Plan (LINAP). This month's newsletter serves as an update on the progress that has been made by our LINAP partners over the past year.

In this issue LINAP Updates from:

- Suffolk County
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 - Long Island Regional Planning Council/NYS Department of Environmental Conservation
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 - Stony Brook University Center for Clean Water Technology
 - South Shore Estuary Reserve
 - Peconic Estuary Program
 - Environmental Protection Agency
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 - New York State Department of Agriculture and Markets
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Suffolk County

- The County's Subwatersheds Wastewater Plan (SWP) has evaluated parcel-specific nitrogen loads from wastewater, fertilizer, stormwater, and atmospheric deposition to the groundwater and receiving waters of nearly 200 [subwatersheds](#) identified by the Suffolk County Department of Health Services and stakeholders, including the Wastewater Advisory Committee. The effort will develop first order nitrogen load reduction goals for groundwater and surface waters. Work on the SWP began in summer 2016, with a draft plan expected in January 2018 and a final plan in March 2018.
- Under the County's [Septic Improvement Program](#), individual homeowners may be eligible for a \$10,000 grant for the purchase and installation of an approved I/A OWTS and leaching structure, as well as for attendant engineering and design services. An additional \$1,000 may be available for installation of a Pressurized Shallow Drainfield for a maximum grant of up to \$11,000. Since July 3, 2017, 842 homeowners have registered online for the program and 222 have satisfied all the documentation requirements. To date, 158 grant certificates have been issued.
- The County has examined new technology through its NYSDEC-funded [Septic/Cesspool Upgrade Program Enterprise](#) (SCUPE). During Phase I, it monitored six Innovative/Alternative Onsite Wastewater Treatment Systems (I/A OWTS) at 19 residential sites. During Phase 2 of I/A OWTS, eight additional technologies have been installed at 23 residential sites.

An example of an Innovative Alternative Onsite Waste Water System

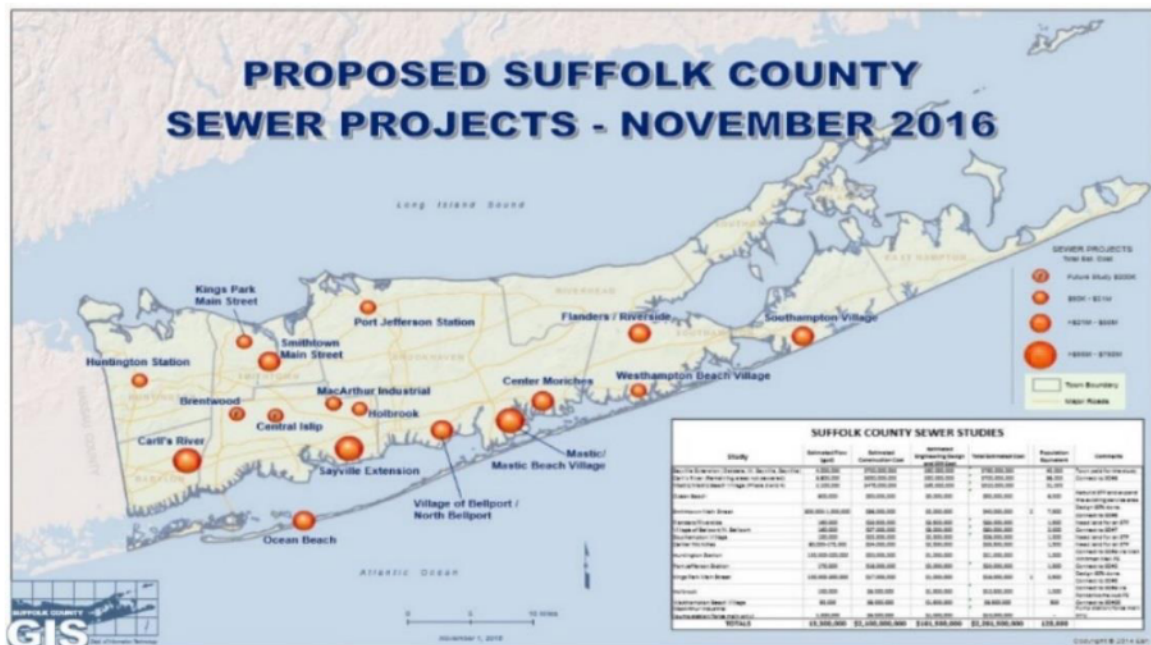


- Suffolk County Sanitary Code Article 6 - On December 21st, 2017, County Executive Steve Bellone signed legislation to amend the Suffolk County Sanitary Code regarding replacement of failing cesspools. This policy will require that replacements and retrofits of existing onsite wastewater disposal systems (OWDS) meet current Suffolk County Department of Health Service (SCDHS) standards, which require, at a minimum, a septic tank (a non-leaching structure to retain solids) and a leaching structure.

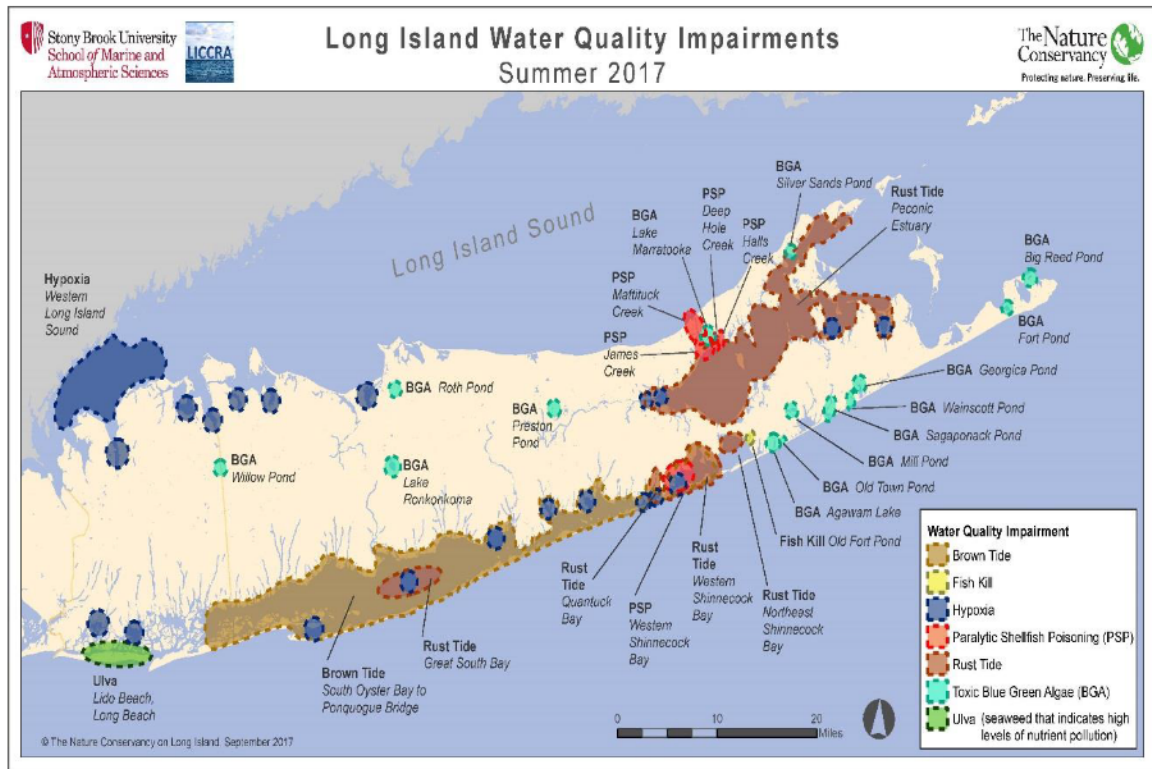
This policy change will become effective in two parts. The 1st part, effective July 1, 2018, will require reporting of 1) pump-outs of existing OWDS, and 2) OWDS replacements and retrofits. The 2nd part, effective July 1, 2019, will require SCDHS permits for replacements and retrofits of existing OWDS. The law also closes a loophole that had allowed commercial property owners to discharge wastewater based on past rather than current usage, a practice known as 'grandfathering.' Under the new amendments, advanced wastewater treatment systems for commercial buildings will be required if they have preexisting nonconforming sanitary flows and subsequently change use.

- [Sewering Projects](#) - The Suffolk County Department of Public Works authorized engineering studies of the costs, benefits, current and future demands, and overall feasibility of sewerage various environmentally sensitive and economically significant locations throughout the County.

Based on the results of those studies, sewerage is expected to be implemented in multiple areas including the Carlls River watershed which encompasses portions of West Babylon, North Babylon and Wyandanch, the [Forge River](#) watershed including portions of Mastic and Shirley, the [Connetquot River](#) watershed encompassing the Great River area and Patchogue, which will expand the existing sewer system. These sewerage projects are currently in the design phase of development.



- The Suffolk County Department of Health Services Division of Environmental Quality released its [Suffolk County Harmful Algal Bloom Action Plan](#), a comprehensive strategy developed to guide the work of government, scientists, and academia to address harmful algae blooms that threaten both Suffolk County's environment and economy.



The Plan will provide a coordinated strategy for the research, monitoring, and management of Harmful Algal Blooms (HAB).

The goal of the Plan is to achieve inter-governmental cooperation and consistency in HAB and nutrient management, report on HAB Action Plan outputs and outcomes, and make recommendations for Plan updates. In addition, the Plan calls for the establishment of a Harmful Algal Bloom Management Workgroup to coordinate Plan recommendations, an annual symposium, and significant new investments in water quality monitoring, research, and public outreach.

Nassau County

- **Subwatershed Planning** - A Nitrogen Load Model is in the final stages of development and will determine the nitrogen load from wastewater, fertilizer, and atmospheric deposition to 13 subwatersheds throughout the County. Hydrodynamic modeling is being used to estimate nitrogen loading and flushing rates in the bays. The models will determine the priority subwatersheds in the County and inform nitrogen load reduction strategies.
- **Bay Park Wastewater Treatment Plant** - The County has commenced two projects designed to reduce the nitrogen concentration in wastewater effluent discharged from the Bay Park Wastewater Treatment Plant. The first project, Biological Nutrient Removal, has been in construction since the summer of 2017. Work is approximately 15 percent complete and the anticipated completion date is January 3, 2020. The second nitrogen reduction project is a Deammonification (Sidestream) Treatment Process. The design phase has been completed and the project is currently out to bid. Anticipated construction will commence in March 2018 and will be completed by March 2020.
- **Bay Park Effluent Diversion Project** - The County has completed the inspection and assessment of an abandoned aqueduct located under Sunrise Highway and found it to be in good condition and suitable for rehabilitation. The aqueduct will now be repurposed to divert treated wastewater effluent from the Bay Park Wastewater Treatment Plant (WWTP) to the existing Cedar Creek WWTP ocean outfall. The County has negotiated an agreement with the New York State Department of Environmental Conservation to implement the Bay Park to Cedar Creek effluent diversion project utilizing the State's design-build legislation to expedite the project. The project will prevent the discharge of 19 billion gallons of treated sewage into the Western Bays each year, eliminating harmful nitrogen pollution which will help rejuvenate vital marshlands that protect communities from storm-induced waves in the Western Bays of Long Island's south shore.



- **City of Long Beach Wastewater Diversion to Bay Park** - The City of Long Beach entered into a Consent Order with NYSDEC committing to the planning, design, construction, and operation of a project to divert wastewater from the Long Beach WWTP to the Bay Park WWTP for treatment and discharge. The Long Beach WWTP would be converted to a pump station to enable this change.



This project, in conjunction with the Bay Park Effluent Diversion project, would remove approximately 60 million gallons per day of wastewater effluent containing over 15 tons of pollutants from Reynolds Channel and the Western Bays. The project can begin after the City and County negotiate and execute an Intermunicipal Agreement.

- **Point Lookout Sewer Study** - On December 13, 2017, as part of the [Long Island Regional Economic Development Award](#), the County was awarded \$2 million to plan, design and construct sewer infrastructure for Point Lookout to connect to the existing Waste Water Treatment Plant in Long Beach. Ultimately, Point Lookout's wastewater would be pumped along with that of the City of Long Beach's to the Bay Park WWTP, treated, and pumped to the Cedar Creek WWTP ocean outfall.
- **Crescent Beach Watershed Study** - The County engaged an engineering consultant to conduct a site-specific groundwater assessment and stream sampling program for the Crescent Beach area. The purpose of the sampling program was to identify the source of bacterial contamination that has led to the closing of Crescent Beach by the Nassau County Department of Health. The focused assessment of the cause for beach closures ruled out nitrogen contamination and pointed toward illicit connections from the local community. The NYSDEC will conduct a follow-up investigation. The Hempstead Harbor Sewer Feasibility Study (of which Crescent Beach was a subset) will be finalized in early 2018.

Long Island Regional Planning Council (LIRPC)/New York State Department of Environmental Conservation (NYSDEC)

Advisory Workgroups - The LIRPC and NYSDEC convened advisory workgroups to provide input and support in the development and implementation of the LINAP. Workgroups consist of representatives from Suffolk and Nassau County, local governments, area scientists, environmental organizations, and industry experts.

- The [Fertilizer Management Workgroup](#) had its initial meeting in December 2016 with representatives from landscape and grounds, agriculture, and golf course industry associations, fertilizer manufacturers, industry advisory organizations, governmental agencies, environmental advocacy organizations, and academia. The group is evaluating existing fertilizer reduction strategies, recommending modifications and additional measures and identifying actions that can be taken to further reduce nitrogen pollution from fertilizer use.

Questionnaires were issued to group members and completed by most attendees. The results were analyzed, summarized, and posted on the [LINAP Workgroup webpage](#). A second round of meetings with industry representatives was held in July 2017 to review questionnaire results and discuss potential strategies. Additional meetings will be scheduled in 2018 to present recommendations.



- **The Bioextraction Workgroup** was established to consider nitrogen removal from surface water through wild harvesting and cultivation of bivalves and seaweeds. The first workgroup meeting was held in February 2017. The group was established to provide technical assistance as LINAP determines the feasibility of bioextraction as a nitrogen reduction strategy. The Workgroup will also assist a Bioextraction Coordinator, to be hired in early 2018, as they determine the challenges and opportunities presented by bioextraction with a goal of establishing a commercial nitrogen bioextraction industry. Key bioextraction objectives for LINAP include:

 - Coordinate with the [NYS Shellfish Restoration Initiative](#): LIRPC staff appointed to NYS Shellfish Advisory Committee to guide the Governor's initiative
 - Identify ecological and cultivation requirements for key seaweed and shellfish species
 - Develop a siting tool to identify most effective locations for bioextraction 'farms'
 - Identify policy, permit, and approvals requirements and develop guidance document
 - Provide communication and outreach to stakeholders
 - Propose pilot projects and provide oversight
 - Coordinate with Suffolk County's Harmful Algal Bloom Action Plan
 - Coordinate with Suffolk County Seaweed Aquaculture Feasibility Study
- [Nassau County Nitrogen Reduction Workgroup](#) met for the first time in April 2017 with the goal of providing stakeholder updates and to seek input into Nassau County projects related to nitrogen reduction. Representatives from LIRPC, NYSDEC, Stony Brook University, Nassau County, and water protection and environmental advocacy groups were present. The Workgroup will assist in the development of:

 - A Nitrogen Load Model for Nassau County
 - Collection of all stormwater infrastructure maps for Nassau County
 - Evaluation and analysis of data available in all municipalities
 - Development of an RFP to be issued for stormwater nitrogen load modeling to be used as a Best Management Practices planning tool
 - Follow Suffolk County's progress on adoption of Innovative Alternative Onsite Wastewater Treatment systems and septic codes
- [Water Reuse Workgroup](#) met for the first time November 9, 2017 to investigate wastewater reuse as a means of achieving additional nitrogen removal prior to effluent discharge to groundwater and surface waters. Treated wastewater effluent has been reused around the country and the world for water conservation (to replenish aquifers) and to reduce nutrient inputs to groundwater and surface waters. The introductory meeting was organized to hear perspectives on wastewater reuse and to begin discussing ways to facilitate wider adoption of reuse practices on Long Island. Present were representatives from Federal, State, and County agencies, local engineering firms, environmental, builders' and civic organizations. This initial discussion covered a wide

range of reuse topics including the use of treated municipal wastewater effluent for irrigation of golf courses, parks, landscaped areas, and crops, and industrial uses, such as cooling water; grey water reuse in homes and buildings; augmentation of potable supplies through direct and indirect potable reuse; urine separation; and environmental reuse. The PowerPoint presentation from the meeting is posted on the [LINAP Workgroup page](#).

United States Geological Survey (USGS)

- **Groundwater Sustainability Status Summary** - The USGS, in partnership with the New York State Department of Environmental Conservation (NYSDEC), is conducting a regional assessment of the groundwater sustainability of the Long Island aquifer system. This six-year study began in the spring of 2016 and includes both hydrogeologic framework and groundwater modeling components. The hydrogeologic framework component is focused primarily on the installation of up to 25 deep, coastal monitoring wells to characterize the hydrogeologic conditions in the area and to assess the potential risk for saltwater intrusion in public-supply wells. Prior to drilling new wells, the USGS project team has been testing a surface geophysical technique referred to as Time Domain Electromagnetics (TDEM) in southeast Queens and southwest Nassau County to provide additional insight into where best to install the proposed monitoring wells. The second component of this study is the development of a three-dimensional, island-wide groundwater flow model. The preliminary model is currently used to delineate the groundwater recharge areas (groundwatersheds), travel times, and outflow rates to surface waters and it also serves as the foundation for the plume-containment analysis related to the Navy/Northrup-Grumman facility in Bethpage.
- **Transport Methods to Estimate Time-Varying Nitrogen Loading Rates to the Peconic Estuary** - The Peconic Estuary consists of several estuarine systems and the tidal and non-tidal portions of the Peconic River. The watershed to the system is transitioning from a



largely agricultural area to one with increasing residential development. Communities within the watershed will be developing wastewater-management plans to decrease loads of nitrogen sufficient to improve estuarine health. In October 2017, the U.S. Geological Survey (USGS), in cooperation with the Peconic Estuary Program (PEP), began an

investigation into the application of innovative numerical-modeling methods to simulate the complex transport of nitrogen within the watershed. The study will consist of three components: the definition of nitrogen sources within the watershed over time, the development of numerical models and methods capable of simulating nitrogen transport from those sources to wells and ecological receptors, and the application of those methods to estimate time-varying nitrogen loads resulting from wastewater-management actions and evaluate nitrogen attenuation. The main task since the project's inception in October 2017, has been to develop an inventory of nitrogen data sources for the Peconic watershed. Potential sources include existing USGS studies, land-use data, aerial photos, and other historical data, LANDSAT imagery, as well as population and agriculture data.

- **South Shore Estuary Reserve Coordinated Water Resources Monitoring Strategy** - The USGS is in the final stages of developing a new Coordinated Water Resources Monitoring Strategy for the South Shore Estuary Reserve, which will provide a review of past and current water- and ecological-monitoring programs in the Reserve. In collaboration with the New York State Department of State (NYSDOS) Office of Planning, Development, and Community Infrastructure and the NYSDOS South Shore Estuary Reserve Office, the USGS identified datasets and compiled monitoring program information that can be used to inform Reserve management. A Project Advisory Committee of government agencies, educational institutions, stakeholders, and citizen scientists assisted in these efforts. The final report will include stakeholder recommendations for continued monitoring and filling of data gaps necessary to address management issues.



An interactive mapper (<https://ny.water.usgs.gov/maps/sser/>) has been developed to present information on the various monitoring programs along with other relevant information.

Stony Brook University Center for Clean Water Technology

- **Nitrogen Removing Biofilters** - The Center for Clean Water Technology (CCWT) is developing non-proprietary wastewater treatment systems that could be installed to remove nitrogen from septic tank effluent. These might be installed beneath a septic tank effluent drain field. The CCWT currently has three configurations of Nitrogen Removing Biofilter (NRB) systems installed at the [Massachusetts Alternative Septic System Test Center](#) using Long Island materials (i.e., sand and wood chips). These systems require a component that provides an anaerobic (oxygen-free) environment for denitrifying bacteria to convert nitrate into nitrogen gas that is released to the atmosphere. The three systems are NY1) lined and saturated, NY2) lined sand layer leading to a wood chip tank, and NY3) unlined, unsaturated. The systems have been operating since October 2016. Both NY1 and NY3 have been consistently producing total effluent nitrogen concentrations less than 15 mg/L, with averages around 8.5 mg/L since start-up, and slightly higher values in the winter. This represents a nitrogen reduction of approximately 78% from the influent concentration of ~38 mg/L. In comparison, the "tank" system (NY2) effluent averaged ~2.7 mg/L or a nitrogen reduction of ~93% with values consistently below 2 mg/L for the past 200 days. All three systems show great promise for alternative on-site waste water treatment.
- **Constructed Wetlands** - The CCWT is also evaluating a constructed wetland system on Shelter Island in collaboration with Suffolk County. The Center is supplementing the



baseline sampling and analysis by Suffolk County to develop a better understanding of how the system functions. The Center has also installed pilot-scale experimental wetlands at the Massachusetts Alternative Septic System Test Center to answer specific research questions important for constructed wetland design.

- **Other Technologies** - The Center continues to evaluate the potential of small-scale Permeable Reactive Barrier (PRB) installations for nitrogen removal. These function similarly to the Nitrogen Removing Biofilters and are used to intercept high-nitrogen groundwater before it discharges to surface water. Denitrifying bacteria convert nitrates into nitrogen gas which is released to the atmosphere.

The Center is currently developing new approaches to synthesize wastewater treatment membranes out of nanocellulose for use in Membrane Bioreactors. Preliminary experiments demonstrate that their nanocellulose membranes are significantly less subject to fouling compared to existing proprietary membrane materials. This finding suggests that these nanocellulose membranes have advantages over conventional membrane materials for wastewater treatment.

South Shore Estuary Reserve

The Long Island South Shore Estuary Reserve (Reserve) enjoyed a successful 2017. In late December 2016, the [Long Island South Shore Estuary Reserve Eastern Bays Project: Nitrogen Loading, Sources and Management Options](#) authored by Stony Brook University School of



Marine and Atmospheric Science Professor Dr. Christopher Gobler was announced to support nitrogen reduction efforts on Long Island. Also, on November 11, the Reserve announced \$668,385 for 16 projects to assist with implementation of the [Reserves' Comprehensive Management Plan](#). This was the first round of funding for the Local Assistance Grant program. Other projects in the Reserve that are still ongoing include: the update of the Reserves' Comprehensive Management Plan that is expected to be completed by

mid-2018; and the Reserves' Coordinated Water Resource Monitoring Strategy that is on schedule to be released in early 2018.

Peconic Estuary Program

This past year, the [Peconic Estuary Program](#) (PEP) began updating its 2001 [Comprehensive Conservation and Management Plan \(CCMP\)](#). The CCMP is the blueprint by which the PEP directs its resources and efforts at the region's environmental challenges and the priority actions needed to address those [challenges](#)- namely: climate change, nitrogen pollution, and habitat restoration. Reducing [nitrogen loading](#) to the Peconic Estuary, especially via groundwater, has been identified as a top priority for the PEP. The PEP aims to reduce nitrogen loads by [identifying sources of nitrogen](#) on a subwatershed basis and accelerating the implementation of the [Peconic Estuary Nitrogen Total Maximum Daily Load \(TMDL\)](#) based on the [2013 U.S. EPA TMDL Review](#) and pursuing actions from the Nitrogen Management section of the [2015-2018 Action Plan](#). Actions include funding Nitrogen Assessment Services to investigate emerging technologies as interim solutions to address existing groundwater



contamination and working with the U.S. Geological Survey to develop a Peconic Estuary Solute Transport Model to provide information for future policy and management tools to reduce nitrogen in the Peconic Estuary. To further reduce nitrogen and other sources of pollution, the PEP [Homeowner Rewards Program](#) provides financial rewards for homeowners in the Peconic Estuary

watershed to add rain gardens, native plantings, and/or rain barrels to their properties. Simultaneously, the program launched an [interactive yard tool](#) and [native plant database](#) on its website to help individuals, schools, places of worship and other community organizations to plan and visualize their own rain garden or native plant garden.

Environmental Protection Agency (EPA)

- On November 8, the EPA held a public informational webinar on the progress of the [Long Island Sound Nitrogen Reduction Strategy](http://longislandsoundstudy.net/issues-actions/water-quality/nitrogen-strategy/), including specific technical tasks and timelines to identify nitrogen thresholds protective of Long Island Sound water quality. The webinar presentation slides and technical products are available at <http://longislandsoundstudy.net/issues-actions/water-quality/nitrogen-strategy/>. Those interested are encouraged to sign up for email alerts for posted updates.
- EPA launched Phase I of the [Advanced Septic System Nitrogen Sensor Challenge](#) - the Ideation Phase on InnoCentive in January 2017. On June 29, 2017, EPA hosted the Advanced Septic System Nitrogen Sensor Challenge Showcase Day in New York City where the 1st, 2nd and 3rd place winners of Phase I gave presentations on the design of their proposed sensors. For Phase II, EPA selected Battelle Memorial Institute (Battelle) to support the development of a Test/Quality Assurance Plan and Verification Protocol (T/QAP) and oversee the testing of the sensor prototypes. Applications for prototype testing is expected to be done by late February 2018. Developers whose prototypes meet the basic performance goals during preliminary screening will be invited to the full 6-month field performance test, which is planned for late May 2018 through late November 2018. By late February 2019, VerifiGlobal and Battelle will complete verification statements and reports for each sensor that completes the 6-month field performance test and meets or exceeds the minimum Performance Goals. The Technical Panel, EPA and The Nature Conservancy plan to review the testing results in the spring of 2019. The Nature Conservancy and others are seeking funding for an order of 200 units, not to exceed a total cost of \$300,000. The order would be presented in the summer of 2019 to the best



performing sensors that complete the 6-month field performance test and meets or exceeds the performance goals.

- The [Nutrient Sensor Action Challenge](#) builds upon the 2014 Nutrient Sensor Challenge, which helped develop affordable, high-performing, continuous nutrient sensors and analyzers. The 2017 challenge calls for demonstrations showing 1) the effective use of low-cost continuous sensors, 2) innovative partnerships to pilot the sensors and manage data, and 3) how collected information can be used in state and local decision-making. Stage 1 closed September 20, 2017. In Stage 1, teams submitted action plans describing an approach for sensor deployment and use, to meet challenge goals. The plans will be judged and up to five winning applications will be selected. The top entries will be awarded cash prizes totaling \$50,000 and invited to participate in Stage 2. In Stage 2 of the Challenge, set for Spring 2018, teams will deploy the sensors and collect data as they compete for a share of \$100,000 in prizes.

Seatuck Environmental Association

Seatuck continues to work with Dr. Gary Zarillo of the Florida Institute of Technology to refine and validate its Environmental Fluid Dynamics Code (EFDC) hydrodynamic model of the Great South Bay and the Western Bays. Through a partnership with NYSDEC, a Quality Assurance Project Plan is being developed for the model. In the coming months, Seatuck will employ the model to test ideas for improving tidal circulation and flushing rates in the south shore bays, including the proposal to return Fire Island Inlet back to its historic location and configuration.

New York State Department of Agriculture and Markets (NYSDAM)

NYSDAM has contracted with Suffolk County Agricultural Stewardship Program partners, Cornell Cooperative Extension and the Suffolk County Soil and Water Conservation District for nutrient management research, planning, and implementation.

