

The Subwatersheds Wastewater Plan - A Roadmap to Reclaim Our Water

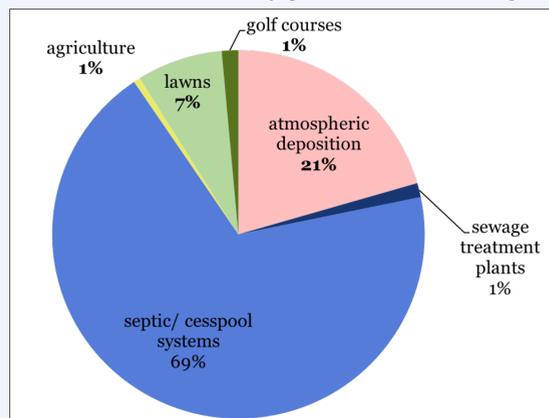
What is the Problem?

Excess nitrogen emanating from an estimated 380,000 untreated wastewater sources in Suffolk County is contributing to water quality degradation to our waterways. An outgrowth of recommendations provided in the IBM Smarter Cities Report and the Suffolk County Comprehensive Water Resources Management Plan, the Subwatersheds Wastewater Plan provides a recommended roadmap of policy recommendations to facilitate the transition from the use of cesspools to wastewater technologies capable of significantly reducing nitrogen; with the ultimate goal of restoring and protecting Suffolk County's water resources.

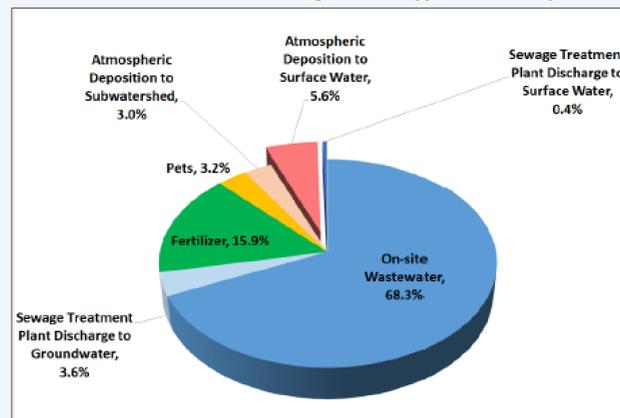
What are the sources of nitrogen in Suffolk County?

The sources of nitrogen in Suffolk County have been studied and well documented for decades going back to the 1978 208 Study. For most waterbodies, the primary sources of nitrogen include onsite wastewater disposal systems, atmospheric deposition (e.g., "rain water" and other atmospheric sources), and fertilizer. In the past 10 years, five studies ([Gobler et al., 2016], [Vaudrey et al., 2016], [Lloyd, 2014], [Kinney & Valiela, 2011], [Lloyd, et al., 2016]) have evaluated nitrogen sources at various geographic locations throughout the county using watershed models. While each study provided valuable information regarding the relative contribution of nitrogen from their respective study areas, no single study provided a comprehensive evaluation of nitrogen sources for all Suffolk County waterbodies under a unified groundwater model based upon a common set of model input parameters. The Suffolk County Groundwater Model, first developed in the 1980's and which has been used in numerous studies and applications over the past three decades, was used to quantify the nitrogen loads for 190 subwatersheds in the county using the most up-to-date model input parameters agreed upon by an expert workgroup panel.

The SWP model corroborated the findings of previous studies and found that on-site wastewater is the number one contributor of groundwater nitrogen in most subwatersheds throughout Suffolk County.

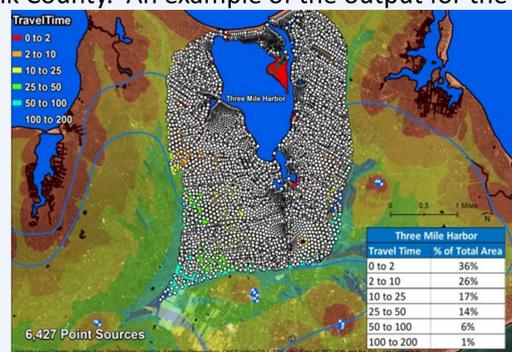


Estimated Nitrogen Sources to Great South Bay from Kinney and Valiela, 2011

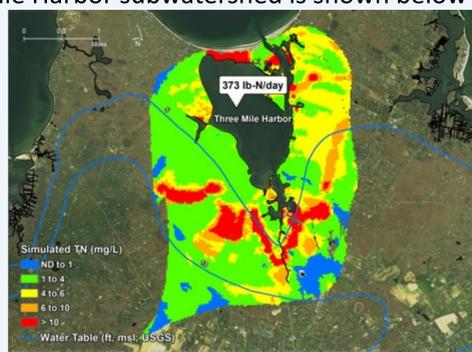


Estimated Nitrogen Sources to Great South Bay from the SWP

The Suffolk County Groundwater Model calculated the nitrogen sources by inputting a nitrogen load for every single parcel in Suffolk County based upon each parcel's respective land use. An example of the individual loads applied to each parcel within the Three Mile Harbor subwatershed is shown below (left). Using the nitrogen load inputs and regional flow dynamics, the Suffolk County Groundwater Model was also used to estimate the predicted nitrogen concentration in shallow groundwater throughout the county, a first ever in Suffolk County. An example of the output for the Three Mile Harbor subwatershed is shown below (right).



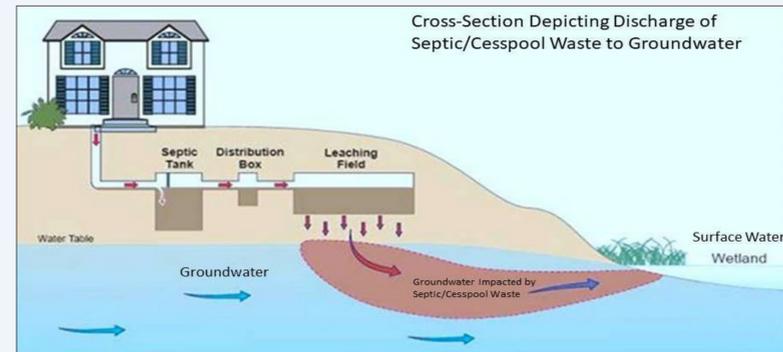
Example of Parcel-Specific Nitrogen Load Inputs



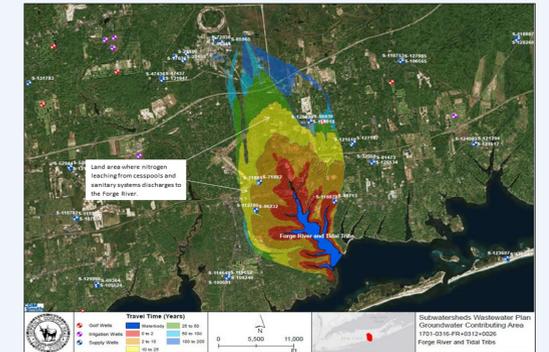
Example of Predicted Nitrogen Concentration in Shallow Groundwater Using Parcel-Specific Nitrogen Loads

What is a Subwatershed?

A subwatershed includes the land area that surrounds a waterbody (such as a stream, lake, or embayment), where the discharge of cesspool and septic waste drains into the adjacent waterbody.



Cross-Section Depicting Septic/Cesspool Discharge

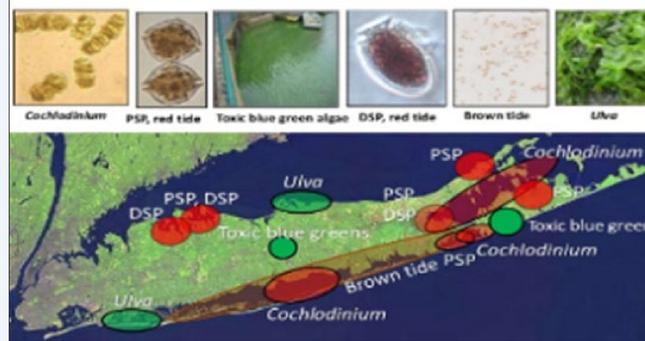


Example Subwatershed Delineation from SWP (Forge River)

How has nitrogen impacted Suffolk County waterbodies?

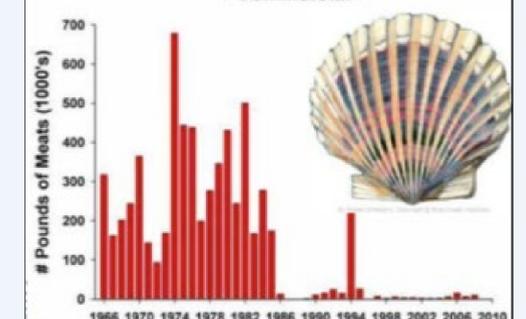
Excess nitrogen has been a contributing factor to water quality degradation in Suffolk County waterbodies. **In the past 10 years alone, Suffolk County has experienced over 230 harmful algal blooms (HABs).** HABs can be dangerous to human health and the ecosystem, and ultimately have far reaching effects on our economy. HABs reduce water clarity and disrupt local ecosystems, devastating submerged aquatic vegetation such as eelgrass which provides habitat to a wide variety of fin and shellfish and helps to protect our shorelines from storm surge. Combined with other factors such as overfishing, the declining water quality has resulted in a dramatic decline in Suffolk County's shellfishing industry.

Harmful algal blooms across Long Island



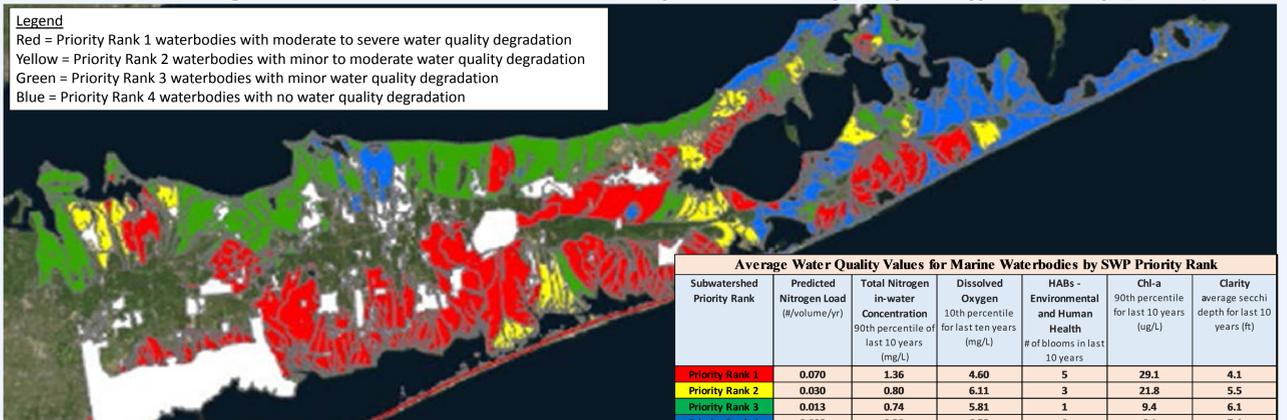
Harmful Algal Blooms Detected Across Long Island

New York Bay Scallop Landings - Commercial -



New York Bay Scallop Landings

Several existing regional studies have documented the link between nitrogen loads, in water nitrogen concentration, and water quality degradation (e.g., [Hauxwell, Cebrian & Valiela, 2003], [Heisler et al., 2008], [Davis et al., 2009], [Hattenrath et al., 2010], [Latimer & Charpentier, 2010], [Latimer & Rego, 2010], [Gobler & Sunda, 2012], [Harke & Gobler, 2013], [Benson et al., 2013], [Davidson et al., 2014], [Wallace et al., 2014], [Gobler et al., 2016], [Lefcheck et al., 2017], [Luk et al., 2019]). Using the first of its kind county-wide water quality database, the SWP corroborated these findings and found that **waterbodies with higher nitrogen concentrations and nitrogen load rates were associated with poorer water quality in Suffolk County** (below).

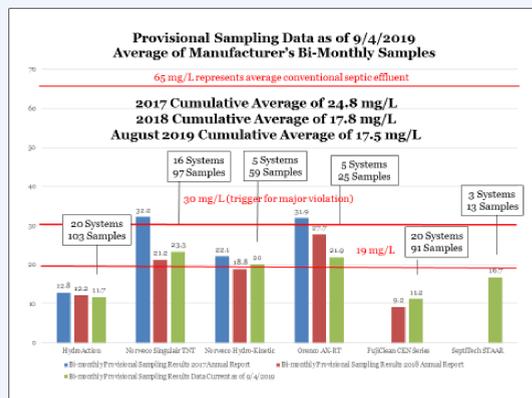
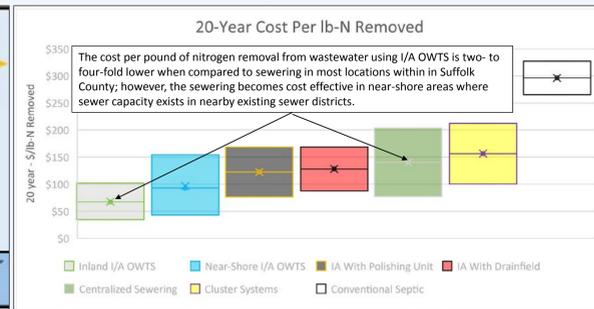
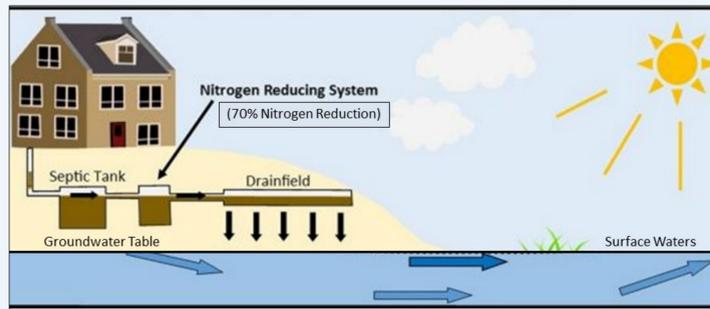


SWP Subwatershed Priority Rankings and Average Water Quality by Priority Rank

The Subwatersheds Wastewater Plan - A Roadmap to Reclaim Our Water

What is the Solution?

Addressing nitrogen pollution in Suffolk County requires a multifaceted, integrated strategy, that addresses all sources of nitrogen. Working with the Long Island Nitrogen Action Plan and numerous other project partners, the **Subwatersheds Wastewater Plan presents a comprehensive approach to addressing nitrogen from the primary source of human derived nitrogen in Suffolk County: untreated wastewater from antiquated cesspools and sanitary systems.** While sewerage is an established means of wastewater treatment that significantly reduces nitrogen from wastewater sources, numerous studies (2014 IBM Smarter Cities Challenge Report, 2015 Suffolk County Comprehensive Water Resource Management Plan) document that sewerage is not a cost effective or practical strategy for most locations. Innovative and Alternative Onsite Wastewater Treatment Systems (I/A OWTS) provide a cost-effective and environmentally sound alternative to sewers. I/A OWTS use the same biological processes to remove nitrogen that sewage treatment plants use and are demonstrated through rigorous testing by Suffolk County and other jurisdictions to remove greater than 70 percent of the nitrogen in our wastewater.

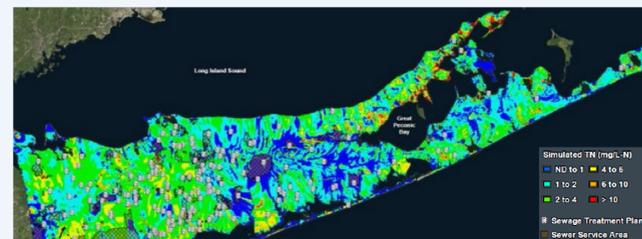
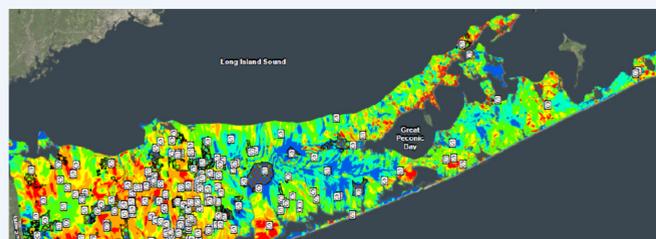


I/A OWTS Effluent Sampling Data in Suffolk County

Examples of I/A OWTS

Potential Program Benefits

- **Protection of the health of you and your family** through a reduction in harmful algal blooms, reduction of toxins in shellfish, enhanced coastal resiliency, and reduction of toxins in our sole source drinking water aquifer.
- **Increase in property values** due to higher market demand caused by cleaner recreational waters.
- **Increase in economic prosperity** through enhanced tourism, creation of new jobs, and the reestablishment of Suffolk County as a leader in the shell fishing industry.
- **Increased protection against storm surges (coastal resiliency)** through the protection of the submerged aquatic vegetation and wetlands plants that anchor our shores.



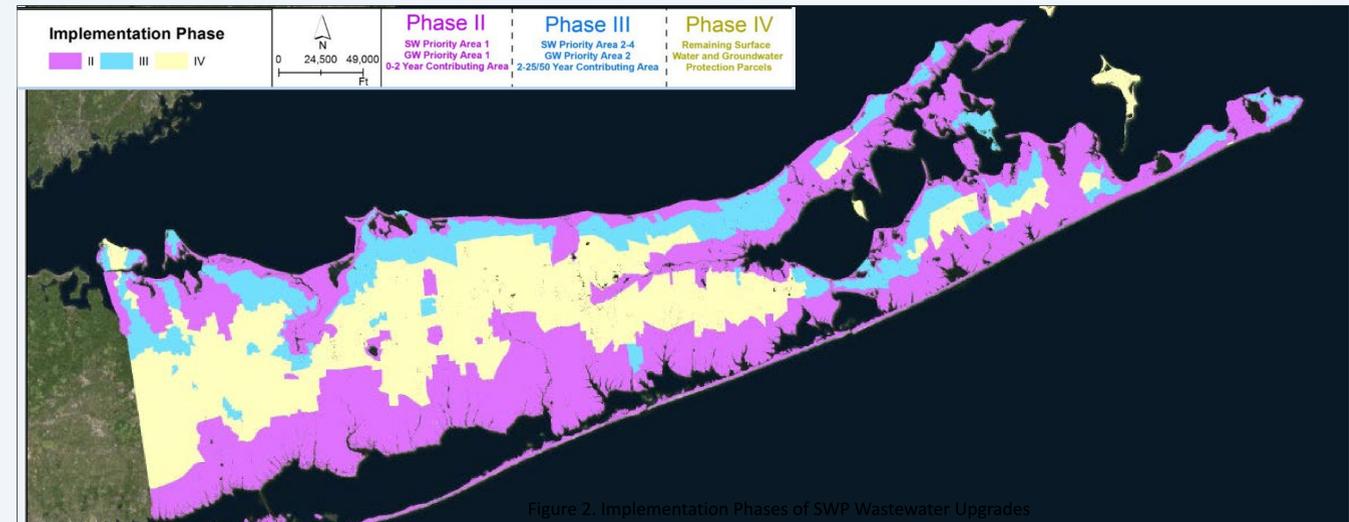
Simulated Groundwater Nitrogen Under Current Wastewater Management Practices

Simulated Groundwater Nitrogen Post-SWP Recommendations Implementation

Turning the Tide on Nitrogen Pollution

The recommended strategy*** set forth in the plan includes a **phased approach** which will upgrade all conventional on-site wastewater systems within the most sensitive and vulnerable areas of Suffolk County within 30 years establishing a stable and recurring funding source.

***The recommendations in the SWP are not binding and present strategies for consideration by policymakers. Each policy recommendation would require review and approval by the Suffolk County Board of Health and Legislature.



| Implementation Phase | Program Details | Timeline |
|----------------------|--|----------------------|
| I | Program Ramp Up 9,000 WWT Upgrades (5,000 retrofit; 4,000 new construction) | 5 Years (2019-2023) |
| II | Upgrades in Near Shore and Highest Priority Areas 207,000 WWT Upgrades (177,000 retrofit; 30,000 new construction) | 30 Years (2024-2053) |
| III | Upgrades in All Other Priority Areas 299,000 WWT Upgrades (253,000 retrofit; 46,000 new construction) | 15 Years (2054-2068) |

What's the Cost to the Homeowner?

Suffolk County recognizes the financial challenges and tax burden faced by all homeowners in Suffolk County. **Implementation of the Subwatersheds Wastewater Plan will not move forward unless a revenue stream is established that results in minimal out-of-pocket expense to homeowners.** Under the proposed financial model, the homeowner has four options for upgrading their sanitary system if they fall within a priority area resulting in:

- ✓ NO out-of-pocket expense for installation if the homeowner elects to upgrade voluntarily or at system failure
- ✓ NO out-of-pocket maintenance cost for 3 years if the homeowner elects to upgrade voluntarily or at system failure. ~\$250-\$300/year thereafter (note that it is expected the annual O&M cost will decrease as the program matures due to an increase in number of service providers)
- ✓ An annual electric cost of ~\$11/month
- ✓ Additional incentives may also be provided for those with limited financial means.

Four Options Available to Homeowners Under Proposed Financial Model

| | | | |
|---|--|---|---|
| Option 1 – Voluntary %100 grant funded | Option 2 – System Failure %100 grant funded | Option 3 – Renovation %50 grant funded | Option 4 – Property Transfer %0 grant funded |
|---|--|---|---|