

Project: Inventory and Assessment of Onsite Wastewater Treatment Systems and their impact on Nitrogen loadings in Connecticut Coastal Areas

Contractor: Lombardo Associates, LLC

Project Manager: CTDEEP, Water Protection and Land Reuse

Project Summary

July 27, 2018

Consultant Services: The Connecticut Department of Energy and Environmental Protection (DEEP) has contracted with Lombardo Associates, LLC to conduct an assessment of onsite wastewater treatment systems (i.e. septic systems, clear wells), quantification of the nitrogen loading, and propose potential nitrogen management options for onsite wastewater treatment systems (OWTS) in coastal areas of CT.

Background: Long Island Sound (LIS) is one of the most densely developed estuaries in the United States, approximately 24 million people live within 50 miles of LIS. During the summer, the bottom water of LIS is subject to low levels of dissolved oxygen (hypoxia) which results from excess nitrogen loading. The documented occurrence of hypoxia threatens fish, shellfish, and other aquatic life of LIS (Figure 1). In response to the occurrence of hypoxia, the States of Connecticut and New York developed a joint nitrogen reduction plan in 2000 called the LIS Total Maximum Daily Load (TMDL). The TMDL required a 58% reduction in the estimated nitrogen point and nonpoint source loads. This plan was approved by the United States Environmental Protection Agency (USEPA) in 2001.

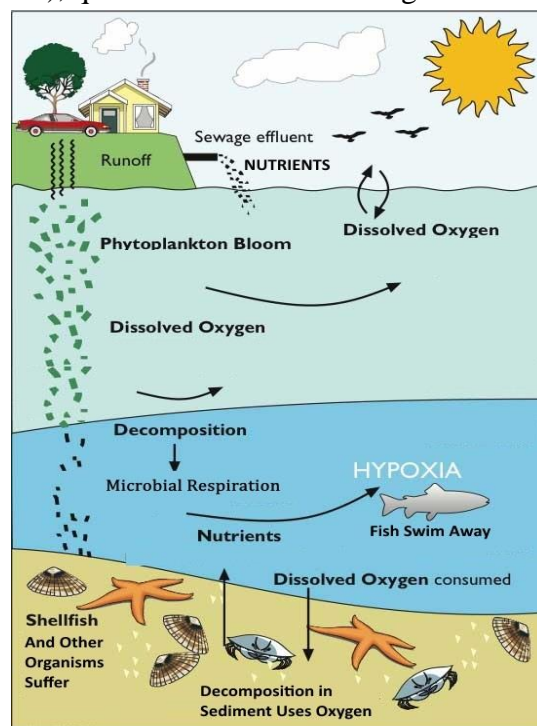


Figure 1 – Hypoxia Schematic

As a result of these efforts, nitrogen discharged from Connecticut’s wastewater treatment plants has been reduced by 63.5% (Figure 2).

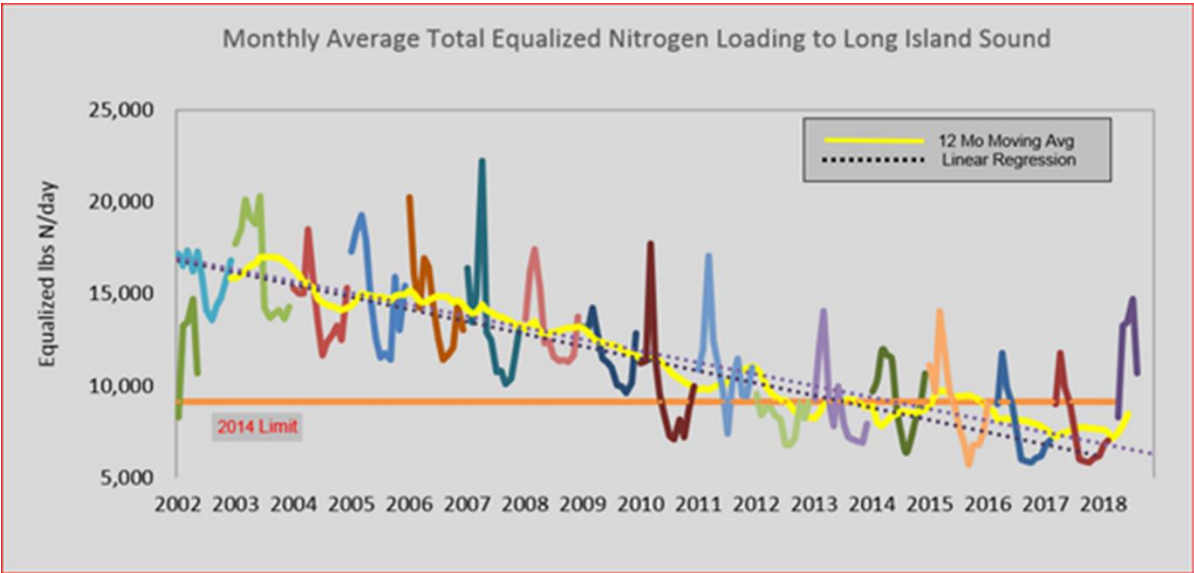
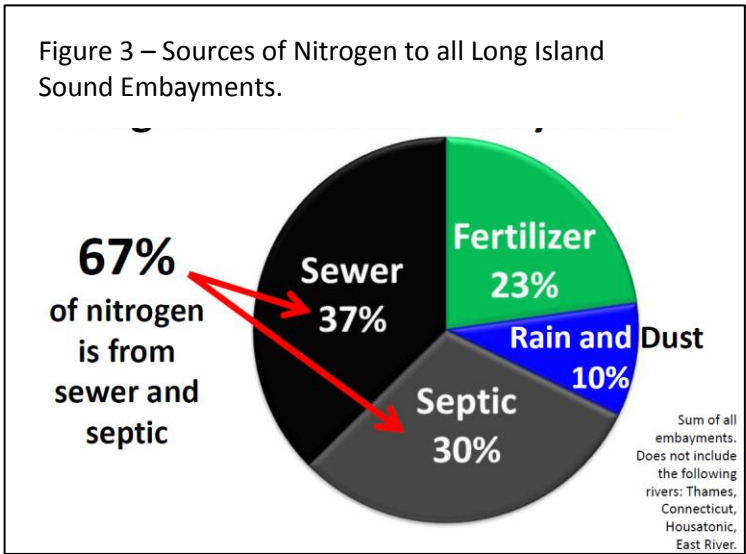


Figure 2 – Wastewater Treatment Plant Discharges of Nitrogen to Long Island Sound.

In 2013, DEEP conducted an evaluation of nonpoint source and stormwater efforts to qualitatively assess the effectiveness of implementation efforts to reduce these sources of nitrogen. Such nonpoint source efforts included watershed management plans, stormwater management and permitting, agricultural nutrient management plans, OWTS mitigation, and nonpoint grant programs. As nonpoint and stormwater sources become a significant remaining factor in nitrogen loading to LIS and local embayments, future management efforts now need to focus improvements in these areas.



In 2012 the Long Island Sound Study (LISS), through SeaGrant, funded a study by Uconn called Comparative Analysis and Model Development for Determining the Susceptibility to Eutrophication of Long Island Sound Embayments. The overall goal of this project was to develop a land use based model which estimates nitrogen loading coupled with embayment characteristics to identify the Long Island Sound embayments at greatest risk for exhibiting symptoms of eutrophication and to identify the main sources of nitrogen to these embayments. Figure 3 shows the

contributions of sources to all Long Island Sound embayments. Sewer and septic sources continue to account for a large portion of nitrogen to Long Island Sound's embayments.

The USEPA issued their new nitrogen strategy for LIS in December 2015. This strategy is based on monitoring and modeling of current and planned actions by the states, and indicates that fully implementing the 2000 TMDL may be insufficient to address other adverse impacts, such as eutrophication, to water quality in LIS and near shore coastal waters. The USEPA evaluation of stormwater and nonpoint sources of nitrogen suggests that loads from urban stormwater, OWTS, and turf fertilizer have remained steady or increased.

Concurrently, DEEP developed additional nitrogen reduction strategies for greater LIS as well as for local embayments. In order to ascertain and manage the nitrogen load from OWTS in coastal areas, DEEP developed a contract project to quantify (as much as possible) additional nitrogen loading and source data for OWTS. This effort also includes the development of potential OWTS management options to assist in future water quality improvement efforts. This project is applicable to the coastal watersheds delineated in Uconn study discussed above.

Project Description and Deliverables: The consultant will conduct an inventory and assessment of OWTS in coastal watersheds, estimate effluent nitrogen loading from OWTS, and evaluate and identify alternative structural and non-structural management options to achieve nitrogen reduction and water quality goals.

The deliverable for this project will be a report addressing the following tasks:

- Using best available land use data, OWTS information available from DEEP, CT Department of Public Health (DPH), and local and regional health departments, census data, and other pertinent information, provide an inventory that estimates the number, type, age, and overall conditions of OWTS existing in coastal areas.
- Review and assess OWTS nitrogen loading information (export and assumptions) from the Uconn *Comparative Analysis and Model Development for Determining the Susceptibility to Eutrophication of Long Island Sound Embayments* [Report](#).
- Using modeling, spatial tools, and/or other available approaches, identify OWTS conditions, estimate nitrogen loading, and identify environmentally sensitive OWTS settings that result in high nitrogen loading. Utilize estimated effluent loading, attenuation, and delivery rate information to estimate nitrogen loads based on type and age of OWTS, physical settings, water use, distance to water bodies, surficial geology, soil conditions and other relevant factors that impact nitrogen loading and reduction capabilities.
- Conduct a literature search of OWTSs management approaches, strategies and options including recent work in Chesapeake Bay, Cape Cod and MassBays, Long Island, New Jersey Pinelands District, and other relevant locations.
- Conduct a literature search of new and developing OWTS treatment technology for nitrogen removal (including passive approaches). Include nitrogen removal efficiencies, cost, maintenance, storm resiliency considerations and other operational factors for such technologies.
- Evaluate and recommend non-regulatory and regulatory approaches to manage new and existing OWTSs for nitrogen controls. Consider existing state and federal guidelines,

policies, and regulations (e.g. EPA guidance, CT Decentralized Wastewater Management District (DWMD) legislation, and CT public health code).

- Perform a preliminary assessment of the potential impacts that climate change (e.g. sea level rise and groundwater rise) may have on OWTS and their ability to effectively operate and reduce nitrogen. Utilize existing information available through the CT Institute for Resiliency and Climate Adaptation, USGS, NOAA or others regarding sea level and ground water rise estimates for the State.

Project Time Period: October 1, 2017 – September 30, 2018