

General Nitrogen – Water Quality Narrative

Water is the most important resource within the Town of Southampton. We all rely on groundwater from beneath our feet as our sole source of drinking water. That same groundwater discharges to our lakes, ponds, bays, and ocean water that represent the core of our tourism and fisheries economies [1]. New research shows that even home values in coastal regions such as Southampton are directly linked to water quality. As the population of Southampton continues to expand, the nitrogen levels in our groundwater continues to rise at a rapid rate because nearly every home and facility within the Town have waste disposal systems that discharge to groundwater and because of expanding fertilizer use [1]. As nitrogen rich groundwater continually seeps from land into our bays, harbors, and estuaries it is exacting an unwanted toll:

- Salt marshes are the marine habitats closest to land, serve as an important habitat for a variety of animals and serve as a critical first line of defense against coastal storm surge and waves. Unfortunately, excessive nitrogen loading has contributed to the loss of up to 80% of Long Island’s coastal salt marshes since the 1970s [2].
- Excessive nitrogen seepage is also stimulating the growth of multiple strains of harmful and toxic algae such as brown tides, red tides, green tides, rust tides, which were unknown to Southampton three decades ago, but recur annually today [3,4,5,6]. These algae are having a cascading negative impacts on our coastal ecosystems and in some cases can be a human health threat [3,4,5,6].
- Eelgrass meadows are critical benthic habitats that sustain our most important shellfish and finfish but are highly sensitive to nitrogen and shading by algae. As nitrogen levels in groundwater have increased, 90% of Long Island’s eelgrass has vanished and Suffolk County has recently predicted these grasses will be extinct on Long Island in two decades if current nitrogen loading trends continue [7].
- Algal blooms stimulated by excessive nitrogen loading can also starve coastal waters of oxygen and make them more acidic, two conditions that are also detrimental to fish and shellfish [8,9,10].
- For all of these reasons, Southampton fisheries have been in decline. In the 1970s, the bay scallop fishery on eastern Long Island and the hard clam fishery on the south shore were the two largest fisheries for these mollusks on the US east coast. Since that time, landings of hard clams and bay scallops on Long Island have diminished more than 90% due to a combination of the woes brought about by excessive wastewater nitrogen outlined above [11, 12].

Studies have now shown that the two largest sources of nitrogen from land to sea for all of the Town of Southampton are wastewater and fertilizer. Therefore, every homeowner can take action now to minimize their nitrogen footprint and help ensure these trends are not continued but rather are reversed.

1: Suffolk County Comprehensive Water Resources Management Plan. 2015

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4: Hattenrath TK, Anderson DA, Gobler CJ. 2010. The influence of nutrients and climate on the dynamics and toxicity of *Alexandrium fundyense* blooms in a New York (USA) estuary. *Harmful Algae* 9: 402–412.

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- 7: New York State Department of Environmental Conservation 2009. Seagrass Task Force Final Report.
- 8: Gobler CJ, Depasquale EL, Griffith AW, Baumann H. 2014. Hypoxia and acidification have additive and synergistic negative effects on the growth, survival, and metamorphosis of early life stage bivalves. *PLoS ONE* 9(1): e83648. doi:10.1371/journal.pone.0083648
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- 10: Depasquale EL, Baumann H, Gobler CJ. 2015. Vulnerability of early life stage Northwest Atlantic forage fish to ocean acidification and low oxygen. *Marine Ecology Progress Series* 523, 145-156
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