

The Nature Conservancy



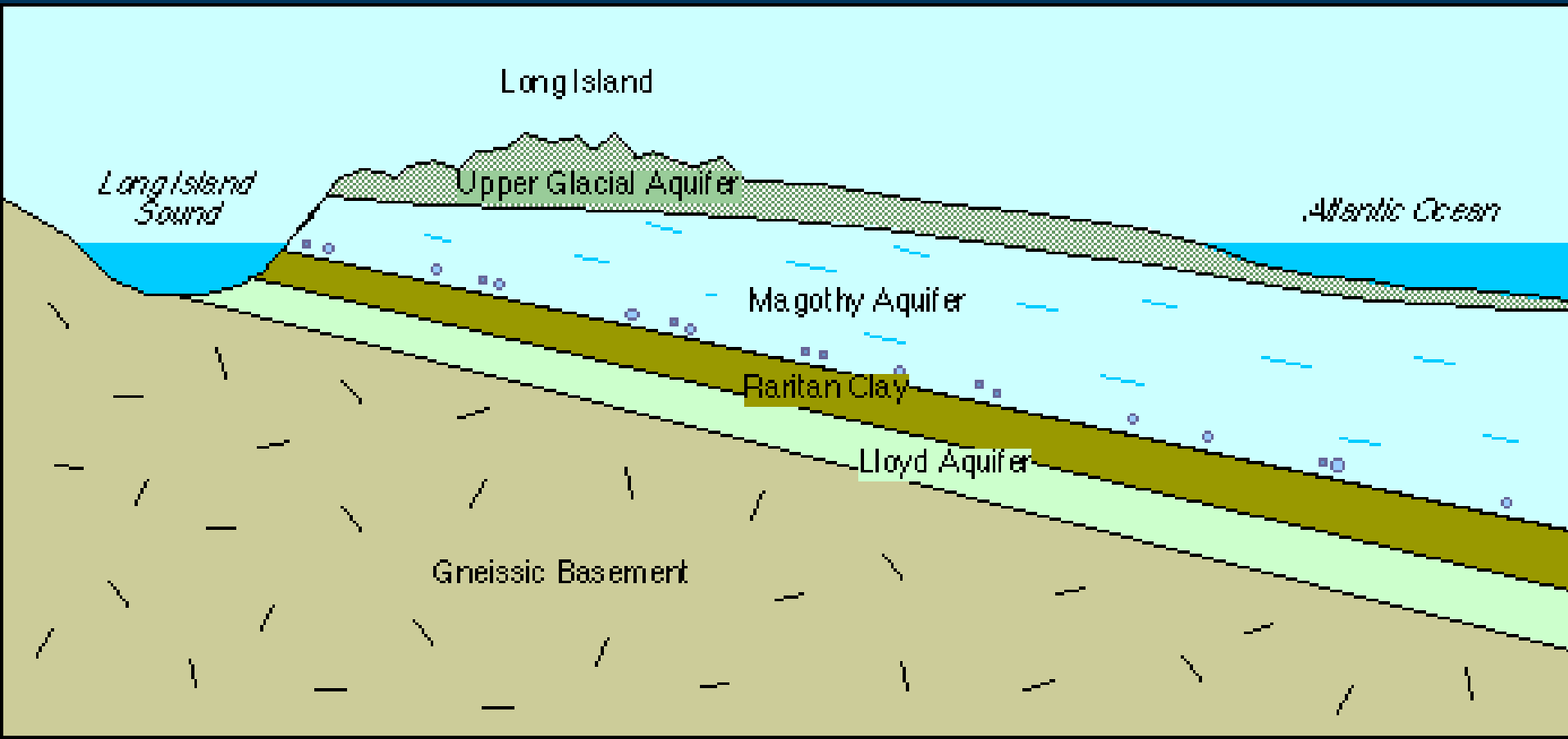
Protecting nature. Preserving life.™

Causes, consequences, costs, and policy ramifications of Nitrogen pollution on Long Island NY



Aquifers on Long Island

What goes onto and into the land ends up in our drinking water and in our surface waters.



Bays and harbors of Nassau and Suffolk Counties



LONG ISLAND SOUND

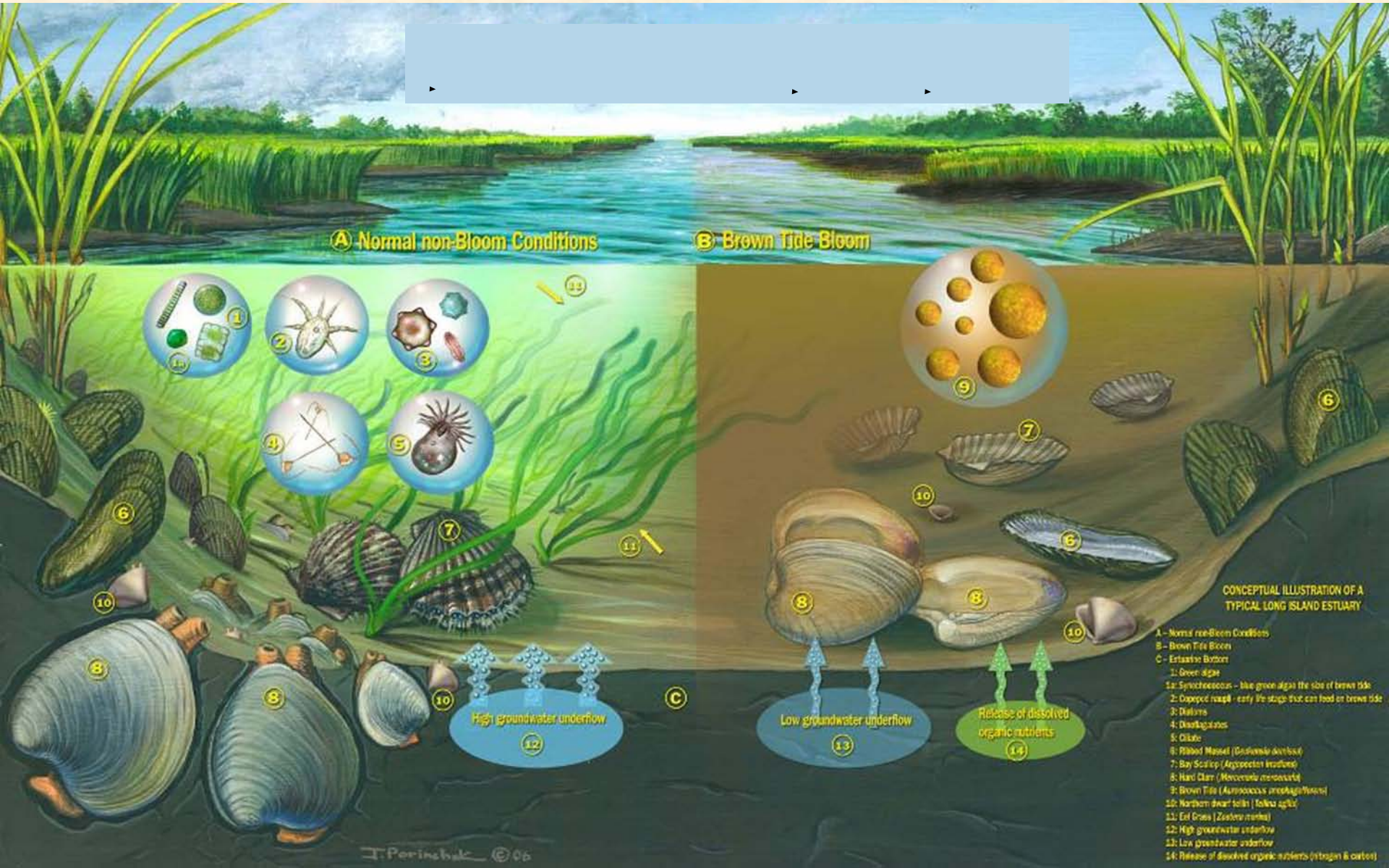
ATLANTIC OCEAN

MILES

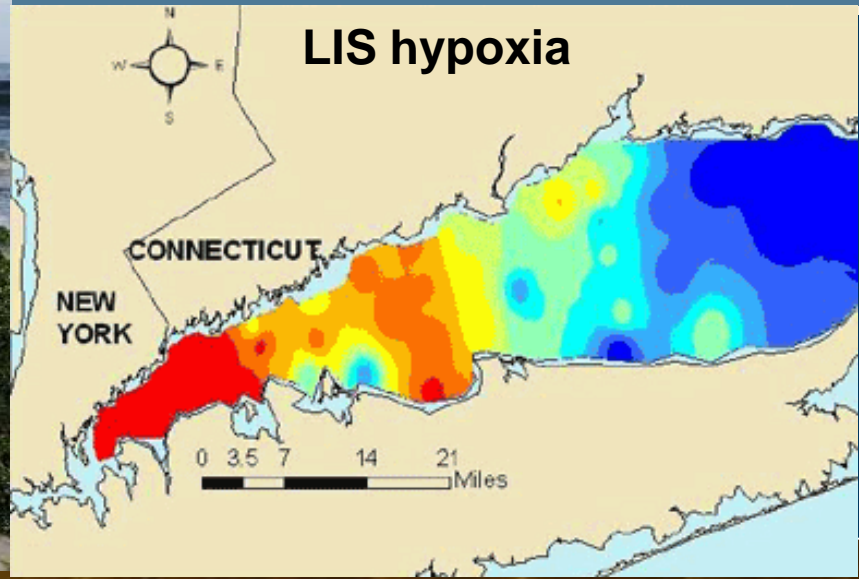
Key estuarine/coastal biogenic habitats



LI waterways transitioning to alternative less desirable state

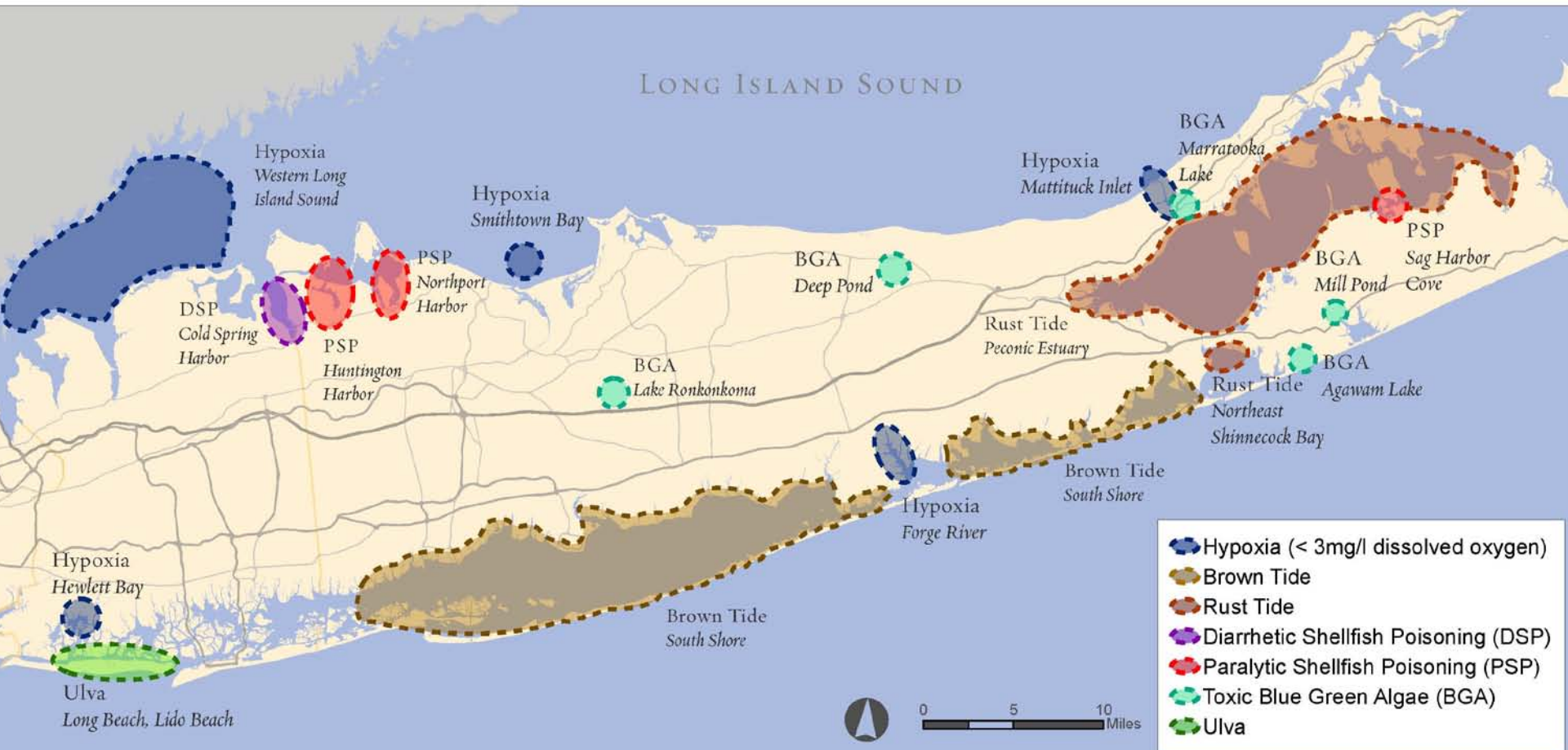


Other impacts of excessive algal growth from nitrogen pollution



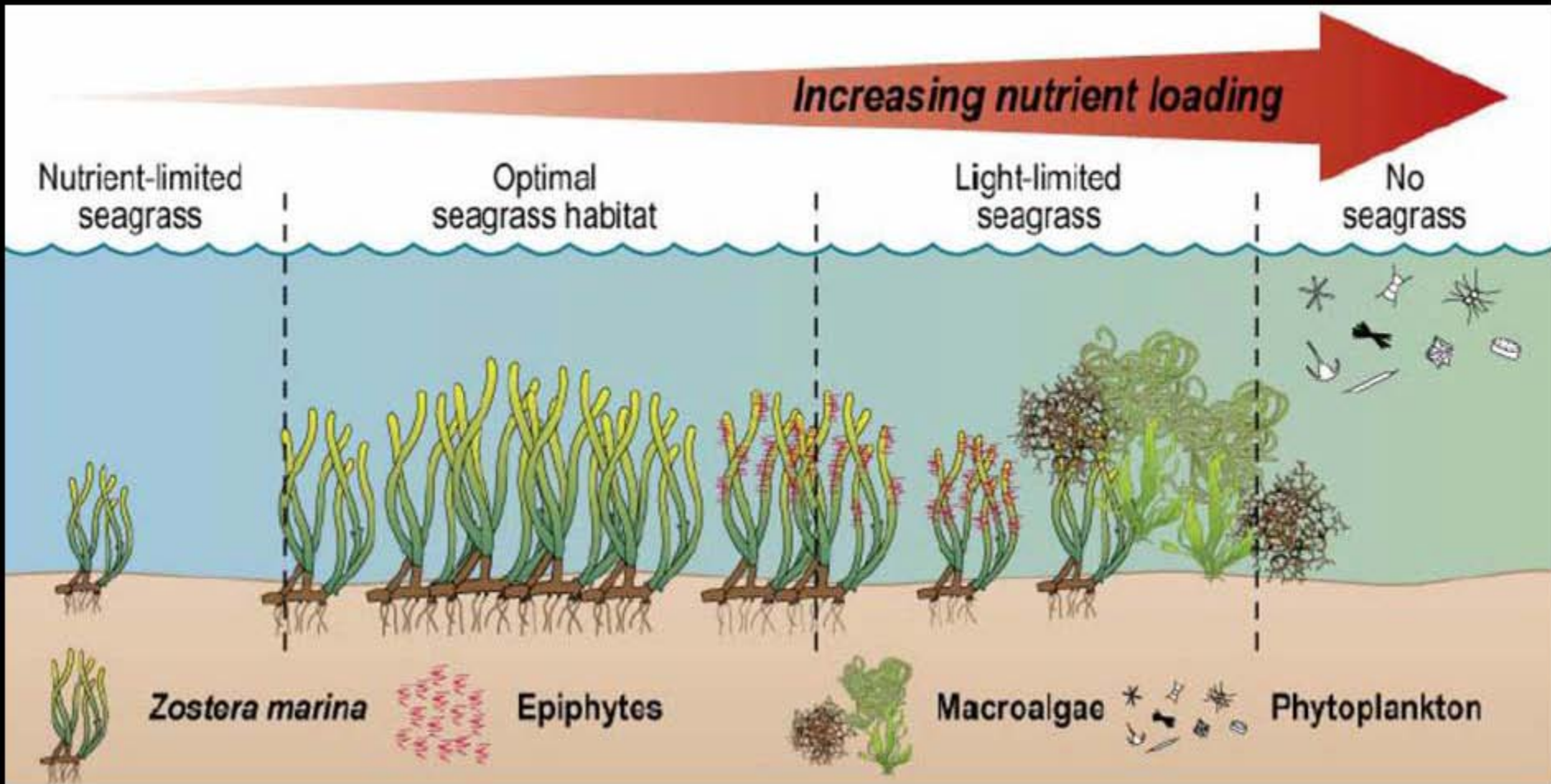
Algae symptoms are island-wide

WATER QUALITY ISSUES, SUMMER 2013



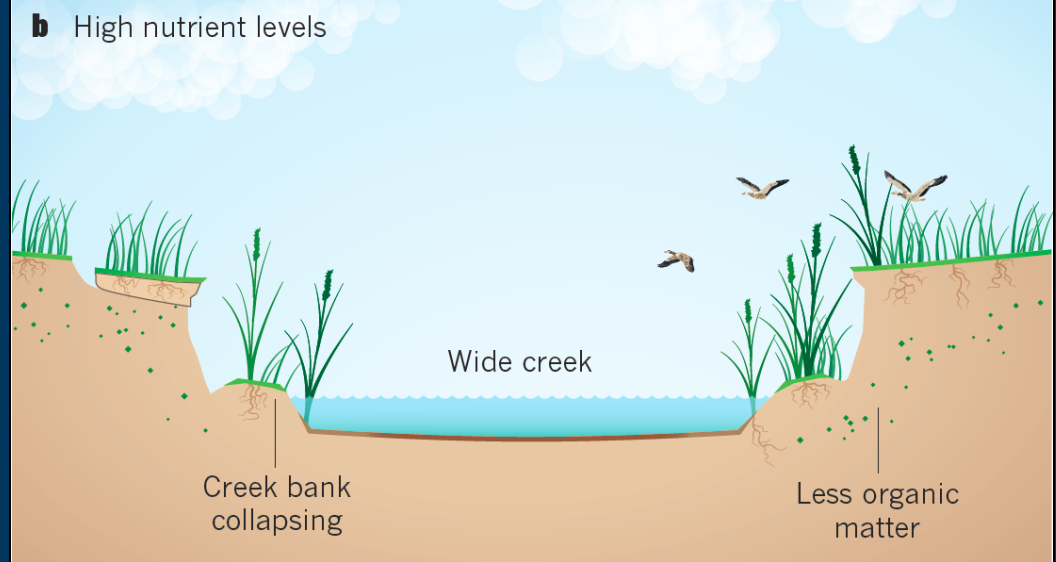
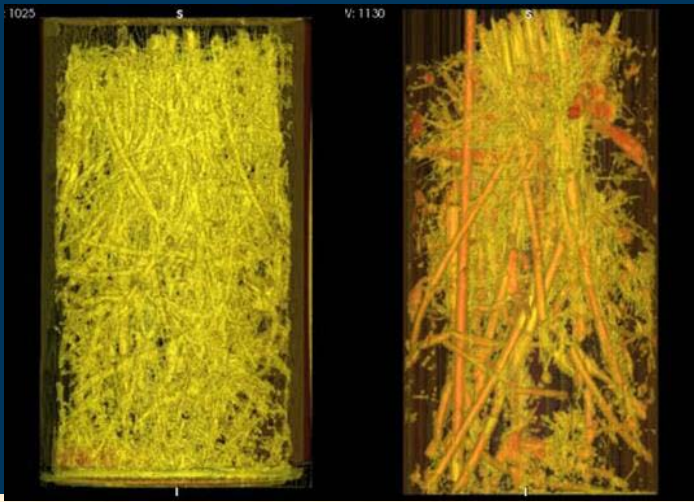
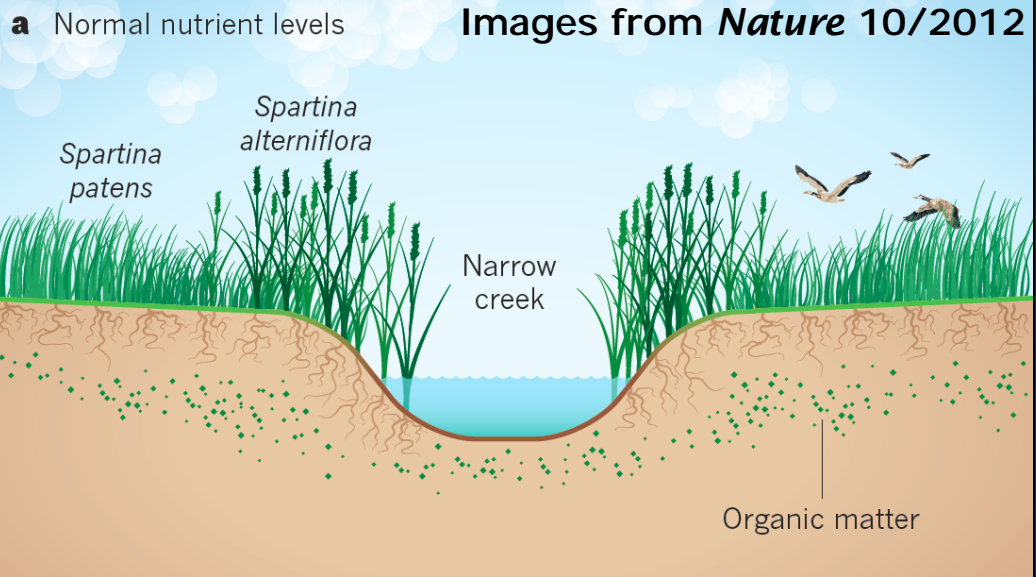
Nitrogen enrichment impacts on seagrass *from Butler (1999)*

Eelgrass is Essential Fish Habitat

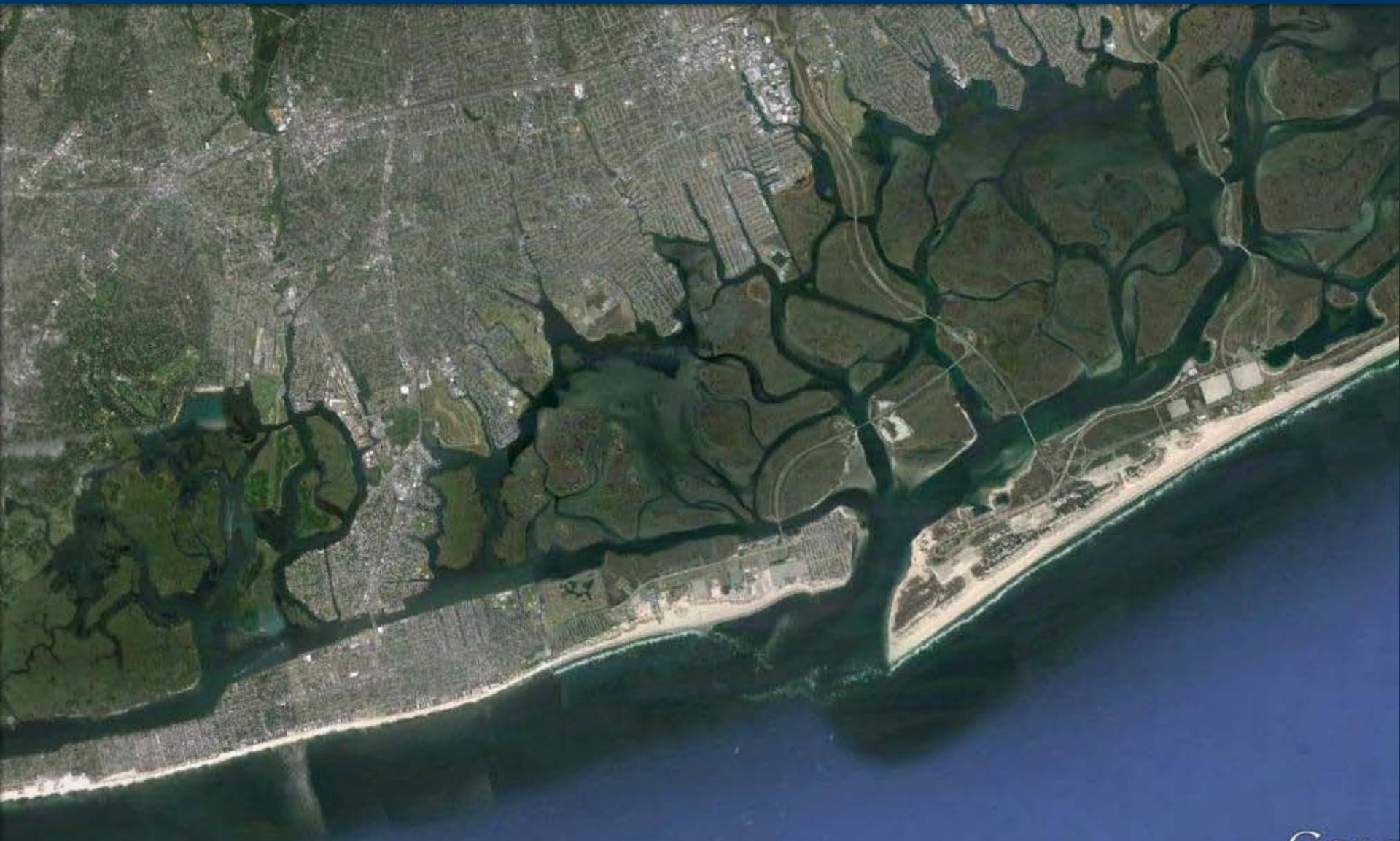


Thousands of acres of eelgrass have already disappeared

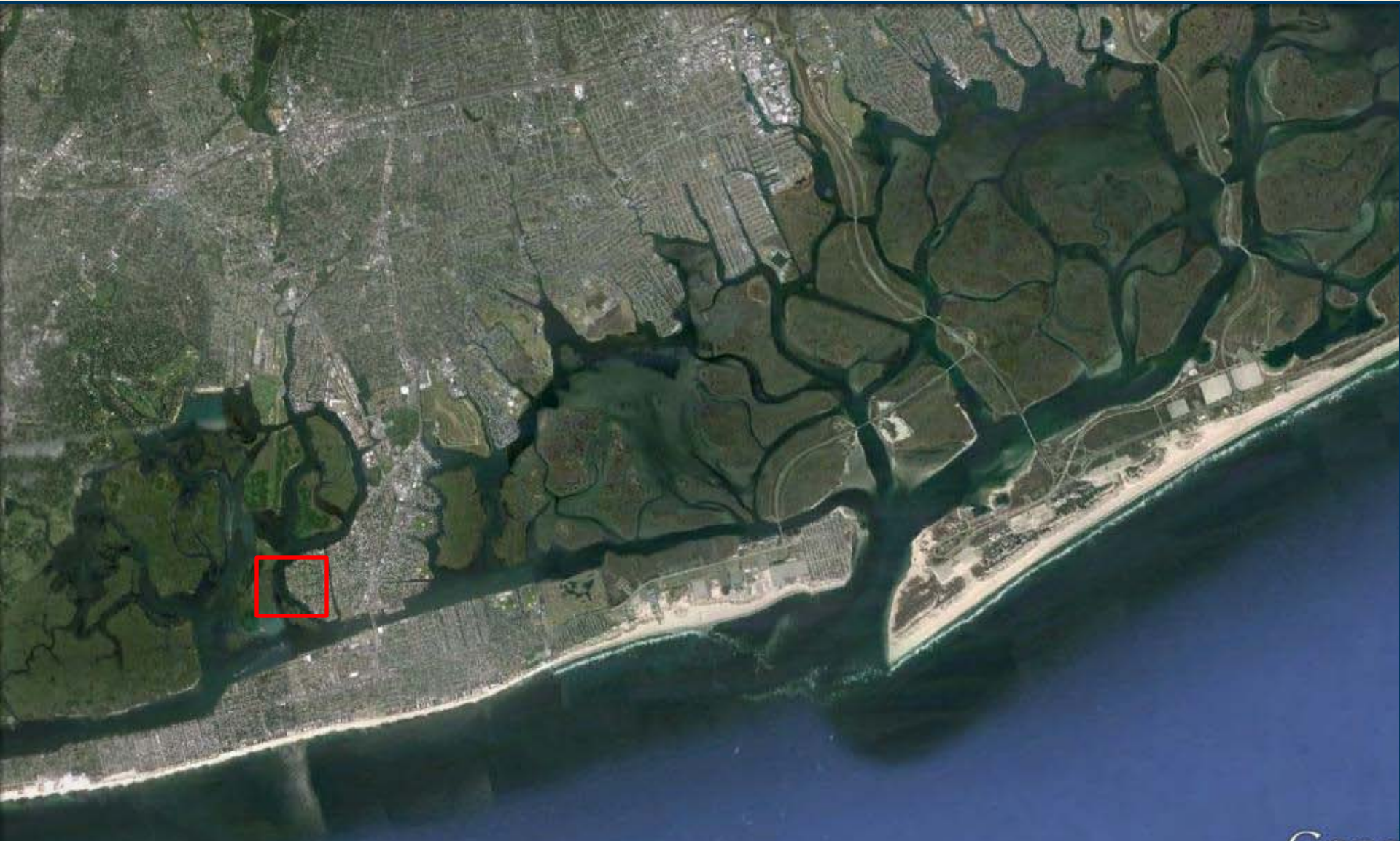
Nitrogen pollution impacts on saltmarshes



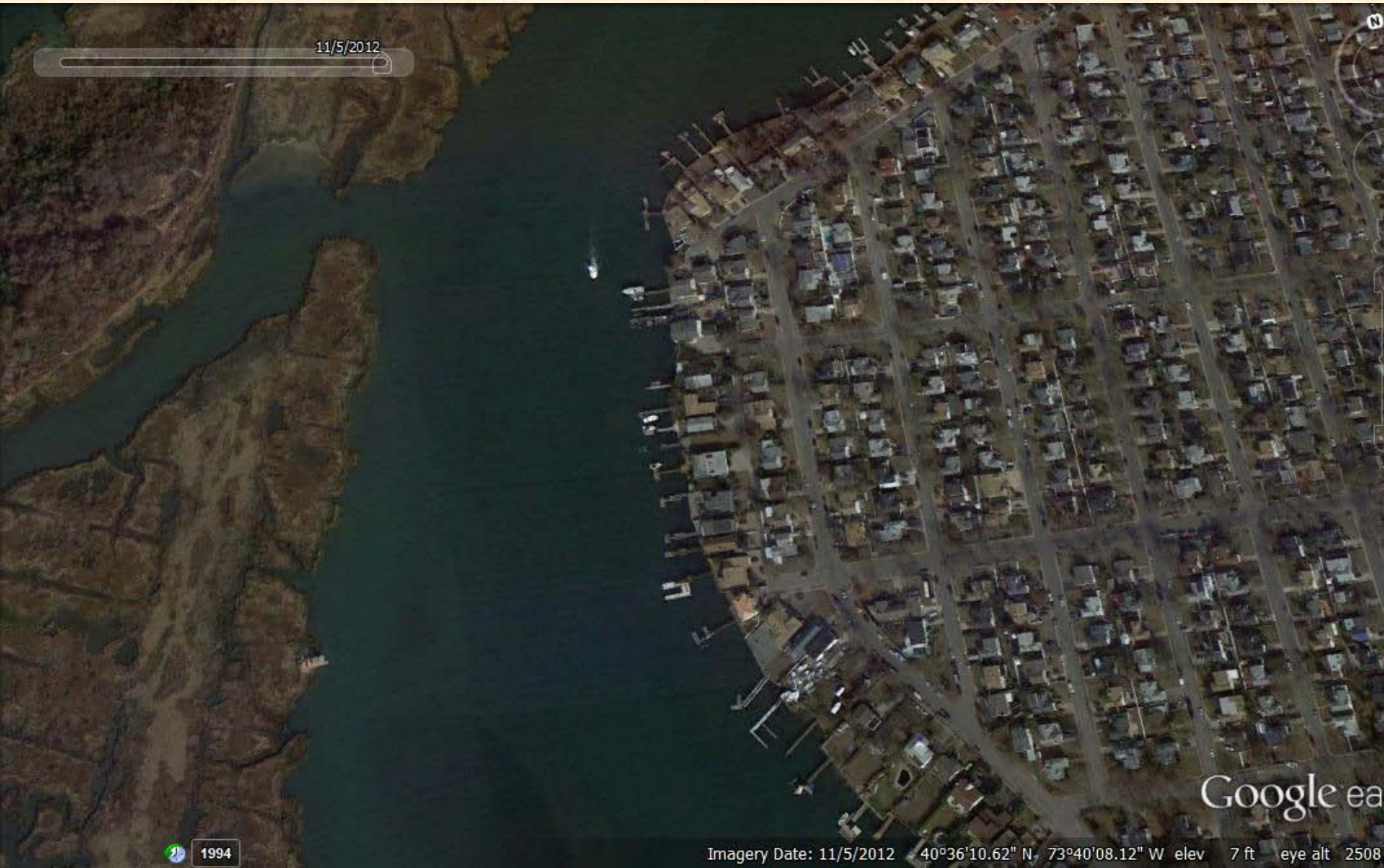
Marshes protect developed shore from energy every day



Island Park: Example of vulnerability



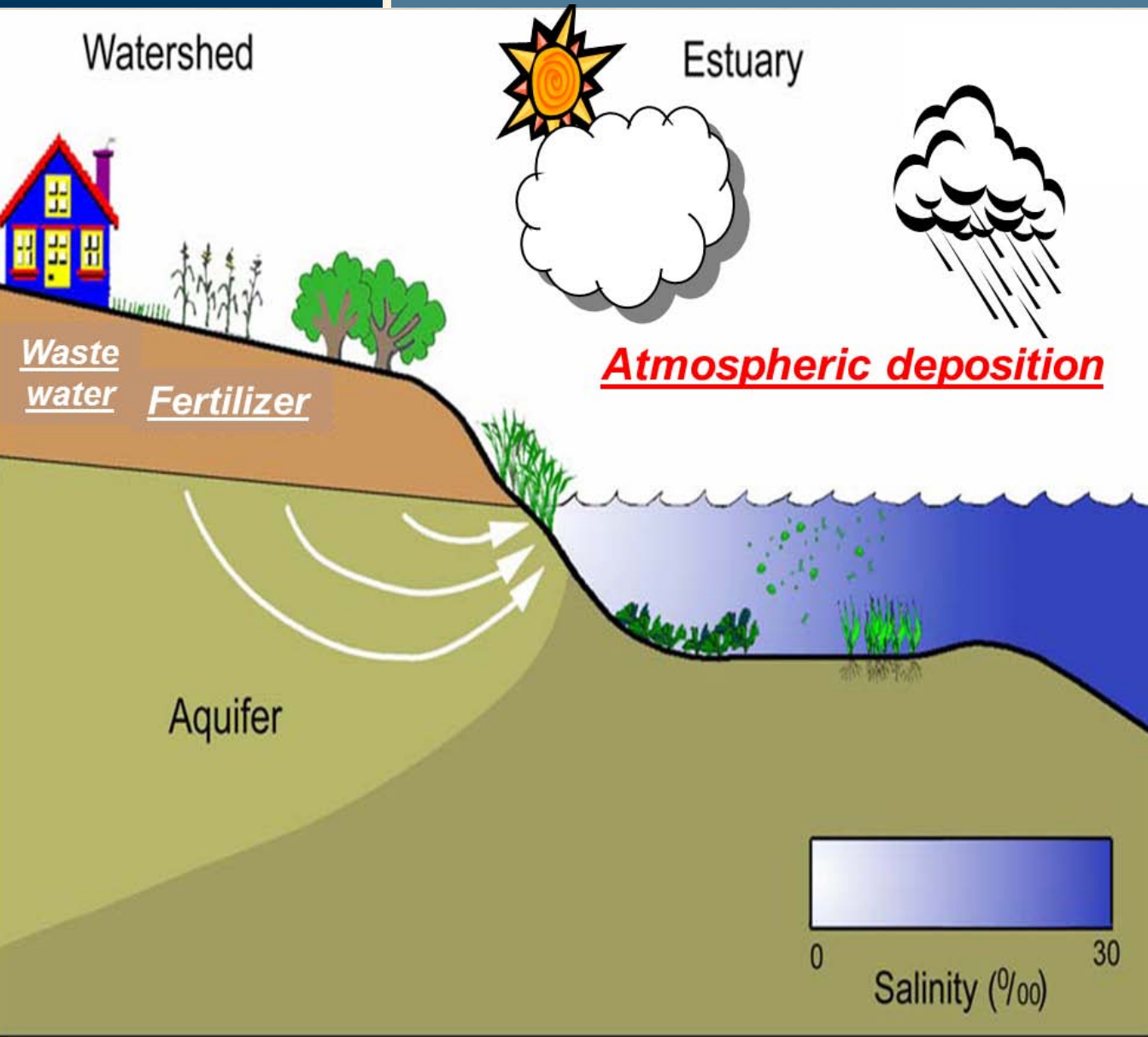
Many coastal properties will be more vulnerable as marshes degrade



Routine windy day in part of bay without expansive marsh islands

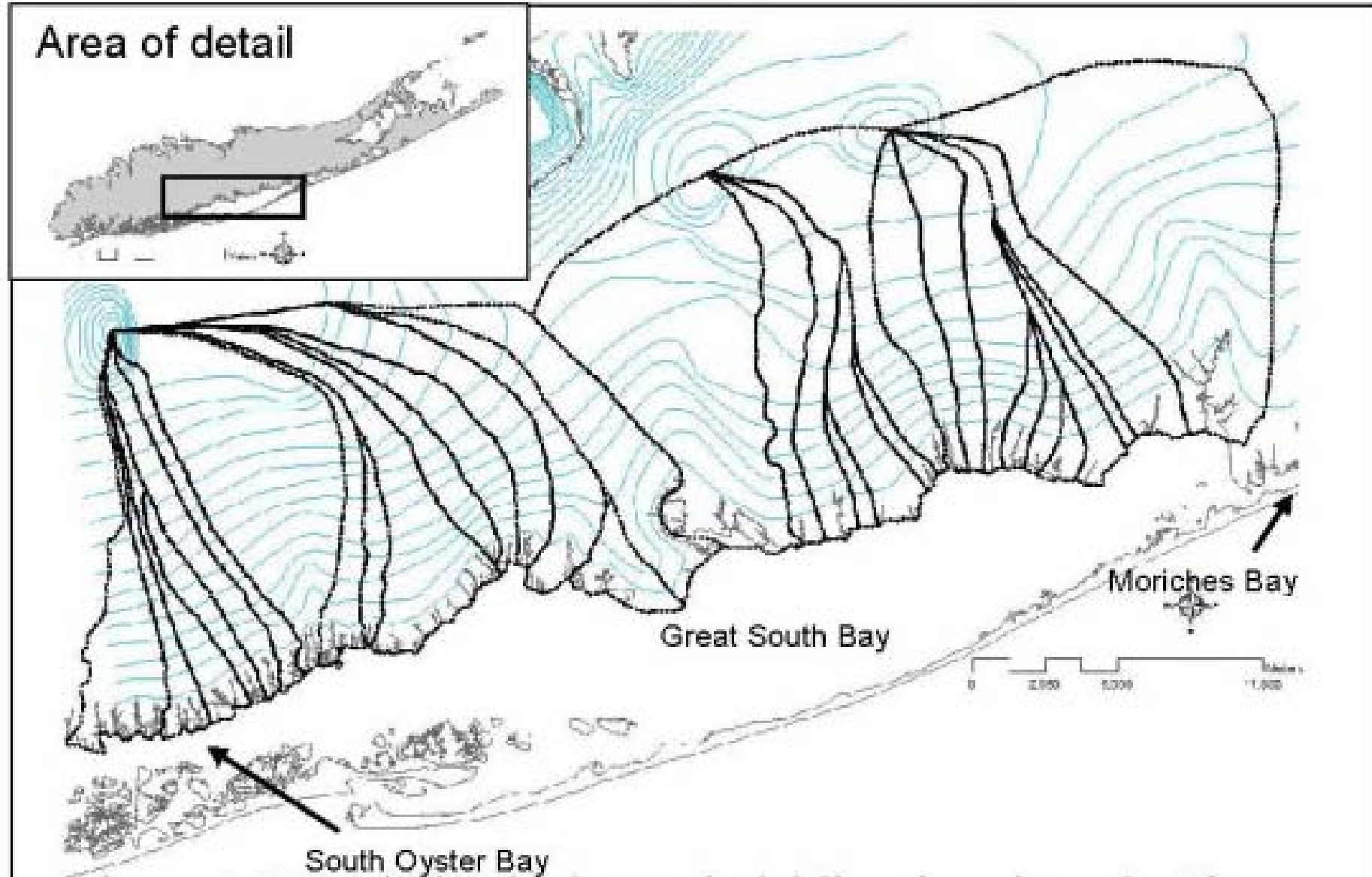


Sources of reactive nitrogen to coastal waters



County land use data
N-Load and ELM models quantify sources of Nitrogen loaded to LI bays

33 GSB sub-watersheds



~ 1M people live in the GSB groundwatershed

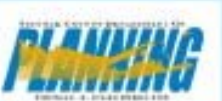
Nassau County



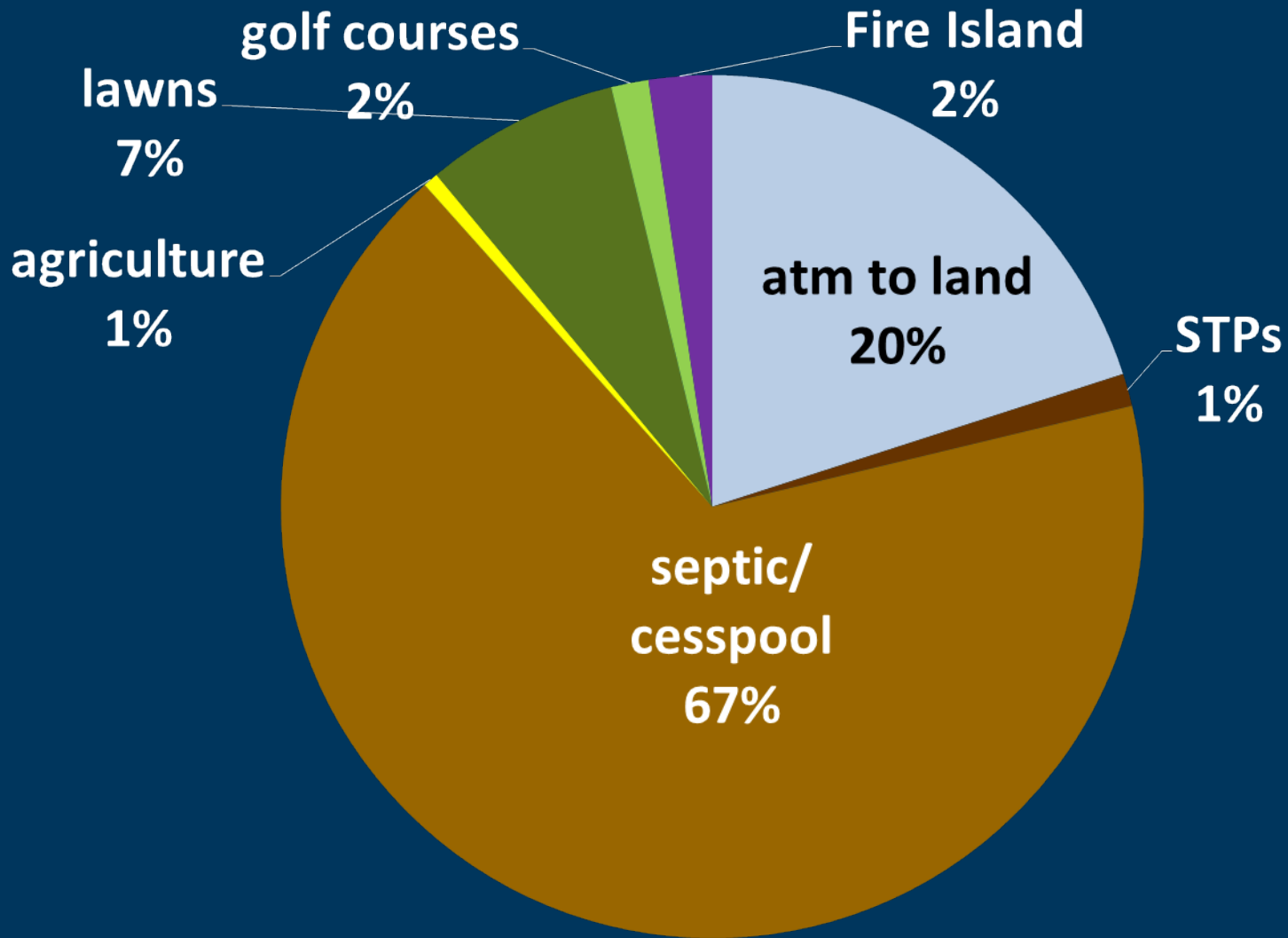
SWSD has ocean outfall

20% GW to Ocean

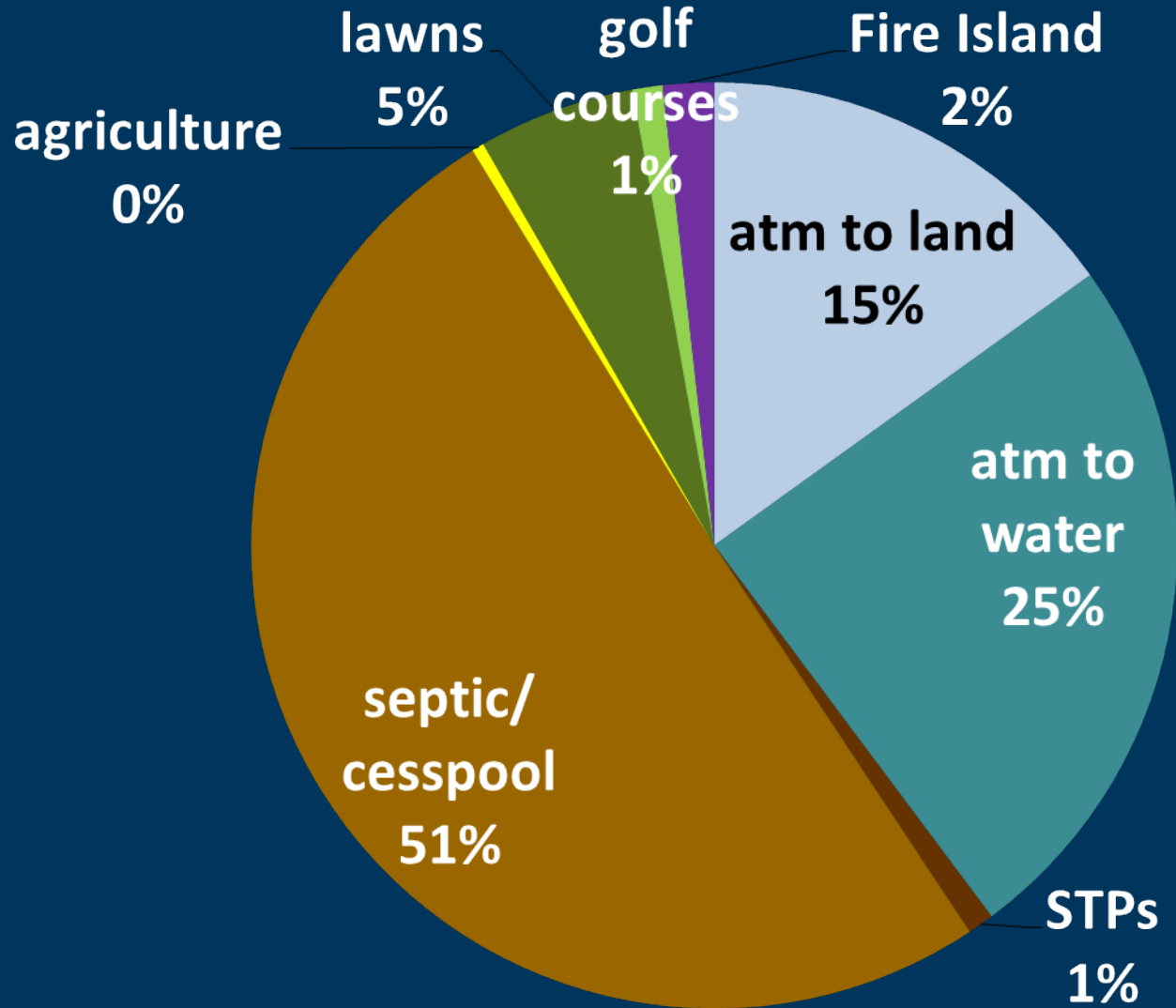
Source: Suffolk County Department of Planning & Suffolk County Department of Health Services



N loads to GSB from watershed (684,000 kg N/Yr)



Total N Loads to Great South Bay (908,000 kg N/Yr)

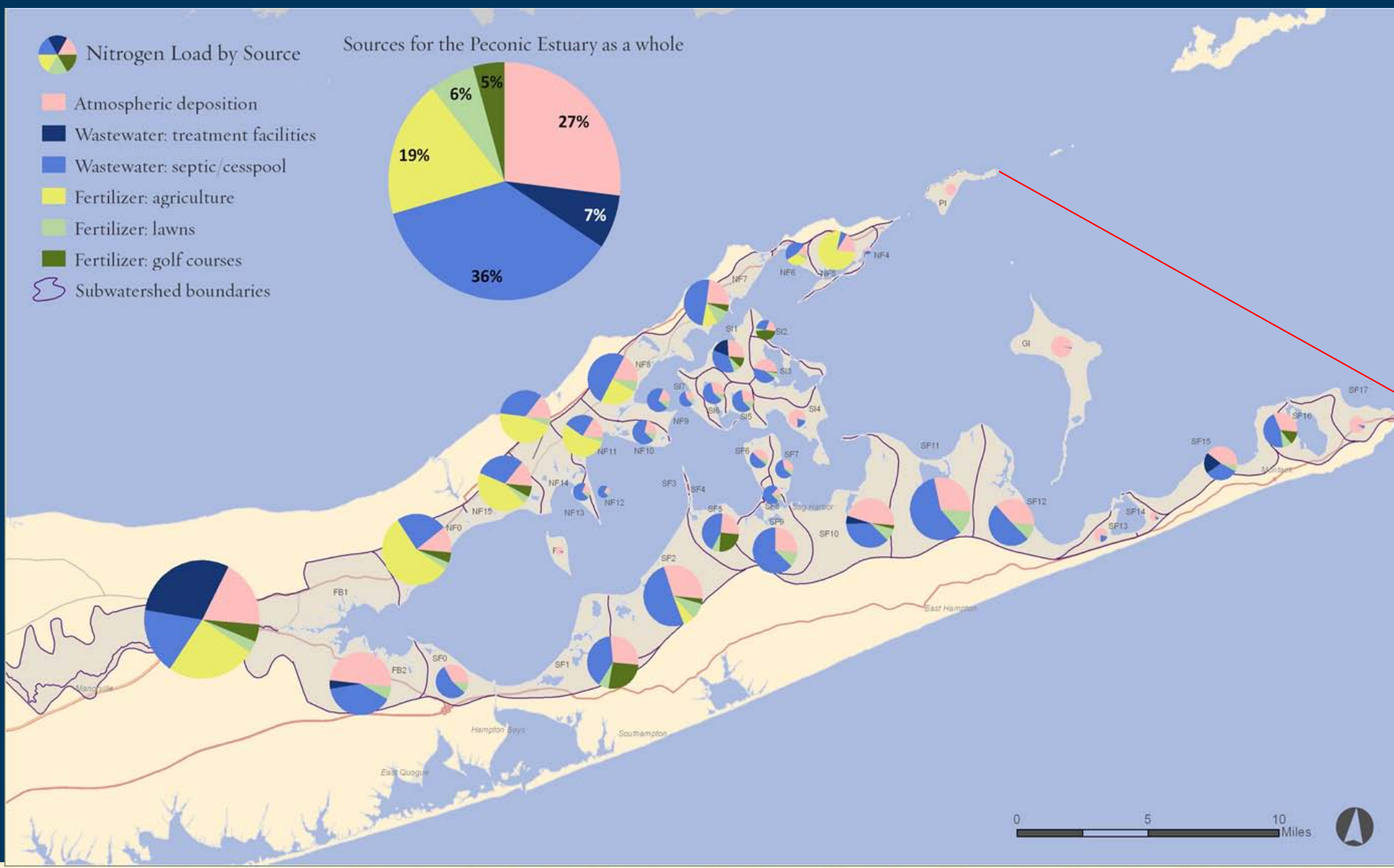
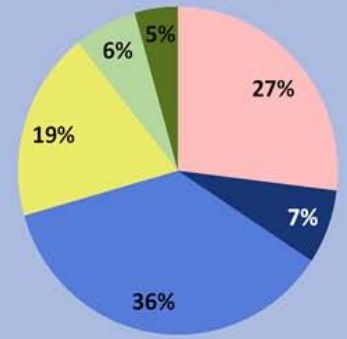


Nitrogen loading to Peconic Estuary

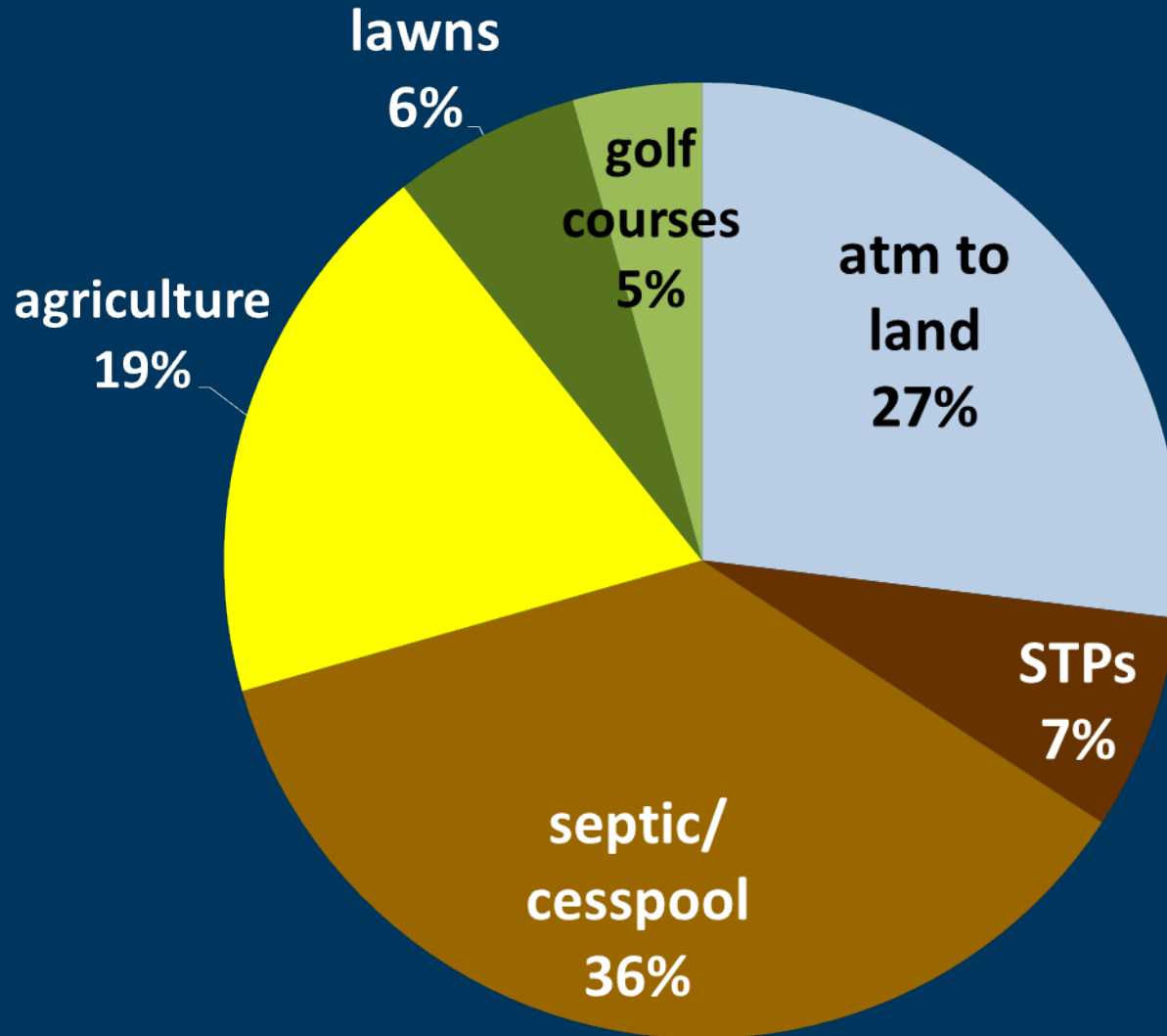
 Nitrogen Load by Source

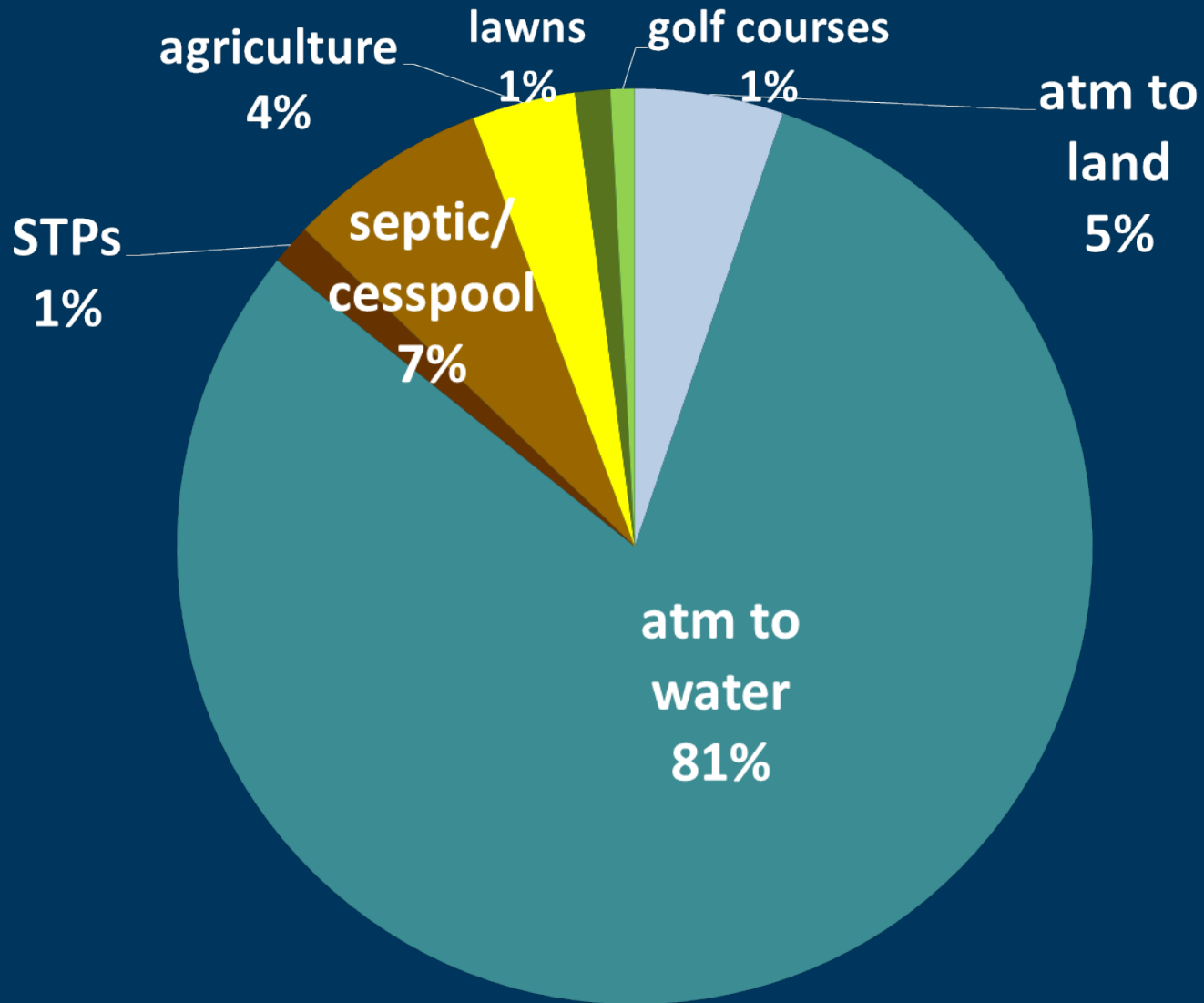
-  Atmospheric deposition
-  Wastewater: treatment facilities
-  Wastewater: septic/cesspool
-  Fertilizer: agriculture
-  Fertilizer: lawns
-  Fertilizer: golf courses
-  Subwatershed boundaries

Sources for the Peconic Estuary as a whole



N Loads to PE from watershed (243,000 kg N / Yr)

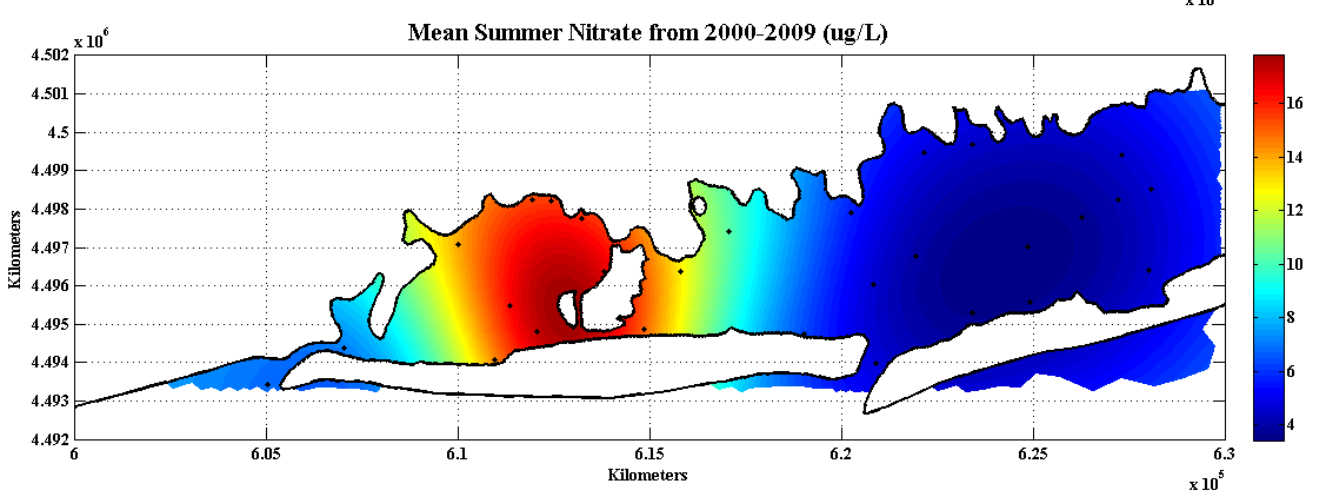
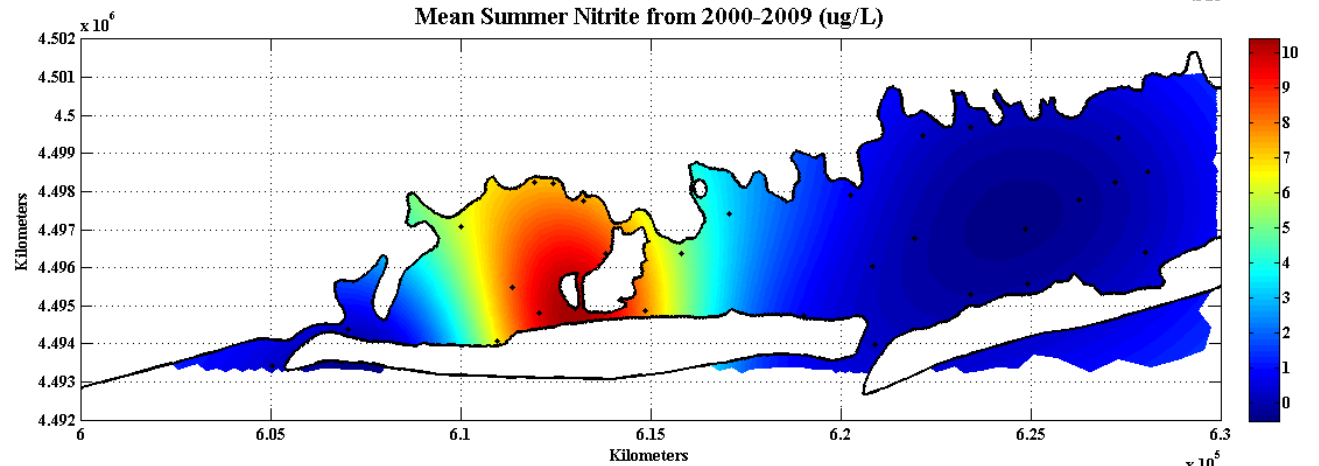
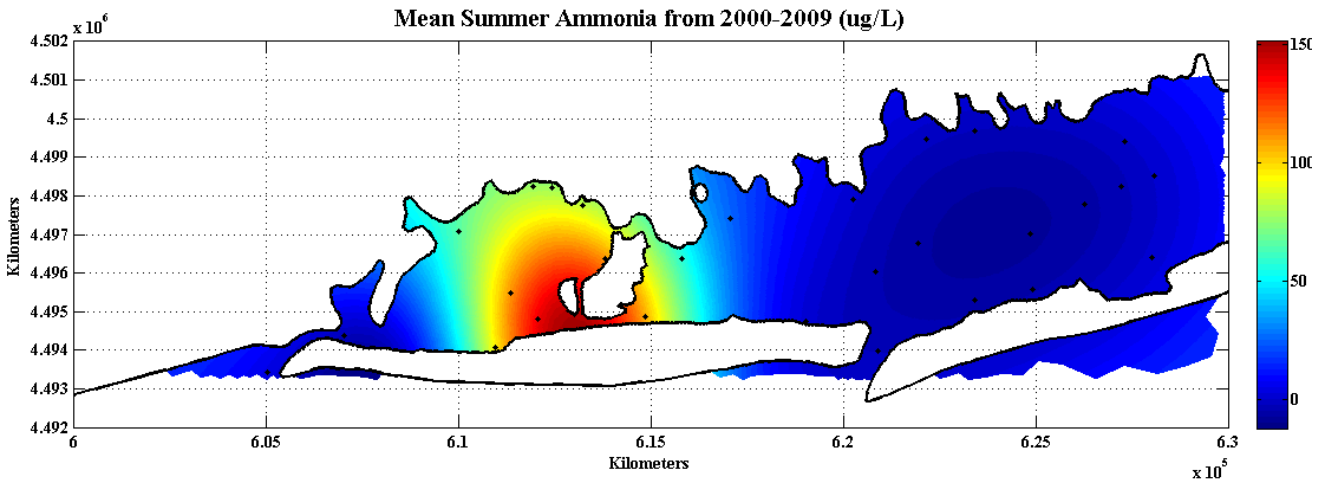




Bay Park STP



Outfall
location



In some places like Western Bays, the majority of N is end of pipe

Mean Summer (June, July, August) Ammonia, Nitrate, Nitrite (2000-2009)

Excessive seaweed impacts prime ocean front beaches along Point Lookout





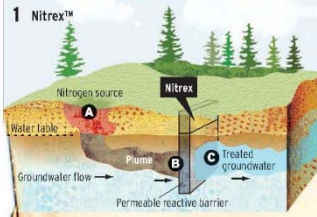
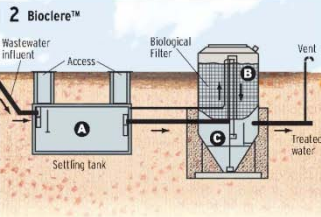
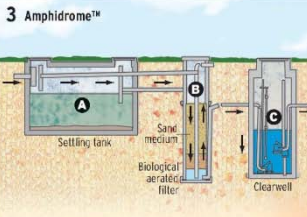
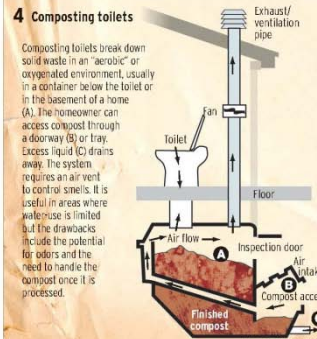
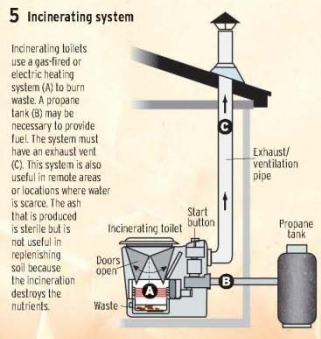
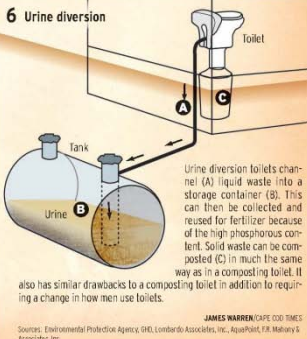
Nov 14, 2012 Newsday Photos

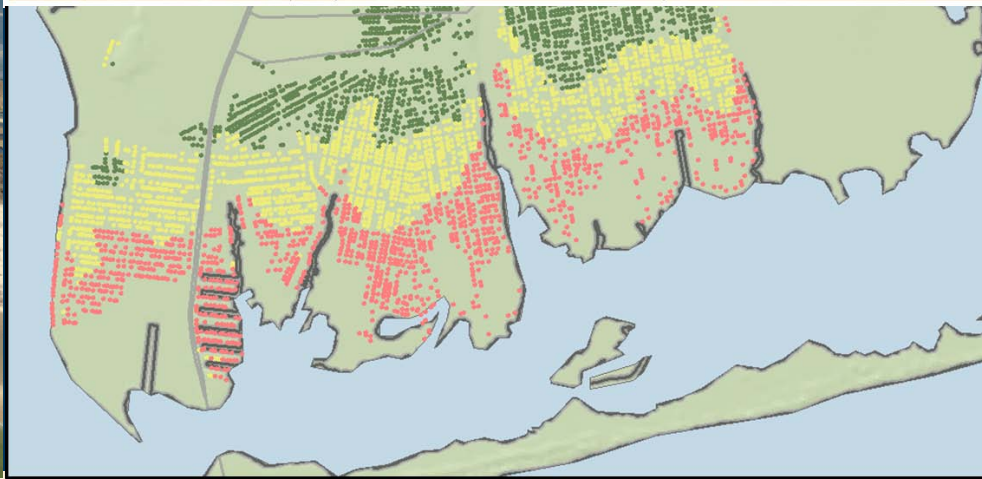
What can we do?



What is happening locally



<p>1 Nitrex™</p>  <p>Nitrex, developed at Waterloo University in Ontario, Canada and marketed by Newton-based Lombardo Associates, Inc., uses the carbon in woodchips in a permeable reactive barrier to filter wastewater and turn nitrogen into a gas. The technology can be used in wastewater systems or to treat groundwater directly, such as is being done on a part of the Waquoit Bay shoreline. Nitrogen (A) in groundwater travels through the barrier (B) where it is converted into a gas and disperses, while the treated water (C) keeps flowing. State regulators have given Nitrex provisional-use status allowing for a limited number of the systems to be installed.</p>	<p>2 Bioclere™</p>  <p>Bioclere combines a filter with a water clarifier in a unique configuration that produces the system. Like many systems, it separates most of the solids in the wastewater stream in a settling tank (A) and then uses a biological filter (B) in which microorganisms feed on the nitrogen. But unlike other systems the filter is located on top of a (C) clarifier. Bioclere is also available only on a provisional-use basis.</p>	<p>3 Amphidrome™</p>  <p>The Amphidrome system, manufactured by Rockland-based F.R. Mahony & Associates, Inc., also uses a settling tank (A) where solids settle to the bottom and the wastewater is stored to be fed into a biological aerated filter. The microorganisms that attach to the sand filter (B) are alternately starved and fed oxygen making them feed at different rates on the nitrogen in the wastewater. A clear well (C) stores the treated water, including enough backwash to clean a filter. Amphidrome is approved for provisional use.</p>
<p>4 Composting toilets</p>  <p>Composting toilets break down solid waste in an "aerobic" or oxygenated environment, usually in a container below the toilet or in the basement of a home (A). The homeowner can access compost through a doorway (B) or tray. Excess liquid (C) drains away. The system requires an air vent to control smells. It is useful in areas where water use is limited but the drawbacks include the potential for odors and the need to handle the compost once it is processed.</p>	<p>5 Incinerating system</p>  <p>Incinerating toilets use a gas-fired or electric heating system (A) to burn waste. A propane tank (B) may be necessary to provide fuel. The system must have an exhaust vent (C). This system is also useful in remote areas or locations where water is scarce. The ash that is produced is sterile but is not useful in replenishing soil because the incineration destroys the nutrients.</p>	<p>6 Urine diversion</p>  <p>Urine diversion toilets channel (A) liquid waste into a storage container (B). This can then be collected and reused for fertilizer because of the high phosphorous content. Solid waste can be composted (C) in much the same way as in a composting toilet. It also has similar drawbacks to a composting toilet in addition to requiring a change in how men use toilets.</p> <p><small>JAMES WARREN/CAPE COD TIMES Sources: Environmental Protection Agency, PhD, Lombardo Associates, Inc., AquaPoint, F.R. Mahony & Associates, Inc.</small></p>



Opportunities for modernization



Living and working in LI coastal communities

Costs and Risk 
Benefits and Opportunities 



Potential ideas for future work

- Critical Loads approach for estuaries
- Cost per lb of N-load reduction
- Recovery of resources from wastewater
- Decentralized power for alternative septics
- Others?



This is Great!

Questions?

It's stinky and slimy

No, you can't go in the water, its polluted

Point Lookout July 2013

