LONG ISLAND SOUND STUDY

A PARTNERSHIP TO RESTORE AND PROTECT THE SOUND

Overview of

Nitrogen Reduction Strategy

for Long Island Sound

Public Meeting
Huntington, NY
April 15, 2016

Photo: Little Gull Island, Long Island Sound, NY

Presentation Overview:

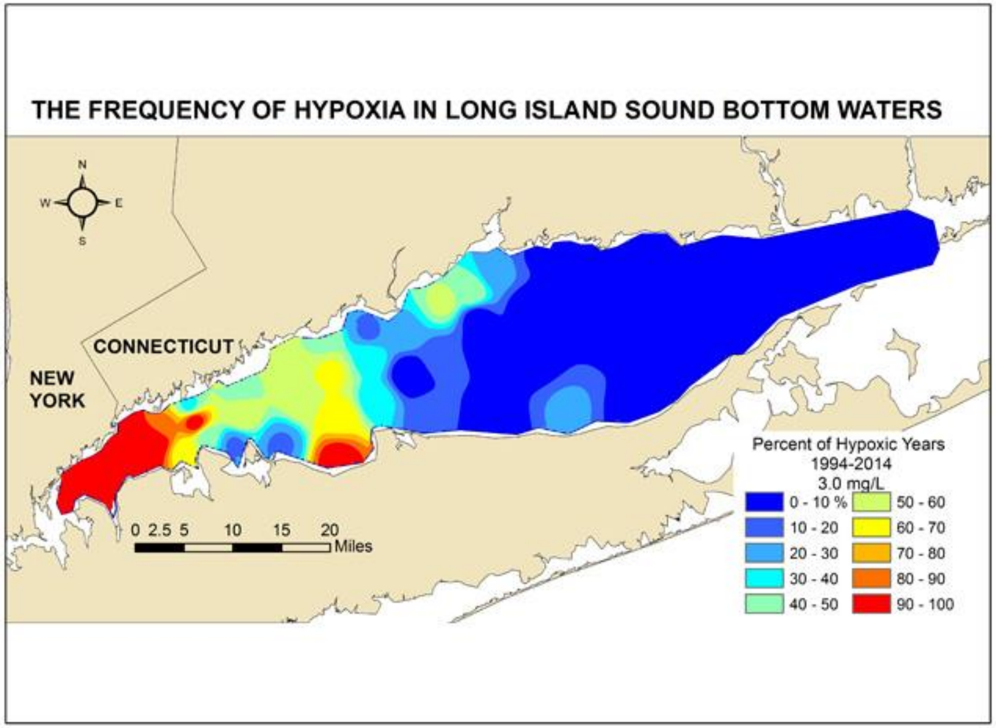
- Introduction & Overview (30 Minutes)
  - LIS Total Maximum Daily Load (TMDL) and Implementation Progress
  - Outline of Nitrogen Reduction Strategy
- Questions (60 Minutes)

Long Island Sound

- One of EPA's "Large Aquatic Ecosystem" Programs and an "Estuary of National Significance"
- Home to the Long Island Sound Study (LISS): a cooperative management partnership

long island sound study

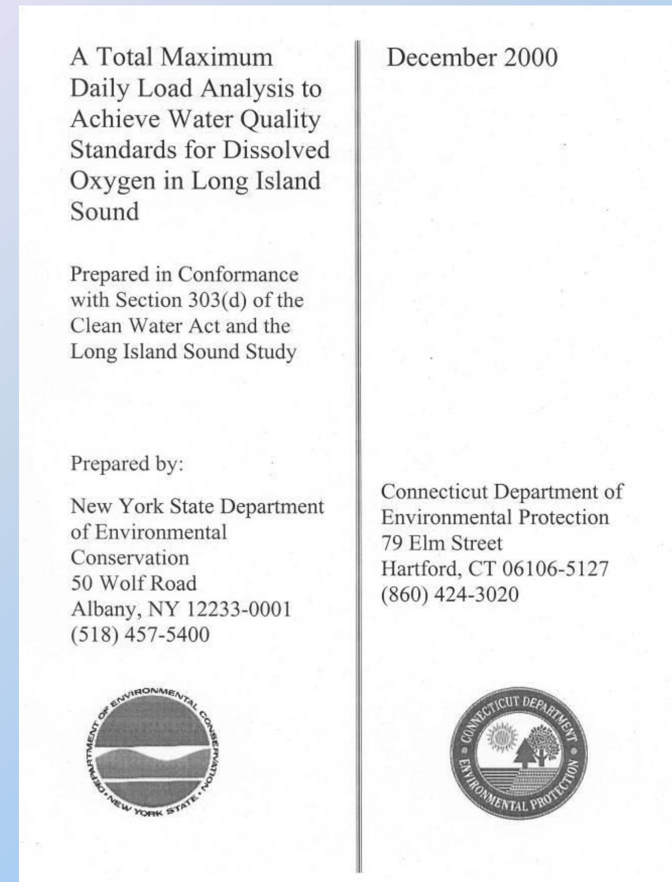
Problem: Hypoxia



Menhaden fish kill, 1990s

Hempstead Harbor, NY

Long Island Sound Total Maximum Daily Load



A Total Maximum Daily Load Analysis to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound

December 2000

Prepared in Conformance with Section 303(d) of the Clean Water Act and the Long Island Sound Study

Prepared by:

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Albany, NY 12233-0001
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CT DEEP and NYS DEC collaborated to develop the TMDL, approved by EPA in 2001.

- Assessed sources of nitrogen to the Sound
- Developed overall reduction targets
- Developed waste load allocations for point sources (POTWs) and load allocations for nonpoint sources
- Included estimated reductions to atmospheric deposition following implementation of clean air rules
- Included advisory tributary state reduction targets

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Success: Nitrogen Control

- As of 2015, **42,000,000 lbs/year** less nitrogen entering the Sound from sewage treatment plants.
- 25-40% reduction in agricultural fertilizer and livestock
- Estimated 27% reduction in total nitrogen and 50% reduction in nitrate through Clean Air Act

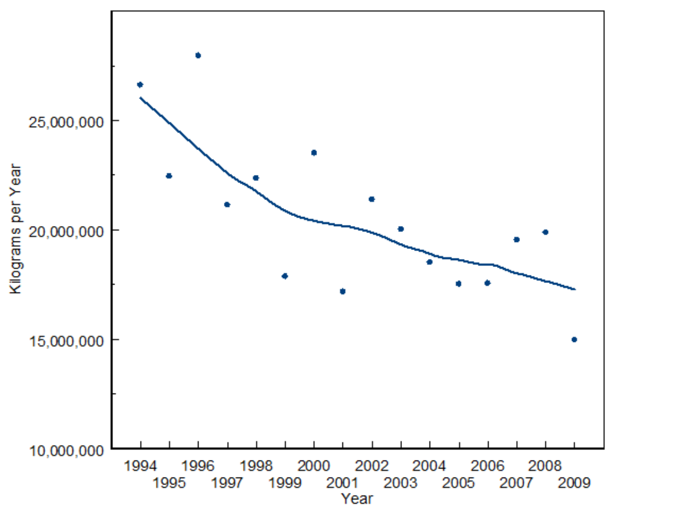
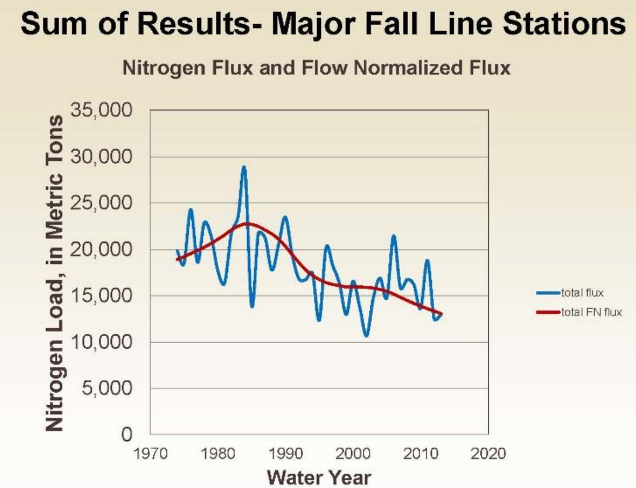


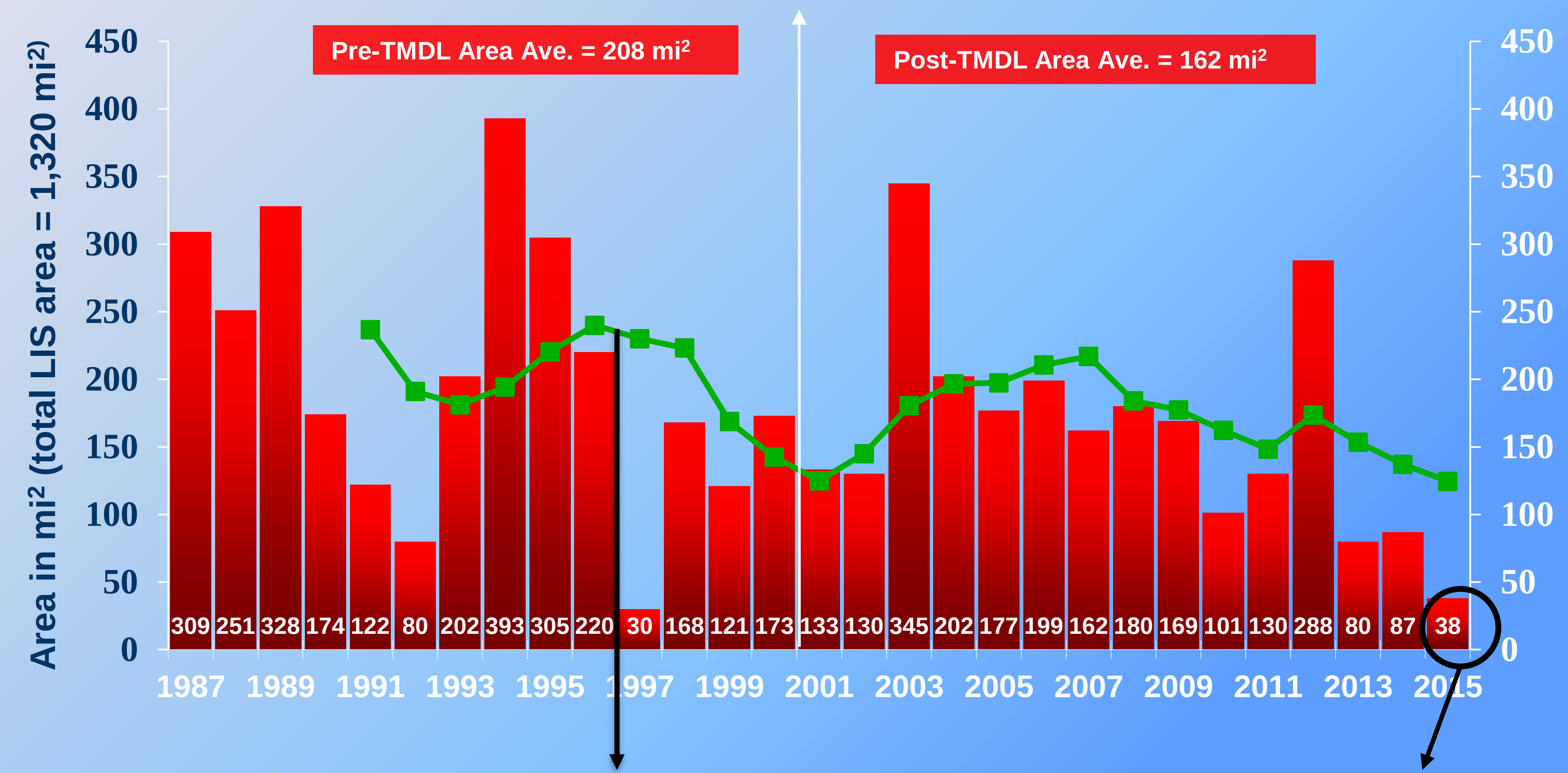
Figure x. Atmospheric wet deposition of inorganic nitrogen averaged for the Long Island Sound Watershed, 1994-2009.



USGS From Mullany, USGS, unpublished

Maximum Area of Hypoxia (≤ 3 mg/l)

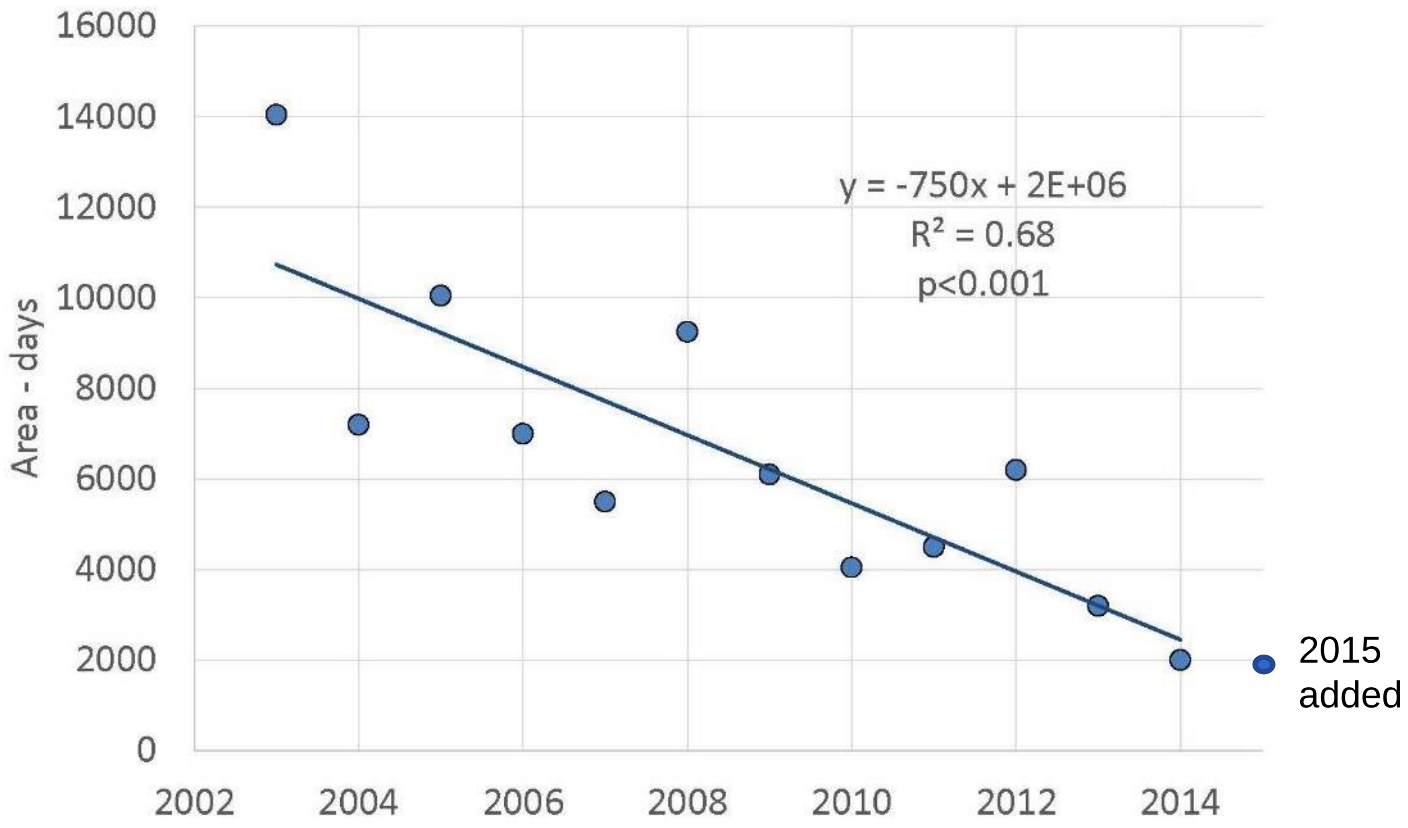
1987-2015 (June-September)



Five-year rolling average

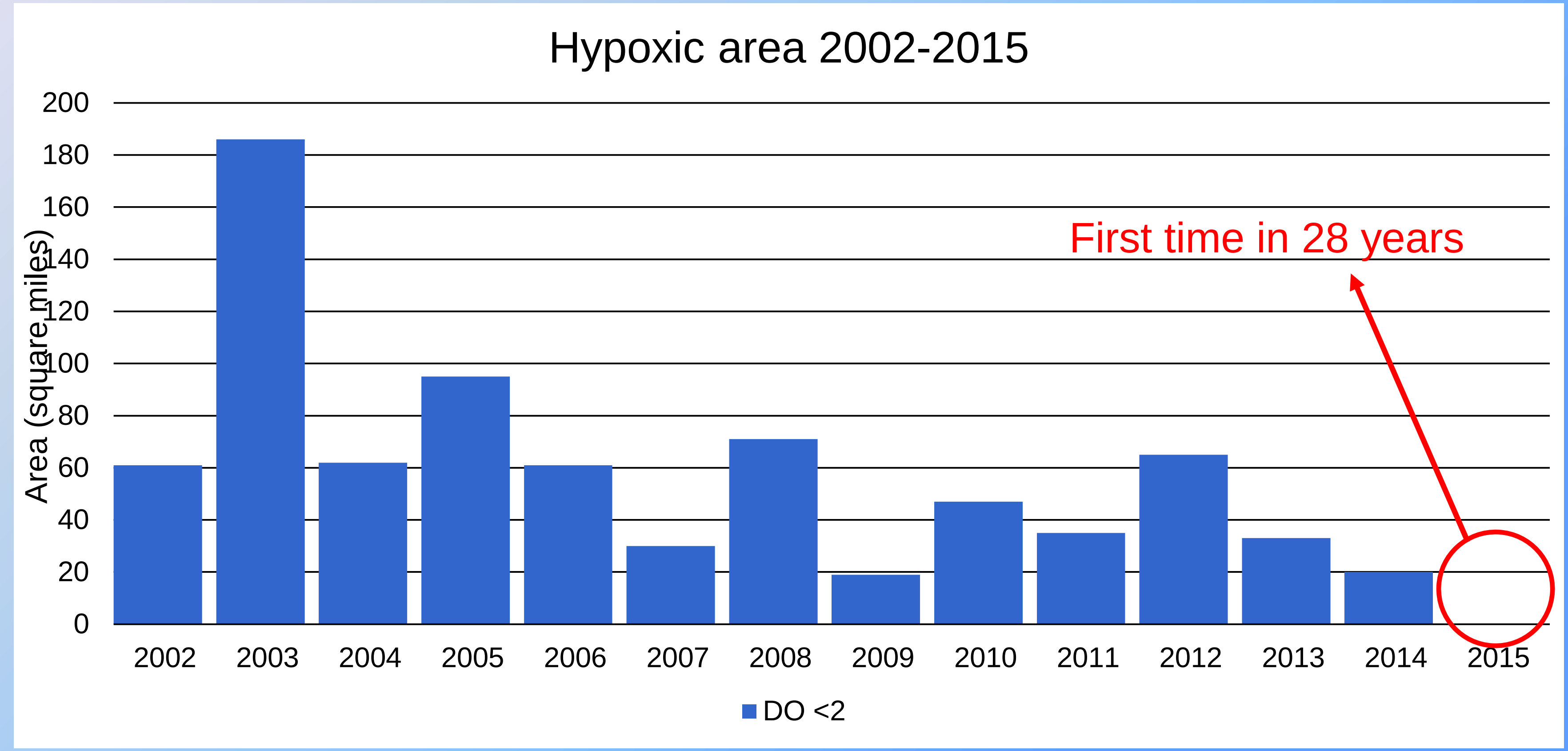
Second smallest area in 28 years

Long Island Sound, 12-year trend in hypoxia area - days

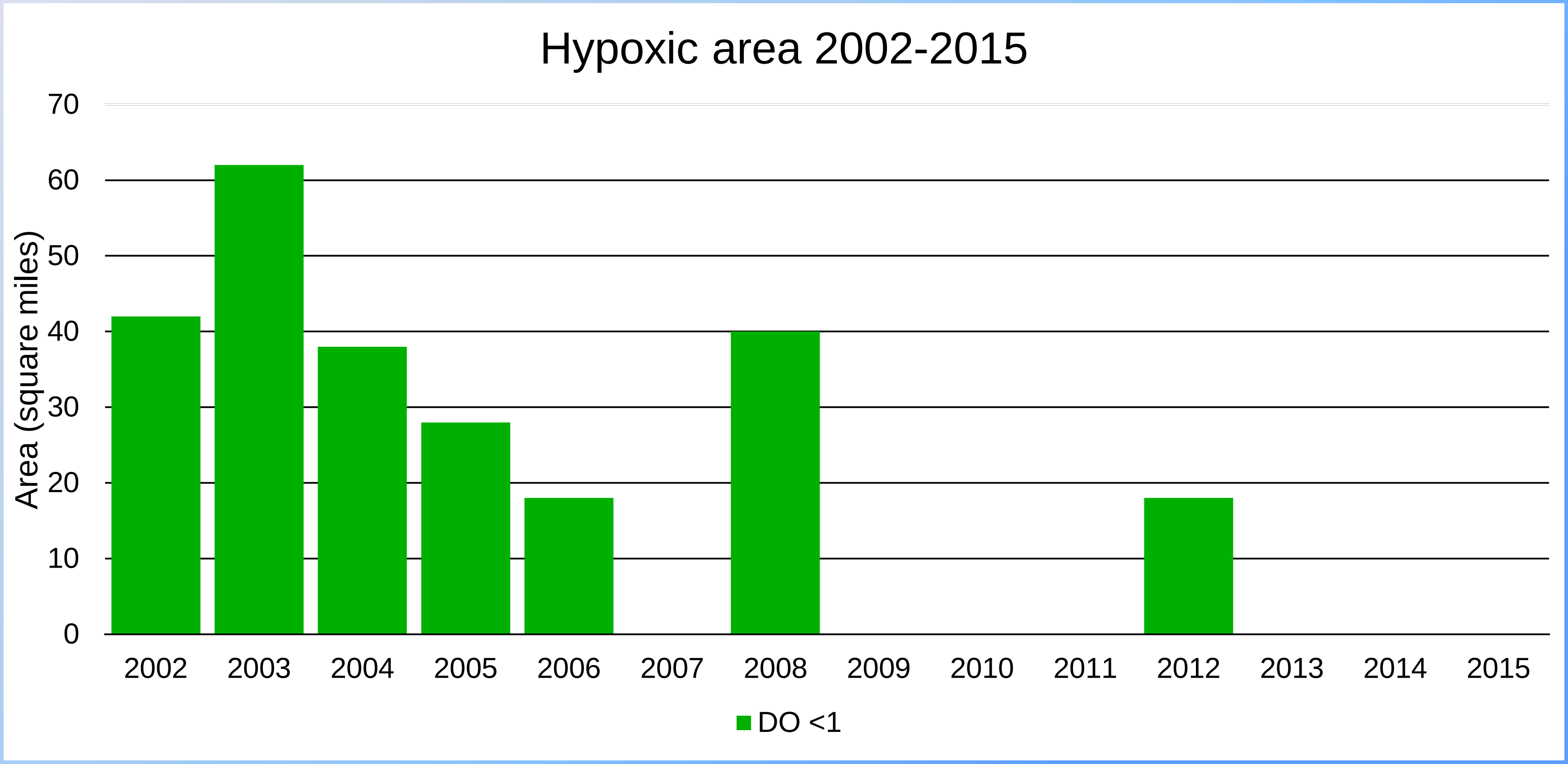


Source: Dr. Christopher Gobler, SBU/SOMAS

No area < 2 mg/l in 2015

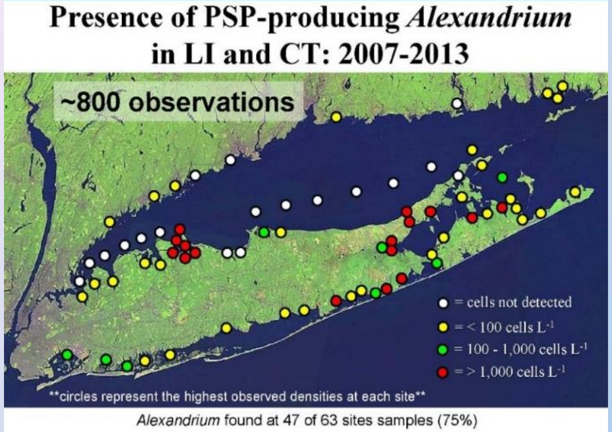


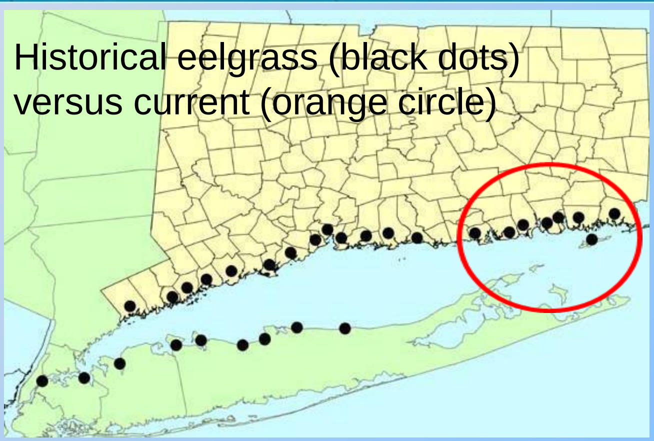
Elimination of Anoxia

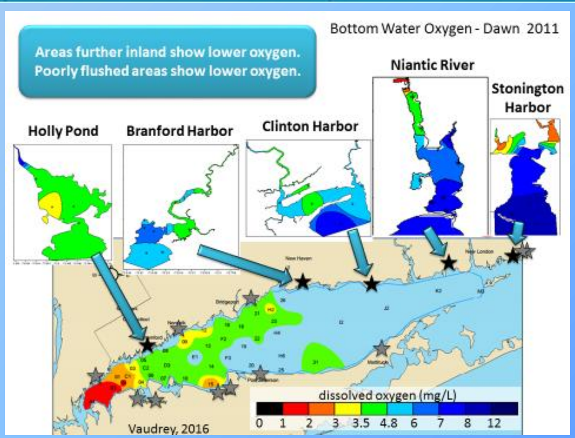


Tackling the Unfinished Agenda

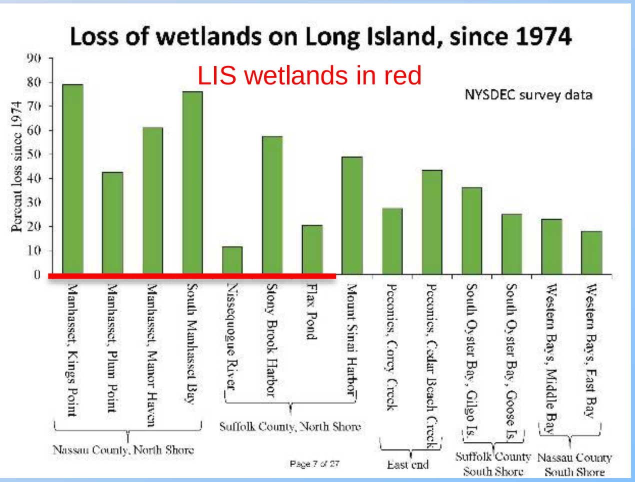
- Current monitoring and modeling indicate that planned actions by the states will fall short of fully implementing the TMDL
    - Further progress needed on nonpoint allocations (stormwater, on-site treatment systems, turf fertilizer)
    - Alternatives to nitrogen reduction (aeration, bioextraction) not implemented to scale
- Nitrogen pollution is also contributing to harmful algal blooms, loss of tidal wetlands and eelgrass, coastal acidification, and embayment hypoxia

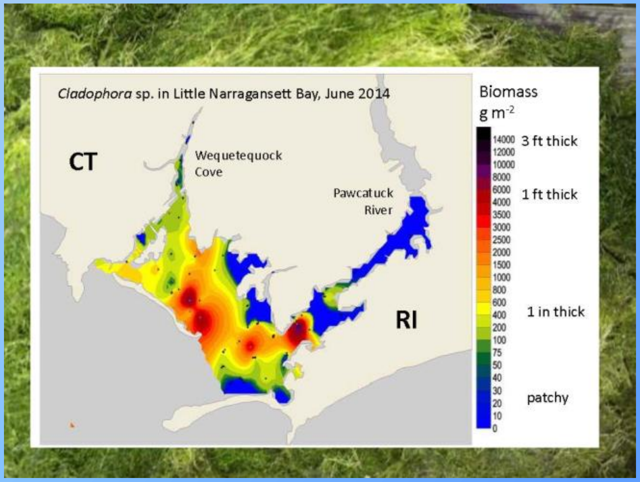


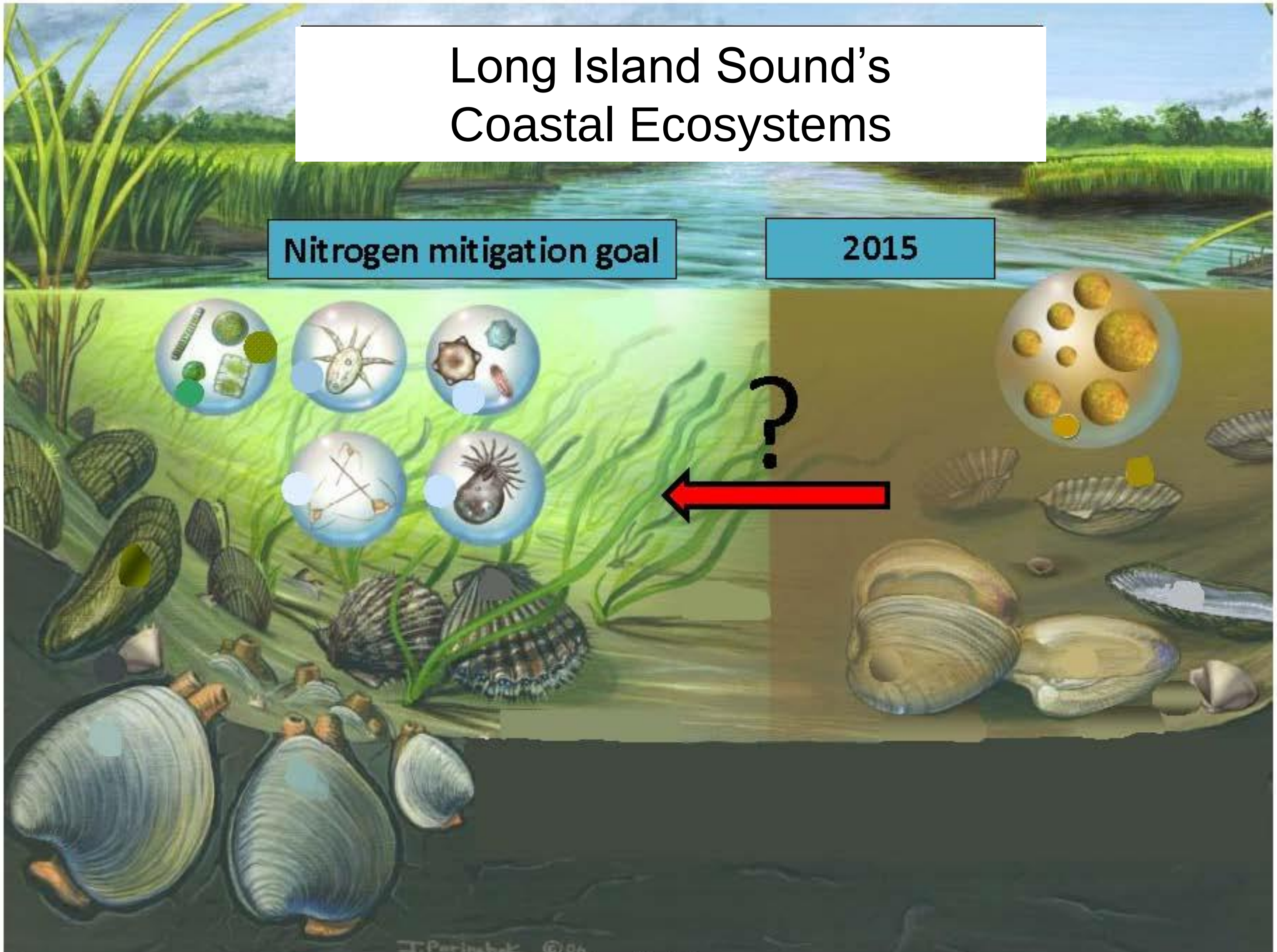




Other eutrophication-related impairments







Source: Dr. Christopher Gobler, SBU/SOMAS

Strategy 1-1a3: Enhance implementation of the existing 2000 Dissolved Oxygen TMDL throughout the watershed; and adapt and revise it based on monitoring, modeling, research, and how climate change may affect attainment of water quality standards in the future.

Strategy 1-3a2: Better understand eutrophication dynamics, effects, and mechanisms and continue support for modeling and synthesis efforts and their application to management scenarios.

Strategy 1-3a1: Understand the effects that nutrient ratios (nitrogen, phosphorus, carbon) have on ecosystem structure and function in freshwaters, embayments, and in Long Island Sound and consider them in setting nutrient control policies.

CONNECTICUT ENERGY ENVIRONMENT

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Nitrogen Reduction Strategy

12/23/15 letter transmitting strategy to five states

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
Boston, Massachusetts

REGION 2
New York, NY

OFFICE OF THE
REGIONAL ADMINISTRATORS

December 23, 2015

Clark Freise, Commissioner
NH Dept. of Environmental Services
29 Hazen Drive, P.O. Box 95
Concord, NH 03302-0095

Rob Klee, Commissioner
CT Dept. of Energy & Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

Alyssa B. Schuren, Commissioner
VT Dept. of Environmental Conservation
1 National Life Drive, Main 2
Montpelier, VT 05620-3520

Basil Seggos, Acting Commissioner
NY State Dept. of Environmental Conservation
625 Broadway
Albany, NY 12233-1011

Martin Suuberg, Commissioner
MA Dept. of Environmental Protection
1 Winter Street
Boston, MA 02108

Dear Commissioners Freise, Klee, Schuren, Seggos and Suuberg:

Our agencies have worked together for many years to repair the environmental damage caused by excessive nitrogen in Long Island Sound. We appreciate the investments you and your communities have made, and welcome the progress we have begun to see in the Sound. It is clear, however, that more must be done if we are to fully restore this vital resource. We are writing this letter to invite you to partner with EPA on our plan to implement a comprehensive nitrogen reduction strategy for Long Island Sound (LIS). As you know, implementation of the *Total Maximum Daily Load to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound* (2000 TMDL) has resulted in significant progress toward reducing dissolved oxygen (DO) impairments in the open waters of the Sound. EPA commends the States for their collective efforts to implement the measures necessary to meet the load reductions specified in the 2000 TMDL. Upgrades to 106 wastewater treatment facilities in Connecticut and New York have resulted in the discharge of 40 million fewer pounds of nitrogen in calendar year 2014 compared to baseline levels, a 51.5 percent reduction. Annual monitoring has documented a 40 percent reduction in the area of hypoxia compared to pre-TMDL levels.[1]

Despite this progress, there is more to do. It is clear based on monitoring and modeling that current and planned actions by the states will fall short of fully implementing the 2000 TMDL and will be insufficient to address other adverse impacts to water quality in Long Island Sound, and its embayments and near shore coastal waters. First, an assessment of stormwater and nonpoint sources of nitrogen suggests that loads from urban storm water, on-site wastewater

[1] Current five-year rolling average in the maximum area of hypoxia compared to the pre-TMDL average.

1

"Aggressively continue progress on nitrogen reductions, in parallel with the States' continued implementation of the 2000 TMDL, and achieve water quality standards throughout Long Island Sound and its embayments and near shore coastal waters."

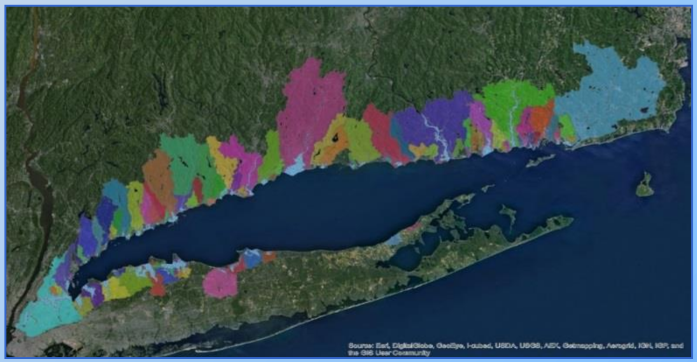
Nitrogen Reduction Strategy

1) Complement LIS TMDL N management initiatives by addressing other eutrophication-related impacts
2) Develop numeric N thresholds that are protective of designated uses
3) Set N reduction targets and allocations where necessary to meet the N thresholds
4) Continue efforts to increase oxygen in Western LIS

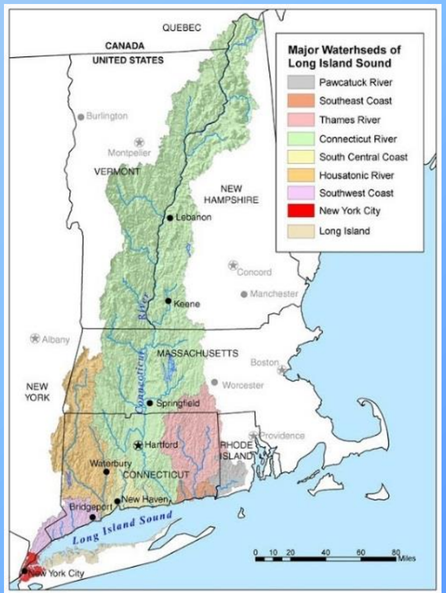
Nitrogen Reduction Strategy

Customize the application of nitrogen thresholds to develop targets for each of three watershed groupings:

Coastal watersheds that directly drain to embayments or nearshore waters



Tributary watersheds that drain inland reaches



WLIS coastal watersheds with large, direct discharging WWTFs

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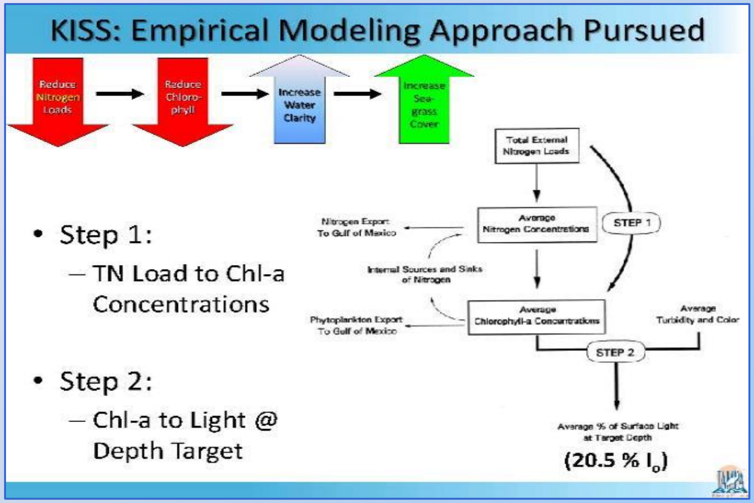
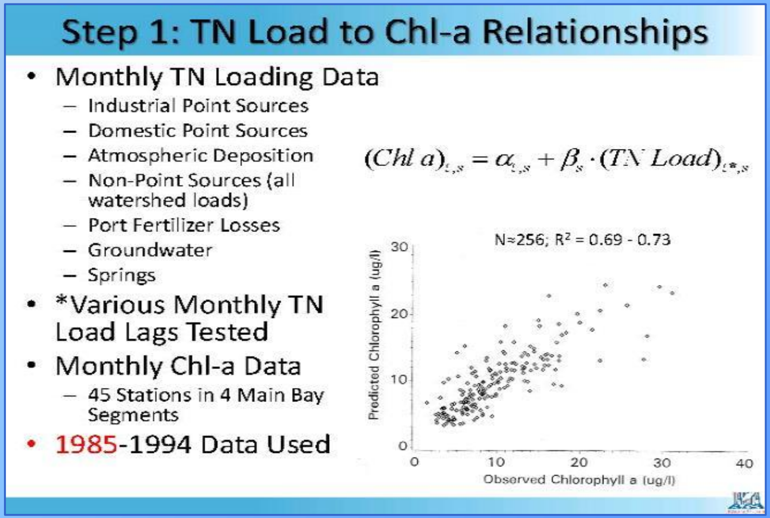
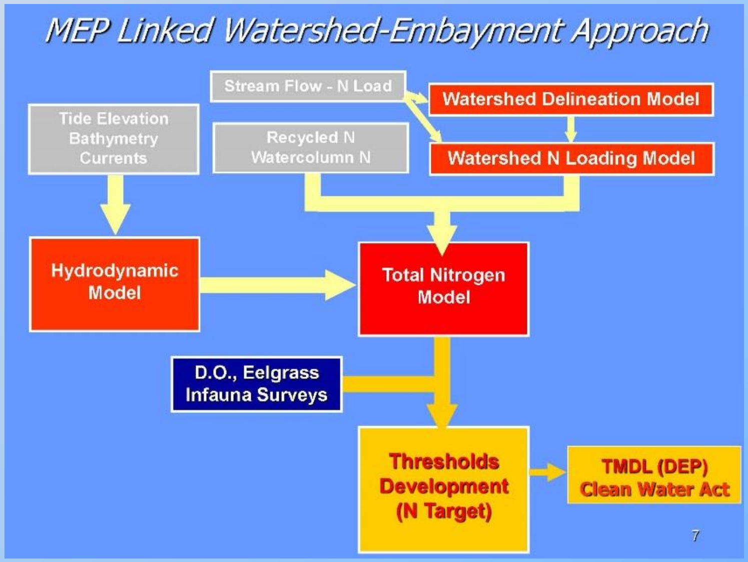
Setting N thresholds

Use of sea grass restoration goals to establish N caps in Tampa Bay, FL



Relationship between N load and chlorophyll-a in Tampa Bay, FL





Mass Estuaries Project

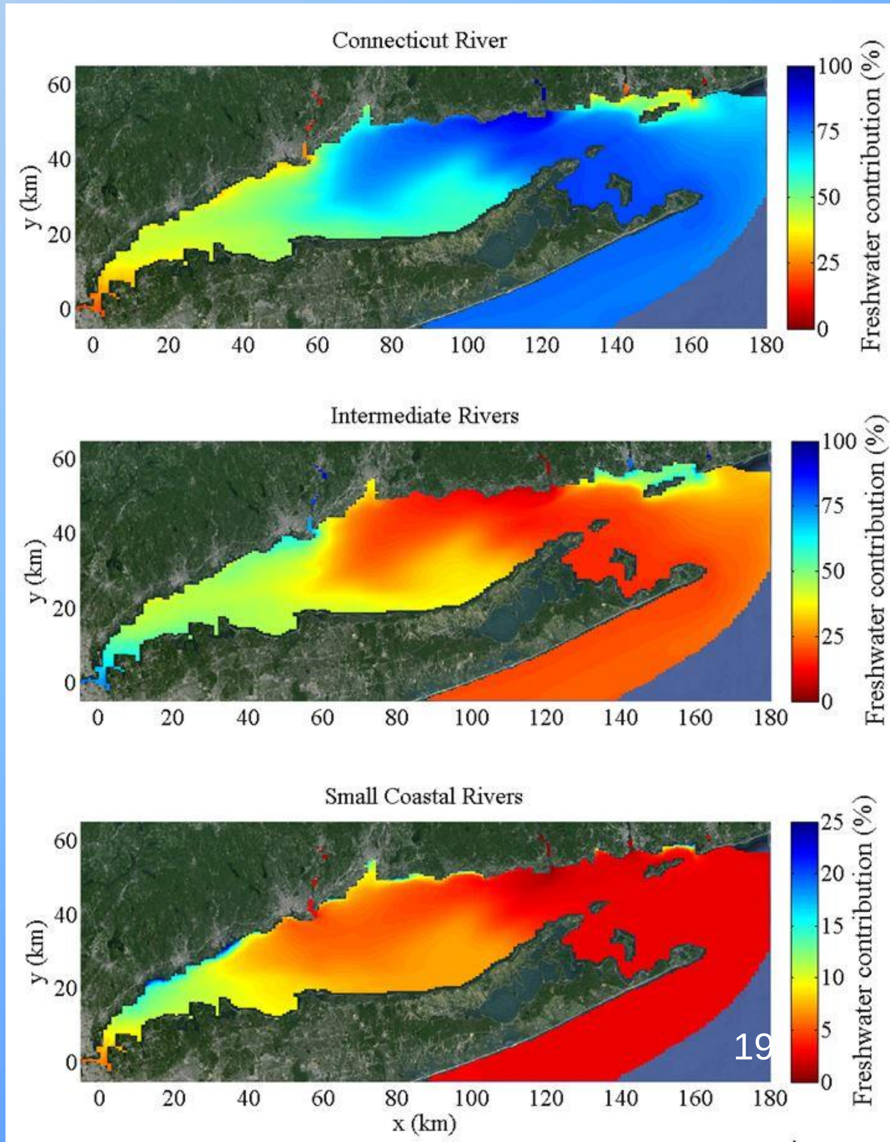
http://www.oceanscience.net/estuaries/index.htm

Tributary Watersheds

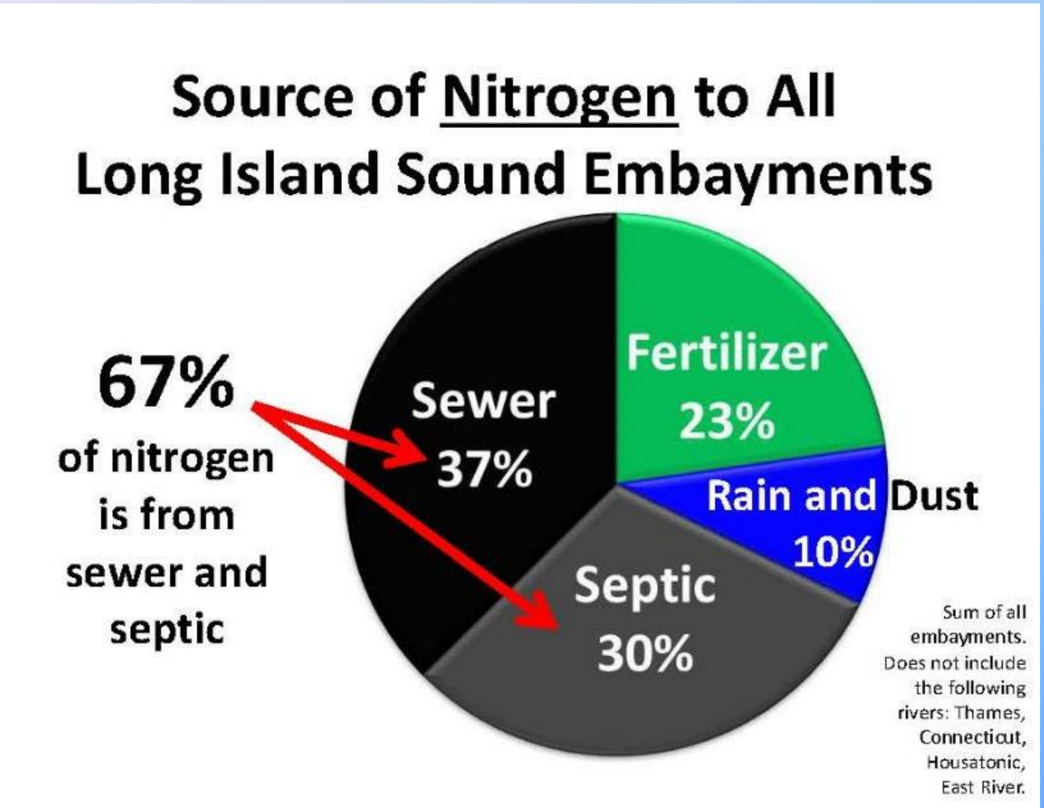
- Track how waters from each river are distributed throughout LIS
- Understand the influence of tributaries to near shore water quality
  - Water quality monitoring data
  - Model projections
- Compare tributary load reduction scenarios with N distributions
- Relate tributary loading conditions to attainment of N thresholds to near shore water quality
  - Relative influence of freshwater from the CT River (the largest source), intermediate rivers (Pawcatuck, Thames, Quinnipiac, Housatonic, and Hudson via the East River connection), and numerous smaller rivers with coastal watersheds.

http://cprime.uconn.edu/wp-content/uploads/sites/119/2015/04/surface_freshwatercontributions.gif

Whitney, 2016. http://cprime.uconn.edu/nsfcareer



Applying Thresholds



Nitrogen load by source to LIS embayments (Vaudrey et al.).

- Collaborate with the states
- Prioritize watersheds
- Identify watershed reductions to attain thresholds
- Allocate among sources
- Phase in point source controls considering progress in reducing nonpoint sources
- Continue to monitor, model, and research to better understand how LIS responds to N reductions

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Compatible with NY State Draft Scope Long Island Nitrogen Action Plan

5

Potential Nitrogen Endpoints

1. **Cape Cod (0.3 – 0.4 mg TN/l)**
2. **208 Study (0.35 mg TN/l Eelgrass, 0.4 mg TN/l No Eelgrass)**
3. **EPA Rating System (Excellent 0.3 mg TN/l, Good 0.3 to 0.39 mg TN/l)**
4. **National Estuary Program (DIN, DIP, Chlorophyll a, Clarity, and DO index)**

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That migration of nitrogen in groundwater is impairing surface water embayments at a crisis levels.

Surface waters require nutrients, such as nitrogen, to support healthy ecosystems. However, excessive nitrogen can limit or preclude opportunities for swimming and fishing, and destroy habitat which in turn harms aquatic life, and reduces storm resiliency. Swimming is harmed by when high levels of nitrogen in waters produce nuisance algal blooms and increase aquatic weed growth.

Nitrogen and resulting plant growth and die off can draw oxygen from the water and produce "dead zones" where dissolved oxygen levels are so low that aquatic life cannot survive. This condition is referred to as hypoxia. Shallow, well-mixed estuaries are less susceptible to this phenomenon because wave action and circulation patterns supply the waters with plentiful oxygen. Excessive nitrogen fueled algae growth also shades submerged aquatic vegetation (SAV) reducing their ability to photosynthesize. Excessive nitrogen is also a key contributor in wetland degradation. Low dissolved oxygen, reduced SAVs, and wetland degradation lead to many areas having poor marine habitats that do not adequately support fin fish and shellfish populations. Degraded marine wetlands and aquatic vegetation reduces coastal areas natural storm buffering capacity, thereby reducing resiliency. .

Recognition of the role of nitrogen in the destruction of water resources and commensurate effects on economic viability on Long Island has grown recent years. LINAP will integrate many local initiatives, and evaluate additional alternative solutions to address water quality degradation on Long Island.

1.2 GOAL STATEMENT

The goals of the Long Island Nitrogen Action Plan (LINAP) include:

1. Assess Nitrogen Pollution in Long Island Waters
2. Identify sources of nitrogen and impacted water bodies
3. Establish nitrogen reduction endpoints
    1. Identifying ecological endpoints (desirable conditions in surface waters) for individual estuaries or embayments around Long Island to restore/protect estuarine health and function as well as groundwater resources.
    2. Establishing estuarine or embayment specific nitrogen loading targets based on:
        a. preliminary rapid assessments for immediate reduction actions
        b. development of more specific reduction targets based on higher precision estuarine modeling for meeting ecological endpoints
4. Develop implementation plan to achieve reduction endpoints.
    a) Developing sub-watershed plans including:
        a. Action plans which contain near term actions that will reduce nitrogen pollution to groundwater and surface waters

Next Steps

- Encourage public participation
- Collaborate with the states & partners
- Integrate with Long Island Nitrogen Action Plan and other state efforts
- Refine & begin implementation of strategy
  - Technical analysis by grouping, e.g tributaries
- Apply in priority watersheds

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Questions?

www.longislandsoundstudy.net

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