


# EPA Perspectives on Nitrogen Reduction in Long Island Sound

New York Marine Sciences Consortium  
October 22, 2016



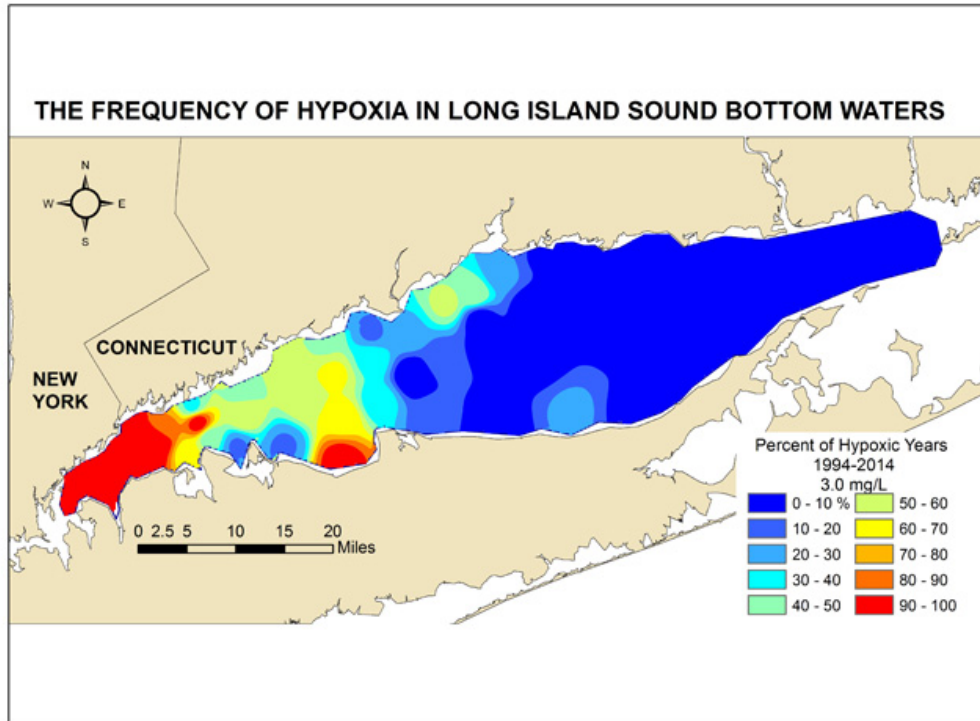
*Photo: Little Gull Island, Long  
Island Sound, NY*



Why should we  
care about  
nitrogen?

# Excess Nitrogen Causes Eutrophication in Marine Waters.

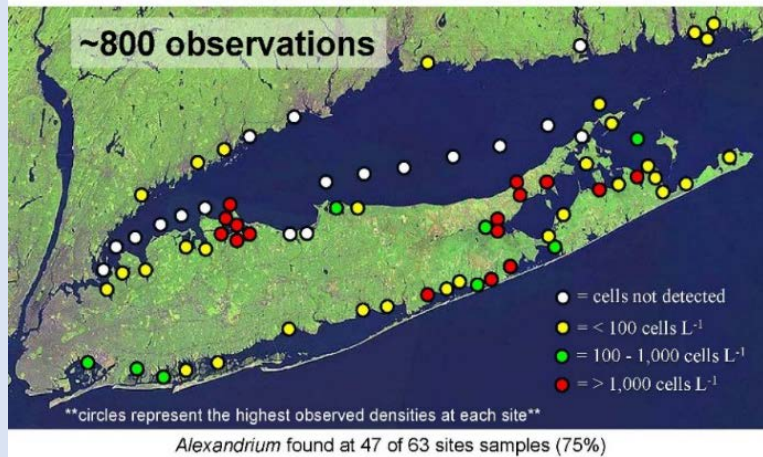
## One Major Problem of Eutrophication: Hypoxia





## Harmful Algal Blooms

### Presence of PSP-producing *Alexandrium* in LI and CT: 2007-2013

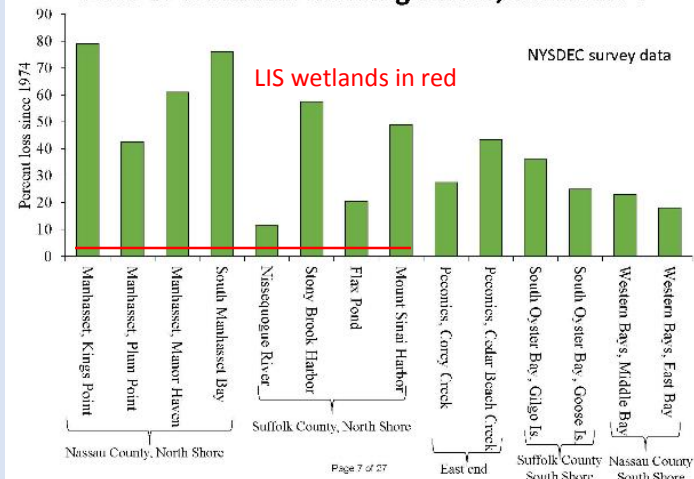


## Excessive Macro Algae Growth

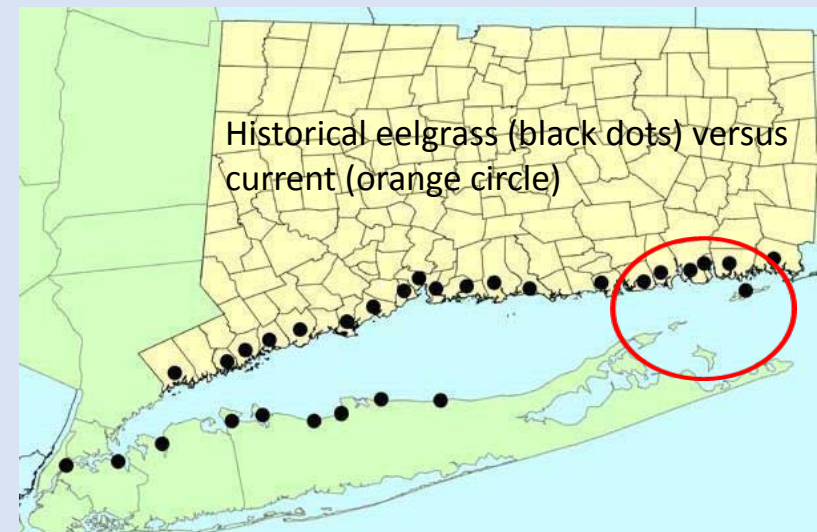


# Other Eutrophication-related Impairments

### Loss of wetlands on Long Island, since 1974



## Loss of Wetlands

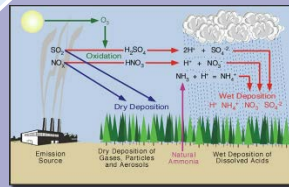


## Loss of Eelgrass

# Where's all the Nitrogen Coming from?

Nitrogen Loading to LIS by Source.

Atmospheric  
Deposition –  
18%



Nonpoint  
Sources –  
19%



Point Sources –  
63%





An underwater photograph showing a sandy seabed. In the upper center, a bright orange starfish is visible. In the lower center, a dark, elongated fish is swimming. The water is slightly murky, and the overall lighting is dim, typical of an underwater environment.

So what is being done about excess  
nitrogen in the Sound?

# Total Maximum Daily Load (“TMDL”) in 2000



- Clean Water Act regulatory tool to assign reduction targets.
- Agreed to overall nitrogen reduction of 58.5% by 2017 to get “biggest bang for the buck.”
- Since 2000, great reductions in nitrogen and ecological successes.

# Success: Declines in Big Sources of N

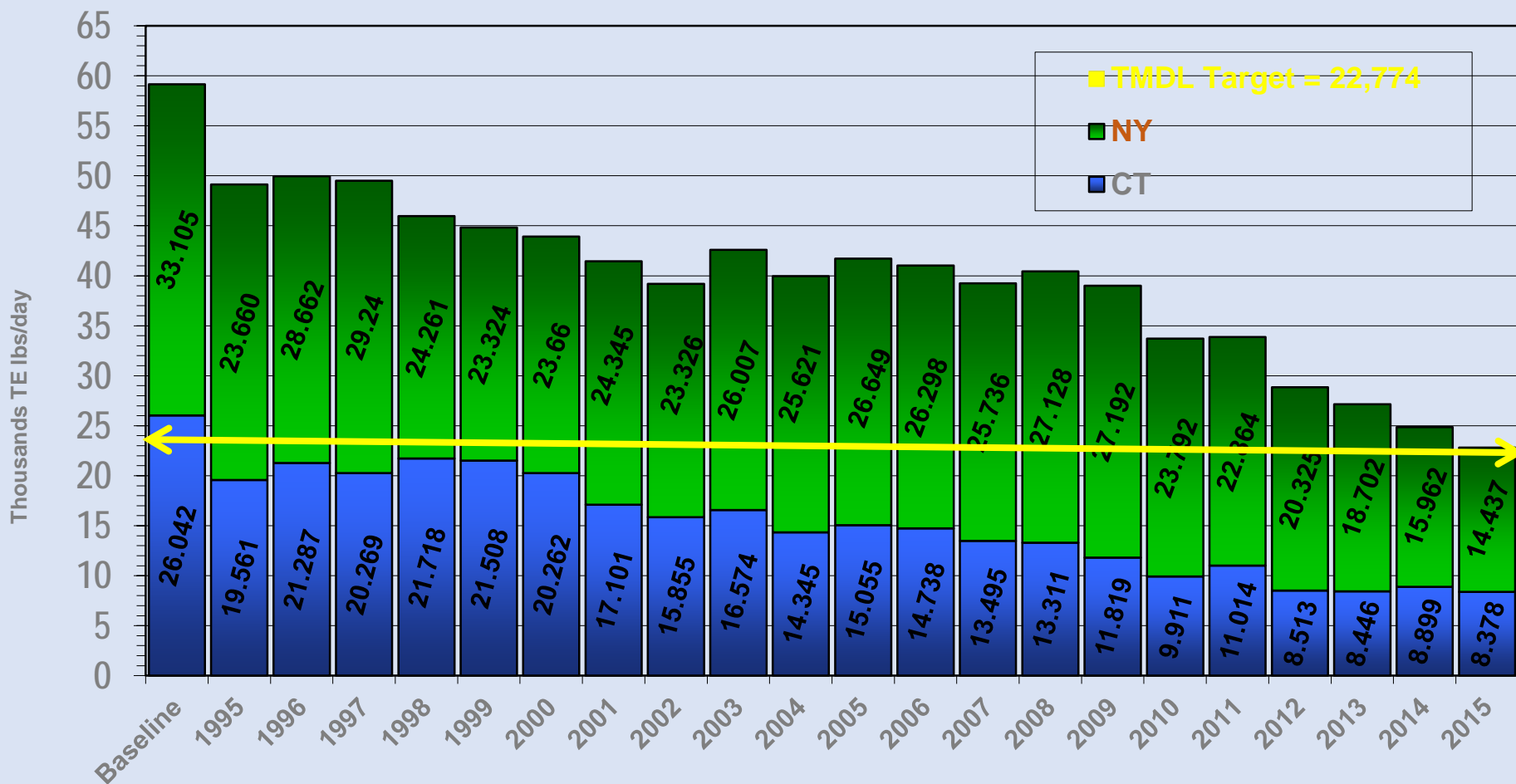
Source	Trend	Description
WWTPs (CT, NY)		94% of WLA trade equalized target
Atm. Deposition		26% ↓ TN, 50% ↓ NO <sub>3</sub>
Agricultural		25-40% ↓ in fertilizer and livestock
Urban storm water		2-3% ↑ in impervious areas
Septic		8% ↑ in basin population (1990-2010)*
Turf Fertilizer		1-2% ↑ in turf/grass areas

\*40-200% increase in NO<sub>3</sub> in Suffolk County groundwater (1987-2010). Increase of 185,000 households on septic, decrease of 15,000 on sanitary sewer in CT from 1990-2010.



# Point Source Nitrogen Trade-Equalized Loads

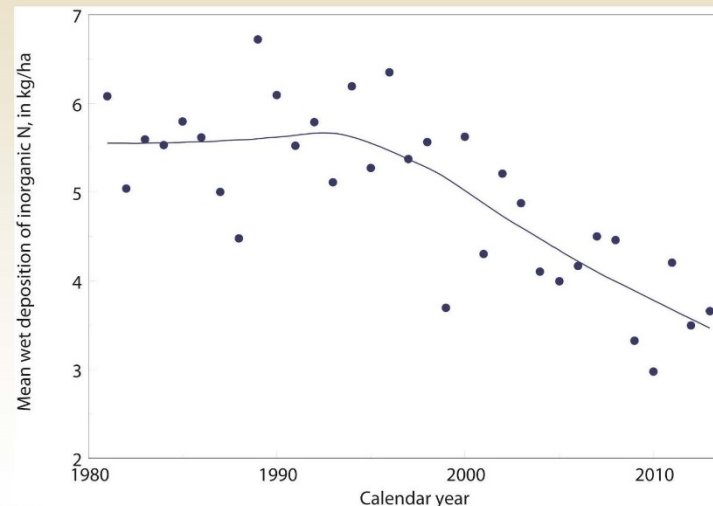
1995-2015  
106 NY/CT STPs



# Success: Atmospheric Nitrogen Control

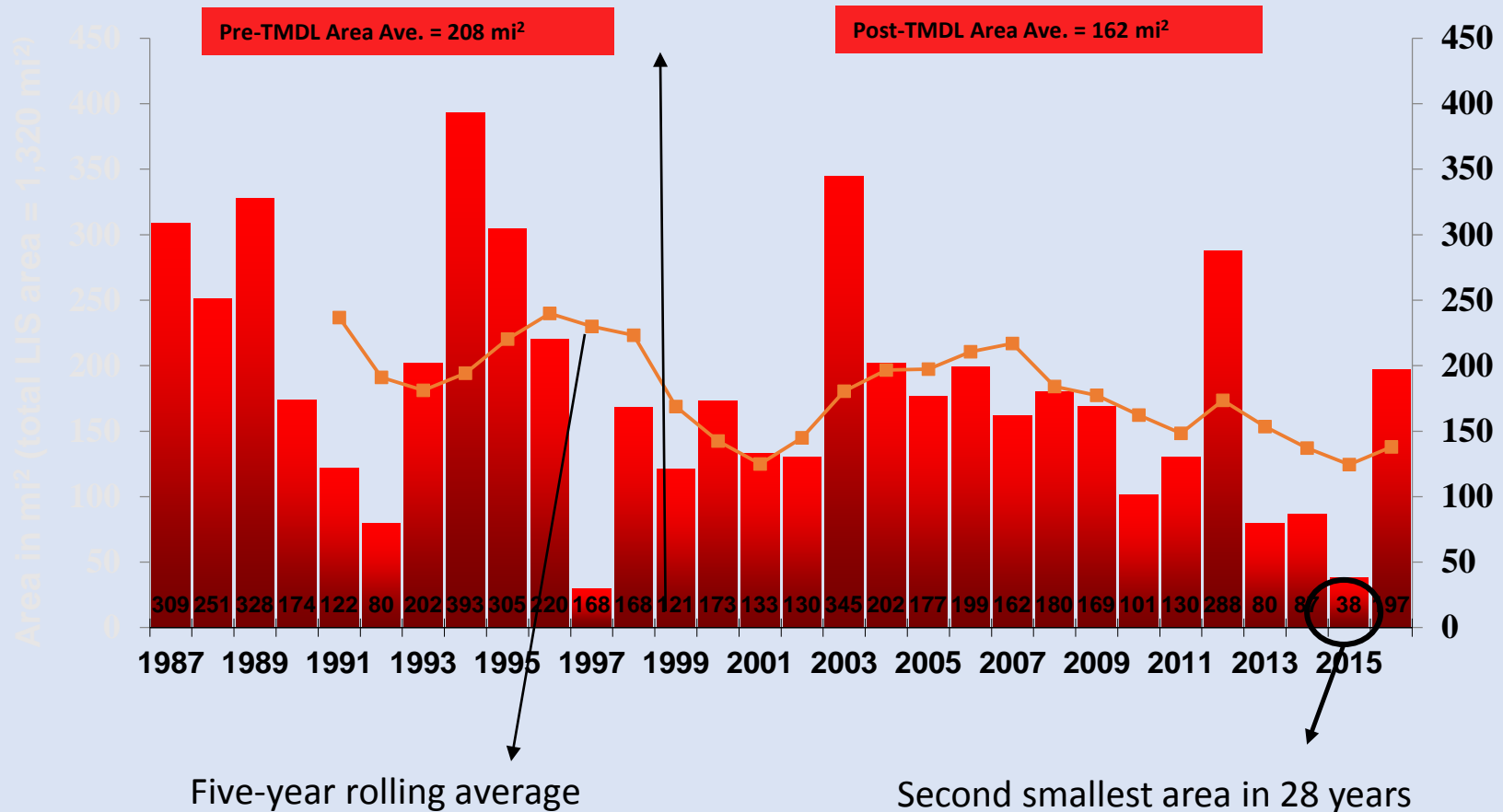
Implementation of the **Clean Air Act** resulted in reductions in atmospheric deposition of NO<sub>x</sub> from power plants, vehicles, etc.

## Wet Deposition of Atmospheric Inorganic N, LIS Watershed



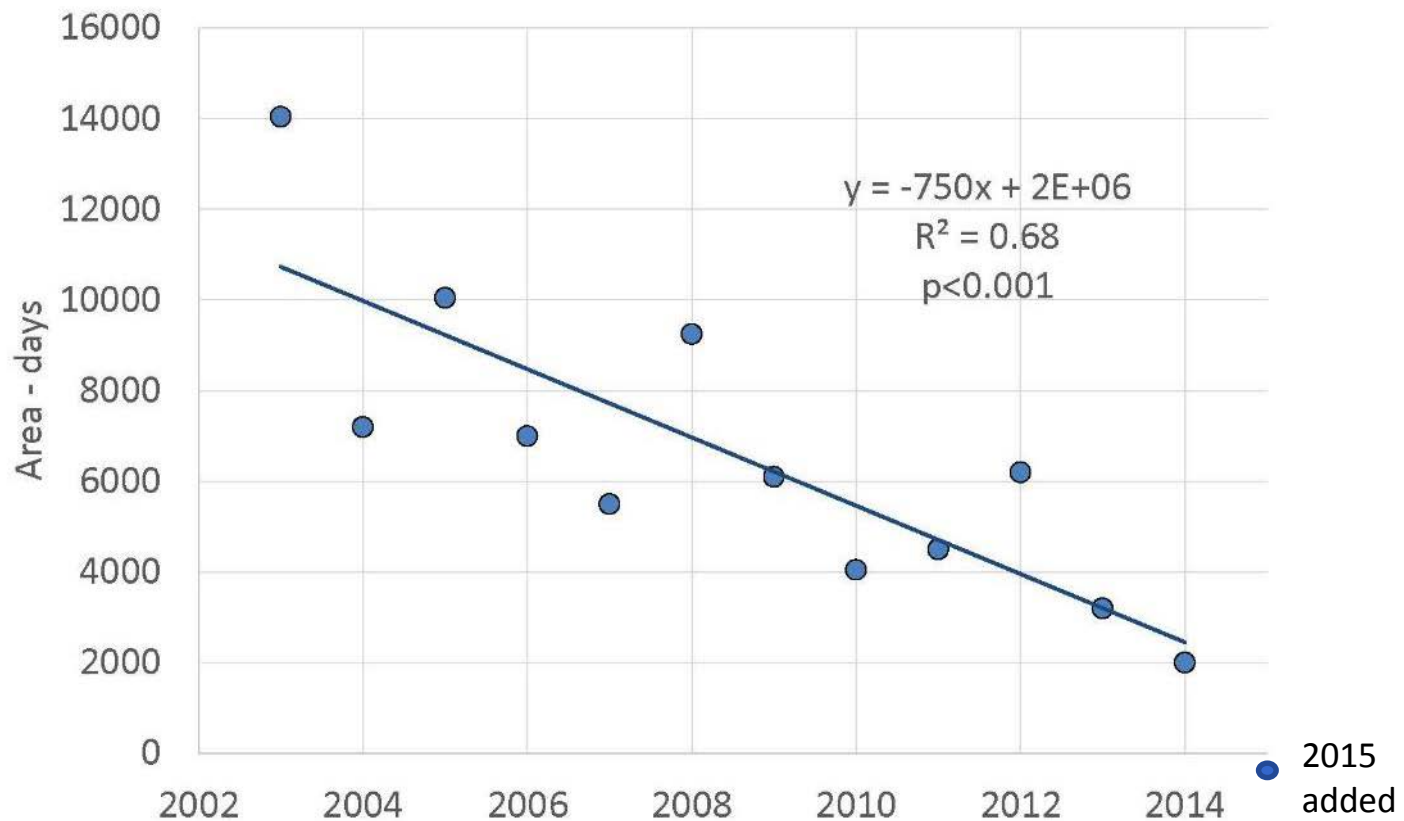
# Success: Hypoxia Less Severe

Maximum Area of Hypoxia  
(state acute criteria  $< 3 \text{ mg/l}$ )

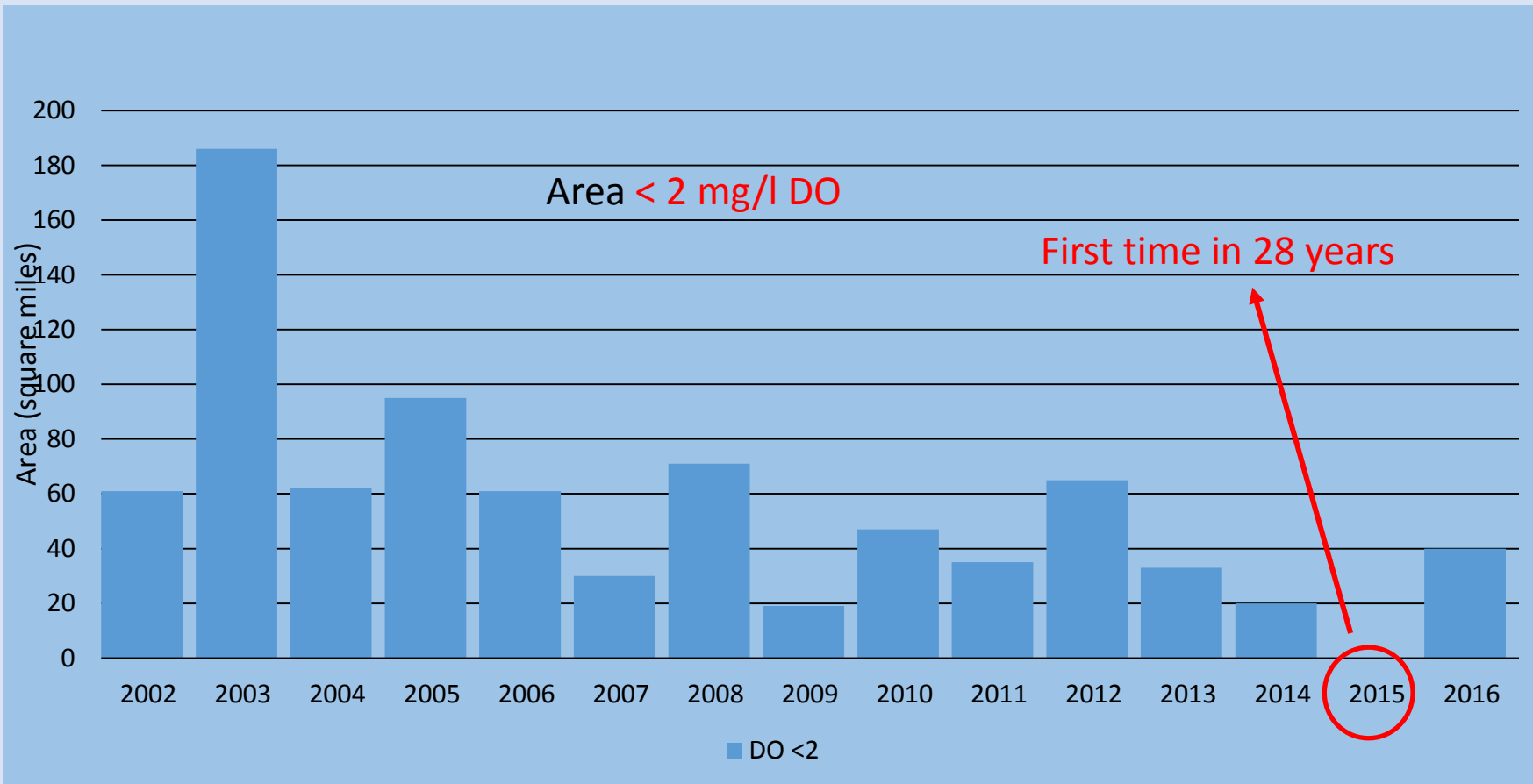




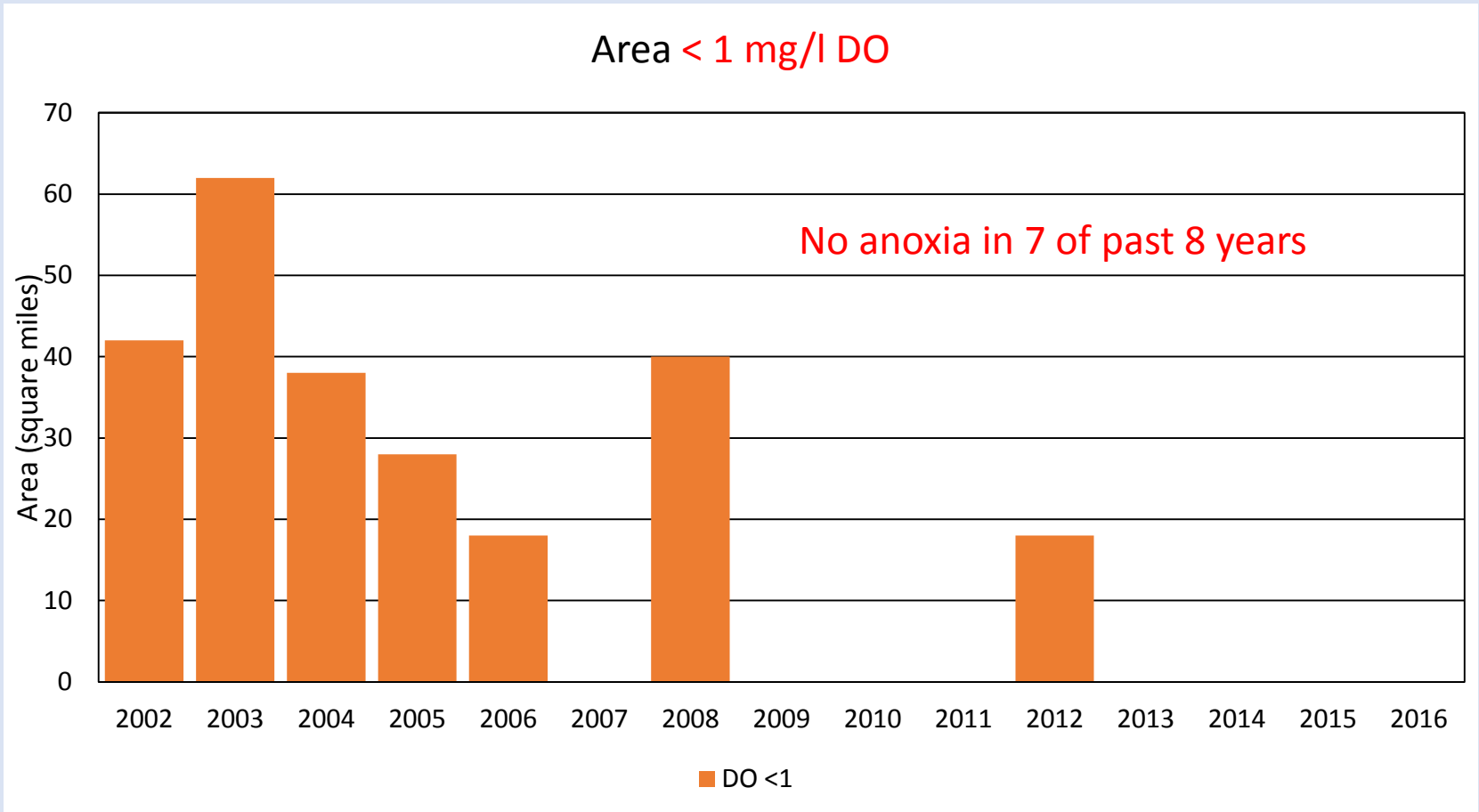
## Long Island Sound, 12-year trend in hypoxia area - days



# Reduction in Critical Conditions



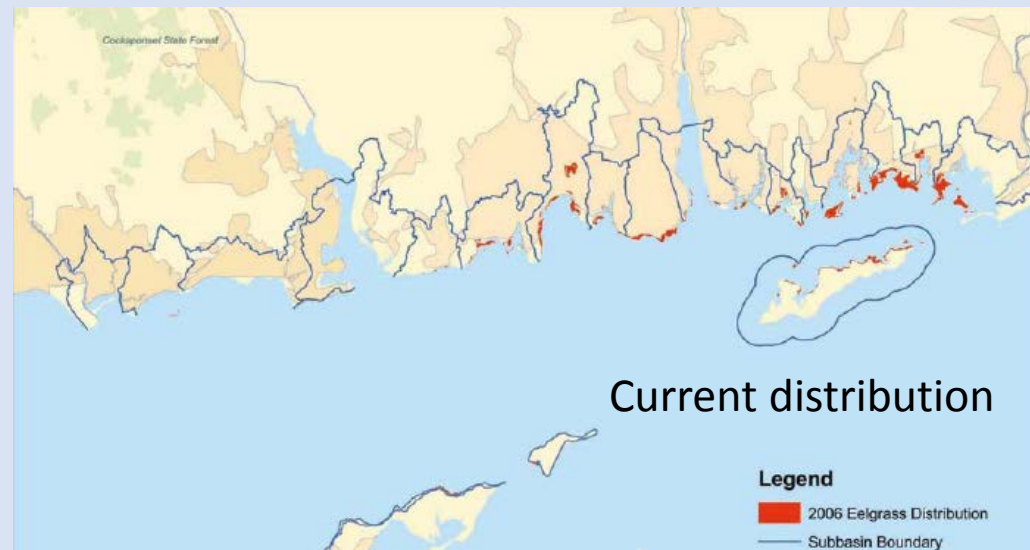
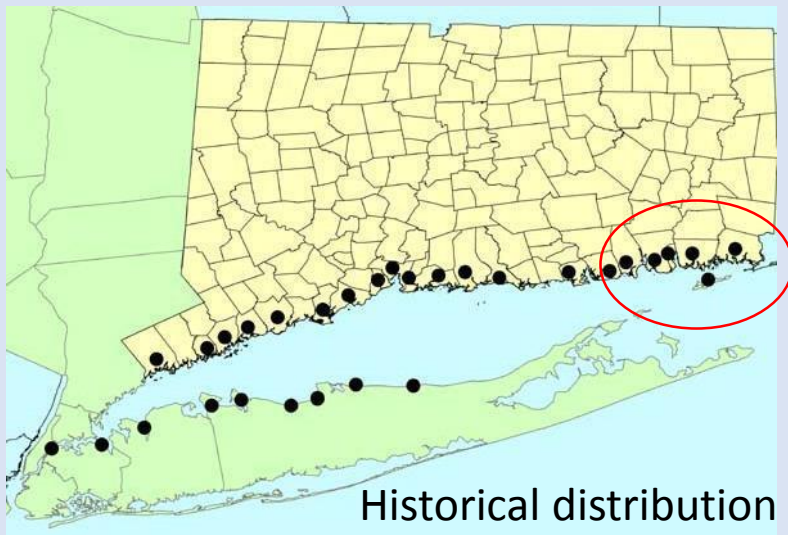
# Reduction in Anoxic Conditions





# Success: Eelgrass expanding

- Historical losses due to disease in 1930's.
- Recent increase of 29% between 2002-2012



## However - Current monitoring and modeling indicate a fall short of fully implementing the TMDL

- Water quality standards will not be met for portions of the Sound.
- Nitrogen pollution is still contributing to harmful algal blooms, loss of tidal wetlands and eelgrass, coastal acidification and embayment hypoxia.
- Further progress needed on nonpoint allocations.

We need to do more...

# Alternatives to Nitrogen Reduction (e.g. bio-extraction) Not Implemented to Scale.





# EPA Nitrogen Reduction Strategy

12/23/15 EPA letter transmitting strategy to five states

“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.”



## 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

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

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

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

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

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.<sup>1</sup>

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

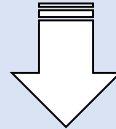
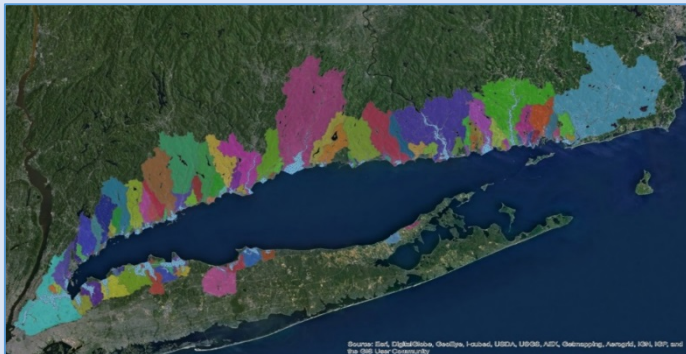
<sup>1</sup> Current five-year rolling average in the maximum area of hypoxia compared to the pre-TMDL average.

# Nitrogen Reduction Strategy

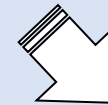
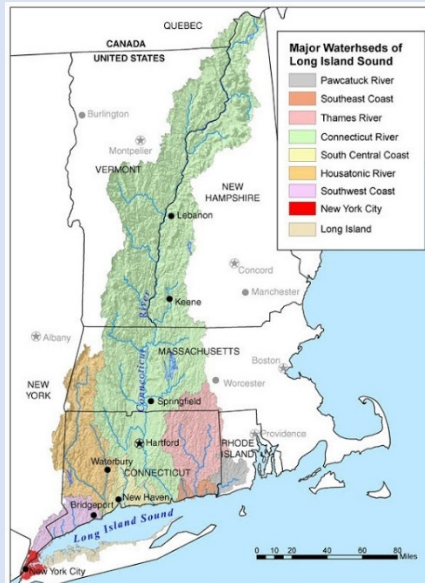
Customize the application of nitrogen **thresholds** for each of three watershed groupings:



Coastal watersheds that directly drain to embayments or nearshore waters



Tributary watersheds that drain inland reaches



WLIS coastal watersheds with large, direct discharging WWTFs




# EPA Strategy is Compatible with NY State *Long Island Nitrogen Action Plan (LINAP)*

- Both efforts are seeking to develop endpoints or thresholds for N.
- EPA's effort will also consider Connecticut and Western LIS (NYC area)
- NYS Threshold work - early 2017.
- EPA Threshold work late 2017-2018.

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## 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)



NEW YORK  
Department of  
Environmental  
Conservation

# Next Steps

- Encourage public participation
- Collaborate with the states & partners
- Integrate with Long Island Nitrogen Action Plan and Connecticut efforts
- Refine & begin implementation of strategy
- Technical analysis by watershed grouping
- Apply in priority watersheds

Lots to do!



# Questions?



Photo: Orient Light