



Connecticut DEEP

Second Generation Nitrogen Strategy

Kelly Streich, CTDEEP
CLEAR Workshop Series
August 2017



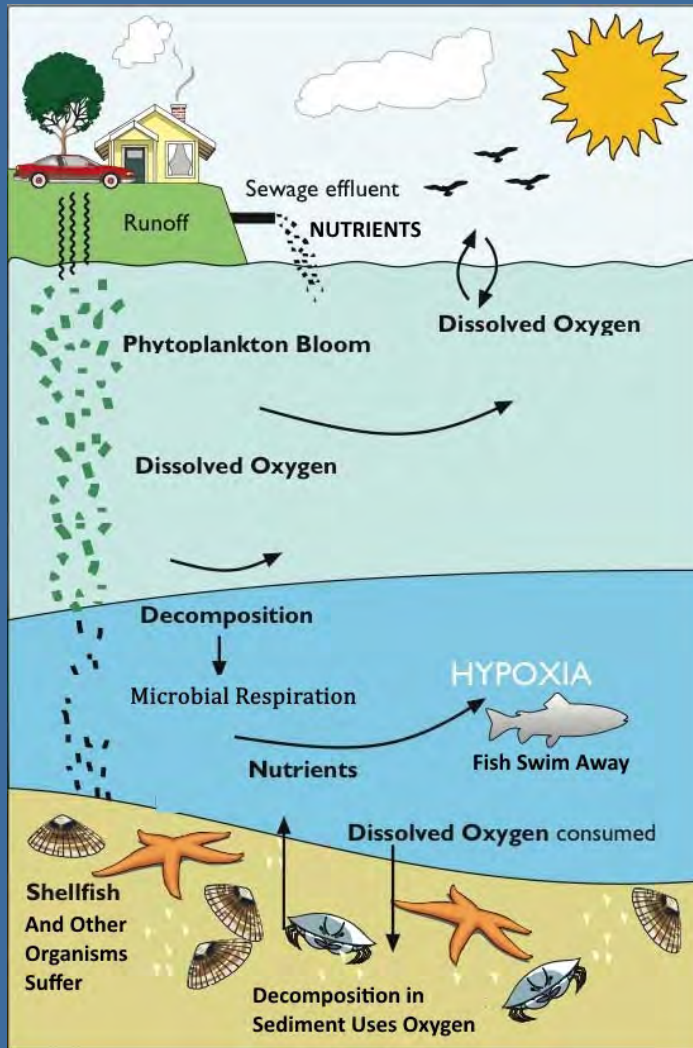
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The Agenda

- 1) Hypoxia and the LIS TMDL
- 2) Shifting CT Nitrogen Loads and Priorities
- 3) EPA's Nitrogen Reduction Strategy
- 4) CT's 2cd Generation Nitrogen Strategy
- 5) Priority Embayments and WWTPs
- 6) Summary of Nitrogen Reduction Efforts



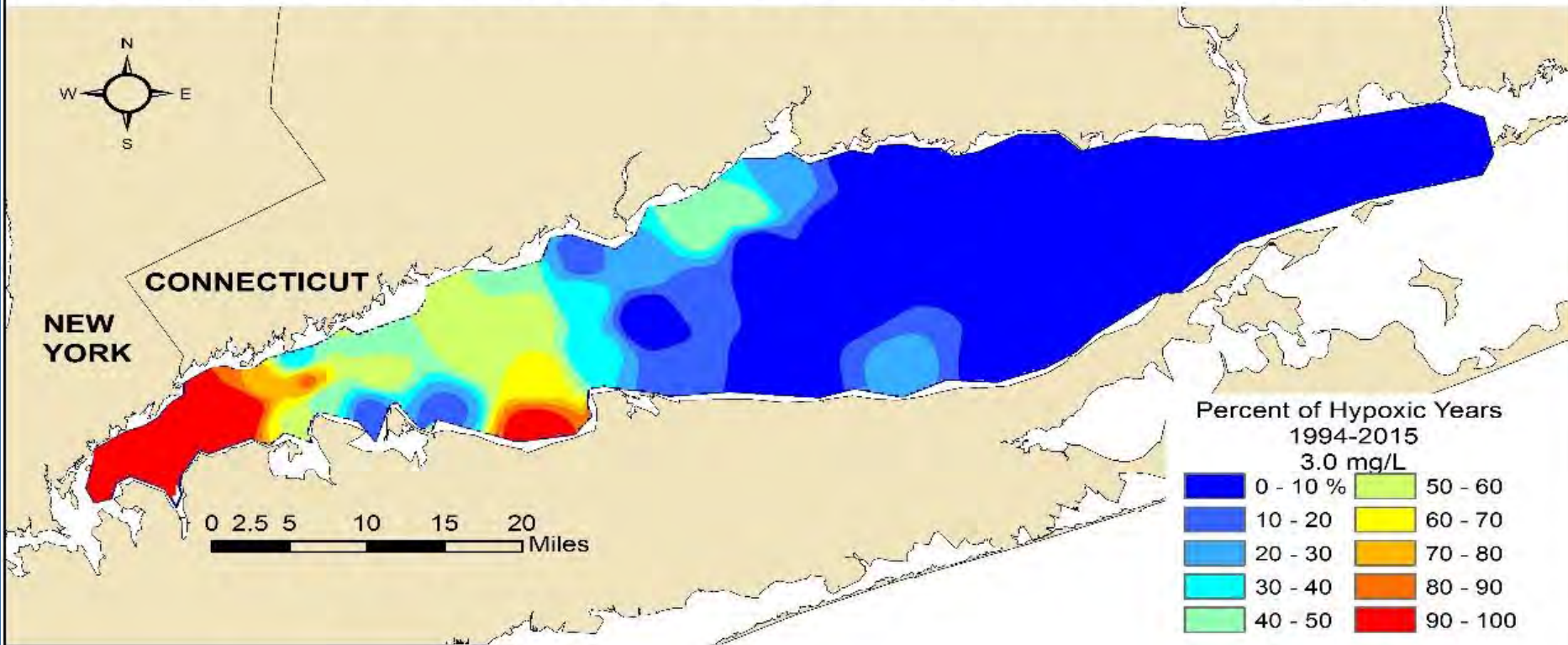
Hypoxia



- aka – Low Dissolved Oxygen
- Occurs between June – Sept. in bottom water
- Cause – Too Much Nitrogen
- DO conditions < 3 mg/L



THE FREQUENCY OF HYPOXIA IN LONG ISLAND SOUND BOTTOM WATERS



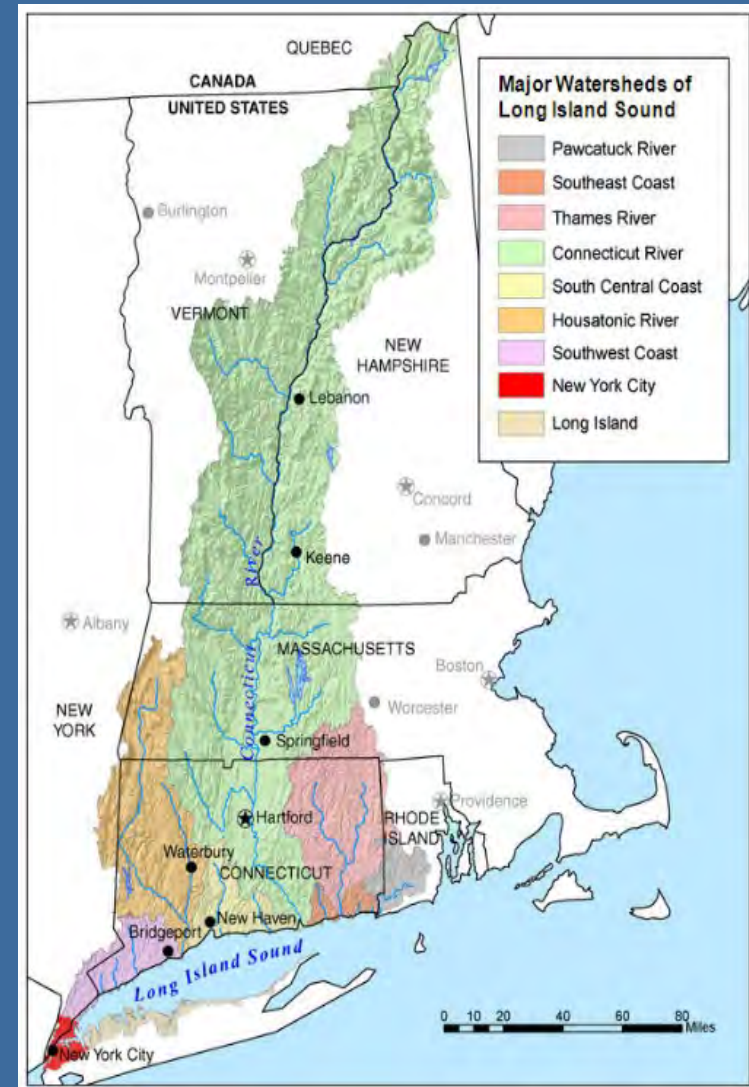
LIS TMDL History

- Adopted in 2000, to be implemented by 2015
- Good progress, but mixed results
- TMDL revision/enhancement stalled in 2014
- CFE/STS petition to EPA- 3/2015
- UConn Embayment Study- 2015
- EPA Nitrogen Strategy- 12/2015
- CT DEEP 2nd Generation Nitrogen Strategy- 2016



2000 TMDL Nitrogen Requirements

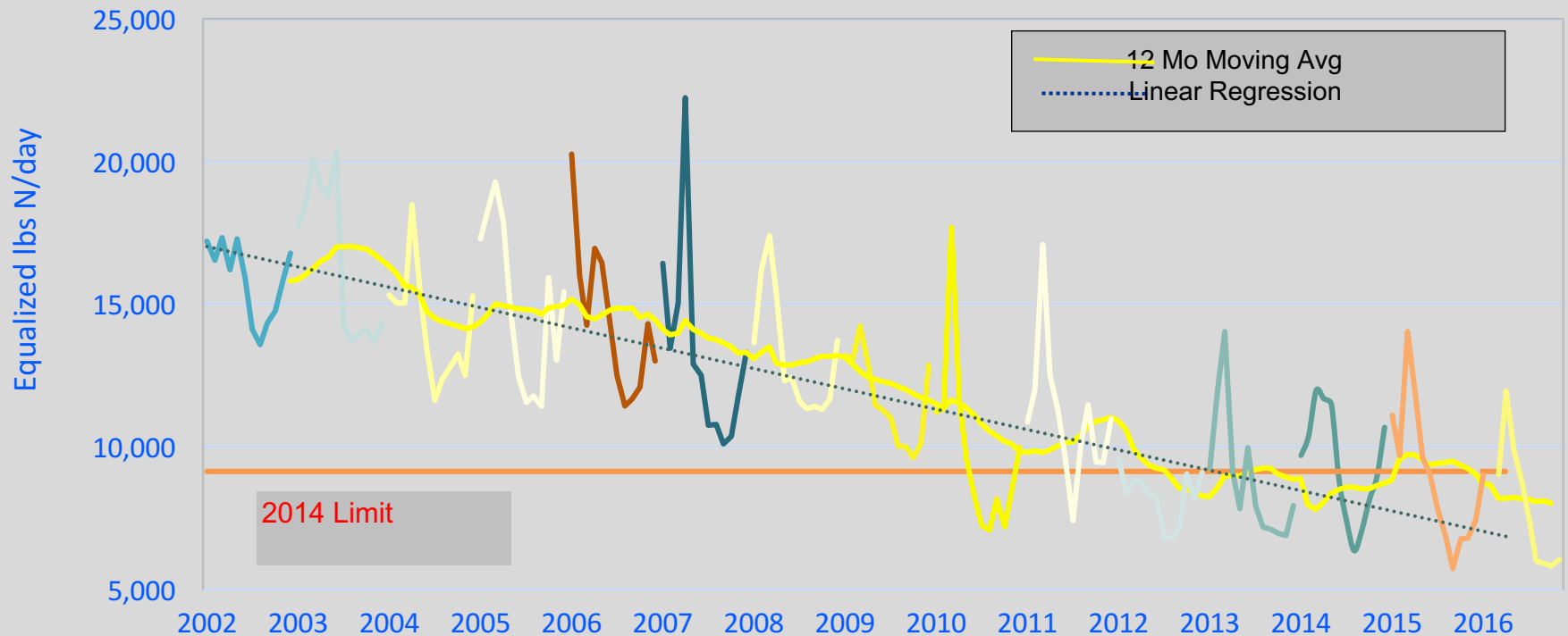
- **58.5% Reduction in Total Nitrogen Loading**
 - The reduction applied to WWTPs in CT is 63.5%
- **25% Aggregate WWTP Reductions for Upstream States (MA, NH, VT)**
- **10% Reduction in NPS (all the watershed)**
- **Atmospheric Reductions**
 - 18% reduction expected (CAA)



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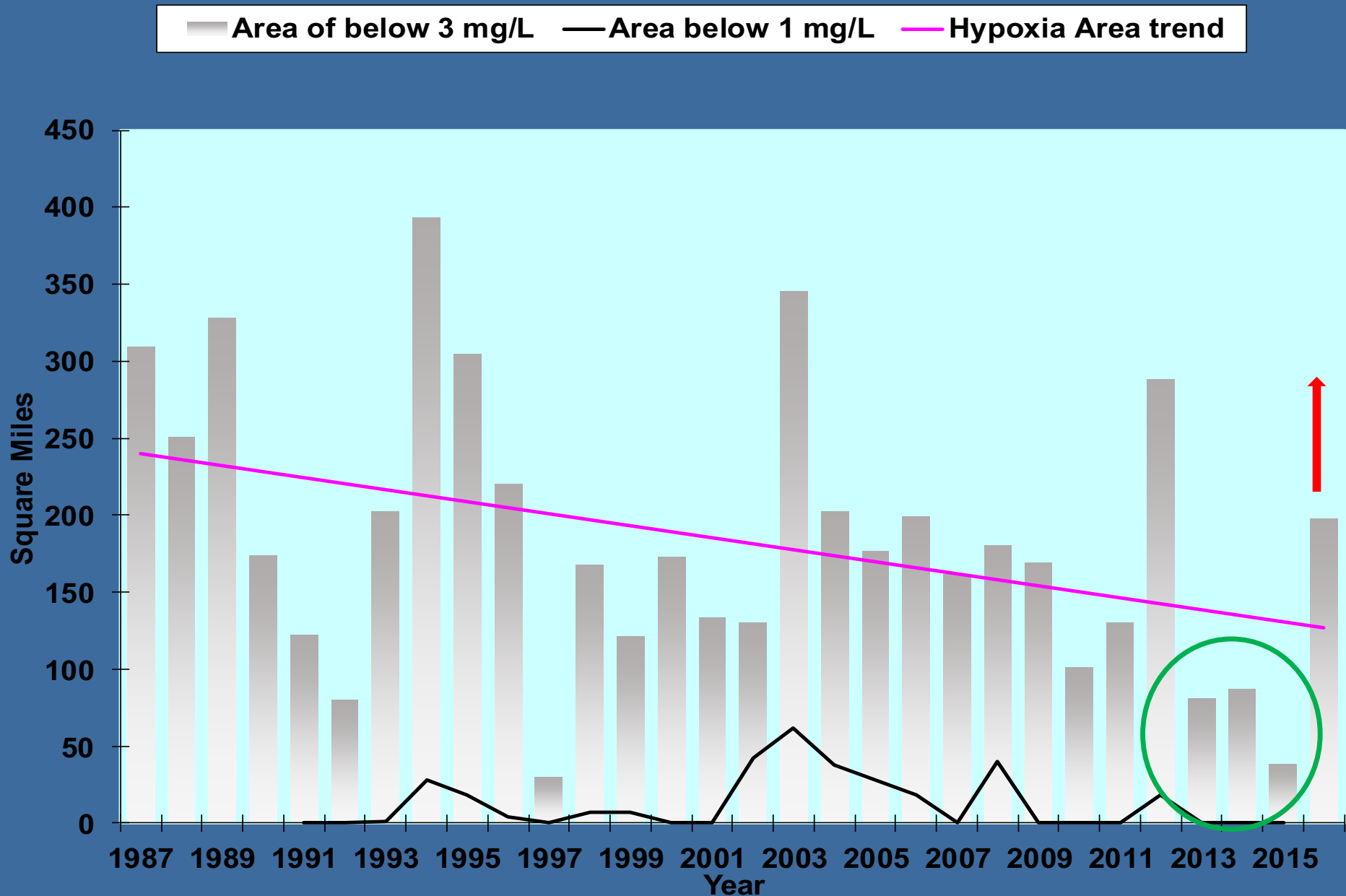
CT WWTPs – Meeting the TMDL

Monthly Average Total Equalized Nitrogen Loading to Long Island Sound



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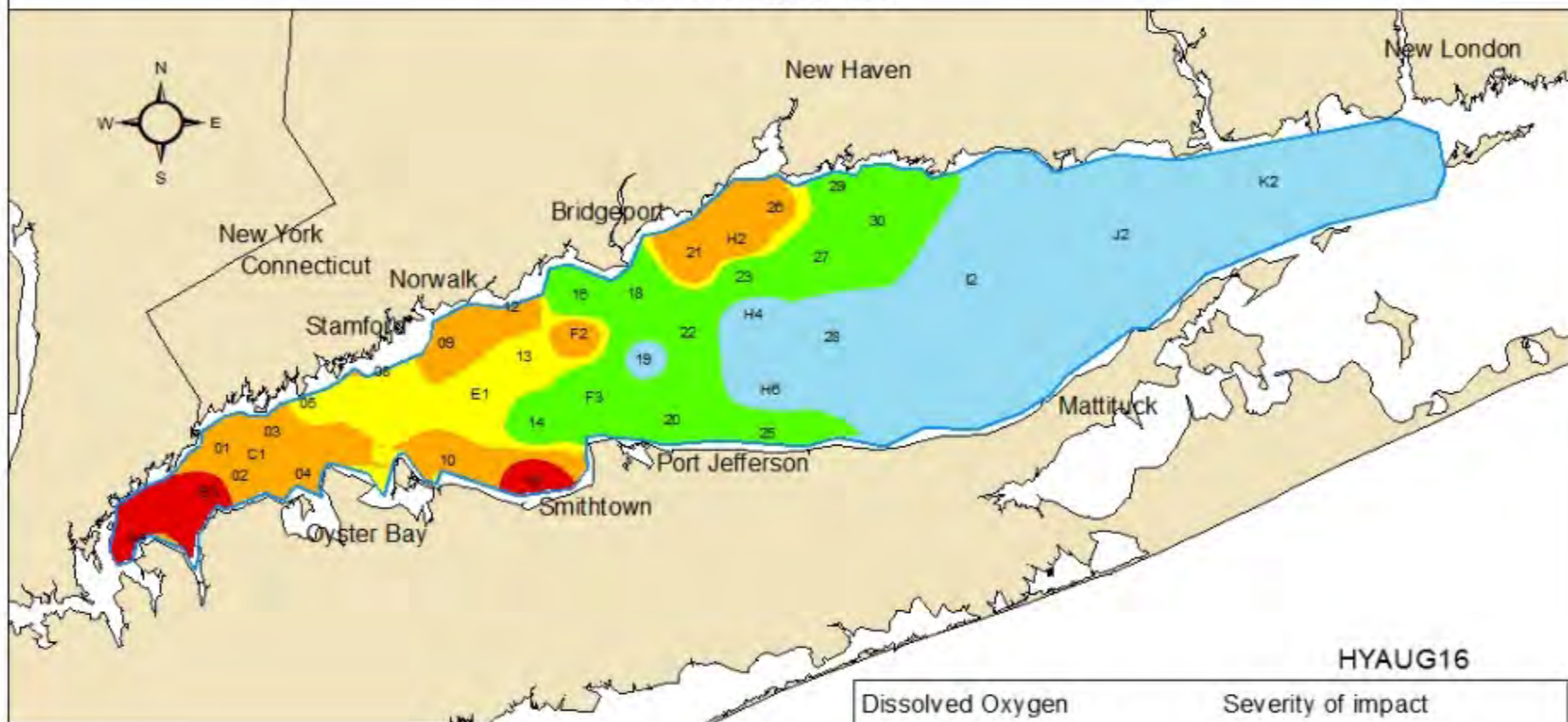
LIS Hypoxic Area Trend





Dissolved Oxygen in Long Island Sound Bottom Waters

16 & 18 August 2016



HYAUG16

Dissolved Oxygen

0.0 - 0.99
1.0 - 1.99
2.0 - 2.99
3.0 - 3.49
3.5 - 4.79
4.8+

Severity of impact

Severe
Moderately severe
Moderate
Marginal
Interim management goal
Excellent - Supportive of marine life

Overall Trends in Nitrogen Loading

Source	Trend	Description
WWTPs (CT/NY)	↓	88% of WLA target
Atm Deposition	↓	26% ↓ in TN, 50% ↓ in NO ₃
Agricultural	↓	25-40% ↓ in fertilizer and livestock
Urban Stormwater	↗	2-3% ↑ in impervious areas
Septic	↗	8% ↑ in basin population (1990-2010)
Turf Fertilizer	↗	1-2% ↑ in turf/grass areas

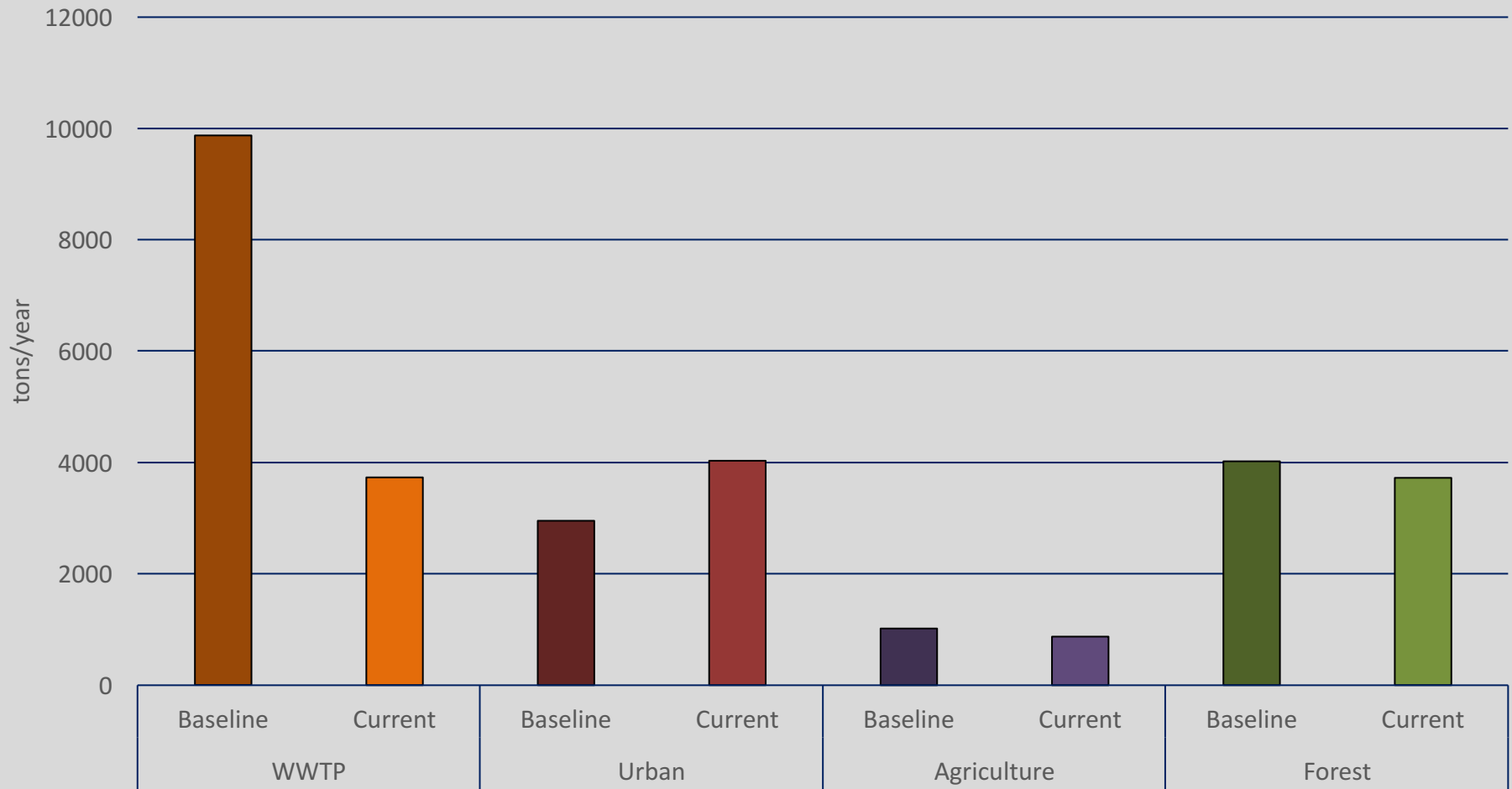
Source: Long Island Sound Study, 2013



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CT Nitrogen Loading- Shifting Priorities

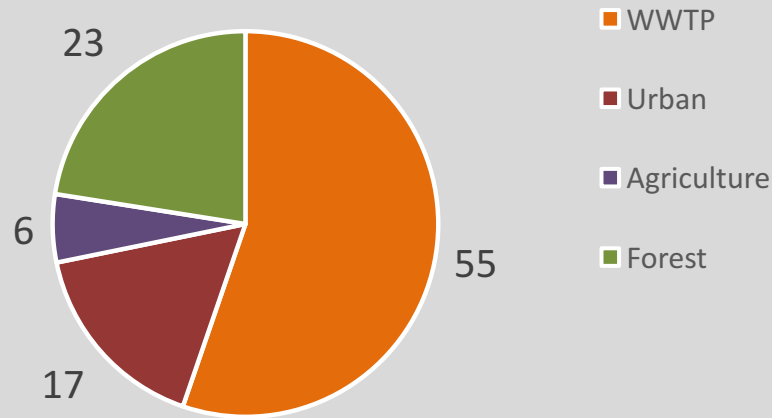
Connecticut Nitrogen Load- Baseline & Current



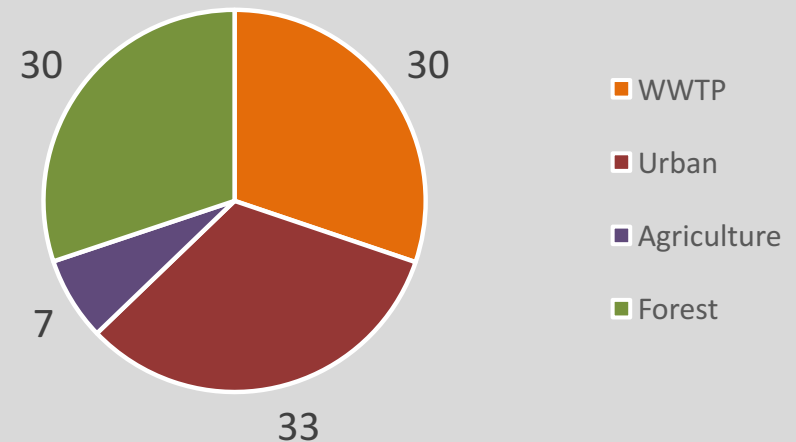
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Nitrogen Loading- Shifting Priorities

CT Baseline Nitrogen Percentages



CT Current Nitrogen Percentages



EPA Nitrogen Reduction Strategy

- Complement LIS TMDL N management initiatives by addressing other eutrophication related impacts.
- Develop numeric N thresholds that are protective of designated uses
- Set N reduction targets and allocations where necessary to meet the N thresholds
- Continue efforts to increase oxygen in WLIS
- Contract is in place – First Phase

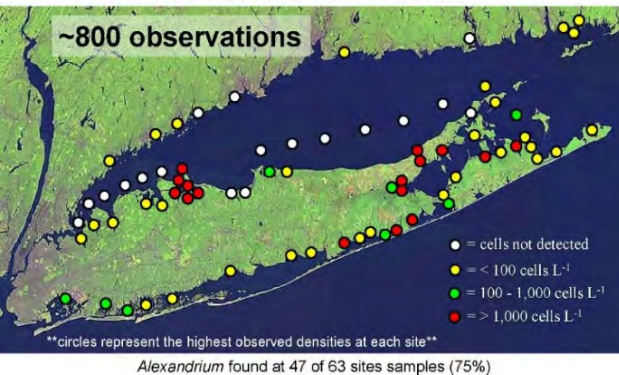


LONG ISLAND SOUND STUDY

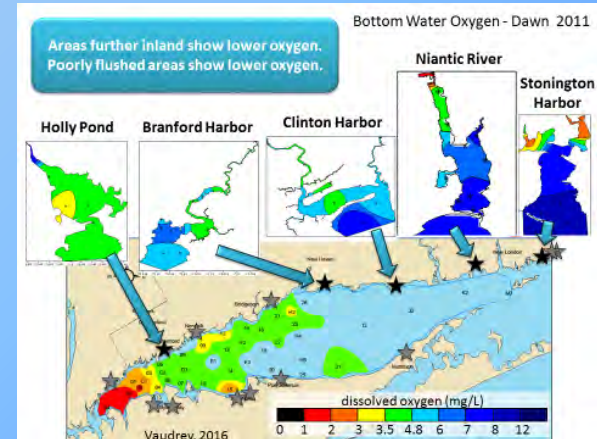
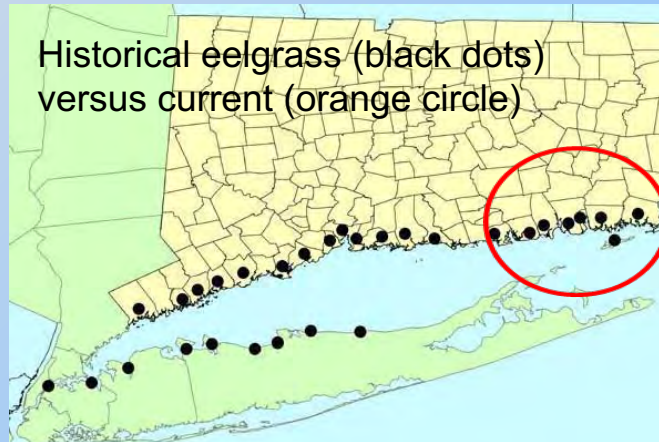
A PARTNERSHIP TO RESTORE AND PROTECT THE SOUND

Other eutrophication-related impairments

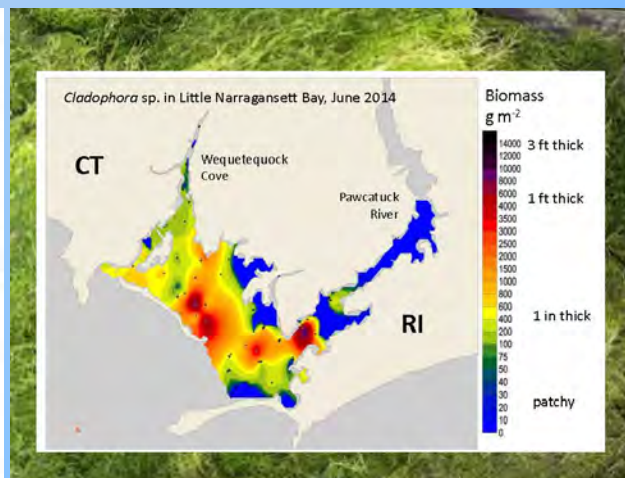
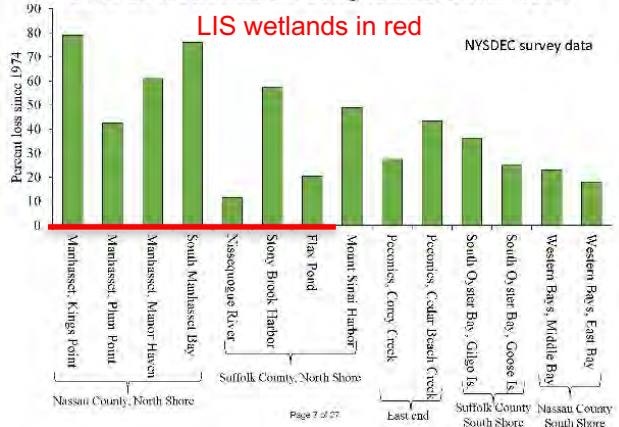
Presence of PSP-producing *Alexandrium* in LI and CT: 2007-2013



Historical eelgrass (black dots) versus current (orange circle)



Loss of wetlands on Long Island, since 1974

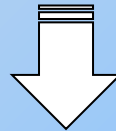
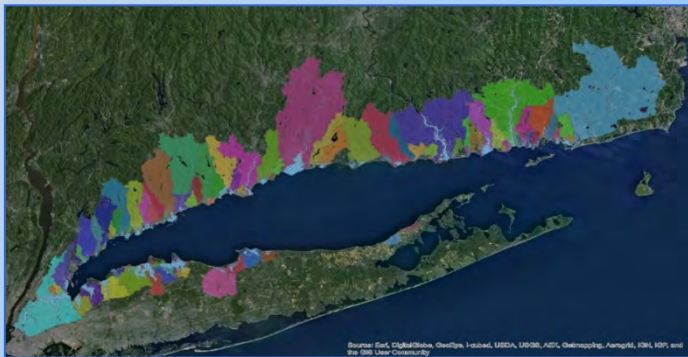


EPA Nitrogen Reduction Strategy

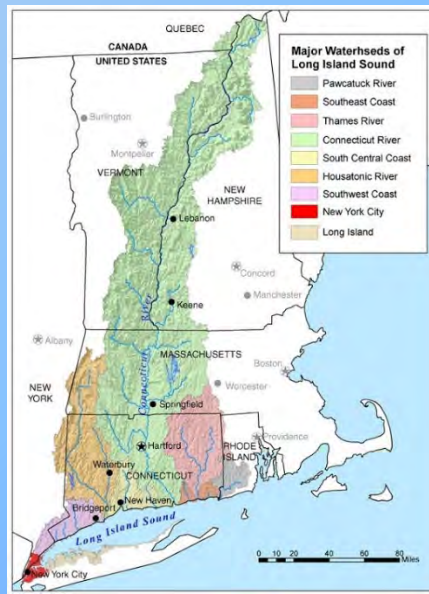
Customize the application of nitrogen thresholds to develop targets for each of three watershed groupings:



Coastal watersheds that directly drain to embayments or nearshore waters



Tributary watersheds that drain inland reaches



WLIS coastal watersheds with large, direct discharging WWTFs



CT 2nd Generation Nitrogen Strategy

1) Wastewater Treatment Plants

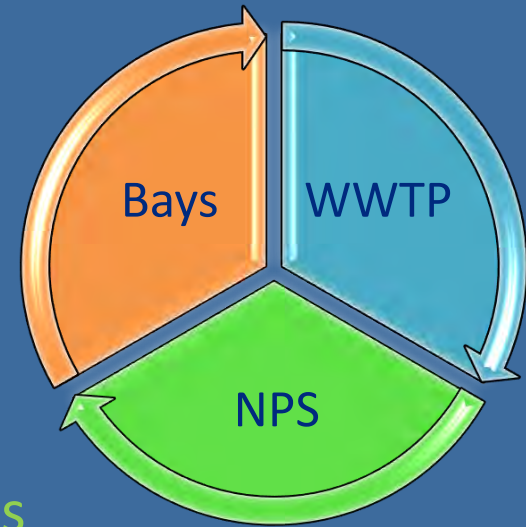
- Complete new planned upgrades
- Continue to operate trading program

2) Enhance NPS/Stormwater Mgt.

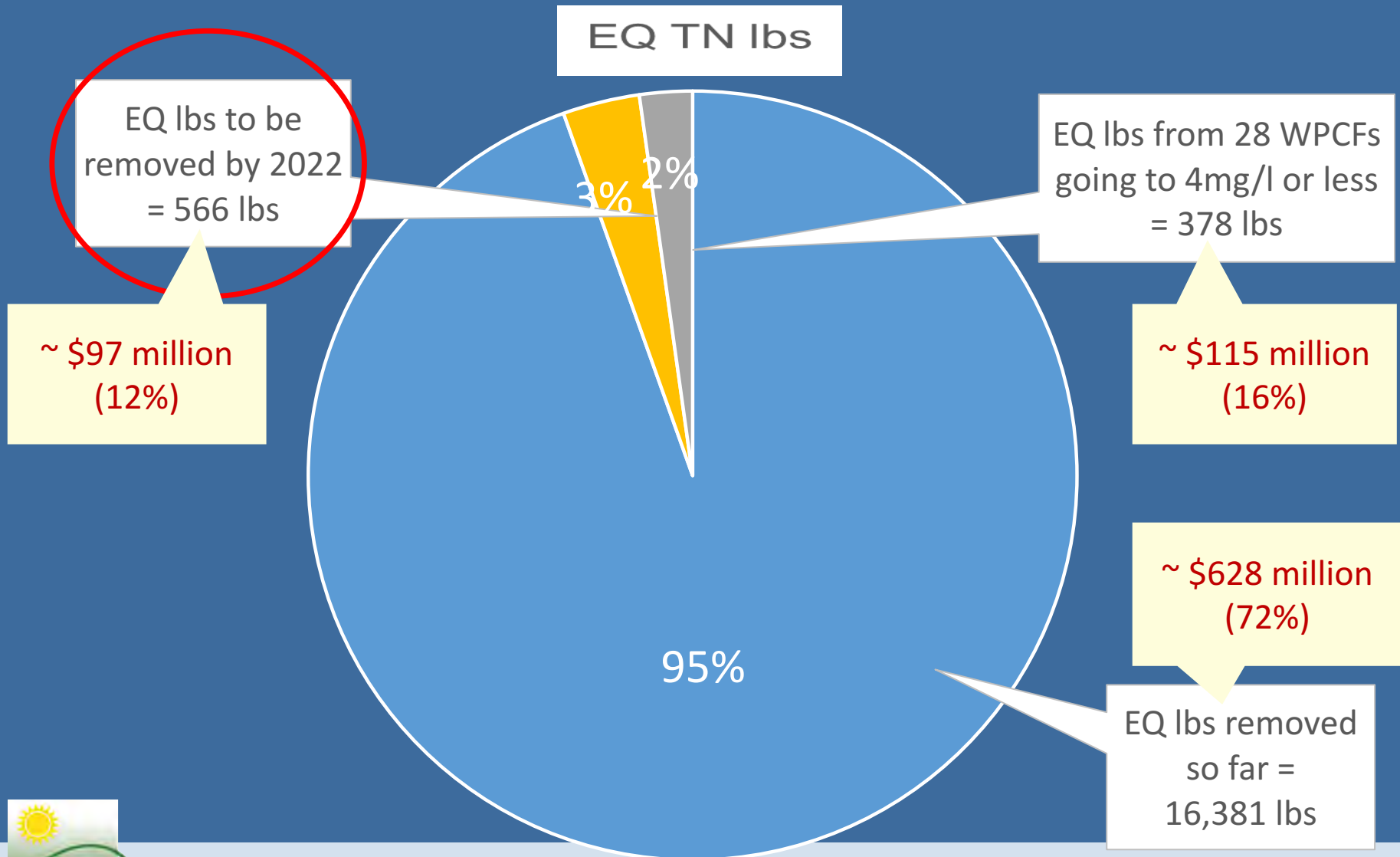
- Regulatory and non-regulatory measures

3) Focus on Embayments

- Outreach and short term management measures
- Enhance monitoring
- Prioritize embayments for analysis and TMDLs (or alternative action plans)



Wastewater Treatment Plants - TMDL Plus



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Curbing NPS Nitrogen

- Urban Stormwater
 - Implement 2015 Enhanced MS4 General Permit
 - Coverage, nitrogen, IC & retrofits, LID/GI
 - Finalize DOT General Permit (MS4 like)
 - Impervious Cover Response Plan
 - DEEP and CLEAR Outreach/Tech. Assist.
- Septic Systems and Sewers Analysis
 - Continue coastal sewer plans and decentralized projects
 - Further assess SS loads and management options



Curbing NPS Nitrogen

- Turf and Fertilizer
 - Revisit regional nitrogen guidelines
 - Behavior change campaign
 - Outreach & Education



- Agriculture
 - Nutrient Management Plans
 - Animal waste distribution, value end products, energy digesters
 - NRCS coordination



Embayment Projects & Outreach

- Project with CLEAR/NEMO to communicate:
 - Eutrophication Susceptibility Study Results
 - Sources of Nitrogen (Fertilizers, Stormwater, OWTS)
 - Best Management Practices
 - Solicit input for local level actions
- Contract project to evaluate OWTS, nitrogen load, susceptibility to failures, and mgt. options
- Additional embayment monitoring, nitrogen assessments, and modeling



Niantic River Estuary Pilot Project

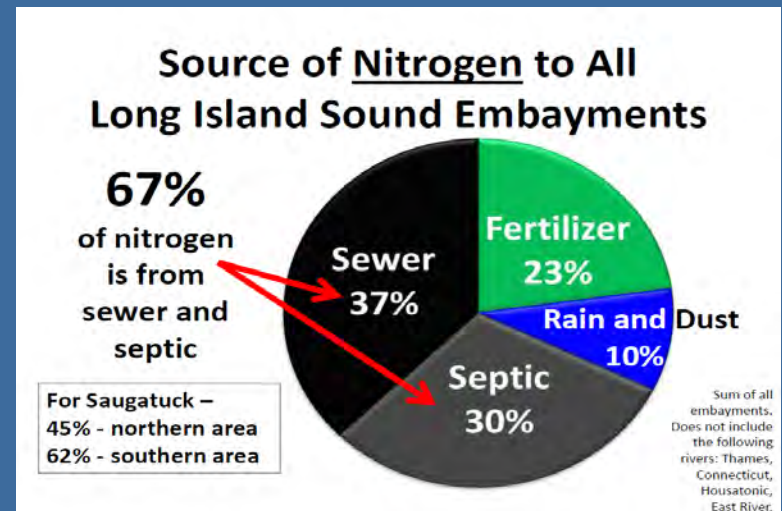
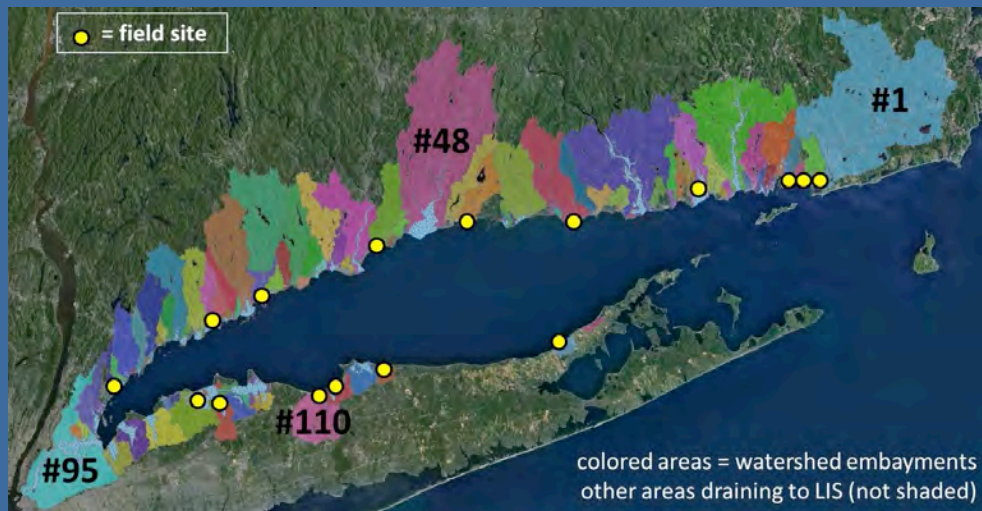
- Evaluate environmental impacts (eelgrass, hypoxia) and stressors (river flow, nutrients)
- Develop an estuary ecosystem model to link with watershed loading model
- Develop targets for nitrogen load protective of eelgrass
- Evaluate mitigation strategies
- Assess the transferability to other CT embayments



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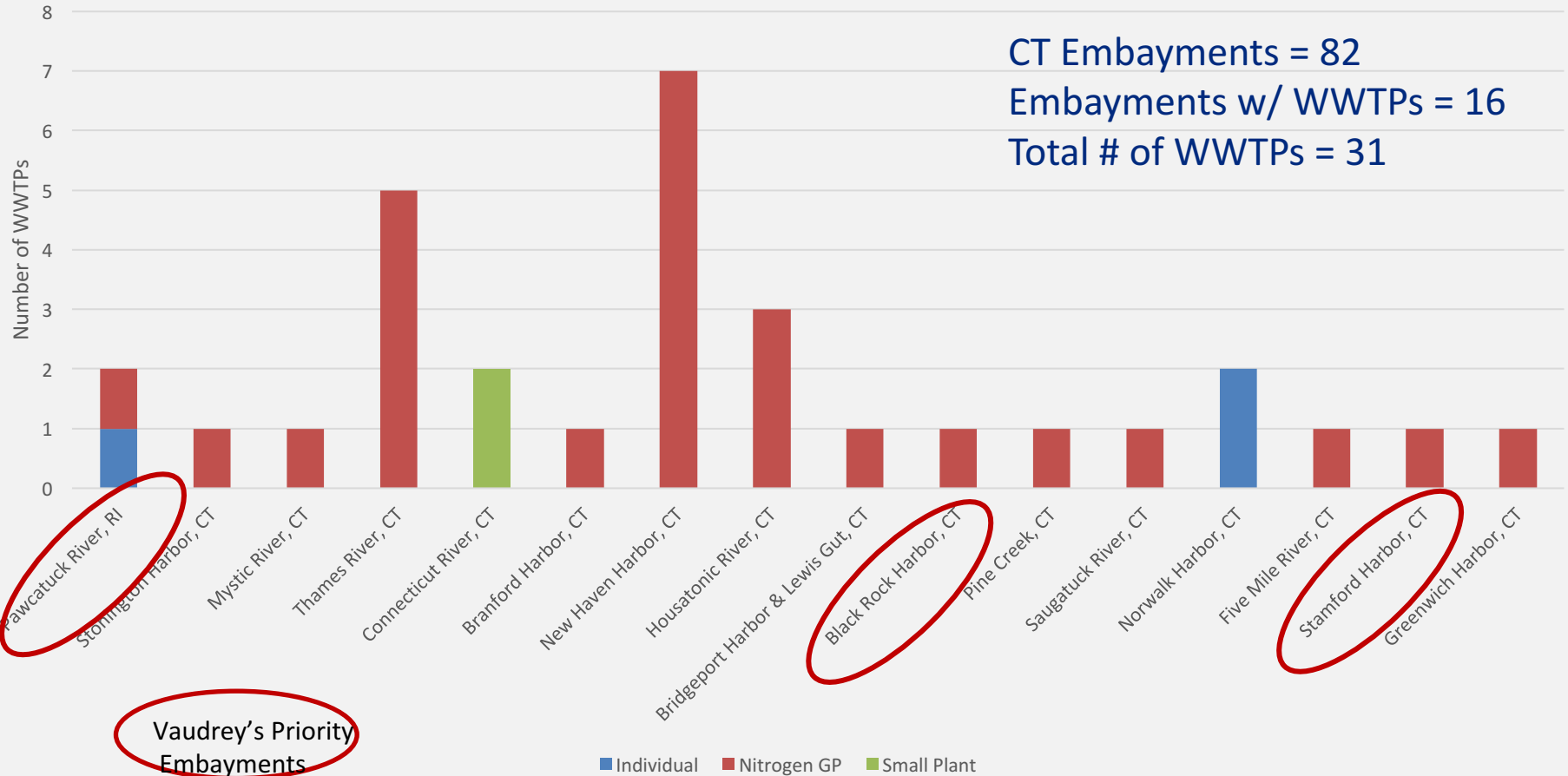
UConn Eutrophication Susceptibility Study

- Estimated Nitrogen Load (total and normalized) for 116 Embayment Segments
- Determined Potential Sources of Nitrogen to Embayments
- Predicted Potential Embayment Eutrophication
- Identified 16 CT Embayments of Concern



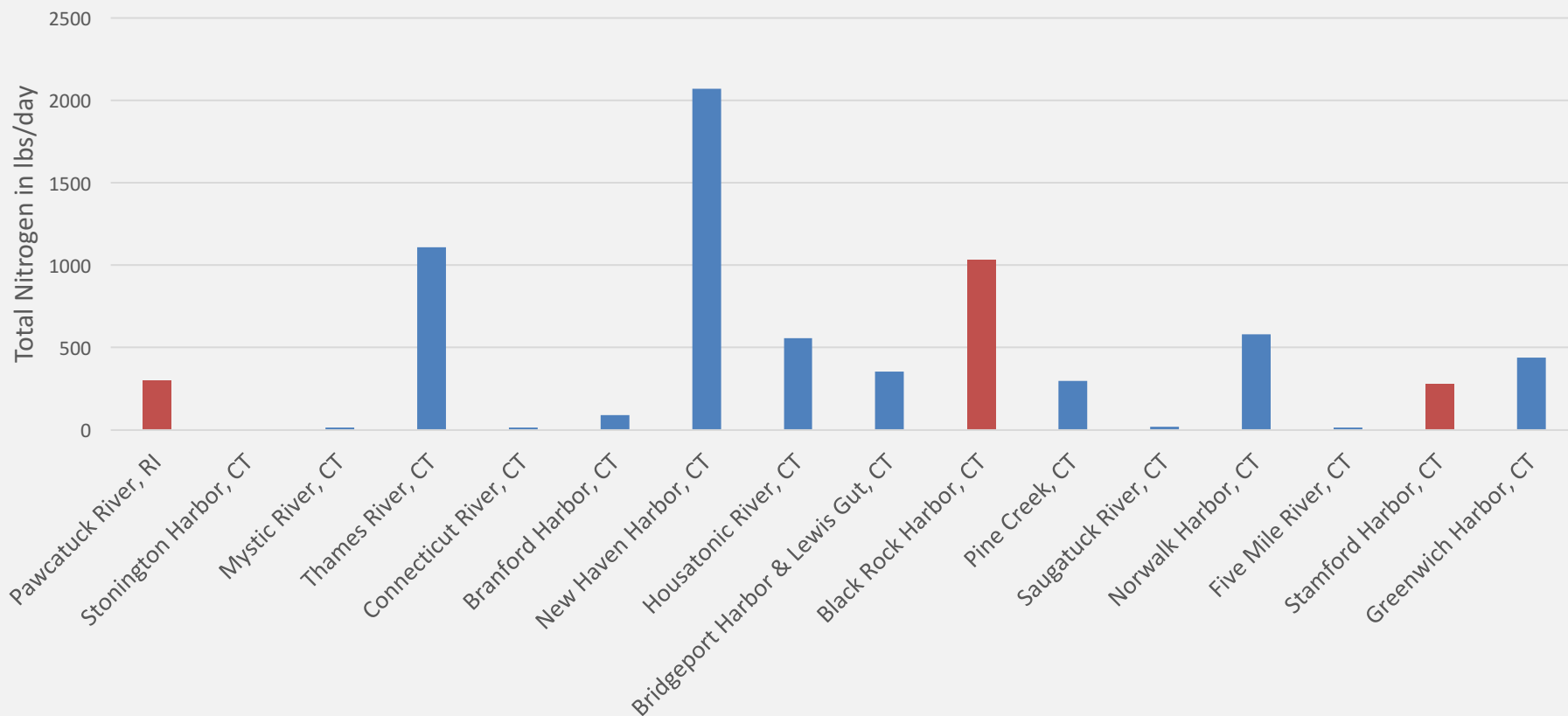
Embayments with WWTP Discharges

Embayments with WWTPs and Type of WWTP



WWTP Load to Embayment

Wastewater Treatment Plant Nitrogen Load (2015) to Embayments

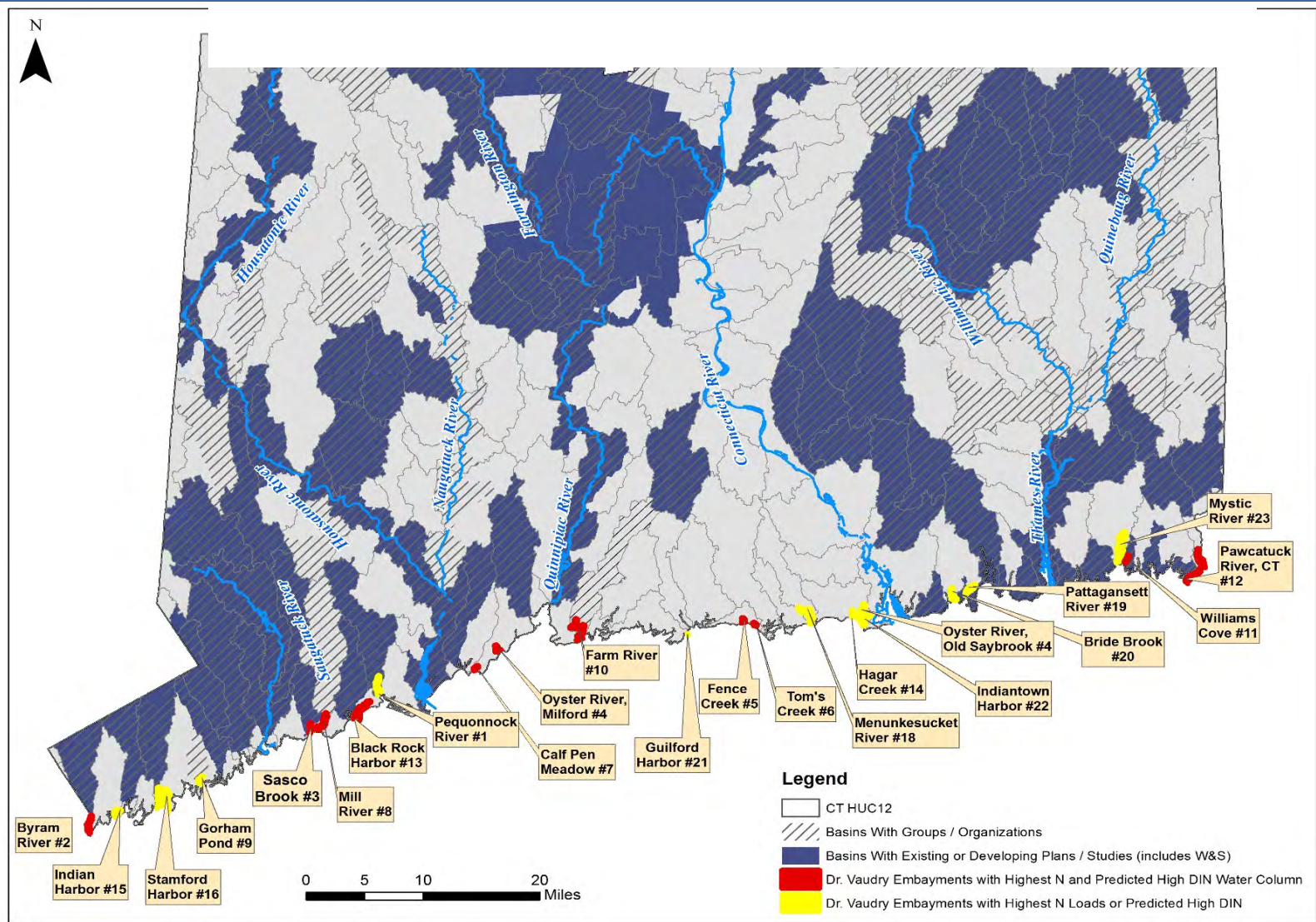


Priority Embayments Based on N load per Embayment Area



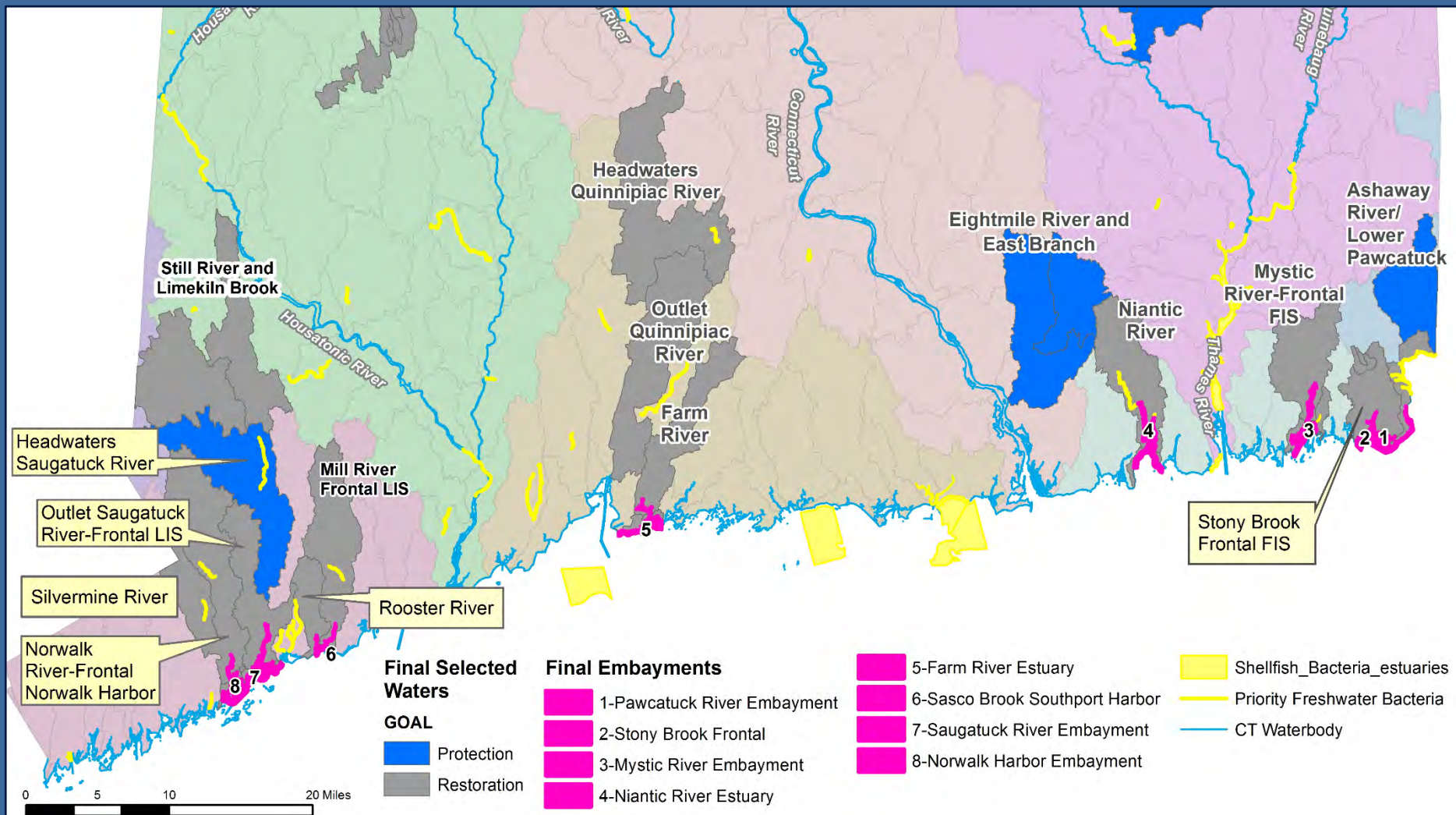
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Prioritizing of Embayments



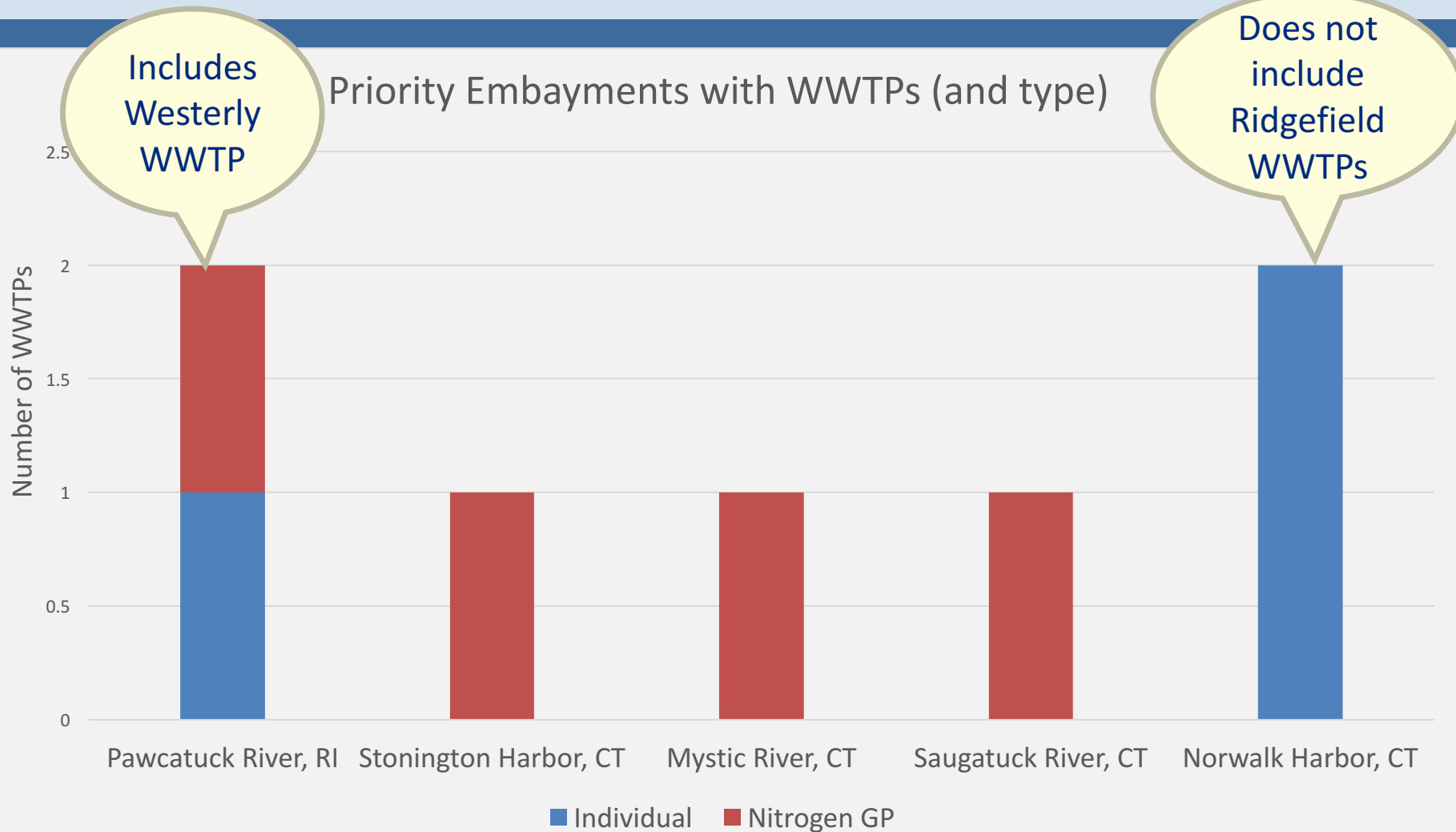
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Priority Embayments



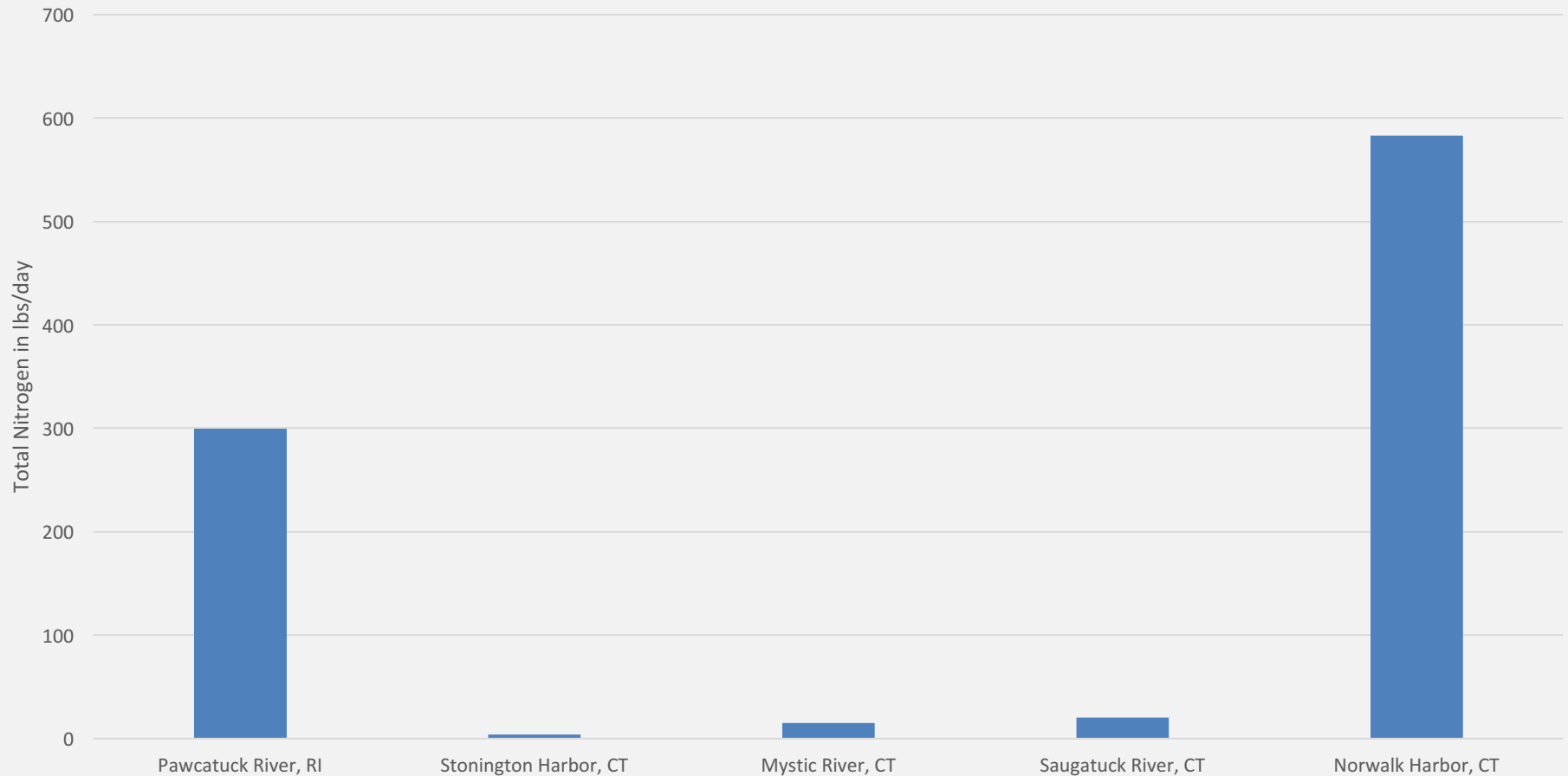
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Priority Embayments with WWTP



WWTP N Load to Priority Embayments

Wastewater Treatment Plant Nitrogen Load (2015) to Priority Embayments



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Summary N Reduction Efforts

- WWTP – TMDL plus
- Individual permit limits for WWTPs directly discharging to priority embayments
- Additional NPS/SW reductions of N
- TMDLs (or alternatives) for embayments



Your Sound – Your Waters – Your Plan



Workshop Dates

✓ August 8, 2-3:30 - Waterford Town Hall Auditorium

August 15, 2-3:30 - SCRCOG Conference Room –
North Haven

August 22, 2-3:30 - Westport Town Hall Auditorium



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Web Resources

EPA Nitrogen Reduction Strategy:

<http://longislandsoundstudy.net/issues-actions/water-quality/nitrogen-strategy/>

Long Island Nitrogen Action Plan:

<http://www.dec.ny.gov/lands/103654.html>

CTDEEP Second Generation Nitrogen Strategy:

Coming soon to DEEP website

<http://www.ct.gov/deep/site/default.asp>

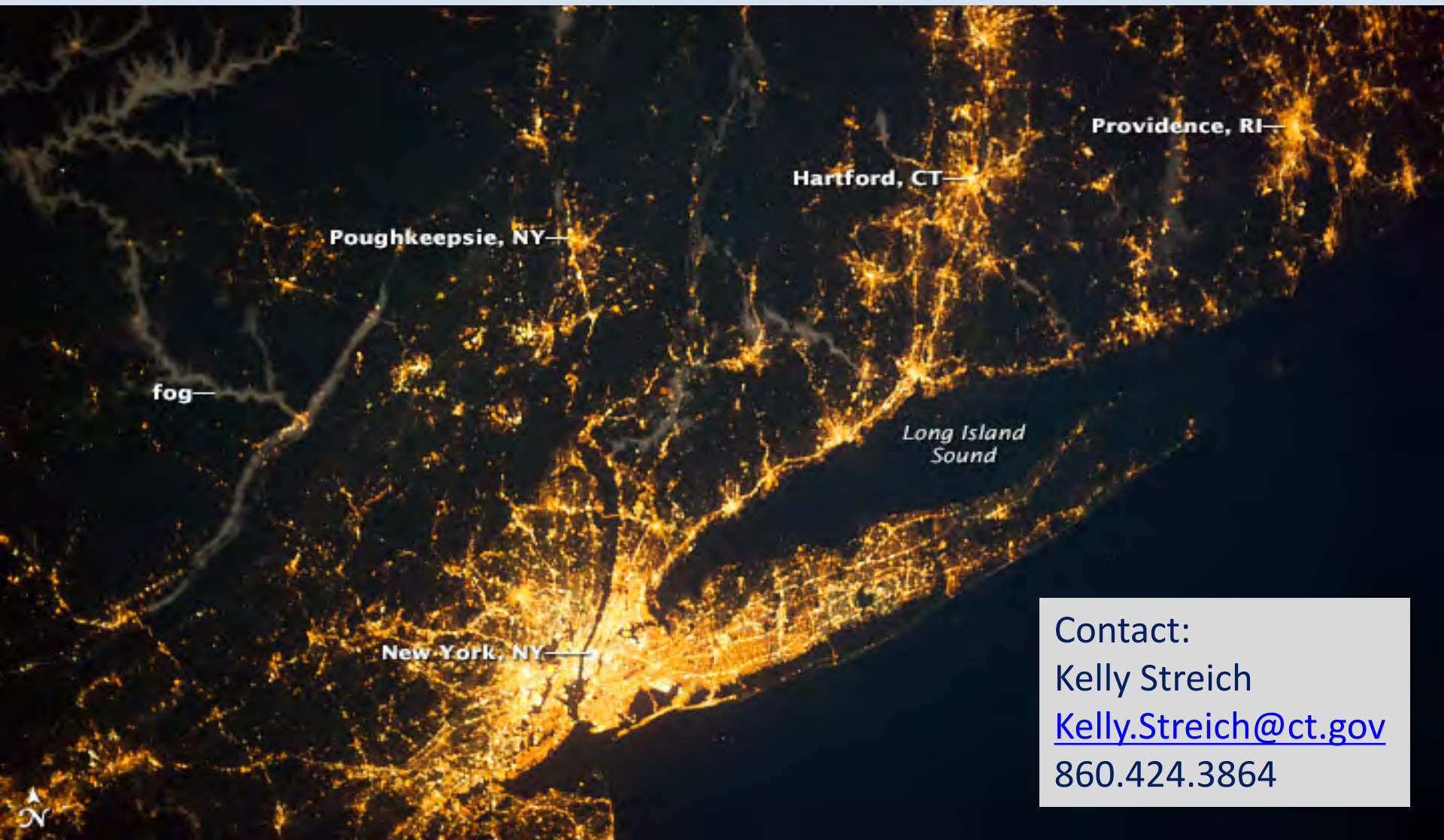
Uconn Eutrophication Susceptibility Study:

<http://vaudrey.lab.uconn.edu/research/#active>
(also includes Niantic River Estuary Study)



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? Questions ?



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