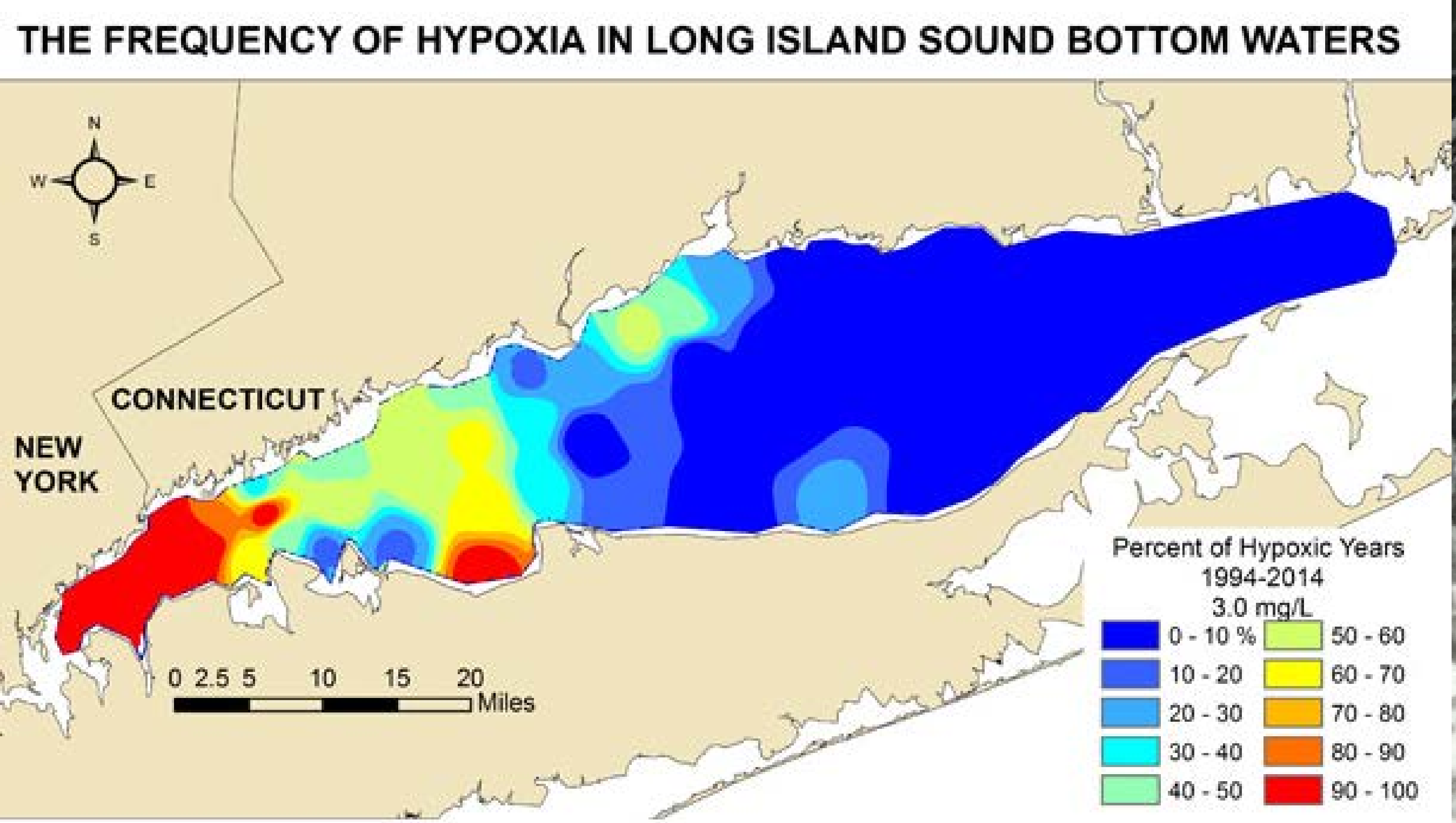

Making Progress on
Nitrogen Reduction Strategy for
Long Island Sound
Public Webinar
December 19, 2016
Penfield Reef Lighthouse

Presentation Overview

- **Summarize the nitrogen strategy**
- **Outline technical process and products**
- **Highlight schedule & information resources**
- **Questions**

Long Island Sound | New London, CT

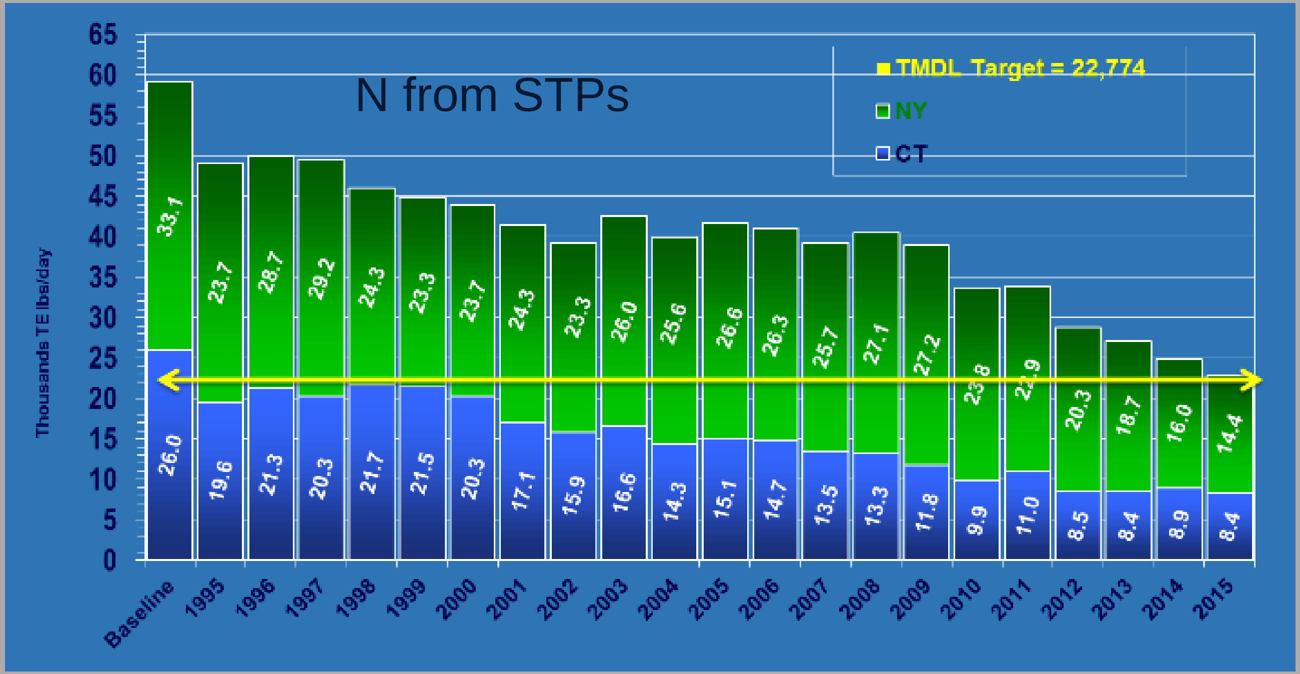


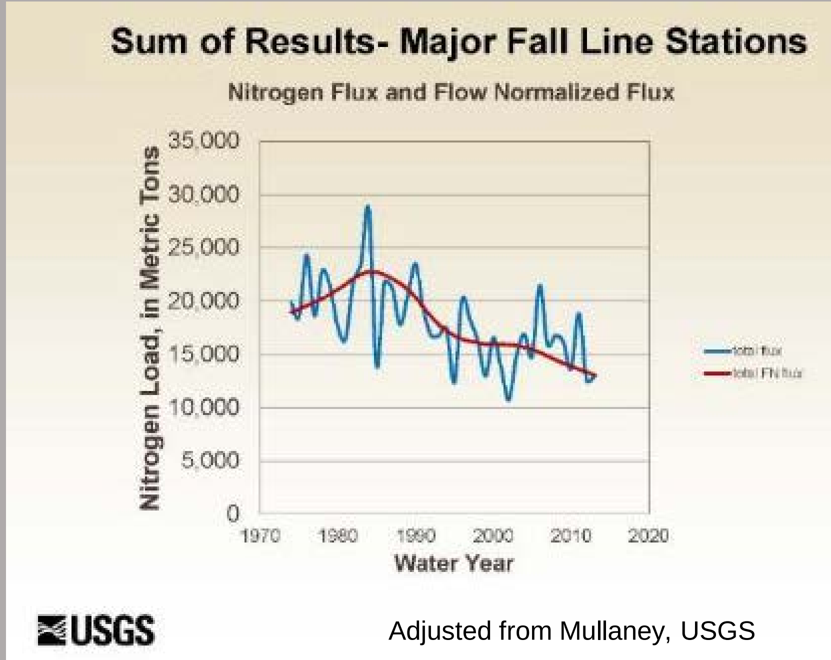
Menhaden fish kill, 1990s

Success: Declines in big sources of nitrogen

Challenge: diffuse sources

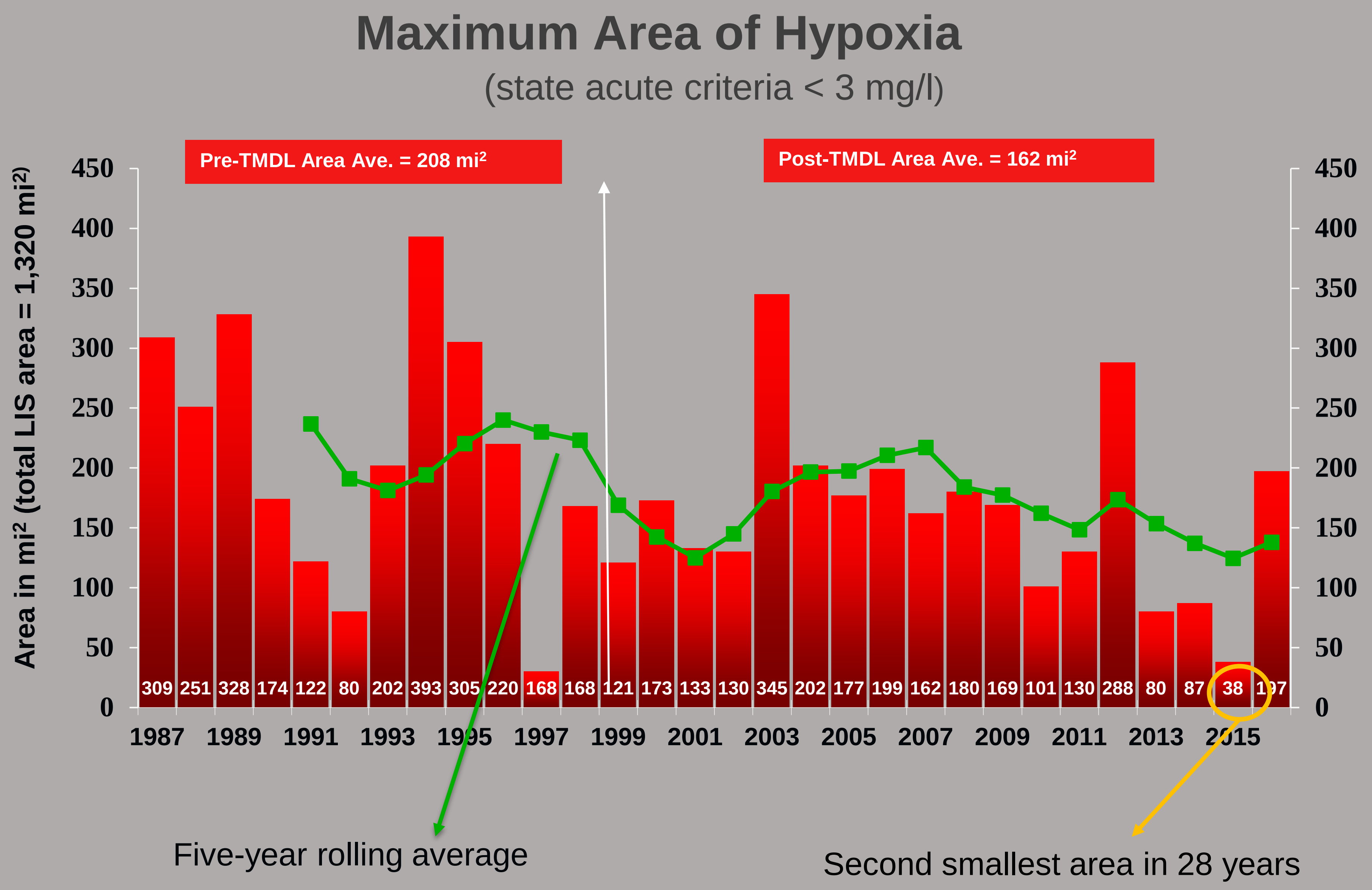
Source	Trend	Description
Sewage Treatment Plants (CT, NY)	↓	98% of WLA trade equalized target
Atm. Deposition	↓	26% ↓ TN, 50% ↓ NO_3
Agricultural	↓	25-40% ↓ in fertilizer and livestock
Urban storm water	↗	2-3% ↑ in impervious areas
Septic	↗	8% ↑ in basin population (1990-2010)
Turf Fertilizer	↗	1-2% ↑ in turf/grass areas



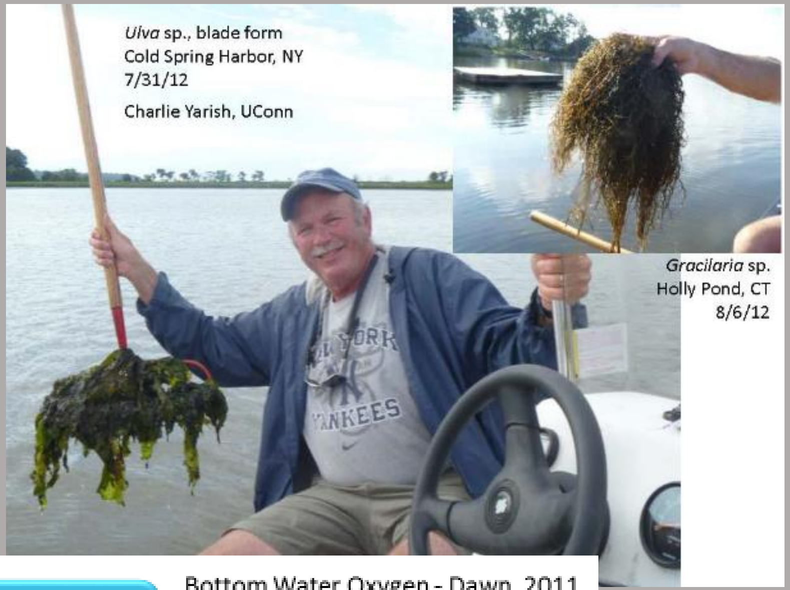


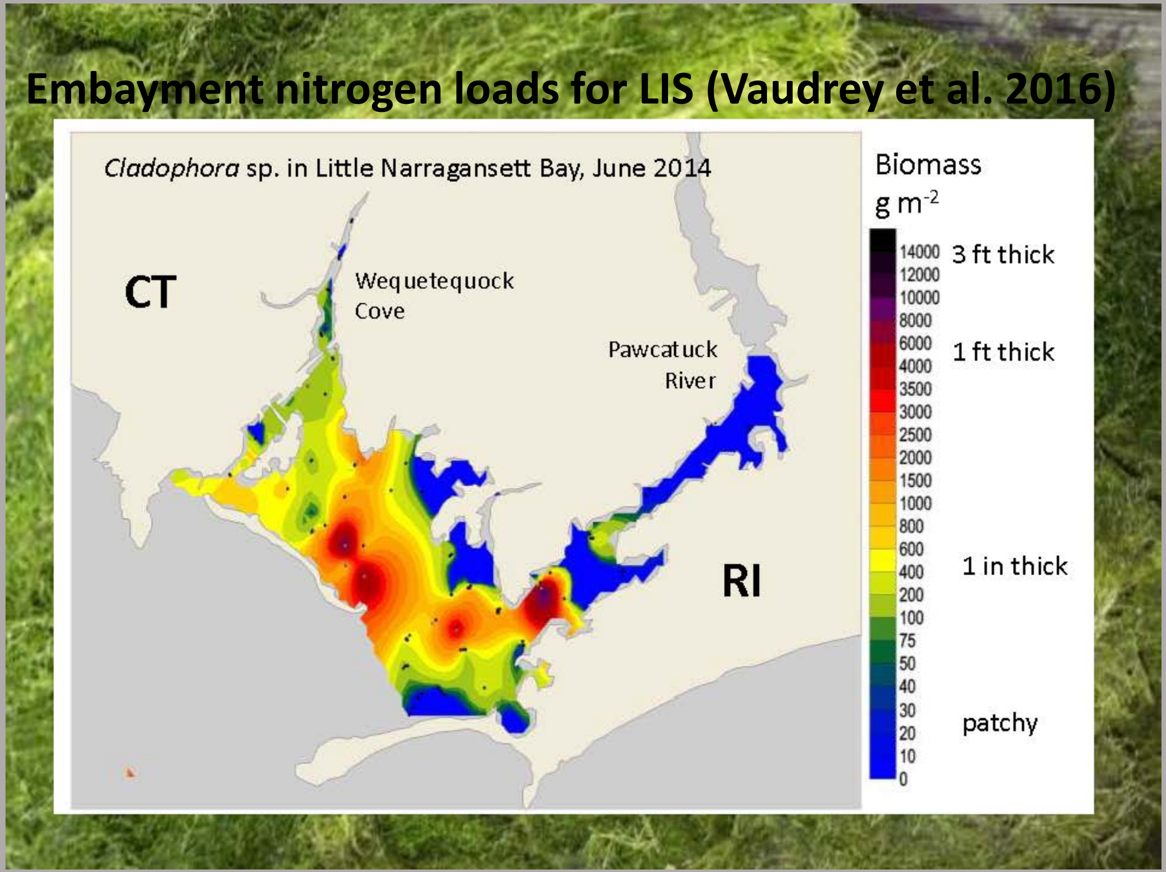
Adjusted from Mullaney, USGS

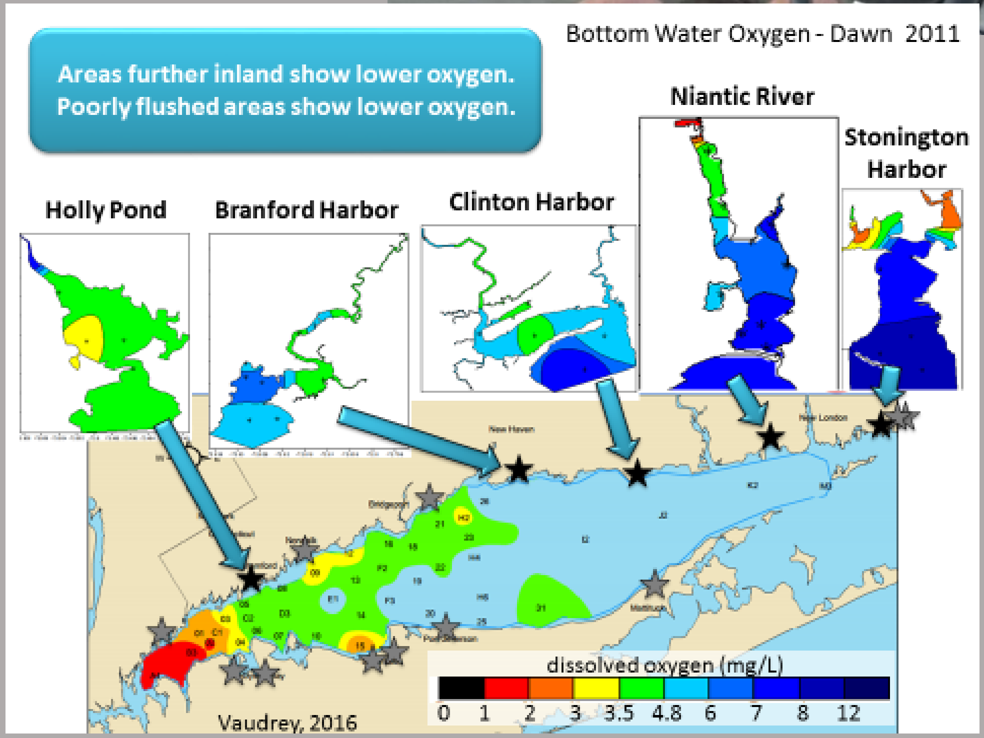
Success: Hypoxia less severe



Despite this good progress & positive trends, all the monitoring & modeling show that there is still more to do.



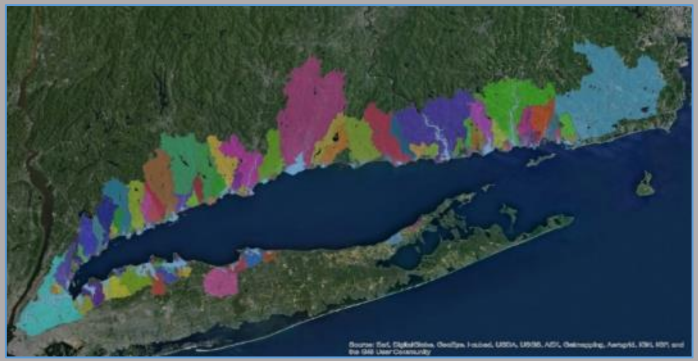




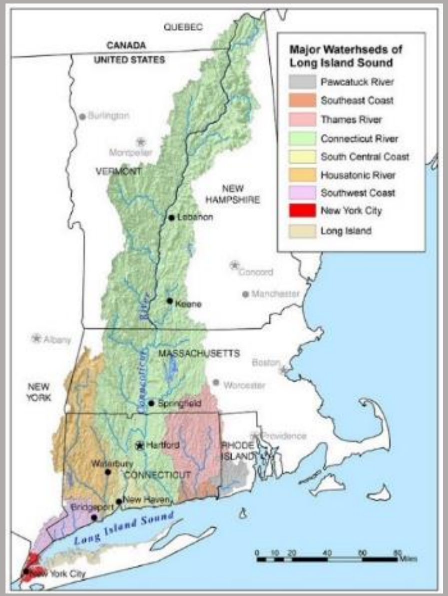
Nitrogen Reduction Strategy

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

<ins>Coastal</ins> watersheds that directly drain to embayments or nearshore waters



<ins>Tributary</ins> watersheds that drain inland reaches



<ins>WLIS coastal</ins> watersheds with large, direct discharging sewage treatment plants

Future Challenges

- Setting numeric targets based on ecological goals
- Accountability while fostering local collaboration and innovation
- Building science feedback into adaptive implementation

Excessive Algae in Milford, CT

Application of a Technical Approach for Establishing Nitrogen Thresholds in LIS

USEPA

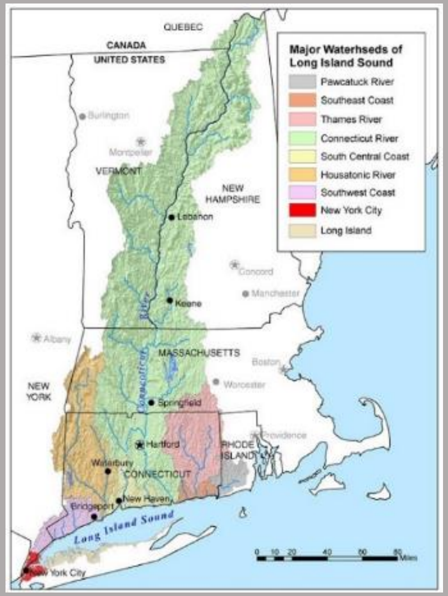
Tetra Tech Inc.

Mike Paul, PhD

Goal: Develop Nitrogen (N) loads to meet desired water quality conditions in the Long Island Sound (LIS)

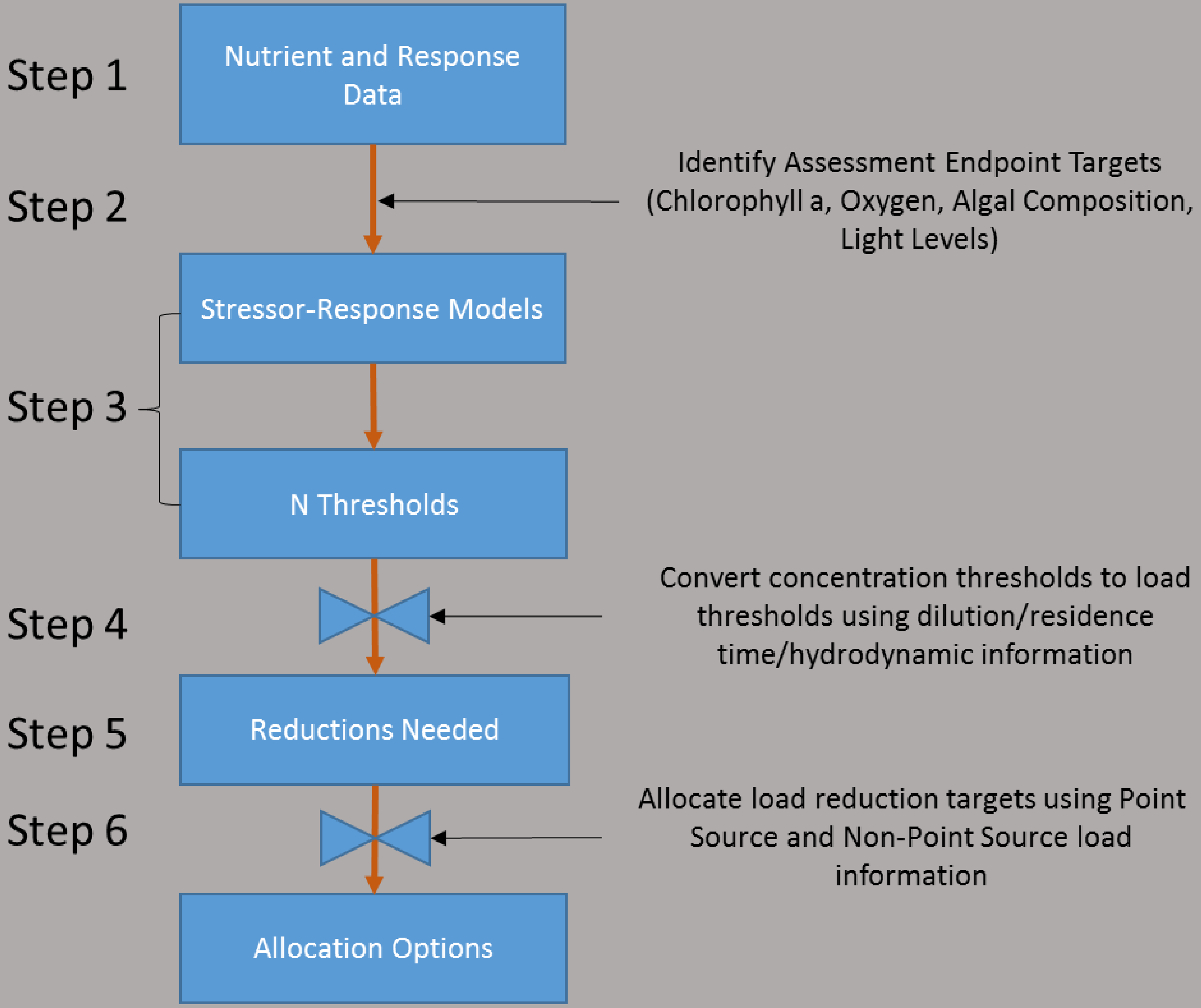
<u>Coastal</u> watersheds that directly drain to embayments or nearshore waters

<u>Tributary</u> watersheds that drain inland reaches



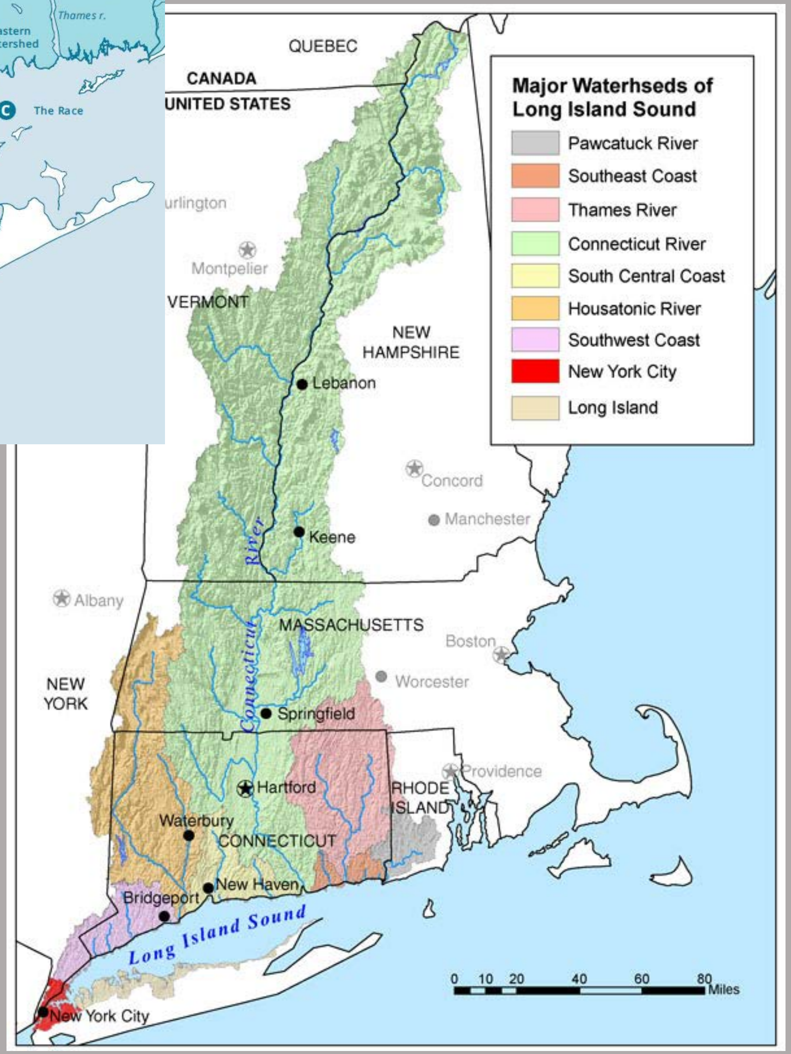
<u>WLIS coastal</u> watersheds with large, direct discharging wastewater facilities

Technical Approach



Step 1 – Assemble nutrient and endpoint data

- Nutrient data
  - Embayment loads
  - Permitted loads
  - Major tributary loads
  - Water quality data
  - Tributary areas of influence



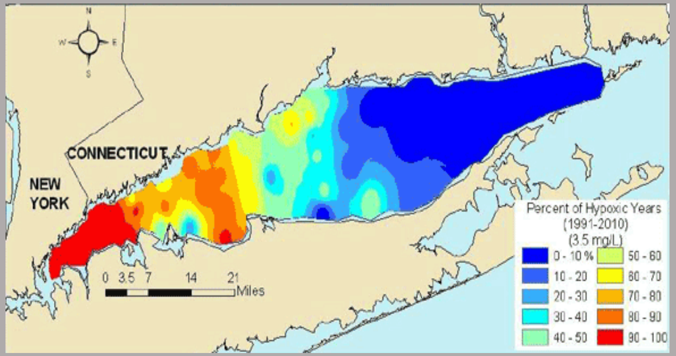
Step 1 – Assemble nutrient and endpoint data

- Assessment endpoints – embayments and sound

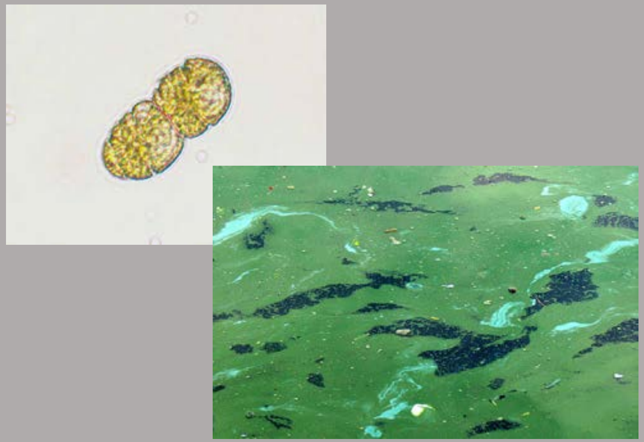
Seagrasses

Macroalgae

Dissolved Oxygen



Phytoplankton

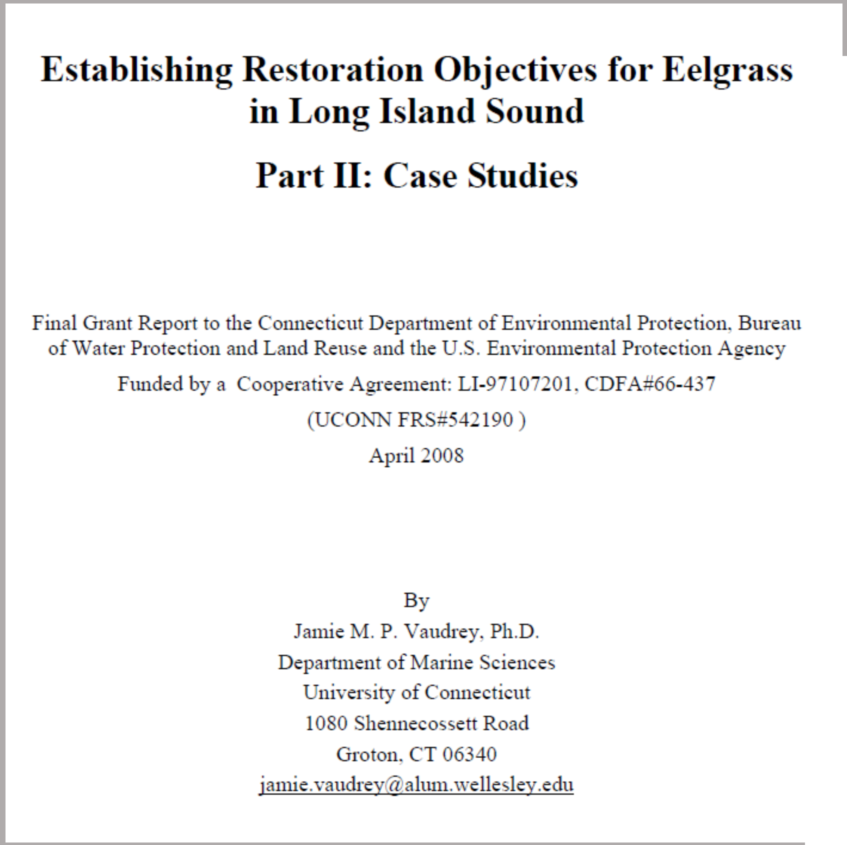


Step 2 – Identify numeric targets for assessment endpoints

- Assessment endpoint targets – embayments and sound

Vaudrey 2008

Seagrasses



Establishing Restoration Objectives for Eelgrass in Long Island Sound

Part II: Case Studies

Final Grant Report to the Connecticut Department of Environmental Protection, Bureau of Water Protection and Land Reuse and the U.S. Environmental Protection Agency

Funded by a Cooperative Agreement: LI-97107201, CDFA#66-437

(UCONN FRS#542190)

April 2008

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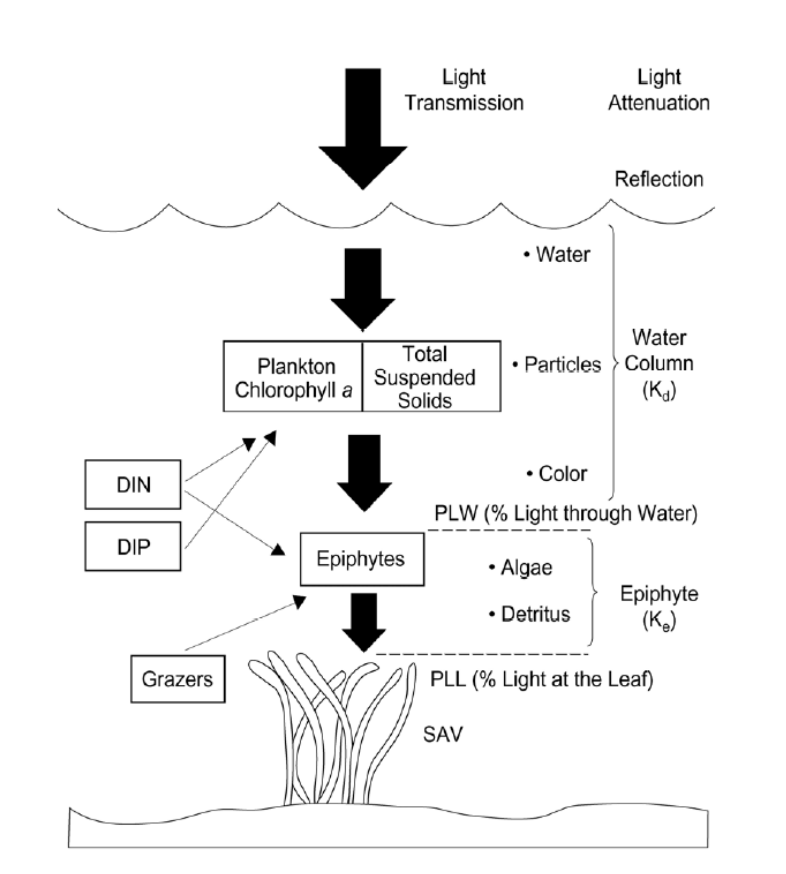
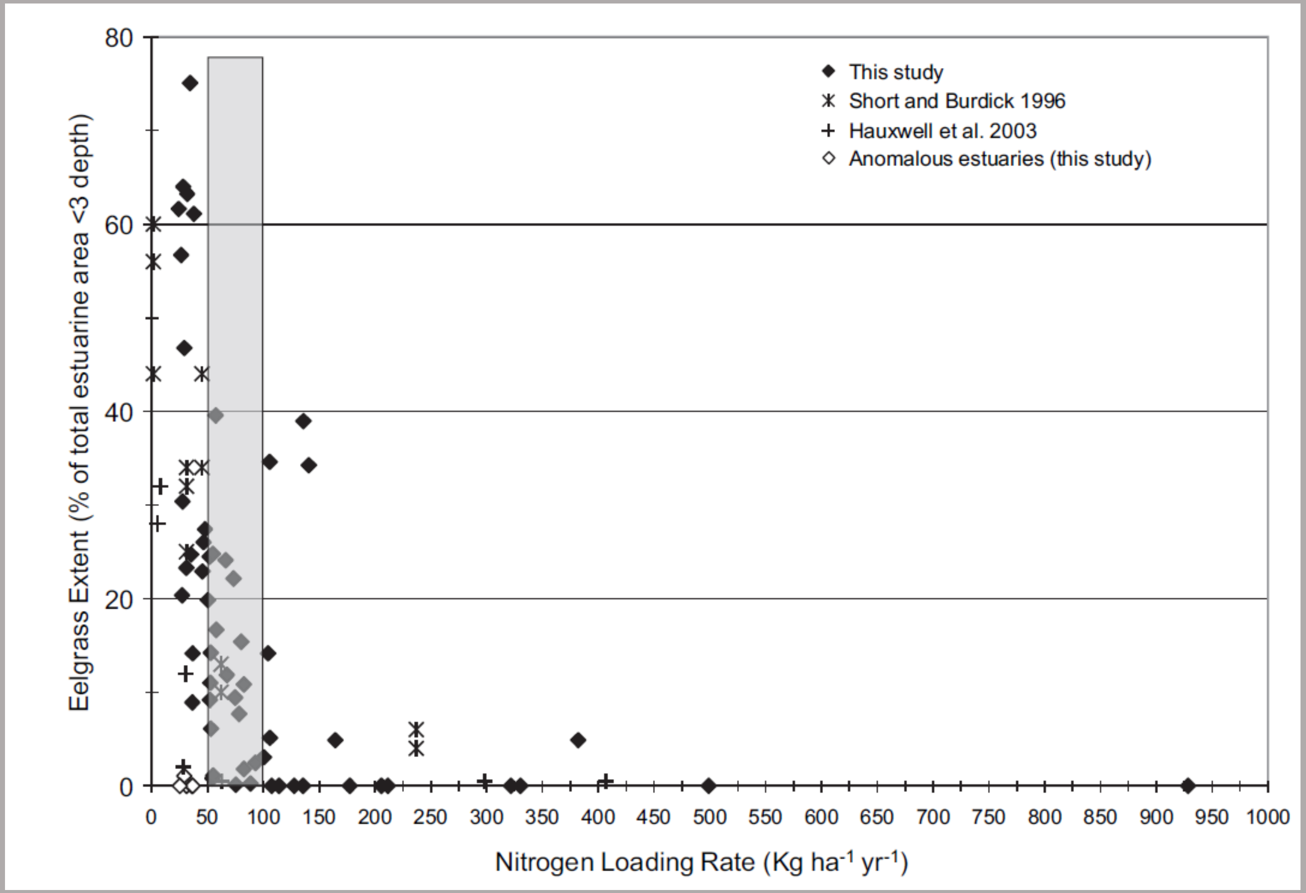


Step 3 – Stressor-response modeling

- Relate assessment endpoint targets to N concentrations/loads
- Identify N thresholds

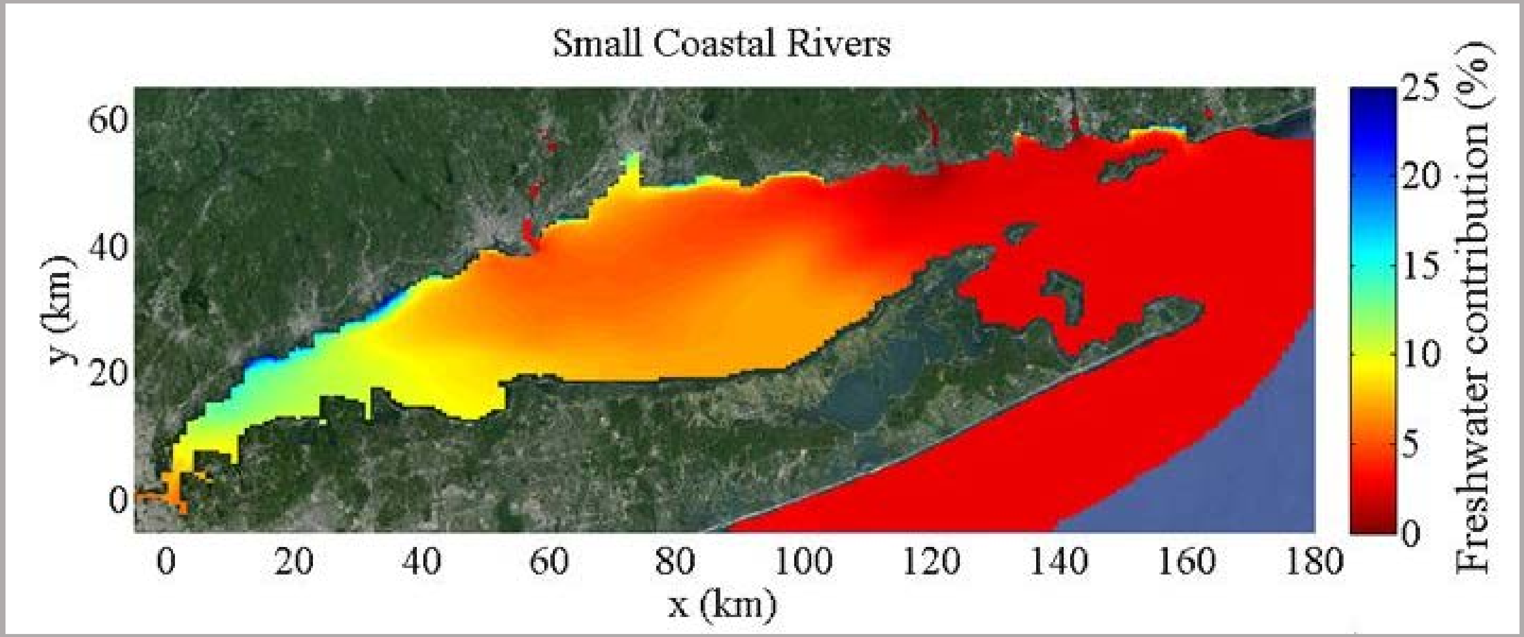
Seagrasses



Latimer and Rego 2010

Step 4 – Convert concentration thresholds to loads

- Relate assessment endpoint targets to N concentrations/loads
  - Residence time from hydrodynamic models

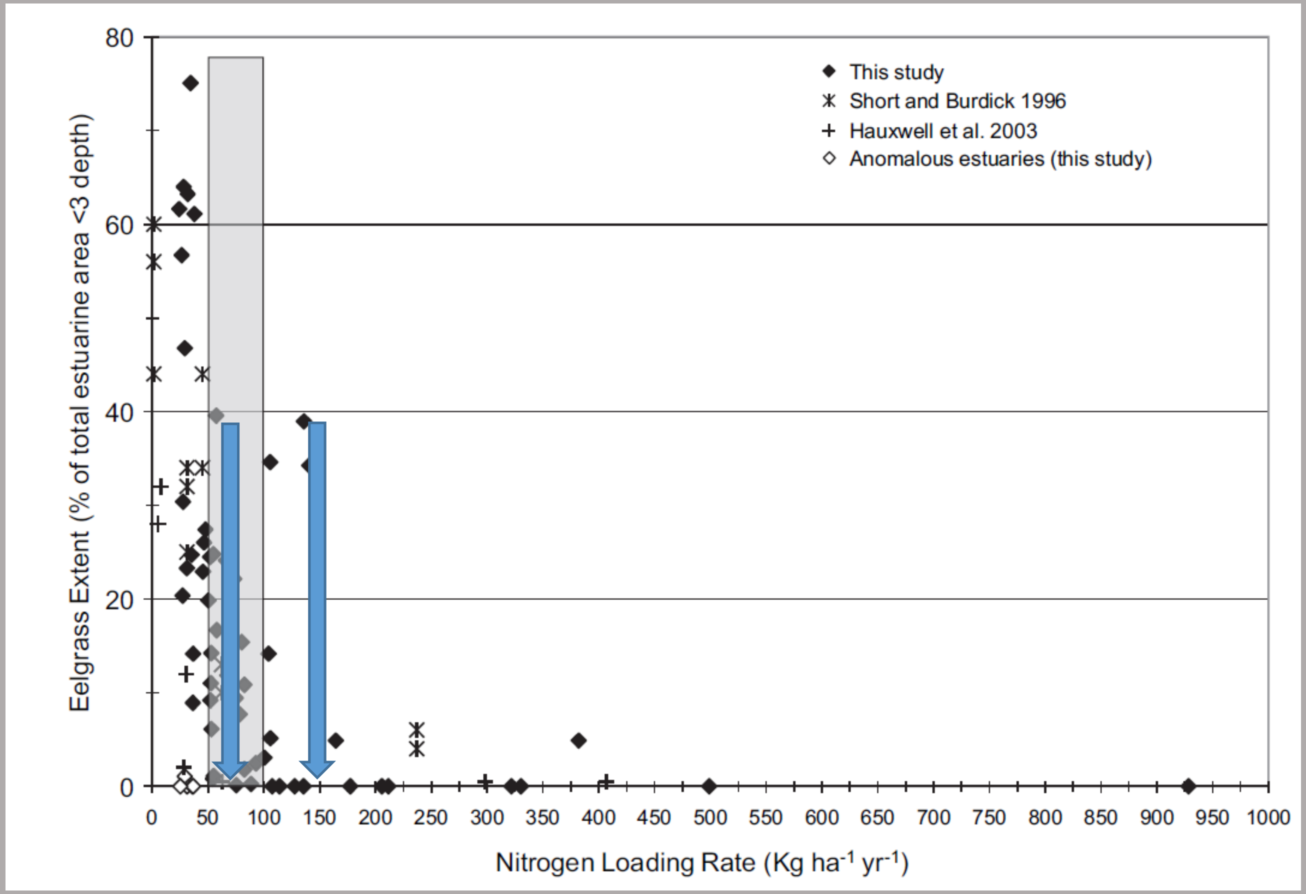


http://cprime.uconn.edu/nsfcareer/

Step 5 – Calculate reductions needed

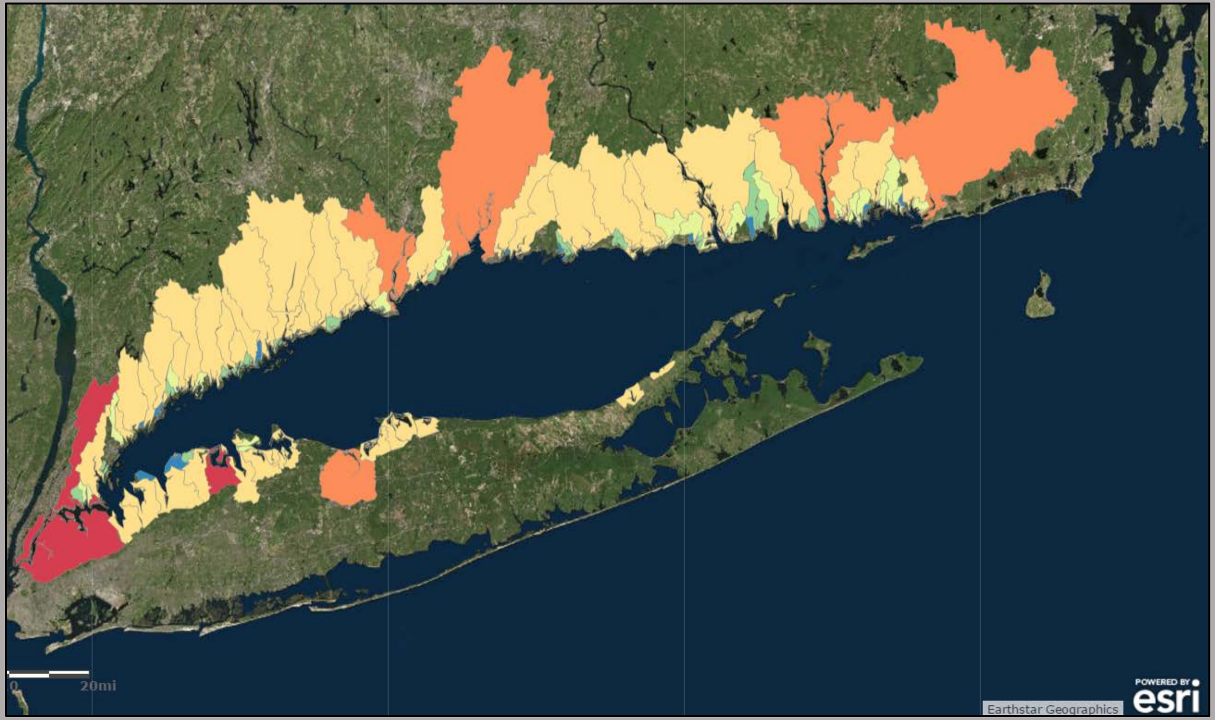
- Calculate load reductions needed to meet N thresholds

Seagrasses



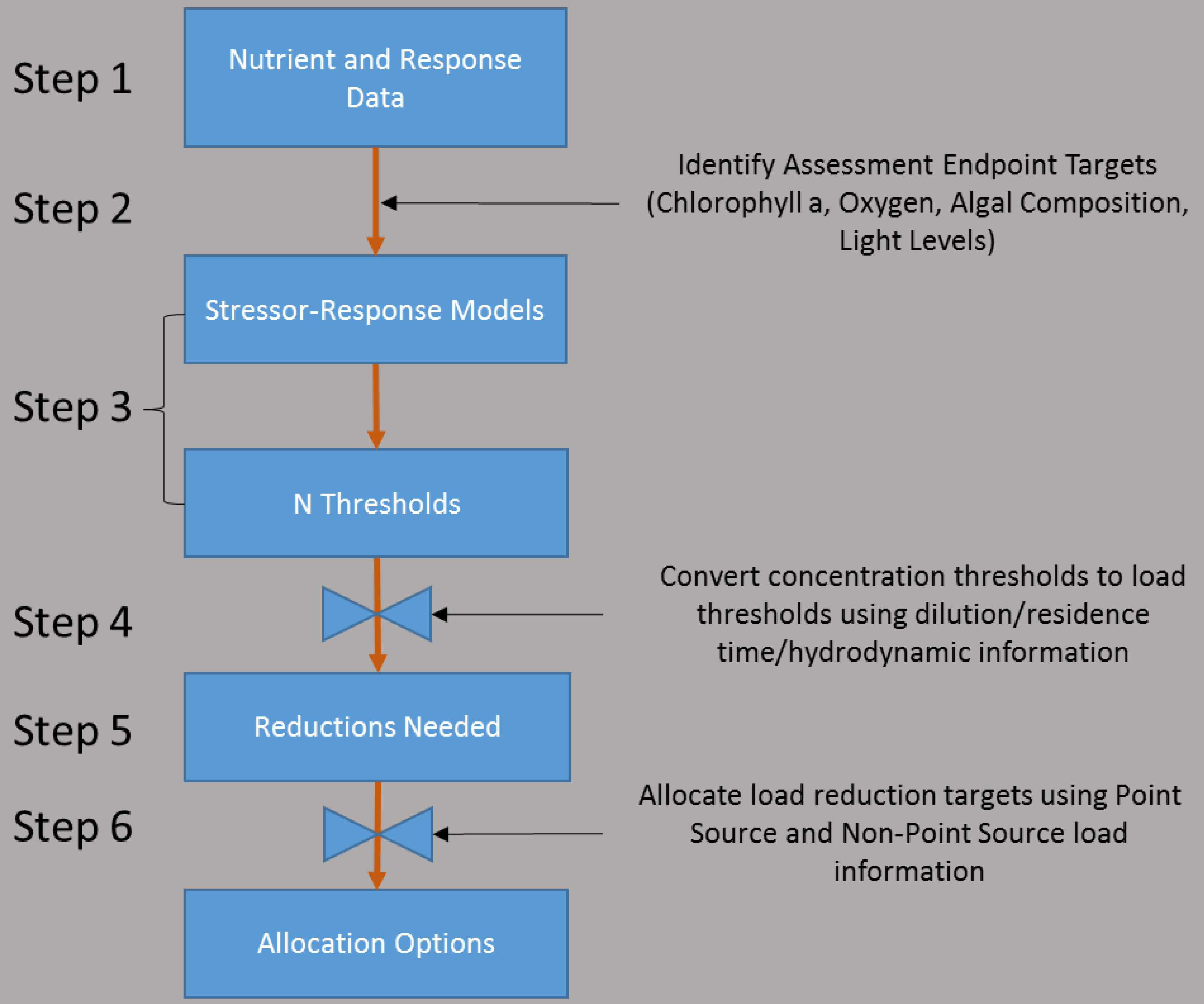
Step 6 – Develop load allocation scenarios

- Develop allocation scenarios for any recommended load reductions for embayments, Western LIS, and tributaries

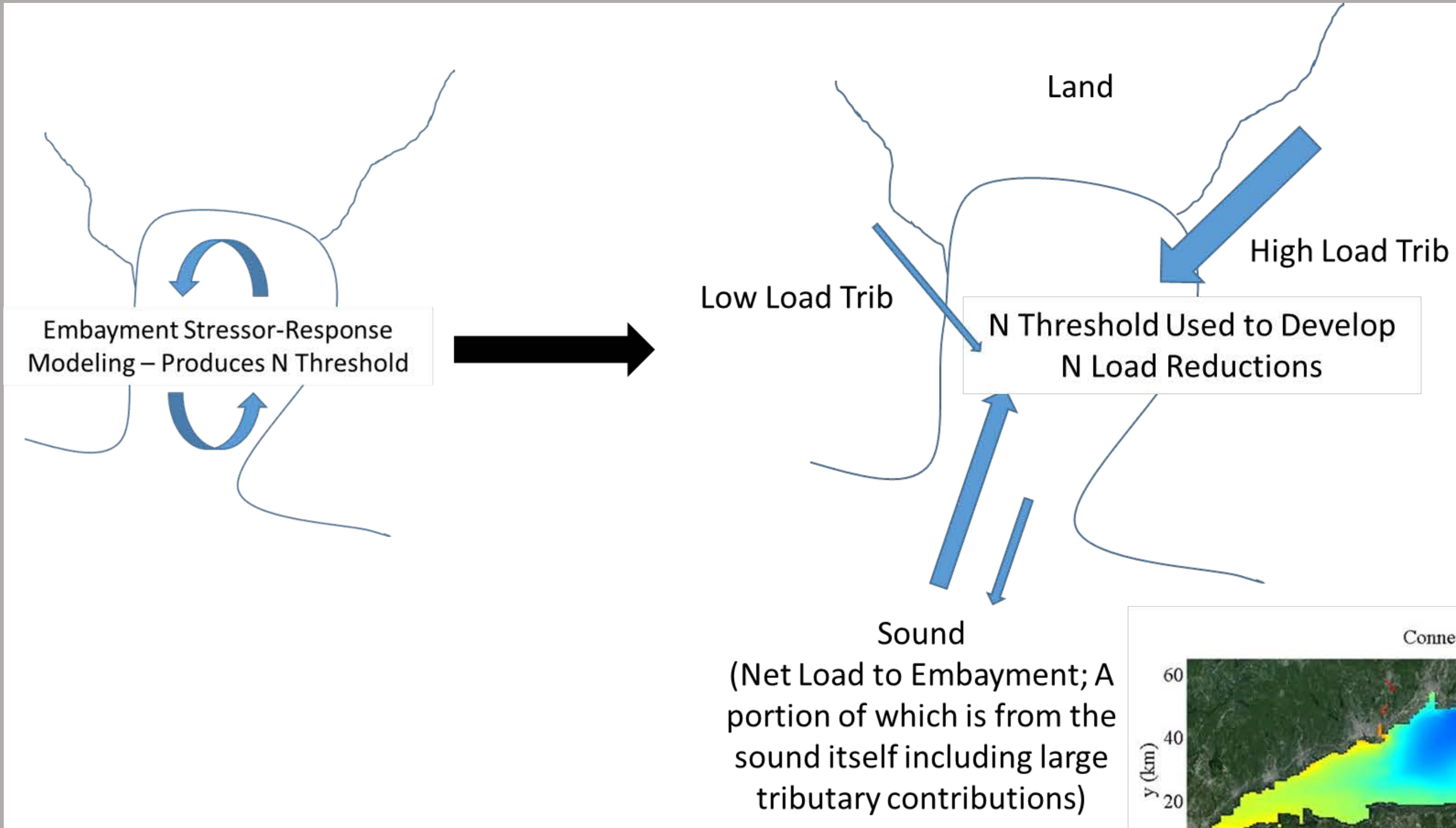


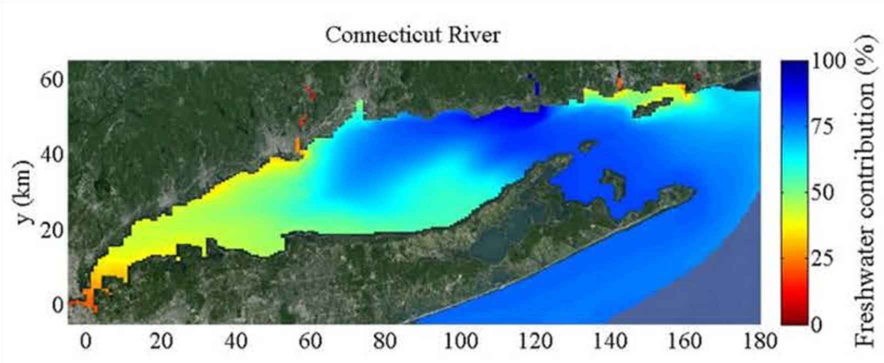
Technical Approach

Application of approach may differ slightly by waterbody type

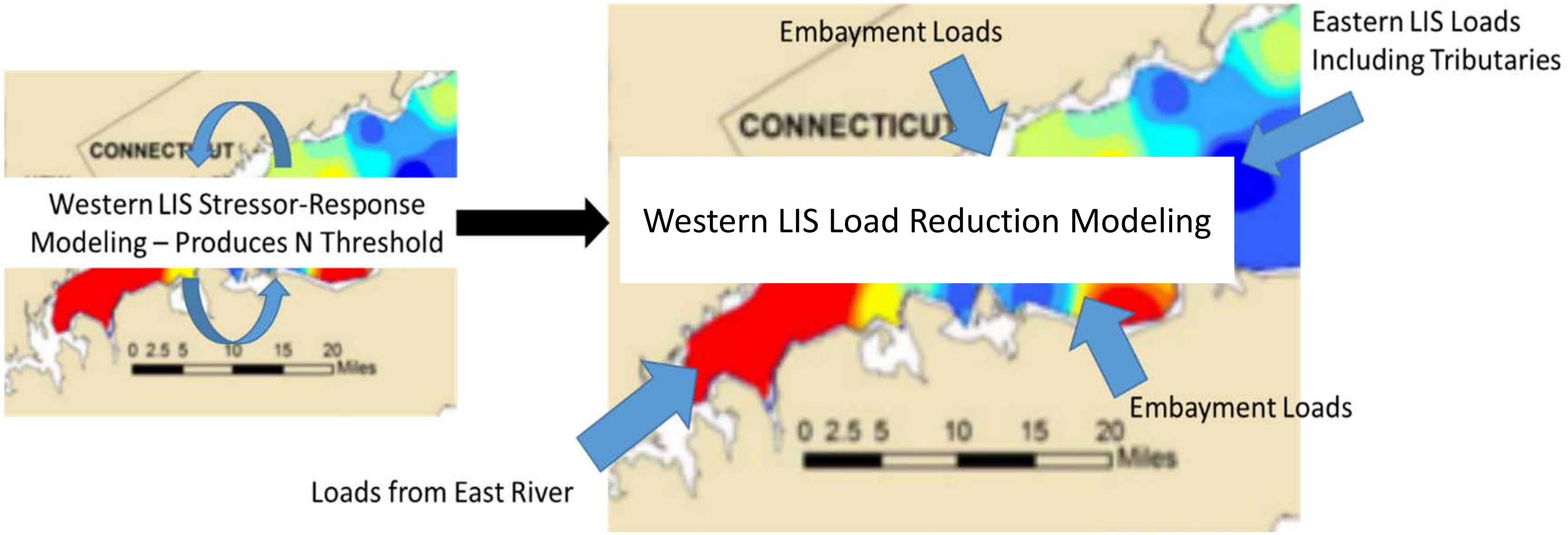


Embayments

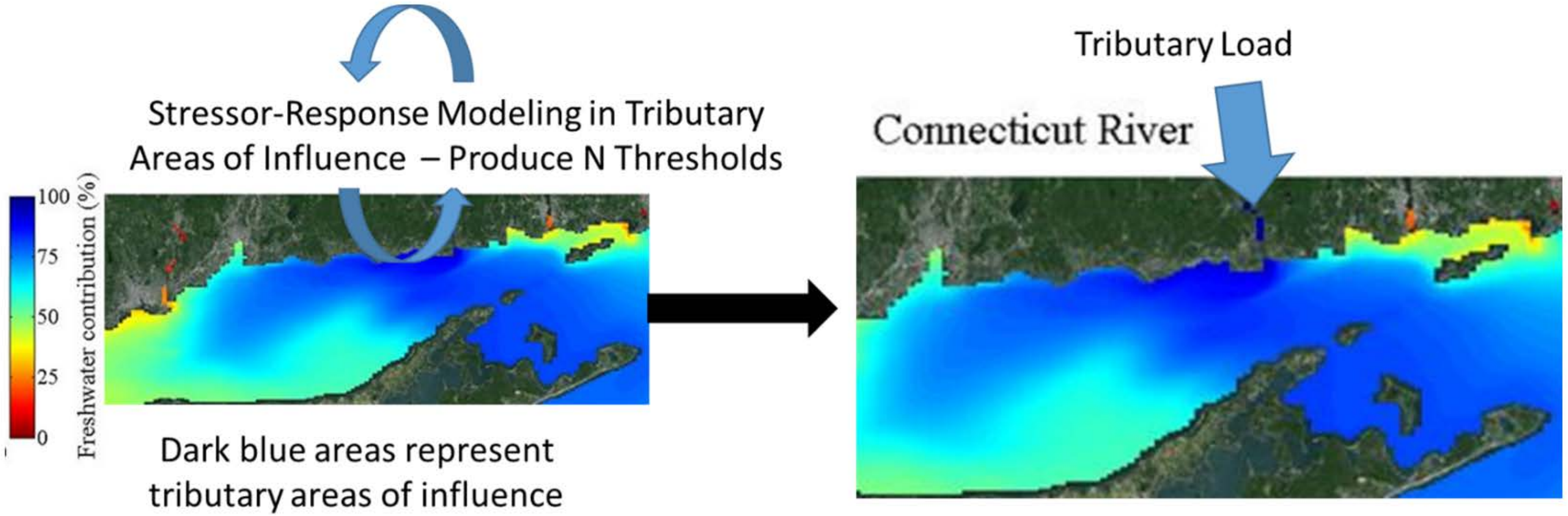

Embayment Stressor-Response
Modeling – Produces N Threshold
Land
High Load Trib
Low Load Trib
N Threshold Used to Develop
N Load Reductions
Sound
(Net Load to Embayment; A
portion of which is from the
sound itself including large
tributary contributions)


Connecticut River
y (km)
Freshwater contribution (%)
0
20
40
60
80
100
120
140
160
180
25
50
75

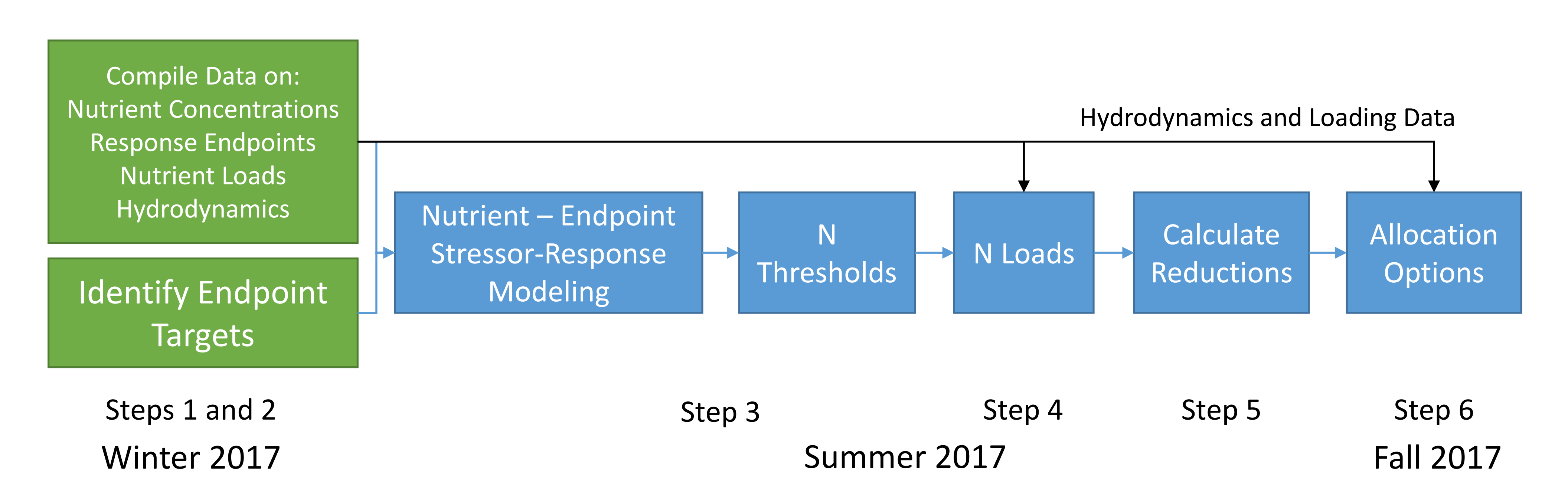
Western Long Island Sound



Major tributaries



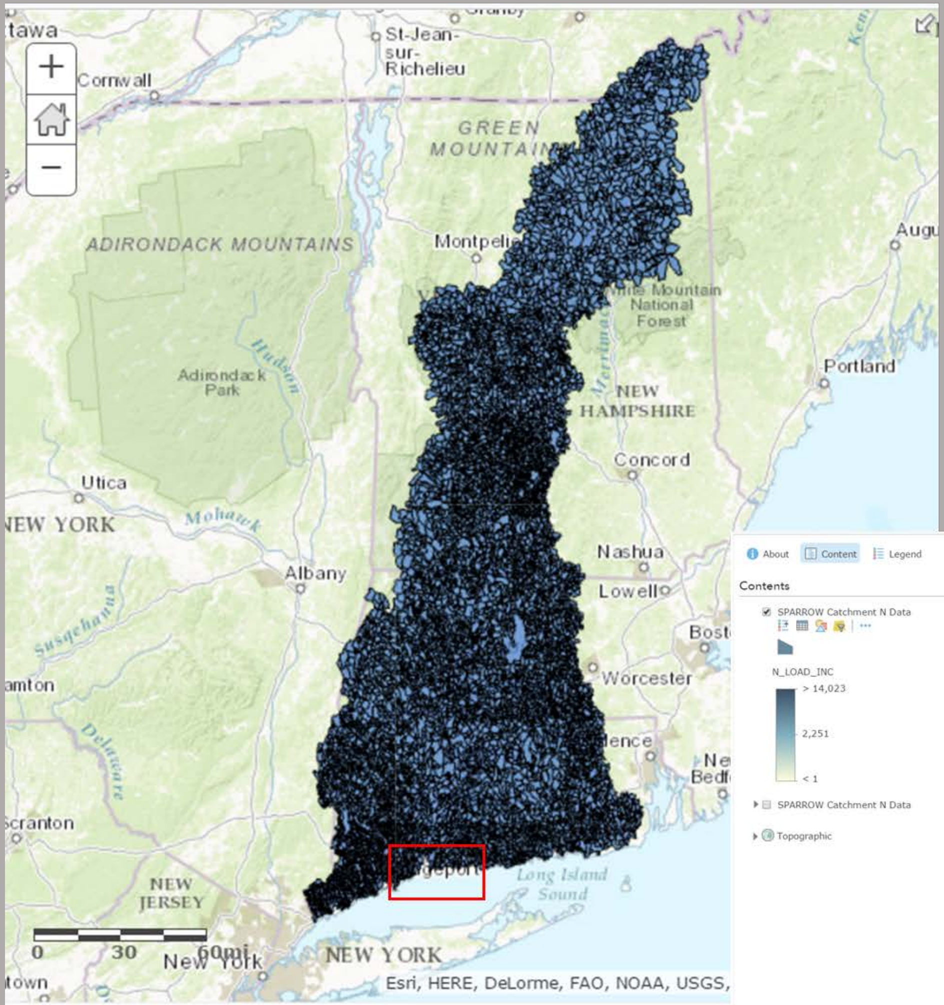
Progress

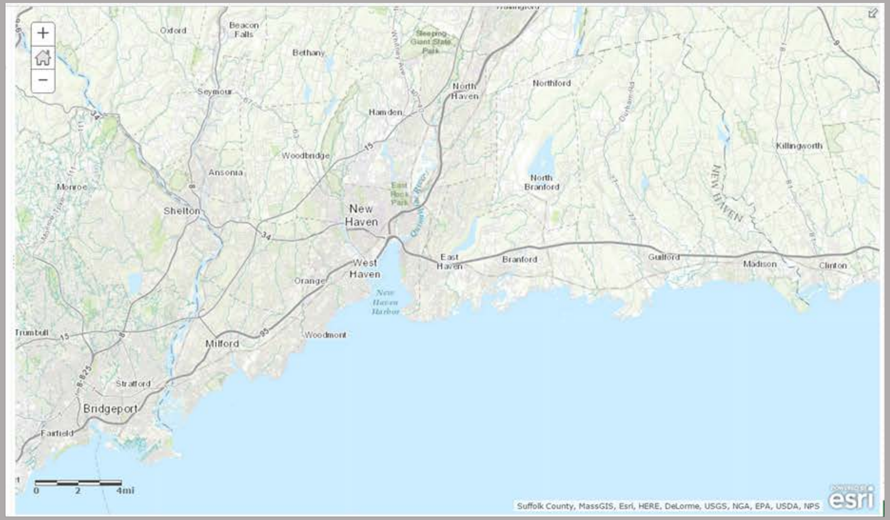


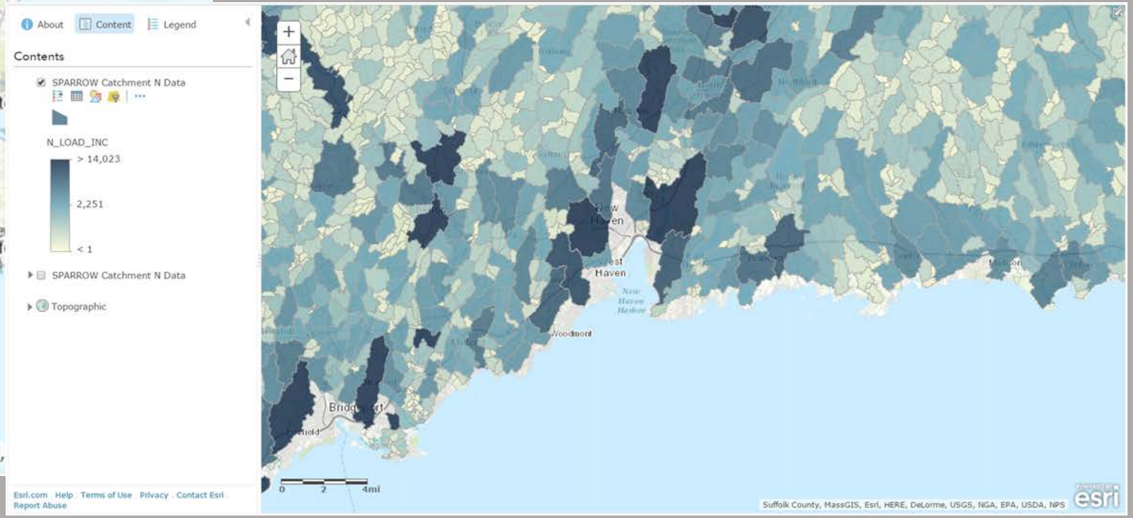
Current Project Focus and Status:

- Reviewing literature on LIS assessment endpoint values (chlorophyll a, oxygen, algal composition, light levels)
- Compiling nutrient loading data to embayments, western LIS, and tributaries
- Compiling water quality data for embayments and LIS
- Compiling hydrodynamic model output for bay and tributaries

Progress – N Load data

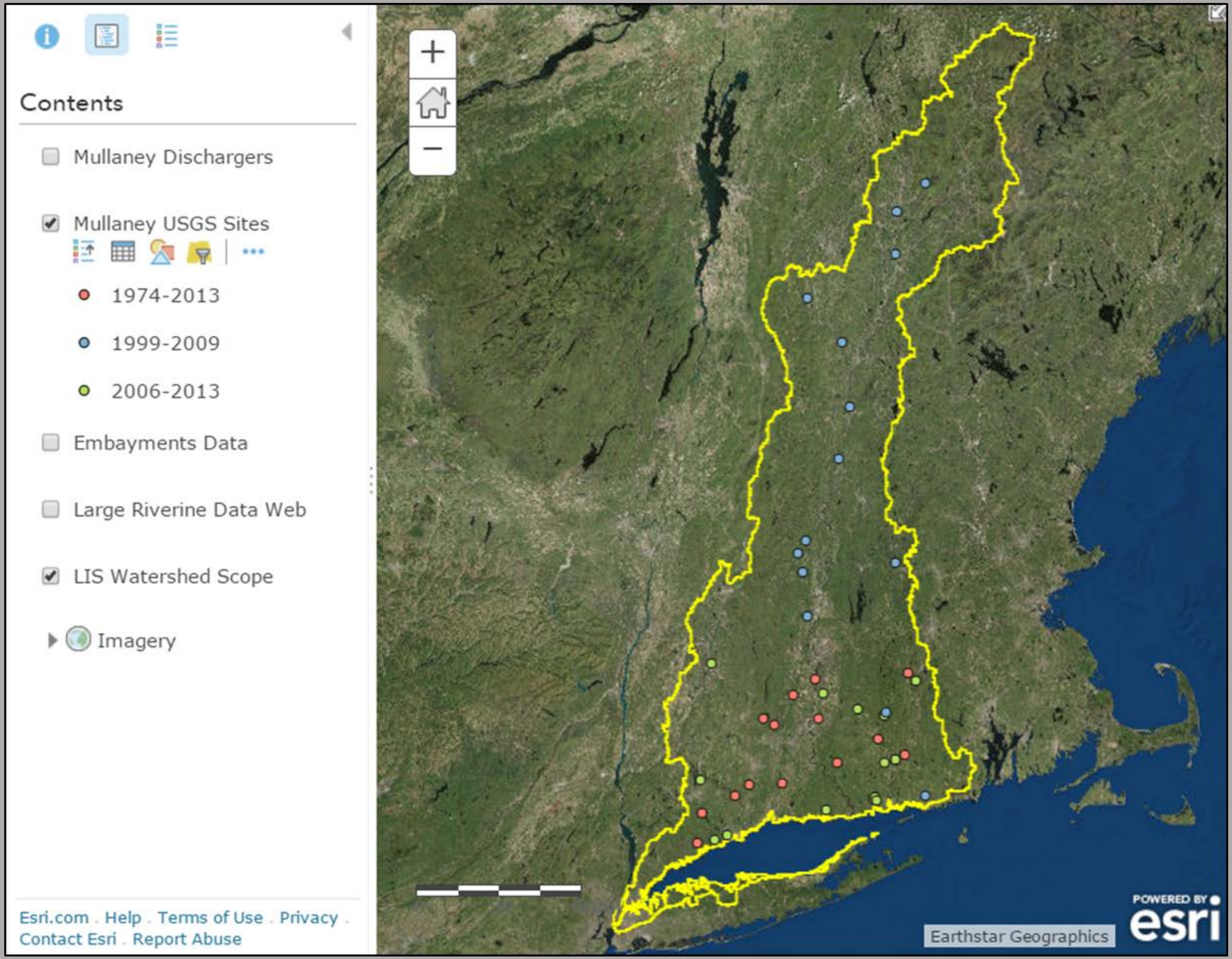






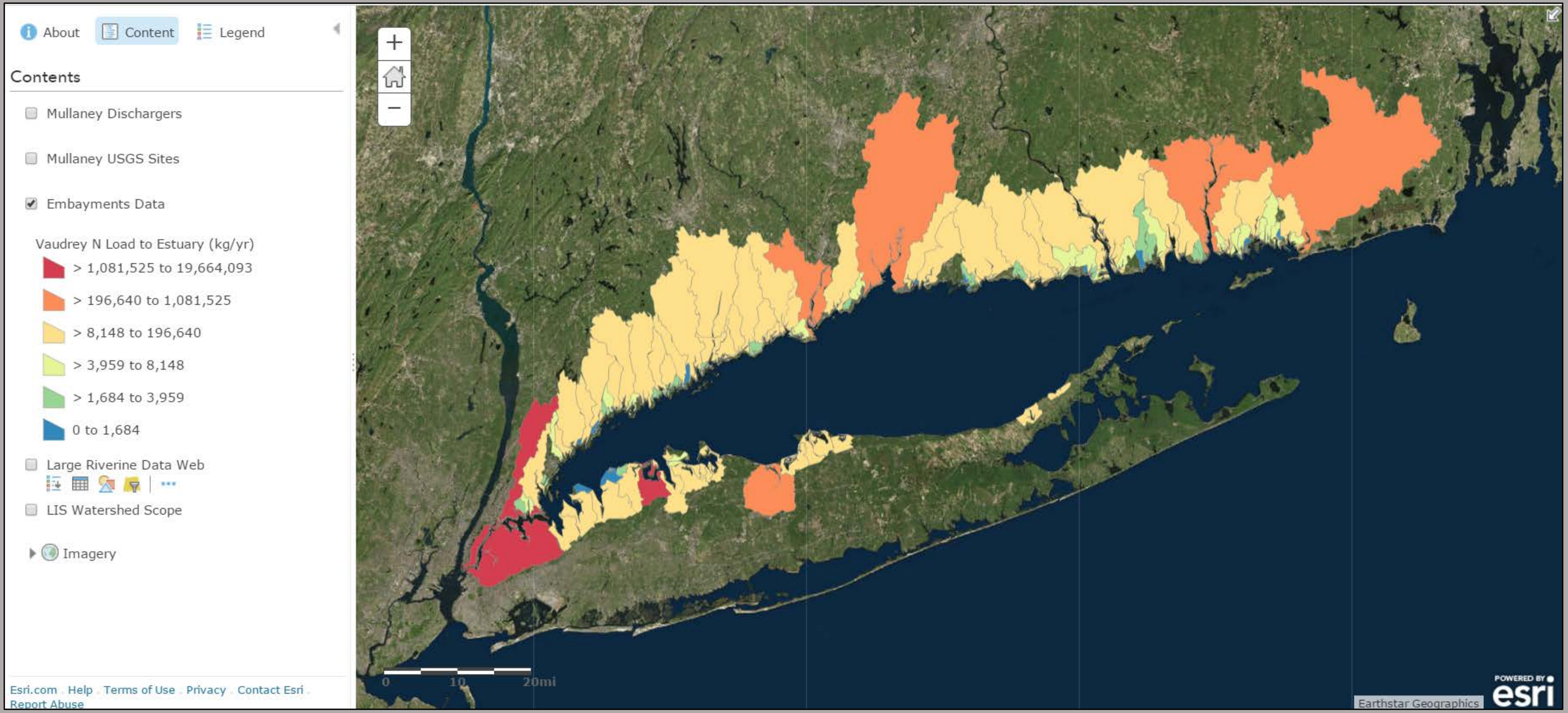
SPARROW NHD Catchment Loads

Progress – N Load data



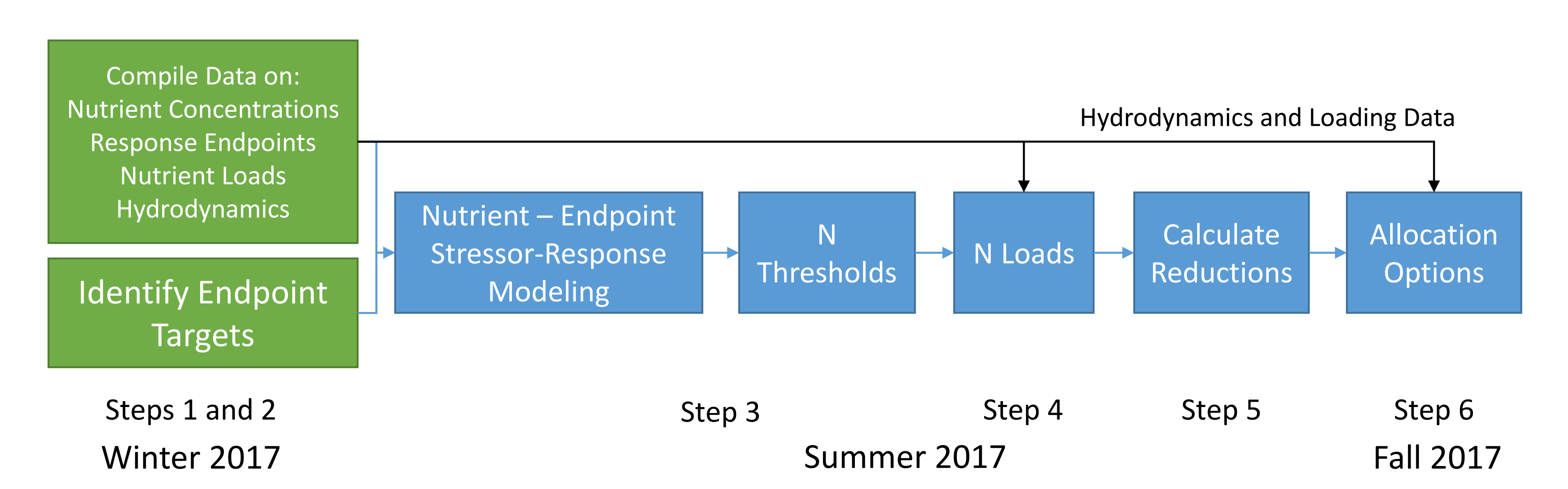
USGS Mullaney Tributary Loading Estimates

Progress – N Load data



Vaudrey embayment N load estimates

Progress



Current Project Focus and Status:

- Reviewing literature on LIS assessment endpoint values (eelgrass, DO, harmful algal prevalence, macroalgae)
- Compiling nutrient loading data to embayments, western LIS, and tributaries
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Next Steps

- Continue contract base period activities
- Integrate with similar ongoing initiatives
- Collaborate with the states & partners
- Invite technical comment
- Continue to monitor, model, and research to better understand how LIS responds to N reductions

Stay Informed

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

Posting:

- Meeting announcements
- Presentation slides
- Review schedule
- View major reports
- Provide technical comment

Questions and Discussion

www.longislandsoundstudy.net