EPA Perspectives on Nitrogen Reduction in Long Island Sound

New York Marine Sciences Consortium
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Why should we care about nitrogen?
Excess Nitrogen Causes Eutrophication in Marine Waters.

One Major Problem of Eutrophication: Hypoxia

Menhaden fish kill, 1990s

Hempstead Harbor, NY
Harmful Algal Blooms

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

~800 observations

[LIS wetlands in red]

Excessive Macro Algae Growth

[Harmful Algal Blooms](#)

LIS wetlands in red

Other Eutrophication-related Impairments

Loss of wetlands on Long Island, since 1974

Loss of Eelgrass

**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%
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

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

TMDL Target = 22,774

NY

CT
Success: Atmospheric Nitrogen Control

Implementation of the Clean Air Act resulted in reductions in atmospheric deposition of NOx from power plants, vehicles, etc.
**Success:** Hypoxia Less Severe

Maximum Area of Hypoxia
(state acute criteria < 3 mg/l)

Area in mi² (total LIS area = 1,320 mi²)

- Pre-TMDL Area Ave. = 208 mi²
- Post-TMDL Area Ave. = 162 mi²

Five-year rolling average

Second smallest area in 28 years
Long Island Sound, 12-year trend in hypoxia area - days

\[ y = -750x + 2 \times 10^6 \]
\[ R^2 = 0.68 \]
\[ p < 0.001 \]

Source: Dr. Christopher Gobler, SBU/SOMAS
Reduction in Critical Conditions

Area < 2 mg/l DO

First time in 28 years
Reduction in Anoxic Conditions

No anoxia in 7 of past 8 years
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.
“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

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.

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)
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?