

Restoring Falmouth's Impaired Estuaries

**Eric Turkington, Chair
Falmouth Water Quality Management Committee**

**Wheeler Lecture
July 17, 2014**



Cape Cod and the Islands

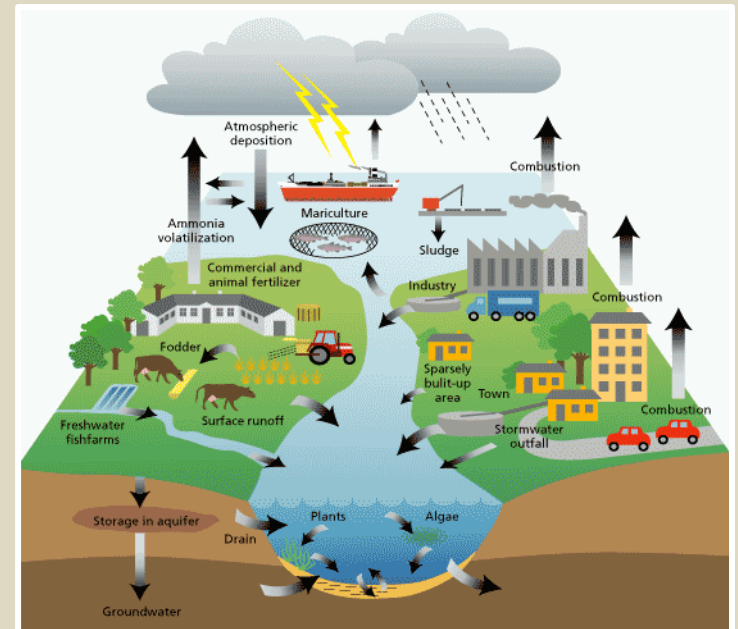
Massachusetts Estuaries Project Reports document decline in water quality in estuaries

- **Loss of eelgrass**
- **Algae blooms**
- **Odors**
- **Shellfish disappearance**
- **Finfish declining**
- **Anoxic environments**

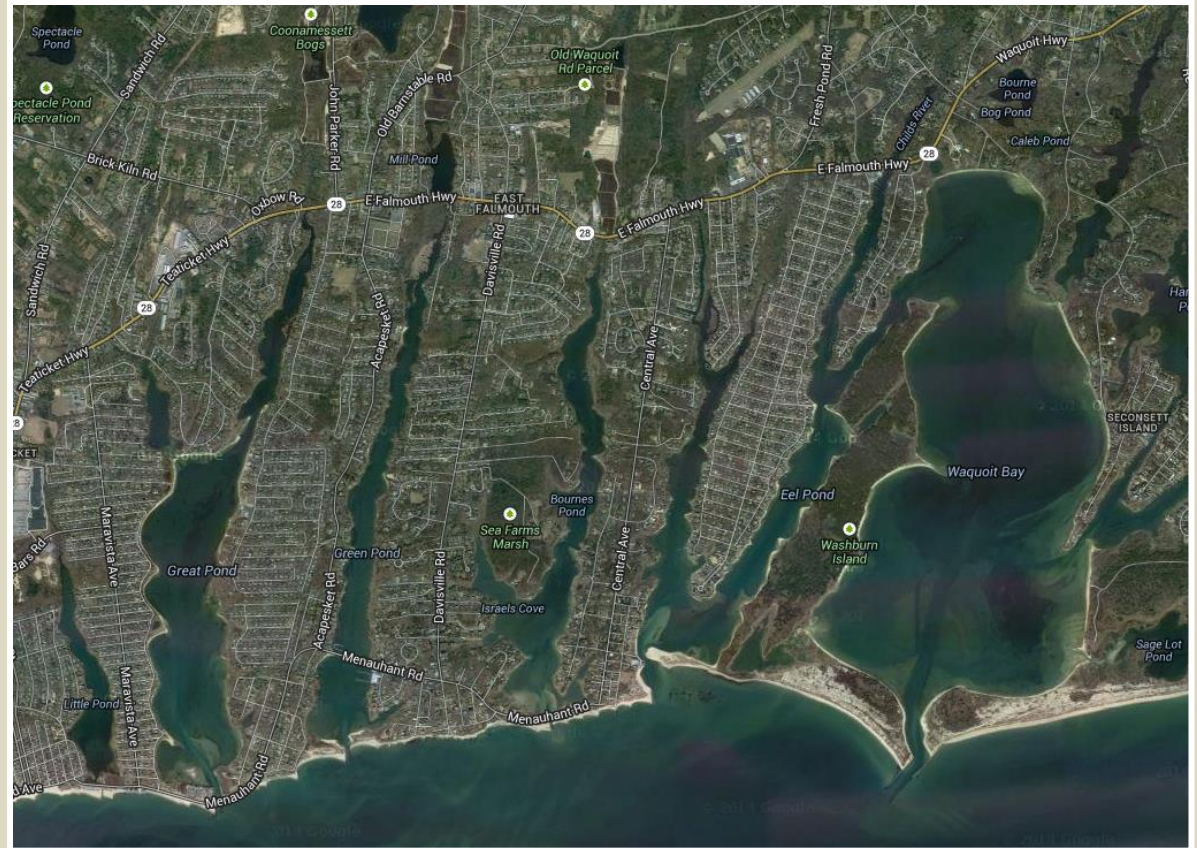
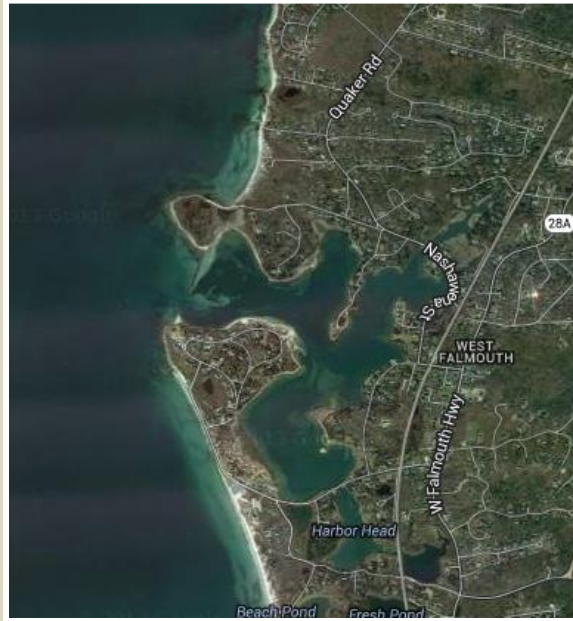


Possible Causes

- Rising water temperatures
- Ocean acidification
- Increased nitrogen inputs:
 - Atmospheric deposition
 - Fertilizer
 - Road Runoff
 - Wastewater



Comprehensive Wastewater Management Plan Study Area



Falmouth's Plan to Restore our Estuaries:

1. Sewer as little as possible
2. Pursue demonstration projects, and evaluate with rigorous monitoring program
3. Fund projects with no tax rate increase



20 year plan with a 40-year perspective

Approval of Falmouth's Plan

- **August 2012, Board of Selectmen unanimously approve a Draft Comprehensive Wastewater Management Plan (DCWMP) and submit to the state.**
- **January 10, 2014 - Received Certificate of Approval for final CWMP from Secretary of the Executive Office of Energy and Environmental Affairs**
- **April/May 2014 – Town Meeting and Voters approve initial implementation of the Plan**



Sewering Lower Little Pond Watershed

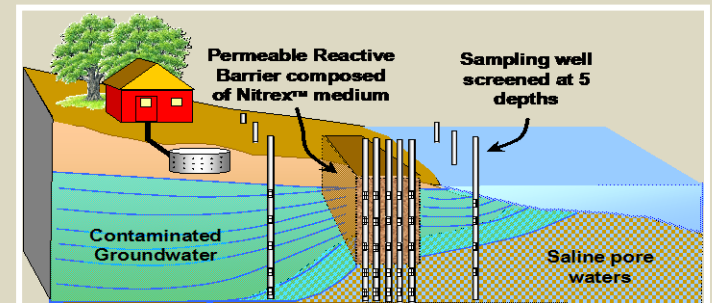
An important and cost-effective project:

- Little Pond is the town's most degraded estuary
- Projected to significantly improve water quality:
 - Nitrogen load currently at 0.837 mg/L reduced to 0.495 mg/L (0.45 is regulatory limit - TMDL)
- Many very small lots (5000 square feet or less)
- Area almost at build-out
- Many homes still have cesspools
- Septic system failures are both expensive and technically difficult to remediate



Alternatives to Sewering:

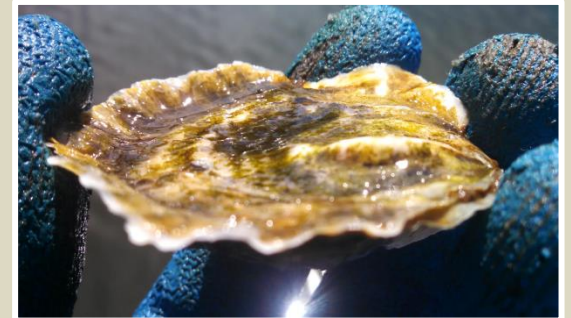
- Nitrogen Control Bylaw for Fertilizer
- Shellfish Aquaculture
- Stormwater Remediation
- Permeable Reactive Barriers
- Inlet Widening
- Denitrifying Septic Systems
- Eco-toilets



Nitrogen Control By-law for Fertilizer



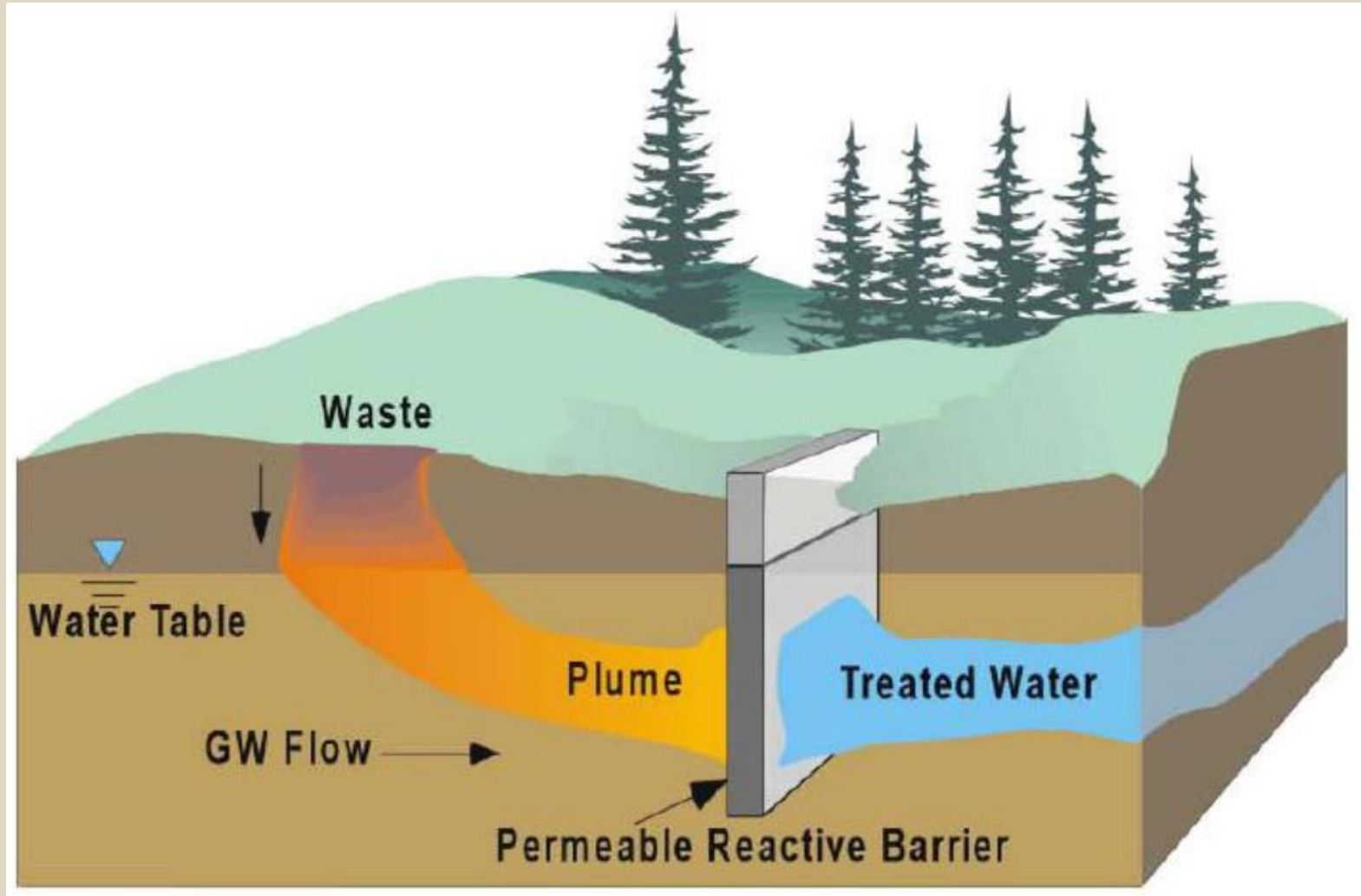
Shellfish Cultivation



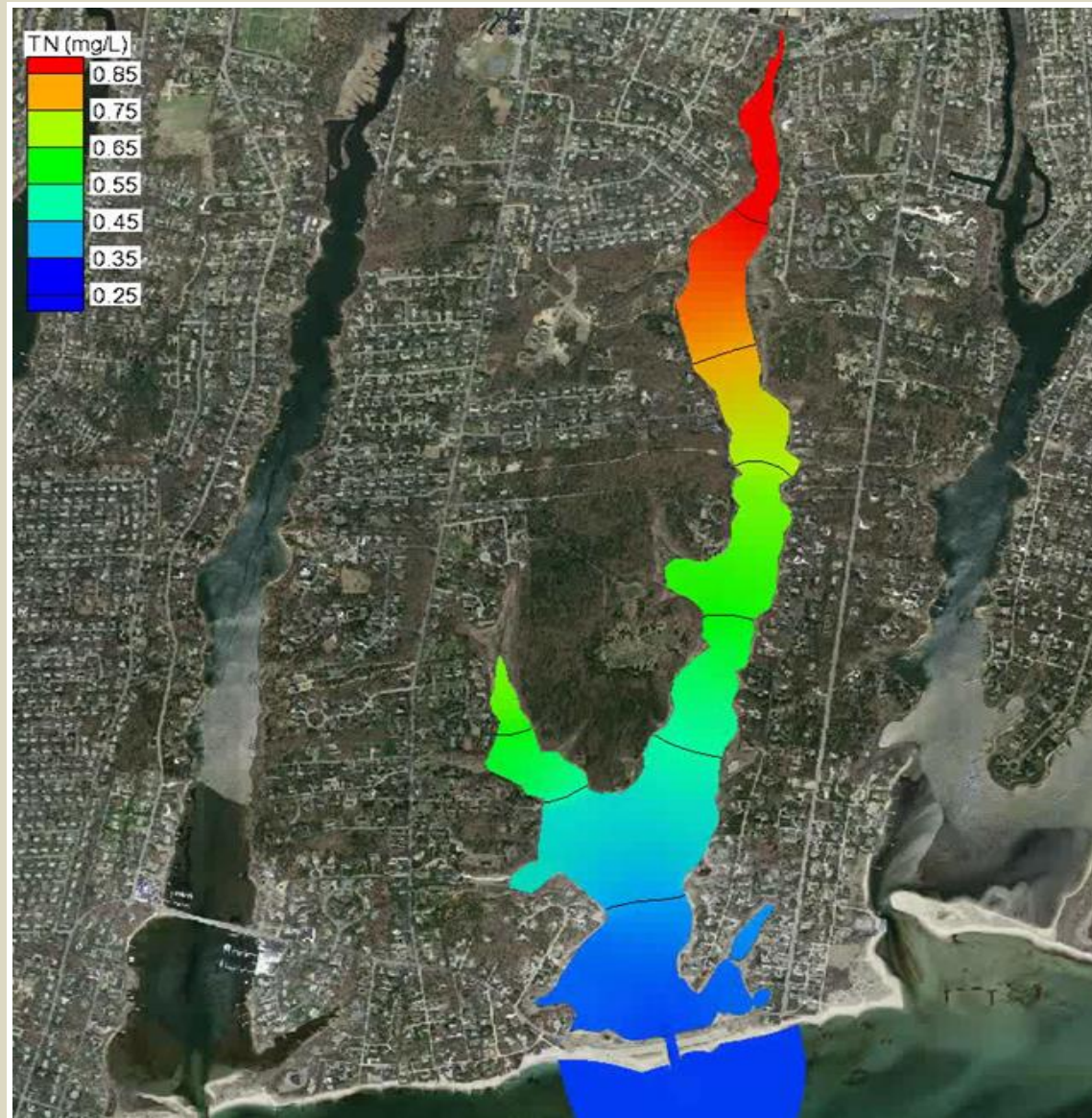
Stormwater Remediation



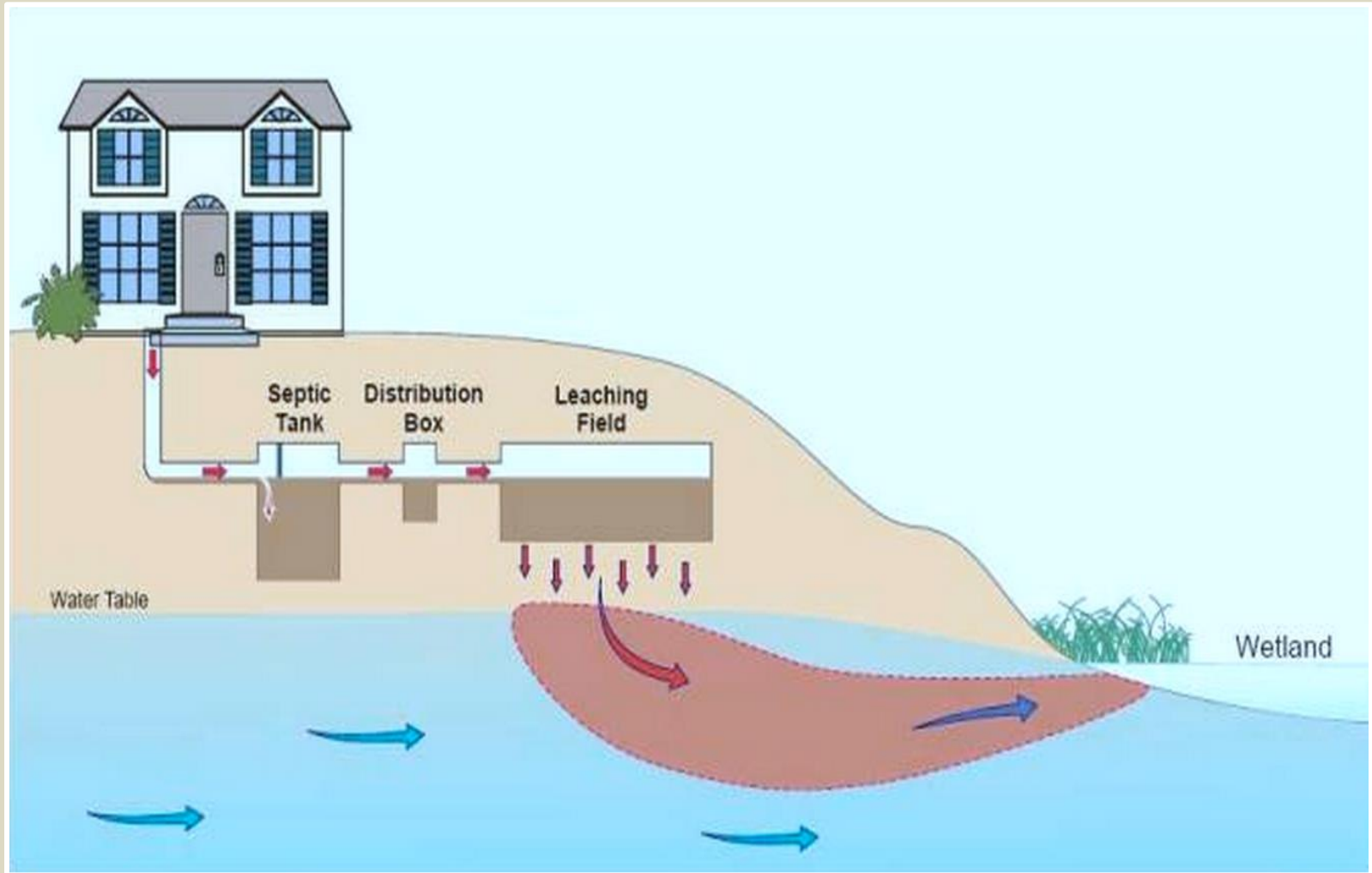
Permeable Reactive Barriers



Inlet Widening



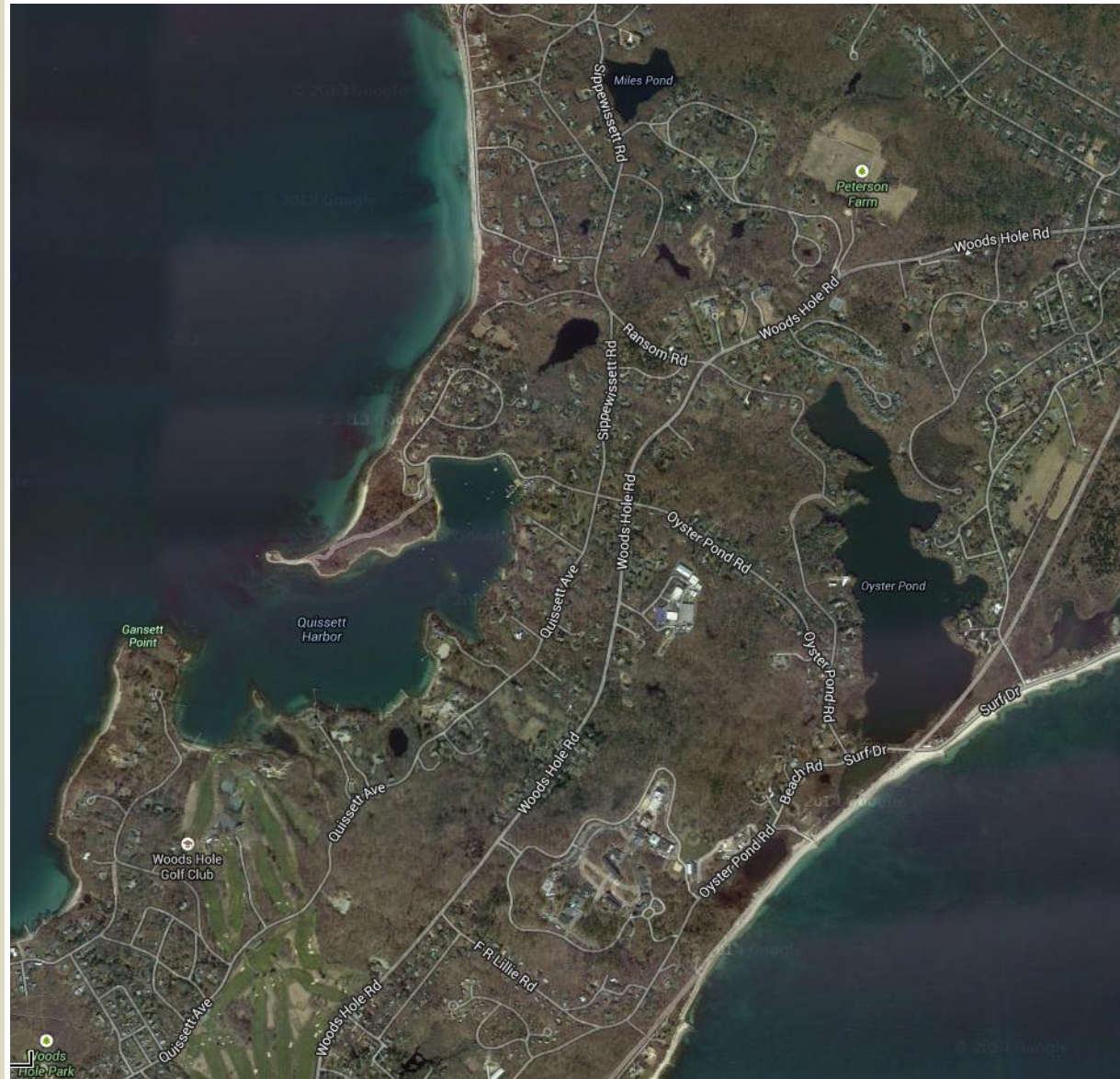
Denitrifying Septic Systems



Eco-toilets

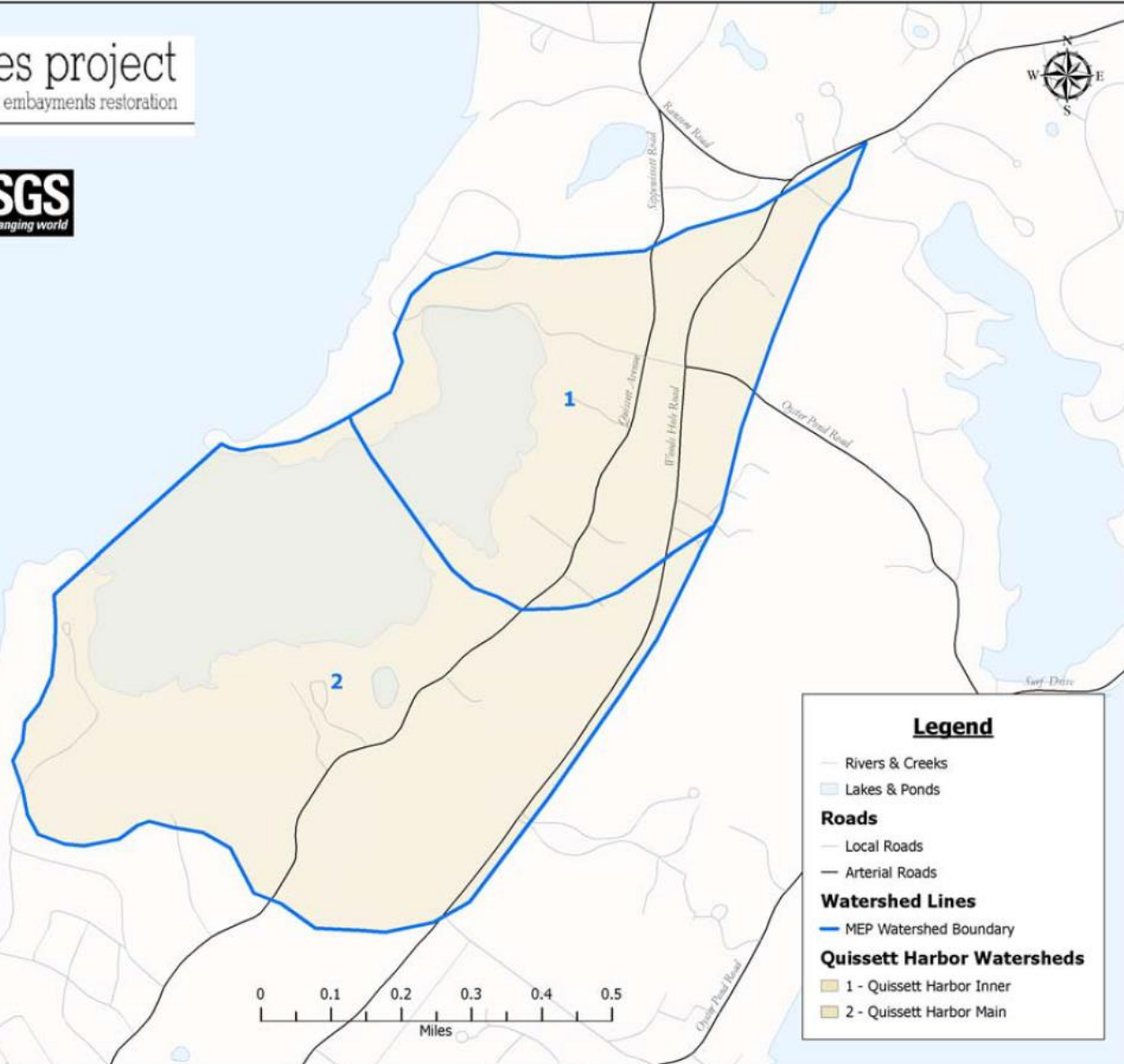


Quissett Harbor



Quissett Harbor Watersheds

the estuaries project
southeastern massachusetts embayments restoration



Legend

- Rivers & Creeks
- ▭ Lakes & Ponds
- Roads**
- Local Roads
- Arterial Roads
- Watershed Lines**
- MEP Watershed Boundary
- Quissett Harbor Watersheds**
- ▭ 1 - Quissett Harbor Inner
- ▭ 2 - Quissett Harbor Main

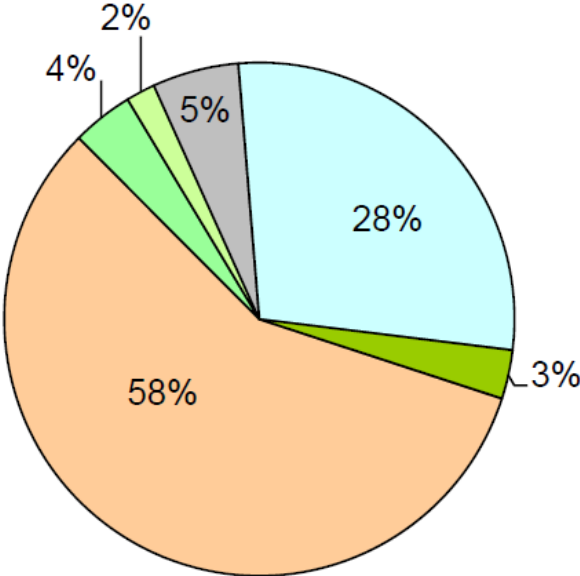
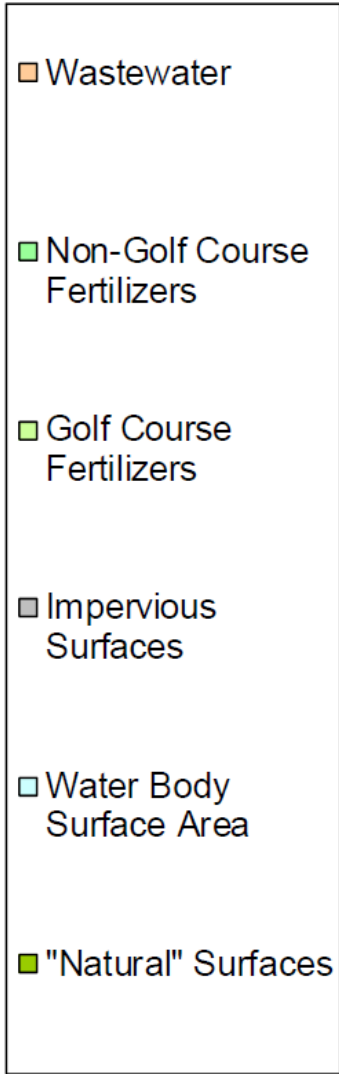
Quissett Harbor Water Quality

According to the MEP Report
~22% of the controllable nitrogen load must be removed
from Quissett Harbor

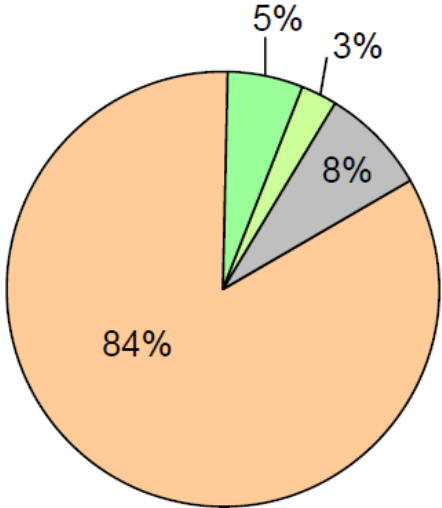
Table VIII-3. Comparison of sub-embayment *total watershed loads* (including septic, runoff, and fertilizer) used for modeling of present and threshold loading scenarios of the Quissett Harbor System. These loads do not include direct atmospheric deposition (onto the sub-embayment surface) or benthic flux loading terms.

sub-embayment	present load (kg/day)	threshold load (kg/day)	threshold % change
Quissett Harbor (outer basin)	1.46	1.46	0.0%
Upper Harbor (inner basin)	1.92	1.19	-38.0%
System Total	3.38	2.65	-21.6%

Quissett Harbor Nitrogen Sources



Overall Load



Local Control Load

Alternatives Relevant to Quissett:

- Nitrogen Control Bylaw for Fertilizer
- Shellfish Aquaculture
- Stormwater Remediation
- ~~Permeable Reactive Barriers~~
- ~~Inlet Widening~~
- Denitrifying Septic Systems
- Eco-toilets



Questions/Comments

