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*implementing* solutions for clean water

June 23-24 | Resort and Conference Center at Hyannis



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*implementing solutions for clean water*

# Regional Knowledge Transfer on Coastal Issues and Multi State Collaboration

Moderator: Johanna Hunter, US EPA

Speakers: Alison Bowden, The Nature Conservancy  
Jonathan Stone, Save The Bay  
Curt Johnson, Save The Sound  
Korrin Peterson, Buzzards Bay Coalition

# Alison Bowden

Freshwater Program Director, The Nature Conservancy

**PANEL | REGIONAL KNOWLEDGE TRANSFER**



# Innovations for Clean Water & Healthy Habitats in the Narragansett Bay Watershed

Alison Bowden





## The Mission of The Nature Conservancy:

*“To conserve the lands and waters on which all life depends”*





## Ecological Integrity

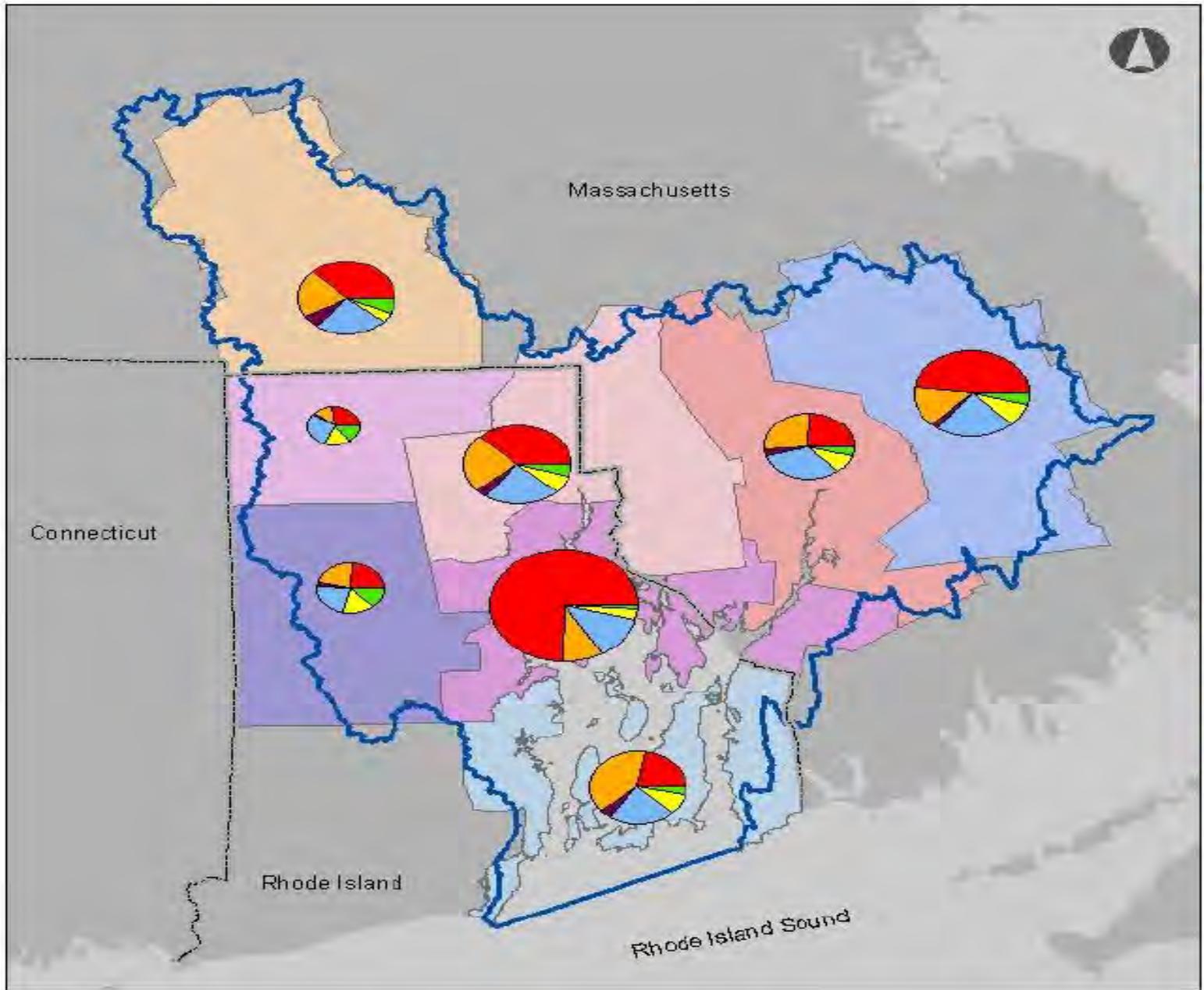


...the long-term capability of an ecological community to sustain its composition, structure and function and its resiliency to stress









- State Boundary
- ▭ Natural Watershed Boundary
- Nitrogen Loading by Area**
- Sewered Population
- Unsewered Population
- Animals
- Urban Stormwater
- Agricultural Fertilizer
- Non-Urban Atmospheric Deposition
- Nitrogen Loading Areas**
- Blackstone Above Manville (RI Portion)
- Blackstone Above Millville (MA Portion)
- Lower Bay
- Mid/Lower Taunton
- Pawtuxet
- Small Watersheds
- Taunton Above Bridgewater
- Upper Bay

**Source:**  
 1. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA  
 2. Vadeboncoeur, A., Hamburg, S.P., and Pryor, D. 2010. "Modeled Nitrogen Loading to Narragansett Bay: 1850 to 2015." *Estuaries and Coasts*. 33:1113-1127



# 208 Plan Watershed Planning and Technology Transfer to Narragansett Bay

TNC, Cape Cod Commission, Horsley Witten Group

Goal: develop a systemic approach, public process utilizing a hybrid framework (grey and green infrastructure) technologies to abate nutrient pollution



# Two Model sub-watershed plans in Taunton & Blackstone watersheds

- Nutrient loading assessment
- site prioritization
- watershed calculators



# Facilitated public dialogue on nitrogen reduction

-Preferences for implementing nitrogen reduction technologies



# Updated Technology Matrix

- Siting constraints & opportunities
- Expected nutrient reduction performance
- Case studies
- Costs and co-benefits (e.g., creation of local jobs).





### Reduction

Treatment before disposal to ground



### Remediation

Treatment in groundwater



### Restoration

Treatment in water body



Policy

# Actions to Meet Multiple Requirements and Goals

Possible Action	Addresses Stormwater (MS4)	Addresses Water Management Act Mitigation	Helps with Climate Resilience
Revise bylaws to allow for Low Impact Development / infiltration	X	X	X
Require porous pavement in certain situations, and allow for curb cuts to improve drainage to swales	X	X	X
Culvert replacements meeting stream crossing standards		X	X
Acquire/ preserve property for resource protection	X	X	X

# Narragansett Bay Watershed Summit

- Outcomes from demo projects
- Guidance on adaptive management approaches to improve nutrient reduction in existing watershed plans.
- Recommendations for application in the SNECWRP geography





# Jonathan Stone

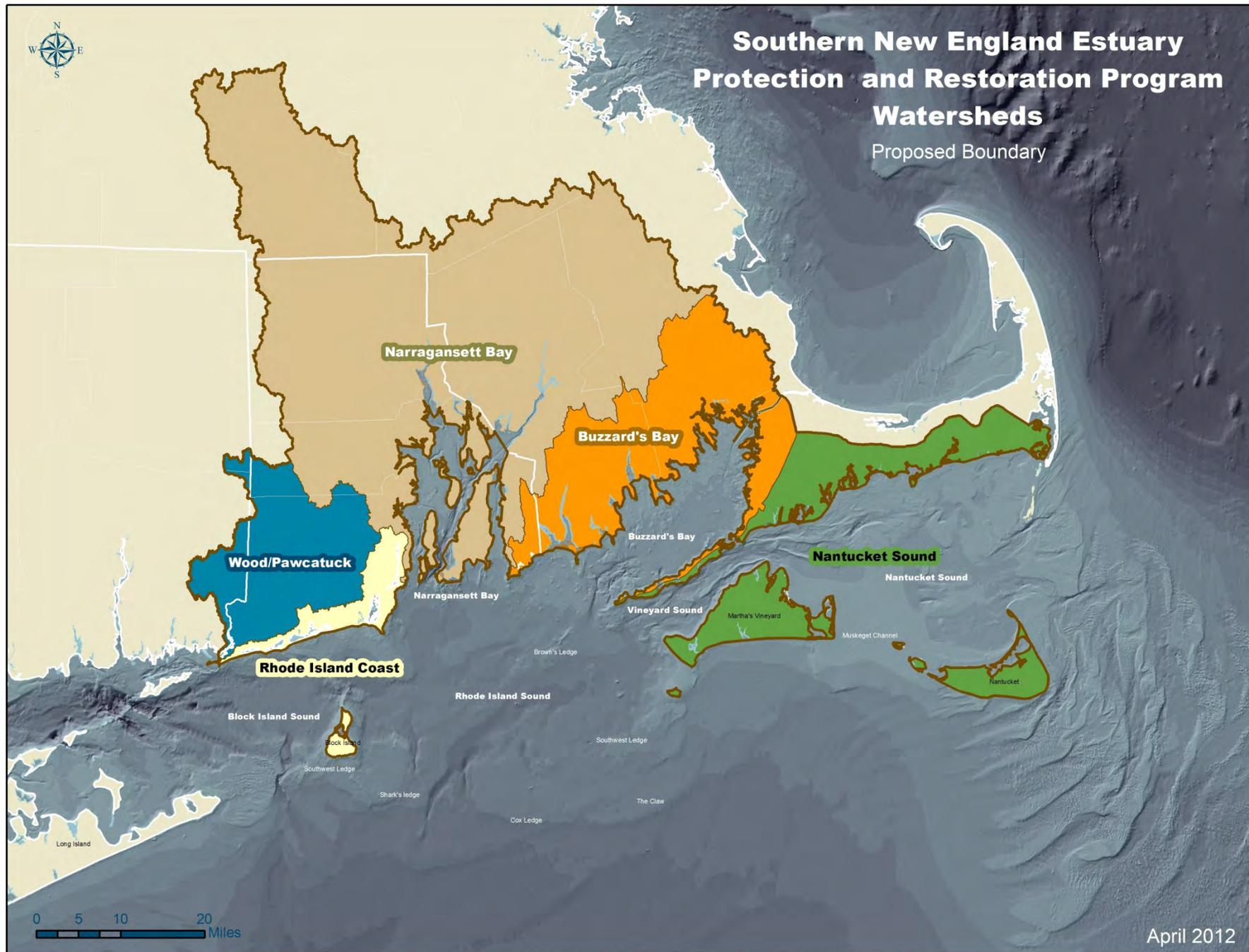
Executive Director, Save The Bay

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# Southern New England Estuary Protection and Restoration Program Watersheds

Proposed Boundary

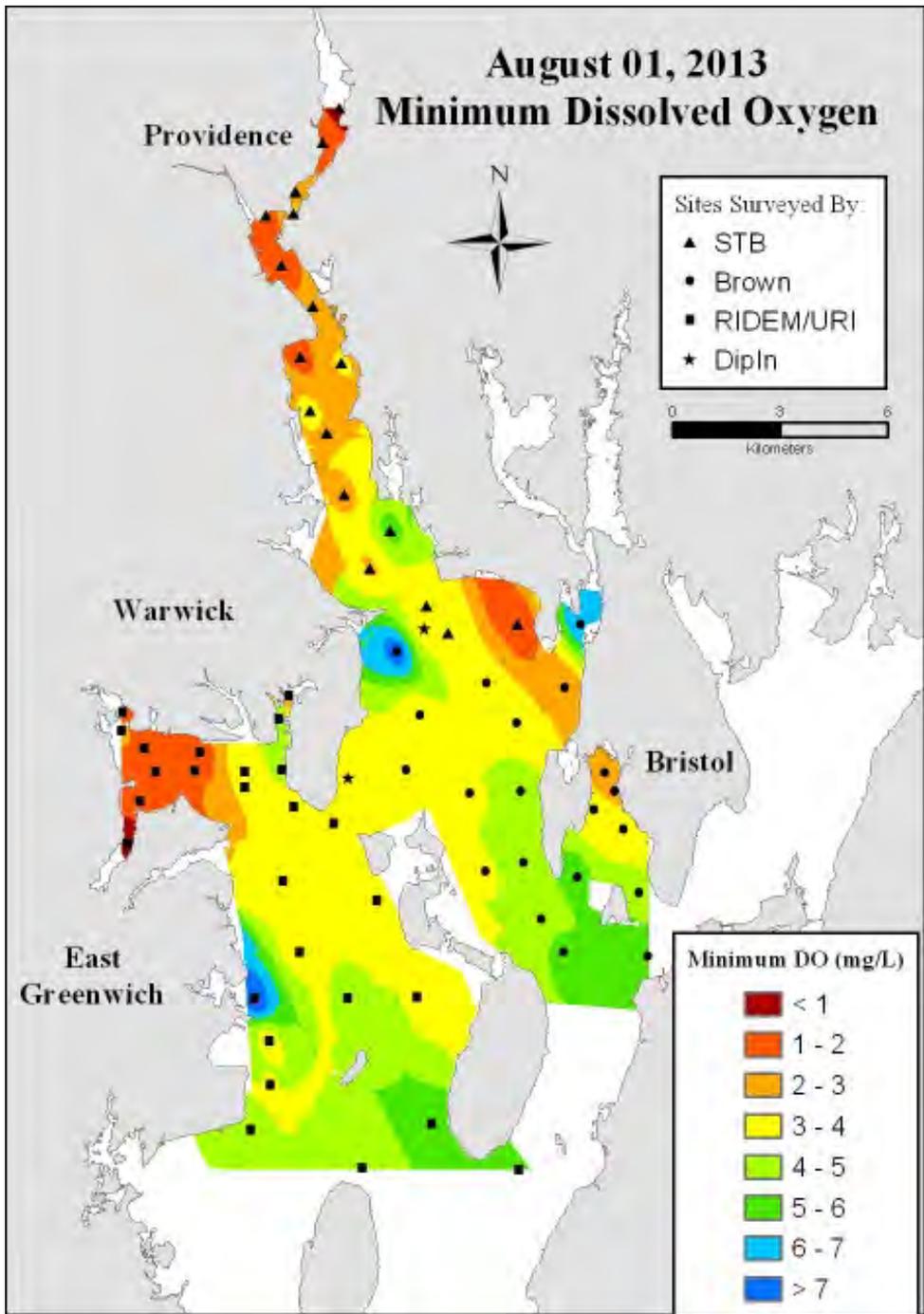


April 2012





# August 01, 2013 Minimum Dissolved Oxygen



# Curt Johnson

Executive Director, Save The Sound



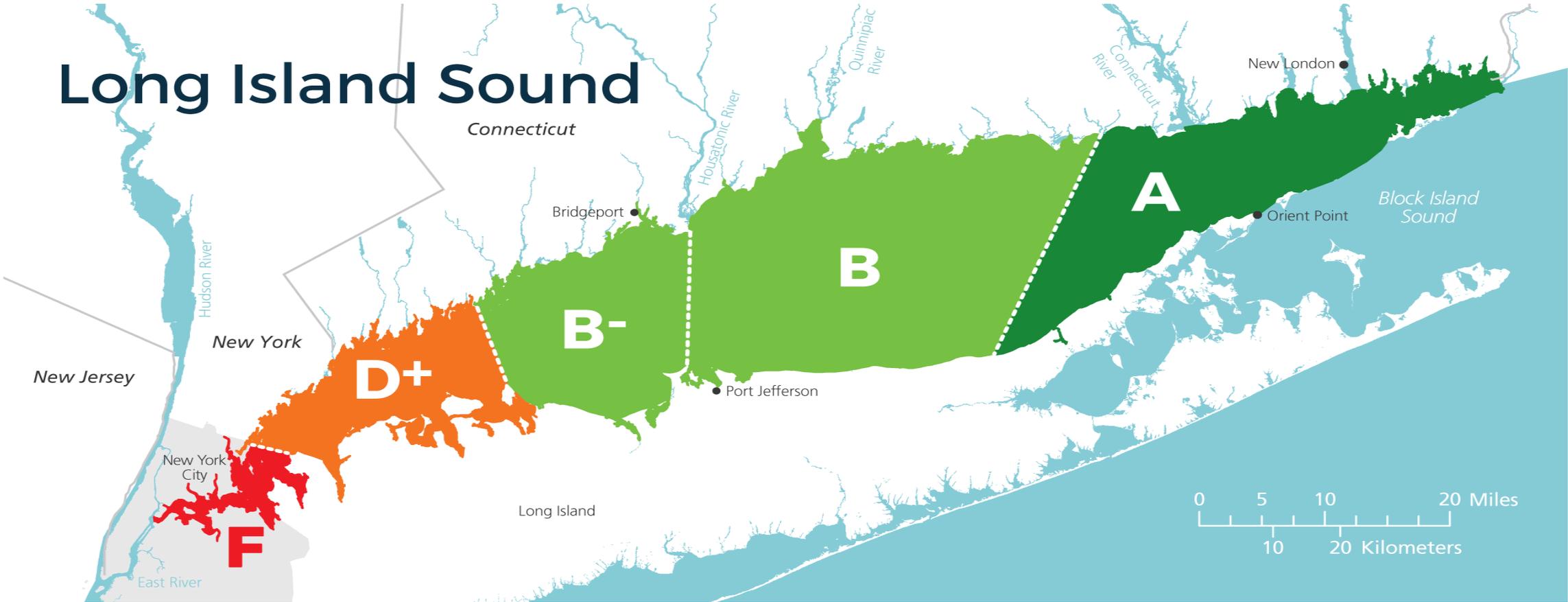
# Save the Sound

## Curt Johnson



Save the Sound®

# Long Island Sound



# Long Island's Coastal Ecosystems

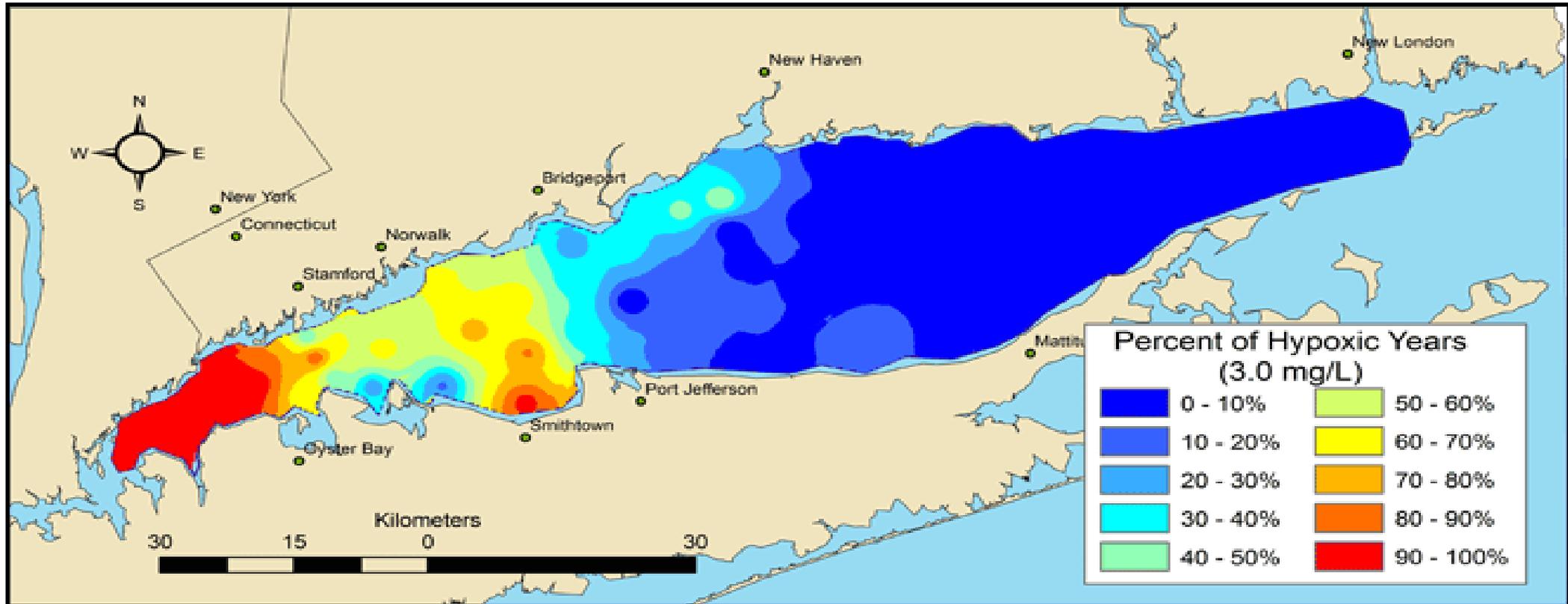
Nitrogen mitigation goal

2015



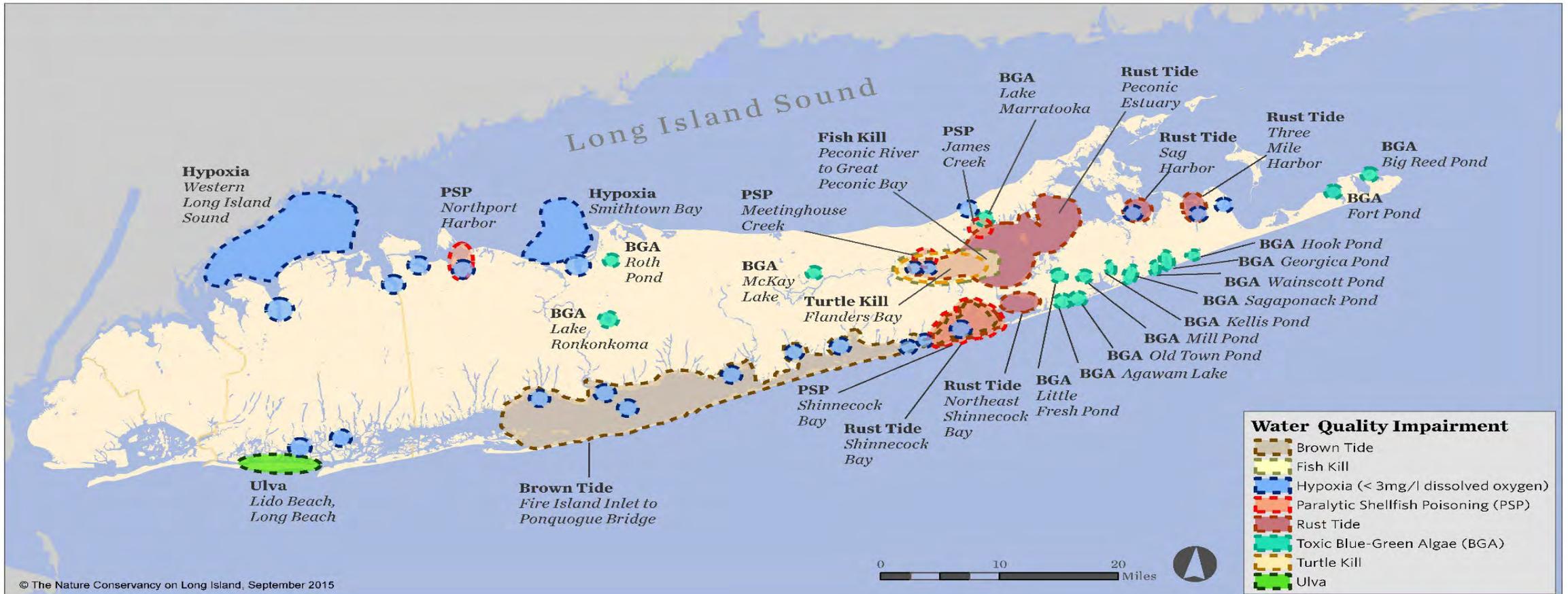
# Dissolved Oxygen in Long Island Sound

- In 2014 improvements in open Sound
- Ecosystem response?



**Yellow and Red = Fish gasping for air**

# Nitrogen feeds algae blooms



# Great Peconic Bay, rust tide, May 2015, linked to fish mortality



Riverhead fish kill, June 2015, linked to nitrogen loading, algal blooms, low oxygen



# Riverhead turtle die-off, May 2015, linked to red tide, saxitoxin





## **Save the Sound:**

Filed Legal Petition (2/15)

### **EPA:**

Nitrogen Strategy (12/15)

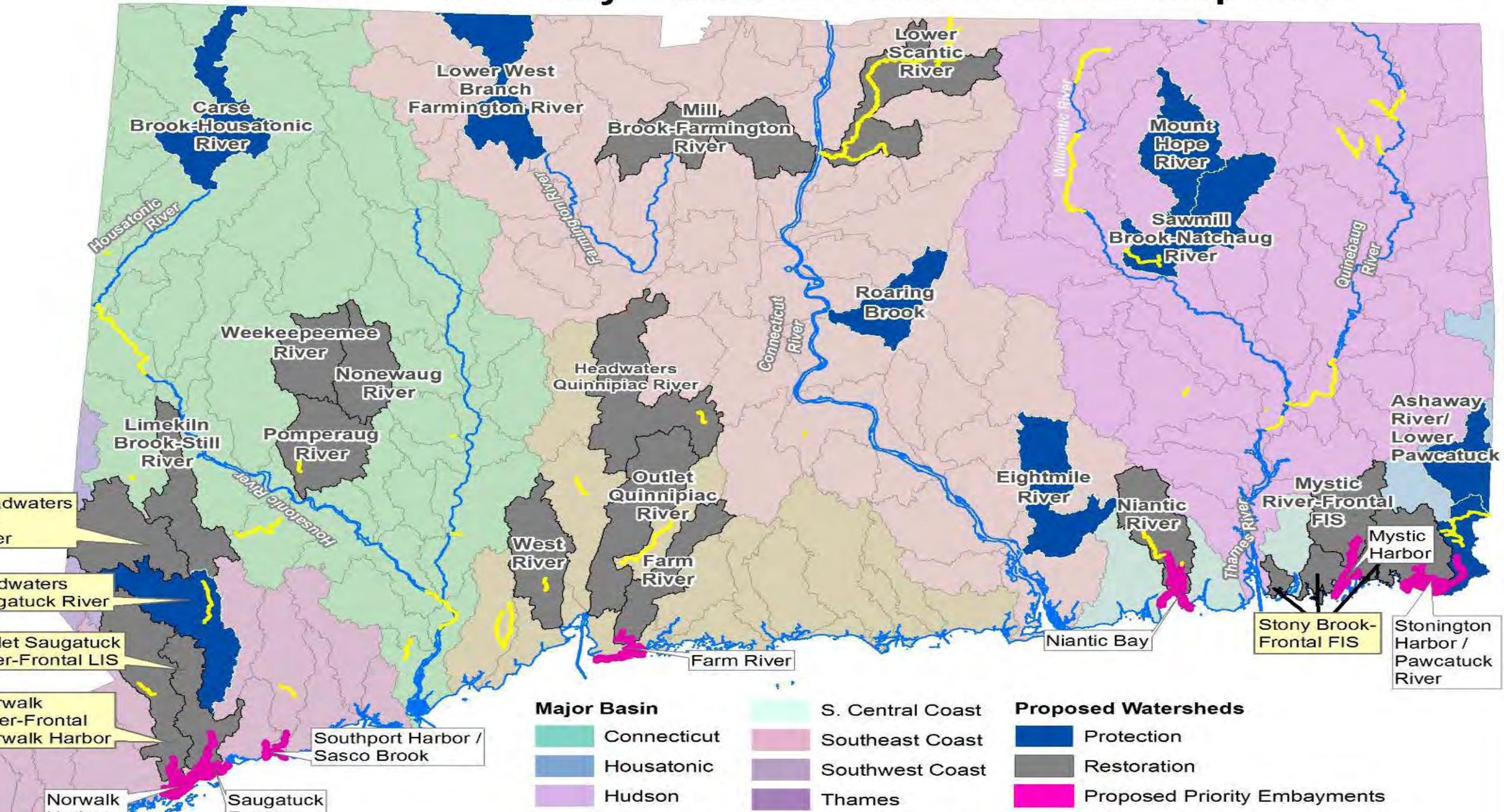
- Bays and Harbors
- East River
- 3 Major Tributaries
- Load allocations/action 2018

### **NY DEC**

LI Nitrogen Plan (4/16)

- Bays/Harbor orientation
- Local allocations/action 2018

# CT DEEP Preliminary Waters for Action Plan Development





## **CT DEEP:**

### Integrated Water Plan

- Identifies target watersheds
- Weak on deliverables

(Don't Forget Me!)

# Regional Tech Transfer – Strategies Septic/Fertilizer Rich Watersheds

Septic Capitol  
U.S.A.

# Regional Planning Transfer Bays/Harbor Scale: MVP Tool





**Regional Issue – Nitrogen Sequestration  
Function of Tidal Marsh**

**Long Island Sound/USFWS Assessment  
Predicted Tidal Marsh Loss by 2100**

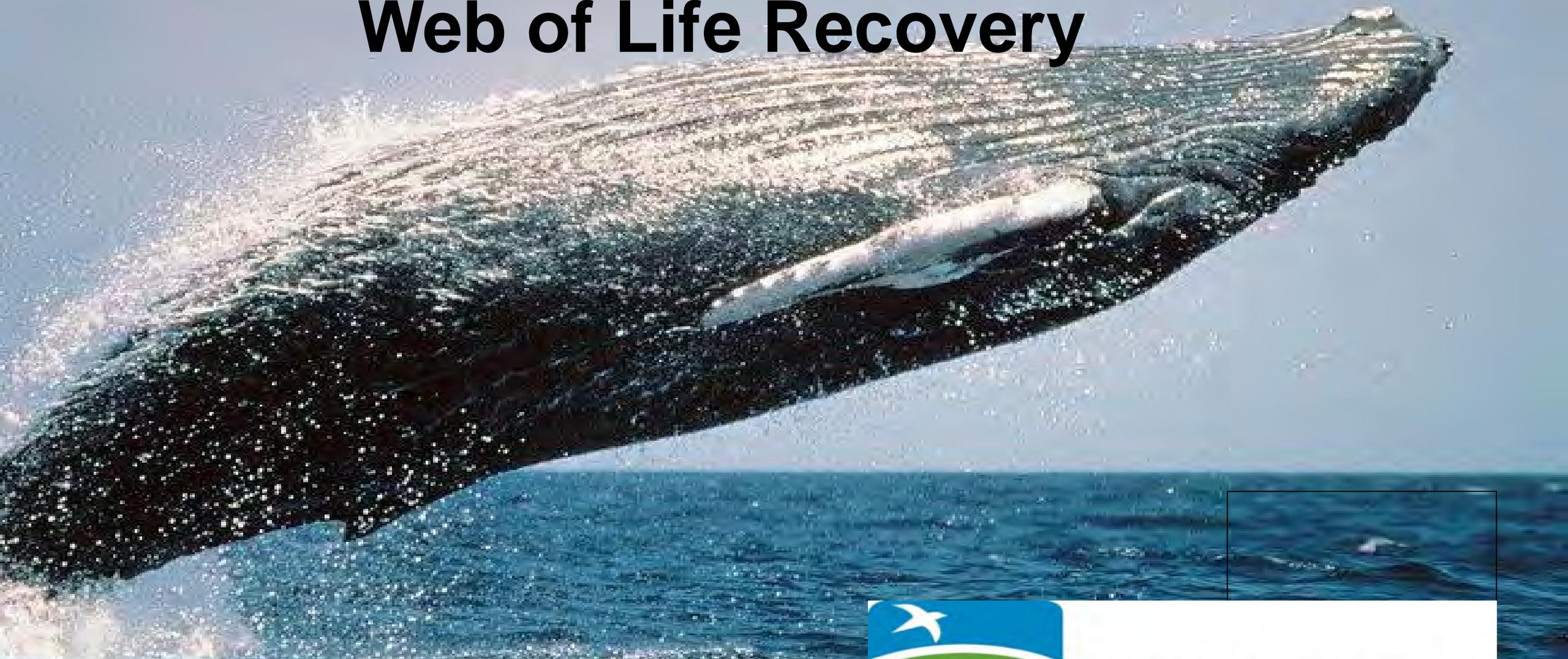
**Suggests**

**Nitrogen**



**= All Sewage Plant Discharges**

# Nitrogen Diet for the Sound = Web of Life Recovery



Save the Sound®

# Korrin Peterson

Senior Attorney, Buzzards Bay Coalition

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# Regional and Municipal Wastewater Collaborations to Reduce Nitrogen Pollution

## One Cape: Implementing Solutions for Clean Water

June 24, 2016



**Korrin Petersen, Esq.**  
Senior Attorney  
Buzzards Bay Coalition



[www.savebuzzardsbay.org](http://www.savebuzzardsbay.org)

# About the Buzzards Bay Coalition

- The Buzzards Bay Coalition is a nonprofit organization dedicated to restoration, protection, and sustainable use and enjoyment of Buzzards Bay and its watershed.
- The Coalition works to improve the health of the Bay ecosystem for all through education, conservation, research, and advocacy.
- Supported by nearly 8,000 members.



# About the Buzzards Bay Coalition

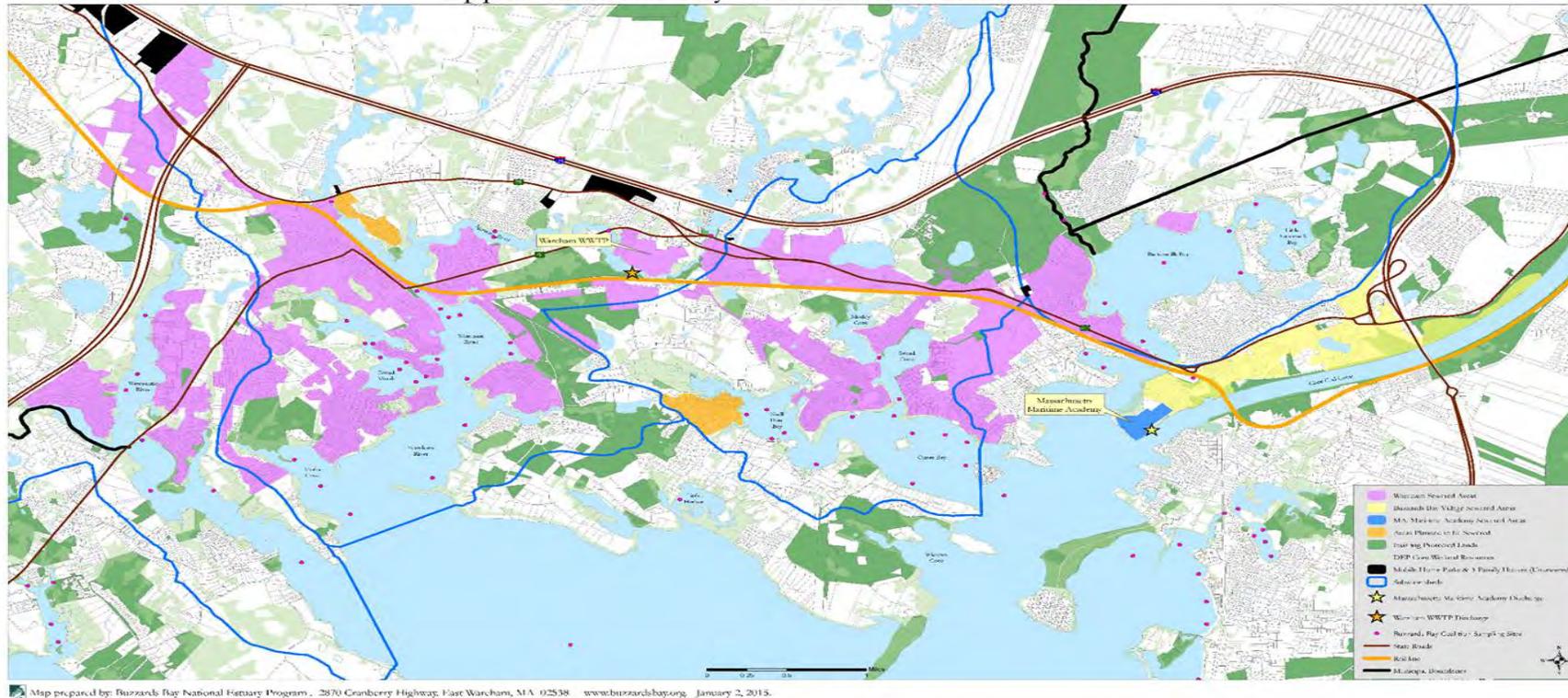
- Since 1987, the Buzzards Bay Coalition has:
  - **Partnered** with towns and agencies to clean up sewer and other pollution resulting in cleaner waters in nearly every Bay community,
  - **Preserved** more than 7,000 acres of Buzzards Bay watershed,
  - **Responded** to the 2003 Bouchard oil spill and protected the Bay from new spills,
  - **Created** a volunteer-based water quality monitoring program that includes numerous sites in Falmouth and Bourne,
  - **Educated thousands** about protecting and restoring the Bay.



# Multi-Community Partnership to Reduce Nitrogen in Upper Buzzards Bay

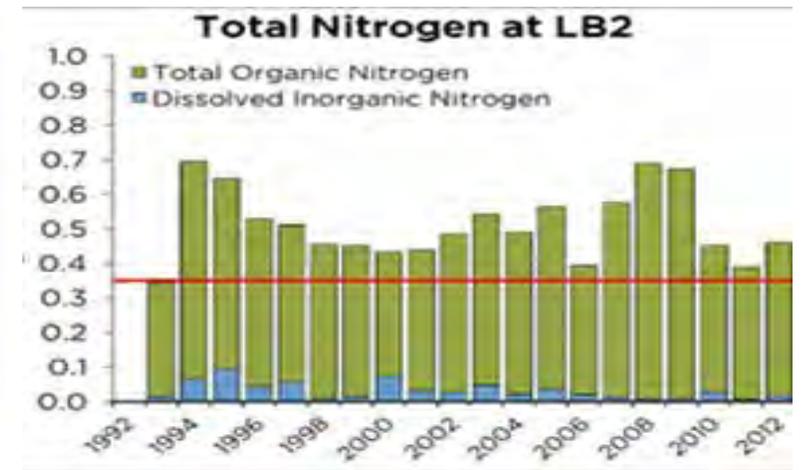
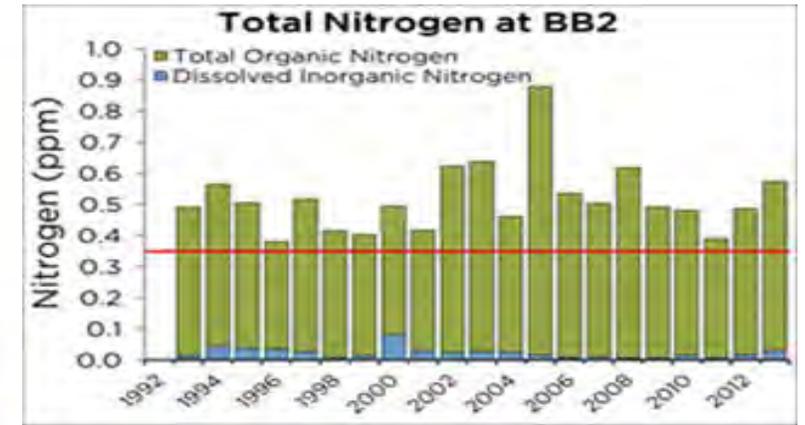
- Partnership between the towns of Bourne, Plymouth, and Wareham, the Massachusetts Maritime Academy, and the Coalition to evaluate region-wide sewers in Upper Buzzards Bay.

Upper Buzzards Bay - Subwatersheds and Sewers



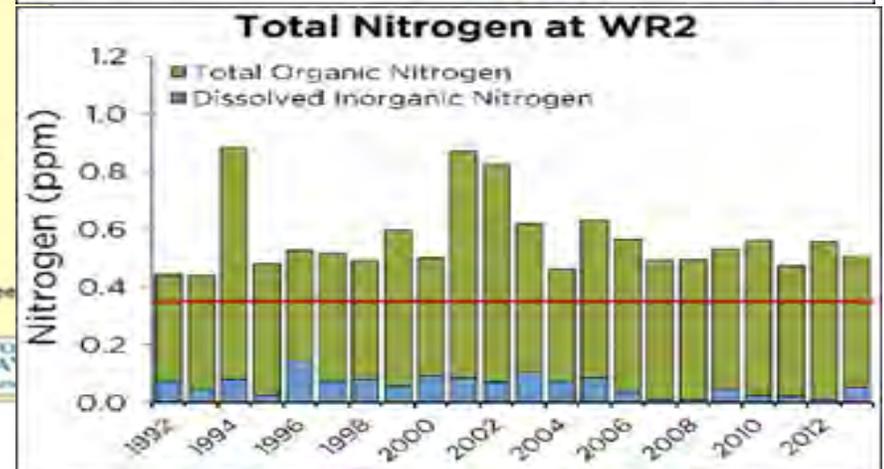
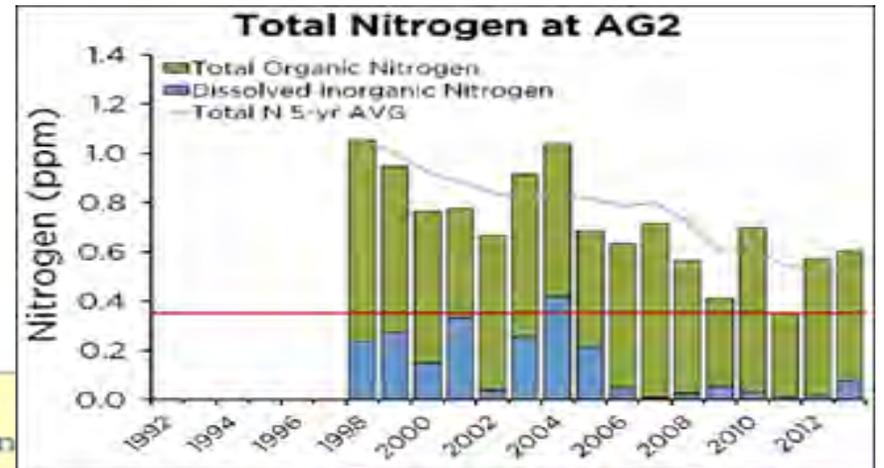
# Multi-Community Partnership to Reduce Nitrogen in Upper Buzzards Bay

- Water quality in Upper Bay estuaries – Buttermilk Bay



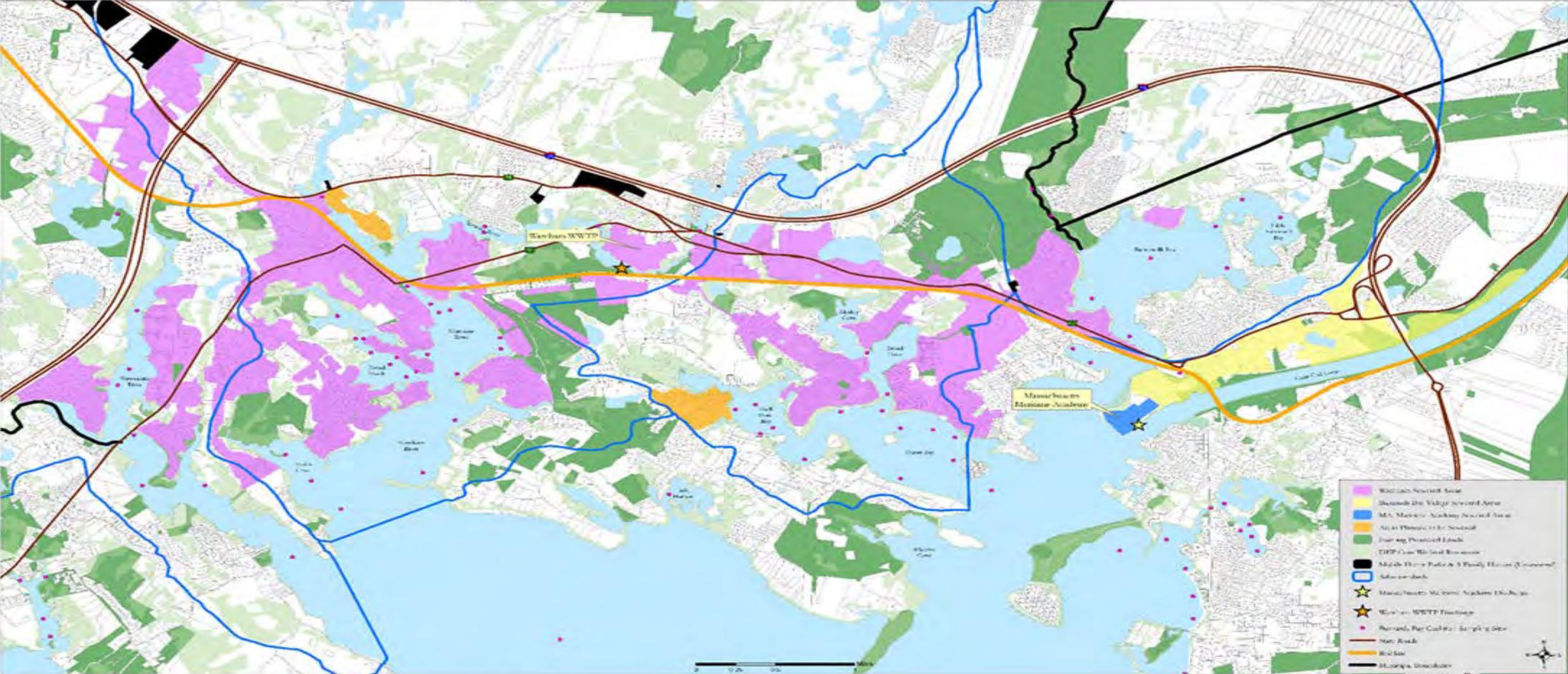
# Multi-Community Partnership to Reduce Nitrogen in Upper Buzzards Bay

- Water quality in Upper Bay estuaries – Wareham River



# Existing Sewer Infrastructure

Upper Buzzards Bay - Subwatersheds and Sewers



# Sewer Needs in Buzzards Bay Village

- The town of Bourne needs increased sewage capacity to accommodate planned economic development in the Buzzards Bay Village area.
- Additional capacity is needed to reduce the existing amount of nitrogen being discharged to Buttermilk Bay from septic systems in the Queen Sewell Park neighborhood.

**CHALLENGE** – Limitations on Treatment and Disposal. The Intermunicipal Agreement between Bourne and Wareham limits Bourne to 200,000gpd. Limited on discharge sites.

# Sewer Needs in Wareham

- Wareham WWTF upgraded in 2004, and is meeting one of the most aggressive nitrogen limits in all of Buzzards Bay.
- Wareham has extended sewer to all but two of 12 priority areas identified in their 2001 CWMP.

**CHALLENGE:** While the upgrade to the WWTF has had a positive water quality impact in the Agawam River, more nitrogen must be removed. Draft MEP Report suggest an additional 2100 homes. Discharge permit appropriately caps the volume discharged to the Agawam. Alternative discharge site required.

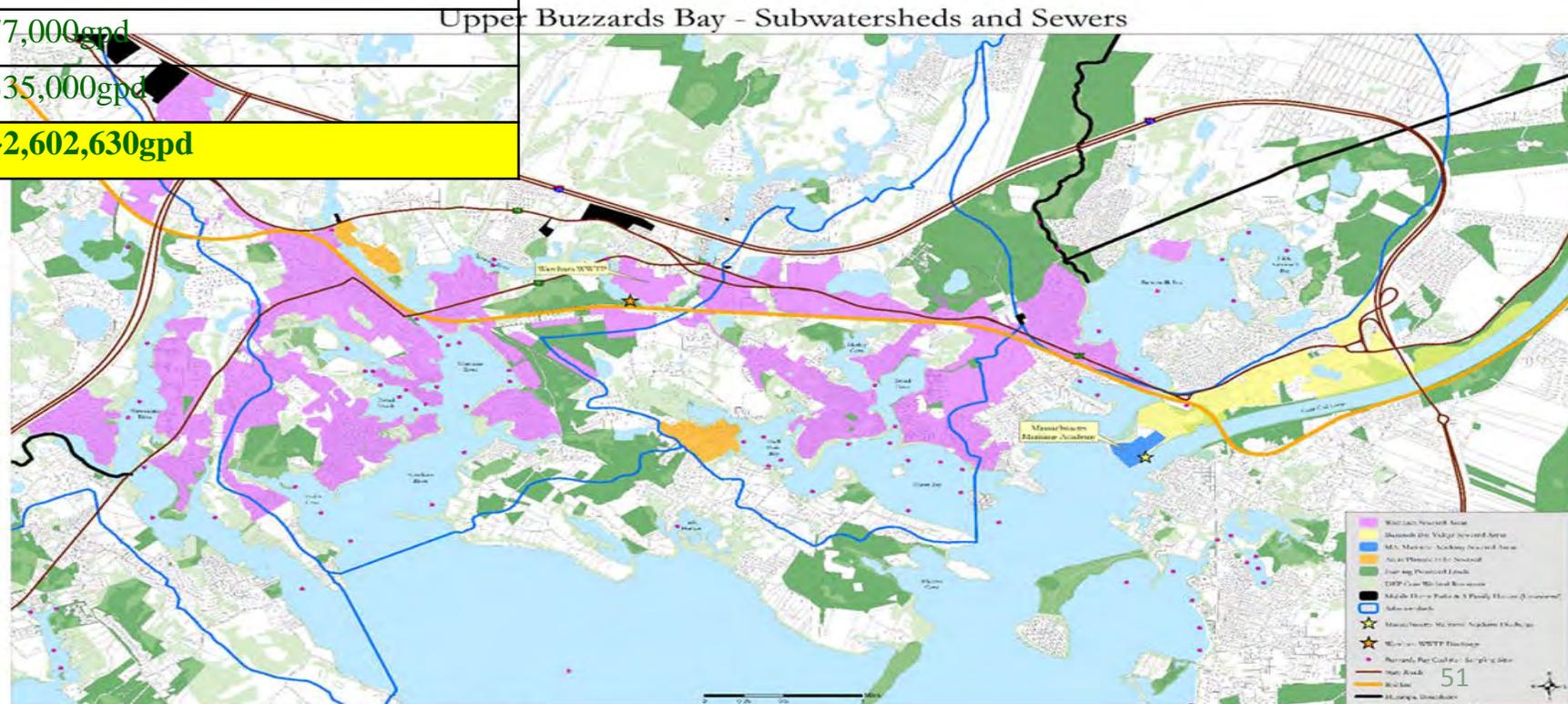
# Mass Maritime Academy Sewer Needs

- Currently, MMA operates a 77,000gpd wastewater treatment plant on campus and discharges at Taylors Point at the Cape Cod Canal.
- The WWTP does not treat for nitrogen resulting in approximately 18,276lbs of nitrogen discharged at Taylors Point per year.
- MMA's 2014 Master Plan anticipates future growth of students to 1,800, increasing wastewater volume.

**CHALLENGE:** No nitrogen removal at WWTP.

# Regional Sewer Needs

	Estimated Wastewater Volume (gpd)
Current Wareham WWTP	1,560,000gpd
Gateway Shores	159,060gpd
Mobile Home Parks	47,520 gpd
South Plymouth	160,050gpd
Queen Sewell Neighborhood	264,000gpd
MMA	77,000gpd
Buzzards Bay Downtown	335,000gpd
<b>Total</b>	<b>~2,602,630gpd</b>



# Regional Sewer Solution

- How can we combine resources and municipal sewer infrastructure across town and watershed boundaries to develop a regional wastewater solution to reduce nitrogen pollution in two of upper Buzzards Bay's critically nutrient impaired sub-estuaries; the Agawam/Wareham River and Buttermilk and Little Buttermilk Bays.
- Evaluate the relocation of the Wareham WWTP discharge pipe from the Agawam River to Taylors Point.
- If feasible, expand collection system in all three communities to be treated at Wareham WWTP.

# Potential Nitrogen Reductions

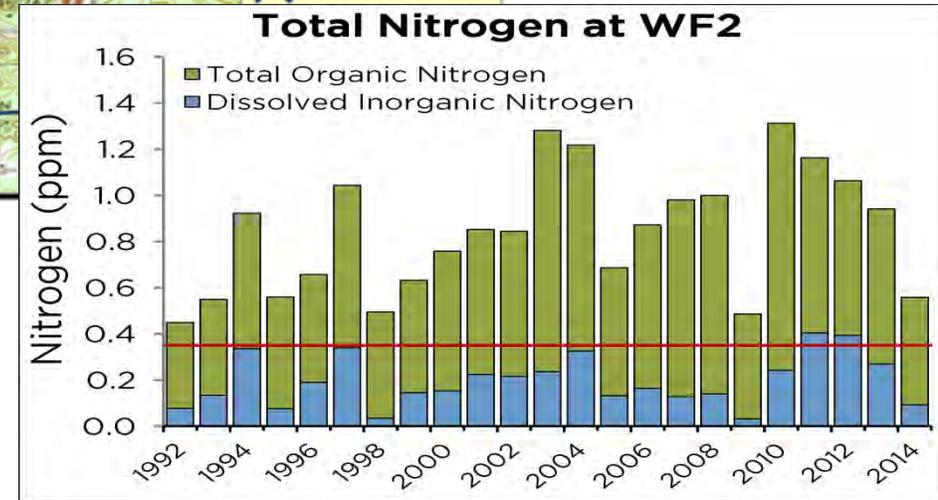
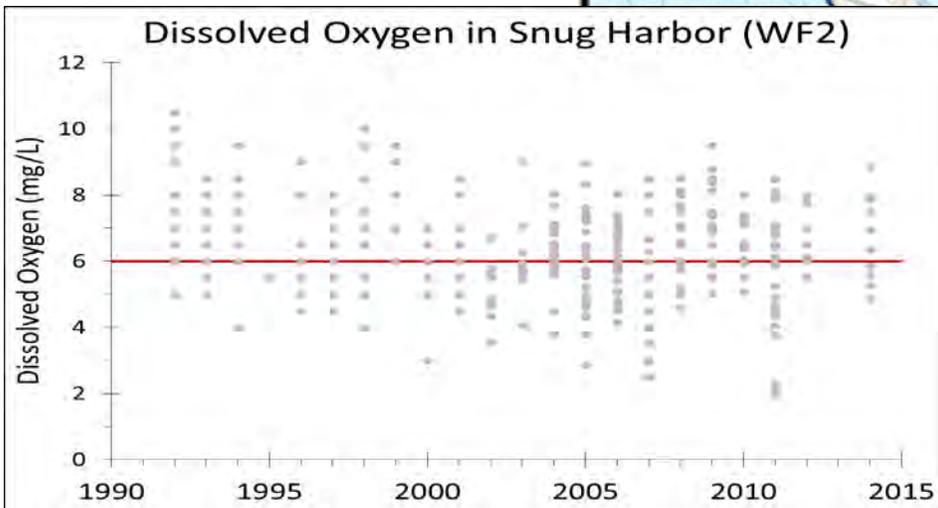
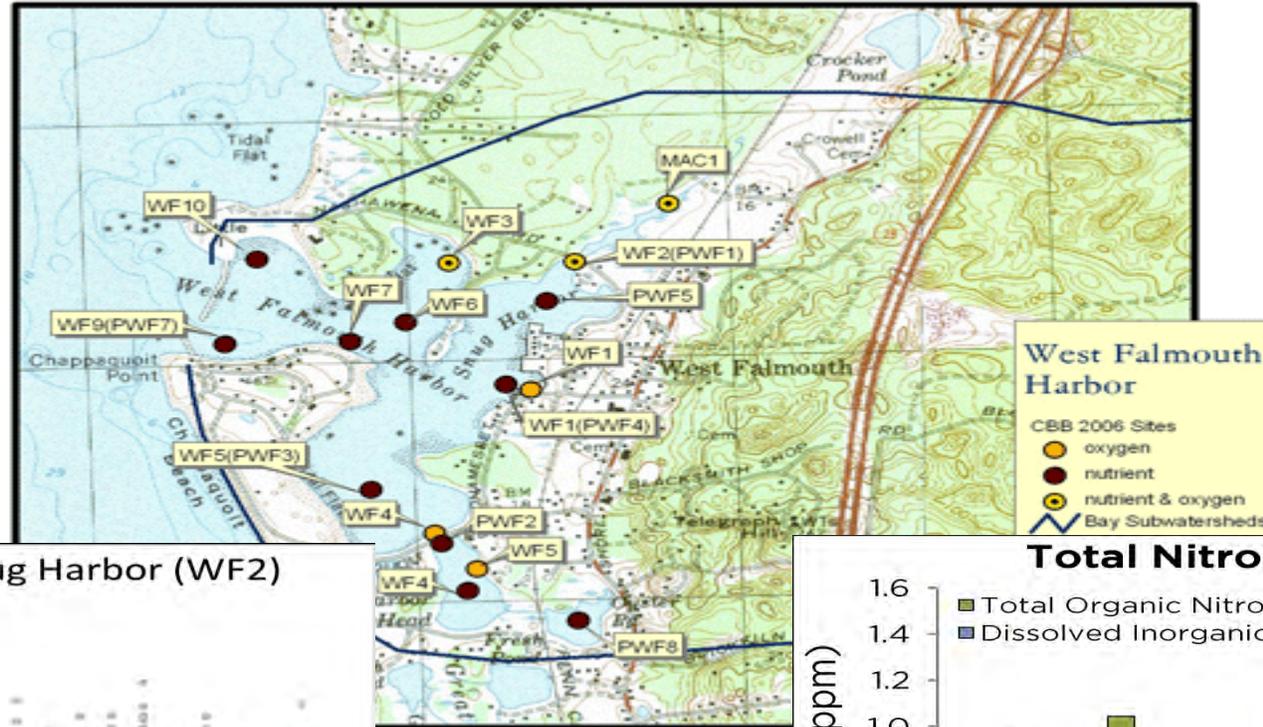
Reduction of Existing Nitrogen Sources to Impaired Waterbodies (lbs/year)		Total Nitrogen Load Reductions from Impaired Waterbodies
Relocate Wareham WWTP discharge from Agawam River to Cape Cod Canal. 1.56MGD at 3mg/L	14,241.27 lbs/year	
Expand sewer to ~482 on-site systems in Gateway Shores. 159,060gpd at 35mg/L	16,940.72 lbs/year	
Connect ~ 144 Mobile Home Units. 47,520gpd at 35mg/L	5,061.13 lbs/year	
<b>Total nitrogen reduction in the Agawam River</b>		<b>36,243.12 lbs/year</b>
Expand sewer to ~485 on-site systems in South Plymouth. 160,050gpd at 35mg/L	17,046.16 lbs/year	
Expand sewer to ~800 on-site systems in Queen Sewell Park Neighborhood. 264,000gpd at 35mg/L	28,117.38 lbs/year	
<b>Total nitrogen reduction for Buttermilk Bay</b>		<b>45,163.54 lbs/year</b>
<b>Total Annual Nitrogen Load Removed from Impaired Estuaries</b>		<b>81,406.66 lbs/year</b>

# 2016 Southeast New England Program Water Quality Management Grant

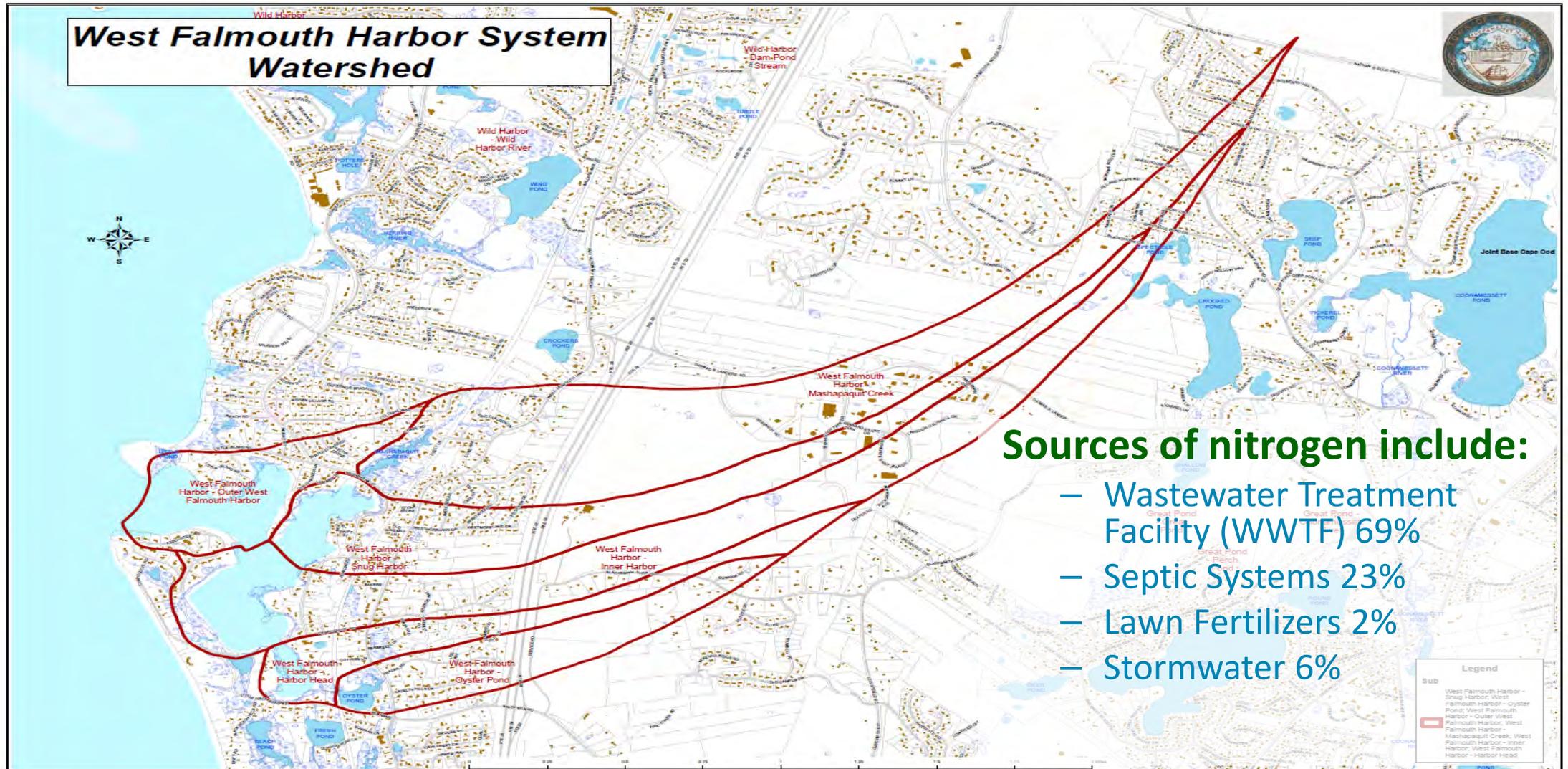
- **Initial Tasks to Assess Feasibility**

- Survey of Railroad to Assess Feasibility of Force Main Construction
- Sewer Needs Analysis for Plymouth, Bourne and Wareham.
- Assessment of Required WWTP Upgrades to Maintain Treatment Level.
- Deploy Baseline Water Quality Monitoring Buoy.
- Hydrodynamic Model to Assess Water Quality Impacts of Potential Discharge.

# Septic System Remediation in West Falmouth Harbor



# Sources of Nitrogen to West Falmouth Harbor



# Wastewater is the Largest Source of Nitrogen to West Falmouth Harbor

## 1. Town of Falmouth Wastewater Treatment Facility

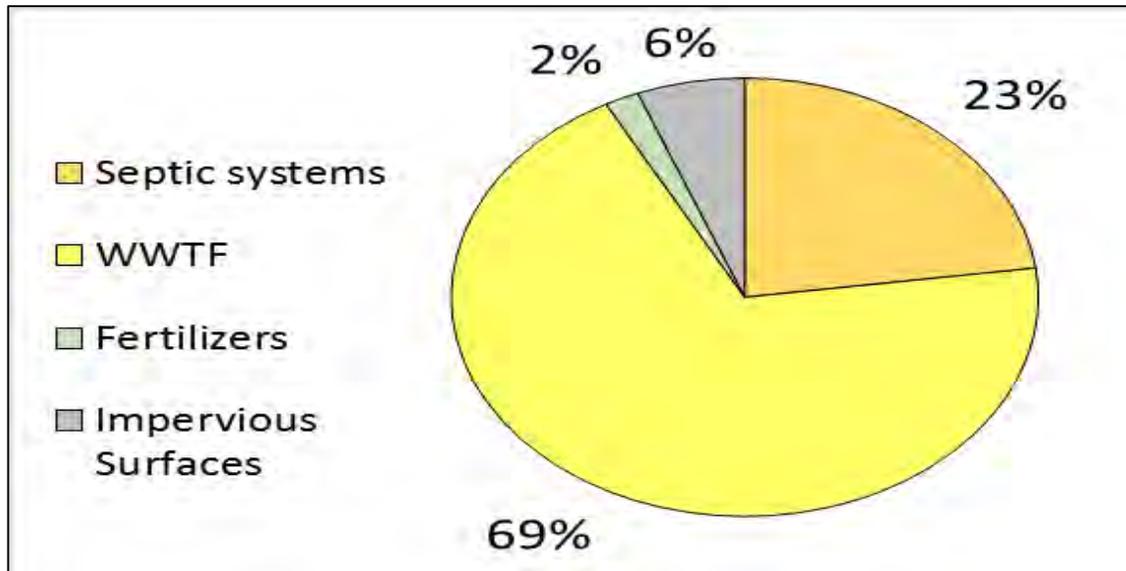
- Discharges effluent (treated wastewater) into the ground where it flows directly to West Falmouth Harbor.
- Historically, was responsible for 70% of nitrogen in the Harbor.
- *Facility upgrades and strict permit limits are addressing this problem.*

## 2. Conventional Septic Systems Near the Harbor

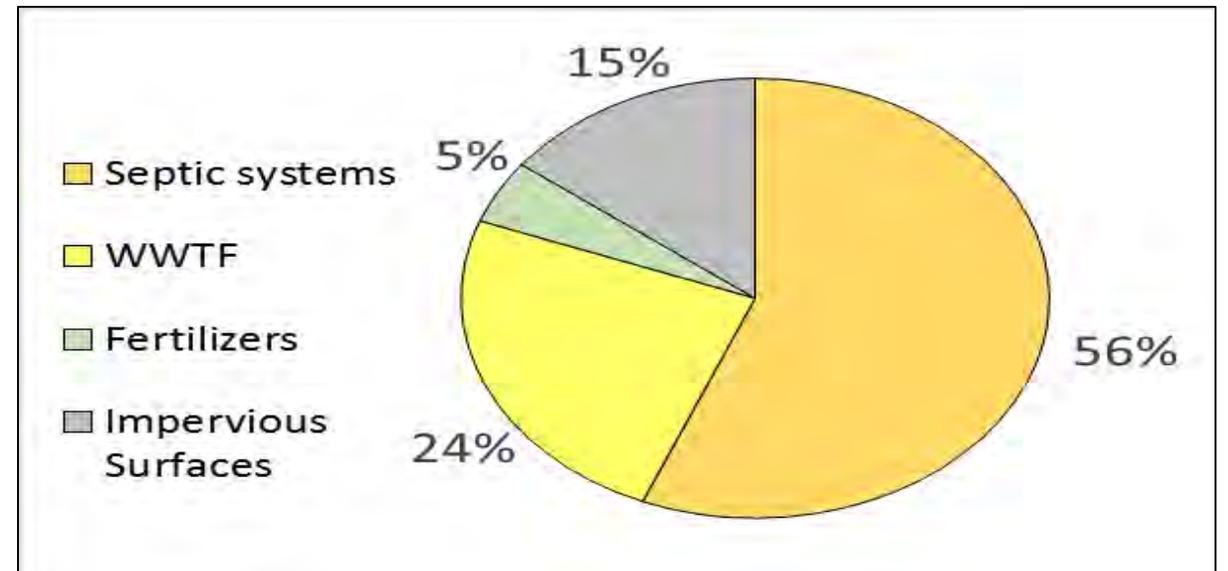
- Discharge wastewater into the ground near the Harbor.
- Historically, were responsible for 23% of nitrogen in the Harbor, but now are the largest source of nitrogen pollution.
- *This is the problem we need to solve. It is the largest unaddressed source now that the WWTP is controlled.*

# Sources of Nitrogen in West Falmouth Harbor

## Prior to WWTF Upgrade



## After WWTF Upgrade



Data source: West Falmouth MEP Report (Howes et al. 2006)

# Reducing Nitrogen from On-Site Septic Systems

## The West Falmouth Harbor Restoration Project

- Project Goals
  - Reduce the Harbor's largest source of nitrogen contamination to restore the health of West Falmouth Harbor.
- Project Strategy
  - Upgrade 20 conventional septic systems and cesspools very near the Harbor to systems that remove nitrogen.

# The West Falmouth Harbor Restoration Project

- Project partners

- Town of Falmouth
- Buzzards Bay Coalition



- Additional support

- West Falmouth Village Association
- Barnstable County Department of



- Project scope

- Partners received a \$250,000 federal grant to provide subsidies to homeowners within 300 feet of West Falmouth Harbor who upgrade their septic system to one that removes more nitrogen.

# Candidate Properties

West Falmouth Harbor Shoreline Septic Remediation Project



Map prepared by: Buzzards Bay National Estuary Program, 2870 Cranberry Highway, East Wareham, MA 02538. [www.buzzardsbay.org](http://www.buzzardsbay.org) March 10, 2015

# Installations

- Prioritized year-round cesspools closest to the Harbor.
- 20 Upgrades complete.
- 4 different technologies chosen.
- More than 20 homeowners were interested. Demand for the project exists.

# Installations



# Installations



# Questions?





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