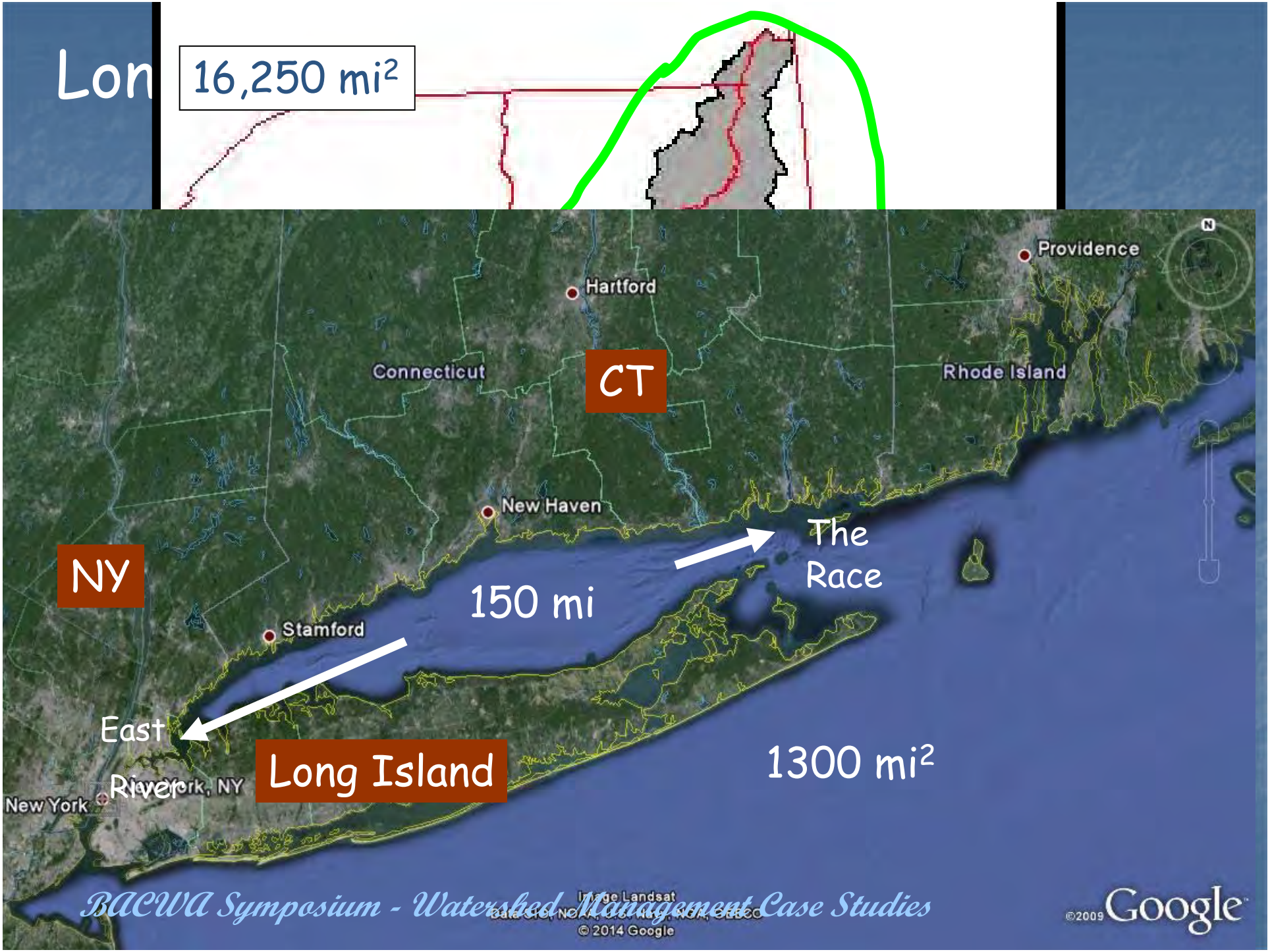
Past, Present, and Future of the Long Island Sound Watershed Management Program

Paul E. Stacey
Great Bay National Estuarine Research Reserve
New Hampshire Fish & Game Department

6 October 2014


Lon
16,250 mi²
Providence
Hartford
Connecticut
CT
Rhode Island
New Haven
The
Race
NY
150 mi
Stamford
East
Long Island
River
New York
1300 mi²
BACWA Symposium - Watershed Management Case Studies
Image Landsat
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Sound Facts

- ***9 million people*** live in the watershed;
- ***24 million people*** live within 50 miles of LIS;
- ***$17 - 37 billion*** annually to the economy;
- ***240 beaches*** host ***15 M*** summer visits;
- ***105 STPs*** discharge ***> 1 BGD*** of effluent;
- LIS holds ***18 Trillion Gallons of Water***;
- ***600 miles of coastline***;

- ***250 different animal species*** live in or depend upon the Sound for their food, water, and habitat.

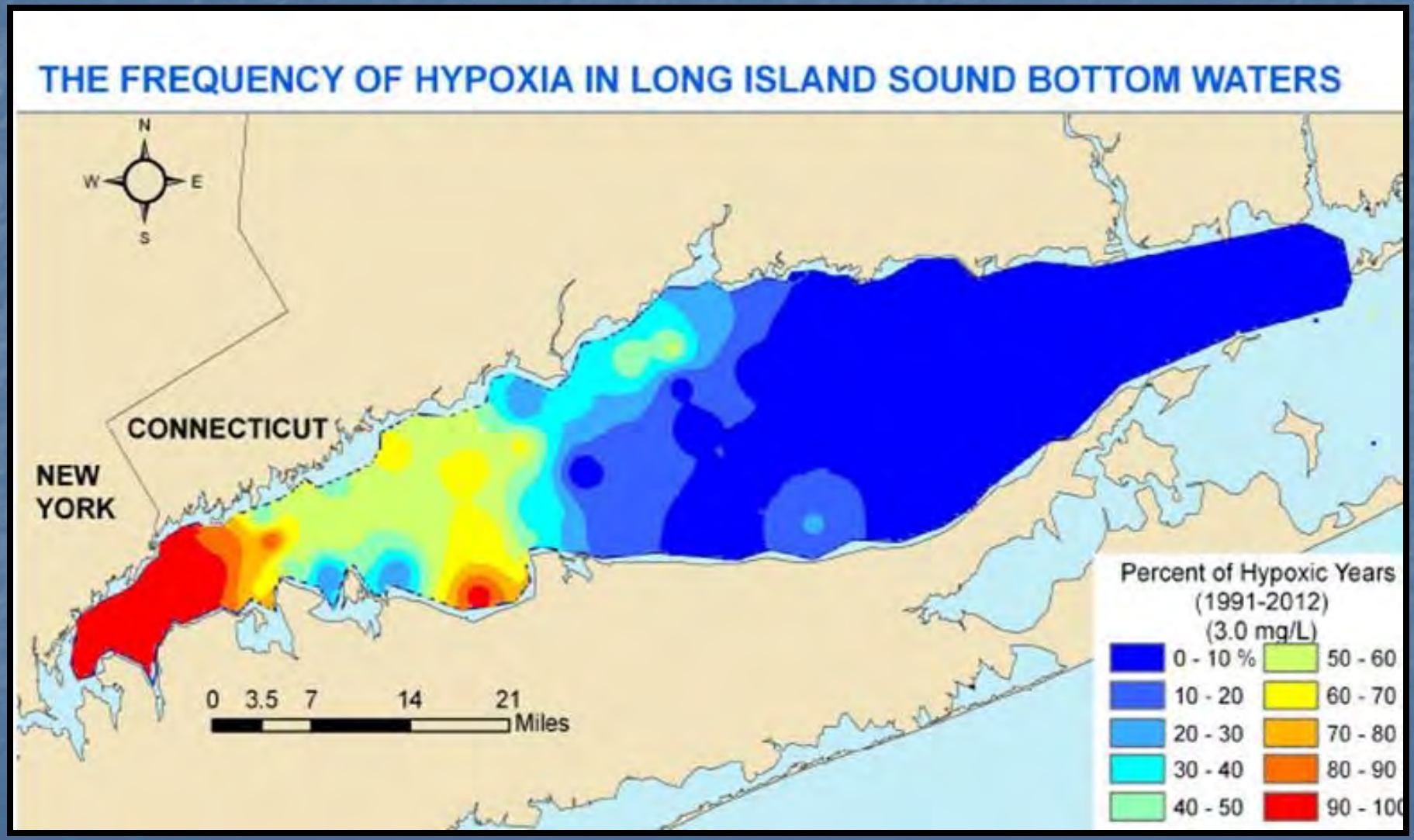
The 1994 Long Island Sound Study Comprehensive Conservation and Management Plan (CCMP)

Set forth the vision for a Long Island Sound waters that ***"…are clean, clear, safe to swim in, and charged with life."***

The 1994 CCMP focus areas were:

- Low dissolved oxygen (hypoxia)
- Toxic contamination
- Pathogen contamination
- Floatable debris
- Living resources and habitat management
- Land use and development
- Public involvement and education

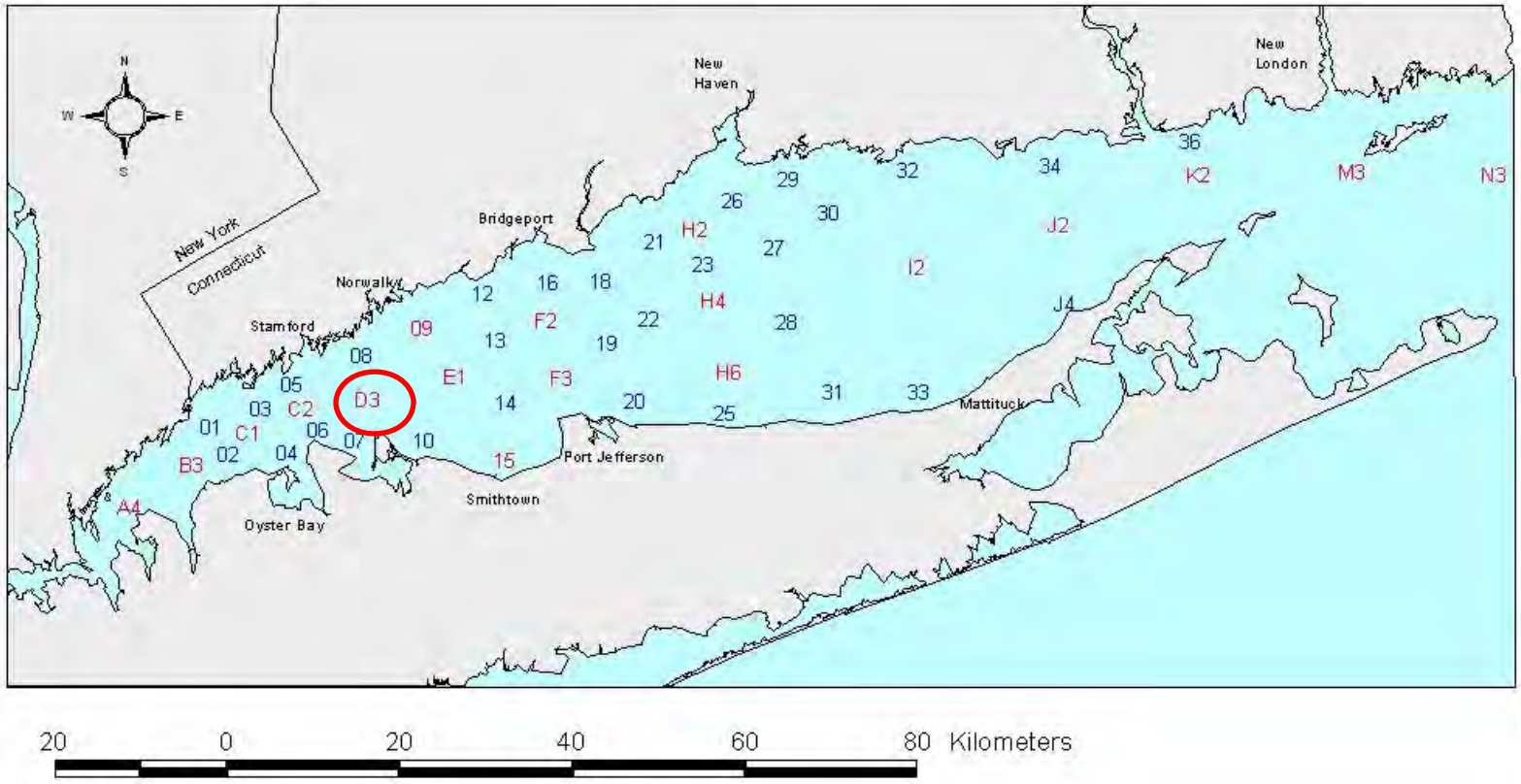
Primary Challenge: Nutrient Enrichment Hypoxia!



STATE OF CONNECTICUT
DEPARTMENT OF
ENVIRONMENTAL PROTECTION
79 Elm Street
Hartford, CT 06106-5127

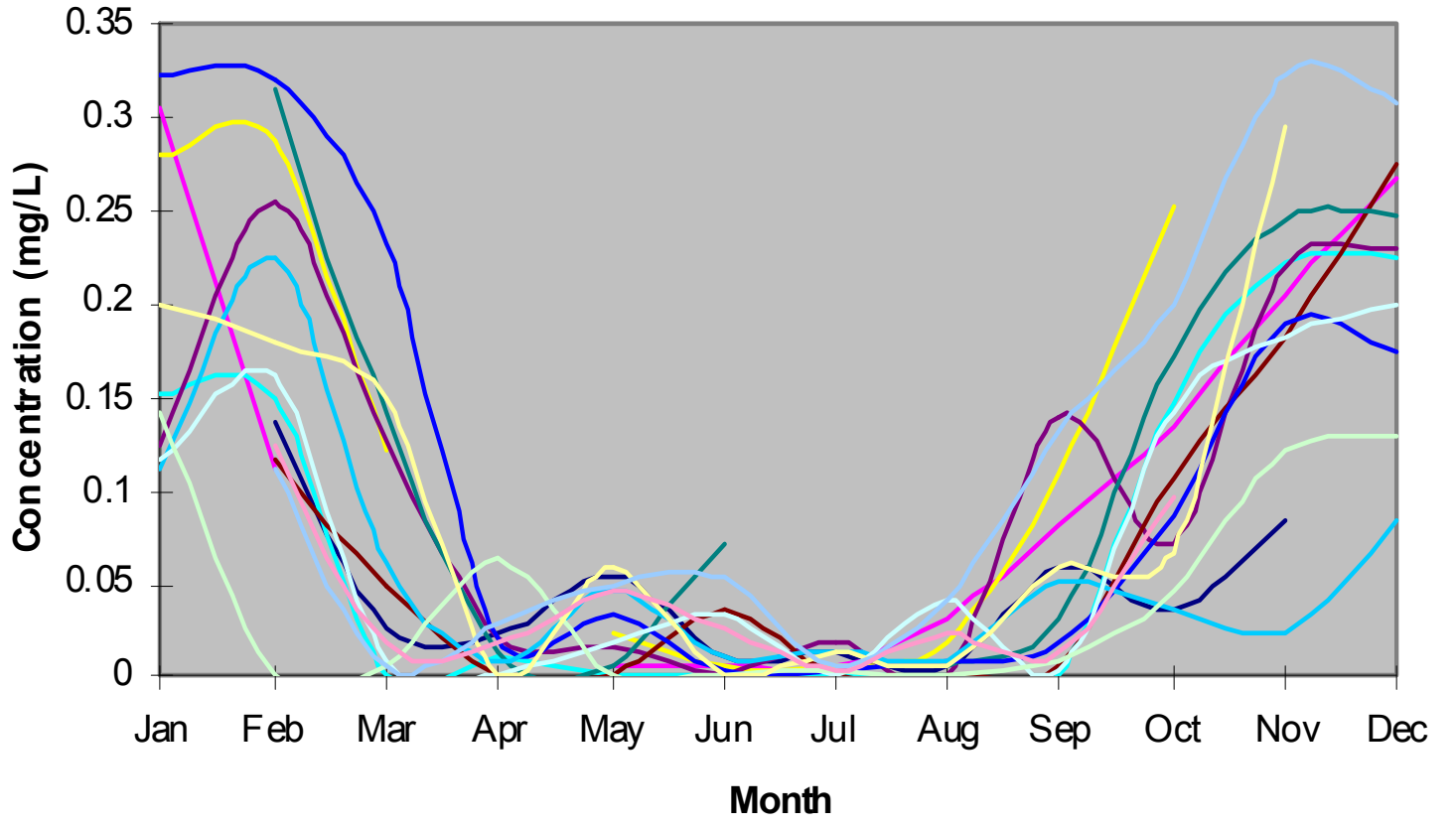
Bureau of Water Management
Long Island Sound Water Quality Monitoring Program

Station Location Map



Nitrogen

Surface Water Total Inorganic Nitrogen – Station D3



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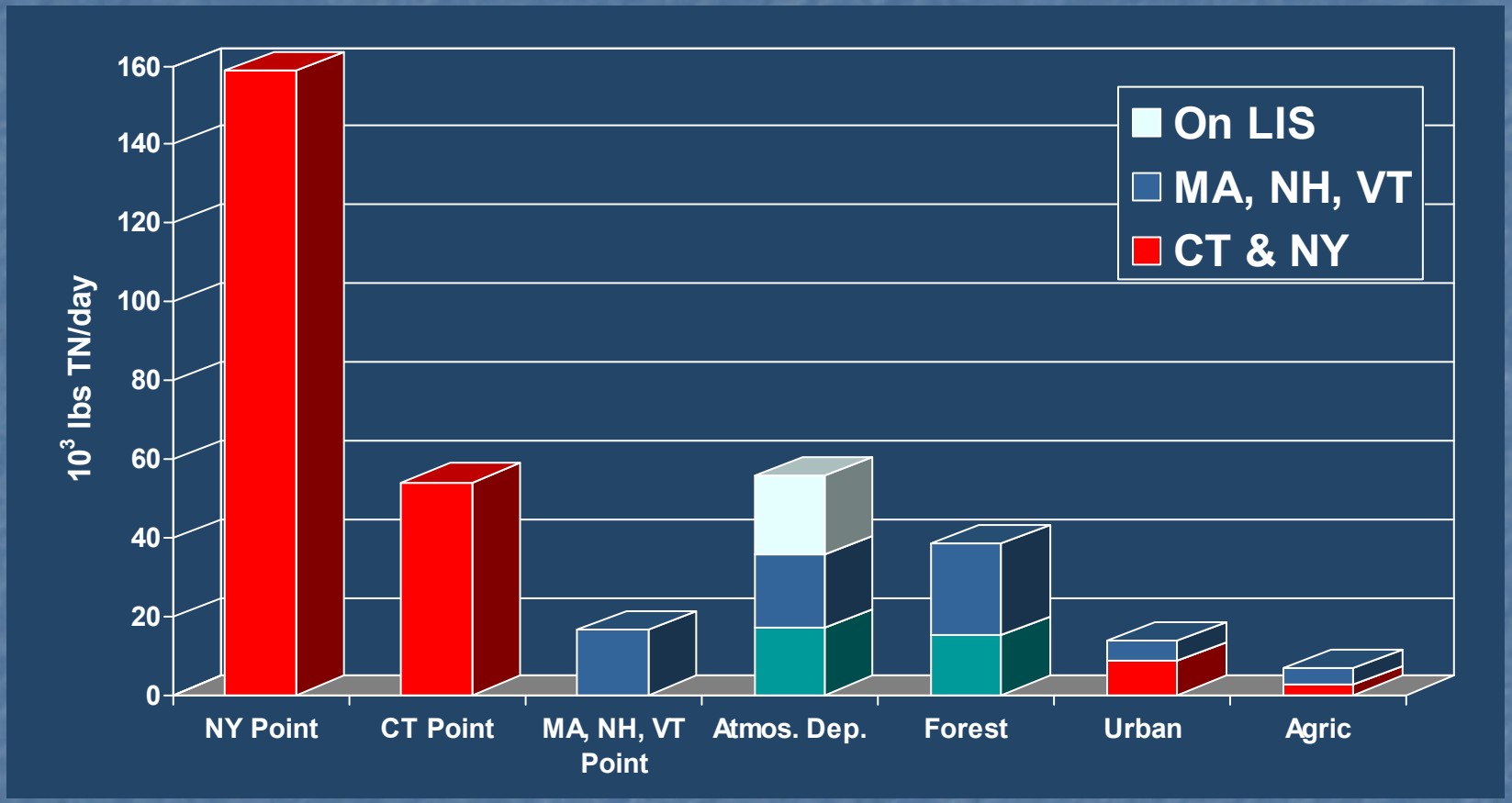
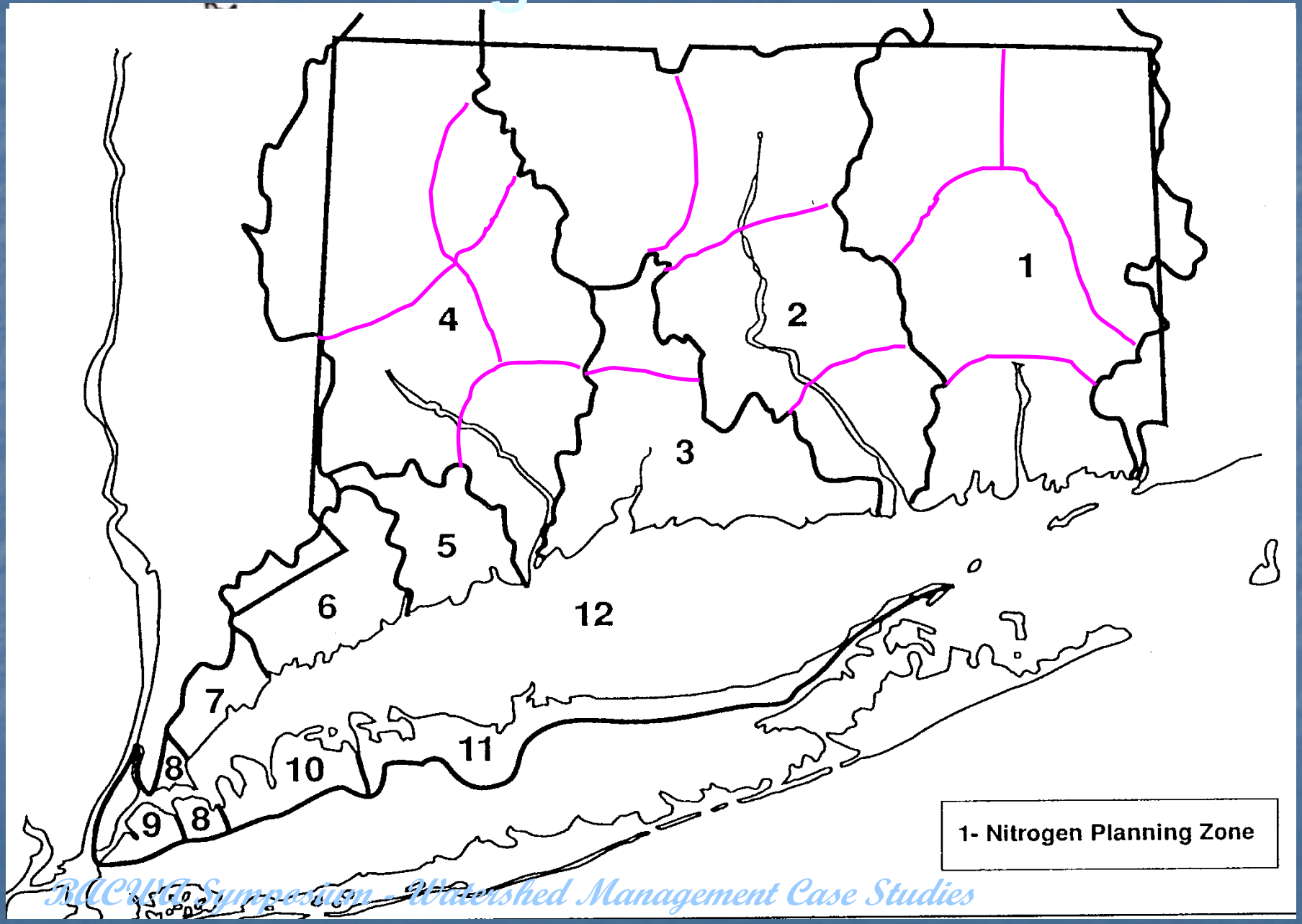
TOTAL NITROGEN LOAD DELIVERED TO LONG ISLAND SOUND (K Lbs TN/Day)

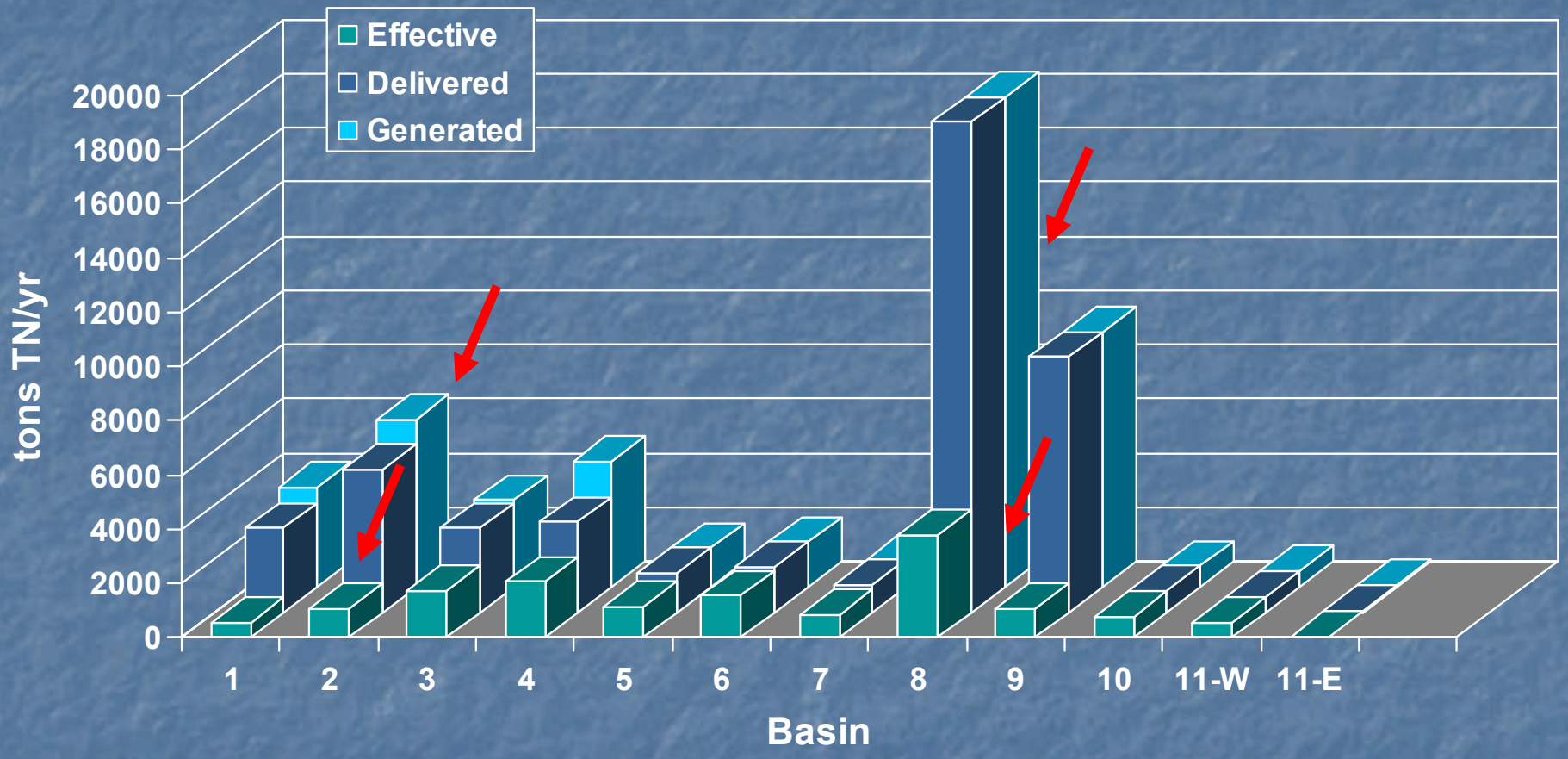


Total Load from all Sources = 340K lbs TN/day

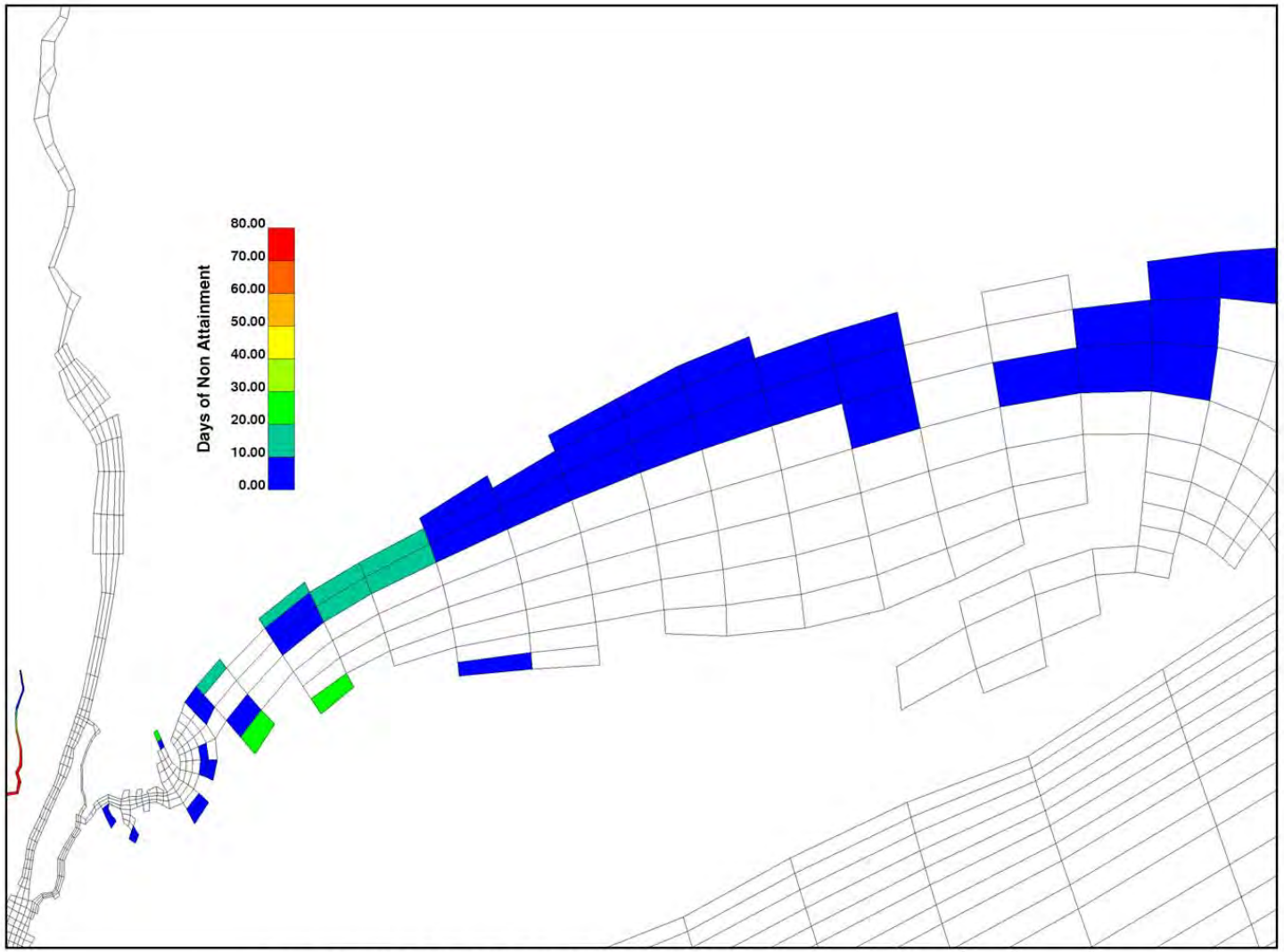
Management Zones



CT & NY TN Sources and Effect in LIS

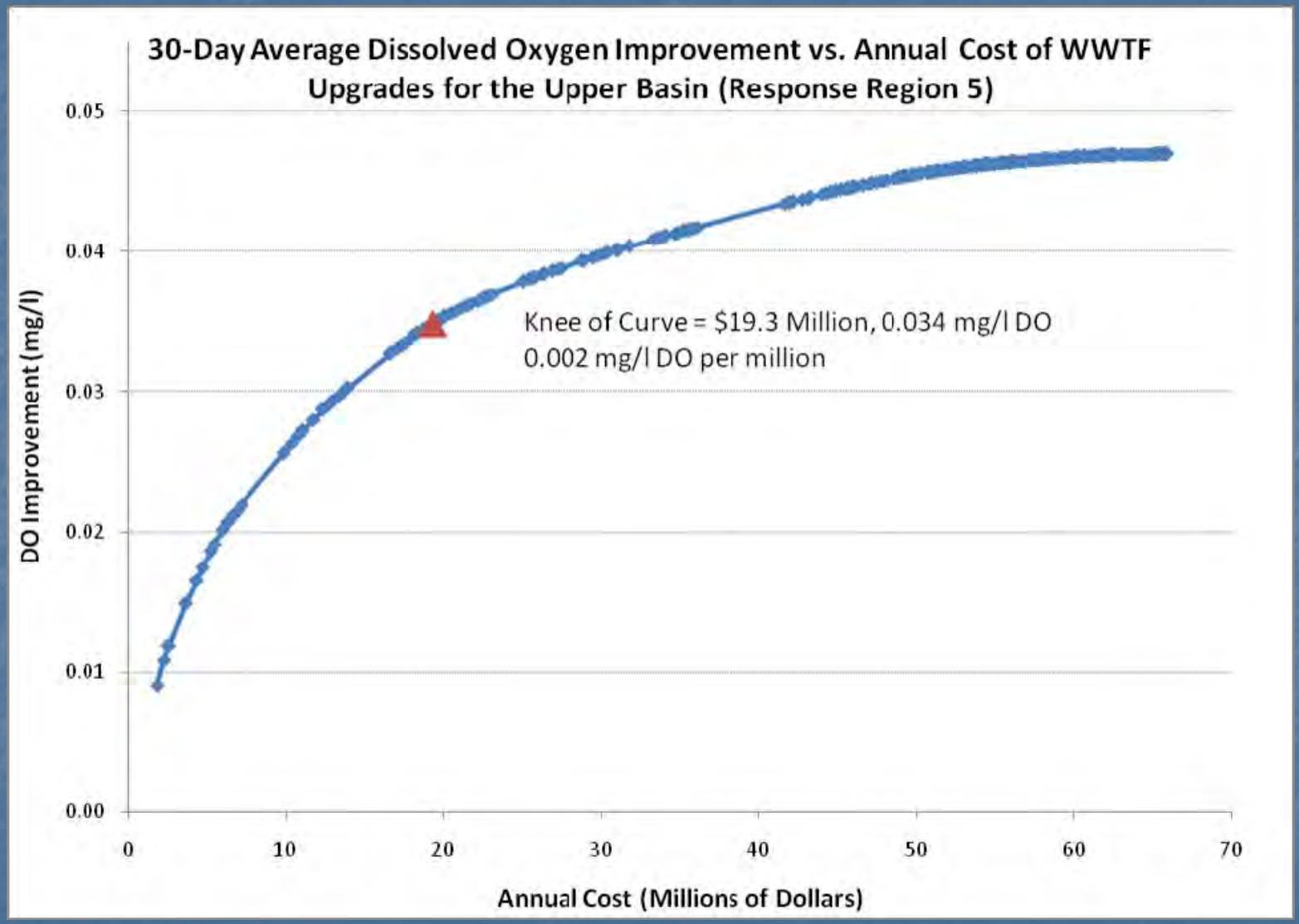


Models, Models, Models



LIS = Min(LOT-N,TMDL-N) TMDL-C, 1988 Hydrodynamic Conditions
New York State Proposed Acute and Connecticut Current Criteria

Setting the Target



Long Island Sound TMDL

(A *Phased* Total Maximum Daily Load - 2000)

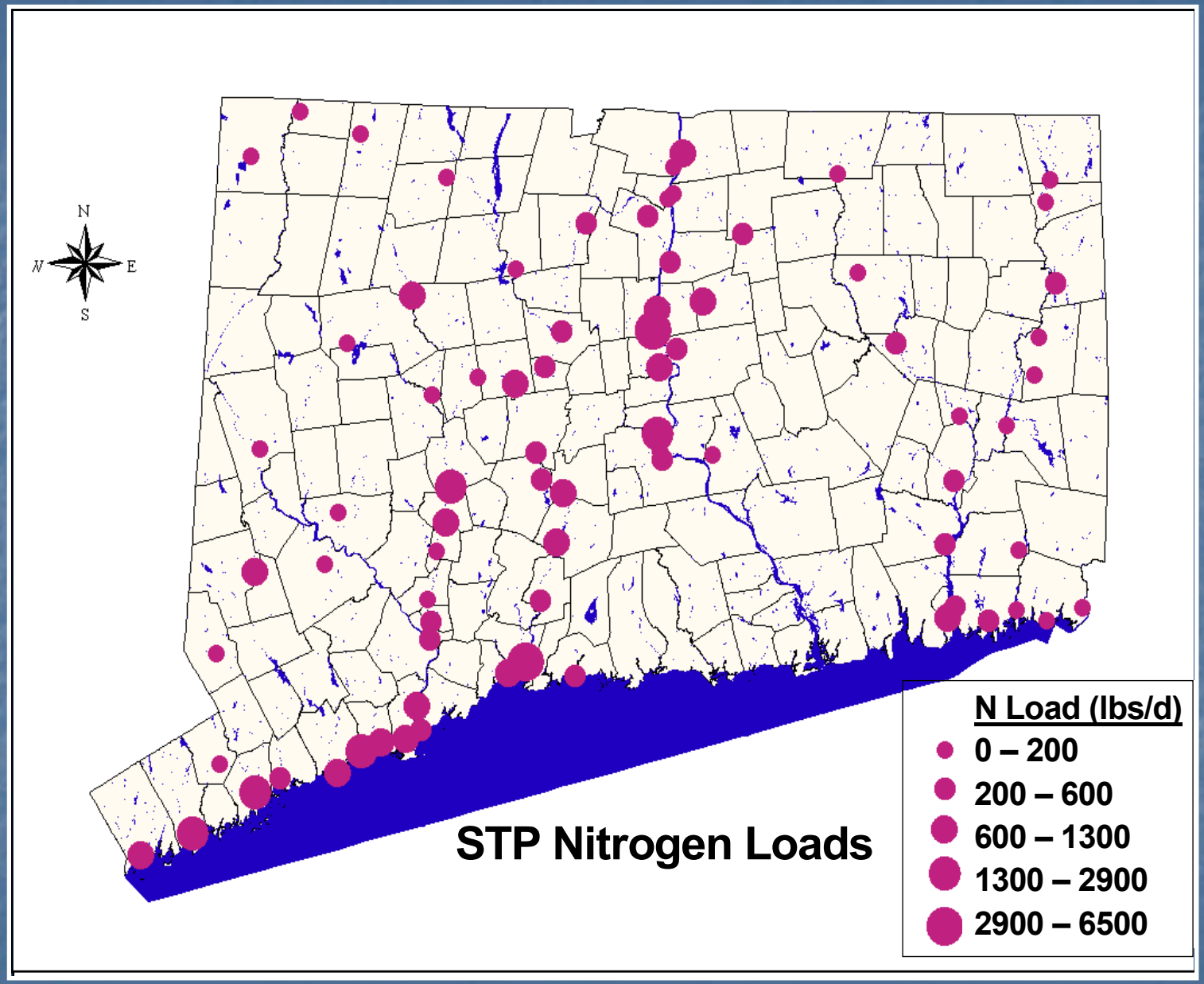
- Enforceable Schedule
- Meet Water Quality Standards
- CT & NY Nitrogen Reduction Goal
  - 58.5% by 2014
    - 10% reduction to urban and agricultural runoff
    - 59-64% reduction to point sources
- Allows "Trading"
- Future Actions
  - Out of State Sources (runoff –10%, pt sources – 25%)
  - Atmospheric Deposition (CAIR Rule and SIPs)
- Periodic Revision (Adaptive Management)
  - Revision Every 5 Years

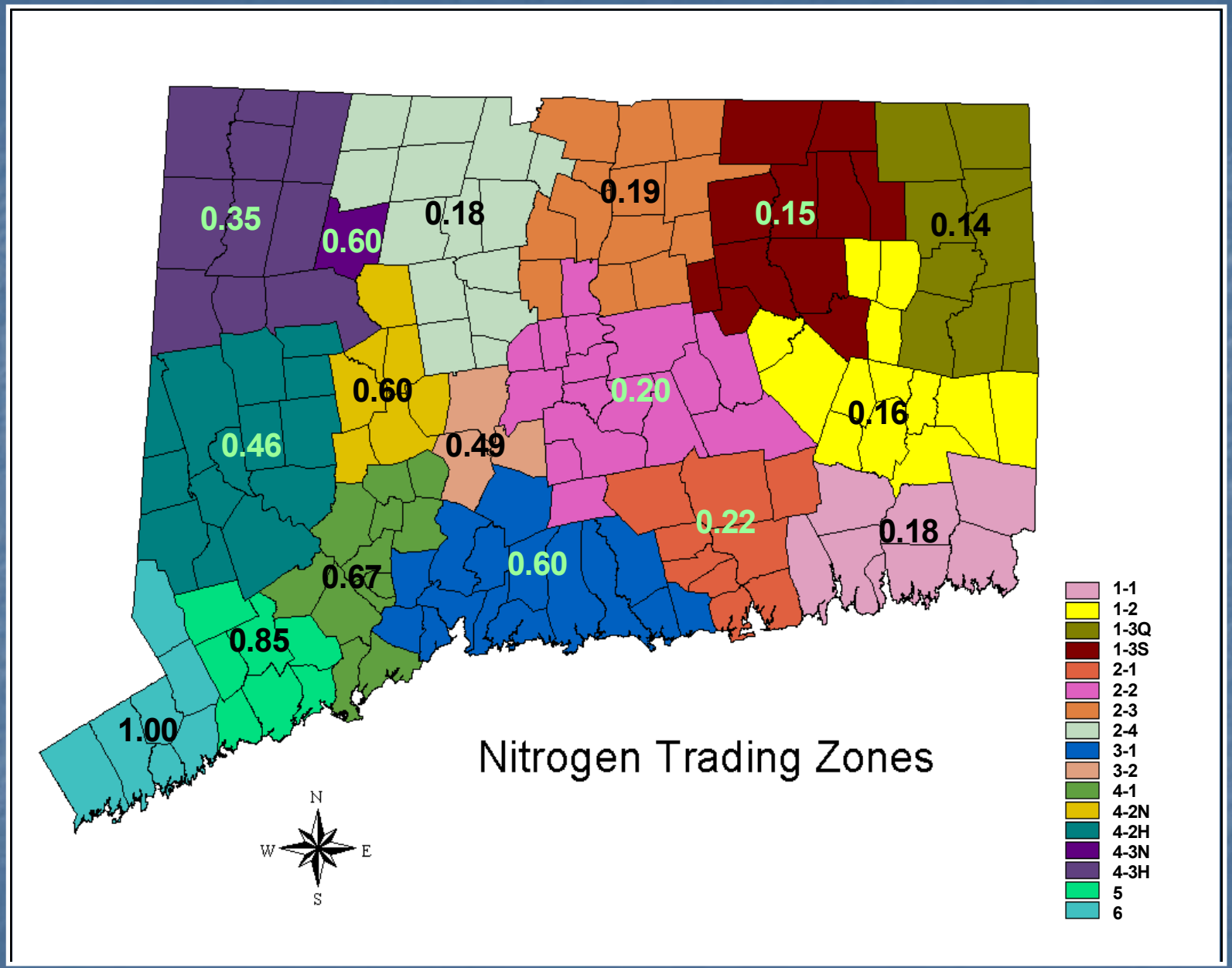
What Worked?

- TMDL - WLA
  - Trading
  - Financing

About CT's Nitrogen Credit Exchange…

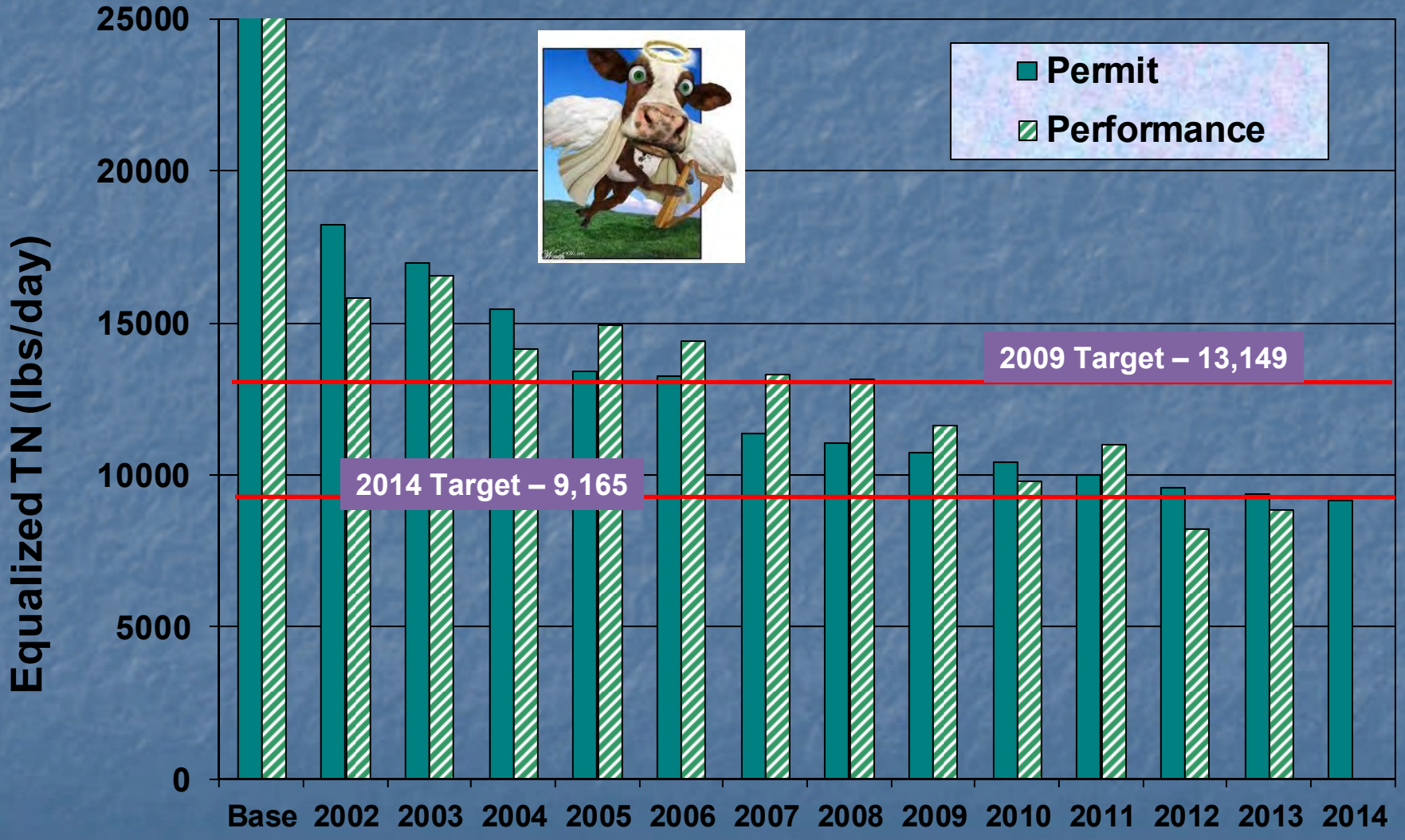
- 80 POTW's in CT
- Regulatory Driver: TMDL
- Incentive Based – Not Free Market
- Regulatory Authority: State General Permit
  - Permit Limits ramped down Annually
  - Exceed your limit – you sell
  - Don't meet your limit – you buy
- Centrally Managed by NCAB – The "Bank"
  - Annual Trades
  - Pricing - Project Costs and Performance
- Financed by CT Clean Water Fund (SRF)


N
W
E
S
STP Nitrogen Loads
N Load (lbs/d)
0 – 200
200 – 600
600 – 1300
1300 – 2900
2900 – 6500

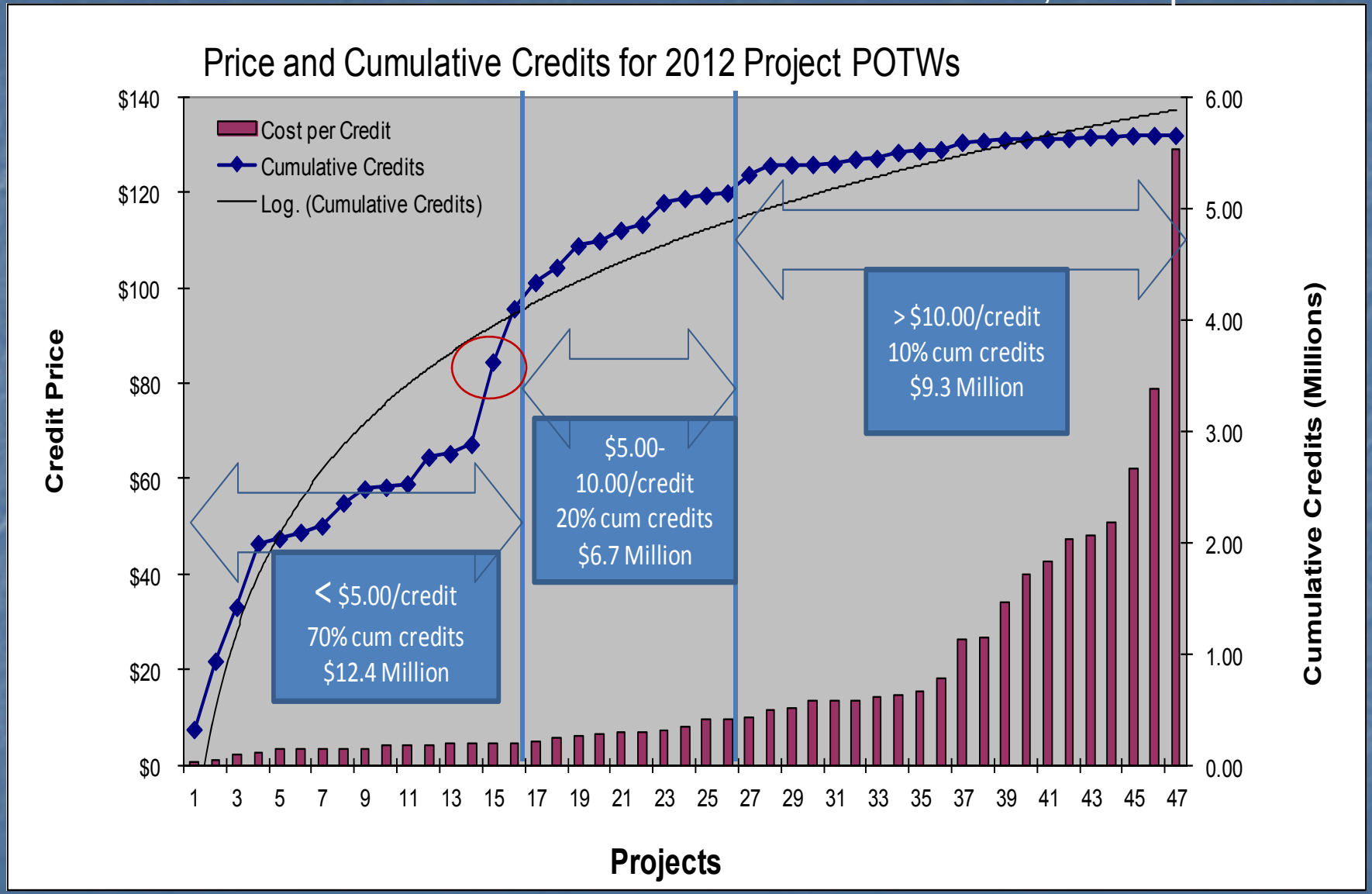

0.35
0.60
0.18
0.19
0.15
0.14
0.60
0.20
0.16
0.46
0.49
0.22
0.18
0.67
0.60
0.85
1.00
Nitrogen Trading Zones
N
W
E
S
1-1
1-2
1-3Q
1-3S
2-1
2-2
2-3
2-4
3-1
3-2
4-1
4-2N
4-2H
4-3N
4-3H
5
6

CT PROGRESS RELATIVE TO MEETING WASTELOAD ALLOCATION

Data: CT DEEP, NCE



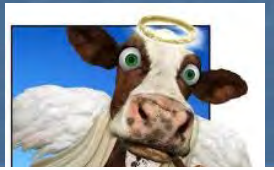
Data: CT DEEP, Municipal Facilities



- Trading Volume (2002 – 2012):
  - 10 million credits purchased by [illegible]s ($35 M)
  - 9 million credits sold by POTW[illegible]28 M)
  - $7 M used for Research & [illegible]gement

- The Power of Trad[illegible] (2013 Status):
  - End of Pipe [illegible]it = 18,874 lbs TN/day
  - End of Pi[illegible]erage = 21,504 lbs TN/day
  - Equ[illegible] Permit = 9,351 eq. lbs TN/day
  - E[illegible]ed Average = 8,853 eq. lbs TN/day

Estimated Savings: $300 – 400 M



Did it Catch On?

TRADING FUNDAMENTALS

	PT - PT	PT – NPS/SW
Common water quality problem	YES	YES
Technically feasible to meet pollutant reduction target	YES	UNCERTAIN
Compelling member benefits, especially economic	YES	**PT to NPS/SW**
Ability to quantify and track pollutant loads	YES	**Difficult & Costly**
Credit costs based upon agreed protocols	YES	YES
Diverse market, viable supply and demand	YES	NO
Reduce overall cost	YES	**PT to NPS/SW**
Transaction costs low relative to price	YES	NO

Bottom Line:

- Point Source Trading Proven Effective
  - Accelerated Progress
  - Reduced Cost
  - Enhanced Intermunicipal Cooperation
  - Strong Local and Political Support
- Adding NPS/SW trading would be challenging
  - New Growth
  - Efficiency
  - Application Rate
  - Cost
  - Accountability/Tracking/Monitoring

Financing – Clean Water Fund (CT's SRF)

State Grants and State Funded Direct Loans

River Restoration Account grants to fund physical improvement and river restoration

Federally designated State Revolving Fund for Clean Water Fund Policy

Low Interest loans for wastewater infrastructure projects

Federal state revolving fund

Loan and Assets

State Match Authorizations

State Grants for protection of the Long Island Sound

Nitrogen removal improvement projects

State support of the Nitrogen Credit Exchange Program

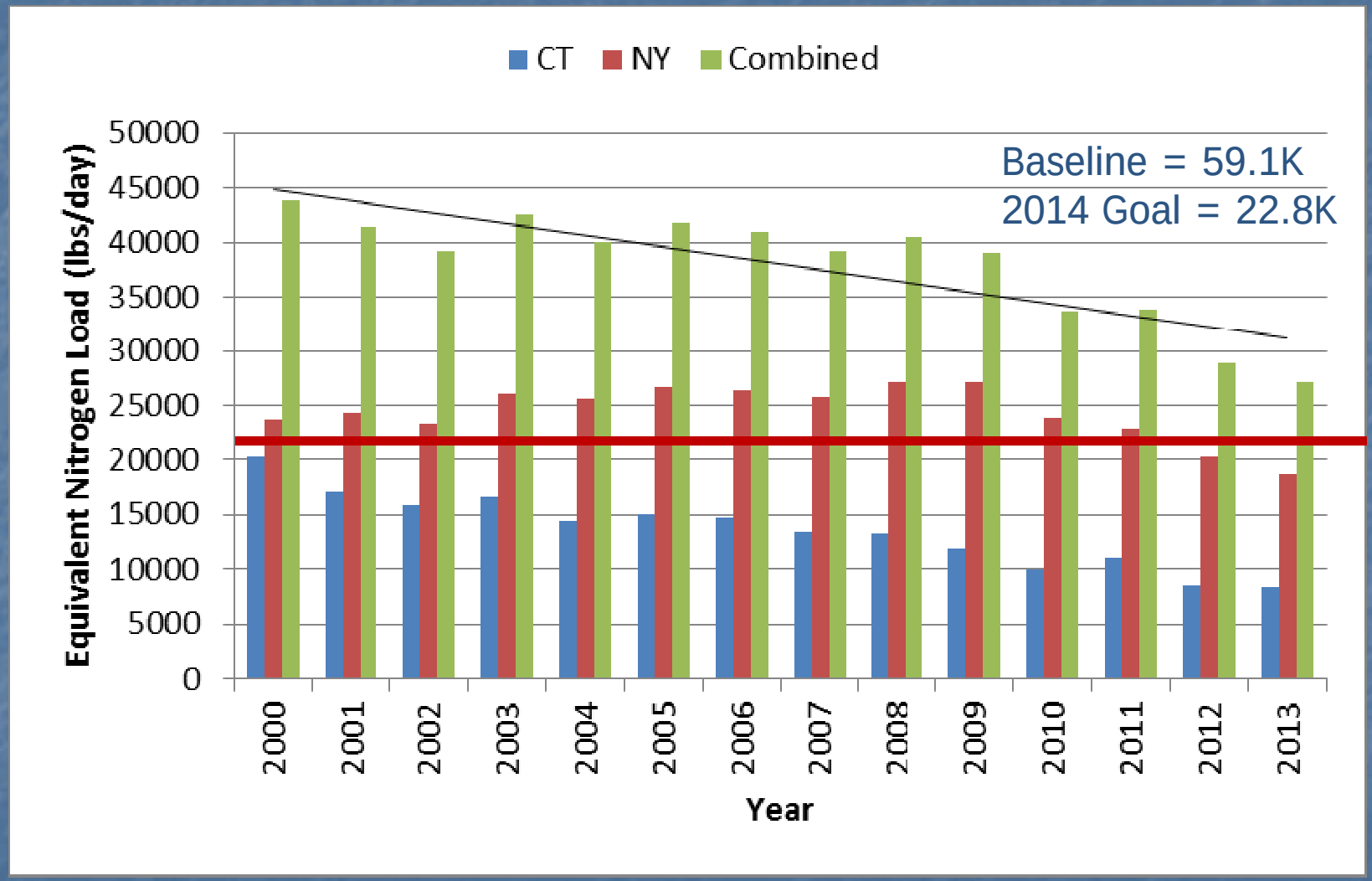
Federally designated state revolving fund

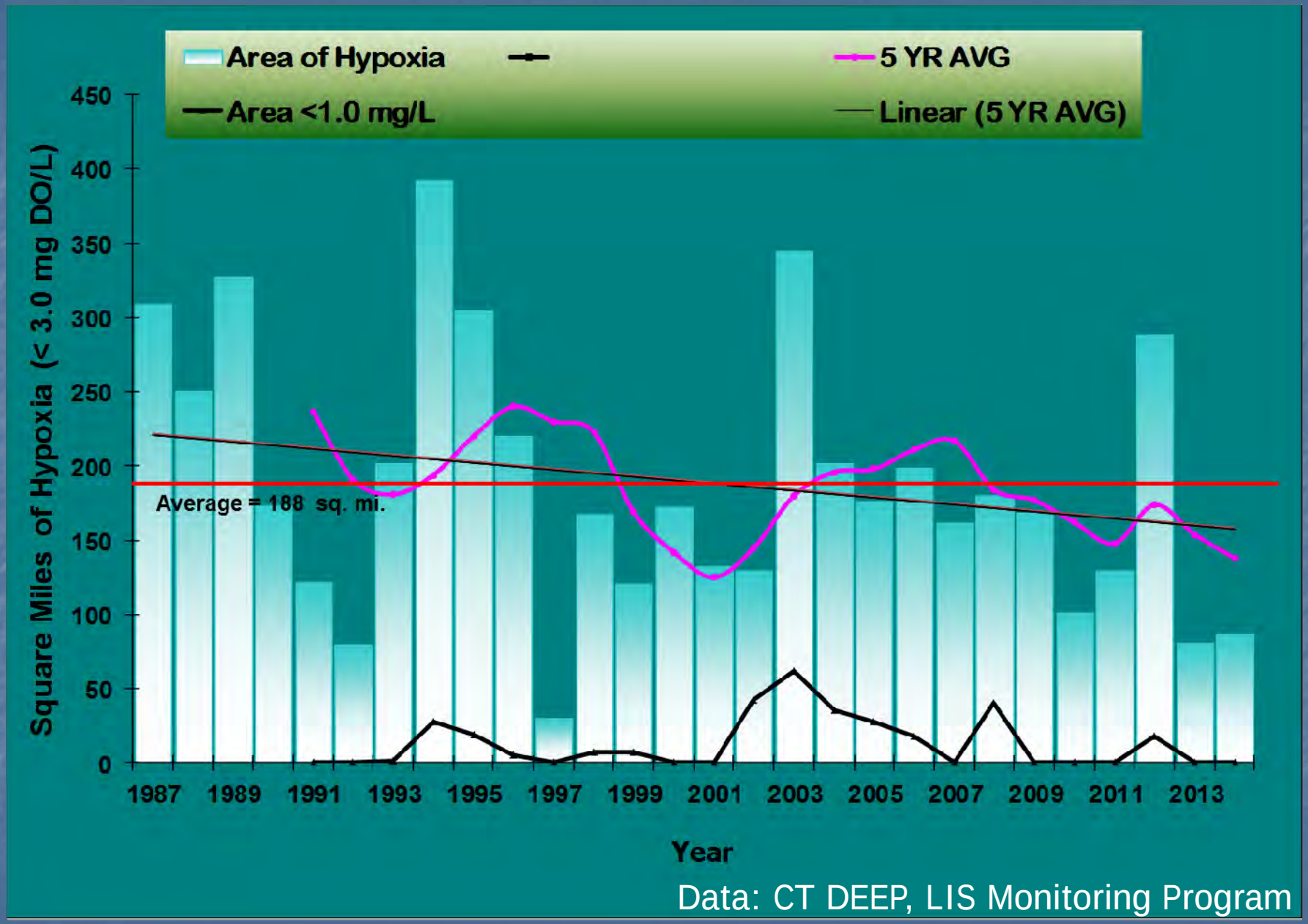
Provides low interest loans for drinking water projects

ARRA loan funding

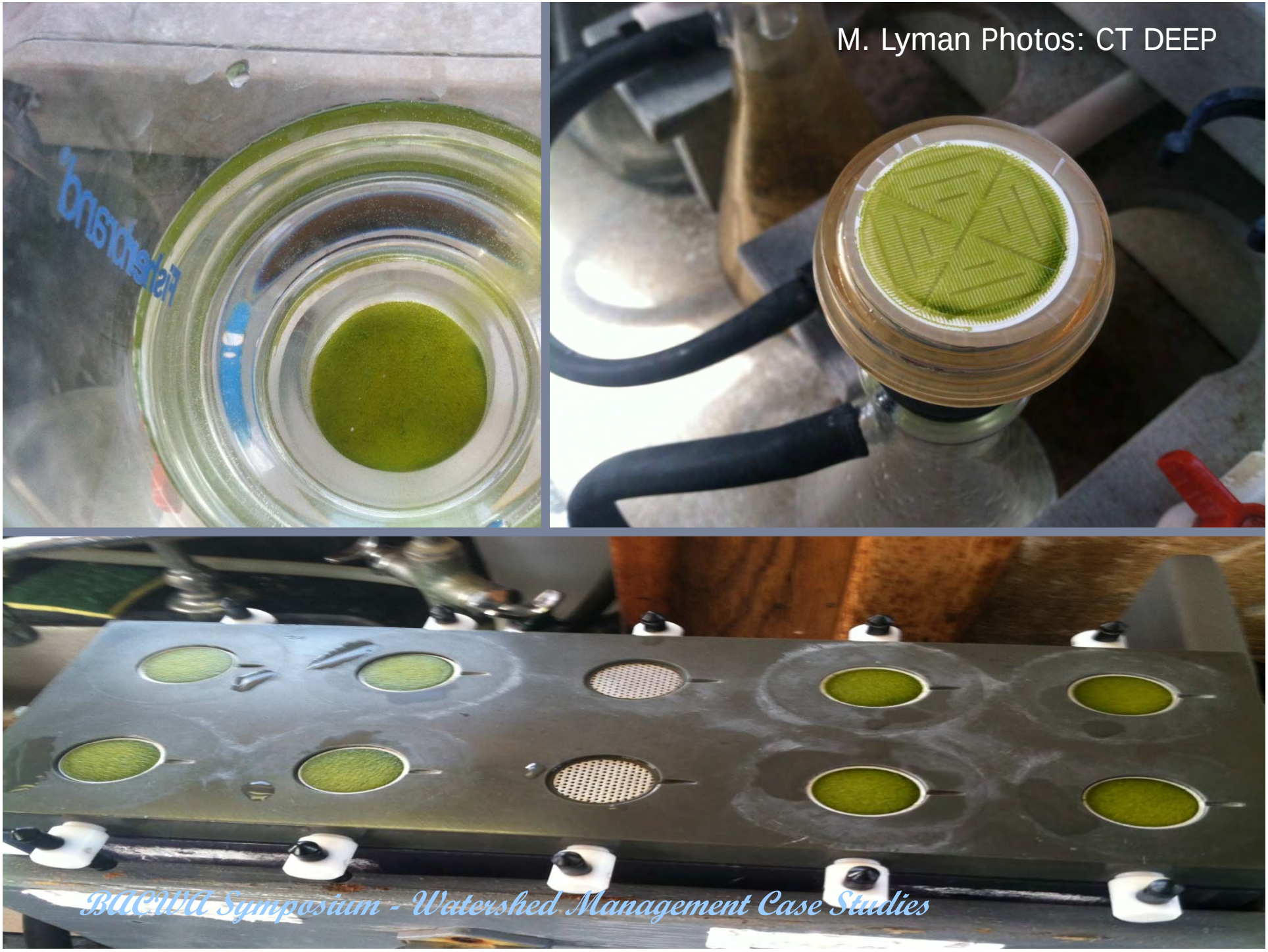
State Match Authorizations

POTW Equivalent Nitrogen Loads





Data: CT DEEP, LIS Monitoring Program


M. Lyman Photos: CT DEEP

What's Not Working?
(...as well...)

Bloomberg BNA

Water Pollution

Integrated Plans for Wastewater, Stormwater Still Not Seen in Permits, EPA Official Says

By Amena H. Saiyid

Oct. 2 — Federal and state permitting authorities are still waiting to see a Clean Water Act discharge permit incorporate an integrated plan for prioritizing and managing stormwater and wastewater projects, according to an Environmental Protection Agency official. "We are still not seeing any full-fledged plans being used to write a permit.

Watershed Management

Drivers of Ecosystem Change

- Climate Change
- Development
- Food and Fiber Production
- Resource Extraction and Relocation (Water, Minerals, Energy)
- Ecosystem Instability (Invasives, Extinctions, Pestilence)

Inconvenient truths about:

- Nutrient Management
  - Impairment driven
  - Nutrients don't behave like threshold pollutants
  - Nutrient criteria are often not attainable
  - Antidegradation is scary
  - Adaptive management not practicable
  - "Flexibility" does not equal "cheap and easy"
  - Sustainability or a Zero-Sum Game?

Ecosystem Services

"**Ecosystem Services** are the direct or indirect contributions from ecosystems that help *support*, *sustain*, and *enrich* human life" (Yoskowitz, et al. 2010).

Cultural Services

Provisioning Services

Regulating Services

Supportive Services

Perceived Value to Humans

Plantier Santos, 2010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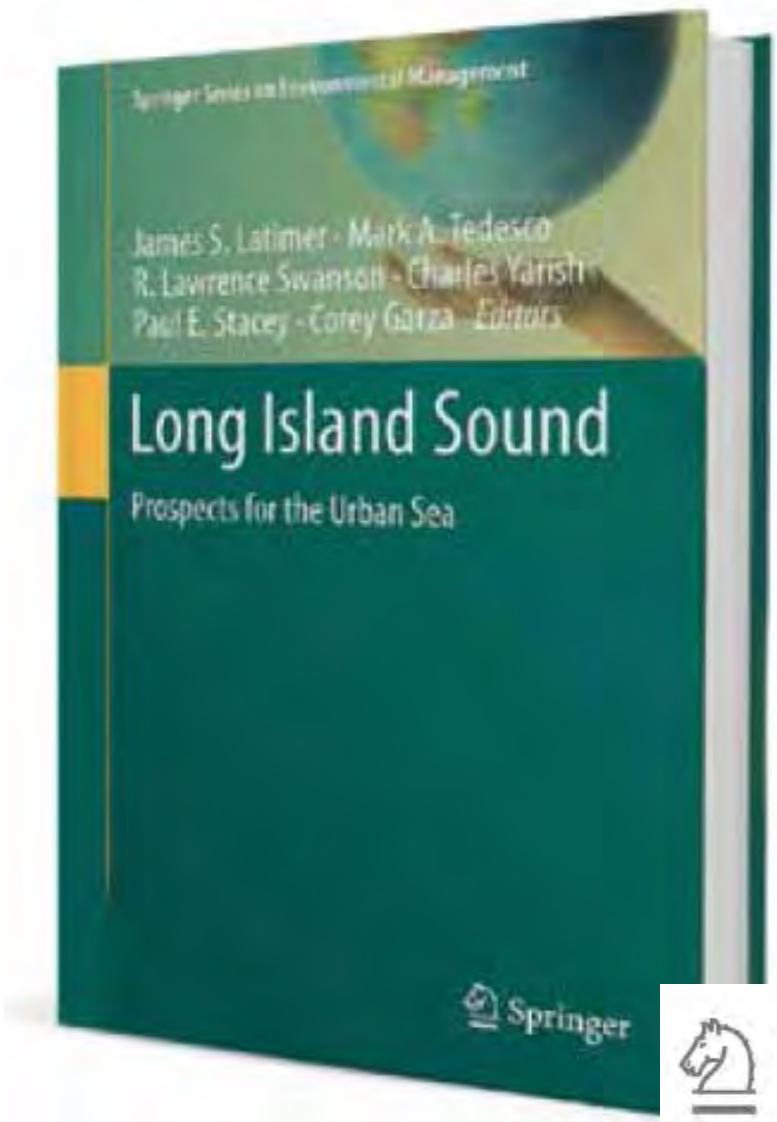
Future Direction?

- Ecosystem-based Management
- Trade-offs and Compromises
- Integrated Watershed Mgmt.

Is it happening?



Prospects for all our estuaries are changing, primarily as a result of coastal development and effects associated with climate change...

...understanding these impacts and how to improve the prospects for the qualities and uses of LIS [is] most important to society and to creating and maintaining a healthy, productive ecosystem.

Springer
www.springer.com

Jerry R. Schubel
President and CEO
Aquarium of the Pacific

Integrating Science and Society – Ecosystem-Based Management

- Human society is an integral component of ecosystems and their functioning
- Ecosystem health and diversity parallel natural capital of ecosystem services and resiliency
- Tradeoffs among components of the ecosystem and the services provided will need to be acknowledged
- Management practices must transparently integrate science, collaboration, communication and implementation with a triple-bottom line outcome

Shared Resources

Trade-offs Collectively Impact:

- Society
- Economy
- Environment

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Set forth the vision for a Long Island Sound waters that ***"…are clean, clear, safe to swim in, and charged with life."***

The 1994 CCMP focus areas were:

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- Living resources and habitat management
- Land use and development
- Public involvement and education

Clean Waters and Healthy Watersheds

GOAL: Attain water quality objectives by reducing pollutant and nutrient loads from the land and the waters impacting Long Island Sound.

Thriving Habitats and Abundant Wildlife

GOAL: Restore and protect the Sound's ecological balance in a healthy, productive, and resilient state for the benefit of people and the natural environment.

Sustainable and Resilient Communities

GOAL: Support vibrant, informed, and engaged communities that use, appreciate, and help protect Long Island Sound.

Sound Science and Inclusive Management

GOAL: Manage Long Island Sound using sound science and cross-jurisdictional governance that is inclusive, adaptive, innovative, and accountable.

SUMMARY OF THE DRAFT COMPREHENSIVE CONSERVATION AND MANAGEMENT PLAN UPDATE

INVESTING IN A REGIONAL ASSET

Management Themes

Convergence of Management

- GOAL: Preserve and Restore Natural Watershed Features and Functions to Build *RESILIENCE*
- Universal Benefits:
  - Water Quantity
  - Water Quality (including nutrient control)
  - Essential Habitat
  - Fish and Wildlife
  - Sustainable Ecosystem Services

A Better Paradigm for Managing a Peopled Planet

Priorities for Integrated Watershed Management

1. Preserve what's good
2. Repair or nurture recovery of what's close to good
3. Restore, but recognize recovery potential and limitations of restoration
4. Engage and motivate public to change behavior and lifestyle by mainstreaming actions into the prevailing socio-economic setting
5. Re-engineer – mitigate to the MEP for BAC

Paul E. Stacey
Research Coordinator
Great Bay National Estuarine
Research Reserve
paul.stacey@wildlife.nh.gov

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