

Meeting the Long Island Sound Watershed Challenge

Jeanette Brown, Manhattan College
Nutrient Symposium Series
“Watershed Management Case Studies”
October 6, 2014
Oakland, CA

Presentation Outline

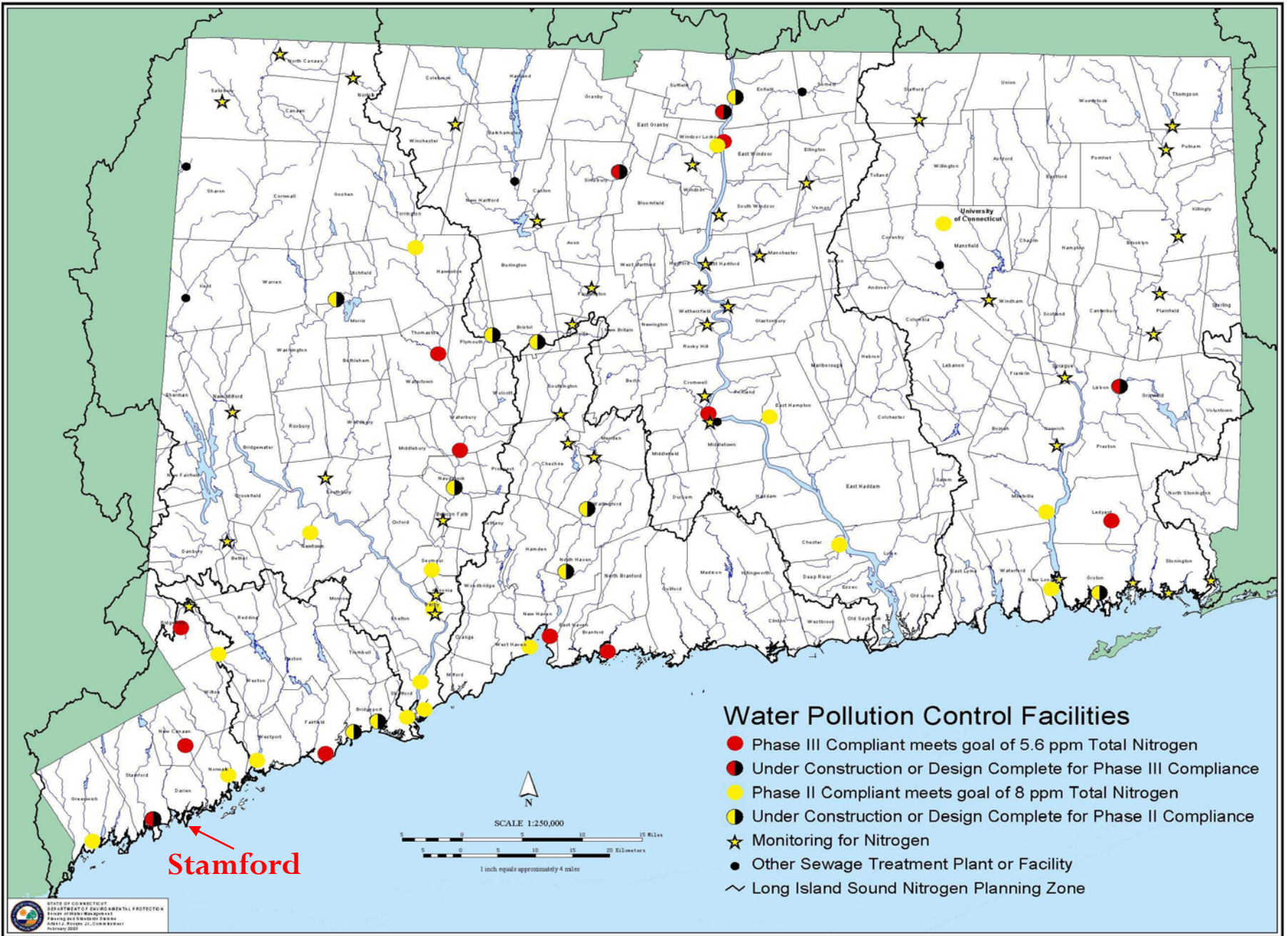
- Introduction
- Early work
- Regulatory Milestones
- No-Net Program
 - Local concerns
- Interim Upgrades
 - Funding mechanism
- Trading Program
 - Concerns and acceptance
 - Value to municipalities
- Upper LIS Watershed Program

Introduction

- Long Island Sound watershed approach
 - Stepwise
 - CT and NY
 - Upper Long Island Watershed (MA, NH, VT)
- Involved
 - Treatment plant personnel
 - Government agencies
 - NGOs and citizen action groups

Early Work

- Mid-late 1980's Long Island Sound water quality impaired
 - First discussions of nitrogen impacting Long Island Sound
 - 1987 Designated Estuary of National Significance
 - Implemented monitoring program
 - Both influent and effluent

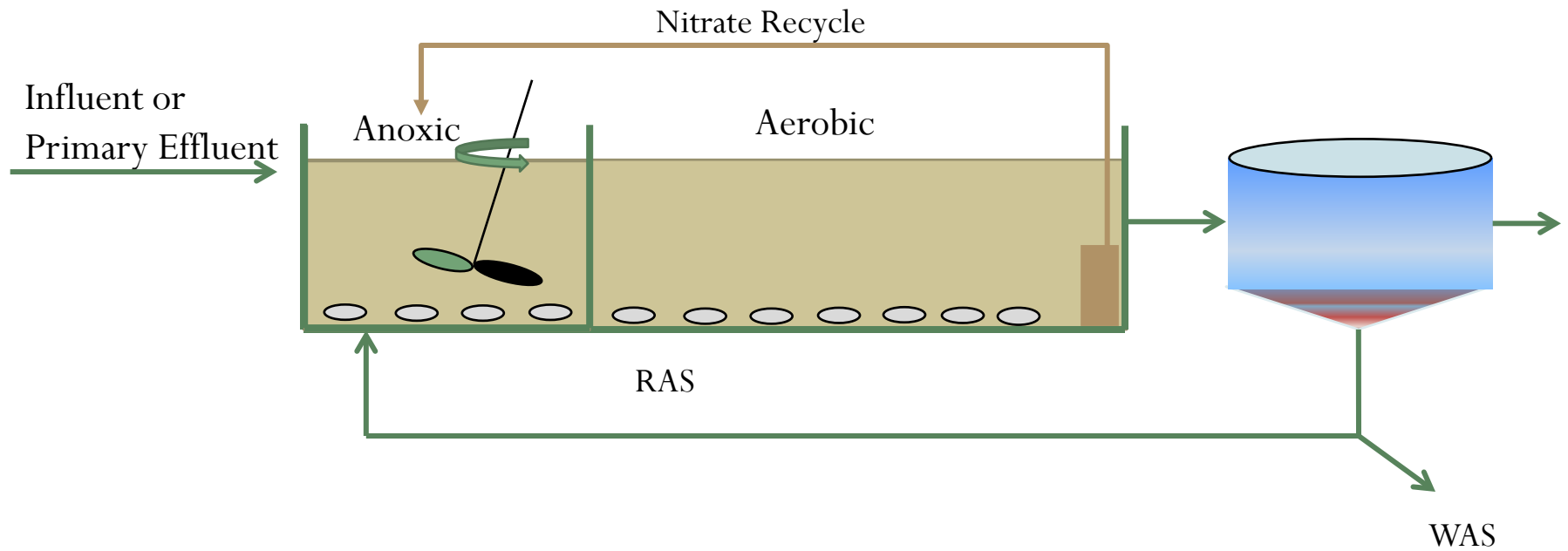




Early Work

- Starting experimenting with modifying operation at Stamford treatment plant
- Received grant from CT-DEP to continue research
- Published “Minor Process Changes for Major Nitrogen Reductions” July 1991

Creating an Anoxic Zone



Stamford Results

- Anoxic (no-cost)
 - Annual average 8.5 mg/L over temperature range of 11° C to 23° C
 - Without recycle except for RAS
 - Nitrate recycle would have improved results
- Cyclic Aeration (turning mechanical aerators on and off a specific time intervals) (no-cost)
 - Average effluent total nitrogen over thirty day operating period-9 mg/l over temperature of 19° C to 24° C

No-Net Policy

- 1991 “No Net Nitrogen Increase Policy”
- Concern from plants and municipal leaders
 - Penalties
 - Law suits
 - Impact on development
- CT Conference of Municipalities and citizen groups
 - Believers and non-believers
 - Concern about New York

Interim Upgrades

- EPA approved CCMP in 1994
 - Nitrogen discharge results in hypoxia
- CT-DEP provided grants (up to \$3 M) for coastal CT treatment
 - Based, in part, on results of operational modification research

Nitrogen General Permit and Trading Program

- TMDL approved in 2001 for TN
 - Reduction of 64 % TN discharged by 2014
- CT created Nitrogen Credit Trading Program
 - Controversial
 - Treatment plant personnel
 - CT Conference of Mayors

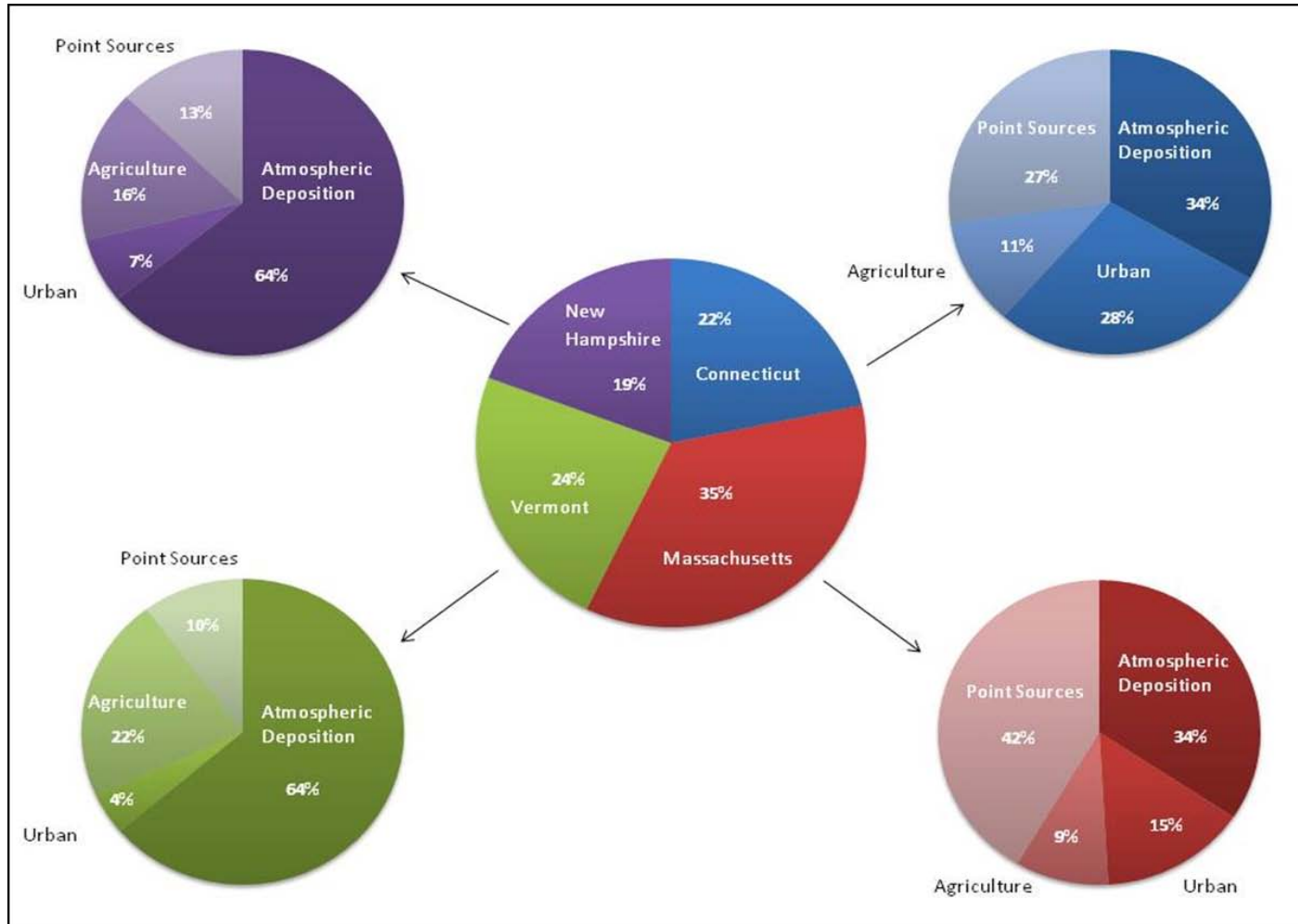
Nitrogen Trading Program

- All POTWs faced a permit limit (N General Permit)
- Municipalities liked
 - If it is cheaper for them, they could buy credits at a rate determined by its trading ratio (distance from the Sound) to meet its permit instead of pursuing an upgrade.
 - Plants that upgrade could sell credits for N reduced beyond the permit limit
 - Some plants, such as Stamford, are making about \$1million/yr

Upgrading Plants

- Most treatment plants in CT were built during construction grants program and needed upgrading
- CT-DEP provided
 - SRL funding for general plant upgrades
 - Provided 30% grants for incremental nitrogen upgrades

Upper Basin Water Shed



Upper Long Island Sound Watershed Low-Cost N Removal Program

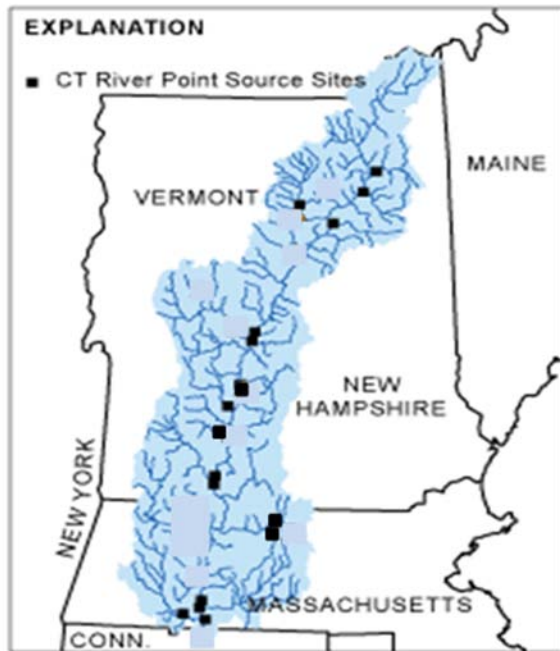


Figure 1: Upper Long Island Sound Watershed

The objectives of this Project were to:

- Perform a detailed and accurate evaluation of the treatment plants :
 - existing and design capacity,
 - expected near term future flows, seasonal flow and load variation,
 - capacity of bioreactors and clarifiers and
 - wastewater characteristics
- Evaluate ability to configure existing tankage and pumps for nitrogen removal

Upper Long Island Sound Watershed Low-Cost N Removal Program

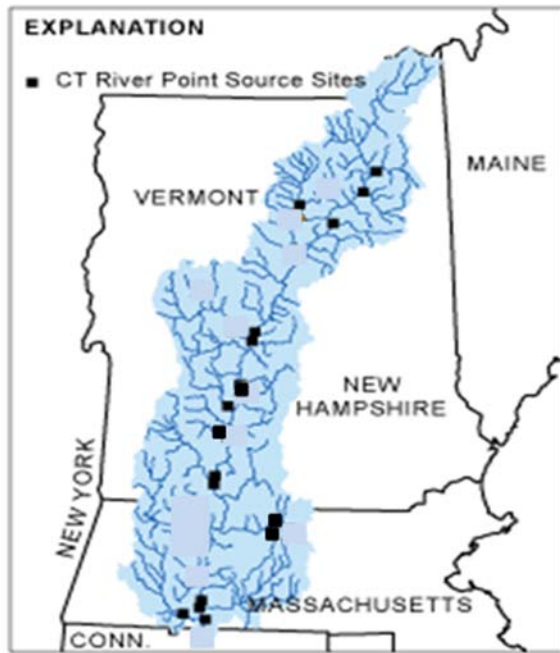


Figure 1: Upper Long Island Sound Watershed

The objectives of this Project were to:

- Determine impact on operation and maintenance budgets
- Determine training needs for plant staff
- Recommend whether operational and/or low cost modifications will be practical and
- Quantify the achievable reduction in effluent nitrogen concentrations and mass.

Special Testing Program

- Very little if any N data
- Some on effluent but virtually none in influent
- Testing program
 - Over three consecutive days
 - Influent or Primary effluent and final effluent

Superintendents Concerns

- All viewed study as beneficial
 - Why us?
 - Very cooperative in sharing concerns and information
 - Regulators were in meetings sometimes and the plants were very frank with their concerns
 - Concerned about plant being able to perform in cold temperatures
 - Concerned about permits and permit limits

Typical Low-cost Modifications

- Creating anoxic zone from existing aerobic bioreactors
 - Nitrate recycle
- Cyclic anoxic/aerobic environments
 - Effect on mechanical aerators
- Issues
 - Aerobic volume
 - De-rating of plants

Summary

- Need step-wise plan
- Good solid science to support why N removal is needed
- Establish good, open and trustworthy relationships between regulators, Utility Managers/operators, and other agencies
- Educational forums for operations personnel
 - Operators always concerned about “if I do it will it be in my permit”
- Look at low-cost, “low hanging fruit” N removal