City Of Taunton

Review of Proposed NPDES Permit Issues and Suggested Resolution of Scientific Uncertainties

February 18, 2015

Taunton Estuary Coalition Objectives

Protect Estuary Resources

- Understand the science
- Invest in solutions that address causes of resource degradation
- Avoid expenditures that won't produce benefits

Concerns Raised by City

- Reliability of Sentinel Method in Complex Estuary (Peer Review Request)
- Use of MHB16 to Predict Taunton Estuary DO Conditions
- Nutrient Reductions Since 2005
- Brayton Point Changes Since 2005
- Outdated Marine DO Criteria

Conceptual Model for EPA Permit

- Excess TN causes excessive plant growth
- Excessive plant growth causes low DO in Taunton Estuary
- Taunton Estuary responds like Mount Hope Bay
- Conditions have not improved since 2005

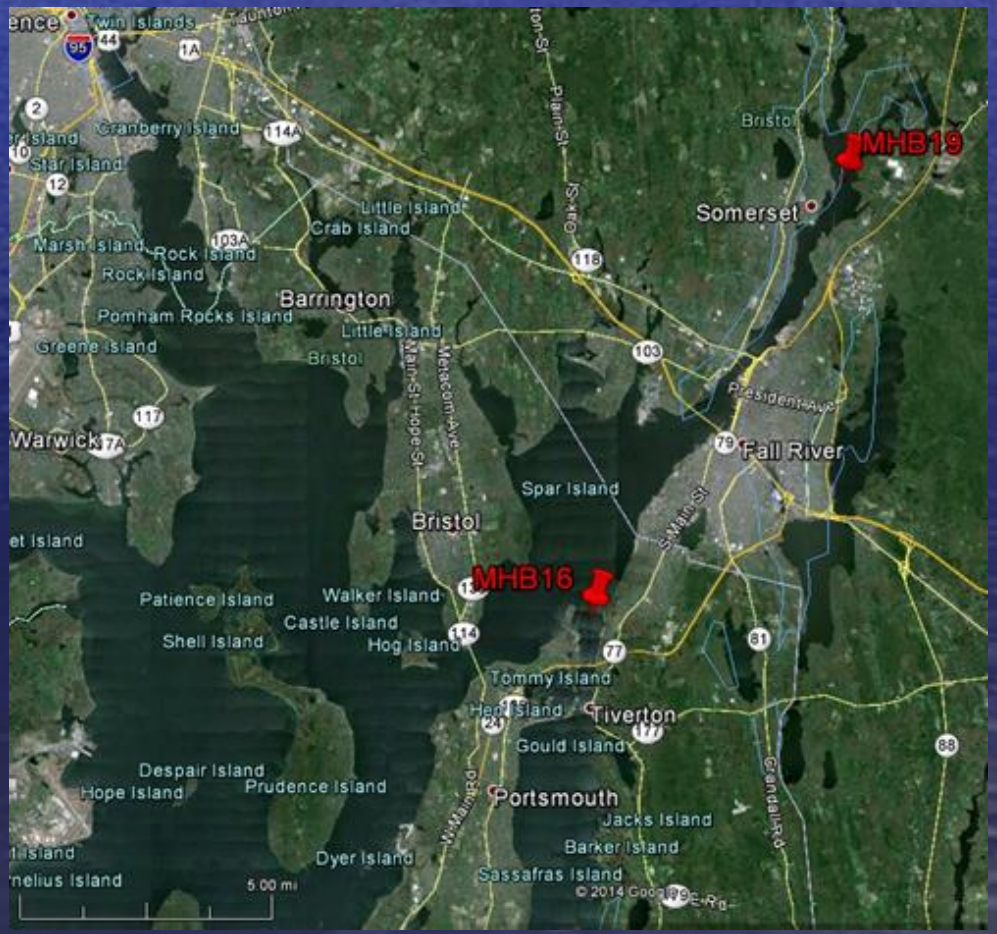
"The Sentinel Method"

Taunton River Estuary, MA

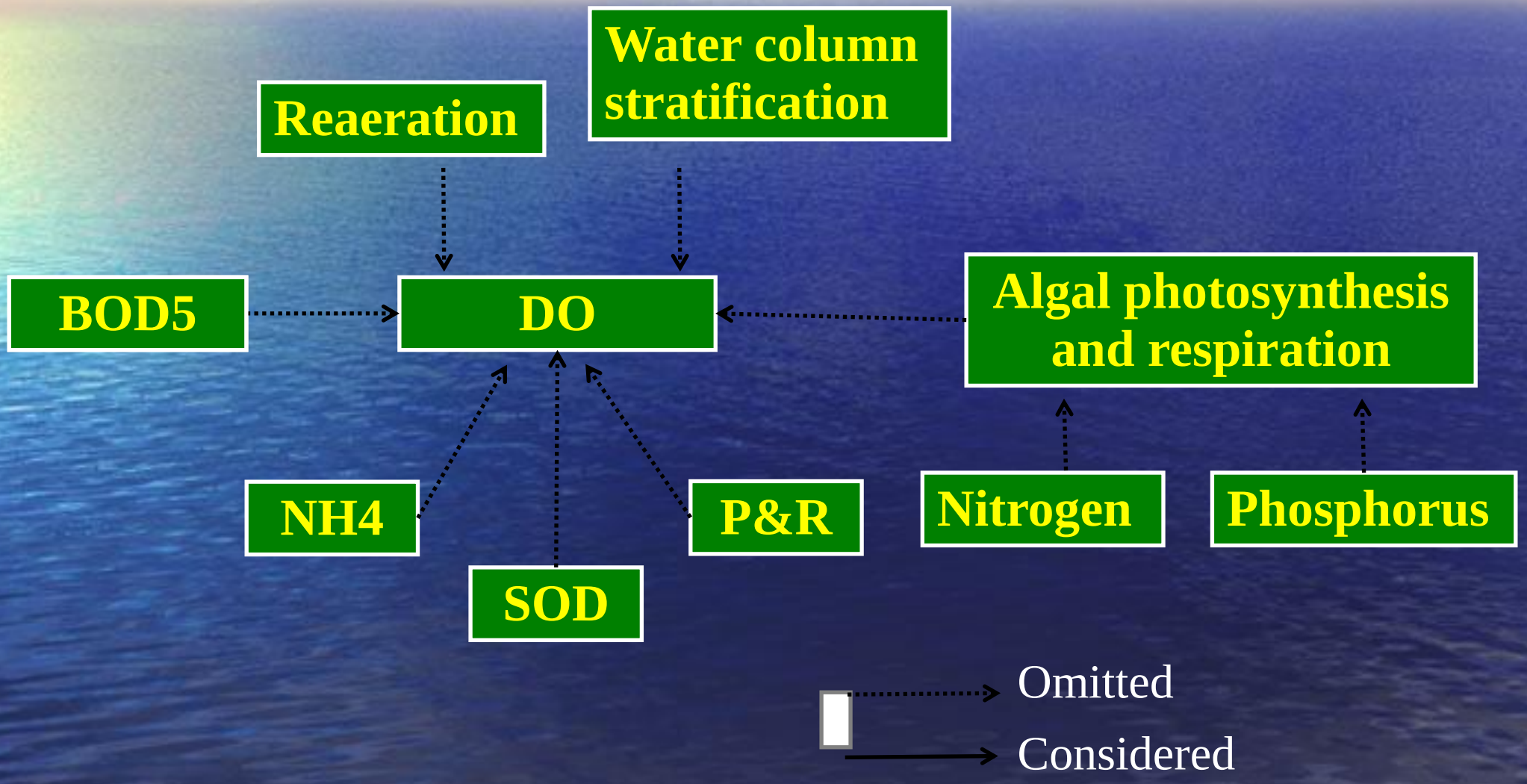
EPA determined DO standard met at MHB16 but not MHB19

EPA assumed TN at MHB16 required to meet DO WQS at MHB19 (10 mi upstream)

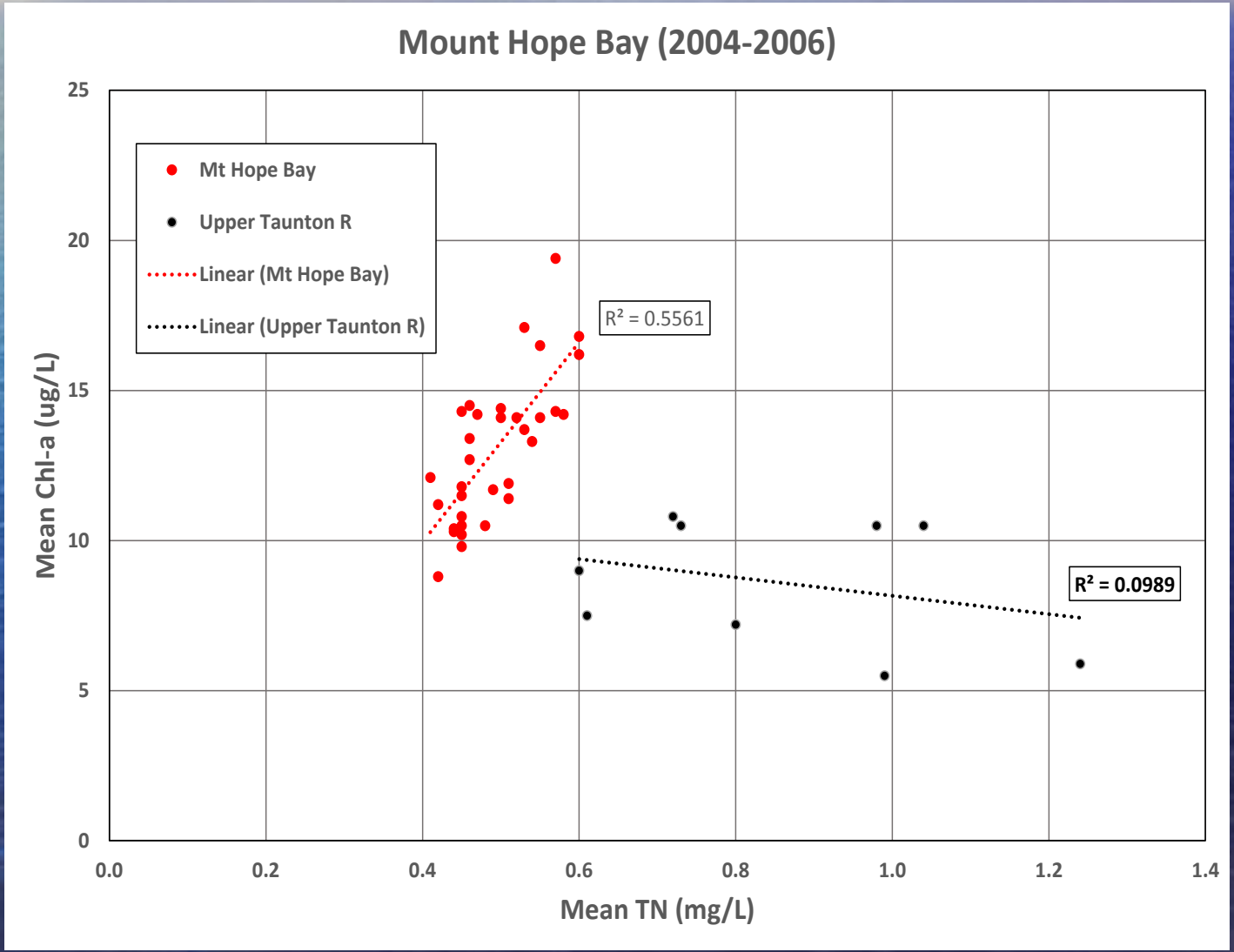
No modeling or consideration of hydrodynamic differences



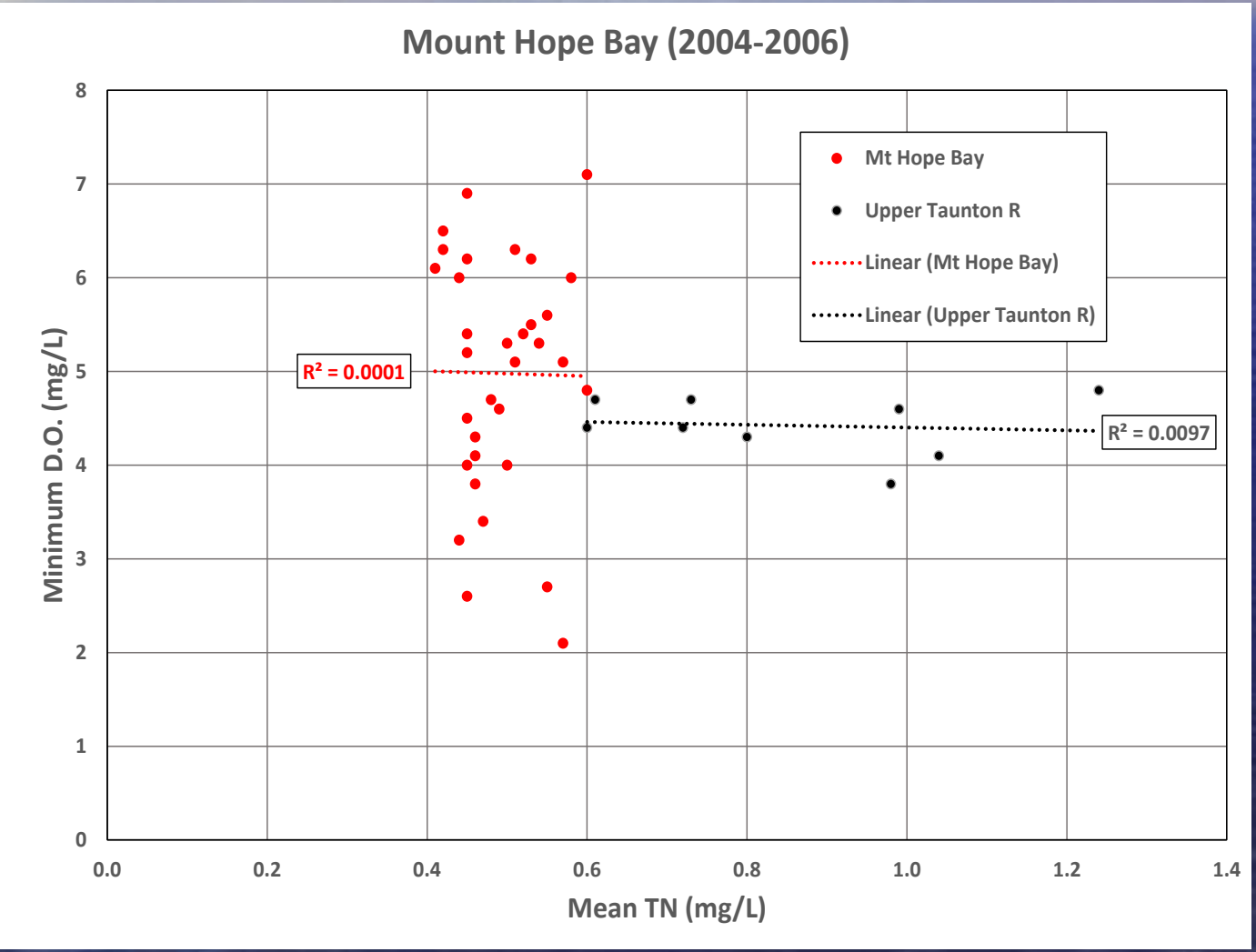
Factors Influencing Water Column Dissolved Oxygen



Taunton Estuary Algal Response Differs from MHB



Taunton Estuary DO Response Differs from MHB



Expert Opinions

- Dr. Steven Chapra – Tufts Univ.
- Dr. Craig Swanson – RPS Group
- Great Bay Peer Review

All concur the present analyses are deficient and TN impact predictions are not defensible

EPA FOIA Response
Dec. 24, 2014

Sentinel Method has never undergone any prior review to ensure it is scientifically defensible

No records in EPA possession confirming approach is "scientifically defensible and an acceptable approach for generating numeric nutrient criteria and/or establishing numeric nutrient limits under 40 CFR 122.44(d)"

EPA 2010 Stressor-Response Document did not include DO impact assessment in guidance

Other Missing Information

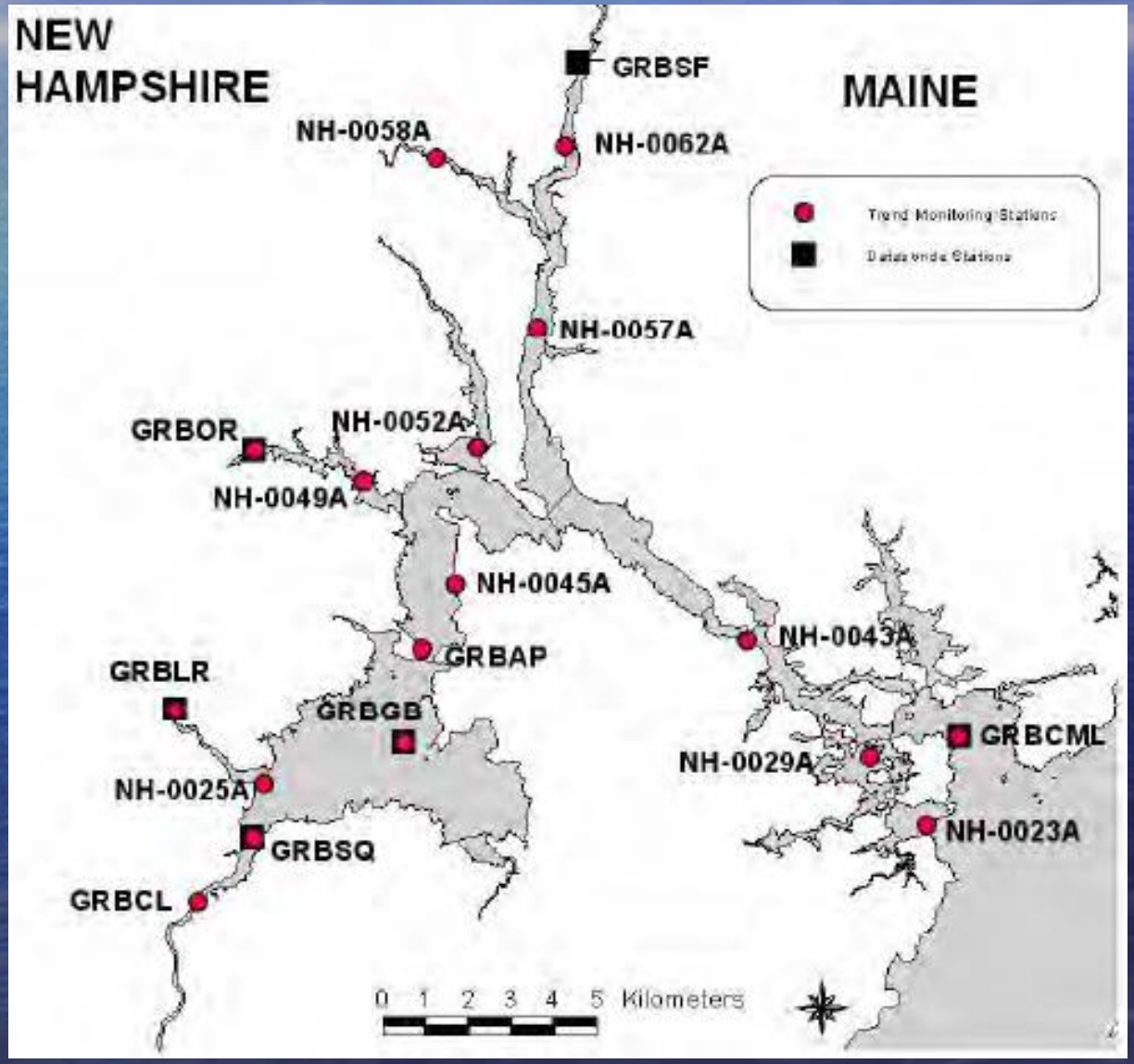
- WWTP upgrades affecting organic loadings to Taunton Estuary (e.g., CSO projects)
- Impact of Brayton Pt. facility closure
- Impact of reduced TN on both systems

"NBC monitoring does not include eutrophication indicators…so their data cannot be used for assessment of the response of the system to the load reduction" USEPA Mansfield Permit Response

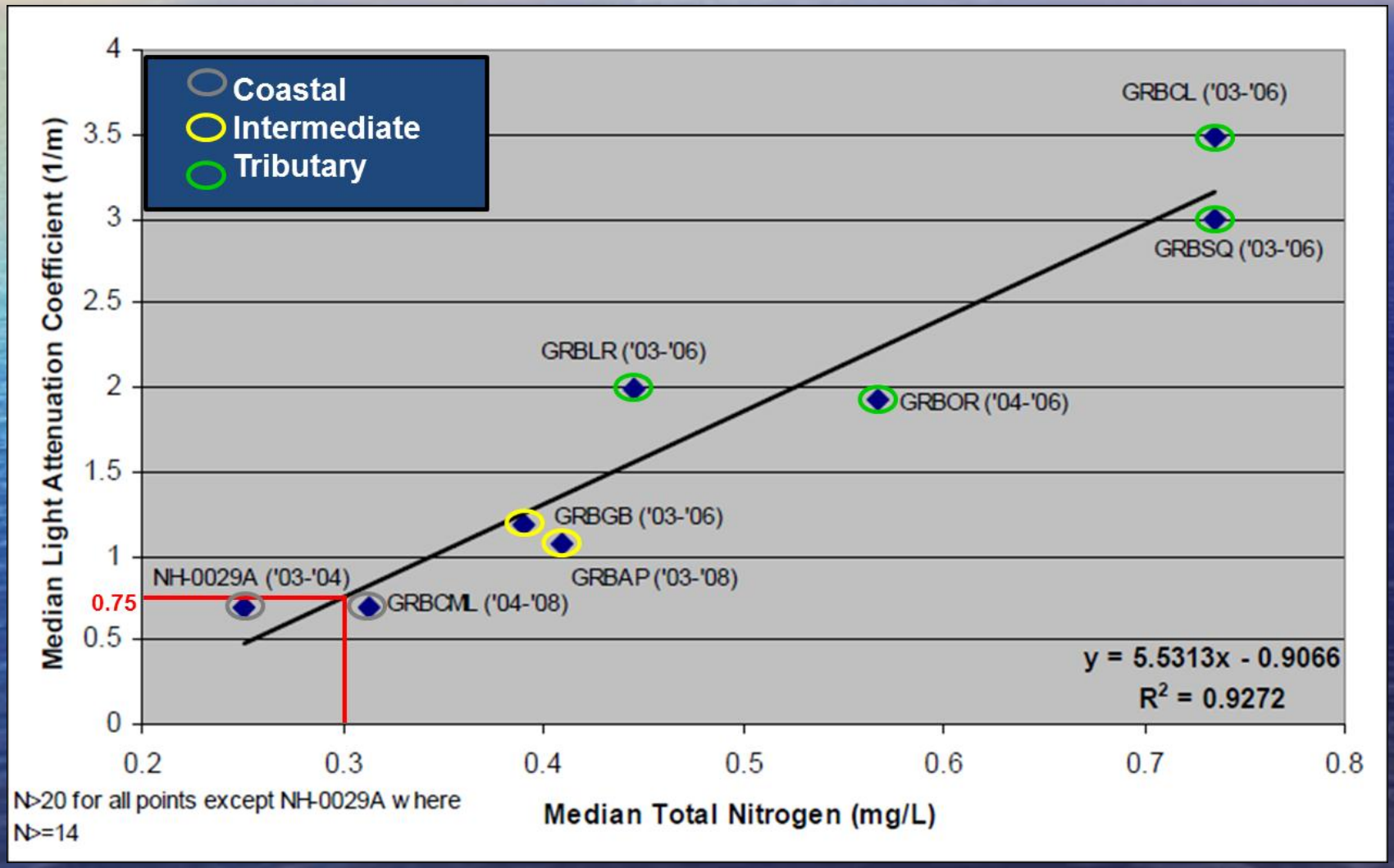
Recent Actions in Other Estuaries Relevant to Taunton Estuary

Great Bay Peer Review

Trend Monitoring Stations for Water Quality in the Great Bay Estuary (New Hampshire DES, 2009)



Estuary Evaluation Method Essentially Identical to Taunton Case



Peer Review Panel

Review of 2009 Numeric Nutrient Criteria

- Dr. Vic Bierman - system modeler
- Dr. Robert Diaz - DO
- Dr. Ken Reckhow - statistics
- Dr. Jud Kenworthy - eelgrass

Two of these experts previously used by MassDEP

GBE Peer Review Conclusions

The DES 2009 Report did not adequately demonstrate that nitrogen is the primary factor in the Great Bay Estuary because it did not explicitly consider any of the other important, confounding factors in developing relationships between nitrogen and the presence/health of eelgrass (Bierman, 18).

Scientific knowledge indicates a causal linkage between TN and DO, due to the growth and decomposition of algae. However, the data analysis does not support this TN-DO linkage in the NH DES data (Reckhow, 48)

The results in the 2009 report are not acceptable or reliable for setting nutrient criteria (Reckhow, 38).

These conclusions are consistent with prior MassDEP peer review assessments

Going Forward Cooperatively (as in New Hampshire)

- Defer issuance of permits pending the development of additional information; avoids regulatory confrontation
- Taunton will proceed with voluntary efforts to reduce nitrogen levels at their facility (major upgrade)
- MassDEP and the Coalition work together to plan and finance additional monitoring and research as recommended by the peer reviewers

EPA has decided to defer NH permitting for at least 18 months

Limitations at the Taunton WWTF

- Biological treatment process is at two elevations
- Upper treatment train handles 1/3 of plant flow
- Lower treatment train handles 2/3 of plant flow.
- Current treatment process provides nitrification only
- Limited land area for additional tanks and equipment
  - Primary clarifier
  - Anoxic reactors
  - Aerobic reactors
  - Denitrification filters
  - CSO mitigation

Possible Treatment Alternative TN Reduction

- PHASE I - 4-stage Bardenpho process
  - Can meet a TN of 5 mg/l (Seasonal Average)
  - New anoxic reactors in each treatment train
  - Additional aerobic volume
  - Fixed film media
  - Complete plant upgrade including electrical systems

- PHASE II (If Necessary) - Denitrification filters and an intermediate pump station required to meet TN of 3 mg/l

Nitrification Denitrification Costs

- WWTP Upgrade to meet 5 mg/l (Seasonal average)
- $40-$45 million capital costs
- Over 30% of the single family households will be paying over 2% of the median household income
- Estimated completion of construction Fall 2020

Discussion of Issues

- Response to Mayor's Questions
- Independent Peer Review of Sentinel Method
- Ability to Use Adaptive Management
- Update of Applicable DO Criteria
- Cooperative Data Collection and Analysis