# Analysis of Nitrogen Loading Reductions for Wastewater Treatment Facilities and Non-Point Sources in the Great Bay Estuary Watershed

## Appendix F:

## Responsiveness Summary

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

DRAFT

On October 30, 2009, the New Hampshire Department of Environmental Services (DES) released a draft of the report titled "Preliminary Watershed Nitrogen Loading Thresholds for Watersheds Draining to the Great Bay Estuary" for stakeholder review. Comments were accepted until December 31, 2009.

Written comments received by the deadline from seven organizations:

- Conservation Law Foundation
- Environmental Protection Agency, Region 1
- Environmental Protection Agency, Office of Research and Development
- University of New Hampshire (Fred Short)
- University of New Hampshire (Michelle Daley)
- City of Portsmouth
- The Nature Conservancy

The major comments provided by these organizations have been summarized and responded to in the sections below. The report was largely re-written so not all of the original comments are relevant to the revised report.

**Technical Comments**

Did the USGS studies that formed the basis for the attenuation assumptions include rivers and streams experiencing cultural eutrophication resulting from excessive phosphorus loadings? Rivers and streams experiencing phosphorus driven cultural eutrophication may have artificially high attenuation rates for nitrogen. As the cultural eutrophication is controlled, the delivery rate of nitrogen may increase. (EPA)
Response: To the extent that cultural eutrophication from phosphorus existed in the watersheds for the SPARROW calibration datasets, then cultural eutrophication was included in the attenuation assumptions. We expect the uncertainty in attenuation due to this factor to be small compared to the overall uncertainty in the estimate.

Nitrogen attenuation factors are underestimated by using the average velocities in the river reaches. (Portsmouth)
Response: In the revised report, in-stream attenuation was calculated for each reach using the stream velocity in the reach. The method average velocity for the whole river was not used.

The sensitivity analysis only varied salinity by 10% when the variability within sub-estuaries can vary by much more. We recognize that simplifying assumptions were necessary and that a representative station for each sub-estuary had to be chosen, but it is important to note that the upper part of most sub-estuaries will have significantly lower salinities and potentially higher nitrogen levels than predicted for the representative stations. (EPA)
Response: The difference in average salinities within sub-estuaries was relatively small in most subestuaries (+/- 2 ppt). In the subestuaries where it was possible to have a wide

range of salinities (e.g., the Exeter/Squamscott subestuary), DES chose a location in the subestuary to model which corresponded to the upstream extent of historic eelgrass.

Sensitivity analysis should have considered interplay between salinity in estuary and salinity in ocean. (Portsmouth)
Response: In the revised report, the sensitivity analysis was conducted using Monte Carlo simulations that varied all of the input parameters at the same time. This approach allowed for the consideration of interactions between variables.

Calibration to measured nitrogen concentrations was achieved by reducing the annual stream flow variable by 25%. To the extent that other factors, e.g., uptake by micro and macro-algae, might explain the over prediction of ambient nitrogen levels, this should be discussed in the report. (EPA)
Should not use the stream flow as the calibration variable. (Portsmouth)
The uniform calibration coefficient for all areas does not work well for the tributaries. (TNC)
Response: In the revised report, the calibration coefficient on the stream flow variable was removed. The model was sufficiently accurate without this calibration step.

The assumption that 50% of the discharge from WWTFs in Lower Piscataqua River reaches Great Bay/Little Bay and the Upper Piscataqua needs to be justified. What percent reaches Great Bay? Is the 50% equally split between Great Bay/Little Bay and the Upper Piscataqua? (CLF, Short, Portsmouth)
Response: In the revised report, DES used the results of a particle tracking model to refine the percentage of discharge from WWTFs in the Lower Piscataqua that reaches Great Bay/Little Bay and the Upper Piscataqua.

The Lower Piscataqua River should not be combined but split into two assessment units. Need to justify the lack of an impairment in the Lower Piscataqua River. Was it due to dilution of the south by the north? Need to explain that eelgrass impairment exists. (Short)
Response: Details about the methods for assessing the estuary for nitrogen impacts are provided in DES (2009). The Lower Piscataqua River was indeed split into two assessment units. However, since the revised report does not cover the Lower Piscataqua River, this split does not affect the models.

The model needs to have dynamic inputs for atmospheric deposition, groundwater, and ocean concentrations. These terms are not static and may increase in the future. (TNC)
Response: The models represent average conditions over two-year periods ranging from 2003 to 2008. It is not expected that atmospheric deposition, groundwater concentrations, and ocean concentrations of nitrogen would have changed significantly during this period.

Is the steady-state model justified? (Portsmouth)
Response: This steady state assumption was valid because the calculations were made using multi-year average conditions which approximate steady state.

Need to justify the assumption for 0.2 mg/L of nitrogen in ocean waters. (Portsmouth)
Response: The nitrogen concentration of Gulf of Maine waters offshore from the Great Bay Estuary was determined to be 0.2 mg N/L in DES (2009). Data from a cruise by the EPA oceanographic vessel, R/V Bold, confirms this determination. During a cruise in the Gulf of Maine, water samples were collected 5 kilometers offshore from the mouth of the Piscataqua River at station R1-19 on 7/31/09. The total nitrogen concentration in the surface, mid-depth, and bottom samples were 0.18, 0.20, and 0.24 mg N/L, respectively.

**Policy Comments**

Eelgrass needs to be restored in all areas where eelgrass existed including tidal rivers. (EPA, CLF, Short, TNC)
Response: The revised report contains watershed nitrogen load thresholds for restoring eelgrass in all areas where eelgrass existing, including tidal rivers.

The recommendation for 8 mg/l for WWTFs would still require too much NPS reductions to be feasible. (EPA, CLF, Short, TNC)
Response: The revised report will only contain the results of modeling, not specific policy recommendations.

Affordability issues for wastewater treatment facilities associated with meeting lower nitrogen limits can and should be evaluated on a case by case basis in accordance with federal affordability guidelines. (EPA)
Response: The revised report contains preliminary estimates of increased capital and operations/maintenance costs associated with nitrogen removal at the 18 WWTFs in the watershed.

The purpose of the report needs to be clarified. If the report is to replace a TMDL, water quality standards must be met. (CLF)
The intent of this draft document is not clear. Is it to report on the modeling process, to set a water quality objective, to propose further work, or to initiate town and municipal point source and non-point source nitrogen (N) reductions? The intent should be made clear. (Short)
Response: The purpose of the revised report is to report the findings from a modeling exercise to inform policy decisions regarding NPDES permitting and non-point source reductions. The report is not a TMDL.

The nutrient criteria which are the basis of the modeling effort need to be justified. (Portsmouth)
Response: The proposed nutrient criteria for the Great Bay Estuary have undergone an independent peer-review by national experts from Cornell University and the University of Maryland. The reviewers validated the proposed criteria.

Nitrogen loading targets for the Lower Piscataqua River, Little Harbor, and Portsmouth Harbor are needed. (CLF, Short)

A screening level model which does not cover the whole study area (LPR, PH, LH) is not appropriate for this application. (Portsmouth)
Response: The models used in the revised report do not work in the Lower Piscataqua River, Little Harbor, and Portsmouth Harbor because of the high salinity in these areas. Therefore, the scope of the modeling in the revised report only covers Great Bay, Little Bay, Upper Piscataqua, and the tidal rivers that feed these areas. This approach is still valid and useful because the modeled area includes 14 of the 18 WWTF discharges in the watershed.

A major concern is the lack of any proposed education and outreach component in this draft. We must start convincing our legislators, the public, and policy people of the need to lower N inputs to the GBE, or there will be no political will to undertake these costly changes. (Short)
Response: The revised report is a technical work product from a modeling exercise. DES is working on a coordinated communications strategy regarding Great Bay.