DRAFT Response to "List of Information Requests and Questions for J. S. Latimer concerning Latimer and Rego 2010"

November 8, 2018
James S. Latimer

**The statements contained in this document reflect the preliminary responses of Dr. Latimer to the questions posed by the Great Bay Municipal Coalition and may be revised or supplemented. Neither Region 1 nor NHDES have had the opportunity to substantively opine or to coordinate positions on the content of these responses. They are being provided now as a courtesy considering Dr. Latimer's schedule and the accelerated timeline for the Coalition's anticipated submission to the agencies as outlined at the November 7, 2018 meeting between the agencies and stakeholders.*

Data Requests

- Variable list: TBD
- Data for Fig 1 & 2: TBD
- Estuarine volume, tidal range, FW input for all study systems: TBD
- Systems with significant TN impairments: unknown

Questions

- Yes
- TDN was calculated using the NLOAD (NLM) watershed model; see Latimer and Charpentier 2010 paper for details. Upstream (watershed) sources were considered as well as atmospheric deposition to estuarine surface.
- We did not document TN impairments to the estuaries (except for anomalous estuaries)
- Basis for 99th percentile for dilution potential:

Dilution values: source: Bricker SB, et al, (1999): 1/ (estuarine volume) for well mixed estuaries

Dilution potential: Bricker SB, et al, (1999); High dilution potential 10^-13 to 10^-12; MED dilution potential 10^-11; LOW dilution potential 10^-10 to 10^-9; but these were from very large estuaries where the estuarine volumes are huge.

Adjusted dilution potential: Used 33.33, 66.6 and 99.9 percentile cut-off values to separate categories - HIGH <=2.1485X10^-7; MOD >2.1485-<8.4504X10^-7; LOW >=8.4504x10^-7. We looked for a way to scale down NOAA's values to the volume ranges of our estuaries. We evaluate the statistical characteristics for break points and used best professional judgment to divide the volumes in 3 bins (33, 67, 99th percentiles).

- We did not consider trophic state (chl-a) in our analysis.
- We did not consider phytoplankton biomass (chl-a) in our analysis.
- Regarding water depth. Bathymetry for each estuary was used to generate a triangular irregular network (TIN) model. A contour line for the 0.5, 2, and 3m depth was generated from the TIN model. The area between the 0.5 and 2m depth was determined along with the area between the 0.5 and 3m depth.
- We have SAV data from aerial photography – that we considered representative of the period of the last decade of the 2000s; similar to the land use data and therefore the N loading rate data (1990s).
- We have no knowledge of timing of gains or losses in SAV in our study systems.
- Yes; we used general conclusions from the Vaudrey 2008 report. We had no data on CDOM levels for the estuaries.
- Aerial surveys were taken (decisions of when to take aerial photos considered weather, water clarity and phenology by the respective states): CT, Spring 2006; MA, Spring-Summer 2001; RI, August 2006.
- Anomalous estuaries (n=5): the cause of the anomalies was purely based on general ecological knowledge and not specific data, except where noted in Table 3.
- We did not account for wasting disease; although, in general, southern New England system wide losses from wasting disease has been documented to be before the imagery was collected for this study.

- We did not characterize the hydrodynamics of the study systems except for general tidal range, volume, etc.
- Portions of Great Bay likely have tidal ranges similar to the study systems. (i.e., mean tidal range for Latimer/Rego 2010 study: 0.4-2.7 m) (for comparison, the mean tidal range for portions of GBE: 1.9-2.1 m, Denney 2012)
- Only non-river dominated systems were studied.
- My understanding is that total nitrogen loads to entire Great Bay estuary are ~150 kg ha-1 yr-1.
- Annual loading rate was used because the model used to estimate loading is based on land use and thus integrates over time (average loading).