APNEP Nutrients Workgroup Meeting

January 27, 2016

Attendees

Dean Carpenter, APNEP; Marygrace Knight, APNEP; Coley Hughes, APNEP; David Carpenter, APNEP; Lisa Schiavinato, N.C. Coastal Resources Law, Planning, and Policy Center; Tyler O'Hara, N.C. Coastal Resources Law, Planning, and Policy Center; Steve Kroeger, DWR; Jim Hawhee, DWR; Carrie Ruhlman, DWR; Jen Schmitz, DWR; Jing Lin, DWR; Keith Larick, N.C. Farm Bureau; Anne Coan, N.C. Farm Bureau; Rhonda Evans, USEPA; Clifton Bell, Brown and Caldwell; Tim Spruill; Martin Lebo, Aquater; Sharon Fitzgerald, USGS; Hans Paerl (remote), UNC Chapel Hill

Proceedings

Welcome, introduction and announcements

Jim Hawhee gives general introduction and opening and asked workgroup members to introduce themselves. He provided a recap of the current status of nutrient criteria development in North Carolina, including the three pilot areas: High Rock Lake, Middle Cape Fear River, and Albemarle Sound. Also, two advisory bodies the state have convened: the Scientific Advisory Committee (SAC) and the Criteria Implementation Committee (CIC). Therefore, some parties may be involved in one or more of each of these tracks concurrently.

Jim asked for comments or changes to last meeting's minutes. No objections were raised, so those minutes were approved. Moving on to this meeting, the James River Estuary was added to today's case study load, in addition to the others prepared for the meeting.

Steve Kroeger and Carrie Ruhlman provided an update on the SAC and CIC. As part of the Nutrient Criteria Development Plan (NCDP) with EPA, the SAC was formed to recommend scientifically sound criteria for NC waters. This year's SAC schedule depends on APNEP's involvement and production of data for SAC. The SAC is presently focused on evaluating High Rock Lake criteria. The SAC was briefed in December as to the progress of the APNEP Nutrients Workgroup (Albemarle Sound) and asked to participate as they see fit, but can work more closely if needed. Group members noted that they would need feedback from the SAC once criteria are recommended, so regular updates would be warranted.

The CIC has convened but is still evaluating its role in the criteria development process.

Relevant project updates were also shared among the group. Sharon Fitzgerald discussed the status of two USGS projects in the area. Currituck Sound monitoring is ongoing in anticipation of the Mid-Currituck bridge, with baseline water and sediment data being collected according to a four-year sampling plan. Also, the four-year project funded to

monitor Albemarle Sound and assess baseline conditions of Albemarle Sound and its tributaries is concluding

Jim Hawhee also discussed the status of the data analysis project underway by Tetra Tech on behalf of the workgroup. That document is nearing publication. Preliminary findings suggest Albemarle Sound is ecologically distinct from other waters in the region, including Currituck, Roanoke, and Croatan Sounds. This supports the development of site-specific nutrient criteria for Albemarle Sound. Additionally, the law and policy analysis project is complete, with Tyler attending to present their conclusions.

Legal Overview of National Nutrient Criteria Development Efforts – Tyler O'Hara
Tyler O'Hara, a UNC law student working with the N.C. Coastal Resources Law, Planning, and Policy Center provided an overview of national nutrient criteria development litigation. To date, litigation at this stage appears to be rare, with a single major case involving the state of Florida. Tyler provided an overview of the Clean Water Act as it relates to criteria and then a procedural history of the case in Florida (Florida Wildlife Federation v. Jackson, 853 F. Supp. 2d 1138). Ultimately, site specific estuarine criteria were adopted throughout Florida utilizing a patchwork of methods (note: methods are well described in both the submitted NCCRLPP report and in the Florida case study document). Tyler discussed the application of the "arbitrary and capricious" standard in this case, notably the finding by the court that a failure to show a *harmful* change in flora and fauna as a basis for criteria was arbitrary and capricious.

Case Studies
(Case studies are on the shared Google Drive account. Efforts to recap them here are brief.)

Delaware Inland Bays– Tim Spruill
DE started with the 1998 requirement to establish standards. They were initially suggested by the Chesapeake Bay group, based on nitrogen and phosphorus. DE engaged in a TMDL analysis to try to attain those standards, which turned out to be extremely difficult; therefore, they still have not attained those standards today. The DE inland bay is significantly smaller than Albemarle Sound, only 7 feet deep across the Bay. Originally this ecosystem was thought to be very healthy; however, now dominated by algae without healthy oxygen levels and minimal aquatic life. Existing nutrient criteria were adopted from 1980/90's Chesapeake Bay studies. (DIN = 0.14 mg/L, DIP= 0.01mg/L). These criteria appear stringent and are frequently exceeded.

New Hampshire Case Study – Martin Lebo
New Hampshire analyzed data across the Great Bay system to attempt to predict appropriate levels of nutrients for the sustained health and protection of seagrass and benthos. In 2009 they proposed criteria based on this analysis with the input and review from EPA scientists. In 2013, these were re-evaluated and these criteria were not adopted. Simple regressions and relationships were evaluated, and nutrient levels were

established that were different than the initial criteria, so they were retracted. Marty believes that the complicated ecological processes in an estuarine environment create opportunistic communities, which were not considered adequately in the regressions and analyses. Therefore, it is difficult to establish a clear linkage between nutrients and responses; this lack of proven cause/effect was the main question posed by the peer-review and the reason why they felt the criteria did not answer that question sufficiently.

Hawaii Case Study – Jim Hawhee
Hawaii's criteria and thresholds are very stringent and complicated, with geometric means and percent exceedances. Surprised to find that a little less than half of the marine waters on Hawaii are impaired for nutrients. Overall, the development of these criteria is very cryptic and unknown. Several UH researchers and private consultants came up with them in the 1970's. General perception, even among regulators, is that the criteria appear to be too stringent but it's unclear how to change them effectively (limited resources, EPA anti-degradation concerns, etc.).

Maine Case Study – Sharon Fitzgerald
Maine was slated to establish criteria by the end of 2015, but the deadline was missed and will continue to be missed for quite some time. The modeler is doing dilution modeling, which analyzes how much dilution is required to meet a standard, which is an interesting approach. Sharon believes they are locked in a cycle of being unable to adequately model the impact of the criteria without first establishing them, but unable to establish without more data. Ultimately, the lack of data will be detrimental to establishing NNC. A rolling permit process will help bring in additional data points (RPA – Regional Potential Analysis).

Massachusetts Case Study – Martin Lebo
Process to address 89 estuaries. 2000 pilot estuaries, Data intensive, monitoring intensive, modeling intensive. TMDL done for each estuary. Coastal communities, stormwater runoff, salt marshes are nutrient sources. Each segment was modeled to determine nutrient responses. Modeling allowed evaluation of responses to modifications in loading to the system. Strong community engagement during the process from the beginning. Also notable for the early policy decision related to each estuary, as classifications relate to various desired trophic states. Modeling is an ongoing process, with a certain number of segments modeled per year.

12:00 – Break.

12:25 – Reconvene.

Puget Sound Case Study - Marygrace Knight and Jim Hawhee
Numeric criteria exist for DO and turbidity, as well as narrative criteria for aesthetics. Dissolved oxygen and turbidity have criteria based on a percent increase above

background, implemented on a point-by-point basis. Washington's Nutrient Control Plan doesn't offer further marine system recommendations (most recommendations already implemented in prior years), but the Puget Sound DO study found human influences were reducing DO more than allowable under rule. Findings were based on statistical models rather than direct measurements. Nutrient TMDLs under consideration to address DO violations. This is a data rich system with sophisticated models, but DO is really the driver of nutrient controls. Not much discussion of HABs, though they can wash in from the ocean. DO issues are driven by salinity gradients and ocean nutrient imports as much as human influences. WWTP limits are 25 NTUs for turbidity. It was noted that limits are measured instantaneously, so even one violation over a 10-year period influences allocations.

Rhode Island Case Study – Jing Lin
Numeric nutrient criteria are presently being evaluated and are not in effect. Narragansett Bay is split between RI and MA. It is deeper than Albemarle Sound, with deepest points in the channel mouth. Very important fish and shellfish industries in the area. A majority of the nitrogen input is from wastewater. They have water quality standards for many endpoints, including aquatic life. What is interesting is that most of the biological conditions were evaluated using narrative criteria, by comparing the difference between reference or expected conditions and those found at a specific site.
The bay is not impaired for low pH, but is impaired for low DO. Narragansett Bay long-term studies have shown that climate (particularly increase in temps) have played a role in the delineation and extent of hypoxia in the Bay, due to 1) stronger stratification and 2) changes in phytoplankton assemblages. This is a complicating factor when looking at the trends in DO in the bay. A study in 2015 found that a 15% reduction in Total N in wastewater is improving water quality now. DO seems to be driven by physical factors as well as nutrients (stratification, etc.). Narragansett Bay was noted as a good example of the role of climate change can play in the establishment of nutrient criteria. Recent studies show that the thresholds are changing significantly with increased water temperatures and subsequent physical changes in the water column.

San Francisco Bay Case Study – Jim Hawhee
About $850,000-$1million per year from WWTP permits funds research and development related to nutrient criteria. Chose to go with a narrative response to parameters, including 4 criteria. These criteria are being developed using a very collaborative, scientifically rigorous approach; however, they still are not being implemented or adopted from a regulatory standpoint. It seems as if they are not interested in adopting NNC by themselves, but rather use them as a translation tool. Process to evaluate the suitability of various response parameters was notable. Top down pressures were notable in this system, including algal predation by invasive clams. Also, in contrast to Albemarle Sound, San Francisco Bay is a well-flushed system, with constant exchange with the ocean.

Chesapeake Bay Case Study – Clifton Bell

EPA likely considers this the flagship system for nutrient criteria development and it is one of the best-funded programs in the world. Extremely robust modeling framework. Most are numeric criteria, but chlorophyll-a is narrative. No N or P criteria. Though chlorophyll-a is an indicator of many other parameters, the committee did not feel bay-wide criteria would work for this system; however, it was recommended that numeric chlorophyll-a criteria be developed for areas where algae are a problem. The group discussed various modeling scenarios, including the "John Smith" predevelopment scenario as related to nutrient criteria, which indicates some potential hypoxia during those times. Distinctions between Chesapeake Bay chlorophyll recommendations and state-adopted criteria were noted. Some work has been done correlating aerial data with nutrients and chlorophyll. APNEP provide a comparative overview of its seagrass monitoring efforts.   An aerial census is conducted every 5 years, with smaller stations sampled annually.

James River Case Study – Clifton Bell
The James River is an area in the Chesapeake Bay watershed where a site-specific chlorophyll-a criterion has been developed. Results of analyses were used to define defensible ranges of chlorophyll-a. High chlorophyll peak, 80-100, microcystins known to occur, mahogany tide/dinoflagellate blooms in more saline areas. 10-23 (seasonal average) was set as standard in 2005. 2010 EPA had a new baywide model which showed additional $1 billion in costs to achieve goal. In light of that potential investment, calibration of the model in the James River and more rigorous linkages were sought. Research scheduled for completion in 2016. Includes new monitoring efforts, enhanced modeling of chlorophyll a/algal density, and laboratory studies. *Microcystis* and *Cochlodinium* are among the genera of interest.

Florida Case Study – Rhonda Evans
Rhonda provided an additional overview of Florida's nutrient criteria development process, which was also covered somewhat in Tyler's presentation. The full list of standards is available online. There is also a link to the webpage at the end of the presentation. Seagrass recovery efforts were the main driver for criteria development in Tampa Bay, while other estuaries had criteria set based on a reference condition approach.

Wrap-up and Discussion
Jim informs the group that additional information from South Carolina/ Georgia may be relevant, which was posted to the Drive account. He requested that the group review all of the case study documents online. Based on prior discussions, the group indicated an interest in hearing from external experts in these various jurisdictions. Jim poses question to the group: from where would you like to seek expert opinions? After some discussion, the consensus was to wait on consulting specific jurisdictional experts. Instead, the group will focus its March meeting on the analyses contained in the forthcoming Tetra Tech report.

Group members discussed some general process matters, including how criteria recommendations will be supported and documented. The group also noted impressions from the case studies. Workgroup members emphasized various points, including the desirability of defensible links to designated uses, concerns about unintended consequences of criteria, and the various methods by which other jurisdictions are moving forward with criteria.

3:00 Adjourn.