



Portland Area Nitrogen Group Meeting Summary

Virtual Meeting No. 4+ | May 26, 2022 | 12:00 PM – 2 PM

MEETING OBJECTIVES

This was the final meeting of the PANG, and was intended to:

- Review final technical materials
- Consider a recommendation from this group around nitrogen criteria for the Portland area
- Provide input on the application of those criteria to permits

To view meeting materials, please click [here](#).

PRESENTATION: *Overview of Final Data Analysis*

Angela Brewer, Maine DEP

Curtis Bohlen, CBEP

Angela presented the results of the N-STEPS analysis, including outlining of the pros and cons of distinct criteria development approaches, Major changes in prior N-STEPS material include:

- 1) Terminology for water segmentation: (“riverine” → “upper estuarine”), watershed TN modeling for reference waters (“Top 4” → “Lowest 4”)
- 2) Reduction of annual data summaries to seasonal (May – Oct)
- 3) Clarification of salinity segmentation values

Curtis presented on his independent analyses (“stress-testing”), which highlighted available data and challenges with balanced sample design associated with stressor response analyses. Reasonable data inclusion decisions give similar results when compared. Brief mention of data inclusion criteria and reference values that were sometimes derived from few data points. Decent water quality in Maine means bad reference conditions are tough to find or few. Take homes: Use data with care, three approaches each have strengths and weaknesses, stats used give similar but not identical outcomes, multiple approaches provide a “weight of evidence” based on available data.

Conversations after the presentations focused on the following:

- **Ivy:** When talking about the lower estuary, can you explain why the difference between existing total nitrogen (TN) values and the predictive model’s TN numbers?
 - **Angie:** I believe there are other things going on and these areas are complex – nitrogen burial, uptake especially by primary producers, import and export from system, or something else that is not captured in the model.
- **Fred:** Curtis’s effort is a good way for us to have some confidence in what N-STEPS has done, signaling that it is heading in the right direction. What would be parameters that might significantly alter the numbers?
 - **Curtis:** What would change the outcomes is using a different modeling approach, but that raises questions about whether EPA would accept it. For instance, thinking differently about the way we understand how eelgrass grows in Casco Bay.



- **Scott:** How would a new hydrodynamic model affect the criteria derivation process?
 - **Curtis:** Wouldn't affect it much. The uneven sampling history would make it difficult to use a spatial model.
- **Ivy:** Do we have sufficient data to use another indicator other than dissolved oxygen under these models? Seems that by the time dissolved oxygen is of concern, the nitrogen impact has already been realized.
 - **Angie:** I really wanted the Kd value to work for us, but there are too many confounding factors to rely on it. The analyses use grab sample data for total suspended solids (TSS) and chlorophyll within the top meter of the water column, which doesn't represent the full water column, so relating those data to water column light attenuation can be problematic. Kd might not be a parameter we can lean on now, but by addressing chlorophyll, you address the habitat endpoint. Chlorophyll is a good line of evidence and using 5 mg/l is a strong regional value. DO is a very logical direction to go for estuaries – the best parameter we have in the estuaries. Protects all aquatic life. The lines of evidence converge with chlorophyll and DO. We're just not there yet with Kd.
 - **Curtis:** In all of the stressor response models, there is a greater amount of uncertainty.
- **Scott:** Does this approach include using response variables like what is proposed in phosphorus rule? Ambient nitrogen values are now lower than in the past. How does this align with existing conditions in the Casco Bay Estuary Partnership's State of the Bay report? Hydrodynamic model becomes essential when we start talking about applying criteria to discharge licensing. Assessing TN at the point of discharge is too small an assessment area, and the DEP bathtub model approach was too coarse. Is there a compromise?
 - **Angie:** N-STEPS has not put forward response variables. But has related those response variables to the DO thresholds.
 - **Curtis:** The way to do this is look at how often current conditions exceed these conditions. When we look at 75% confidence, that means you'll exceed 25% the time. This raises questions about how this is going to be implemented regarding timing and frequency of sampling.
- **Kelly:** How did N-STEPS determine to use yearly averages? That doesn't feel typical.
 - **Curtis:** used a seasonal average because if one includes the limited amount of winter data that existed in the averaging, it complicated the whole relationship between temperature and salinity. There is a tradeoff between accuracy and data quantity and representativeness.

PRESENTATION: *Considering a recommended approach for nitrogen criteria*

Angela Brewer, Maine DEP

Angie presented a "strawman" approach, which she said is still the subject of internal conversations in DEP, which is open to input. The approach would memorialize TN thresholds as seasonal criteria, divided into "estuarine" and "marine" (open) waters. Mapped eelgrass would serve to delineate estuarine from marine waters, with 0.5 km buffer surrounding mapped beds. Conversation focused on the following:



- **Ivy:** At the 0.32 mg/L value, we have observed nuisance algal blooms and disturbed eelgrass beds. We see eelgrass rebounds with lower TN values and macroalgae blooms disappear. I thought you were going to propose a lower level, like 0.29 mg/L. I have a concern with the 0.32 mg/L level.
 - **Angie:** Regarding blooms, we had seen that in Back Cove, there seem to be fewer macroalgae blooms now (since East End nitrogen load reduction). There indeed could be a tipping point and we would want to be below that. But on average, not sure. We just don't have good evidence to suggest a precise number between 0.25 mg/L and 0.32 mg/L TN.
- **Ivy:** Would you expect to see macroalgal blooms on the flats at 0.45 mg/L in estuaries?
 - **Angie:** The data are based on site farther from shore and in the deeper channels, not over the intertidal flats. I would expect that the nitrogen values over those flats are higher than 0.45 at the start of those blooms.
- **Fred:** How does the 0.5 km buffer relate to hydrodynamic modeling?
 - **Angie:** the buffer is for estimating the extension of eelgrass, creating a protective space for habitat, and is not related to hydrodynamic modeling.
- **Kristie:** Why include the lower Fore River estuary in the marine polygon? Feels like it doesn't pass the straight-face test that you would see eelgrass in those areas. Do the eelgrass beds on the map reflect the maximum extent in all surveys?
 - **Angie:** There has been eelgrass on South Portland side in the past. Salinity, temperature and TN data in the lower Fore are essentially the same as the open water. We have no reason to think that eelgrass couldn't survive in the lower Fore. Yes, layer shown in presentation is cumulative extent of eelgrass mapped since first survey in Portland area in 1993.
 - **Curtis:** It's a reasonable approach to treat them the same – does behave like open water and marine habitat.
 - **Wil:** Adds support for lower Fore behaving like open water based on data.

PRESENTATION: Applying criteria to permitting

Gregg Wood, Maine DEP

David Plumb, CBI

Gregg Wood described how Maine DEP would use the output of this process in permitting decisions. He emphasized that the only difference is having more data on the background conditions, as well as having better hydrodynamic modeling in the future, though that model hasn't been built yet. The conversation focused on:

- **Curtis:** There is a verbal agreement with NERACOOS and UMass Dartmouth to complete a hydrodynamic model using infrastructure funding. Probably within a year and a quarter or so it would be ready - early summer or fall 2023. Then some work in translating that into permitting.
- **Fred:** How does this work with permit renewal timetable? If move forward now before permits expire, will analysis change? If waiting for hydrodynamic models, will be a few years.
 - **Gregg:** Permits that are set to expire in Sept. will use the existing Reasonable Potential assessment. For some, that means the question of far-field dilution needs to be set aside for now.



- **Ivy:** Far field dilution model has not been used anywhere else in the country, and EPA did not support it. Should focus on stressor-response, not dilution model.
- **Angie:** At the East End sampling site, the numbers are below the threshold of 0.32 mg/L now. The same with the Presumpscot River estuary for the 0.45 mg/L threshold. For South Portland, we would need to assess the ambient data.
- **Scott:** Hydrodynamic models are used in evaluating permit limits. There are reopeners to permits, so would model allow reopening of permits? Suggested that Ivy's point that modeling is not used in nutrient permitting decision is not accurate.
 - **Gregg:** If a new hydrodynamic model is built, there is a mechanism to open a permit to take a new look. Now we can follow the process we have in front of us, and use that mechanism if needed.
- **Matt:** Asked about ground truthing the new hydrodynamic model; for example, if model predicts exceedance of TN criteria. Could *in situ* data be collected to verify model and then refine criteria?
 - **Curtis:** Hydrodynamic model maps movement of water, and this can be used to talk about concentrations, but ultimately it will help determine modeled dilutions/observed concentrations.
- **Kelly:** A biogeochemical model requires really long timescale for results. What is the output for the hydrodynamic model? A grid, with all the years you need?
 - **Curtis:** The plan for building the hydrodynamic model will be to use the first six months to put the structure together based on the specific scenarios from which we need to get results. We can bring the users together then to decide how the model can be most useful.
- **Kristie:** Stormwater discharges don't get dilution applied, so how will these criteria affect what stormwater folks will have to meet? Will stormwater folks be responsible for calculating own dilution areas?
 - **Gregg:** Plan will be to rely on the MS4 permit, practices, fertilizer, etc., and not to apply ambient WQ criteria as 1:1 dilution at end of stormwater pipe.
- **Kristie:** How will straw proposal be used by Matt? A plan is needed for the statewide criteria meeting.
 - **Matt:** How proposed approach moves forward depends on reception with this group and going forward with larger stakeholder process.

WRAP UP & CLOSE: *Taking the group's temperature on a recommended approach*

Organizers ran a handful of Zoom polls to test the group's comfort level with the approaches discussed during the meeting. The results are as follows:



1. Does the classification/segmentation of estuarine and open water/marine make sense for the Portland area? (Single Choice) *

21/21 (100%) answered

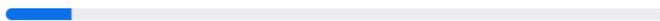
Yes, definitely (3/21) 14%



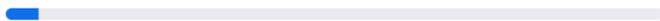
I think so... (15/21) 71%



I'm not sure yet (2/21) 10%



I'm feeling uncomfortable with what I'm seeing (1/21) 5%



The one person expressing discomfort based on her concern about classifying the lower estuarine portion of the Fore River as open/marine and therefore eelgrass habitat, with consideration for usage of the waterway for petroleum transport, etc.

2. Does the approach of memorializing current thresholds as seasonal criteria look like a reasonable way to address nitrogen criteria in the Portland area? (Single Choice) *

21/21 (100%) answered

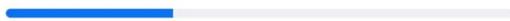
Yes, definitely (3/21) 14%



I think so... (9/21) 43%



I'm not sure yet (7/21) 33%



I'm feeling uncomfortable with what I'm seeing (2/21) 10%



One participant said she was uncomfortable with the 0.32 mg/L TN level based on eelgrass habitat, and wanted more time to think about whether that level was protective enough and how criterion would be applied in permits. PWD has done good work and she wants to see continued improvements.



3. Based on our conversation just now about applying the criteria to permitting, how comfortable are you with the direction DEP is suggesting? (Single Choice) *

21/21 (100%) answered



One participant expressed concern about the application of criteria to permits and how modeling will be used. Application of criteria to permits as mass limit and not concentration limit is important.



APPENDIX A: PANG MEETING PARTICIPANTS – MAY 26, 2022

Al Basile, US EPA
Marti Blair, Casco Bay Estuary Partnership
Curtis Bohlen, Casco Bay Estuary Partnership
Bill Boornazian, City of Portland
Angela Brewer, Maine DEP
Kelly Cole, University of Maine
Fred Dillon, City of South Portland
Mike Doan, Friends of Casco Bay
Scott Firmin, Portland Water District
Ivy Frignoca, Friends of Casco Bay
Wendy Garland, Maine DEP
Matt Hight, Maine DEP
Galen Kaufman, US EPA
Brian Kavanah, DEP
Dan Marks, Town of Falmouth
Rob Mohlar, Maine DEP
Kristie Rabasca, Maine Water Environment Association
Jim Stahlnecker, Maine DEP
Brad Weeks, City of South Portland
Tom Wiley, City of South Portland
Wil Wollheim, University of New Hampshire
Gregg Wood, Maine DEP

David Plumb, Consensus Building Institute