Modeling Workgroup Conference Call

January 11, 2018

Meeting Summary

Event webpage:

https://www.chesapeakebay.net/what/event/january_2018_modeling_workgoup_conference_call

1:10 Outcomes of the PSC's December 2017 Midpoint Assessment Meeting – Lee Currey, MDE and Dave Montali, Tetra Tech

The decision outcomes of the December 2017 PSC meeting will be reviewed. In particular, the PSC decisions regarding the draft Phase 3 WIP Targets, Conowingo infill, and climate change will be discussed in some detail among the Workgroup participants

Lee reviewed the decision outcomes of the December 2017 PSC meeting. Lew and Lee both agreed that PSC were satisfied with the results that the Workgroup provided.

Discussion:

Lew: The charge we have been given by PSC is to develop a refined analysis of climate change by 2019 and that will be reviewed by partnership in 2020 will lead us to what may be a suite of model in preparation for 2025.

Ted: The draft planning targets are available for the state-basin level. Are the finer scale planning targets also available?

- Lew: Not yet. At this point, we are still working on the added special cases which we will talk about later and Gary is the go-to person regarding this info.
- Gary: The planning targets are calculated at the state basin and fall line level. That's the limit to which we are making the calculations here and assigning them as far as the Bay Program concern. PA, MD, and VA are working with the CBPO to make calculations at a finer scale. We can certainly provide assistances based on your needs.
- Ted: From where I understand, the PSC approved the targets and the methodology in how they are divided up in the basin. The state has the flexibility to move the targets as long as water quality response is met.
- Gary: Agreed. The CBP will not direct an individual state on how to divide targets as long as the plan is consistent with the water quality. The Bay Program will provide technical assistance based on the needs of the state.

Dave: Is the up-to-date state-basin level scale available on cast?

- Gary: Yes

Lee: The two most immediate task are: 1) what additional pounds would be available from the original planning targets if we hold the water quality variances at 6%; 2) planned response to PSC's 2021 deadline for refined modeling and assessment of climate change.

1:45 Detailed Assessment of Chesapeake Assimilation Capacity – Lew Linker EPA-CBPO and Richard Tian, UMCES

A detailed assessment of the Chesapeake assimilation capacity for nutrient loads will be developed in order to accommodate, to the extent possible, the special conditions of the New York basin of an additional allocation of 1M and 0.1M pounds TN and TP, respectively, and in West Virginia's basin for 2M pounds of TN. Approaches that examine additional loads on the fine edge of attainment of water quality standards, as well as the estimated 2025 freeboard in the EPA atmospheric deposition of TN allocation to tidal waters, will be reviewed.

The key question we were asked by PSC is the additional amount of loads with WIP2 (TN: 195 million pounds TN and TP: 13.7 million lbs) baseline and the restrictions of 100% attainment in deep water and open water and no more than 6% nonattainment at the CB4MH deep channel. The results show that the estimated assimilation capacity of the Chesapeake with the condition of maintaining no more than 6 percent nonattainment in CB4MH Deep Channel allows an increase 0.5 million lbs of TN and 0.05 million lbs of TP at the Susquehanna, and 1 million lbs of TN at Potomac fall line. Note that the added loads at the Susquehanna and West Virginia fall lines are fungible. It is estimated that 0.8 million pounds of TN is available in 2030 from the EPA tidal water allocation overshoot. Using the refined assimilation capacity estimates and estimated freeboard of atmospheric deposition to tidal waters, one possible solution is to fully satisfy the NY's special case (1 million pounds TN and 100k pounds TP at the Susquehanna fall line), and partially fulfill the WV's special case (2 million pounds TN at the Potomac fall line) by an estimated 1.18 million pounds.

Discussion:
Lee: Is the total additional allocation for NY (1M and 0.1M pounds TN and TP) and WV (2M pounds of TN) 3M pounds of TN and 0.1M TN? With the 0.8M pounds of freeboard TN from atmospheric deposition and additional 0.5M pounds of additional TN from the assimilation capacity, NY may get 1.3M pounds of TN, right?

- Lew: Correct. This is just one solution and there are other possible alternatives.
- Lee: It looks like the additional pound of TP for NY is only provided by assimilation capacity analysis, but the assimilation capacity result shows that only 0.05M pounds of TP can be provided, which cannot fully satisfy NW's special case.
- Lew: The additional TP for NY is partially converted from the overshoot of the atmospheric deposition. The special cases of WV can only be partially met.
- Dave: We're also unclear about the allocation of the freeboard of atmospheric deposition.
- Lew: there are plenty of ways to approach this. They are equally exchangeable based on the relative effectiveness. This is just a demonstration and other alternatives are also possible.

Dave: It is anticipated that some questions will be asked regarding the solution: Why meet NY not meet WV? Can both States' special cases partially met? We cannot get by these two methods. We can frame that "we can meet NY and WV will still be short" or "we are getting close on both but we are not 100% sure"

- Lew: In terms of finding the language, Dave's help is much appreciated. The 2013 progress of WV indicated that WV is less urgent in terms of additional load allocation.
- Dave: The 2013 Progress shows that there is a 100k pound deficit for WV's phosphorous. We should not assumed WV's urgency. I recommend that at least 3 alternatives should be provided to the GIT.

Hassan: Is the level of effort which is needed by these two jurisdictions same for them? There are different target allocations provided by previous model and current models, and the special cases remain the same.

- Gary: It is about the same for New York, and it is higher for WV if they had the 0.2M lbs of phosphorus it's lower if they had the 3M lbs of nitrogen.
- Lee: When NY and WV were talking about this, they weren't talking about the level of effort. The agreement was X number of lbs. We want that same agreement in terms of pounds upheld.
- Dave: West Virginia will go through a 4-month review process, a very detailed assessment of WV's WIP2 level of effort. The result may show that WV may not need the full 2M lbs of

TN. We are taking every step to see what the intended level of efforts are and achievement by by 2025.

Tanya: Agree that more scenarios should be provided and the criteria should be established as well. Some possible bounding scenarios maybe: fully fulfill NY first, fully fulfil WV first, only partially fulfill both of the states, and other variations that you come up with. Each of the scenario carry some values, notion of equity and flexibility, which are important to make a policy decision. It would be important to understand how significant of the additional pounds for NY and WV relative to their actual load. In terms of equity, the significance of 1 million pounds to one state is not necessarily the same to another state basin.

- Lee: Lew will provide a memo to WQGIT members. I agree with Tanya. There is not enough to fully fulfill both NY and WV, and also lay out a few other scenarios. It is important for NY and WV to understand the significance of the additional pounds for NY and WV relative to their actual load. Would WQGIT need follow-up in addition to these scenarios?
- Tanya: Provide the several scenarios first and then ask for WQGIT guidance on what other information they might need.
- Lee: Suggests bringing these available scenarios to NY and WV and ask them to get back to you on progress of 2025 goal and what they might need, which help to shape some policy questions.
- Dave: We should be hesitant to jump into the decision that WV doesn't need that much and we need to leave this decision to WV.

Marjy: We have done similar experiment using our modeling systems in the bay and we find that the same amount of inorganic nitrogen coming from the atmospheric deposition has the same impact on the bottom nitrogen concentration all the river combined. This is a very different result from what you are getting. Whether you are looking at their impact on going through the full water quality attainment and looking at that as a criteria for comparing the rivers versus the atmosphere or you are looking the hypoxia volume less than say 2 ug/L. What metrics did you use to compare the sources of the river?

Gary: The metric was used in the geo run which is 25th percentile of the dissolved oxygen for the combination of the CB3, 4 and 5 and the Potomac Mesohaline for the deep water deep channel. Those areas of the bay is what we use, and we just looked at the 25th percentile of DO and how much that changes when you change the load in.

Marjy: So the actual concentration of the oxygen but not the volume?

Gary: Yes

Marjy: That should be the same as what we have been doing and I am unsure why we are getting such different results.

Gary: I think you are looking at different things. We looked at the management practices for the atmospheric deposition reduction and they affect only nitrate. When we reduce atmospheric deposition, we only reduce nitrate. When we looked at the management practices in the watershed, they reduce TN so the geo runs for all other basins are for TN. We didn't run nitrate to nitrate we ran nitrate to TN.

Lew: We are doing this because we want to make sure that we are stay on track in terms of what are the loads coming out of the Susquehanna or elsewhere and what is the influence of those loads on hypoxia.

Marjy: It looks like if you find nitrate matches TN from the river, you couldn't find nitrate from the atmosphere match nitrate from the river, right?

Lew: We don't know because we are comparing very different things.

The memo for the WQGIT to review will go out to Modeling WG leadership on Tuesday and request for response by the end of Wednesday.

2:15 Planned Response to PSC's 2021 Deadline for Refined Modeling and Assessment of Climate Change Influence on Water Quality for 2022-2023 milestone Quantification – Lee Currey, MDE and Dave Montali, Tetra Tech

Discussion of initial ideas on the Modeling Workgroup's development of a refined analysis, with completion by 2019, of estimated 2025 climate change influence on Chesapeake water quality standards for inclusion into the 2022-2023 milestones as directed by the PSC.

After reviewing the PSC decisions regarding climate change, Lee asked what we should do in the short term and long term. What are the steps we should take immediately and over the years? What do we need to get to the PSC now? Lee would like to have a plan by the end of January.

Discussion:

Dave: suggested a briefing paper about how we come up with 2025 numbers by Feb 14.

Lee: The briefing paper is just one part of the PSC action item: "*The Partnership's Modeling Workgroup, working with the Climate Resiliency Workgroup, will develop and distribute a briefing package in advance of the Principals' Staff Committee's February 2018 meeting that will provide greater detail on how the additional nutrient and sediment loads due to 2025 climate change conditions were developed, and the data and assumptions behind those calculations."*

Dave: The second part is that modeling WG needs to do by 2019 is: "*Develop an estimate of pollutant load changes (nitrogen, phosphorus, and sediment) due to 2025 climate change conditions".* The Modeling WG may not be very involved in BMP resiliency and effectiveness, which is part of an important package which is required by 2021.

Tanya: There should be some collaborations between CRWG and Modeling WG. There are several aspects should be paid attention to: sea level rise, Water Quality and Sediment Transport Model responses to assumptions of the climate impact, and the Watershed Model. Understanding if there is a threshold for changes in precipitation duration and frequency and the impacts on loads, is important for BMP effectiveness. I recommend to have a dialog with the CRWG about some of the above points and model analysis input/output.

Zoe: There were several BMP related workshops held in the past 2017 and much work were stacked over the past two years. We should take some time to review the results and suggestions we had from the workshops. I think the last action item is intended to give the jurisdictions more info to understand the final climate change results, and assumptions and uncertainties behind those numbers. We had a workshop in September of 2016 and even 2015 that laid out recommendations for climate change projections and scenarios for the bay program to use. We also had two STAC peer reviews which we were given recommendations on improvement with the existing modeling efforts. The first review was about the estuary model and the second one is the independent peer review on climate change pragmatic response and the selection of the scenarios for climate that bay program was using. We received draft recommendations and there are still follow up action in terms of compiling and documenting. The most recent BMP workshop we had in September is about "Monitoring and Assessing Impacts of Changes in Weather Patterns and Extreme Events on BMP Siting and Design". The current state of knowledge the BMP efficiency is pretty limited at this time. We should make sure we spent time digesting those recommendations provided by the STAC workshop before putting a STAC workshop so close to these previous workshops and peer reviews. It is important to take time to document and think about what we have done so far and the next phase so that we are not prolonging the discussions we already had.

Mark: The first STAC workshop we had was about the method we use to identify the dataset we used and how we would model climate for the program, then we had the bmp workshop a few months ago which was to review the mechanic of the model. If we have a workshop it would focus on that the results of the model and if they make sense, and do we need to make changes.

Lee: Second to Mark's point. The three key issues we are dealing with are growth, Conowingo, and climate change. If we scale them to how big of the issue growth is 3 million lbs increase in nitrogen, Conowingo is 6 M lbs and now climate change is 9 M lbs now which is very different from a year ago. Climate change is the biggest load reduction. So what changed and what's the driver. And one of the reasons is the sea level rise. However, that's not the complete answer. We should digest those results and information from workshop and addressing those gaps.
Lew: start documenting what has done. Right now the movement is toward to the mid Feb meeting. We have limited time. We are going to take this as action today. The sea level rise is the big player but it's not all the story. We need to document all the reasons behind.
Gary: We have several pressing deadlines regarding climate change given by PSC which give us some opportunities to focus on this issue. In the watershed model, we know that we have sensitivities to certain things but we don't have sensitivity yet. This can be revised by revisiting other models and investigate what they have found, and incorporate into Phase 7.
Mark: Marjy is looking into this and we can bring her into this discussion and their feedback is valuable.
Lew: Let's team up and put some ideas forward for the workshop.
Mark: There is a lot of value in putting together a STAC workshop.
Tanya: we also need inputs from Waste Treatment WG, Storm Water WG, and AG WG.
Lee: We need 1) a briefing paper to explain climate change conditions, and data assumptions; 2) to highlight Zoe's opinion: digest the information we already have; 3) a joint proposal between Modeling WG and CRWG to go through the result.
Dave: I agree that we need to evaluate the effectiveness of model. It's important that we don't put the 2025 look in.

2:45 Outline and Plans for WQSTM and WSM Documentation – Carl Cerco, Attain LLC and Gary Shenk, USGS-CBPO
The target date for completion of the final documentation of the Phase 6 WSM and WQSTM is April 1. Document outlines will be presented for the model documentation and the status of the STAC peer reviews will be described. Overall documentation of the Phase 6 model application to the 2017 Midpoint Assessment will be completed by December 2018.

Carl: In June, we prepared a report for STAC review. At that time, 6 chapters were completed. Two chapters were planned but missing: oysters and recommended improvement for the model. Statistical summaries and appendices need to be redone. Carl's responsibility on the report are listed as initials in the slides. The responsibilities of the appendices fall on the Bay Program. Projected timeframe to be done is April 1 2018.
Lee: Where are the STAC review and responses and how do they fit into this report?

- Marjy: We should have the report after workshop next week.
- Carl: the response to the STAC report will be a separate report.

Gary: The deadline to the WSM is April 1 2018. All the links will be under the cast website under model documentations and everyone would have access to them. By April 1, 2018, we will have the documentation finalized. The STAC review to the watershed model is finalized. The Chesapeake Bay program responses are not finalized. We will have it finalized by Mid Feb and have the Modeling WG to review and revise. We would like to have several publications and manuscripts by the end of year.

Lee: We should have a summary of STAC reviews and where they all are. The letter goes through Modeling WG, Water Quality GIT and Management Board.
Gary: We just have two reviews under Modeling WG.
Lee: Is there an airshed model review?
Lew: No, that's a national model review.
Zoe: The STAC climate review is technically not under the Modeling WG but should have some feedback on the responses.
Lee: What's the title for that one?
Zoe: Programmatic framework for incorporating climate change into modeling framework
Lew: Do we know when we will receive it?
Zoe: We have received the draft not the final.
Dave: Will CAST have the STAC results of the inputs on the land use change?
Gary: Under the cast documentation, there will be a session for review which is for the Watershed Model. Under the Modeling WG webpage, we can expand that to Water Quality Model and Land Use Change Model.
Dave: In the Kyle's documentations, is there a specific segment for STAC review and responses provided there?
Lew: We may have those under Modeling WG webpage.

Next meeting: Feb 5.6 in person meeting.

Meeting Participants:	
Alisha Mulkey	Hassan Mirsajadi
Amir Sharifi	Jeff Sweeney
Andrea Danucalov	Jim George
Andrew Sommerlot	Karl Berger
Bruce Michael	Larry Sanford
Carl Cerco	Lee Currey
Cassandra Davis	Marjy Friedrichs
Collen Hicks	Mark Bennet
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