Criteria Assessment Protocol Workgroup (CAP) Meeting

Thursday, September 14, 2023
10:00 AM – 11:30 AM

Meeting Materials
This meeting was recorded for internal use to assure the accuracy of meeting notes.

Actions:

- ✓ Richard Tian (UMCES) and Qian Zhang (UMCES) will evaluate segments with no SAV/water clarity goals and check that calculations of the indicator including the DO variances are correct.
- ✓ Tish Robertson (VA DEQ) will email Richard, Qian, Gary, Lew and Peter with the segment information for the Pocomoke River segment that is categorized as impaired due to natural conditions.
- ✓ Decision: Qian and Richard will incorporate the PSC-approved DO variances (CB4MH DW - 5%, CB4MH DC - 6%, and EASMH- 2%) into the annual update of the WQS attainment indicator, starting for the 2020-2022 period, and retrospectively to all periods since 1985-1987. They will document this change in the indicator's A&M file.

Participants:

Amanda Shaver (VA DEQ), August Goldfischer (CRC), Becky Monahan (MDE), Breck Sullivan (USGS), Cindy Johnson (VA DEQ), Claire Buchanan (ICPRB), Elgin Perry, Gary Shenk (USGS), Jacob Greene (MDE), Juan Vicenty-Gonzalez (EPA), Lew Linker (EPA), Mark Trice (MD DNR), Melinda Cutler (MDE), Peter Tango (USGS), Qian Zhang (UMCES), Rebecca Murphy (UMCES), Renee Karrh (MD DNR), Richard Tian (UMCES), Tish Robertson (VA DEQ), Joe Morina (VA DEQ)

Minutes:

10:00 AM **Welcome, Introductions & Announcements – Peter Tango** (USGS), Chair

Upcoming Conferences, Meetings, Workshops and Webinars:

- Chesapeake Watershed Forum – November 3-5, 2023, Shepherdstown, VA.
- CERF 2023 Conference: Resilience & Recovery – November 12-16, 2023, Portland, Oregon.
- National Conference on Ecosystem Restoration – April 14-19, 2024, Albuquerque, New Mexico.
- Chesapeake Community Research Symposium – June 10-12, 2024, Annapolis, Maryland. Special session proposals due October 2, 2023 – email allison@greenfinstudio.com

A new member of the workgroup, Joe Morina, was introduced. Joe is the new Water Quality Assessment Data Coordinator at Virginia Department of Environmental Quality (VA DEQ).

10:20 AM **Follow up on the D.O. criterion variance** – *Qian Zhang (UMCES) and Richard Tian (UMCES)*

Presentation summary

They main finding is that incorporating the variances doesn't affect the previous assessment. The plan is to include these variances in the assessment starting this year if the CAP workgroup gives their approval.

As a reminder, each segment contains up to five designated uses (DUs) and each contain their own set of criteria for different parameters. The variances Qian discussed are relevant only to deep channel and deep water DUs. They prepare the WQS indicator every year using the most recent 3 years of data. They just compiled the data for 2020-2022 and will do the assessment for that very soon. They can't do a full accounting for all the water quality (WQ) criteria because of monitoring limitations, so what they have is just an estimate.

Variances are used in the Total Maximum Daily Load (TMDL) for conditions beyond management and control, where specified DUs are unattainable. The restoration variance is the allowable exceedance of a specific WQ criteria based on the best available scientific understanding consistent with Clean Water Act requirements. Qian provided several resources for understanding the justification of restoration variances. Maryland made dissolved oxygen (DO) variance revisions in 2017 that were approved by the CBP partnership and EPA at the Principals' Staff Committee (PSC) meeting. Qian demonstrated that using the revised variances has no impact on any results of the assessment or the attainment deficit indicator in any of the locations the revision was approved. There is no impact from the revised variances on the overall attainment indicator in all assessment periods.

Qian requested approval from the group to incorporate the PSC-approved DO variances into the annual update of the WQS attainment indicator. They include CB4MH DW (5%), CB4MH DC (6%), and EASMH (2%). These variances would be applied starting in the upcoming assessment for the 2020-2022 period, which is expected to be completed in late 2023 or early 2024. Additionally, these variances would be retrospectively applied to all periods since 1985- 1987. This change would be documented in the indicator's A&M file.

Discussion

- Tish Robertson (VA DEQ) in the chat: We have 91 segments that have SAV/water clarity goals? I believe there are 7 segments in VA that are "no grow" zones and thus don't have SAV/water clarity goals.
- Lew Linker (EPA) in the chat: Very good point Tish. We need to get this right.

- Lew: Great job, Qian. This is great. There are two additional points that I have: we have variances in the York River and other rivers in the Chesapeake for open water where there are extensive tidal wetlands. Those wetlands consume oxygen. We're not going to meet the 5mg/l or 6 mg/l migratory. Those variances are in place in the MD and VA statute. We need to find those and include them in the open water. I think it's important to note that it will make our assessment correct. Those open water variances will probably change things. Tish has a good point that when we put together the SAV water quality standards it was where have we ever seen SAV in the century record of the confluence of aerial photography and airplanes. It established the SAV criteria and some places we had never seen SAV grow. In those areas we don't have an SAV clarity standard, I don't think. We may have some default clarity standard even if it's not for SAV. Open water with extensive tidal wetlands and SAV are two other places we should look for variances.
- Tish: I just wanted to gently correct Lew – in the York River, those aren't variances we have for the Pamunkey and Mattaponi, those are site specific criteria. We don't actually have variances in VA. There is the matter of Pocomoke OH which is not a variance, but we've been calling it impaired for DO due to non-anthropogenic, natural conditions, and it is not assessed for DO like the other segments. It's not a variance but we should talk about how we handle that. Right now, we say it's impaired due to natural conditions, but we should say it's not impaired. MD and VA share that assessment and we are both assessing it the same way now.
- Becky Monahan (MD DNR): Qian, I just want to make sure I understand. MD put these variances in 2017 and they were approved. This was you analyzing whether they changed the results, and summarizing you'll include these updated variances in assessment results moving forward?
- Qian Zhang (UMCES): Correct. And retrospectively to the previous assessment periods.
- Becky: But there were previously variances that were changed. Do we need to keep the previous numbers with the years that they belonged with?
- Qian: The variances were not incorporated before – this is the first time we're considering having the variances in the assessment. This won't affect anything Richard does with coding and assessment itself; this is an extra column in my spreadsheet as to whether the updated variances change the current and previous results. And my finding was it doesn't not change.
- Becky: If our variances continue to change, and they will cause we evaluate them every 3 years, and we get a change in variance and if we start seeing improved DO there may be a point where a variance contributes to a section meeting.
- Qian: That may happen. Both will have to get approval and be documented in the A & M.
- Lew: Another perspective is the variances that MD put forward for those segments CB4 Eastern Bay, Chester River, Patapsco, were all based on model results. The 2014

variances are based on 2010 model findings, and prior to that was the earlier version. It was clear that we couldn't meet the water quality standards without draconian reductions. That was a finding of the model and MD applied the variances earlier as well as these variances based on those modeling results. Since we have one model extent in assessing the WQ standards and one set of variances applying as Qian has suggested these water quality standard variances throughout.

- Richard Tian (UMCES): I think the objective of today's meeting is to approve the inclusion of these variances in the calculation of the indicator. At this point, Qian's results suggest it doesn't influence the outcome of the current status of the Bay, but it will at one point, because the variance will determine the result on the TMDL. The minute we approach that level of nutrient loading, it will have an impact on water quality. We need to keep that in mind the importance of this inclusion. Re Lew's question, some of the segments are 4 mg/l instead of 5. This would permanently be included in the code. I think Qian and I need to go back and look at where Tish mentioned, not everywhere we have SAV criteria. We need to check that to make it correct, particularly in the calculation of the indicator. Lastly, I have a question to Becky: you mentioned in MD you reassessed the variance every 3 years. Is it correct or would it only be the model result?
- Becky: I think Qian mentioned the variance is reassessed every 3 years but it's not something I know off the top of my head.
- Qian: Yes, the document says every 3 years.
- Richard: Another question is when you do the 303d report do you consider the variance at that point or not?
- Becky: I was going to ask now that you're including these variances for 2020-2022 period, if this is the first-time variances are going to be included in the assessment, is it safe to say that for all past assessments you've done and provided to us the variances have not been included?
- Richard: Yes. That's correct. It does not include the variances. You will have to consider whether to include it or not when you do your report. I think the variance is something after that, you'll have to decide when the red number is lower than the variance, the segment is attained. It's not something in the code we put in, it's when you do the report you'll have to consider it.
- Becky: That's a great point. Right now we do not do that because our numbers haven't been anywhere near the variances. We haven't included it in the past.
- Richard: I think it's the same situation as the indicator – including or not including the variances at this point doesn't matter so much, but in the future it may.
- Becky: We'll need to continue to talk about this because if you are including the variances in your analysis we'll need to include it in our analysis as we get closer. Tish, you mentioned that one segment was not assessed because we don't need to assess it.

- Tish: It's either Pocomoke MH or Pocomoke OH. We don't report the nonattainment like we do the other segments. Right before the TMDL was finalized we (MD and VA) did a demonstration for EPA to show that the low DO in that segment is due to the fact it's a mudflat draining a wetland so the DO is naturally depressed. The EPA approved that it didn't need a TMDL allocation. It's parked in a limbo category because we're saying it's impaired but it doesn't need a TMDL. We ultimately want to say it's meeting and not impaired, but we would need site specific criteria for that, and we just haven't had enough time to do that yet. MD and VA would need to work on that.
- Richard: So you don't include this segment in your 303d report?
- Tish: We include it but it doesn't get the same category as another segment that a segment that is being impaired and addressed by the TMDL.
- Richard: When we do the indicator calculation, should we include this segment or not?
- Tish: No. Don't include it. By saying it's impaired due to natural conditions we're saying the criteria aren't appropriate for that segment and we shouldn't be evaluating it the same way as other segments.
- Richard: Got it. However, in our coding procedure, we continue to include that segment, is that ok?
- Tish: That's ok. Maybe one day it will attain and that will be something we need to know. We just haven't had the bandwidth to figure out what to do with the segment in the long term.
- Richard: Can you email me and Qian what segment it is
- Lew: Please include me and Peter in that email. It would be useful to have documentation. We would footnote that it would be assessed and the situation that it is assessable and there is a standard but the standard isn't applicable. How do we do this? Do we include the variances in our assessment or not, and if we don't do MDE and MD take those variances into consideration? I think we need to get everything consistent. If it's a variance it's part of a WQ standard, if part of other category it's part of water quality standard. Let's do it once and correctly throughout. Going forward, taking into account known variances. There are other variances and procedures to account for different water quality standards in open water because of the presence of extensive wetlands in MD and VA. There are some places like Wicomico where they should be but there aren't and they're failing due to natural conditions. We should represent what's exactly on the books.
- Amanda Shaver (VA DEQ) in the chat: POCOH
- Gary Shenk (USGS) in the chat: I didn't realize that either about POCOH. I'd like to be on the email chain as well.
- Amanda Shaver in the chat: We are reporting the DO as Category 4C in POCOH assessment units. Impaired due to natural conditions, not needing a TMDL.

- Qian: Responding to Tish's question about SAV, it is 91 because there are split segments. If you consider only the overall segment it is fewer than that. Maybe I should correct the table to be consistent with the other ones.
- Tish: I was thinking that the 92 segments included the split segments.
- Qian: Yes but when you split there's more than one, some have six. So when you add them up it's 91.
- Richard: When you split them it is 104.
- Tish: Your table had 92 segments for open water. That's why I was confused.
- Qian: All the other criteria DUs don't have the split. The max number is 92. Maybe I should have another column if I continue to use that 91 number.
- Tish: We do have split SAV goals.
- Qian: That's why we have that number.
- Lew: When I find the variances that are extent in the Bay now I'll share them and maybe have a presentation on this.
- Peter: When we were developing the indicator, the question came up. The document that Qian found was post the publication of the 2017 technical addendum. I know rounding up the various variances and rules was in progress but we didn't have it previously.
- Lew: They're out there but you have to excavate them. Richard if you have a cheat sheet of variances extent in the bay please share.
- Richard: Sure. I think when we talk there are two types of variance: one is the criteria ready, the critical variant; the other one is the percentage that Qian talked about today. I will provide you with both.
- Qian: That information is in my presentation to the ad hoc meeting and I can re-send that file that way you can have the two different types. Let me know if you see anything that needs to be corrected though.
- Tish: We would call that water quality standard flexibilities because it's different from site specific criteria. The flexibilities we have under the clean water act when we can't meet the criteria.
- Lew: To your point Tish, are there places where there are no SAV and water clarity goals in the 92 segments and finding where they are and taking them off the list would be useful as well?
- Tish: Agreed.

Decision: Qian and Richard will include the DO variances in the indicator assessment (no objections raised).

10:50 AM **Concepts for confidence intervals in our assessment method** – *Peter Tango (USGS)*

Presentation summary

Peter summarized how we take our data and make it into a space-time assessment curve (CFD curve) and then use compliance decision frameworks to see if we are meeting our standards based on either a 10% reference curve or a bioreference curve. The 10% curve is a buffer against what the technique is able to assess, but there are questions about when we are close to that curve, is there additional uncertainty we should be taking into account. There are some shades of nuance in criterion assessment between passing and failing. Category 3 of insufficient or no data has been used to express levels of uncertainty. When we have results that are really close, should we call them in or out of attainment? Should we have a zone of uncertainty to express really close levels of attainment or non-attainment? What is really close? Our attainment deficit status shows fractional attainment measures. Some results are less than 1% out of attainment. Qian looked at the distribution of our recent fractional attainment outputs. All DU-segment pairs show a small number with fractional out of attainment. All DU-DO segments pairs also show a small subset.

USEPA 2017 addendum gives us precedent for this decision making. The Bay Benthic index of biotic integrity (BIBI) expresses shades of degradation. MD and VA have confidence limits, and VA in particular has segments in different subsets of Category 3 of the 303d listing (the "uncertain" category).

Discussion

- Lew: What degree of precision do we have with the DO meters?
- Peter: I think it's 0.01, out to the 100ths of mg/l.
- Richard: That's correct. That decision is not the same or influenced by the precision here. The precision here is fully computed by the computer based on total volume, not the volume divided by the total volume. Not concentration divided by concentration.
- Lew: Ultimately the volume of DO is determined by the measurement of DO. By standard operating rules you carry all your calculations to your highest degree of measurement precision. By one argument we shouldn't even be showing anything to the 100ths place. It doesn't address your essential question of what is uncertain however. That is a partnership decision for sure.
- Gary: I want to emphasize Richard's point. It's unclear to me how DO measurement relates to precision in fraction of space time. I don't think we can directly translate one to the other with a simple rule. Also this is looking at just one side of uncertainty and we have to have two sided uncertainty if we look into this.
- Peter: I flipped that graph around to show that we don't yet have that attainment buffer idea that would be complimentary to the fractional nonattainment. How close are we to the curve influences this fractional closeness.
- Tish: I agree with Richard and Gary. I think what Lew brings up is relevant to when we're trying to define the exceedance, but that's a separate question than defining the excessive exceedance which is what Peter is talking about. When we're contemplating

the CFD we've already defined the exceedance. I think your question is relevant to precision and uncertainty but fits in a different slot than the CFD.

- Lew: I appreciate that comment. Interpolation is made of monthly/bi-monthly casts of 1-meter deep measurements. That volume of DO comes from what did each station say about DO at each depth. They were always measure to the 100ths of mgs of DO. I think that the 100ths of mgs of DO has standing, and I remain unconvinced why we would be able to go beyond 100ths. I would like to see an analysis demonstrating to the program why more than 100ths of mgs is appropriate.
- Tish: I agree.
- Mark Trice in the chat: Here are the specs for the YSI 6150 DO probe we use: Range: 0 to 500%; 0 to 50 mg/L; Resolution: 0.1%; 0.01 mg/L; Accuracy (0 to 200%): +/-1% of reading or 1% air saturation, whichever is greater; Accuracy (200 to 500%): +/-15% of reading; Accuracy (0 to 20 mg/L): +/-0.1 mg/L or 1% of reading, whichever is greater; Accuracy (20 to 50 mg/L): +/-15% of reading

11:10 AM Update on hypoxia monitoring site selection – considerations for sampling design – *Peter Tango (USGS)*

This item was postponed until the next meeting.

11:30 AM Adjourn