Criteria Assessment Protocol Workgroup

February 4, 2021
1:00 p.m. – 2:30 p.m.

Webinar*:

https://umces.webex.com/umces/j.php?MTID=m1da4c800b5a20c8f5a636b3e34733bc2

Meeting Number: 120 004 7361 <mark>**Password: CAPWG**</mark>

Or Join by phone:
Conference Line: +1-408-418-9388 Access Code: 120 004 7361

Meeting Materials:
https://www.chesapeakebay.net/what/event/criteria_assessment_protocol_workgroup_february_2021_meeting
Location: Conference Call

*If you are joining by webinar, please open the webinar first, then dial in.

This meeting will be recorded for internal use to assure the accuracy of meeting notes.

Action Items:
- ✓ Peter Tango will confirm the data going into the DO assessment for the water quality standards indicator and share with Mike Stover.
- ✓

AGENDA

1:00 **Welcome, introductions & announcements** – *Peter Tango, Chair Criteria Assessment Protocol workgroup, USGS@CBPO*
- National Monitoring Conference, Providence, R.I. April 20 – 22, 2021.

1:05 – 1:10 **April 2022: 50th Anniversary of the Clean Water Act. Target for 50 states all submitting Integrated Reports by April 1, 2022. Timing for data, results - Peter Tango (USGS)**
Peter will quickly review expectations about what data and analysis results are anticipated to accommodate jurisdiction needs for their public review to support timely 2022 submittals of IRs for EPA.

The states utilize and submit data for the Chesapeake Bay Program (CBP) water quality standards (WQS) indicator. They are finalizing what is available for the Dissolved Oxygen (DO), Submerged Aquatic Vegetation (SAV), and chlorophyll results that feed the indicator for the 2017 – 2019 assessment period. They are

not going to finalize the 2018 – 2020 by the time Integrated Reports (IRs) are due on April 1, 2022.

Matt Stover asked if there is a list of what data goes into the DO assessment. Peter Tango said they are targeting the best available data, but he needs to check with Mike Mallonee, Richard Tian, and Qian Zhang on what went into the 2017 – 2019 period. Mike Stover also asked if the assessment would include the water clarity information. Peter said the DO, SAV, and chlorophyll info is finalized, but he does not know if MD DNR water clarity assessments are finalized.

Amanda Shaver wanted to confirm that 2018 – 2020 period will not be able early next year. Peter Tango said the data is available, but the analysis will take more time so it will not be available for the state IRs.

Bruce Michael said the Bay Barometer is coming out in March and asked if it will contain the 2017 – 2019 results. Peter Tango said there are two questions that need to be resolved with CBP employees, but it should be included. Qian Zhang confirmed the upcoming Bay Barometer will include WQS indicator for the 2016-2018 assessment period. The one that they are working on right now is for the 2017-2019 period, which hopefully will be available on Chesapeake Progress soon.

1:10 - 1:40   **Maryland Case Study Plan: Considerations for monitoring and assessment of all applicable water quality criteria for all applicable designated uses in one bay segment related to the Bay TMDL - Matt Stover (MDE)**
Matt will update the group on evolving Maryland monitoring plans for evaluating short- and long-term criteria to address assessment of all applicable criteria in one segment, Fishing Bay.
Reference to how San Francisco Bay has considered assessing short duration DO criteria are here in the Suisun Marsh habitat complex: https://www.waterboards.ca.gov/rwqcb2/water_issues/programs/TMDLs/suisunmarsh/Basis%20For%20DO%20Objectives%20for%20Suisun%20Marsh.pdf

Action: Workgroup Questions and comments welcomed for support of moving the plan into action in 2021.

Their pilot study is to find one bay segment in MD to monitor all the DO criteria to hopefully show a delisting of a bay segment. In the last presentation, they were choosing between two sites, and they have now decided to move forward with Fishing Bay. This choice will dovetail with Peter Tango's STAC proposal and

hopefully provide some data or lessons learned for investigating new data and tools. They will collect sufficient data and assess all applicable DO criteria and designated uses for the segment. They also picked this segment because it does not experience significant stratification, so the Deep Water and Deep Channel designated uses do not apply. The 7 day Mean criteria for Migratory and Fish Spawning and Nursery does not apply to this segment because it is in the mesohaline range.

Their draft monitoring proposal is to cover all 3 zones (open, shallow, tribs of tribs). It also includes depths of less than 2 meters, between 2 and 4 meters, and larger than 4 meters, and it will include temporal aspects by including one continuous monitoring station.

Tom Parham stated for the Fishing Bay segment includes a lot of creeks, and a question the project group was considering was how to adequately monitor all the creeks. If monitoring instruments are placed in each creek, that is a lot that they do not think they can handle with their current configuration. They spoke with fishery experts and a lot of creeks are significant for migratory species which fits with the criteria they are analyzing. They are working with MDE and their monitoring program to get good coverage of the area. One thing they can also do is reach out to folks who are able to help and have research interests to help cover additional areas. Matt Stover commented that they one monitoring site outside the Fishing Bay segment coverage. They talked about keeping it there and extending the segmentation so that it was still factored into the interpolator. He is curious on peoples thought on it. He also noted there is a decent size tributary in the north west part of the segment associated with the Blackwater Refuge. There is not a sample there because it is a tough area to access with little roads and surrounding marsh land.

Some of the challenges they are facing includes access because there are not a lot of roads to the site, it is too marshy, and there are many shallow areas. Cost and Staffing is an issue, so they are considering partnering with a NGO for some discrete sample collections. They are also considering integrating non-traditional datasets which might add an additional challenge to the study.

The feedback they are looking for from the workgoup is around monitoring coverage and timing issues. They were hoping to start January 1st and have 3 full years of data. They were not able to start monitoring so should they start in the summer or wait until January of next year to make sure they have full years of data.

Ken Moore asked if the proposed continuous monitoring sties have been profiled to determine if they are well mixed vertically. Mark Trice said they monitored the segment back in the 2000's so they have a lot of prior information, and there is a fixed station in the segment that doesn't show a lot of mixing. They showed Matt Stover's group the long-term monitoring record. They never saw any DO failures with the data flow surface data. If looking at the long-term mid/max/average DO data for the bottom, it never failed. The only place failure was seen was in the continuous monitoring. Ken Moore asked if they were able to get up into the creeks. Mark Trice said they were able to get up there in years past. The creeks are very narrow, but they are deep so there are some exceedances. One of the limitations of this segment is there is no fix structures around it. It is surrounded by marshes. They have tried a float in the past, but they can get stolen easily.

Tish Robertson asked how they would handle seeing criteria exceedance in the smaller creeks compared to the open bay. Matt Stover estimates that since the interpolator is dependent on volume and time, those factors will drive it. The majority of the volume of the Fishing Bay segment is located in Fishing Bay Proper. He images the data from that areas will drive it since it is driven by volume and time. The tidal creeks are used because they are important to spawning and nursery. They study group didn't want to miss those areas, but it may be that the main Fishery Bay sites will drive the process. Tish agreed and asked if they were considering doing any subsegments. For example, only assessing Fishing Bay. Matt said they had not yet considered it. Tish said the only sites they have looked at for the short duration criteria are the Pamunkey sites because they continuous monitoring year-round. They do not have a lot of small tributaries around it.

Peter Tango said the study group has good case study. The idea of having a prominent open water segment with important tributaries could show that the whole segment passes and the need for more local assessments to those tributaries. This study will highlight the temporal information and possibly show that more spatial information is needed.

Matt Stover said this segment is different because so much of the nearshore watershed is marsh so there is not a lot of impacts from fertilizer or development. If they did find low DO in those areas, it might be a natural condition. He wonders if the criteria was designed for those areas where there is a lot of organic material, and it is not well flushed. Mart Trice said the upper part of the watershed trends into more agriculture, and there is major rendering plant so there are a few factors that affect it besides natural aspects.

1:40 - 2:10   [Updating designated use characterization of bay segments CB6 and CB7](#) - **Tish Robertson (VADEQ)**

VADEQ has reviewed the history of water quality conditions in the lower Chesapeake Bay segments. Designated use characterization affects which criteria are applied at appropriate times of the year for conducting the water quality standards attainment assessment.

Action: Tish is looking for our comments and support to move these findings into the accepted understanding of habitat characterization by the Chesapeake Bay Program partnership. Next step approval will be at the WQGIT level of the CBP partnership.

There are designated uses throughout the Bay that are protected through DO criteria. Tish Robertson went over the Open Water and Deep Water designated uses. A designated use is a goal for a water body, and they use water quality criteria to test if they are reaching that use. Each designated use has their own set of DO criteria, and the criteria is tailored to the aquatic life assemblages that rely on those uses. The most stringent criteria are applicable to the Migratory Fish Spawning and Nursery use because that aquatic life assemblage is most sensitive to hypoxia. The least stringent criteria are used to assess the Deep Channel use. The critters that live in the Deep Channel are used to low DO concentrations. Tish will focus on the Open Water and Deep Water areas. Due to the connections between designated uses and water quality criteria, it is important to have a formal document that describes the Bay uses. VA and MD have incorporated into their water quality standard regulations a reference to the 2003 Technical Support document published by the CBP about the uses and criteria. All 92 segments are designated for the Open Water use and exists from the surface to the bottom. In a subset of groups, they look for a pycnocline in Open Water because if a segment is especially deep and stratified the Open Water use only exists in the surface layer and stops at the upper pycnocline boundary. The Deep Water use in segments exists during the summer only when stratification exists and below the upper pycnocline. The presence of a pycnocline is key. The physical characteristics of temperature, salinity, and bathymetry determines where the two uses end and begin.

She showed an image for the designated use boundaries that was published in 2003 and the updated image in the 2004 Technical Addendum. In the 2004 Technical Addendum, there was an extension of the Deep Water boundary because the Bay Model predicted nonattainability of Open Water use in parts of CB6PH with the previous boundary. The segments of CB6PH and CB7PH are of interest for this presentation which consists of Deep Water and Open Water. The

30 – Day Mean Criterion for Deep water is 3 mg/L, and it is 5 mg/L for Open Water. There is a big difference between the criteria which makes the Deep Water boundary is critical. If it is wrong, they are assessing water by the wrong (over protected vs under protected) criteria. In a previous CAP WG meeting, Lewis Linker presented the achievement of Open Water DO Water Quality Standards while taking into consideration climate change. The Bay Model indicates the DO criteria will be met in most of the mainstem segments except for CB6PH and CB7PH Open Water. Tish Robertson suggests there is Deep Water in these segments that they are treating as Open Water. She states there is something going wrong in those two segments that is not tied to nutrients but o physical variables. She suggests refining the man-made boundary and how areas fit the characteristics of Deep Water habitat.

She showed an image of the current boundary for Deep Water and her suggested revision of the boundary that incorporates CB6.3 and CB7.2 monitoring stations. She notes there are other ways to redesign the boundary, but it should include those two stations. Her evidence is based on three lines of evidence: bathymetry, stratification, and hypoxia.

Bathymetry showed Open Water stations in CB6PH and CB7PH are just as deep as the Deep Water stations. There is literally deep water in at least CB7.2E (21 meters). It may not be deep water habitat, but it is deeper than other areas. She said bathymetry is not the most critical justification because there needs to be stratification and hypoxia too.

She showed graphs for stratification. The first set of graphs was for the representative Deep Water station CB6.2. She took the first 15 vertical profiles for the station going back to the 80's and applied the water density through the water columns. CB6.2 shows is expected at a deep water station. There is a surface layer well mixed, and a deep layer that is well mixed. There is pycnocline that spans multiple depth. The station CB6.3 is characterized as Open Water, and it shows a similar picture to CB6.2. Based on the stratification graphs, Tish recommends CB6.3 should be characterized as Deep Water. She did the same analysis for CB7.2 which is also characterized as Open Water. For these stations sometimes there is a well-defined surface area but other times it is not. Overall, all the profiles show stratification and pycnoclines which makes it appear to be Deep Water and not Open Water. CB6.4 shows a water column that is stratified so it could be Deep Water. CB7.2E shows stratification, but it shows straight lines for the water column, so it is not Deep Water. She moved from visualizing the data to statistical analysis with density gradients. It is expected of stations with weakly or inconsistent stratified water columns to have lower density gradients

compared to stations with strong and persistent stratification during the summer. Stations located near the mouth have lower density gradients on average. Stations more upstream closer to the Deep Water boundary have slightly higher density gradients on average. CB6.3 and CB6.2, the deep water station, have very similar distributions. CB7.2 has the highest density gradients which makes a lot of sense since it located in a trench. CB7.2E is also in the trench and it has a relatively low density. With this graphic, Tish states CB6.3 and CB7.2 are Deep Water habitats.

Hypoxia is another factor of evidence to assess. She created a DO vertical profile of all the summer monitoring events form 1986 – 2019 for the Deep Water station CB6.2. The red dash on the line refers to the 30 – Day mean criterion of 5 mg/L. Normally that value is used only against monthly averages and for the surface layer, but she is applying it to the entire water column. The red box on the graphs represents the portion of the water column below the average pycnocline. To quantify the red box, she took the thickness of it which is 3 meters. She also created a graph to individually look at all the summer monitoring events for CB6.2. The graph doesn't show very shallow pycnocline depths. At this station in the summer, hypoxia is present and very low DO occurs frequently. Based on her thickness test, there is a greater than of equal to 3 meter thick hypoxia layer below pycnocline occurring in 58% of the summer monitoring events. She did the same analysis for the station CB6.3. There was only two instances when there wasn't a pycnocline which is similar to CB6.2 in terms of stratification. It is also similar in terms of hypoxia because there is going to be a thick hypoxia layer and many instances where low DO occurs. For the station CB7.2, there are no pycnocline depths equal to zero so during the summer there is always going to be stratification. The hypoxia is frequently occurring and substantial at this station. If there is deep water habitat at this station, it is a different Deep Water habitat then what appears at CB6.2 because the frequency of hypoxia is lower at CB7.2 and in recent years there has not been much occurrence of low oxygen. This could mean this habitat is on the edge of Deep Water habitat and is Deep Water habitat that is improving in terms of hypoxia. The station CB6.4 starts to deviate from the Deep Water habitat. There is a lot of instances where there is no pycnocline, and very low DO occurs only sometimes. The same is true for station CB7.2E. CB7.3E station gets a lot of mixing from the ocean to support that it is an Open Water station.

Tish Robertson stated she believes there is supporting evidence for the extension of the Deep Water boundary to include stations CB6.3 and CB7.2. There needs to be assistance with the modeling team to see if the boundary change helps with the Open Water attainment at these stations. There are other

approaches to consider for attainment, but one option is changing the designated use. This can be confirmed by the modeling team's assessment.

Lewis Linker stated assistance from the Modeling Team would be helpful. Richard Tian said even with the new boundaries they do not know if it will solve the nonattainment issues for those sites. He commented on the justification of having or not having a boundary related to the pycnocline. Tish Robertson said they see pycnocline all throughout the segments down to the mouth so maybe it would be best to treat all waters as Deep Water that have a pycnocline and there be no boundary. She also sees the justification in having a boundary.

Gary Shenk said these areas are unique because they are seeing oxygen coming from the ocean and when the water runs out of oxygen. When they ran different scenarios, they saw it ran out of oxygen in the same place now matter what was done on the watershed. When they ran it with climate change, they saw it ran out of oxygen further south. CB6 and CB7 were relatively insensitive to nutrient changes with the modeling scenarios so it is the physical changes occurring due to climate change that makes the oxygen be used up faster when it makes it way up from the ocean. He does not want to set the boundary on the knife line of nonattainment like they did last time. The 2004 addendum moved the boundary south until they reached attainment. If they set it up on the edge of nonattainment in 2025, they will have this same discussion in a few years. Gary Shenk suggests going into the code to adjust the boundary east, west, north, and south. He also suggests looking at different climate scenarios at the same time and bringing the results back to this workgroup. Tish said she was relying on the monitoring stations for the boundary because she needed empirical evidence for moving the boundary and not leaving an arbitrary boundary.

Lewis Linker agrees that they have moved the boundary south once so they should use a mix of Tish's observations and model scenarios to note where they see Deep Water today and Deep Water in the future. He asked what is the deadline for the work of looking at the different climate scenarios and boundary movement.

John Kennedy said they hope it would be another technical addendum to the criteria that they would adopt given the larger CBP and EPA endorsed it. At the state level, it would provide consistency to use the guidelines in the technical addendum and integrate it into their water quality standards. He does not see any immediacy for this work except they are perpetuating the use of false assessment outcomes based on the lack of designated use.

Lewis Linker said there is no immediate work, but it is something they want to correct in a collaborative partnership which leads to a technical addendum. John Kennedy said incorporating a technical addendum into their regulation is a much simpler rule making because it provides a level of consistency and goes through the rule making process quicker. Lewis Linker suggested an addendum done in 2023 so it is complete well in advance before next assessment in 2025.

Ken Moore Is there any biological information relative to benthic community types or deep water designated use which would support any change in the hypoxia goals? Peter Tango said that is worth investigating to support addendum development.

2:10 - 2:30 [**Review and input: A 2021 STAC Proposal on advanced monitoring and assessment to address data gaps and cost efficiency in support of water quality criteria evaluations in the tidal Bay**](#) **- Peter Tango (USGS)**
The traditional long-term water quality monitoring program supported through the Chesapeake Bay Program partnership remains world class, however, capacity has gently eroded, and data collection has been steadily declining. Coincidentally, there are other high integrity data collections either underway or tested under pilot studies in the bay and tidal tributaries providing needed water quality information at spatial and temporal resolutions well beyond historical data collections. These additional data sources (e.g. satellite-based data collection, affordable high-frequency temporal water quality sensors on new forms of infrastructure, citizen science-based data collection programs) represent the best new opportunities for the Chesapeake Bay Program partnership to leverage in filling long-standing monitoring gaps and bring into the annual assessment and reporting fold. A STAC workshop provides the ideal forum for synthesizing what is known, developing recommendations for adapting our monitoring program by formalizing recognition for and adoption of new data sources complementing work to update the interpolation framework and improve our full assessment of TMDL-related water quality standards attainment assessment of DO, water clarity/SAV and CHLA.

The STAC proposal is due February 16, 2021. Work for the proposal would start in June, and there is time until May 2022 to hold the workshop. The proposal meets multiple outcomes in the Chesapeake Bay Watershed Agreement and established science needs of the CBP. The draft proposal is available [here](#). Peter Tango requests workgroup members to review the proposal and provide feedback. He is also asking for volunteers to be a part of the workshop steering committee. Peter will also reach out to organizations for a letter of support.

Action: Request for review and approval of submitting the proposal for STAC consideration.

Action: Request for committee members participating in organizing, conducting the workshop.

2:30PM   **Adjourn**

Participants: Peter Tango, Amanda Shaver, Becky Monahan, Bill Richardson, Bruce Michael, Carl Friedrichs, Cindy Johnson, Claire Buchanan, Dave Parrish, Dong Liang, Dustin Shull, Fred Irani, Gary Shenk, John Kennedy, Juan Vicenty-Gonzalez, Ken Moore, Lew Linker, Mark Trice, Matt Stover, Qian Zhang, Rebecca Murphy, Richard Tian, Steve Hummel, Thomas Barron, Tish Robertson, Tom Parham