Bay Oxygen Research Group Meeting

Thursday, April 22, 2021
1:00 PM – 2:00 PM

Meeting Link*:
https://umces.webex.com/umces/j.php?MTID=m92c1694634d6a8df2ca4ea3840e20c44

Meeting Number: 120 276 0632
<mark>**Password:**</mark> BORG

Conference Line: +1-408-418-9388 Access Code: 120 276 0632

Meeting Materials:
https://www.chesapeakebay.net/what/event/bay_oxygen_research_group_april_2021_meeting

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

Action Items:
- ✓ Add Diana Domotor to mailing list.
- ✓ The first homework assignment for the group is to consider if they have another idea for an alternative method besides the single GAM method suggested. Members are welcome to suggest people to present to the group.
- ✓ The second homework assignment is to provide feedback on system requirements such as what does the group need for structure and function from a 4-D water quality estimator.

AGENDA

1:00   Welcome, Introductions & Announcements – Peter Tango, Coordinator (USGS@CBPO)

How did we get here?
In 2008, there was a STAC proposal for the feasibility of 4-D interpolator. This effort will build on what was already done for the old 4-D interpolator. This is part of an opportunity to help using the data the CBP monitoring program has as well as needed data sets to address.

Monitoring Expectations & Challenges
There is previous work in the science community to advance 4-D modeling and assessing monitoring data using multiple sources of monitoring data. An example is comparison

model of fusion-based hypoxia estimates in the Gulf of Mexico. There are good foundations, and the work has advanced so there is precedent to the work this team will accomplish.

Community interest continues to support the need to overcome long-standing assessment gaps and resolution including not being able to assess all the criteria in a particular segment. There are also expectations due to the monitoring outcome described in the Chesapeake Bay Watershed Agreement. The traditional monitoring foundations are important to efforts, but it does not produce all the interpolation in time and space needed. The CBP needs to advance the capacity and adapt the program.

Setting

Over time, the CBP has not gotten all the data they need for interpolating, so they need to leverage successful research and adapt to address shortfalls. They are now seeing citizen monitoring groups can reach more tributaries and get more samples in a local area. Vertical profilers can collect more samples and on a continuous timeframe. There are other new innovations such as satellite-based imagery to expand capacity. With the CBP understanding of spatial variability and temporal variability, they should be able to achieve the full water quality standards attainment assessment with the incorporation of these new innovations and research. Also recognize that those assessments are part and parcel to data layers and data insights that have Cross GIT benefits.

Vision

The vision behind this is that multiple data sources will feed into the interpolator with model insights. The information would be processed, and assessments would be carried out in those areas and timescales when uncertainty estimates are within acceptable ranges. It will benefit the assessments of criteria and understanding conditions needed to manage in the future.

For Monitoring Designs, there is a variety of data and they are trying to get new data to address the spatial and temporal scales need to inform the interpolator. They can test different spatial and temporal schemes to test cost effectiveness.

Timeline Insights

There is a current 9-month timeline to address the PSC request for gathering information on the status and threats of the networks and how to improve the CBP monitoring networks. After this timeline, there is a 2-year timeline to getting it to a testing while working with multiple teams such as the Water Quality GIT. The operational phase is estimated in the next 4 years.

In March 2021, EPA-CBPO year 1 pilot investment for the interpolator provided to the team to move forward on research and development. To accomplish all of this, the team

will meet monthly for the next several months to get started. Complimentary to this effort there is a STAC workshop to help with development, insights, and directions. The workshop can dedicate a full day to review, guide development, and evaluate outputs.

Homework
The first homework assignment for the group is to consider if they have another idea for alternative method besides the single GAM method suggested. Members are welcome to suggest people to present to the group.
The second homework assignment is to provide feedback on system requirements such as what does the group need for structure and function from a 4-D water quality estimator.

Discussion
Bruce Vogt asked if Peter Tango could provide more information on the relationship between 4-D water quality estimator and existing forecast model? Isabela Bertani said now there is no other relationship but hopes the output is used to measure hypoxia volume and update the forecast model. Gary Shenk stated there are forecast models for seasonal hypoxia models and then a two-week forecast done at VIMS. For the water quality estimator, not thinking of using it as a forecast but looking at what the oxygen was like back to in the past and how it is currently. Jeni Keisman agreed that the 4-D interpolator will focus more on hindcasting-to-nowcasting than forecasting. Bruce Vogt said the long term look at hypoxia would also be useful from a fish habitat standpoint so your point about creating a historical record was helpful. He also stated Dan O. has done some habitat assessment work as well. From fish science and management standpoint, NOAA would like to have the 4D WQE useful to correlate with fish survey data (abundance and distribution) and habitat suitability modeling.
Elgin Perry said from the point of view of assessing criteria, the forecast model is giving an estimate of water quality characteristic, while for criteria assessment, they need a tool that drills down to each of the segments and the different habitats within the segment to make an estimation at a finer spatial and temporal scale.

Guido Yactayo asked if there is interpolator documentation is available? If looking at the original bay interpolator, there is documentation available, or he can look at the code in 4tran.

Jeni Keisman wanted to note one thing that would be valuable as part of the workplan. People have put emphasis on doing various analyses of all the different types of data sets available to better understand their variability to inform a 4D interpolator. She suggests having those data sets interrogated in various ways. Peter Tango asked for clarification if it is how the data is translated for usability. Jeni Keisman said it is not so much metadata, but it is more the variability of the characteristics of the data itself and how it can be incorporated. There is a lot of analysis to understand the patterns the

data is showing. Tish Robertson said this is a good question to consider because they may want to reassess the short duration criteria since it has never been assessed before through interpolation. Jeni Keisman commented if they want to take the approach of including the "whole kitchen sink" for using all the data available then they need to consider how do they integrate it all.

Rebecca Murphy said a good preliminary task is to see what the data sets looks like similar to what she did with the vertical profile data. Tish Robertson commented that in VA they do not use all the available DO data in their assessments. They collect an under the shell shallow water data but do not use it because it is surface data, and it is spatially intensive. It would be great if they could say they were using all available data. Peter Tango said an important part of what they can do with this effort is an advanced use of available data sets.

Tish Robertson commented there will be a communication challenge when rolling out the tool. She is anticipating there will be significant differences with what the assessments show now and what is anticipated in the future. They will need to think about how to translate that for the public. Peter Tango said in different venues they are trying to discuss that because in 2025 the Bay will not be fully healthy because of the time lag for implementation and result in the Bay. There is also the item that they are using an estimator that was developed out of a suite of rules and monitoring data, but they are looking for a concrete accounting based on monitoring data. Gary Shenk said when the group uses this information to change the TMDL it is going to be a big deal, and it needs to be translated well for the water quality managers to highlight that it is better science no matter the outcome.

Elgin Perry has been considering other methods that is needed for homework assignment #1. The team has been focused on GAMs, but one idea is small area estimation methods. It is a tool used by the Census Bureau. Another idea is boosted regression tree which is a machine learning tool. It builds a regression. Elgin Perry said the expert in this field is Trever Hastie.

2:00   Adjourn

Next meeting: Thursday, May 20, 2021, 1 PM – 2:00 PM

Participants: Tom Butler, Peter Tango, Breck Sullivan, Elgin Perry, Gary Shenk, Isabella Bertani, Mark Nardi, Mark Trice, Matt Stover, Rebecca Murphy, Tish Robertson, Bruce Vogt, Jay Lazar, Diana Domotor, Lee McDonnell, Jeni Keisman, Lucretia Brown, Justin Shapiro