Climate Resiliency Workgroup Conference Call

Monday, April 20, 2020
1:30 PM – 3:30 PM

Conference Line: (669) 224-3412 Access Code: 998-845-845
Please see email/calendar notice for password
Webinar*: https://global.gotomeeting.com/join/998845845

Meeting Materials:
https://www.chesapeakebay.net/what/event/climate_resiliency_workgroup_crwg_april_2020_meeting

Location: Conference Line

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

AGENDA

Action Items:

- ✓ The Modeling workgroup will come back later this summer to show their habitat quality work of modeling key species and tidal water habitats related to habitat workgroup goals and outcomes.
- ✓ CRWG will help set up a cross GIT meeting with the Fish and Habitat workgroups and Modeling Team to help pick out key species to focus analyses on.
- ✓ If a CRWG member has any ideas on how to connect the inputs and results from the Phase 6 Model to the CRWG work, please email Julie (julie.reichert-nguyen@noaa.gov).
- ✓ Please send ideas to Julie for GIT-funding proposals before the next CRWG meeting.
- ✓ Breck or Cuiyin will send an email with more information on the sessions for the Chesapeake Watershed Forum, but if a member has ideas or wants to be involved in planning a session, please contact Julie.

1:30 PM **Welcome and Meeting Overview – Co-Chair Mark Bennett (USGS) and Erik Meyers (The Conservation Fund)**

- Showcase updated Phase 6 modeling results for climate change impacts and allocation methods.
    - Action requested by Water Quality Goal Implementation (WQGIT) Team: Review allocation method options to address climate change risk in the Chesapeake Watershed and Tidal Waters. Report to WQGIT if there are any major concerns with the options so they may take it into consideration before they make their final decisions.
    - Follow up on STAR discussion on the available climate modeling outputs from the Phase 6 model. Discuss which climate resilience

questions could be of use to answer in relation to Chesapeake Bay Program (CBP) outcomes.

- Update on urban stormwater BMP climate assessment efforts.

1:40 PM **Initial Assessment of Allocation Methods to Address the Climate Risk in the Chesapeake Watershed and Tidal Waters – Gary Shenk (USGS)**
Gary will present the progress on the WQGIT requested modeling analyses on options for allocating climate targets.

Request: CRWG review options and provide feedback, particularly any preferences or concerns.

The Modeling Team has discussed with the Modeling Workgroup and Water Quality Goal Implementation Team (WQGIT) about different ways to divide up the additional loads of nitrogen and phosphorous that the jurisdictions are going to need to undertake to counteract the effects of climate change. This presentation goes over the different options the WQGIT is considering.

In the watershed, the CBP Modeling team is modeling the increased volume and intensity of rain, but a decrease in flow due to an increase in temperature and evapotranspiration. All of this causes an increase in watershed loads going into the Bay causing more effects to dissolved oxygen (DO). Other components of climate change that effect tidal DO is an increase in temperature, which makes it worse for DO, but sea level rise and change in circulation make it a little better for DO. Now that the team knows there is detrimental effect to DO from climate change components, the partnership needs to decide what to do about it in context of the TMDL.

The Principal Staff Committee (PSC) in 2018 deemed 305 million cubic meters of exceedance acceptable for loads based on Chesapeake Bay Segment 4 of deep water and deep channel. If the impact of climate change to the loads is added to that number, there is now 375 million cubic meters of exceedance which means the jurisdictions need to allocate for more load reductions to get it back to the PSC level.

WQGIT Climate Allocation Decisions:

- Wastewater Treatment Plant (WWTP) responsibility - Only non-WWTP resources or include WWTP resources?
    - More reductions from none WWTP or allocate loads if want more reductions from WWTP which means that areas with WWTP would have to do more
- Watershed loads first - Take out jurisdiction loads first or do not consider jurisdiction loads?

    - The addition reductions could be proportionally distributed among jurisdictions or model the climate increase for each state and then allocate any additional remaining reduction
- Year – 2025 or 2035?
    - The starting year is always 1995. They are using hydrology around 1995 to assess the TMDL.
    - What change to account for?
        - 1995 – 2025
        - 1995 – 2035
    - When the reductions need to be accomplished?
        - 2025
        - 2035
        - Some other date
- Open Water (OW) - How to deal with open water violations in the lower Bay?
    - DO criteria in the Bay are open water or water above the pycnocline or surface mixed layer and deep channel is the lower mixed layer so it is in contact with the bottom. Everything in between is deep water. Once you reach the deep water and deep channel attainment then open water is attained too, but looking at scenarios, open water was getting worse with climate change than deep water.
    - Open water is important because the OW criteria are based on living resource needs for striped bass and other important species.
    - There is a huge amount of open water (2/3 of the Bay).
    - Climate change is decreasing the saturation concentration of oxygen.
    - Open water is more often saturated or super saturated so it will be decreased by a lowering of the saturation level.
    - Deep water and deep channel rarely approach saturation, so lowering of the saturation concentration may have less of an effect.
    - The Modeling Team only saw open water going to nonattainment in CB6 and CB7 focused in the shallow water areas. They are not ready to use the shallow water results to drive policy because they know they need to improve their modeling for it. In CB6 and CB7, open water is defined all the way to the bottom except for a small part of CB6. These segments may not have been defined correctly especially with probably not taking into consideration a changing climate. Therefore, the question is if the WQGIT wants to make a decision based on subjective decision of CB6 and CB7?
        - The Modeling Workgroup did not advocate for the WQGIT to drive allocations with CB6 and CB7 open water due to it being relatively insensitive to load reductions, and there

were no other mainstem Open Water violations through 2055

- Reduction Scenarios based on different allocation options
    - If dealing with deep water or deep channel then 10 – 15 million reduction needed, if dealing with just open water then around 30 million pound reduction needed
        - Adding open water to the mix is a big lift for the Chesapeake Bay Program Partnership.
    - 2035 increases effort substantially
        - Changes from 5 million lbs to 10 million lbs just when dealing with Deep Water and Deep Channel.
    - Including WWTP increases necessary reductions
    - Watershed loads first are a little lower for N, but need larger reduction for P

Kristin asked if there is any more information besides the modeling results that will drive the decision making by the WQGIT. She suggested looking at information and data about living resources. Gary said yes because the DO criteria are based on living resources, but it is hard to come to those answers when the program does not have a model that represents the energy fluxes and relationship of the system with natural resources. Richard mentioned the modeling team is working on looking at living resources as an indicator in the future.

Jim George asked for clarification on the WWTP option. Most of the WWTPs are down south in the watershed and reductions from them are less effective because reductions are more effective from the north like near the Susquehanna. If allocate reductions WWTP, then there needs be more reductions.

John Kennedy followed up from a discussion on the James River CHLA criteria when using the 2025 planning horizon. Are we now looking at a new planning horizon for the WIP on 2035 planning and need to make changes based on it? Gary said the initial idea when showing these multiple dates to the WQGIT was to show 2025 as what they are doing and show 2035/2045/2055 to see if it will be harder in the future with sea level rise and other impacts. There is discussion about how to use these additional reductions with the Phase III WIPs, but there is no concrete decision that is being made or even being put forward to be made on it.

John had another question if the discussion on the criteria for water quality is going to expand from DO to maybe ammonium or other parameters which are also impacted by climate change. Will a CBP workgroup consider changing the criteria for DO because of climate change? Gary said that with the initial conversations with DO criteria 20 years ago, the scientific community suggested using percent saturation instead of DO level because it relates better to living

resources. This is a conversation that the CBP could make to have the criteria based on temperature and other climate change impacts. Lew has discussed looking at what estuaries more south are doing with DO because they are experiencing more temperature increase and living resources seen more south could be present in the Chesapeake Bay in a few years.

2:10 PM **Updated Phase 6 Modeling Results for Climate Change Impacts – Lew Linker (US EPA)**

Lew Linker will present the updated Phase 6 modeling results, specifically looking at: what the current Phase 6 Model used to assess climate change in the Chesapeake watershed airshed and tidal Bay such as precipitation, temp, DO, and wetland change and overall findings from the analyses.

The new 2019 climate change assessment confirms the December 2017 climate change findings with a better model, providing better understanding of underlying processes, more specific findings on nutrient speciation, CSOs, wet deposition of nitrogen, etc.

Lew showed all the topics considered when including climate change. Some topics were included in the model, some were not included due to insignificance, and some such as BMP resiliency was not included because there is not enough scientific information on this subject.

The watershed key findings include increased precipitation volume, precipitation intensity, and evapotranspiration are major determinates of changes in loads due to climate change. Land use change beyond 2025 also increases nutrient and sediment loads. The long term mean precipitation increased 3.1% and temperature by 1 degree Celsius. The Total Nitrogen (TN) and Total Phosphorous (TP) loads are steadily increasing from 2025 to 2055 under climate change but there is a greater proportion of organic N and P compared to Dissolved Inorganic N or P.

The Modeling Team looked at the marginal difference estimates of climate change only and climate and land use combined for multiple factors. For difference in freshwater delivery, sediment delivery, N delivery, and P delivery, the percentage of these factors increase over the years and there is a higher percentage with the climate and land use scenarios combined.

The overall estimates of 2025 climate change impacts from the watershed to the estuary concludes an increase in flow by 2.4%, 2.6% nitrogen increase, 4.5% phosphorous load increase, and 3.8% increase for sediment load which will lead to consequences to the estuary. Keeping all other factors constant, sea level rise and increased watershed flow reduce hypoxia in the Bay, but the predominant influence are the negative impacts of increased water column temperature. This will make it harder for the Partnership to achieve their deep water DO water

quality standard and even hard to reach the open water DO water quality standard.

All the jurisdictions have to complete their Watershed Implementation Plans (WIPs) to describe what amount, how, where, and when for all the implementation required to achieve water quality standards by 2025. By the 2022-2023 milestones there will be quantifiable reductions needed to defend water quality standards from future climate risk. There are other efforts conducted by the Partnership to understand and hopefully reduce the nutrient load impact from climate change. The Scientific and Technical Advisory Committee (STAC) is conducting a science synthesis project to review the Chesapeake Bay climate change impacts and uncertainty of BMP performance. The Urban Stormwater Workgroup (USWG) and the Chesapeake Stormwater Network are working to maintain the resiliency of stormwater and restoration practices in the face of climate change. The USWG is also working on funded project to develop probabilistic intensity duration frequency curves.

Loads have decreased by about half from the December 2017 estimates of the load required to respond to climate risks and achieve 2025 water quality standards. Now, depending on decisions to be made by the WQGIT, the additional load reduction estimated to be needed to respond to climate change risk are 5M lb TN (before was 9M lb TN). However, the estimated load reduction to address climate risk for 2035 is about twice that of the estimated 2025 nitrogen load reduction.

Tish Robinson asked with increasing stratification, do we expect to see the deep water or deep channel Uses "appearing" in segments that currently do not have those uses designated? Or does the predicated increase in stratification only occur in those segments that are currently designated for deep water and/or deep channel? Lew said they still need to look at this point because CB6 and CB7 designated use was based on the observations available at that time of choosing the designated use. Now with temperature increasing and other changes, there are different bases on what is achievable.

Kevin Du Bios stated he thought he recalled there was a researcher at Old Dominion University that had some preliminary data that after one heavy rainfall last summer a whole year's worth of sediment entered the tributary studied. How does that affect estimates of increases in climate-induced sediment by 2025? Lew said the Modeling Team is using a delta approach of increased precipitation and temperature so with climate change, they are seeing more extremes. At the moment, this type of research is out of their hands to be included in the model.

2:30 PM **Discussion on the Application of the Climate Model Results to Climate Resiliency CBP outcomes**
Materials: CRWG Coordination Summary

Some examples of discussion topics:

- How can the precipitation and temperature projections help with the CRWG indicators?
- How can the nitrogen and phosphorous projections help inform Climate BMP projects?
- How can information on changes in wetlands help address wetland migration issues?

Julie went over the coordination summary slides to start showing the connection between the inputs and results of the new Phase 6 model with the CRWG indicator and BMP work.

Lew said the habitat quality section for the CRWG indicators is very important, and the Modeling team is trying to look at different modeling approaches for natural resources (e.g., brook trout/water temperature). He suggested having the Modeling Workgroup come back later this summer to show this work of looking at key species in relation to climate projections and tidal waters. CRWG will help set up a cross GIT meeting with the Fish and Habitat workgroups to help pick out key species.

Nicole Carlozo asked if the Phase 6 model run assumed wetland migration or loss to sea level rise. Lew mentioned that the Phase 6 model run did not have a sophisticated assessment of marsh migration/loss and that it did not take into account barriers and land use changes. They had used SLAMM as a first initial evaluation of impacts from sea level rise. They hope to make improvements on this topics and could explore incorporation of additional marsh considerations in the Phase 7 model run.

This is only the beginning of the discussion, but if a CRWG member has any ideas on how to connect the inputs and results from the Phase 6 Model to the CRWG work, please email Julie.

2:50 PM **Maintaining Resiliency of Stormwater and Restoration Practices – David Wood, Chesapeake Stormwater Network (CSN)**

Progress will be presented on the design and encouragement of accelerated adoption of stormwater management practices appropriately designed for rainfall volumes and intensities expected in the future for all counties in the Chesapeake watershed.

Track 2 will be a combination of 4 memos. The first memo is based on the survey they sent out to stakeholders to gather information on their concerns, current management, and future needs for addressing climate change impacts on stormwater management. The first memo summarizes the key findings, but the appendix for the report allows the reader to go through question by question. The first takeaway from the survey is that a major concern for stakeholders is the damage from private and public infrastructure especially for roads, bridges, and

culverts caused by large storm events because it concerns public safety. For stormwater management, public infrastructure such as sewer pipe network, roads, bridges, dams, water pipe distribution and private property such as shoreline engineering are at risk. The second takeaway is that everyone is concerned how they will pay for the necessary maintenance and upgrades, as well as to plan for future resilience. The old BMP inspection model was to drain one large community to a retention pond, but the new model is a "Many-BMP" model. The new model requires a lot of frequent routine maintenance. Large storm events could lead to bed erosion and sedimentation build up which requires money to repair. The third takeaway is that respondents are not comfortable with the current quality and utility of engineering design criteria on future rainfall intensity. The data sources show that the larger storm events are showing a significant increase with rainfall depth, and stakeholders are seeing more damage. The fourth takeaway is that all tools are useful, but if there needs to be a new design, the stakeholders just want someone to give them the new design specs.

The responses were generally consistent across the Chesapeake Watershed and within the different sizes of communities. For example, the small communities are more interested in easing maintenance burdens and planning guidance while large communities are more interested in retrofitting existing practices.

The report for memo 1 is available on their website. The second memo will be a state-by-state summary of current engineering standards to make sure everyone is working off the same information before they draft recommendations.

Lew commented that he was surprised by the number of respondents for the survey question on IDF curves. David thinks it is due to them being projected IDF curves. Stakeholders want the information, but the question is how much they want to use it as a general planning tool versus using it in certain engineering design criteria. There are still some needs to sort out for the short duration time scales for the projection data because there is less confidence around it. People also need to time to get use to projected data when they have been using historical data for years.

Lew asked if this information could be used by the stormwater utility as further justification for the utility aspect of stormwater management. David said there are communities that can use it to make a case for it being a priority and using resources to manage it.

Kevin asked if memo #4 will look at the resilience of nature based BMPs like wetlands or forest canopy vs engineered BMPs. David said their plan is to speak to both types of practices, but it will depend on the amount of information available when they are making memo #4.

3:20 PM **Announcements – Julie Reichert-Nguyen, (NOAA)**

- Call for Ideas/Request for Ideas for GIT Funding will be released at the next CBP Coordinator and Staffer Meeting on April 23rd.
  - Are there any initial GIT Funding ideas from members of the Climate Resiliency Workgroup?
  - Please send ideas to Julie before the next CRWG meeting.
- Session ideas and support for Chesapeake Watershed Forum: Theme this year is, "Climate Resiliency in the Chesapeake Bay." Submission deadline is May 8, 2020.
  - Current ideas include a session on the different Climate Resiliency Scorecards/Report cards available and a session on green infrastructure.
  - Breck or Cuiyin will send an email with more information on these sessions, but if a member has ideas or wants to be involved in planning a session, please contact Julie.

3:30 PM **Meeting Adjourn**

Next Meeting: May 18, 2020 1:00 – 3:30 PM
Please note: The May CRWG meeting is being reschedule from an all-day in person meeting to an afternoon meeting. If there are still working restrictions, it will be a remote only conference call.

Participants: Cuiyin Wu, Julie Reichert-Nguyen, Sally Claggett, Gary Shenk, Ian Yue, Jeremy Hanson, Kate McClure, Katherine Brownson, Katie D, Kevin Du Bois, Krista Romita Grocholski, Jackie Specht, Ben McFarlane, Lindsay Byron, Matt Kundrat, Nicole Carlozo, Normand Goulet, Rebecca Chillrud, John Denniston, Richard Tian, Kristin Saunders, Taryn Sudol, Zoe Johnson, Adrienne Kotula, Claire Buchanan, Elizabeth Andrews, Breck Sullivan, Katheryn Barnhart, Normand Goulet, Ann Phillips, David Wood, Lew Linker, Meg Cole, Cassandra Davis, Gopal Bhatt, John Kennedy, Angie Wei, Peter Tango, Tish Robinson, Jim George, Mark Bennett, Rodney McCallister, Annabelle Harvey, Claire Bucanhan, Jackie Specht