



## Modeling Workgroup Meeting

December 5, 2019

CBPO Conference Room - The Fish Shack  
410 Severn Avenue Annapolis, MD 21403

### Event webpage:

[https://www.chesapeakebay.net/what/event/modeling\\_workgroup\\_december\\_inperson\\_meeting](https://www.chesapeakebay.net/what/event/modeling_workgroup_december_inperson_meeting)

#### 10:05 Evolution of the Phase 6 Model for WIP3 Application and Phase 6 Climate Change Assessment Model – Gary Shenk, USGS-CBPO

What has changed between the July 2018 Phase 6 Model locked down for WIP3 application and tracking, and the current Phase 6 Model used to assess climate change in the Chesapeake watershed and tidal Bay were reviewed.

PSC decided that planning targets will not be changed until 2025 and the model will not be changed until 2025. Gary confirmed that relative change between base condition and climate change condition is being computed by new model.

#### Discussion:

- Larry asked if the new model will not be used in TMDL calculation. Gary confirmed and this model will help inform management decision if we have any, but this model will help inform new model development.
- Lee asked if this model will be able to answer the question in the year of 2021 that what additional mitigation needed to account for climate change. Gary responded this model will be able to do that. However, Marjy recommended that the model may not be good to use in 2021 since the estuarine model is not developed for high temperature that are being observed currently.

#### 10:20 Phase 6 Climate Change Model Initial Findings: Hot, Wet, and Crowded – Lew Linker, EPA-CBPO

Overall scenario results of 2025, 2035, 2045, and 2055 were reviewed. The scenarios provided estimated future climate response and estimated future climate and land use response. Nutrient loads are estimated to increase going forward increase but the TN and TP loads will become increasingly refractory (increased portions of Org N, Org P, and PIP) in scenarios beyond 2025.

#### Discussion:

- James raised the question that the Rappahannock River Basin PRISM trend is higher than his expectation. The reason is not obvious and modeling team will look into this.
- Lee asked if the partitioning of volume into Intensity reflects the greatest change to rainfall will happen in the highest decile. Gopal confirmed that Grosman et al 2014 reviewed hundreds of years data and 60% of change in the rainfall happening in the 10<sup>th</sup> decile rainfall volume.
- Tom asked what aspects are include in the calculation of Marginal Differences in Sediment Delivery. Gopal responded that it includes changes on land, corresponding effect in the streams and rivers.

- James asked the calculation for summer hypoxia volume accounting all factor calculated on the slide 14 and the separate factors on hypoxia volume on slide 15. Richard responded that the reason that separate factors calculation doesn't add up to all the factor accounted is because these factors interact with one another.
- Lee asked how tidal wetland change factors into the hypoxia volume change computation. Lew responded that currently 2025 the wetland change is not considered since the change is not significant but beyond 2025 will be included.
- Norm pointed out that the climate change impact on open water will be more visible than deep water considering the factor of higher water temperature from urban landscape running into the surface water.
- Dave pointed out that the sensitivity analyses on the temperature will be worth pursuing considering the temperature constraint at the shallow water. Gary pointed out the shallow water modeling will be the major change for the next generation model.
- James asked with 2025 climate and 2025 land use, do we need to bring the open water nonattainment segments in compliance. Gary responded that additional nutrient reduction is to bring deep water deep channel in CB4 to attainment not open water.

**10:40 Estimated CBP Nutrient Reductions to Respond to Climate Change Risk – Gary Shenk, EPA-USGS**

Gary reviewed initial, preliminary nutrient reductions estimated to be needed to maintain DO water quality standard attainment under climate change risk for 2025, 2035, 2045, and 2055.

Discussion:

- Gary pointed out the method used here is similar to the method used to distribute Conowingo loads for the four PSC Conowingo options  
James asked if the 2035 to 2055 climate for percent nutrient reduction in Susquehanna includes land use change. Gary responded that land use change is not included.
- Marjy asked if the 2035 and beyond climate condition assumes the TMDL has been met. Gary responded that it assumes the planning target has been met.
- Lee asked for 2055 condition, if it takes account of RCP scenarios. Gary responded that it should take account of RCP scenarios and uncertainty related will be significant.
- James pointed out that if the 8 million lbs reduction have been made to deep water and deep channel and our original assumption is that the as long as water quality standards have been met, everything will be fine but the results of the open water stop light plot may not be the case. Lew pointed out that if our climate will be similar to NC estuary, our living resources will also be different than currently. Dave recommended stop light plot for open water for climate reductions have been met. Lee pointed out the management practices under climate change effect is also uncertain. Lee reminded that there are more climate resilient BMP that we cannot quantify now and there are a lot of other opportunities with this additional 8 million lbs.

- Gary pointed out more analysis needs to be done open water attainment analysis and how this would be affected by climate change.
- Norm pointed out that the local water is also as important as deep-water deep channel water quality condition.
- Richard pointed out with the current model there are a lot of segments that the model is not suited for.

**11:30 [Elements of the Climate Change Scenarios – Lew Linker, EPA-CBPO](#)**

The various elements of the future scenarios of 2025, 2035, 2045, and 2055 were reviewed.

Discussion:

- James asked the Jan Quarterly for 2055 establishing the range for the scenarios based on the RCPs.
- Lew pointed out that during Jan Quarterly Kyle Hinson will be presenting the preliminary results based on VIMS model. Marjy added that based on different GCMs, the climate change impact on the Bay will be very different.

**11:45 [A Review of How Climate Change Scenarios are “Scenarioed Against Observed Data” – Gary Shenk, USGS-CBPO and Richard Tian, UMCES](#)**

A review of how climate change scenarios are “scenarioed” against observed data was presented.

**1:00 [Maintaining Resiliency of Stormwater and Restoration Practices – Tom Schueler, Chesapeake Stormwater Network](#)**

Initial work was presented on the design and accelerated adoption of stormwater management practices appropriately designed for rainfall volumes and intensities expected in the future for all counties in the Chesapeake watershed.

Discussion:

- Greg asked if there is any stream restoration such as legacy floodplain less susceptible to destruction. Tom responded that there are some are less susceptible but it is less likely to invest the same amount of installation cost to restore the practice.
- Lew asked about for the public structure which one is more vulnerable. Tom responded current dams and embankments not only not reflect future climate conditions or current climate condition.
- Lee asked about risk management and Tom’s plan to sort through public safety. Tom mentioned that they are doing surveys and local and state are more keen on the issues.
- Lew asked the audience of the survey. David responded that there are questions to identify the respondents. Norm pointed out even though localities have experienced the damage due to excess rainfall, the localities are less likely to take the new IDF curve. Tom agreed since this would be accounted towards cost of infrastructures and states should be taking leadership in this issue.

**1:20 [A Response to the Challenge of Future Climate Risk in Stormwater Management – Normand Goulet \(USWG Chair\), Northern Virginia Regional Commission](#)**

A project to develop current and future IDF curves combined with web-based tools to make results accessible to potential users for portions of Virginia and DC was described.

Discussion:

- Lee asked about if methods for developing IDF curves for MD, DC and northern Virginia. Norm responded that currently are not determined and he needs to see all the proposals before decision.
- James asked if IDF curve would have bay program modeling applications. Gary responded that this could have compared 1995 distribution to 2025 rainfall distribution.

#### **1:40 Climate Data Guide Website – Paul Ullrich, UC-Davis**

Paul described work on a website to display model skill evaluation results using the decision-relevant metrics such as accuracy and reproducing IDF curves. The website will be a growing resource for practitioners to understand the strengths and weaknesses of different modeling methods and models.

Discussion:

- Norm asked if the website is ready to use. Paul responded that this website would be updated during the next few months.
- Gary asked if the polled IDF curve is weighted. Paul confirmed and the data for Susquehanna can be shared. Gary asked if the models tend to perform well in the East Coast. Paul responded below North Carolina to south Florida tend to perform better.

#### **Meeting Participants:**

Arianna Johns  
Bruce Michael  
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Cassandra Davis  
Clint Gill  
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Emily Trentacoste  
Gary Shenk  
Greg Bush  
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Isabella Bertani  
James Davis-Martin  
Jeni Keisman  
Jim George  
Julie Reichert-Nguyen  
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Kyle Hinson  
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