Modeling Workgroup Quarterly Review

June 20, 2023

Meeting Materials:
https://www.chesapeakebay.net/what/event/modeling-workgroup-meeting-quarterly-review-july-2023

For Remote Access - WebEx Link:
https://umces.webex.com/umces/j.php?MTID=m4d23c385ad35f60cf1432126af378672

Meeting number: 2624 285 9008 **Password:** faQkEFdr687

Phone number: +1-408-418-9388 **Access code**: 2624 285 9008

To enter the webinar, please open the webinar link first.

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

10:00   Announcements and Amendments to the Agenda – Mark Bennett, USGS and Dave Montali, Tetra Tech

10:05   Phase 7 Watershed Model Overview – Gary Shenk, USGS-CBPO
Gary will provide an overall summary of progress.

10:20   Discussion of the Phase 7 Model Overview

10:30   Update on CalCAST Development – Isabella Bertani, UMCES
Isabella will provide an update on the progress made in the development of CalCAST, specifically focusing on testing watershed predictors of spatial variability in streamflow. She will also discuss a proposed approach to develop a reproducible workflow to gather water quality data for watershed model calibration.

10:50   Discussion of CalCAST development

11:00   Progress in Phase 7 WSM Development – Gopal Bhatt, Penn State
The NHDplus 100K scale Phase 7 Dynamic Watershed Model (DWM) prototype with simulations of hydrology, sediment, nutrients, water temperature, DO, and phytoplankton is now operational for the entire watershed. The DWM is using a nested model segmentation of streams and rivers with a hybrid structure for the simulation of water quality processes using HSPF and Simple Routing models. During this quarter, refinements have been made on the segmentation and computational elements of the model operations. Gopal will survey progress and describe activities upcoming in the next quarter.

11:30   Discussion of Phase 7 WSM Development Progress

11:40   Development of Efficient Multi-Objective Optimization Procedures – Gregorio Toscano, Kalyan Deb, Pouyan Nejadhashemi, and Hoda Razavi, MSU
Progress since the April Quarterly in the development of efficient multi-objective (MO) optimization procedures including replicating the study with the rest of the BMPs will be presented.

12:10   Optimization Discussion

12:20 LUNCH

1:20   Review of the 2020 to 2023 Summer Hypoxia Forecasts – Isabella Bertani, UMCES
Isabella will review the 2020 to 2023 Summer Hypoxia Forecasts since she and a team of VIMS, UMCES, DNR, and U. of Michigan PIs had refined the methodology. Attempted refinements to the method for the 2023 forecast and the 2023 forecast results will be discussed.

1:40   Discussion of the summer hypoxia forecasts.

1:50   Case Study of Decarbonized Economy Benefits to Nitrogen Reduction in the Chesapeake – Chris Nolte, Dan Loughlin, and Uma Shankar, EPA-ORD
Initial work will be discussed in the application of scenarios developed by EPA's Center for Environmental Measurement and Modeling to estimate atmospheric nitrogen reductions due to decarbonizing the economy with respect to power generation, mobile sources, and other CO_2 emission sources. The scenarios would be run initially in Phase 6 watershed and Bay models to assess the degree of additional nitrogen reductions to the Chesapeake that would result from the national economic and policy actions of decarbonization. The scenarios would run for the years of 2035, 2045, 2055, and 2075 on Phase 6 and then later on the Phase 7 suite of models when they are completed.

2:05   Discussion of Decarbonized Economy Benefits

2:15   Progress of the Agricultural Modeling Team – Tom Butler, EPA-CBPO
Tom will describe progress of the Ag Modeling Team in its role in determining the agricultural data inputs for the Phase 7 Watershed Model.

2:30   Discussion of Agricultural Modeling Work Group

2:40   ADJOURN

Modeling Workgroup Quarterly Review

June 21, 2023

9:00 **Announcements and Amendments to the Agenda – Dave Montali, Tetra Tech and Mark Bennett, USGS**

9:05 **Comprehensive Assessment of the Impacts of Large Reductions in Point Source Nutrient Loading to the Patapsco River Estuary – Jeremy Testa and Walter Boynton, UMCES**
This analysis examined changes in municipal and industrial nutrient loading rates to the Patapsco River estuary over the past 35 years and the associated changes in nutrient concentrations, chlorophyll-a, and dissolved oxygen. A nutrient budget was developed for the estuary over three periods within the 35-year times series to investigate how internal recycling influenced the estuary. Substantial declines in industrial nutrient loading were associated with long-term declines in nutrients and surface water chlorophyll but increasing bottom-water chlorophyll (potentially delivered from the mainstem Bay) combined with warming possibly contributed to relative stability in dissolved oxygen.

9:30 **Discussion of Assessing Impacts of Large Reductions in Point Source Nutrient Loading to the Patapsco River Estuary**

9:40 **Update on Main Bay Model (MBM) Progress – Jian Shen, VIMS**
Progress in the MBM development will be presented.

10:10 **Discussion of the Main Bay Model (MBM) Progress**

10:20 **Refinement of the Temperature Dependence of Algal Growth Rates in the MBM and MTMs – Carl Cerco, Attain**
Carl will describe his examination of the shallow water monitoring data of continuous temperature and chlorophyll observations and other data sources for the purpose of refining the algal growth response to temperature in the MBMs and MTMs. The Modeling Workgroup will use this method along with updating a literature search; and having this as a topic in an upcoming STAC workshop on assessing climate change in the CBP.

10:40 Discussion of the Refinement of the Temperature Dependence of Algal Growth Rates

10:50 Estimating Tidal Shoreline Recession and Bank Height – Julie Herman, VIMS
Julie will describe potential approaches to estimate tidal shoreline recession along with bank height that can be used to generate TSS, TN, and TP loads from the tidal shoreline, especially by using remote sensing data and AI. The initial stages of the study will be described today with a fuller description of the work coming in the October Quarterly.

11:00 Discussion of Estimating Tidal Shoreline Recession and Bank Height

11:10 Shoreline Erosion Testbeds of Corsica and Choptank Rivers – Richard Tian, UMCES
 Progress in assessing the efficacy of a dynamic input of shoreline sediment and associated nutrients using fine scale models of the Corsica and Choptank Rivers will be discussed. To do a dynamic input of shoreline loads we'd need 1) wave power (f wave speed, wave energy, and depth), 2) shoreline height, 3) protected shoreline, 4) bulk density, 5) sand, silt, clay classes, 6) eroded shoreline TN & TP species.

11:30 Discussion of Shoreline Erosion Testbeds

11:40 Progress on the Multiple Tributary Model (MTM) Effort and Introducing the Rappahannock MTM Team – Lew Linker EPA-CBPO
An update on the selection of three MTMs supported by an EPA RFA that will support the teams over five years will be presented. The CBPO will also support two in-house MTM teams.

11:50 Discussion of MTM Progress

12:00 LUNCH

1:00 Rappahannock MTM – Qubin Qin and Nicole Cai, VIMS
Initial work on the Rappahannock MTM will be described.

1:15 Discussion of Rappahannock MTM

1:25 Continuous Hypoxia Profilers – Bruce Vogt, NOAA
The CBP's Hypoxia Collaborative's new hypoxia profilers for 2023 Deployment will be described. The goal is to have 5-7 out in the water next year for a total of 9 profilers. The profilers will be of tremendous help with the MBM and MTM calibration as well as improved understanding of shallow water processes.

1:40 Discussion of the Continuous Hypoxia Profilers

1:55 ADJOURN