Modeling Workgroup Quarterly Review

April 5, 2022

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

10:05 **Phase 7 Model Development Web Site– Gary Shenk, USGS-CBPO**
Gary will introduce the Phase 7 Model Development Web Site and demonstrate how the Modeling Workgroup can track the Phase 7 Watershed Model development with the tool.

10:30 **Discussion of the Phase 7 Model development site and Watershed Model progress**

10:40 **Progress in Phase 7 WSM Development – Gopal Bhatt, Penn State**
Gopal will describe progress made in development of the Phase 7 Dynamic Watershed Model with – (a) refinements in the incorporation of CalCAST flow in a NHDplus scale hydrology model prototype, (b) expansion of the simulation period from 2014 to CY 2020, and (c) a method for nesting of NHD streams with Phase 6 river segments for modeling and analysis of model results.

11:00 **Discussion of Phase 7 WSM Development Progress**

11:10 **Structure and Development of CalCAST – Isabella Bertani, UMCES**
Isabella will describe the role and overall structure of the CalCAST simulation and the progress being made in its development. CalCAST is a relatively parsimonious modeling tool that is being developed to test predictors and spatially calibrate parameters that will ultimately inform prediction of flow and loads at monitoring stations throughout the watershed. Isabella will provide an overview of initial steps taken to implement CalCAST in a Bayesian calibration framework and get feedback on potential next steps, including initial thoughts on future GIS and land-use data needs.

11:30 **Discussion of CalCAST development**

11:45 **Development of Efficient Multi-Objective Optimization Procedures – Gregorio Toscano, Kalyan Deb, Pouyan Nejadhashemi, Sebastian Hernandez-Suarez, and Julian Blank, MSU**
Progress in the development of efficient multi-objective (MO) optimization procedures including developing generative MO optimization using the current hybrid optimization

procedure developed and to develop simultaneous MO customized optimization using population-based evolutionary algorithms.

12:20   Optimization Discussion

12:30   BREAK

1:00   Relative Confidence Index - Katie Walker, Chesapeake Conservancy and Mike Campagna, Drexel
The Relative Confidence Index (RCI), an application that quantifies the local impact of BMPs on nutrient and sediment runoff, will be reviewed. The index helps BMP implementers identify projects that have a higher likelihood of meeting or exceeding regional reduction calculations.

1:40   Discussion Relative Confidence Index

1:55   CMAQ Tracer Runs – Jesse Bash and Sarah Benish, EPA-ORD
Progress on estimating the transport and fate of atmospheric emissions of oxidized nitrogen (NOx) and ammonium (NH_4^+) will be presented. The analysis centers on the question, "For a nitrogen emission source from different regions in the Chesapeake watershed, what is the fraction that is deposited to a particular region or point?". In addition, the analysis can be used to estimate reductions in nitrogen deposition to the Chesapeake watershed and tidal Bay under future conditions of greater penetration of electric vehicles into the existing mobile fleet, greater wind and solar electric generation, and other types of future economic conditions.

2:10   Discussion of CMAQ Tracer Runs

2:20   ADJOURN

Modeling Workgroup Quarterly Review

April 6, 2022

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

9:05   Climate Change and Striped Bass Chesapeake Habitat – Tom Parham, Andrew Keppel, and Jim Uphoff, MD-DNR
Progress in an analysis to assess DO and water temperature related striped bass summer habitat conditions, Bay-wide, by State, and by CB Segment, under 2025 and 2055 climate conditions will be reviewed. Key Bay restoration/climate scenarios of Full WIP3 Implementation and No Action scenarios will be used to estimate to determine change in the quantity/quality of habitat rated as Suitable, Tolerable, Marginal, or Unsuitable.

9:40   Discussion of Climate Change and Striped Bass Chesapeake Habitat

9:55   Phase 7 Watershed and Tidal Water Model Boundaries – Andy Fitch, USGS-CBPO
Andy will describe a prototype shoreline product of updated and refined model boundaries for the Phase 7 Watershed Model, MBM, and MTMs including spatially detailed estimates of the tidal wetlands.

10:15   Discussion of Phase 7 Watershed and Tidal Water Model Boundaries

10:25   Main Bay Model (MBM) Progress Tracking – Lew Linker, EPA-CBPO
Tracking MBM progress with the Phase 7 Model web site will be presented.

10:35   Discussion of Phase 7 MBM Progress Tracking

10:45   The Main Bay Model (MBM) Progress – Jian Shen and Joseph Zhang, VIMS
The overall approach and key questions to be resolved over the four year MBM development period will be discussed and the initial work underway will be described.

11:20   Discussion of the Main Bay Model (MBM) Progress

11:40   Corsica River Shallow Water Simulation Progress – Richard Tian and Jeremy Testa, UMCES and Nicole Cai, EPA-ORISE

The Corsica presents a unique opportunity to examine the effects of nutrient load reductions on a shallow ecosystem with both models and data. In particular, the Corsica will be a good test of MBM & MTM's ability to reproduce diel-cycling hypoxia and the forces that drive it (shallow water metabolism, wetland inputs, etc.) and very high chlorophyll concentrations often found in Chesapeake shallow water systems. The recent incorporation of benthic algae and tidal wetlands will be presented.

12:10 Discussion of the Corsica River Shallow Water Model Development Work

12:20 BREAK

12:50 SAV Nutrient Flux Assessment – Carl Cerco, Attain
The findings and initial documentation of the 2017 WQSTM estimated SAV nutrient flux by submerged aquatic vegetation and consequences for Chesapeake hypoxia will be presented.

1:10   Discussion of SAV Nutrient Flux Assessment

1:20   Initial Set-up MTMs in the Tidal York and James Rivers – Nicole Cai, EPA ORISE
Progress in the MTM simulations in the tidal York and James Rivers, with the incorporation of benthic algae, will be discussed.

1:50   Discussion of the York and James River Initial MTM Setup

2:00   Progress in the Patuxent MTM – Richard Tian, UMCES
Progress in the MTM simulation of the Patuxent will be presented.

2:20   Discussion of Patuxent MTM Progress

2:30   ADJOURN