Review of Modeling Workgroup Priorities

Modeling Quarterly Review
07/22/2014

Modeling Workgroup Priorities

Watershed Model

- Revise Watershed Model system structure
- Revisit Watershed Model calibration methods, including regional factors

Water Quality and Sediment Transport Model

- Refine and update the Water Quality and Sediment Transport Model (WQSTM)
- Refinement of shallow water simulation for improved assessment of open water DO and SAV/clarity standards

Airshed Model

- Update Airshed Model to new CMAQ Bidirectional Ammonia Model

TMDL Charges

- Effects of Conowingo infill on Chesapeake Bay WQS
- Examine the influence of climate change (CC) on Chesapeake WQ standards and the 2010 Bay TMDL
- Review James River chlorophyll criteria and James River TMDL allocations
- Influence of oyster filter feeders on water quality, with increased aquaculture and sanctuary development

STAR Requests

- Assess and Explain Water Quality Trends

Modeling Workgroup – Work Plan 20140123

Update Airshed Model to new CMAQ Bidirectional Ammonia Model

- Office of Air Quality Planning and Standards (OAQPS) provides bidirectional Ammonia CMAQ simulation scenarios. CMAQ scenarios with bidirectional ammonia simulation developed through 2014-2015. By December 2015 all CMAQ Airshed scenarios will be in place.

- Relevant meeting presentations:
  - 2014 Extension of Ammonium and Nitrate Wet Deposition Models for the Chesapeake Bay Watershed and Tidal Waters – Jeff Grimm (Penn State) – 20140723
  - Developing Oxidized Nitrogen Atmospheric Deposition Source Attribution from CMAQ for Air-Water Trading for Chesapeake – Robin Dennis (NERL EPA) – 20130724

Revise Watershed Model system structure

- A Phase 6 Watershed Model based on the HSPF PQUAL simulation and with an updated precipitation input dataset, hydrology, and sediment simulations.

- Relevant meeting presentations:
  - Scenario Builder and Watershed Model Progress Toward the MPA – Gary Shenk (EPA/CBPO) – 20140722
  - Recommendation for PQUAL Sensitivity to Inputs – Guido Yactayo (UMCES/CBPO) – 20140722
  - Phosphorus Modeling with Variable Source Hydrology – Zachary Easton (VT) – 20140722
  - STAC Review of Chesapeake Bay Program Watershed Model Phosphorus Processes – Ken Staver (UMD College of Agriculture) – 20140722
  - APLE Implementation in the Chesapeake Bay Watershed – Alisha Mulkey (UMD-ENST) – 20140722
  - Spatial Estimates of Phosphorus Transport in the Chesapeake Watershed Using SPARROW – Scott Ator (USGS) – 20140722
  - Phase 6 Prototype – Gopal Bhatt (Penn State) – 20140723

Revisit Watershed Model calibration methods, including regional factors

- Revisit Watershed Model calibration methods with the goal of improving local watershed results, including revisiting regional factors.

- Relevant meeting presentations:
  - Application of SPARROW for Target Load Specification – Ross Mandel (ICPRB) – 20140722
  - Phase 6 Prototype – Gopal Bhatt (Penn State) – 20140723

Refine and update the Water Quality and Sediment Transport Model (WQSTM)

- CoE Engineering Research and Development Center (ERDC) develops and applies WQSTM. WQSTM development is ongoing until December 2015 followed by review and application during 2016-2017.

- Relevant meeting presentations:
  - Extension of the WQSTM Simulation to 2011 – Carl Cerco (USACE ERDC) – 20140723

Refinement of shallow water simulation

- Funding has been identified for multiple modeling in shallow-water. RFP has been awarded and work is to begin in 2014. Comparison of different models applied to shallow-water systems will result in a model representation of shallow-water regions in WQSTM.

- Relevant meeting presentations:
  - Biogeochemical Modeling in Shallow Estuarine Ecosystems: Key Processes and Challenges – Jeremy Testa (UMCES) – 20140723
  - Multiple Model Assessment of Shallow Water Systems with FVCOM and ICM – Richard Tian (UMCES) – 20140723
  - Extension of the WQSTM Simulation to 2011 – Carl Cerco (USACE ERDC) – 20140723

Effects of Conowingo infill on Chesapeake Bay WQS

- This work includes applying the results from the Lower Susquehanna River Watershed Assessment study, as well as work to provide land use characterization of small impoundments and associated drainage area.

- Relevant meeting presentations:
  - Progress on Lower Susquehanna Dams – Lewis Linker (EPA/CBPO) – 20140402
  - Robert Hirsch – Observations about the changing behavior of the Susquehanna River at Conowingo, MD – Robert Hirsch (USGS) – 20140107
  - Lower Susquehanna River Watershed Assessment – Carl Cerco (USACE ERDC) – 20140108

Examine the influence of climate change (CC) on Chesapeake WQ standards and the 2010 Bay TMDL

- Many climate change studies will provide input:
  - Robust Decision Making (RDM) Analysis
  - Penn State analysis of climate change
  - UMD analysis of climate change impacts on Patuxent watershed and estuary
  - USGS analysis of Chesapeake watershed hydrology under future climate change conditions
  - JHU analysis of CC effects on observed trends in CB watershed
  - UVA analysis of CC

- Relevant meeting presentations:
  - A proposal for Climate Change, Sea Level Rise, and Marsh Loss – Carl Cerco (USACE ERDC) – 20140723

Review James River chlorophyll criteria and James River TMDL allocations

- The VA DEQ is now undertaking a review of the CHLa standards and associated modeling framework. This effort will provide the scientific basis for a potential water quality standards rulemaking process, which may result in revisions to nutrient allocations contained in the Chesapeake Bay TMDL.

- Relevant meeting presentations:
  - Arthur Butt – James Chlorophyll Update 20140723
    - James River CHLa Study – 2012 Summary and 2013 Research – Arthur Butt (VA DEQ) – 20130725
    - Executive Summary – First Year Findings from the James River Chlorophyll-a Study – 20130715

Influence of oyster filter feeders on water quality, with increased aquaculture and sanctuary development

- The oyster model will be revised as necessary to incorporate aquaculture operations and additional oyster biomass brought about by restoration activities including sanctuaries. Current and projected data on biomass distribution and abundance will be mapped onto the current computational grid and various combinations of restoration and load reductions will be examined. The oyster analysis is planned for the 2014 calendar year.

- Relevant meeting presentations:
  - Calculation of Oyster Benefits with a Bioenergetics Model of the Virginia Oyster – Carl Cerco (USACE ERDC) – 20140402
  - Oyster Restoration, Aquaculture, and Nitrogen Removal – Jeffrey Cornwell (UMCES) – 20140402

Assess and Explain Water Quality Trends

- The activities described in this work plan will provide an integrated assessment and explanation of changes in watershed and estuary water-quality monitoring information. The five major work elements are:
  - Analyze trends of nitrogen, phosphorus and sediment in the watershed.
  - Enhance approaches using tidal monitoring data to assess attainment of water-quality standards.
  - Explain water-quality trends in Bay and its watershed.
  - Use improved understanding of trends to enhance CBP Models.
  - Synthesize and communicate results and implications for the TMDL.

- Next Steps:
  - STAC Workshop – Enhancing Approaches to Explain Management Effects on Water Quality Trends – 20140325

Upcoming Meetings

- **September Modeling Workgroup Conference Call**
  - Date: September 4th, 2014
  - Time: 10:00AM – 12:00PM
  - Location: Conference Call
  - Conference Line: 1-866-299-3188 code 410-267-5731
  - Adobe Connect: https://epa.connectsolutions.com/modeling (enter as guest)
  - Event webpage: http://www.chesapeakebay.net/calendar/event/21924/

- **October Modeling Quarterly Review**
  - Date: September 30th and October 1st, 2014
  - Time: 10:00AM – 3:00PM
  - Location: Joe Macknis Memorial Conference Room (Fishshack) CBPO 410 Severn Avenue Annapolis, MD
  - Conference Line: 1-866-299-3188 code 410-267-5731
  - Adobe Connect: https://epa.connectsolutions.com/modeling (enter as guest)
  - Event webpage: http://www.chesapeakebay.net/calendar/event/21917/