Review of Modeling Workgroup Priorities

Modeling Quarterly Review
09/30/2014

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

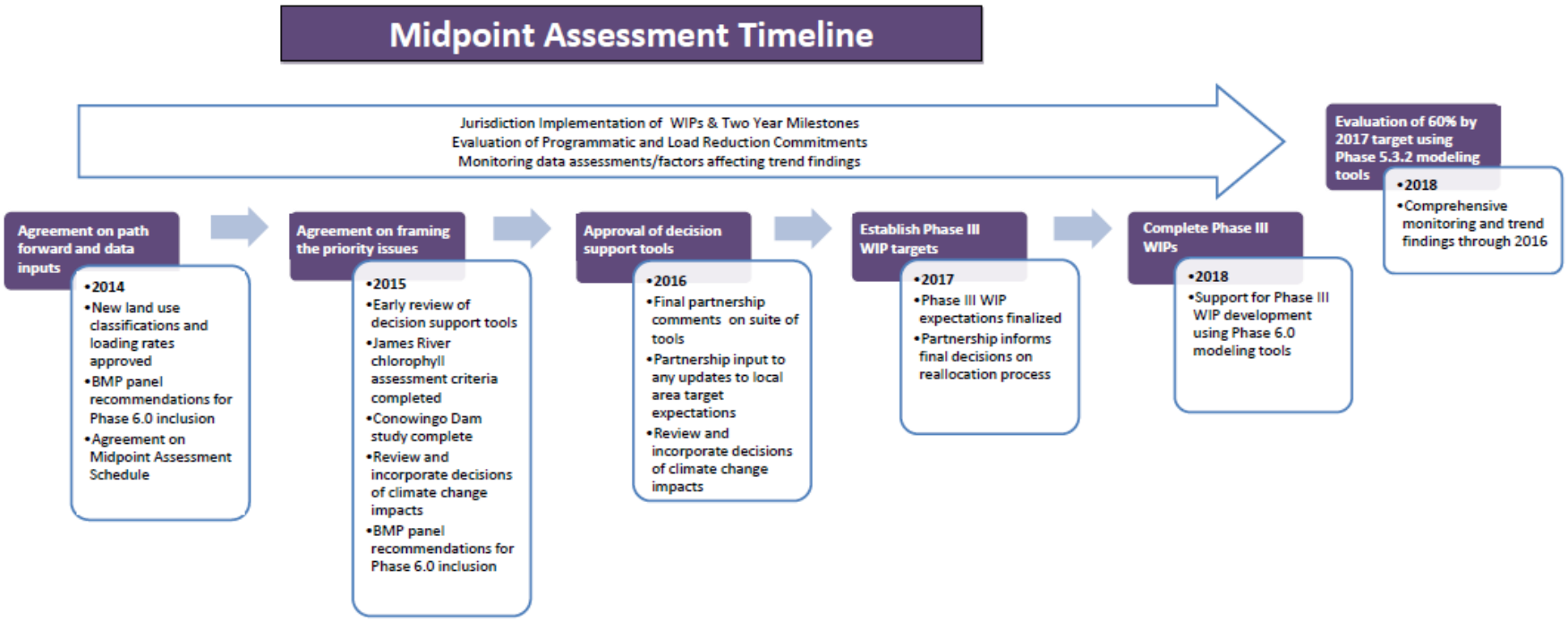
- Effects of Conowingo infill on Chesapeake Bay WQS
- Examine the influence of climate change (CC) on Chesapeake WQ standards and the 2010 Bay TMDL
- Review James River chlorophyll criteria and James River TMDL allocations
- Influence of oyster filter feeders on water quality, with increased aquaculture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

STAR Requests

- Assess and Explain Water Quality Trends

Scenario Builder and Watershed Model Plan for the MPA (tracking webpage)

Integrated with MPA Timeline



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:
  - CMAQ Air Scenarios – Lewis Linker and Robin Dennis (EPA) – 20141001

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:
  - Phase 6 Watershed Model Schedule Update – Gary Shenk (EPA/CBPO) – 20140930
  - Phase 6 Prototype – Gopal Bhatt (Penn State/CBPO) – 20140930
  - Annual Phosphorus Loss Estimator (APLE) and Surface Phosphorus and Runoff (SurPhos) Models – Guido Yactayo (UMCES/CBPO) – 20140930
  - Phosphorus Modeling and Legacies in the Chesapeake Bay Watershed – Kleinman, Buda, and Bryant (USDA ARS) – 20140930

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:
  - Phase 6 Prototype – Gopal Bhatt (Penn State) – 20140930
  - Phase 6 Land Use: Stream Corridor Sediment Contribution – Reid Christianson (USGS/CBPO) – 20140930
  - Phase 6 Land Use Loading Rates – Olivia Devereux (Devereux Consulting) – 20140930
  - Replacing Regional Factors: A Multiple Model Approach Based – Ross Mandel (ICPRB) – 20140930

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 from 1991 to 2011 – Carl Cerco (USACE ERDC) – 20141001
  - Nutrient Loads from Tidal Shoreline Erosion – Carl Cerco (USACE ERDC) – 20141001
  - Resurgence of Susquehanna Flats SAV – Cassie Gurbisz and Mike Kemp (UMCES) – 20141001
  - Estimating Impacts of Cumulative Stressors on Fisheries Production in the Chesapeake Bay with Atlantis – Tom Ihde (NOAA) – 20141001

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

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:
  - Conowingo II – Field/Lab Measurements and Modeling – Jeff Cornwell (UMCES) – 20140930

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:
  - Synergistic impacts of population growth, urbanization, and climate change on watersheds and coastal ecology of the northeastern United States - Ray Najjar (Penn State) – 20141001

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:
  - James River ChLa Study Update – Arthur Butt (VA DEQ) – 20141001

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) – 20140723

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

- **Modeling Workgroup Conference Calls (as needed)**
  - Date: November 6th, 2014 and December 4th, 2014.
  - Time: 10:00AM – 12:00PM
  - More information will be distributed closer to the meeting date.
  - November webevent: http://www.chesapeakebay.net/calendar/event/22108/
  - December webevent: http://www.chesapeakebay.net/calendar/event/22126/

- **January Modeling Quarterly Review**
  - Date: January 6th and 7th, 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/22107/