# Modeling Workgroup Workplan 2015 – 2017

STAR
2/26/2015

# Organization

- Co-Chairs
  - Lee Currey – Maryland Department of the Environment
  - Dave Montali – West Virginia Department of Environmental Protections
- EPA Chesapeake Bay Program
  - Lew Linker – Modeling Coordinator
  - Gary Shenk – Integrated Analysis Coordinator
  - Kyle Hinson
  - Modeling Team
- Membership
  - http://www.chesapeakebay.net/groups/group/modeling_team

# Modeling Workgroup Priorities

***Airshed Model***

- Update Airshed Model to new CMAQ Bidirectional Ammonia Model

***Watershed Model***

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

***Water Quality and Sediment Transport Model***

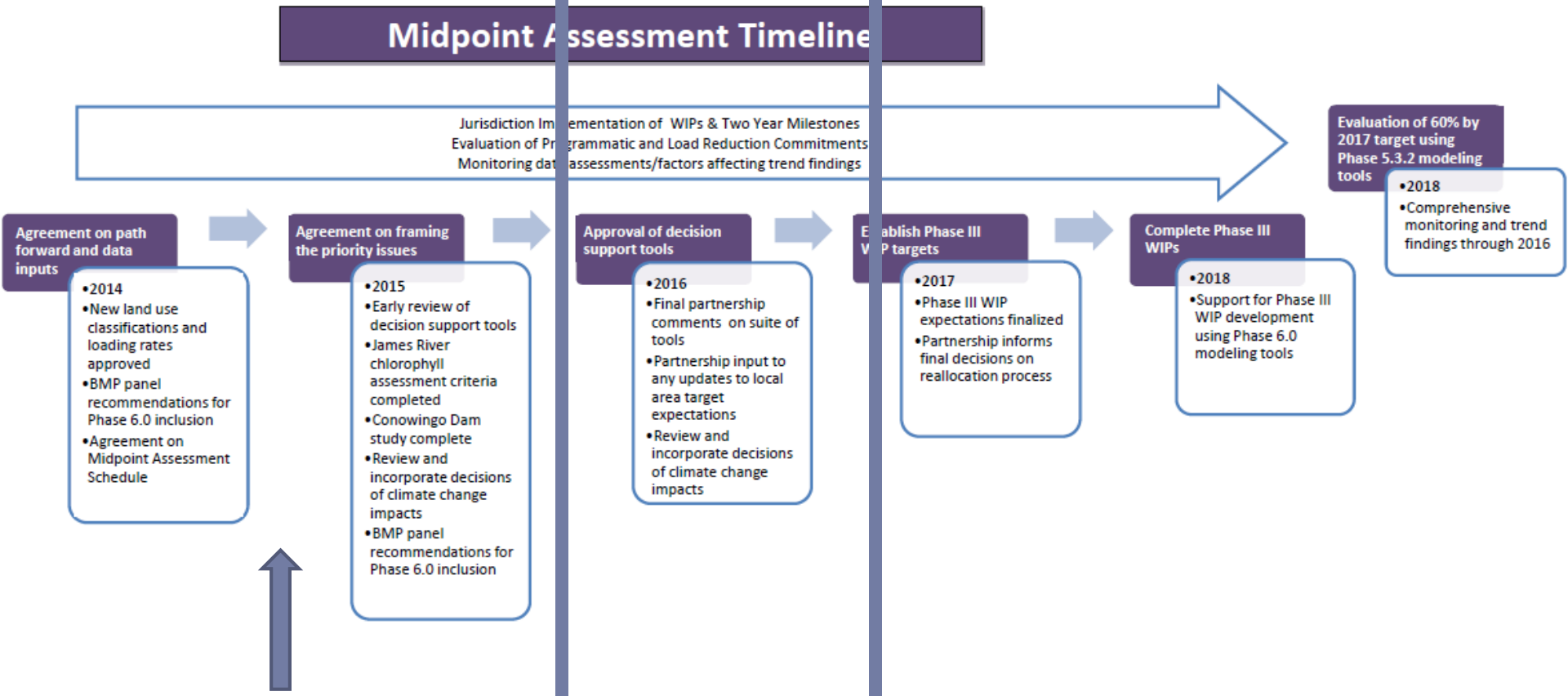
- Refine and update the Water Quality and Sediment Transport Model (WQSTM)
- Refinement of shallow water simulation for improved assessment of open water DO and SAV/clarity standards

***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***

- Support needs of water quality goal team and TMDL Mid-point assessment support
- Assess and Explain Water Quality Trends
- Evolve to address other GIT needs including predicting ecosystem response to different management and environmental scenarios.
- Work with Chesapeake Community Modeling Program (CCMP) to meet expanding needs




**CREATE The Models**

**REVIEW The Models**

**USE The Models**

# Calibration Timeline
# Oct 2014 to Dec 2016

- **October 2014 –** Rough Draft of major changes to nutrient processing in Scenario Builder will need to be complete. Continued sensitivity refinement
- **February 2015 -** draft targets for draft land Uses
- **March 2015 –** All major partnership decisions are made on changes to scenario builder processing and data. Scenario builder final modifications begin.
- **April 2015 -** final targets approved by Modeling Workgroup for draft land uses
- **Early October 2015 –** All inputs are final and delivered to the WSM by the scenario builder team for the final calibration run. Final targets are based on this information.
- **December 2015 -** Phase 6 draft model is complete.
- **December 2015 – December 2016 -** Evaluation followed by fine tuning during the next year. Key scenarios available
- **September 2016 –** Final comments on the draft Phase 6 model
- **December 2016 -** All models are final. The partnership decision-making process begins to discuss how these new models will be used in the WIP3 process

# Modeling WG
# Management Strategy

# Communication Strategy

Internal

- Weekly Modeling Team Meetings
  - Discuss Scenario Builder and Phase 6 Issues and identify decisions that must be made by the partnership.
- Quarterly two day review
  - Provide a briefing to the partnership on all Modeling WG priorities.
  - Decision making and consensus
- Monthly Modeling WG conference calls as needed
  - Identify and make key decisions related to modeling on the workgroup priorities.

External

- Regular Updates to STAR and WQGIT
  - Meeting minutes briefing prepared for STAR
  - WQGIT briefings to communicate progress on Midpoint Assessment priorities. Mid Point Assessment Schedule
- Management Board and PSC
  - Requested to provide update this Spring specific to Phase 6
  - Expected to continue

# Monthly Modeling WG Conference Calls

- 2-hour Monthly Modeling Workgroup Conference Calls
  - Purpose: Identify and make key decisions related to modeling on the workgroup priorities.
    - These conference calls will NOT occur during months where there is a Modeling Quarterly and will ONLY occur if WG members are needed to make key decisions.
    - On monthly conference calls, as in the Quarterlies, we work for consensus with all. But major decisions are voted on by members only.
  - Dates: 1st Thursday of the month 10AM – 12PM

# Midpoint Assessment Tracking

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

Per WQGIT Request, record of Modeling WG Decisions available from January meetings

- Rainfall
- Sediment Calibration
- Nutrient Sensitivities
- Targets
- Landuses
- Lag times
- Regional factors
- Conowingo
- …

## Scenario Builder and Watershed Model Plan for the MPA

In preparation for the 2017 Mid-Point Assessment, the CBP Partnership has expressed priorities for the Phase 6 watershed model development which are detailed in documents under the 'Projects and Resources' tab on the Water Quality GIT page. Initial priorities were set in the October 2012 water quality GIT meeting. These priorities have been updated and refined by recommendations from subsequent workshops and CBP meetings. The MPA master schedule lists these priorities in a table format. Additional documents on the web page are specific work plans to accomplish these tasks.

Out of necessity, phase 6 development is occurring along multiple parallel paths. These must eventually meet in a draft phase 6 watershed model and scenario builder that will be ready for full partnership review beginning January 1 2016. These parallel paths encompass all of the CBP priorities.

This document summarizes the priorities and identifies lead researchers for each effort. The descriptions here are brief with links to more detailed workplans.

### Efforts

Below are the efforts related to the Scenario Builder and Watershed Model Plan for the Mid-Point Assessment

- **BMP effectiveness**
- **BMP Implementation Accounting**
- **Fertilizer and Manure Applications**
- **Land Use Types and Acreage**
- **Land Use Loading Rates**
- **Climate Change**
- **Scenario Builder Development and Code Versioning**
- **Watershed Model Development and Code Versioning**
- **Calibration Methodology**
- **Sensitivities to inputs**
- **Fine-scale Processes**
- **Atmospheric Data**
- **Groundwater Lag**
- **Better Representation of Reservoirs**

# Priority Projects

# Update Airshed Model to new CMAQ Bidirectional Ammonia Model

- 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.
  - There are a lot of success stories that STAR could use as insights from this work. Fact Sheet: The Importance of Clean Air to Clean Water in the Chesapeake Bay

# Watershed Model

- Revise Watershed Model system structure
  - A Phase 6 Watershed Model based on the HSPF PQUAL simulation concept with updated precipitation input dataset, hydrology, and sediment simulations.
- Revisit Watershed Model calibration methods with the goal of improving local watershed results, including revisiting regional factors and lag times. Leverage a multiple model approach
- STAC
  - Joint Proposal from MWG/WQGIT on uncertainty submitted
  - Review of Phase 6 will be requested

# 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.
- Refinement of shallow water simulation
  - Extension of WQSTM to recent time periods so shallow water data can be used to inform model recalibration needs
  - 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.

# 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.
  - will include the incorporation of additional monitoring data that will be collected during 2015 and will be used to inform both the Phase 6 watershed model and water quality sediment transport model
- Proposed a STAC review on the incorporation of new data  This will be a follow up to the uncertainties identified in the LSRWA STAC review

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

- Considered in development of Phase 6
- 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
  - UMCES estimate of increase storm intensity
  - 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
  - VT IPCC Downscaled Climate Change Scenarios
- STAC Review on this topic to coordinate efforts. Need to coordinate with STAR climate workgroup

# 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.

# 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.

# 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.