

2016 Phase 6 Modeling Review Period

Briefing Paper for the WQGIT's December 14-15 Meeting

Phase 6 Modeling Tools – 2016 Review

Provide an overview of the review period, including key scenarios and outputs, deadlines, priority-setting of new data inputs, calibration schedule, and identification of priority setting and decision making processes for addressing data gaps and requested model changes throughout 2016.

Decision: Agreement on process and timeline for the 2016 Phase 6 modeling tools review period, including process for prioritizing and making decisions on data input changes for the interim and final model calibrations.

Background on Phase 6

- The Phase 6 models build upon the historic modeling within the Bay partnership and brings in new science where warranted through a multiple model approach.
- Many of the fundamental modeling processes have remained the same but have been improved with better, and more recent, input information. In some cases the modeling processes have changed, such as the simulation of phosphorus transport or have been simplified to make them more transparent.
- The improvements are to provide increased confidence in Bay restoration decision making. This is accomplished through extending the models in time to include the most recent monitoring information, increasing the transparency of the modeling tools, improving the resolution of land use and watershed transport processes and by leveraging the strength of multiple models within the Bay watershed.

The Purpose & Importance of the 2016 Phase 6 Review Period

- As part of the Bay TMDL's Midpoint assessment, the partnership's Modeling Workgroup has been tasked to enhance and refine the Phase 6 decision support tools for improved transparency, accuracy, and confidence.
- The review period provides the partnership with the opportunity to review the inputs, outputs, and processes of the Phase 6 Watershed Model; to run key scenarios; and to make further refinements as needed.
- The Phase 6 Watershed Model will be calibrated multiple times during 2016, so the partnership will be able to see incremental changes as new inputs and processes are added.
- The review period allows the partnership to set the priorities for changes to be incorporated into the final version of the Phase 6 Watershed Model.

Model Versioning Timeline

- January 1, 2016: CBPO Modeling Team, on behalf of the Modeling Workgroup and WQGIT, releases Phase 6 Beta 1
- April-May 2016: Probable release of Phase 6 Beta 2 if changes warrant
- September 30, 2016: Deadline for all partnership input. Data and recommendations can be submitted at any time prior to this date.
- October 2016: Phase 6 Beta 3 if changes warrant
- January 1, 2017: CBPO Modeling Team, on behalf of the Modeling Workgroup and WQGIT, releases Phase 6.0

Beta Version to Final Phase 6

- The similarity of the January 2016 model compared to the final model applied in the Phase III WIP is going to be largely dependent upon the following items:
 - Comments by WQGIT
 - The differences in input information the WQGIT provided to the Modeling Workgroup between September 2015 and September 2016
 - The STAC reviews and workshop input
 - The outcomes of expert panels and products of other WQGIT workgroups

Changes Expected through 2016

- Conowingo – both watershed and water quality sediment transport model (Spring)
- Land use (Incrementally)
- Outcome of nutrient management expert panel (Spring)
- BMP verification
- Incorporating climate change
- Loading rates for land uses

What will be Available for Review in the Phase 6 Beta Versions?

- Inputs, such as atmospheric deposition, land use, animal numbers, etc.
- Outputs – all outputs of the phase 6 Beta including:
 - Scenario builder outputs such as Manure, fertilizer, Land use, BMP implementation and effectiveness, etc.
 - Watershed model outputs such as Loads by land use, Loads by basin, and Multiple key scenarios
 - Water quality model output – spotlight charts
- Documentation – some examples of topics covered in the documentation:
 - Scenario Builder documentation
 - Manure and fertilizer calculation and distribution
 - BMP processing
 - Land use acres
 - Watershed Model documentation
 - Target loads
 - Calibration methods
 - Lag time implementation
 - Water Quality Sediment Transport Model documentation

Prioritizing Changes - Who

- Partnership Reviewers
 - WQGIT and Modeling Workgroup
 - All substantive comments by the above groups will be addressed by the CBPO modeling team.
 - All recommendations made by these groups will be implemented subject to feasibility constraints.
 - STAC
 - All comments will be addressed by CBPO modeling team through the Modeling Workgroup
 - The implementation of any recommendations will be subject to review by the WQGIT or Modeling Workgroup as appropriate.

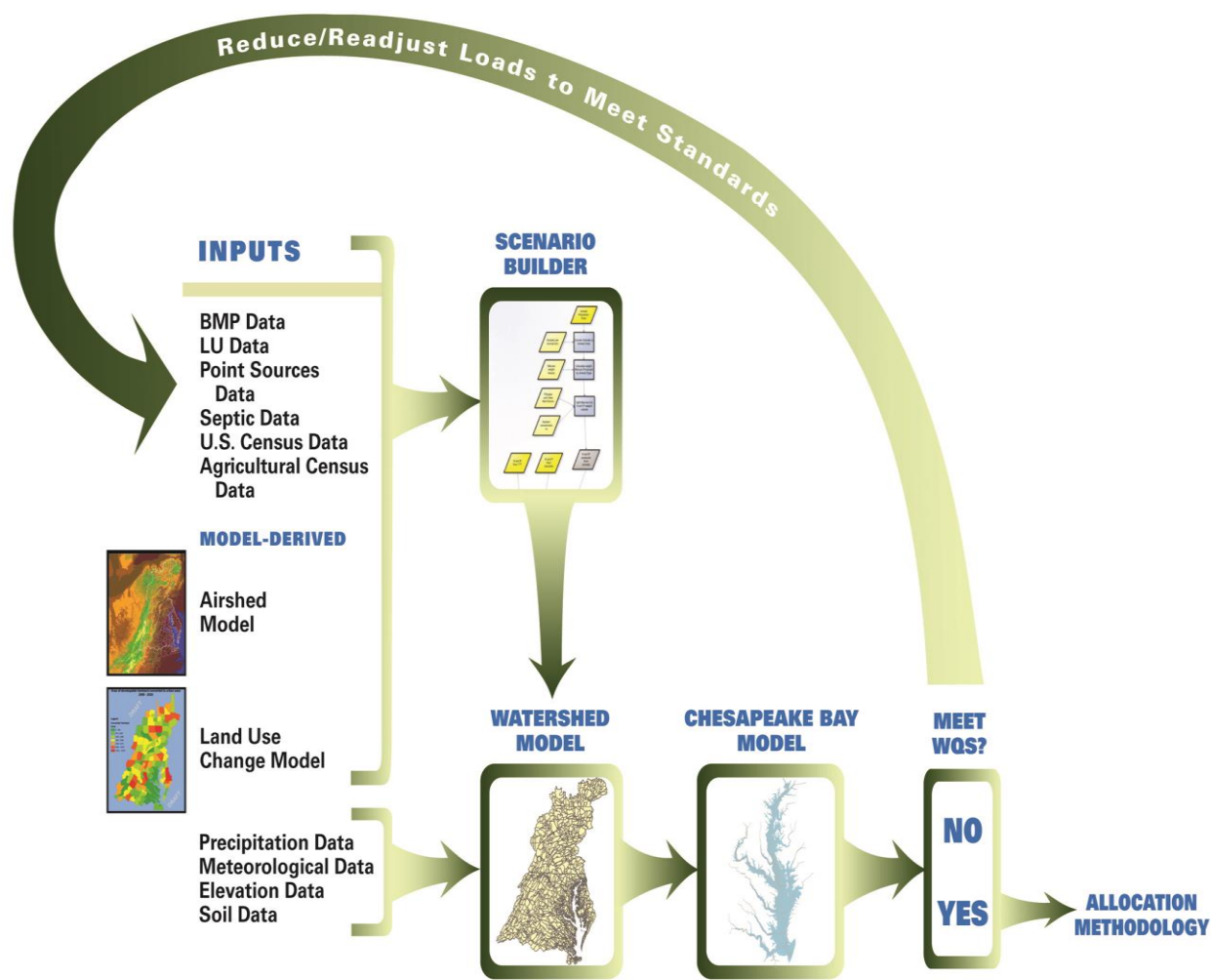
- Other reviews by the partnership or external groups are welcome and will be responded to as time allows. Implementation of these recommendations will be at the discretion of the WQGIT and Modeling Workgroup.
- **Prioritizing Changes - How**
 - Issues identified as “Fatal Flaws” by the WQGIT or the Modeling Workgroup will be the top priority, other recommendations will be judged by their feasibility and the following three factors:
 - Complexity – Any change that is a simple update to a value in a table (BMP efficiency, land use load ratio, etc.) can be implemented in a few minutes and will not be subject to this constraint. A complex change to BMP reporting or the way that fertilizer and manure are calculated would take more time to implement.
 - Timing – a recommendation submitted in April, 2016 has a greater chance of being implemented than one submitted on September, 2016, all else being equal.
 - Competing priorities – Just about any change can be accommodated, but the partnership may have to choose between multiple priorities given the available time.

Communication Framework Phase 6 Review

- The partnership can access data, documentation, and outputs through the Modeling Workgroup’s webpage. Links will be sent to the Modeling Workgroup and WQGIT members and interested parties when the information is available.
- Results will be presented at the Modeling Workgroup and WQGIT meetings. For efficiency, suggest scheduling WQGIT F2F 2-weeks following modeling Quarterly review.
- The modeling team will work directly with STAC during the reviews.
- Partnership groups can submit feedback to the modeling team through the WQGIT or Modeling Workgroup.
- Documentation of feedback, prioritization and status will be maintained by the modeling coordinator.

Comparing Versions of Models

- Beta versions must not be used to inform final Bay Restoration policy decisions. They can provide insights into expected changes but only the final version can be used to inform official policy.
- In comparing the Phase 6 version of the model to previous versions of the modeling tools, history has shown that a common question is to understand the level of implementation effort required to meet water quality goals.
- The Bay models are a suite of models and ultimately must be applied as a complete system to understand how model revisions impact on implementation levels.



Phase 6 Review Schedule for Key Decisions & Deadlines

<p><u>December 2015 – March 2016</u></p> <ul style="list-style-type: none"> • Release of Beta 1 Version (Jan 2016) • Very preliminary findings on the Bay and watershed effects from climate change • STAC Workshop on Conowingo modeling approach with Phase 6 WM and WQSTM (Jan 13-14) • STAC Workshop on approach to climate change in Phase 6 WM (March) • STAC Peer Review of Phase 6 Watershed Model begins (Feb) • STAC peer review of proposed James River chlorophyll-a criteria assessment procedures (Jan - March) 	<p><u>April 2016 – July 2016</u></p> <ul style="list-style-type: none"> • Phase 6 Beta 2 model calibration w/ data updates (April Modeling Quarterly) • Initial findings from key Phase 6 model scenarios – No Action (2010), All Forest, 1985 Progress, 2009 Progress, 2014 Progress, E3, and Phase II WIPs (April Modeling Quarterly) • Maryland led peer review of Conowingo modeling (May) • STAC Workshop on model uncertainty (Spring) <ul style="list-style-type: none"> ○ Possible uncertainty analysis following STAC Workshop • STAC peer review of WQSTM (June) • Model analysis of James chlorophyll-a (Summer) • Updated assessment of Conowingo (July) • Phase 6 Model calibration w/ data updates (July Modeling Quarterly) • Final decisions on loading rates, e.g. tree canopy (April) • Decisions on BMP efficiencies, onsite system attenuation
<p><u>August 2016 – November 2016</u></p> <ul style="list-style-type: none"> • Phase 6 Beta 3 model calibration w/ data updates (October Modeling Quarterly) • • STAC peer review of climate change modeling approach (Aug) • Final high resolution land use data (Sept) • Approval of updates to land uses for Phase 6 (Sept) • Deadline for all final data inputs to Phase 6 modeling tools for final calibration (Sept) • 	<p><u>December 2016 – March 2017</u></p> <ul style="list-style-type: none"> • Final calibration of Phase 6 modeling tools (January Modeling Quarterly) • Phase 6 Watershed Model final (January 1, 2017) • Preliminary/limited Phase 6 linked Watershed and Estuarine Model scenarios presented (Jan-Feb 2017) • All Phase 6 linked Watershed and Estuarine Model runs complete (March 2017) • WQGIT decision on climate change assessment findings and implications (Jan - Feb 2017) • WQGIT decision on final assessment of Conowingo and implications (Jan – Feb 2017) • MB & PSC decision on climate change assessment findings and implications (March 2017) • MB & PSC decision on final assessment of Conowingo and implications (March 2017)