# Modeling Quarterly Review Meeting

January 28-29, 2015

http://www.chesapeakebay.net/calendar/event/21646/

**UPCOMING MEETINGS**

**March Modeling Workgroup Conference Call**
Date: March 26, 2015
Time: 10:00AM – 12:00PM
Location: Room 305A CBPO 410 Severn Avenue, Annapolis, MD
Conference Line: 1-866-299-3188 code 267-985-6222
Adobe Connect: https://epa.connectsolutions.com/modeling (enter as guest)
Event Webpage: http://www.chesapeakebay.net/S=0/calendar/event/22433/

**April Modeling Quarterly Review**
Date: April 22-24, 2015
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/S=0/calendar/event/22434/

**MINUTES: JANUARY 28, 2015**

**Review of Modeling Workgroup Priorities – Lee Currey, MDE – Dave Montali, WVDEP**
*Attachment A*

- A brief review of upcoming priorities and deadlines was provided by Lee Currey.
- ACTION: Update Modeling WG Membership

**Phase 6 Watershed Model Schedule Update = Gary Shenk, EPA-CBP**
*Attachment B*

Gary reviewed updates on the watershed model, the schedule of model development, and three workshops to be proposed to STAC.

- Land use types are behind schedule and is slowing progress in other areas of model development.
- Announcement of new STAC Coordinator Bill Ball.
- The three STAC proposals to be submitted by the modeling workgroup involve climate change, model uncertainty, and Conowingo infill.

- Mark Bennett is taking the lead on compiling a broader climate change proposal that incorporates more than just an approach entirely focused on the modeling aspects.
- The proposal considering uncertainty analysis is to be sponsored by the WQGIT.
- The Conowingo infill proposal notes points of interest such as the behavior of the reservoir through time, nutrient speciation change, and the behavior of other reservoirs.

**Representation of Storage and Lag Times in the Chesapeake Watershed – Ciaran Harman, Johns Hopkins**
*Attachment C*

Ciaran presented an overview of transit time distribution approaches and the potential to utilize Storage Selection functions (SAS) within the watershed model, specifically the rank Storage Selection (rSAS) model developed and currently in review.

- rSAS can be implemented with current hydrology within the model, and it is recommended that a storage dependent gamma function be used to model transit time distributions.
- rSAS can be applied to the groundwater lag times initially. Surface washoff timing will still be simulated using the UNEC function.
- **ACTION**: Contact Ward Sanford about attending April Quarterly meeting to discuss Eastern Shore work with storage selection.
- **ACTION**: Make Ciaran's article available to quarterly attendees. For anyone interested in reviewing the article please email Kyle Hinson, khinson@chesapeakebay.net.

**PQUAL Sensitivity to Inputs – Guido Yactayo, UMCES**
*Attachment D*

Guido reviewed some of the motivations behind the use of pre-defined sensitivities to inputs to model nitrogen in the development of Phase 6 instead of continuing to use AGCHEM. In addition, Gary reviewed the methods by which land use loading rates are being modified.

- There is a loss of spatial variability that AGCHEM helped produce, but much of that variability was not easily explicable and may have been based on hydrologic differences based upon the shape of the watershed and not necessarily actual hydrologic parameters that should drive differences. The spatial detail will be regained through land-to-water and stream-to-river factors
- A decision was made to move ahead with P532 nitrogen sensitivities, which have been implemented. Any questions or concerns by members of the modeling workgroup will be addressed by Feb. 3, 2015.
- Information generally available on land use loading rates are delineated as edge of stream. The edge of field factors are expressed at the spatial scale of edge of stream but are averaged across the landscape. To determine the factors it is possible to multiply first through fourth order streams by watershed delivery variance factors which are determined by measurable qualities outlined in Ross Mandel's presentation (Attachment

K). There is therefore no true edge of field within the model, but there is a sensitivity that is not based on the actual physical setting after which the physical setting and BMPs are applied to determine the loading rates.

**Phase 6 Phosphorous Simulation: Role of APLE in Phosphorous Sensitivities– Gary Shenk, EPA-CBP – Guido Yactayo, UMCES**
*Attachment E.1*, *Attachment E.2*

Gary presented an overview of approaches being taken to refine modeling phosphorous processes, and Guido reviewed updates about APLE's implementation thus far within the watershed model.

- STAC phosphorous report emphasized that we are dealing with a great stored deposit of phosphorous, and also recommended the use of a model that matches the current understanding of transport in the literature. APLE is the phosphorous model closest to that understanding.
- Now that APLE is programmed in FORTRAN, it will be run with numerous different inputs. Once the behavior is better understood it will be easier to make improved decisions. Further ideas about factors affecting phosphorous that should be incorporated into the model are welcome.
- Data availability is limited. This is the first time that phosphorous collection has been attempted across the entire Bay watershed. Data primarily came from universities, and some by private labs, and were provided by zip code, county, or state, depending on the source.

**Phase 6 Development Progress – Gopal Bhatt, Penn State**
*Attachment F*

Gopal presented brief updates on progress made in model development since the last modeling quarterly meeting, covering the general simulation period, the incorporation of lag times including the use of transit time distributions, and the exploration and feasibility of rSAS.

- The modeling team is currently in the phase of data gathering and data development.
- There are separate concentration targets for surface water and groundwater in developing the transit time distribution (TTD) methods.
- TTDs can be applied by targeting the land segments at land use scales. The entire catchment cannot use one single TTD, but a single TTD could be used to begin the method as a prototype.
- There are concerns about the UNEC (Unit Nutrient Export Curve) method failing to conserve mass, which will be addressed at the end of development.
- Obstacles in moving to rSAS include adding a variable to lose mass based on first order decay, obtaining specific parameters, and assumptions about pulse attenuations.

**MINUTES: JANUARY 29, 2015**

**Record of Modeling WG Presentations – Lee Currey, MDE – Lewis Linker, EPA-CBP**

*Attachment G*

Lewis reviewed the presentations covered throughout the two quarterly meetings, outlining progress and projected future work for refining the Phase 6 model.

- The Phase 6 Land Use Target decisions are to be finalized by the April quarterly meeting.

**Progress in Phase 6 Land Use/Land Cover – Peter Claggett, USGS**
*Attachment H*

Peter presented a status report about the progress that has been made in developing Phase 6 land use data and reported about the discussion that was held at the land use workgroup meeting.

- In every county, the land change model is used to better represent the initially underestimated spatial extent of crop types (compared to the land census) and pixels are added until the crop cover is equivalent to that which is reported in the agricultural census.
- The land use dataset is to be finalized in April but there will be continued review by jurisdictions into July. If jurisdictions have additional data that fall into the defined data classes, then they can be accepted by May 2016 subject to partnership approval.

**USGS Dynamic Surface Water Extent (DSWE) Project for Quantifying Surface Water Storage on the Landscape – John Jones, USGS**
*Attachment I*

John introduced the USGS' DSWE project and discussed the status, goals and aims for the project. The modeling workgroup then discussed possibilities for collaboration.

- Terrain analysis could be applied to flow path analyses currently being undertaken.
- Stream to river factors work taken on by Ross Mandel could also be benefited by DSWE, to better predict water spatial quality.
    - However, SPARROW empirically estimates effects of NHD water features. With a different and more accurate accounting of water features provided by DSWE, there would not necessarily be an impetus to apply what SPARROW had estimated as an effect of the NHD features. A different coefficient that would be produced due to the presence of more water features would likely necessitate that the DSWE tool be run through SPARROW to see if it helps to better predict water quality spatially compared to current NHD water features. This would be a fairly major revision to the use of SPARROW.
- **ACTION**: Bay Program Modeling Team to follow up with John about potential targeted study areas where SPARROW is already being run and comparisons can be made.

**Progress with Phase 6 Land Use Target Loads – Olivia Devereux, Devereux Consulting**
*Attachment J*

Olivia summarized findings provided by multiple models and a literature review on land use export rates for multiple targets and presented a comparison of the data.

- The information from the studies were derived for multiple different reasons, and not necessarily to quantify export rates related to a particular land use.
- Guidance on weighting data from the literature review regarding natural land uses is needed to better understand loads.

**Progress in Replacing Regional Factors: A Multiple Model Approach Based – Ross Mandel, ICPRB**
*Attachment K*

Ross reviewed work done using SPARROW to represent land-to-water delivery factors as well as stream-to-river processes for streams that fall below the level of those classified in Phase 6.

- The machinery of using this method has been developed, and in the process it does several things. When a SPARROW run is completed and the model calibrates it will calibrate the land to water delivery factors which determines the quantity of the load from the edge of field to the smallest order streams represented. Following this, delivery factors are assigned to estimate small stream processes to tell us how much is being lost in the small streams.

**Refinements in Phase 6 Land Segments – Howard Weinberg, UMCES – Peter Claggett, USGS = Gary Shenk, EPA-CBP**
*Attachment L*

Howard presented updates on new land segments developed for Phase 6.

- Recommendations and proposals included the non-inclusion of federal land segments (already requested by the Modeling WG), update the county boundaries with newer GIS data, and to update the subdivisions on those counties based on a surrogate of precipitation data with actual precipitation data.
- Next steps include forming polygons with cell data, conflating it with the county data so that all boundaries match up, incorporating those into the counties, and then overlaying the new land segments with Phase 5 river segments to create Phase 6 land-river segments.
- **ACTION**: Proceed with Phase 6 segmentation approach outlined, return in April with the new segmentation completed.
- There will still be tabular acreage of federal land, just not a separate simulated segment.
- A suggestion was offered to possibly use HUCs for the outer watershed boundary. However, changing the outer boundary without using the latest HUCs would necessitate recreating all the outer land segments, a task that is not feasible for the established April completion date.

| Last Name | First Name | Email | Affiliation | 1/28 | 1/29 |
|---|---|---|---|---|---|
| **MEMBERS** | | | | x | x |

| | | | | | |
|---|---|---|---|---|---|
| Currey | Lee | lcurrey@mde.state.md.us | MDE/Modeling WG Co-Chair | x | x |
| Montali | Dave | david.a.montali@wv.gov | WV DEP/Modeling WG Co-Chair | x | x |
| Linker | Lewis | linker.lewis@epa.gov | EPA/CBPO/Modeling WG Coord | x | x |
| Hinson | Kyle | khinson@chesapeakebay.net | CRC/CBPO/Modeling WG Staffer | x | x |
| Bennett | Mark | mrbennet@usgs.gov | USGS | | x |
| Gladding | Steve | smgladdi@gw.dec.state.ny.us | NYSDEC | x | x |
| Keeling | William | william.keeling@deq.virginia.gov | VA DEQ | x | x |
| Mandel | Ross | rmandel@potomac-commission.org | ICPRB | x | x |
| Shenk | Gary | gshenk@chesapeakebay.net | EPA/CBPO | x | x |
| Tesler | Ted | thtesler@pa.gov | PA DEP | x | |
| **PARTICIPANTS** | | | | x | x |
| Amin | Vimal | vamin@mde.state.md.us | MDE | | x |
| Bell | Clifton | Cbell@BrwnCald.com | Malcolm Pirnie, Inc. | x | |
| Berger | Karl | kberger@mwcog.org | MWCOG | x | x |
| Bhatt | Gopal | gbhatt@chesapeakebay.net | Penn State/CBPO | x | x |
| Brosch | Chris | broschc@vt.edu | VT-VADCR | x | x |
| Dalmasy | Dinorah | dinorah.dalmasy@maryland.gov | MDE | x | |
| Davis-Martin | James | james.davis-martin@deq.virginia.gov | VADEQ | | x |
| Devereux | Olivia | olivia@devereuxconsulting.com | DEC, Inc. | x | x |
| Friedrichs | Marjy | marjy@VIMS.edu | VIMS/STAC | x | |
| Friedrichs | Carl | carl@VIMS.edu | VIMS | x | x |
| Gardner | Natalie | gardnern@si.edu | CRC/STAC | x | |
| Goulet | Norm | ngoulet@novaregion.org | Northern VA Regional Commission | | x |
| Harman | Ciaran | charman1@jhu.edu | JHU | x | |
| Ibrahim | Mukhtar | mibrahim@mwcog.org | MWCOG | x | x |
| Jones | John | jwjones@usgs.gov | USGS | | x |
| Kling | Lara | lara.kling@deq.virginia.gov | VA DEQ | x | |
| Mirsajadi | Hassan | hassan.mirsajadi@state.de.us | DE DNREC | | x |
| Mulkey | Alisha | alisha.mulkey@maryland.gov | MDA | x | x |
| Pattison | Kenn | kpattison@state.pa.us | PA DEP | | x |
| Power | Lucinda | power.lucinda@epa.gov | EPA/CBPO | x | |
| Quinn | Sheryle | sheryle.quinn@navy.mil | US Dept of Navy | | x |
| Rutkowki | Mary Jane | mrutkowski@mde.state.md.us | MDE | x | x |
| Stallings | Kevin | kdstalli24@gmail.com | NCSU | x | |
| Sweeney | Jeff | jsweeney@chesapeakebay.net | EPA/CBPO | | x |

| | | | | | |
|---|---|---|---|---|---|
| Szydlowski | Sally | sallyb@waterstewardshipinc.org | Water Stewardship | | x |
| Tian | Richard | rtian@chesapeakebay.net | UMCES/CBPO | x | x |
| Tribo | Jenny | jtribo@hrpdcva.gov | HRPDC | x | x |
| Wang | Ping | pwang@chesapeakebay.net | VIMS/CBPO | x | x |
| Wazniak | Cathy | cwazniak@dnr.state.md.us | MDNR | | x |
| Wilusz | Dano | dwilusz1@jhu.edu | JHU | x | |
| Yactayo | Guido | gyactayo@chesapeakebay.net | UMCES/CBPO | x | x |