Modeling Workgroup Conference Call
September 3, 2015
12:00 PM – 2:00 PM

For Remote Access:
Adobe Connect: https://epa.connectsolutions.com/modeling/ (enter as guest)
Conference Bridge: 1-(866)-299-3188 code 410-267-5731
Event webpage: http://www.chesapeakebay.net/calendar/event/22982

MINUTES

Announcements and Amendments to the Agenda – Lee Currey, MDE and Dave Montali, WVDEP

- SAVE THE DATES:
  - October Modeling WG Meeting – October 5 (to check up on Phase 6 data inputs and progress in climate change analysis)
  - Fall Modeling Quarterly Review – November 3-4
- The Modeling WG Leadership met with the WQGIT immediately after the meeting, and will bring back points to the Modeling WG membership at the October Quarterly.
- Decisions were made at the last quarterly meeting to move ahead with nitrogen sensitivities in the beta version of the Watershed Model.

Advances in Phase 6 Phosphorus Simulation – Gary Shenk, USGS-CBPO
Attachment A

- Work is being completed on parallel tracks, and the Modeling Team is still on time to complete development of the models by the end of 2015.
  - Despite some missed deadlines of model inputs, the Modeling Team has developed robust software that has kept the modeling development schedule on time.
- Many outstanding items will start to fall into place as soon as the land use acreage comes in mid-September.
- Provisional atmospheric data is set to come in during the calibration period.
- Gary also reviewed the reasoning for assumptions made about phosphorus storage and transport in Phase 5, and demonstrated how the understanding of phosphorus within the modeling team has grown since then.
- Bill Keeling made a comment regarding amendments to the soil as a factor contributing to higher loads from fields, in addition to the contribution of tillage rates with increased loads.
- The simulation of phosphorus dynamics are not being applied generally to all parts of the watershed based on the latest research findings. Rather, the research direction points to the effect of the storage of phosphorus and geographic differences that need to be taken into account when sensitivity to inputs are incorporated. Delivery variance factors are based more on land segments on the Western Shore than those on the Eastern Shore.
- With further efforts and comparisons of preliminary work done by Jeremy Testa and Lora Harris of UCMES, the theory, monitoring data, empirical models, and field scale research

are all pointing in the same direction. Namely, soil phosphorus is the most important factor when simulating the export of loads, and has been previously underrepresented in the coastal plain in previous models.

- Bill Keeling also voiced concerns about the reliance on soil test phosphorus based on requirements of nutrient management plans for different users, which could potentially skew results in the VA coastal plain.
- A discussion regarding whether or not the tree canopy land uses were fully established was tabled to continue the discussion focus on phosphorus.

Phase 6 August Prototype with Revised Phosphorus Calibration– Gopal Bhatt, PSU 38:00
Attachment B

- Gopal presented work done for the development of the Phase 6 Watershed Model, and the progress made since the July Quarterly meeting.
- With respect to new calculations of delivery variances, individual precipitation, and sediment wash-off, variances were excluded to avoid double counting since precipitation and sediment runoff sensitivities were previously calculated using APLE.
- Nitrogen model outputs in the P6 beta version show very favorable comparisons with the Phase 5.3.2 model outputs.
- Significant progress has been made in bringing the phosphorus outputs closer in alignment to WRTDS loads, and further progress is also expected with the inclusion of October data.
  - It should be noted that while the Phase 5.3.2 loads were in close alignment with WRTDS loads thanks to regional factors and calibration, the closeness of fit seen in Phase 6 development without calibration helps to validate the methodology used.
- Q: How does the difference in a Mehlich value affect targets set for phosphorus, especially when looking in areas of higher concentration like the coastal plain?
  - If application rates and Mehlich values were the same across the entirety of the watershed, there would be no differences in the export targets. However, when we bring in Mehlich values and combine them with sensitivities developed in APLE, loads will be shifted around to areas that have greater Mehlich values.
- Bill Keeling asked whether there might be a sampling bias that is skewing the result.
  - The goal is to develop a spatial variability due to differences in soil phosphorus, and data will be updated from Gene Yagow's work in addition to the data provided by Alisha Mulkey.
- Eventually the entire history of soil phosphorus will need to be reproduced, and Guido will further explain the reasoning behind the efforts. This process will help to answer questions regarding the direct use of Mehlich values or the generation of Mehlich values based on a history of inputs, and how closely the calibration follows these values.
- In analyzing the results and realizing the extent of soil phosphorus underestimation in the coastal plain, one of the challenges to be faced is communicating to the WQGIT what the corollary is between expected increased loads and concomitant increased efforts to meet WIP goals. Definitive answers regarding level of efforts and changes in WIP strategies cannot be made at this point.

Phosphorous Sensitivities for Phase 6 Model August Prototype – Guido Yactayo, UMCES-CBPO
Attachment C

- Guido discussed the different simulation periods used to determine the sensitivities, as well as how to determine the effect of the change in input independent of soil phosphorus levels, and lastly present ideas related to how to run progress and what-if scenarios using the new sensitivities.
- As a reminder, sensitivities relate the change in load outputs to the change in inputs.
- Guido presented sensitivity analyses for input increases and decreases of 30 and 60 percent (as recommended by Bill Keeling) for the high till with manure land use for each land segment in the watershed.
- Sensitivities are calculated for each land segment and will be provided to Olivia to calculate targets for the median sensitivity of all the land segments in the watershed. In addition, the relative sensitivity and a range of sensitivity classifications will better define how sensitive the model is to the change in an input.
- The median sensitivity slope increased relative to the base case because of a buildup in soil phosphorus in the APLE simulation. This finding suggests that in order to determine the effects of a change in input independent of soil phosphorus, the Mehlich input would need to be held constant during the simulation. It also suggests an error in potentially double counting in the case of soil phosphorus.
  - While it was clear that double counting was occurring for the Mehlich difference and the effect that fertilization had on Mehlich, whether or not a change in fertilizer has any effect on loads independent of its effect on Mehlich soil phosphorus value is still undetermined. Running the model further with a history of soil phosphorus may help to potentially isolate an independent effect of fertilization.
- In running soil phosphorus histories and projections while examining multiple time periods, decisions should be passed up to managers. It is important for the Modeling Workgroup to keep a broad perspective.. Management practices should be on the ground by 2025, and it is important to ask the GITs what the long-term standards are at which we expect goals to be met.
- Points of insight from the presentations relevant to calibration include the fact that we have been double counting the effect of fertilization in how it affects Mehlich values. It is also clear that a constructed history of soil phosphorus, to be developed with APLE, is necessary as there was relatively little soil phosphorus sampling carried out before the implementation of nutrient management plans. As APLE runs the balance between inputs and uptake, it will be necessary for each land use and land segment to use the inputs available to create this soil phosphorus history.
- Bill Keeling expressed concerns that historical observations may bias the development of the soil phosphorus history. This issue will be further discussed offline in internal modeling team meetings with Gene Yagow.
- Loading rate targets should be based on the average of the soil phosphorus history, which scenarios and calibration will also require.

Meeting Attendance

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