WQGIT Workgroup and Modeling Workgroup Midpoint Assessment Priorities

Agriculture Workgroup

- Modeling Baseline/Input Data Assumptions/Needs
  - Examples and issues to be evaluated include: Land Use; Livestock and Poultry Populations; Manure Generation and Nutrient Values; Atmospheric Nitrogen Deposition Values; Use of Annual Census data/Remote Sensing Data vs. 5-Year Census; Manure Management Nutrient Loss Assumptions; Enhanced Modeling Suite Functionality/Assumptions
  - *Initial suggestion for corresponding Guiding Principle: Principle 2*

- Scenario Builder and Chesapeake Bay Program Modeling Suite Transparency, Accuracy, and Confidence
  - Examples and issues to be evaluated include: Review time for Revised Models; Improved Access; Documentation of Assumptions; Public Demonstration of Accuracy; Increased Technical Support Enhanced Modeling Suite Functionality/Assumptions
  - *Initial suggestion for corresponding Guiding Principle: Principle 2*

- Establishment and Update of BMP Definitions and Efficiencies
  - Examples and issues to be evaluated include: Traditional and Commodity Cover Crops; Irrigation Cropland Management; Conservation Tillage and Continuous No-Till; Poultry Heavy Use Area Pads; N and P-Based Nutrient Management; Enhanced and Precision Nutrient Management; Enhanced Scenario Builder use of BMP Definitions and Efficiencies
  - *Initial suggestion for corresponding Guiding Principle: Principle 2*

- Model Data Processing
  - Phosphorus Transport/Accumulation; Address Concerns Regarding Manure Losses, Distribution and Fertilizer Algorithms, Particularly Regarding Replacement of Manure with Commercial Fertilizer; Nutrient Processes in Enhanced Modeling Suite Functionality/Assumptions
  - *Initial suggestion for corresponding Guiding Principle: Principle 2*

- Chesapeake Bay Program TMDL and WIP/Milestones Policy

**Note: Please see attached AgWG Priorities spreadsheet for more detailed information on the Agriculture Workgroup member's priorities for the midpoint assessment.

Land Use Workgroup

- Improve the spatial, temporal, and categorical representation of urban, agricultural, federal, and wetland land uses through the use of local land-use information, annual NASS data, and other land-use related datasets, and by exploring the development of a probabilistic and high spatial resolution land-use dataset.
  - *Initial suggestion for corresponding Guiding Principle: Principle 2*

- Evaluate a variety of methods for developing future land use scenarios that are locally credible and relevant and consider basing the Phase III WIPs on a year 2025 land use to facilitate the crediting the water quality benefits derived from land conservation and land-use planning.
    - *Initial suggestion for corresponding Guiding Principle: Principle 4. 2nd: Principle 2.*

- Investigate differential loading rates for expanded urban land use classes and wetlands.
    - *Initial suggestion for corresponding Guiding Principle: Principle 2*

Milestones Workgroup

Meeting 10/4; input by 9/28.

Modeling Workgroup (Possible refinements following 10/2-3 meeting)

Model Review Process
- Provide clarification on the process and schedule for submitting the 2017 midpoint assessment model recommendations and refinement of model (accountability tool)
    - *Initial suggestion for corresponding Guiding Principle: Schedule*

- The schedule must allow for time to review and comment on outcomes of revisions, methods and tools, including both watershed and estuary models
    - *Initial suggestion for corresponding Guiding Principle: Schedule*

- Explain how to communicate the transition from one model version to another
    - Whenever we upgrade the models with a new version, there are always questions of why the numbers change. Therefore, further discussions should be held related potential consequences when the Bay program moves from WSM v5.3.2 to v.6 post 2017. A great deal of analysis will be need comparing model performance (v5 vs v6) and delivery of loads to the bay.
    - *Initial suggestion for corresponding Guiding Principle: Principle 1. 2nd: Principle 5.*

- Determine the criteria that would determine the need to move to a revised model in 2017
    - *Initial suggestion for corresponding Guiding Principle: Principle 5.*

- Phase 6 WSM have at a minimum 6 months of evaluation/testing and that the WIP 3 development schedule be dependent upon the successful completion of the model review. Specifically that if one or more partners finds a critical flaw that WIP 3 planning does not begin until the identified problems have been corrected and tested to ensure the problems have actually been corrected. This test period would also define the appropriate scale of use of the phase 6 WSM as well as appropriate uses for tracking and reporting progress.
    - *Initial suggestion for corresponding Guiding Principle: Schedule. 2nd: Principle 2*

Model and Input Data
- **Modify land use to make it more "acceptable" to local jurisdictions.** Land use is a large issue at the local level, in part because local jurisdictions do possess better information than what is used in the model, and in part because it is a prerequisite for correctly tracking BMP implementation. I understand that there is a workgroup tasked with improving land use. I also recognize that there may not be enough time to develop a land use acceptable at the local scale.
    - *Initial suggestion for corresponding Guiding Principle: Principle 2*

- Additional work is needed to couple the James River chl modeling & monitoring study with the Bay water quality model. This should include boundary condition comparisons as well as improved model calibration within the tributary proper.
  - *Initial suggestion for corresponding Guiding Principle: Principle 4*

Watershed Model
- Revisit the regional factors
  - There are significant unit load differences across Maryland
  - Consider spatially smoothing the regional factors using kriging concepts.
  - Improvement in local calibration stations (e.g. Phosphorus in Monocacy is consistently over simulated in all versions of the model. Even more so in P5.3.2).
  - *Initial suggestion for corresponding Guiding Principle: Principle 2*

- Calibration to water quality data should consider flow in the quintiles
  - *Initial suggestion for corresponding Guiding Principle: Principle 2*

- Review BMP interaction with surface flow and groundwater flow. For example a stormwater pond is only treating surface flow and does not consider groundwater flow
  - *Initial suggestion for corresponding Guiding Principle: Principle 2*

- Remove nutrient management from HSPF and simulate as a regional BMP. This would simplify the watershed model and facilitate the transparent discussion of BMPs outside of the HSPF code and calibration.
  - *Initial suggestion for corresponding Guiding Principle: Principle 2*

- Incorporate geographically specific targets from site scale models.
  - Investigate the use of local model to refine the targets (e.g. SPARROW).
  - *Initial suggestion for corresponding Guiding Principle: Principle 2*

- Review the impact of a long time period calibration given uncertainty in lag times and BMP response.
  - *Initial suggestion for corresponding Guiding Principle: Principle 2*

- Watershed modeling (WSM) loads below the fall line (BFL) drive Bay water quality responses in the 92 segments. However, few of these below fall line segments have calibration stations to assess model performance (lack both accuracy and precision). Therefore, it is critical the WSM land use characterization be accurately represented. Therefore, detailed analyses of WSM performance BFL should be considered during the assessment phase.
  - *Initial suggestion for corresponding Guiding Principle: Principle 2*

- **Develop additional loading targets for Watershed Model calibration and use these targets to eliminate need for regional factors.** P5 used ESTIMATOR loads to help set regional factors. I would like to see a wider use of load estimates to calibrate the next phase of the Watershed Model. The load estimates used in SPARROW may be a good place to start. I recommend that these load estimates be used to eliminate the need for regional factors by adjusting the calibration targets for the land simulation directly, based on these estimates of watershed yield. These adjustments could be made on a large scale, perhaps the scale of the hydrogeomorphic regions. Consider using PQUAL to make the land simulation calibration easier.
  - *Initial suggestion for corresponding Guiding Principle: Principle 2*

- **Improve river calibration methodology**. Some processes in the HSPF river simulation, and their corresponding parameters, are primarily associated with either high-flow or ambient-flow

events. The automated calibration methodology for the river simulation should be adjusted to take into account the flow regime of observations and corresponding simulated values. Improvements in the simulation ambient-flow phosphorus concentrations could help improve the perceived validity of the model, even if these improvements do not have a great impact on loads.

- *Initial suggestion for corresponding Guiding Principle: Principle 2. 2nd: Principle 5.*

- **Differentiate loading rates and other impacts of different types of impervious surfaces**. Disconnected impervious surfaces have different loading rates and different contribution to flow. Much of the impervious surface in rural areas outside of the transportation sector is probably disconnected. The transportation sector uses a different range of drainage technologies in rural areas than in more developed areas. The model should recognize these differences such as rural vs. urban or connected vs. disconnected and also recognize differences in land use type where these differences can be documented. Some effort should be made to incorporate local monitoring data, such as data collected under MS4 permits, into developed land use targets.
  - *Initial suggestion for corresponding Guiding Principle: Principle 2*

Estuary Model

- Improve simulation of "problem" Bay segments discussed in Appendix
  - *Initial suggestion for corresponding Guiding Principle: Principle 4*

- Improve simulation of estuarine wetlands
  - *Initial suggestion for corresponding Guiding Principle: Principle 2. 2nd: Principle 4.*

ICPRB Watershed Model Review (Full document available from MDE)

The recommendations for improving future phases of the CBP Watershed Model are summarized in the following list:

- Estimate additional load targets for river simulation;
- Eliminate regional factors and calculate land simulation targets on a regional basis;
- Use additional auxiliary information, such as soil nutrient test results, percent connected impervious area, or ratio of inspectors to construction acreage, to estimate intraregional variability in target loads for non-agricultural land uses;
- Consider simplifying Watershed Model land simulation by using the PQUAL module everywhere to simulate fate and transport of nutrients from the land;
- Adjust river simulation parameters based on bias in distribution of flow-indexed observed and simulated concentrations; and
- Measure success of Watershed Model in terms of matching observed daily loads and river load targets.

Adopting these recommendations will require additional work to set up the model, but should result in simplifying model calibration and increasing the transparency of model assumptions.

The efficacy of these recommendations depends on collecting sufficient storm event monitoring data both to establish regional nutrient loading targets and to better calibrate river processes. It is probably unrealistic to expect that sufficient storm monitoring data will be collected before the 2017 reevaluation of the Watershed Model to fully implement these recommendations, particularly since the model simulation period, and all the other input data that entails, would also have to be updated. But any additional storm monitoring data collected before 2017 could be used to better estimate river load targets, and consequently, recalculate land simulation targets on their basis according to the recommendations of this memo. A computer simulation model is only as good as the data that is used to develop it, and the Watershed Model can be improved to the extent to which additional storm data is collected to better identify the regional distribution of nutrient loads within the Chesapeake Bay watershed.

- *Initial suggestion for corresponding Guiding Principle: Principle 2. 2nd: Principle 4.*

Trading and Offsets Workgroup

1. Recognize in the MA principles or elsewhere that jurisdictions in 2017 could be using PS or NPS credits or offsets to achieve or maintain the MA goal (i.e., 60 percent load reduction by 2017 compared to the 2009 TMDL baseline). The MA will assess progress toward implementing practices to achieve the 2017 goal. Clearly, practices implemented in a sector could demonstrate progress toward meeting that sector's WLA or LA (e.g., WWTP upgrades, ag BMPs, sw SCMs). But with trading, practices from one sector could demonstrate progress toward meeting the WLA or LA of another sector. Currently, no MA documents recognize this possibility.
   a. *Initial suggestion for corresponding Guiding Principle: Principle 1 (eg, that midpoint assessment is separate from reaching 2017 goal, and that latter still needs to continue in parallel). 2nd: Principle 4.*

2. Develop technical memoranda.
   a. *Initial suggestion for corresponding Guiding Principle: Principle 4 (to extent would affect how things done differently after 2017). 2nd: Principle 1 (this should be happening in parallel to midpoint assessment as part of the 2017 goal).*

3. Create a sixth principle that addresses the practical issue of funding practices to implement the TMDL and engages the private sector in that effort.
   a. *Initial suggestion for corresponding Guiding Principle: Principle 5 (eg, what will help w/ implementation, ensuring things don't fall off table). 2nd: New Principle 6.*

4. Determine effect on trading programs from delivery factors revised through Principle 4: Address Emerging Issues that May Impact Current Strategies and Future Plans. Specifically, determine the effect of "…factoring in [the] new understanding of the Susquehanna River dams' influence on nutrient and sediment pollutant loads…". (Less imperative priority, but still important.)
   a. *Initial suggestion for corresponding Guiding Principle: Principle 4.*

5. Develop protocol, based on projected numbers for population growth, to estimate future offset demand. (Less imperative priority, but still important.)
   a. *Initial suggestion for corresponding Guiding Principle: Principle 4.*

Urban Stormwater Workgroup

Priority #1 – Improved modeling accuracy of area-specific hydrologic networks, land use characteristics, and sediment dynamics.

a) The model currently fails to adequately differentiate between different classifications of urban land use. The USWG highly supports improved characterization of urban land use as also discussed within the Land Use Workgroup, e.g., differentiating loading rates.
b) Assess the Model's accuracy; specifically, the USWG suggests that the Model Team run small scale simulations for headwater areas with relatively uniform land use (all urban or all agriculture) to verify loadings based on input parameters.
c) Improve the Model's depiction of local hydrologic networks, the USWG suggests distinguishing connected from non-connected areas, and incorporating proximity to watercourses. This would help improve regionalization factors that currently display large variability between segments.
d) Improve the Model's depiction of explicit stream erosion; [*clarification added by DE: after a watershed reaches a certain impervious threshold,*] much of the sediment and phosphorus may be

coming from stream erosion versus land surface wash off, especially in low density dominated areas.
- *Initial suggestion for corresponding Guiding Principle: Principle 2.*

Priority #2 – Greater capture of local impoundments and reservoirs
Only the largest impoundments/reservoirs were incorporated in the previous version of the Model. Integrating a greater portion of these impoundments would supplement the USWG's previous priority.
- *Initial suggestion for corresponding Guiding Principle: Principle 2.*

Wastewater Treatment Workgroup

Wastewater Plants:
1. Determine how to reconcile/account for actual or apparent differences in reported annual loads versus WLAs due to permanent or annual Trades and Offsets.
   a) *Initial suggestion for corresponding Guiding Principle: Principle 4 (to extent would affect how things done differently after 2017). 2nd: Principle 1 (this should be happening in parallel to midpoint assessment as part of the 2017 goal).*

2. Determine how to improve nutrient loading data from Non-Significant Facilities, especially the Non-Significant Industrial Facilities.
   a) *Initial suggestion for corresponding Guiding Principle: Principle 2.*

3. Agree on methodologies to reflect the expected variability in point source loads when reporting on progress:
   a) To account for the expected variability due to wet weather impacts – to be consistent with how non-point source progress is characterized; and
   b) To ensure that increases in loads attributable to growth that are under the load caps is expected/acceptable and is not mistaken for lack or a decline in progress.
   c) *Initial suggestion for corresponding Guiding Principle: Principle 4.*

4. Standardize the methods used to calculate the net loads from industrial plants with river uptakes and defining the no-net-contribution dischargers.
   a) *Initial suggestion for corresponding Guiding Principle: Principle 2.*

5. Evaluate how biosolids that are land-applied are accounted for – to ensure that net loads are accounted for, and to ensure consistency with how other nutrient load ag practices are accounted for (e.g., manure, chemical fertilizers). [Point raised in BMP Verification process]
   a) *Initial suggestion for corresponding Guiding Principle: Principle 2.*

On-site/Septics:
1. Determine how to best to use local septic information to improve Bay model estimates to:
   a) Better reconcile local and Bay Program data; and
   b) Assess how this information can be used to improve how loads are estimated in growth projections.
   c) *Initial suggestion for corresponding Guiding Principle: Principle 2.*

2. Develop methods for identifying/quantifying loads from commercial and residential systems.
   a) *Initial suggestion for corresponding Guiding Principle: Principle 2.*

3. Agree on methods to account for reduced septic loads due to:

a) Septic system/BMP upgrades;
b) Connections to sewered systems; and
c) Determine how to address affordability issues associated with onsite/septic upgrades for nutrient removal - and identify potential funding sources; recognizing the increased concerns as we move forward in the process.
d) *Initial suggestion for corresponding Guiding Principle: Principle 2. For 3c, could also consider under potential new Guiding Principle 6 – funding solutions.*

Watershed Technical Workgroup

1. The Chesapeake Bay Program's Phase 6.0 Watershed Model should undergo a **thorough review process** including uncertainty analysis and local groundtruthing, and the Phase 3 WIP schedule should be adjusted if changes are made to the model during this review process.
   a) *Initial suggestion for corresponding Guiding Principle: Schedule*

2. **Regional delivery factors** should be adjusted so that delivery loads reported by the model represent real world loads derived from local monitoring stations. This would result in better incorporation of lag times, and reduce the risk of drastically different loading rates from one locality that flows into separate basins.
   a) *Initial suggestion for corresponding Guiding Principle: Principle 2*

3. **Local data** on both urban and agricultural land uses, and loadings (manure, fertilizer, animal numbers, and urban loads etc.) should be incorporated to increase local confidence in the model and Scenario Builder. Specifically, the model should improve:
   a) Agricultural manure and fertilizer use
   b) Animal numbers
   c) Urban fertilizer use
   d) Urban, construction and AFO/CAFO loading rates.
   e) *Initial suggestion for corresponding Guiding Principle: Principle 2*

4. Where local data is not available, the Chesapeake Bay Program should work to create **finer scale, more accurate distributions of loads** from both urban and agricultural lands. This will require better distribution of animals, manure and fertilizer application on all land uses, as well as more accurate land use classifications and spatial distributions.
   a) *Initial suggestion for corresponding Guiding Principle: Principle 2*

5. **Simulations of phosphorus and sediment dynamics** should be improved for all land uses.
   a) *Initial suggestion for corresponding Guiding Principle: Principle 4.*