WQGIT Workgroup and Modeling Workgroup Midpoint Assessment Priorities

Note: This document lists priorities by workgroups and gives a quick assessment of the relative level of effort by the CBPO using a stoplight color code. The purpose is to inform the WQGIT's deliberations on priorities. Efforts were made to include the latest version of each workgroup's priorities, however this is not meant to be the official list of priorities, but rather an informal document to be used during the Oct WQGIT meeting.

Color Codes

Not a modeling Question
Already in Motion
Low Effort
Medium Effort
High Effort

Agriculture Workgroup

1. Modeling Baseline/Input Data Assumptions/Needs
    - Examples and issues to be evaluated include:
        - Land Use Categories and Conversions; Livestock and Poultry Populations and associated Manure Generation and Nutrient Values;; Manure Management Nutrient Loss Assumptions; Already in Panels
        - Atmospheric Nitrogen Deposition Values; Will need to update analysis. Best way is to re-contract with same provider to generate the data for us. Many of the high-dep stations had few years last time. Now with 10 more years of data. Very good idea to do this. Will take 1-2 person-months for the modeling team to implement.
        - Use of Annual Census data/Remote Sensing Data vs. 5-Year Census scenario builder effort to integrate new data, but needs to coordinate with land use workgroup, ag workgroup, and USDA workplan.
        - Enhanced Modeling Suite Functionality/Assumptions What does this mean?
        - Fertilizer Application Rates; Blended Crop Yield Data; Manure Mineralization Values and Assumptions; Nitrogen Volatilization Will likely take a good deal of time in workgroups and committees, but should not be much of a SB programming issue
    - *Initial suggestion for corresponding Guiding Principle: Principle 2*

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; to be worked out in WQGIT
        - Improved Access; CAST to be closer to SB/WSM output. Access to WSM already a priority. If Scenario Builder itself is to be easily accessible, it would require a significant effort.
        - Documentation of Assumptions; Fully documented, and will continue to do so. Panels will be documented. SB and WSM documentation will be updated. Possible simplification of modeling processes will help.
        - Public Demonstration of Accuracy and Variance; Calibration always available. Factors Affecting Trends will further explore accuracy of prediction.

- Increased Technical Support New Hire
- Enhanced Modeling Suite Functionality/Assumptions What does this mean?
- Incorporation of BMP Expert Review Panel Recommendations varying degree of effort, but will be accomplished
- State Review Process for Allocation of County BMPs Implementation to Model Segments Need more detail. Could be very simple with tools already in place
- Use of PQUAL for Simulations discussed below in modeling priorites . Long term time savings for investment up front
- GIS Land Use Data Layers discussed below in Land Use Workgroup. Likely very difficult to implement

- *Initial suggestion for corresponding Guiding Principle: Principle 2*

3. 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; Already in panels
     - Enhanced Scenario Builder use of BMP Definitions and Efficiencies Standard Procedure
     - Alternative Manure Technologies; Animal Mortality; should be relatively easy to implement, but may require additional panels
     - Clarity and Consistency between CBP BMPs and NRCS CPs Definitions and Reporting Methods; Improved Clarity of NEIEN BMP Reporting; A good goal, but some of these discrepancies exist for good reasons. AgWG could take a look at it.
   - *Initial suggestion for corresponding Guiding Principle: Principle 2*

4. Model Data Processing
   - Phosphorus Transport/Accumulation; we have the STAC group ongoing. This will interact with some of the BMP panels. Once we have the information about what we need to take into account, we will still need to discuss the implementation of the ideas, probably within the Modeling WG. There may be significant work in the WSM and/or SB teams to implement.
   - Address Concerns Regarding Manure Losses, Distribution and Fertilizer Algorithms, Particularly Regarding Replacement of Manure with Commercial Fertilizer; in various Ag WG Panels
   - Nutrient Processes in Enhanced Modeling Suite Functionality/Assumptions What does this mean?
   - Model Segments match County Size; Not sure how this could be accomplished with a good calibration of hydrology. Also opposite to calls to understand smaller-scale watershed effects
   - Verification of Automatic Load Calibration for Split-Basin Counties; Hydrology Calibration Alternatives; See calibration discussion in modeling comments below. Time-consuming, but likely to be a big priority
   - Federal Facilities Segmentation Will be a topic for the Land Use Workgroup
   - *Initial suggestion for corresponding Guiding Principle: Principle 2*

5. Chesapeake Bay Program TMDL and WIP/Milestones Policy
   - Examples and issues to be evaluated include:

- Jurisdictional goals do not change, regardless of any other programmatic changes; Reinstatement of 2003 Allocation Principle that Bay Jurisdictions who benefit more are expected to do more

- *Initial suggestion for corresponding Guiding Principle: Draft Principle 5*

**** Note: Additional detail of the Agriculture Workgroup members' priorities can be accessed through the spreadsheet "AgWG MPA Priorities" at http://www.chesapeakebay.net/calendar/event/18727 ****

Land Use Workgroup

1. 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. Clearly this is going to be a very big effort over several years. I fully expect many versions to be produced with different land use classifications. SB and WSM will have to be able to deal with the new land use types as they come in. The WSM can incorporate new land uses relatively easily, but we'll need to develop calibration targets and hydrologic characteristics for each. SB will need more work to accept new land uses and this should be considered in the architecture redesign.
    a. *Initial suggestion for corresponding Guiding Principle: Principle 2*

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. This is just a scenario for the WSM and SB teams, so no extra effort.
    a. *Initial suggestion for corresponding Guiding Principle: Principle 4. 2nd: Principle 2.*

3. Investigate differential loading rates for expanded urban land use classes and wetlands. Since the development of the phase 5 land use calibration targets, Bob Pitt's group has made very significant progress in the development of differential land use loading rates in the National Stormwater Quality Database. At the first level of lumped modeling, similar to phase5.3.x this would be too much of an effort to receive and interpret these data. We would need to gather literature on wetlands to develop an estimate of their effect on loads, which would not be a very large effort. Depending on how the land use works out, we could add much more complexity if we are able to address impervious connectivity or wetland placement issues.
    a. *Initial suggestion for corresponding Guiding Principle: Principle 2*

Milestones Workgroup

1. Evaluating Milestones – What is the most effective way to develop and ultimately evaluate the two-year milestones in order to be able to track these commitments in terms of the TMDL, 2017 and 2025 targets, yet at the same time ensure that jurisdictions are accounting for changes in land use/septic/animal numbers?
    a. Suggestions and further detail to this topic are included in the background material for the Milestone Workgroup priorities.
    b. This supports a priority identified by the Land Use workgroup and suggest this priority corresponds with Guiding Principle 1 and 2.

2. Evaluating Milestones - Wastewater: Exploring the evaluation of wastewater in the annual progress runs examining current flows versus average flows. This topic may support a potential priority for the wastewater workgroup in the midpoint assessment.

a. *This supports a priority identified by the Wastewater Treatment workgroup (#3) and suggest this priority corresponds with Guiding Principle 4.*

3. Ensuring milestones are evaluated using the same model that was in place when they were developed.
    a. *This supports a priority identified by the Modeling Workgroup regarding potential model changes and communication of a transition and suggest this priority corresponds with Guiding Principle 1 and 2.*

Modeling Workgroup

1. **Revisiting the Watershed Model calibration with the goal of improving local watershed results.**

- Topics
    - Revisiting regional factor estimation methods.
    - Consider inclusion of additional calibration data sources from literature and other modeling analyses (e.g. SPARROW).
    - Evaluate the use of NLDAS rainfall data as it compares to XYZ methods.
    - Calibration objective functions (e.g. flow quintiles, weighting).
    - Review calibration methods to determine the effect of the lag times.
        - All of the above calibration topics are considerable expenses of time in both the CBPO modeling team and the modeling workgroup. However, both groups have traditionally dealt with these topics during model calibration so these tasks are expected
- Communication
    - Transitioning model versions.
    - Explanation of calibration revisions.
    - Explanation of regional differences.

2. **Incorporate the revised Airshed Model in the watershed and water quality modeling framework**

- CMAQ Refinement Topics
    - Update the wet deposition.
    - Refine bi-directional ammonia.
    - Update 2007 emissions/meteorology base to update the current 2002 emissions/meteorology base and consider including MARAMA regional inventory into the emissions inventory available from Research Triangle Park (RTP).
    - Develop a new library of CMAQ Scenarios, i.e., current conditions, 2025, 2030, maximum feasible.
        - The CBP is largely a passive user of CMAQ output. These priorities reflect planned CMAQ refinements, but will take a few months to implement in the CBPO modeling team
- Communication
    - Improve communication with state air quality State Implementation Plans (SIPs) counterparts about emissions and modeling.

3. **Refinements to the Water Quality Sediment Transport Model**

- Topics
    - Represent shallows and embayments with a finer grid, perhaps with a ribbon model, perhaps with finite volume grid to better represent clarity SAV and open water DO, and perhaps augmented with multiple models to improve calibration.

- Improve simulation of estuarine wetlands.
- Examine the simulation of sediment diagenesis with scour, resuspension, fate, and transport of organic material.
- Develop process to integrate local results from fine scale models (e.g. James River).
- Expand assessment with oyster and menhaden filter feeder simulations.
    - The James Chlorophyll study will certainly take a good portion of our time for determining how to interact with it on many levels. It's it not clear that the models will need to be linked our how they would be used. Shallow water simulation is going to be a difficult but achievable task. We need a finer grid with its own simulation system for the shallow water SAV, clarity, and DO water quality standards, and then we need to couple the fine grid with the larger estuary model. Wetlands are difficult because we'll need to delineate wetlands everywhere in the estuary under the current conditions and provide an estimate of the attenuation of nitrogen, phosphorus, and sediment from the wetlands. Then we need to estimate sea level rise in some future year (2050?) and estimate the loss of wetlands and their nutrient and sediment attenuating potential. The work involved is difficult, but the objective is very achievable.

4. Extending the airshed, watershed and water quality sediment transport model simulation period

- Revise/revisit precipitation input for ability of near time load estimates.
- Extend calibration period beyond 2005 to get more observed data and more recent data, particularly for shallow water monitoring that came on line from 2003 forward and the more recently established monitoring stations in the watershed.
    - Most of the input data streams necessary for this work have been developed during the past year by the CBPO modeling team. Additional data would have to be downloaded and processed each year, but the process would be automated.

5. Revising the Partnership Model System Structure

- Goals
    - Separate the research and operational models to increase partnership ability to efficiently run scenarios and provide flexibility to build upon current scientific knowledge.
    - Include information from other models in the estimation of small-scale processes and BMP effects. These may include local-scale models, distributed models, regression models, or sector-specific models.
        - Would take a significant investment in up-front work, but would save time over the long run by simplifying and clarifying the model structure

6. Development of 1) the Midpoint Assessment technical tools schedule to identify critical path items and milestone dates and 2) integrate of the technical tool revision and Phase III WIP development schedules to achieve an effective balance between sufficient review time for tool revisions/review/concurrence and sufficient time for target development and implementation planning.

- Goals
    - Develop "continuous" review process of model refinements which allows interaction with the Partnership.
    - Set realistic expectations on the number of possible model revision iterations given allowable timeframe.

- Consider a formal and final review of next phase of models prior to use in Phase III WIPs.
- Develop objective criteria that would define the need to transition to a revised model for use in Phase III WIP.
- Modeling delivery date from WQGIT
- Resolve current disconnect between the 2017 progress run scenario completion date and the Phase III WIP development schedule

7. Engaging STAC

- STAC is a valuable resource that can help provide insight into and assistance with challenging issues. The Modeling Workgroup recommends the current topics.
- Topics
  - Phase III WIP Watershed model review – The Phase 5 Model structure was reviewed by STAC. Part of this process identified key questions such as local applicability. The Modeling Workgroup proposes to engage STAC again to address similar questions, such as Phase III WIP development scale, but also add topics such as communication through model refinement process.
  - Initiate a STAC Workshop on Climate change - While there is a significant amount of research surrounding climate change, the Modeling Workroup's recommendation is that a consolidation/coordination of the work as it relates to the Bay is necessary.
    - Relatively low level of effort for CBPO staff

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.*

The TOWG items are not modeling questions

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. Discussed above
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. Need more information, but this sounds like a suggestion for a new calibration method.
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. Discussed above
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. This is part of a bigger question. By decision of the MWG, the loads have always been attributed to the land sources and not the river. To reverse this decision, we need some estimates of the effect of small non-simulated rivers. The sediment workgroup punted on this question a few years ago.

- *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. This was a significant effort by the USGS for phase 5. Adding more would be a new effort.

- *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] Needs to be incorporated in a panel which will result in some re-programming of SB.
    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.*

Septic issues for Peter Claggett

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. WQGIT issue
    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. Discussed above

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: significant issues with how these data are put together relative to all other data sets. Need to incorporate these data in a method to facilitate a fair decision among data-rich and data-poor areas. It's not clear how this can happen so it may take a long time to develop the data and process for incorporation.
    a) Agricultural manure and fertilizer use in panel
    b) Animal numbers in panel
    c) Urban fertilizer use in panel
    d) Urban, construction and AFO/CAFO loading rates. Loading rates discussed above
    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. Incorporated in earlier priorities of land use and other inputs
    a) *Initial suggestion for corresponding Guiding Principle: Principle 2*

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

Forestry Workgroup

1. **Account for true forest and riparian/floodplain forests** by making separate layers in the land cover model. The CBW model currently has one land cover that combines forests with other land types that do not fit in either urban or agriculture. The true forest land cover is important as a "natural background" – i.e., no pollution is attributed. The difference to water quality and habitat is significant when compared to a non-forested (e.g., "open") land use. Types of forest that differentially treat WQ (e.g., species, age) may also be delineated, TBD. A similar situation exists with riparian and floodplain forests – they are uniquely beneficial to watershed functioning. This is how we had it in phase 4.3 with a mixed open land use. The partnership decided to lump it in with forest for phase 5. It would not be too difficult to bring it back, but it may create the same difficulties
    a. **Report air deposition loadings**— more clearly communicate the additional loading from air that is being processed by land cover acreage in efforts to demonstrate how natural land cover is already reducing pollution from this source. For example, an acre of forest may be receiving 14 lbs of TN from air, but is able to process all but 4 lbs which becomes the pollutant loading of that acre of forest—the forest reduced 10 lb of TN naturally. There is no way to further improve upon forest loads—except to plant more forests.
    b. As a land cover, **existing riparian/floodplain forests** could receive a similar or lower loading than true forests and/or become a BMP because of the ability of the forested floodplains and streams to continually process TN and prevent sedimentation. The value of this land cover would be made more obvious by taking this step. The re-connection of forests to their floodplain would also become a BMP (per Delaware).
    c. *Initial suggestion for corresponding Guiding Principle: Draft Principle 2*

2. **Use projected future land cover data for WIPs** and other planning processes. This makes more sense since the future land cover is what each jurisdiction will be managing. It will also make more obvious the benefits of preventing conversion of forest lands.

a. *Initial suggestion for corresponding Guiding Principle: Draft Principle 2 and 4.*

3. **Refine the amount of forest land assumed to be harvested** (or disturbed) in any given year. Some states have regulatory programs around forest harvesting and can document acres of forests harvested and BMPs applied on those acres for any given year. Jurisdictions that are unable to report acres of forest harvest, would refine a percent of forest land harvested annually in that jurisdiction. Currently, 1% of "forest" land cover in the CBW model is assumed to be harvested annually. Would need data from states that is consistent with calibration.
    a. *Initial suggestion for corresponding Guiding Principle: Draft Principle 2*