Attachment B

Comments submitted to Water Quality GIT related to Watershed Technical Workgroup:
Background material for September 5, 2012 WTWG

Please note that jurisdictions, place names and agencies are occasionally, if not always, blacked out in the document to keep the original comments intact and the contributors anonymous.

Regional Factors

- Regional factors make working at a local scale challenging
  - There are significant unit load differences across [redacted]
  - Regional factors can create inequity in trading among counties and other source sectors (e.g. WWTP)
  - P5.3.2 vs. P5.3.0, in general EOF increased by more than 60% for phosphorus. In contrast the EOS loads increased by only 4%. This is because the regional factors corrected for the EOF differences.
  - Refined weights for calibration using top kriging concepts. This method develops weights by consideration spatial covariance but also considers watershed flow paths (i.e. not just as the crow flies). Therefore the calibration would look within and outside of the up-steam watershed, but would consider similarity in response data. Look in literature under Skoien.
- The "regional factor" protocol for the Upper Potomac watershed to ensure that [redacted] land use loading increases are supported by [redacted] monitoring data

Targets

- Incorporate geographically specific targets from site scale models. Use local data and modeling studies to set regional targets. The new targets then incorporate the more refined "subscale" information. This has been implemented to some extent but could be greatly enhanced. This also allows for the local TMDL models to contribute to the greater watershed model.

Calibration

- Calibration to water quality data should consider flow in the quintiles
- Is extending the calibration time period going to be problematic due to lag in BMP response? Calibration replicates changes that occur on landscape but in-stream water quality response may not have been observed. This creates an internal lag in the model.
- 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).
- Urban dry weather TN calibration concentration a problem due to confounding from septic systems or failing infrastructure.
- Improvement of the Watershed Model's calibration methods.
  - Ensure tighter bounds on unit loading rates of land uses so that we prevent loads from varying so widely within a single county.

BMPs and Model Calculations

- Resolution of lingering questions over how the model handles litter as-excreted vs. as-applied-to-fields.

- Clarify that BMPs are not a land use change. (There are opposing statements on this point).
    - Land Use Change BMPs complicate area loads.
- Disagrees with notion that BMPs should not be classified as land use changes.
    - Irrigated cropland vs. corn-soy rotations vs. alfalfa: differences require separation of land uses.
        - Current agriculture land uses need to be at least tripled for improved accuracy in the Model.
        - Increase number of land use categories, but stop changing BMPs to land uses.
- BMPs should be linked to efficiencies not land use changes, so practices may be more clearly compared to each other.
- BMP interaction with surface flow and groundwater flow separately. For example a stormwater pond is only treating surface flow and does not consider groundwater flow
- 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.
- The model should be adaptable to data available to each jurisdiction. BMPs should be designed to the lowest common denominator and mirror NRCS practice code definitions.
- The nutrient reduction efficiencies given for nutrient management are not representative of actual implementation. This important topic is being considered by an active workgroup.
- Nutrient Management
- Recognition of a BMP in the model is needed to address highly erodible lands within stream channels (Legacy Sediments from Mill Dams, etc.)
- BMPs should be linked to efficiencies not land use changes, so practices may be more clearly compared to each other.
    - Land use change BMPs, while helpful for modeling, complicate understanding the available land acreage for planning and implementation. BMP efficiencies are much easier to conceptualize.
- Stackable CNT
- Manure Alternative Use
- Conservation Tillage on HOM
- Shellfish Restoration and Aquaculture
- Urban Grass Buffer
- Stackable Pasture BMPs
- Animal Mortality BMPs
- Algae biomass harvesting
- Septic Denitrification – 25%
- Septic Denitrification – 75%
- Harvested Treatment Wetlands
- No Discharge Zones or Marine Sanitation Pumpout Stations
- Water Capture and Reuse is the only BMP available to reduce Nursery loads. Because of the sequencing in the model the maximum load reduction, when applied at 100%, is a 10% reduction.

    - If this the only BMP to apply to Nursery it is difficult accomplish targeted reductions
    - Working to address with WTWG
- More dynamic BMP efficiencies: Creating a simple model is well-intentioned, but a simple programming of efficiencies can achieve robust change in terms of reflecting reality.
- Dynamic efficiencies: ability of cover crops to scavenge depends greatly on residual nitrate.
    - Model cannot currently show residual nitrate.
    - Site variables need to be shown.

Land Uses

- Correct AGCHEM Coding - 1 to 1 Input to Delivered Reductions from Agricultural Land Uses
- Consider Using PQUAL for Simulation of Agricultural Land Uses
- Repair assessment of degraded riparian area acres.
- Develop a spatially explicit landuse dataset. We need to move past the tabular data.
- Better incorporation of local jurisdiction information (both land-use and impervious data)
- Reviewing available acres – counties/agencies are submitted BMPs based on "real" acres but in some instances there aren't enough available "model" acres, limiting our crediting ability.
    - Particular BMPs affected: nutrient management, forest buffers, wetland restoration, grass buffers, pasture fencing
- Agriculture misclassified on federal lands (urban on Ag Federal Lands)
    - Refine federal lands to more accurately discriminate the agricultural land
- Improve Federal Land Use
- Urban land uses need to be divided into more specific categories: commercial, industrial, high density residential, median density residential, low density residential, etc. similar to what agricultural land has, reducing urban loadings.
    - Need to differentiate between connected and disconnected impervious
- Federal land use assumptions in the model must be corrected to ensure the data accurately reflects current land use.
- Improved spatial delineation of agricultural lands
    - Misclassifications with turf grass, forest, etc.
- Improved spatial specificity of agricultural lands
    - Ag. lands by specific crop type
- Example of disagreement:
    - Model 5.3.2 = 1.52 mil acres agricultural land in [redacted] (pasture, cropland, hayland)
    - MDA Nutrient Management = 1.2 mil acres
    - 20% more acres of loads (300,000 acres)
    - Report Nutrient Management Implementation on actual acres or model acres?
- Improve Resolution
- Add Wetlands Land Use

- Rework HOM Land Use
- Do Not Treat Nutrient Management as a Land Use Change BMP
- Reevaluate Septic System Numbers
    - Commercial/Retail Systems
    - Mass Drain Fields
    - Failing Septic Systems (Surficial Runoff Loading)
    - Straight Pipes (Direct Discharges)
- Reevaluate the REX/NEX Land Uses
- Reevaluate Representation of Construction Activities
- Reevaluate CSO/CSS Land Uses
- Refine urban land use extent.
- Urban equivalent of Hay without nutrients
- Improve Animal Distribution (Sub-county)
- Develop a GIS Polygon Coverage Map with Final Land Use
- Use Local Land Use to Ground Truth Classification Methodology
- Improve Methods for Estimation of Growth In Urban Areas
    - Changes to Imperviousness.
- The Bay Program should develop a process for incorporating local land use data into the Bay models as soon as possible and, at a minimum, ensure that the information is incorporated into the 2017 model calibration. As part of the Phase II WIP process, many localities have mapped their land use/land cover. This information is more appropriate for implementation planning and tracking progress than using the current methodology for estimating land use throughout the Bay watershed. The Bay modelers should provide criteria for the type and format of land use data that they can use in the models. [redacted] should develop a framework for collecting local data and issuing BMP guidance and updates on the Bay program's modeling efforts. The lack of a framework and clear expectations has frustrated local planning efforts and development of implementation strategies. Specifically, the state should provide:
    - Template for tracking BMP data and schedule for submitting the data.
    - Frequently asked questions for Urban BMPs.
    - Updates describing recently proposed BMPs, approved BMPs or revised modeling assumptions.
    - Process for localities to request addition of alternate BMPs to the Chesapeake Bay Watershed Model.
    - Assumptions regarding the redistribution of locality target reductions based on the implementation of the fertilizer ban, additional L3 level of reductions on federal lands instead of L2, and changes to air deposition due to the construction or closure of stationary sources.
    - Schedule and process for incorporating locality corrections for pre-2006 BMPs.

Error/Uncertainty

- Increase the size of watershed model segments to reduce error caused by linear averaging/splitting of data.
- The suite of models should be more upfront in discussion of error/variance within each component and include discussion of sensitivity of input variable so that resources can be matched to correctly address uncertainty.

- Modeling trend of increasing granularity, but data is not there without making assumptions.
    - Need to fit model to available data, not vice versa.
        - Need to consider development of an algorithm takes into consideration the available data and determines the scale at which we can model.

Estuary Model

- Improve simulation of "problem" Bay segments discussed in Appendix
- Improve simulation of estuarine wetlands
- Inclusion of BMPs that do not fit into the Watershed Model but along the interface between the Watershed Model and Estuarine Model – i.e. Living Shorelines
- Multi-model Approach to Address Tidal Fresh Portions of Rivers and Shallow Bays.

Airshed Model

- Evaluating the atmospheric deposition components of the model with other N deposition datasets/models, such as those developed by jurisdictions, to improve accuracy of N deposition estimates across all land uses (e.g., ag, forest, urban, suburban, etc.).

Review Process

- Desire to improve the model review process and its transparency.
    - Clarification on how modeling issues are prioritized
        - WTWG should prioritize modeling recommendations before they are sent for WQGIT approval.
- Minimum of six months of testing before a Phase 6 model is finalized.
- Timeframe: present until 2016 to develop Phase 6 of the Model. Phase III Watershed Implementation Plans (WIPs) to be completed by 2017.
    - This does not leave sufficient time to identify and fix likely problems that exist in the Phase 6 of the Chesapeake Bay Watershed Model (WSM) to accurately evaluate next WIPs.
    - Jurisdictions will need 6-9 month period of access and testing to the next version of WSM prior to Ph III WIP submission.
    - As jurisdictions are developing Ph III WIPs, need to be satisfied that the correct actions are occurring and accounted for.
- Ensure sufficient time for trials, groundtruthing of WSM Ph6 using land river segment scale data from those subwatersheds where we have more detailed input data/water quality monitoring data available—Upper Chester River, MD; Howard County, MD; Lancaster County, PA; Bedford, PA.
- Can we build a timeline that provides for sufficient testing of data and assumptions earlier in the process before we get too far down the road, forcing last minute changes and quick fixes? We as partners also need sufficient time to understand the Model sufficiently to be able to explain it to our members/constituents and other stakeholders, building confidence in the process.
- Allow Sufficient Time to Develop and Verify Pre-calibration BMPs

MAST/CAST/VAST/BayTAS/Reporting

- Consider CAST as the accountability tool instead of watershed model

    - Need for timely scenario results
    - Transparency
- MAST improvements
    - Improve agricultural estimates
    - Add cost module
- (Contrasts with other comments). Scrap VAST. Contains too much error, different orders of magnitude than WSM. Poor tool for localities to depend on it as a planning tool.
- Modify Planning, Accountability and Reporting Tools
    - Update NEIEN
    - Update BayTAS
    - Update M/C/VAST
- BayTAS
    - The BayTAS reports from the watershed model need to be standardized at the basin and county scale to reflect progress in a way that is easier to compare previous model runs.
    - BMP reports are adequate, but it would be better to add in reasons for cut off and maybe acres of land available versus acres credit.
- NEIEN
    - Make it less rigid at accepting information so that if there are minor mistakes say an extra comma or space in an entry that the entire submission is not rejected.
    - Make the error report more precise.
    - Reinstate the Testing Node
- Make the Bay watershed model and Scenario Builder directly availability directly to the community.
    - State and local partners should be in a position to run both ourselves.
    - Community model must be consistent with the WSM.
    - Scenario Builder should also be available to the community as it is an integral component of the Model.
- Need to review Ken Pattison's suggested changes to the review process from years ago.
- Ascertain the correct procedure to accurately show what the implementation levels; these should be in relation to land use change

Miscellaneous/General Comments

- Coupling of Sediment and Phosphorus
- Utilize Annual Agriculture Statistics Where Ever Possible
- Simulate Septic Systems as Loading to Ground Water
- Evaluate Impact of Extreme Weather Events
- Reevaluate Delivery Factors and CDF Decision
- Reevaluate Stoichiometry of Nitrogen and Phosphorus Species
- Ensure Mass Balances for Nutrient
- Use Input Deck Format Consistent with v.5.3.2.
- Use the current year rainfall for the 10^{th} year of hydrology as an alternate run for temporal comparison.
- Improve Federal Segmentation
- Utilize 12-digit Hydrologic Units in Segmentation

- Expand the Representation of Reservoirs
- Improve Representation of Perennial Stream Network
    - Simulate Stream Banks as Source of Pollutants
- Include data from all states or exclude data from all states for treatment of biosolids
- Verification and Tracking
    - It would be helpful for EPA to provide a web-based tool to help track BMPs or at least support to provide a web based tool. The US Army Corp of Engineers has such a tool, but may need EPA support to help provide it to [redacted].

- Improved characterization of pervious areas in the model in regard to fertilization status and risk factors for N and P loss
- Improved simulation of urban sediment dynamics
    - Sediment loadings: There appears to be a disconnect between sediment loadings and the work being done by the stream restoration expert panel on the amount of sediment input into the system (Piedmont stream erosion would suggest there is more sediment). This could be due to sediment deposition in the larger scale watershed above the calibration points. Greater inclusion of explicit stream erosion in head water streams needs to be included; much of the sediment and phosphorus may be coming from headwater stream erosion versus land surface washoff.
    - From our perspective, the highest priority for the Urban Sector in [redacted] is revisiting the sediment loading module in the model. As we noted in our Phase I and Phase II WIP, the sediment loading that's allocated to the urban sector is about 1/3 of the total [redacted] allocation. Since the urban land classes only constitute about 10% of the total [redacted] land area draining to the Chesapeake Bay, this appears inordinately high. In addition, about 75% of the urban land is classified as low density residential with mostly disconnected impervious areas. I haven't gone through in detail to check the loadings for the [redacted] Coastal Plain segments, but I suspect they are similar. I'm not sure if the problem is a Piedmont vs. Coastal Plain issue or whether the methodology used in the model is not reliable at these low levels of imperviousness, but in either case we would request that the modeling team take another look at this to verify the results.
- Better characterization of illicit discharges/SSOs/Septics and other sources of N and P during dry weather conditions
    - How will future sewer and water infrastructure improvements/funding affect loading rates and monitoring data?
    - The number of On-Site Sewage Disposal Systems seem to be over-estimated in the Watershed Model. This needs to be corrected in some fashion.
- Better characterization of the effects of local reservoirs/impoundments on load delivery
- Dealing with the enormous variability in urban loadings from segment to segment and state to state in Phase 5.3.2 of model
    - Increase the size of watershed model segments to reduce error caused by linear averaging/splitting of data.
    - Use the current year rainfall for the 10th year of hydrology as an alternate run for temporal comparison.

    - Virtualization of automatic calibration for headwater areas so split-basin counties have similar loading rates
- The Bay Program does not collect and calculate nutrient and sediment loads for the tidal areas of [redacted]. The technology and equipment exists to measure the water quality and flowrates but it is expensive and more difficult than gathering data in non-tidal areas. The Bay Program should gather data from tidal zones to validate loading rates and measure the ratio of nitrogen, phosphorus, and sediment in urban runoff from [redacted] Coastal Plain. [redacted] should consider partnering with localities to provide financial assistant to expand water quality monitoring in tidal areas.
- Several segmentsheds in the Hampton Roads region may have been incorrectly assigned to drainage basins. The localities request that the state or Bay modelers provide the justification to support basin assignments for segmentsheds, specifically, the assignment of the Lynnhaven River to the James River basin and the assignment of portions of the City of Poquoson to the Mobjack Bay basin, and consider model revisions to accommodate all segmentsheds that discharge directly to the Chesapeake Bay.
- Refine methods to evaluate progress.
    - Rather than project growth rates, use actual growth rates on an annual basis.
    - Use actual hydrology, not 10 year averages, to run future progress model runs.
        - This will indicate how predictive the Model is of monitoring results by making direct modeling/monitoring comparisons possible.
- Increase the number of modeling staff to provide more support and model evaluation assistance directly to the states (with more modeling staff, success would depend on regular, detailed coordination among modeling staff to ensure consistency across the jurisdictions).
- Revisit the E3 scenario
    - Urban
    - Manure Disposal in Ag Scenario
    - Nursery (Converted to Hay?)
- Resolution of "backout" procedure issues (deals with no action land use).
    - CBP staff will ask for recommendations to accompany the refinement requests.
- Need a systematic review of the Scenario Builder to update the input data, assumptions, and documentation.
    - Policy and management changes negate the older data.
    - Four specific areas of potential improvement:

        1) Manure volume and analysis.

        2) Fertilizer applications based on real, current data.

        3) Scale: basin TMDLs necessitates basin yield data.

        4) Nitrogen based Nutrient Management (NM) plans included, but does not consider Phosphorus-based NM plans.

            - N-based plans overestimate amount of P; therefore, P-based NM plans must be considered.