Question: What would you like to see changed in the Phase 6 suite of modeling tools?

- Characterization and articulation of uncertainty
- Legume Assumptions
- Differentiate federal agency lands
- Ag input refinements with new data sources
- Evaluating co-benefits (flooding, carbon, air quality, etc.) with NPS
- Working from the Phase 6 base, perhaps an effort to re-evaluate application curves N fixation, soil P, land use/crop types, land use loading rates, fertilizer accounting, etc.
- Determining the benefit of specific efforts and weighing them against others is not simple
- Ag and urban load rebalancing
- Address benefits to other outcomes, such as stream health, toxic contaminants
- Model documentation that allows users to easily track how Phase 6 (or the new Phase) functions
- The connection between air sources and management efforts is very unclear, particularly on the ammonia side
- Improved and simplified processes to capture and credit existing BMPs, especially those related to BMPs for nonpoint pollution control
- Urban load refinements, incorporation of local monitoring data
- Simplification of agricultural model. It is too complex and leads to weird results
- Water quality monitoring and assessment of usage of data that is not currently being used
- Ag input refinements
- Ability to see percent of load reduction from each BMP type when building a scenario (e.g., forest buffers account for x% of load reductions in scenario)
- Better urban fertilizer data
- Tracking Bay Agreement outcomes, in addition to WQ progress
- Improve transparency of NEIEN to CAST data reporting
- Manure/fertilizer applications, ag data inputs, application/model assumptions
- Add ability to model incremental progress, attainment in individual segments and uses
- Ability to run different climate change scenarios
- Better land use change estimates
- Add the land use model to CAST
- A better way to track annual BMP implementation progress without the issues that currently arise due to BMP expiration
- Publicly accessible tracking of BMP losses through verification and back-out and cut-off
- Means of encouraging reporting and crediting of agricultural BMPs
- Nutrient speciation
- Ability to simulate BMP effectiveness spatially
- Better P dynamics in urban watersheds
- SAV nutrient sinks simulation
- Improvement in urban phosphorus sensitivities to nutrient inputs, improvement to stream bed and bank loads

- More data for calibration in the watershed model
- Improvements in shallow water modeling (estuarine model)
- Being able to better assess water quality standards for all designated uses
- Efforts, which have important influences on bay tributaries, but limited effect upon the most sensitive segment are not "rewarded" in CAST
- Differentiate state lands
- Link annual reporting to CAST so we can see the date of implementation
- Data that captures what forests and wetlands are lost
- Add all of the 30 outcomes to CAST
- A simulation option made available for finer scale assessment in the watershed and in the tidal Bay so that all watershed streams and the tidal tributaries and embayments can be simulated
- Easier stream restoration crediting
- Improve representation and simulation of land use change (1985-2035)
- Improved agricultural data, looking to additional data sources beyond ag census
- Transparency in land use change model
- Comparing year to year scenarios is very challenging because inputs (or understanding of inputs change). For instance, ag census data causes years that follow each other to appear significantly different, for reasons unrelated to progress.
- Better wetland data tracking
- Improvements to abandoned and historic mined lands
- Some assessment of uncertainty could be beneficial
- Better means of communication to stakeholders about modeling processes and results
- Modeling monitoring comparisons available
- More flexibility to take advantage of higher resolution data
- Improved documentation on the website
- Faster updating of progress scenarios
- Groundwater loads quantified as a source
- Living resources interactions
- Capture nutrient load from solar farm conversions
- Accommodate PCBs and other pollutants
- The tidal water monitor was not discussed today but has been in the previous two meetings. The attainment of standards, which is based on monitoring, needs to be used for more strategic decision making.
- Artificial increases in ag loads in multi-cropping systems should be evaluated
- Better definition of wetlands, of their hydrologic and biogeochemical cycling trends (including forms of N, P, and C)
- Further assessment of uncredited BMPs
- More local scale impacts

Question: What are the key takeaways from the previous 3 presentations on modeling?

- We have made a lot of progress but there is still work to do

- It is an evolving process and the program is assessing how to best utilize existing monitoring data
- Modeling is an iterative and nuanced process
- A land use map would help partners to visaulize where BMPs could be targeted
- There is still the influence of policy decision making in determining states' respons to modeling
- Need to incorporate more local tidal water monitoring dta rather than extrapolate all loading assumptions from nontidal areas
- Have the prior 8 model updates improved the partnerships ability to plan/ target implementation?
- Opportunities exist fro improvement. We have a long, accalimed histort of leading edge model development.
- We are making steady progress, one steop at a time.
- There is progress to be made to match model input/ outputs to what we are seeing in on the ground implemetnation and monitoring
- The modeling tools have made significant progress over time, however there are still gaps that should be addressed in order for the model to be more informative toward planning and assessing performance
- We need lead time to communicate changes in load targets to leadership.
- Monitoring may affirm the accuracy of modeling results and decision making, but not a given that monitoring may drive decision making.
- Still unsure of the planning targets. It seems a foregone conclusion that there will be a p7 watershed model. With a new watershed model, planning targets will change, correct?
- It may be unreasonable to think the models can drive implementation in the future.
- We need to provide better context on utility of the model to policy makers using the model to make decisions...
- The focus in deep channel as a promise ignores shallows and we need a policy shift at the highest levels if we want to show progress where we have most interaction. With local waters
- Still unclear how monitoring influences delivery factors and how those will be updated
- CAST and Bay modeling cover a lot- but ultimately the goals of the tools are to help make better decisions for bay outcomes and hold partners accountable for past efforts.
- Need to verify lag time assumptions in model with monitoring data
- Doing the same things we have tried 8 times over and expecting a different outcome
- Still lack of data from tidal/ coastal plain, need to incorporate monitoring efforts
- We need to invest more in monitoring and tweak the model. To serve more needs
- Future modeling should not simply tweak what we are doing and already know. Instead, test our underlying assumptions (deep channel goal) and how the changing world/watershed is going to impact our efforts and what we may need to do to adapt efforts.
- Additional monitoring efforts should be made.
- "What we were doing 30 years ago, is a lot different than what we are doing now... We should probably expect continued levels of change moving into the future."
- We need a way to merge our tools so mapping and CAST are mutually supportive and add co benefits sooner rather than later

Question: Have these presentations changed any response and feedback provided from the earlier round table?

- We need to step back and reconsider the big picture questions we want the models to help answer
- Not really; the presentations were helpful, but I think there are a number of ideas for a wide range of topics. I'm not sure we've really touched many of those newer idea.
- Progress on nutrient load reduction is disappointing -- at first glance. Would there be benefits to estimating through modeling, and, showing what the current situation would be if no or few BMP actions had been taken?
- Tidal monitoring data and progress toward attainment needs to be used more in the decision making for water-quality.
- It is still unclear as to where we should start with prioritization of the work that should be done for Phase 7
- No
- Yes, nuances reshuffled priorities
- No. Primary concern remains identifying priorities for future modeling efforts and where our efforts and energies should be targeted.
- Maybe, gave me more info, need to think it through.

Question: What does the WQGIT want to see done differently with the new suite of modeling tools to advance implementation efforts and achieve water quality goals?

- Relative confidence of inputs distinct by source sector with outputs
- More explicit modeling of the incentive programs in place (particularly for ag) and how they have influence implementation
- Non-point source responses
- Centralized location for all web-available modeling tools
- Greater understanding, incorporation, and public outreach of fiscal and financial impacts of model effects on land management and conservation practices
- MBM – improve shallow water simulation for CC, improving problem tribs and incremental attainment. MTM should wait.
- More transparent about uncertainty
- Dynamics in shallow water
- Evaluate what's working and what's not
- Need to address the PSC and EC direction on 2035 climate change assessment
- Focused attention on subject areas where implementation has been limited
- Addressing uncertainty
- More time for WTWG and source sector workgroup review
- Greater opportunities to evaluate trade-offs
- Focus on shallow waters modeling in part because they introduce significant uncertainty that modeling could help flesh out a little bit more. Focus on shallow waters also readily engages stakeholders, including mobilization of resources.

- Simplify nutrient application calculation
- Wait on MTMs, don't focus too much on being spatially explicit, scales are too different
- Evaluate land use change over time and review land use policy BMPs based on the evaluation
- Focus on progress that can be made in shallow waters
- Transparency of input data sources and robustness, consistency, and similar metadata
- More transparency (in terms of simplicity), user understanding of how simulation is being done
- Refine agricultural inputs for watershed model and CAST
- Tools that prevent technical assistance staff from focusing on verifying rather than implementing
- Refine nutrient assumptions in watershed model and CAST
- Focus on BMPs with co-benefits to achieve multiple benefits
- More details on how urban loads and nutrient sensitivity will be revised
- Targeting with implementation
- Recognition of spatial limitations based on uncertainties
- Regardless of changes made to modeling to reflect physical process simulation improvements, concern that modeling is being used for purposes beyond the TMDL
- Need models that would allow the assessment of different water uses (for example cold water and small embayments) and to show progress at the scales where progress has been made
- Consider info provided to us from STAC – more effective implementation, rethink criteria…
- Find additional data sources to support agricultural simulation
- CAST transparency – ability to see all of the reported BMPs, verification, backout, and cutoff in one report
- Whatever we do, communication of the strengths, weaknesses, applicability of tools need to be better communicated to the public
- Compare Phase 6 or 7 with other models, such as SPARROW, specifically future climate impacts on water quality
- Include groundwater loads as a separate load source
- Build on Bay Data Dashboard, tributary reports, land use data, and Chesapeake Conservancy BMP opportunities work to aggregate those products into a BMP targeting tool
- Investing in tracking tools (satellite imagery, fertilizer data, etc.) that avoid the need for onsite verification and will last for decades to come
- Need evaluation of what commitments we fell short of and why
- Moving into 2025 with a stable model to support regulatory stability
- Progress scenarios should make clear what changes due to management (BMPs, investments, etc.) and what changes due to growing pressures (growth, animals, climate)
- Incorporate co-benefits of each practice that can be selected by the user
- Unless we can spatially capture landowner willingness, lets not spend significant staff and financial resources on targeting
- Recognition that uncertainties cannot be eliminated completely, that the best way to handle uncertainty is to be transparent about it
- Relative confidence of estimated loads as an output metric, even qualitative like high or low
- Improved cost estimates
- Co-benefits!!!

- Build BMP targeting tool outside (but linked in) CAST. Use bay data dashboard, tributary reports, land use and CC BMP opportunities work as a starting point
- Models being able to demonstrate incremental progress in terms of WQ attainment can help support decision making

Question: What functionality can the tools provide to support decision-making?

- Ability to assess attainment.
- provide scenarios and options
- inform, but not determine, on-the-ground implementation
- If accurate, it will help state and local stakeholders and decisionmakers implement cost efficient and environmentally effective practices.
- Refined scales or targeting is of little use to most localities; reality is that stormwater BMPs are sited by MS4 localities based on availability of sites and costs and by developers based on economics and regulatory requirements.
- Demonstrate progress toward targets
- Ability to see impacts on WQ while planning for implementation.
- Tools should be used for state wip implementation, tracking and assessment, not overly refined at small spatial scales
- Qualitative estimates of confidence based on BMP mixes and land uses inherent to geographies and scenarios
- Estimated lag times based on BMP mix
- Improve transparency and enhance communication with stakeholders.
- It will also help identify for state and local stakeholders and decisionmakers needed technical resources and direct financial resources to meet those needs.
- Evaluate progress of the partnership's efforts, year over year, and identifying where we did not achieve the goals we set.
- Upfront communication about what spatial scales is model output most accurate and therefore usable
- provide feedback that helps elucidate progress or lack of progress
- Provide the framework for a discussion on how to implement management practices for a better, healthier watershed and tidal Bay
- Identify specific 'value' of management efforts, and predict what level of incentive is necessary to increase implementation.
- Provide a menu of options/BMPs to consider.
- Land use change patterns
- Improved cost estimates with NRCS tie in
- Evaluate the incentive structures (what are we underpaying for, what are we overpaying for) of various programs that are directed towards achieving bay goals.
- Provide information regarding which aggregate set of BMPs are associated improvements in load reductions where.

- What was mentioned earlier (I think by James) related to ag land values/production costs/commodity prices is interesting. Don't know that could be realistically be accommodated. cost of taking land out of production is critical to decision-making.
- More explicit consideration of air sources, and how management factors influence these; providing more specific information as to how various management efforts might influence these loads.
- identify where state leadership can make the most influential policy decisions.
- credit for air emission reduction
- Ability to track progress at a BMP level through portion of load changes in a year that came from specific practice types
- Scales for each input and output should be available
- Identify where investments are needed, and where historic investments have been ineffective.
- Refine landuse change model beyond current urban growth model
- Being able to re-define/model local land use could direct to watershed optimal land use distribution and integration with surrounding watersheds
- Evaluate land use change on a per capita basis
- Tie land use change model in with tools, it's not transparent as is
- dynamics of shallow water
- Greater connection of modeling to shallow waters and living resources
- Evaluating if we need to look at uncertainty using different approaches
- Updated LU mapping and ensuring BMP efficiencies are fully evaluated that have been introduced in CBPO workgroups
- of the ag lands in the watershed, identifying and targeting areas that are ripe for BMPs to produce a disproportionate load reduction.

Question: What modeling priorities would the WQGIT like to see that's not reflected in the current Phase 7 work plan?

- Enhanced groundwater functionality
- Update critical conditions period and 10-year hydrology period
- Take another look at average source sector loads using more recent SPARROW and other loading information. Average loads should reflect more current conditions
- Improved nutrient speciation towards a mass balance
- Continued evaluation and application of Ag BMPs and methods being considered by the AgWG and BMP verification Ad hoc Action Team
- Include confidence and uncertainty metrics among the various parameters
- Specific consideration of how to manage air sources within the modeling framework (and make it clear to the managers/CAST users of the air implications of inputs or BMPs)
- Co-benefits – include carbon sequestration and soil carbon change resulting from a CAST scenario (Start from NRCS COMET model)
- More understanding of land use change model, inputs, and assumptions
- Identifying new approaches to verification that avoid utilizing critical technical assistance staff time
- Optimal Land Use distribution for watersheds based on land cover and surrounding watersheds and existing use

- Explicit considerations of incentive programs and how those programs look according to CAST
- Models should be able to help us focus our efforts moving forward in areas where there are the greatest needs in achieving targets, especially focusing the agricultural sector. Gear towards improving understanding of implementation actions.
- Integrate GIS layers, EJ Screen, Data Dashboard, and Chrissie Bibi and healthy watersheds assessment into one place (CAST)
- Update accounting for air credits, how to take credits from air actions beyond what is required by the Clean Air Act
- Consideration of how practices and decisions are applied as offsets/trades to account for growth
- Cost share programs around the watershed are built around the idea that they get credit in the bay model; yet I don't think there has ever been an alignment between these systems – and more explicit connections could be greatly beneficial
- Use of local water quality monitoring data