Consideration of BMP Performance Uncertainty in Chesapeake Bay Program Implementation

Proactive STAC Workshop Proposal

Summary Description and Objectives of the Workshop

Addressing best management practice (BMP) pollutant reduction performance uncertainty is essential if decision makers are to effectively select and place nonpoint source pollution control BMPs and achieve necessary pollutant reduction targets given limited funding. The objectives of the proposed 2-day workshop are to:

1. Document how BMP performance uncertainty is currently accounted for within the Chesapeake Bay Program BMP approval process;
2. Develop protocols to improve the documentation and evaluation of BMP performance uncertainty within the Chesapeake Bay Program BMP approval process; and
3. Explore alternatives for incorporating BMP performance uncertainty into watershed modeling and implementation planning.

Workshop Justification

The Chesapeake Bay jurisdictions have made significant progress toward achieving the pollutant reduction goals established in the Bay TMDLs. As the Chesapeake Bay Program (CBP) nears the mid-point assessment, point source dischargers will have achieved (or nearly achieved) their final TMDL nitrogen and phosphorus wasteload allocations. Jurisdictions, however, still need to achieve substantial nutrient and sediment reductions from agricultural and urban nonpoint sources. Based on current understanding and modeling, the CBP estimates that agriculture and urban nonpoint sources (both regulated and unregulated) need to achieve an additional 35 million and 12 million pounds of nitrogen reductions, 1.3 and 0.6 million pounds of phosphorus reductions, and 941 and 594 million pounds of sediment, respectively to meet TMDL goals. State and local governments and their citizens are poised to spend hundreds of millions of additional dollars to meet these goals, primarily by installing agricultural and urban nonpoint source BMPs. Unlike industrial and municipal wastewater treatment facilities, it is difficult and expensive to verify the nutrient and sediment reduction/removal performance of installed nonpoint source BMPs.

The CBP has developed an "Expert Panel" process and associated protocol for estimating BMP nutrient and sediment reduction/removal effectiveness. In this process, the CBP tasks experts with assessing how effective BMPs are at reducing nutrient and sediment loads. Specific nutrient and sediment reduction/removal performance estimates (typically expressed as % reduction) are developed for each CBP-approved BMP. The Expert Panels typically include academics and agency experts (e.g., USDA-NRCS) with relevant technical and scientific expertise. The CBP assigns paid staff to assist each panel. Each panel produces a technical report based on a review of the relevant literature and their deliberations as outlined in the CBP's *BMP Expert Panel Protocol*.[1] The CBP program requires that each approved BMP be periodically reviewed. The current *Protocol* contains limited language related to BMP uncertainty and does not formally specify how BMP performance uncertainty should be incorporated into BMP performance estimates/recommendations.

[1] http://www.chesapeakebay.net/publications/title/bmp_review_protocol

Expert Panel findings are reviewed and approved by the CBP Working Group that requested the BMP review (e.g., Agriculture, Stormwater, Watershed Technical) and the appropriate Goal Implementation Team. Once approved, the BMP pollutant reduction/removal performance estimate is incorporated into the Chesapeake Bay modeling suite that is used to track and evaluate progress toward meeting the Bay TMDL. Those tasked with achieving TMDL goals (state agencies, local governments, and municipal stormwater permittees) use the approved BMPs performance estimates to calculate their assigned nutrient reduction requirements/ goals. Those responsible for achieving the TMDL goals can only claim nutrient and sediment reductions for BMPs approved through this process. As a result, the BMP effectiveness estimates become a key decision factor when evaluating which BMPs will be implemented, but those tasked with implementing the BMPs have no incentive to consider BMP performance variability or uncertainty when selecting BMPs and making BMP investment decisions.

BMP performance uncertainty is not well characterized within the CBP but its importance to meeting Bay goals is well recognized. Implementing BMPs without a better understanding of the level and extent of pollutant removal uncertainty can misdirect BMP investments and jeopardize achievement of water quality goals. A recent STAC workshop, "Assessing Uncertainty in the Chesapeake Bay Modeling System", examined uncertainty in CBP modeling efforts. The workshop proposed here complements this and other modeling workshops[2] by focusing on characterizing and documenting BMP performance uncertainty. In fact, a recommendation of STAC's recent Phase 6.0 Chesapeake Bay Watershed Model review was that expert panels should incorporate some kind of explicit basis/approach for evaluating uncertainty when developing their BMP performance estimates.

Workshop Design

The goals of the workshop are 1) to develop a set of recommendations that detail how expert panels convened as part of the CBP BMP approval process should incorporate the assessment and documentation of BMP performance uncertainty in their performance estimates/recommendations and 2) to facilitate a discussion to explore alternatives for how BMP performance uncertainty can be effectively incorporated into CBP Watershed Modeling process and TMDL implementation.

Prior to the workshop, the Steering Committee will conduct a survey of BMP expert panel chairs and lead staff members of reviewed and approved BMPs since 2012 (i.e., since the review process became more formalized). The survey will document and summarize how recent BMP panels considered and reported BMP performance uncertainty as they developed their performance estimates/recommendations (Obj 1). This survey will include questions such as:

1. What evidence did the panel consider regarding uncertainty?
2. Was BMP performance variability reported/available in the literature?
3. Did the panel collect and report BMP performance uncertainty/variability? If so, what statistical data did the panel collect/use?
4. How did the panel account for BMP performance uncertainty/variability during the development of BMP performance estimates?

[2] For example, STAC workshop examined the use of multiple water quality models ("Multiple Models for Management in the Chesapeake Bay") to better inform management decisions.

The Workshop Steering Committee will distribute workshop materials to participants prior to the workshop. Materials will include a summary of the BMP evaluation process and a written summary of the BMP protocol survey results.

Workshop Program

The majority of the workshop will be devoted to structured discussions to address two questions: 1) How can the CBP BMP panel process better document and more consistently assess BMP performance uncertainty, and 2) what alternatives exist that would allow for consideration of BMP performance uncertainty during implementation?

The program will begin with a summary presentation outlining the current CBP BMP expert panel process, including discussion of the pre-workshop survey results. An introductory presentation may also summarize prior research about the relative performance uncertainty across selected BMPs. Workshop participants will develop guidance recommendations for assessing and documenting BMP performance uncertainty as a part of the BMP review process (Obj 2). Substantial time will be devoted to small group discussions to understand the challenges associated with developing BMP performance estimates and to generate/develop ideas for improving the evaluation, consideration, and reporting of BMP performance uncertainty. Workgroup participants will reconvene to discuss and clarify recommendations to put forward.

The workshop will also include facilitated discussions about how uncertainty BMP performance could be better integrated into watershed modeling and TMDL implementation planning (Obj 3). This topic will be introduced by two to three brief presentations illustrating innovative approaches to addressing uncertainty in closely related programs and decision-making contexts. Presentations may include examples of addressing uncertainty in point source permit compliance planning and technology design (e.g., Charles Bott Hampton Roads Sanitation District and STAC member) and approaches used by other programs, such as the National Climate Assessment, to explicitly consider and address uncertainty. Facilitated discussions will follow that will solicit ideas and recommendations for improving understanding and consideration of BMP uncertainty in CBP modeling and TMDL implementation.

Anticipated Workshop Participants: The steering committee (see below) will identify and invite participants that will facilitate the discussion about and development of effective, practical workshop recommendations. Workshop attendees will include CBP staff representing the BMP expert panels, the modeling group, and program management, former members of BMP expert panels, researchers and professional managers with expertise in risk assessment and watershed management, including managers and decision makers at state and municipal levels.

Logistics: The workshop will be conducted over 2 days in the Fall of 2017 (flexible). The survey will be complete by the end of summer 2017. Workshop participation will be by invitation only. To facilitate effective discussion, the workshop will be limited to less than 40 people and held in the northern Virginia/Maryland region. The workshop proceedings will be produced within 90 days following the workshop.

Budget: Venue: $3,500; Catering $2,500; Travel for invited participants $3,000. Total Requested from STAC: $9,000.

Submitted by:

Kurt Stephenson, Steering Committee Chair

Workshop Steering Committee (all have agreed to serve)

Kurt Stephenson	Agricultural and Applied Economics, Virginia Tech. Expertise in policy analysis and evaluation. STAC member.
Brian Benham	Biological Systems Engineering, Virginia Tech. Expertise in watershed planning and watershed modeling. PI of EPA/CBP/VT Cooperative Agreement tasked with convening and managing selected BMP Expert Panels. STAC Vice-Chair.
Zach Easton	Biological Systems Engineering, Virginia Tech. Expertise in watershed modeling and model development, BMP performance, and risk assessment. STAC member.
Jeremy Hanson	Biological Systems Engineering, Virginia Tech/CBP. Expertise in convening and managing BMP expert panels. Project Coordinator, EPA/CBP/VT Expert Panel BMP Assessment Cooperative Agreement.
Carl Hershner	VIMS, Center for Coastal Resources Management. Expertise in watershed and adaptive management. STAC member.
Susan Julius	Global Change Impacts & Adaptation, EPA. Expertise in vulnerability, risk, and adaptation assessments for aquatic and urban systems. STAC member.