Protocol for the Development, Review, and Approval of Loading and Effectiveness Estimates for Nutrient and Sediment Controls in the Chesapeake Bay Watershed Model

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Introduction

The Chesapeake Bay Program (CBP) uses loading estimates to quantify expected amounts of nutrients (nitrogen and phosphorus) or sediment loads to water from specific land uses or point sources. Changes in estimated loads from a particular piece of land can occur in four ways: 1) A change in the land use (e.g. forest instead of grassland), 2) an adjustment based on an estimate of effectiveness of a best management practice (BMP), 3) a measured reduction in direct load to the land use, and 4) a measured reduction from a treatment process. Effectiveness estimates and direct load reductions to land result in percentage adjustments on a per acre basis (as opposed to an adjustment in concentration or a load per farm operation) used by the CBP to modify the existing baseline loading for particular land uses and practices. Loads from point sources can be adjusted based on a new treatment process or practice.

The Water Quality Goal Implementation Team (WQGIT) is responsible for approving the loading rates, and percentage adjustments to these rates, used in the Chesapeake Bay Watershed Model (CBWM). The CBP Executive Council's 2009 commitment to meet two-year milestones that accelerate the pace of Chesapeake Bay restoration, and the need to quantify practices to be used in Watershed Implementation Plans (WIPs) that will achieve Total Maximum Daily Load (TMDL) allocations, will likely spur innovation and identification of new BMPs.

Direct nutrient and sediment load reductions and reductions from treatment process often can be estimated, or measured, with a relatively high degree of accuracy. However, due to the variability of available data, loading rates and effectiveness estimates for nonpoint sources are based largely on best professional judgment. Since the definitions and values used for both loading and effectiveness estimates have important implications for the CBP and the various partners, it is critical that they be developed in a process that is consistent, transparent, and scientifically defensible.

This document contains three sections addressing the following process steps:

I. Determine the need for a review process,
II. Review process:
    a. For new estimates
    b. For existing estimates or treatment processes
III. Chesapeake Bay Program review and approval

I. Determine the Need for a Review Process for New Estimates:

A. ~~New estimates~~Requests for Evaluation of Technologies and Practices

As the Executive Order and Bay TMDL processes unfold, the CBP expects to receive numerous requests to evaluate innovative technologies and practices for the reduction of nutrients and sediment. It will be necessary to review and prioritize these requests. Requests can be initiated by the following groups:

- A CBP source sector Workgroup
- A jurisdiction
- A different group/organization/agency *if* a CBP Workgroup agrees to sponsor the recommendation through the CBP review process

Requests should be submitted to the Chair of the WQGIT who will then route requests to the Watershed Technical Workgroup (WTWG) and to the relevant source sector Workgroup. These Workgroups will determine if sufficient credible data is available for a full review process. This determination will be made within 60 days from the date received by the WQGIT Chair. The decision to proceed will include a timeframe for completion of the review that will be based on the complexity of the review and workload issues. Proposed technologies and practices that have been identified by jurisdictions in their Watershed Implementation Plans (WIPs) will be given highest priority.

If new BMPs are proposed by entities other than a CBP technical workgroup or a jurisdiction, the WQGIT procedure for routing these requests are as follows:

1. The entity requesting consideration shall submit to the WQGIT Vice Chair the following information: (a) a clear and concise definition of the practice with specific information on how it reduces nitrogen, phosphorus and sediment, and (b) reference available science/data on the nutrient and sediment removal efficiencies with the contact information and affiliation of the lead researchers, including the geographical location of where the data was collected.
2. The WQGIT Vice Chair will forward these requests to the WQGIT workgroup chair for the workgroup most applicable to the particular BMP. The initial determination of the most applicable workgroup will be at the discretion of the WQGIT Vice Chair.
3. The workgroup chair may request to the WQGIT Vice Chair that the proposed BMP be routed to an alternative technical workgroup if he/she feels that placement in another workgroup is more appropriate.
4. The workgroup chair provides a brief representation of the proposal to their respective workgroup. The workgroup chair and workgroup have discretion to determine the level of attention to devote to a particular request. For proprietary BMPs, this may include referral of the requesting entity to seek a determination of efficiency by the Technology Acceptance Reciprocity Partnership (TARP) for urban stormwater related BMPs, National Sanitation Foundation (NSF) International for septic treatment units, or other similar third-party evaluation processes as determined relevant by the workgroup before any further workgroup consideration of the BMP.
5. The workgroup may chose to sponsor the proposed BMP through the entire WQGIT development, review, and approval process. If this is the case, the workgroup would determine the level of priority for this BMP is compared to other BMPs that have

been identified for review through the protocol. Alternatively the workgroup may decide not to take action on a BMP.

B. Existing estimates or treatment processes

The WQGIT will evaluate existing loading and effectiveness estimates on a three year schedule to determine if a review is warranted. Such reviews can be prompted by the availability of new information, such as a new treatment process. Reviews can also be initiated if current estimates produce illogical model outputs or if there is reason to believe that they were developed using inaccurate information.

C. Communication of Requests to the Chesapeake Bay Program

The Water Quality GIT Coordinator will distribute on a monthly basis an email with a status update on the existing BMP review panels and a notification of those review panels that are expected to be convened within the next three months. These email communications will be sent directly to all of the GIT, STAC, and STAR Chairs and Coordinators so the Partnership is fully aware of the review panels underway and what is expected to undergo the panel process in the near future. Questions about the review panels listed in the monthly email updates should be sent to the Water Quality GIT Coordinator and Staffers.

IIA. Review Process for New Estimates

Convene a review panel

~~The source sector Workgroup, in consultation with the WTWG and WQGIT Chair, will identify and convene a panel of experts on the relevant topic. Each request for review should include suggestions for such panel members. The panel must include at least six individuals; three recognized topic experts and three individuals with expertise in environmental and water quality-related issues. It is also important that the review panel has appropriate geographic representation.~~

As requests for BMP evaluations are made to the WQGIT or any other Partnership Goal Implementation Team, the WQGIT Chair and the requesting WQGIT Workgroup Chair and Coordinator will work together to develop a review panel request for proposals (RFP). The RFP would solicit brief proposals that specify: 1) who will chair the review panel; 2) the other experts that are proposed to participate in the review panel with a brief description of their qualifications[1]; 3) the panel's scope and charge; and 4) proposed schedule for developing the review panel's recommendations and associated deliverables.

Review panel proposals will be required to conform to a specific template and will be evaluated by the Chesapeake Bay Watershed Research and Outreach Collaborative (CBW-ROC) Advisory Board[2][3], with input from the WQGIT Chair and the appropriate WQGIT Workgroup Chair and Coordinator. The Scientific and Technical Advisory Committee

[1] The panel must include at least six individuals; three recognized topic experts and three individuals with expertise in environmental and water quality-related issues.

[2] The CBW-ROC team includes the lead land grant university in each jurisdiction that is included in the Chesapeake Bay watershed.

[3] Proposed change subject to further discussion by the CBW-ROC

(STAC) will be afforded the opportunity to comment on a proposed list of panelists before final approval.

Expectations of review panel members

Panel members should not represent entities with potential conflicts of interest, such as entities that could receive a financial benefit from panel recommendations (e.g. recommendations regarding how a proprietary BMP is represented). All panelists are required to identify any potential financial or other conflicts of interest prior to serving on the panel.

Panelists should have an equitable representation of expertise and affiliations. Representation by geographic location and affiliations should not outweigh expertise, availability, willingness, and ability to participate.

These additional conditions will minimize the risk that review panels are biased toward particular interests or regions. The panel may elect to solicit input or presentations from groups that may not qualify as panel participants to ensure that the panel receives the full range of information and science available on the panel topic.

Although discussion and deliberation is reserved for panel members, all review panel meetings and conference calls will be open to the public. Notices of any review panel meeting and calls will be posted on the Chesapeake Bay Program's website, www.chesapeakebay.net, and final recommendations from the review panel will be posted to the following site: http://stat.chesapeakebay.net/?q=node/130&quicktabs_10=3

The Panel Chair and Coordinator will be the primary points of contact during the comment period and are responsible for managing the comment process. However, panel members may be expected to address and respond to comments received during the comment period for the relevant draft of the review panel's recommendations, as appropriate. Once the comment period has ended and the reports finalized, the charge of the review panel has been met and panel members are released from duty.

Expectations of the review panel

The review panel will develop definitions and loading or effectiveness estimates for innovative, nutrient- and sediment-reducing technologies and practices. The panel will work with the source Workgroup and WTWG to develop a report that includes the following:

- Identity and expertise of panel members
- Land Use or practice name/title
- Detailed definition of the land use or practice
- Recommended nitrogen, phosphorus, and sediment loading or effectiveness estimates
  - Discussion may include alternative modeling approaches if appropriate
- Justification for the selected effectiveness estimates, including
  - List of references used (peer-reviewed, etc)
  - Detailed discussion of how each reference was considered.

- Land uses to which the BMP is applied
- Load sources that the BMP will address and potential interactions with other practices
- Description of pre-BMP and post-BMP circumstances, including the baseline conditions for individual practices
- Conditions under which the BMP works:
  - Should include conditions where the BMP will not work, or will be less effective. An example is large storms that overwhelm the design.
  - Any variations in BMP effectiveness across the watershed due to climate, hydrogeomorphic region, or other measureable factors.
- Temporal performance of the BMP including lag times between establishment and full functioning (if applicable)
- Unit of measure (e.g., feet, acres)
- Locations within the Chesapeake Bay watershed where this practice is applicable
- Useful life; effectiveness of practice over time
- Cumulative or annual practice
- Description of how the BMP will be tracked and reported:
  - Include a clear indication that this BMP will be used and reported by jurisdictions
- Suggestion for a review timeline; when will additional information be available that may warrant a re-evaluation of the estimate
- Outstanding issues that need to be resolved in the future and a list of ongoing studies, if any
- Operation and Maintenance requirements and how neglect alters performance

Unintended Consequences

The scope of the BMP expert panels is to develop definitions and loading or effectiveness estimates for innovative, nutrient- and sediment-reducing technologies and practices. However, panel members will be expected to identify any ancillary benefits or unintended consequences beyond impacts on nitrogen, phosphorus and sediment loads. Examples include increased, or reduced, air emissions and changes to habitat. It is recognized that further analyses into unintended consequences could be a significant and useful contribution to the final panel report. Therefore, if there is interest to further expand upon an unintended consequence once the panel report is finalized, such a request must be submitted to the WQGIT Chair and Vice Chair. If approved, the requesting party will be responsible for drafting such document that will serve as an appendix to the final panel report.

It is important to note that any appendix on unintended consequences does not change the definitions and loading or effectiveness estimates for nutrient- and sediment-reducing technologies and practices in the final panel report. Information on these definitions and effectiveness estimates serve to assist state and local governments in selecting, funding, and implementing those technologies and practices within their respective jurisdictions.

Additional guidelines:

- Include negative results

- Where studies with negative pollution reduction data are found (i.e. the BMP acted as a source of pollutants), they should be considered the same as all other data.

- Include results where the practice relocated pollutants to a different location. An example is where a practice eliminates a pollutant from surface transport but moves the pollutant into groundwater.

Data applicability

Determining which data should be used to develop loading and effectiveness estimates is a critical step. When considering sources of data, the panel must decide: 1) if the data is appropriate, and 2) how much influence each data source should have on the final estimate. Each of these decisions should be discussed explicitly in the final report for each data source.

Data sources should be characterized using Table 1 (below).

Table 1. Data source characterization matrix

	High confidence	**Medium confidence**	**Lowest confidence**
Applicability [a]	Definition matches technical specifications	Generally representative	Somewhat representative
Study location [b]	Very representative of soils and hydrology	Generally representative	Somewhat representative
Variability [c]	Relatively Low	Medium	Relatively High
Number of studies [d]	Many	Moderate	Few
Scientific support [e]	Operational scale research (peer reviewed)	Research scale (peer reviewed)	Not peer reviewed ("gray" literature)

a = How well does the practice match any established technical standards (according to participating professionals).
b = How well does the location of the reported practice match conditions in the Chesapeake Bay watershed (e.g. soil type, hydrologic flow paths, and species composition)?
c = How much variability is there in the reported results?
d = The number of studies included in the reference.
e = Has the source been peer reviewed in a scientific setting, and was the work done on an operational or a smaller (research/small plot) scale?

The panel should also consider the following:

- Was the data generated from a BMP design and implementation consistent with those found in the Chesapeake Bay watershed?

- How does is the duration of the experiment impact the operational effectiveness of the practice?
- Do results reflect changes in pollution reduction benefits over the lifetime of the practice?
- What parameters were sampled and monitored (paired watershed study, grab samples, etc.)?
- What, if any, assumptions were made during the experiment and conclusion?

Once the panel has characterized a data source, they must determine how much influence (i.e. 'weight') the data should have on resulting estimates. For example, peer-reviewed publications will usually have more weight than non-reviewed sources. However, the exact influence of a particular data source will also consider other factors, such as those listed in the questions above, which the panel will consider.

Incremental Recommendations. The duration of a panel is dependent upon the complexity of the review and workload issues. However, the Partnership may recommend expediting an element of the review process (e.g. partner's request for BMP effectiveness estimates that have immediate implications for progress or planning purposes). Therefore, a panel is welcome to make incremental recommendations that can be sent forward for final approval to the WQGIT by working through the normal review and approval procedures identified above and more clearly defined in Section III of the Protocol. If the panel is charged with producing incremental recommendations at the inception of the panel, it will be the responsibility of the panel to produce those incremental recommendations. However, if the request for incremental recommendations is made after the panel has received its charge and has begun work on those charges, it is at the panel's discretion as to whether or not the interim or incremental recommendations will be pursued. The panel is still expected to complete and finalize the panel report which will contain the more comprehensive set of recommendations.

Technical Appendices. In an effort for the Partnership to more efficiently approve the technical requirements for Scenario Builder, NEIEN, and the Watershed Model that are required by each panel report, the CBPO Scenario Builder and Modeling Team will work with the panel members and the Watershed Technical Workgroup to develop a technical appendix that describes changes that will be made to the modeling and reporting tools to accommodate the BMP(s). Once drafted, each technical appendix will move through the comment process in conjunction with its parent report. Any future changes to the approved appendix should be brought to the attention of the appropriate source sector workgroup, WTWG, and WQGIT.

IIB. Review Process for Existing Estimates or Treatment Processes

If approved by the WQGIT Chair, the review of existing estimates can be conducted within a source Workgroup in consultation with the WTWG. This approach should reduce the amount of time necessary to conduct the review because the definition(s) have already been developed, a background of available data already exists, and issues of how the practices or land use is incorporated into the CBWM have been addressed. Reviews of existing estimates should follow the guidelines listed in IIA above except that a separate review panel is not convened and the information generated is added to the existing support documentation for the estimate.

III. Chesapeake Bay Program Review and Approval

Review panel recommendations will follow a specific procedure through the CBP (listed below). Each recommendation must first receive approval from the indicated group before it can be reviewed by the next group listed in the process.

All review panel recommendations will undergo one formal review and comment process that will include, at a minimum, the following groups:

- Water Quality Goal Implementation Team. This group will be responsible for reviewing the process used and the recommendation's consistency with other approved BMP effectiveness estimates.

- Relevant source sector Workgroup. This group will be responsible for reviewing the technical components of the recommendation, ensuring that all of the pollutant(s) source loading(s) or BMP pollution reduction mechanisms have been included.

- Watershed Technical Workgroup. This group will be responsible for analyzing the modeling components of the recommendation(s) and determining that the tracking and reporting data that is needed to receive credit is available in the appropriate Chesapeake Bay jurisdiction(s) thereby ensuring that no double counting is occurring.

A draft of the review panel's recommendations will be submitted to the commenting group at least ten business days in advance.

To initiate the review and comment period, the Panel Chair and Coordinator will host a kick-off meeting that provides:

- Rationale for review panel
- Detailed overview of the review panel's findings
- Next steps and comment period logistics

The review and comment period shall not exceed fifteen business days in duration. During this time, commenters should send comments in track change format to the Panel Chair and Panel Coordinator.

In the event that a comment does not result in a change to the review panel's report, the Panel Chair and Panel Coordinator shall work with the specific commenter(s) to resolve the issue.

A consensus-based approach is the first and preferred option. If consensus cannot be reached, the issue will go before the WQIGT for final discussion and decision[4].

The Panel Chair and Coordinator will be responsible for developing a "response to comments" document that provides a response to comments received. This document will be posted as an appendix to the final panel's report. Specific responses will **not** be provided for:

- Overlapping comments (one response will be provided)
- Comments outside the scope of the panel or demonstrate no relevancy to the report's findings
- Editorial changes, such as grammatical edits

Once comments have been addressed and incorporated, as appropriate, the Panel Chair and Coordinator will distribute the final panel report to the Partnership and post online at http://stat.chesapeakebay.net/?q=node/130&quicktabs_10=3

~~Review by the relevant source sector Workgroup. This group will be responsible for reviewing the technical components of the recommendation, ensuring that all of the pollutant(s) source loading(s) or BMP pollution reduction mechanisms have been included.~~

~~Review by the WTWG. This group will be responsible for analyzing the modeling components of the recommendation(s) and determining that the tracking and reporting data that is needed to receive credit is available in the appropriate Chesapeake Bay jurisdiction(s) thereby ensuring that no double counting is occurring.~~

~~Review by the WQGIT. This group will be responsible for reviewing the process used and the recommendation's consistency with other approved BMP effectiveness estimates.~~

Note that the graphic above will be deleted given the revised review and comment process.

[4] Link to WQGIT governance document once finalized