Recommendations for the Nutrient Management Phase 6.0 Expert Panel

Prepared for the Chesapeake Bay Program Partnership's Agriculture Workgroup by the Nutrient Management Phase 6.0 Expert Panel Establishment Group
March 9, 2015

Background

The current version of the Chesapeake Bay Program (CBP) partnership's Watershed Model (Phase 5.3.2 or P5.3.2) credits Crop Group Nutrient Application Management (or Tier 1), under the following definition: "Documentation exists for manure and/or fertilizer application management activities in accordance with basic land grant university (LGU) recommendations. This documentation supports farm-specific efforts to maximize growth by application of nitrogen (N) and phosphorus (P) with respect to proper nutrient source, rate, timing and placement for optimum crop growth consistent with LGU recommendations. Particular attention is paid to: (1) standard, realistic farm-wide yield goals; (2) credit for N sources (soil, sod, past manure and current-year applications); (3) P application rates consistent with LGU recommendations based on soil tests for fields without manure; and (4) N based application rates consistent with LGU recommendations for fields receiving manure."

Enhanced Nutrient Management and Decision Agriculture BMPs are currently represented in the P5.3.2 Model. However, these practices are expected to be replaced by Nutrient Application Management Tier 2 and Tier 3 practices respectively, which are being finalized by the Nutrient Management P5.3.2 Expert Panel in spring 2015.

- Proposed Tier 2
  The implementation of field-specific nutrient application management efforts to maximize growth by application of nitrogen (N) and phosphorus (P) with respect to proper nutrient source, rate, timing and placement for optimum crop growth consistent with LGU recommendations incorporating a P risk assessment tool.
- Proposed Tier 3
  The implementation of subfield-specific nutrient application management efforts to maximize growth by application of nitrogen (N) and phosphorus (P) with respect to proper nutrient source, rate, timing and placement for optimum crop growth incorporating sub-field monitoring and operational practices to further refine the LGU recommendations for the specific farm site and conditions.

The Nutrient Management Expert Panel Establishment Group (EPEG) was formed to:

- Identify priority tasks for the first Phase 6.0 (P6.0) Nutrient Management Expert Panel (EP),
- Recommend areas of expertise that should be included on the Nutrient Management EP, and
- Draft the Nutrient Management EP's charge for the review process.

From February 18, 2015 through March 6, 2015 the EPEG met 3 times by conference call and worked collaboratively to complete this charge for presentation to the Agriculture Workgroup

(AgWG) on March 18-19, 2015. Final approval of the charge was obtained by online polling of all members. Members of the EPEG are listed in Table 1.

Table 1. Nutrient Management Expert Panel Establishment Group membership and affiliations.

Member	Affiliation
Beth McGee	Chesapeake Bay Foundation
Chris Brosch	Virginia Tech
Doug Goodlander	Pennsylvania Department of Environmental Protection
Frank Coale	University of Maryland
Jack Meisinger	U.S. Department of Agriculture-Agricultural Research Service
Jason Keppler	Maryland Department of Agriculture
EPEG Support Staff	
Emma Giese	Chesapeake Research Consortium
Mark Dubin	University Maryland
Steve Dressing	Tetra Tech, Inc.

Method

The Nutrient Management EPEG developed its recommendations in accordance with the process specified by the AgWG (AgWG 2014). This process is informed by the strawman proposal presented at the December 11, 2014 AgWG meeting, the Water Quality Goal Implementation Team (WQGIT) Best Management Practice (BMP) protocol, input from existing panelists and chairs, and the process recently undertaken by the AgWG to develop the charge for the Manure Treatment Technologies EP.

The collective knowledge and expertise of EPEG members formed the basis for the recommendations contained herein. A number of EPEG members have had experience on BMP expert panels, including the P5.3.2 Nutrient Management EP. Other EPEG members have knowledge and/or expertise in state and federal programs, the Chesapeake Bay model, and nutrient management practices within the Chesapeake Bay watershed.

Communication among EPEG members was by conference call and email. All decisions were consensus-based.

Recommendations for Expert Panel Member Expertise

The AgWG expert panel organization process directs that each expert panel is to include eight members, including one non-voting representative each from the Watershed Technical Workgroup (WTWG) and Chesapeake Bay Program modeling team. Panels are also expected to include three recognized topic experts and three individuals with expertise in environmental and water quality-related issues. A representative of USDA who is familiar with the USDA-Natural Resources Conservation Service (NRCS) conservation practice standards should be included as one of the six individuals who have topic- or other expertise.

In accordance with the WQGIT BMP protocol, panel members should not represent entities with potential conflicts of interest, such as entities that could receive a financial benefit from Panel recommendations or where there is a conflict between the private interests and the official responsibilities of those entities. All Panelists are required to identify any potential financial or other conflicts of interest prior to serving on the Panel. These conditions will minimize the risk that Expert Panels are biased toward particular interests or regions.

The Nutrient Management EPEG recommends that the P6.0 Nutrient Management EP should include members with the following areas of expertise:

- Nutrient management planning and agronomy.
- Expertise in farm- and field-level nutrient risk assessment tools for N and P.
- Experience with carrying out research projects relating to nutrient management.
- Expertise in fate and transport of N and/or P in agricultural systems.
- Knowledge of nutrient management practices implemented in the Bay jurisdiction(s).
- Knowledge of how BMPs are tracked and reported, and the Chesapeake Bay Program partnership's modeling tools.
- Experience with verification of nutrient management plans and other forms of nutrient management.
- Knowledge of relevant USDA-NRCS practice codes or standards.

Expert Panel Scope of Work

The general scope of work for the Nutrient Management P6.0 EP(s) will be to define and configure the Nutrient Management BMPs in the P6.0 model. Specifically, the Nutrient Management EPEG recommends the following five charges with associated tasks for the P6.0 Nutrient Management EP:

1. Review the P5.3.2 definitions and effectiveness estimates for the implementation of component practices of Nutrient Management and make adjustments or modifications as needed for Phase 6.0.
    a) Consider the current P5.3.2 Tier system used for identifying levels of nutrient management implementation activities to be credited to the model, and
    b) Decide if the current proposed Tier process should remain or if a more component oriented process for crediting nutrient management practices is more appropriate.
2. Determine how nutrient management practices can be applied to the P6.0 land uses.
3. Consider multi-year vs. annual model representation of legume crop nitrogen residues, soil nutrient residuals, and organic nitrogen mineralization residuals, for calculation of available nutrient mass balances to meet crop requirements on an annual basis.
4. Collaboration with the Cropland Irrigation Management EP on fertigation will be critical to ensure that recommendations are complementary as well as to avoid double-counting and ensure effective reporting of practices.

This scope of work addresses nutrient management reduction efficiencies for N and P.

Under the first charge, the Nutrient Management Phase 6.0 (P6.0) Expert Panel will review the P5.3.2 definitions and effectiveness estimates for the implementation of component practices of Nutrient Management and make adjustments or modifications as needed for Phase 6.0. This charge is necessary because the P6.0 model features a change in land use categories, a possible change in the baseline condition, and some likely changes in how BMPs are applied. While the EPEG considers the tiered approach to be an improvement over the previous P5.3.2 approach to nutrient management, there is interest in considering an alternative approach for P6.0. Both a tiered approach and practice-specific approach have pros and cons associated with reporting implementation and determining efficiency values. Items 1a and 1b specify that the P6.0 EP will consider the current Tier system used for identifying levels of nutrient management implementation activities to be credited to the model and decide if the current proposed Tier process should remain or if a more component oriented process for selecting nutrient management practices is more appropriate. Nutrient management Tiers 1-3 are described in the *Background* section of this document.

The second charge directs the P6.0 EP to determine how nutrient management practices can be applied to the P6.0 land uses. Factors such as the baseline conditions assumed by the model (e.g., with or without nutrient management) and potential variation in crediting for different land uses should be considered when performing tasks under this charge.

Residual nutrients are not adequately accounted for by the P5.3.2 model. Under the third charge, the P6.0 EP will consider management of residual nutrients and how they are carried over to subsequent years in the P6.0 model. This will require close coordination with the Chesapeake Bay modeling team which is ultimately responsible for developing the capability to add this important feature to the model.

Collaboration with the P6.0 Cropland Irrigation Management EP is specified under the fourth charge to ensure that recommendations from the two panels are complementary and that practice reporting and crediting are accurate. Either panel could address fertigation, but both panels should have a role in determining the final recommendations.

Timeline and Deliverables

April 2015 - Panel stakeholder kickoff meeting

Spring/Early summer 2015 – Based on their written EPEG charge, the panel will develop a proposed scope of work including BMP structure and type, draft BMP definition(s), and initial elements of the BMP such as associated components and conservation practices, and USDA-NRCS associated CP codes. Initially identified literature citations will be included to provide a range of potential effectiveness values that the panel will consider and supplement with further evaluation. The panel will present their provisional BMP paper to the AgWG, WTWG, and WQGIT for informational purposes, and for initial partnership comments on the proposed direction of the panel's evaluation. The paper will not represent a full recommendation report, and the partnership will not be asked for formal approval at this time.

Prior to October 1, 2015 – **Target date** for partnership approval of full panel recommendations (see Attachment 1 for an outline of the final report). If approved by the partnership, the CBPO

modeling team will build the recommendations into the Phase 6 Beta Scenario Builder tool to meet an early October deadline. If a partnership approved panel report will not be available at this time, the CBPO modeling team will request a decision by the partnership of whether the BMP will be represented using the Phase 5.3.2 information, or if the panel's provisional paper will be the interim representation of the BMP.

Early October 2015 – All inputs are final and delivered to the WSM by the Scenario Builder team for the final calibration run. Final targets are based on this information.

April 2016 – **Final date** for panel to release full recommendations for approval by the AgWG, WTWG, and WQGIT.

July 2016 – If approved by the partnership, panel recommendations are final and will replace the interim representation of the BMP in the final version of the Phase 6 modeling tools.

Phase 6.0 BMP Verification Recommendations:

The panel will utilize the Partnership approved ***Agricultural BMP Verification Guidance***[1], as the basis for developing BMP verification guidance recommendations that are specific to the BMP(s) being evaluated. The panel's verification guidance will provide relevant supplemental details and specific examples to provide the Partnership with recommended potential options for how jurisdictions and partners can verify nutrient management practices in accordance with the Partnership's approved guidance.

References

AgWG. 2014. Agriculture Workgroup expert panel organization – DRAFT January 8, 2014. Agriculture Workgroup, Chesapeake Bay Program.

[1] http://www.chesapeakebay.net/documents/Appendix%20B%20-Ag%20BMP%20Verification%20Guidance%20Final.pdf

Attachment 1: Outline for Final Expert Panel Reports

- Identity and expertise of Panel members
- Practice name/title
- Detailed definition(s) of the 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, unpublished, etc.)
  - Detailed discussion of how each reference was considered, or if another source was investigated, but not considered.
- Description of how best professional judgment was used, if applicable
- 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, reported, and verified:
  - 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
- Documentation of any dissenting opinion(s) if consensus cannot be reached
- Operation and Maintenance requirements and how neglect alters performance

Additional Guidelines

- Identify ancillary benefits and unintended consequences
- 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. Examples include where a practice eliminates a pollutant from surface transport but

moves the pollutant into groundwater, or where the practice will move manure from the farm credited for the practice to another farm more in need of nutrients.

In addition, the Expert Panel will follow the "data applicability" guidelines outlined Table 1 of the Water Quality Goal Implementation Team *Protocol for the Development, Review, and Approval of Loading and Effectiveness Estimates for Nutrient and Sediment Controls in the Chesapeake Bay Watershed Model*.