



Chesapeake Bay Program
SCIENTIFIC AND TECHNICAL ADVISORY COMMITTEE
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August 26, 2014

RE: STAC Review of Agricultural P-dynamics in the Chesapeake Bay Watershed Model

Nicholas DiPasquale, Chair, Chesapeake Bay Program Management Board
U.S. Environmental Protection Agency
410 Severn Avenue, Suite 109
Annapolis, MD 21403

Cc: Management Board; STAR, Tidal Monitoring and Analysis Workgroup, Modeling Workgroup; Water Quality GIT, Best Management Practices Verification Committee, Watershed Technical Workgroup, Sediment Workgroup

Dear Mr. DiPasquale,

Please see the enclosed STAC publication entitled “A Review of Agricultural P-dynamics in the Chesapeake Bay Watershed Model.” This review was initiated following the September 2011 STAC meeting in order to investigate how phosphorus (P) transport from cropland is simulated in the Chesapeake Bay Watershed Model (CBWM). The review provides a number of categorized recommendations for the partnership:

Modeling Recommendations Related to Soil P:

1. Account for soil P reservoirs as a source of P to runoff on a segment-by-segment basis.
2. Track segment P balances to determine whether soil P reservoirs are increasing or decreasing.
3. Describe the temporal dynamics of the effects of drawdown/build-up of soil P reservoirs on P losses in runoff.

Modeling Recommendations Related to Management of P Inputs:

1. Account for different P application methods, including whether manure is left on the soil surface, incorporated by tillage or incorporated with low soil disturbance full-width applicators, or injected in bands.
2. Apply manure at rates and times based on watershed or regional information.
3. Improve representation of practices aimed at reducing P runoff potential by adjusting the timing of P applications.
4. Account for P stratification that develops in soils in continuous no-till.
5. Account for interaction between tillage and manure application on potential for P losses as particulate and dissolved P fractions in overland and sub-surface flow.

General Modeling Recommendations:

1. Identify the fraction of P losses associated with short versus long-term management strategies.
2. Model functions should be capable of scaling down to provide segment and field guidance on drivers of P.
3. Shift away from using model-generated values and proxy data for key input parameters.
4. Consider changing weather patterns associated with climate change.
5. Better represent and report uncertainty in data sources and model output.
6. Differentiate between surface and sub-surface transport pathways of P loss and account for the role of drainage intensity.

Future Data Needs to Support Recommended Changes in Modeling Approach:

1. Baseline soil P levels.
2. Information on P application methods.
3. Spatial and temporal data on manure application.
4. Inorganic P application rates, including those associated with high-value row and horticulture crops.
5. More systematic storm water sampling in predominantly agricultural watersheds for use in model calibration.
6. Improved mapping of features that restrict water infiltration and promote “saturation excess” runoff.
7. Improved mapping of drainage intensity as an indicator of hydrologic connectivity and P delivery potential.

We hope these recommendations are useful, and STAC looks forward to your feedback. Inclusion of such model considerations is likely to increase confidence in the CBWM and improve accuracy of future model projections related to agricultural P loads throughout the Chesapeake Bay watershed.

STAC respectfully requests a written response to the above specific recommendations from the CBP Management Board Chair by Friday, October 24, 2014.

Please direct any questions you may have about this report and its recommendations to Matt Ellis, the Chesapeake Bay Program’s Scientific and Technical Advisory Committee Staff, and lead reviewer, Dr. Ken Staver of UMD Wye Center.

On behalf of the entire STAC, thank you again for considering these recommended next steps, and we look forward to working with you closely on this in the future.

Sincerely,



Kirk Havens
Chair, Chesapeake Bay Program's Scientific and Technical Advisory Committee