Soil Phosphorus Update

CBP Management Board Meeting

December 6, 2018

Jason Keppler – AgWG Chair

Overview

- Brief History
- Review Recommendations
- Response to Recommendations
- Next Steps

Summary – Briefing Paper

- P6 Fatal Flaw Review Period (June 1 – July 31 2017)
  - 115 Comments (80 Unique)
  - August 28, 2017 proposed solutions on all but 2 issues related to soil phosphorus (15 comments)
- Issue #1 – Inequity in Modeling Soil P Ag vs Urban Soils
- Issue #2 - Soil Phosphorus Data Quality, Uncertainty, and the APLE process

https://www.chesapeakebay.net/channel_files/24399/soil_p_briefing_paper_for_mb_9.21.17_(003).pdf

Issue #1 – Inequity Among Sectors

- "Delaware contends that the APLE simulation on agricultural land is inequitable with the developed sector. Delaware is requesting that soil samples and relative load should be simulated in a similar fashion in both sectors; using either the Phase 5 Watershed Model or APLE method. "
- Several Considerations
  - There is some "Home and Garden" soil phosphorus data available in the existing data.
  - The Partnership's approved Urban Nutrient Management BMP Expert Panel Report determined that high soil phosphorus levels were only one of eleven factors which determine phosphorus runoff from pervious, developed land.
  - Urban pervious lands have much different phosphorus inputs than crop land. For example, only half of urban turf in the Bay watershed is fertilized, and no urban lands receive any manure applications (like their agricultural counterparts).
  - APLE is not a peer-reviewed, calibrated tool for urban soils, and should not be used for estimating runoff from urban soils. No known model exists to simulate urban phosphorus runoff based upon soil phosphorus data.
  - The APLE model does not change the total load within a sector but only changes its geographic distribution.
  - Phosphorus concentrations in developed runoff are well-understood, and monitoring data suggest they are very consistent across the nation and in the Bay watershed.
  - Simply applying agricultural methods to developed lands is not scientifically valid, since no such method exists at this point, and it would have little or no aggregate effect on the load balance between the agricultural and developed sectors.
  - Removing the modeling approach for soil phosphorus in the Phase 6 Watershed Model would actually have a detrimental effect: o It would limit agricultural management practice effects and Delaware loads would likely increase.

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Issue #2 – Data Quality, Uncertainty, and the APLE Process

- Extent of observed agricultural phosphorus soils data available for individual counties and years across the watershed is highly variable
- Uncertainty of data due to differences in lab techniques, extraction methods, lab equip, etc.
- Concerns about the appropriateness of the APLE process to apply these data to all agricultural land uses in each county through time.
- Delaware requested that the use of the APLE model and the method of simulating phosphorus on agricultural lands be removed from the Partnership's Phase 6 suite of modeling tools, reverting back to the Phase 5 approach where soil phosphorus concentrations were not explicitly simulated.
- Several Considerations
  - Removing the modeling approach for soil phosphorus in the Phase 6 Watershed Model would have a detrimental effect on the calibration and the Partnership-approved Midpoint Assessment schedule
  - While the data is imperfect, the methods to incorporate the data reflect the recommendations of regional and national experts in soil phosphorus, and the decisions of the Partnership
  - The 2014 STAC Report specifically recommended changes to the Phase 5 modeling approach to better simulate soil phosphorus concentrations, which have the potential to contribute to watershed P losses well into the future.

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Recommended Path Forward

1. Working through EPA, develop and implement a contract/grant to **conduct a comprehensive statistical analysis of all the states' existing soil phosphorus data** to better understand the statistical validity, viability, and confidence interval of the existing data and to support the development of a suite of expectations for future data collection efforts. This analysis would include, but not be limited to determining: sample size, confidence intervals, geographic domain, representativeness, data extrapolation and land uses. The results will also be used to prioritize future data collection efforts to address data gaps.
2. Informed by the contractor's/grantee's work from number 1 above, and with the support of the Partnership's Agriculture Workgroup and the Scientific and Technical Advisory Committee, the Partnership will cooperatively **develop regional standards for a comparable and consistent suite of soil phosphorus sample collection methods, sample data recording, and laboratory analysis methods.** These new regional standards would be proposed for mutual adoption and implementation across all state, land grant, and private laboratories which provide analytical services for agricultural operations within the six Chesapeake Bay watershed states. These would guide the Partnership for future reporting of soil phosphorus data during each two-year milestone period.
3. **Identify and implement opportunities to ensure the collection of more representative soil phosphorus data into the future** by building from existing state nutrient management and permitting requirements for soil phosphorus data collection.

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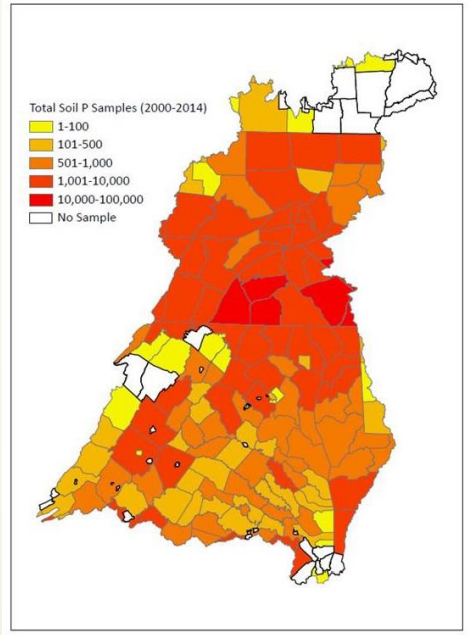
Recommended Path Forward

4. **Establish a quality assurance system** to prevent future concerns about soil phosphorus data comparability within and across jurisdictions. This quality assurance system will utilize the Partnership's existing quality assurance structure (e.g., CBP Quality Assurance Coordinator), infrastructure (e.g.,CBP Data Integrity Workgroup), and verification program plans.
5. Informed by the contractor's/grantee's work from number 1 above, **develop a verified reference soil phosphorus sub-dataset for each state** by obtaining soil samples and associated data using standardized collection methods.
6. **Ask the Partnership's Scientific and Technical Advisory Committee to sponsor a workshop** to investigate the impact of and appropriate model representation of soil phosphorus levels of **urban and other non-agricultural land uses** for future use by the Partnership.
7. With the support of the Partnership's Agriculture Workgroup, the Scientific and Technical Advisory Committee, regional land grant universities and private laboratories, **develop and implement a regional structure and process** for the biennial collection, synthesis, and reporting of soil phosphorus analysis data by land use at an aggregated county-scale for inclusion in the Phase 6 Chesapeake Bay Watershed Modeling tools during future two-year milestone periods

https://www.chesapeakebay.net/channel_files/25489/recommended_follow_through_soil_p_data_quality_actions_for_mb_decisions_proposal_9_20_2017_v-3.pdf

#1 – Analysis of Current Soil P Data

- Status – Complete
  - Fall of 2017 by the Chesapeake Bay Program Office (CBPO) Modeling Workgroup
  - Results were presented by Gary Shenk, USGS, to the AgWG on Sept 20, 2018



- Based on more than half a million observations
- Uneven coverage between counties
- Uneven coverage between states
- Uneven coverage in time
- Many of the largest ag counties are well-covered

- Further Actions
  - Future presentation to the Water Quality Goal Implementation Team (WQGIT)

#2 – Development of Regional Standards

- Ag Workgroup Response
  - Land grant and private labs have established protocols to conduct their analyses
  - Conversion processes has been developed to standardize results across labs
- Rationale
  - Complexity of logistics and expense associated with Action #2 are extremely high
- Status – Alternate Approach
  - Seek out and obtain access to existing soil P data not currently available for use in the Chesapeake Bay watershed model (CBWM)
  - Collaboration with private and public soil testing labs

#3 - Ensure Collection of Representative P Data

- Ag Workgroup Response
  - Agreed that there is a void in soil P data available for use in the CBWM
  - Foster good relationships with regional soil labs (public & private)
  - Address data confidentiality concerns related to data sharing
- Rationale
  - Associated with #2 - Complexity of logistics & expense very high
- Status – Alternate Approach
  - Seek out and obtain access to existing soil P data not currently available for use in the Chesapeake Bay watershed model (CBWM)
  - Collaboration with private and public soil testing labs

#4 - Establish QA for Soil P Data Comparability

- Ag Workgroup Response
  - Land grant and private labs have established protocols to conduct their analyses
  - Conversion processes has been developed to standardize results across labs
- Rationale
  - Well-established conversion factors and QA/QC for regional soil analysis data already exist
- Status – Alternate Approach
  - Collaboration with private and public soil testing labs.
  - Evaluate lab-to-lab conversion factors provided by lab community and/or land grant universities.

#5 - Reference soil P sub-dataset by state

- Ag Workgroup Response
  - Many challenges politically, logistically, and financially
  - More feasible
    - Foster good relationships with regional soil labs (public & private)
    - Address data confidentiality concerns related to data sharing.
    - More data = Better characterization of soil P distribution across the Watershed over time
- Rationale
  - Associated with #2 - Complexity of logistics & expense very high
- Status – Alternate Approach
  - Seek out and obtain access to existing soil P data not currently available for use in the CBWM
  - Collaboration with private and public soil testing labs

#6 – STAC Workshop Urban/Non-Ag Landuses

- Ag Workgroup Response
  - Requires collaboration with WQGIT and associated sector workgroups

- Status – In Progress
  - Collaborate with Urban Stormwater Workgroup (USWG) and WQGIT to evaluate next steps and report back to Management Board (MB) at later date

#7 – Biennial Reporting of Soil P at County Level

- Ag Workgroup Response
  - Leverage existing reporting framework
- Status – In Progress
  - Collaborate with CBPO on reporting framework

#1: Analysis of current soil P data	Done
#2: Development of regional standards for soil P data collection, analysis, and recording #3: Ensure collection of representative P data from existing NM and permitting frameworks #5: Reference soil P sub-dataset by state	*Alternative Approach* • Seek out and obtain access to existing soil P data not currently available for use in the CBWM • Collaboration with private and public soil testing labs
#4: Establish quality assurance for soil P data comparability	*Alternative Approach* • Collaboration with private and public soil testing labs • Evaluate lab-to-lab conversion factors provided by lab community and/or land grant universities
#6: STAC Workshop: Impacts & Representation of Soil P in Urban and Non-Ag Land Uses	In progress
#7: Process for biennial reporting of soil P at county-level	In progress

Collaborators

Putting together a good team