Chesapeake Bay Program
Agricultural Modeling Team (AMT)
Meeting Minutes

January 13th, 2023
09:00 AM – 10:35 AM
Meeting Materials

Summary of Actions and Decisions

Decision: The AMT approved the December 2022 meeting minutes.

Meeting Minutes

Announcements - Tom Butler, EPA.

- **Decision:** The AMT approved the December 2022 minutes.
- 2022 Ag Census is here! Responses are due by Feb. 6, 2023. Visit website for more information.
- Principals Staff Committee (PSC) made several decisions:
  - "The partnership will convene a committee to develop short-term, interim resolutions to fertilizer data concerns before moving forward with CAST 2021 as well as long-term resolutions for Phase 7 model. The committee will report on progress towards this action at the next PSC meeting."
  - Request for a reprioritization will need to happen again so that the AMT can make a living workplan.

Introduction – Tom Butler, EPA.

Recap of our previous meeting.

Nutrient applications: Nutrient Management – Tom Butler, EPA.

We examined the effect of nutrient management on three counties TN applications and how Core Nutrient Management impacts applications.

Discussion

Ken Staver: If you don't have the core nutrient management (NM) BMP then you can't have the efficiency BMPs?
Ruth Cassilly: Yes, that's correct. You can't claim supplemental unless you are doing core NM.
Ken Staver: If we get more acres of the NM BMP and we reduce the application on those acres, does that mean it will increase on non-NM acres to accommodate the totals since we have a fixed amount?
Tom Butler: We'll dive into that later. We establish our crop need, so if we're dealing with fertilizer, it's based on a percentage. We don't necessarily have the exact amount of fertilizer.

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Gary Shenk: If we're talking about the past, where we have a measurement of how much fertilizer there is and an estimate of how much NM there was, then yes. If there's more NM on the ground and the same amount of fertilizer was sold, then that has to be applied somewhere. But for scenarios in the future, if someone claims more NM acres it doesn't mean that other counties' application of fertilizer automatically goes up.
Tamie Veith: Concerned about impact of putting efficiency values (rate/timing/placement) *after* the crop. Rate/timing/placement affects the crop as well as the runoff from the crop. What are the ramifications of other aspects or components of the model?
Mark Dubin: One of the challenges that the expert panel (EP) had was that we had to represent NM over the past 40 years. NM definition has changed over that period of time. The supplemental NM is supposed to represent the more advanced NM practices.
Eric Rosenbaum (in chat): I don't think of it as "after the crop" . Think of it as planning vs implementation. The NMP calls for 100 lbs nitrogen. Efficiency Values would be splitting that 100lbs into multiple applications or using a nitrogen model.
Gary Shenk: From Phase 3 through Phase 5, we've been trying to do more process modeling to get everything in the inputs rather than apply efficiencies afterwards, but we've run into issues with outliers. People actually live in those outliers, and it causes a disruption. We use process models to give us information like distribution, which we simplify and put into our model as an efficiency afterwards. Benefits of not doing a process model in every instance gives us stability and it outweighs the problems. Trying to reflect the central tendency of the effect of these BMPs.
Robert Shoemaker: We have two types of pasture in VA - one that's managed and one that isn't well managed. We are getting a lot of poultry litter that is going on these pastures. I think we're underestimating the nutrient inputs in this system. Also, cattle producers purchasing off-farm winter feed (hay) is another input that I don't think is reflected in the model. Not worried as much about the efficiency numbers. Having NM on about 60% of ag land in VA come up as zero for N and P makes me think we need to revisit that.
Mark Dubin: This was an area that the partnership struggled to figure out and come up with a recommendation on. The condition before this was an assumption that all pasture acres got the recommended rate from LGU and there was a non-NM rate that was even higher. It was applied to all pasture acres in the watershed. But the partnership found that fertilizer was redirected towards pastures at higher rates. To address that, an alternative was to create a static value as an average condition. At the time we didn't have much data to work with. Should look at revisiting this issue with better data if we can get it.
Alisha Mulkey (in chat): Crop need is not the same as applied. CAST will apply more than need, even if core NM is reported, correct?
Jessica Rigelman (in chat): Alicia, correct.
Ken Staver: Your graphs aren't showing the plant available N, correct? Only total N?
Tom Butler: Yes, that's correct.
Jess Rigelman: we can produce these graphs with just the plant available N to show a comparison. It's not a gross over application because of the plant availability of the N.
Mark Dubin: We implement a 3-year mineralization value based on the type of manure it is from the species of livestock. Part of this is developing and identifying what the plant available N would be. Might be helpful for group to be shown that.

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Understanding CAST: Loads – Gary Shenk, USGS.

Gary presented on the foundation of how loads are calculated within CAST. This allowed us to see how the data inputs factor into calculating loads.

Discussion

Lisa Duriancik: Isn't the land water adjustment partially inherent in the BMP effectiveness estimate? Is that value double counted?
Gary Shenk: Generally we have a lot of this information at the county level, some of it at a finer level. The land to water factors are not based on BMPs, they are natural factors of the landscape. The BMP effectiveness works in conjunction with the land to water factors.
Lisa Duriancik: Literature often gives a range of effectiveness for practices, usually based on the conditions or environment in which the practice was implemented. So I wonder if it already accounts for the land to water factor.
Gary Shenk: We use one BMP percentage everywhere for the most part, so I don't think that would be an issue. If we used different percentages for BMPs, then I think you would be right.
Mark Dubin: Expert panels look at a wide range of data for each of these BMPs. Where we have better information panels will be more specific, and where we don't we are more general. Sometimes the data can be difficult to find to cover all aspects of agriculture within the watershed.
Dave Montali: For septics, there were different amounts for different geographic areas but I think that expert panel took it all the way to edge-of-stream so we wouldn't be modifying the loading by land to water factors.
Gary Shenk: Right, so Lisa's point was considered by the expert panels.
Chris Brosch: Are the sensitivities shown specific to agriculture?
Gary Shenk: Yes, they are.
Chris Brosch: How do these inputs vary from risk assessment tools like the phosphorus site index that we might use for NM?
Gary Shenk: I know they are different but I don't know the specifics.
Ken Stavers: Water extractable P says its lbs per acre. Is that for lbs of P applied multiplied by some solubility factor?
Gary Shenk: Yes.
Chris Brosch: But it's only related directly to the inputs.
Gary Shenk: Yes.
Chris Brosch: For the DE Phosphorus site index, we have much more sensitivity built into the input side. Up to a certain range, the inputs will drive the risk more. It's worth discussing that again and talking to those who have updated those risk assessment tools.
Gary Shenk: Absolutely a good discussion to have. These sensitivities are based on the APLE model.
Chris Brosch: The soil P dataset that is generated is unique to this model?
Gary Shenk: Yes, that's right.
Ken Staver: Short term factors should be considered as well.
Chris Brosch: One challenge in communicating this is that there are different types of soil P and different ways to measure water extractable P.
Dave Montali: What's the purview of AMT and MWG and issues about sensitivities? How will we get the input of the ag experts into our considerations of this in the MWG?
Gary Shenk: The AMT can say this input is really important and tell the MWG to come up with a sensitivity for it.

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Dave Montali: So AMT can provide input to the MWG?
Gary Shenk: Yes, that's how I see it.
Mark Dubin: We're trying to get to the baseline conditions with these sensitivities. How do other ag BMPs (manure incorporation, injection, NM supplementals, etc.) influence the final results?
Gary Shenk: They would be applied after the sensitivities.
Ken Staver: On the watershed delivery potential slide on land to water and river delivery. Somewhere the loads are constrained by monitoring data? Is that how SPARROW is involved?
Gary Shenk: SPARROW is calibrated to the nontidal network so those are informed, but final constraint was done by HSPF in Phase 6, so river delivery is where the constraint by monitoring data exists. In Phase 7, we're doing things differently and we're using CalCAST to do that constraint. With CalCAST at the NHD catchment scale, we can double the number of stations that we previously had.
Ken Staver: So the calculations before that have to equal what is being measured for a huge portion of the watershed?
Gary Shenk: Yes.
Robert Shoemaker: A general example that may come into this conversation is soil health. Not sure how well that's integrated into the current model. We generally understand for P that improvement of soil health influences the amount of infiltration v runoff. Seems like it might be worth considering in the sensitivity or input side of things.
Gary Shenk: Soil health has been a big topic, but I think the definition is not consistent. So first there's a question of how we measure that and then consider how we integrate it. We may already have some components integrated into that.
Jess Rigelman: About the work plan - not all decisions necessarily have to be final before we start testing them. If we can start making decisions early, we can prototype them first in CAST to test them out.
Lisa Duriancik (in chat): Here is a recent article in CSA News on the complexities around soil health and water quality featuring research results:
https://acsess.onlinelibrary.wiley.com/doi/10.1002/csan.20907

Closing –10:30-10:35 (5 minutes)

Adjourn – 10:35

Up Next: February 10th, 2023 – 09:00-11:00; Further CAST learning, reprioritization.

Participants

Jackie Pickford, CRC
Tom Butler, EPA-CBPO
Gary Shenk, USGS
Alex Soroka, USGS
Becky Barlow, VA DCR
Dave Kindig
Chris Brosch, DDA
Cassie Davis, NYSDEC
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Elizabeth Hoffman, MDA
Emily Dekar, USC
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Jess Rigelman, J7 LLC contractor to CBPO
Jeff Sweeney, EPA-CBPO
Karl Blankenship, Bay Journal
Kate Bresaw, PA DEP
Kristen Bisom, WVCA
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Acronym List

AAPFCO: Association of American Plant Food Control Officials
APLE: Annual phosphorus loading estimator
AMT: Agricultural Modeling Team (Phase 7)
AMS: Agricultural Modeling Subcommittee (Phase 6)
BMP: Best Management Practice
CAST: Chesapeake Assessment Scenario Tool
CBPO: Chesapeake Bay Program Office
LUWG: Land Use Workgroup
RUSLE: Revised Universal Soil Loss Equation
GIT: Goal Implementation Team
LRseg: Land river segment
NHD: National hydrography dataset
WEP: Water extractable phosphorus
DEQ: department of environmental quality
USDA: United States Department of Agriculture
PSNT: pre-sidedress nitrate test
NM: nutrient management
MDA: Maryland Department of Agriculture
MWG: Modeling Workgroup
DAP: di-ammonium phosphate
MAP: mono-ammonium phosphate
N: nitrogen
TN: total nitrogen
P: phosphorus
LGU: land grant university
WG: workgroup
NASS: National Agricultural Statistics Survey
STAC: Scientific and Technical Advisory Committee

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