# Ag Data:
# Updates & Moving Forward

Agriculture Workgroup

March 17, 2022

# Today's Items

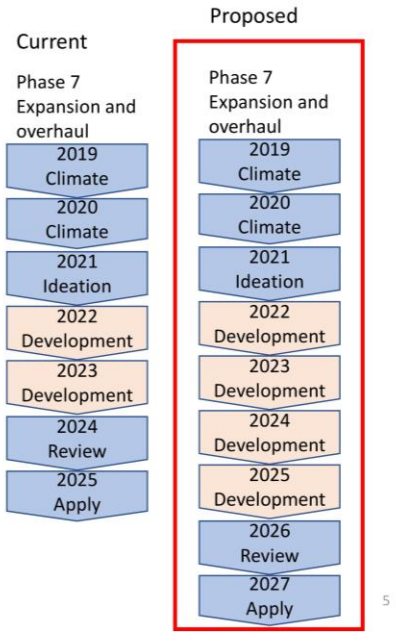
- Phase 7 Development  Timeline- *Update*
- BMP Partial Credit Proposal- *Update*
- CAST-21 Review & Release- *Update*
- Hillandale → Ag Data Concerns- *What's Next?*
- Fertilizer Data in CAST-21 → *Moving Forward*

# Phase 7 Development

*Update*

# Phase 7 (Revised) Proposed Timeline

***Timeline Approved @ Management Board & Principal's Staff Committee***



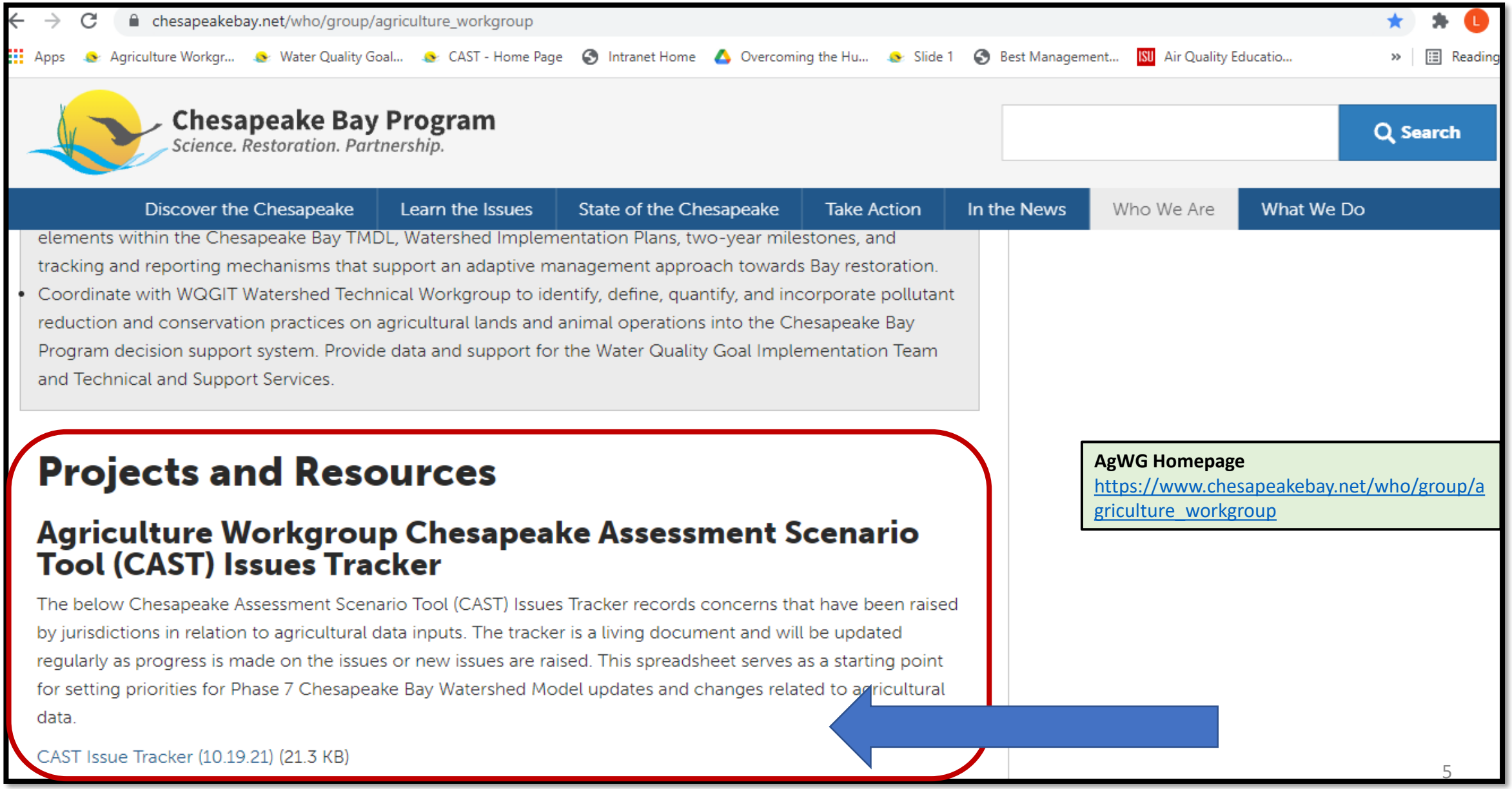




| | 2022 1 | 2022 2 | 2022 3 | 2022 4 | 2023 1 | 2023 2 | 2023 3 | 2023 4 | 2024 1 | 2024 2 | 2024 3 | 2024 4 | 2025 1 | 2025 2 | 2025 3 | 2025 4 | 2026 1 | 2026 2 | 2026 3 | 2026 4 | 2027 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phase 7 Activity | Work plan | Build Models | | | Work plan | Build Models | | | Work plan | Build Models | | | Work plan | Build Models | | | Review Models | | | | |
| Variable Scale Modeling | Determine official CBPO GIS layers; system of annual weather updates | | | | | | | | | | | | | | | | | | | | |
| | Combine average load calculator and CalCAST using p6 data | | | | Use CalCAST as primary calibration tool | | | | | | | | | | | | | | | | |
| | Finalize Methods | | | | Produce output for estuarine models, provide temporal output for lag calibration and overall validation | | | | | | | | | | | | | | | | |
| Nutrient application Calculation | Restart AMS | | | | Update nutrient inputs | | | | | | | | | | | | | | | | |
| Physical Process Simulation | | | | Average Loads | | | | | | | | | | | | | | | | | |
| | | | | | | Sensitivities | | | | | | | | | | | | | | | |
| | | | | | | Land-to-water | | | | | | | | | | | | | | | |
| | | | | | | Stream to Bay | | | | | | | | | | | | | | | |
| Uncertainty Quantification | Methods | | | | Parameters | | | | | | | | | Use in review | | | | | | | |
| Improve climate change modeling | | | | | | | | | | | | | Climate Change | | | | | | | | |

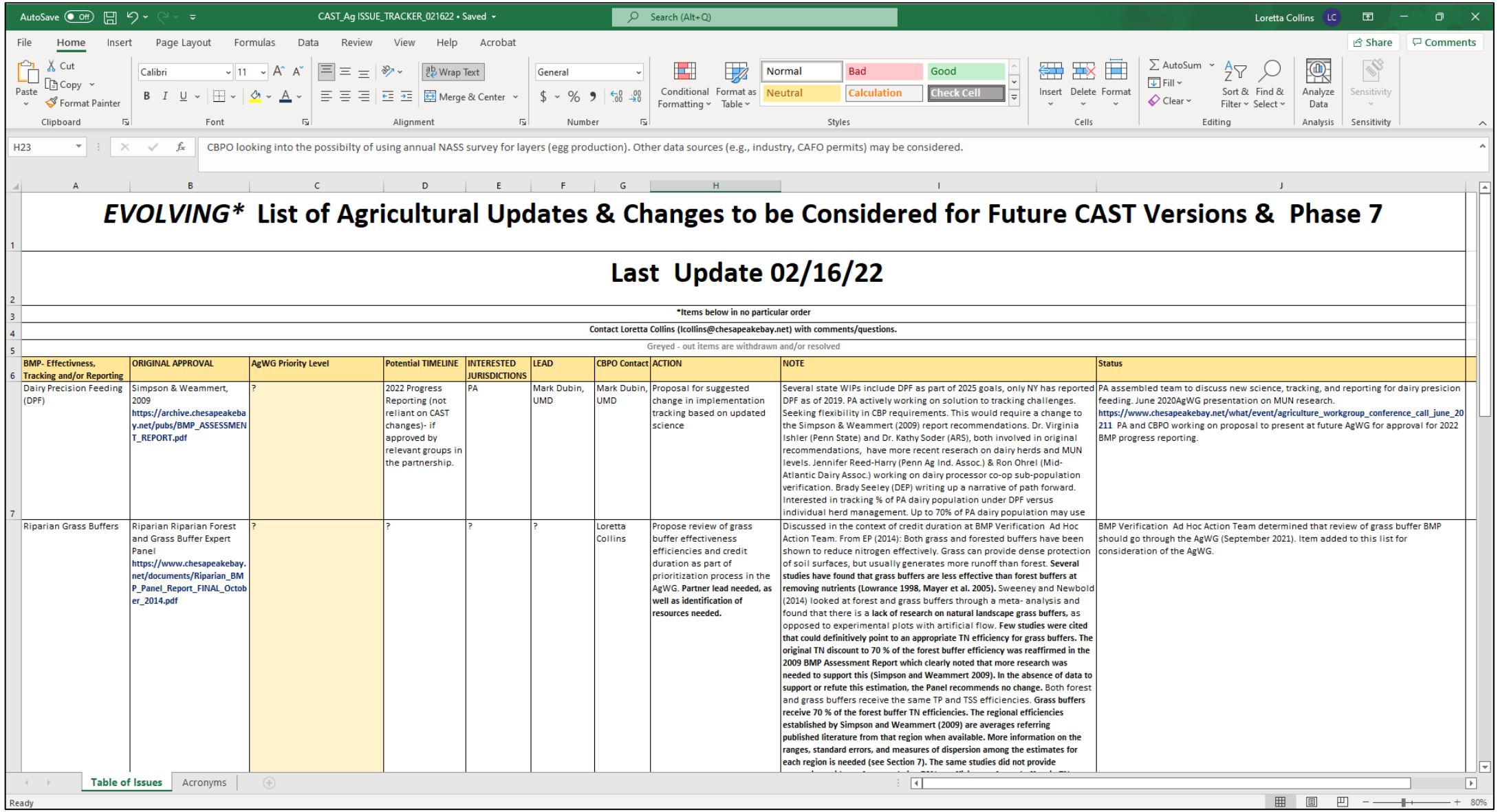
**AMS = Agricultural Modeling Subcommittee** → Phase 6 Decisions

# Prioritizing Concerns (Post- CAST-21)




**AgWG Homepage**
https://www.chesapeakebay.net/who/group/agriculture_workgroup

# CAST Ag Issue Tracker



AutoSave Off | CAST_Ag ISSUE_TRACKER_021622 • Saved | Search (Alt+Q) | Loretta Collins

File Home Insert Page Layout Formulas Data Review View Help Acrobat | Share | Comments

Cut Copy Format Painter | Paste | Clipboard | Calibri 11 | Font | Wrap Text | Merge & Center | Alignment | General | Number | Conditional Formatting | Format as Table | Normal | Bad | Good | Neutral | Calculation | Check Cell | Styles | Insert Delete Format | Cells | AutoSum Fill Clear | Sort & Filter | Find & Select | Editing | Analyze Data | Analysis | Sensitivity

H23 | CBPO looking into the possibilty of using annual NASS survey for layers (egg production). Other data sources (e.g., industry, CAFO permits) may be considered.

## *EVOLVING** List of Agricultural Updates & Changes to be Considered for Future CAST Versions & Phase 7

## Last Update 02/16/22

*Items below in no particular order

Contact Loretta Collins (lcollins@chesapeakebay.net) with comments/questions.

Greyed - out items are withdrawn and/or resolved

| BMP- Effectivness, Tracking and/or Reporting | ORIGINAL APPROVAL | AgWG Priority Level | Potential TIMELINE | INTERESTED JURISDICTIONS | LEAD | CBPO Contact | ACTION | NOTE | Status |
|---|---|---|---|---|---|---|---|---|---|
| Dairy Precision Feeding (DPF) | Simpson & Weammert, 2009 https://archive.chesapeakebay.net/pubs/BMP_ASSESSMENT_REPORT.pdf | ? | 2022 Progress Reporting (not reliant on CAST changes)- if approved by relevant groups in the partnership. | PA | Mark Dubin, UMD | Mark Dubin, UMD | Proposal for suggested change in implementation tracking based on updated science | Several state WIPs include DPF as part of 2025 goals, only NY has reported DPF as of 2019. PA actively working on solution to tracking challenges. Seeking flexibility in CBP requirements. This would require a change to the Simpson & Weammert (2009) report recommendations. Dr. Virginia Ishler (Penn State) and Dr. Kathy Soder (ARS), both involved in original recommendations, have more recent reserach on dairy herds and MUN levels. Jennifer Reed-Harry (Penn Ag Ind. Assoc.) & Ron Ohrel (Mid-Atlantic Dairy Assoc.) working on dairy processor co-op sub-population verification. Brady Seeley (DEP) writing up a narrative of path forward. Interested in tracking % of PA dairy population under DPF versus individual herd management. Up to 70% of PA dairy population may use | PA assembled team to discuss new science, tracking, and reporting for dairy presicion feeding. June 2020AgWG presentation on MUN research. https://www.chesapeakebay.net/what/event/agriculture_workgroup_conference_call_june_2021 PA and CBPO working on proposal to present at future AgWG for approval for 2022 BMP progress reporting. |
| Riparian Grass Buffers | Riparian Riparian Forest and Grass Buffer Expert Panel https://www.chesapeakebay.net/documents/Riparian_BMP_Panel_Report_FINAL_October_2014.pdf | ? | ? | ? | ? | Loretta Collins | Propose review of grass buffer effectiveness efficiencies and credit duration as part of prioritization process in the AgWG. **Partner lead needed, as well as identification of resources needed.** | Discussed in the context of credit duration at BMP Verification Ad Hoc Action Team. From EP (2014): Both grass and forested buffers have been shown to reduce nitrogen effectively. Grass can provide dense protection of soil surfaces, but usually generates more runoff than forest. **Several studies have found that grass buffers are less effective than forest buffers at removing nutrients (Lowrance 1998, Mayer et al. 2005).** Sweeney and Newbold (2014) looked at forest and grass buffers through a meta- analysis and found that there is a **lack of research on natural landscape grass buffers**, as opposed to experimental plots with artificial flow. **Few studies were cited that could definitively point to an appropriate TN efficiency for grass buffers. The original TN discount to 70 % of the forest buffer efficiency was reaffirmed in the 2009 BMP Assessment Report which clearly noted that more research was needed to support this (Simpson and Weammert 2009). In the absence of data to support or refute this estimation, the Panel recommends no change.** Both forest and grass buffers receive the same TP and TSS efficiencies. **Grass buffers receive 70 % of the forest buffer TN efficiencies. The regional efficiencies established by Simpson and Weammert (2009) are averages referring published literature from that region when available. More information on the ranges, standard errors, and measures of dispersion among the estimates for each region is needed (see Section 7). The same studies did not provide** | BMP Verification Ad Hoc Action Team determined that review of grass buffer BMP should go through the AgWG (September 2021). Item added to this list for consideration of the AgWG. |

Table of Issues | Acronyms

Ready | 80%

# Phase 7 Model Development

Chesapeake Bay Program
Science. Restoration. Partnership.

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Discover the Chesapeake | Learn the Issues | State of the Chesapeake | Take Action | In the News | Who We Are | What We Do

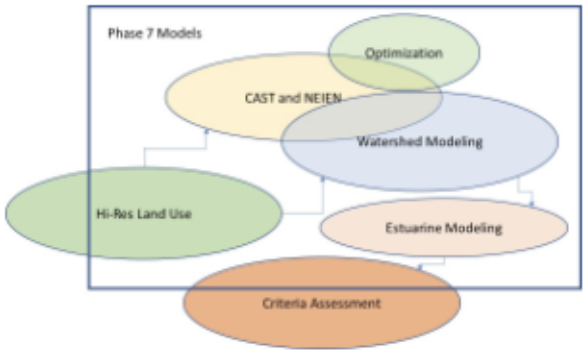
WHAT WE DO > PROGRAMS & PROJECTS > PHASE 7 MODEL DEVELOPMENT

## Phase 7 Model Development

The Chesapeake Bay Program is updating its modeling and analysis tools used in the Chesapeake Bay TMDL.

Currently in development, the Phase 7 Modeling Tools will be used by the partnership to inform decisions related to nutrient and sediment reduction goals outlined in the Chesapeake Bay Watershed Agreement. Integral to this updated suite of tools is the ability to project climate change effect through 2035. The model, which will be ready for use by 2027, consists of six interrelated projects:

1. High Resolution Land Use
2. Chesapeake Assessment Scenario Tool (CAST)
3. Optimization
4. Watershed Modeling
5. Estuarine Modeling
6. Criteria Assessment




### How are the projects interrelated?

CAST is a publicly available model of the Chesapeake Bay watershed used to estimate changes in long-term nutrient and sediment loads due to changes in point sources, land use and land management. Watershed modeling provides the science behind the calculations in CAST while optimization allows users to find a least cost management option in

**Modeling**

Phase 7 Model Development

**Programs & Projects**

- Modeling
- Monitoring
- Quality Assurance
- Resource Lands Assessment
- Chesapeake Bay TMDL
- Watershed Implementation Plans
- BMP Verification

# Phase 7 Ag Modeling Subcommittee

*Formation Timeline (Tentative)*

**Step 1:**

Assignment of CBPO coordinator & staffer → in process

**Step 2:**

Draft Charge → In Process

- Responsibilities
- Expertise Needed
- Voting Process

**Step 3:**

Partnership Review of Charge → Apr-May

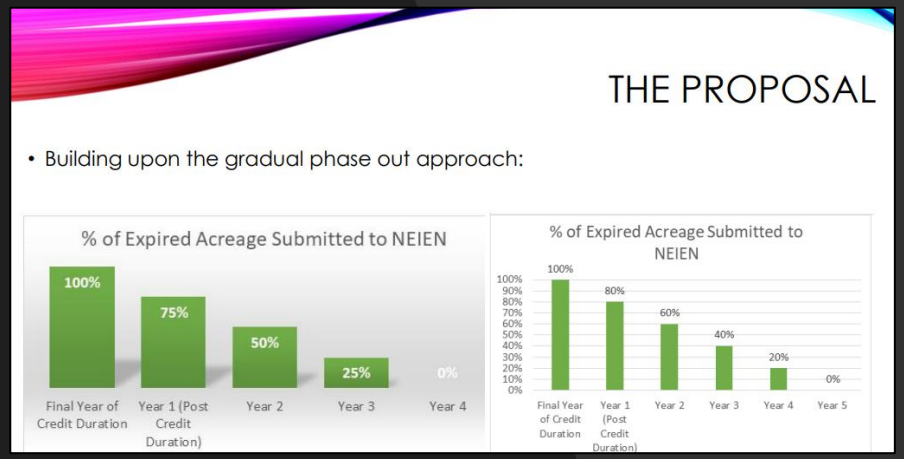
**Step 4:**

Approve Charge → June AgWG

# BMP Partial Credit Proposal

*Update*

# BMP Partial Credit Proposal- *March Update*




## Partial Credit Proposal

**Problem:** Re-verification of "expired BMPs"* is resource intensive

- Multi-year BMPs that have reached established CBP-approved credit duration "drop out" of CAST until re-verified.
- Difficult to impossible to find federally-funded BMPs for re-verification (varies by jurisdiction)

### Action Taken

- BMP Verification Ad Hoc Action Team established by the WQGIT: 1st meeting Sept 2020
- Monthly discussions resulted in proposed compromise

### Current Status

- The BMPVAHAT did not seek consensus on proposed partial credit compromise on February 11
- **Seeking path forward**

### References

Partial Credit Recommendation: Link
Partial Credit Presentation: Link

*BMPs that have exceeded credit life w/o re-verification-typically 10-15 years for the BMPs in question (as approved by the AgWG for Phase 6 CAST development).

# CAST-21 Review & Release

*Update*

# CAST-21 Review & Release *March Update*

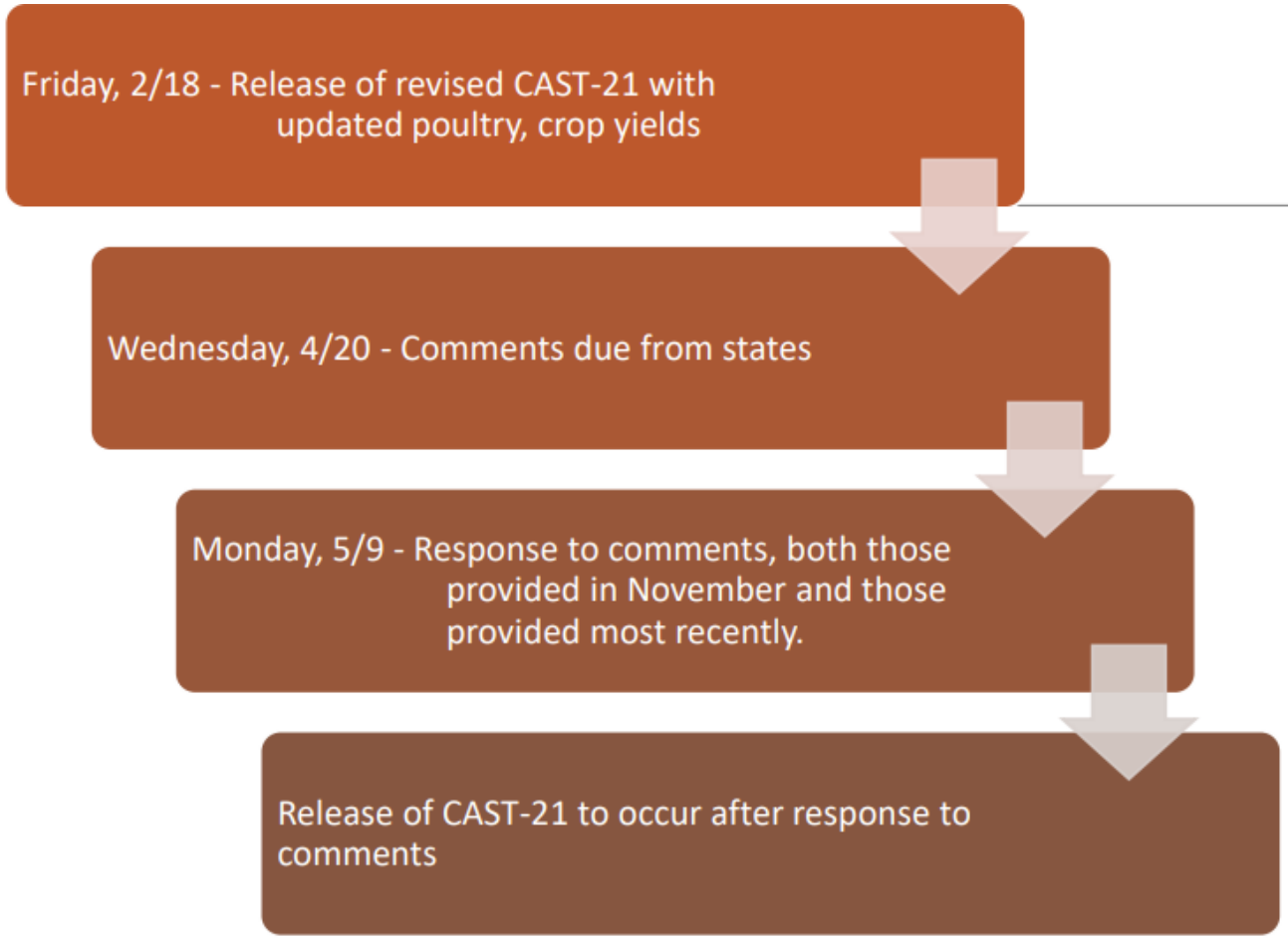
**February 28 WQGIT**

- **Action:** The WQGIT leadership will write a letter to the Management Board addressing their collective concerns (examples below) for CAST 2021 and recommendations for how to proceed.
  - Release and use of CAST 2021
  - Fertilizer data
  - Impacts to jurisdictional loads and attainability
  - EPA expectations for achieving jurisdictional goals

- **Action:** The WQGIT leadership will reach out to the Management Board to schedule time to discuss CAST 2021 concerns at an upcoming meeting (aiming for April at the earliest).
  - March 10 quick CAST-21 overview @ MB

# CAST-21 Review & Release

[Feb 14 Water Quality GIT]




## Draft Schedule for Deliberative Purposes

# Hillandale → Ag Data Concerns

*What's Next?*

# Incorporation of Hillandale Layer Population Data into CAST

**Problem:** CAST does not account for millions of layers across two PA counties.

- Current population data source: USDA Census of Agriculture
- Challenge: USDA-NASS privacy protection

**Action Taken**

- Population data acquired from Hillandale
  - QA/QC against CAFO permits & NMPs
  - ~5 million layers
- Review & Analysis of Census of Ag county & state totals
  - Published data underestimates layers (order of magnitude)

**Current Status**

- Hillandale pop. data can be incorporated in FUTURE VERISON of Phase 6 CAST (as a change product) *with partnership approval*.
- Hillandale & other alt. data can be incorporated in Phase 7 CAST *with partnership approval*.

**References**

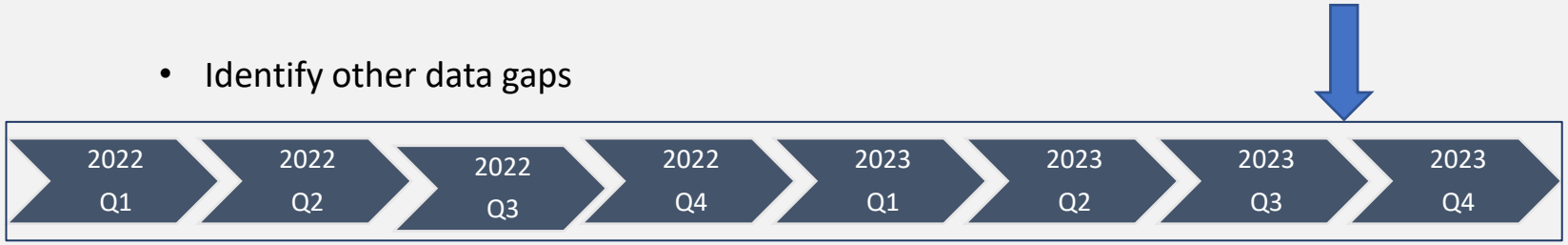
Incorporating Private Industry Data Into CAST – Nov AgWG: Link
Commercial Agricultural Production Data Decisions – Nov AgWG: Link

# Comment Summary

**Ad Hoc Group to Address Questions & Knowledge Gaps**

- Why must changes in one county affect far reaches of watershed?
  - Can we change that?
- Standardization of process for industry data
  - QA/QC
  - Addressed duplication & equity
- Standard of quality across all types of data (data equity)
- Shared understanding of available data sets & use
  - Feasibility of incorporating alternative data sets
  - Consideration of data privacy
- Shared understanding of NASS data sets- **APR 21 AgWG**
  - Opportunities and constraints
- Identify other data gaps

Next version of CAST?



# Next Step: Understanding Current Animal Data Sources

***Starter Questions for USDA-NASS (Apr AgWG)***

**Intended Purpose of Ag Census?**

- Who is it for?
- Who participates & how?
- Response rate?
- Accounting for non-response?
- Privacy protections? (What does “D” county indicate)
- What hinders participation?

**Intended Purpose of Annual Surveys?**

- Who is it for?
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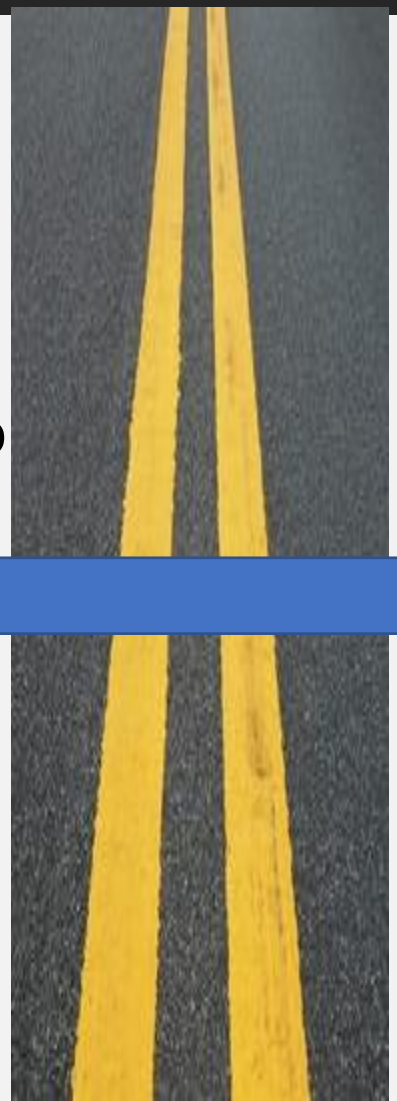
# Fertilizer Data in CAST-21

*Moving Forward*

# Quick Comparison:
## Ag vs Urban Fertilizer Methodology



### Ag Fertilizer

**Source:** AAPFCO (county-level)

**Data Prep:** County data rolled up to CBW

- Outliers removed
- 3-year rolling avg.

**Distribution:** allocated based on county-level conditions:

- crop acres & yields
- manure availability & allocation

### Urban Fertilizer

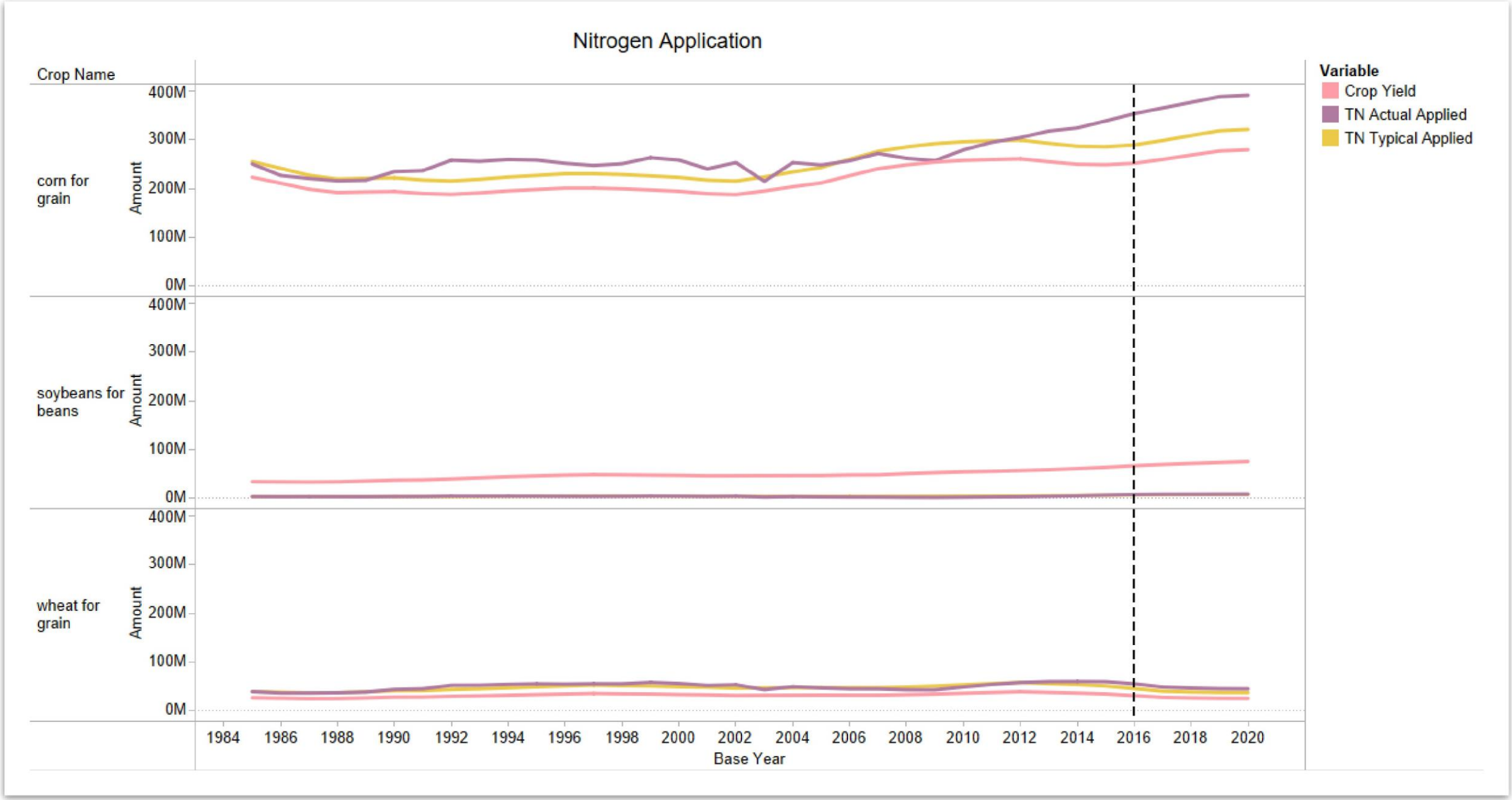
**Source:** AAPFCO (county-level)

**Data Prep:** County data rolled up to state

- Linear regression

**Distribution:** allocated based on turf grass acres

- steady rate per acre within each state (inside CBW)



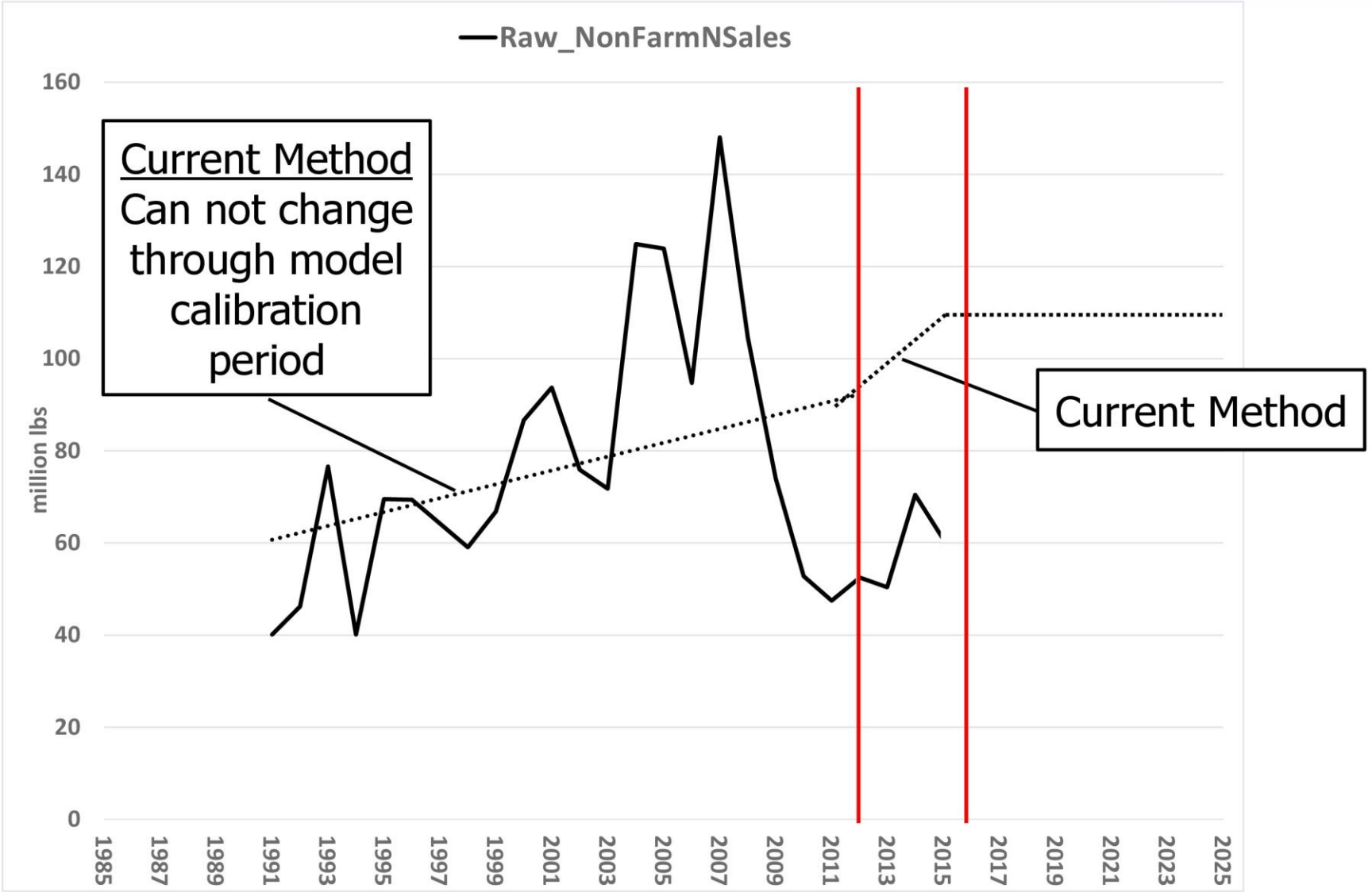

**Actual rate = (TN lbs / crop yield) * (NASS yield / acre)**



https://www.chesapeakebay.net/what/event/wqgit_discussion_of_cast_2021_data_inputs_results_and_next_steps

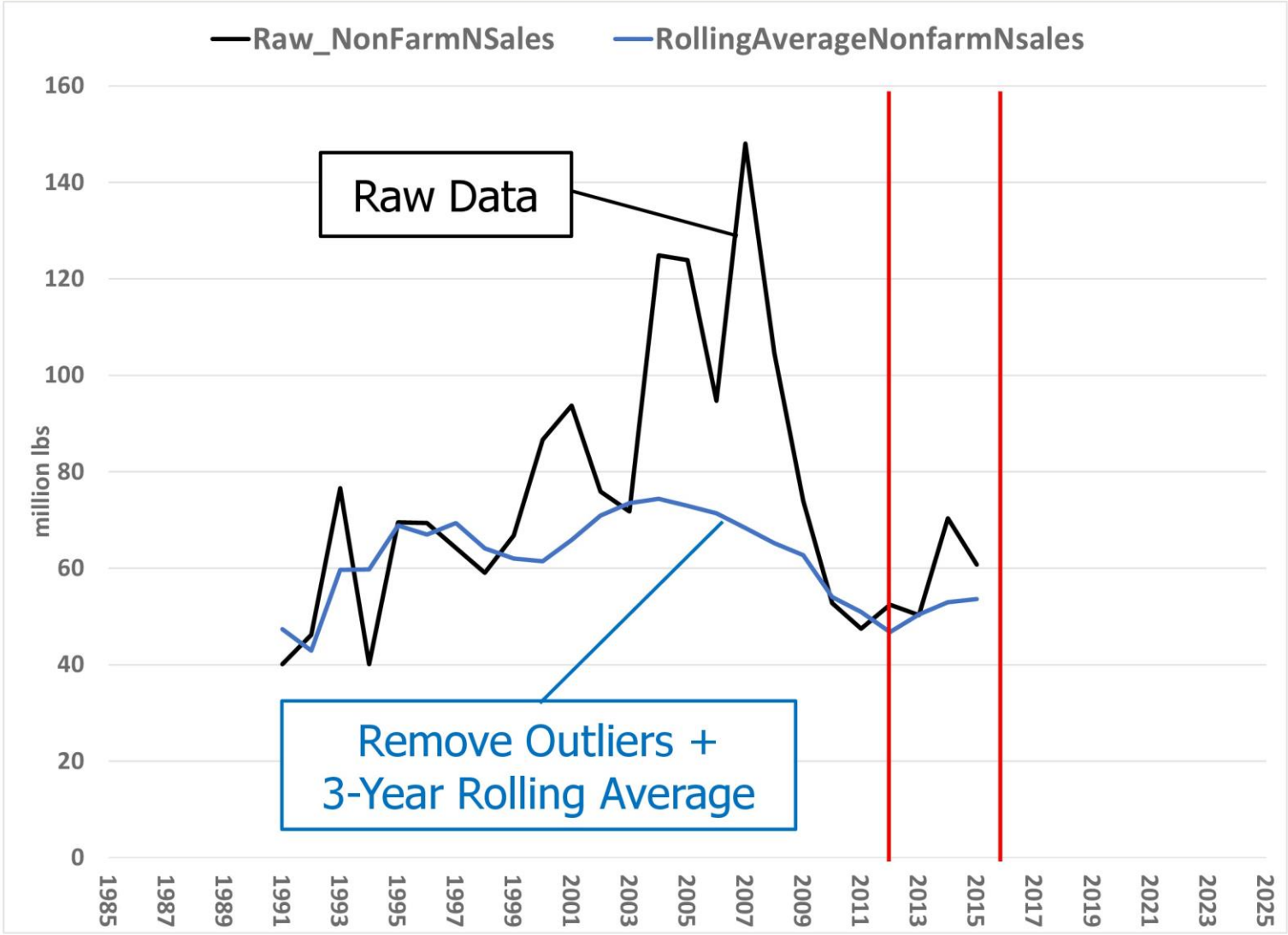
# CB Watershed Pounds of Nitrogen Applied (1991–2025)

https://www.chesapeakebay.net/what/event/urban_stormwater_workgroup_uswg_conference_call_march_2022



# CB Watershed Pounds of Nitrogen Applied (1991–2015)

https://www.chesapeakebay.net/what/event/urban_stormwater_workgroup_uswg_conference_call_march_2022



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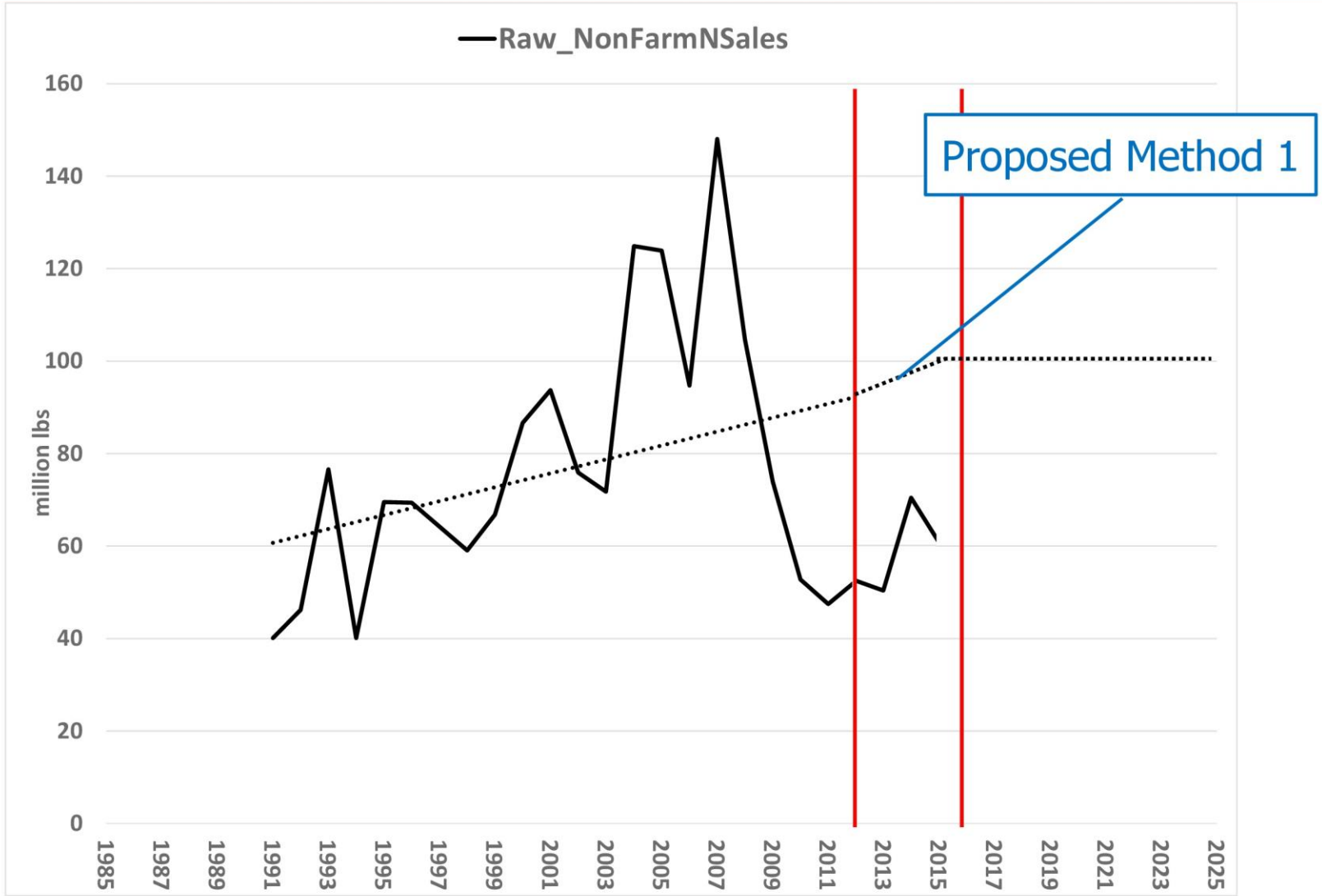

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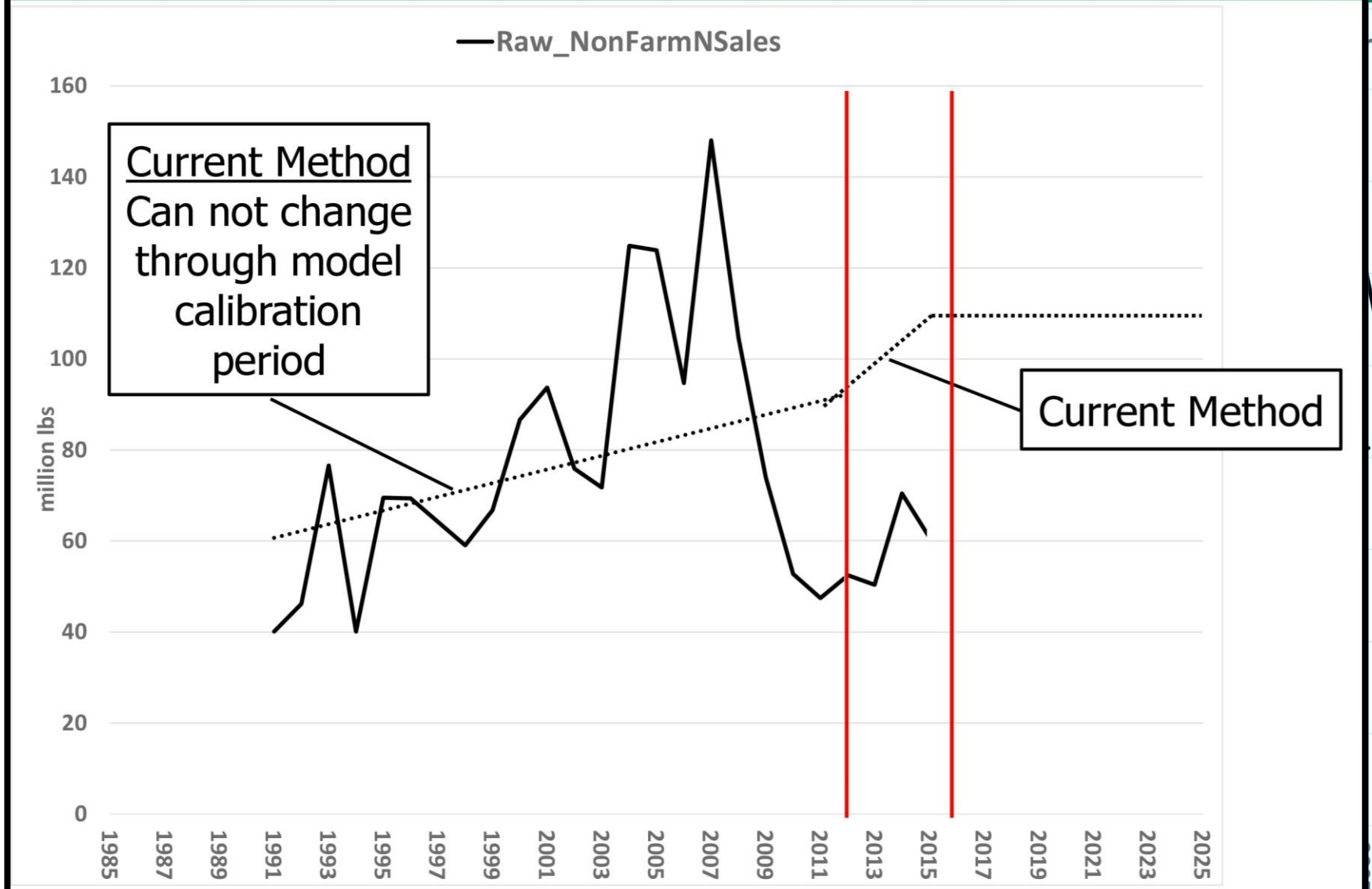
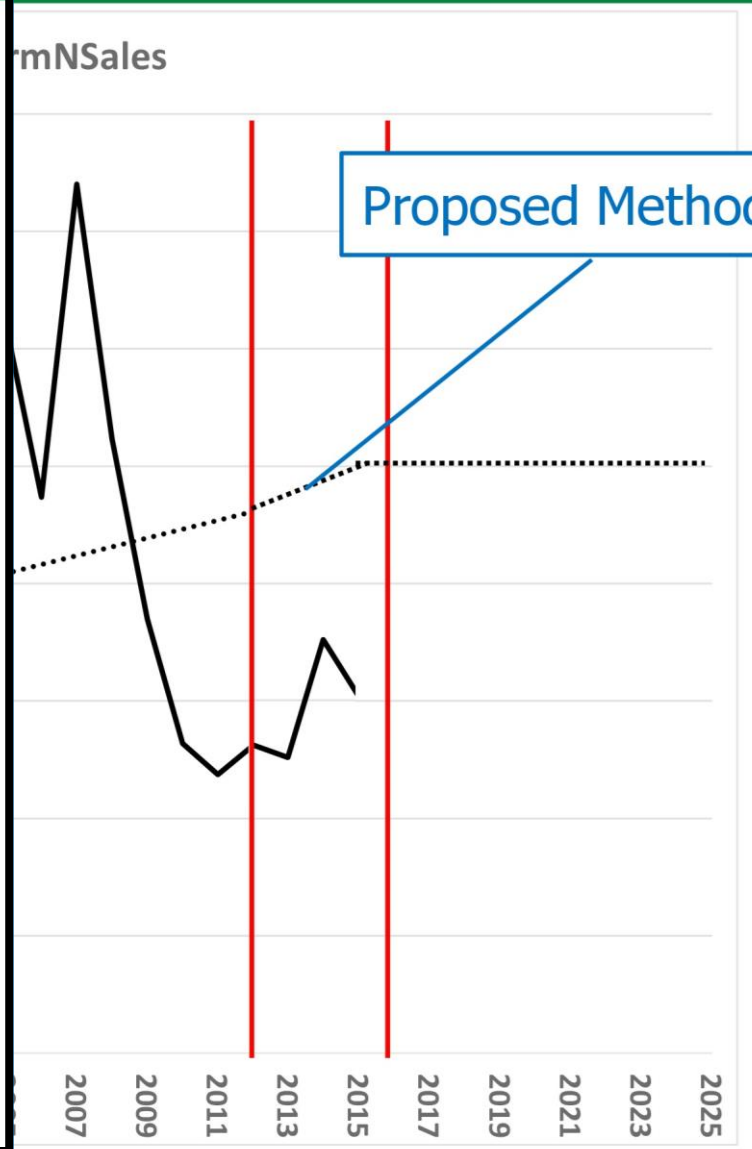



# of Nitrogen Applied 025)



# Urban Fertilizer Data Preparation

***March 15 Urban Stormwater Workgroup***

DECISION: USWG asked to decide on a preferred method for turfgrass fertilizer application to be accommodated with CAST-21, the updated version of the Chesapeake Bay Watershed Model currently out for review by the partnership.

**RESULT**

*No Consensus*

*1 Endorse*

*3 Hold/Stop*

*Several in the middle (stand aside/ambivalent)*

*1 no vote*

https://www.chesapeakebay.net/what/event/urban_stormwater_workgroup_uswg_conference_call_march_2022


March 28 WQGIT

- BMP Protocol Update Discussion
- Urban Fertilizer Discussion

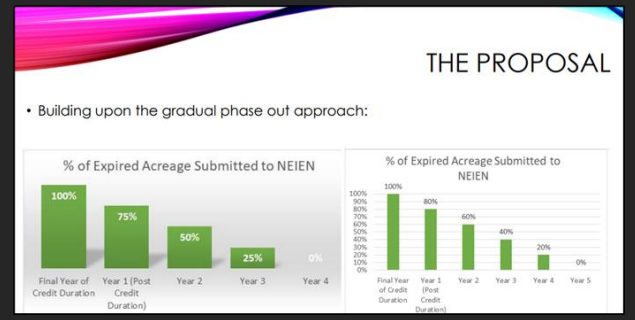
April 7 WTWG

- Animal Mortality Management Technical Appendix (discussion)

Apr 21 AgWG

- Remote Sensing Discussion
- Animal Data Discussion w/ NASS
- Phase 7 Ag Modeling Subcommittee

# BMPVAHAT Feb 11 Rationale Summary




- Need a **Long-Term Solution**
  - Incl. location data & financial support
- Temporary Fix (this is a band-aid)
- **Provides Some Relief** to Verification Hurdles

- **Does not Solve Underlying Challenges** (USDA 1619 & all or nothing for BMP crediting)
- Needs Steps Towards Resolution (**Action Plan) Before Phase 7**
  - Scheduled check-ins on progress

- Do not Support Sunset
- Only Support w/ Sunset

- Proposal is **Policy Decision-** Should not Replace Field Data
- Need More Field Data to Support Extended Credit w/o Verification

- Need for **High-Level Policy Intervention**

zazzle.com

**BMP Verification Ad Hoc Action Team** (BMPVAHAT)
BMP Partial Credit Proposal
Feb 11 Vote

<u>16 Responses</u>

- 0 Endorse
- 7 Agree w/ Reservations
- 8 Stand Aside
- 7 Hold
- 0 Stop


***Next Steps TBD***

# CAST-21 Review & Release

Feb 14 Water Quality GIT

**Error identified by the Bay Program Office**

- The **missing agricultural fertilizer data** for 2013 and 2014 was corrected.
  - ✓ Data was missing in CAST-19 (current version) and put in for the CAST-21 version that is out for review.

**Missing data**

- **Broilers and turkeys** from the 2020 NASS Survey
- **Crop yields** from NASS Surveys for post calibration period
  - ✓ Data are not yet in the CAST-21 version available for review

# CAST-21 Review & Release

Feb 14 Water Quality GIT

## Change in Nutrient Loads to the Chesapeake Bay

**Differences between CAST versions with each update: 6.2M lbs TN, -0.6M lbs TP**

By source sector; 2020 Progress scenario

### Nitrogen

| | | CAST19 - CAST21 (Reviewed) | | CAST21 Effect of Broiler Data | | CAST21 Effect of Yield Data | | CAST19 - CAST21 (All Effects) | |
|---|---|---|---|---|---|---|---|---|---|
| Jurisdiction | Source | (M lbs) | (%) | (M lbs) | (%) | (M lbs) | (%) | (M lbs) | (%) |
| NY | AllSources | 0.697 | 5.3% | 0.000 | 0.00% | -0.042 | -0.3% | 0.655 | 4.9% |
| PA | AllSources | 1.772 | 1.6% | 0.124 | 0.11% | 0.868 | 0.8% | 2.764 | 2.6% |
| MD | AllSources | 1.017 | 2.1% | -0.016 | -0.03% | 0.482 | 1.0% | 1.483 | 3.1% |
| VA | AllSources | 0.566 | 1.0% | -0.015 | -0.03% | 0.434 | 0.7% | 0.985 | 1.7% |
| WV | AllSources | -0.153 | -1.4% | -0.016 | -0.20% | -0.005 | -0.1% | -0.173 | -1.7% |
| DE | AllSources | 0.374 | 5.4% | -0.052 | -0.71% | 0.220 | 3.0% | 0.542 | 7.9% |
| DC | AllSources | -0.002 | -0.1% | 0 | 0 | 0 | 0 | -0.002 | -0.1% |
| CBW | AllSources | 4.273 | 1.8% | 0.025 | 0.01% | 1.957 | 0.8% | 6.255 | 2.6% |

### Phosphorus

| | | CAST19 - CAST21 (Reviewed) | | CAST21 Effect of Broiler Data | | CAST21 Effect of Yield Data | | CAST19 - CAST21 (All Effects) | |
|---|---|---|---|---|---|---|---|---|---|
| Jurisdiction | Source | (M lbs) | (%) | (M lbs) | (%) | (M lbs) | (%) | (M lbs) | (%) |
| NY | AllSources | 0.004 | 0.7% | 0.000 | 0.02% | -0.002 | -0.4% | 0.002 | 0.3% |
| PA | AllSources | -0.027 | -0.8% | 0.004 | 0.11% | -0.014 | -0.4% | -0.036 | -1.0% |
| MD | AllSources | -0.392 | -10.6% | 0.000 | 0.00% | -0.014 | -0.4% | -0.406 | -11.0% |
| VA | AllSources | -0.159 | -3.5% | 0.001 | 0.01% | -0.004 | -0.1% | -0.163 | -3.5% |
| WV | AllSources | 0.067 | 15.6% | 0.000 | -0.04% | 0.000 | -0.1% | 0.067 | 15.4% |
| DE | AllSources | 0.013 | 10.7% | -0.004 | -2.86% | -0.001 | -1.0% | 0.008 | 6.5% |
| DC | AllSources | -0.003 | -5.4% | 0 | 0 | 0 | 0 | -0.003 | -5.4% |
| CBW | AllSources | -0.498 | -3.7% | 0.001 | 0.01% | -0.036 | -0.3% | -0.533 | -4.0% |

# CAST-21 Review & Release

[Feb 14 Water Quality GIT]

## Change in Nutrient Loads to the Chesapeake Bay

**Differences between CAST versions with each update: 6.2M lbs TN, -0.6M lbs TP**

By source sector; 2020 Progress scenario

### Nitrogen

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|---|---|---|---|---|---|---|---|---|---|
| Jurisdiction | Source | (M lbs) | (%) | (M lbs) | (%) | (M lbs) | (%) | (M lbs) | (%) |
| CBW | Agriculture | 4.056 | 3.4% | 0.024 | 0.02% | 1.863 | 1.5% | 5.943 | 5.0% |
| CBW | Developed | 0.177 | 0.4% | 0 | 0 | 0 | 0 | 0.177 | 0.4% |
| CBW | Wastewater | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CBW | Septic | -0.080 | -1.0% | 0 | 0 | 0 | 0 | -0.080 | -1.0% |
| CBW | Natural | 0.120 | 0.3% | 0.001 | 0.00% | 0.094 | 0.2% | 0.215 | 0.5% |
| CBW | All Sources | 4.273 | 1.8% | 0.025 | 0.01% | 1.957 | 0.8% | 6.255 | 2.6% |

### Phosphorus

| | | CAST19 - CAST21 (Reviewed) | | CAST21 Effect of Broiler Data | | CAST21 Effect of Yield Data | | CAST19 - CAST21 (All Effects) | |
|---|---|---|---|---|---|---|---|---|---|
| Jurisdiction | Source | (M lbs) | (%) | (M lbs) | (%) | (M lbs) | (%) | (M lbs) | (%) |
| CBW | Agriculture | 0.086 | 2.1% | 0.001 | 0.03% | -0.029 | -0.7% | 0.058 | 1.4% |
| CBW | Developed | -0.454 | -17.4% | 0 | 0 | 0 | 0 | -0.454 | -17.4% |
| CBW | Wastewater | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CBW | Septic | -0.003 | -60.6% | 0 | 0 | 0 | 0 | -0.003 | -60.6% |
| CBW | Natural | -0.127 | -2.2% | 0.000 | -0.01% | -0.006 | -0.1% | -0.134 | -2.4% |
| CBW | All Sources | -0.498 | -3.7% | 0.001 | 0.01% | -0.036 | -0.3% | -0.533 | -4.0% |