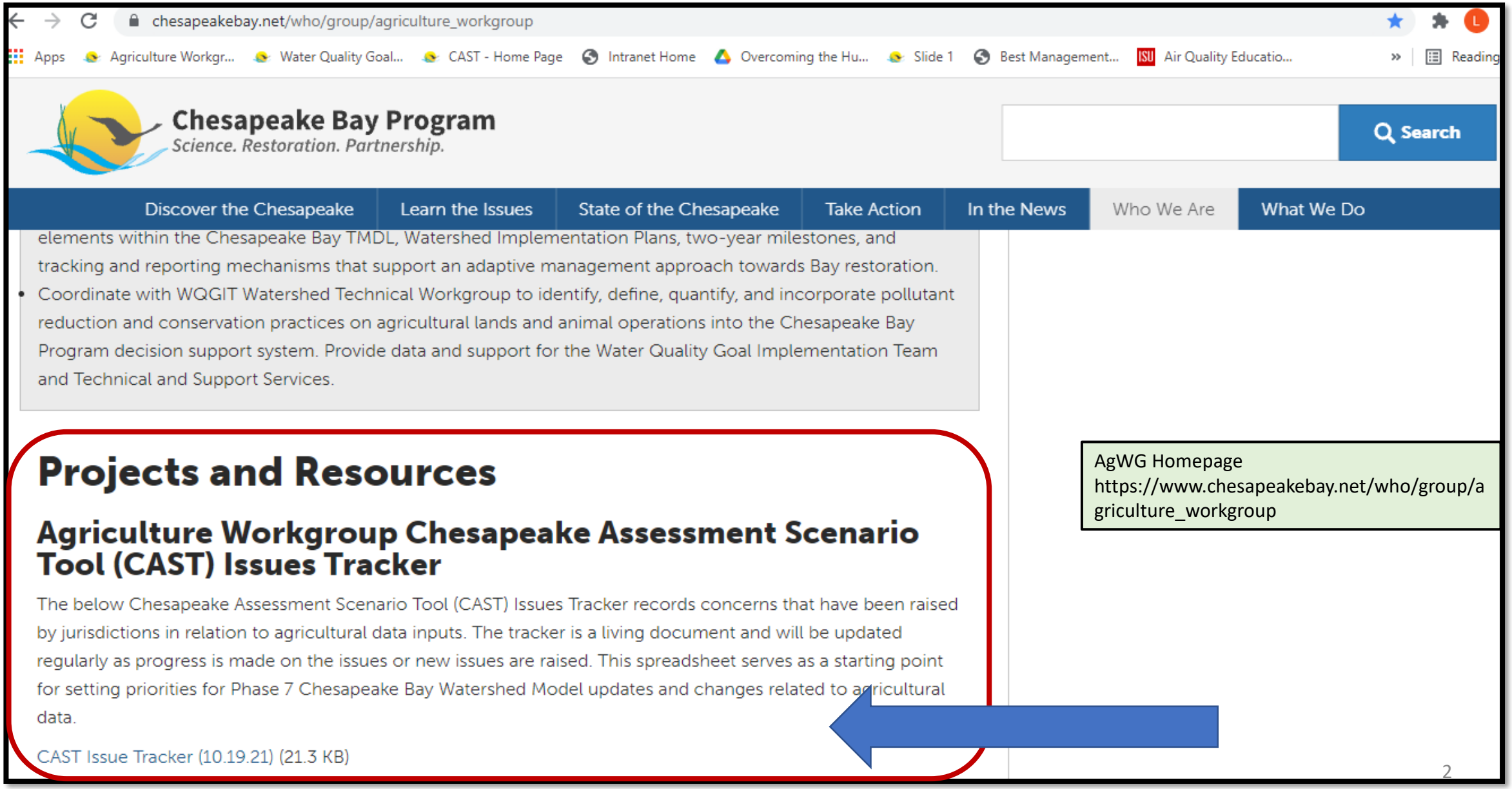
Looking Towards Phase 7: Ag Data Concerns

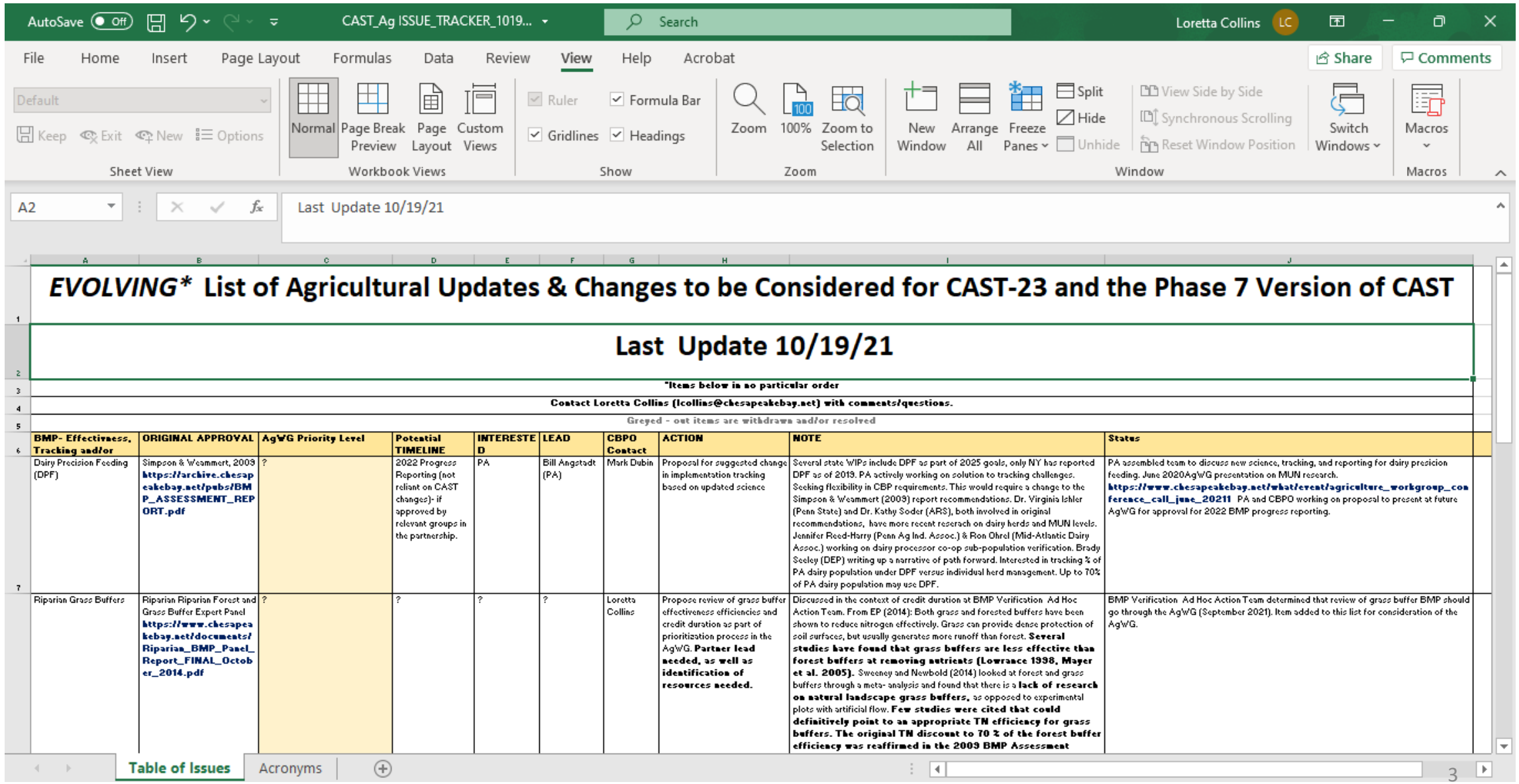
November 18, 2021

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_1019... | Search | Loretta Collins LC

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A2 | Last Update 10/19/21

*EVOLVING** List of Agricultural Updates & Changes to be Considered for CAST-23 and the Phase 7 Version of CAST

Last Update 10/19/21

*Items below in no particular order

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

Greyed - out items are withdrawn and/or resolved

BMP- Effectiveness, Tracking and/or	ORIGINAL APPROVAL	AgWG Priority Level	Potential TIMELINE	INTERESTED	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	Bill Angstadt (PA)	Mark Dubin	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 research 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 DPF.	PA assembled team to discuss new science, tracking, and reporting for dairy precision feeding. June 2020AgWG presentation on MUN research. https://www.chesapeakebay.net/what/event/agriculture_workgroup_conference_call_june_20211 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**	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

Water Quality Goal Implementation Team Meeting October 25 – 26, 2021

Purpose:

To discuss an initial set of Phase 7 Model update priorities that pertain to supporting and advancing the Chesapeake Bay Program partnership's water quality goals.

Current Watershed Model work plan based on feedback from other partnership groups

Watershed Model Workplan Options for 2025 (Draft)

- **o NHD-scale Phase 7 model**
- o Improvement of physical process simulation
- o Uncertainty quantification
- o Co-benefits
- o Evaluation of all Bay TMDL water quality standards
- **o Changing nutrient input calculations**
- o Improvement of climate change simulation

Water Quality Goal Implementation Team Meeting October 25 – 26, 2021

Objectives:

1. Understanding of planned and proposed updates to the Phase 7 suite of modeling tools

What happened? ***Clarity on meaning and importance of proposed updates still needed (hesitancy to fully engage in prioritization process)***

2. Consensus on process for identifying Phase 7 priorities & initial prioritized list of updates to inform development and application of Phase 7

What happened? ***No consensus due to needed clarity. Discussion on changes to proposed Phase 7 timeline. To be continued Dec 13 WQGIT meeting.***

3. Initial feedback on partnership direction post-2025

What happened? ***Discussion on changes to proposed Phase 7 timeline.***

Current Watershed Model work plan based on feedback from other partnership groups

Watershed Model Workplan Options for 2025 (Draft)

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- o Improvement of physical process simulation
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NHD-scale Phase 7 model (Finer-Scale Modeling)

Upgrade the scale of the underlying processes simulated in the watershed model.

New segmentation would allow differentiation of load sources within counties.

- Finer-scale data improves load predictions at larger-scale (but not local-scale)
- Localized targeting of BMPs
- Differential BMP crediting potential (with additional work)

Questions about opportunities & constraints?

(Example: Some inputs remains available only at county-scale, how does the impact what we can track & report?)

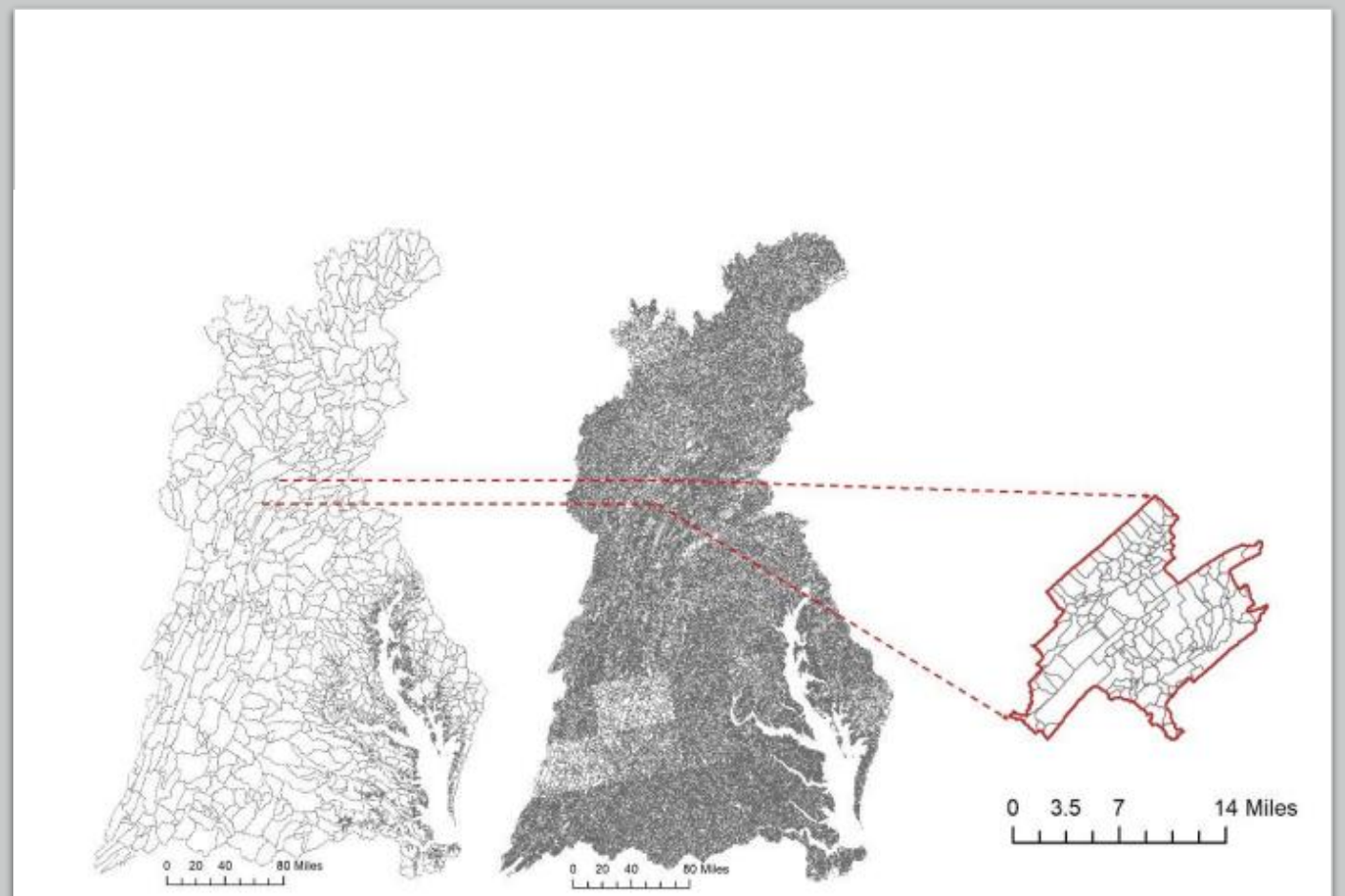


Figure 4: watershed scale in phase 6 and proposed phase 7 models.

Changing nutrient input calculations (Simplifying)

FEEDBACK RECEIVED (***FOR*** SIMPLIFYING)

In terms of a planning tool…WIPs are at macro geographic scales for future cropland. Unneeded complexity that is not justified.

- Rotations happen at the field scale
- NASS information is limited & interpreted by the CBP modelers
- Economic factors beyond anyone's predictive abilities

No one is collecting BMP reporting at a rotation-based scale. At best we will know if it is a BMP used on cropland situations versus pasture or grass and grazing livestock type BMPs.

- Complexity does not support planning or reporting
- Collapse all cropland rotations into a single load source of Cropland or CROP- something that supports our planning & reporting efforts

Changing nutrient input calculations (Simplifying)

FEEDBACK RECEIVED (***AGAINST*** SIMPLIFYING)

Many of the practices we use & give credit for only make sense if you include the crop.

- Example: Soybean acres are about half of row crop acres % generally receive no N applications

Producers and implementers think about every crop differently

- Mash everything together, it does not make sense

Giant step backwards given the advances in technology that give us 1 m resolution on land use.

Support targeting of practices to get the greatest reductions

- Needs a system that encourages states to do it
- Provide default options- states only provide unspecific data & get a low credit.

OCTOBER AgWG Discussion

If the model is not reflecting what ag is doing, why support what the CBP is doing?

- Communication to people on the ground
  - Field-level connection to model is needed
  - Need to be able to scale it down for communication purposes to farmer
  - Need to help service providers make connections between CBP model and farmer/producer management

More is Not Always Better– Makes Output More Difficult to Decipher.

- Communicating it to people is challenging
- Model is a decisional tool at state-level
  - States may have localized tools for making decisions
  - Model not meant to be field-scale tool
  - Field-scale understanding comes from service providers
- Complexity in data sets is challenging for tracking system

Field-based Tools for Specificity

- Nutrient Trading Tool can look at specifics for N, P. Simplified could potentially be a restoration tool.
  - Built off Phase 6 watershed model
- Farmers need an **easy app** and reason to use it.
  - Many don't have great reception on-farm
  - Cultural differences in technology acceptance
- Privacy & tracking related to field-level model inputs
  - Farmers get nervous about specific filed-level info
  - Anything that allows for scrutiny of specific farm would be problematic.

WQGIT Meeting October 25 – 26, 2021

Ag-Related Comments Consolidated Summary

(mentimeter poll results- not exhaustive)

What would you like to see changed in the P6 suite of modeling tools?

Modeling

- Ag input refinements with new data sources
- Reevaulate application curves, N fixation, soil P , land use/crop types, land use loading rates, fertilizer accounting etc.
- Ag and urban load re-balancing
- Simplification of ag model
- Nutrient speciation
- Comparing year to year difficult because of input changes (ex. Ag census)
- Ability to simulate BMP effectiveness spatially

BMPs

- Improved & simplified process to capture and credit existing non-point source BMPs
- Better way to track BMP implementation progress w/o the BMP expiration challenges
- Means of encouraging reporting and crediting of ag BMPs
- Capture nutrient load from solar farm conversion.
- Further assessment of uncredited BMPs

WQGIT Meeting October 25 – 26, 2021

Ag-Related Comments Consolidated Summary

(mentimeter poll results- not exhaustive)

What does the WQGIT want to see done differently with a new suite of modeling tools to advance implementation efforts & achieve water quality goals?

Modeling

- Relative confidence of inputs distinct by source sector with outputs
- Evaluate what's working and what's not
- Non-point source responses
- Greater understanding, incorporation & public outreach of fiscal & financial impacts related to model outputs.
- Better communication of strengths, weaknesses, and applicability of tools to the public
- More transparency about uncertainly
- Relative confidence of estimated loads as an output metric
- More time for WTWG & source sector workgroup review
- Simplify nutrient application calculation

BMPs

- Tools that prevent TA from focusing on verifying rather than implementing
- Refine nutrient assumptions
- Find additional data sources to support ag simulation
- Invest in tracking tools that avoid need for on-site verification.
- Targeting with implementation
- Unless we can spatiality capture and landowner willingness, let's not spend significant staff & financial resource on targeting
- External BMP targeting tool linked to CAST.
- Refines scales or targeting of little uses to most localities. Influenced by site availability , economics, and regulatory requirements

Winter 2021-2022 AgWG

- Prioritizing needs for Phase 7 Watershed Model
  - Updates on partnership timeline
  - Formalize process and charge for addressing AgWG model needs for Phase 7
- Seek resolution on Hillandale data incorporation question for Phase 6
  - Broader questions on animal data sources (Phase 6 & Phase 7)
- Winter BMP question (incentivizing winter cover in dairy systems)
- NEIEN adjustments to accommodate relevant NRCS practices

December WQGIT

- Phase 7 Timeline & Priorities

Animal Population Supplemental Data: CAST-23 & Beyond

Manure Generated

NASS Annual Survey Data to Inform Population Trends Between Census Years?

- Dairy, Beef Cattle, Layers, Swine…
- Partnership Approval Needed

Industry Data Can Inform Animal Population ***Trend***

- Requires Careful Cooperation
- QA/QC Needed
- Partnership Approval Needed

CAFO Permitting Data

- Indicates Max Capacity (not actual population)
- Collection/Use Methodology & QA/QC Needed
- Partnership Approval Needed

Population Distributions

- Jurisdictions Can Provide Data to Allocate State Totals to Appropriate Counties (contact CBPO staff for guidance)

Right Now

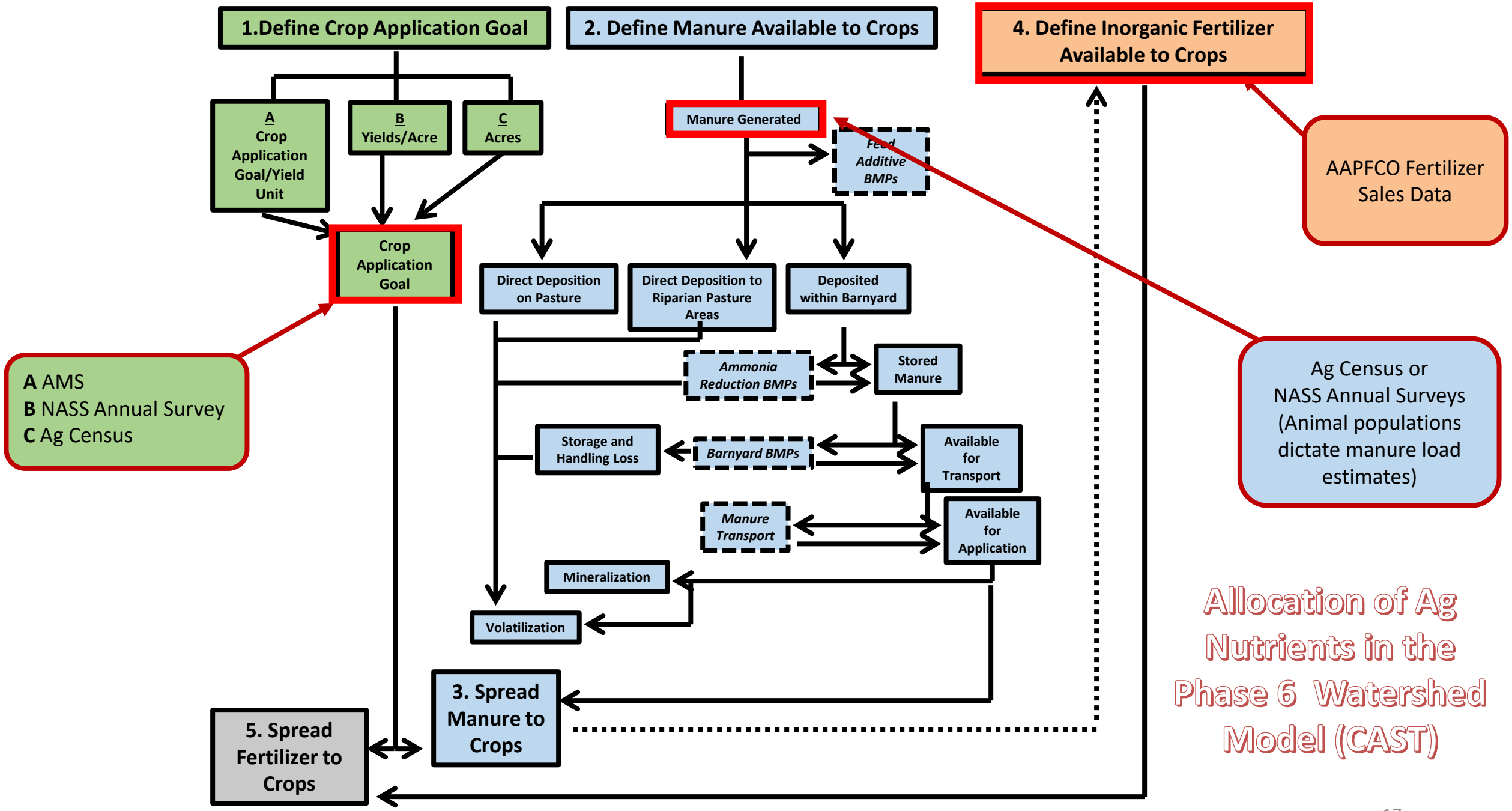
CRITICAL CONCEPT:

To maintain integrity of CBWM (CAST) there are two options for new data sets:

- Provide data all the way back through 1985.

OR

- Use the **trend** in new data sets for the years available.



Allocation of Ag Nutrients in the Phase 6 Watershed Model (CAST)

AMS= Agricultural Modeling Subcommittee; NASS= National Agricultural Statistics Service; AAPFCO= Assoc. of American Plant Food Control Officials

Improving Ag Data

Crop Acreage Data

Crop Application Goal

Alternative methods to account for fitting Ag Census data to CBP needs?

- Adjusting methods for estimating crop acres (e.g. double crops)

Alternative/supplemental data sets

- Other data sets at the state or federal level?

Animal Population Data

Additional NASS Annual Survey Data may be available to inform population trends between census years (incorporated every two years)

- Dairy, Beef Cattle, Layers, Swine…

Direct from industry data can inform animal population ***trends*** between census years.

- Requires careful cooperation
- Legal, privacy assurances

Manure Generated

Other Data Issues

Soil P data

- Gary Shenk Sept 2018 presentation to AgWG on data set incorporated into the CBWM
- **Additional soil P data is welcome and encouraged (NY & WV have made inquiries)**

Manure Nutrient Concentration Data

- Changes in management may result in changes in nutrient concentrations
- Additional manure concentration data is welcome and encouraged (see grant guidance)

Fertilizer Data

- More accurate allocation of fertilizer within the CBW?
  - **Jurisdictions working with state chemists**

Define Inorganic Fertilizer Available to Crops

CRITICAL CONCEPT:

To maintain integrity of CBWM (CAST) there are two options for new data sets:

- Provide data all the way back through 1985.

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- Use the **trend** in new data sets for the years available.

CBWM= Chesapeake Bay Watershed Model

Crop Application Goal

Crop Acreage Data: Phase 6 Possibilities

Alternative methods to account for fitting Ag Census data to CBP needs?

- Adjusting methods for estimating crop acres

  *The AgWG supported adoption of the proposed land use methodology for determining the change in total agricultural area from 2013 to 2017.

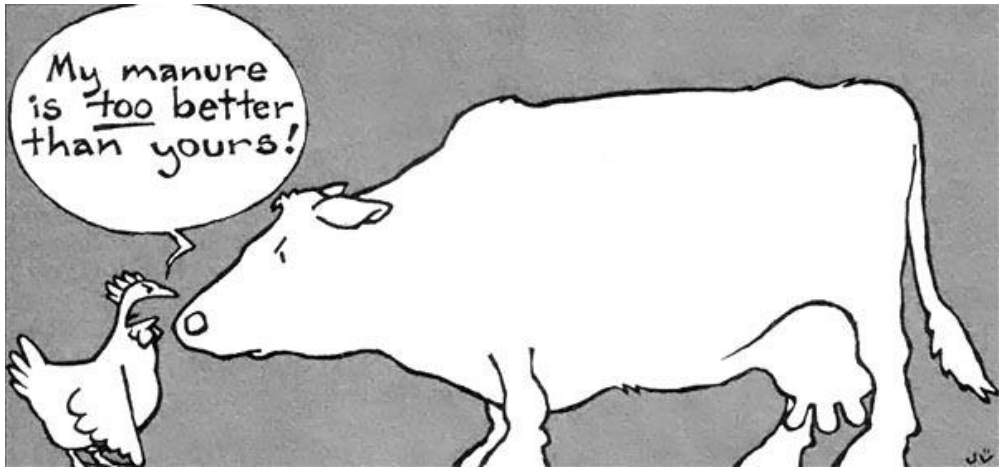
Alternative/supplemental data sets

- Other data sets at the state or federal level?

  Collaborate with fed & state agencies

How Do We Use the 5-Year Ag Census Data?

- **Animal Inventory & Sales**
  - Estimate Populations By County
  - Define Feed Space Acres
  - Estimate the “Manure Bucket” for the CBW
    - Manure nutrients applied to crops, directly deposited to pasture and riparian areas, and left in the feed space.
- **Crop Acres By County**
  - Used in Conjunction with
    - High-Resolution Mapped Land Cover Data to Improve Land Use Assumptions
    - Yield Data & Crop Application Goals to Allocate Annual Fertilizer & Manure Applications Across the Watershed



https://www.motherearthnews.com/homesteading-and-livestock/manure-fertilizer-zmaz83mazraw

What About Annual Data?

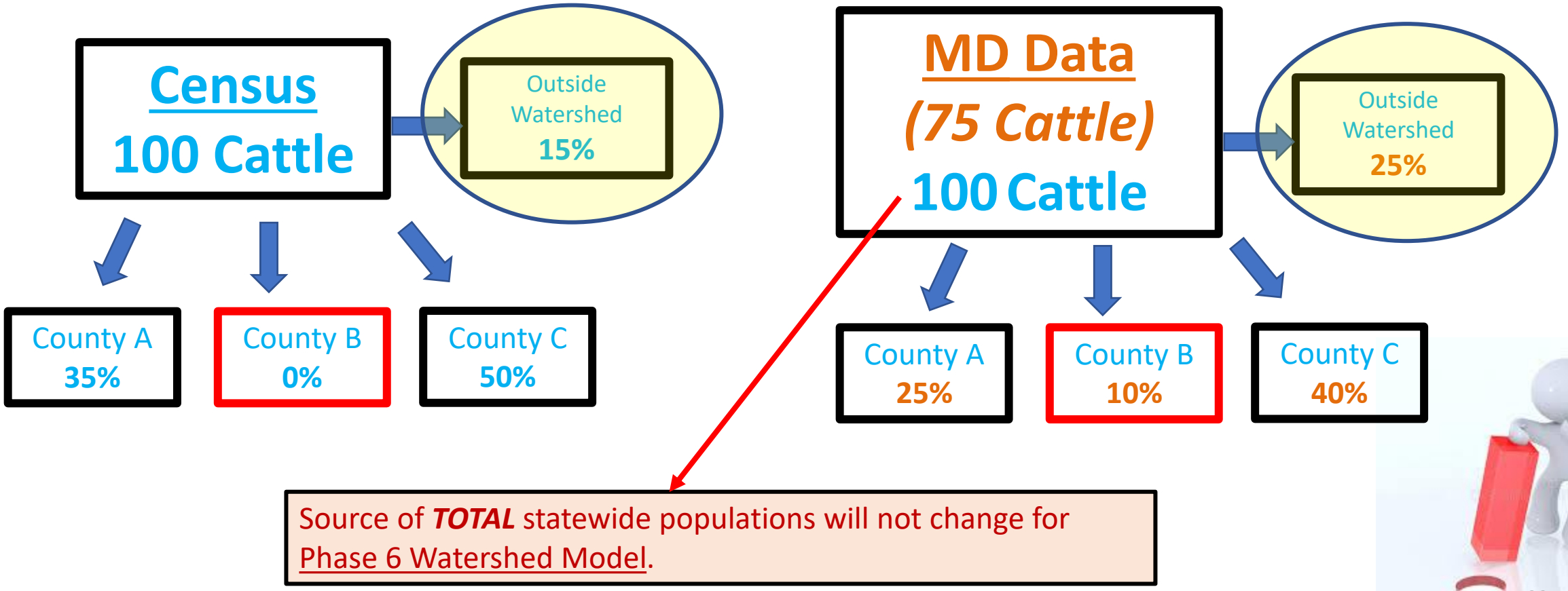
National Agricultural Statistics Service (NASS) Annual Surveys

- Incorporated Every Two Years (CAST-17, -19, -21, -23…)
  - When the watershed model “opens” for changes
- Yield data for the following major crops:
  - Alfalfa Hay; Barley; Buckwheat; Corn for Grain; Corn for Silage; Oats for Grain; Rye for Grain; Sorghum for Grain; Sorghum for Silage; Soybeans for Beans; and Wheat for Grain
- Broiler & Turkey Sales Data (state-level)

CRITICAL CONCEPT

Source for ***distribution*** of statewide populations can change.

Example: MD provides fraction of cattle in every county for the year 2020, and these fractions are used to distribute TOTAL statewide cattle populations from the Census of Agriculture.



Source of ***TOTAL*** statewide populations will not change for Phase 6 Watershed Model.

Other Data Issues

Soil P data

- Gary Shenk AgWG Sept 2018 presentation on Phase 6 Data

Additional Soil P Data Requested from State Jurisdictions

Manure Nutrient Concentration Data

- Change in Management → Changes in Nutrient Conc.

Recent Manure Conc. Data is Requested from State Jurisdictions (see EPA grant guidance- contact CBPO staff)

Fertilizer Data

- Improve Accuracy of Fertilizer Allocation within the CBW

Jurisdictions Working with State Chemists

4. Define Inorganic Fertilizer Available to Crops

CRITICAL CONCEPT:

To maintain integrity of CBWM (CAST) there are two options for new data sets:

- Provide data all the way back through 1985.

  OR
- Use the **trend** in new data sets for the years available.

Manure Generation – Nutrient Content

Manure Generated

Data Currently Used in the Phase 6.0 Model

Animal Type	Manure Source	Lbs Dry Manure/Animal/Yr	Lbs TN/Lb Dry Manure	LbsTP/Lb Dry Manure
Beef	Use Beef - Cow (confinement) from ASAE* 2005 for manure values	5,475.00	0.028788	0.006467
Dairy	Use Lactating Cow, Dry Cow and Heifer from ASAE 2005 for manure values	4,404.33	0.042221	0.006764
Other Cattle	Estimated based upon weighted average combination of Beef and Dairy from Census of Agriculture	1,605.07	0.035504	0.006616
Horses	Use average of Horse- Sedentary and Horse - Intense Exercise from ASAE 2005 for manure values	3,102.50	0.031672	0.005941
Hogs for Breeding	Swine Characterization Report;	220.62	.294653	Varies
Hogs for Slaughter	Swine Characterization Report;	97.09	0.106841	Varies
Sheep and Lambs	Use ASAE 2003 for manure values	240.9	0.038182	0.007909
Goats	Use ASAE 2003 for manure values	680.91	0.034615	0.008462
Pullets	PLS Report; See Appendix A	12.95	Varies	Varies
Layers	PLS Report; See Appendix A	17.89	Varies	Varies
Broilers	PLS Report; See Appendix A	Varies	Varies	Varies
Turkeys	Turkey Characterization Report;	7.62	Varies	Varies

*Now ASABE- American Society of Agricultural and Biological Engineers

3-year trends (up or down) can be applied to existing values in this table.

(requires 3 consecutive years of data)

Data must be collected in a similar fashion as was done for:

- Poultry Litter Subcommittee Report
- Swine Characterization Study
- Turkey Characterization Study

Available in Section 3 of Model Documentation

Chesapeake Bay Program Grant Guidance

Attachment 6: Wastewater Facility and BMP Implementation Data Submission Specifications and Requirements (page 11)

Reporting Animal Information:

Animal data will be updated in the Phase 6 Watershed Model **every two years**.

- Reporting of permitted and unpermitted animals
  - Jurisdictions should provide the fraction of animal type by county that is considered "permitted" either through an EPA or state program. These data will be used to update the land use acres for permitted feeding operations and unpermitted feeding operations once every two years.

- Reporting of animal manure nutrient concentrations for poultry and swine
  - Data should be provided for the last three years, if possible, and updated each year to reflect new litter/manure samples. Jurisdictions who don't report volume data will receive default values according to rules established by the CBP Agriculture Workgroup. These data will be reviewed by the Partnership for use in estimating manure nutrients once every two years.