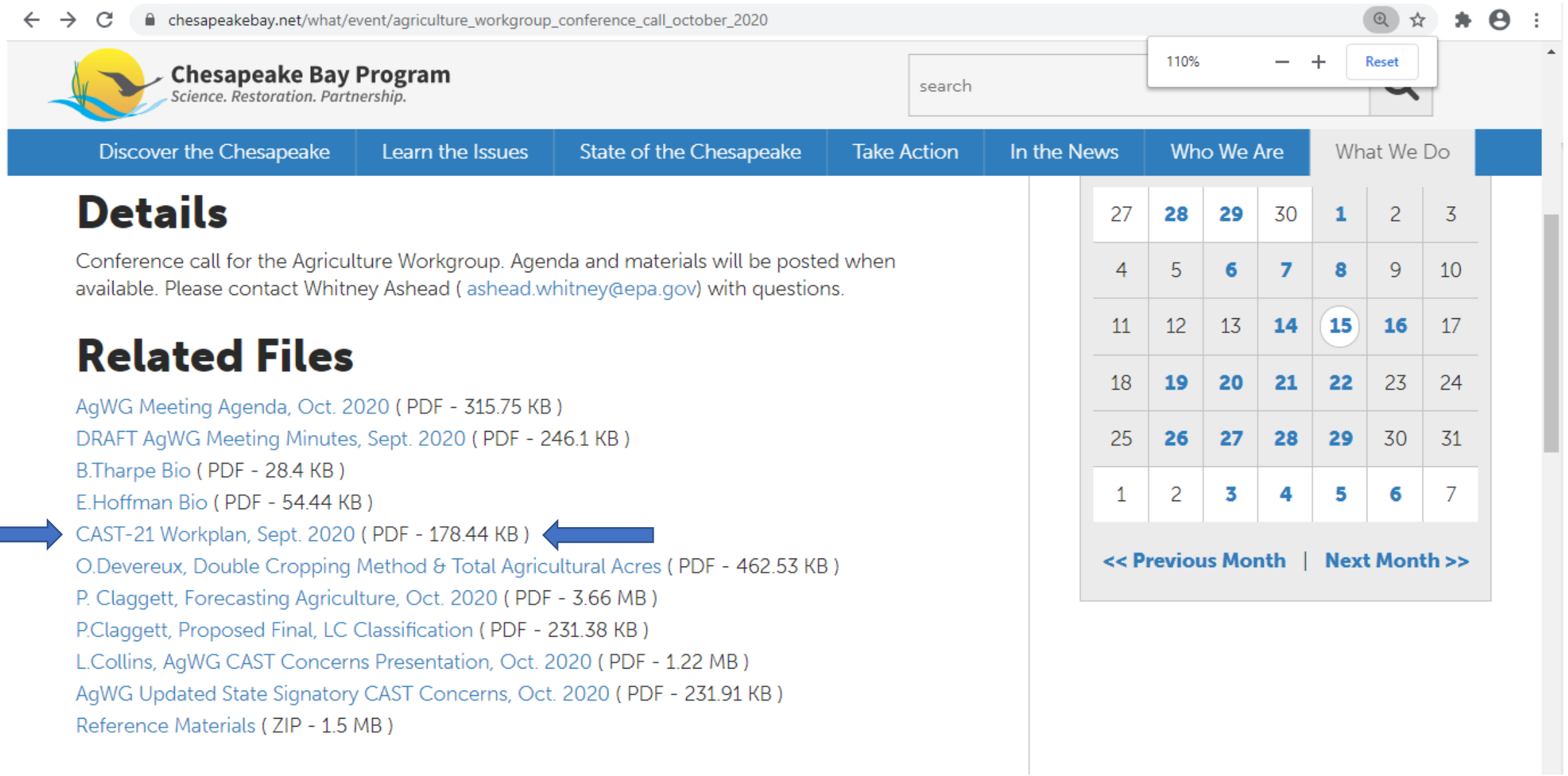
AgWG CAST Issues

October 15th, 2020

https://www.chesapeakebay.net/what/event/agriculture_workgroup_conference_call_october_2020



CAST-21 Workplan (Working Draft)

Approved data and method changes need to be finalized through the WQGIT by Sept. 1, 2021

Questions/ Comments?

KEY ACTION	STATUS
Task 1: Updates to data & methods that typically occur every 2 years.	• On-going • In process: "Rules of the Road" document for data submissions
Task 2: Investigate alternative forecasting methods for ag land uses & animals	• In process • Nov AgWG: CBPO presentation on 4 methods of forecasting
Task 3: Investigate 2012-2017 Ag Census change for fallow/idle acres	• In process • AgWG presentation Sept 17: seeking guidance from membership (Dave Montali)
Task 4: Investigate use of latest landcover & LiDAR imagery to better define changes in total ag (& other land use) acres	• In process • Oct AgWG: P. Claggett, USGS & J. Czawlytko, Chesapeake Conservancy • Return in Jan/Feb 2021 for decision)
Task 5: Investigate alternatives for double-crop acre estimates	• On-going • Oct AgWG: Olivia Devereux, Devereux Consulting
Task 6: Consider supplemental NM for soybeans	• In process • Reached out to NM EP members (Loretta Collins) • Nov/Dec Ad Hoc & AgWG
Task 7: QA/QC'd historic & current layer pop. data for Hillandale Farms (PA)	• In process • CBPO- future presentation to AgWG
Task 8: Build-in Verification Ad Hoc Team products	• In process • Meeting #2 Sept 8

TODAY

Challenges

September AgWG Call:

Action: The Ad Hoc Cast Concerns group will discuss and prioritize CAST concerns raised in addition to the current "CAST-21 Workplan" and bring recommendations back to the AgWG.

Resources

- Capacity is limited at the CBPO & state agencies

BMP Effectiveness Protocol

- Care to follow science

September Action:

The Ad Hoc Cast Concerns group will discuss and prioritize CAST concerns raised in addition to the current "CAST-21 Workplan" and bring recommendations back to the AgWG.

Animal Data

Animal Populations: explore other estimating options (MD/NY)

Crop Production/Acres

Crop Production Acres: improve annual estimates (MD/**PA**)

Nutrient Applications/Assumptions

Fertilizer Sales and Use Data (MD**/PA/VA**)

Nutrient Management on Pasture (NY/PA)

BMP Tracking & Reporting

Dairy Precision Feeding (PA)

Rotational/Prescribed Grazing (PA-resolved)

Heavy Use Area Protection- NRCS 561 (PA)

BMP Effectiveness

"Winter Crops" (NY/PA/MD)

Heavy Use Area Protection- NRCS 561 Poultry Pads (DE/MD/WV)

Manure Transport / Manure Treatment Technologies (PA/**MD**)

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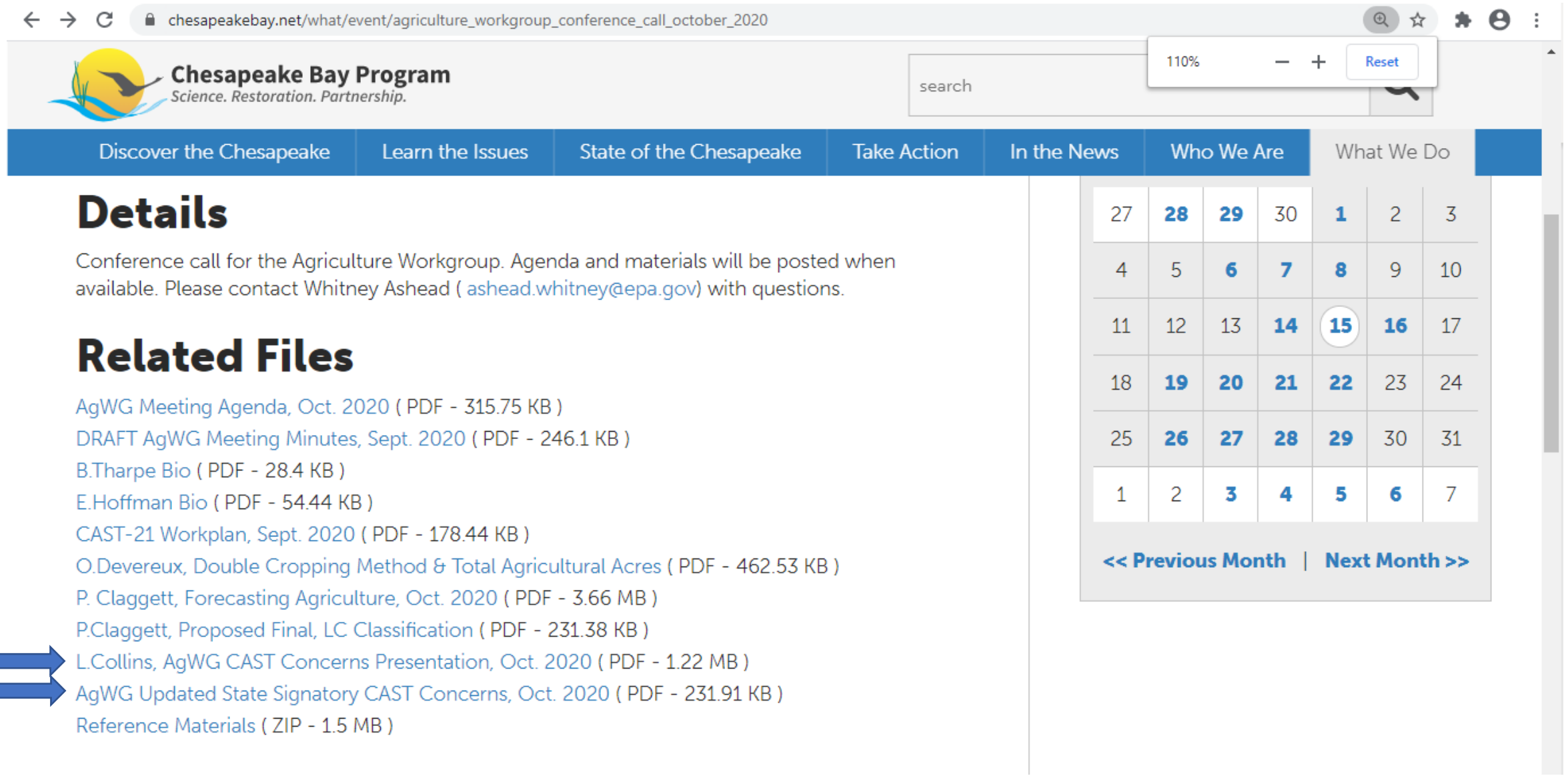


Animal Data

Animal Populations: explore other estimating options (MD/NY)

NASS Annual Surveys

State Data (QA/QC'd)

Industry Data (QA/QC'd)

CBPO evaluating forecasting methods

KEY ACTION

Task 1: Updates to data & methods that typically occurring every 2 years.

Crop Production/Acres

Crop Production Acres: improve annual estimates (MD/**PA**)

State Data (QA/QC'd)

Industry Data (QA/QC'd)

Other USDA data sources

CBPO evaluating forecasting methods

Nutrient Applications/Assumptions

Fertilizer Sales and Use Data (MD)

Nutrient Management on Pasture (NY/PA)

Communication with state chemists

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 (new data incorporation every 2 years)

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**

Manure Nutrient Concentration Data

- Changes in management may result in changes in nutrient concentrations
- **Additional manure concentration data is welcome and encouraged**

Fertilizer Data

- More accurate allocation of fertilizer within the CBW?

4. Define Inorganic Fertilizer Available to Crops

KEY ACTION

Task 1: Updates to data & methods that typically occurring every 2 years.

CRITICAL CONCEPT:

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

- Provide data all the way back through 1985.

OR

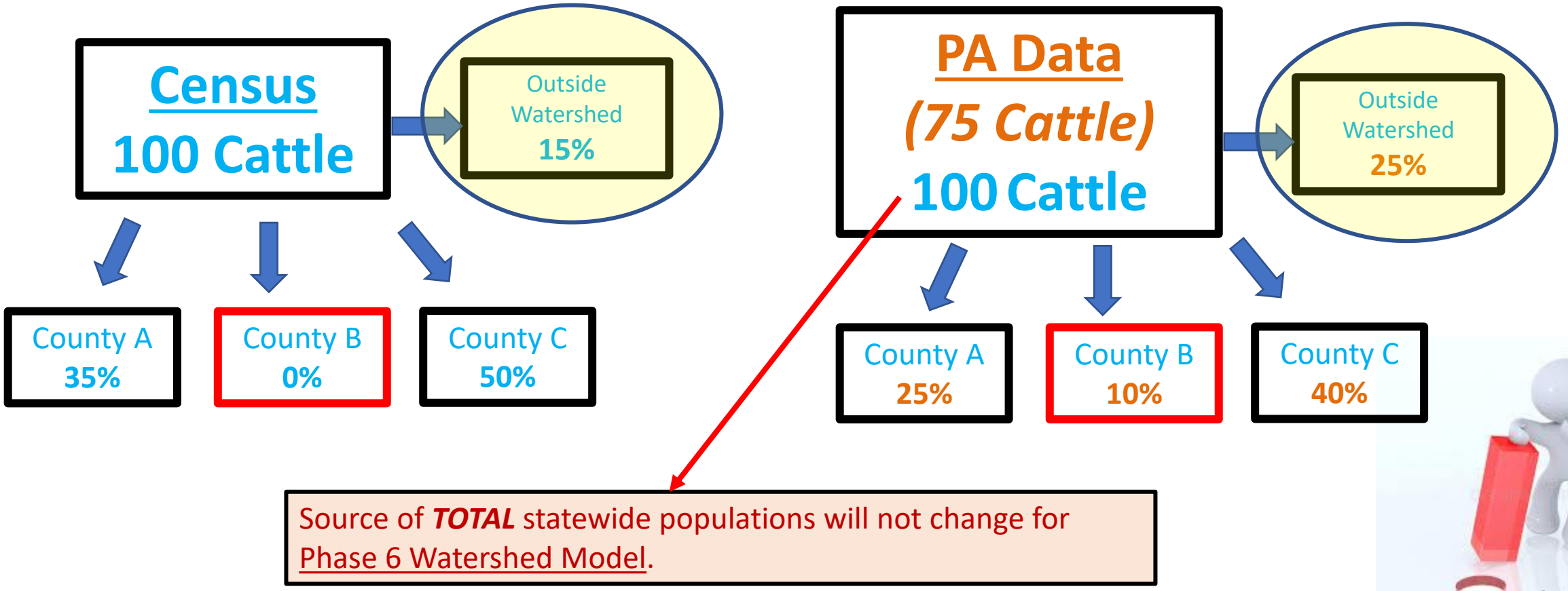
- Use the **trend** in new data sets for the years available.

CBWM= **Chesapeake Bay Watershed** Model

CRITICAL CONCEPT

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

Example: Pennsylvania provides fraction of cattle in every county for the year 2019, 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.

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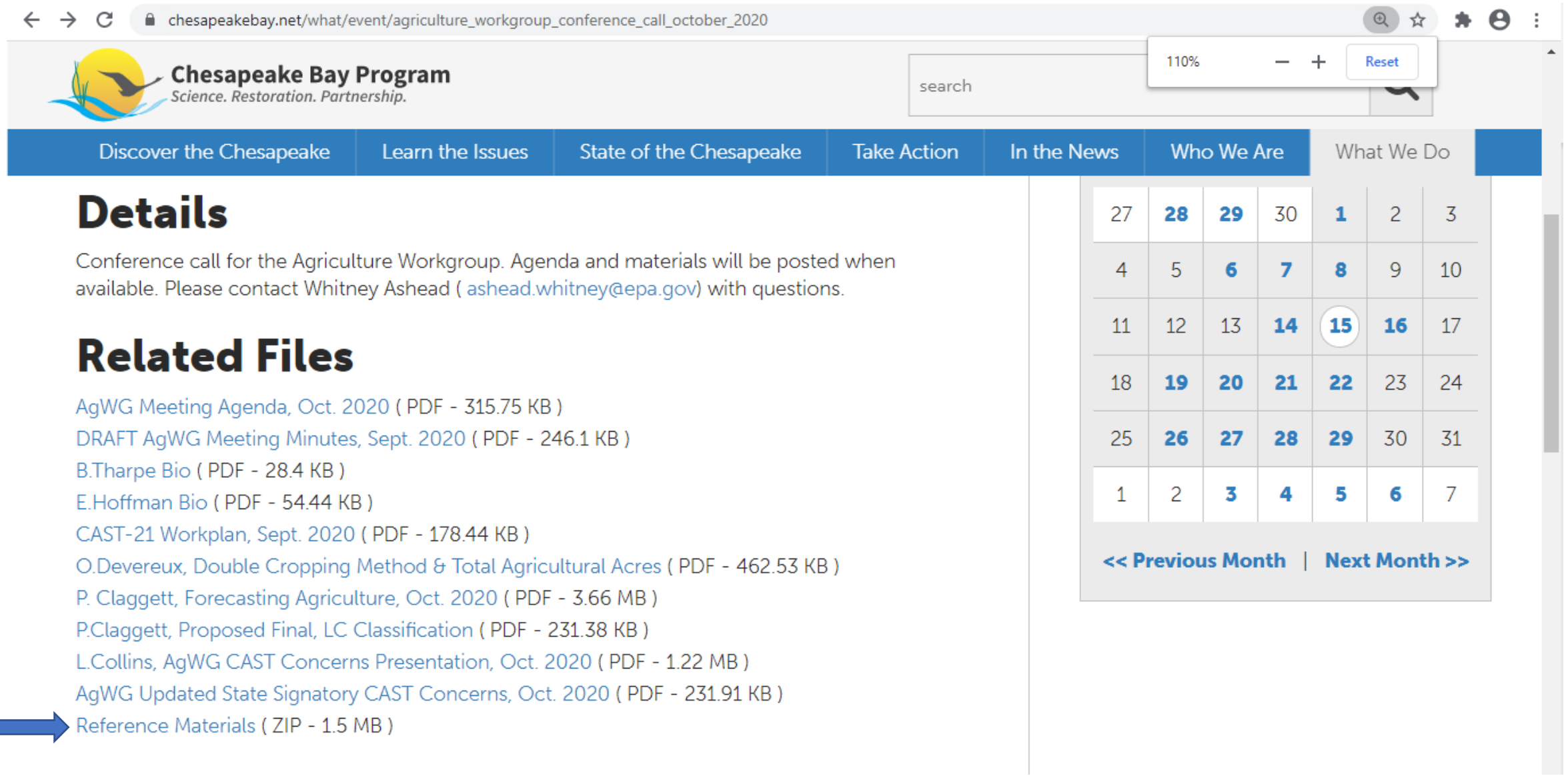


BMP Tracking & Reporting

Dairy Precision Feeding (PA)

~~Rotational/Prescribed Grazing (PA)~~

Heavy Use Area Protection- NRCS 561 (PA)*

BMP Effectiveness

~~**Commodity Cover Crops**~~ **Winter Crop (NY/PA)**

Heavy Use Area Protection- Poultry (DE, MD, WV)

Manure Transport / Manure Treatment Technologies (PA/**MD**)*

All BMP effectiveness estimates are subject to potential future reviews according to the availability of new scientific information and CBP partnership needs, as defined in the BMP Review Protocol.

IIB. Review Process for Existing Estimates or Treatment Processes

If approved by the WQGIT Chair, the review of existing estimates and, when applicable, the definition of a BMP can be conducted within a source Workgroup in consultation with the WTWG. This approach should reduce the amount of time necessary to conduct the review because the definition(s) have already been developed, a background of available data already exists, and issues of how the practices or land use is incorporated into the CBWM have been addressed. Reviews of existing estimates should follow the guidelines listed in IIA above except that a separate Panel is not convened and the information generated is added to the existing support documentation for the estimate.

BMP Concern	CBP BMP Effectiveness Source	Next Steps
Dairy Precision Feeding (PA)	Definitions and reductions approved by the WQGIT in **2009**	**Ad Hoc- Review BMP documentation (FALL 2020)**
Heavy Use Area Protection-NRCS 561 (PA)	Loafing Lot Management definitions and reductions approved by the Chesapeake Bay Program's Nutrient Subcommittee in **2003**.	**Ad Hoc- Review BMP documentation** **Invite NRCS for discussion (FALL 2020)**
Nutrient Management on Pasture (NY/PA)	Nutrient Management Practices for use in the Phase 6.0 Chesapeake Bay Program Watershed Model (**2016**)	**Ad Hoc- Review BMP documentation**
Commodity Cover Crops (NY/PA)	Cover Crops Practices for use in Phase 6 of the Chesapeake Bay Watershed Model (**2016**)	**AgWG- Invite EP Chair to present to AgWG (Jan-Feb 2021)**
Manure Transport / Manure Treatment Technologies (PA)	• *Manure Treatment Technologies*: Recommendations from the Manure Treatment Technologies Expert Panel to the CBP's WQGIT to define Manure Treatment Technologies as a Best Management Practice (**2016**) • *Manure Transport*: definition and benefits have remained in use **since review and approval by the CBP partnership's source sector workgroups for tributary strategy development**.	**Ad Hoc- Review BMP documentation**

[Protocol for the Development, Review, and Approval of Loading and Effectiveness Estimates for Nutrient and Sediment Controls in the Chesapeake Bay Watershed Model]

BMP Concern	CBP BMP Effectiveness Source
Dairy Precision Feeding (PA)	Definitions and reductions approved by the WQGIT in **2009**

Dairy Precision Feeding:

- ❑revisit the criteria for measurement of implementation

Harrison, J.H., et al. 2013. An introduction to NRCS Feed Management Practice Standard 592: http://articles.extension.org/pages/11312/an-introduction-to-natural-resources-conservation-service-nrcs-feed-management-practice-standard-592

eXtension.org, Dairy video archive: http://articles.extension.org/pages/15830/dairy-video-archive

Penn State Extension. Precision feeding dairy heifers: strategies and recommendations. https://extension.psu.edu/precision-feeding-dairy-heifers-strategies-and-recommendations

All BMP effectiveness estimates are subject to potential future reviews according to the availability of new scientific information and CBP partnership needs, as defined in the BMP Review Protocol.

Dairy Precision Feeding

Ask:

- Request developing alternative methods to develop the needed data.
- Is there an effective approach in the mild of phytase use in poultry?

Challenge:

- Enabling and ensuring accurate tracking of farm operations (implemented on voluntary basis)
- Dairy Precision Feeding BMP recs from 2009.

WIP III SNAPSHOT:

State	2019 Progress % Implementation	WIP 2025 % Implementation (AU)
DE	0	100 (4308.11)
MD	0	47 (19400.0)
NY	3.8	3.7 (10371.0)
PA	0	42.2 (25879.34)
VA	0	100 (68962.26)
WV	0	0

BMP Concern	CBP BMP Effectiveness Source
Heavy Use Area Protection- NRCS 561 (PA)*	Loafing Lot Management definitions and reductions approved by the Chesapeake Bay Program's Nutrient Subcommittee in **2003**. Find original documentation

Heavy Use Area Protection (NRCS 561):

- ❑Heavy Use Area Protection HUAP is not currently credited
- ❑HUAP should be synonymous to Loafing Lot Management BMP

Loafing lot management is the stabilization of areas frequently and intensively used by people, animals or vehicles by establishing vegetative cover, surfacing with suitable materials, and/or installing needed structures. *This does not include poultry pad installation*. (CBP BMP Quick Guide)

DEFINITION: Heavy Use Area Protection is used to stabilize a ground surface that is frequently and intensively used by people, animals, or vehicles.

PURPOSE: Heavy Use Area Protection is used: • To provide a stable, non-eroding surface for areas frequently used by animals, people or vehicles • To protect or improve water quality
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1263184.pdf

All BMP effectiveness estimates are subject to potential future reviews according to the availability of new scientific information and CBP partnership needs, as defined in the BMP Review Protocol.

Heavy Use Area Protection (HUAP)

Ask:

- NRCS CPS 561: Heavy Use Area Protection credit under CBP BMP Loafing Lot Management (excluding poultry)- PA
- Allow credit for poultry pads (DE/MD/WV)

Challenge:

- Poultry pad concerns overlap Animal Waste Management System EP recs.
- The AWMS did not consider HUAP for other livestock.
- NRCS data privacy requirements
- Tracking methods may vary by state

WIP III SNAPSHOT

Barnyard Runoff Control + Loafing Lot Management

State	2019 Progress % Imp	WIP 2025 % Imp. (ac)
DE	99.3	100 (1060)
MD	44.3	46.7 (904)
NY	5	6.2 (113)
PA	62.5	72.8 (4899)
VA	40.1	66.7 (2769)
WV	46.2	47.7 (340)

Livestock + Poultry Waste Management Systems

State	2019 Progress % Imp.	WIP 2025 % Imp. (AU)
DE	66.4	99.3 (2.1 mill)
MD	84.1	96.2 (1.8 mill)
NY	16.2	16.8 (81,915)
PA	38.1	75.2 (2.5 mill)
VA	34.8	88.5 (2.5 mill)
WV	61.5	70.1 (321,256)

BMP Concern	CBP BMP Related Reports
~~Commodity Cover Crops~~ (NY/PA) NEW DISTINCTION: "Winter Crop"	Cover Crops Practices for use in Phase 6 of the Chesapeake Bay Watershed Model **(2016)** Nutrient Management Practices For Use in Phase 6.0 of the Chesapeake Bay Program Watershed Model **(2016)**

Cover Crops:

- ❑ Additional category Commodity Cover Crops with Manure (not inorganic fertilizer).
  - ❑ Encourage/credit cover cropping in forage-based dairy cropping systems
- ❑ ~~Revisit the criteria for crediting commodity cover crop (harvested, nutrients applied)~~

NEW Expert Panel

“Winter Crop”

Ask:

- New crop LU?/BMP? recognizing forage-based cropping systems

Challenge:

- Expert Panel needed
  - Resource limitations
  - Adequate modeling

WIP III SNAPSHOT

Commodity Cover Crop

State	2019 Progress % Imp.	WIP 2025 % Imp. (ac)
DE	77.1	46.1 (28423)
MD	59.3	36.9 (79448)
NY	1.1	5.1 (5996)
PA	0	4 (11000)
VA	0	2.4 (23024)
WV	0	0

[Traditional] Cover Crop with Fall Nutrients

State	2019 Progress % Imp.	WIP 2025 % Imp. (ac)
DE	0	0
MD	0	0
NY	0.9	1 (8528)
PA	0.9	30.6 (615135)
VA	0	2.4 (23024)
WV	0	0

BMP Concern	CBP BMP Effectiveness Source
Manure Transport / Manure Treatment Technologies (PA)	• *Manure Treatment Technologies*: Recommendations from the Manure Treatment Technologies Expert Panel to the CBP's WQGIT to define Manure Treatment Technologies as a Best Management Practice (**2016**) • *Manure Transport*: definition and benefits have remained in use **since review and approval by the CBP partnership's source sector workgroups for tributary strategy development**.

Manure Transport / Manure Treatment Technologies:

- ❑ Revisit the requirement to apply NM to offset an assumed "backfill" of inorganic application
  - ❑ Assumption does not adequately reflect current practice

There is no requirement to apply NM

Manure Transport / Manure Treatment Technologies

Ask:

- AgWG sponsored study group
  - inter-county manure transport
  - Manure treatment technologies & backfill issues

Challenge:

- Unresolved issues related to MTT & N backfill (circa 2017)
- Agricultural input data for the Phase 6 CBWM is collected, analyzed, and interpreted on a county-level
  - Crediting transport within-county or across river segments is not feasible with Phase 6 CBWM

WIP III SNAPSHOT

Manure Transport Out of Area

State	2019 Progress Annual Dry Tons	WIP 2025 Annual Dry Tons
DE	32341.56	140405.52
MD	29391.68	65537.26
NY	0	0
PA	61127.29	321997.78
VA	9966.27	89221.00
WV	4406.25	7302.68

Manure Transport into Area

State	2019 Progress Annual Dry Tons	WIP 2025 Annual Dry Tons
DE	5483.26	0.00
MD	33953.88	0.00
NY	26.45	0.00
PA	51867.11	29282.09
VA	9057.60	0.00
WV	437.57	0.00

Manure Treatment Technologies Out of Area

State	2019 Progress Annual Dry Tons	WIP 2025 Annual Dry Tons
DE	0	0
MD	0	0
NY	0	0
PA	0	20000
VA	0	16700.15
WV	0	0

Manure Treatment Technologies into Area

State	2019 Progress Annual Dry Tons	WIP 2025 Annual Dry Tons
DE	0	0
MD	0	0
NY	0	0
PA	0	0
VA	0	16700.15
WV	0	0

BMP Concern	CBP BMP Effectiveness Source
Nutrient Management on Pasture (NY/PA)	Nutrient Management Practices for use in the Phase 6.0 Chesapeake Bay Program Watershed Model (**2016**)

Nutrient Management on Pasture:

❑Crediting NM on pasture/non-cropland acres

Q10. Can states take credit for practices on pasture? A10. No. The panel specifically recommended reductions to application goals and runoff estimates on non-pasture acres only. (p.49)

"N Core NM BMP multiplier values for Other Hay and Pasture were set at 1.00 because the CBP Partnership's modification of the LGU N application recommendations **created a uniform and much-reduced N application rate goal for these two agricultural land uses that included an assumed implementation rate of NM BMPs across the entire CBW**. Therefore, the Panel could not apply a N application rate BMP multiplier other than 1.00 to these two land uses." (p.24)

"…Panel recommendations are **avoiding the 'double crediting'** of nutrient management on these land uses as the "model credit" as already been represented in the base model condition established by the AMS application rate table. One potential option for the partnership to consider would be the representation of several management levels for pasture land uses in the future. Currently, only one pasture land use is available in Phase 6." (p. 99-100)

Nutrient Management on Pasture (nutrient spread curves)*

*(slide updated to remove error post-meeting)

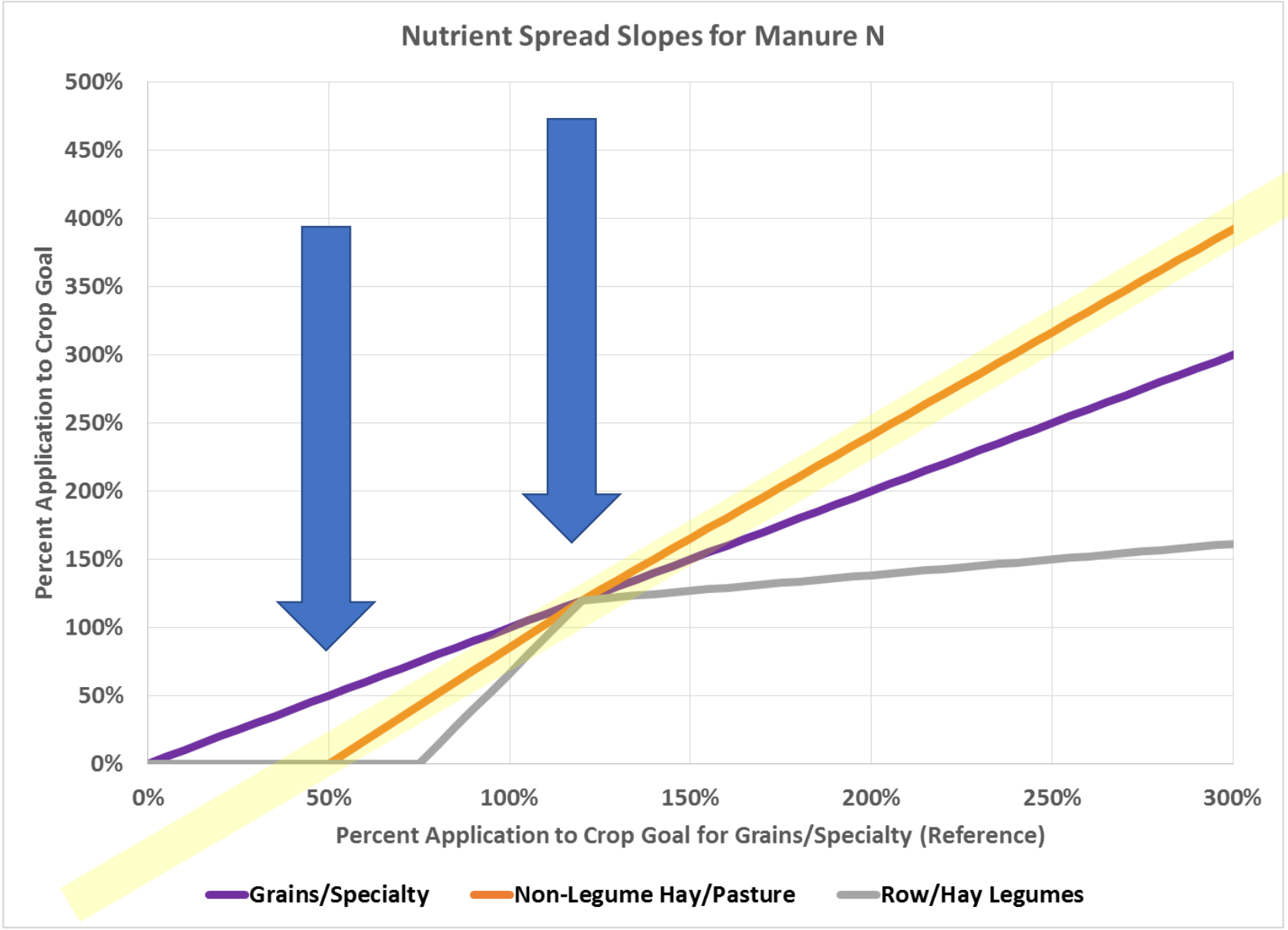
Ask:

- update manure-eligible land uses to soybean and small grain/soybean (double crop)
- adjustment to nutrient spread curves based on updated understanding of agronomic applications of manure

Challenge:

- The “backfill” of inorganic N to meet crop need is based on agronomic assumptions
- Estimated manure nutrients must be accounted for somewhere
- Changes may result in unintended consequences

AgWG DECISION: The AgWG endorsed the recommended changes to nutrient spread curves, size of other cattle, yield goal multipliers, ammonia volatilization values, and double cropping methodology to Scenario Builder as presented by the Agricultural Modeling Subcommittee. (September 7, 2016)



https://cast.chesapeakebay.net/Documentation/ModelDocumentation --> Terrestrial Inputs → 3.4

What happens to Edge-of-Stream loads when you change the nutrient spread curves?

IT'S COMPLICATED…

According to appendix 4B, you get .167 lbs of TN on average at the EOS if you apply an extra pound of manure N to grain with manure. If you apply the same amount to pasture, you get .0476. Legume hay is .199 and other hay is .224. **If you are moving manure from crop to pasture or hay as a scenario, you will have a decrease.**

But, if the AgWG wants to change this specification, it changes it throughout the model including in 1995. The calibration loads by sector are based on modeling data and multiple model averaging**. Changing the curves will not change the overall ag load in the calibration.**

Predicting how it will change in scenarios relative to 1995 is very complicated. Generally, if the pasture line is moved up from where it is now, more manure will go onto pasture, but that means a higher fraction of inorganic on cropland, which creates a higher load. But, all scenarios are relative, so if the ratio of available manure to crop need increases in a scenario and the slope of pasture is higher than it was, you will move more manure to pasture than that same scenario in CAST-2019. Of course, the total fertilizer is a known quantity as well so shifting manure in one direction will shift fertilizer in the other direction, which may make total loads go up as inorganic fills in, even as the load generated *from manure* goes down. But this all interacts with nutrient management and changes in crop types, etc., so it's really hard to say.

-Gary Shenk, USGS

Before November AgWG Call:

- Post list of concerns on AgWG website (finding right spot)

Oct 26:

- WQGIT: Quick announcement/update on today

Nov 17:

- CBPO presentation on alternate forecasting methods for ag data
- Updates from ad hoc/CAST items
- USGS: Factors affecting rivers & streams

Nov 30:

- Water Quality GIT Extended Update?

Dec 17:

- Cover crop discussion
- Updates from ad hoc/CAST items

Allocation of Ag Nutrients in the Watershed Model

1.Define Crop Application Goal

2. Define Manure Available to Crops

4. Define Inorganic Fertilizer Available to Crops

A Crop Application Goal/Yield Unit

B Yields/Acre

C Acres

Crop Application Goal

Manure Generated

Feed Additive BMPs

Direct Deposition on Pasture

Direct Deposition to Riparian Pasture Areas

Deposited within Barnyard

Ammonia Reduction BMPs

Stored Manure

Storage and Handling Loss

Barnyard BMPs

Available for Transport

Manure Transport

Available for Application

Mineralization

Volatilization

3. Spread Manure to Crops

5. Spread Fertilizer to Crops

AAPFCO Fertilizer Sales Data

Ag Census or NASS Annual Surveys (Animal populations dictate manure load estimates)

A AMS
B NASS Annual Survey
C Ag Census

AMS= Agricultural Modeling Subcommittee