

Inorganic Fertilizer

2/14/2025

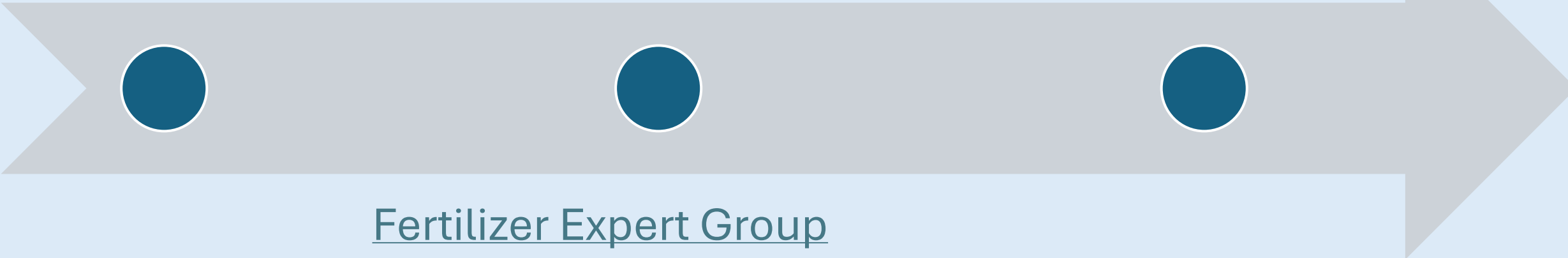
Background

Ongoing concern

- Data omission
- Time lag
- Intended use

AMT (Phase 7)

- Alternative data sources should be examined
- Watershed wide stock could be improved



Fertilizer Expert Group (Phase 6)

- American Association of Plant Food Control Officials (AAPFCO) sales data is universal
- Data directly from states is an improvement
- Recommended further investigations

Background

November 2024

- States supplied input
- Scale concerns
 - Movement from watershed to state scale fertilizer stocks.

December 2024

- USGS fertilizer modeling
- Group support effort
- Further investigation
 - Timeline
 - Data requirements
- No updates yet

Recap inorganic fertilizer in CAST

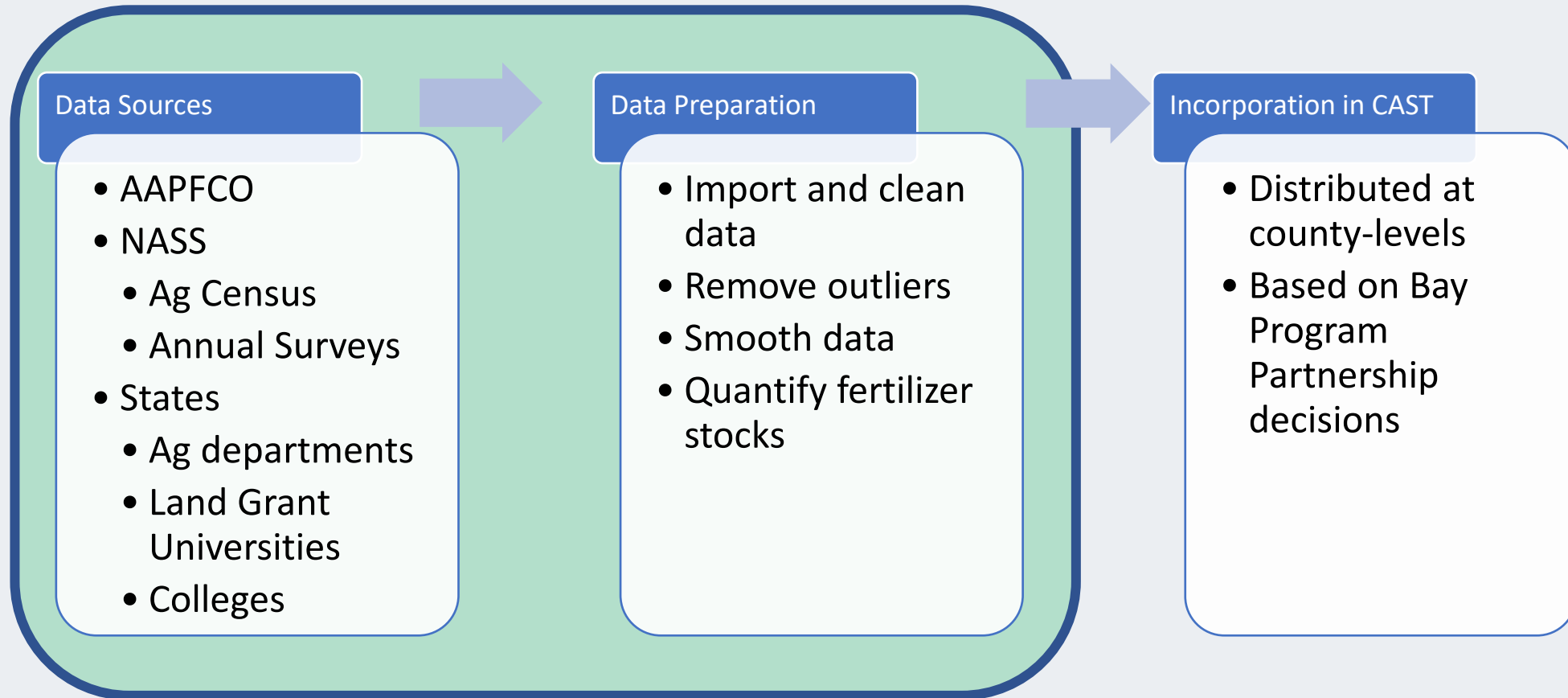
Foundational
knowledge

Current
fertilizer
scale

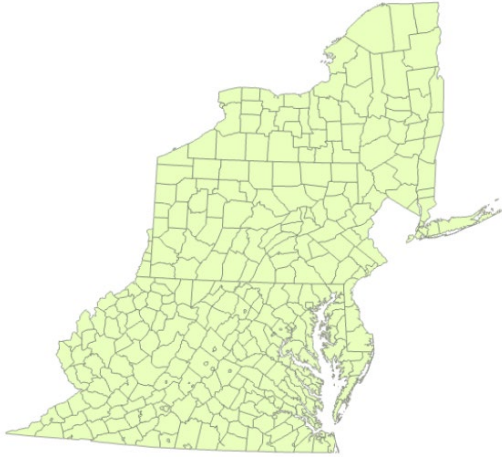
Path towards
improvement

- State scale?

Ag Fertilizer Data Processing Overview



1. County Level



AAPFCO/State

1. AAPFCO/State data are obtained by the Chesapeake Bay Program at the **county level**.
 - a. These data contain the annual mass (tons) of fertilizer sold (% TN and P205).

1. County Level



AAPFCO/State

2. State Level



AAPFCO/State

1. AAPFCO/State data are obtained by the Chesapeake Bay Program at the **county level**.
 - a. These data contain the annual mass (tons) of fertilizer sold (% TN and P2O5)
2. These data are converted to pounds of fertilizer sold then summed at the **state level**.
 - a. Outlier removal occurs.
 - b. Farm fertilizer fraction is determined.
 - c. Smoothing with a 3-year rolling average.

1. County Level



AAPFCO/State

2. State Level



AAPFCO/State

3. Six State Level



AAPFCO/State

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 - a. These data contain the annual mass (tons) of fertilizer sold (% TN and P205)
2. These data are converted to pounds of fertilizer sold then summed at the **state level**.
 - a. Outlier removal occurs.
 - b. Farm fertilizer fraction is determined.
 - c. Smoothing with a 3-year rolling average.
3. Summed for the **six state level** per year for TN and P205.

Notes on State data *

- The same information is gathered from states as AAPFCO.
- Data after 2016 and up to 2020 were provided directly by states.
 - DE, PA, MD, VA
- Remaining states used the trend of fertilizer increase from those who reported.
 - Trend was applied from last reported data.

4. County Level



Ag Census

4. Ag Census data are obtained by the Chesapeake Bay Program at the **county level**.
 - a. These data contain soil amendments expenditures (US Dollars), which include annual fertilizer purchases; Reference point for state fertilizer applications.

4. County Level



Ag Census

5. Six State Level



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5. These data are then summed to the **six state level**.

4. County Level



Ag Census

5. Six State Level



Ag Census

5a. CBW Counties



Ag Census

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 - a. These data contain soil amendments expenditures (US Dollars), which include annual fertilizer purchases; Reference point for state fertilizer applications.
5. These data are then summed to the **six state level**.
 - a. Soil amendment expenditures are summed for **CBW counties**.

4. County Level



Ag Census

5. Six-State Level



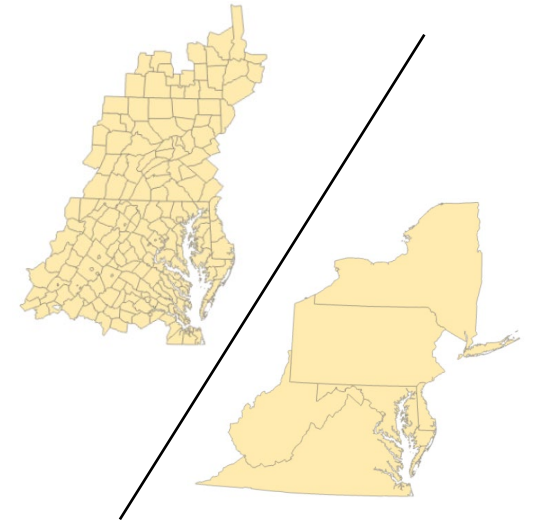
Ag Census

5a. CBW Counties



Ag Census

6. Expenditures Fraction

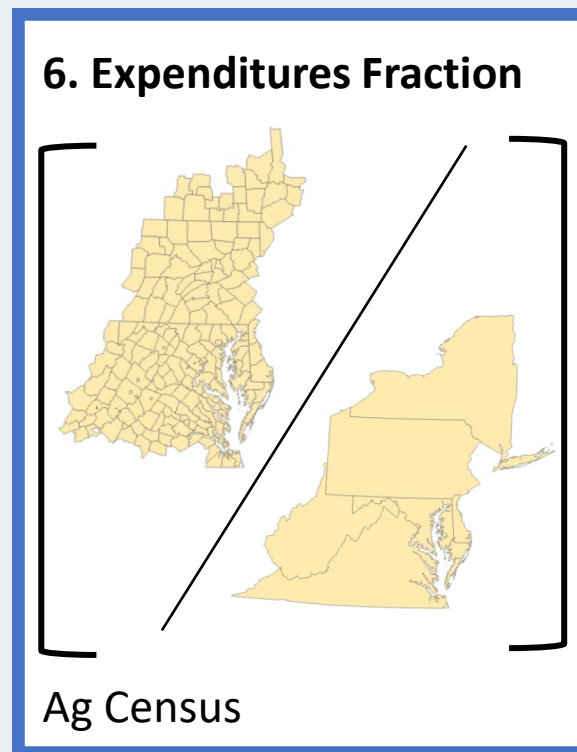


Ag Census

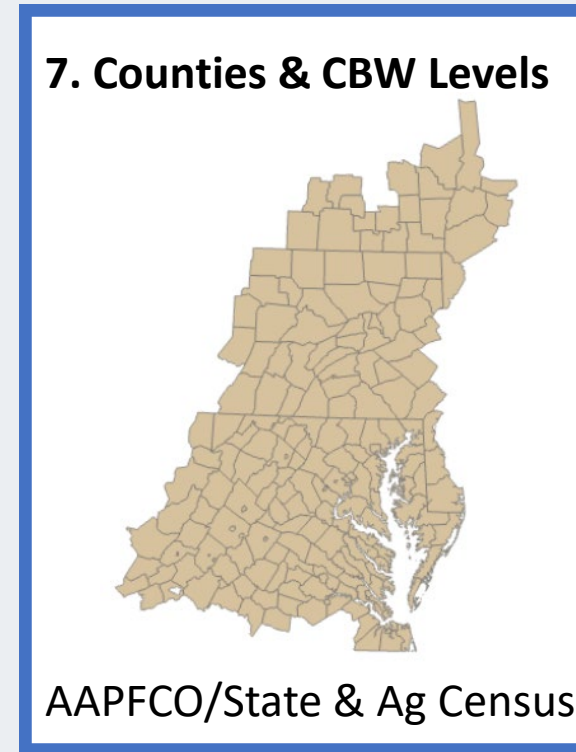
4. Ag Census data are obtained by the Chesapeake Bay Program at the **county level**.
 - a. These data contain soil amendments expenditures (US Dollars), which include annual fertilizer purchases; Reference point for state fertilizer applications.
5. These data are then summed to the **six-state level**.
 - a. Soil amendment expenditures are summed for **CBW counties**.
6. The **expenditures fraction** spent on agricultural fertilizer within the CBW is determined.
 - a. Ratio of CBW Counties to the Six-State Level (unitless) per year.



X



=

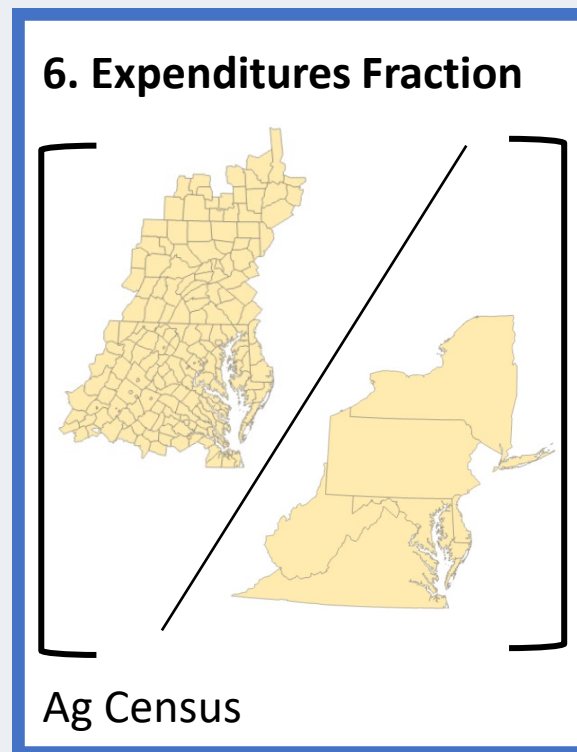


7. Quantify the pounds of agricultural fertilizer used annually in the **CBW**.

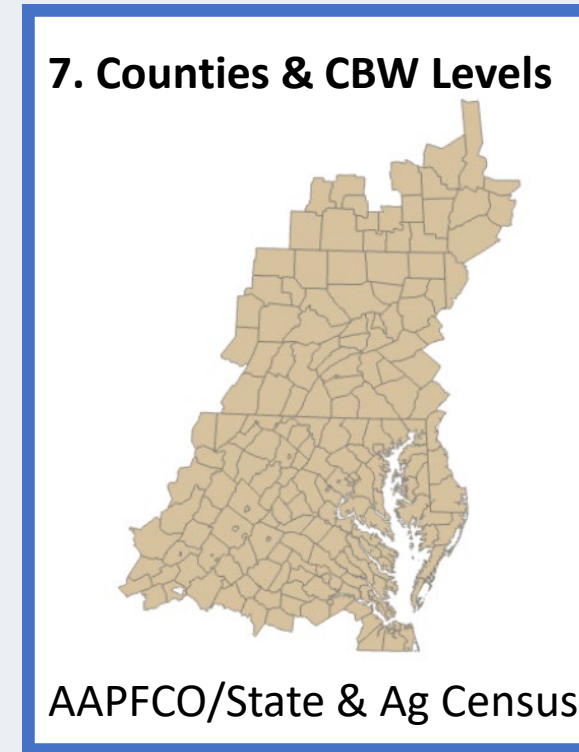
- a. Six state agricultural fertilizer mass (pounds; AAPFCO) is multiplied by the CBW expenditures fraction (unitless; Ag Census).



X



=



7. Quantify the pounds of agricultural fertilizer used annually in the **CBW**.

a. Six state agricultural fertilizer mass (pounds; AAPFCO) is multiplied by the CBW expenditures fraction (unitless; Ag Census).

b. Results in annual fertilizer mass available for application (pounds of TN and P205 [multiplied by 0.4362 for farm fertilizer]), which is a calculated fertilizer stock for the entirety of CBW **counties**.

Some quick Terminology

- **Expected Application (pounds)**

- Indicates the amount of nitrogen a crop or set of crops is expected to receive for an entire county. It is calculated for each crop type using this equation: **#acres of crop x yield/acre (NASS Annual data C-23) x *Expected Application Rate**

- **Expected Application Rate (pounds/acre)**

- The ***Recommended Application Rate** is adjusted for a factor to account for acres **not** under nutrient management

- **Recommended Application (pounds)**

- Indicates the amount of nitrogen a crop or set of crops is expected to receive for an entire county under 100% nutrient management. It is calculated for each crop type using this equation: **#acres of crop x yield/acre x *Recommended Application Rate**

- **Recommended Application Rate (pounds/acre)**

- The Nutrient Management Application Goal per Acre supplied by the jurisdictional land grant university (LGU)- it describes the amount of nitrogen needed per yield unit or acre for each crop type and assumes nutrient management is practiced.

Fertilizer application rates were **quantified** by the Chesapeake Bay Program **Ag Workgroup-approved methods** for CBW counties.

- a. *Recommended application rates* are provided by state land grant universities in pounds of N or P per yield unit.
 - a. Acres under nutrient management have an **application goal** equal to the *recommended application rate*.
 - b. Acres not under nutrient management have a higher **application goal** as specified by the Nutrient Management BMP panel.
- b. All fertilizer is distributed to counties based on their remaining **application goal** after manure and biosolids are applied.
- c. Fertilizer is distributed to crops within counties based on a complex formula developed by the Ag Modeling Subcommittee.

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Summary

We need fertilizer data to estimate N and P applications to the land.

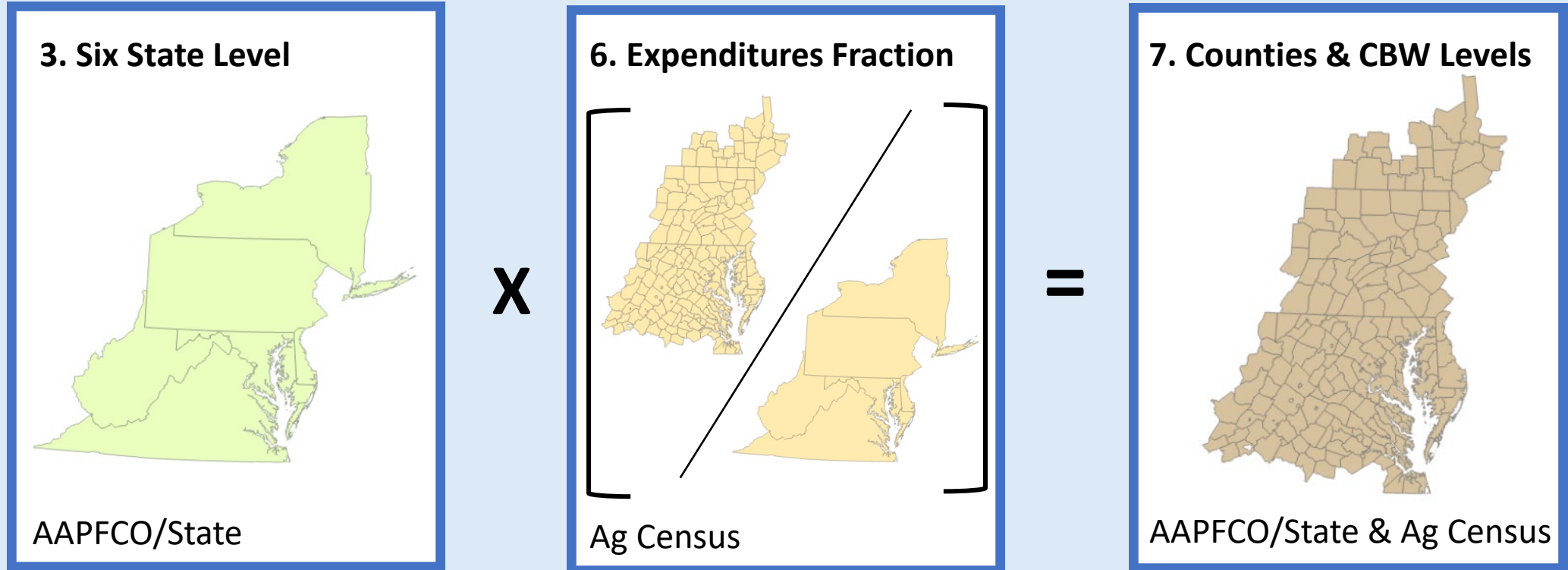
We use state and federally reported data sets.

Data are processed to remove outliers, location issues, and timing of use.

Processed data are applied at the county level, based on the reported crop types and yields in addition to applied organic nutrients.

Questions?

What does this mean for us?



- CURRENTLY fertilizer from ALL states feeds a single stock
- Fertilizer from one state can theoretically be applied in another
- Avoidable if we use a separate stock specific to each state

How do we want to proceed?

- Let's discuss a path forward:
 - State stocks?
 - County stocks?
 - New ideas?