AAPFCO Processing Methods Comparison

Tom Butler, EPA

5/1/2023

Comparing AAPFCO processing

- Multiple organizations use AAPFCO data
- Do not know exactly how our use of the data compares
- Compare Chesapeake Bay Program and NuGIS

Association of American Plant Food Control Officials

- County level
- State reported
- Nationwide coverage
- Inorganic fertilizer sales tonnage
- 1985-2016

- 2017 in process

The end goal

CBP

- Estimate inorganic farm fertilizer application at a county scale across the Chesapeake Bay watershed.

NuGIS

- Assess nutrient use efficiency and balance in crops at county and HUC-8 watershed scales.

A roadmap of the process:
Both work at a county scale but arrive at this differently

CBP

- Create a watershed fertilizer stock

NuGIS

- Divide county level information into HUC-8 watersheds

NuGIS processing

- AAPFCO
- USDA five year census and annual surveys

Collect nationwide data

Estimate Farm Fertilizer use

- National average percent farm and non-farm use sold in reliably reporting states
- Apply percentage to states without reliable county data
- For states with incomplete reporting at county level, apportion sales based on each county's reported Dollars Spent on Soil amendments.
- Estimate fertilized acres in each county
- Mean center of cropland in each county.

- Inverse distance weighted interpolation to smooth fertilizer application among counties
- Calculate percentage of county cropland in each watershed
- Migrate County data to watersheds (8-digit hydrologic units)
- Produce input, removal, and acreage data at the watershed scale

Apply inorganic farm fertilizer to counties and 8-digit hydrologic units

CBP processing

Collect regionwide data

- AAPFCO
- USDA five year census and annual surveys
- Land grant university application recommendations

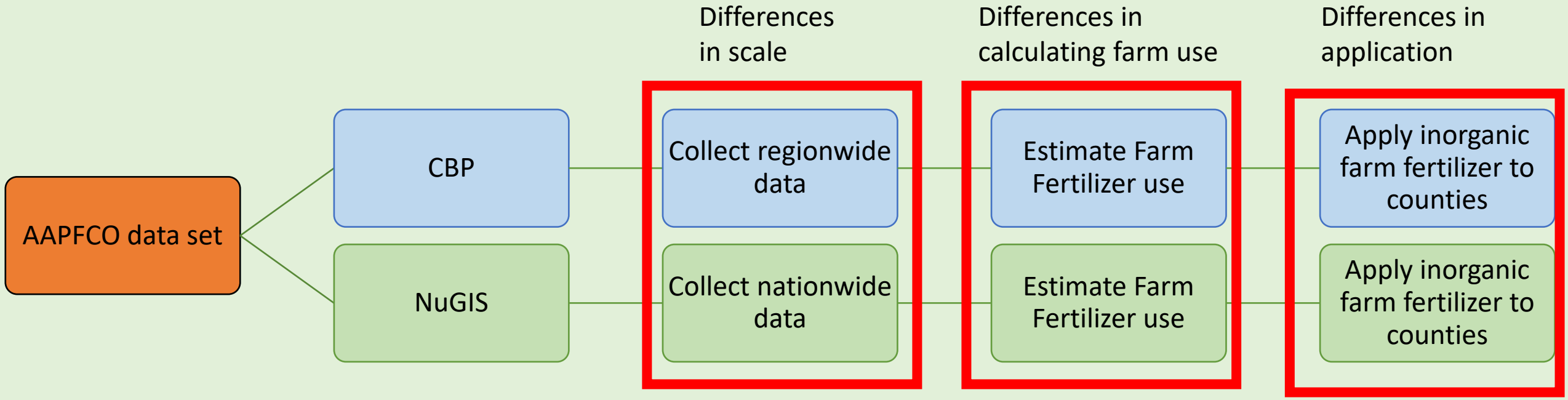
Estimate Farm Fertilizer use

- Sum farm and nonfarm fertilizer and remove outliers
- Calculate a three year rolling average of the fraction of farm fertilizer vs nonfarm fertilizer for each state
- Sum state farm fertilizer amounts for all states
- Determine watershed fertilizer stock
  - Determine the proportion of expenditures spent on farm fertilizer within the Chesapeake Bay watershed.
  - Determine the lbs of farm fertilizer for the watershed (combine state farm fertilizer mass X expenditures ratio

Apply inorganic farm fertilizer to counties

- Determine the yield of crops within each county using Ag census and survey data.
- Apply inorganic fertilizer to meet crop need after accounting for nutrient management implementation and organic fertilizer

Processing compared:



Differences in scale

CBP

- Six states
- One watershed, Chesapeake Bay

NuGIS

- 50 states
- Multiple smaller watersheds

Differences in calculating farm use

CBP

- No states without county totals
- No unknowns
- Watershed scale fertilizer stock
- Farm ratio based on farm and nonfarm tonnage

NuGIS

- Several states with only state totals and/or some counties unknown
- Apply unknowns based on national average ratio (farm/non-farm use)
- County scale fertilizer stock
- Distribution farm fertilizer among counties based on expenditures

Differences in application

CBP

- Based on crop yield data
- Based on inorganic crop need.

NuGIS

- County mean center of cropland
- Inverse distance interpolation

Questions?