Urban Fertilizer Application Rates

Phase 6 Modeling

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Urban Stormwater Workgroup Meeting
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Turfgrass Application Rates

Questions and Concerns from 6/21/16 Meeting

- Concern that urban nutrient management BMP credit would be lost if urban nutrient applications are based on fertilizer sales data, e.g., Changes in application rates over time (as an impact of nutrient management) would be already captured by sales data.
  - Both agriculture and urban nutrient management have additional benefits for several types of supplemental enhancing practices

Turfgrass Application Rates

Phase 6

Summary of Urban Fertilizer Management Credits for Phosphorus and Nitrogen			
Nutrient	*Statewide with P fertilizer legislation*	*Statewide without P fertilizer legislation*	*Urban Nutrient Management UNM [2]*
Phosphorus	25%	20%	Low risk: 3% High risk: 10% Blended: 4.5%
Notes & Conditions of Credit	Effective 2013 for 3 years. In 2016 , need to show reduction in P using two years of fertilizer sales data		Need to survey high-risk every 5 years; Renew UNM every 3 years
Nitrogen	For States with N fertilizer legislation: 9% reduction for qualifying acres by commercial applicators, 4.5% reduction for do-it-yourselfer acres For all other States: 3% load reduction for every 10% decrease in N urban fertilizer input from CBWM benchmark		Low risk: 6% High risk: 20% Blended: 9%
Notes & Conditions of Credit	Effective 2014, need to show N reduction using two consecutive years sales data		Need to survey high-risk every 5 years; Renew UNM every 3 years

Recommendations of the Expert Panel to Define Removal Rates for Urban Nutrient Management
CBP Approved Final Report – by WQGIT 3/11/2013

Turfgrass Application Rates

Questions and Concerns from 6/21/16 Meeting

- How does the Agriculture Workgroup method differ from the USGS method?
  - Agriculture Nutrient Management
    - Total mass of chemical fertilizer, manure and bio-solids are distributed across the CB watershed among all crops (100+) with differences in application rates between nutrient management acres and non-nutrient management
    - For the CB watershed-wide mass of fertilizer nutrients from AAPFCO, agriculture method sums Farm, Non-Farm and Unknown for 6 states for each year (1985 through 2012)
    - Replace outliers and interpolate missing years
    - Calculate fraction of Farm versus Total for 6 states for each year
    - Calculate 3-year rolling average of Farm versus Total for 6 states
    - Estimate Farm total for 6 states for each year by multiplying Total by 3-year rolling average Farm
    - Assume Farm = Total – Non-Farm
    - Currently no way to estimate amount used within the watershed vs. outside
    - Additional credit for supplemental components of nutrient management = application rate, timing, method and form.

Turfgrass Application Rates

Questions and Concerns from 6/21/16 Meeting

- How does the Agriculture Workgroup method differ from the USGS method?
  - Urban Nutrient Management
    - USGS uses the same AAPFCO data but comes up with methods to fill in holes in the data, such as when a county didn't report, or the sales data were not split between Farm and Non-Farm.
    - Rather than start with CB watershed-wide mass, urban method has mass of fertilizer nutrients for each state distributed to one "crop" type = turfgrass
    - Additional credit for practices that make up nutrient management – depending on high-risk, low-risk, blended
    - USGS-processed data is not expected anytime soon to extrapolating from what we have.

Turfgrass Application Rates

Questions and Concerns from 6/21/16 Meeting

- Is this method more accurate than the current method of assuming a single application rate everywhere, through time?
  - Yes. This is an improvement. Captures variability among states for rural versus suburban. Using data that has other utilities nation-wide
  - Individual state data seems to be more variable than what is presented here
  - June 21, 2016 USWG decision: The USWG approved the proposed method to vary nutrient application on urban lands in the Chesapeake Bay Watershed Model by jurisdiction and through time.

Turfgrass Application Rates

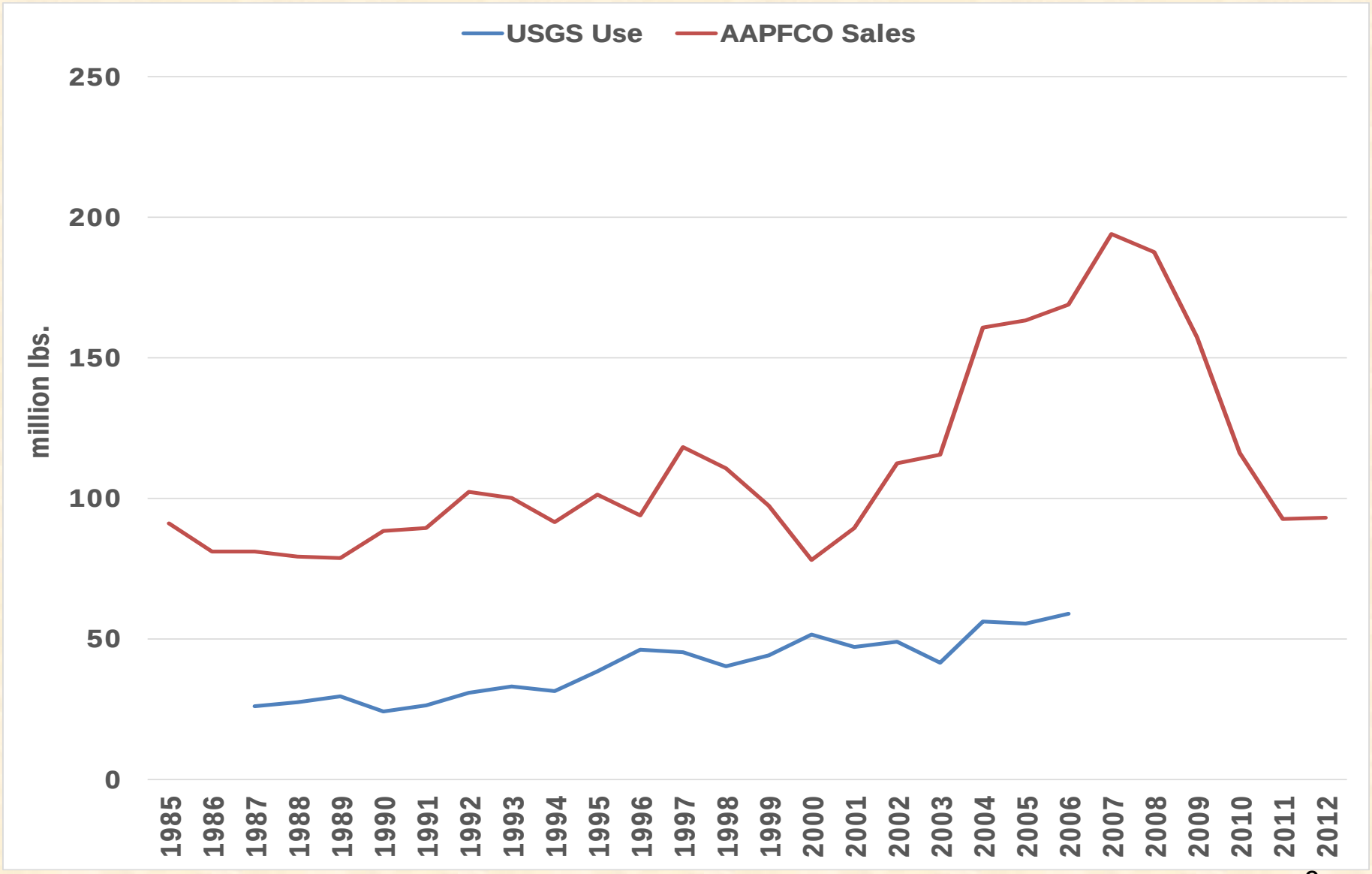
Questions and Concerns from 6/21/16 Meeting

- A lot of unexplained variation in these data and the regression lines are an oversimplification of what is occurring
- It seems linear regression does not capture the short-term variations.
  - Year-to-year sales data are quite variable both at the state and CB watershed scale.
  - USGS “use” data is better; USGS methods for National Water-Quality Assessment program for period 1987-2006

Nitrogen Urban Fertilizer

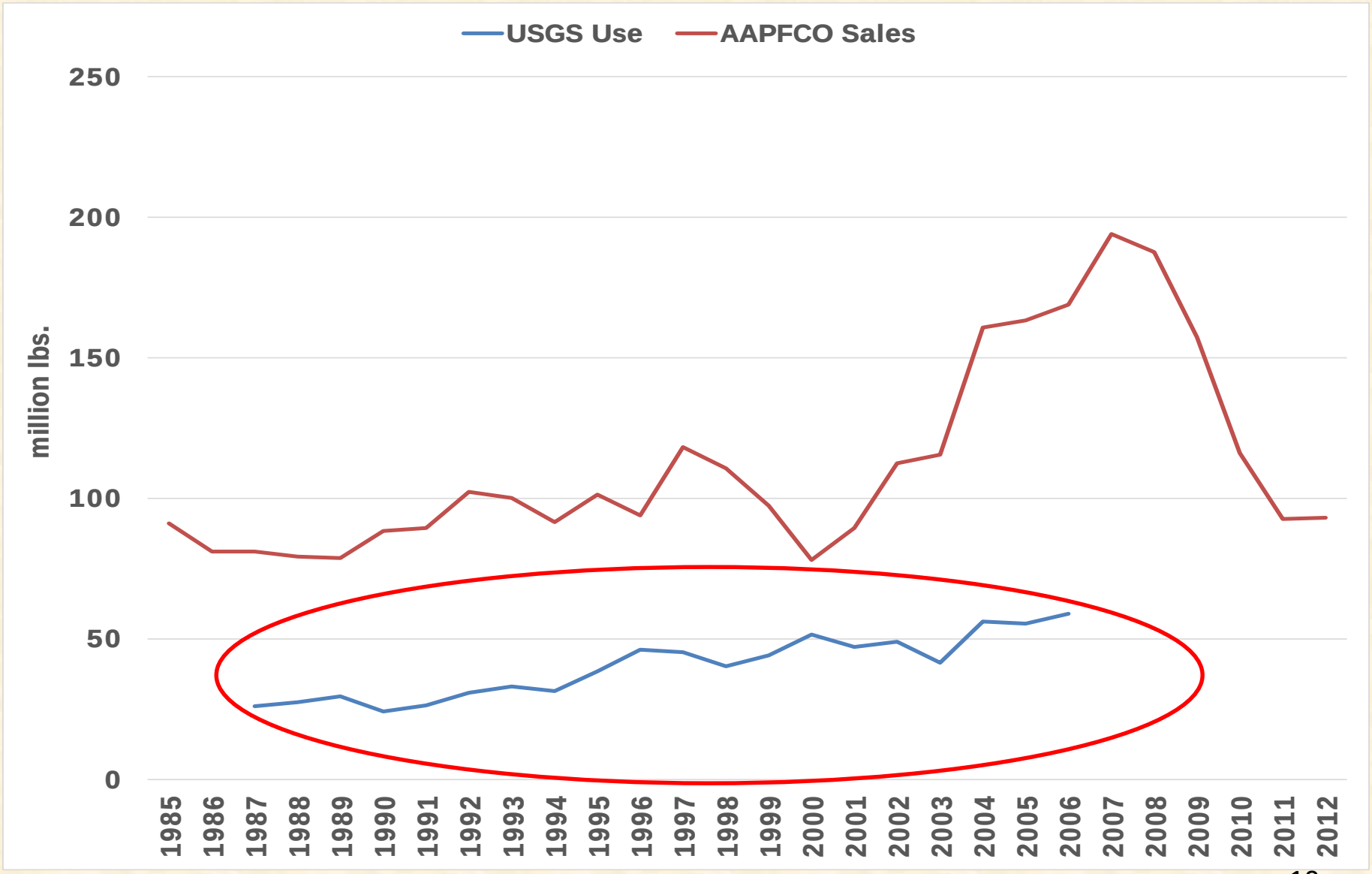
Nitrogen Fertilizer Sales and Use

Pounds Annually CB Watershed-Wide



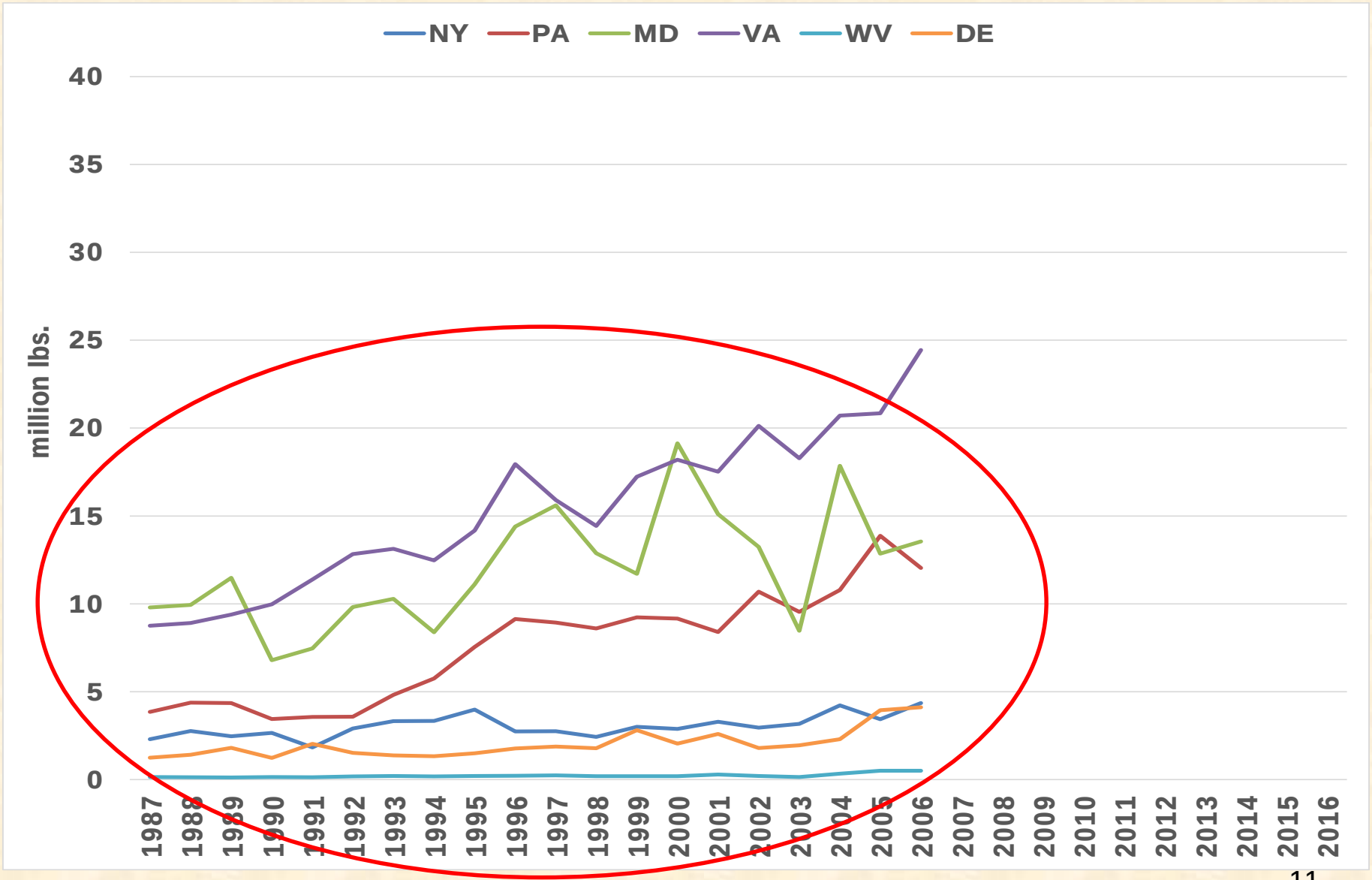
Nitrogen Fertilizer Sales and Use

Pounds Annually CB Watershed-Wide



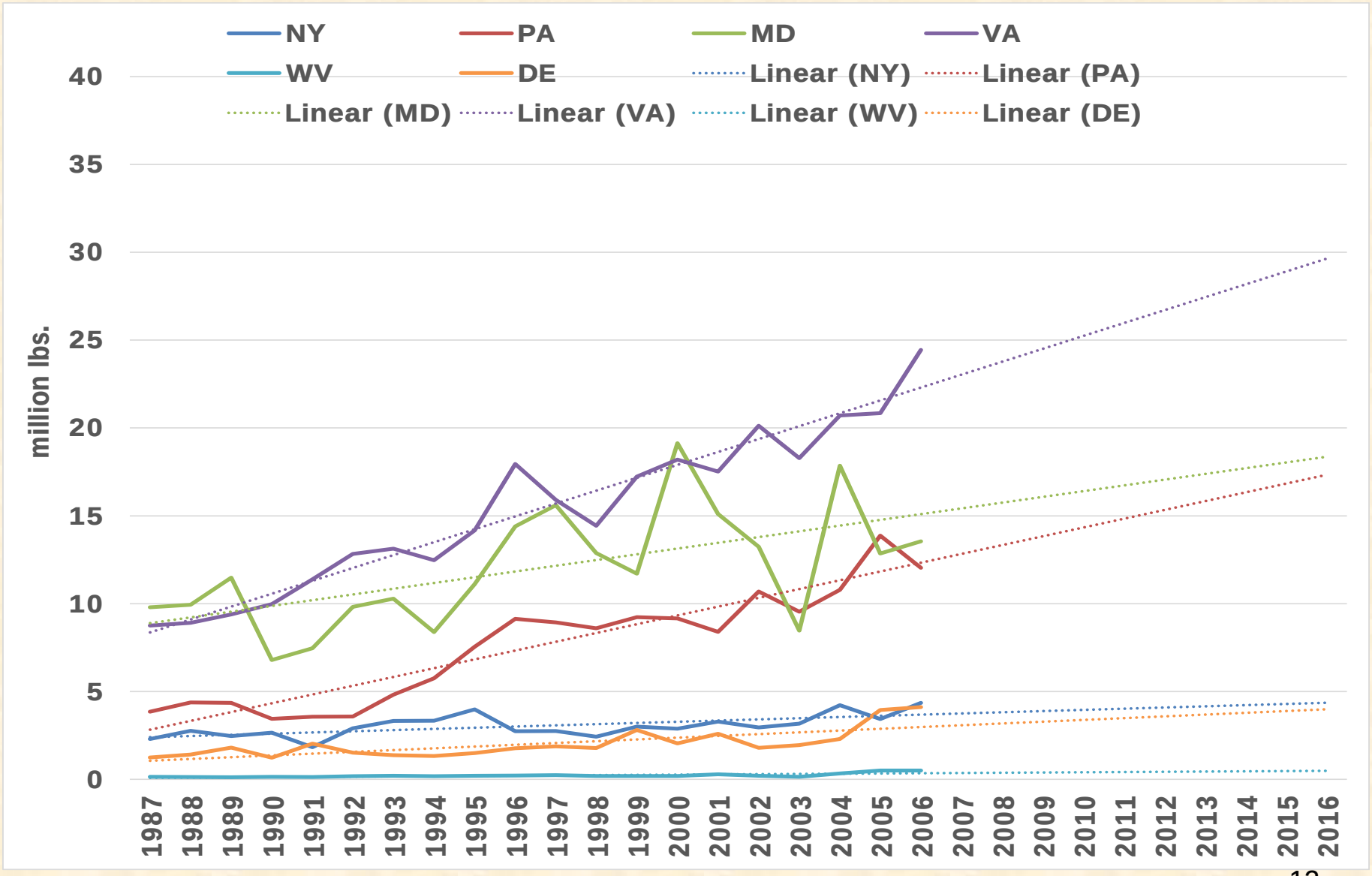
Nitrogen Fertilizer Use

USGS Use Information By State



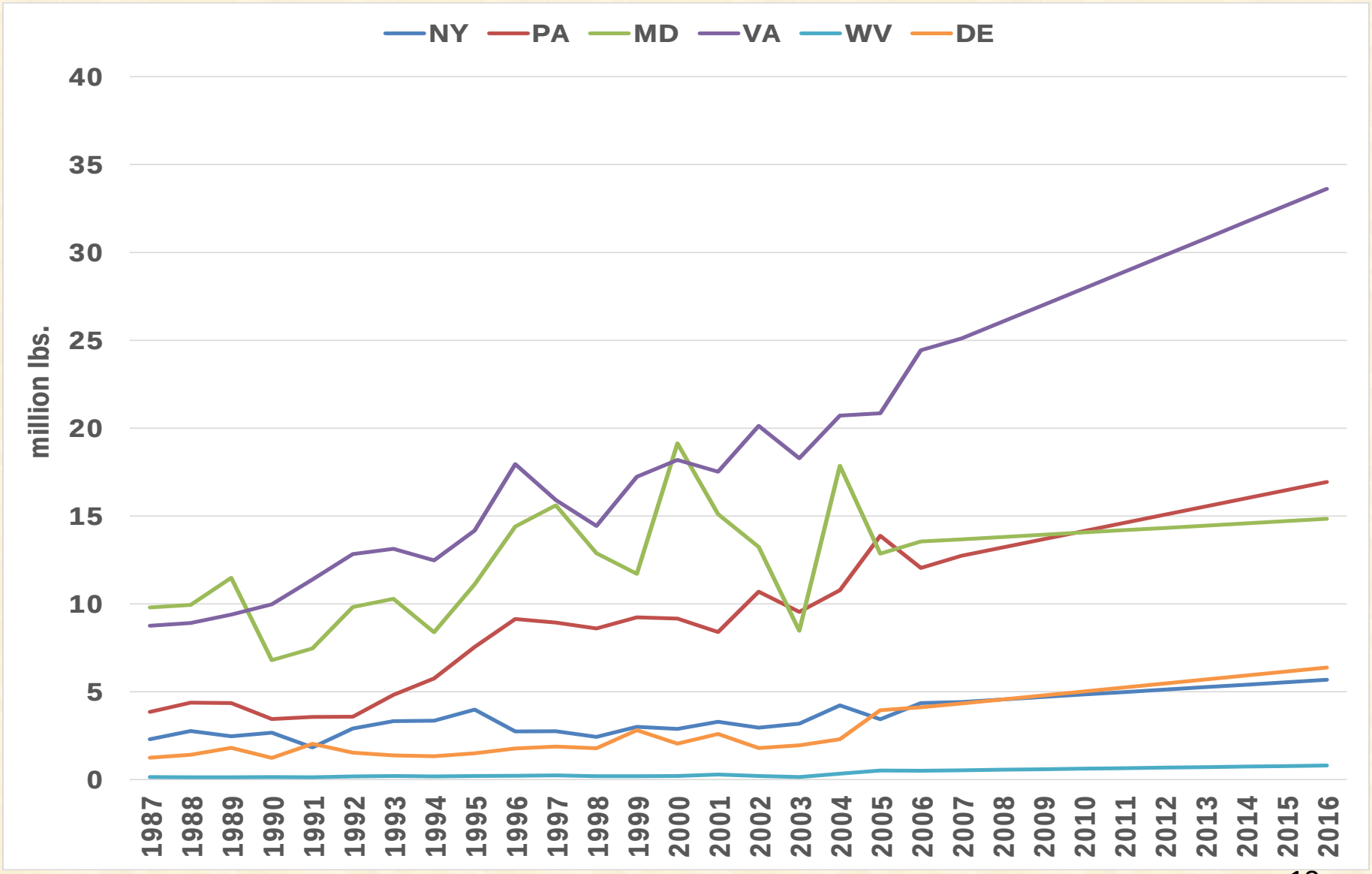
Nitrogen Fertilizer Use

USGS Use Information – Linear Trend



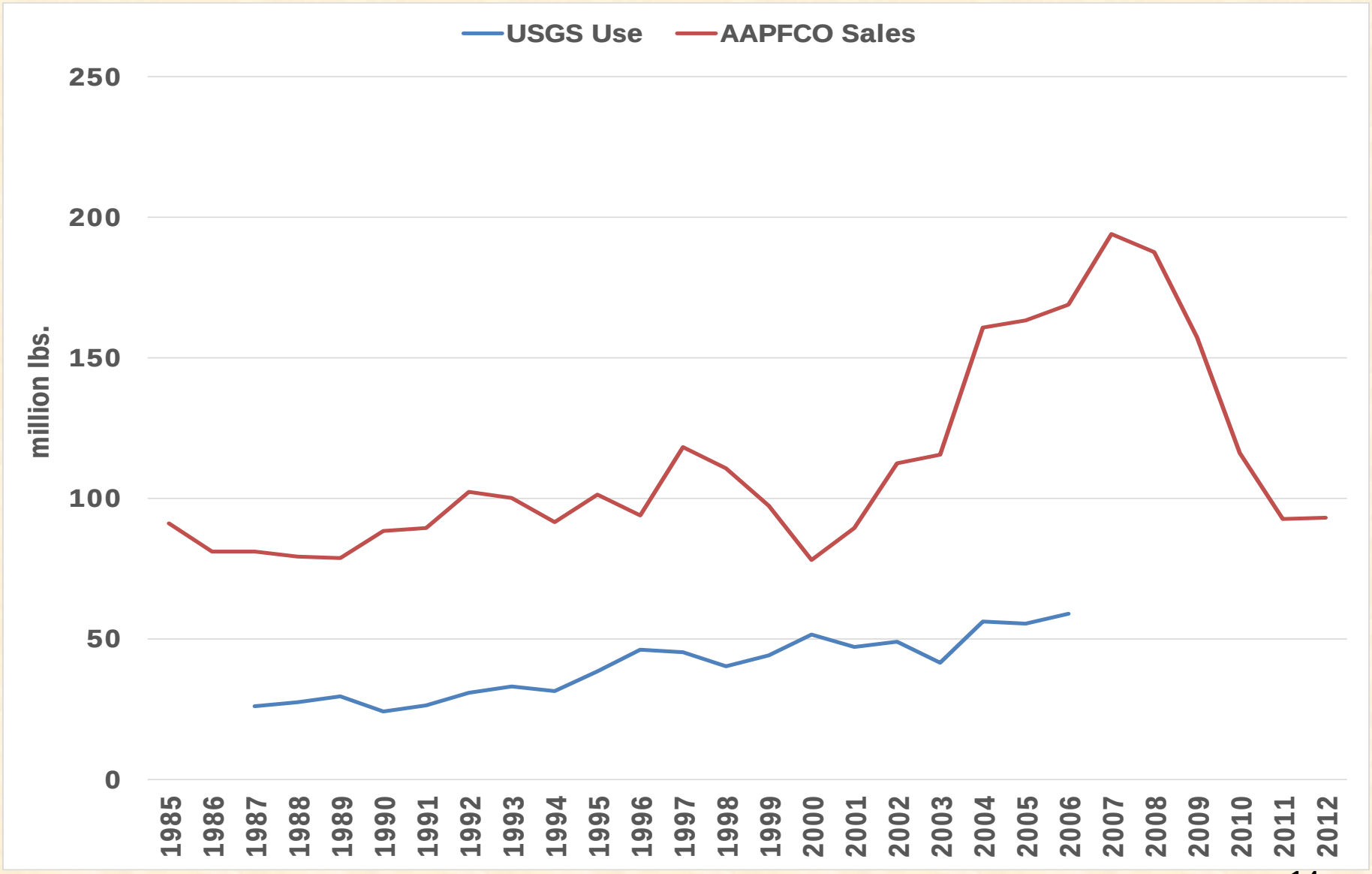
Nitrogen Fertilizer Use

Double Exponential Smoothing Trend



Nitrogen Fertilizer Sales and Use

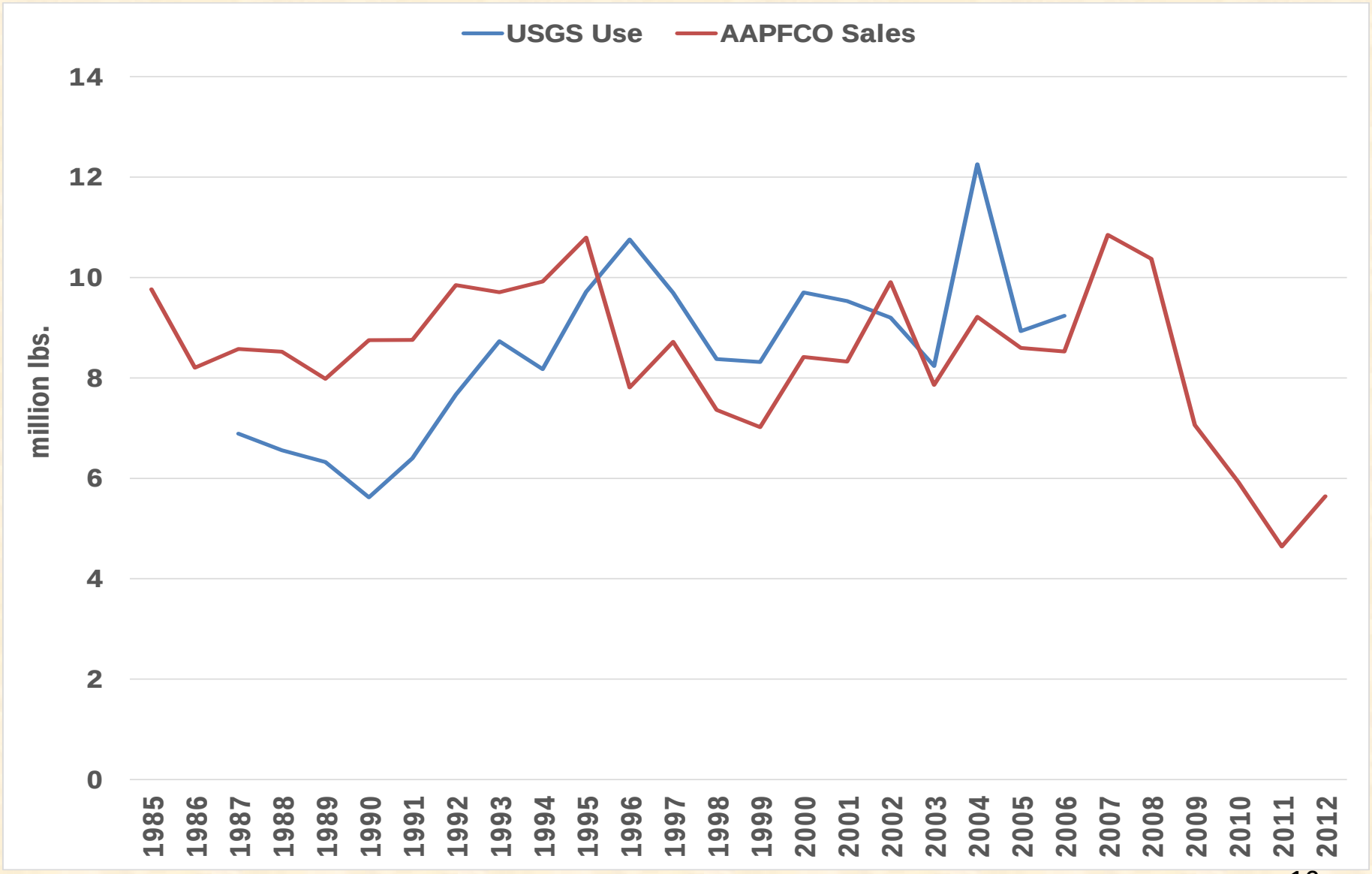
Pounds Annually CB Watershed-Wide



Phosphorus Urban Fertilizer

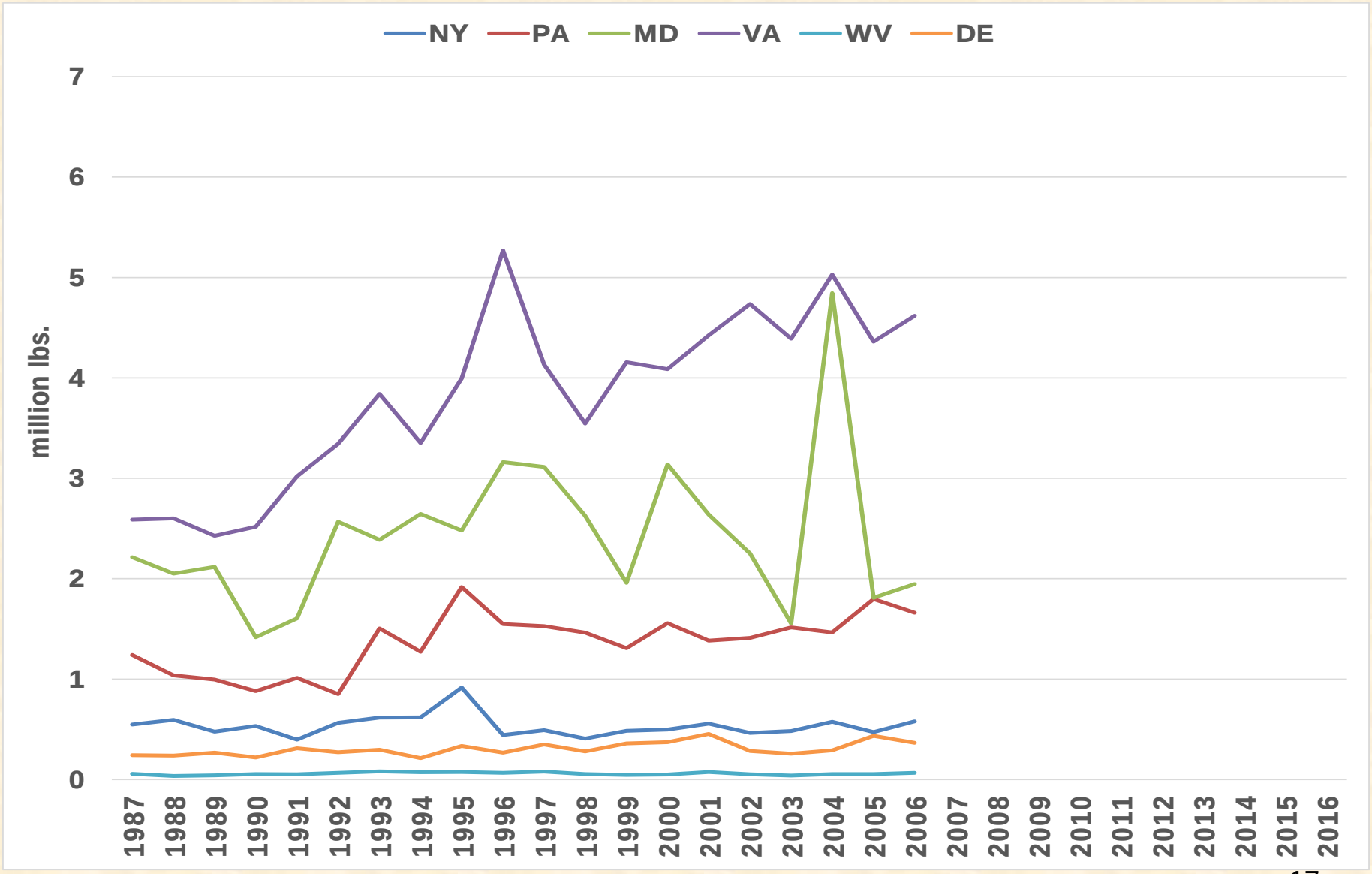
Phosphorus Fertilizer Sales and Use

Pounds Annually CB Watershed-Wide



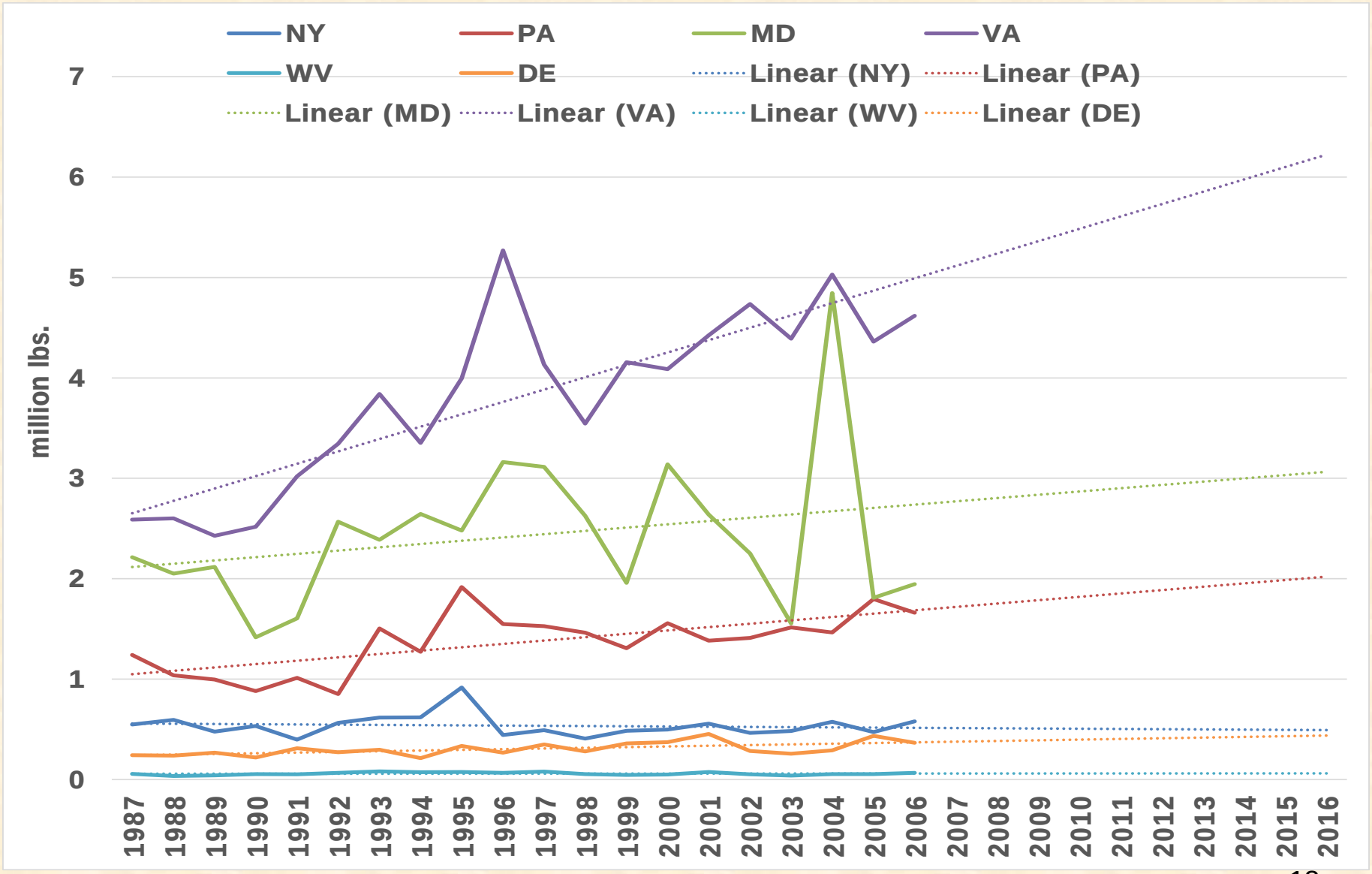
Phosphorus Fertilizer Use

USGS Use Information By State



Phosphorus Fertilizer Use

USGS Use Information – Linear Trend



Phosphorus Fertilizer Use

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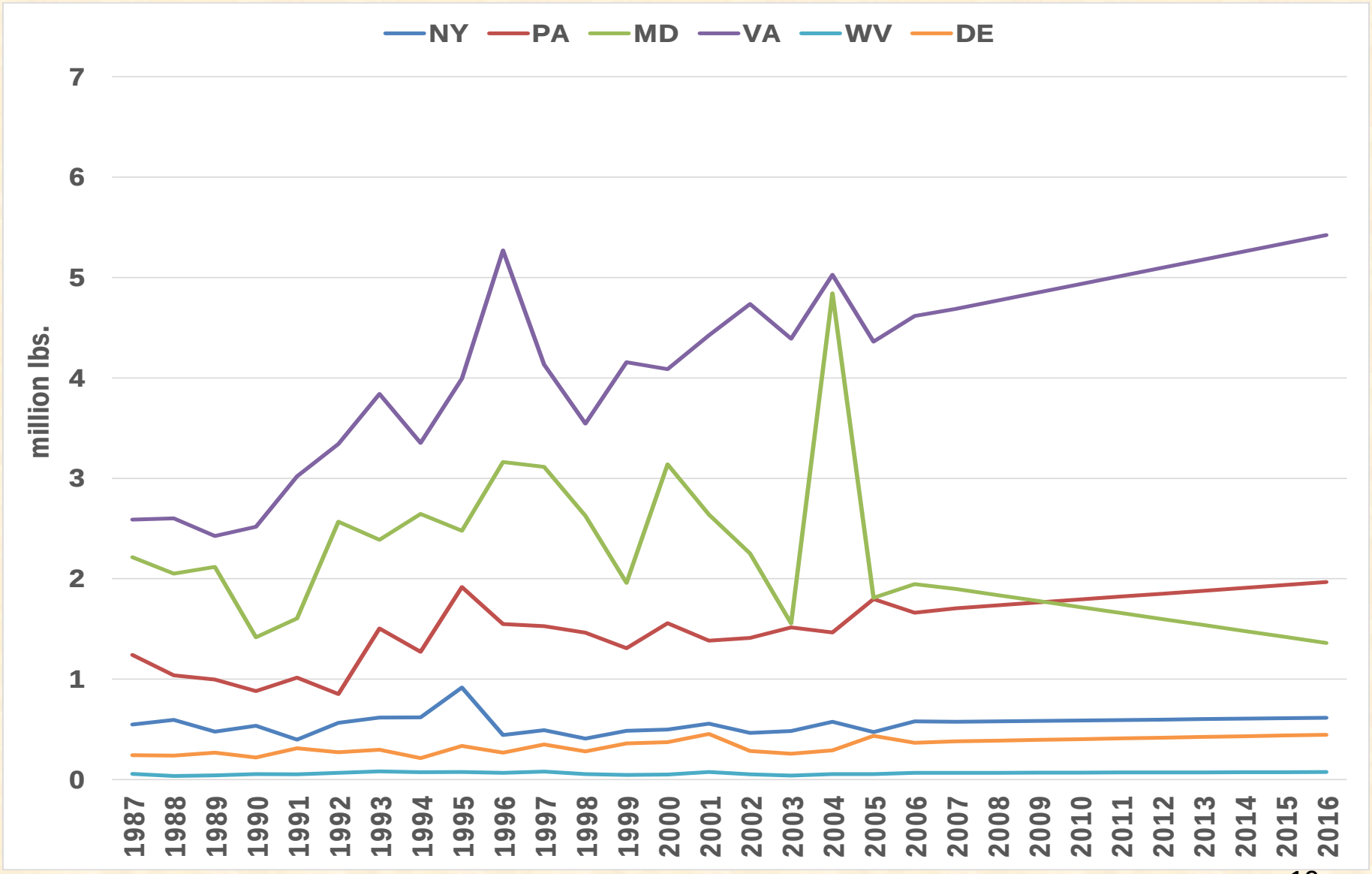

Turfgrass Application Rates
Phase 6

- Two components
  - Fertilizer mass data
  - Pervious urban area data = turfgrass acres
    - Current data and methods
    - High-resolution land cover w/ USGS's Landsat processing center's backcasting methodology for land cover change 1984-2015 annual by end of August, 2016
- Non-farm fertilizer mass ÷ turfgrass acres = turfgrass application rate

Turfgrass Application Rates
Phase 6

- Phase 6 models
  - Need final nutrient applications to turfgrass for model calibration (1985-2013) no later than mid-Sept., 2016
  - How do we forecast application rates for progress scenarios and for planning scenarios, e.g., 2025 WIPs?