Turfgrass Fertilizer
New Data for CAST '19

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Urban Stormwater Workgroup Meeting
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Turfgrass Nutrient Applications

Phase 6 Model

- Methods for the developed sector prescribe a mass of fertilizer nutrients for each state distributed to one "crop" type = turfgrass
  - Methods capture variability among states for rural versus suburban.
  - Using fertilizer data that has other utilities nation-wide

Turfgrass Nutrient Applications

Phase 6 Model

- Source for fertilizer nutrient mass is AAPFCO 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
  - Same source as chemical fertilizer data for agriculture sector

Turfgrass Nutrient Applications

Phase 6 Model

- Two components to the application rates (lbs/acre)
  1) Fertilizer mass
  2) Turfgrass acres
     - For back-cast, high-resolution land cover w/ USGS's Landsat processing center's back-casting methodology for land cover change 1984-2013 annual
     - Land Use Workgroup + CBP office working on land use forecast with new data

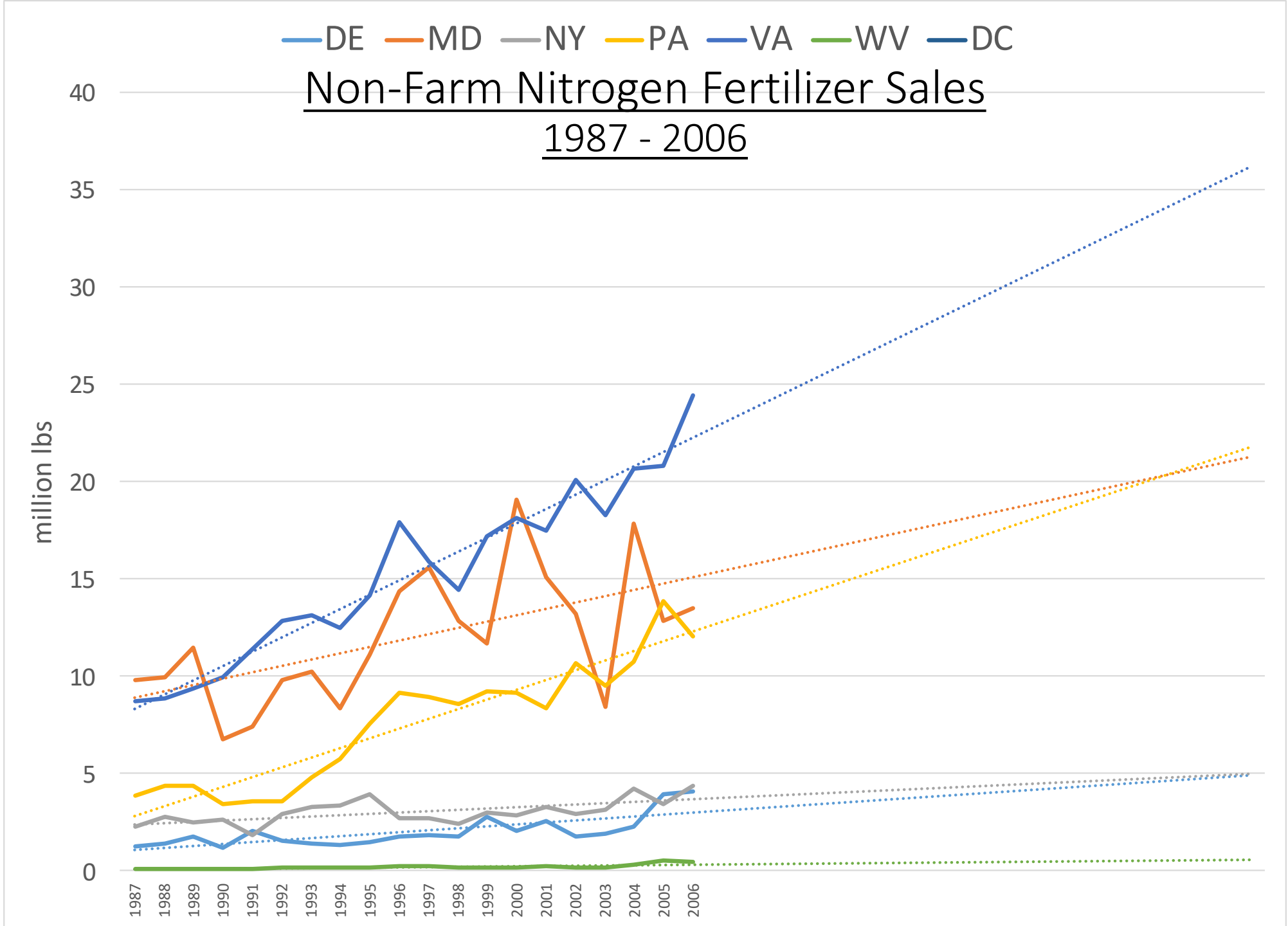
Turfgrass Nutrient Applications

Phase 6 Model

- Additional credit is given for practices that make up nutrient management – depending on high-risk, low-risk, blended
- The USWG approved the methods to vary nutrient application on developed lands for the Phase 6 model by jurisdiction and through time, 6/21/16
  - USWG will review new data at their 9/17/19 meeting

Turfgrass Fertilizer

Nitrogen


DE
MD
NY
PA
VA
WV
DC
Non-Farm Nitrogen Fertilizer Sales
1987 - 2006
million lbs
40
35
30
25
20
15
10
5
0
1987
1988
1989
1990
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1994
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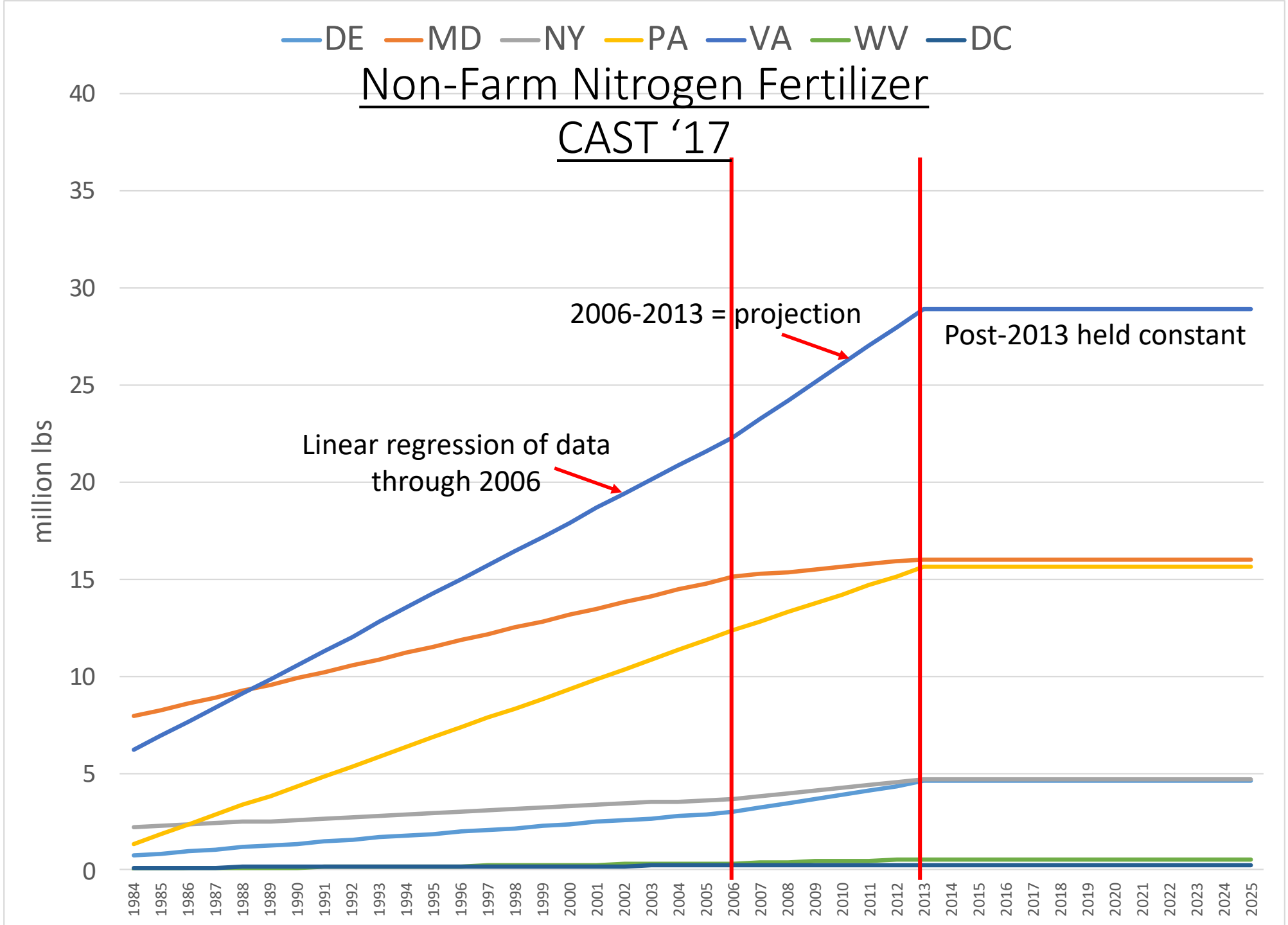
DE
MD
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Non-Farm Nitrogen Fertilizer
CAST '17
2006-2013 = projection
Post-2013 held constant
Linear regression of data through 2006
million lbs
0
5
10
15
20
25
30
35
40
1984
1985
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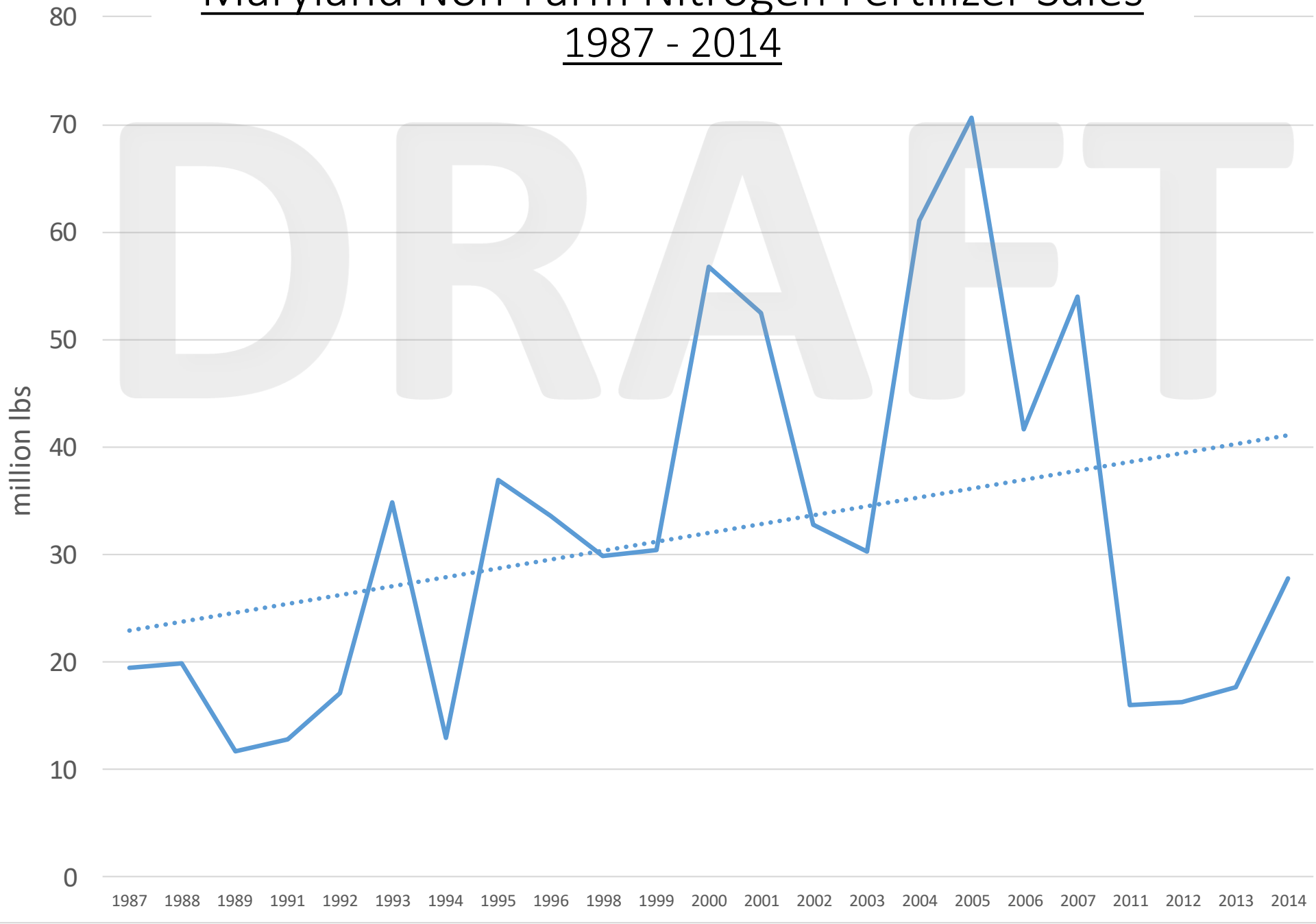
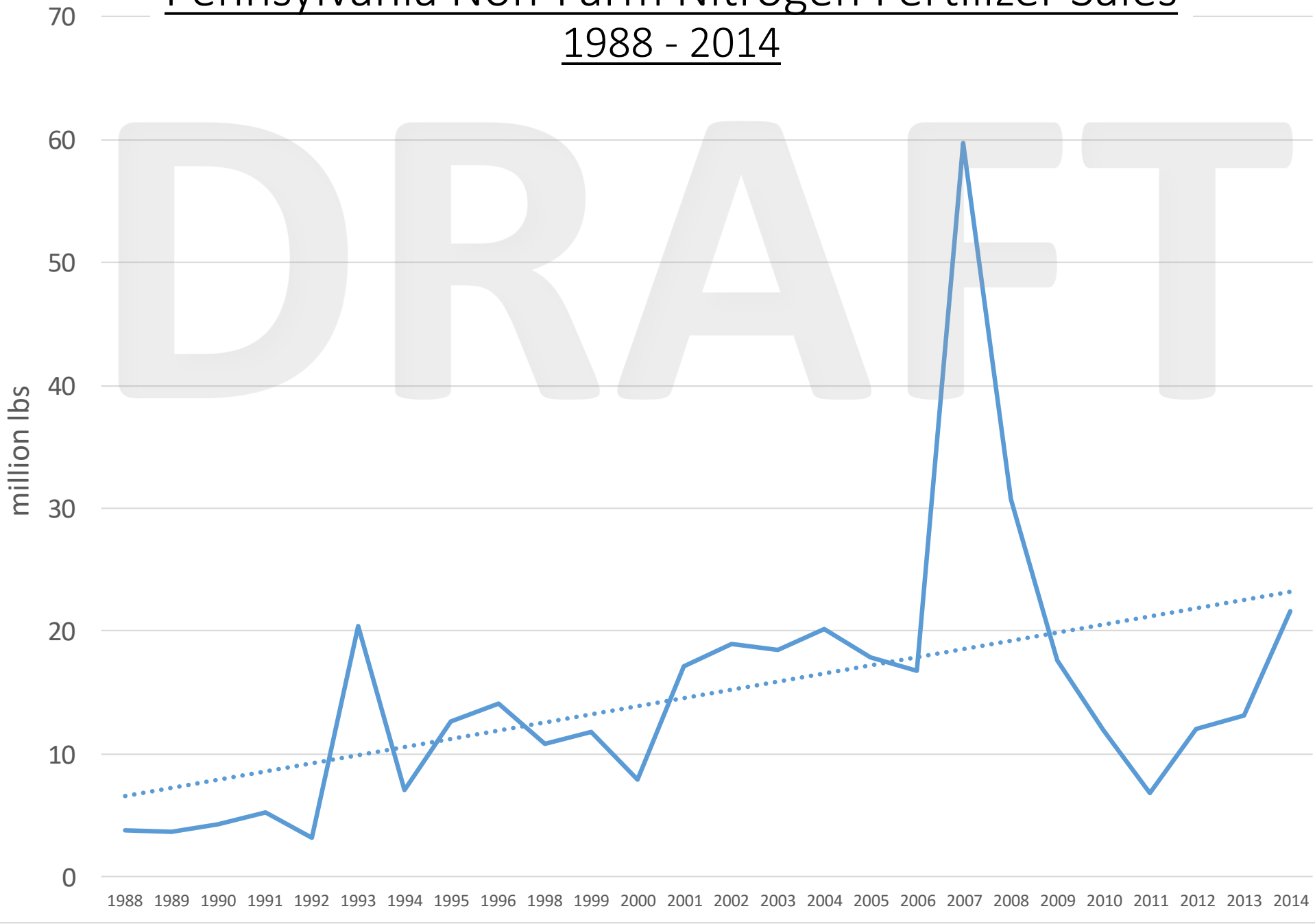
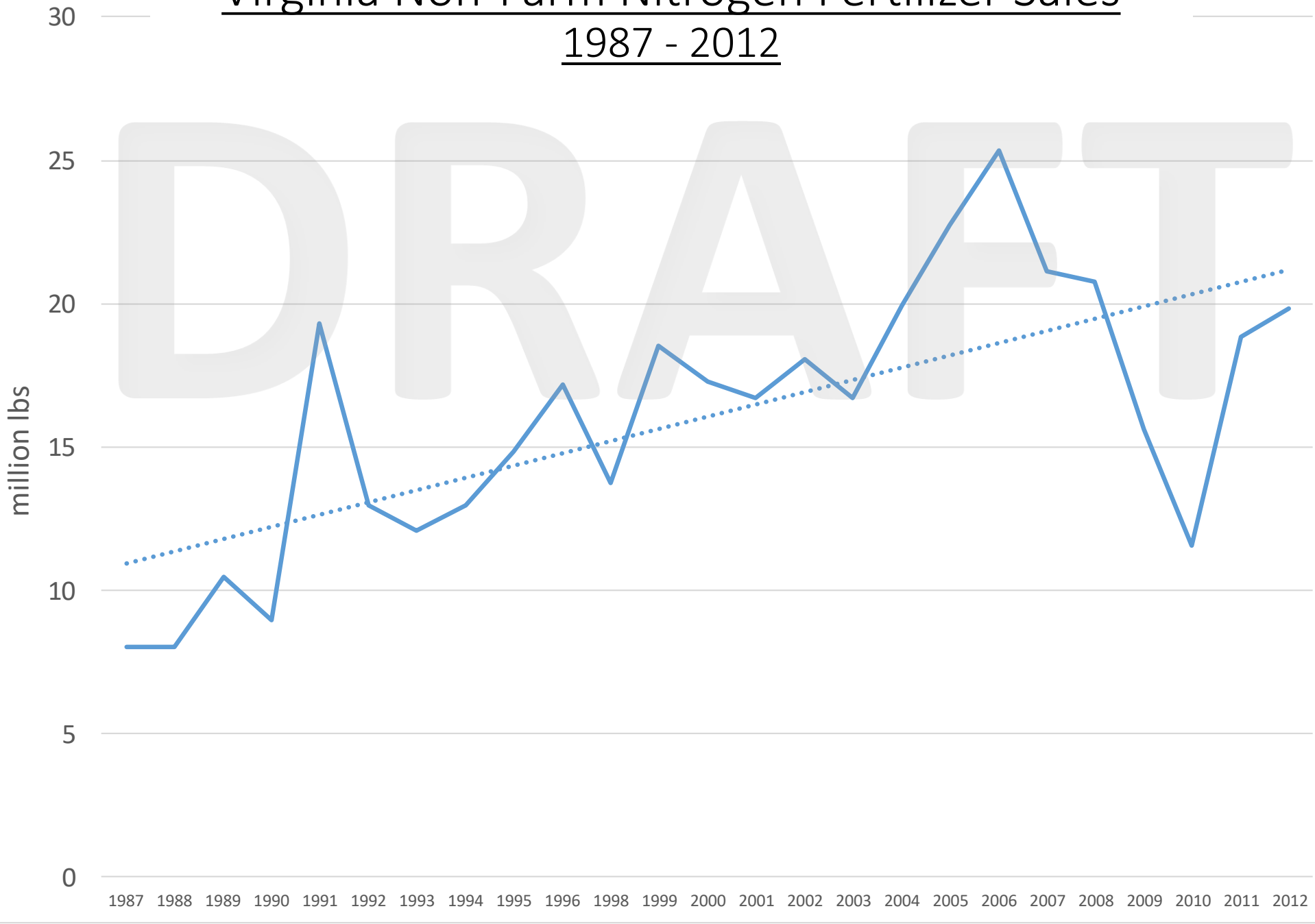
Maryland Non-Farm Nitrogen Fertilizer Sales
1987 - 2014



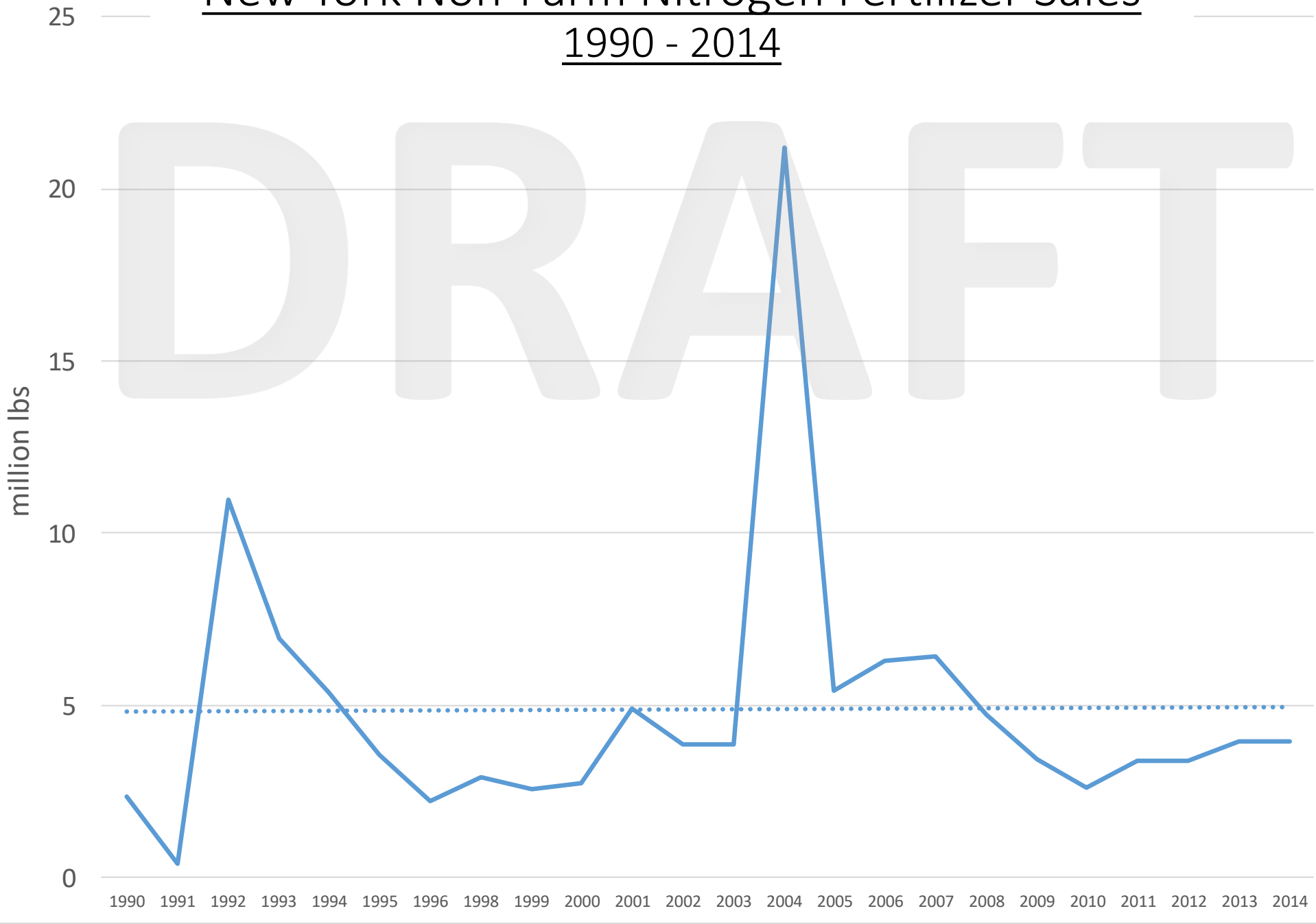
Pennsylvania Non-Farm Nitrogen Fertilizer Sales
1988 - 2014



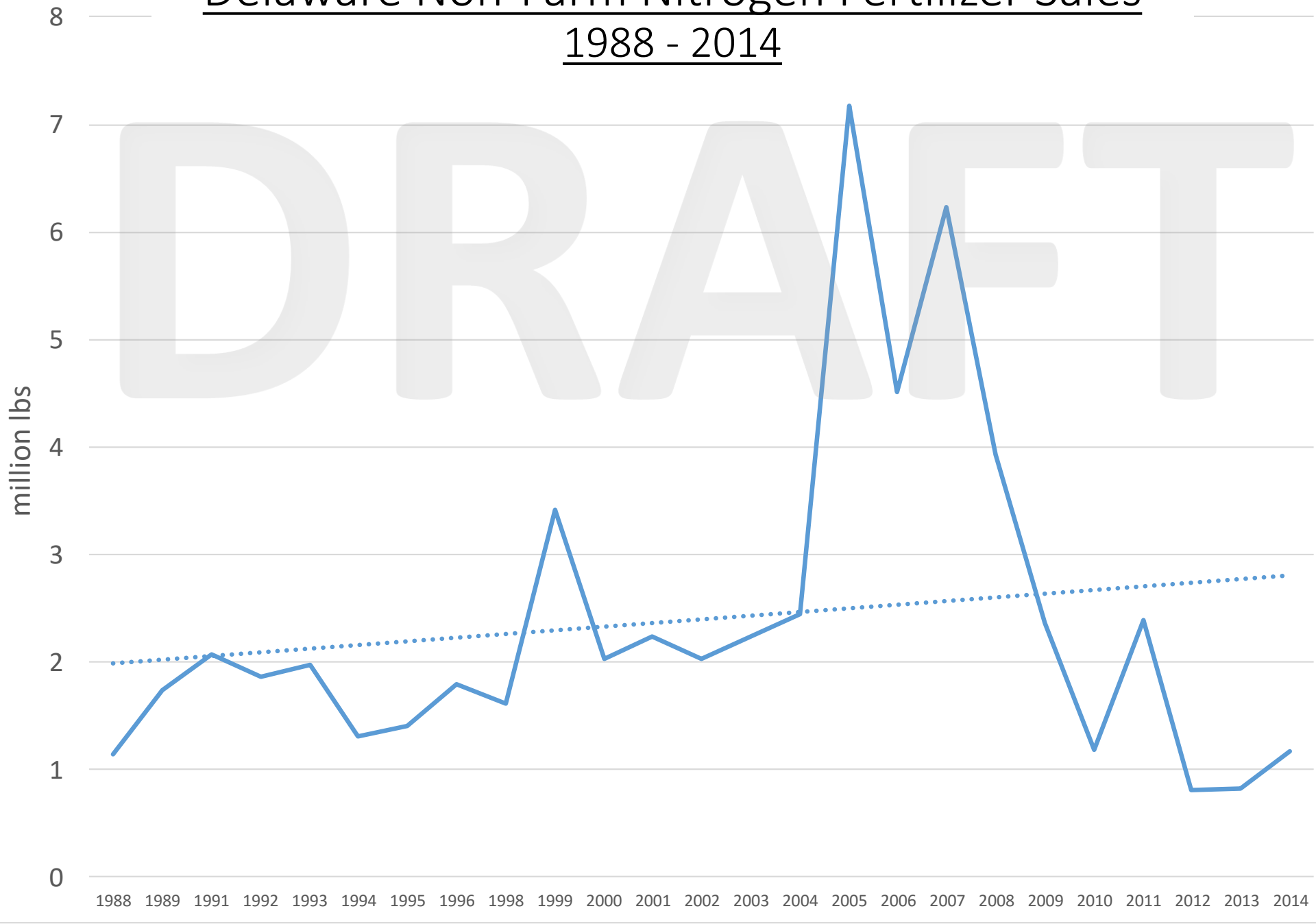
Virginia Non-Farm Nitrogen Fertilizer Sales
1987 - 2012



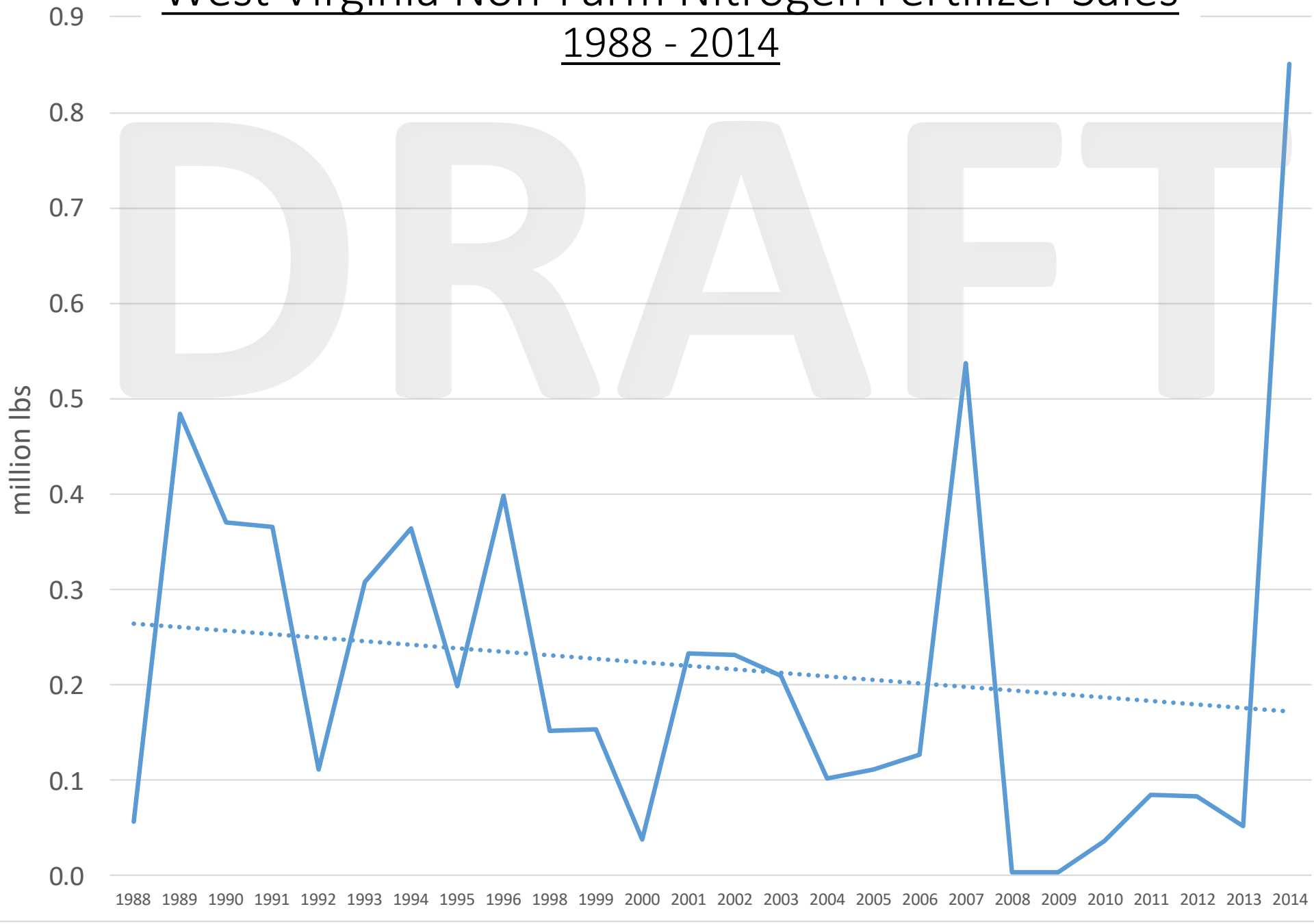
New York Non-Farm Nitrogen Fertilizer Sales
1990 - 2014



Delaware Non-Farm Nitrogen Fertilizer Sales
1988 - 2014

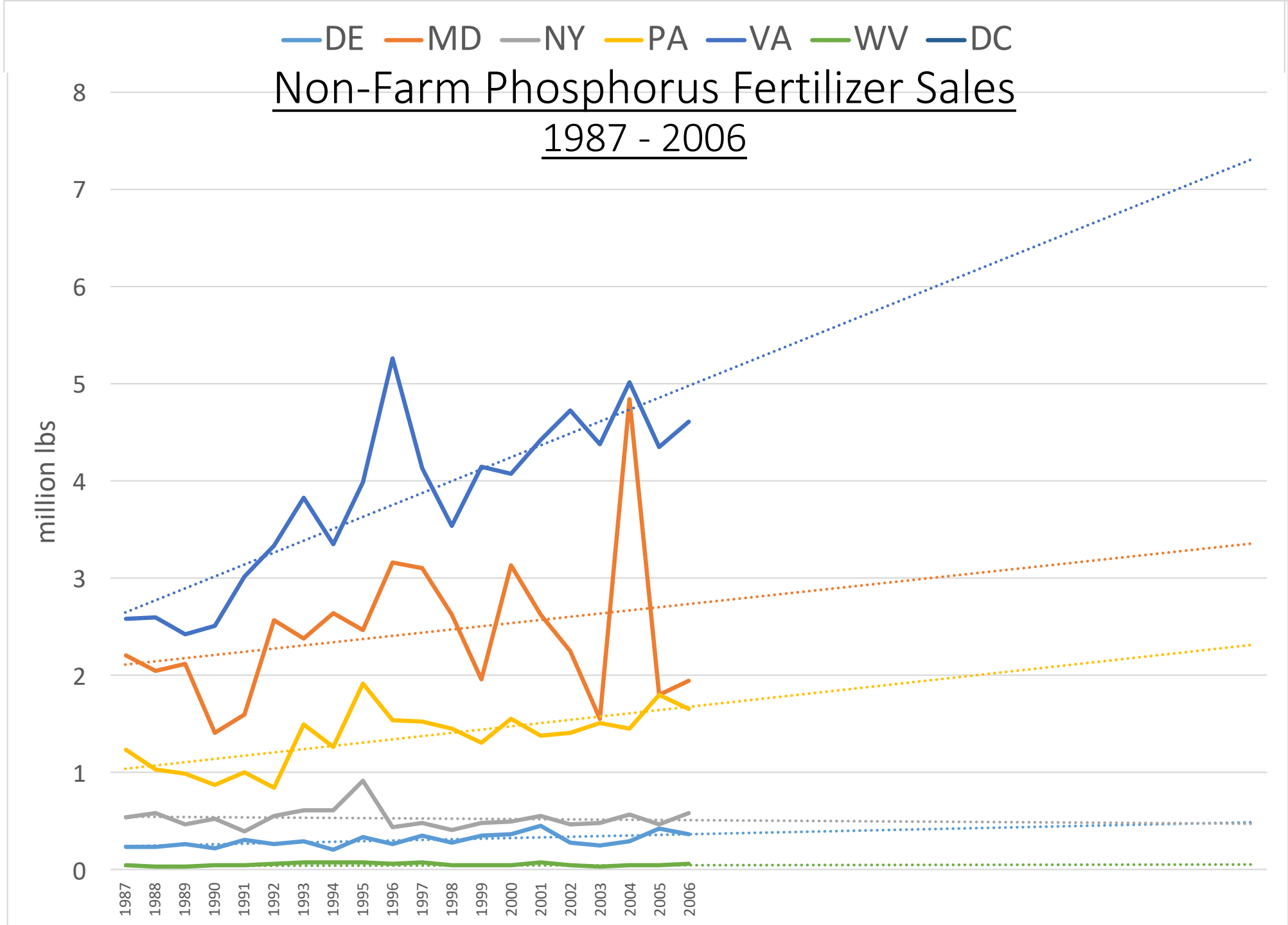


West Virginia Non-Farm Nitrogen Fertilizer Sales
1988 - 2014



Turfgrass Fertilizer

Phosphorus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1987 - 2006
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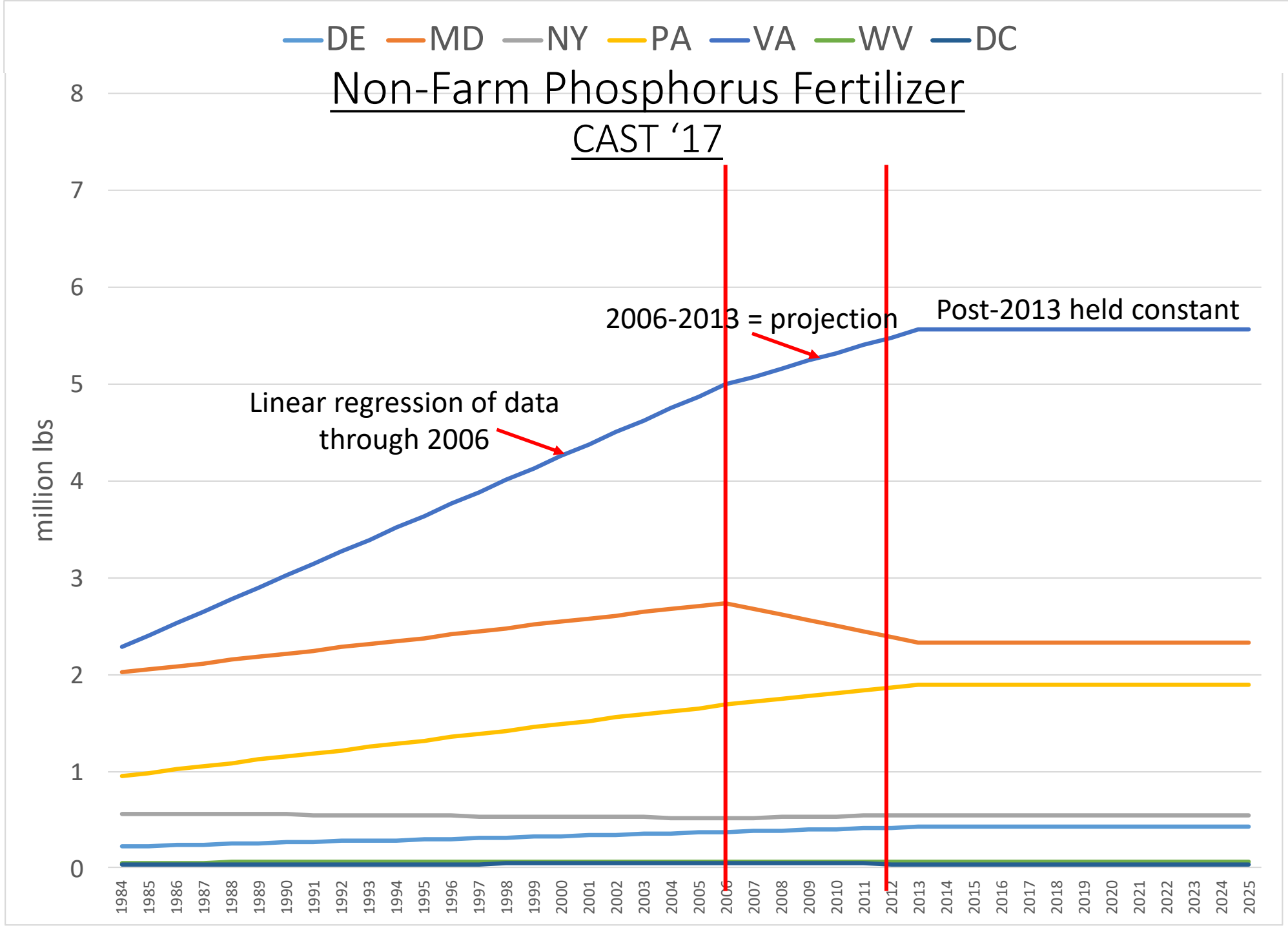
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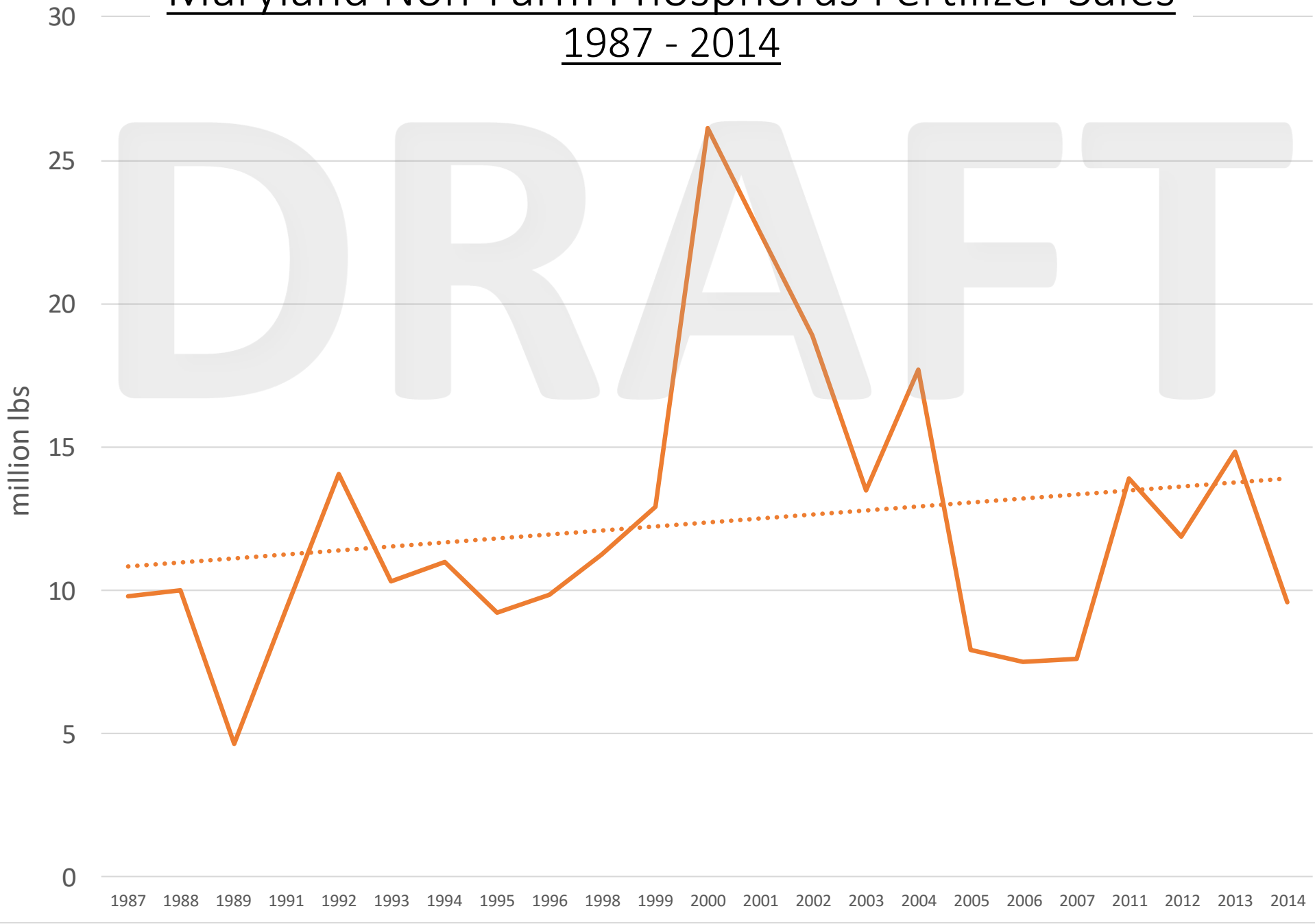

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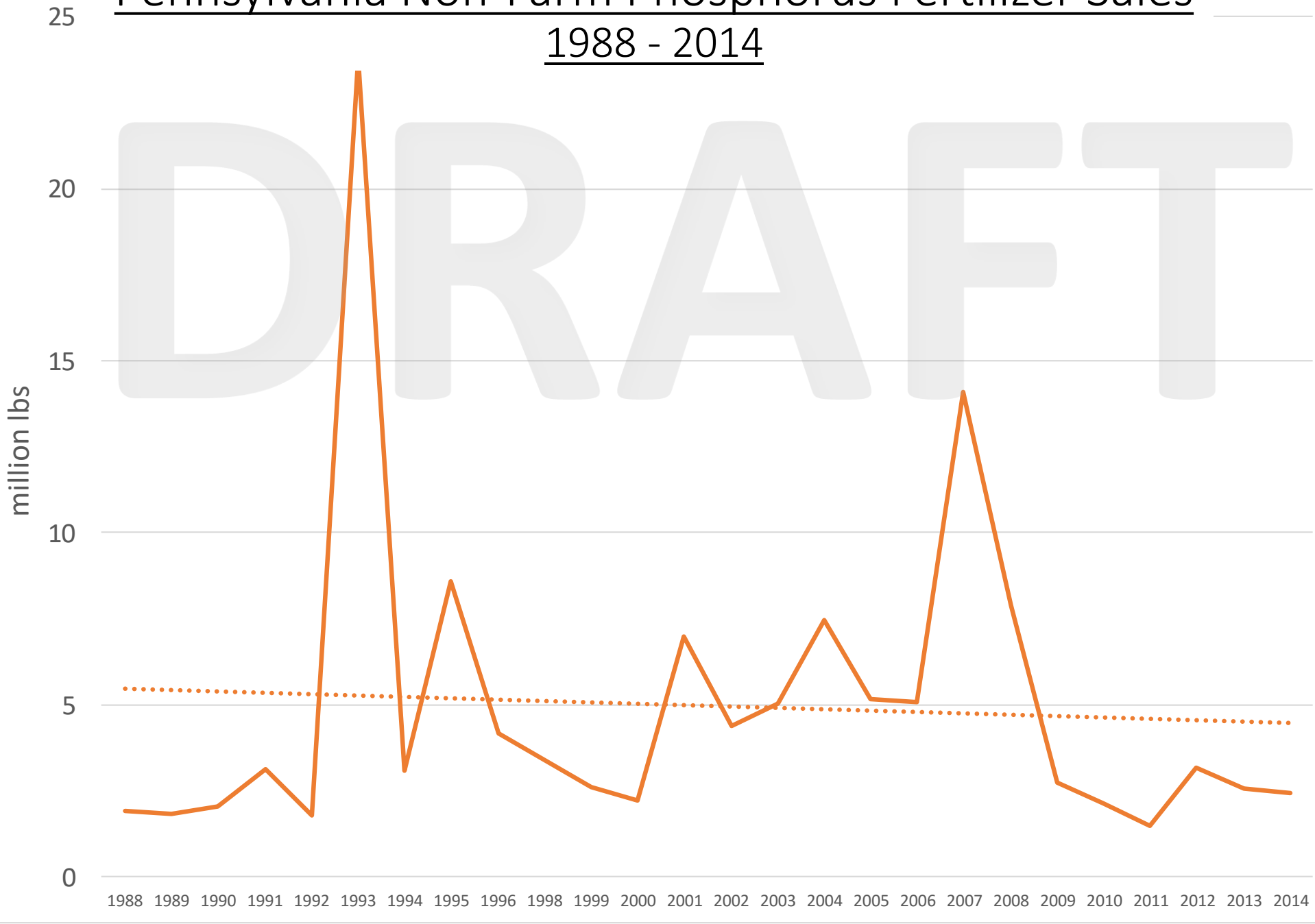

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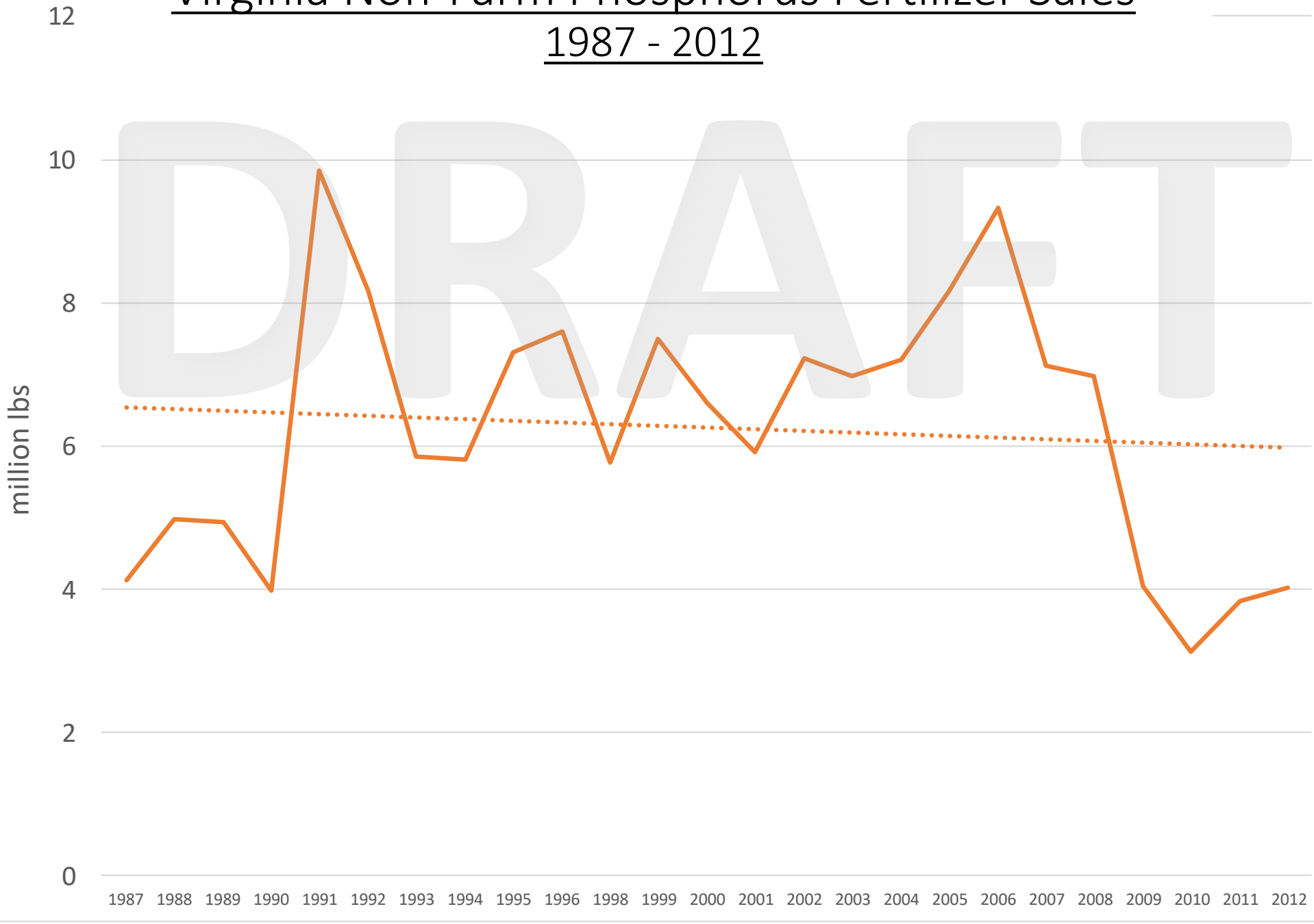

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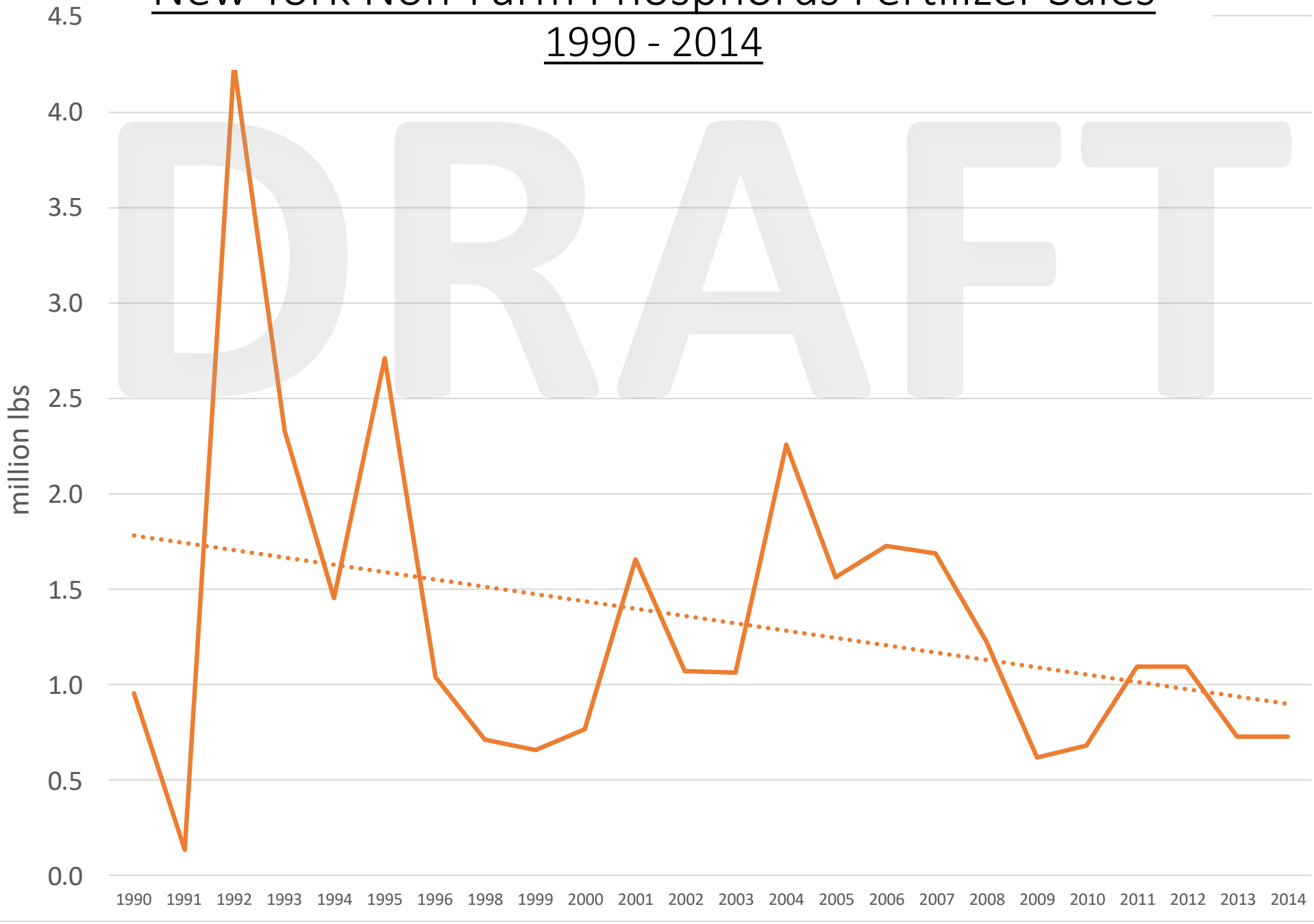
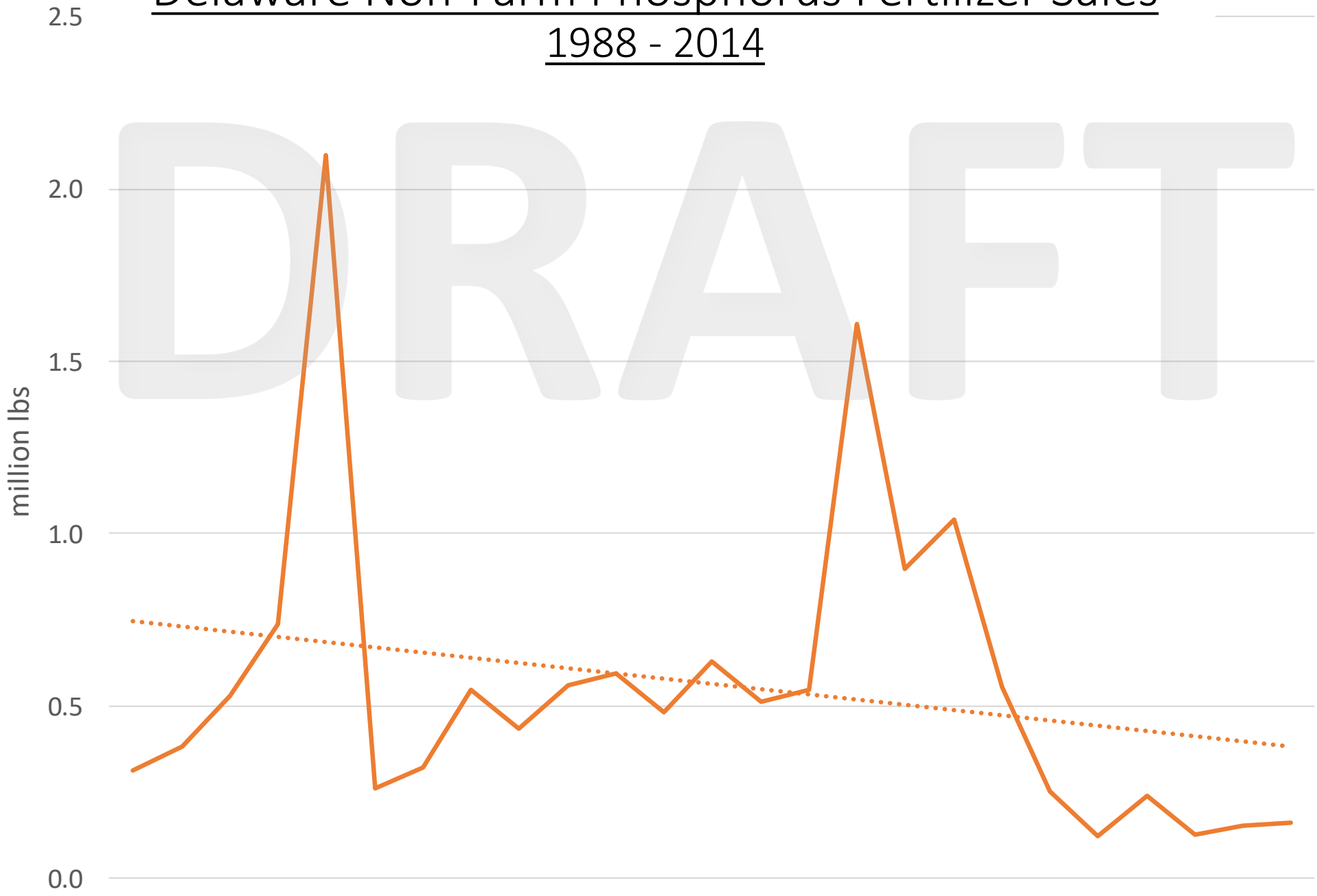
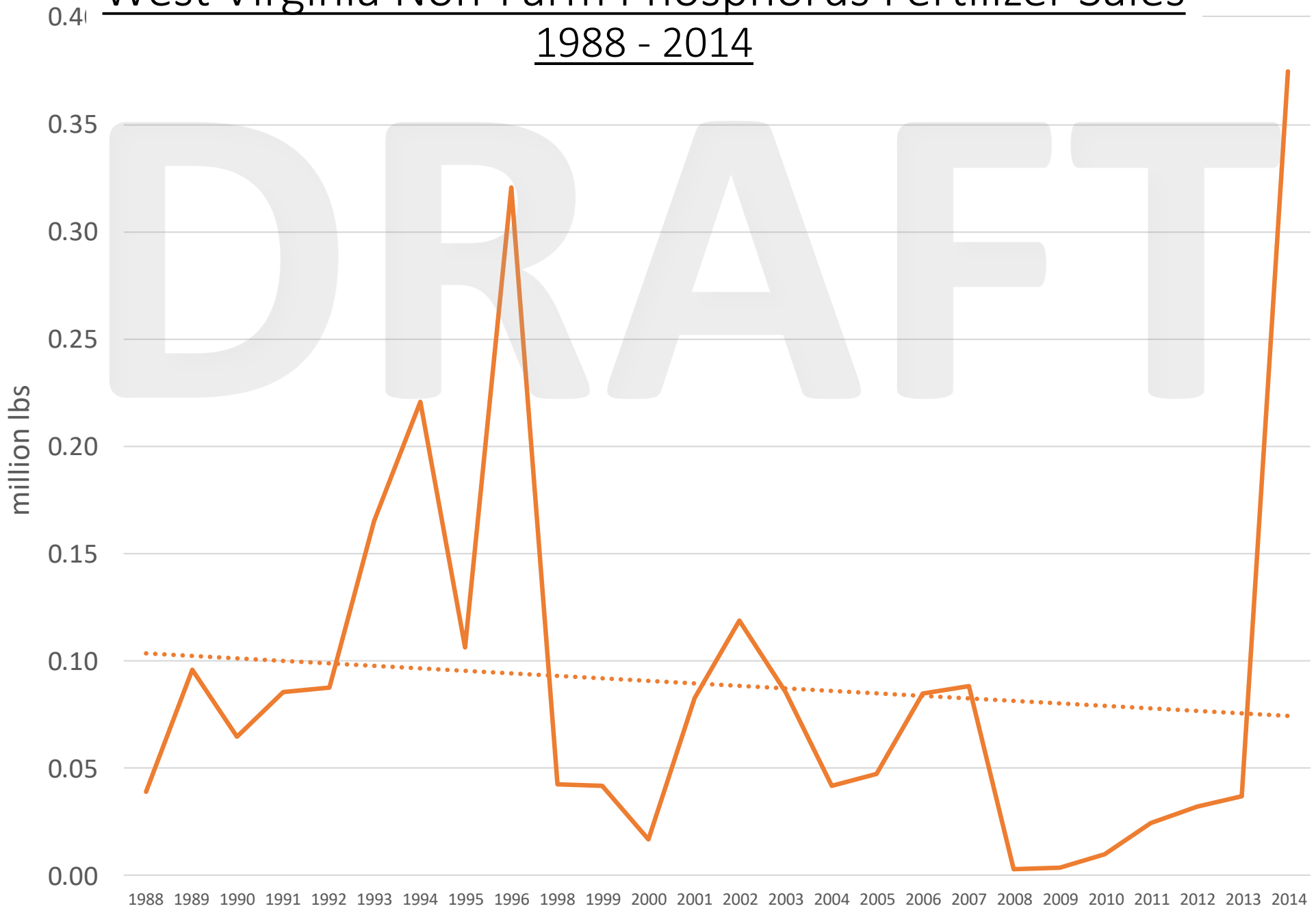


Delaware Non-Farm Phosphorus Fertilizer Sales
1988 - 2014



West Virginia Non-Farm Phosphorus Fertilizer Sales 1988 - 2014



Turfgrass Nutrient Applications

Phase 6 Model

- Urban Stormwater Workgroup will decide what trend to use that incorporates the new fertilizer data.

Turfgrass Nutrient Applications

Phase 6 Model

Changes in application rates over time (as an impact of nutrient management) would be captured by sales data.

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

Must be an actual plan or homeowner pledge

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

Turfgrass Nutrient Applications

Phase 6 Model

- Increasing nutrient mass on turfgrass does not necessarily mean increasing loads.
- Load changes primarily depend on the relationship of the rate of change of nutrient mass to the rate of change of the turfgrass acres.

Turfgrass Nutrient Applications

From K. Berger

2) What would be the TN and TP fertilizer application rates under the proposed revisions to the AAPFCO state data?

Turfgrass Nutrient Applications

From K. Berger

1) What are the TN and TP fertilizer application rates under the current set of AAPFCO state data? These were set in the Phase 6 model on a state-by-state basis, with each county in a state having the same application rates. (We calculated the VA, MD and DC rates below.)

Jurisdiction	2018 Turfgrass Acres	2018 Urban Fertilizer N Lbs Applied	2018 N Lb/Acre	2018 Urban Fertilizer P Lbs Applied	2018 P Lb/Acre
District of Columbia, DC	11612.05	248210.74	21.38	42553.70	3.66
Charles, MD	30622.03	570113.62	18.62	82620.84	2.70
Frederick, MD	58395.86	1087200.37	18.62	157557.02	2.70
Montgomery, MD	86911.44	1618096.71	18.62	234494.48	2.70
Prince Georges, MD	77496.38	1442809.26	18.62	209091.84	2.70
Alexandria, VA	3169.77	68171.26	21.51	13108.53	4.14
Arlington, VA	5846.87	125746.62	21.51	24179.60	4.14
Fairfax City, VA	1562.23	33598.33	21.51	6460.56	4.14
Fairfax, VA	77172.91	1659731.49	21.51	319146.88	4.14
Falls Church City, VA	463.31	9964.19	21.51	1916.00	4.14
Loudoun, VA	57788.22	1242831.57	21.51	238981.92	4.14
Manassas City, VA	3213.27	69106.61	21.51	13288.39	4.14
Manassas Park City, VA	766.63	16487.57	21.51	3170.37	4.14
Prince William, VA	42635.08	916938.17	21.51	176316.45	4.14

Turfgrass Nutrient Applications

From K. Berger

3) What are the sensitivities to TN and TP urban fertilizer application in the model?

The sensitivity to TN urban fertilizer is relatively low (about 0.06), which means even relatively large changes in pounds applied will have a small impact on estimated urban loads. The sensitivity to TP urban fertilizer is somewhat higher (0.20 – 0.25), which would mean changes to the TP application rate would have a bigger impact.

Water Quality Standards Attainment