



# Urban Fertilizer Application Rates Phase 6 Modeling

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Urban Stormwater Workgroup Meeting  
February 20, 2018



# Turfgrass Application Rates

## USWG Agenda

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### 11:30 Urban Nutrient Management Update (Jeff Sweeney, EPA)

- Jeff will discuss how the new urban nutrient application method in Phase 6 impacts the Urban Nutrient Management BMP.
- The USWG will then discuss a proposed approach to help states plan for nutrient reductions from new fertilizer legislation.



# Turfgrass Application Rates

## Phase 6 Model

Summary of Urban Fertilizer Management Credits for Phosphorus and Nitrogen			
<b>Nutrient</b>	<i>Statewide with P fertilizer legislation</i>	<i>Statewide without P fertilizer legislation</i>	<i>Urban Nutrient Management UNM<sup>2</sup></i>
<b>Phosphorus</b>	25%	20%	Low risk: 3% High risk: 10% Blended: 4.5%
<b>Notes &amp; Conditions of Credit</b>	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
<b>Nitrogen</b>	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%
<b>Notes &amp; Conditions of Credit</b>	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





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**Must be an actual plan or homeowner pledge**



# Turfgrass Application Rates

## Core Urban Nutrient Management Practices

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### Ten core lawn care practices that minimize the risk of N and P export

(States may modify individual practices to meet unique terrain and conditions as long as they document the nutrient reduction benefit):

- 1) Maintenance of dense cover of grass or conservation landscaping to reduce runoff, prevent erosion, and retain nutrients;
- 2) Reduction or elimination of fertilizer through choosing not to fertilize OR reducing application in areas of low need OR applying less than one pound of total nitrogen per 1,000 square feet;
- 3) Prohibition of application before spring “green up” and after the grass becomes dormant;
- 4) Use of slow release nitrogen fertilizers;
- 5) Sweeping of fertilizer off of impervious surfaces;
- 6) Prohibition of fertilizer application within 15 to 20 feet of any water feature, and management of the prohibited zone as a grass, meadow or forest buffer;
- 7) Recycling of clippings and mulched leaves on the lawn to keep them out of streets and storm drains;
- 8) Minimum mowing height of 3 inches;
- 9) Use of other practices to increase the porosity and infiltration capability of your lawn to treat stormwater; and
- 10) Consultation with local extension service office or lawn care company to receive advice, including, but not limited to, soil test analyses.



# Turfgrass Application Rates

## Phase 6 Model

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

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- USGS uses 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.
  - 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

## Phase 6 Model

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- Method captures variability among states for rural versus suburban.
- Using data that has other utilities nation-wide
- 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

## Phase 6 Model

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- Jurisdiction's concerns:
  - A lot of unexplained variation in the data
  - Regression lines are an oversimplification of what is occurring and does not capture the short-term variations
    - USGS "use" data is better; USGS methods for National Water-Quality Assessment program for period 1987-2006

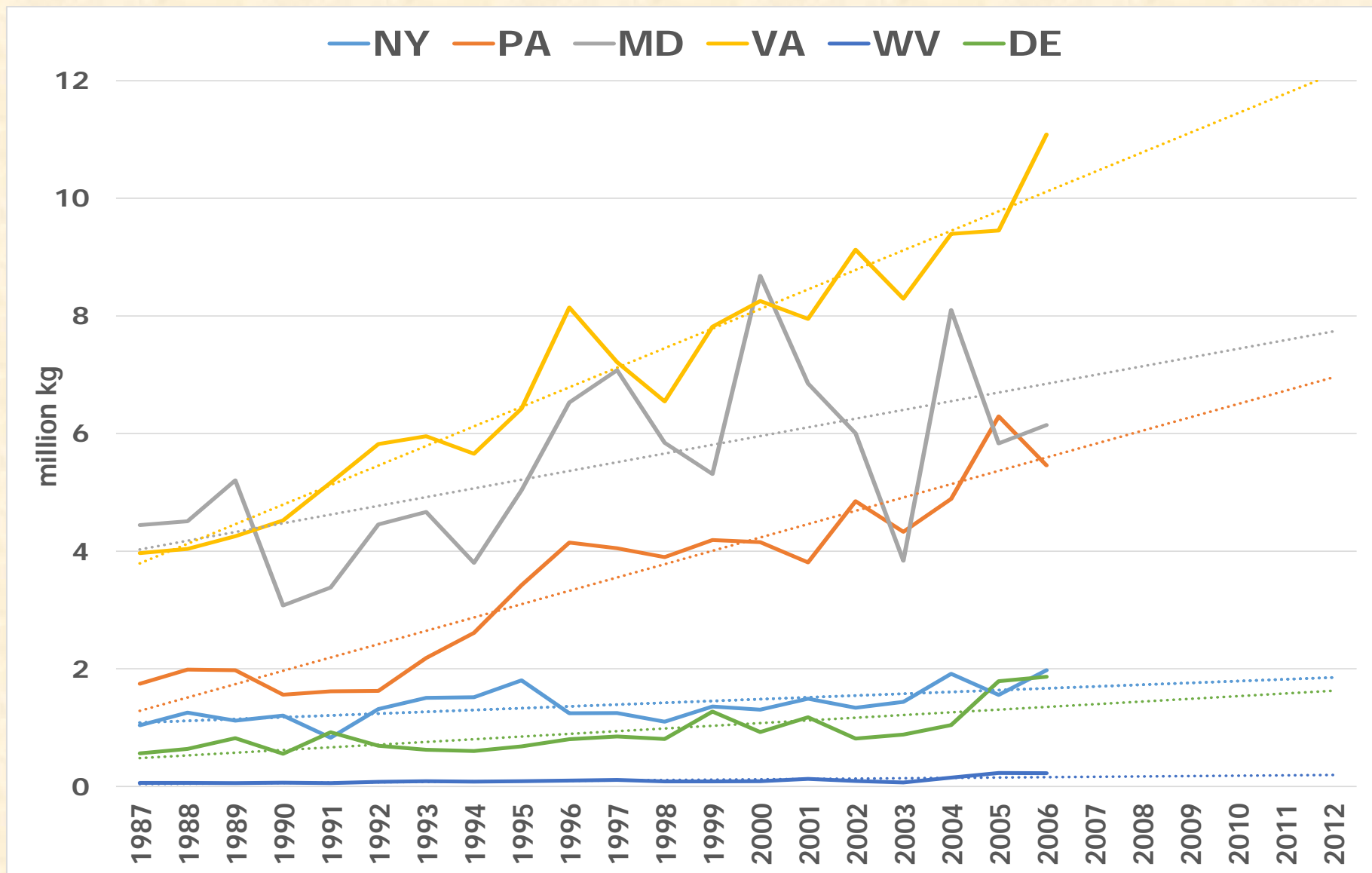


# Nitrogen Urban Fertilizer



# Nitrogen Fertilizer Use through 2006

## kg Annually by State





# Turfgrass Application Rates

## Phase 6

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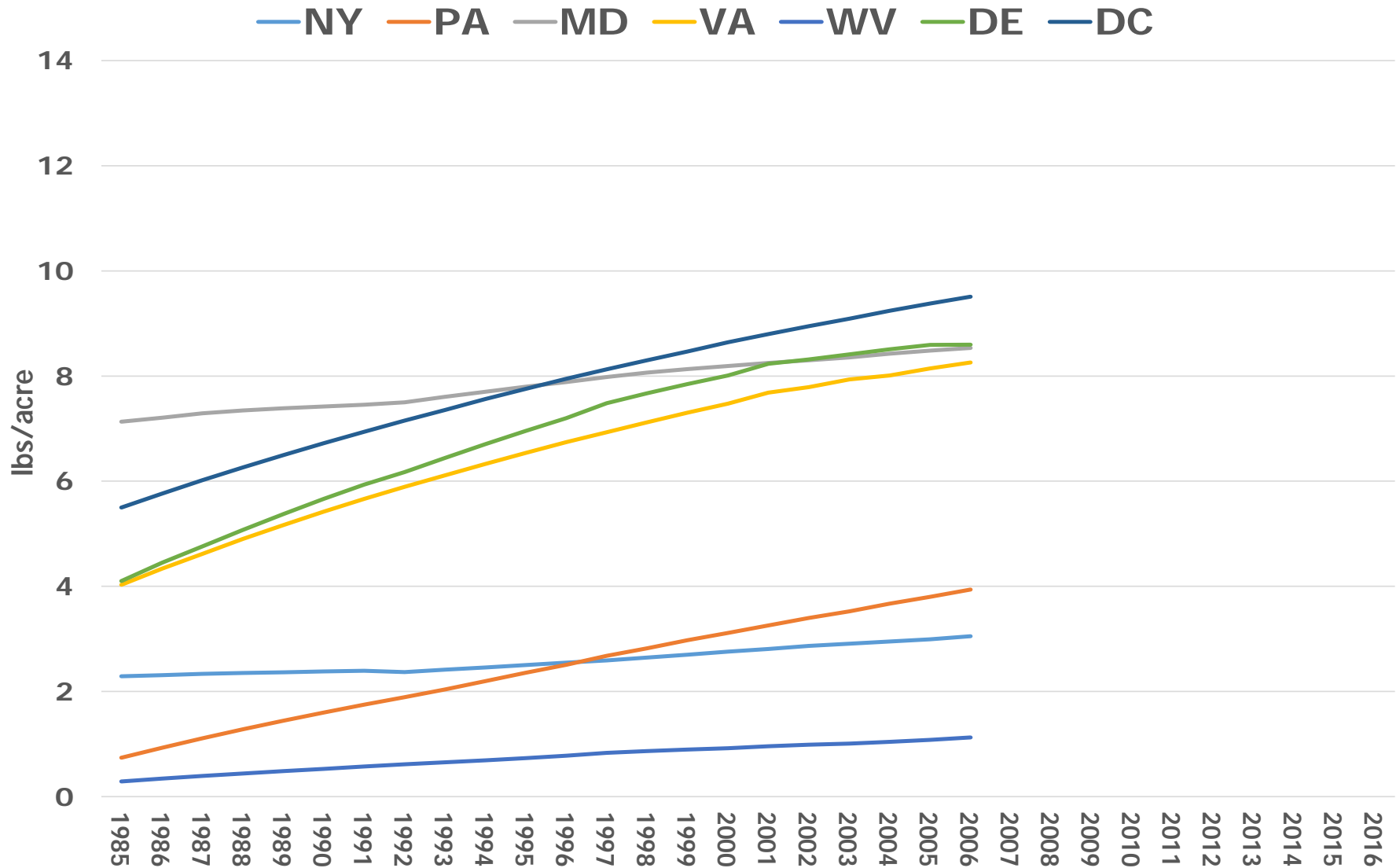
- Two components:
  - Fertilizer mass data
  - Pervious urban area data = turfgrass acres
    - High-resolution land cover w/ USGS's Landsat processing center's back-casting methodology for land cover change 1984-2013 annual
- $\text{Non-farm fertilizer mass} \div \text{turfgrass acres} = \text{turfgrass application rate}$





# Nitrogen Application Rates through 2006

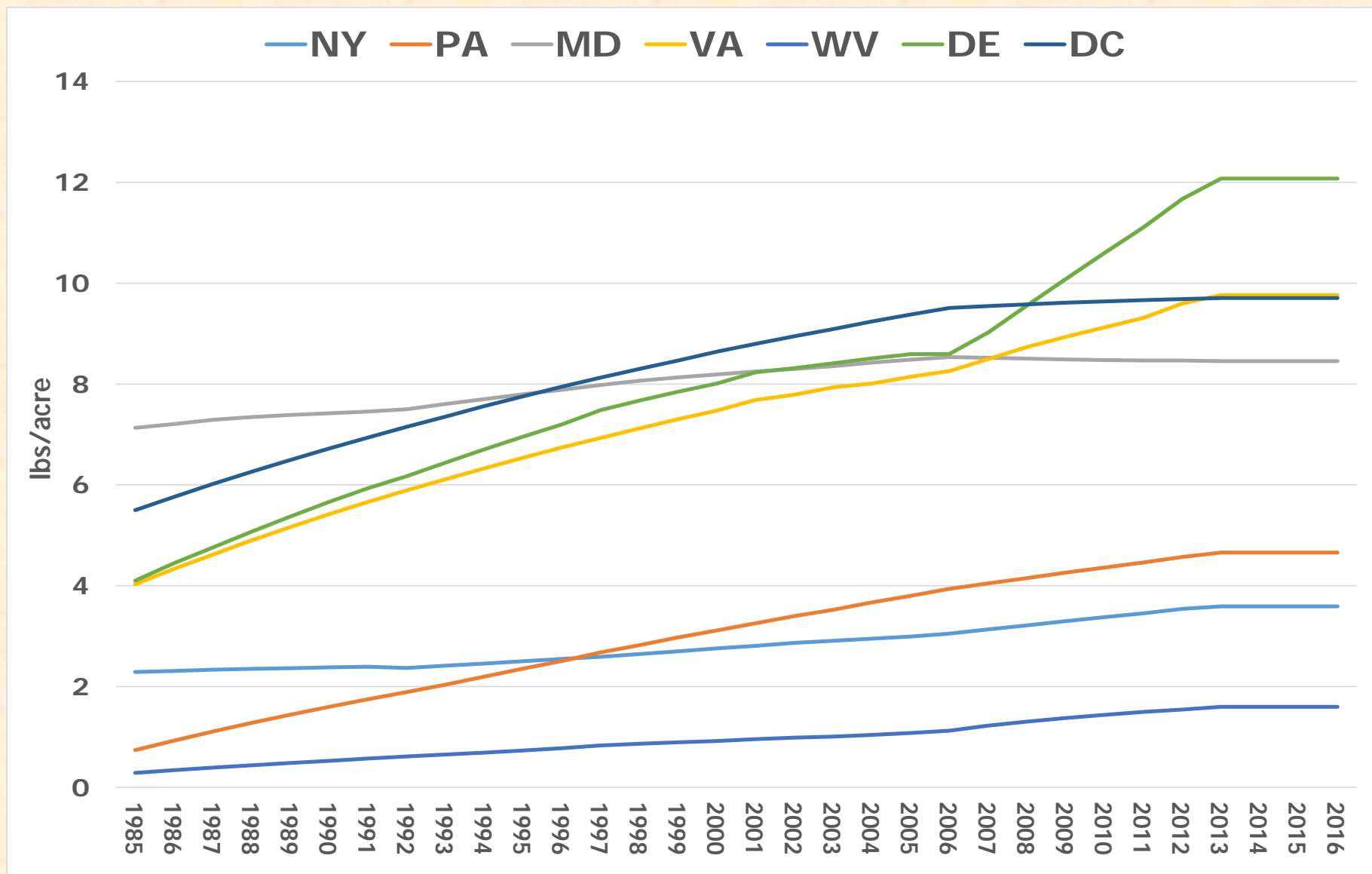
## lbs/acre by State





# Nitrogen Application Rates through 2012

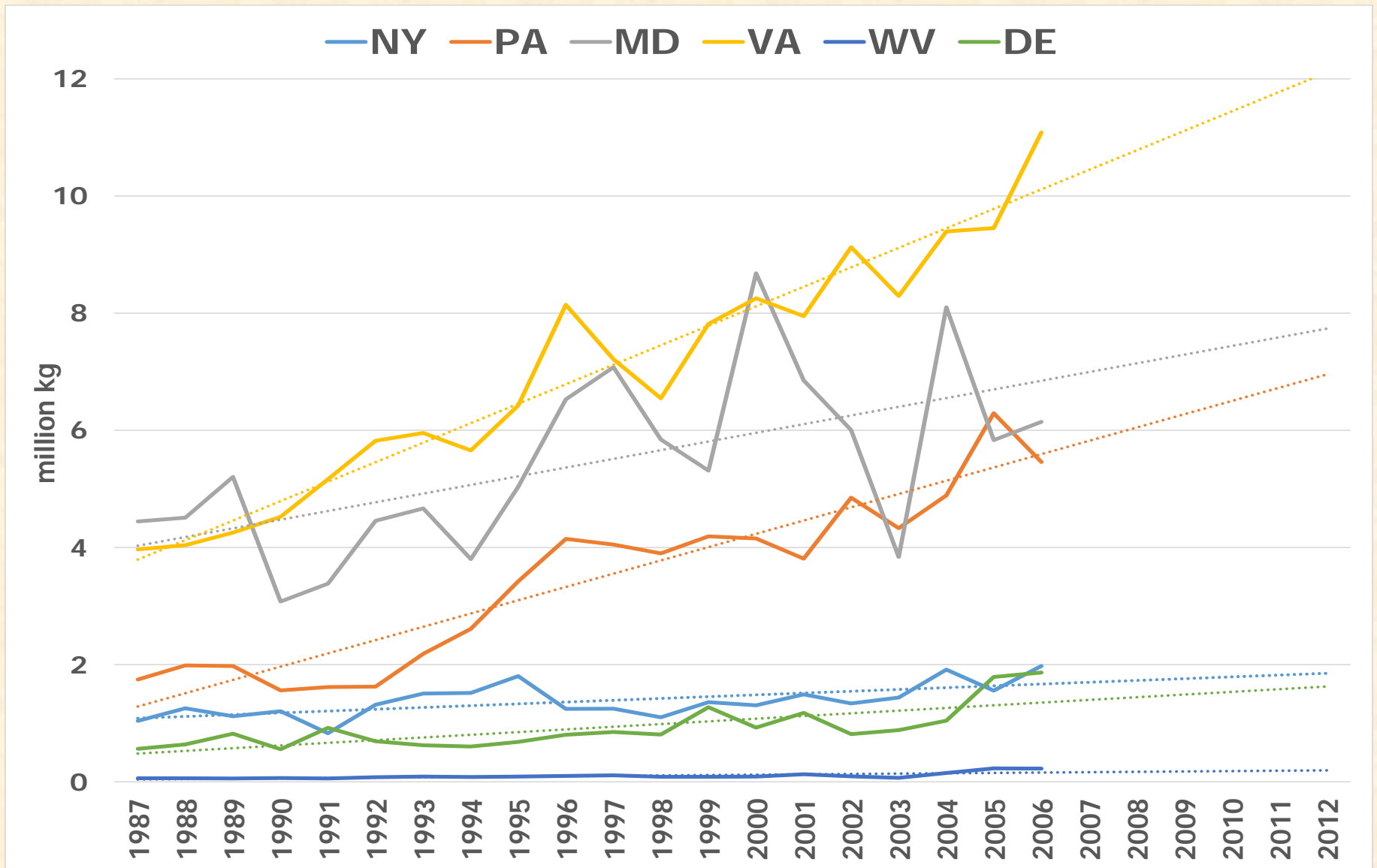
## lbs/acre with [DES] Projection





# Nitrogen Fertilizer Use through 2006

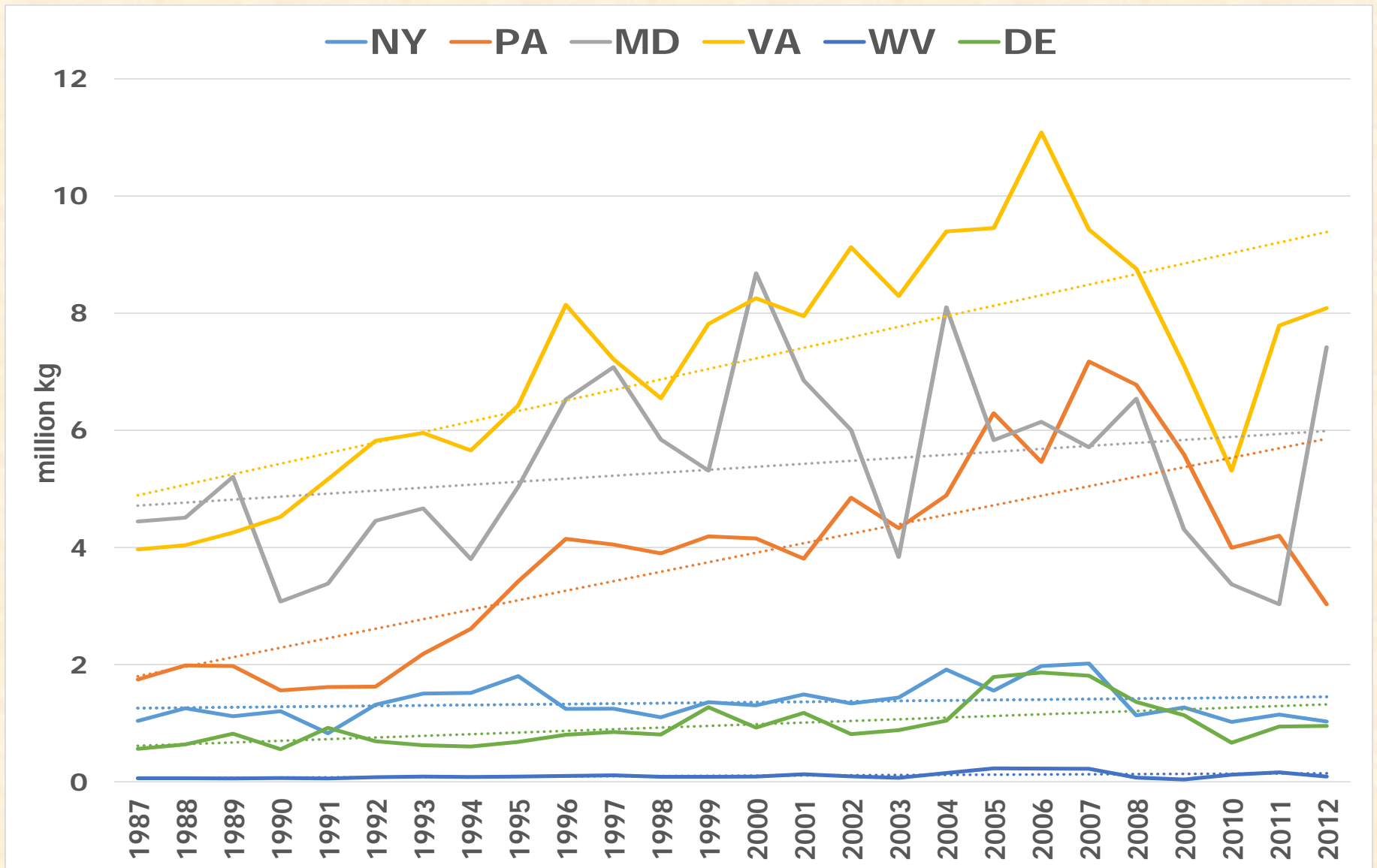
## kg Annually by State





# Nitrogen Fertilizer Use through 2012

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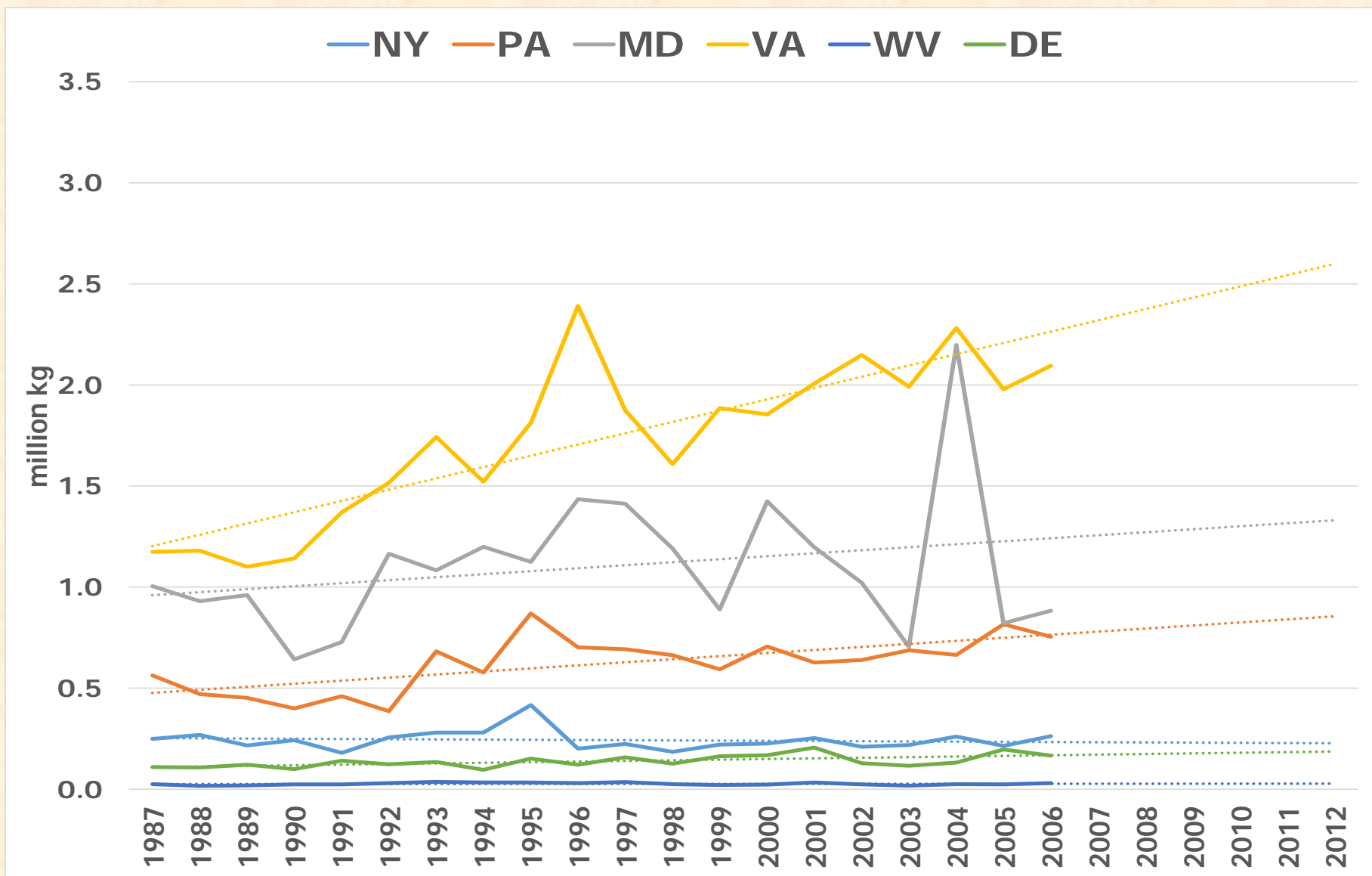




# Phosphorus Urban Fertilizer



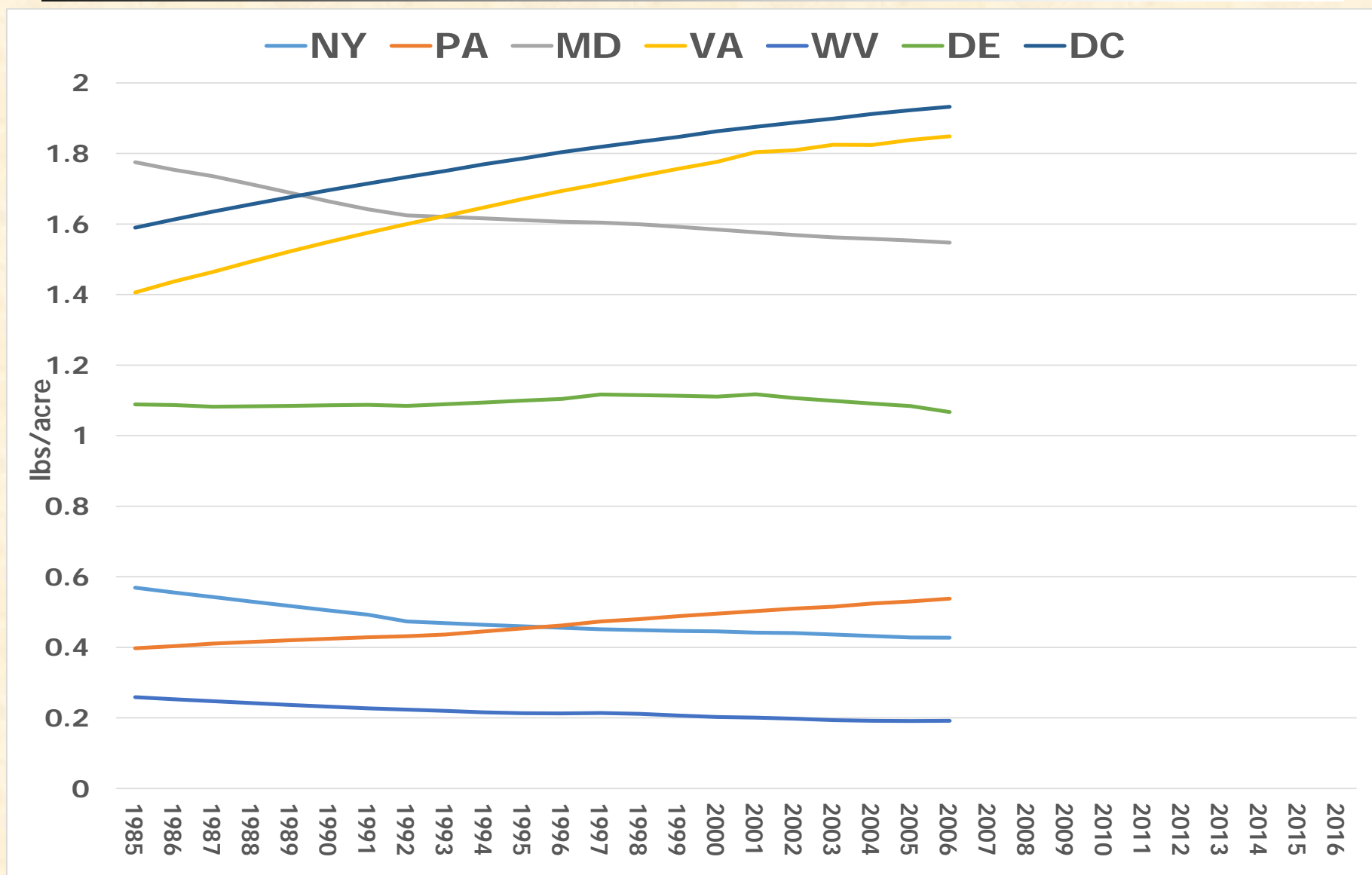
# Phosphorus Fertilizer Use through 2006 kg Annually by State





# Phosphorus Application Rates through 2006

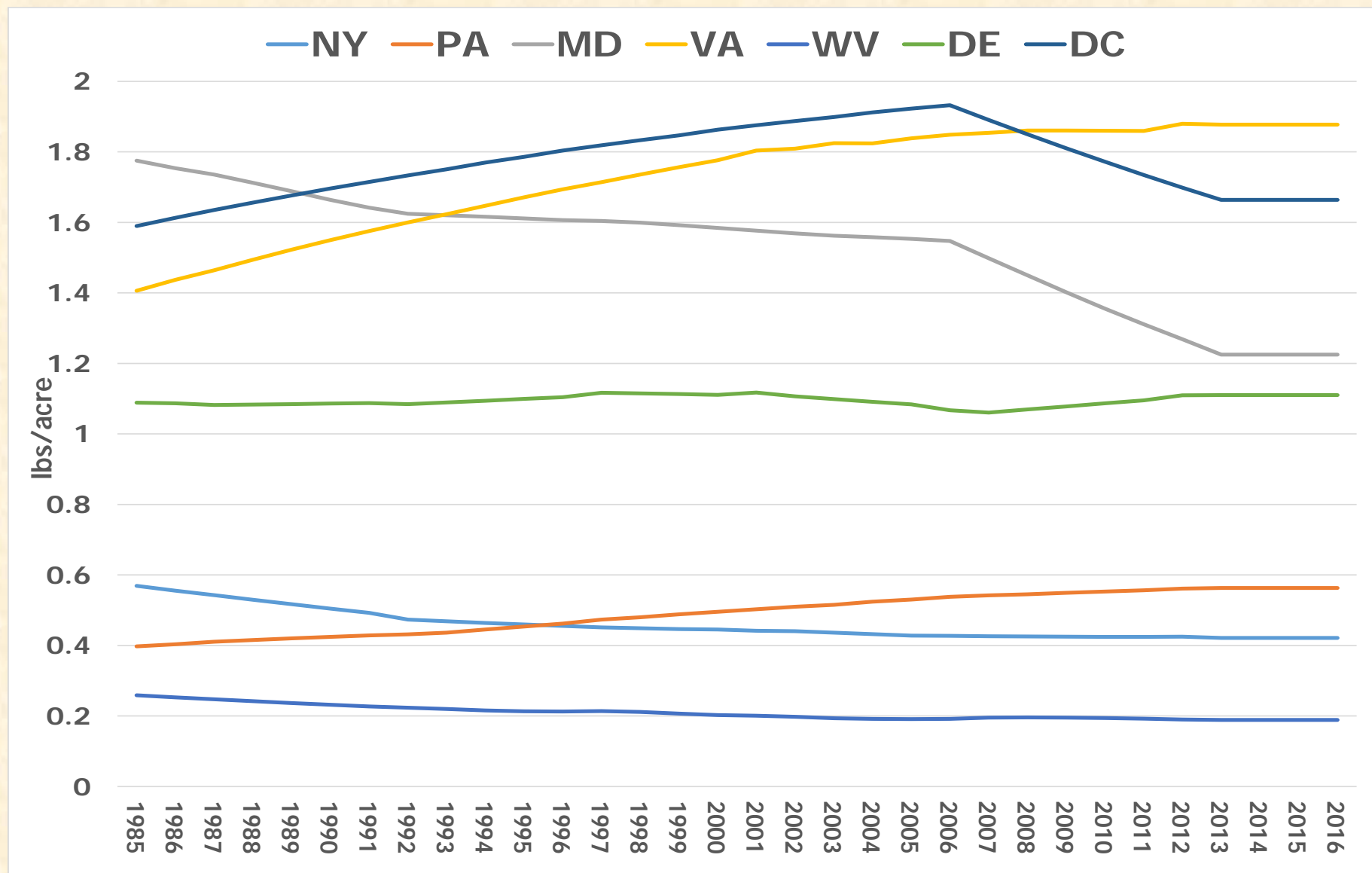
## lbs/acre by State





# Phosphorus Application Rates through 2012

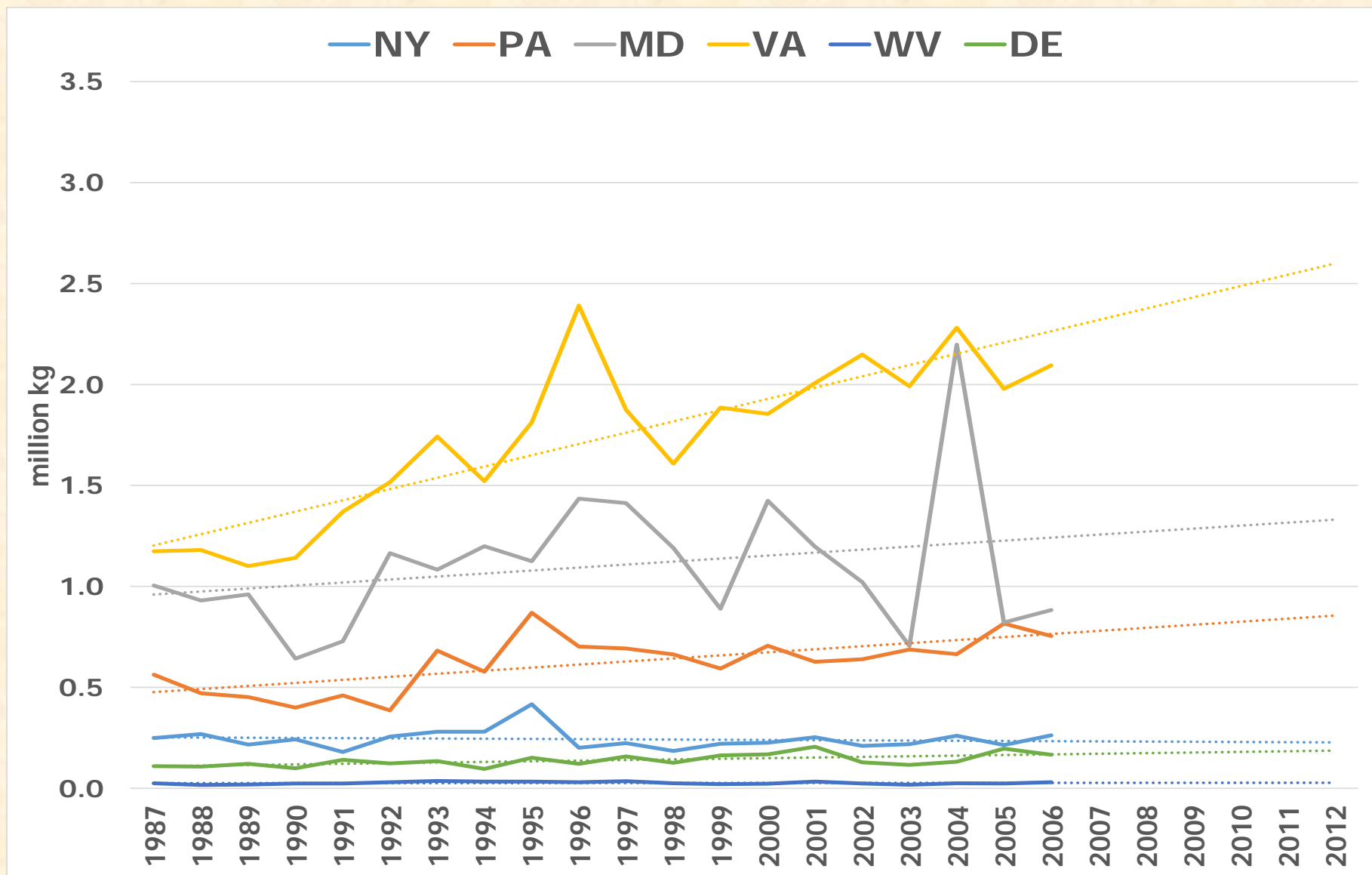
## lbs/acre with [DES] Projection







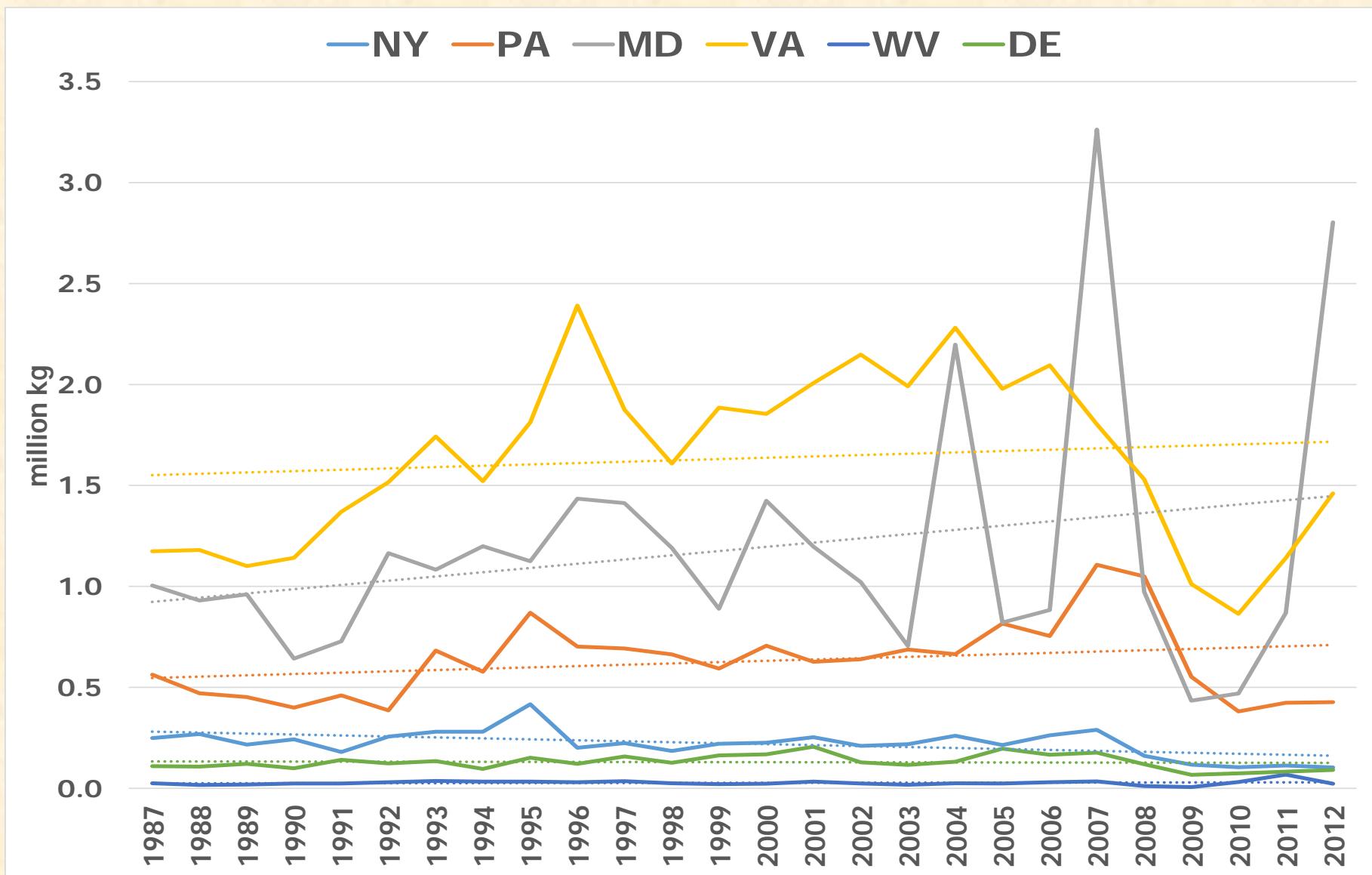
# Phosphorus Fertilizer Use through 2006 kg Annually by State





# Phosphorus Fertilizer Use through 2012

## kg Annually by State





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# Planning for Reduced Application Rates WIPs and Milestones

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- Request for mechanism to allow for benefits of planned reductions in turfgrass applications
- Only applied to plans (WIPs, Milestones)





# Planning for Reduced Application Rates WIPs and Milestones

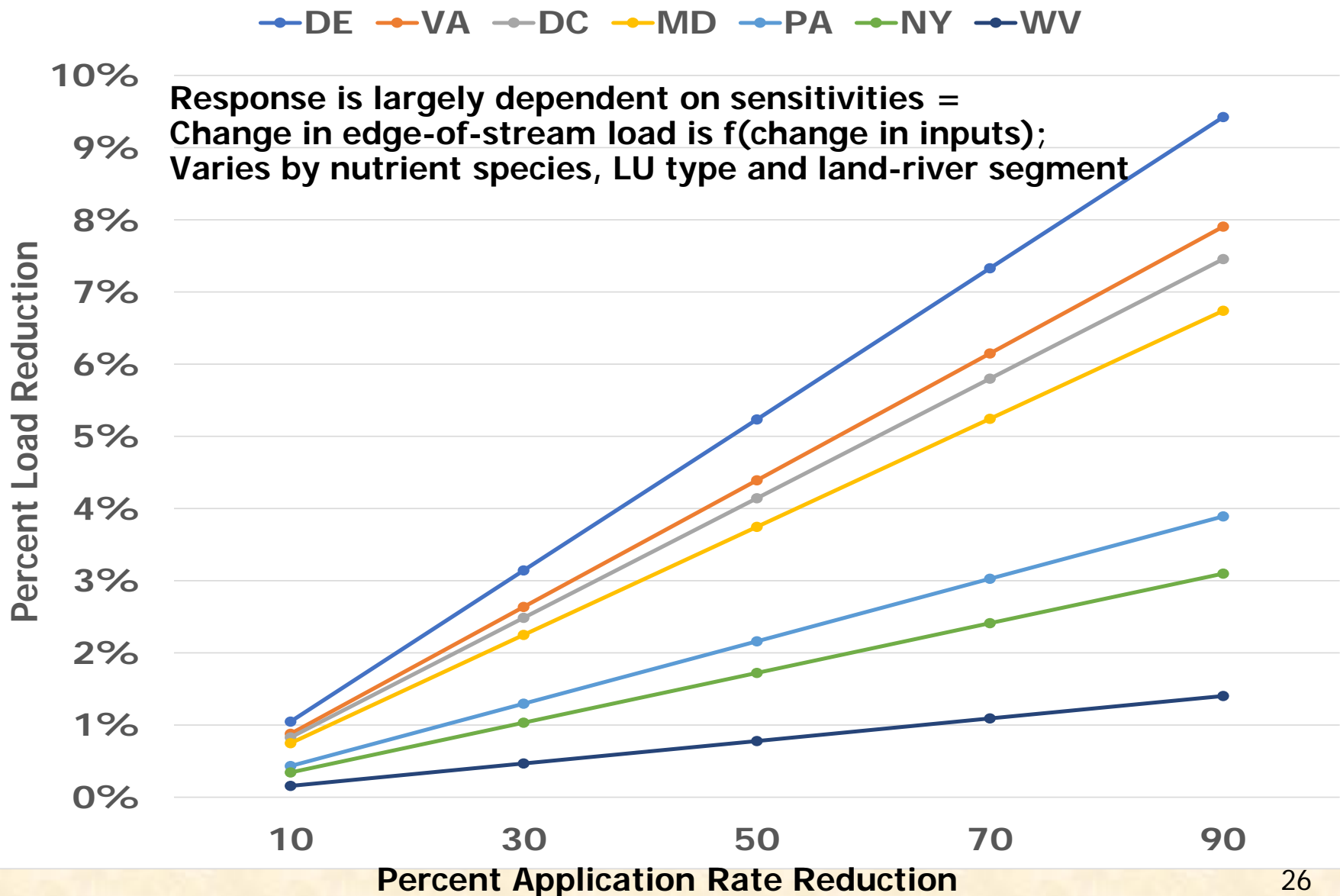
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## Method

- Efficiency BMP based on Phase 6 model investigation
- Model study where fertilizer application rates on turfgrass were reduced 10%, 30%, 50%, 70%, and 90% - by jurisdiction
- What's the associated response in loads?



# Change in Load with Change in Applications Nitrogen



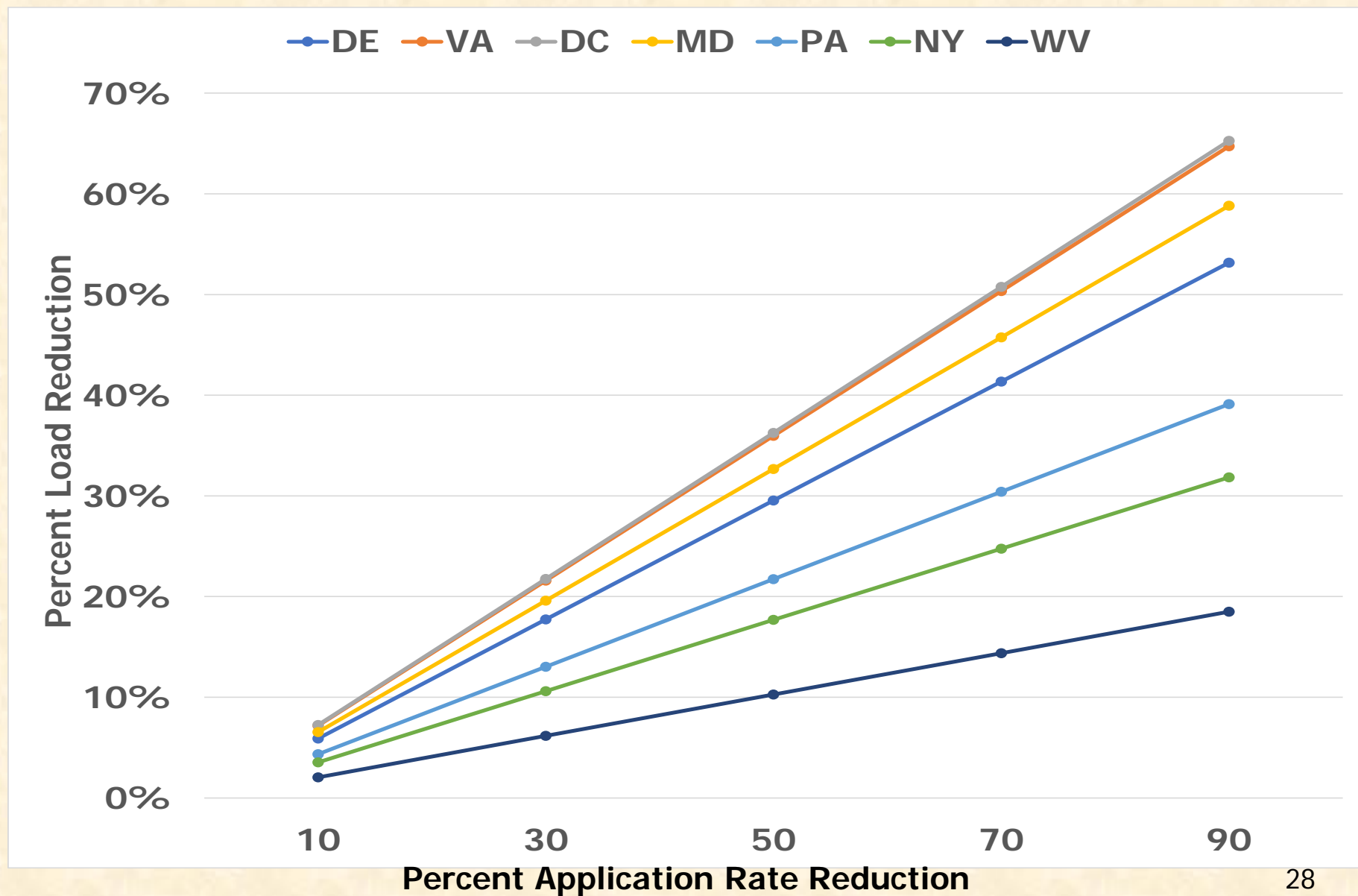


# Change in Load with Change in Applications Nitrogen

LoadSource	Nutrient Species	P6 Sensitivity
Turf Grass (Non-Regulated + MS4)	NH3	0.005
Turf Grass (Non-Regulated + MS4)	OrgN	0.009
Turf Grass (Non-Regulated + MS4)	NO3	0.033
Tree Canopy over Turfgrass (Non-Regulated + MS4)	NH3	0.004
Tree Canopy over Turfgrass (Non-Regulated + MS4)	OrgN	0.007
Tree Canopy over Turfgrass (Non-Regulated + MS4)	NO3	0.023



# Change in Load with Change in Applications Phosphorus





# Planning for Reduced Application Rates WIPs and Milestones

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## Proposal

- Add 10 new efficiency BMPs – UrbanFert10N, UrbanFert10P, UrbanFert30N, etc.
- Jurisdictions report planned affected acres for N and P separately depending on planned policies
- Not applicable to progress scenarios