AMS Update for Ag Workgroup: Modeling Decisions for Beta 4

09222016

Curtis Dell, USDA-ARS-PSWMRU

Matt Johnston, University of Maryland
CBPO Non-Point Source Data Analyst

Issues approved, or pending approval, under development

- Nutrient spread curves (approved)
- Size of other cattle (approved)
- Yield goal multiplier (approved)
- Ammonia volatilization (approved)
- Double crops (approved)
- **Future NM and Manure Transport (pending approval)**
- **Biosolids (pending approval)**
- Confinement fractions (under review)
- Outliers in Ag Census data (under development/review)
- STAC Review results (under development/review)

Options for 2013-2025 Fertilizer Estimates and Core Nutrient Management Credit

- **Option 1 (Application Credit)**
  - Doable by September 30 for Beta 4
- **Option 2 (Fertilizer Projections)**
  - Doable by September 30 for Beta 4
- **Option 3 (?)**
  - Not doable by September 30 for Beta 4

Options for 2013-2025 Fertilizer Estimates and Core Nutrient Management Credit

- **Option 1 (Application Credit):**
  - Pre-BMP Fertilizer tied to application goals, and varies as crops and yields vary
  - Post-BMP Fertilizer decreases with each additional acre of Corn NM
    - Best reflects NM Panel recommendations
  - Core NM also helps to distribute manure within county
  - Fertilizer sales used as true-up once per milestone period
    - Core NM acres used in true-up just as it was from 1984-2012
  - Currently built for Beta 4

Option 1 - Pg. 28-29 NM Panel Report

NITROGEN Core Nutrient Management BMP

(ALL core elements required to be implemented and verified)

- N application goal (N rate) according to LGU recommendations at field level
- Manure analysis and volume – test value or book value
- Spreader/application calibration
- Yield estimates and cropping plan at field level
- Cropping and manure history at field level

NO → No credit for N Core Nutrient Management BMP → N application goal = **LGU recommendation x A**

YES → Credit for N Core Nutrient Management BMP efficiency → N application goal = **LGU recommendation x B**

PHOSPHORUS Core Nutrient Management BMP

(ALL core elements required to be implemented and verified)

- P application goal (P rate) according to LGU recommendations at field level
- P soil tests at field level
- Manure analysis and volume – test value or book value
- Spreader/application calibration
- Yield estimates and cropping plan at field level
- Cropping and manure history at field level

NO → No credit for P Core Nutrient Management BMP → P application goal = **LGU recommendation x F**

YES → Credit for P Core Nutrient Management BMP efficiency → P application goal = **LGU recommendation x G**

Option 1 - Impact to N Fert Applications by Land Use (2013 – 2025)

Land Use	Non-NM N Multiplier	NM N Multiplier	Reduction in Fert N Applications for NM Acre
Full Season Soybeans	1.2	1	-17%
Grain with Manure	1.3	1	-23%
Grain without Manure	1.2	1	-17%
Legume Hay	1.2	1	-17%
Silage with Manure	1.4	1	-29%
Silage without Manure	1.2	1	-17%
Small Grains and Grains	1.2	1	-17%
Small Grains and Soybeans	1.2	1	-17%
Specialty Crop High	1.3	1	-23%
Specialty Crop Low	1.2	1	-17%
Other Agronomic Crops	1.1	1	-9%
Other Hay	1	1	0%
Pasture	1	1	0%

Option 1 - Impact to P Fert Applications by Land Use (2013 – 2025)

Land Use	Non-NM P Multiplier	NM P Multiplier	Reduction in Fert P Applications for NM Acre
Full Season Soybeans	1.5	1	-33%
Grain with Manure	3	1	-67%
Grain without Manure	1.5	1	-33%
Legume Hay	1	1	0%
Silage with Manure	3	1	-67%
Silage without Manure	1.5	1	-33%
Small Grains and Grains	1.5	1	-33%
Small Grains and Soybeans	1.5	1	-33%
Specialty Crop High	2	1	-50%
Specialty Crop Low	2	1	-50%
Other Agronomic Crops	1.5	1	-33%
Other Hay	1	1	0%
Pasture	1	1	0%

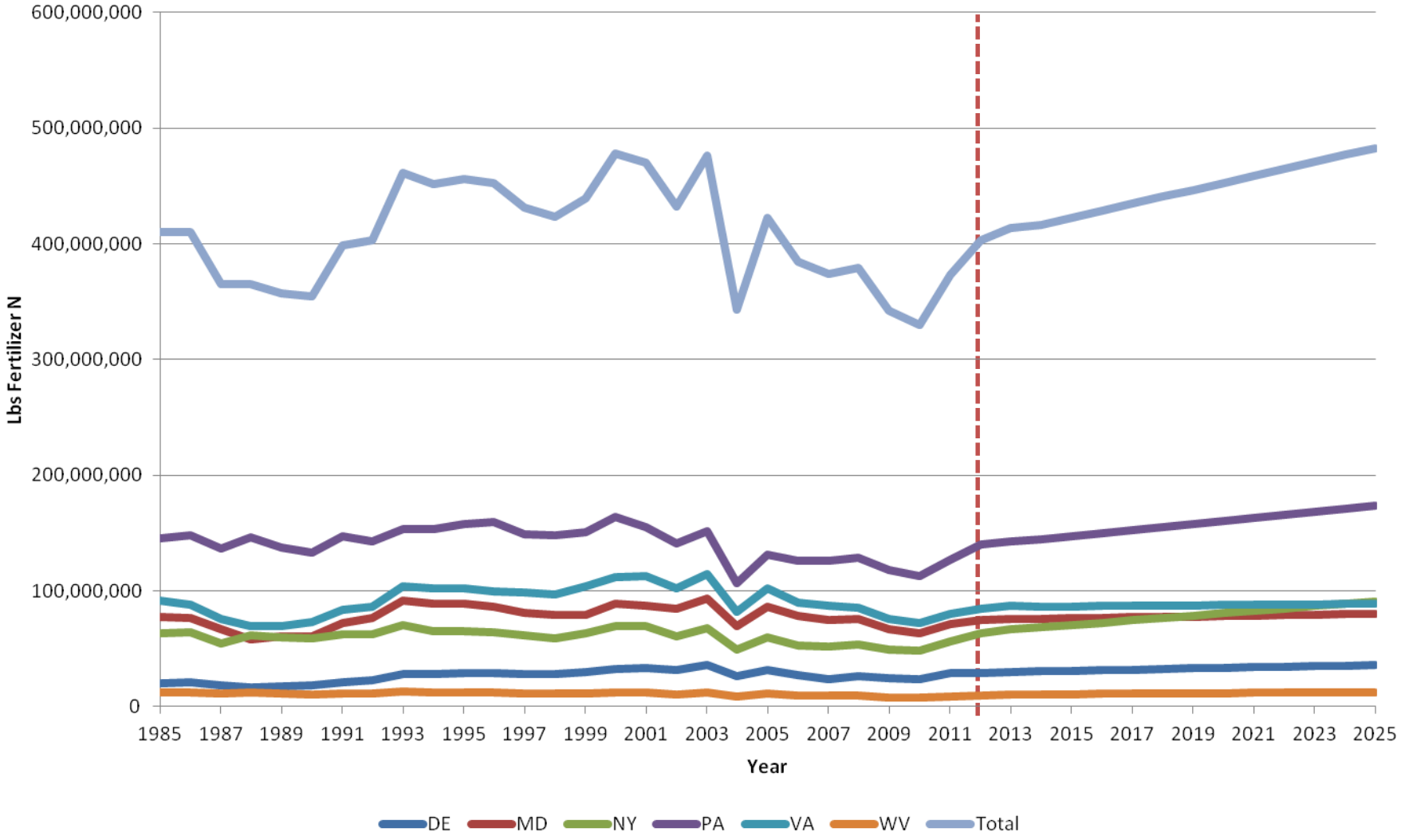
Option 1 – Pros and Cons

- **Pros:**
  - Stability:
    - Applications are based on USDA and USGS projected yields, acres, and manure totals (based upon animal populations), not fertilizer history
    - If nothing changes (NM acres, yields, crop acres, manure), then applications don't change
    - This stability would exist at the county scale: one county's changes will not impact another county's applications
  - Direct Core NM Credit:
    - Gives direct, significant credit to additional acres of NM
    - Best reflects NM Panel recommendations
- **Cons:**
  - Exact Credit Unknown:
    - Because manure will move around within the county based upon more or less NM credit, the exact impact in any given scenario cannot be known. This is the same for many BMPs.
  - Potential Over-Crediting:
    - Fertilizer sales may indicate that credit is too generous for planning scenarios. The same could be true for other model inputs.

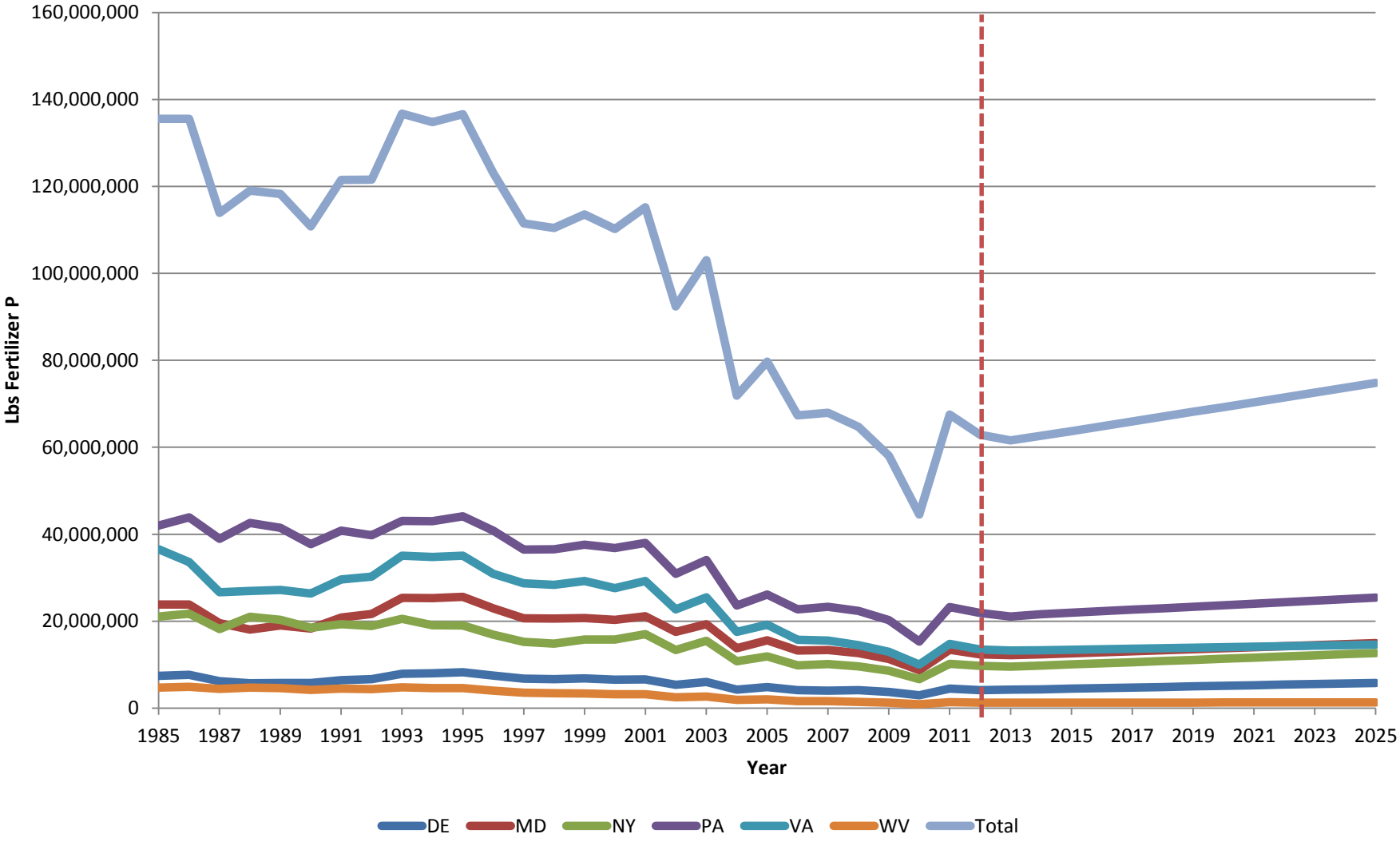
Options for 2013-2025 Fertilizer Estimates and Core Nutrient Management Credit

- **Option 2 (Fertilizer Projections):**
  - Pre-BMP Fertilizer is projected past 2012 using same methods for crop and animal projections
  - Post-BMP Fertilizer = Pre-BMP Fertilizer
  - Core NM helps to distribute manure and fertilizer within county
  - Fertilizer sales used as true-up once per milestone period
    - Core NM acres used in true-up just as it was from 1984-2012
  - Easy to build for Beta 4

N Fertilizer Projections



P Fertilizer Projections



Option 2 – Pros and Cons

- **Pros:**
  - Common Projection Method:
    - Use the same projection method as all other agricultural inputs (crop acres, animals, etc.)
  - Stability:
    - Fertilizer totals set at beginning of each Milestone period and do not fluctuate based upon BMP submissions
    - Stability exists at county level
- **Cons:**
  - Projection Independent of Crops and Manure:
    - Projected trends in fertilizer not related to projected trends in crops or manure; could result in unbalanced, unrealistic applications despite recommendations from NM Panel
  - No Direct Core NM Credit:
    - Additional acres of core NM would not reduce fertilizer use as described in the panel report, but would reallocate fertilizer and manure to land uses within a county

Recommendation for Manure Transport Credit (2013-2025)

- AMS recommends the following for every county:
  - Every additional **pound of manure PAN** transported out of a county should be replaced with **one pound of inorganic PAN**.
  - Every additional **pound of manure P** transported out of a county should be replaced with **0 pounds of inorganic P**.
- Rationale:
  - Manure Transport is done predominantly to limit over-application of P, not N.

Advantages of Manure Transport Methods

- Reflects more efficient use of N.
  - In 2012, every 1 lb of manure TN transported would be replaced with 0.6 lbs of inorganic TN (40% reduction in inputs, on average across watershed).
  - Value can vary by county and manure type being transported.
- Reflects likely current and future limits on use of P.
- Incentivizes manure transport for both nutrients and provides clear assumptions for trading credits if partners choose to use model's methodology.

Biosolids

- Biosolids Taskforce requests that biosolids be applied first to ensure they are applied to the correct crops, and not influenced by manure.
- On average, biosolids account for less than 1% of a county total application goals.