Nutrient Management Panel Phase 5 Report

Advance preview of recommendations

Agriculture Workgroup Meeting

June 17-18, 2015

Agriculture Workgroup Phase 5 Expert Panel Membership

- Comprised of Research Scientists, Extension Specialists, Nutrient Management Program Specialists, Policy Specialists

  - **County Conservation Districts:**
    - New York (1)

  - **State Agencies:**
    - Delaware (1)
    - Maryland (1)
    - New York (1)
    - Pennsylvania (1)
    - Virginia (1)
    - West Virginia (1)

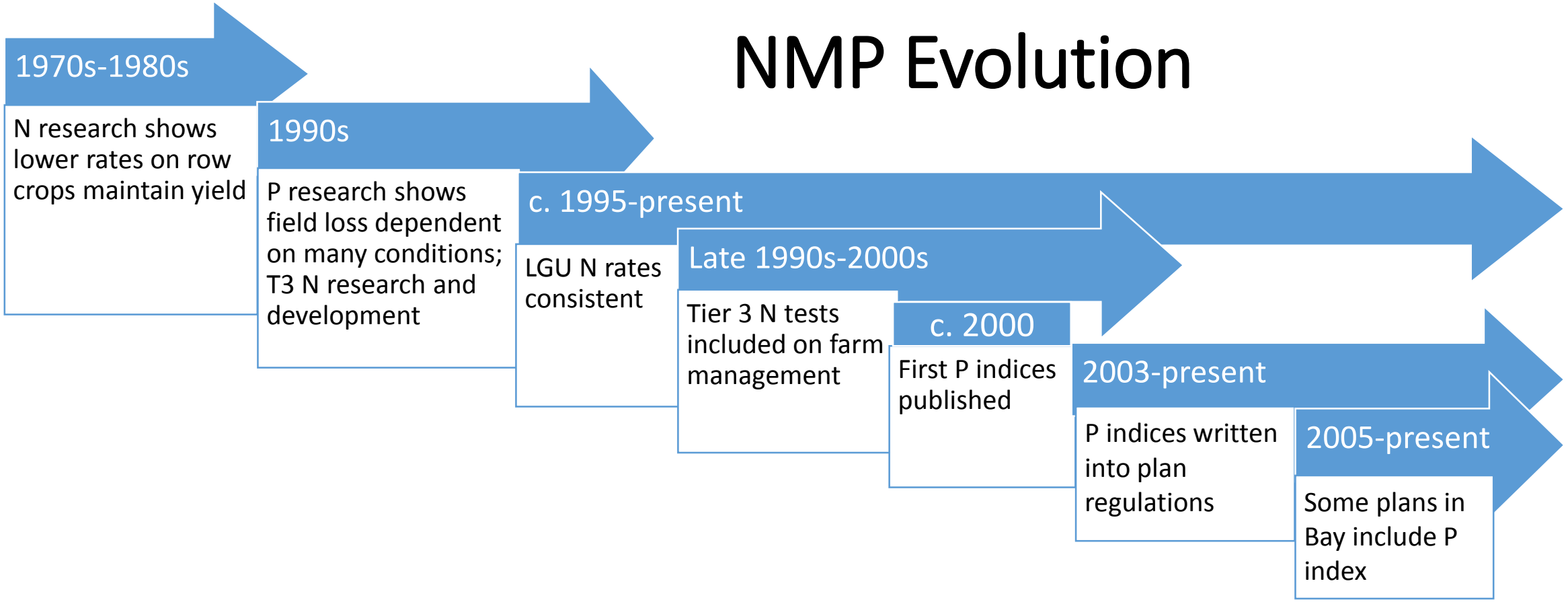
Federal Agencies:

- USDA Agricultural Research Service (3)
- USDA Natural Resources Conservation Service (1)

- **Universities:**
  - Maryland (6)
  - Pennsylvania (2)
  - Virginia (3)
  - West Virginia (1)
  - Johns Hopkins (1)

- **Non-Governmental Organizations:**
  - Conserve Pennsylvania (1)
  - Northeast Pasture Consortium (1)
  - International Plant Nutrition Inst. (1)

NMP Evolution



Tier 1 Plans

Tier 3 Plans

Tier 2 Plans

Tier definitions

Phase 5 Expert Panel's revised tiers of Nutrient Application Management

Tier 3 Nitrogen Adaptive Nutrient Application Management

Ex: PSNT, CSNT, var. rate

Tier 3 Phosphorus Adaptive Nutrient Application Management

Ex: variable rate

Tier 2 Nitrogen Field Level Nutrient Application Management

Ex: split N applications, setbacks, incorporation

Tier 2 Phosphorus Field Level Nutrient Application Management

Ex: manure/soil P management; use of an assessment

Tier 1 Crop Group Nutrient Application Management

*Adoption of land grant university recommendations for proper **nutrient source and rate**, but including consideration of timing, and placement (4Rs)*

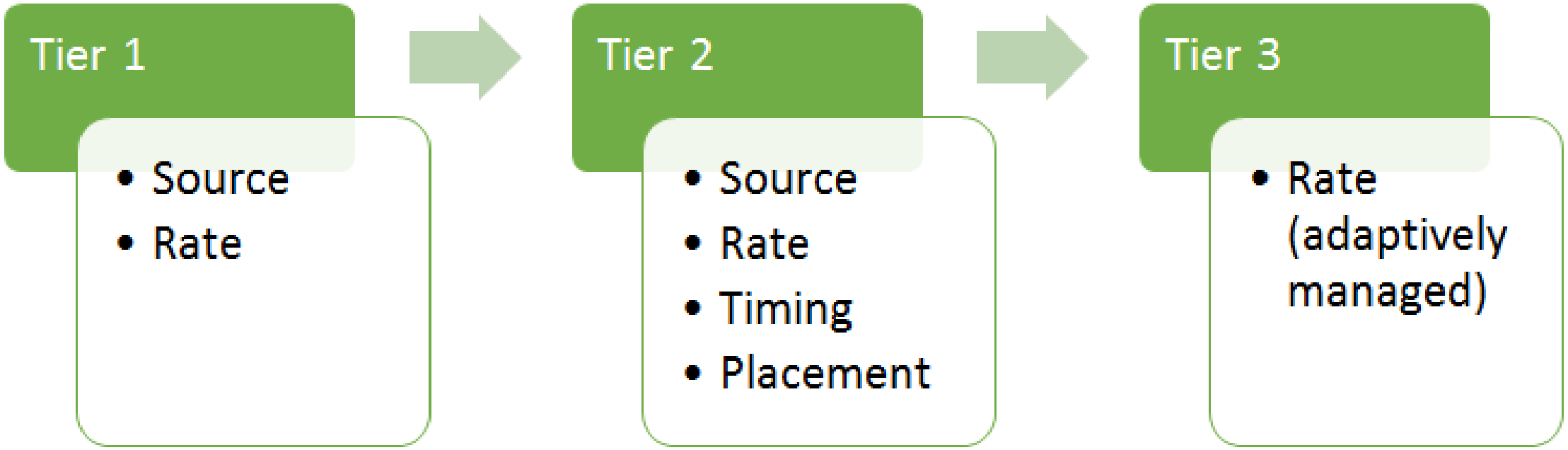


Figure 3. Diagram that shows the most relevant of the 4Rs of nutrient management as considered by the panel to influence the recommended reduction efficiencies.

Literature support for Tiers

Tier 2 N – Manure Incorporation

- **Reducing** ammonia volatilization
- N reduction efficiency determined by the ammonia conserved by incorporation within one day after application and using tillage implements that would leave at least 30% residue cover (chisel plow or light tandem-disk)
- Final small-plot estimate = 10% of the applied manure ammonium-N
- Temporary until Phase 6.0 Manure Incorporation panel conducts review for Phase 6.0 Model

Tier 2 N – Timing of N Applications

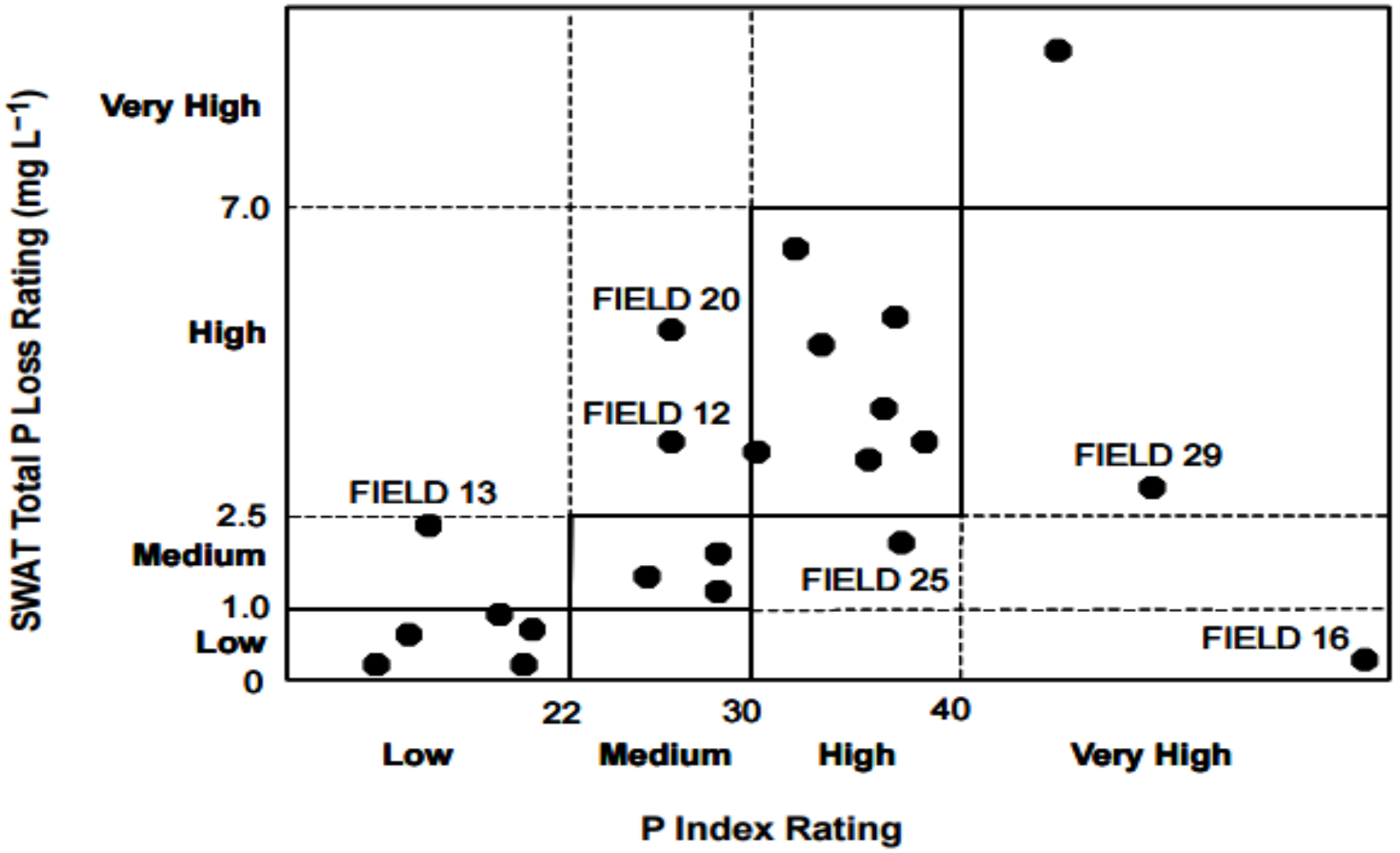
- Timing: one of the 4Rs
- N **use efficiency is increased** by applying N in phase with crop need
- N **loss risk is reduced** by decreasing exposure to loss pathways
- N reduction efficiencies estimated by comparing corn yields from replicated N-response trials over many site-years
- Panel used data from both corn and wheat studies
- Hayland managed similarly

Tier 2 P – Manure Incorporation

- Reducing risk of early season surface losses from manure spreading
  - Comes at cost of soil erodibility
- Coarser textured, lower sloped fields show benefit from mixing surface applied manure with upper soil. ~40+%
  - Fine textured, steep slopes have too high a risk of soil and nutrient loss to yield a net benefit
- Mixing of surface soil where sediment-bound P can reduce surface loss risk, as well
- One of several elements contributing to P-index
  - Evidence was used in support of P-index recommended credit.

Tier 2 P – P Site Index

Change in PSI rating from High to Medium = 35% reduction in P loss



Tier 2 P – Setbacks

- Setback values were not considered in the Tier credit calculation explicitly
- Identified as contributing to conservativeness
  - Practiced after the calibration
  - Results in lower nutrient applications/acre
  - Evidence of water quality protection could be stronger

Tier 3 N – PSNT, CSNT, ISNT, FSNT

Mid/Late season soil or plant tissue tests

Effective application requires that producers:

- Conduct the tests
- Manage N fertilizer applications based on test results so that excess N is not added where no yield response would be expected

Annual N fertilizer application rates are typically reduced through the recommendations based on test results following the season(s).

Tier 3 N – Variable rate N applications

- Studies in VA compared N application rates based on Virginia Tech Corn Algorithm to standard N rate
- Average VTCA N rate was 24 kg/ha (~20 percent) less than the standard farmer’s rate

Effectiveness Estimates

Applicable land uses by Tier

Tier 1

- Row w/ manure
  - HWM
  - LWM
- Specialty row crops (HOM)
- Pasture (PAS)
- Nursery (NUR)
- Hay w/ nutrients (HYW)
- Alfalfa (ALF)
- 92% of ag acres

Tier 2N

- Row w/ manure
  - HWM
  - LWM
- Hay w/ nutrients (HYW)

Tier2P

- Row w/ manure
  - HWM
  - LWM
- Hay w/ nutrients (HYW)
- Alfalfa (ALF)

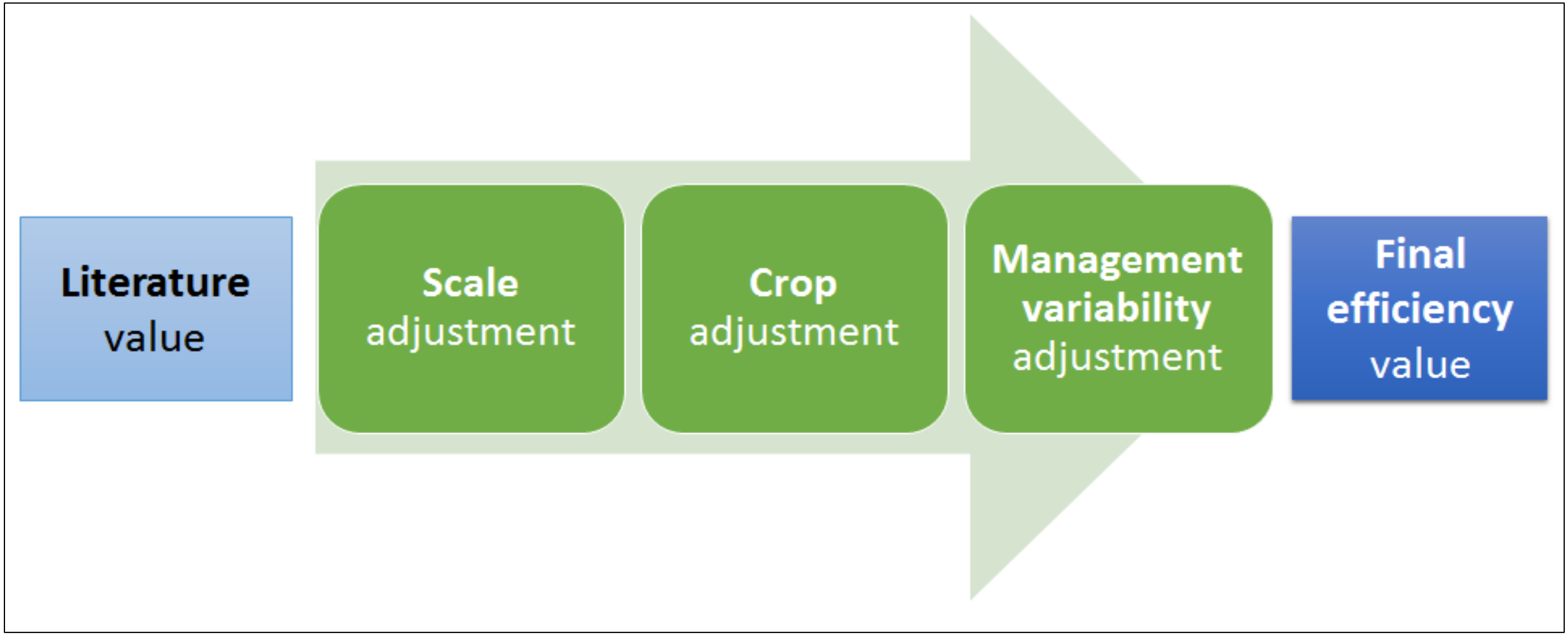
Tier 3

- Row w/ manure
  - HWM
  - LWM

Ag Acres available for implementation in 2012

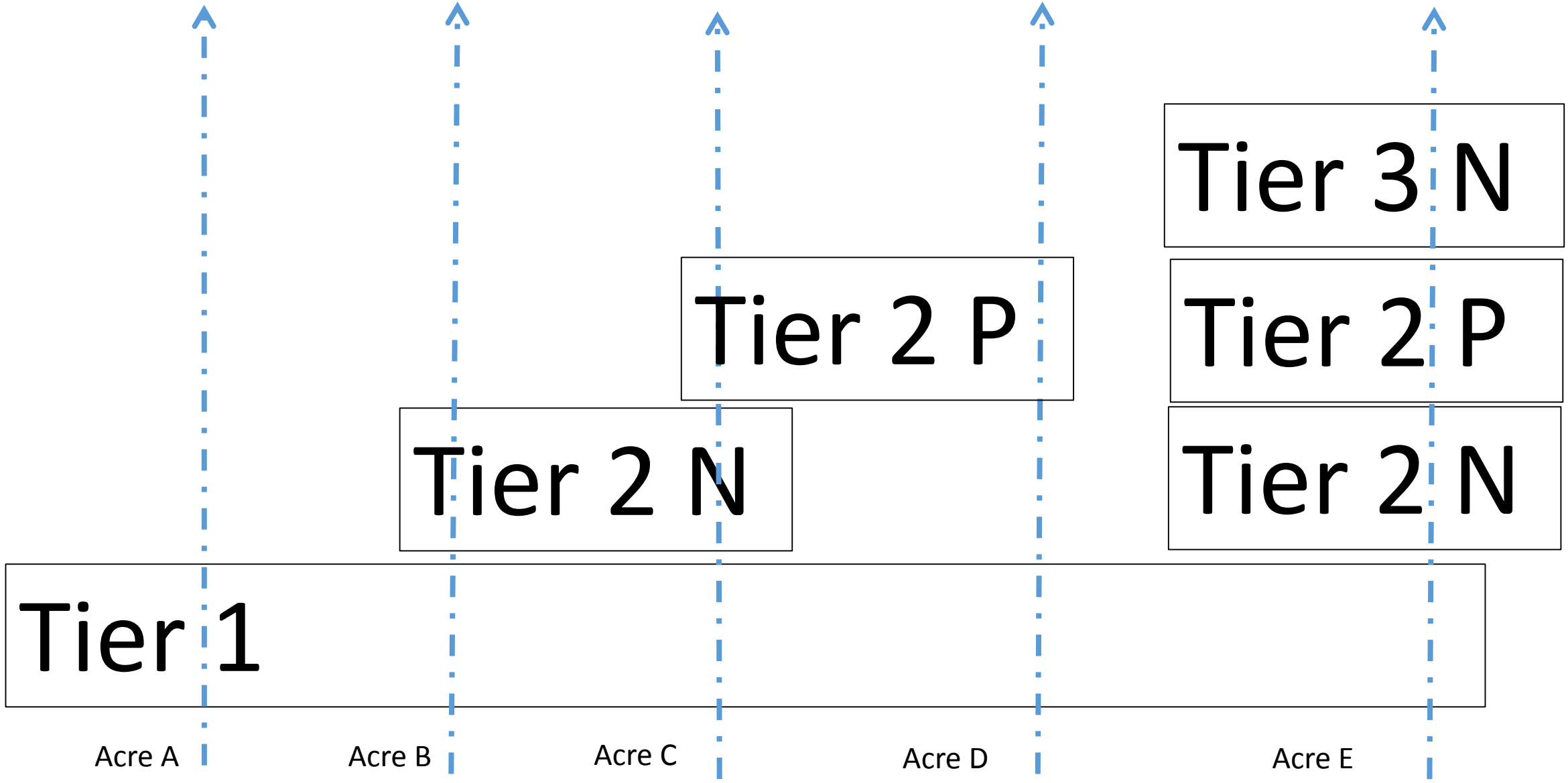
Tier	Fall 2014 Report	Current Report	% Change
1	92%	92%	0 - Approved
2N	92%	58%	-37%
2P	92%	66%	-28%
3N	0%	41%	N/A

Adjustments to literature values



		High-Till with Manure	Low-Till with Manure	High-Till without Manure	Pasture	Hay with Nutrients	Alfalfa	Nursery
Tier 1 Reduction mrom no NMP	TN	9.25	9.25	**5**	**5**	5	5	**5**
	TP	10	10	**8**	**8**	8	8	**8**
Tier 2 Reduction from no BMP	TN	12.79	12.79	N/A	N/A	**7.6**	N/A	N/A
	TP	**15.94**	**15.94**	N/A	N/A	**14.07**	**14.07**	N/A
Tier 3 Reduction from no BMP	TN	**15.23**	**15.23**	N/A	N/A	N/A	N/A	N/A

Crediting options



Review of Fall 2014 comments raised on Nutrient Management Phase 5 Report

Need for increased scientific support for Tier credit

- Limited data to support manure application timing
- Limited N split application data on leaching and on total nitrogen
- Lack of justification for P site indices benefit
- Lack of data to support setbacks
- Lack of data to support fertilizer banding
- **Need for increased detail on how the literature sources were used by the panel to develop effectiveness estimates**

Increased scientific support for Tier credit

Revised report section 3.3 explains justification for effectiveness estimates for each component of each Tier

Highlights:

- Effect of timing shifted entirely to split applications (no baseline)
- Leaching identified as sole pathway needed for credit
  - Volatilization and denitrification both only further reduced: adding implicit conservatism.
- P site index research reviewed
  - back up documentation on incorporation of manure
- Banding and Setbacks considered as implicitly contributing to conservative estimate.

Need for increased transparency with panel process

- Include details of panel discussions and decision making in the report
- Follow BMP protocol:
  - Required elements to be included in report
  - Review and approval process

Increased transparency with panel process

- Revised report section 3.2 explains process for developing effectiveness estimates
- 2-pager summary of panel discussions January – June 2015
- Appendix E(?): crosswalk between required components and BMP protocol
- Webinar to document process and continued concerns was performed April 6.
- Well publicized comment period to begin June 25
- Webinar for recommendation overview scheduled July 1

Need for improved clarity of Tier definitions

- Definitions should provide clear understanding of whether an acre is under Tier 1 vs. Tier 2 management
- Describe how the 4Rs relate to each Tier

Improved clarity of Tier definitions

- State Program review of applicability to 590 standard in development for Tier 2 credit, see next slide

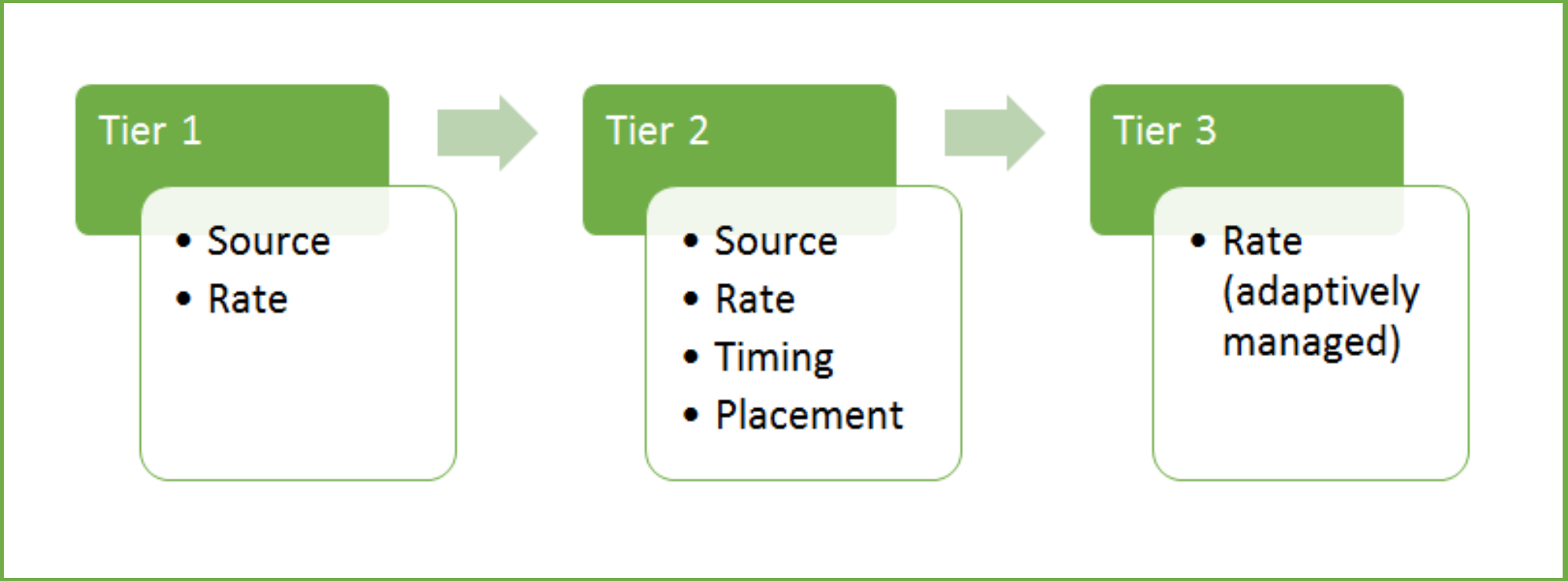


Figure 3. Diagram that shows the most relevant of the 4Rs of nutrient management as considered by the panel to influence the recommended reduction efficiencies.

		Delaware	Maryland	New York	Pennsylvania	Virginia	West Virginia
Current regulations adopted		2007	2005 Revised 2012 Revised 2015	2004	2006	2006	2011 47CSR10 "CAFO Rule"
Regs apply to:	CAFOs	All CAFOs	All CAFOs	All medium and large CAFOs (per EPA size	All CAOs > 8 AUs and all CAFOs > 8 AUs	CAFOs/AFOs under DEQ permit ≥300 AU	All Permitted CAFOs and unpermitted
	Other animal operations	Other animal operations ≥8 AU	Other animal operations ≥8 AU	Not a regulation, but required for producers engaged in State or Federal programs for	Tier 2 plans voluntary for non CAOs and non Tier 1 plans required for all operations	Voluntary	Voluntary Note: USDA requires a CNMP based on
	Cropland, pasture, nursery	Cropland, pasture, nursery with applications to ≥10 ac	Cropland, pasture, nursery with applications to ≥10 ac	Not a regulation, but required for producers engaged in State or Federal programs for	Plans are required to include all cropland, hay land, pasture land, and heavy use	Voluntary	Voluntary Note: USDA requires a CNMP based on
Timing (N)		Timing and method of nutrient application	(2005) Sept 1 to Nov 14 apply nutrients @	Nutrient application timings are based on	PA Nutrient Mgmt regulations require		Nutrient application timing is required by
Setbacks (P)		Prohibited from applying manure	(2012) phase in on Jan 2014 35' for all	Manure application setbacks from down-	100 foot manure application setback		Required setbacks for Permitted CAFOs.
Manure incorporation		As soon as possible after application.	(2012) phase in on Jan 2013 all organic	The NY 590 and associated tools (NY P Index, Nitrate	The PA 590 standard states that manure		Manure incorporation is
P risk assessment requirements		**Phosphorus applications should be consistent with the rates recommended based on the soil test and/or the P Site Index**	**(2005) The PSI must be completed on all sites with soil fertility index value above 150.**	**The NY P Index is run in its entirety on every field.**	**The PA Phosphorus Index (PI) is broken into two sections, Part A and Part B. Part A is used to identify those**	**If soil P saturation is >65%, P application is not permitted. Otherwise, soil test P, P-Environmental**	**Once phosphorus levels exceed 120 lbs per acre, no phosphorus applications will be made unless the**
Source of technical standards		DE NRCS 590 standard	Maryland Nutrient Management Manual	NY NRCS 590	Pennsylvania Nutrient Pennsylvania's Manure	Virginia Nutrient Management Standards and Criteria	Technical Standards For West Virginia CAFO Nutrient Management

Need for additional detail on tracking/reporting

- Concern about increasing nutrient reductions due to accounting change rather than change on the ground
  - Document when states adopted Tier 2 plans
- Increased detail about the records/data needed to substantiate the reported implementation for each Tier
- Consideration of CEAP report information about level of nutrient management occurring in CBW

Tracking issues

- NM has historically been tracked and reported to the CBPO on a farm acreage level (i.e. total acres of NMPs).
- This is the same tracking criteria for tier 2 plans, but the magnitude of recorded data about the 4Rs has become much more rigorous.
  - Manure testing for source information
  - Calibration records for the fertilization equipment, if owned
  - Contracts for nutrient services
  - Field or sub field level records of rates for each season
  - Field or sub field level records of timing for each fertilization
  - Field or sub field level records of method for each fertilization
- CEAP was not considered in more detail than the Fall 2014 report.

Verification

- Concerns about crediting Tier 2 NM now and then possibly having to remove some or all of the credit in the future when states have adopted verification protocols
- Concerns about increasing credit for NM before verification protocols are adopted
- Recommend that verification be a requirement for states to claim Tier 2 credit

Verification

- Revised report: section 6
- Non-visual BMPs are difficult to verify and we need to primarily rely on the NMP's and on-farm documentation.
- The jurisdictions are currently developing BMP verification protocols which will identify the methods for verifying NM to implement in Jan 2018.
- Enabling the tracking and reporting of detailed management actions on specific fields or subfields will require retooling of the current partnership framework, as well as inspection and verification procedures.
- The panel recommends criteria for crediting acres to the tier and sub-tier (N vs. P), but adoption and reporting will be a new and unprecedented challenge for the partnership to address.

Other comments

- Concern about double counting manure incorporation as part of NM and as a separate BMP
- Explain how reduction efficiencies can apply to the row crop land use when not all crops receive manure
- How do the panel recommendations account for evidence of increases in manure and fertilizer applications?

Phase 5

Nutrient Application Management INCLUDES manure incorporation

Phase 6

Nutrient Application Management

Manure Injection/ Incorporation

Tier 1

- Row w/ manure
  - HWM
  - LWM
- Specialty row crops (HOM)
- Pasture (PAS)
- Nursery (NUR)
- Hay w/ nutrients (HYW)
- Alfalfa (ALF)

Tier 2N

- Row w/ manure
  - HWM
  - LWM
- Hay w/ nutrients (HYW)

Tier2P

- Row w/ manure
  - HWM
  - LWM
- Hay w/ nutrients (HYW)
- Alfalfa (ALF)

Tier 3

- Row w/ manure
  - HWM
  - LWM