Nutrient Application Management

Definitions and Nutrient and Reduction Efficiencies of Nutrient Application Management for use in Phase 5.3.2 of the Chesapeake Bay Program Watershed Model

Report approved and enacted for Phase 5.3.2 for 2013 progress [pending approval by the Water Quality Goal Implementation Team] as of October 15, 2013.

1. **Crop Group Nutrient Application Management**
2. **Field Level Nutrient Application Management**
3. **Adaptive Nutrient Management**

Recommendations for [Provisional] Approval by the Water Quality Goal Implementation Team's Watershed Technical and Agricultural Workgroups

Introduction

Nutrient Management Plans on agricultural lands is a practice counted in the millions of acres across the Chesapeake Bay watershed. It is one of the oldest best management practices in agriculture and is the cornerstone of stewardship efforts by conservation groups, producers and jurisdictions. This document summarizes the recommendations of the Nutrient Management Expert Panel for revised definition and efficiencies for Nutrient Management (NM). NM will be replaced by Crop Group Nutrient Application Management (CGNAP) and new practices, Field Level Nutrient Application Management (FLNAM) and Adaptive Nutrient Management (ANM) are defined.

The Agriculture and Watershed Technical Workgroups approved this practice for inclusion for Phase 5.3.2 of the Chesapeake Bay Program Watershed Model (CBPWM) pending [conditions of approval] after October 7, 2013.

Nutrient Management Panel Members

Panelist	Affiliation
Chris Brosch, Chair	Virginia Tech/Virginia Department of Environmental Quality
Greg Albrecht	New York Department of Agriculture
Tom Basden	West Virginia University
Doug Beegle	Penn State University
Thomas Bruulsema	International Plant Nutrition Institute
Frank Coale	University of Maryland
Jim Cropper	Northeast Pasture Consortium
Jason Dalrymple	West Virginia Department of Agriculture
Curtis Dell	USDA Agricultural Research Service
Barry Evans	Penn State University

Doug Goodlander	Pennsylvania Department of Environmental Protection
Chris Gross	USDA Natural Resources Conservation Service
Peter Kleinman	USDA Agricultural Research Service
John Lea-Cox	University of Maryland
Rory Maguire	Virginia Tech
John Majsztrik	University of Maryland
Anne S. Marsh	Heinz Center
Josh McGrath	University of Maryland
Jack Meisinger	USDA Agricultural Research Service
Royden Powell	Maryland Department of Agriculture
Aaron Ristow	Upper Susquehanna Coalition
Tim Sexton	Virginia Department of Conservation and Recreation
Kim Snell-Zarcone	Conservation Pennsylvania
Ken Staver	University of Maryland
Trish Steinhilber	University of Maryland
Wade Thomason	Virginia Tech
Larry Towle	Delaware Department of Agriculture
Mark Dubin	University of Maryland
Technical support by Steve Dressing, Don Meals, Jennifer Ferrando (TetraTech), Jeff Sweeney (EPA CBPO), Matt Johnston (UMD CBPO) and Emma Giese (CRC).	

Practice Definitions

- The purpose of CGNAM is to replace the current version of NM in P5.3.2 of the CBPWM
    - The current definition of NM is inadequate and vague.
    - The current credit for NM is inconsistent and does not reflect the best professional judgment (BPJ) of national experts on the suite of practices regarding the change from a pre-BMP condition and land grant university recommendations of the 1970s and early 1980s; a time in agriculture that pre-dates the CBPWM simulation period.
- FLNAM is a new practice that reflects the substantive change in NM addressing phosphorus applications and methods by the land grant universities and jurisdictional policies circa 1995.
- ANM is a new practice in line with NRCS standard practice 590, which will credit the reductions in lost nutrients consistent with an adaptive management approach to nutrient applications and management on agricultural lands.
- These suite of practices will work in tiers where a higher tier practice receives additional nutrient reduction efficiencies exceeding cumulative effect of the lower tiers.

Tier 1) Crop Group Nutrient Application Management: Documentation exists for manure and/or fertilizer application management activities in accordance with basic land grant university (LGU) recommendations. This documentation supports farm specific efforts to maximize growth by application of nitrogen (N), phosphorus (P) with respect to proper nutrient source, rate, timing

and placement for optimum crop growth consistent with LGU recommendations. Particular attention is paid to: (1) standard, realistic farm-wide yield goals; (2) credit for N sources (soil, sod, past manure and current year applications); (3) P application rates consistent with LGU recommendations based on soil tests for fields without manure; (4) N based application rates consistent with LGU recommendations for fields receiving manure.

Tier 2) Field Level Nutrient Application Management: Implementation of a formal nutrient management planning is documented and supported with records consistent with efficient use of nutrients for both crop production and environmental management. Nutrient applications are based on: (1) standard yield goals per soil type, or historic yields within field management units; (2) credit for N sources (soil, sod, past manure, and current year applications); (3) P application rates consistent with LGU recommendations based on soil tests and LGU guidelines; (4) ***fields*** assessed for phosphorus loss risk with a LGU phosphorus risk assessment tool and (5) other conservation tools necessary for proper nutrient source, rate, timing and placement to improve nutrient use efficiency.

Tier 3) Adaptive Nutrient Management: Implementation of Tier 2 Nutrient Application Management (NAM), plus nutrient management contains multi-year monitoring of nutrient use efficiency with the results of this monitoring being integrated into future nutrient management planning. This process evaluates and refines the standard LGU nutrient recommendations using field/subfield specific multiple season records. It further promotes the coordination of amount (rate), source, timing, and placement (method of application) of plant nutrients to further reduce nutrient losses while maintaining economic returns. In addition to the field assessments in Tier 2 NAM, it must include the following elements.

- Multi-year, on-going records from tests or trials including
- Field/subfield level soil test P (STP) and
- A nitrogen assessment including but not limited to Illinois Soil Nitrogen Test (ISNT), Corn Stalk Nitrate Test (CSNT), Pre-sidedress Nitrate Test (PSNT) and/or in-field monitoring/strip trials with yield determination to improve upon the standard land grant university recommendations for application

AND/OR

- Precision application technologies to more accurately deliver and record recommendations.

Effectiveness Estimates

- CGNAM consistent with the definition is proposed for the CBPWM to have an effectiveness estimate of
    - 9.25% total nitrogen (TN) reduction and 10% total phosphorus (TP) reduction from landuses high-till with manure (HWM) and low-till with manure (LWM).
    - 5% TN and 8% TP reduction from landuses high-till without manure (HOM), pasture (PAS), hay receiving nutrients (HYM), alfalfa (ALF), and nursery (URS).

    - Riparian pasture (TRP) and Hay without nutrients (HYO) are still excluded from being eligible for any form of nutrient management.
    - Logic written into the CBPWM NM landuses (NHI, NHO, NLO, NHY, NPA and NAL) should be retained for Expert panel use, but should not be used to calculate any loads related to CGNAM.
- The effectiveness estimate will be simulated as an edge of stream reduction in the reporting county from the non-BMP landuse edge of stream load.
- Expert Panel considered changing the efficiencies based on geography, but didn't deem it necessary or prudent based on the limited timeline for report turnaround and lifespan of this interim recommendation.

Justification for Recommended Effectiveness Estimates of CGNAM

- In the absence of historic surveys on nutrient applications to crops Bay-wide, representative NM and non-nutrient management application rates were determined based on historic (i.e. antecedent to the CBPWM simulation period) and c. 1995 LGU agronomy guides (antecedent to the on-set of FLNAM in appearing agronomy guides). Historic LGU agronomy guides evaluated by panelists recommended between 40-15% more plant available nitrogen than c. 1995 LGU guides. This change in recommendations was unanimously agreed to serve as a proxy for pre-NM conditions on corn acres across the Chesapeake Bay Watershed. A 20% difference in Non-NM and NM nitrogen applications was determined to be a conservative estimate for the literature search. Other crops of significant acreage (i.e. soy, wheat, alfalfa) did not have consistently lower recommended application rates from LGU agronomy guides and proxy non-NM application rates could not be determined.
  This proxy was used in conjunction with Expert panel summarized literature comparing application rates, yields and spring or fall residual soil fall nitrate on corn. First, the NM yield was determined from the paper. A current LGU nitrogen application rate was calculated as well as a proxy non-NM, 1.2xNM, N application rate. Study application rates or yields were plotted against residual soil N and a change in soil N resulting from a 20% nutrient reduction to NM rates. Across 2 fully summarized studies in MD, one fully summarized study in VA and partially summarized studies in PA and NY, the panel considered 15% reductions in fall soil N to be expected Bay-wide.
  In order to not violate the P5.3.2 CBPWM calibration, a sensitivity analysis was performed on a 2007 progress scenario where three runs were performed. One run where P5.3.2 acres were modeled with current methods of determining non-NM application rates (see v2.4 Scenario Builder documentation), another where P5.3.2 acres were modeled with current NM application rates and a third where non-NM rates on corn were replaced with rates 1.2 times higher than the current P5.3.2 CBPWM NM rate. These runs were named after the average nitrogen application rate of each scenario and summarized at different landuses in each state and across the whole Bay watershed.
  The Panel agreed the most prudent estimate of the nutrient management proxy was to compare the landuse pair HWM and LWM that simulate row crops across the simulate runs. The standard average effectiveness estimate calculated in the comparison

between NM and current Non-NM runs for all other NM modeled landuses (HYW, HOM, PAS, ALF) was the only defensible efficiency the panel could chose before the CBP deadline. The efficiency was chosen to replace the current NM landuses and also be available to nursery acres (URS).

- The Expert Panel unanimously chose the corn application rate proxy approach to affect all crops in the HWM landuse. The majority of acres in this landuse are in corn in 2007.
- While the Expert Panel agrees that the current version of NM calculating application rates based on yield is consistent with the concept of CGNAM, the yields from the NASS Ag Census included in the CBPWM, are far too low to have efficiencies reduce those loads. The corresponding application rates to efficiencies reflecting the BPJ of the Panel would not produce realistic yields on the landscape.
- The Expert Panel made special note that neither this recommendation, nor the CBPWM account appropriately for the documented increase in corn grain yields through the simulation period, and this report does not identify the lack of significant decreases in nitrogen fertilizer use over the same period.
- Increases in pollution from this practice with regards to literature were not identified. Anecdotal evidence of producers increasing their nutrient application rates was considered to be inconsequential Bay-wide and would be limited to producers using commercial fertilizers too conservatively based on the cost, was less of a consideration.
- The panel discussed and agreed that the change in manure mineralization estimates of manure through subsequent LGU agronomy guide publications added a significant amount of conservativeness to the efficiency estimate. Through the period of agronomy guides reviewed, annual nitrogen mineralization from animal manure used applied to land increased.
- The Panel was careful to exclude effects from other practices in combination with CGNAM like timing and placement and especially manure management structures by using best-case-scenario considerations included in the model and many scientific papers and based the effectiveness solely on LGU recommendation changes over time.

Comments on References

- The references were discussed in Panel calls and determined to have consistent enough results to warrant model runs used to determine the interim efficiencies proposed.
    - The Coale (2000), Angle and Ditsch data were summarized into charts for the panelists to compare side by side with consistent results. The Angle results were slightly lower, but mixed in other BMPs in a different season that were expected to yield results in the magnitude and direction presented when compared to Coale, Ditsch and anecdotal summaries of Jemison, van Es and Sogbedji.
    - Considerations:
        - Data was higher than current CBPWM.
        - Results were multi-year and should reflect an average of this annual practice.

        - Leaching or soil-test nitrate were evaluated as edge of field loss and this was compared to CBPWM edge of stream loss (consistent with efficiency estimates) on a BPJ basis.
        - Anecdotal evidence from Jemison paper was presented by Doug Beegle to the Expert panel in a conference call. The discussion was recorded in meeting minutes. Preliminary evidence from van Es and Sogbedji was deemed sufficient and findings are reported in Appendix A.
    - Unpublished data had been presented and was given the same weight as peer reviewed journal articles and dissertation data.

Application of Practice Effectiveness Estimates

- All tiers should be reported in acres and are credited the same across the CBPWM.
- 9.25% total nitrogen (TN) reduction and 10% total phosphorus (TP) reduction from landuses high-till with manure (HWM) and low-till with manure (LWM).
- 5% TN and 8% TP reduction from landuses high-till without manure (HOM), pasture (PAS), hay receiving nutrients (HYM), alfalfa (ALF), and nursery (URS).
- Riparian pasture (TRP) and Hay without nutrients (HYO) are still excluded from being eligible for any form of nutrient management.
- Expired plans and acres not in active plans that didn't follow the plan or could not be verified should not be credited.
- The panel unanimously agreed that the LGU agronomy guide recommendations for corn application rates based on yield through time were a conservative estimate of the application rate differences between real-world Non-NM acres and those acres under a real-world plan consistent with the definition unanimously approved for CGNAM.
- The panel considered only subsurface movement of nitrogen to estimate the nutrient reduction benefit of a nutrient management rate on corn and used model exercises to estimate edge of stream phosphorus benefit on all HWM landuse crops for CGNAM as well and N and P benefits on the other aforementioned landuses and their associated crops.
- The Panel discussed that coarser, well drained soils are more susceptible to nutrient loss, even under nutrient management type BMPs.
- The Panel approved continued use of the Enhanced NM and Precision/Decision Ag at the current effectiveness and under the current definitions, but cited concern over the inconsistent interpretation of those BMPs by reporting authorities.
- Approved NM practice efficiencies should be credited in this order: Enhanced Nutrient Application Management, Decision/Precision Ag, CGNAM. This order allows the CBPWM to credit more effective practices before acres available for any nutrient management practice are consumed in the model.

Temporal Considerations

- CGNAM is intended to be represented as an annual practice. All active plans, whether single or multi-year plans are intended to be represented as active and on the ground in all the years it can be verified.

- The Expert Panel intends to yield to the newly created Agricultural Management Plan Expert Panel for developing guidance on how to verify nutrient application management BMPs.

Practice Limitations

- The Panel was careful to exclude effects from other practices in combination with CGNAM like timing and placement and especially manure management structures by using best-case-scenario considerations included in the model and many scientific papers and based the effectiveness solely on LGU recommendation changes over time.
- The panel discussed and agreed that the change in manure mineralization estimates of manure through subsequent LGU agronomy guide publications added a significant amount of conservativeness to the efficiency estimate. Through the period of agronomy guides reviewed, annual nitrogen mineralization from animal manure used applied to land increased.

Modeling Considerations

- NM landuses are eliminated as the means for crediting NM.
- Non-NM landuses are to be used as the baseline for applying the approved efficiencies.
- Approved NM practice efficiencies should be credited in this order: Enhanced Nutrient Application Management, Decision/Precision Ag, CGNAM.
- Verification considerations were discussed and the discussion has been deferred to its own expert panel established by the AgWG on September 29, 2013.
- The panel commented that verifying active plans in compliance with the approved definitions presents unique challenges compared to BMPs that are visibly implemented.
- Acres not reported under a tier of NM, should be simulated as P5.3.2 CBPWM default non-NM.

Practice Monitoring and Reporting

- All NM tiers are available for reporting to all jurisdictions that have agricultural acres in crops mapped to an agricultural landuse. This condition currently exists for every state in the Chesapeake Bay watershed. The Panel indicated that all three NM tiers likely have acres available for credit in every state.
- The Panel is prepared to consider comments from the Agriculture (AgWG) and Watershed Technical workgroup (WTWG) as well as the Water Quality Goal Implementation Team (WQGIT) before final approval through on-going conference calls.
- The Panel commits to continue working on interim efficiency estimates for FLNAM and ANM after the comments related to CGNAM are addressed and approved by the WQGIT.

Data Gaps and Research Needs

- Research relating edge of stream nutrient loads to leaching or edge of field nutrient losses would be valuable to fill a gap the panel used their BPJ collectively.

- Documentation of efforts related to verifying all NM plans would be useful to develop verification protocols for all three NM tiers, but especially CGNAM.
- Data showing the temporal increase in corn grain yields resulting from genetic improvement related to the apparently steady nitrogen fertilizer use over the same period.

Attachments

- AgWG NM report developed by Tetra Tech.
- Appendix A: Residual Soil Nitrogen related to Nutrient Applications and Yield Estimates
- Appendix B: Approved NM Expert Panel Conference Call Minutes
- Appendix C: Technical Requirements for Tier 1 Nutrient Management

References

Angle, J.S., Gross, C.M., Hill, R.L. and McIntosh, M.C. (1993). Soil Nitrate concentrations under corn as affected by tillage, manure and fertilizer applications. *Journal of Environmental Quality* 22, 141-147.

Coale, F.J. 1995. Plant nutrient recommendations based on soil tests and yield goals. Agronomy Mimeo No. 10, Coop. Ext. Serv. and Agronomy Dept. Univ. MD, College Park, MD.

Coale, F. J. 2000. Effect of crop rotations on the fate of residual soil nitrogen in Maryland grain production systems. Final Project Report, MGPUB Grant No. 98022. Maryland Grain Producers Utilization Board, Edgewater, MD.

Coop. Ext. Serv. 1981. Fertilizer Recommendations, sheet 3, corn for grain on medium textured soils without manure. Univ. MD Coop. Ext. Serv., College Park, MD.

Ditsch, D.C., M.M. Alley, K.R. Kelley, and Y.Z. Lei. 1993. Effectiveness of winter rye for accumulating residual fertilizer N following corn. J. Soil and Water Conservation 48(2): 125-132.

Ditsch, D. C. *Fate of 15N-depleted Fertilizer N in a Corn-rye Cropping Sequence: Plant Uptake and Soil Distribution*. Virginia Polytechnic Institute and State University, 1991.

Jemison, John M., and Richard H. Fox. Nitrate Leaching from Nitrogen-Fertilized and Manured Corn Measured with Zero-Tension Pan Lysimeters. *Journal of Environment Quality* 23.2 (1994): 337. *CrossRef*. Web. 23 Sept. 2013.

Ketterings, Q.M., S.N. Swink*, G. Godwin*, K.J. Czymmek, and G.L. Albrecht* (2005). Maize silage yield and quality response to starter phosphorus fertilizer in high phosphorus soils in New York. *Journal of Food, Agriculture and Environment* 3: 360-365.

Ketterings, Q. M., Czymmek, K. J. and Swink, S. N. 2011. Evaluation methods for a combined research and extension program used to address starter phosphorus fertilizer use for corn in New York. *Can. J. Soil Sci*. 91: 467-477.

Sogbedji, J.M., H.M. van Es, C.L.Yang, L.D. Geohring, and F.R. Magdoff. 2000. Nitrate leaching and N budget as affected by maize N fertilizer rate and soil type. Journal of Environmental Quality 29:1813-1820.

Swink*, S.N., Q.M. Ketterings, L.E. Chase, and K.J. Czymmek, and J.C. Mekken* (2009). Past and future phosphorus balances for agricultural cropland in New York State. *Journal of Soil and Water Conservation* 64(2):120-133.

van Es, H.M., K.J. Czymmek, and Q.M. Ketterings. 2002. Management Effects on Nitrogen Leaching and Guidelines for a Nitrogen Leaching Index in New York. Journal of Soil and Water Conservation 57(6):499-504.

Appendix A:
Residual Soil Nitrogen related to Nutrient Applications and Yield Estimates

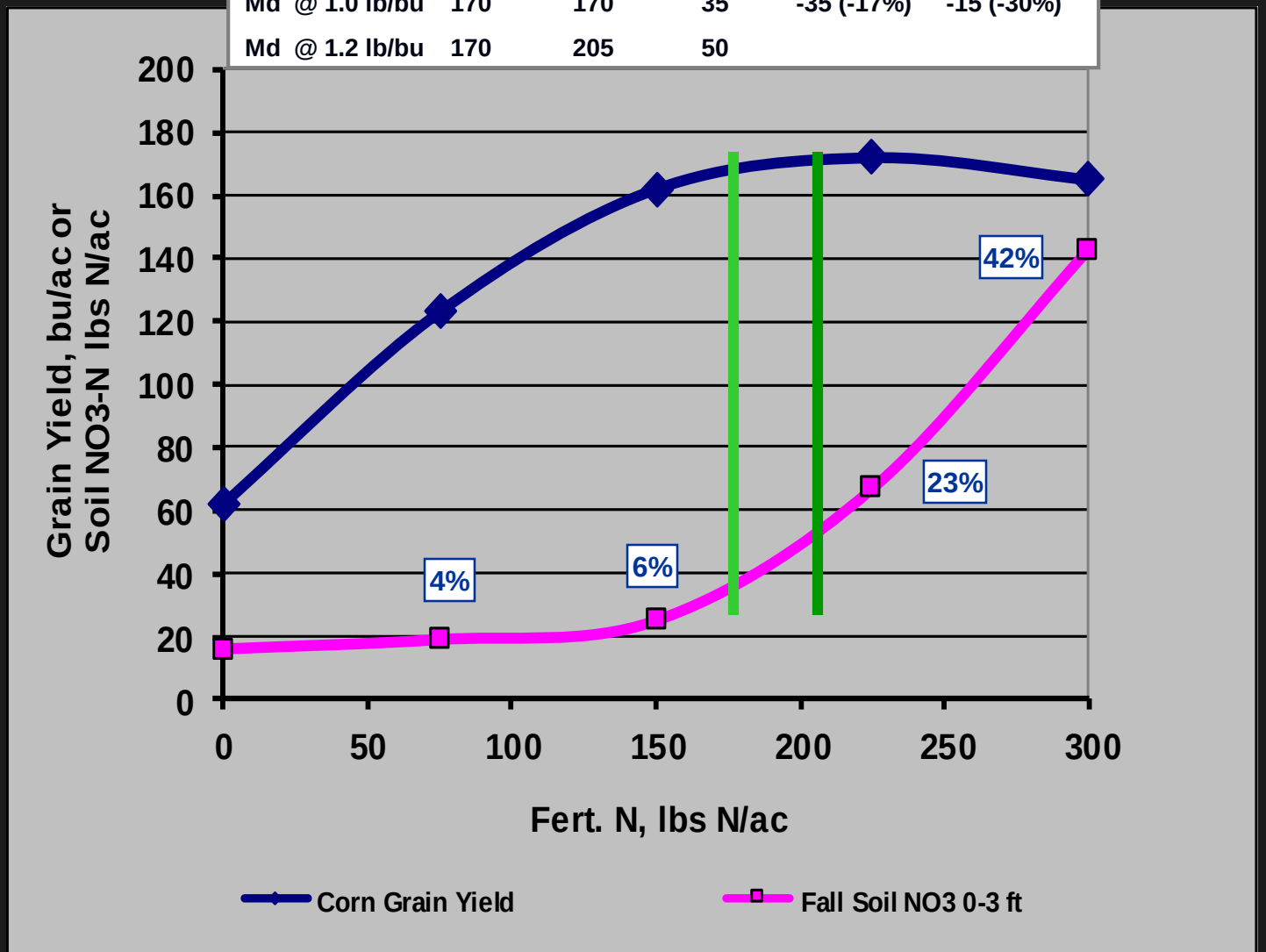
NM Expert Panel 9.23.13

What's the Link between Basic NMP & the Environment?

(Adapted from Coale et al., 2000)

Cont. Corn, no CC, 3-yr study, Mattapex silt loam, Lower Eastern Shore

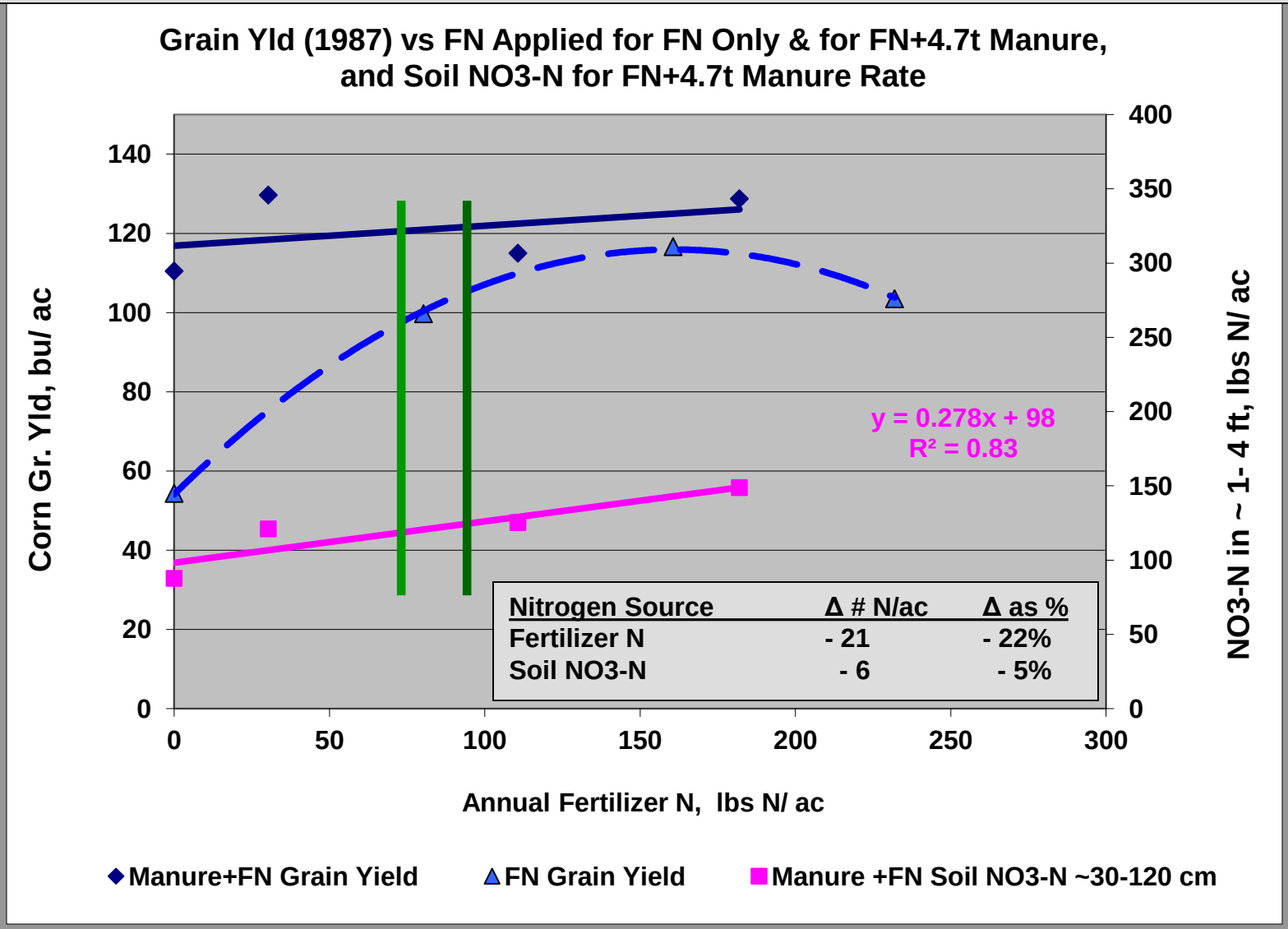
	Exp. Yld	lbs FN	Fall NO3-N	Δ FN	Δ Fall NO3-N
Md @ 1.0 lb/bu	170	170	35	-35 (-17%)	-15 (-30%)
Md @ 1.2 lb/bu	170	205	50		



MD Piedmont, 3rd Yr of FN vs 4.7t Solid Dairy Manure, Cont. Corn, Avg over NT & PT

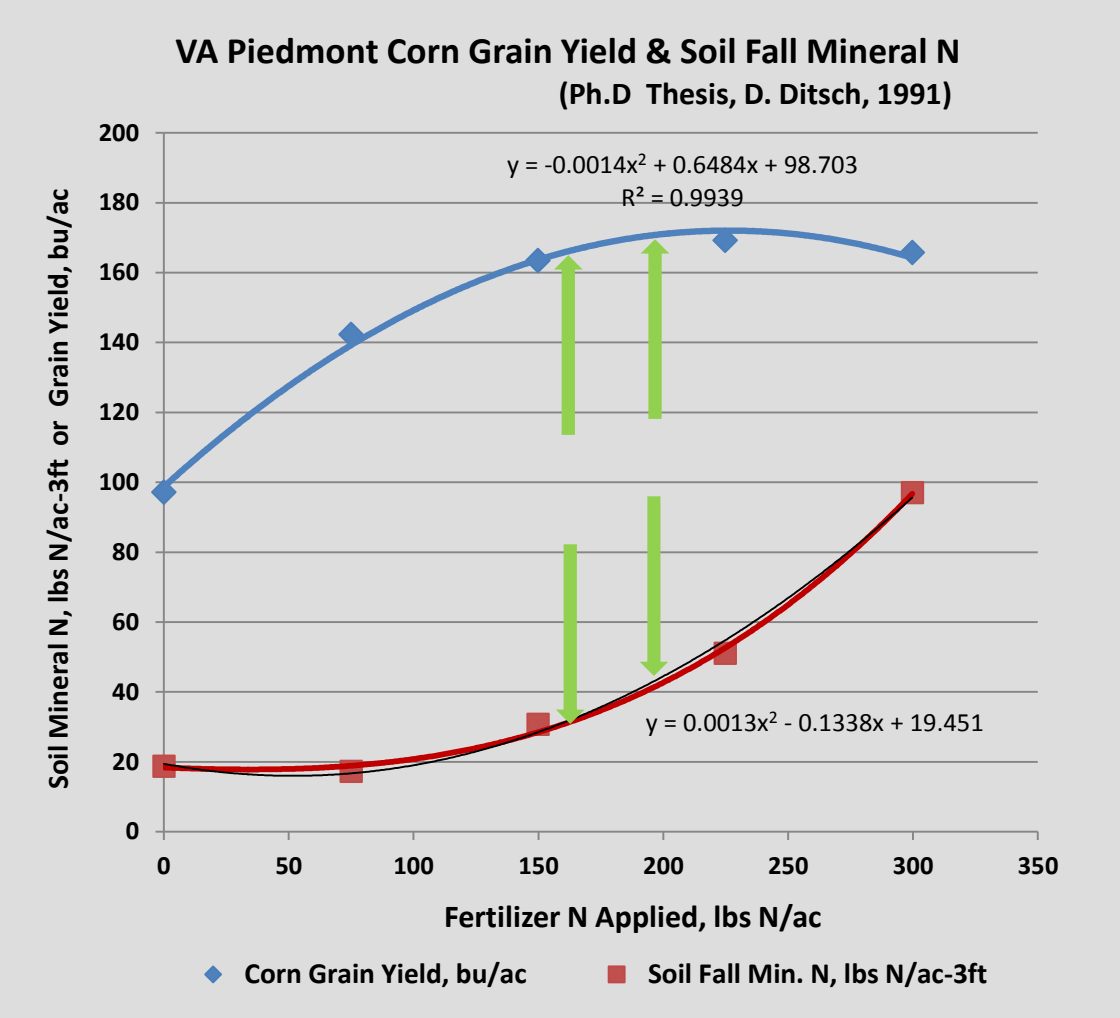
Angle, Gross, et al. 1993. JEQ 22:141-147

Description of Manure N Management System	Expt. Yld.	N for Yld	Man Credit	FN Remainder
1985: 25% Min. rate & no residual N credits	125 bu/a	125 # N/a	30 # N/a	95 # N/ac
1995: 35% Min. rate & 2yrs residual N credits	125 bu/a	125 # N/a	51 # N/a	74 # N/ac



VA Data – Wade Thomason

	N rec		
Yield goal, bu/ac	1 lb N/bu	1.15 lb N/bu	1.2 lb N/bu
165	165	189.75	198
	Est soil residual N, lb/ac - 3ft		
	32.8	**40.9**	**43.9**
RSN decrease lb/ac, 1.2 to 1.0	11.2		
RSN decrease %, 1.2 to 1.0	25%		



References and Summaries of Representative Corn Nitrogen Studies from New York State

Greg Albrecht – August 2013

The following references and summaries are a representative sample of the corn nitrogen studies performed in New York State where yield, end of season N, and beginning of season N were measured across various rates of N (manure alone, manure + fertilizer, or fertilizer alone). The relationship between N rate/supply, yield, end of season residual nitrate, and beginning of season nitrate is fairly classic and consistent across all studies: scenarios that lead to higher residual soil nitrate levels at corn harvest result in higher N losses via leaching (better drained soils) or denitrification (more poorly drained soils) by the next spring. When producers engage in nutrient management, other sources of N (soil N, prior manure N, sod N, soybean N, etc.) are taken into account as are often more realistic yield potentials, thereby matching supplemental manure and fertilizer rates more closely to actual remaining crop need and reducing residual fall nitrate levels.

- Sogbedji, J.M., H.M. van Es, C.L.Yang, L.D. Geohring, and F.R. Magdoff. 2000. Nitrate leaching and N budget as affected by maize N fertilizer rate and soil type. Journal of Environmental Quality 29:1813-1820.
- van Es, H.M., K.J. Czymmek, and Q.M. Ketterings. 2002. Management Effects on Nitrogen Leaching and Guidelines for a Nitrogen Leaching Index in New York. Journal of Soil and Water Conservation 57(6):499-504.
- Cornell University Nutrient Management Spear Program: http://nmsp.cals.cornell.edu/projects/NitrogenforCorn.html
- Note the data described for reference #3, below, is a sub-data set from the N management trials described on the link, above.
- Cornell University Nutrient Management Spear Program: http://css.cals.cornell.edu/cals/css/extension/cropping-up/archive/loader.cfm?csModule=security/getfile&PageID=1095460

References and Summaries of Representative Corn Nitrogen Studies from New York State

Reference	Research Trial Description	Years	N Rates (lbs/ac)	Yield [3]	Fall NO3-N (ppm)	Delta Fall NO3-N (%) Relative to Nutrient Mgt. Rate[1]
1, 2	Corn N rate, yield, and N loss trial (plot sized lysimeters) on both a clay loam and a loamy sand.	1993, 1994 (2nd, 3rd yr corn after sod)	20	a	3 (clay), 5 (sand)	0,0
			90[1]	b	3 (clay), 6 (sand)	----------
			120[2]	b	8 (clay), 12 (sand)	63,50
3	Corn N rate/loss study nested in a broader N, P, and K management field trial on a silt loam (included a wide range of weather years).	2001-2005 (dry '01, '02, & '05; wet to very wet '03 & '04)	20 (starter only)	a	5,5,5,5,5	-80,-86,-58,-29,-77
			Starter + 100[1]	b	25,35,12,7,22	----------
			Starter + 150[2]	b	30,48,10,10,40	17,27,-20,30,45
			Starter + 200	b	50,58,22,25,45	50,40,45,72,51
4	Dairy manure application rate (spring injection with no starter fertilizer) and corn yield trial with intensive N, P, and K sampling on a channery silt loam.	2010-2012	9,000 gal/ac[1]	a	16	----------
			12,000 gal/ac[2]	a	22	27
			15,000 gal/ac	a	25	36

References and Summaries of Representative Corn Nitrogen Studies from New York State

[1]Nutrient management rate based on Cornell University Crop Nutrient Guidelines

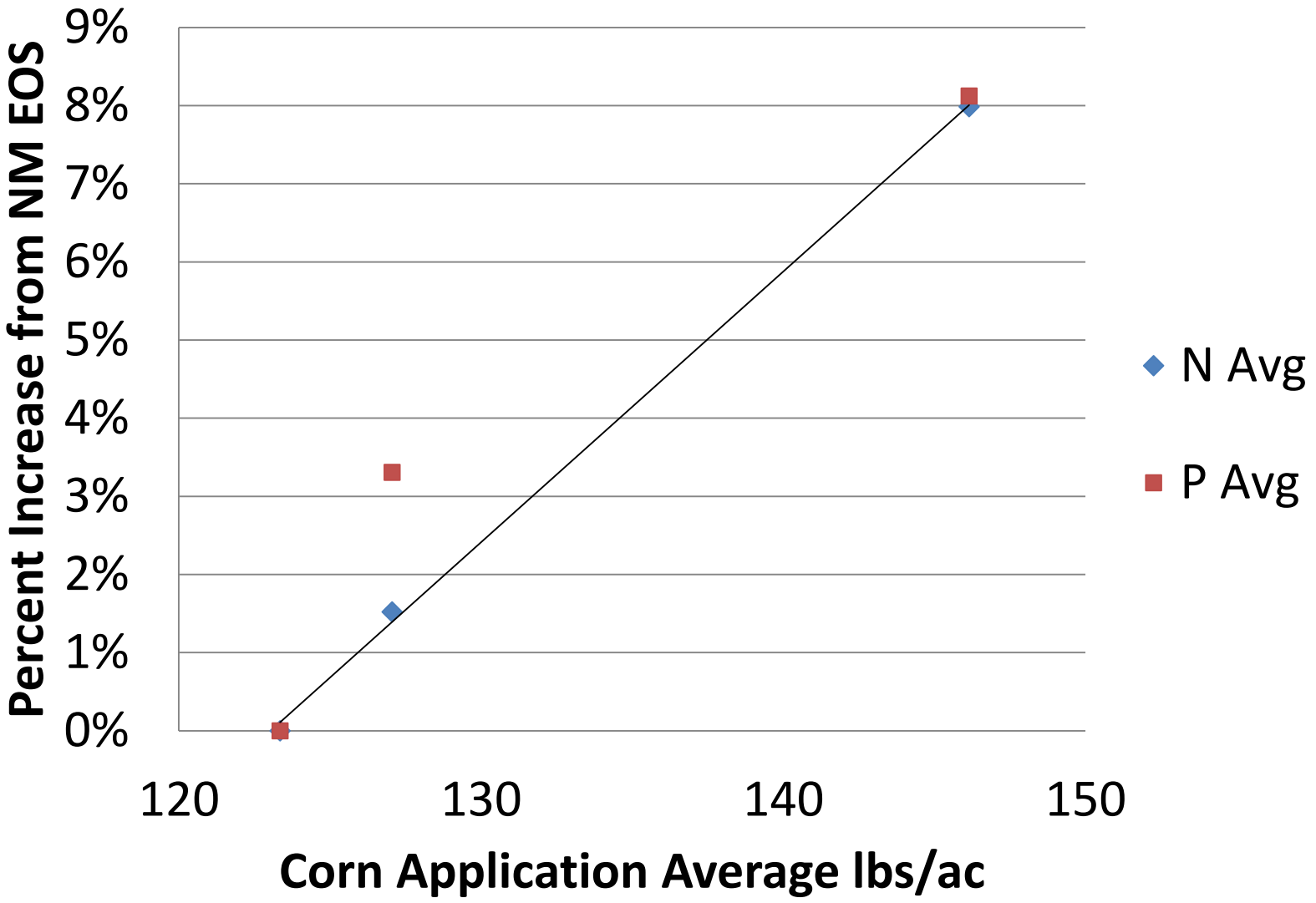
[2]Reasonable characterization of the pre- or non-nutrient management condition.

[3]Average values with different letters are statistically different (alpha = 0.05)

Analysis Adjusts Corn Application Rates

- 2007 model year was used to approx moderate level of other BMPs on landscape
- Corn is in a row crop landuse with scores of other Ag Census crops
  - 2.7m of 3.4m row crop (soy, wheat, etc) acres
- 2.7m of 6.7m ag acres in this analysis
  - Row crops, alfalfa, all hays
  - Excludes pasture, animal areas, nursery

Chesapeake Bay Application Rate Sensitivity Run



Among just row crops:

- N and P EOS loss increase 9.25 and 10%, respectively from NM to 120% N app rate on corn.

Tier 1 – Approved

Pros

Efficiency approach

Is well supported by research

Is simple and easily implemented

Cons

Could require change in reporting to separate acres of NM for pasture

Maintains model based approach to efficiency on many acres (less than Opt A)

- Use research derived efficiencies to decrease N and P load from non-NM *row crop* Ag acres 9.25 & 10%, respectively, Bay-wide.
  - Landuses: HWM, LWM
- Use model derived eff. (5 & 8%) for other landuses.
  - Pasture, nursery, alfalfa, hays, specialty crops.

Appendix B:
Approved Nutrient Management Expert Panel Conference Call Minutes

Nutrient Management Expert Review Panel
Conference Call Meeting Notes
March 27, 2013

1. Mark Dubin, Panel coordinator, welcomed everyone to the call and introduced the new panel chair, Chris Brosch (VA DCR).
    a. Dubin: October 1 is the current deadline for draft recommendations to the AgWG for obtaining modifications to the P5.3.2 models for the 2013 progress reporting. (decisions by the WQGIT have since revised this schedule to early September at the latest)
    b. Chris Brosch introduced two new panel members; Rory Maguire (VT) and Kim Snell-Zarcone (Conservation PA)

2. Steve Dressing (TetraTech) presented the reviewed the final Nutrient Management Report compiled for this panel and the Agriculture Workgroup, highlighting the current state strategies for nutrient management.
    a. Dubin recommended including information on the new Maryland P management tool (Frank Coale and Josh Mcgrath) as an addendum to the report.

ACTION: Peter Kleinman will provide P Index presentation and other materials to be added to the panel report.

3. Matt Johnston, UMD, presented an overview of the modeling framework with special emphasis on BMP pathways available for recommendations in Scenario Builder. (Matt's presentation)
    a. Clarify how the model counts stored nutrients?
    b. Jeff Sweeney: Model is calibrated to monitoring data, so it is capturing discharge from soils, not capturing the quantified connection between historic applications and storage and nutrients in streams.
    c. Johnston reviewed the BMP options:
        i. Land Use change (can change tillage practices, application rates, application timing)
        ii. Efficiency (reduce amount of nutrients from runoff, or output)
        iii. Nutrient source reduction (shrinks the amount of nutrients available for application to crops, or input)
        iv. Watershed load source reduction (e.g. stream restoration, lower the edge of stream nutrient loads to the simulated river)
    d. Johnston clarified that land use revisions won't take effect until Phase 6.0 model, but this shouldn't prevent this group from making recommendations.

e. Brosch noted that placement type BMPs are currently tracked separately from NM, and not necessarily a charge of the panel.
f. Johnston noted that the model has multiple applications during growing season for each crop, and include varied amounts.
g. Greg Albrecht: For Phase 6.0 is there an opportunity for a sub-calibration from fertilizer sales stats?
h. Dubin: Yes, fertilizer data will be part of the discussion at the Ag modeling workshop hosted by the Ag Workgroup in late May
i. Johnston reviewed NM plan definitions
    i. Current NM plan is a land use change. (Panel tasked with providing new definitions of NM.)
    ii. Current Enhanced NM is an efficiency applied after the NM land use change.
    iii. Current decision Ag, no clear definition was ever approved. (task for this panel) A current efficiency BMP reduces runoff of nitrogen applied after the NM land use change.

4. Brosch outlined the panel's next steps required to develop a recommendation report by Fall of 2013 for AgWG and partnership review and approval.
    a. Purpose of the panel is to bring nutrient management up to date in the model.
    b. Panel will evaluate the way NM works on the ground across the bay watershed, come up with recommendations over the next year in terms of how NM should look in the model. (Phase 6.0 and Phase 5.3.2)
    c. Assignment from AgWG for 5.3.2 short term
        i. N based NM (credit difference)
        ii. If possible P based management
    d. Assignment from AgWG for Phase 6.0
        i. N based NM
        ii. P based NM
        iii. Enhanced NM
        iv. Precision/Decision Ag

ACTION: Complete doodle poll to schedule next call April 8th or 9th

Participants
Chris Brosch- VA
Mark Dubin – UMD
Matt Johnston – UMD
Steve Dressing – TetraTech
Don Meals-TetraTech
Adam Orndorff-TetraTech
Jason Dalrymple-WV
Kim Snell-Zarcone – Conservation PA
Greg Albrecht -NY
Tom Bruulsema

Rory Maguire- VT
Curtis Dell-USDA
Emma Giese-CRC
Tim Sexton- VA
Jack Meisinger-USDA
Larry Towle-DE
Ken Staver-MD
Aaron Ristow-NY
Peter Kleinman-USDA-ARS
Glenn Carpenter-USDA
John Majsztrik-UMD

Nutrient Management Expert Review Panel

Conference Call Meeting notes

April 9, 2013

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1. Chris Brosch, Panel Chair, welcomed everyone to the call and confirmed participants.

2. Matt Johnston provided a review of the different types and levels of nutrient management by state through the model's reporting period.

    a. All land uses except for nursery and vegetable production are available for nutrient management in the current model
    b. Johnston clarified that phosphorus based plans are currently not used in 5.3.2 (although they can be). There are current data limitations on P soil reserves, and P-based NMP's are not reported separately by any jurisdictions.
    c. A suggestion raised to better represent Nutrient Management P-based plans for Phase 6.0 with a P index included.

3. Chris Brosch led a discussion on the BMPs for the panel to define in the near term of Phase 5.3.2 of the CBPO Watershed Model, as well as the long-term goals for BMPs to be credited in the Phase 6.0 Watershed Model.
    a. An approved report in October allows incorporation into the model for 2013 progress reporting. In order to achieve this deadline, the panel will need to have these discussions and recommendations for a draft report by August 2013.
    b. PA: Suggestion for the panel to define the Nutrient Management practices that are relevant and reportable.
    c. Brosch: If N based NM is tracked, reported and credited in the current model, should that definition be the same as the final Phase 6.0 recommendations, or would it be different?

d. NY suggested that Phase 6.0 recommendations could be similar for nitrogen but more extensive for phosphorus.
e. MD noted their need for improved NM land use representation; e.g. non-eligible land uses.
f. Question raised about why states do not report P based management?
g. Brosch: Tracking P separately has not been done before, therefore an extra work load, and would be a separate efficiency.
h. The current definition: a Nutrient Management plan minimizes nutrient loss while maintaining yield.
i. MD noted that placement and timing should be separated in the definition.

4. Phase 5.3.2
    a. Brosch called for a motion that a new definition is needed, reflecting some level of N-based nutrient management and crediting.
        i. PA motioned, NGO second, none opposed.

DECISION: Panel will refine the N based nutrient management definition for Model Phase 5.3.2

5. Phase 6.0
    a. NY recommended a three tiered approach
    b. Dubin recommended developing a draft of definitions, for review by the panel.
    c. NGO motioned drafting a three tiered approach for both current and Phase 6.0 model recommendations, NY second. None opposed.

DECISION: Chris Brosch will distribute a draft of three tiered approach definition to the panel.

ACTION: Chris Brosch will report these decisions at the AgWG meeting on Thursday, April 11.

6. Mark Dubin: The information obtained on the new Maryland P management tool, and the regional SERA-17 work on a revised P Index, is currently being developed as addendum document as decided during the last panel call.

Adjourn

Participants
Chris Brosch
Aaron Ristow
Curtis Dell
Don Meals
Doug Beegle
Greg Albrecht
Kim Snell-Zarcone

Steve Dressing
Tom Bruulsema
Barry Evans
John Lea-Cox
Jack Meisinger
John Majstrik
Jason Dalrymple
Anne Marsh
Wade Thomason
Doug Goodlander
Jim Cropper
Matt Johnston
Emma Giese
Mark Dubin
Ken Staver
Tim Sexton

Nutrient Management Expert Review Panel

Conference Call Minutes

May 6, 2013
2:30 to 4:30 PM

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1. **Welcome, Introductions, Minutes Approval**
    - Panelists look over March and April minutes, note any corrections to Emma, minutes will be approved at next call

2. **Nutrient Management definitions**
    - The Panel will discuss benchmarks in nutrient management definitions as proposed last meeting. See below for working draft.
    - Bruulsema: Recommend not repeating management in the definition of Basic Nutrient Management, include the 4Rs (11:00)
    - MD: more detailed from a mechanistic standpoint
    - Brosch: the 4 pillars of NM are newer than NM itself
    - NRCS:
    - USDA: Jack on the record [16:00] for providing data
    - Brosch: move (1) (2) (3) currently under 590NM to Basic NM?
    - NRCS: offered to review a related Adaptive Management
    - Mark Dubin: Noted that title of 'Nutrient Management' causes confusion between the BMP and a NM plan
    - USDA-ARS: should animal management be included in definitions?
    - NY: For simplification recommend limiting the definition to manure [36:00 two things]
    - MD: Recommend the crediting to be progressive

- Jeff Sweeney: Noting the need for reporting from jurisdictions
- USDA: Does CEAP collect information that would help define NM
- Brosch: Recommendations from Expert Panel to push record keeping as well as update and approval. Perhaps each tier could have a few boxes to check for crediting purposes (3 out of 4 needed for credit or similar)
- Dubin: in the past, more credit given for more boxes checked
- USDA: recommend additional specifics for each definition
- Brosch: intended to work in all the comments heard during this discussion today, then discuss the draft at another call. An alternative would be a smaller working group, that could achieve an initial draft for review by the overall panel. Titles will be addressed as well.

ACTION: Chris Gross, Tim Sexton, Mark Dubin and Chris Gross will establish an initial draft

3. Nutrient Management Options in P5.3.2 WSM

- Chris Brosch, Matt Johnston and Jeff Sweeney will answer questions and guide a discussion on panel options for credit forms of nutrient management in the current phase of the Watershed Model in preparation for a draft recommendation.
- [1:06]
- Johnston noted the option of changing the 1st definition to an efficiency, and to redefine
- Brosch: millions of acres of NM have been credited in the past. Credit was based on recommendations from a different panel. Through the end of 2005, are unchangeable.
- If new nutrient management plans are written by a state, they may take 3 years to be fully incorporated
- Brosch: will take panel discussion back to CBP modelers
- Brosch; 2 options that states were already asked to choose between for most recent WIP planning, current credit for NM (amount of manure in a county est.) [1:21]
- USDA noted that one efficiency estimate for entire state would not be accurate
- Brosch: Any interest in using outside models to answer the question of whether effectiveness of nutrient management should change regionally?
- Sweeney clarified that version 6.0 has very few limitations, including that the sates will have to be able to report it. More constraints with the current version, but not a concern based on discussion today.
-

ACTION:

Adjourn

Working Draft Definitions

1. Basic Nutrient Management: documentation of manure and fertilizer management activities in accordance with basic state extension recommendations.

2. 590 Nutrient Management: implementation of the NRCS 590 Nutrient Management Standard. That is, following nutrient guidelines, including: (1) standard, realistic yield goals (per soil type); (2) credit for N sources (soil, sod, past manure, and current year applications); (3) P and K recommendations based on soil tests and the sufficiency method (not crop removal); (4) soil erosion controlled to T per RUSLE2; (5) fields assessed for leaching and runoff risk with conservative tools (N Leaching Index and P Runoff Index); etc.

3. Adaptive Nutrient Management: implementation of the NRCS 590, plus on-going management to improve nutrient use efficiency beyond initial implementation, including tracking performance and managing manure and fertilizer according to tools such as ISNT, CSNT, Mass Nutrient Balance, etc. This practice could also include the use of technology like variable rate applications, satellite guidance systems and/or infield monitoring beyond ISNT and CSNT.

Participants

Chris Brosch, VT/VADCR
Matt Johnston, UMD
Jeff Sweeney, EPA
Mark Dubin, UMD
Tim Sexton, VA
Greg Albrecht, NY
Doug Goodlander, PA
Barry Evans, PSU
Pete Kleinman, PA
Curtis Dell, USDA
Kim Snell-Zarcone, Conservation PA
Larry Towle, DE
Jason Dalrymple, WV
Jack Meisinger, USDA
John Majsztrik, MD
Tom Bruulsema, IPNI
Steve Dressing, TetraTech
Chris Gross, USDA-NRCS
Ken Staver, UMD

Nutrient Management Expert Review Panel

Conference Call Minutes
June 6, 2013
10:00AM-12:00PM

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1. **Welcome, Introductions**

2. **Nutrient Management Definitions**
    - Mark Dubin: led a discussion of the draft Nutrient Management definitions

Basic Nutrient Management

- Matt Johnston: Recommend clarifying the definition to 'basic nutrient *application* management'
    - Dubin: This request has been raised in the AgWG as well
- Suggestion to add 'annual' to the definition
- NRCS: How to handle erosion and erosion control in the definition?
    - Dubin: Nutrient application management, if that is what is decided on, is separate from erosion control. Erosion would be addressed through crop residue management systems (separate BMPs in the model).

590 Nutrient Management

- Brosch: Erosion control should be part of 590 Nutrient Management definition, because it is incorporating all the practices to give benefit in a way that hasn't been modeled before. The basic tier is replacing all the NM pre 2006, the 590 NM was meant to address and give credit to the extra efforts post 2006.
- Johnston: Technical and reporting questions would need to be addressed for partnership approval (how to avoid double counting).
- Dubin: What are the panel's thoughts on stackable vs. unstackable BMP?
- NRCS: The definition for 590 Nutrient Management should include erosion control. Some flexibility regarding stackability and how it is credited as a BMP.
- Brosch: To count 590, would have to include erosion control. 590 gets better N and P reduction because of everything working in unison, which is why it is a better standard. Just need to give credit for the nutrient application management part, which the panel suggests should be higher than basic nutrient management because of consideration for P loss pathways.
- Dubin: The definition will need to clearly state the separate crediting for reporting through conservation planning and BMPs.
- Brosch: The credit we're choosing will be just for the application change.

- Brosch: Panel's thoughts on the method presented?

    - Note that some conservation practices are systems rather than stand alone practices. Agree that application of nutrients is a separate practice.
    - The title would then be '590 Nutrient Application Management'.
- Dubin: If panel accepts this definition and allows stackable BMPs for conservation planning and residue management systems, is it possible to tease out the values of 590 from the application system?
- NY: Recommend a separate category for improved tillage.
- Brosch: Giving credit for manure practices would be an additional credit not currently in the model.
- Johnston: Reduced N and P from model runs is going to have multiple causes, panel will need to determine how much of the reduction is due to application management.
- VA: Recommend giving credit for split applications.
    - Johnston: Efficiency value would achieve this (reduced runoff due to application rate and timing).
- Dubin: If APEX runs generate possible values, take a percentage of the reductions to determine 590 (stack other practices on top of it) OR take the values as they are and assume incorporation of other BMPS?
- VA: What is the timeframe for these recommendations?
    - Dubin: ARS/NRCS Post-doc will be available in 3 months to assist panels, which will be too late for Phase 5 recommendations
- Dubin: Given the structured timeframe for completing Phase 5 recommendation in time for 2013 progress run, would need draft panel recommendations in July in order for the AgWG to review them in August/September.
    - VA: Recommend submitting 5.3.2 recommendations in time for 2014.
- NY: How would the new basic nutrient management definition fit in with the existing NM definitions in the model?
    - Dubin: Would create an efficiency BMP for NM, panel could then submit 590 and adaptive definitions as part of later recommendations.
- NY: How to match the current land use with the proposed efficiency?
    - Johnston: The efficiency version was already built into SB, which mimicked the land use change version of the BMP, and could be used for 2013 Progress Runs.
    - Dubin: The value could be developed as an interim measure, however it would have to be approved by the panel and the full partnership.
- Brosch: Efficiency percentage for N and P would need to be calculated at different geographic locations for the panel to review.
- Dubin: Noted that non-traditional acres (nursery, orchards, etc.) are not eligible currently in the model because there is no land use to represent them as NM is currently represented as a land use change. Some jurisdictions have significant acreage in nurseries, with a high loading rate

and no opportunity for reductions. Recommend deciding how to approach this issue in time for 2013 progress.

- Johnston: The interim value has some questions that would need to be answered by the panel, will look at the modeling options for this method, bring to the panel for review on June 27th (next meeting).
- USDA: Recommend working backwards, identify the largest problem and work on that one.
- Brosch: Request that the modelers highlight the most important issues
- Johnston: Is the panel comfortable in 2013 maintaining current definitions of enhanced and decision Ag?
    - Brosch: Address at next meeting, may not be worth redefining them given the short timeframe.

DECISION: Panel recommends Basic Nutrient Management as an efficiency at the Scenario Builder Growth Region scale.

Adaptive Nutrient Management

- Dubin: How does the panel recommend defining the line between tier 2 and tier 3?
    - USDA: Tier 3 if there is a year to year connection (in field yield strip test) between nutrient management.
    - Recommend a checklist, if for example 4 out of 8 boxes checked promotes to a tier 3.
    - Brosch: Enough items above and beyond 590 would be tier 3.
    - VA: Noted that 590 already has a multiyear requirement.
    - NY: agrees with VA.
    - Field monitoring, higher level of soil testing, or annual sampling (rather than 3 or 5 year sampling).
- Brosch: Is anyone reporting what would be in the tier 3 definition?
    - VA: Approx 15,000 acres could be reported in VA.
    - Dubin: MD, PA, VA, DE acres exist.
- Brosch: Are they tracked and reported?
    - Dubin: MD has been for several years.
- Brosch: Recommend writing a definition that matches known existing programs.
- Dubin: Recommend pulling information from these existing programs, to bring to the panel.
- Brosch: Tim and Mark will bring back list of programs in MD and VA to Chris and Chris, to rewrite the definition matching the programs.
- Johnston: Possibility to incorporate this definition into enhanced NM or precision/decision Ag. For 2013 progress?
- Brosch: These definitions have different meanings in different states, hesitate to match tiers to the existing BMPs.
- USDA: Note that precision/decision has little or no efficiency improvements in the real world.

ACTION: Tim and Mark will provide existing programs in MD and VA to Chris and Chris, to rewrite the definition matching the programs.

3. **Nutrient Management Crediting**
    - Dubin: Modeling team will report back to the panel at next meeting on crediting options. What scale should be provided?
        - Brosch: Propose using the growth region scale, basin level also helpful (baywide level for comparison).
        - USDA: Growth regions are useful in that they capture the regional cropping differences
        - NRCS: Note that APEX is a field scale model, will need to be 'scaled up'.

Adjourn
Next meeting: June 27th 10:00-12:00

Participants
Jim Cropper, NE Pasture
Jason Dalrymple, WV
Mark Dubin, UMD
Emma Giese, CRC
Chris Brosch, VT-VADCR
Greg Albrecht, NY
Matt Johnston, UMD
Chris Gross, NRCS
Steve Dressing, TetraTech
Tim Sexton, VA
Jack Meisinger, USDA

Nutrient Management Expert Review Panel

Conference Call Minutes

July 3, 2013
12:00 to 2:30 PM

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1. **Welcome, Introductions, Minutes Approval**

DECISION: Panel approved June 6 minutes.

2. **Nutrient Management definitions**
    - Panel discussed PA comments and working definitions for P5.3.2 recommendation.

- Chris Gross: What is the difference between Basic Nutrient Management and 590 Nutrient Management? And are both definitions needed?
    - Doug Goodlander: Basic NM does not have an N leaching component, erosion control or the full P Index as the 590 NM does.
    - Mark Dubin: Because the current BMP addresses changing nutrient application, and does not address storage or other aspects that are incorporated in state programs, recommend the panel focus on the Nutrient Management application change rather than pulling storage, barnyards and conservation plans into the definition.
- Gross: What was the background for selecting the three tiers?
    - Dubin: Panel was originally charged with determining Nutrient Management application and crediting for both Phase 5.3.2 and Phase 6.0. There are three tiers of Nutrient Management in the current modeling tools, which makes the 590 three tier system easier to incorporate.
- Cropper: Recommend including heavy use areas and barnyards in the definitions, because of their high impact.
    - Johnston: Note that other practices may be addressed by other BMPs in the model.
    - Goodlander: Recommend that if focusing on the field application scenario, the titles of the definitions should be revised. Clearly state that the definitions relate to application.
    - Brosch: Note that the model does have a way to handle heavy, unfenced areas near streams. Based on the panel's discussion so far, the recommendation for Basic Nutrient Management is to addressing application rate. For 590 Nutrient Management, address other aspects of the plans including animal areas.
- Brosch: Should erosion control be in the definitions?
    - Goodlander: If erosion is left out of the definition, should be separate from all the definitions. Recommend focusing on nutrient application management, and having erosion control in a separate plan.
    - Cropper: Note that drainage also contributes to nutrient loading, not just erosion.
    - Gross: Recommend that erosion control be a co-requirement, because for nutrient application management to work erosion must be kept in check.
    - Jack Meisinger (USDA): What are the other BMPs that relate to this definition, such as manure or sediment?
        - Johnston: Pasture grazing: stream access control with fencing; prescribed grazing: animal waste management systems; barnyard runoff control.
- Cropper: Recommend that basic nutrient management does not need timing in the definition.
- Tom Bruulsema: Recommend buildup maintenance rather than sufficiency method requirement in the definitions, because land grant university recommendations are based on buildup maintenance. Also recommend that

the level of documentation define the difference between basic NM and 590 NM.

- Cropper: Is there enough of a difference between basic NM and 590 NM to require a separate definition?
    - Gross: Basic NM defines the rate of application, 590 NM additionally defines form, timing and placement.
    - Bruulsema: Is the intent to give credit for basic nutrient management? Recommend that credit not be given for rate alone.
        - Dubin: Note the limitations for Phase 5.3.2; if no credit is available below 590 there would be many excluded acres. Recommend that the panel define a level of credit for basic nutrient management, which would be lower than credit for 590 NM.
    - Brosch: Result of the previous panel discussion was that the 590 definition accounted for management changes that took effect after 2006.
    - Goodlander: Basic NM plans are written by crop group, where 590 NM plans are field specific.
    - Brosch: Should the definitions then account for spatial specificity?
        - Cropper: Spatial specificity will help with deciding which definition matches.
        - Kim Snell-Zarcone: Recommend considering verification potential, which for all the definitions would require something in writing. Also recommend the spatial component as the definition, and include the 4Rs along with the spatial specificity.
        - Dubin: Spatial specificity is consistent with the HighQ programs as well.
        - Goodlander: Recommend incorporating that the basic definition focuses on the agronomic need of the crop, while higher levels begin to consider environmental concerns.
    - Ken Staver (UMD): Is there a table of N and P application rates?
        - Johnston: There is a table of reductions for enhanced and decision nutrient management. Basic NM is a land use change.
        - Staver: The largest driver of N loss is the rate. Each of the three definitions need to address the rates the model will define.
    - Goodlander: Will the panel be discussing reductions for each defined tier?
        - Brosch: The three tiered approach was approved by the panel several meetings ago. The next step was to define the three tiers, so that someone tracking could easily define them. However, based on the big picture discussion today, the group is not comfortable enough with the current definitions to move forward.

- Brosch: Will re-draft the definitions to include the spatial component. Recommend that the panel approve the definitions at the next call. Is the panel comfortable with three tiers? Is the spatial piece the important distinction? What is the decision about the ancillary practices?
  - Snell-Zarcone: The ancillary practices seem to be pulled out in other BMPs, recommend focusing these definitions on application.
  - Goodlander: Recommend spatial component, and title change to represent application focus. Recommend including the concept that basic is based on crop need, and 590 adds a component of environmental assessment.
  - Brosch: Will remove sufficiency method from the definition.
  - Larry Towle (DE): Support the spatial approach, and address other issues at Phase 6.0.
  - Goodlander: Motion to make the changes stated.
  - Snell-Zarcone: Second the motion.
  - Gross: Recommend including language with levels two and three that explains the ancillary practices are needed for nutrient management to be effective.
  - None opposed.

DECISION: Panel decided that the nutrient management definition will: 1) include three tiers that highlight a difference in spatial specificity, 2) focus on application rate management, 3) take into account the 4Rs and 4) mention ancillary practices for levels 2 and 3.

3. Nutrient Management WSM Run Results

- Matt Johnston led a discussion on results of runs in the current phase of the Watershed Model through time and at different scales, which show what the model simulates the reduction in loads to be as a result of NM.
- Dubin: If converting NM to an efficiency, these analyses can be used to help define the effectiveness values for Phase 5.3.2.
- Johnston: This analysis was run several ways, consistently hit 5-6% reduction for N and 6-7% for P.
- Meisinger: Expect that 5% reduction in N due to NM is an underestimate.
  - Dubin Clarified that this analysis relates to the Basic Nutrient Management definition.
- Beegle: Basic NM probably matches the reductions modeled. The higher tiers of NM have a higher reduction.
- Recommend a data literature search for Phase 6.0 to better define the differences in Nutrient Management over time.
- Brosch: Is the panel interested in assigning a reduction efficiency for acres under basic nutrient management (as opposed to no nutrient management,) and are these numbers reasonable?

  - Goodlander: 5% N reduction from basic nutrient management probably low, would expect NM to be closer to 10% reduction.
  - Recommend that the panel start moving towards efficiency BMPs in Phase 5, and seek additional expertise for the Phase 6.0 recommendations.
  - Meisinger: Recommend use of literature and real world data, not just model runs to make these decisions.
  - Brosch: The recommendation from the panel would be either to let the model calculate nutrient management by the previous method, or to adopt this efficiency value. Nutrient Management should have a positive effect everywhere; and in order not to violate calibration we have let the model choose the number.
  - Towle: 5% reduction makes sense in context of the model, will have to make up the difference in DE with the higher tiers.
  - Goodlander: Can accept 5% reduction for now.
  - Bruulsema: Recommend making the definitions more measurable and understandable.
- Brosch: Panel will discuss definitions and reductions at the next call on July 18th.

Adjourned

Participants

Mark Dubin	UMD
Doug Beegle	PSU
Thomas Bruulsema	IPNI
Jim Cropper	NE Pasture Consortium
Jason Dalrymple	WV-Agriculture
Curtis Dell	USDA-ARS
Doug Goodlander	PA-Agriculture
Chris Gross	USDA-NRCS
Rory Maguire	VT
John Majsztrik	UMD
Anne S. Marsh	Heinz Center
Jack Meisinger	USDA-ARS
Kim Snell-Zarcone	Conservation PA
Ken Staver	UMD
Wade Thomason	VT
Larry Towle	DE-Agriculture
Chris Brosch	VT/VA DCR
Matt Johnston	UMD
Emma Giese	CRC
Steve Dressing	TetraTech
Don Meals	TetraTech

Greg Albrecht	NY

Nutrient Management Panel
Conference Call Minutes

7/18/13
10:00-12:00

1. **Welcome and Introductions**
   - Chris Brosch, chair, welcomed everyone to the call, and confirmed call participants.

2. **Review of Draft Definitions**
   - Chris Brosch led a discussion of panel comments on the proposed draft of Nutrient Management definitions.
   - Please clarify the difference between Tier 1 and 2.
     - Brosch: Tier 2 is at a field scale, while Tier 1 is at crop group scale.
     - Kim Snell-Zarcone: Recommend more prominently stating "fields".
     - Brosch: Will rename title of Tier 1 to "field level application management" to clarify.
   - Ken Staver: Recommend addressing P based Nutrient Management in the definitions.
     - Albrecht: Addressed by P Index in Tier 2.
   - Staver: Recommend that Tier 1 be based on N only management.
     - Brosch: Tier 1 currently allows N based in terms of progress and credit.
   - Recommend that Tier 1, #3 state "recommendations based on soil tests for inorganic plans".
   - Jack Meisinger: Recommend that Tier 1, #4 states: "N based for organic systems".
   - Gross: Suggest adding to Tier 2: "maximizing nutrient efficiency and minimizing risk to the environment".
   - Recommend stating explicitly in Tier 2 that assessments are done at the field level scale.
   - Sexton: Motion to accept definition of Tier 1 and Tier 2 as edited.
     - Snell-Zarcone: Second
   - Snell-Zarcone: Recommend removing last sentence from Tier 2: "handling and storage of nutrient sources" because addressed by other BMPs.
     - Sexton: Confirmed that VA reports these separately as BMPs.
   - Gross: Recommend defining "substantive" in Tier 1.

- Snell-Zarcone: Recommend keeping verification in mind when crafting the definitions; be clear in Tier 2 what documentation/proof of implementation is needed.
- Dressing: Recommend outlining a few potential scenarios and describing how they fit into the definitions.
    - Brosch: These potential scenarios can be included in the panel report as examples.
- Johnston: Recommend adding 'application' to first sentence of Tier 1.
- Brosch: Will allow panelists time to talk with others before fully approving the definitions. Comments/dissent will be accepted until 1 week from today (8/1/13).
- Meisinger: If anyone encounters a potential problem with these, please provide written detail in order for the panel to best address the issues.

ACTION: Panel members will send any comments on Tier 1 and 2 definitions to Chris Brosch by next Thursday (7/25/13).
ACTION: Chris will compile all comments for the group by the next call (8/1/13).

3. Discussion of Adaptive Nutrient Management
    - Albrecht: Recommend keeping options open for field and sub-field scale.
    - Brosch: Is one adaptive level sufficient?
        - Thomason: Will provide documentation of precision agriculture to panel members.
        - Meisinger: Current definition allows for flexibility with future implementation. Adaptive NM doesn't equal precision management.
    - Cropper: Recommend changing first bullet to "multiple sub-field tests".
    - Staver: Distinction is that in this definition, in-field tests are determining the rate (not just on paper as in Tier 2).
    - Staver: Recommend using agronomic recommendations based on crop need for P.
    - Towle: Recommend P testing incorporated with the other tests (rather than its own bullet).
    - For the field tests recommend changing "such as" to "including but not limited to".
    - Meisinger: Recommend including a field strip test.
        - Field strip tests addressed by in-field monitoring.
    - Recommend that precision not required for adaptive NM.
    - Goodlander: Note that sub-field may not practically apply to small (1-3 acre) fields.
        - Cropper: Recommend using "field/subfield" to include all possibilities.

- Sexton: Motion to include Tier 3 in the definitions for final approval by next week.
    - Cropper: Second.
- Brosch: Panel will discuss efficiencies at next meeting on August 1st.

ACTION: Panel members will send any comments on Tier 3 definitions to Chris Brosch by next Thursday (7/25/13)

Participants
Greg Albrecht, NY
Barry Evans, PSU
Kim Snell-Zarcone, Conservation PA
Doug Goodlander, PA
Curt Dell, USDA
Larry Towle, DDA
Chris Brosch, VT
John Majsztrik, UMD
Chris Gross, USDA-NRCS
Jack Meisinger, USDA
Tim Sexton, VA
Wade Thomason, VT
Mark Dubin, UMD
Emma Giese, CRC
Matt Johnston, UMD
Steve Dressing, TetraTech
Don Meals, TetraTech
Jennifer Ferrando, TetraTech
Jim Cropper, NE Pasture Consortium
Ken Staver, UMD

Nutrient Management Expert Review Panel

Conference Call Minutes

August 1, 2013
10:00AM-12:00 PM

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1. **Welcome and Introductions**

2. **Current Draft Nutrient Management Definitions**
    - Chris Brosch received and incorporated comments from seven panelists since the last conference call.
    - <u>TIER 2 DISCUSSION</u>

- Tom Bruulsema: Recommend Tier 2 bullet 4 be edited to "such as" rather than "including but not limited to".
- Brosch: Panel has previously indicated that P risk assessment tool be required for Tier 2, whether or not it is a part of a resource assessment kit.
- Doug Goodlander: Recommend wording that requires P risk assessment tool, and allows for additional practices.
- Goodlander: Recommend describing an overall environmental assessment of the fields, which addresses all concerns including P.
- Bullet 4: "fields assessed for phosphorus loss risk with a LGU phosphorus risk assessment tool and other conservation tools necessary for proper nutrient rate, timing and placement to optimize nutrient loss and crop nutrient uptake."
- Bruulsema: Recommend adding "source" back into the definition for consistency with Tier 1.
- New wording of Tier 2, bullet 4: "fields assessed for phosphorus loss risk with a LGU phosphorus risk assessment tool and other conservation tools necessary for proper nutrient source, rate, timing and placement to improve crop nutrient use efficiency".
- TIER 1 DISCUSSION
- Jim Cropper: Recommend bullet 3 reworded to include application rates consistent with LGU recommendations.
- New wording of Tier 1, bullet 3: "P and K application rates consistent with LGU recommendations based on soil tests for fields without manure."
- New wording of Tier 1, bullet 4: "N based application rates consistent with LGU recommendations for fields receiving manure."
- Staver: Recommend removing K requirements from definition, because CBP does not have goals related to K.
- Dubin: Agreed as K is not currently represented in the Phase 5.3.2 models.
- Panel agreed; references to potassium removed from all three tiers.
- TIER 3 DISCUSSION
- Meisinger: Recommend a separate bullet for strip trials, because it relates to more than nitrogen.
- Cropper: Recommend replacing "AND/OR" with "AND".
    - Albrecht: "AND/OR" better aligns with NRCS standards.
- Goodlander: Motion to approve the definitions of three tiers of nutrient management as edited today.
- Cropper: Second the motion.
- Dubin: Clarified that when these three tiers are incorporated into the model, the Tier 1 definition will replace the existing Basic Nutrient Management definition, Tiers 2 and 3 will become additional options along with existing enhanced and decision/precision options.
- Staver: Recommend adding a bullet 5 in Tier 2 to separate the two different concepts.
- Motion to approve the definitions was accepted with one abstention.

DECISION: Panel approved the 8/1 version of the Nutrient Management three tiered definition as final.

3. **Efficiencies**
   - Jack Meisinger presented one approach to calculating reduction efficiencies.
   - Dubin: Recommend conducting similar analyses in different regions.
   - Albrecht: Study in NY available.
   - Meisinger: Panel will have to decide which approach to take to determine crediting.
   - Brosch: Do any other panel members have access to this kind of data sources?
   - Staver: Request specific examples of model assumptions for corn.
     - Johnston: Can present this analysis.
   - Meisinger: Request that data be synthesized before submitted if possible.
   - Brosch: Any data available should be used, whether or not panelists have time to synthesize.
   - Goodlander: Note the possible need for two reduction efficiencies.
     - Brosch: Not feasible in Phase 5 because of the need to separate acres, however can address in Phase 6.

4. **Schedule Next Meeting**
   - Brosch: At the next call the panel will review model assumptions based on corn production, and compare with synthesized data from the watershed.
   - Dubin: Requested panel input on the scheduling of the September AgWG for panel reports.
   - Brosch: Request a later AgWG meeting in September if possible.
   - 20,21,23 next call.

ACTION: Panelists will provide documentation on research related to the reduced nutrient losses from corn related to application rate changes in their regions by August 15th.

ACTION: Fill out Doodle poll to schedule next call for August 20, 21 or 23.

Adjourned

Participants
Chris Brosch, VT/VA-DEQ
Don Meals, TetraTech
Jack Meisinger, USDA-ARS
Steve Dressing, TetraTech
Jennifer Ferrando, TetraTech
Jeff Sweeney, EPA
Matt Johnston, UMD
Emma Giese, CRC
Chris Gross, NRCS
Jason Dalrymple, WV

Doug Goodlander, PA
Larry Towle, DE
Greg Albrecht, NY
Tom Bruulsema, IPNI
Jim Cropper, NE Pasture
Mark Dubin, UMD
Kim Snell-Zarcone, Conservation PA
Ken Staver, UMD

Nutrient Management Expert Review Panel

Conference Call Minutes

August 23, 2013
10:00AM-12:00 PM

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1. **Welcome and Introductions**
    a. Panel members approved minutes from 7/3, 7/18 and 8/1.

2. **Nutrient Management Efficiency Estimates**
    a. Matt Johnston gave an overview of nutrient applications to corn in Scenario Builder.
    b. Recommend adjusting the non nutrient management application rate rather that the nutrient management rate.
    c. Chris Brosch presented Scenario Builder data from 2007 Progress Run, for pounds applied on corn.
    d. Chris reviewed the approach presented at the last call, which analyzes the change in recommended application rates before and after 1985 to approximate an efficiency for non-nutrient management.
        i. Panel expressed support for this method.
        ii. Jack Meisinger: Recommend the panel decide whether to use change in fertilizer N applied or change in the environment, which has less data to support it.
        iii. Brosch: Request a motion to use this method of change in application rate to calculate an efficiency.
    e. Mark Dubin: Recommend using surveys from MD and VA, presented to the AgWG by Frank Coale.
    f. Recommend using nitrate loss data to ground truth the data.
    g. Meisinger: Note that most of the data is for nitrogen, will also need recommendations for P. Request that panelists include information for phosphorus in their submissions.
        i. Brosch: Most of the phosphorus information will be incorporated in the Tier 2 definition

DECISION: Panel decided to use literature from the states to determine the reduction in recommended rates for nitrogen that existed before 1985 and how that changed in the following years to estimate the efficiency for non nutrient management.

Adjourned

Participants
Chris Brosch, VT/VA-DEQ
Rory Maguire, VT
John Majsztrik, UMD
Curt Dell, ARS
Anne Marsh, Heinz Center
Tim Sexton, VA
Jack Meisinger, USDA-ARS
Jennifer Ferrando, TetraTech
Jeff Sweeney, EPA
Matt Johnston, UMD
Emma Giese, CRC
Chris Gross, NRCS
Doug Goodlander, PA
Greg Albrecht, NY
Tom Bruulsema, IPNI
Jim Cropper, NE Pasture
Mark Dubin, UMD
Kim Snell-Zarcone, Conservation PA
Ken Staver, UMD

Nutrient Management Panel

Conference Call Minutes

September 5, 2013
10:00-12:00PM

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1. **Panel Recommendations: Discussion of Corn Nitrogen Studies**
    - Chris Brosch: At the previous call, the panel decided to extract as much literature from states as possible to determine what if any reduction in recommended rates in nitrogen existed before 1985 and how that changed in the following years. Additional sources have been located since the last call, VA and NY will share their summaries today. Chris requested two runs of the watershed model to estimate resulting reductions, which will be presented at the next call.
    - Wade Thomason presented nitrogen recommendations for corn in VA.
    - Tom Bruulsema: Support this approach for calculation the nitrogen reductions. Note the interaction with cover crops.
        a. Meisinger: The interaction between Nutrient Management and Cover Crops will likely have to be addressed in Phase 6.0.

- Brosch clarified that the panel previously decided that the non nutrient management condition will be estimated from the pre 1986 recommendations.
- Greg Albrecht presented summaries of representative corn nitrogen studies from New York.
- Don Meals: One of the questions from the TetraTech survey asked the panelists their assessment of the extent to which each practice is implemented as designed. Answers to this question are included in the summary report.

2. Next Steps

- Brosch: At the next conference call, the panel will discuss the nitrogen reduction efficiencies from the four studies discussed so far, which seem to center around 20%. For the next call, will have information from the latest model fun, which includes what a 20% reduction looks like. How best to use this information to get closer to an efficiency estimate by the next call in two weeks?
    - Tim Sexton: Considering the tight timeline, recommend taking an average of the available data from these four studies.
- Johnston: As the model lumps row crops together, and Nutrient Management can be applied to all, how best to model this?
    - Staver: Recommend estimating a zero reduction for soybeans and weighted average based on acres of corn vs. acres of soy.
- Meisinger: What about wheat?
    - Brosch: Knowing that the differences between NM app rates and non were small for corn, can assume that the differences are also small for other crops (in the model). Recommend taking the previous model run, which estimated 5% for the watershed, and using this as the low bookend.
- Johnston: If changing application rates on corn in the model, that will estimate the weighted average.
- Meisinger: This last model run is an important piece of information in order to meet the panel recommendation deadline for 2013, request that it be made available to the panel by next week to prepare for the final call.
    - Johnston: Model run is being conducted, and will be available early next week.
- Sexton: Will the efficiency be applied to the whole watershed?
    - Brosch: Without more time, will have to be general with geographic specificity.

- Meisinger: How would the geographic specificity be defined in the model?
    - Johnston: Could be split up any way the panel recommends, may be difficult to reach consensus on a separate efficiency for every jurisdiction.
    - Albrecht: Should the panel recommend this as corn only efficiency? Leaving the other crops as they are.
    - Brosch: That is the most scientifically defensible approach.
- Staver: Are hay and pasture being included in these recommendations?
    - Sexton: Currently counted separately.
    - Johnston: The results of the coming model analysis will be for composite crop, not possible to isolate corn through the model run.
- Albrecht: Each jurisdiction's corn acres under nutrient management would have an updated efficiency, and during the model run would be blended into other row crops. Recommend that corn be assigned one efficiency, and other crops be assigned a separate efficiency.
- Staver: Recommend one method for dealing with corn, and an approach to deal with the fact that there is insufficient information for soybeans.
- Brosch: In order to isolate corn, can change the non nutrient management application rate method to estimate. The old method had rates for corn that were different.
- Johnston: The results of this model run, have taken into account the composite crops.
- Dubin: Recommend an additional conference call once the model runs are complete.
- Meisinger: Still need to understand how the model will work with the real world data, studies discussed today.

ACTION: Doug and Greg will summarize their datasets similar to Wade's and Jack's for discussion at the next call.
ACTION: Emma will send a doodle poll for a short intermediate call on Sept. 16th or 17th.
ACTION: The panel will meet at their regularly scheduled call on **Sept. 19th 10:00AM-12:00PM**.

Participants
Chris Brosch, VT-VADEQ
Don Meals, TetraTech
Doug Goodlander, PA
Greg Albrecht, NY

Jennifer Ferrando, TetraTech
Jim Cropper, NE Pasture
John Majsztrik, UMD
Tom Bruulsema, IPNI
Tim Sexton, VA
Jason Dalrymple, WV
Doug Beegle, PSU
Curt Dell, USDA-ARS
Kim Snell-Zarcone, Conservation PA
Wade Thomason, VT
Matt Johnston, UMD
Mark Dubin, UMD
Ken Staver, UMD
Chris Gross, USDA-NRCS

Nutrient Management Panel
Conference Call Minutes
September 19, 2013
10:00-12:00

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1. **Mark Dubin gave an overview of the goal of interim recommendations.**
   - Dubin: The recommendations we are attempting to finalize today are interim, the panel has the option of submitting additional recommendations in the future.
   - Chris Brosch: Noted that the panel has future work to do, including defining efficiencies for the upper tiers of nutrient management, and other Phase 6.0 recommendations. The goal for the call today is to better define the first tier of nutrient management.

2. **Panel members reviewed the minutes from the past two calls**

DECISION: Panel approved the minutes from 8/23/13 and 9/5/13.

3. **Chris presented results of the recent sensitivity analysis, and outlined four options for the panel to consider when finalizing their recommendations.**
   - Greg Albrecht: Support option C. Request explanation of changes in states' reporting.
     - Brosch: The states could report exactly the same way, and the nutrient management would be proportioned out as defined.
     - Tim Sexton: Could also change the way crops are reported by row crops vs. alfalfa.

    - Brosch: Recommend addressing the reporting details later with the watershed technical workgroup.
- Sexton: Support option C, and let the Watershed Technical workgroup address the reporting details. States could decide whether to report their acres separately, or allow the model defined acres to determine the distribution.
- Brosch: Clarified that the efficiencies are at edge of stream.
- Meisinger noted that the P index began around the timeframe being considered for model adjustments, so a phosphorus adjustment makes sense with these recommendations.
- Staver: Note that the yield inaccuracies should be fixed too.
- Sexton: Motion to approve option C.
    i. Jim Cropper: Second.
    ii. No abstentions or objections.

DECISION: Panel decided to use research derived efficiencies to adjust N and P loads from non Nutrient Management row crop acres (9.25% and 10%, respectively) bay wide and to use model derived efficiencies (5% and 8%) for the other land uses, which include alfalfa, pasture and nursery.

4. **Chris reviewed the draft Nutrient Management Panel report.**
    - Brosch: The next call will focus on working out the details of the panel report.
    - Johnston: The AgWG will be reviewing the report at their 9/26 meeting, and the WTWG will have a meeting on 10/7 for final review.
    - Staver: Request chart of historically reported tier 1 nutrient management acres.

ACTION: Matt will provide the panel with a chart of historically reported tier 1 Nutrient Management acres.

Participants
Mark Dubin, UMD
Kim Snell-Zarcone, Conservation PA
Tim Sexton, VA
Greg Albrecht, NY
Jason Dalrymple, WV
Rory Maguire, VT
Jim Cropper, NE Pasture
Don Meals, TetraTech
Matt Johnston, UMD
Wade Thomason, VT
Chris Gross, USDA

Dan Baldwin, MDP
Ken Staver, UMD
Jack Meisinger, USDA-ARS
Chris Brosch, VT-VADEQ
Emma Giese, CRC

Technical Requirements for Entering Tier 1 and Existing Nutrient Management BMPs into Scenario Builder and the Watershed Model

Background: In June, 2013 the Water Quality Goal Implementation Team (WQGIT) agreed that each BMP expert panel would work with CBPO staff and the Watershed Technical Workgroup (WTWG) to develop a technical appendix for each expert report. The purpose of the technical appendix is to describe how the expert panel's recommendations will be integrated into the modeling tools including NEIEN, Scenario Builder and the Watershed Model.

Q1: What are the efficiency reductions a jurisdiction can claim for implementing Tier 1, Crop Group Nutrient Application Management?

A1: The panel recommended that Tier 1, Crop Group Nutrient Application Management, should have different reductions to loads for different land uses simulated in the Chesapeake Bay Watershed Model (INSERT REFERENCE TO TABLE OF EFFICIENCIES OR DISCUSSION OF EFFICIENCIES IN REPORT). A jurisdiction can expect loads from agricultural land uses to be reduced by percentages in the table below.

Table 1. Tier 1, Crop Group Nutrient Application Management Percent Nutrient Reductions

Land Use	TN Reduction	TP Reduction
High-Till with Manure	9.25	10
Low-Till with Manure	9.25	10
High-Till without Manure	5	8
Pasture	5	8
Alfalfa	5	8
Hay with Nutrients	5	8
Nursery	5	8

Q2: Why is there no credit given for Tier 2 or Tier 3 Nutrient Application Management?

A2: At the time of publication of this document, the expert panel has not defined reduction efficiencies for Tier 2 and Tier 3. Credit will be given in Scenario Builder and the Watershed Model for Tier 2 and Tier 3 following approval of the panel's future recommendations.

Q3: Can a jurisdiction still receive credit for traditional nutrient application management as a land use change in the modeling tools.

A3: No. The panel recommended the immediate replacement of the current traditional nutrient application management BMP with Tier 1 Crop Group Nutrient Application Management. All acres under the previous BMP will now receive the credits listed in the table above (INSERT REFERENCE TO REPORT DISCUSSING REPLACEMENT OF LAND USE CHANGE).

Q4: Can jurisdictions still receive credit for the Enhanced Nutrient Application Management and Decision Agriculture BMPs?

A4: Yes. The expert panel may replace these BMPs in the future, but recommended no change to these BMPs in the interim (INSERT REFERENCE TO THIS STATEMENT IN REPORT). The current version of Decision Agriculture results in a 3.5% reduction in nitrogen loads, while the current version of Enhanced Nutrient Application Management results in a 7% reduction in nitrogen loads. Both of these BMPs were previously modeled as reductions in addition to the traditional Nutrient Application Management BMP. BMPs will continue to result in reductions beyond the Tier 1 Crop Group Nutrient Application Management in a similar manner.

New efficiencies for Enhanced Nutrient Application Management and Decision Agriculture were calculated by combining the currently approved efficiencies for each BMP with the new Tier 1 efficiencies. The following equation was used to calculate the values shown in Tables 2 and 3 below.

Decision Agriculture Efficiency *= 1- ((1- Tier 1 nutrient efficiency) X (1- existing Decision Ag efficiency))*

Enhanced Nutrient Application Management *= 1- ((1- Tier 1 nutrient efficiency) X (1- existing Enhanced Nutrient Application Management efficiency))*

Table 2. Decision Agriculture Percent Nutrient Reductions

Land Use	TN Reduction	TP Reduction
High-Till with Manure	12.4	10
Low-Till with Manure	12.4	10
High-Till without Manure	8.3	8
Pasture	8.3	8
Alfalfa	8.3	8
Hay with Nutrients	8.3	8
Nursery	8.3	8

Table3. Enhanced Nutrient Application Management Nutrient Reductions

Land Use	TN Reduction	TP Reduction
High-Till with Manure	15.6	10
Low-Till with Manure	15.6	10
High-Till without Manure	11.7	8
Pasture	11.7	8
Alfalfa	11.7	8
Hay with Nutrients	11.7	8
Nursery	11.7	8

Q5: Can a jurisdiction report Tier 1 Nutrient Management AND Decision Agriculture or Enhanced Nutrient Management on the same acre?

A5: No. Each BMP must be reported separately. Acres of Decision Agriculture and Enhanced Nutrient Management should no longer be reported as acres of Tier 1 Nutrient Management, as was done in previous BMP submissions. For example, a state has 200 acres under some type of nutrient management in a county, with 100 acres of Tier 1 Nutrient Management, 50 acres of Decision Agriculture and 50 acres of Enhanced Nutrient Management. States should report 100, 50 and 50 acres accordingly.

Q6: Is Decision Agriculture the same as Tier 2? Similarly, is Enhanced Nutrient Management the same as Tier 3?

A6: No. Decision Agriculture and Enhanced Nutrient Management are existing BMPs in Scenario Builder that are available for states to report in 2013. States should not report Tier 2 or Tier 3 Nutrient Management for 2013. The panel may recommend the replacement of Decision Agriculture and Enhanced Nutrient Management in the future. Scenario Builder will be adjusted accordingly when such a recommendation is approved.

Q7: How are the reductions actually calculated in Scenario Builder and the Watershed Model?

A7: Reductions for all types of nutrient application management BMPs are applied as percent reductions to loads exiting agricultural land uses. Therefore, the impact of these reductions in the Watershed Model will vary across the watershed as a result of hydrologic conditions, application rates to land uses and nutrient export from land uses.

Q8: What does a jurisdiction need to report in order to receive credit for the nutrient management BMPs?

A8: Jurisdictions should report the following information:

- Nutrient Application Practice Type: Crop Group Nutrient Application Management (Tier 1); Decision Agriculture; Enhanced Nutrient Application Management
- Acres: Number of acres under a nutrient application management plan in the geographic reporting unit
- Land use: Approved NEIEN land uses
- Location: Approved NEIEN geographies: County; County (CBWS Only); Hydrologic Unit Code (HUC12, HUC10, HUC8, HUC6, HUC4), State (CBWS Only)
- Date of Implementation: Year of plan implementation (not necessarily the year the plan was written)

Q9: Do states need to report all acres under nutrient management BMPs annually?

A9: Yes. While some states currently report the number of acres under new nutrient management plans for a given year, the panel recommends states submit all acres concurrently under Tier 1, Decision Agriculture and Enhanced Nutrient Application Management for a given year beginning in 2013.

Q10: What is the order of credit for nutrient management BMPs in Scenario Builder?

A10: Jurisdictions may submit acres of Tier 1 Nutrient Management, Decision Agriculture and Enhanced Nutrient Management in the same geographic reporting unit. However, these BMPs may not be reported on the same acre. To avoid double-counting on the same acres, the panel recommends that Scenario Builder will process the BMPs in the following order (INSERT REFERENCE ABOUT PROCESSING ORDER FROM REPORT):

1) Enhanced Nutrient Management
2) Decision Agriculture
3) Tier 1 Nutrient Management

If there are no agricultural acres available in the geographic reporting unit after a BMP is processed, the next BMP in the processing order will not receive credit.