

Nutrient Management Expert Panel Phase 5 Report

Panel response to comments received
during Partnership review period

August 20, 2015

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- We will answer as many as possible during Q&A.
- If we run out of time to respond to all questions, following the webinar, we will post written responses to the questions.

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- All comments and questions will be recorded and included in the archives. The recording and related resources will be posted on the event page

Today's Briefing

- Agriculture Workgroup and Nutrient Management
- Panel Responses to Partnership Comments
 - Tier 2
 - Tier 3
 - Table 7 – Effectiveness Estimates
 - Practice Monitoring, Reporting, and Verification
 - Other Comments
 - Tier 1 Considerations
- Next Steps for Agriculture Workgroup in response to the NM Phase 5 Panel Report
- Phase 6.0 NM Expert Panel Process
- Q&A

Emma Giese

Staffer – CBP Agriculture
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AgWg & Nutrient Management

Kristen Saacke Blunk

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Panel Responses to Comments

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Next Steps

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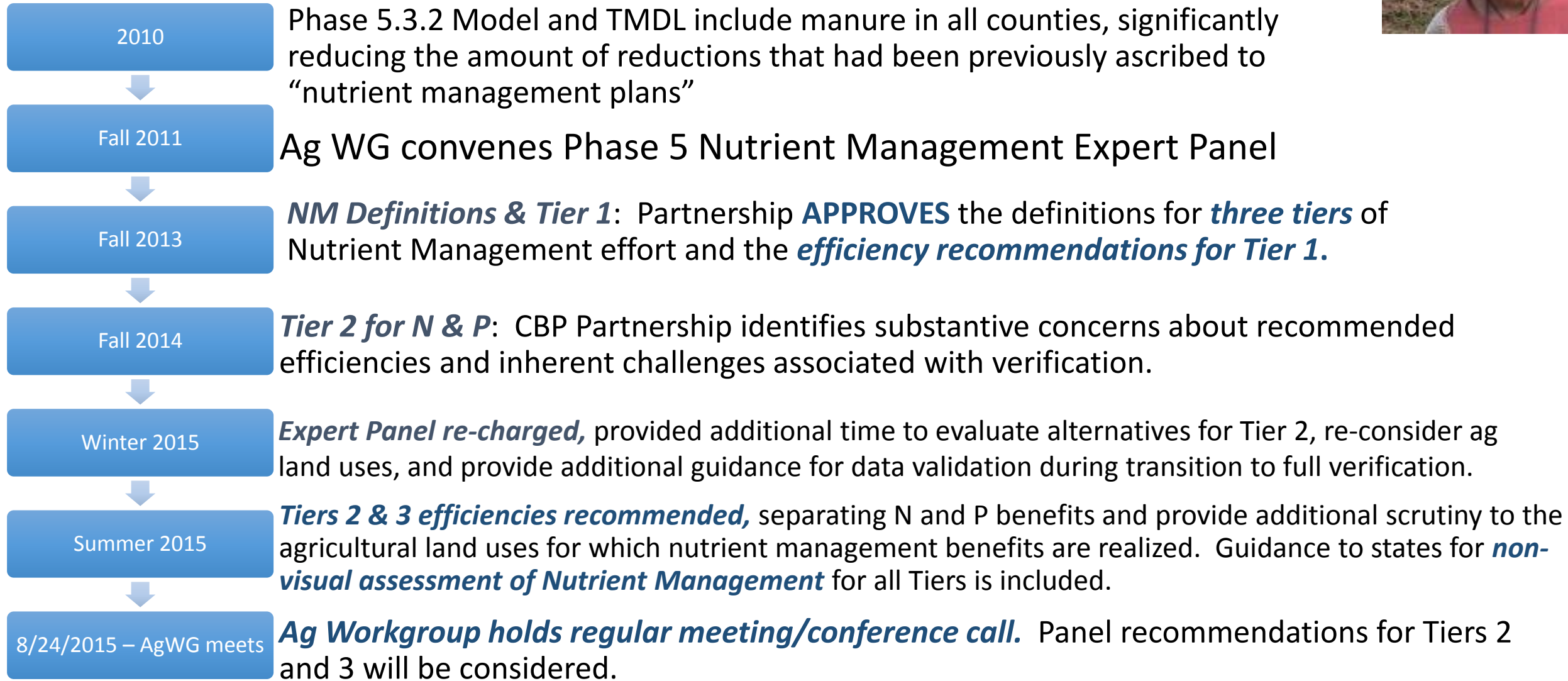
Phase 6.0 NM Expert Panel

Jack Meisinger

Member – CBP Phase 5 Nutrient
Management (USDA-ARS)



Nutrient Management – Phase 5 CB Model



8/20/2015

Overarching questions and concerns



- Does the combined Tier 1 + Tier 2 Phosphorus recommended efficiencies OVER credit for nutrient management?
 - Is the Phase 6.0 Expert Panel confined or limited by the recommendations of the Phase 5.3.2 Panel?
 - How will the States interpret the definitions and report their respective programs?
- Please listen carefully to the responses that the Panel is providing in respect to the comments received about the P efficiencies for Tier 2. Tier 2 P benefits will apply to a SUBSET of acres that are eligible under Tier 1.
 - The Phase 6.0 Nutrient Management Panel will benefit from the work of the 5.3.2 Panel – but will be working with an entirely different set of assumptions related to ag land uses and model considerations. No constraints or limitations, but definitely advantages from the work of the 5.3.2. Panel.
 - The AgWG will work with the states in the months ahead to hear how their programs are being interpreted in respect to Tier 1, Tier 2, and Tier 3 definitions and to provide guidance and input based on the definitions provided by the 5.3.2 Expert Panel.

Partnership Review and Comment Period

June 25 - July 30, 2015



Comments received from:

- Chesapeake Bay Foundation (CBF)
- Angstadt Consulting Inc. (ACI)
- Aqua Terra Science (ATS)
- Environmental Integrity Project on behalf of Environmental Integrity Project, Waterkeepers Chesapeake, Assateague Coastal Trust, Potomac Riverkeeper Network, Potomac Riverkeeper, Upper Potomac Riverkeeper, Shenandoah Riverkeeper, Midshore Riverkeeper Conservancy, Maryland League of Conservation Voters, Sierra Club Maryland Chapter, and the Center for Progressive Reform (EIP)
- Choose Clean Water Coalition (CCWC)
- Maryland Department of Agriculture (MDA)
- Chesapeake Bay Program Modeling Team (CBPO Modeling Team)
- EPA Chesapeake Bay Program Office (EPA)
- Chesapeake Bay Commission (CBC)

Process: Response to Comments



Per WQGIT BMP protocol:

- The Panel developed a “response to comments”, which is included as **Appendix F** in the **August 10** release of the report.
- Specific responses were **not** provided for:
 - Overlapping comments (one response was provided)
 - Comments outside the scope of the Panel or demonstrate no relevancy to the report’s findings
 - Editorial changes, such as grammatical edits



Partnership Comments & Panel Response

Chris Brosch, CBP Nutrient Management Expert Panel Chair

Overview of Partnership Comments



- The following slides are an overview of the comments received and the Panel's response.
- Full comment and responses are documented in **Appendix F** of the August 10 version of the report



Tier 2 Comments



Tier 2 Nitrogen – Manure Incorporation

- *Manure incorporation should be stand alone BMP due to variation in requirements between jurisdictions*
 - Manure incorporation is included in the recommendations only where 30% residue cover is maintained.
 - ALL further considerations will be forwarded to the Phase 6 Manure Incorporation and Injection Expert Panel.
- *Manure incorporation: missing support for the idea that reducing volatilization results in net benefit to environment compared to N losses from soil.*
 - Studies support reducing applications as conservative estimate of prevented loss.

Smaller applications = Big reductions

- Increases in uptake were approved by the panel as an appropriate proxy for N runoff and leaching because the nature of split timing or incorporation reduces availability for loss.
- Additionally, any increase in yield is a direct benefit of a reduction in loss because the lost N cannot contribute to the yield of the crop, so it is also a good indicator of quantity of pollution prevented at the EOF/plot scale.
- Appropriate adjustments were made to convert plot or EOF reductions into EOS efficiencies.

Best Management Practice	Variable Measured	Without BMP	With BMP	Reduction, as % with-out BMP	Notes	Reference
		----- kg N/ha -----				
Reduce corn N requirement, 1.2 to 1.0 lbs N/bu.	Fall soil NO ₃ -N, 0-90 cm	56	39	30%	Avg. over 3-yr study	Coale et al., (2000)
	Total PAN applied	230	191	17%		
Pre-sidedress soil nitrate test	Fall soil NO ₃ -N, 0-120 cm	151	66	56%	Avg. over 3-yr study	Durieux et al., (1995)
	Total PAN applied	168	120	29%		
Pre-sidedress Soil Nitrate Test	Mass NO ₃ -N leached, Pan lysimeters	50	19	62%	Avg. over 2-yr study	Guillard et al., (1999)
	Total PAN applied	196	113	42%		
Pre-sidedress Soil Nitrate Test	Mass NO ₃ -N leached, Tile-drain lysimeters	28	16	43%	Avg. over 2-yr study	Sogbedji, et al., (2000)
	Total PAN applied	19	15	21%		
Reduction Estimated from Environmental Variable :				48%	Avg. of % reductions, from all studies	
Reduction Estimated from Decrease in Total PAN applied :				27%		
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Tier 2 Nitrogen – Timing of N applications

- *Benefits of timing based on increase in yield/crop uptake not on measured reductions of N*
 - Increases in uptake were approved by the panel as an appropriate proxy for N runoff and leaching because the nature of split timing or incorporation reduces availability for loss.
- *If PSNT linked to split applications, how can PSNT be used to justify Tier 3 credits?*
 - Splitting applications does not decrease rates, it decreases environmental exposure and risk for loss.
 - PSNT, credited separately, is an in-season test to determine if sufficient or insufficient N is available.



Tier 2 Phosphorus

- *Tier 2 P reductions do not appear to be supported by literature:*
 - *Studies used to derive manure incorporation benefits did not consider subsurface P losses.*
 - *No empirical evidence showing that application of the P Site Index (PSI) has reduced P losses*
 - Manure incorporation was not used to develop Tier 2 P recommendations BUT Manure incorporation analysis did approximate subsurface losses (~50% based on flow data)
 - The Panel based the estimation of the PSI benefits on sites that change their status and we adjusted the efficiency by 25% to approximate only 1 in 4 sites having the measured benefit to P loss where the PSI is issued.
 - The Panel recognizes there is a significant lag related to water quality and soil test phosphorus (STP) levels. This will be better addressed with a Phase 6 Model.



Tier 3 Comments



Tier 3 - Crediting

- *Why is full credit given for any one of the 5 practices under Tier 3?*
 - Credit is recommended to be granted for the change in rate of application from results of any of these tools.
 - No state data collection system exists for individual practices.
- *Include rationale for why PSNT given additional credit beyond benefits of split application/timing in Tier 2*
 - Splitting applications does not decrease rates, it decreases environmental exposure and risk for loss. PSNT, credited separately, is an in-season test to determine if sufficient or insufficient N is available.



Tier 3 – CSNT & ISNT

- *Explain source of literature values*
 - Literature sources calculated benefits in tested N parts per million.
 - Changes in ppm of soil N determined % difference.
- *Why did the Panel apply the same value to all geographies?*
 - The literature indicated consistent reductions across study settings.
- *Do other states besides NY employ ISNT?*
 - This tool is emerging, but useful to NY farmers now.
 - Can eliminate up to an entire season of N application based on measured credits.



Effectiveness Estimates for Tiers 2 and 3 (Table 7) Comments



Comments on Table 7

- *Clarify what the literature values represent (some are based on ammonia conserved (N) or reduced surface runoff (P) while others are based on reduced N application or differences in nutrient uptake as reflected in crop yield) then explicitly add discounts if they do not represent actual monitored losses to surface or groundwater*
 - All N values are reduced N application, due to either conserved ammonia or improved yield (e.g. from reduced in season leaching) resulting in better nutrient uptake.
 - Uptake is not measured, but is considered higher in magnitude when the same crop has an increase in yield.

Comments on Table 7



- *ISNT value seems high given relatively little information on benefits.*
 - Like other adaptive N management tools, the ISNT is used more and more each year, especially in cropping systems involving significant organic N contributions from hay in rotation, cover crops, manure, and/or compost.
 - For conservatism, the rate reductions and associated leaching losses were further and significantly discounted to arrive at the final value.

Comments on Table 7 continued



- *Explain how Tier 2 N benefit on row crop was derived*
 - This mathematical approach attempts to average similar timing components, while allowing the non-timing component to be independent of timing.
 - Adjusted data points for N timing (X_f) were utilized as a mean that contributed in an additive way to the Manure Incorporation adjusted value for the row crop efficiency of 3.9 percent (i.e., $(X-f_1 + X-f_2 + X-f_3)/3 + Yf_1$).
 - Where X is an N timing value of row crops (excluding hay) and Y is Manure Incorporation effects.
- *The Panel should not average efficiencies*
 - Efficiencies were not averaged.
 - Adjusted literature values were averaged resulting in a single efficiency.
 - The specificity of the literature was too narrow for the scale of BMP data, so the efficiency scale matches the data for this short-term practice recommendation.

Table 7. Nutrient reduction credits for each Tier component, adjustment factors applied, and final Tier credit recommendations											
Tier	Component	Geography	Literature value	Research scale	Scaling adjustment	Relevant crops	Land use/crop adjustment	Model Considerations and Mgt. Variability adjustment	Mgt. Variability adjustment	Adjusted efficiency	Tier credit
Tier 2 N	N timing	Coastal Plain	15.6%	plot	75%	Corn	51%	Impl. scheduling challenges	80%	4.7%	Row Crop: 3.9% Hay w/ nutr.: 2.8%
		Piedmont	8.9%	plot	75%	Corn	51%	Impl. scheduling challenges	80%	2.7%	
		All	14.9%	plot	75%	Small grains	15%	Impl. scheduling challenges	80%	1.4%	
	N timing – ½ Avg for hay	Hay with nutrients landuse	6.6%	plot	75%	Non-legumes	70%	Impl. scheduling challenges	80%	2.8%	
	Manure incorporation ¹		10%	plot	75%	Corn, small grains	66%	N savings → N loss	30%	1.5%	
	Enhanced efficiency fertilizers (deferred)										
Tier 2 P		Appl./R&V	0%	plot	75%	Corn, small grains	66%	Simulated storm effect	20%	0%	6.6%
	Manure incorporation	Piedmont	46%	plot	75%	Corn, small grains	66%	Simulated storm effect	20%	4.6%	
		Coastal Plain	48%	plot	75%	Corn, small grains	66%	Simulated storm effect	50%	11.9%	
	P Site Index	All	35%	farm	75%	All crops	100%	Model value, response lag, effect on farm P budget	25%	6.6%	
	Setbacks (deferred)										
Tier 3 N	PSNT	Coastal Plain	8.1%	plot	75%	Corn	51%	N savings → N loss	60%	1.8%	2.8%
		Piedmont	26.6%	plot	75%	Corn	51%	N savings → N loss	40%	4.0%	
	CSNT	All	20%	plot	75%	Corn	51%	Results inform future decision	40%	3.0%	
	ISNT	All	33%	plot	75%	Corn	51%	Results inform future decision	50%	6.3%	
	FSNT	All	10%	plot	75%	Small grains	15%		80%	0.9%	
	Variable rate N fertilizer	All	10%	plot	75%	Corn	51%		80%	3%	
		All	5%	plot	75%	Wheat	15%		80%	0.5%	
	Adapt-N (deferred)										

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Comments on Table 7 continued

- *Explain how management variability factors are applied*
 - Management variability adjustment (MVA) factors are applied in a multiplicative way where the discount to the practice is the inverse of the percent converted to a decimal.
 - For example:
 - 80% MVA = 20% multiplicative discount to the literature value
 - Literature value of 10% with 80% MVA becomes 8% (20% less than lit value)



Practice Monitoring, Reporting and Verification

Practice Reporting



- *States should provide basis for claimed number of acres implementing NM (how reported numbers were determined, not verification protocol).*
 - States are required to provide the basis for the number of acres claimed for implementing nutrient management as a part of their EPA reviewed QAPPs.
- *States should not get credit unless they can document what percentage of their crops receive split or better timing of applied fertilizer, as these studies are the driver of this benefit.*
 - The splitting of fertilizer applications is based on a crop's portion of the CBWM landuse and is included as an adjustment.
 - Only corn and small grains are credited wholesale within the row crop landuse, so this is already a conservative estimate for percentage of acres.

State Programs Table



- *590 Nutrient Management should not be automatically considered equivalent with Tier 2 or Tier 3 nutrient management without verification documentation.*
 - All plans meeting the NRCS 590 standard are consistent with the Tier 2 definition.
 - Many state-approved plans have elements that address goals for P loss reduction using distinctly separate tools (other than NRCS's 590).
 - EXAMPLE: VA plans use an Environmental Threshold Method, developed by Virginia Tech for estimating soil loss and soluble P loss. These are not 590 NM plans but are eligible for Tier 2 credit despite not having receiving Federal cost share.

State Programs Table



- *Nutrient reduction credit should reflect variability in state nutrient management programs.*
 - The table of state programs was taken from a Tetra Tech survey report.
 - The classifications of the plans in this table are recommendations based on reviews of this information cross-walked with the section 6.1 guidance (Tier definitions and assessment elements).

State Programs Table



- *PA regulations also provide for “Tier 1” plans for those farms that use manure but are not CAOs or CAFOs. This should be clarified here.*
 - PA’s Manure Management Plans are developed either by trained professionals, assessed and approved by trained professionals, or developed by farmers assisted and overseen by trained professions to write these plans.
 - Winter manure applications are allowed but only in limited conditions and in limited locations (reduced winter application rates, added application setbacks, winter cover or established crop required on application fields, limited field slope for application fields).
 - The plans do NOT allow manure and fertilizer applications to be in excess of LGU N rates.
 - These plans also address barnyard manure losses, losses from pastures and manure stacking losses.
 - This is consistent with the Tier 1 definition.

Verification



- *Will only the plans developed with a trained professional count?*
 - Yes, this would include supervision and/or post-development review and approval.
- *Will “Tier 1” plans that may be N-based only still get the P credit?*
 - Yes, the influence of P reductions in manure rates to N-based credit yield a reduction.
 - Fertilizer applications of P must be P based in Tier 1.



Verification

- *The Panel should incorporate the Chesapeake Bay Program's Verification Framework requirements.*
 - ✓ Verification for the Phase 5.3.2 Nutrient Management recommendations would be performed in accordance with a jurisdiction's approved QAPP as the states transition to FULL implementation of verification programs by 2018.
- *Presence of a plan does not indicate/document implementation; see both CEAP reports. How do you verify it?*
 - ✓ The Panel provided guidance on elements that indicate a plan is implemented.

Compliance Rates



- *The Panel should adjust nutrient reduction credits to account for known rates of non-compliance with nutrient management plans*
 - Management Variability adjustments (MVA) where not otherwise stated are generally used to capture BPJ of non-compliance, non-applicability for a field based on physical characteristics, omission from an NMP for BPJ by a Planner or poor environmental response from the BMP.
- *MDA noted that they voluntarily discount the acreage reported consistent with their compliance inspections.*
- *MDA also asserted that if MVA include compliance considerations, they will no longer discount their acreage.*



Overall Report Comments

Tables 4 and 8



Revised Table 4:

Practice Tier	Stand-Alone Efficiencies	Initial Load	Pass-Through Load	Combined Efficiencies
1N	0.0925	100	90.75	9.25%
1P	0.1	100	90	10.00%
1N(HYW)	0.05	100	95	5.00%
2N	0.039	90.75	87.2108	12.79%
2N(HYW)	0.028	95	92.34	7.66%
2P	0.066	90	84.06	15.94%
3N	0.028	87.2108	84.7689	15.23%

CEAP



- *Panel should consider CEAP data regarding level of implementation in Bay watershed*
 - ✓ The Panel has concluded that the applicability of the CEAP results suggesting that only 12% of NRCS NMPs are fully implemented without exception is not related to this recommendation.
 - ✓ Lack of implementation picked up by CEAP may be for reasons other than water quality-based BMPs because NRCS NM plans may include non-water quality practices.



Tier 1 Comments

Tier 1



A series of comments were received addressing technical and clarifying questions about Tier 1, its definition, and the efficiencies that were recommended and approved by the Partnership in October 2013.

A number of the Tier 1 comments were addressed within the Tier 2 and 3 discussions



Tier 1 – General Comments

- *Panel should accept comment in Tier 1 efficiencies and adjust its Tier 1 recommendations as necessary*
 - ✓ The Agriculture Workgroup – in its January 2015 re-charge to the Nutrient Management Expert Panel – requested three specific considerations:
 - A separation of N and P in Tier 2
 - A re-consideration of the appropriate land uses for the application of Tier 2
 - A checklist of what components states must have in place to receive credit in the interim period prior to the full implementation of the verification plans (required by Jan 2018).
 - ✓ Re-consideration of Tier 1 definitions and efficiencies were NOT a part of the January 2015 charge.
 - ✓ The terms of the January 2015 re-charge to the Panel were made in consultation and agreement with the CPBO, the WQGIT, and the AgWG – and in direct response to the extensive stakeholder/partner input received in Fall 2014.



Tier 1 – General Comments continued

- *Tier 1 Should Be Revised to Remove Phosphorus Reduction Credit Where Practices Actually Increase Phosphorus Runoff.*
 - The scientific rationale for the 10% P reduction is based on manure P decreasing in application by a significant amount in the model.
 - The decrease is calculated from a difference of P loss from corn acres receiving 100% v 120% non-nutrient management N rates in fertilizer and manure.
 - Where 20% more PAN yielded a 9.25% N load difference, and given manure N:P ratios are unfavorable to P rates considering plant need N:P ratios, a 10% change in P loads is conservative.

Tier 1 – Definition and Efficiency



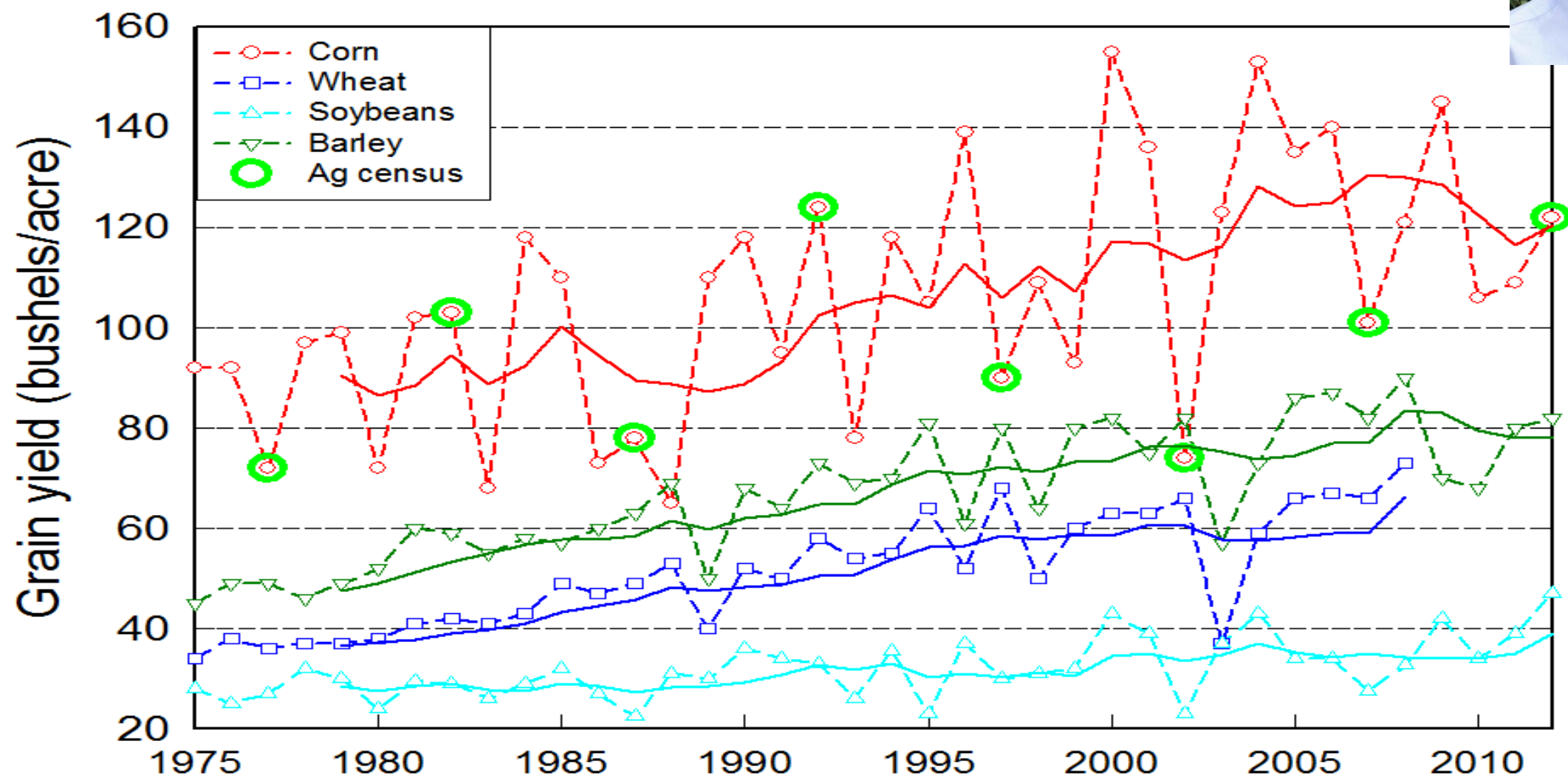
- *Do Tier 1 plans include some P risk assessment?*
 - NO, P risk assessment is a Tier 2 component and the selected component to represent the credit driving the Tier 2 efficiency.



Tier 1 - Justification

- *Data needed to support claim of yield increase*
 - Figure 11 “Grain yield in bushels per acre for Maryland from the NASS exhibiting double digit percent increases over the simulation period for major commodity crops and illustrating a disproportionate number of low yield years captured by Ag Census, which is currently the only input data for yield in the Phase 5.3.2 CBWM.”

Fig 11



Tier 1 – Justification continued

- Concern about crediting changes in LGU recommendations as a creditable BMP

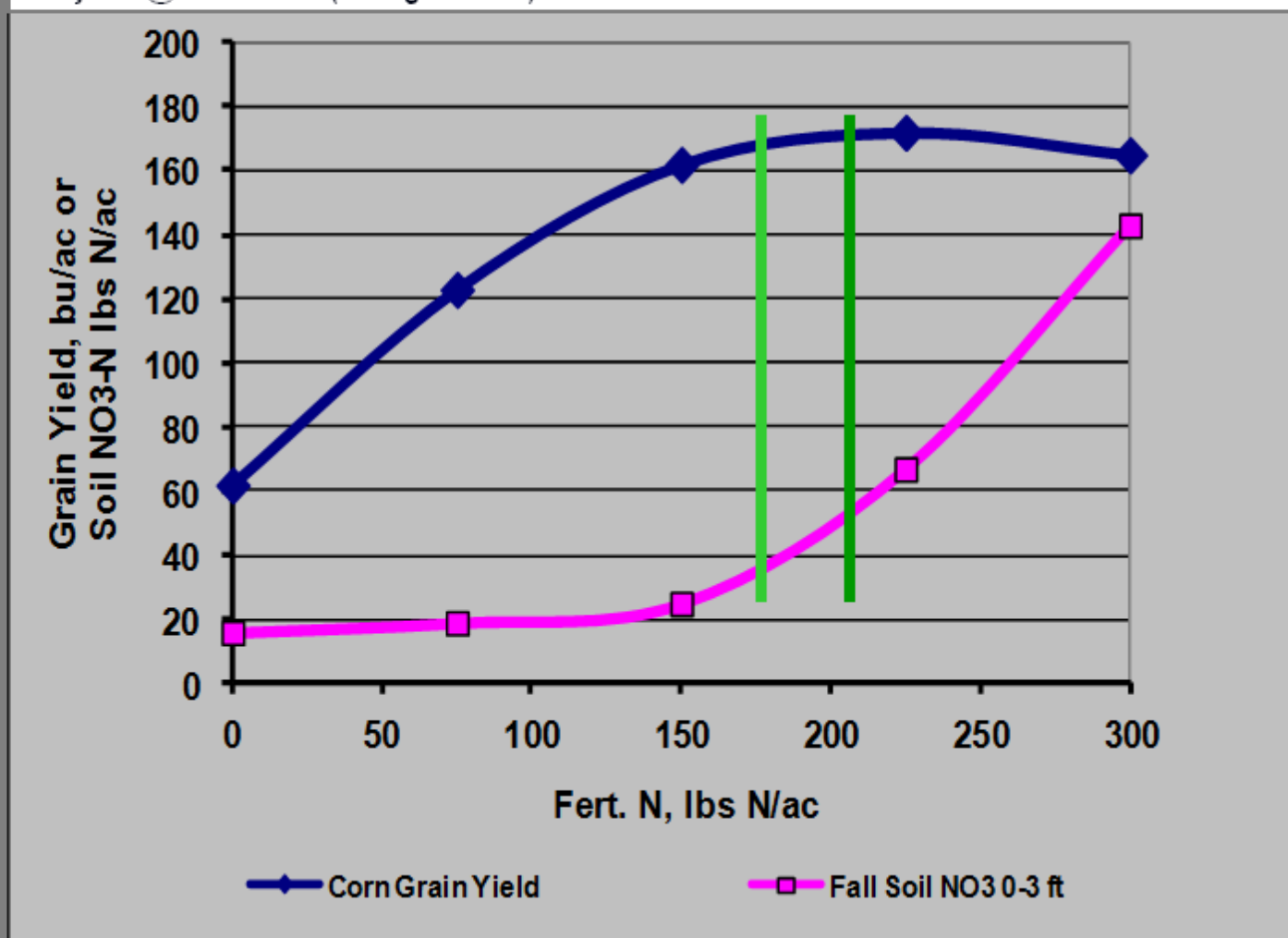


What's the Link between Basic NMP & the Environment?

(Adapted from Coale et al., 2000)

Continuous Corn, no Cover Crop, 3-yr study, Mattapex silt loam, Lower Eastern Shore

<u>Nutrient Management Scenario</u>	<u>Exp. Yld</u>	<u>lbs FN</u>	<u>Fall NO3-N</u>	<u>Δ FN</u>	<u>Δ Fall NO3-N</u>
Maryland @ 1.0 lb N/ bu (light-green line)	170	170	35	-35 (-17%)	-15 (-30%)
Maryland @ 1.2 lb N/ bu (dark-green line)	170	205	50		



Notes on the figures referencing the Tier 1 efficiencies:



- N and P EOS loss increase 9.25 and 10%, respectively from NM (100%) to 120% N app rate on corn.

Effect of Phase 5 Recommendations on Phase 6 Nutrient Management Panel



- *It is imperative that as many changes as possible that may result in progress reversals, including changes to the NAM report, be included in Ph. 5.3.2 model, BMP definition, efficiencies and scenario protocols. Concern over impacts on calibration or other “model world” issues should not preclude this from occurring.*
- *Failure to do this in Ph. 5.3.2 will create immense confusion and controversy if done in Ph. 6.0, but more likely will assure that no changes in net progress will result from Ph. 6.0.*
 - The Phase 6.0 Panel will be an independent process and the recommendations of that Panel will be based on a different set of landuses, acres of crops, nutrient mass balance and verification protocols.
 - The Phase 6.0 Panel will be based on a different model structure.



Nutrient Management Phase 5 Panel Report Next Steps

John Rhoderick, CBP Agriculture Workgroup Co-Chair



Timeline for Partnership Review

Revised: 7/9/15

June 25: Report posted. 20 day Partnership review and comment period begins.


July 1: Webinar briefing on report content.

July 16: Agriculture Workgroup conference call. Watershed Technical Workgroup members invited to join the Nutrient Management discussion.

July 29: Comment period closes.

Early August: Panel responds to comments.

August 10: Revised report and response to comments posted 10 business days in advance of 8/24 Agriculture Workgroup conference call.

 **August 20:** Webinar to review: 1) Panel response to Partnership comments, and 2) any changes made to the report as a result of those comments.

August 24: Agriculture Workgroup conference call – including consideration of NM Expert Panel recommendations.

August 24: Water Quality Goal Implementation Team briefing on report. *(Originally scheduled for August 10, rescheduled due to meeting time constraints)*

September 3: Watershed Technical Workgroup conference call. Target date for approval (pending Agriculture Workgroup approval).

September 14: Water Quality Goal Implementation Team conference call. Target date for approval (pending Agriculture Workgroup and Watershed Technical Workgroup approval).

8/20/2015

Q&A

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