CONTINUOUS HIGH RESIDUE, MINIMUM SOIL DISTURBANCE BMP

Definition and Recommended Sediment Reduction Efficiencies for Use in Phase 5.3.2 of the Chesapeake Bay Program Watershed Model

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

Introduction

This document summarizes the recommendations of the Conservation Tillage Expert Panel for the revised tillage practice of Continuous High Residue, Minimum Soil Disturbance (HR), including a new practice definition and efficiency estimates for inclusion in the Phase 5.3.2 of the Chesapeake Bay Program Watershed Model. The report was approved and enacted for 2013 progress by the Water Quality Goal Implementation Team on October 15, 2013. This practice represents the highest level of soil conservation and soil cover management to improve soil organic matter content and soil quality, and to reduce runoff and sediment and nutrient losses. This practice is proposed to provide stackability with other best management practice (BMP) reductions, such as cover crops and nutrient management. HR will only be placed on acres of agricultural land already reported under conservation tillage. The HR BMP can be placed on the Watershed Model land uses, LWM (low-till with manure) and NLO (nutrient management low-till). This BMP is intended to replace the current CNT (continuous no-till) practice.

This document summarizes adopted recommendations and plans for future recommendations of the 2012-13 Conservation Tillage Expert Panel for nitrogen (N), phosphorus (P), and sediment reduction efficiencies associated with high-residue, minimum soil disturbance cropland management.

Panel Members

Member	Jurisdiction	Affiliation
Ben Coverdale	Delaware	DE-Agriculture
Phillip Sylvester	Delaware	University of Delaware
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Kevin Ganoe	New York	Cornell

Bill Clouser	Pennsylvania	PA-Agriculture
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Rory Maguire	Virginia	Virginia Tech
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Tom Basden	West Virginia	West Virginia University
Technical support by Steve Dressing, Don Meals, Jennifer Ferrando (Tetra Tech), Jeff Sweeney (EPA CBPO), Matt Johnston (UMD CBPO), Mark Dubin (UMD CBPO), and Emma Giese (CRC).		

Practice Definition: Continuous High-Residue Minimum Soil-Disturbance (HR)

A high degree of soil cover dramatically increases water infiltration and storage, and decreases soil erosion and soil-bound nutrient losses. Over time, this practice also typically results in increased N retention in soil due to increased soil organic matter content. The Continuous No-Till (CNT) practice was proposed for inclusion in the Bay Model in 2005. CNT is considered an enhanced version of the Conservation Tillage BMP and thus can be applied to a subset of the acres receiving Conservation Tillage. However in previous iterations, the N, P, and sediment reduction efficiencies associated with CNT were inclusive of reductions due to Nutrient Management and Cover Crops, both associated cropland BMPs. In order to maximize the potential impact of the panels' limited time and scope for potential revisions to the overall set of conservation tillage practices, the panel decided to focus emphasis directly on a "stackable" CNT practice. After considerable time spent reviewing the literature and discussing the various effects of no-till practices, the panel agreed that the preponderance of evidence indicates that a high degree of soil cover, over 60%, has the greatest impact on water quality benefits. Research from soils and cropping systems within the Chesapeake Bay watershed and from similar conditions elsewhere suggests the effects on infiltration and sediment loss are predominantly determined by residue cover and not by soil disturbance, per-se.

The Continuous High-Residue Minimum Soil-Disturbance (HR) BMP definition does not currently exist in the model but is intended to replace the current CNT practice. The HR BMP is a new crop planting and residue management practice in which soil disturbance by plows and implements intended to invert residue is eliminated. Any disturbance must leave a minimum of 60% crop residue cover on the soil surface as measured after planting. HR involves all crops in a multi-crop, multi-year rotation and the crop residue cover requirement (including living or dead material) is to be met immediately after planting of each crop.

The purpose of implementing the HR BMP is to improve soil organic matter content and soil quality, and to reduce runoff and sediment and nutrient losses coupled with a continuous high-residue management system. Multi-crop, multi-year rotations on cropland are eligible. The system must be maintained for a minimum of one full crop rotation, and tracked and reported on an annual basis.

The Chesapeake Bay Watershed Model has hi-till (0-29% crop residue or conventional tillage) crop land-uses and low till (30+% crop residue or conservation tillage) land-uses, but does not have an explicit land use that defines the properties of HR with minimum soil disturbance. Because HR will be considered a sub-set of the current conservation tillage land use, it is necessary to calculate the effects of HR as reduction efficiency relative to the efficiency already achieved by the conservation tillage land use. The HR practice can be combined with other associated, applicable BMPs for additional reductions, including nutrient management and cover crops.

Applicable USDA-NRCS Practices

No current USDA Natural Resource Conservation Service (NRCS) Conservation Practice standards are directly applicable to this practice. NRCS residue management practice standards are based on the Soil Tillage Intensity Rating (STIR) rather than the percent cover remaining after planting. All related practice standards describe practices to be implemented or avoided. The HR BMP is defined based on outcomes (>60% residue cover), not a particular practice or set of practices.

Effectiveness Estimates

Table 1. Proposed relative reduction efficiency estimates

Panel Proposed HR BMP	
Total N Uplands Continuous High-Residue Minimum Soil-Disturbance lbs/acre Low-Till → Continuous HR (Stackable) Load Reduction TBD	Total N Coastal Plain Continuous High-Residue Minimum Soil-Disturbance lbs/acre Low-Till → Continuous HR (Stackable) Load Reduction TBD
Total P Uplands Continuous High-Residue Minimum Soil-Disturbance lbs/acre Low-Till → Continuous HR (Stackable) Load Reduction TBD	Total P Coastal Plain Continuous High-Residue Minimum Soil-Disturbance lbs/acre Low-Till → Continuous HR (Stackable) Load Reduction TBD
Total Suspended Solids Uplands Continuous High-Residue Minimum Soil-Disturbance tons/acre Low-Till → Continuous HR (Stackable) Load Reduction -64.0%	Total Suspended Solids Coastal Plain Continuous High-Residue Minimum Soil-Disturbance tons/acre Low-Till → Continuous HR (Stackable) Load Reduction -64.0%

TBD indicates that estimated load reduction is yet to be determined by the panel.

Sediment

The panel found ample evidence in the existing literature comparing sediment losses from conservation tillage systems with those of high residue examples, generally from no-till systems. In many cases the cited work did not provide estimates of soil cover after the conservation tillage practice was applied, however the professional judgment of the panel was that the practices indicated would likely produce the minimum 30% residue for the Conservation Tillage category. Also in support of this was that the RUSLE2 estimates of sediment loss reduction calculated by NRCS for typical agricultural cropland soils in Pennsylvania and Virginia were very similar to the values from literature and these runs were conducted with at least 30% soil cover estimates for the conservation tillage practice.

In general, small plot studies with simulated rainfall produced higher reduction estimates than the watershed-scale studies, which the panel assumed to be more reliable and indicative of real-world conditions. Therefore, the panel decided to reduce reported erosion reduction values from small plot studies by 15% to compensate for this effect (Table 2). Values from watershed-scale studies, small plot experiments, and RUSLE2 simulation were evaluated for corroboration. While the absolute values for sediment losses varied by region, soil, and slope the relative reduction was similar across the watershed. The panel recommends a single efficiency value of 64% sediment reduction for this practice, based on averaging applicable reported efficiencies.

Table 2. Reported sediment reduction values of high residue systems over conservation tillage from applicable peer-reviewed studies and RUSLE2 model runs.

Brief Citation	% sediment reduction, Conservation Till to High-Res, Min Disturbance (NT)
Small Watershed-scale studies	
Shipitalo and Edwards, 1998	-61.5%
Staver, 2004	-67.5%
AVG	**-64.5%**
Small plot studies	
Verbree et al, 2010	-85.2%
Truman e al., 2005	-91.5%
Benham et al., 2007	-77.2%
Eghball and Gilley, 2001	-79.6%
Kleinman et al., 2009	-38.0%
AVG	**-74.3%**
15% small plot adjustment	**-63.1%**
RUSLE2 model runs	
Coastal Plain, 1% slope	-49%
Coastal Plain, 2% slope	-80%
Coastal Plain, 4% slope	-78%
Piedmont, 3-4% slope	-65%
Piedmont, 5-6% slope	-68%
Piedmont, 9-10% slope	-58%
Ridge & Valley, 3-4% slope	-66%
Ridge & Valley, 5-6% slope	-71%
Ridge & Valley, 9-10% slope	-70%
Plateau, 4% slope	-75%
Plateau, 6% slope	-77%
Plateau, 10% slope	-76%
AVG	**-69.4%**

Phosphorus

After reviewing numerous papers reporting P losses in response to residue cover and tillage, panel members were unable to arrive at a clear consensus for a reduction value for P, based on the existing data. The panel discussed the possibility of using placeholder, estimated values for P reductions as well as relying more heavily on modeled results for inclusion in this progress run. The group decided to delay a recommendation until a solid base of evidence could be built and consensus for a reduction value reached by the panel. The panel expects to benefit from new simulation modeling capacity within USDA-ARS and from further refinement of the data available in the existing literature. The panel expects a final recommendation can be developed and available for future progress runs.

Nitrogen

Due to a lack of available time, the panel was unable to evaluate a significant body of literature for Total N reduction efficiency from the new HR practice. The group decided to delay a recommendation until a solid base of evidence could be built and consensus for a reduction value reached by the panel. The panel expects to benefit from new simulation modeling capacity within USDA-ARS and from further refinement of the data available in the existing literature. The panel expects a final recommendation can be developed and available for future progress runs.

Recommendation and associated benefits

The panel is currently recommending that the HR practice and sediment reduction values recommended for HR be treated as stackable with other applicable agricultural cropland BMPs on lo-till land uses. At this time, the stackable HR practice would be given no N or P reduction credit; however, any reduction values associated with other practices applied to that same area would be included. The same acre could not be reported to CNT and HR. States must choose if they will submit HR or CNT. States cannot submit HR in one county and CNT in another county for the same scenario.

In addition to the direct benefit of reduced erosion, reduced tillage cropping systems are often more profitable for farmers, retain more soil water, and result in higher soil organic matter levels over time. Less fuel usage can also reduce the carbon footprint associated with crop production.

The panel found no instances in the literature where this practice increased sediment losses or where pollutants (sediment) were relocated to a different location or loss mechanism. The panel was diligent about selecting data on sediment losses that would be representative of this practice alone and not dependent on the inclusion of other potential BMPs such as cover crops or nutrient management. The RUSLE2 simulations included only crop residue, with no cover crops included, to reach the minimum required levels of soil cover. However these factors can definitely interact and can synergistically enhance environmental benefits.

References

Andraski B.J., Mueller D.H., Daniel T.C. (1985) Phosphorus Losses in Runoff As Affected by Tillage. Soil Sci. Soc. Am. J. 49:1523-1527. DOI: 10.2136/sssaj1985.03615995004900060038x.

Benham B., Vaughan D., Laird M., Ross B., Peek D. (2007) Surface Water Quality Impacts of Conservation Tillage Practices on Burley Tobacco Production Systems in Southwest Virginia. Water, Air, and Soil Pollution 179:159-166. DOI: 10.1007/s11270-006-9221-z.

Bundy L.G., Andraski T.W., Powell J.M. (2001) Management practice effects on phosphorus losses in runoff in corn production system. J. Environ. Qual. 30:1822-28.

Eghball B., Gilley J.E. (2001) Phosphorus risk assessment index evaluation using runoff measurements. J. Soil Water Cons. 56:202-206.

Kimmell R.J., Pierzynski G.M., Janssen K.A., Barnes P.L. (2001) Effects of Tillage and Phosphorus Placement on Phosphorus Runoff Losses in a Grain Sorghum–Soybean Rotation Contribution no. 00-358-J from the Kansas Agric. Exp. Stn. J. Environ. Qual. 30:1324-1330. DOI: 10.2134/jeq2001.3041324x.

Kleinman P.A., Sharpley A., Saporito L., Buda A., Bryant R. (2009) Application of manure to no-till soils: phosphorus losses by sub-surface and surface pathways. Nutrient Cycling in Agroecosystems 84:215-227. DOI: 10.1007/s10705-008-9238-3.

Kleinman P.J.A., Sharpley A.N., Moyer B.G., Elwinger G.F. (2002) Effect of Mineral and Manure Phosphorus Sources on Runoff Phosphorus. J. Environ. Qual. 31:2026-2033. DOI: 10.2134/jeq2002.2026.

Quincke J.A., Wortmann C.S., Mamo M., Franti T., Drijber R.A., García J.P. (2007) One-Time Tillage of No-Till Systems. Agron. J. 99:1104-1110. DOI: 10.2134/agronj2006.0321.

Sharpley A.N., Smith S.J., Williams J.R., Jones O.R., Coleman G.A. (1991) Water Quality Impacts Associated with Sorghum Culture in the Southern Plains. J. Environ. Qual. 20:239-244. DOI: 10.2134/jeq1991.00472425002000010038x.

Shipitalo M.J., Edwards W.M. (1998) Runoff and erosion control with conservation tillage and reduced-input practices on cropped watersheds. Soil Till. Res. 46:1-12.

Staver K.W. (2004) Efficient utilization of poultry litter in cash grain rotations. Final Report submitted to: Maryland Grain Producers Utilization Board. MCAE Pub. 2004-03.

Truman C.C., Shaw J.N., Reeves D.W. (2005) Tillage effects on rainfall partitioning and sediment yield from an ultisol in central Alabama. Journal of Soil and Water Conservation 60:89-98.

Verbree D.A., Duiker S.W., Kleinman P.J.A. (2010) Runoff losses of sediment and phosphorus from no-till and cultivated soils receiving dairy manure. J. Environ. Qual. 39:1762-1770.

<u>References used for sediment estimates</u>

Shipitalo and Edwards, 1998
Staver, 2004
Verbree et al, 2010
Truman e al., 2005
Benham et al., 2007
Eghball and Gilley, 2001
Kleinman et al., 2009

Results from these references were averaged to arrive at the proposed efficiency estimates; reductions reported by small plot studies were discounted 15% as discussed previously (see Table 2).

Results reported in the literature reviewed for sediment and P reduction efficiencies are summarized in an attachment to this report.

All citations and data used in developing the sediment loss reduction values were from studies conducted in the CB region or on very similar soils under similar cropping systems. In general, small plot studies with simulated rainfall produced higher reduction estimates than the watershed-scale studies, which the panel assumed to be more reliable and indicative of real-world conditions. Therefore, the panel decided to reduce reported erosion reduction values from small plot studies by 15% to compensate for this effect (Table 2). Values from watershed-scale studies, small plot experiments, and RUSLE2 simulation were evaluated for corroboration. Specific information about each study cited is included in Appendix A.

Application of Practice Effectiveness Estimates

- Units of measure: acre
- Load sources addressed: 64% sediment reduction over that credited for low-till with manure (LWM).
- Conditions under which the BMP works: Relative effectiveness for sediment reduction is similar across regions, soils, and slopes. Uneven distribution of cover could decrease effectiveness.
- Considerations for benefits in load reduction: The panel reviewed and included seven peer-reviewed studies over a wide range of soil textures, slope and drainage. Because all studies reported similar relative sediment efficiency values, the panel did not differentiate by texture, etc. In our findings, there were no changes in load reductions among soil textures. Sediment values are only relevant as surface transport. Subsurface and other pathways relevant for nutrient losses are not relevant for sediment.

Geographic Considerations

- This practice is applicable to lo-till row crop land throughout the watershed.
- Load reduction estimates reflect edge-of-field reductions.
- The baseline condition was Conservation Tillage, as currently defined. Efficiency values represent reductions relative to this baseline.
- The same sediment reduction efficiency is appropriate across the watershed.

Temporal Considerations

- HR involves all crops in a multi-crop, multi-year rotation and the crop residue cover requirement (including living or dead material) is to be met immediately after planting of each crop in rotation.
- The practice will be tracked and reported annually.
- The practice is expected to provide full benefits at all times when the minimum residue cover is in place and effecting as long as that condition persists.
- The efficacy of this practice is defined based on an outcome of at least 60% residue cover and not as implementation of a specific management practice. Therefore, imperfect operation and maintenance of the practice is not a factor for performance.

Practice Limitations

- The HR BMP is defined as a stand-alone practice that can be implemented with other BMP's however the sediment reduction values represent only that achieved by the HR practice.
- The practice is limited to lo-till cropland.
- Ancillary benefits include, over time, increase soil organic matter, increased soil cation exchange capacity, increase water-holding capacity, and improved soil quality.
- Eliminating or minimizing tillage can result in surface application of fertilizer and manures with no, or very little, incorporation. The result could produce greater ammonia volatilization and soluble P losses in certain circumstances and management systems..

Modeling Considerations

- BMP Name: Continuous, High Residue, Minimum Soil Disturbance (HR)
- Acres: Number of acres under HR meeting the definition of 60% residue cover
- Location: Approved NEIEN geographies: County; County (CBWS Only); Hydrologic Unit Code (HUC12, HUC10, HUC8, HUC6, HUC4), State (CBWS Only)
- Date of Implementation: Year of HR implementation or continued management of an HR system
- See Attachment C
- Applicable verification standards:
  The HR BMP has been defined by the panel as an annual crop residue and tillage practice which will can be applied onto applicable Conservation Tillage BMP acres. Annual crop residue and tillage practices have subsequently been categorized by the Chesapeake Bay Program's Agriculture Workgroup as Single-Year Visual Assessment BMPs. The panel recommends that the appropriate verification guidance associated with this category of BMPs be implemented by the partnership in the verification of acres reported under this BMP.
- Panel comments on verification protocols recommended by the Verification Panel:
  The panel recommendations for defining, tracking and reporting to the Chesapeake Bay Program partnership models the HR BMP, is compatible with and supports the

agricultural BMP verification guidance subsequent developed by the Agriculture Workgroup.

- Panel recommendations on what to use as default conditions or default benefits if not all information about a practice is reported or known:
  The panel recommendations for defining the HR BMP were developed from the baseline of the existing Conservation Tillage BMP and associated Phase 5.3.2 Modeling land uses. The default condition and benefits if not all information is known or reported on a subset of reported acreage would be as the baseline condition; i.e. represented as a Conservation Tillage BMP.

Practice Monitoring and Reporting

This practice could be tracked through field transect surveys (CTIC methodology), potentially through remote sensing and limited field transect surveys in the future, or through state or federal programs that collect information on high-residue, minimum disturbance practices. The current CTIC methodology would need to be revised to include a category specifically with >60% cover. The panel discussed the importance of obtaining complete information about implementation of this practice. Therefore, information about implementation obtained through programs needs to be supplemented with other information to report acres where farmers practice HR voluntarily. The panel recommends that residue cover requirement (including living or dead material) is evaluated in the period shortly after planting a new crop. The acres that meet these criteria should be tracked and reported annually. A re-evaluation of the estimates should be conducted as new data are available.

Data Gaps and Research Needs

If remote sensing of residue cover is adopted in the future as the technology improves to meet the partnership's verification expectations, additional research validation will likely be required and protocols for evaluation developed.

Additional small watershed scale studies of sediment and especially N and P losses from representative locations within the Bay watershed would provide highly valuable information.

Attachments

- Attachment A: Summary of literature included in sediment reduction estimate
- Attachment B: Summary of literature reviewed for P reduction estimate

- Attachment C: Technical Requirements for Entering the Continuous, High Residue, Minimum Soil Disturbance (HR) Practice into Scenario Builder and the Watershed Model
- Attachment D: Initial Expert Panel survey summary, conducted by Tetra Tech
- Attachment E: Expert Panel meeting minutes/notes/attendance

Attachment A: Summary of literature included in sediment reduction estimate

Summary of High Residue, minimum soil disturbance practice Sediment reduction efficiency							
Citation	Notes						
Verbree, D. A., S. W. Duiker, P.J.A. Kleinman. 2010. Runoff losses of sediment and phosphorus from no-till and cultivated soils receiving dairy manure. J. Environ. Qual. 39:1762-1770	Central PA, limestone derived soil (WD) and colluvium-derived soil (SWPD), Flow-weighted average soil loss over 3 1-hr rainfall events (planting, mid-season,after silage harvest), Flow-weighted solids load (g m-2 h-1)			Flow-weighted solids load (g m-2 h-1)			
				Chisel/disk	NT	NT effiiciency	
			Well-drained	10.8	1.1	-89.8%	
			Well-drained	27.7	2.1	-92.4%	
			SWPD	10.6	2	-81.1%	
			SWPD	8.36	1.9	-77.3%	
					AVG	-85.2%	
Shipitalo, M.J. and W.M.Edwards. 1998. Runoff and erosion control with conservation tillage and reduced-input practices on cropped watersheds. Soil Till. Res. 46(1): 1-12	Average soil loss (kg/ha) in corn year of corn/wheat/meadow/meadow rotation, Research on about 0.5 ha watersheds, 7-13% slopes,		14 yr/location data		12 yr/location data		
			Chisel plowed		No-till	NT efficiency	
			Sed loss		Sed loss		
			3585.5		1380.5	-61.5%	
Truman, C.C., J.N. Shaw and D.W. Reeves. 2005. Tillage effects on rainfall partitioning and sediment yield from an ultisol in central Alabama. Journal of Soil and Water Conservation 60: 89-98.	Coastal plain of AL, sandy soil 1% slope, Total sediment loss (g) over two 1-hour rainfall simulation events (50 mm/hr), used 1m2 small plots, took treatments w/o paratill, but with residue (incorporated in chisel, left on surface in NT,	Total sediment loss (g) over two 1-hour rainfall simulation events (50 mm/hr)					
			Chisel	NT	NT efficiency		
			235	20	-91%		
Benham, B., D. Vaughan, M. Laird, B. Ross and D. Peek. 2007. Surface Water Quality Impacts of Conservation Tillage Practices on Burley Tobacco Production Systems in Southwest Virginia. Water Air Soil Pollut 179: 159-166.	Speedwell sandy loam 1% slope, Alluvial soil, Strip till was 59% cover, NT 82%, Conventional was 5% cove,r Rainfall simulation on 2.1x7m plots at 50 mm/hr. average soil loss kg/ha of 6 runs reported	Conv	Strip till	NT	NT efficiency	efficiiency vs Conv	
		Soil Loss, kg/ha					
		320.8	115.2	73	-36.6%	-77.2%	
Eghball, B. and J.E. Gilley. 2001. Phosphorus risk assessment index evaluation using runoff measurements. J. Soil Water Cons. 56: 202-206.	Sharpsburg sicl NE 6-7% and Monona si IA 12%, Did not use trtmnts with hedges		Disked	NT			
		Soil Loss, kg/ha					
			16.5	2.5			
			7	2.7			
			10.7	4.1			
			11.7	4.1			
			14	1.1			
			7	2			
			9.8	0.6			
			8.4	1.1			
			7.1	1.1			
			10.2	0.9			
			1.66	0.58			
			2.78	0.77			
			2.15	0.73	NT efficiency		
		Average	8.383846154	1.71384615	-79.6%		

Citation	Notes						
Staver, KW. 2004. EFFICIENT UTILIZATION OF POULTRY LITTER IN CASH GRAIN ROTATIONS. Final Report submitted to: Maryland Grain Producers Utilization Board Maryland Center for Agro-	Staver (personal communication, based on figure 19 in report Staver 2004.						
	CT was chisel-disk rye cover crop NT planted in both tillage treatments from 1988-1998						
			CT	CT	CT	CT	
	date	precip.	runoff	residue nf	residue nf	residue nf	
		(cm)	(cm)	(kg/ha)	(kg/ha)	(mg/l)	
	May 1- April 30						
	85-86						
	86-87	94.02	9.84	131.8	131.8	133.9	
	87-88	85.3	11.04	631.7	631.7	572.0	
	88-89	74.36	3.18	326.3	326.3	1027.2	
	89-90	99.18	9.51	1795.3	1795.3	1887.6	
	90-91	117.24	16.63	1051.4	1051.4	632.3	
	91-92	106.54	15.54	2581.9		1661.1	
	92-93	86.8	9.78	210.1	210.1	214.7	
	93-94	108.68	20.34	231.5	231.5	113.8	
	94-95	112.79	28.52	377.1	377.1	132.2	
	95-96	85.25	6.38	108.1	108.1	169.5	
	96-97	106.86	15.88	343.4	343.4	216.2	
	97-98	124.62	28.55	442.0	442.0	154.8	
	98-99	114.03	26.37	391.5	391.5	148.5	
	99-00	75.46	4.16	526.5	526.5	1267.2	
	00-01	128.8	21.75	82.4	82.4	37.9	
	01-02	103.91	11.01	256.2	256.2	232.7	
	02-03	100.77	10.52	28.9	28.9	27.4	
	03-04	118.31	26.73	155.5	155.5	58.2	
		143.37	42.82	187.0	187.0	43.7	
					404.3		
	residue nf = Residue non-filterable,all the material collected on a GFC filter pad with average pore size of 1.4 microns.						
					NT		
			NT	NT	residue nf		
		precip.	runoff	residue nf	(mg/l)		
	date	(cm)	(cm)	(kg/ha)			
					204.7		
	85-86	94.02	12.08	247.2	298.2		
	86-87	85.3	11.15	332.4	164.7		
	87-88	74.36	3.85	63.5	96.4		
	88-89	99.18	10.06	96.9	89.7		
	89-90	117.24	23.11	207.3	150.8		
	90-91	106.54	16.31	246.0	41.8		
	91-92	86.8	8.86	37.0	40.2		
	92-93	108.68	17.12	68.8	27.6		
	93-94	112.79	27.55	75.9	42.7		
	94-95	85.25	4.96	21.2	49.2		
	95-96	106.86	15.76	77.5	29.9		
	96-97	124.62	28.02	83.9	43.0		
	97-98	114.03	23.71	101.9	803.4		
	98-99	75.46	3.76	302.0	36.4		
	99-00	128.8	17.02	61.9	172.2		
	00-01	103.91	10.49	180.6	68.9		
	01-02	100.77	8.09	55.8	28.5		
	02-03	118.31	24.20	68.9	49.2		
	03-04	143.37	33.37	164.1			
				131.2			
	NT efficiency						
	-67.5%						

Kleinman, P.A., A. Sharpley, L. Saporito, A. Buda and R. Bryant. 2009. Application of manure to no-till soils: phosphorus losses by sub-surface and surface pathways. Nutrient Cycling in Agroecosystems 84: 215-227. doi:10.1007/s10705-008-9238-3.	Used rainfall simulation at 75 mm/hr intensity, until 30 minutes of runoff had finished.		Sediment loss (kg/ha)		
			Rototill 20 cm	NT	NT efficiency
		Clymer sandy loam	69.2	36.2	-47.7%
		Wharton clay loam	166.3	119.3	-28.3%
				av	-38.0%

Attachment B: Summary of literature reviewed for P reduction estimate

Summary of High Residue, minimum soil disturbance practice P reduction efficiency						
Literature Citation	Particulate P	Dissolved P	Subsurface P	Total P	Location	Notes
	% change Conserv-Till to HRMSD (NT)					
Benham, B., D. Vaughan, M. Laird, B. Ross and D. Peek. 2007. Surface Water Quality Impacts of Conservation Tillage Practices on Burley Tobacco Production Systems in Southwest Virginia. Water Air Soil Pollut 179: 159-166. doi:10.1007/s11270-006-9221-z.				-23%	VA; Ridge and Valley	Rainfall simulation on 2.1x7m plots at 50 mm/hr. average soil loss kg/ha of 6 runs reported; Speedwell sandy loam, 1% slope; alluvial soil; No till was 82% cover, strip till was 59%, conventional till was 5%
Verbree, D. A., S. W. Duiker, P.J.A. Kleinman. 2010. Runoff losses of sediment and phosphorus from no-till and cultivated soils receiving dairy manure. J. Environ. Qual. 39:1762-1770	-73%	333%		-5%	PA	Central PA, limestone derived soil (WD) and colluvium-derived soil (SWPD). 3, 1-hr rainfall events (planting, mid-season,after silage harvest)
Kleinman, P.J.A., A.N. Sharpley, B.G. Moyer and G.F. Elwinger. 2002. Effect of Mineral and Manure Phosphorus Sources on Runoff Phosphorus. J. Environ. Qual. 31: 2026-2033. doi:10.2134/jeq2002.2026.				147%	PA	3 soils, 4 P sources, 100 kg/ha TP applied, rainfall sim
Andraski, B.J., D.H. Mueller and T.C. Daniel. 1985. Phosphorus Losses in Runoff As Affected by Tillage. Soil Sci. Soc. Am. J. 49: 1523-1527. doi:10.2136/sssaj1985.03615995004900060038x.		57%		-15%	Wisconsin, three locations, (silt loam soils)	Various STP due to previous treatments, small plot studies with NT vs Chisel, manure applied at est rate of 50 kg/ha of first-year available P. Rainfall simulation preplant and in September, results averaged
Bundy, L.G., T. W. Andraski, and J. M. Powell. 2001. Management practice effects on phosphorus losses in runoff in corn production system. J. Environ Qual. 30(5):1822-28		-60%		-35%	*no manure*	STP, tilage and manure treatments. Fig 4 DRP concentration and Loss. Fig 5 TotP concentration and loss. History of biosolids to generate various STP. Spring manure application, chisel plow (CP), shallow till (ST), and no-till (NT). Rainfall simulation preplant and in September, results averaged
		0%		-80%	*with manure*	
Kimmell, R.J., G.M. Pierzynski, K.A. Janssen and P.L. Barnes. 2001. Effects of Tillage and Phosphorus Placement on Phosphorus Runoff Losses in a Grain Sorghum–Soybean Rotation Contribution no. 00-358-J from the Kansas Agric. Exp. Stn. J. Environ. Qual. 30: 1324-1330. doi:10.2134/jeq2001.3041324x.				-56%	Woodson sl, Ottawa KS 1.5% slope	ridge till vs NT, small plot, grain sorghum/soybean rotation, Fertilizer P, natural rainfall collected throughout two seasons (6-7 events/year)
Kleinman, P.A., A. Sharpley, L. Saporito, A. Buda and R. Bryant. 2009. Application of manure to no-till soils: phosphorus losses by sub-surface and surface pathways. Nutrient Cycling in Agroecosystems 84: 215-227. doi:10.1007/s10705-008-9238-3.	5%	80%	71%	10%	PA Plateau	Clymer and Wharton soil, manure application of 30 kg/ha TP, subwatershed, includes leachate

Literature Citation	Particulate P	Dissolved P	Subsurface P	Total P	Location	Notes
	% change Conserv-Till to HRMSD (NT)					
Kleinman, P.A., A. Sharpley, L. Saporito, A. Buda and R. Bryant. 2009. Application of manure to no-till soils: phosphorus losses by sub-surface and surface pathways. Nutrient Cycling in Agroecosystems 84: 215-227. doi:10.1007/s10705-008-9238-3.	5%	80%	71%	10%	PA Plateau	Clymer and Wharton soil, manure application of 30 kg/ha TP, subwatershed, includes leachate
Quincke, J.A., C.S. Wortmann, M. Mamo, T. Franti, R.A. Drijber and J.P. García. 2007. One-Time Tillage of No-Till Systems. Agron. J. 99: 1104-1110. doi:10.2134/agronj2006.0321.	14%	0%		9%	Nebraska, 2 and 3% slope	NE, sharpsburg scl, Yutan scl, corn soy sorghum rotation, NT since 1992one time tillage after 15 yr NT, disc vs NT, rainfall sim, 2 yr after tillage
Sharpley, A.N., S.J. Smith, J.R. Williams, O.R. Jones and G.A. Coleman. 1991. Water Quality Impacts Associated with Sorghum Culture in the Southern Plains. J. Environ. Qual. 20: 239-244. doi:10.2134/jeq1991.00472425002000010038x.				-32%	OK, TX	grain sorghum in southern plains, rainfall sim
Staver, KW. 2004. EFFICIENT UTILIZATION OF POULTRY LITTER IN CASH GRAIN ROTATIONS. Final Report submitted to: Maryland Grain Producers Utilization Board Maryland Center for Agro-Ecology, MCAE Pub. 2004-03	-65%	421%		238%	Coastal Plain	Wye REC, MD: 4-yr study. small watershed scale study. The primary objective of this project was to evaluate the effect of nitrogen-based poultry litter applications on phosphorus and nitrogen transport rates in tilled and no-till settings during a three crop/two year rotation of corn/wheat/double-crop soybeans. Two complete cycles of the rotation were completed. Poultry litter was applied in the spring (3 tons/acre) prior to corn planting and also in the fall (2 tons/acre) prior to wheat planning in 1998 and 2000. During the second year of the rotation, no additional poultry litter was applied but nutrient transport patterns were tracked during wheat/double-crop soybean production. To meet the project objectives poultry litter was applied to two fully instrumented field-scale watersheds where detailed studies have been conducted since 1984 of nutrient transport rates from cropping systems utilizing inorganic fertilizers. Field edge
Ross, B. B., Davis, P. H., and Heath, V. L. June 11, 2001. Water Quality Improvement Resulting from Continuous No-Tillage Practices. Final Report. Colonial Soil and Water Conservation District.				-87%	Coastal Plain	A rainfall simulator was used to demonstrate and evaluate the effectiveness, in terms of NPS pollution control, of various nutrient inputs, as well as corn pre-planting and post-harvest tillage operations in preparation for small grain planting. An average 85.9 mm (3.38 in.) of artificial rainfall was applied to ten runoff plots during three separate runs conducted over a two-day period. During the simulated rainfall events, runoff from the plots was measured and

APEL Runs

	Coastal Plain		Piedmont		Ridge and Valley		Plateau	
STP	H	VH	H	VH	H	VH	H	VH
% change CT to NT	**-48%**	**108%**	**-56%**	**-16%**	**-57%**	**-16%**	**-60%**	**-31%**

Attachment C: Technical Requirements for Entering the Continuous, High Residue, Minimum Soil Disturbance (HR) Practice 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 efficiency reductions can a jurisdiction claim by implementing and reporting the HR practice?

A1: A jurisdiction will receive a 64% reduction to the edge-of-stream sediment losses from agricultural acres already under a low-till condition for every acre reported under HR. No phosphorus or nitrogen reduction credits will be given to this practice at this time (Table 1). The impact of these reductions in the Watershed Model will vary across the watershed as a result of hydrologic conditions, application rates to low-till land uses and sediment export from those low-till land uses.

Q2: What land uses are eligible to receive the HR practice?

A2: HR will only be placed on acres of agricultural land already reported under conservation tillage (lo-till). The HR BMP can be placed on the Watershed Model land uses, LWM (low-till with manure) and NLO (nutrient management low-till). This practice is not eligible on HOM (high-till without manure) or any other agricultural land uses in the Watershed Model. When an acre of row crops is reported under the conservation tillage BMP, that row crop acre is converted from a conventional tillage routine to a low-tillage routine in the Watershed Model. This conversion results in a reduction of sediment loads from that acre of row crop. HR is intended to be a reduction beyond this initial conversion from conventional to low-till. For this reason, an acre submitted as HR should also be submitted under the conservation tillage BMP (Table 1).

Q3: Can other BMPs be placed on the same acre as HR?

A3: Yes. All efficiency reduction BMPs that are currently eligible for LWM and NLO will receive credit in combination with this practice.

Q4: Can states still report Continuous No-Till (CNT)?

A4: Yes. However, states must choose if they will submit HR or CNT. States cannot submit HR in one county and CNT in another county for the same scenario (See: Associated Benefits, page 6).

Q5: What are the main differences between HR and the currently approved, CNT?

A5: An acre reported under CNT currently receives reductions to sediment, phosphorus and nitrogen loads. However, other BMPs eligible for low-till land uses including nutrient management and cover crops cannot currently be reported on the same acre as CNT. An acre reported under HR will receive only a sediment reduction, but will still be eligible for reductions from other low-till eligible BMPs such as nutrient management and cover crops.

Q6: Why is there no phosphorus or nitrogen benefit given to HR?

A6: The panel determined that more time was needed to evaluate the literature and results from various models before providing scientifically defensible reduction rates for phosphorus or nitrogen for this practice (See: Phosphorus and Nitrogen subsections, page 6).

Q7: What does a jurisdiction need to report in order to receive credit for HR?

A7: Jurisdictions should report the following information:

- BMP Name: Continuous, High Residue, Minimum Disturbance (HR)
- Acres: Number of acres under HR meeting the definition of 60% residue cover
- Location: Approved NEIEN geographies: County; County (CBWS Only); Hydrologic Unit Code (HUC12, HUC10, HUC8, HUC6, HUC4), State (CBWS Only)
- Date of Implementation: Year of HR implementation or continued management of an HR system

Q8: Do states need to track and report HR annually?

A8: Yes. All states currently report CNT as a cumulative practice, which means that they only report new acres each year, but receive credit for all acres reported and verified from previous years. Beginning in 2013, states should report HR and CNT as an annual practice, or as the snapshot of all acres on the ground in 2013. Again, states should submit only HR or CNT in a single scenario.

APPENDIX E: Expert Panel Meeting Minutes

Conservation Tillage Expert Panel Conference Call Minutes
6/13/12
List of participants:

- Mark Dubin, AgWG
- Jeff Sweeny, EPA
- Ben Coverdale, DE-Agriculture
- Bill Keeling, VA DCR
- Dale Gates, USDA-NRCS-NY
- Jack Meisinger, USDA-ARS
- Ken Staver, UMD
- Kevin Ganoe, Cornell
- Mark Reiter, VT
- Philip Sylvester, UD
- Sjoerd Duiker, PSU
- Tim Sexton, VA DCR
- Mark Sievers, Tetra Tech
- Kamran Zendehdel, Tetra Tech

Purposes

- Describing goals and process
- Proposing to have some subgroups for the panel
- Selecting a chair person for the panel
- Hearing from the panel members
- Scheduling interviews
- Discussing the timelines

Introduction:
Mark D., This is the first call for this panel. Basically, I am helping with the panel. We will try to select a chair for the panel as a voice of the panel.
The Bay program partnership specifically through agricultural work group has identified a number of both traditional practices as well as new conservation practices that partnership would be interested in having either evaluated and added to the list or re-evaluated if it is a current practice. The aim is to know pros and cons of how practices are reported.
How is the practice represented now in the model? How do we would like to be represented in the future? Our discussion is really an open forum, and as far as what the panel can look at and what they can recommend. If the panel feels comfortable with its recommendations, the panel can submit them to AgWG to review. We will expect to have a list of recommendations or report by the end of this year.
Bill K., Asked if this was the first meeting of this panel?
Mark D., Confirmed that this was in fact the first meeting of this panel.
Mark S., The AgWG requested EPA to evaluate BMPs under the protocol. EPA tasked Tetra Tech with helping out with the panels. We are coordinating with Mark D. and the AgWG in the panel. We are collecting technical and model information for panel review and support. We have done literature search. Tetra Tech is tasked with interviews, panel

minutes, a final report, and aiding in the various workgroup approvals. The AgWG has a leadership role, however, Tetra Tech provides some staffing and technical assistants.
Mark D., We have a panel that is representative for whole watershed. We will have a diversity of viewpoints. One of the areas that has come up with another panel, was working in subgroups. In this way we do not need to involve everybody into all discussions. In another panel, we have three subgroups, including Academic, Programmatic, and Modeling. You can serve one or all three subgroups based on your expertise and interest. I would like to open the floor on that and I would like to know do you have suggestion.
Bill K., In another panel that I worked on, we did everything in front of all panel members. In that way, all benefited from the discussion. However, if there are different subgroups in this panel, I have been directed to be in all of them.
Mark D., It turns out based on comments from other panel members, working with smaller group was seen as more efficient and effective. Some possible subgroups can be:

- The Academic subgroup is looking at the scientific literature and research and looking at those mechanisms of potential nutrient sediment lost. In the impacts from tillage management systems.
- The Programmatic subgroup is looking at the point of implementing of state or federal programs through cost share programs or state regulations.
- The Modeling subgroup is taking the concepts from two other subgroups and to see how they can represent those in the model.

If we decided to use subgroups, it does not mean that we will not have a whole group discussion. The subgroups will discuss on smaller topics and report back to the main panel. However, it will be up to the members to decide on that.
Jack, Historically, it is proven the subgroup is better with this task, but we can invite the whole panel members and based on the agenda if they are interested in, they can join the call.
A motion was made to use these subgroups and duly seconded. All voted in the affirmative except Bill Keeling who abstained. The motion was carried and advanced. There will be 3 subgroups as described by Mark D. and the members will select the group(s) they will participate in.
---., Does the chair have to attend all subgroup meetings?
Mark D., The chair is open to go to any subgroup meetings. However, we do not expect the chair to go to all meetings.
We will talk about some of the recommendations from AgWG. The AgWG had some discussions about Continuous No Till. Some panel members were part of this discussion. This is the current practice within the Bay program model. This practice has been around for 7 to 8 years. Some partners believe that we need to re-look at the practice. Based on the partners' views, if we are going to evaluate Continuous No Till system practices, we should evaluate Conservation Till as well, because both connect to each other. Therefore, this is why we are looking a little broader. This is short presentation about the works that have been done in the past here.
We have Jeff Sweeney (Chesapeake Bay Program Office), who will talk about tillage practices in the Bay program, models and looking at Continuous No Till as part of Phase 2 process.

Jeff, I have three graphs: sediment, nitrogen, and phosphorus. I will go through first five years and try to explain the differences between loading rates. I am not going to go through all the rates and making many comparisons between them. But this is where we stand right now on the benefit of Continuous Tillage and No Till practices. In our model world, the two first bars are kind of composite crops including corn, bean, soybean, barley, and oats. We are not individually modeling those crops. But we do account for them in the pre-process of the model. When it gets to actual watershed model we treat all the crops. High till without manure this again is a composite crop, but a different category including vegetables, Christmas tree, corn, and beans. There is a lot of benefits going from Conventional Till to Conservation Till. Based on this, the model calculated the reduction of sediment from 1,700 lbs./acre to 1,000 lbs./acre. The benefits came from a study that Mid-Atlantic Water Program did for us and provided a set of recommendations about the benefits of moving from conventional till to conservation tillage.
The blue bar is the vegetable category. The next three bars are outputs of the current model for Continuous No Till and differences between stackable and non-stackable. Non-stackable stands for individual practices and stackable practices stands for practices that can be put on top of each other in the model, such as cover crops, nutrient management plans, and Continuous No Till.
Bill K., Couldn't there be a chance for the panel to make a recommendation, which crops should be considered row crop and under some form of tillage system. That is part of the problem and why Virginia has requested and interim BMP to have conservation tillage BMP on the model land use high till without manure . That land use in the model currently has crops like Christmas trees and orchards listed as grown under full width tillage. We (VA) do not considered Christmas trees and other things like that under row crops requiring tillage.
Jeff, As Mark said, the floor is open for this category. It is part of BMPs, moving from conventional till to conservation tillage.
Mark D., We are looking for what are the baseline conditions, what are the appropriate BMPs that can be applied under the baseline condition, which would impact the BMPs.
Bill K., There are certain crops whether historically or not that could have been done via full width tillage and those crops can be eligible for conservation tillage and other crops in the model should not be eligible for conservation tillage such as alfalfa, hay, or pasture, which are not regularly tilled. We as a panel define the crops that go into cropland; therefore they are eligible for these BMPs.
Ken, I was wondering why all crops listed with manure. Why we have manure in these graphs. We are just looking at tillage.
Jeff, In our model, we do not have any idea who is using organic or non-organic fertilizer. In the graph, crops that listed with manures mean that they are eligible to be used with manure and not that they have been used with manure. It is a way to determine how to route manure in the model.
Mark D., At this point, manure may have some impacts, but we would like to focus on tillage practices.
Ken, How do the practices interact? Could we also say cover crop and tillage? Maybe how things are lumped together is changed? Might be good way to go.
---, Therefore, we should focus on how the practices interact with the crop.

Ken, For future, it will be better and more clear to just say high till and low till.
---, We always heard that these are the categories that model used. We might disassociate it. We might have low till and high till categories. But maybe you should talk about it.
Bill K., I think we should look at everything holistically. We might use different models in 2017 (Phase 6). We have to produce a set of recommendations for the current model and something else for future phases. Maybe for Phase 6 we say we recommend a single row crop land use.
Mark D., I think Bill is right. Right now we will be using the current model. This is in the next phase of the model. Eventually, the panel will need recommendations for the current and next phase of the WSM.

Ken, 1,700 lbs. in each acre is not very much here.

Jeff, It is related to the calibration. The numbers are from the edge of stream and not edge of the field.

Bill K., The numbers can be very different. It can be from one ton per acre to three times or more higher in different places.

Jeff, The rate varies by watershed. The model takes into account scour and re-suspension.

Ken, This explains why that number is lower.

Mark D., We now move to Phosphorus part
Jeff, We focus on the benefit of going toward conservation tillage. We will talk about the model and the indicators that are used in the model. For next version of the model, it is open to change for nutrient and sediment for conservation tillage. The group will receive the definition of the practices that we discussed here. The phosphorus is very tight to sediment.
Ken, What about phosphorus and its forms: soluble and sediment. How does tillage affect different forms of nitrogen and phosphorus? There is a whole discussion about phosphorus. There is a discussion about different forms of phosphorus and their diverse impact on water quality. There are sediment bound phosphorus and soluble phosphorus. Soluble phosphorus is very reactive. More likely to cause problem for water quality. We are looking at the model and the indicators that used in the model. We are using phosphorus just as one bulk number.
Bill K., Maybe it will be useful to put together something like a primer for those who have limited knowledge about modeling to let them know about it and its environment and terminology.
Mark D., It is good idea. We will definitely focus on this and provide more information and detail here to all panel members.
Jeff, There is very detail related to Mid-Atlantic study. There are 50 pages including meeting minutes and how the model works. There is a long discussion about differences on species and nutrients. But we should focus on eligibility of BMPs.
Ken, I guess we have to talk about how different types of tillage affect different types of phosphorus such as organic vs. non-organic.
---, One thing that I want to add is that right now the definition of conservation tillage is quite long. But whatever you came up with needs to be related to what state were actually

able to track and report to us. How different benefits depend on low till and high till practices are.
Mark D., A good example that has been done previously and Bill K. was part of it, was on pasture management practices. Basically the panel looked at different sources of information including pasture management practices and they came up with a recommendation packages and new categories of practices. In other words, they created a system to see how you can stack or overlap practices to create multiple levels of benefits. This is an example of what a panel can do.
There are some limitations to the current model. We will start our work on a new model very soon, which this panel recommendations will influence that. There have been some interests by the panel in focusing on different forms of the phosphorus. We are trying to be sure that the model will consider it.
---, You cannot ask us to do that, because we do not collect that information. Something very important to know for predicting load is to know how they can be in future, are now and were in the past. But we do not collect this information and we need to see how we can collect it. It will be better to see how we can collect this information. Otherwise you are introducing an uncertainty into the model.
Bill K., This might be a recommendation that we can come up with and introduce it to NRCS. But, there won't be any guarantee that they go with it. **(This was related to NRCS practice code 329 covering multiple flavors of conservation tillage and the inability to differentiate between them based on the data NRCS tracks and reports.)**
Jeff, The group is tasked with coming up with definitions. Right now, they are long, but follow NRCS codes, so they are easy to report to the Chesapeake Bay Program.
Mark D., I think it illustrates that we need to look at it through the academic subgroup. Then, through the programmatic group we can see how we can potentially track the information, regarding what scientists are saying. Are there other aspects? For example, if there is no information, how we can collect the information for future. What do we need to know to collect this information? How we can find a way for collaborating process for the academic and programmatic groups. We might need some years to see how we implement it and how we can represent it in the model.
Jeff, One of the questions will be that how we can generate data that is not available from 1985 to now. We normally come back to expert panel, and ask them to do something here. Expert panel generally feel very uncomfortable to do it.
Jack, I think it would be better the panel do it rather than the model does it.
Tim, It is important to understand how the model handle some of these BMPs.
Jack, I think there are something that we can fix in a short term and some other issues that we won't be able to fix till the time of Version 6. We expect that Jeff can give us some indications what can be fixed in the short term.
Mark D., I will work with Jeff to give some more formal information to the group. We need to have long term information that plays an important role for the model. We will definitely have Jeff to help us with this. Here we are looking for suggestions from the panel members as well.
Bill K., We may not necessarily have to be married to model outputs. My point is that if the model outputs do not make any sense, we need to go elsewhere. Some things might be kicked back for the AGWG or WQGIT for future review. Need to keep them updated.

Mark S., One of the tasks we have been asked to do is to interview the expert panel. We do have states specific information related to tracking, reporting and what BMPs are implementing. In addition, if you think we need to interview somebody outside of the panel, we can do it. We are now working with Mark D. on interview questions. We have 8 questions for the panel members and 3 extra questions for the state representatives. We will send you interview questions in advance. We will send you a Doodle pool before scheduling. I think we need 30 to 40 minutes time to go through the questions. We will summarize the responses and we will send you a document related to the answers for review. Other task is the literature search, going back to 1985, on practices and definition. All information is reflected in the SharePoint. At the moment, we have the list of documents and their abstracts, but we do not have the full documents. Before looking for the complete version of the document, we would like to ask you to propose us which documents you want to review. The SharePoint site is very easy to use and it helps us to see all data in one place. On the SharePoint you can find meeting minutes, Powerpoint presentations, and all other documents related to different panels.
Having SharePoint enables us to have everything in one place and it contains information for all the panels. The SharePoint site is at: https://sites.tetratech.com/projects/100-CB_BMP_Review/default.aspx. If you have a username and password already, please use it. If not, please use the generic ones for download only (Username: ttsvcs\CBUser and Password: Review2012. You can send us your documents and we will upload them for you. If you have any problem with SharePoint, please let us know. Kamran will be working with this panel and in the future you will hear from him.
Mark D., We need to select a chair for the panel. The Nutrient Management Panel selected a chair and the Cover Crop panel is in the process of submitting their nominations and voting for a chair. We can make a decision through this conference call or we can ask for nominations and then vote for a chair. I am open to any suggestions.
Jack, I do not mind being this panel chair, if I am not the chair for the Cover Crop panel.
Mark D., Jack Meisinger, Tim Sexton, and Mark Goodson are our nominees here. We will have a Doodle poll and a vote from there. Then we will let you know what the results are.
In the next step we will go through the interview process. Please provide your preferences about subgroup(s) to Mark S. In the meantime, we can start scheduling some of our subgroup discussions. It will be up to group to have first interview then the subgroup call. How soon can interviews be done?
Mark S., We need one or two weeks to interview panelists and around two weeks to prepare the document.
Mark D., Probably it will take one month to have the survey result. It might be better to have the interview results before subgroup call. Therefore, our subgroup call will be around end of July.
Jack, I think it will be useful to give Tetra Tech enough time to do their job.
Mark S., For interview Kamran will make a Doodle poll to have the best time for you. We will finalize the questions and then we will set up the Doodle poll.
Mark D., Thank you all for joining us.
15:26

Conservation Tillage Expert Panel
Conference Call Minutes
August 20th, 2012

Recommendations, Decisions, and Action Items

ACTION: Molly Harrington will send minutes to the Panel as a word document for review. Approval of 06.13 conference call minutes will occur during next panel call.
POST-MEETING NOTE: The SharePoint site is at: https://sites.tetratech.com/projects/100-CB_BMP_Review/default.aspx. If you have a username and password already, please use it. If not, please use the generic ones for download only: Username: ttsvcs\CBUser and Password: Review2012.
DECISION: For the draft Summary Report on Panel Interviews, a 20 day review period will commence after document is received by panelists, followed by week for Tetra Tech to incorporate edits and comments. A track changes version will then be submitted to the panel again for final review/approval.

Minutes

Minutes Review – Wade Thomason

- Motion to approve 06.13 Conference Call Minutes.
    - Difficulty accessing minutes from sharepoint site.

ACTION: Molly Harrington will send minutes to the Panel as a word document for review. Approval of 06.13 conference call minutes will occur during next panel call.
POST-MEETING NOTE: The SharePoint site is at: https://sites.tetratech.com/projects/100-CB_BMP_Review/default.aspx. If you have a username and password already, please use it. If not, please use the generic ones for download only: Username: ttsvcs\CBUser and Password: Review2012.

Conservation Tillage Panel Purpose and Organization – Wade Thomason

- See presentation: Conservation Tillage Panel Update
- Panel to develop recommendations on conservation tillage, no till, and continuous no till practices. Focus area in the impact of the combination these practices (e.g. erosion, movement of sediment, N and P loading, and surface and sub-surface water movement).
- Presented status update during the 8/9 AgWG meeting which characterized the Conservation Tillage (CT) Panel's activities as including a literature review, producing an Interview Summary document, and devising recommendations for values of practices individually and when combined with other best management practices (BMPs).
    - Indicated to AgWG CT Panel membership and potential to divide into subgroups for efficient use of panelists' time and expertise.

        - Findings from subgroups would be reviewed by full panel to develop one panel recommendation.
- Will use Interview Summary document, compiled by Tetra Tech (TT), to identify current practices and management approaches in different states and agencies throughout the Watershed.
    - Panel will review current panel knowledge, as indicated in Interview Summary, and information from literature review to develop recommendation on BMP definitions and effectiveness estimates.
- Timeline:
    - Interviews completed with majority of panelists.
    - Review preliminary draft of Interview Summary. Determine expected time that the document will be completed with all interviews, then establish appropriate length of review period.
    - October AgWG meeting: present draft Tier I recommendations.
    - Continue to work recommendations through Watershed Technical WG and WQGIT in order to incorporate recommendations into 2012 Progress Run.
- **Keeling:** Feels this timeline is overly optimistic, considering that 3 subpanels work and development of full panel recommendations. All this work to develop recommendations on current modeling is unlikely to be completed by October.
    - Tier 1 and Tier 2 may not be very different.
    - **Thomason:** Acknowledges timeline is ambitious, but hopes to drive work. However, timeline can be revised as needed to allow panel more time to effectively develop recommendations.

Phase 5.3.2 Model Primer – Gary Shenk

- See presentation: Watershed Model Primer
- **Keeling:** Slide 8- Believes that non-stackable percent reductions are higher than displayed interim stackable numbers.
- **Shenk:** Slide 9 – CT simulation options. Opinion that option of specifying percent reduction rather than direct simulation is easier to explain method of simulating CT and more understandable model result.
- **Shenk:** Slide 10: short-term vs. long-term recommendations
    - Short-term relates to current model and efforts to incorporate everything that is a real change on the ground since 2005 calibration.
    - Long-term relates to changes to the model set-up and calibration because these changes would affect loading simulation, not reflect changes in implementation.

Discussion:

- **Dubin:** Relate short-term vs. long-term to Tier I and Tier II recommendations.
    - Tier I: short-term recommendations that work within current modeling structure.
        - Calibration period ended 12/31/05; therefore, changes since 1/06 are not part of calibration period of current model.
    - Tier II: long-term recommendations on next modeling suite for midpoint assessment. More opportunity to make direct recommendations to modeling practices.

    - **Keeling:** Caveat- conservation tillage was included in calibration, but very little continuous no-till (CNT) was represented (a few thousand acres from VA in calibration period).
        - **Dubin:** Agrees that there is a difference in modeling representation. More flexibility in making Tier I CNT recommendations. However, panel needs to relate back to CT as requested by AgWG.
- **Dubin:** Programmatic subgroup deal with gathering implementation data (as available) for panel.
    - Determine how to balance information available with current science through work with the science subgroup.
        - Possibly will indicate a need to change method of data collection as available tillage data is probably limited.
    - Modeling subgroup to determine how to appropriately incorporate information into model.
    - Balance of 3 subgroups to develop comprehensive recommendation.
- **Thomason:** Clarify: an example of short-term recommendation would be a method to capture acres of implementation since 2005. What are other examples that would fit the Tier I category?
    - **Keeling:** Current stackable CNT is an interim; therefore cannot be included in a progress run. Panel could develop recommendations to credit CNT in annual progress runs.
        - **Dubin:** Concurs.
    - **Dubin:** Other examples would include other tillage types not represented in the current model.
        - Conventional tillage and conservation tillage are two main tillage types represented in the model.
            - CNT representation could be increased; possibly other tillage types (e.g. those covered in NRCS standards).
    - **Keeling:** Problem with NRCS standard is one standard to covers multiple tillage practices.
        - **Dubin:** Correct, but the standard still has information about the other tillage systems.
        - **Keeling:** If data only shows acres implemented under 329a, but doesn't specify type of tillage, this can only be reported as CT.
            - Panel might recommend NRCS to have separate standards or a different way of tracking tillage practices.
        - **Dubin:** Information prior to 2005 on specific tillage systems; therefore, data is available. PA currently compiling new tillage data.
        - **Keeling:** Would this be a Tier II recommendation if differentiation from today forward is not possible, therefore impacting Phase 6 more?
            - **Shenk:** It depends, but probably more of a Tier II recommendation.
        - **Dubin:** PA will have new tillage data by the end of the year from transect surveys at a county level.
            - **Shenk:** If people are implementing in a way that is different from 2005, this should absolutely be counted in the model.
- **Keeling:** In the panel's discussion of relevant science, will this include RUSLE2?

    - **Dubin:** Probably have science subgroup decide what appropriate reference sources are.
- **Clouser:** Agrees that PA should have good data for no till, but problem is who is capturing CNT data?
    - Feeling that there is a significant amount of no-till, but not necessarily continuous.
    - **Dubin:** Ongoing issues that the panel could weigh-in on.
        - Currently, CNT definition requires more than 5 years of implementation. Whether NRCS contracts (which are 3 years), state cost-shared contracts, or reporting, difficult to find long-term data to show CNT meeting definition.
        - Comments in the Interview Summary document reflect the interest in an additional no-till BMP that requires a shorter time period of implementation.
    - **Keeling:** VA does have a CNT BMP that is tracked and verified.
        - Other discussions indicate that benefits of CNT do not start accruing until years 3,4, or 5. Therefore, an annual continuous tillage BMP would not be effective.
            - **Dubin:** Would not be CNT, but a no-till BMP with higher form of residue than 30% standard used for CT. Annual no-till BMP would also have to have own scientifically supported values.
- **Keeling:** Will each type of tillage BMP need to answer all the questions in the BMP Protocol document?
    - **Shenk:** Believes panel should attempt to answer each question for every BMP, but notes that sometimes there is a lack of available data.
- **Duiker:** Explanation for corn/soy/wheat rotation high-till and low-till categories, but not for other row crop rotations?
    - **Keeling:** All crop types in 5 year agricultural census were evaluated. Each was assigned into category of high-till with manure or high-till without manure, meaning crops could be using full width tillage.
        - Typical row crops (corn, wheat, beans) went into high-till with manure (therefore eligible to receive manure). Other crops categorized into high-till without manure.
        - Low-till category occurs after CT is applied to the land use in the model.
        - Suggests that the panel looks at potential crops to use CT, if agreed to keep current land use categories intact.
    - **Shenk:** Initially developed by the Nutrient Subcommittee (pre-WQGIT) as corn/soy/wheat and everything else.
        - In Phase 5, decided high-till with manure includes more crops than corn, soy, and wheat and included additional crops in category.
            - With other row crops, debated about a low-till version for crops not eligible to receive manure. Determined that low-till was not typically used.
            - Agrees will Keeling that these classifications should be reexamined.
        - **Dubin:** Tier I or Tier II topic?

        - **Shenk:** Tier II because will take significant time to compile information and see how tillage classifications could affect other modeling assumptions like fertilization rates. Would dovetail with nutrient management.
    - **Keeling:** VA did ask for interim CT on other row crops category; therefore, could be a panel topic for Tier I.
        - More detailed, other work could be Tier II.
- **Duiker:** Corn/soy/wheat not a common rotation in many parts of PA. Does this classification refer to this particular rotation or the crops listed?
    - **Shenk:** All of the crops listed.
    - **Keeling:** Chris Brosch developed a table listing crops and their associated landuse. Would be helpful to panel's work.
    - **Dubin:** Model looks at total acres of corn, soybeans, wheat, etc. not the rotation. Model then applies that type of management system on the acres reported in agriculture census.
        - Barley and oats also included as total acres reported on county basis.
- **Duiker:** Can CT also be applied to alfalfa acres?
    - **Keeling:** No, classified with hay because both thought to be long-term crops.
    - **Duiker:** Typical rotation includes 4 years alfalfa, 4 years corm, but intensive tillage common in the first year of alfalfa establishment. Therefore, a quarter of the tillage is not represented in alfalfa production.
        - Grass hay is also similar.
        - **Shenk:** Good point. Similar topics could be incorporated as an aerially averaged model.
    - **Keeling:** Is this rotation common to PA? Can see this in Shenandoah Valley, but not VA Coastal Plain.
        - **Duiker:** Common in areas with dairies or other ruminant livestock; therefore, rotation would probably be most common in PA and Shenandoah Valley.
    - **Dubin:** Alfalfa might also see manure in management system.
- **Duiker:** Regarding different types of tillage discussed, panel should consider refinements proposed only for practices that can be monitored.
    - For example, vertical tillage separate from other types of CT, but how can this be measured or monitored?
    - Interested that VA is tracking CNT; PA doesn't have a means to measure this.
    - **Shenk:** Panel must develop a practical recommendation, but also valuable to document all information available for the best report possible to produce.

Draft Summary Report on Panel Interviews – Kamran Zendehdel

- See presentation: Conservation Tillage Interview Summary
- Will send draft summary to panel for review shortly after last panelist interviews are completed.
- **Keeling:** Slide 15 says that CB states do not have local programs, but slide 16 shows conservation districts as a funding source.
    - **Zendehdel:** No local programs for technical or funding support; not a generating program.
        - **Keeling:** But the money goes to local resources.

        - **Dubin:** Funding and initiative is at the state level; local government doesn't initiate.
    - **Keeling:** Requests an appropriate review period for the draft document.
        - **Dubin:** When full report is finished, all panel will have access to document and opportunity to suggest edits.
- **Duiker:** Unclear on slide 7. How can CT % of tillage acres be less than CNT % of tillage acres? This must be incorrect.
    - **Powell:** CNT is part of CT; therefore, can never be more acres than CT.
    - **Zendehdel:** These are estimates, not clear numbers.
    - **Dubin:** These numbers are just an overview and do not represent state data. Will be sure to identify in report if numbers are derived from data or just an educated guess.
- **Duiker:** Regarding slide 11 on baseline condition. Purpose of model to track progress towards meeting water quality standards?
    - **Keeling:** Provides a "what if" scenario to meet load allocations and produce situation to meet water quality standards.
        - Model baseline represents a no action scenario (e.g., no CT occurs).
    - **Shenk:** Panel to evaluate efficiencies of certain types of tillage; therefore, the panel will not need to consider baseline, but efficiencies of certain types of tillage.
        - **Keeling:** However, RUSLE2 could be used, assuming full width tillage is the starting point, and apply scenarios of different tillage types to gauge sediment reductions.
            - **Shenk:** Yes, whatever method used (e.g. RUSLE2 or CEAP results), percent reduction's baseline, then determine percent reduction of other tillage methods.
        - **Dubin:** Baseline reflective of definition and representation of conventional tillage. We need to have a discussion to make sure baseline values are correct for foundation of other recommendations.
- **Duiker:** Ken Staver study in the Coastal Plain found little impact on soil loss due to implementation of no till.
    - **Keeling:** Similar to work done on CNT. Would like to summarize RUSLE2 and phosphorus index runs done for that effort.
        - Low slope, low erosive soils (e.g. Coastal Plain soils), the sediment loss that typically drive benefits are not evident as they would be on 3-6% Piedmont soil.
        - Keeling will summarize and send to panel.
- **Duiker:** Does model assume percent reduction of sediment loss from CT compared to conventional tillage, even though it is on a soil where sediment loss is not typically seen?
    - **Shenk:** Currently, yes. The assumption previously recommended and incorporated into the model assumes 40% sediment loss everywhere.
        - This group is empowered to modify that assumption.
    - **Keeling:** The percent may not be wrong, but may be indicating 40% of one ton in a situation and 40% of five tons in a different, high slope situation.
        - **Dubin:** Yes, because will be applied again erosion loss factor for a certain site and slope.

- **Staver:** In Coastal Plain, sediment reduction is smaller, but the problem is a bump in dissolved phosphorus.

Summary Discussion

- **Thomason:** Suspects the panel will handle some relatively easy questions, while others will be more difficult. A significant amount of discussion will be needed.
    - Determine timeline for review of interview summary document.
- **Dubin:** Method used by Nutrient Management Panel: 20 day review period after document received by panelists, followed by week review to incorporate edits and comments. Track changes version will then be submitted to the panel again for final review/approval.
    - **Thomason:** Any concerns with that approach.
        - None raised by panel.
        - Will send hard deadlines in email with draft summary.
    - **Dubin:** Note that a few interviews still need to be completed, so draft report will not be sent immediately following this call.

DECISION: For the draft Summary Report on Panel Interviews, a 20 day review period will commence after document is received by panelists, followed by week for Tetra Tech to incorporate edits and comments. A track changes version will then be submitted to the panel again for final review/approval.

- **Dubin:** Note that subgroups should be formed and activated in the near future.
    - **Keeling:** Will participate in all three subgroups.

Conference Call Participants

Participants	Affiliation
Wade Thomason, Chair	Virgina Tech
Kevin Ganoe	Cornell
Phillip Sylvester	UDel
Royden Powell	MDA
Ken Staver	UMD
Mark Goodson	PA DEP
Sjoerd Duiker	PSU
Bill Clouser	PA DEP
Bill Keeling	VA DCR
Mark Reiter	Virginia Tech
Patrick Bowen	WV USDA-NRCS
Tom Basden	WVU
Gary Shenk	EPA/CBPO
Jeff Sweeney	EPA/CBPO
Mark Dubin	UMD/CBPO
Kamran Zendehdel	Tetra Tech

Conservation Tillage Expert Review Panel
Conference Call Minutes
February 28, 2013

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1. Wade Thomason, Panel Chair, welcomed everyone and confirmed call participants.

2. Panel reviewed the meeting minutes from the June 13th Conservation Tillage Expert Panel conference call minutes.

DECISION: Panel approved the June minutes.

3. Panel reviewed the draft meeting minutes from the August 20th meeting.

ACTION: August minutes will be circulated to members and approved at the next call.

4. Thomason: Reports from expert panels will be on the agenda for the March AgWG meeting.

5. Mark Dubin: Current Phase 5 model recommendations must be submitted by Fall 2013 for partnership review and approval to allow implementation by December 1st for use in annual progress reporting by the jurisdictions.
    a. Bill Keeling clarified that the deadline is for the progress run year

6. Mark Dubin discussed the formation of an Agricultural Modeling Subcommittee to support the panels as well as the Phase 6 modeling development decisions. discussed the formation of an AgWG modeling subgroup.
    a. Jack Meisinger: USDA post-doc will be conducting modeling runs for Cover Crops panel, some overlap with Conservation Tillage panel.

7. Kamran Zendehdel reviewed the draft summary report on interviews with panel members.
    a. Dubin: Panel members should review summary report and note any changes before panel finalizes it at the next meeting.
    b. Thomason: Once the report is distributed, members will have two weeks to offer comments in a tracked changes document.

ACTION: Summary report will be distributed to panel members for review.

8. Wade Thomason suggested that the panel consider defining intermediate levels between Conservation Tillage (30% of crop residue left on soil surface) and Continuous No Till (5+ years of no-till).
    a. Keeling: Agree for Phase 6.0 recommendations, question ability to implement in Phase 5.
    b. Jeff Sweeney clarified that CNT can be adjusted in the current model. If it is redefined or given a different efficiency it would only affect future progress runs.
    c. Sjoerd Duiker recommended that annual no-till data be used.

i. Ken Staver noted the large impact on water quality of switching to no-till and agreed that annual no-till should be tracked.
ii. Duiker: Panel could recommend a class for 'intermittent no-till'. (e.g. every other year)
iii. Dubin: Panel should present to the AgWG, obtain a recommendation for addressing it in this model or in Phase 6.0.

d. Staver: Panel should also consider manure management, and the negative interaction that has with no-till
   i. Keeling: Panel recommendations should be different in regions where manure is involved.
   ii. Duiker: Caution that manure not always incorporated in no-till.
e. Philip Sylvester: Note that new tillage equipment has significantly changed Conservation Tillage; e.g. vertical tillage and no-till rippers which should be considered in these definitions.
f. Dale Gates: Agree with moving towards tracking annual no-till
g. Thomason: Is one gradation of annual no-till enough or more needed?
   i. Staver: MD hopes to solve manure incorporation issues with vertical tillage; reduces dissolved nutrient loss without much increased soil erosion.
   ii. Dubin: Panel could consider manure incorporation or injection while addressing Tillage.
   iii. Royden Powell: Is the panel responsible for both issues?
   iv. Dubin: Panel responsible for CT and CNT. Manure injection and incorporation is a potential new BMP, which will need to be discussed by this panel or another. Addressing both issues at the same time would make it difficult to meet this year's progress run deadline.
   v. Staver: While tracking tillage, the panel may be able to do some preliminary work for the manure component.
   vi. Thomason: How these are defined and interrelated will need to be part of the panel discussion.
h. Thomason: From interview summary report, noted a need for a consistent tracking and reporting system for CT and CNT.

9. Thomason: Suggest that the panel review the range of tillage definitions, and further develop the list, with at least one category between CT and CNT.
   a. Keeling: Recommend that all varieties of tillage have the ability to apply a conservation plan, cover crop, nutrient management plan to the same acres
      i. Thomason: Reasonable to recognize connected practices and address them together
      ii. Keeling: BMPs applicable to CT should be applicable to CNT
      iii. Dubin: Discuss with Cover Crops panel
   b. Keeling: Request that slide illustrating sediment decrease be distributed to the panel.

ACTION: Wade Thomason will put together a definitions document for members to provide feedback during the next call, following the AgWG meeting.

Meeting adjourned.

Participants
Wade Thomason-VT
Bill Keeling- VA
Kevin Ganoe- NY
Dale Gates- NY
Ben Coverdale – DE
Mark Dubin – CBPO
Emma Giese – CBPO
Jeff Sweeney – EPA
Matt Johnston – UMD
Kamran Zendehdel – TetraTech
Philip Sylvester – UD
Sjoerd Duiker – Penn State
Ken Staver - UMD
Jack Mesinger - USDA

Conservation Tillage Expert Review Panel

Meeting Minutes

May 8, 2013
1:00-3:00PM

1. **Welcome**
   - Wade Thomason, panel chair welcomed everyone to the call and confirmed call participants

2. **CT Summary Report Review Update**
   - Kamran Zendehdel, TetraTech provided a brief update on the review and editing of the panel's summary interview report for finalization.

3. **BMP Panel Timeline**
   - Mark Dubin explained the timeline the panel should plan to work within in order to have recommendations implemented in the current Phase 5.3.2 model. Panel would need to present the initial report to the AgWG by September 2013, in order for modifications to occur in November 2013
   - VA requested that the panel recommend 'stackability' of CNT even if final recommendations are not in place this year
   - USDA noted the use for a list of feasible model changes from the modelers to assist the panel
   - Jeff Sweeney: There is an interim way to allow stacking, VA's request is to include the stacking in progress runs, which the panel can recommend
   - Dubin: Recommend including this topic on the next agenda, with a presentation from CBP modelers on how the interim value was developed

ACTION: Presentation from CBP modelers on interim CNT development on agenda for next CT Panel conference call. Materials will be distributed to panel ahead of call

   - Dubin clarified that progress run data is on a July 1-June 30 schedule, after which data is compiled and submitted in a few months later in December
   - Thomason: Suggestions developed by panel in September will be dependent on data collected in June.
   - VA: Clarified that 'stacking' would make acres eligible to receive multiple BMPs

4. **RUSLE2 Update**

5. **Tillage Recommendations**
   - Residue Management document graphs indicate the influence of residue on soil loss. It will be important when defining panel recommendations to consider which factors have the greatest influence.
   - NY noting importance of other factors such as soil health (not treated separately from residue in these studies)
   - VA suggested increased difficulty with tracking and reporting soil health
   - Dubin suggested the panel could use residue methodology for now, but also introduce an alternative for using other tools. If tools provide additional value, can be credited appropriately to encourage partners to track using these methods.
   - Thomason: Panel could define a matrix for annual no-till including a value for different residue amounts.

- VA clarified that the residue amounts would define the BMP's which are what would be reported into the model

6. **Next Steps**
   - VA: recommend this panel could review crop list and determining which are 'tillable land'
   - Dubin: AgWG will be working on this as well with land use definitions

ACTION: Next call to be scheduled mid-June, week of June 3rd or 10th

Participants
Bill Keeling, VA
Dale Gates, NY
Jack Meisinger, USDA
Jeff Sweeney, EPA
Kamran Zendehdel, TetraTech
Kevin Ganoe, NY
Mark Reiter, VA
Wade Thomason, VT
Ben Coverdale, DE
Ken Staver, UMD
Mark Dubin, UMD
Emma Giese, CRC
Sjoerd Duiker, PSU

Conservation Tillage Expert Review Panel
Conference Call Meeting Notes
June 4, 2013
12:00-2:00 PM

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1. **Introductions, Review Past Meeting Notes**

   DECISION: Panel approved May meeting notes

Phase 5.3.2 Updates

2. **Jeff Sweeney presented on development of interim CNT**
   - Sweeney clarified the history of the benefits of Continuous No-Till currently employed in the Bay Program's tools – where there's disagreement among stakeholders on whether the approved reduction efficiencies for nutrients and sediment already incorporated the benefits of cover crops and nutrient management or excluded the benefits of those practices.
   - VA: Note that the original agreement was to allow the mutually exclusive (un-stackable) benefit in Phase 4 and to revisit with the Phase 5 model
   - VA: Recommend the panel consider sediment and nutrient benefits of low till as well as CNT over conventional tillage, add BMPs to both types and assess how reasonable the results are
   - Dubin: Additional physiographic regions can be added, recommend asking jurisdictional representatives for their input on whether or not RUSLE2 runs for modeling CNT effects are applicable to their region. Do the jurisdictions capture CNT acres, or do they desire to do so? If so, request for jurisdictional representatives to suggest soils and/or cropping systems to evaluate.
   - Dubin clarified that it would be more defensible to create CNT effectiveness values more specific to the multiple P5.3.2 model physiographic regions than the single effectiveness value currently assigned to CNT. The previous developmental work on CNT values were based on averaged RUSLE2 results across Pennsylvania and Virginia.
   - VA: RUSLE2 estimates sediment loss, but not soluble nutrient losses
   - VA: Does stratification due to no-till and plant residue occur immediately or after 3-5 years?
     - Staver: Increased tillage leads to less dissolved P and vice versa, duration in NT has little effect.
   - Dubin: Could the APEX model handle the nutrient concentration component?
     - USDA: NRCS post-doc will be running APEX model (nutrients and surface runoff), may not be up to date with soluble P buildup. Post-doc will not be available in time for the 5.3.2 updates
     - Jack Meisinger will find out if APEX (through NRCS) has phosphorus capabilities.

- VA: Note that a model scenario only represents one year, not representative of a 3 year nutrient management plan (or 5 year CNT stratification of phosphorus)

3. Mark Dubin reviewed the timeline for completion and next steps towards Partnership approval of Phase 5.3.2 updates

- USDA: Is the modeling approach (RUSLE2 and APEX) going to be accepted by the workgroups and WQGIT, or will published data be needed to back up the modeling information?
  - Dubin: Published data should back up the model runs
  - USDA: Propose collecting data (even outside the watershed)
  - Dubin: Request that panel members, and specifically jurisdictional representatives collect relevant data sources.
- Sweeney: Note that a negative benefit could take longer to get put into the model. A zero value would be simpler to incorporate.
  - Dubin: Requested that Jeff report back on the possible model effects of a negative benefit.
- USDA: How best to streamline the process of approval?
  - VA: Follow the partnership BMP protocol
  - USDA: Request for the BMP protocol and an example of an approved panel report be provided to the chairs to assist with the approval process.
  - Dubin: Note that Tetra Tech will assist with developing panel reports and organizing recommendation documents

ACTION: Jurisdictional representatives will be asked whether CNT is applicable to their region and whether RUSLE2 should be conducted, if so, what soils series should be prioritized for evaluation. Panel members to collect supporting published data for the panel report.

ACTION: Jack Meisinger will determine APEX capabilities to handle phosphorus and nitrogen.

4. Phase 6.0 Updates

- Mark and Kamran reviewed the status of the Conservation Tillage Interview Summary Report review and the soon to be renewed contract with Tetra Tech.
  - Panel members will have the opportunity for a final review before presenting it to the AgWG.
- Mark summarized outcomes from the Agriculture Workgroup's Building a Better Bay Model workshop held May 22-23, 2013.

ACTION: Complete Doodle Poll to schedule next meeting June 24-26

Adjourned

Participants
Wade Thomason, VT
Jack Meisinger, USDA-ARS

Kamran Zendehdel, TetraTech
Neely Law, CWP
Philip Sylvester, UD
Ben Coverdale, DE
Bill Keeling, VA
Mark Dubin, UMD
Jeff Sweeney, EPA
Patrick Bowen, USDA-NRCS
Ken Staver, UMD
Sjoerd Duiker, PSU
Kevin Ganoe, Cornell
Emma Giese, CRC

Conservation Tillage Expert Review Panel
Conference Call Minutes
June 26, 2013
2:00-4:00 PM

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1. **Introductions, Review Past Meeting Notes**

DECISION: Panel approved June 4 meeting notes

2. **Phase 5.3.2 Updates**
    - Mark Dubin: The USDA ARS/NRCS post-doc will not be hired until late summer/fall 2013, panel may need to consider other options for conducting model runs to provide information for the Phase 5.3.2 panel recommendations.
    - Wade Thomason: During the previous call, suggestion to ask the jurisdictions if CNT applies to their region, if not, no need to conduct those model runs.
        - Dubin: Jurisdictional representatives on the panel can decide, or can take it to the AgWG jurisdictional reps.
        - VA: Recommend asking the WTWG membership the same.
    - Collection of supporting data for the panel report
        - Dubin: Will set up a new common space for panel documents to be uploaded; suggest using TetraTech's SparePoint if available.
        - TetraTech: The previously uploaded SharePoint documents still exist, will need to distribute ID and password to the panel.
        - Thomason: Will need to sort through uploaded documents to locate the ones relevant to CNT.
        - TetraTech: Additional documents will need to be sent to Steve to be uploaded.

ACTION: Wade and Mark will send out a request to AgWG jurisdictional representatives to inform the panel of CNT applicability in their regions. Mark will coordinate with Matt on the WTWG response.

ACTION: Steve Dressing will provide the panel with new login ID and password for the SharePoint site.

ACTION: Wade and panel members will locate CNT relevant documents on the SharePoint site, or suggest alternative documents.

3. **Phase 6.0 Updates**
    - Dubin: The new Tetra Tech technical assistance contract is being defined and currently developing technical directives in coordination with the panel chairs and the AgWG chair.
    - Dubin: The Interview Summary Report draft will be transferred to Steve Dressing to complete the final editing with the panel.

- Dubin: To follow up from the previous discussion, is there any reason why negative values for one or more factors influenced by CNT would not work in the model?
    - Jeff Sweeney: Will need verification that it is allowed within the Watershed Model, however it is possible within Scenario Builder.
    - VA: Recommend a zero should be used instead of a negative value.
    - Dubin: Zero could be used if needed, however it should be determined what the data shows the recommended values to be first.
- Dubin: Next steps in RUSLE2 runs. Does TetraTech have this capacity?
    - TetraTech: There are staff who have used RUSLE2, not sure of their level of experience however.
    - VA: Previously asked the state agronomists in each state to conduct these runs.
    - Thomason: Will follow up with Chris Lawrence to see what has been done to date, and collect suggestions from him and Mark Goodson regarding next steps.
    - Dubin: Recommend sending a formal request for RUSLE2 support to NRCS state conservationists from the chair, and through Frank Coale. Would be a stronger request after hearing back from the state representatives as well.

ACTION: Wade will coordinate with Mark and Frank to send RUSLE2 support requests to NRCS state conservationists.

ACTION: Complete Doodle Poll to schedule next meeting July 9 or 10

Adjourned

Participants

Ben Coverdale	DE
Kevin Ganoe	Cornell
Dale Gates	USDA-NRCS-NY
Bill Keeling	VA
Mark Reiter	VT
Ken Staver	UMD
Phillip Sylvester	UD
Wade Thomason	VT
Don Meals	TetraTech
Mark Dubin	UMD
Matt Johnston	UMD
Steve Dressing	TetraTech
Jeff Sweeney	EPA
Neely Law	CWP

Conservation Tillage Expert Review Panel

Conference Call Minutes

July 10, 2013
1:00-3:00 PM

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1. **Welcome, Introductions and Review of Meeting Minutes**
    - Wade Thomason, CT Panel Chair, introduced the draft minutes from the June 26, 2013 panel conference call for review.

DECISION: Panel members decided to approve the 6/26/13 minutes at the next call.

2. **Panel Technical Assistance Support Update**
    - Mark Dubin, AgWG Coordinator, provided an update on the panel's request for technical assistance by Tetra Tech under the new EPA contract. Steve Dressing with Tetra Tech provided the new login information for the panel to access the SharePoint site.

3. **Relevant CNT Literature**
    - Wade introduced a discussion on the solicitation of publications/articles/reports that are pertinent to the panel's consideration of CNT efficiency values for N, P, and TSS. Wade has enlisted a post-doc to review the extensive literature review that Tetra Tech compiled at the start of the project, screening only for CNT.
        - Steve Dressing: Recommend using the filter option in Excel to narrow down the literature.
        - Jack Meisinger: Recommend conducting word search to filter the documents.
        - Dubin: Recommend prioritizing the local data and organizing the relevant data in categories.
    - Thomason: Request panel members provide additional literature, particularly documents that may not be available in the public domain.

ACTION: Panel members requested to provide additional CNT literature particularly documents that may not be available in the public domain.

4. **CNT Jurisdictional Request**
    - Wade led a panel discussion of request to the Chesapeake Bay state agency representatives to determine which jurisdictions intend to track and report CNT for annual progress towards their TMDL goals.
    - Dubin: Frank Coale has approved making the request to the jurisdictions on behalf of the AgWG.

ACTION: Wade will draft a request for Mark Dubin to forward to the state agency representatives on behalf of Frank Coale to determine which jurisdictions intend to track and report CNT for annual progress.

5. **RUSLE2 Technical Assistance**
    - Wade led a panel discussion on developing a request to USDA-NRCS for obtaining technical assistance with RUSLE2 calculations to support the development of TSS efficiencies for CNT. Mark briefed the panel on the process for forwarding the request to USDA-NRCS for approval.
    - Goodson: Suggest setting up a conference call with Chris Lawrence, Wade and Mark prior to conducting RUSLE2 runs.
    - Keeling: After discussions with Chris Lawrence, recommend defining crop rotations, and as many parameters as possible in order to help the RUSLE2 modelers.
    - Meisinger: If long term conservation tillage with an added cover crop, would there be significant sediment reductions associated with the cover crop?
        - Goodson: Can get this answer from a RUSLE2 run.
    - Dubin: confirmed with Mark Goodson that the proposed approval process was correct.
        - Goodson: Process seems correct and may allow support through USDA headquarters.
    - Meisinger: Recalling previous discussion with USDA, recommend contacting RUSLE2 modeler located in Oregon for RUSLE2 assistance.
        - Thomason: Will follow up on this suggestion.

ACTION: Mark Dubin and Wade Thomason will make a request for USDA-NRCS assistance with RUSLE2.
ACTION: Mark Dubin, Wade Thomason, Chris Lawrence, Mark Goodson to set up conference call in the next week to discuss RUSLE2 options.

6. **CNT Definition Description**
    - Wade moderated a panel discussion on redeveloping the existing definition for CNT based on current panel recommendations. Volunteers will be requested to assist in developing a new draft definition for review by the panel.
    - Keeling: Recommend starting with the AgWG approved interim definition for stackable CNT; panel can then define the reduction efficiencies.

ACTION: Bill Keeling will distribute the proposed interim CNT definition to initiate development of a new CNT definition.
ACTION: Complete Doodle Poll to schedule next meeting the week of July 29th.

Adjourned

Participants
Jack Meisinger, USDA
Dale Gates, NRCS
Mark Goodson, PA
Don Meals, TetraTech
Jennifer Ferrando, TetraTech
Steve Dressing, TetraTech
Wade Thomason, VT
Mark Dubin, UMD
Emma Giese, CRC

Conservation Tillage Expert Review Panel

Conference Call Minutes

July 29, 2013
1:00-3:00 PM

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1. **Welcome and Introductions**

2. **CT Panel Meeting Minutes**
   - Wade Thomason, CT Panel Chair, introduced the draft minutes from the past two conference calls for review and approval.

DECISION: Panel approved minutes from the June 26th and July 10th conference calls

3. **Panel Updates**
   - Thomason: subgroup met to discuss options for RUSLE2; decision was made to suggest a consistent protocol for all jurisdictions.
   - Requests will be made to jurisdictions regarding applicability of CNT, before extensive model runs are conducted. Wade has drafted a written request for Mark to send to jurisdictional representatives.
     - Johnston: Is there reason to conduct RUSLE2 runs for all jurisdictions in case jurisdictions decide to track CNT in the future?
       - Mark Goodson: The subgroup will discuss this option.
     - Thomason: Clarified that runs will likely be at physio-geographic scale.
     - Ken Staver: Is RUSLE2 well calibrated enough that it will come up with difference between annual no till and continuous no till?
       - Goodson: Yes.
     - Jack Meisinger: Can the Scenario Builder growth regions be used in 5.3.2?
       - Jeff Sweeney: Yes.
   - Wade's post-doc has been reviewing the CNT literature; list has been prioritized to 200 articles. Panel members are requested to provide any additional reports (particularly un-published literature) that are relevant.

ACTION: Chris Lawrence, Mark Goodson, Wade Thomason, and Mark Dubin will set up a follow up RUSLE2 discussion.
ACTION: Panel members requested to provide additional CNT literature particularly documents that may not be available in the public domain.

4. **CNT Draft Definition**
   - Panel members reviewed the interim definition for CNT, which was distributed following the July 10th conference call to assist in the creation of a panel approved CNT definition.

- Sweeney: Do NRCS or the states have a definition for CNT? Can their definition be used?
    - Goodson: NRCS does not have a definition at this time.
    - Keeling: VA does have a definition, which this interim definition was based on in part.
- Thomason: Should particular implements be listed?
    - Staver: Recommend using the language from the 329 annual tillage definition, and specify the year requirement for CNT.
    - Bill Keeling: Support this recommendation.
- Sjoerd Duiker: Is there a minimum residue required for no-till?
    - Thomason: There is not a numeric requirement in this definition, however, the overall definition of conservation tillage, of which CNT is a subset requires 30% residue.
    - Staver: Recommend removing references to residue in this definition, and instead reference the overall CT definition.
    - Goodson: Note that residue management can be different from tillage management.
    - Thomason: Note the need to focus on the nutrient and sediment losses, while considering the value of a residue requirement.
    - Meisinger: Recommend including the % ground cover tied in with the CNT definition so that it is not lost with revisions to land use.
    - Thomason: Recommend that the definition is more based on performance than practice.
- Thomason: Should the definition be based on 5 years of no-till?
    - Keeling: VA decided on 5 years, because benefits were noticed at 3+ years.
    - Thomason: Definition could be based on rotation, with or without a minimum year requirement.
    - Keeling: Maintain multiyear rotation?
    - Staver: Note that the erosion benefits of CNT vs. CT are small compared with CT vs. till.
    - Sweeney clarified that the current benefit for CT is 40% over high till, and the benefit for CNT is 70% relative to CT.
    - Duiker: Research showing improved soils for reduced erosion after 5 years.
    - Thomason: RUSLE2 runs will help inform when this benefit should be incorporated.
    - Duiker: Recommend taking research into account along with model run results.
- Thomason: Should Nutrient Management and Cover Crops be included in the definition?
    - Duiker: Previous panel discussion was to remove these other practices, so that it could be stackable.
    - Keeling: Note that this definition as it is currently written does not require the additional practices. Benefits from these additional practices were not included either.

    - Thomason: Recommend removing the sentence that references the additional practices.
        - Keeling: Agree with removing this reference.
        - Duiker: Agree with limiting the definition to CNT.
    - Meisinger: Recommend separating the sediment reductions from the nutrients in the definition.
- Thomason: In the section referencing the current model, recommend adding a sentence to clarify that this practice is stand alone, and that other practices can be stacked on.
    - Keeling: Agree with the clarification; no need to spell out the specific BMPs.
- Meisinger: Recommend finalizing the definition following the RUSLE2 runs.
- Keeling: Noted that the Table 1 will need modification to incorporate more hydrogeomorphic scales.
- Thomason: Once RUSLE2 runs are started, their results can inform some revisions to this definition, which can then be distributed to the panel for approval prior to the next call.
- Meisinger: Recommend contacting RUSLE2 modeler located in Oregon for RUSLE2 assistance.
- Dubin: Preparing for panel recommendations to the AgWG in September.

ACTION: Complete Doodle Poll to schedule next call during the week of August 12.

Adjourned

Participants
Don Meals, TetraTech
Wade Thomason, VT
Philip Sylvester, DE
Ben Coverdale, DE
Jack Meisinger, USDA-NRCS
Kevin Ganoe, NY
Mark Goodson, PA
Bill Keeling, VA
Steve Dressing, TetraTech
Jennifer Ferrando, TetraTech
Jeff Sweeney, EPA
Ken Staver, UMD
Matt Johnston, UMD
Sjoerd Duiker, PSU
Mark Dubin, UMD

Conservation Tillage Expert Review Panel

Conference Call Minutes

August 16, 2013
10:00-12:00 PM

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1. **Welcome, Introductions, Review Minutes**
   - Panel members approved the July 29 minutes

2. **Feedback from Jurisdictions**
   - Mark discussed feedback received from jurisdictions regarding tracking and reporting of CNT.
     - NY, MD, VA indicated interest in future tracking of CNT.
     - PA indicated difficulty with tracking.
     - WV has not been tracking CNT; interested in exploring the option.

3. **Draft Definition of CNT**
   - Panel members continued to finalize the definition for CNT as discussed at the previous call.
   - Jack Meisinger: Recommend a motion to approve the definition in the minutes when panel reaches agreement.
   - Dale Gates: Recommend that the definitions be changed to levels of CT, rather than CNT.
     - VA: Panel previously discussed this for Phase 6.0, not for Phase 5.3.2 update.
     - Dubin: Changing to a performance based definition will be a more major change.
   - Thomason: Need published literature on effectiveness of low residue on N, P and sediment losses.
   - Meisinger: Recommend that the definition not prohibit full width tillage.
     - Keeling: Recommend adding "eliminated or reduced" to the end of this sentence.
     - Thomason: Panel can either more specifically define tillage, and name some practices both on and off the list, or tweak the definition to be more flexible and to allow some low residue practices.
     - Dubin: Recommend reflecting the definition based on what is being tracked currently. Another option is to have a more general definition that represents a higher level practice.
     - Kevin Ganoe: Note that this definition is more of a planting practice than a tillage practice.
     - Keeling: Concern that if definition is based on tools, full width tillage could still be practiced with those tools.
   - Thomason: Recommend maintaining the 5 year minimum for the CNT definition.

- Keeling: Support the language in the last sentence, which states that the practice can be combined with other BMPs.

ACTION: Wade will revise the draft definition based on feedback received and distribute it for full panel review.

4. **RUSLE2 Progress**
   - Wade Thomason gave an overview of initial RUSLE2 model runs conducted by Mark Goodson and Chris Lawrence.
   - Mark clarified that the model runs were based on a two year crop rotation.
   - Meisinger: Recommend combining P index information with RUSLE runs, to better account for the soluble P losses with CNT. Dana York may have information about an NRCS P loss tool.
   -

ACTION: Emma will ask Dana for information about the NRCS P loss tool.

5. **CNT Literature**
   - Wade will distribute the relevant literature collected to date for panel members to review.

ACTION: Panel members to review literature from Wade, noting any gaps or missing information.

Adjourned

Participants
Wade Thomason, VT
Kevin Ganoe, NY
Tim Sexton, VA
Jack Meisinger, USDA
Dale Gates, NY
Bill Keeling, VA
Matt Johnston, UMD
Jeff Sweeney, EPA
Mark Dubin, UMD
Emma Giese, CRC
Steve Dressing, TetraTech
Don Meals, TetraTech
Jennifer Ferrando, TetraTech
Neely Law, CWP

Conservation Tillage Expert Review Panel

Conference Call Minutes

August 26, 2013
10:00-12:00 PM

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1. **Welcome, Introductions, Review Minutes**

DECISION: Panel approved the August 16th minutes.

2. **Panel Updates**
    - Mark Dubin: The AgWG agenda has been posted for the September 26th meeting, which will focus on presentations from each of the expert panels.

3. **Draft Definition of CNT**
    - Wade Thomason introduced the current draft of the definition. This version reflects the published data, which supports a residue based approach.
    - Jack Meisinger: Recommend the residue based approach because it will be easier to measure and document.
    - Ken Staver: Note that this method requires an actual measurement, which may require more verification effort than simply determining tillage.
    - Sjoerd Duiker: Recommend that the focus be maintaining residue cover. No need to specify whether residue removal is allowed at all.
    - Matt Johnston: How will the definition work together with cover crops in the model?
        - Meisinger: Note that the overlap between conservation tillage and cover crops may need to be addressed in Phase 6.0.
        - Thomason: Would recommend that states can submit acres under both high-residue limited soil-disturbance, and cover crops.
    - Dale Gates: The references to NRCS standards are not consistent with the rest of the definition; recommend explaining how the standards compare to the definition.
        - Dubin: Recommend considering the CTIC definition as well.
        - Gates: The NRCS tillage standards are activity based rather than residue based.
        - Thomason: Recommend qualifying what is in the NRCS standards to relate it to the definition.
        - Mark will send Wade the CTIC definition for consideration.
    - Thomason: The final paragraph states that the practice can be combined with other applicable BMPs including nutrient management and cover crops.

- Staver: Note that no-till corn silage might not qualify for minimum residue in the residue based approach.
    - Thomason: Recommend that be addressed in the next set of recommendations.
- Thomason: Will consult with the states regarding the NRCS standards, and revise the definition, in the interest of approving a final definition at the next panel call.
    - Meisinger: Recommend consulting with the states on whether the standards are required in the definition.
    - Thomason: Will attempt to include references to as many of the practices as possible.
- Dubin: Recommend language in the definition for how the practice will be tracked, reported and verified.
- Johnston: Will help write up how this will be modeled in the panel report.

ACTION: Mark will provide the CTIC definition for panel consideration.
ACTION: Wade will consult with the states on their NRCS standards, and will edit the definition based on their response as well as today's discussion. The revised draft will be sent to panelists for review.

4. CNT Literature

- Panel discussed the summary of relevant literature distributed by Wade following the last call.
- Wade requested additional literature from the panel, with the greatest focus on studies from within the watershed, however can pull in studies from outside the watershed as needed.
    - Keeling: Will provide the references from the previous set of recommendations.
    - Meisinger: Cover crop panel has been considering references outside the watershed when literature within the watershed is thin.
    - Johnston: Note that the sediment reductions found in the literature are lower than those in the RUSLE2 runs. The panel will have to decide how to interpret the differences in the two data sets.
    - Meisinger: Recommend placing more emphasis on the literature data.
- Thomason: Will compare literature data with model run data at the next call.

ACTION: Panelists continue to submit relevant CNT literature.

5. Schedule Next Meeting

- The next call will be held late next week.

ACTION REQUESTED: Complete Doodle Poll to schedule next meeting.

Adjourned

Participants
Mark Dubin, UMD
Jeff Sweeney, EPA
Matt Johnston, UMD
Tim Sexton, VA
Bill Keeling, VA
Jack Meisinger, USDA-ARS
Wade Thomason, VT
Ben Coverdale, DE
Jennifer Ferrando, TetraTech
Dale Gates, NY
Ken Staver, UMD
Sjoerd Duiker, PSU

Conservation Tillage Expert Review Panel

Conference Call Agenda

September 23, 2013
9:00 to 11:00 AM

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1. **Welcome, Introductions, Review Minutes**

DECISION: Panel approved the September 12 minutes.

2. **Panel Update**
   - Dubin reported that the report outline has been finalized.
   - This initial report is due before 9/26 and will attempt to be both complete and succinct with additional details provided as supplementary documentation and appendices.

3. **Draft Definition of MSD**
   - Panel members were asked to vote to approve the draft definition as final via an online poll.
   - Final results of the poll were unavailable at the time of the call, but preliminary results support the final approval of the panel
   - Thomason reviewed the preliminary results from that poll, (highly supportive) called for any discussion or concerns, then suggested the panel move forward in accepting the final definition.

DECISION: Approve final definition for High Residue MSD practice.

4. **Draft Efficiencies for MSD - Sediment**
   - Duiker and Thomason had worked to review and revise the previously discussed literature citations and summary of sediment reduction for HRMSD compared to conservation tillage.
   - Thomason presented a revised compilation of BMP efficiency values for sediment from literature compared with the values from RUSLE2 runs.
   - Duiker pointed out that many of the citations lacked a direct measure of residue cover and that the practice assumed to represent Conservation Till may in fact have had less than 30% residue. It was pointed out that the RUSLE2 values for sediment were very similar to the watershed-scale values for sediment and that the model simulations DID all contain the required minimum residue.
   - Duiker suggested and the panel generally agreed that watershed-scale studies should be given a higher priority than small plot results. Average sediment reduction for HRMSD compared to conservation tillage in these studies was 64%.
   - Keeling questioned if the suggested value was for the entire watershed. Answer: yes. Since these values represent a relative change from

conservation tillage to HRMSD, even if the absolute values change, the relative differences are similar across regions. Duiker pointed out that the studies summarize include a range of soils, slopes, drainage, etc. Keeling commented that previous discussion on this point came to the same consensus.

- After further discussion, Keeling moved and Duiker seconded a motion that the panel recommend adoption of a 64% sediment reduction over the value for conservation tillage for the HRMSD practice.

DECISION: Panel voted unanimously to accept the 64% value.

5. **Draft Efficiencies for MSD – Phosphorus**
   - Thomason presented the revised summary from literature review and APEL model simulations to the panel.
   - Duiker pointed out many of the deficiencies of small plot studies in deriving these values including: artificial conditions, short runoff period, potential for varying time to runoff, typical close proximity in time of nutrient application and rainfall simulation, etc. Suggested watershed-scale studies be weighted more heavily. Thomason cautioned that these data are scarce.
   - Dubin suggested that further modeling outputs could be useful but that would not be available for several months.
   - Staver cautioned that model components, inputs, assumptions and calculations be carefully understood before acceptance of outputs.

DECISION: Panel consensus was that even though considerable evidence was presented and considered, a conclusion was not reachable at this time and that more work needs to be done. In the meantime a table containing potential interim recommendations for Total P loss reductions will be circulated. The panel will be asked to respond with their input. This will be discussed on a final short call on Wednesday, 9/25

6. **Draft Efficiencies for MSD – N**
   - Due to a lack of time to consider the evidence, the panel concluded that it was not ready to comment on a potential revised N efficiency for the HRMSD over conservation tillage.

DECISION: A table containing potential interim recommendations for Total N loss reductions will be circulated. The panel will be asked to respond with their input. This will be discussed on a final short call on Wednesday, 9/25.

ACTION: Bay program staff and Mark Dubin will compile a table of current efficiency credit for Low Till compared to High Till and CNT practice compared to Low Till. Current non-stackable efficiencies will be included. The panel will be asked to vote online for their preferred recommendation for the N and P efficiency values and this result summarized on a short call on Wednesday, 9/25.

Adjourned: 10:44 am

Participants
Ben Coverdale, DE
Phillip Sylvester, DE
Kevin Ganoe, NY
Ken Staver, UMD
Bill Keeling, VA DEQ
Wade Thomason, VT
Sjoerd Duiker, PSU
Neely Law, CWP
Don Meals, Tetratech
Matt Johnson, UMD
Jeff Sweeney, EPA
Mark Dubin, UMD

Conservation Tillage Panel
Conference Call Minutes
9/25/13
9:00-10:00AM

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1. Wade reviewed four options for panel recommendations for nitrogen and phosphorus in the interim panel report. One option is to recommend the new HRMSD practices with only a sediment efficiency (delaying the decision on N and P). It would be "stackable" but no N or P credit would be given in this form for the HR BMP. The current 'non-stackable' CNT practice would be retained in the model for now for jurisdictions to use as an option, and then replaced fully with the new HR BMP when N and P effectiveness values were determined.

- Mark noted that if the panel opted for this route, they would have the ability to recommend and implement an N and P credit in a future recommendation for Phase 5.3.2. Each of the other two panels are making similar partial crediting recommendations.

2. A second option is to adopt the current 'interim' N and P reductions for this practice (-5% and -10% for N and P, respectively).

- Bill Keeling: If the recommended values are called interim, they may not be eligible to use it for progress.
    - Thomason: The panel could recommend the interim values as their recommendation for use.
- Keeling: Would this option be stackable?
    - Dubin: Yes.
- Keeling: Option two would be more straightforward to write up in a report.
- Meisinger: Noted that the interim sediment value was 20%, which is low compared to the panel recommendation of 60%.
    - Dubin: The panel can use the interim values for N and P, while still using the panel recommended sediment value.
    - Dubin: Noted that the interim effectiveness values were solely derived from the Phase 5 models and are not based directly on external scientific information or data.

3. Wade reviewed option 3, which is to reduce the current 'non-stackable' CNT N and P numbers by some factor.

- Thomason: Noted that this option is more difficult to justify as there is no basis for the value of the reduction factor.

4. Option 4 is to derive the N and P reductions relative to the reduction efficiencies from conservation tillage over High Till using a value similar to that from sediment and the fraction of nutrients applied as organic sources (w/i Lo-Till + manure category). Requires the assumption that what happens with sediment also happens with N and P.

- Meisinger: At least with N, nitrogen reduction is a secondary process, so the assumption may not be very strong.
- Sexton: The assumption may be ok for phosphorus.

5. Discussion
- Staver noted that the panel should have as rigorous a recommendation for nutrients as for sediment. Recommend option 1 until more information to inform the recommendation.
- Meisinger: Recommend that without good N and P studies to use, option 1 is a good recommendation, rather than having the model inform itself.
- Sexton: Agreed.
- Dubin: The panel could make recommendations in the next few months, which could be implemented in time for 2014 progress. However, recommending one set of numbers today and another set of numbers in a few months may decrease support from the partnership.
- Dubin: Clarified that if the partnership does not approve of the recommendations, the decisions would come back to the panel for more discussion.
- Thomason: Asked for any objections to option 1.
    - Sexton: Support option 1, and continue work in the future.
    - Dubin: Note that Jack's post-doc will help the future work of the panel in the next few months.
- Sexton: Motion to approve option 1.
    - Staver: Second.
    - None opposed.
    - Keeling: Abstain.

DECISION: Panel members approved Option 1, which is to recommend the new HRMSD practices with only a sediment efficiency (delaying the decision on N and P). It would be "stackable" but no N or P credit would be given in this form. The current 'non-stackable' CNT practice would be retained in the model for now.

6. Discussion of panel report.
- Wade: Distributed a draft of the panel report to the group this morning, comments welcomed.
- Keeling: Recommend describing that the N and P reductions will be coming in the next report.
- Johnston: Available to help with writing the technical appendix today.

Participants
Jack Meisinger, USDA-ARS
Wade Thomason, VT
Bill Keeling, VA-DEQ
Mark Dubin, UMD
Neely Law, CWP
Matt Johnston, UMD

Kevin Ganoe, NY
Sjoerd Duiker, PSU
Ken Staver, UMD
Tim Sexton, VA-DCR
Emma Giese, CRC

Conservation Tillage Panel
Conference Call Minutes

10/1/13
11:30-1:00

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1. Tim Sexton, Acting Chair due to Wade's absence in Haiti for the University, reviewed the presentation for the 10/3 Agriculture Workgroup meeting.
    - Bill Keeling recommended removing the options slide for the AgWG presentation. Because the panel agreed on option 1 to address N and P with more data in the future, no need to confuse the presentation with the other options.

2. Tim reviewed the Q and A technical appendix from Matt, and discussed the comments and questions that were raised at the September 26th AgWG meeting. Tim reviewed the revised draft of the panel report in which Wade had included additional language to address the partnership comments.

3. NY motioned to approve the panel report as written.
    - Keeling: Second.
    - Panel voted to approve the panel report, unanimously.

4. Mark reviewed the process to complete the partnership review and finalize the interim report.

DECISION: Panel members voted to approve the panel report and technical appendix.
ACTION: Tim will present the report to the Agriculture Workgroup on 10/3 for their approval.

Participants
Tim Sexton, VA
Bill Keeling, VA
Kevin Ganoe, NY
Ken Staver, UMD
Mark Dubin, UMD
Ben Coverdale, DE
Matt Johnston, UMD
Emma Giese, CRC