





- Group One BMP Evaluations
 - Manure Treatment Technologies (New BMP) *
 - Animal Waste Systems Management (Existing BMP) *
 - Nutrient Management (Existing BMP)
 - Conservation Tillage (Existing BMP)
 - Cover Crops (Existing BMP)
 - Manure Incorporation/Injection (Interim/New BMP)
- Group Two BMP Evaluations
 - Cropland Irrigation (Interim BMP)
 - Stormwater for Farmsteads, Greenhouse and Nursery (Interim/New BMP)
 - * Virginia Tech Supported Panels

Manure Treatment Technologies

Status

- Existing BMP Expert Panel.
- Charged with identification and evaluation of manure treatment technologies for nutrient reductions and transformations.
- Preliminary report released September 16, 2015.
- Full Panel recommendations on track for Fall of 2015.
- Panel supported under Virginia Tech assistance agreement.

- Manure Treatment Technologies
 - Panel Members
 - Chair Dr. Doug Hamilton, Oklahoma State University
 - Panelist Robert Meinen, Penn State University
 - Panelist Dr. Jactone Ogejo, Virginia Tech
 - Panelist Jeff Porter, USDA-NRCS Engineer
 - Panelist Dr. John Chastain, Clemson University
 - Panelist Dr. Andrea Ludwig, University of Tennessee
 - Panelist Keri Cantrell, Environmental PE

- Animal Waste Management Systems & Poultry Heavy Use Area Concrete Pads
 - Status
 - New BMP Expert Panel forming and under review.
 - Charged with evaluation of storage and handling nutrient losses and AMWS reductions by species.
 - Charged with evaluation of Poultry Heavy Use Area Concrete Pads.
 - Panel supported under Virginia Tech assistance agreement.

- Animal Waste Management Systems & Poultry Heavy Use Area Concrete Pads
 - Proposed Panel Members
 - Chair Dr. Shawn Hawkins, University of Tennessee
 - Panelist Mark Risse, University of Georgia
 - Panelist Dr. Doug Hamilton, Oklahoma State University
 - Panelist Peter Vanderstappen, PA USDA-NRCS Engineer
 - Panelist Dr. Jon Moyle, University of Maryland
 - Panelist Bridgett McIntosh, Virginia Tech

- Additional Group One BMP Panels
 - Cover Crops (Existing BMP)
 - Conservation Tillage (Existing BMP)
 - Manure Incorporation/Injection (Interim/New BMP)
 - Nutrient Management (Existing BMP)
 - New BMP Expert Panels established.
 - Preliminary Panel reports released September 16-17, 2015.
 - Full Panel recommendation report released in Spring of 2016.
 - Panel recommendation report finial by April, 2016.



Committee Membership

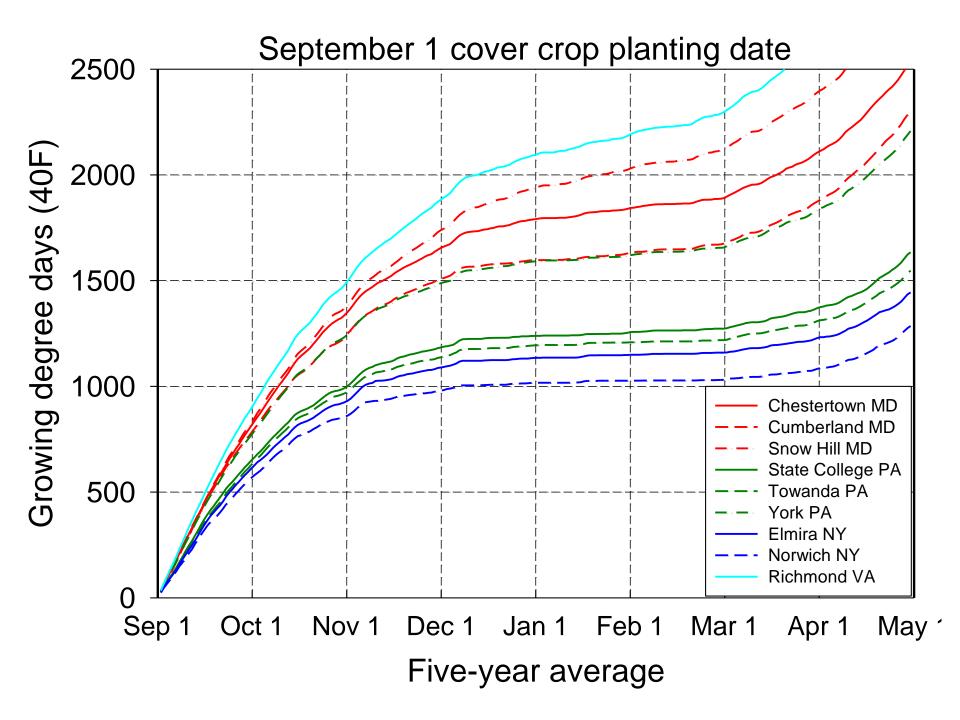
- Ken Staver, UMD, Panel Chair
- Wade Thomason, VT, Panel Member
- Charlie White, Penn State, Panel Member
- Paul Salon, USDA-NRCS, Panel Member
- Jack Meisinger, USDA-ARS, Panel Member
- Jason Keppler, MDA, Watershed Technical WG rep.
- David Wood, US EPA, Modeling team rep.
- Mark Dubin, UMD, AgWG Coordinator
- Lindsey Gordon, CRC, staff

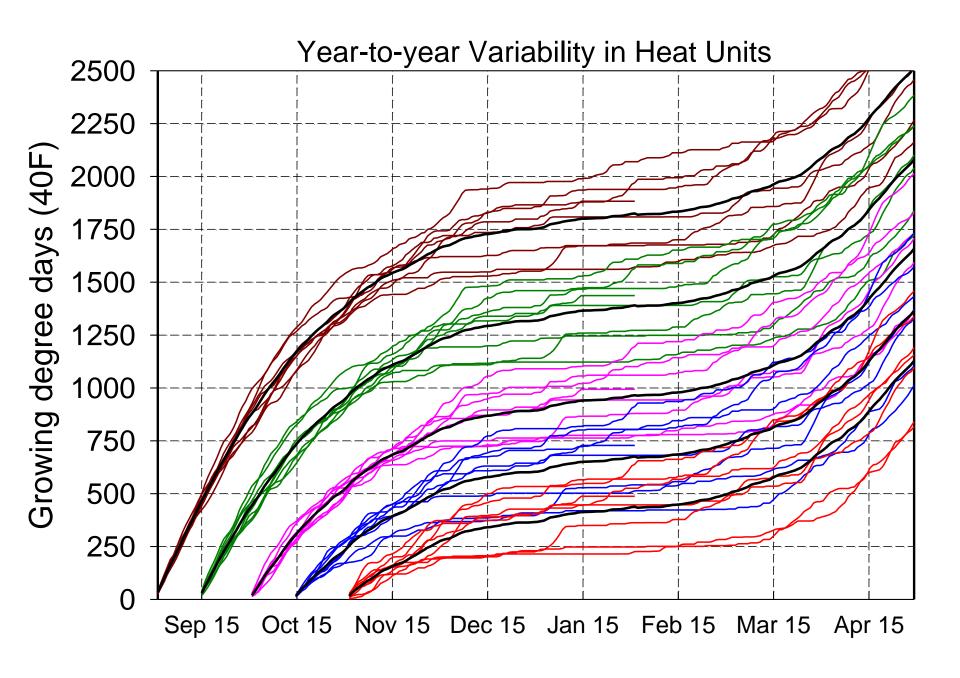
Expert Panel Scope of Work

- Transition and translate all current cover crop reduction efficiencies from the P5.3.2 to the P6.0 model.
- Review and update the definitions and reduction efficiencies of cover crops that are eligible for commodity cover crop status.
- Panel will collaborate with the P6.0 conservation tillage Panel to address credits for winter cover crops that receive fall nutrients.
- The following two items are recommended for consideration if time allows, or if necessary within the context of addressing charges 1 and 2:
 - Create a late-summer planting system for cover crops that are planted in mid- to late-August after a silage removal or shortseason crop (e.g., vegetable).
 - Consider a change from the current approach that uses average frost date for setting planting dates to one that uses heat units.

The General Direction

- Use past work with additions where there is support – mostly leaching
- New commodity cover crop species
- Manure happens and cover crops make a difference. Change since 85?
- Erosion issues? Modeling only option
- Quantifying 30 year change difficult
- Heat units appealing, looking forward







Committee Membership

- Wade Thomason, VT, Panel Chair
- Kevin Ganoe, Cornell, Panel Member
- Mark Reiter, VT, Panel Member
- Sjoerd Duiker, PSU, Panel Member
- Bill McCollum, DuPont Pioneer, Panel Member
- Dale Gates, USDA-NRCS, Panel Member
- Bill Keeling, VADEQ, Watershed Technical WG rep.
- Jeff Sweeney, US EPA, Modeling team rep.
- Mark Dubin, UMD, AgWG Coordinator
- Lindsey Gordon, CRC, staff

Proposal for Phase 6 strategy

Category	Description					
Conventional/Ui Till	<15% cover					
Conventional/Hi Till	15-30% cover, full width tillage					
Low residue, strip till/notill	15-30% cover, strip till or NT, <40%					
new category	soil disturbance, NRCS 329					
Conservation tillage	30-60% cover, NRCS 345					
High residue no tillage (HRTill)	>60% cover, min disturbance					
(111111)						

Lo Residue NT/ST

- Objective is to capture the positive effect of long-term NT on soil structure and infiltration, in systems with less than 30% cover (year round)
- Will likely allow no more than ~40% soil disturbance





HR-Till BMP

• 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.



Strategy – using RUSLE2 for "breaks"

Description	Cons. plan. soil loss	Soil conditioning index (SCI)	STIR value	Residue after planting	Proposed CB Class
Conventional Till Corn Silage. Full inversion primary tillage with two pass secondary tillage. Less than 1% residue cover after planting.	5.1	-0.44	117	<1	Full Width Conventional Tillage
Reduced Till Corn Silage. Chisel plow primary tillage with two pass secondary full width tillage. 6% residue after planting.	4.5	-0.33	101	6	Full Width Conventional Tillage
Reduced Till Corn Silage. One pass full width tillage with field cultivator. 24% residue after planting.	3.9	-0.0076	29.7	24	Full Width Conventional Tillage
Strip Till Corn Silage. In- row subsoiler/zone builder disturbing no more than 40% of soil surface, followed by planter in strips/zones. 26% residue after planting.	3.1	0.11	15.6	26	No-Till/Strip Till
Zone-Till Corn Silage. One pass with strip till planter. 30% residue after planting	2.1	0.24	5.48	30	No-Till/Strip Till
No-Till Corn Silage. One pass with no- till planter. 31% residue after planting.	1.6	0.29	3.85	31	No-Till/Strip Till

Treatment	1971	1972	1973	1974	1975	1976	Average Annual
				— mm -			
Conventional for grain	29 c†	255 b	230 ab	143 c	160 c	53 a	145 bc
Reduced-tillage for grain	33 bc	219 b	189 b	99 c	139 c	35 b	119 c
No-till for grain	50 b	261 b	210 b	155 b	198 b	59 a	156 b
No-till silage with cover	10 c	206 b	178 b	135 bc	182 bc	20 b	122 c
No-till silage without cover	100 a	442 a	292 a	244 a	332 a	62 a	245 a

Table 3. Annual soil losses by tillage year.

	Annual Soil Loss by Tillage Year*								
Treatment	1971	1972	1973	1974	1975	1976	Average Annual		
	Mg ha - 1								
Conventional for grain	1.3 bt	1.6 b	1.8 b	11.7 b	5.9 b	0.8 b	3.9 b		
Reduced tillage for grain	1.0 bc	1.2 bc	1.1 c	4.6 c	4.3 bc	0.4 c	2.1 c		
No-till for grain	0.4 c	0.4 d	0.3 d	0.9 d	1.4 d	0.2 c	0.6 e		
No-till silage with cover	0.2 c	0.9 cd	0.7 c	0.9 d	2.4 cd	< 0.1 c	0.9 d		
No-till silage without cover	10.5 a	50.7 a	10.4 a	19.6 a	39.0 a	2.1 a	22.0 a		

Table 4. Seasonal and annual cover and management (C) factor values.

	C-Factor Values										
		Cro	o Stage Pe	Annual							
Treatment	F	SB	1 and 2 3		4	Observed	Handbook*				
Conventional tillage for grain	0.026	0.555	0.121	0.018	0.075	0.091	0.281†				
Reduced tillage for grain	0.063	0.215	0.073	0.012	0.048	0.049	0.086‡				
No-till for grain	N/A	0.039	0.036	0.003	0.016	0.014	0.042§				
No-till for silage with cover	N/A	0.025	0.026	0.003	0.030	0.020	0.190#				
No-till for silage without cover	N/A	0.692	0.518	0.073	0.825	0.519					

^{*}Computed from seasonal soil loss ratios using El weightings from table 6. †Table 5, line 1; crop stage 4 from table 5C for 95% cover.

^{*}From primary tillage date to primary tillage date the following year. †Values within years followed by the same letter are not significantly different (p<0.05).

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Committee Membership

- Curtis Dell, USDA-ARS, Panel Chair
- Arthur Allen, UMES, Panel Member
- Dan Dostie, USDA-NRCS, Panel Member
- Robb Meinen, Penn State, Panel Member
- Rory Maguire, Virginia Tech, Panel Member
- Chris Brosch, VT/VADCR, Watershed Technical WG rep.
- Jeff Sweeney, US EPA, Modeling team rep.
- Mark Dubin, UMD, AgWB Coordinator
- Lindsey Gordon, CRC, staff
- Emma Giese, UMD, former staff

Proposed BMP Definition

Incorporation is defined as the mixing of dry, semi-dry, or liquid organic nutrient sources¹ into the soil profile within the Panel's specified time period² by a range of field operations. These methods can provide nutrient loss reductions and may differ for P and N by method used. Nutrient loss reductions are primarily due to lower ammonia- N volatilization and in some cases N and P losses with surface runoff. Nutrient loss reductions vary with timing between application and soil mixing, degree of soil mixing, and percent soil disturbance. Incorporation methods alone are not expected to reduce sediment losses.

¹Including manures, biosolids, or composed materials

² To be determined

Proposed BMP Definition (cont.)

- High disturbance incorporation methods provide the highest degree of mixing of organic nutrient sources into the root zone, but the benefits of conservation tillage are eliminated.
- Low disturbance incorporation methods may leave greater quantities of organic nutrient sources on the soil surface, but are compatible with conservation tillage programs.

Proposed BMP Definition (cont.)

 Injection is a specialized category of placement in which organic nutrient sources are mechanically applied into the root zone with surface soil closure at the time of application. Injection is expected to provide the greatest level of nutrient loss reduction, due to limited quantities of material left on soil surface, limited soil disruption, and immediate soil closure.



Committee Membership

- Frank Coale, UMD, Panel Chair
- Doug Beegle, PSU, Panel Member
- Quirine Ketterings, Cornell, Panel Member
- Deanna Osmond, NCSU, Panel Member
- Tom Fisher, UMD, Panel Member
- Jack Meisinger, USDA-ARS, Panel Member
- Chris Brosch, VT/VADCR, Watershed Technical WG rep.
- Jeff Sweeney, US EPA, Modeling team rep.
- Mark Dubin, UMD, AgWG Coordinator
- Lindsey Gordon, CRC, staff

Core Nutrient Management Practices: (Assuming these are verifiable and being used)

- Method of determining nutrient application rates based on contemporary LGU guidelines for rate and timing at the field level
 - Soil tests for P field level
 - Manure analysis and volume test or book value
 - Spreader/applicator calibration
 - Yield estimates and Cropping plan field level
 - Cropping and manure history field level
- Consequence of implementation of these practices: Neutral no efficiency credits and no negative performance efficiency in the Chesapeake Bay models. This assumes that credit for core nutrient management is built into the Phase 6 model baseline.
- Reported as a %.

For those who do not meet the all of the core practices:

 Consequence: Negative performance efficiency credits in the Chesapeake Bay models.

Supplemental Nutrient Management Best Management Practices Menu

- Evaluated practices under consideration for Phase 5.3.2
 - PSNT
 - CSNT
 - FSNT
 - ISNT
 - Variable rate N
 - Soil tests and manure analysis no more than 3 years old
 - Split applications
 - Timing
 - Side dressing
 - Placement options for fertilizers and manures
 - Manure export
 - Cover crop link back to Cover Crops panel
 - Conservation tillage link back to Conservation Tillage Panel
 - Residual Biomass management link to CTP and MIIP
 - Field buffers link back to Forest Buffer Panel

Supplemental Nutrient Management Best Management Practices Menu

- Practices to be evaluated for Phase 6
 - Variable rate P
 - P-based manure rate based on crop removal
 - Split applications Fertigation link back to Cropland Irrigation panel
 - Source material options alternative fertilizers and additives
 - Manure- Link to Manure Technology Panel
 - Fertilizer
 - Soil test P remediation/declining
 - Zero P application
 - Irrigation management link to Cropland Irrigation panel
 - Controlled drainage linked to Tier 3 Priority Panel
 - Drainage ditch filters
 - Grid soil sampling
 - In-season sensors/remote sensing in general

- Yield mapping
- On-farm replicable trials/data
 - Strip-trials
- Geo-spatial mapping
- Whole farm balances
- P-loss risk assessments
 - Particulate P loss pathways
 - Dissolved P loss pathways
 - Source P losses
 - Soil P saturation
- N-loss risk assessments, including Nitrogen rate models
 - Ammonia loss
 - Denitrification
 - Leaching
- Nutrient application setbacks

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		Soybeans	Manure	Manure	Hay	Manure	Manure	and Grains	and Soybeans	Crop High	Crop Low	Crops	Hay	Pasture
Practices evaluated under														
Phase 5.3.2	Sub-practice													
PSNT			N	N		N	N							
CSNT			N	N		N	N							
FSNT								N	N					
ISNT			N	N		N	N							
Variable rate N			N	N		N	N	N	N					
Manure analysis < 3 years old		N P	N P		N P	N P		N P	N P				ΝP	N P
Soil tests < 3 years old		P	Р	Р	Р	Р	Р	Р	Р	Р	Р	P	Р	Р

N

ΝP

N

ΝP

Legume | Silage w/

N

ΝP

ΝP

Silage w/o Small Grains Small Grains

N

ΝP

Specialty

ΝP

Specialty

ΝP

ΝP

Other Agronomic Other

N

ΝP

ΝP

Grain w/o

N

ΝP

Full Season Grain w/

N

ΝP

ΝP

Residual biomass mgmt

Split applications

Crops panel

Panel

Placement options for fertilizers and manures

Cover crop – link back to Cover

Conservation tillage – link back to Conservation Tillage

Field buffers – link back to Forest Buffer Panel

