

APLE Runoff and Error tool (APLE-RunEr)

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E12 30

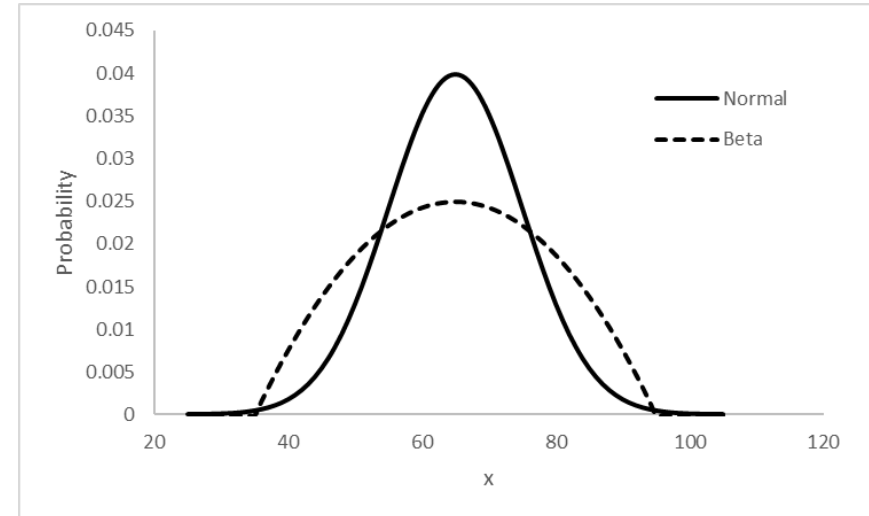
APLE Runoff and Error tool (APLE-RunEr)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Q	R	S	T	U	X	Y	Z
6																						
7																						
8		Model Inputs																				
9		Model input error range +/-																				
10					Error range																	
11		Soil Properties	Units		+-%																	
12		Depth to Bottom of 1st layer	inches	1	30																	
13		Depth to Bottom of 2nd layer	inches	6	5																	
14		Soil bulk density 1st layer	g/cm3	1.2	10																	
15		Soil bulk density 2nd layer	g/cm3	1.2	15																	
16		Mehlich 3 Soil P 1st Layer	ppm	104	20																	
17		Mehlich 3 Soil P 2nd Layer	ppm	104	25																	
18		Soil Clay 1st layer	%	14	30																	
19		Soil Clay 2nd layer	%	14	35																	
20		Soil OM 1st Layer	%	2.4	40																	
21		Soil OM 2nd Layer	%	2.4	30																	
22		Field Area	Acres	1.00	30																	
23																						
24		Year		1						2						3					4	
25		Transport Factors																				
26		Curve Number		76						76						76					76	
27		Annual Rain	mm		30																	
28		Annual Runoff	mm		30																	
29		Sediment Loss	ton/acre	1.00	0					0.00						0.00					0.00	
30																						
31																						
32		Annual Crop P Uptake	lb/ac	42.9	30					42.9						42.9					42.9	
33		Degree of Soil Mixing	%	20	30					20						20					20	
34								Error range														
35		Grazing Animals		Milk Cows	Heifers	Dry Cows	Calves	+-%		Milk Cows	Heifers	Dry Cows	Calves		Milk Cows	Heifers	Dry Cows	Calves		Milk Cows	Heif	
36		Total Cow Days (# cows x # days)						0														

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	A	B	C	D	E
1		Year 1			
2		PP loss	DRP loss	TP loss	M3P
3	MCS Simulation #	2.33	4.53	6.86	174.99
4	1	2.02	5.51	7.53	178.61
5	2	2.02	3.01	5.04	194.10
6	3	2.16	8.07	10.23	239.71
7	4	1.76	3.49	5.25	143.67
8	5	1.99	3.59	5.58	145.47
9	6	1.93	5.01	6.94	286.01
10	7	2.14	3.48	5.62	192.57
11	8	2.09	3.15	5.25	181.89
12	9	2.21	4.04	6.25	165.91
13	10	1.92	3.80	5.72	179.73
14	11	2.53	5.94	8.47	243.24
15	12	2.02	8.25	10.27	232.07
16	13	2.12	4.73	6.86	176.87
17	14	1.97	5.12	7.09	228.86
18	15	2.27	5.04	7.31	190.78
19	16	2.01	4.38	6.39	225.94
20	17	1.90	7.63	9.53	231.68
21	18	2.17	4.92	7.09	186.14
22	19	1.98	5.19	7.17	228.51
23	20	2.10	4.85	6.95	147.23
24	21	2.32	2.82	5.14	199.18
25	22	2.38	4.68	7.06	194.29
26	23	2.50	3.17	5.66	175.96
27	24	2.04	4.41	6.45	167.62
28	25	2.69	5.57	8.25	224.97
29	26	2.18	4.29	6.47	370.96
30	27	1.90	5.51	7.40	318.69
31	28	2.01	4.96	6.96	234.32
32	29	1.72	7.08	8.80	237.01
33	30	2.40	4.56	6.96	255.89
34	31	1.85	4.71	6.57	218.87

- Symmetrical beta distribution assumed using $BETA.INV(p, \alpha, \beta, \min, \max)$



- Monte Carlo simulations run using the 'What-if' Analysis tool (n = 1000)

Output from Updated Version

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	F
1		Confidence Interval (%)														
2		95	Year	PP Loss	lower CI	upper CI	DRP Loss	lower CI	upper CI	TP Loss	lower CI	upper CI	M3P	lower CI	upper CI	
3		99	1	2.12	1.78	2.45	5.13	2.97	8.45	7.25	5.05	10.50	203.0	148.5	274.1	
4		95	2	4.45	3.51	5.53	4.81	2.95	7.25	9.27	6.99	12.05	362.1	247.3	516.1	
5		90	3	6.12	4.80	7.81	6.79	4.17	9.86	12.91	9.43	16.91	585.5	384.9	842.4	
6		85	4	7.33	5.61	9.33	8.34	5.32	12.31	15.67	11.47	20.55	837.8	571.4	1174.1	
7		80	5	8.56	6.64	10.79	2.29	1.33	3.40	10.86	8.06	13.98	749.0	501.7	1054.6	
8		75	6	6.84	5.30	8.66	7.79	4.10	12.39	14.63	9.35	20.77	645.4	421.0	919.0	
9		70	7	5.30	4.01	6.75	2.54	1.24	4.24	7.84	5.35	10.90	553.7	372.0	781.0	
10			8	4.02	2.95	5.26	1.83	0.92	3.24	5.85	3.93	8.32	500.0	345.5	686.6	
11			9	3.17	2.39	4.16	0.90	0.54	1.44	4.07	3.00	5.56	455.4	315.4	624.2	
12			10	2.66	1.99	3.45	0.68	0.44	1.00	3.34	2.48	4.38	402.7	280.7	553.2	

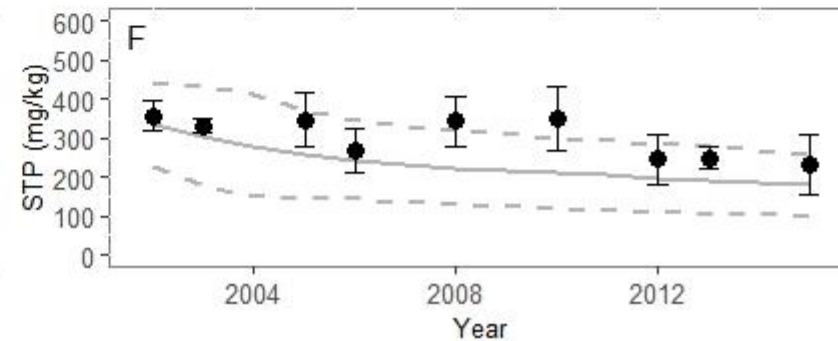
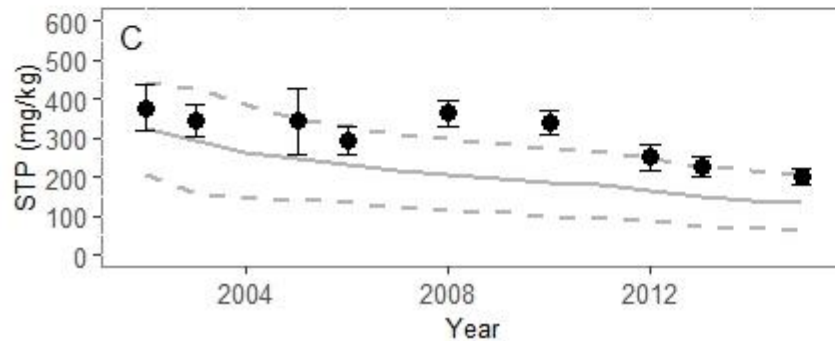
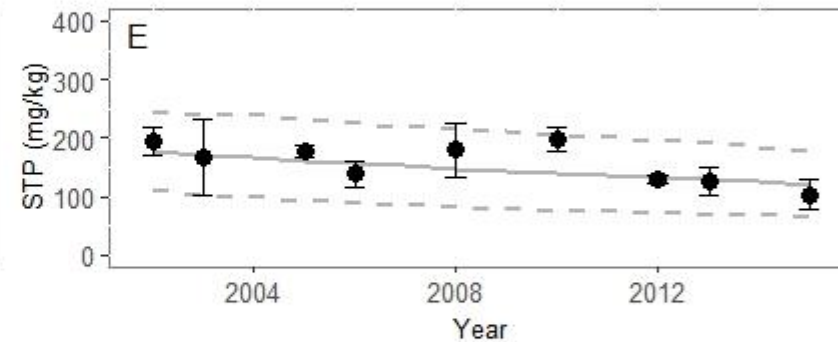
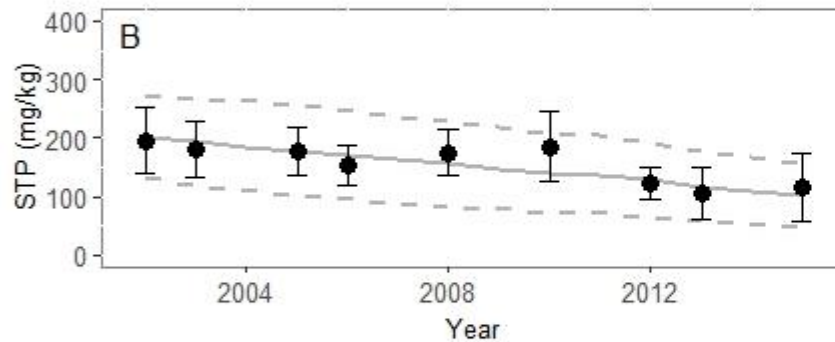
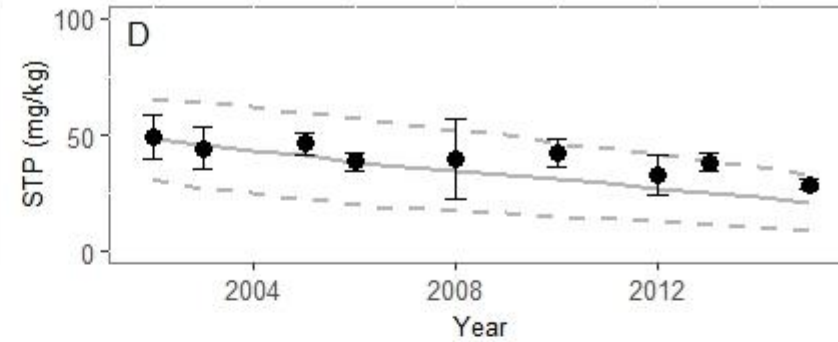
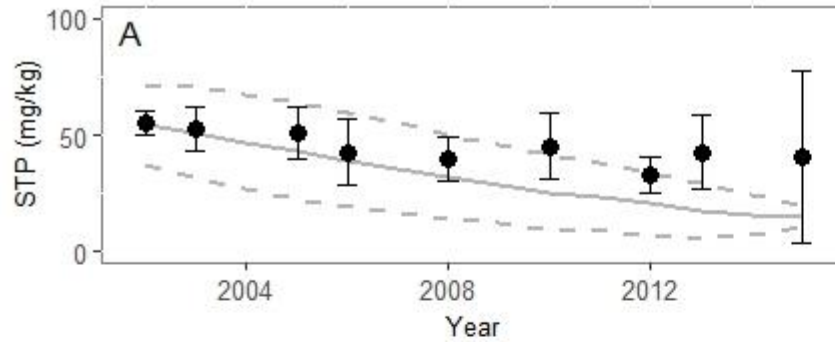
Confidence intervals are calculated from output distribution using PERCENTILE.INC

Evaluating model input error on uncertainties in STP

- Performed model predictions of STP using input data reported in study by Fiorellino (2017) for 3 sites in MD with differing P application and cropping treatments
 - Assumed error of $\pm 10\%$ for all model inputs (including bulk density)
- Calculated variability in measured STP reported by Fiorellino (2017)
- Compared model predictions and uncertainties with measured STP including uncertainty

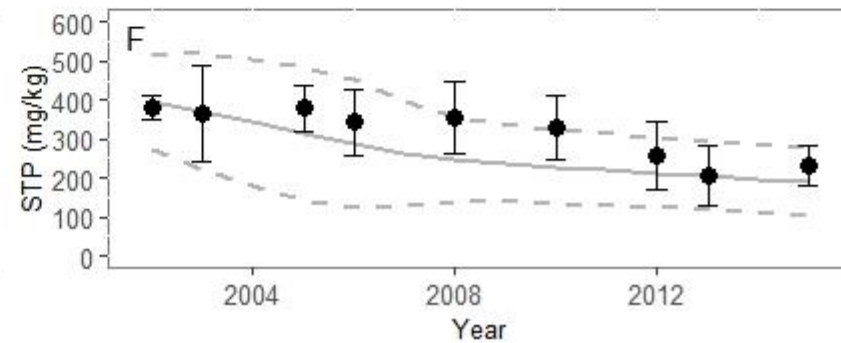
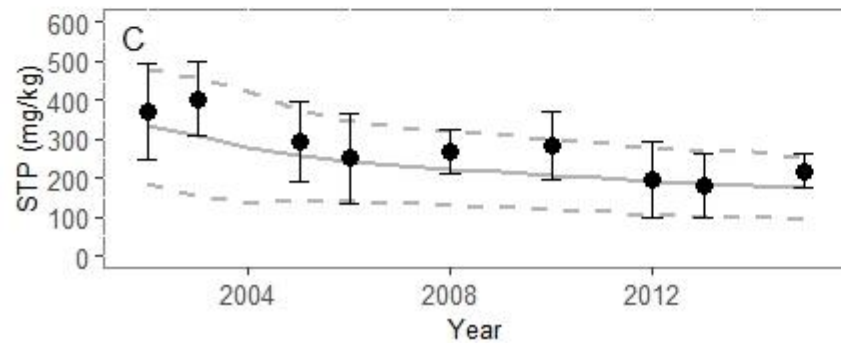
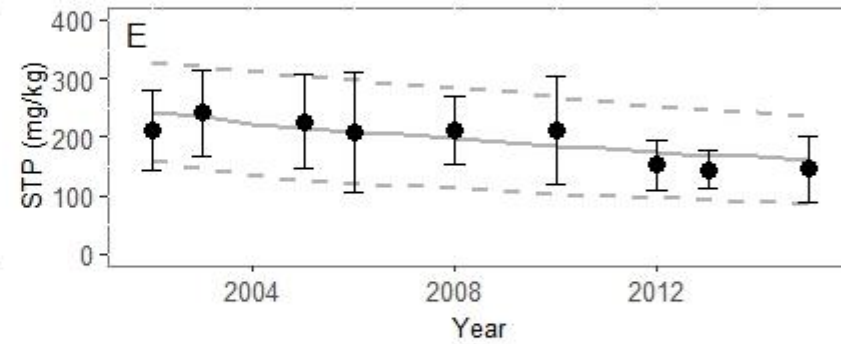
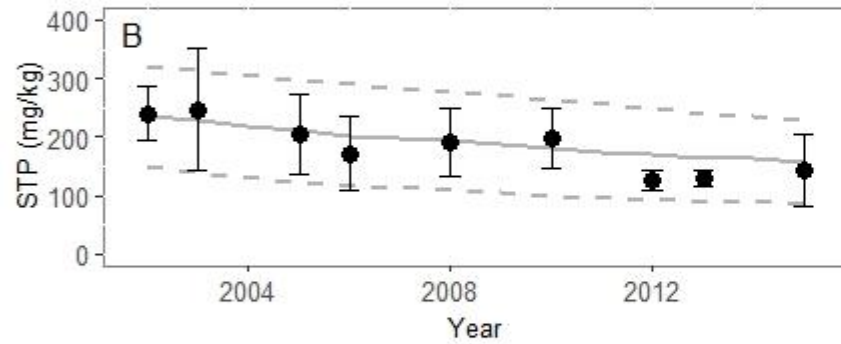
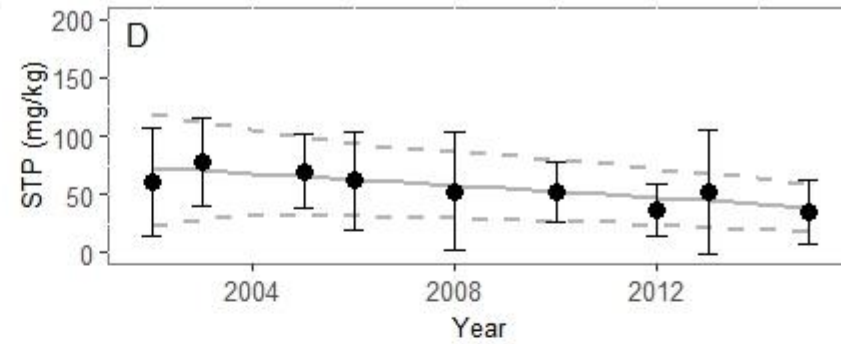
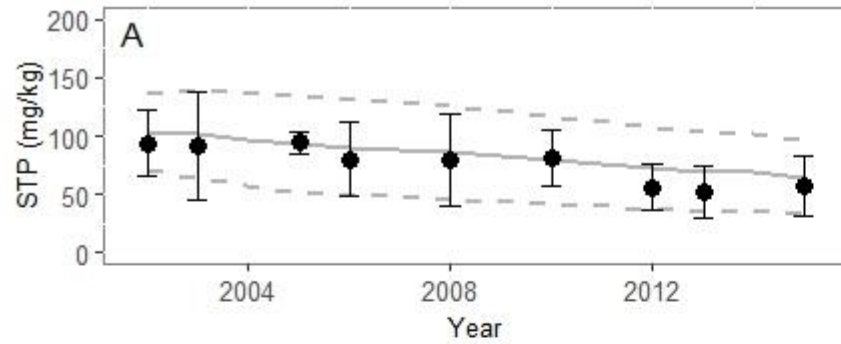
Predicted and observed STP drawdown at Poplar Hill Site in MD

Data courtesy
Nicole Fiorellino



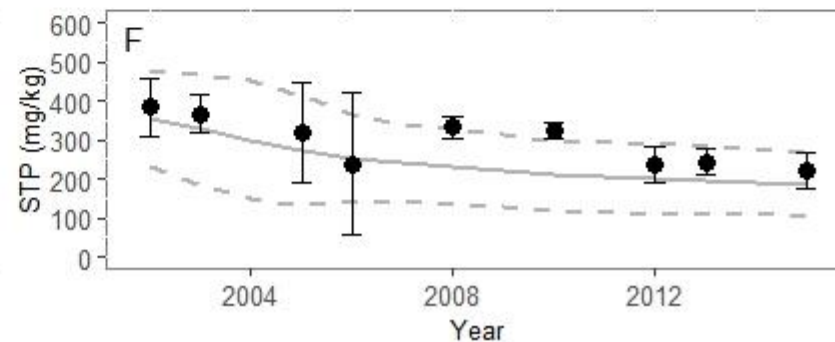
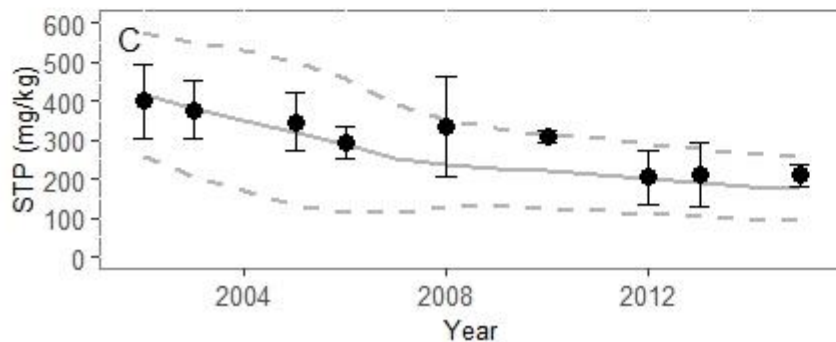
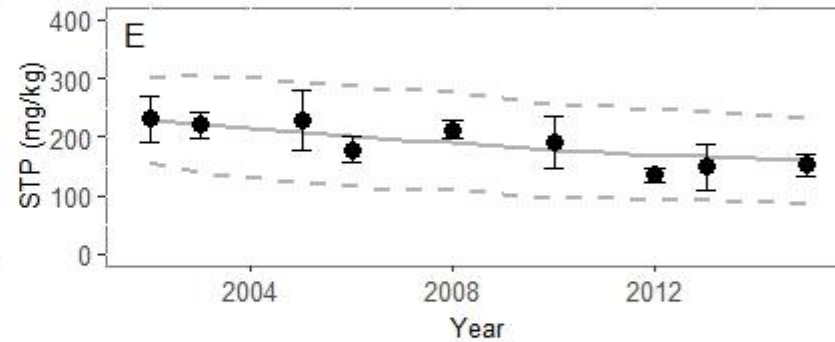
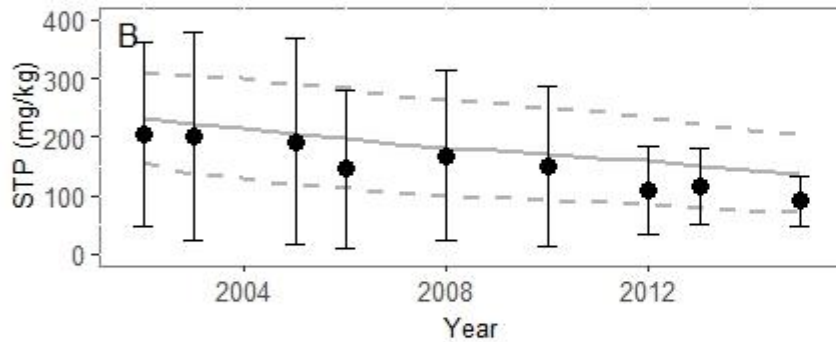
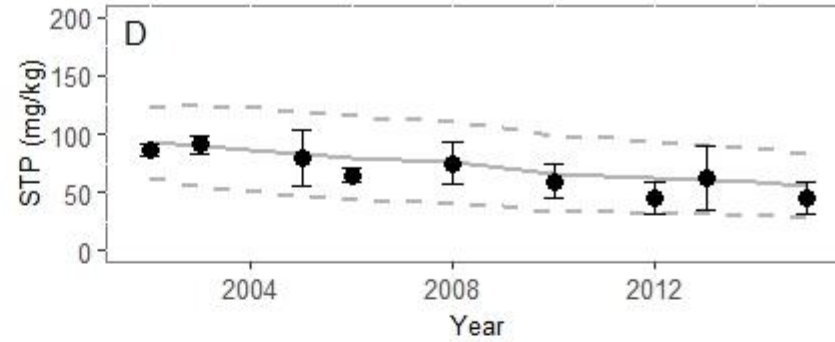
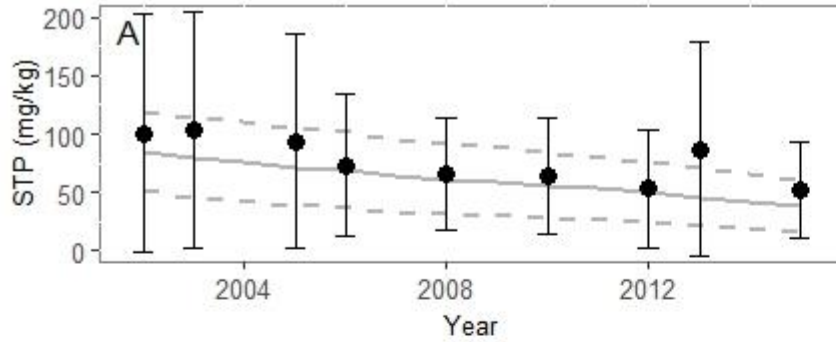
Predicted and observed STP drawdown at Upper Marlboro Site in MD

Data courtesy
Nicole Fiorellino

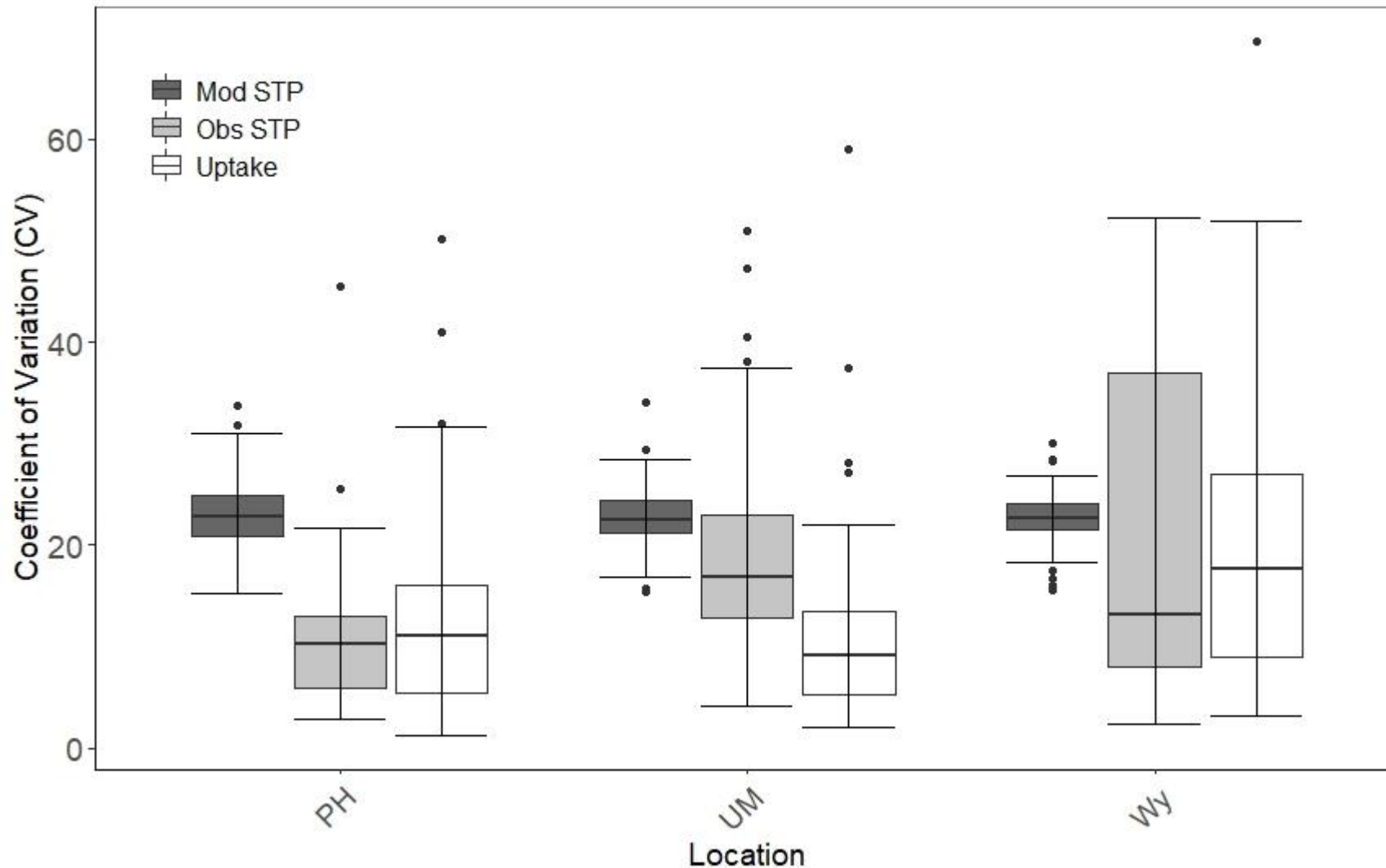


Predicted and observed STP drawdown at Wye Site in MD

Data courtesy
Nicole Fiorellino

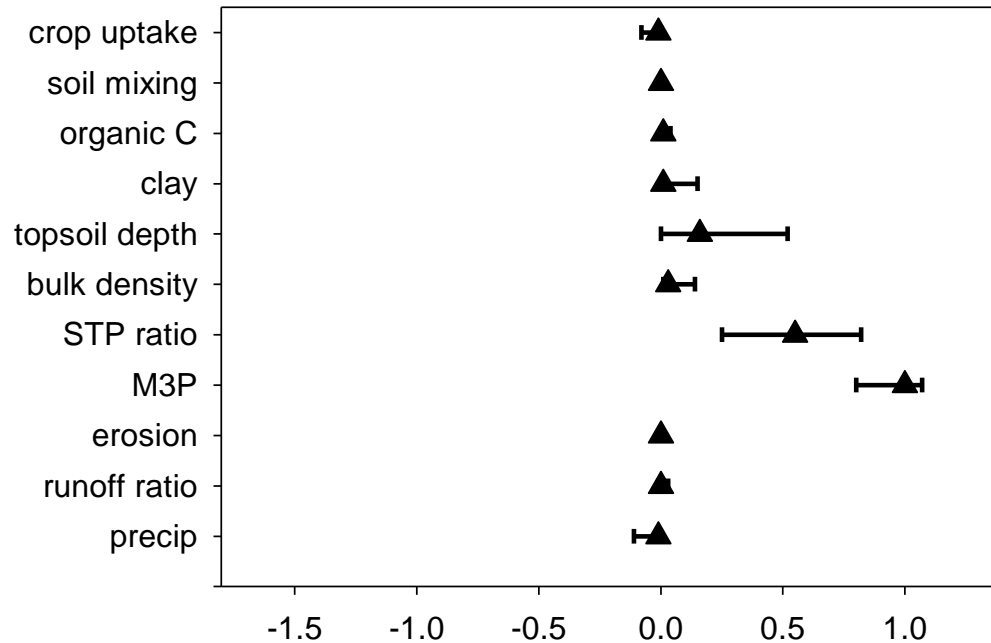


Coefficient of Variation for modeled STP and measured STP and crop uptake

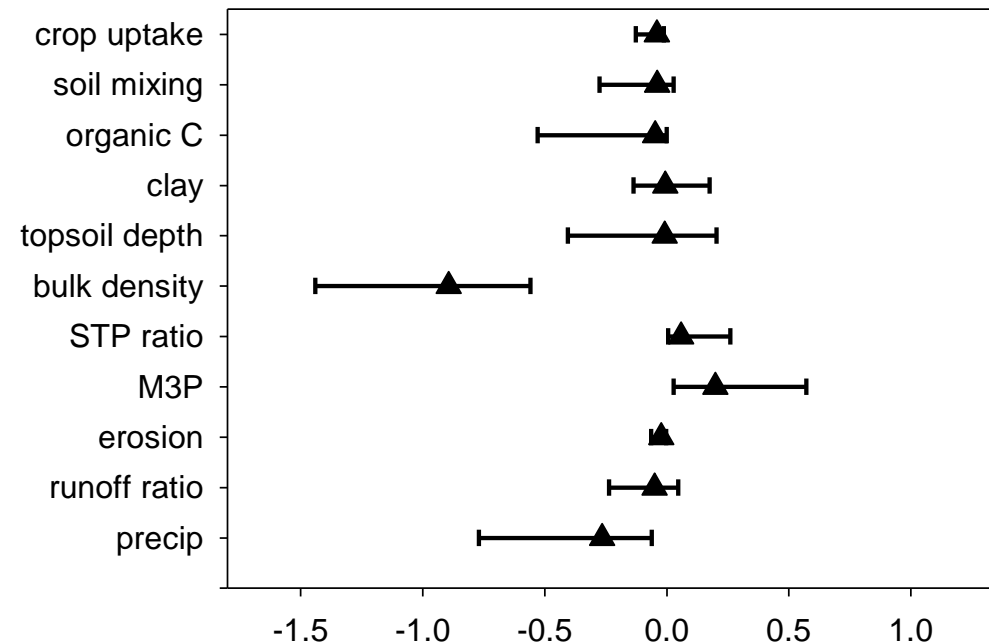


Model input sensitivity indices for predicted STP (Global SA)

1-yr simulation

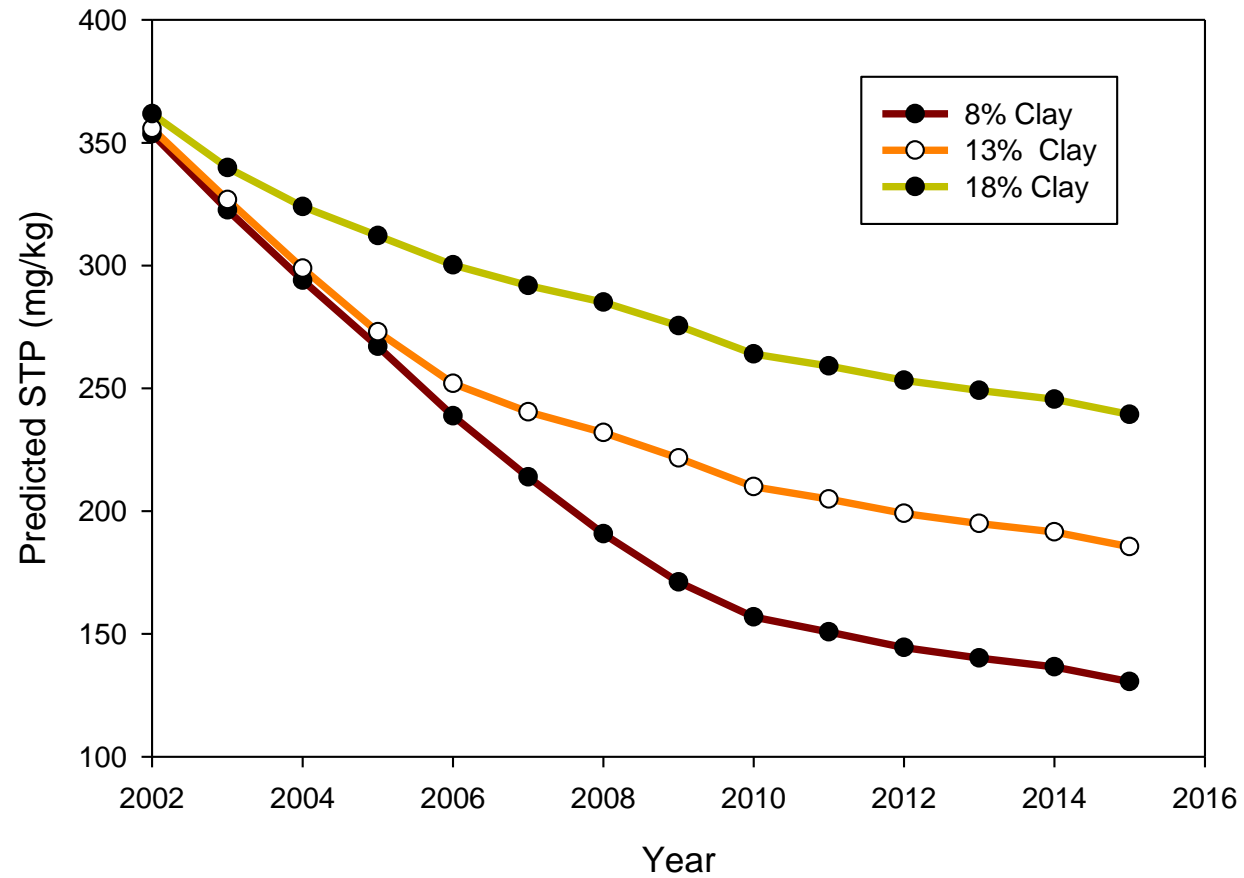


10-yr simulation



Bulk density not currently model input

Effect of clay content on predicted STP for Wye forage site (1600 kg P added)





Questions?