Water Stewardship's Nutrient Load Estimator (NLE)

Water Quality Goal Implementation Team Conference Call Presentation

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WSI Background and Why NLE?

- WSI does implementation assessments & continuous improvement

- Beta test on 40 farms in Shenandoah Valley in 2009

- Needed to quantify loads and reductions

- Developed spreadsheets w/ land-river segment land use loads

- Applied BMP efficiencies and application protocols

- Decided need for software (for WSI trained users) (late summer)

- Work w/ urban partner added urban BMPs

- Originally built for use at lrsegs and tract level estimates

Nutrient Load Estimator (NLE)

• Created by Water Stewardship, Inc. (with software consultant)

• Methodology and numbers adapted from CBP Phase 5 WSM

• Uses land use loads from CBP WSM Phase 5.X
  (will upload 5.3 calibration and "no action" land use loads when available)

• Uses Bay BMP efficiencies and application protocols

• Calculates estimated nutrient and sediment loads for agricultural and urban tracts at a community level

• Allows WSI to evaluate impact of BMP implementation and management scenarios at land river segment and tract level

Potential NLE Uses for WIPs, "what if scenarios", targeting?

• Nutrient/sediment load estimates based on Ph 5.3 land uses and BMP efficiencies/applications; results very similar to Ph. 5.3

• Can run scenarios at the land-river segment, small watershed, tributary basin, county, state and major basin scales.

• Provide rapid turn around on preliminary WIP scenarios before submission to CBPO for "official" Ph5.3 WSM run/results

• Allows evaluation of focused efforts at small watershed, tributary basin, county or regional basis prior to asking for WSM run

• Allows CBPO to focus on needed TMDL runs and final WIP runs

Water Stewardship
Improving Water Quality Sustaining Agriculture

Project Information

Enter Location
Landuse loads used will be specific to the selected Phase 5.3 land-river segment

Enter Pre-BMP Landuse Acres
•Per acre landuse loads for each landuse type

•Loads- Phase 5.2 2002 No Action Scenario

• Nutrient management and low till landuse loads- Calculated using % difference in Phase 5.2 Calibration Scenario

•Will be updated with Phase 5.3 2010 No Action Scenario loads when available

Enter Animal Info
•Load based on animal type and number (not AFO acres)

•Per animal load- Calculated using the AFO loads from the 2002 No Action Scenario and county animal numbers proportioned out to lrseg

BMP Scenarios

Landuse Change BMPs
•Ag and urban
•Applied following CBP methodology

Efficiency BMPs
•Ag and Urban
•Applied following CBP methodology

Animal Confinement Area BMPs
•BMPs applied only to the AFO load (ex. mortality composting)

•BMPs applied to the AFO load and manure-receiving landuses (ex. manure transport)

Application Reduction BMPs
EOS reduction is x% of the application reduction (% TBD)

Results

Pre-BMP Loads
•Pre-BMP nutrient and sediment loads (edge of stream and delivered) – total and by landuse

•Represents a scenario in which no BMPs are applied

Post-BMP Loads
•Post-BMP nutrient and sediment loads (edge of stream and delivered) – total and by landuse

•Represents a scenario in which the BMPs that were submitted are applied

Reduction
•Lb (or ton) reduction from pre-BMP load to post-BMP load

•% reduction from pre-BMP load to post-BMP load

Example

Calculations in this example are for one land-river segment

Note: This example uses landuse loads from the Phase 5.2 2002 No Action scenario. The results will change once these loads are replaced with loads from the Phase 5.3 2010 No Action scenario.

Location: A42055SL2_2540_2370 in Franklin County, PA
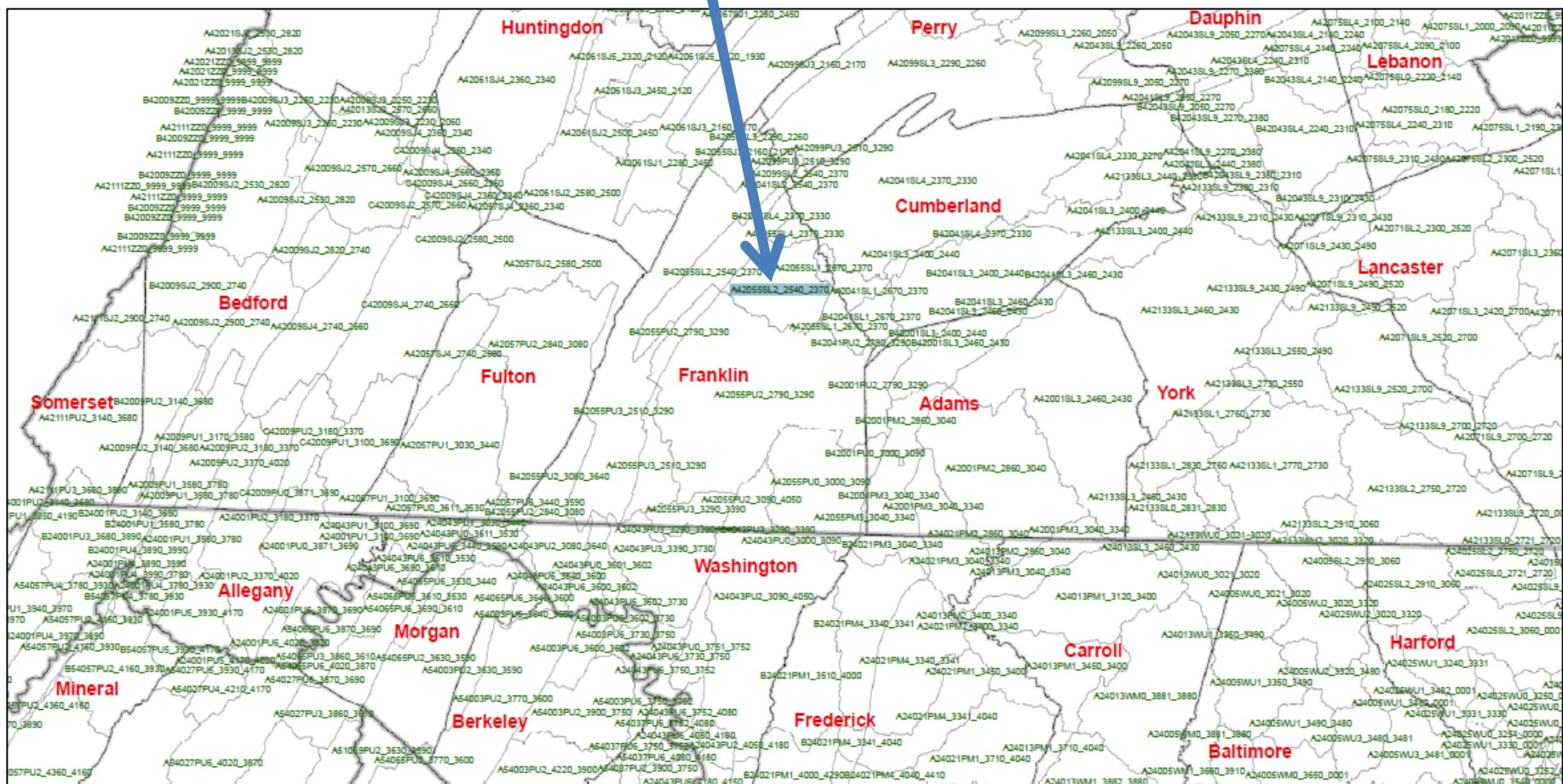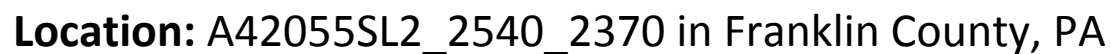
Pre-BMP Landuse Acres: From the Phase 5.2 2002 No Action scenario

Landuse	Acres
Alfalfa	4646.6
Construction	21.1
Degraded Stream Corridor	95.4
Extractive	3.9
Forest	7358.1
Harvested Forest	74.3
Hay	3596.8
High Intensity Impervious Urban	701.1
High Intensity Pervious Urban	1754.5
Low Intensity Impervious Urban	303.1
Low Intensity Pervious Urban	1950.8
Nursery	2.1
Pasture	3087
Row Crops	11942
Specialty Crops	611.4
Unfertilized Grass	744.7

Animals: Animal numbers are based on county numbers from the Ag Census proportioned out to the land-river segment; Confinement fractions are default CBP numbers

Animal	Number	Time Confined
Broilers	87015	1
Dairy Cows	4838	0.75
Hogs and Pigs for Breeding	1750	1
Hogs for Slaughter	9022	1
Horses	313	0.4
Layers	142893	1
Other Cattle	5088	0.25
Pullets	35914	1
Turkeys	44293	1

BMPs Applied in This Scenario

BMP	Landuse	Amount Submitted	Amount Credited	Unit
Conservation Tillage	Row Crops	11942	11942	acres
Nutrient Management	Specialty Crops	611.4	611.4	acres
Nutrient Management	Row Crops- Low Till	11942	11942	acres
Nutrient Management	Hay	3596.8	3596.8	acres
Nutrient Management	Alfalfa	4646.6	4646.6	acres
Forest Buffers	Row Crops w/ Nutrient Mngmt- Low Till	1000	1000	acres
Bioretention (w/ underdrain w/ C/D soils)	High Intensity Pervious Urban	600	600	acres
Bioretention (w/ underdrain w/ C/D soils)	High Intensity Impervious Urban	200	200	acres

Results: Pre-BMP Loads

Landuse	N Load EOS (lbs)	N Load Delivered (lbs)	P Load EOS (lbs)	P Load Delivered (lbs)	Sediment Load EOS (tons)	Sediment Load Delivered(tons)
Animal Confinement Area	111008.1	85458.9	1696.9	804.5	0	0
Alfalfa	74765.7	57557.9	1540.3	730.3	2233.3	1038.1
Construction	1105.7	851.2	85	40.3	136.9	63.6
Extractive	106.1	81.7	7.9	3.7	8.7	4.1
Forest	36860.4	28376.8	440.8	209	516.9	240.3
Specialty Crops	17207.5	13247.1	524	248.4	1031.9	479.6
Harvested Forest	3271.2	2518.3	37.5	17.8	48.3	22.4
Row Crops	1006988.6	775223.8	15626.5	7408.7	21321.3	9910.6
Unfertilized Grass	6926.2	5332.1	19	9	332.6	154.6
Hay	18677.1	14378.5	1449.6	687.3	1675.6	778.8
High Intensity Impervious Urban	16017.4	12330.9	778.2	368.9	587.7	273.2
Low Intensity Impervious Urban	6924.2	5330.6	336.3	159.4	253.9	118
Pasture	68519.2	52749.1	3100	1469.7	468.8	217.9
High Intensity Pervious Urban	38629.3	29738.6	495.6	235	219	101.8
Low Intensity Pervious Urban	43050.6	33142.2	551.6	261.5	242.4	112.7
Degraded Stream Corridor	14105.9	10859.3	790.6	374.8	145.7	67.7
Nursery	1045	804.5	97.4	46.2	1.2	0.6
TOTAL	**1465208.2**	**1127981.3**	**27577**	**13074.5**	**29224.2**	**13584.1**

Results: Post-BMP Loads

Landuse	N Load EOS (lbs)	N Load Delivered (lbs)	P Load EOS (lbs)	P Load Delivered (lbs)	Sediment Load EOS (tons)	Sediment Load Delivered(tons)
Animal Confinement Area	111008.1	85458.9	1696.9	804.5	0	0
Construction	1105.7	851.2	85	40.3	136.9	63.6
Extractive	106.1	81.7	7.9	3.7	8.7	4.1
Forest	41869.9	32233.3	500.7	237.4	587.2	272.9
Harvested Forest	3271.2	2518.3	37.5	17.8	48.3	22.4
Unfertilized Grass	6926.2	5332.1	19	9	332.6	154.6
High Intensity Impervious Urban	14875.4	11451.7	678.3	321.6	495.5	230.3
Low Intensity Impervious Urban	6924.2	5330.6	336.3	159.4	253.9	118
Alfalfa w/ Nutrient Mngmt	74765.7	57557.9	1540.3	730.3	2233.3	1038.1
Specialty Crops w/ Nutrient Mngmt	17207.5	13247.1	524	248.4	1030.4	478.9
Hay w/ Nutrient Mngmt	18677.1	14378.5	1449.6	687.3	1675.6	778.8
Row Crops w/ Nutrient Mngmt- Low Till	767473	590834.3	12400	5879	11691.9	5434.7
Pasture	68519.2	52749.1	3100	1469.7	468.8	217.9
High Intensity Pervious Urban	35326.5	27195.9	419.3	198.8	177.8	82.6
Low Intensity Pervious Urban	43050.6	33142.2	551.6	261.5	242.4	112.7
Degraded Stream Corridor	14105.9	10859.3	790.6	374.8	145.7	67.7
Nursery	1045	804.5	97.4	46.2	1.2	0.6
TOTAL	**1226257.3**	**944026.5**	**24234.2**	**11489.6**	**19530.2**	**9078.1**

Results: Reductions

Load Reduction from Pre-BMP Load

N Load EOS (lbs)	N Load Delivered (lbs)	P Load EOS (lbs)	P Load Delivered (lbs)	Sediment Load EOS (tons)	Sediment Load Delivered (tons)
238950.9	183954.9	3342.8	1584.8	9694	4506

Load Reduction Percentages from Pre-BMP Load

N Load EOS (%)	N Load Delivered (%)	P Load EOS (%)	P Load Delivered (%)	Sediment Load EOS (%)	Sediment Load Delivered (%)
16.3	16.3	12.1	12.1	33.2	33.2

Now let's do one online

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