Nutrient Load Estimator (NLE)

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Models and Decision Support Tools Forum

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What is NLE?

- NLE is a web-based software tool
- Developed by Water Stewardship, Inc. in 2009
- It is a post-processor, not a simulation model
- Provides quantitative estimates of the impact of nutrient and sediment reduction activities
- Estimates for agricultural or urban tracts at a local land-river segment level (community level)
- Results similar to results from the Chesapeake Bay Program Watershed Model (CBP WSM)

NLE Uses

- WSI farm assessments and development of Continuous Improvement Programs (CIPs)
- Ecosystem service assessments
- Assessment of performance relative to regulatory expectations
- NFWF Innovative Nutrient and Sediment Reduction Program grant proposals
- WSI eco-label qualification

Information Used In NLE

- Methodology and numbers from the CBP Phase 5.3 WSM
  - No BMP landuse loads by landuse type for all land-river segments in the CB watershed
  - BMP reduction efficiencies and application protocols adapted for use at the farm/parcel level

User Inputs- Background Info

- Farm/Project location
  - State, County, CBP WSM land-river segment
- Pre-BMP acres by landuse type
  - Acres before any BMPs are applied
  - Landuse types include row crops, specialty crops, alfalfa, hay, pasture, nursery, forest, unfertilized grass, pervious urban, impervious urban, etc.
- Animal information
  - Number, type, fraction of time in confinement annually

User Inputs- Scenario Info

- BMPs to be applied in each scenario
  - BMPs include structural, management, and land conversion practices (ag and urban)
  - Applied to either landuse acres or animal populations
  - Multiple scenarios can be run for a farm/project

NLE Outputs

- Loads for No BMP Scenario and BMP Scenario
  - Annual nitrogen, phosphorus, and sediment load
  - Total and by landuse type
  - Edge of Stream load and load delivered to tidal waters

- Load reduction from No BMP Scenario to BMP Scenario
  - Lbs of N and P reduced, Tons of sediment reduced
  - Percent reduction

Using NLE

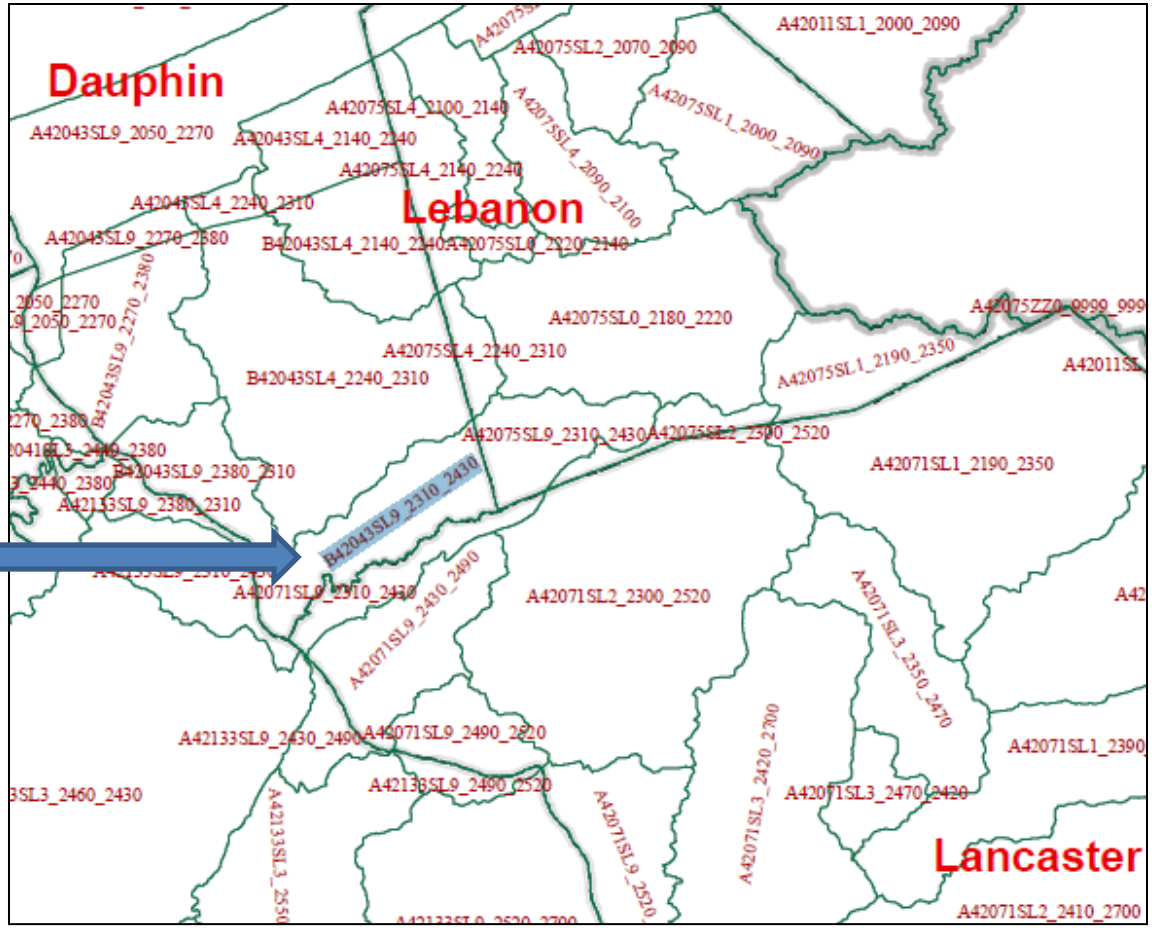
- Relatively simple user-interface intended for the non-modeler
- User's Guide available with detailed step-by-step directions
- WSI staff can provide training if necessary
- WSI has provided both software and technical help desk support for projects

Scales of Relevance

- Designed for use at a tract level (e.g., farm, development, project)
- Primarily used for whole farm water quality assessments
- Can be used for individual land-river segments
- Based on demand considering updating to allow evaluation at the county, sub-basin, or major-basin scale

Example Farm: Location

- Dauphin County, Pennsylvania
- Land-River Segment: B42043SL9_2310_2430



Example Farm: NLE Results

Animals

Animal	Number	Confined Fraction
Dairy Cows	75	0.75
Horses	7	0.4

Pre-BMP Landuse Acres

Pre BMP Landuse	Acres
Alfalfa	25
Row Crops	35
Pasture	10
TOTAL	70

Post-BMP Landuse Acres

Post BMP Landuse	Acres
Unfertilized Grass	2
Alfalfa w/ Nutrient Mngmt	25
Row Crops w/ Nutrient Mngmt- Low Till	33
Pasture w/ Nutrient Mngmt	10
TOTAL	70

Example Farm: NLE Results

Landuse Change and Efficiency BMPs

BMP	Landuse	Amount Submitted	Amount Credited
Conservation Tillage	Row Crops	35 acres	35 acres
Nutrient Management	Row Crops- Low Till	35 acres	35 acres
Nutrient Management	Pasture	10 acres	10 acres
Nutrient Management	Alfalfa	25 acres	25 acres
Grass Buffers	Row Crops w/ Nutrient Mngmt- Low Till	2 acres	2 acres
Cover Crop- Early Drilled Rye	Row Crops w/ Nutrient Mngmt- Low Till	33 acres	33 acres

Animal BMPs

BMP	BMP Location	Animal	Amount Submitted	Amount Credited
Confinement Area Water Management	Animal Confinement Area	Dairy Cows (confined 0.75)	75 animals	75 animals

Example Farm: NLE Results

Pre-BMP Landuse Loads

Landuse	N Load EOS (lbs/year)	N Load Delivered (lbs/year)	P Load EOS (lbs/year)	P Load Delivered (lbs/year)	Sediment Load EOS (tons/year)	Sediment Load Delivered (tons/year)
Animal Confinement Area	527	444.4	6.2	2.7	0.6	0.3
Alfalfa	249.6	210.5	8.5	3.7	3.4	1.6
Row Crops	2178.9	1837.4	41.3	18	18.4	8.6
Pasture	244	205.8	4.8	2.1	0.3	0.1
TOTAL	3199.4	2698	60.8	26.5	22.7	10.6

Example Farm: NLE Results

BMP Scenario Landuse Loads

Landuse	N Load EOS (lbs/year)	N Load Delivered (lbs/year)	P Load EOS (lbs/year)	P Load Delivered (lbs/year)	Sediment Load EOS (tons/year)	Sediment Load Delivered (tons/year)
Animal Confinement Area	424.2	357.7	5	2.2	0.4	0.2
Unfertilized Grass	13.6	11.5	0	0	0.3	0.1
Alfalfa w/ Nutrient Mngmt	239.6	202.1	8.1	3.6	3.4	1.6
Row Crops w/ Nutrient Mngmt-Low Till	1198.1	1010.4	33.5	14.6	13.5	6.3
Pasture w/ Nutrient Mngmt	234.2	197.5	4.6	2	0.3	0.1
TOTAL	2109.8	1779.1	51.3	22.4	17.9	8.4

Example Farm: NLE Results

Load Reduction from Pre-BMP Load

N Load EOS (lbs/year)	N Load Delivered (lbs/year)	P Load EOS (lbs/year)	P Load Delivered (lbs/year)	Sediment Load EOS (tons/year)	Sediment Load Delivered (tons/year)
1089.6	918.9	9.4	4.1	4.8	2.3

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 (%)
34.1	34.1	15.5	15.5	21.3	21.3

Assumptions/Limitations

- Landuse loads in NLE represent the average loads from different landuses in a specific land-river segment
- Designed to give results similar to the Chesapeake Bay Phase 5.3 Watershed Model
- Currently can only be used within the Chesapeake Bay Watershed- use could be expanded if landuse loads were available

Questions?

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