Outcomes Estimation Tools Training Webinar Series

Michelle Perez, PhD
Water Initiative Director

Aysha Tapp Ross
Water & Soil Health Scientist

Kinzie Reiss
Ag Conservation Innovations Program & Communications Manager

Featuring: Pollution Load Estimation Tool (PLET)

October 4, 2023
Noon to 1:30 pm eastern

American Farmland Trust

Agenda

- Welcome, Poll (5 min)
- PLET Presentation (35 min)
- PLET Demonstration (35 min)
- Q&A (15 min)

Aysha

Zoom Webinar Reminders

- Use Q&A Box - last 15 minutes (Vote up!)
- Use Zoom Direct Message feature to Aysha if having technical difficulties
- Email with resources to follow each webinar
- Recordings posted on the webinar series site the following Monday
- **Evaluation survey in the Chat Box**
  - **Complete to be entered to win a $25 gift card!!**

Aysha

Time for 3 polls!

Kinzie

Tools in 2023 Trainings*

May 3: Webinar Launch & PCOC (recording)

June 7: Model My Watershed (recording)

July 12: Nutrient Tracking Tool (NTT) (recording)

August 2: NRCS Cover Crop Economics Tool (economic) (recording)

September 6: FieldPrint Platform (recording)

October 4: EPA PLET (water quality)

November 1: PTMApp Web Tool (water quality)

December 6: AFT Retrospective-Soil Health Economics (R-SHEC) Tool (economic)

Tools in 2024 Trainings*

January 10: SIPES Method/SIDMA Tool (social)

February 7: Fast-GHG (climate)

March 6: Cool Farm Tool (climate)

April 3: TBD

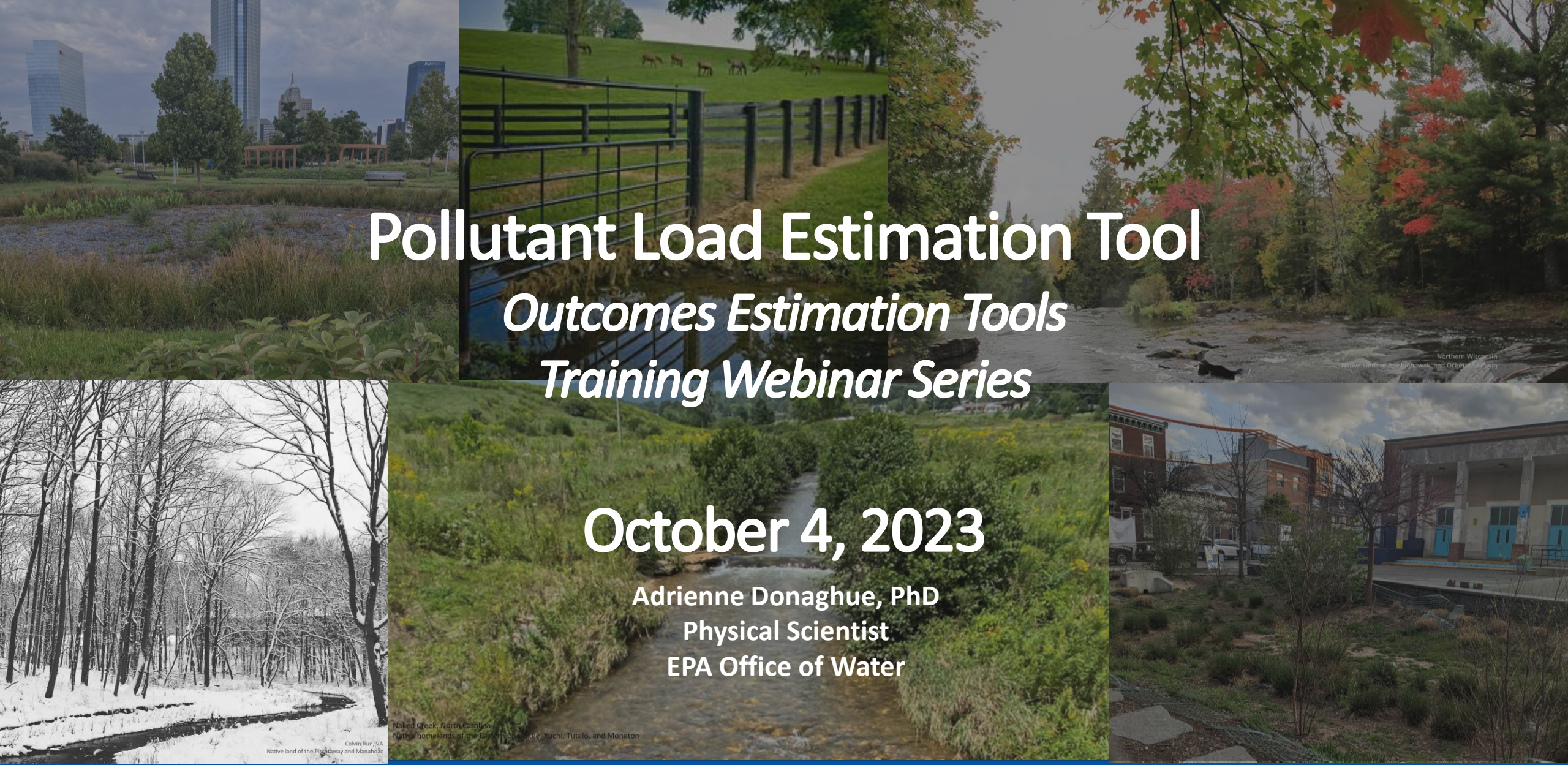
May 1: COMET-Farm & COMET-Planner (climate)

June 5: CAST Tool (water quality)

July 3: TBD

*Subject to change

Aysha



Pollutant Load Estimation Tool

Outcomes Estimation Tools Training Webinar Series

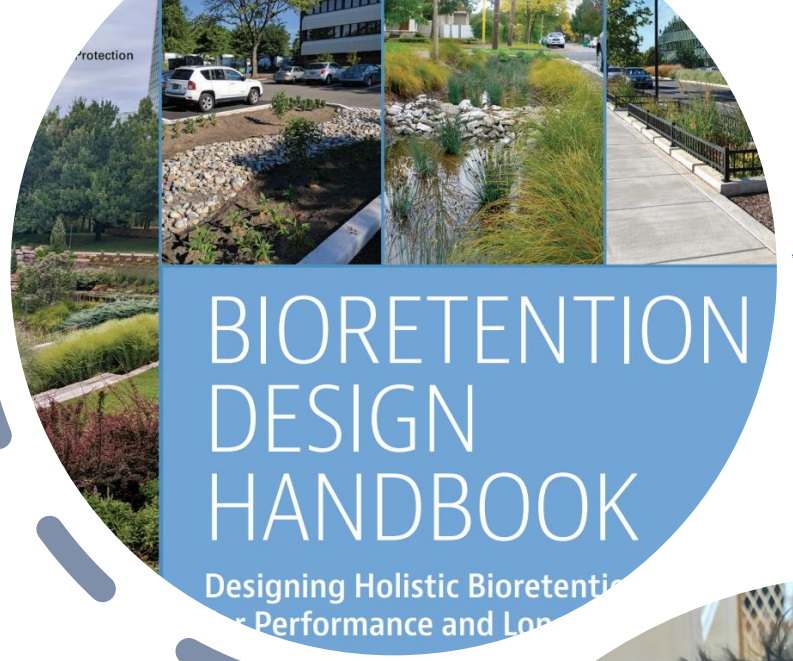
October 4, 2023

Adrienne Donaghue, PhD
Physical Scientist
EPA Office of Water

Presenter Background:

Adrienne Donaghue

- **Physical Scientist in the Nonpoint Source Management Branch within EPA's Office of Water**
- **Role:** PLET, urban & hydromodification NPS measures, and quantifying environmental co-benefits
- **Education**
  - BA in Civil and Environmental Engineering, Villanova University
  - MS in Water Resources and Environmental Engineering, Villanova University
  - PhD in Environmental Engineering, Temple University



Coming soon!

Agenda

- Tool Background
- Model Interface and Modules
- “Quick Guide” Demo
- Big picture

Agenda

Tool Background

- Describe the underlying structure, input data sources, strengths, and limitations

Model Interface and Modules

“Quick Guide” Demo

Big picture

Agenda

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- Describe the underlying structure, input data sources, strengths, and limitations

Model Interface and Modules

- Provide an overview of how to navigate the tool interface

“Quick Guide” Demo

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“Quick Guide” Demo

- Apply the PLET User Guide “Quick Guide” to an example scenario at the field and HUC12 scale
- Introduce the BMP calculator

Big picture

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“Quick Guide” Demo

- Apply the PLET User Guide “Quick Guide” to an example scenario at the field and HUC12 scale
- Introduce the BMP calculator

Big picture

- Showcase example of other project types
- Show where to learn more
- Highlight future updates

Tool Background

Pollutant Load Estimation Tool (PLET)

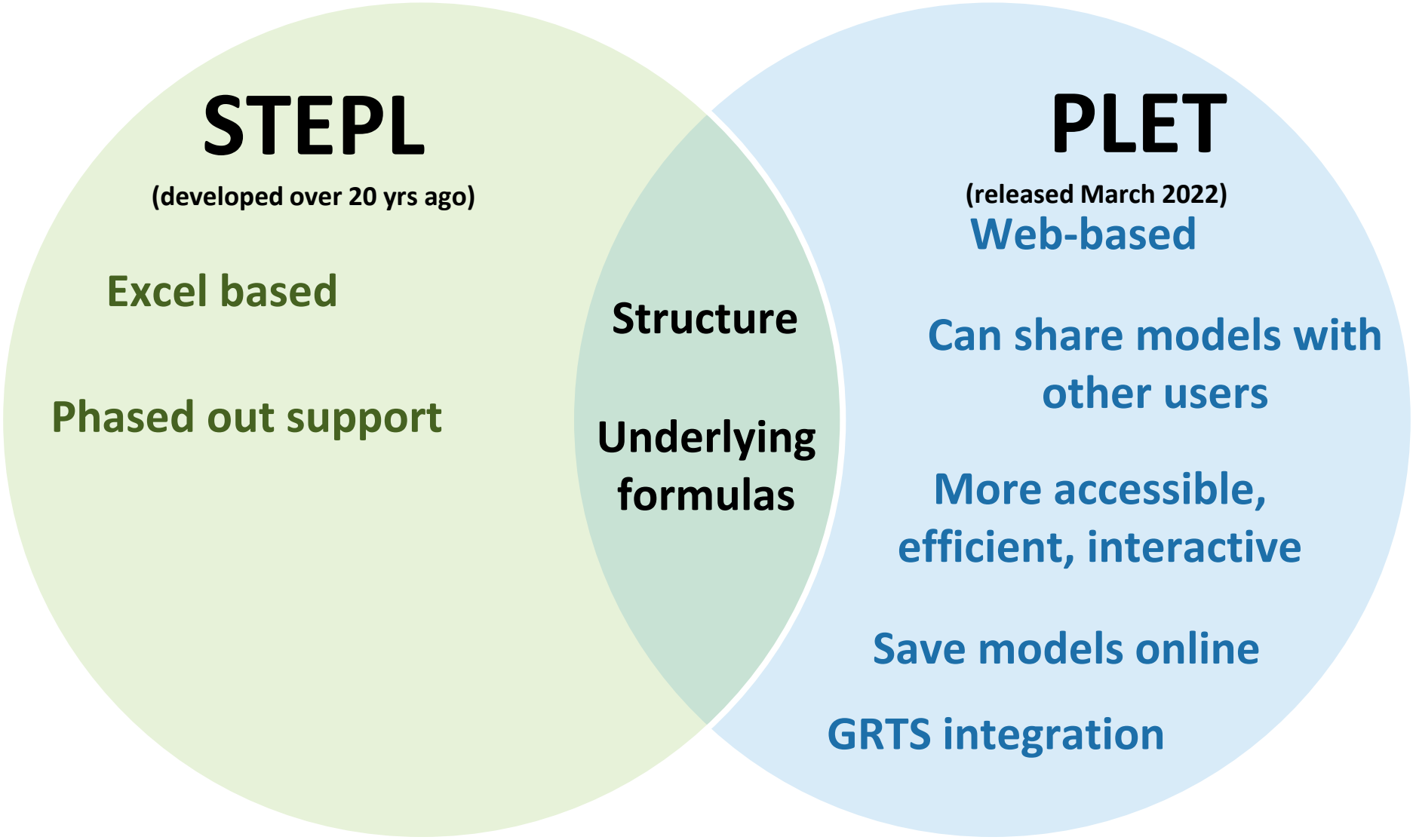
Web-based tool that ***estimates*** annual, long-term ***nutrient and sediment loads*** from cropland, pastureland, feedlots, forest and urban land uses and load reductions resulting from BMP implementation

Section 319 subgrantees, watershed planners, academics, conservation districts (30 different counties), and others

Report annual load reductions* and planning purposes (i.e. watershed-based plans)

*319 grant recipients report load reductions in the Grants Reporting and Tracking System (GRTS)

What is the difference between STEPL and PLET?



STEPL = Spreadsheet Tool for Estimating Pollutant Loads

PLET Snapshot Summary

Features	Description
Scale	Field, county level, and HUC12; multiple fields and HUC12s can be considered simultaneously
Outcomes	Long-term annual loads pre and post BMP implementation • Nitrogen, Phosphorus, Biological Oxygen Demand (BOD): **lbs/year** • Sediment: **tons/year** Volume Reductions • Applies to select urban BMPs: **gallons/year**
Conservation Practices	Includes more than 30 BMPs for Cropland and Pastureland such as: • Conservation tillage, contour farming, cover crops, nutrient management, critical area planting, rotational grazing, prescribed grazing, forest and grass buffers
Land uses	Cropland, Pastureland, Urban*, Forest, Feedlots, and User Defined *9 different urban land use types
Coverage	States and U.S. Territories (American Samoa, Guam, Puerto Rico)
Time and Data Demands	Simple Most inputs are auto populated for the HUC12 scale

PLET Strengths and Limitation

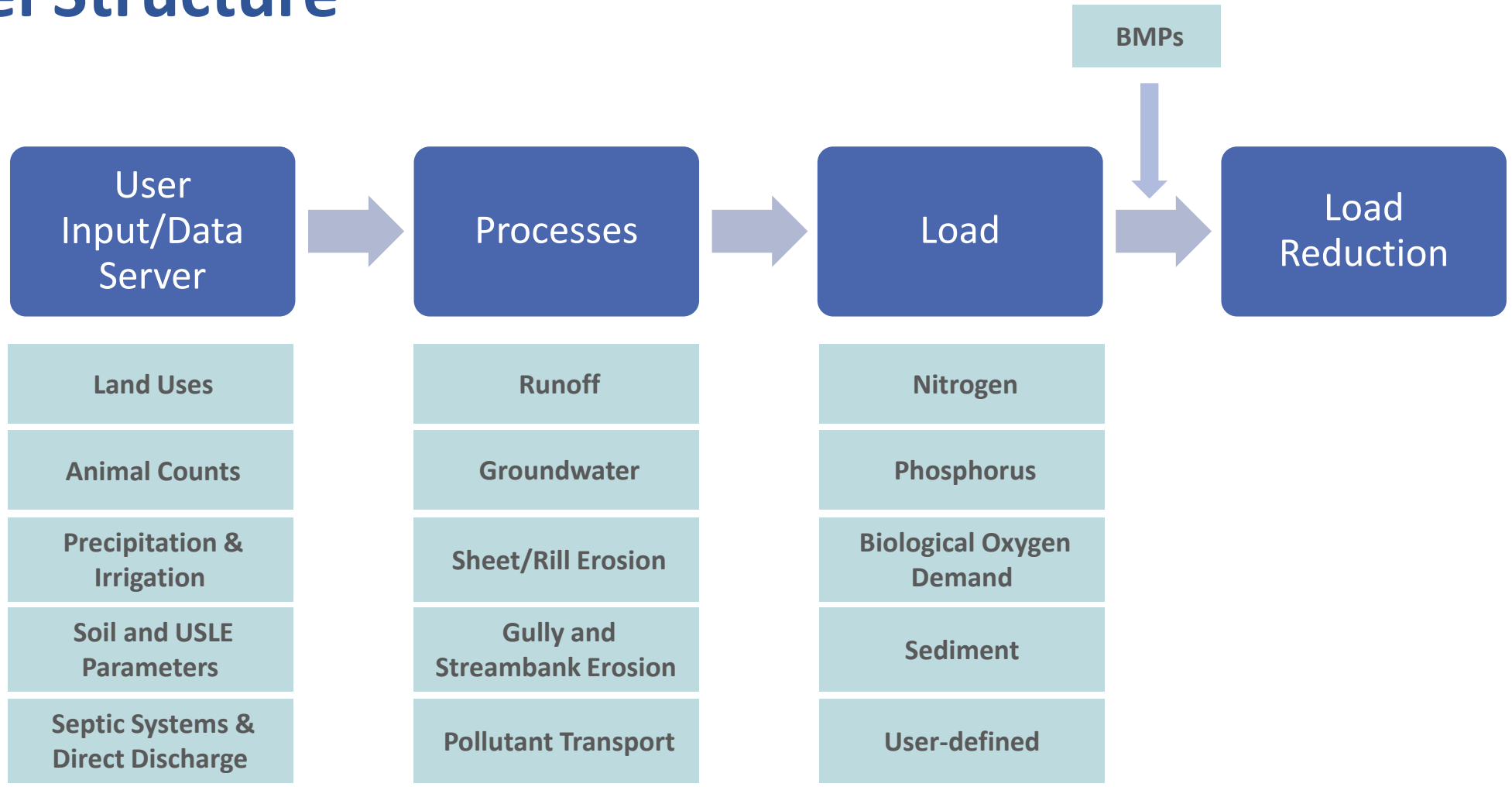
Strengths

- Appropriate for planning and screening level
- Share models with other users
- Include territories
- Customizable:
  - User-defined land use
  - Custom BMP
  - Combined BMP efficiencies (parallel and in series)
  - Other pollutants

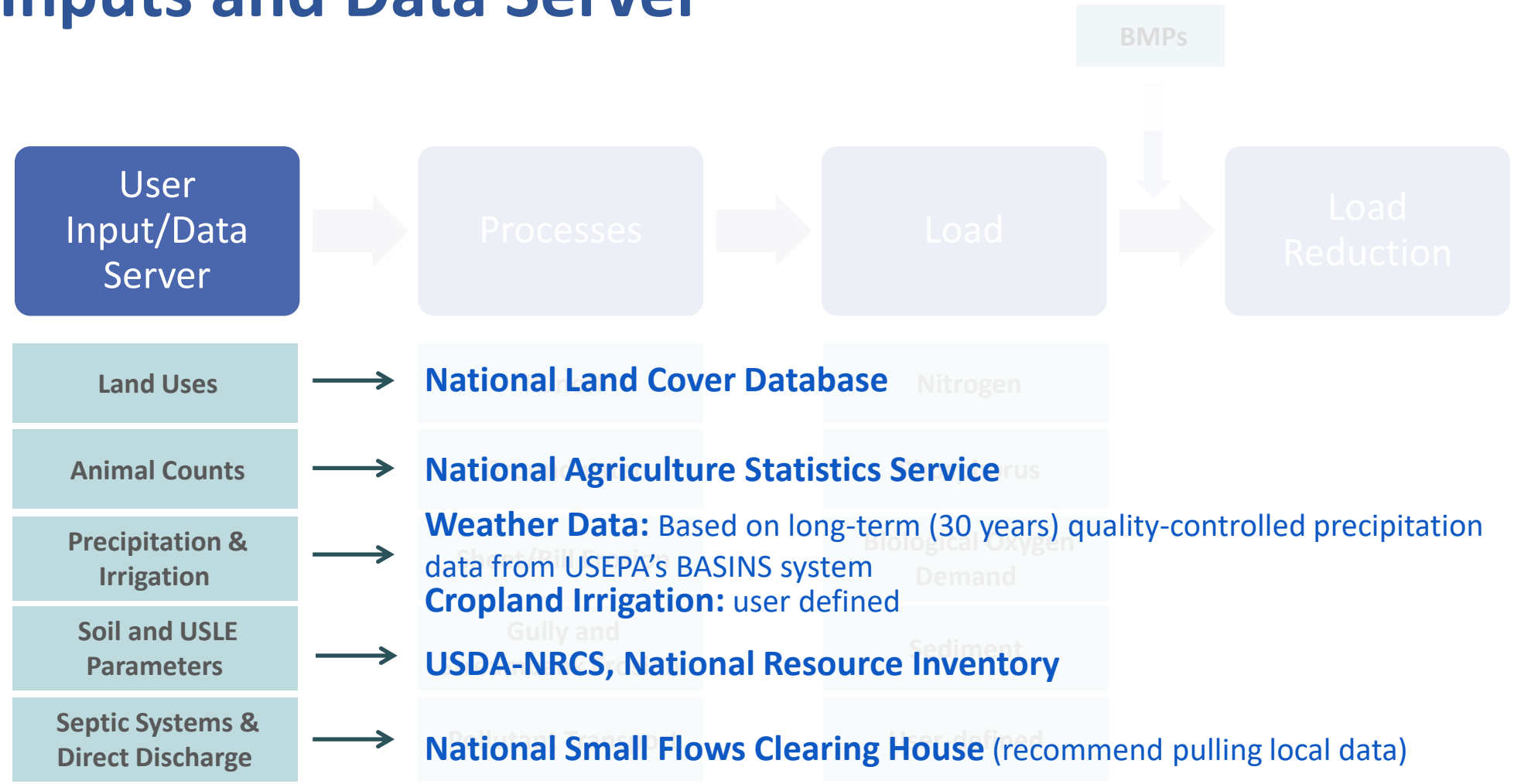
Limitations

- Does not include point sources
- Is a stand-alone web-based application
- Does not reflect subsurface flow of tile drains
- Not appropriate for design of BMPs
- For multiple HUC12, weather data is based on the primary watershed

Model Structure



User Inputs and Data Server



PLET Input Tab: Tables 1-5 populated based on selected HUC12

Pollutant Load Estimation Tool Help ▾ Logout (ADONAGHU)

Title: AFT Webinar Example Scenario | State: Pennsylvania | Watershed: 020503020402 (Halfmoon Creek) | Lookup | County: CENTRE | Weather Station: PHILIPSBURG 8 E

Share Model | Copy Model | Delete Model | Download Input Data Server Data | Exit

Rainfall Correction Factor: 0.8878 | Raindays Correction Factor: 0.5358 | Rainfall Initial Abstraction: 0

Add watershed | Delete watersheds | Gullies and Streambanks | Urban BMP Tool | Manure Application | BMP Calculator

Inputs | BMPs | **Total Loads** | Additional Reference Tables

Mandatory Inputs *NOTE: Required fields are highlighted in red* — Download Inputs

1. Watershed Land Use Area (ac) and Precipitation (in)

Double-click on the "HSG" field to select a Hydrologic Soil Group category [NOTE: hover over the "HSG" column header for more information].

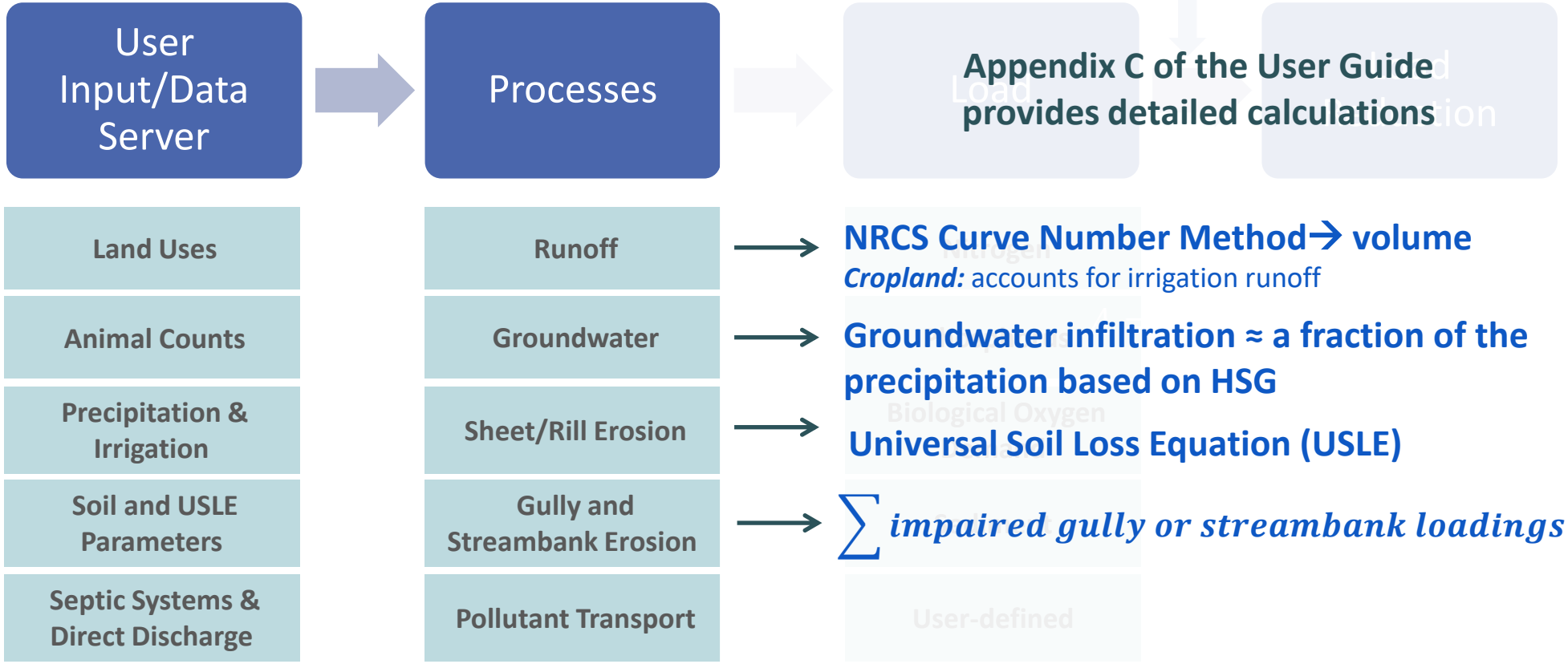
Watershed	HSG	Urban	Cropland	Pastureland	Forest	User Defined	Feedlots	Total	Feedlots Percent Paved	Annual Rainfall	Rain Days	Average Rain/Event
020503020402 - Halfmoon Creek	B	1159.79	2729.45	2668.73	8694.97	0.00	1000.00	16252.94	0-24%	41.83	120.43	0.5756

2. Agricultural Animals (Animal Count)

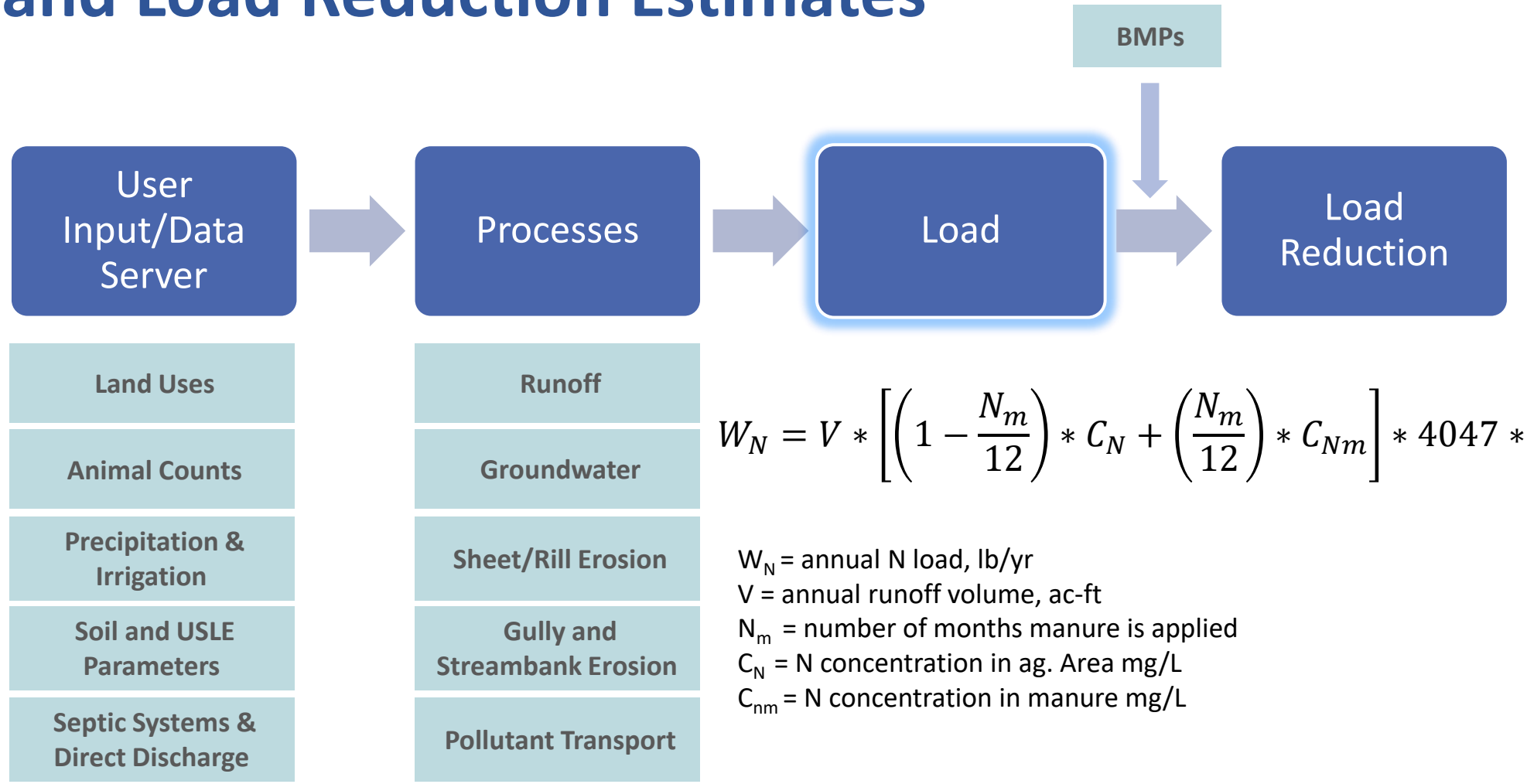
Watershed	Beef Cattle	Young Beef	Dairy Cattle	Young Dairy Stock	Swine (Hog)	Feeder Pig	Sheep	Horse	Chicken	Turkey	Duck	# Of Months Manure Applied to Cropland	# Of Months Manure Applied to Pastureland
020503020402 - Halfmoon Creek	827.00	0.00	472.00	0.00	314.00	0.00	75.00	137.00	1158.00	87.00	12.00	0.00	0.00

Values in red = required

Processes and Calculations



Load and Load Reduction Estimates



$$W_N = V * \left[\left(1 - \frac{N_m}{12}\right) * C_N + \left(\frac{N_m}{12}\right) * C_{Nm}\right] * 4047 * \frac{0.3048}{454}$$

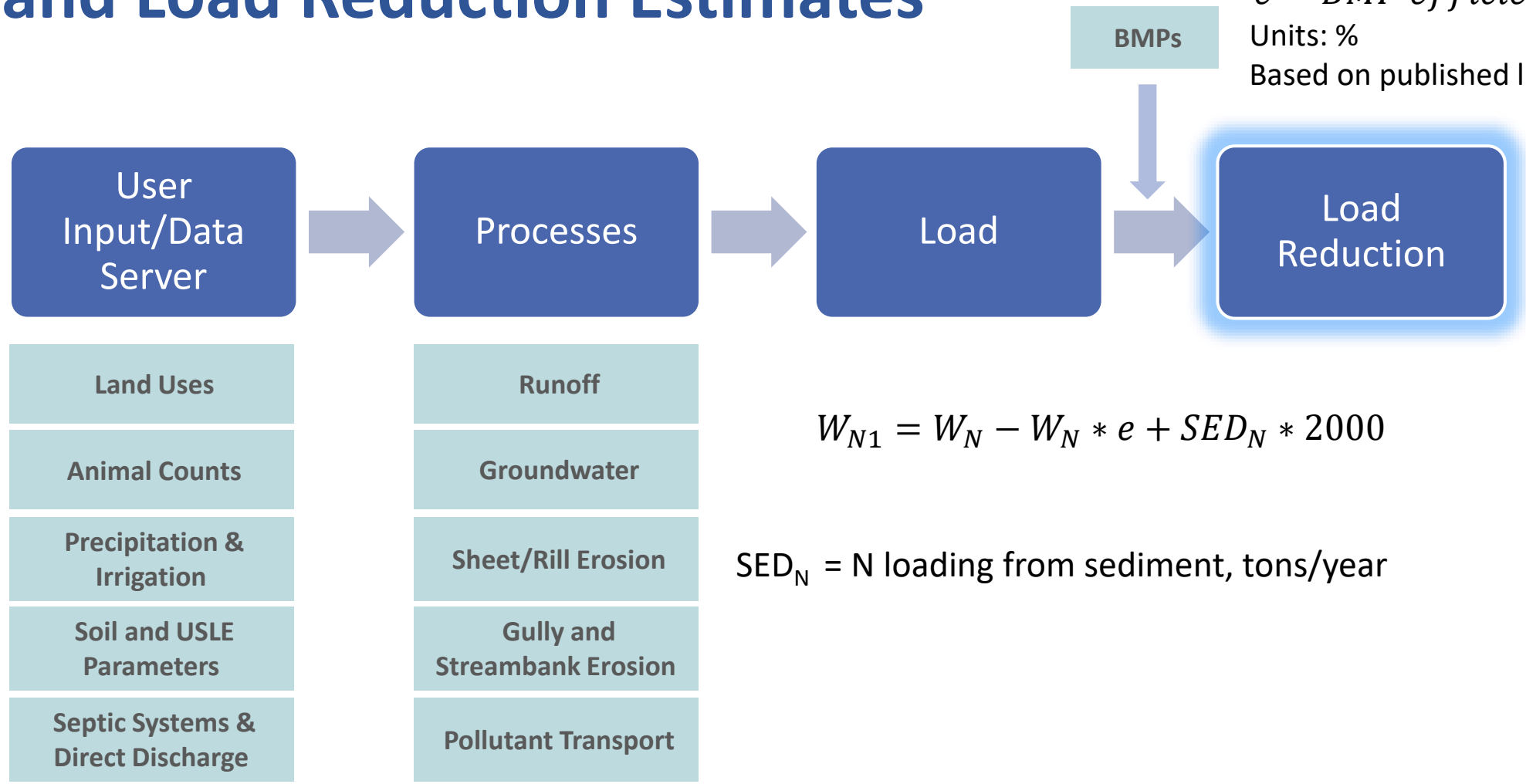
W_N = annual N load, lb/yr
V = annual runoff volume, ac-ft
N_m = number of months manure is applied
C_N = N concentration in ag. Area mg/L
C_{nm} = N concentration in manure mg/L

Load and Load Reduction Estimates

$e = BMP\ efficiency$

Units: %

Based on published literature



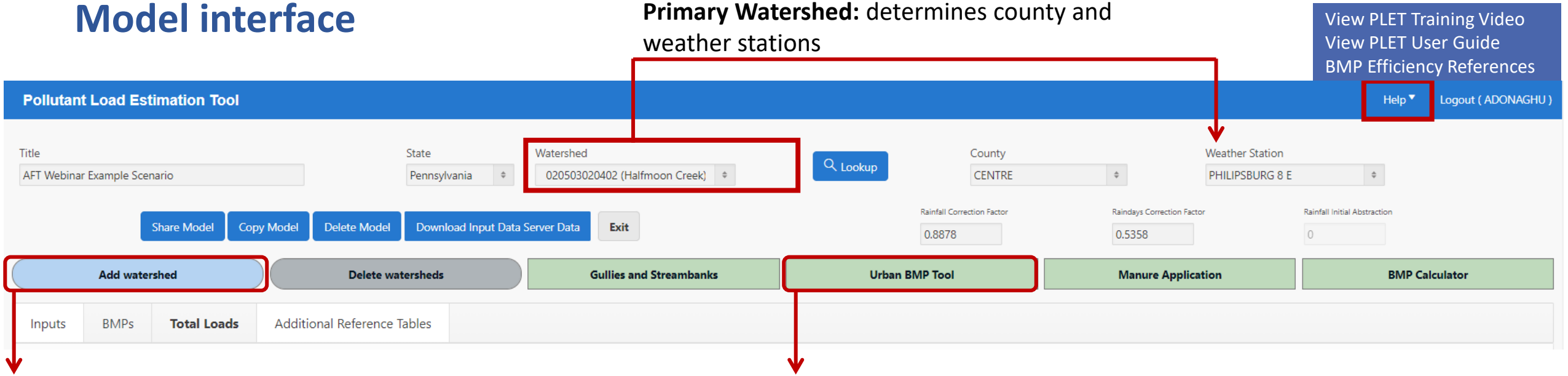
$$W_{N1} = W_N - W_N * e + SED_N * 2000$$

SED_N = N loading from sediment, tons/year

Model Interface & Modules

Model interface

Primary Watershed: determines county and weather stations

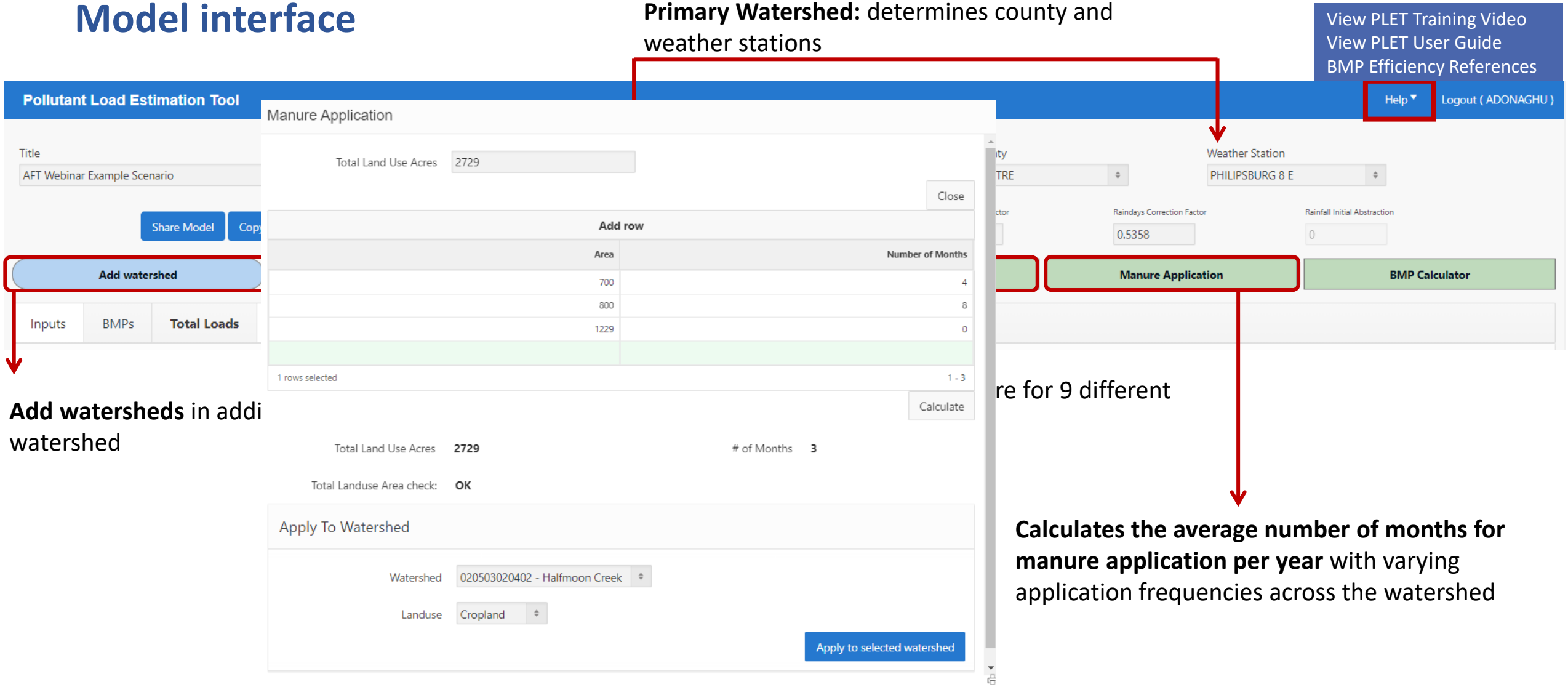


Add watersheds in addition to primary watershed

Add urban BMPs here for 9 different land use type

Model interface

Primary Watershed: determines county and weather stations



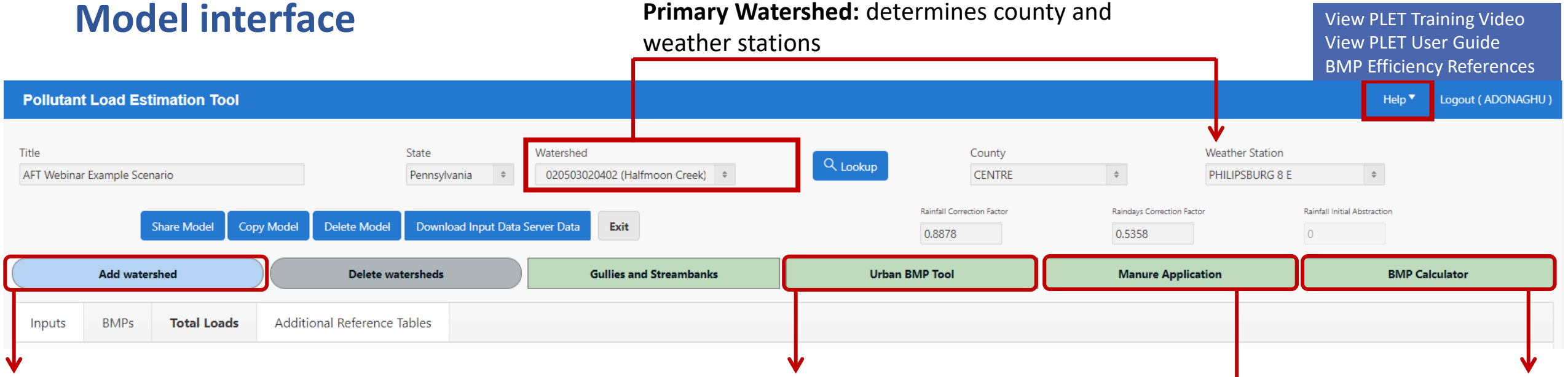
Add watersheds in addi watershed

re for 9 different

Calculates the average number of months for manure application per year with varying application frequencies across the watershed

Model interface

Primary Watershed: determines county and weather stations



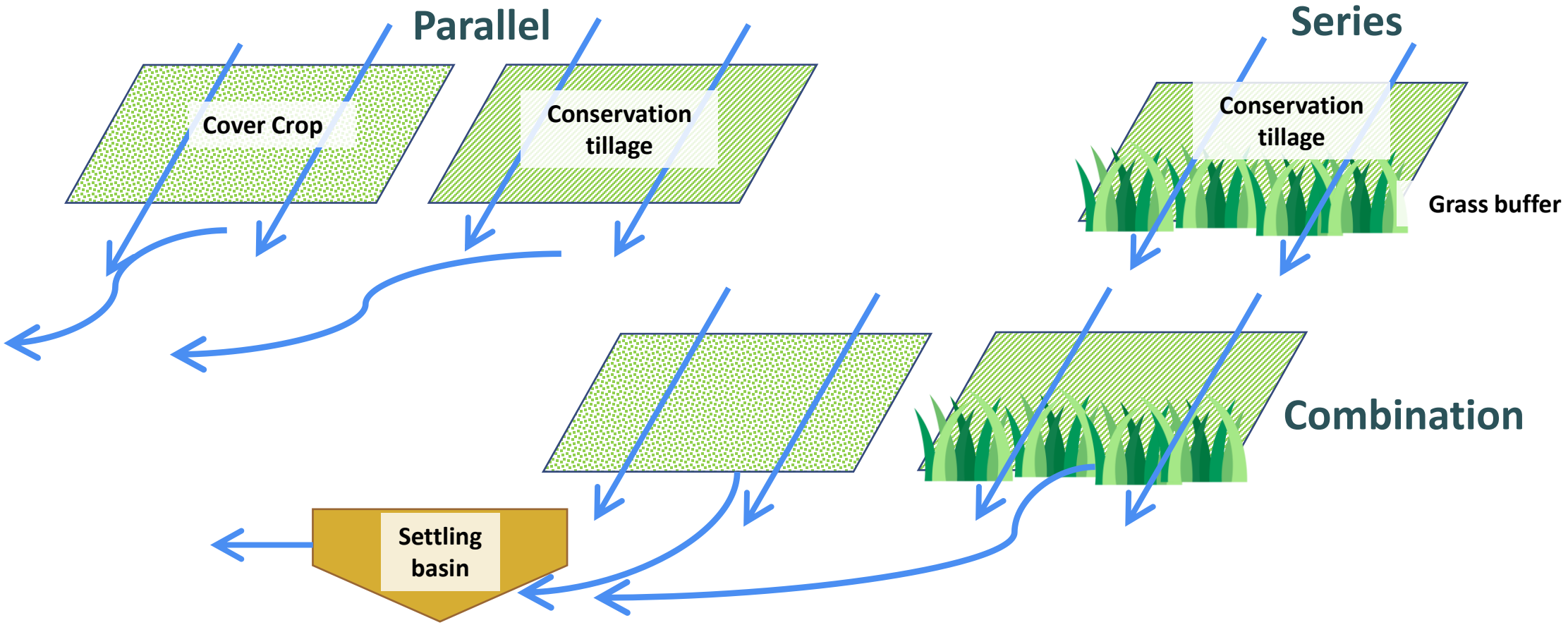
Add watersheds in addition to primary watershed

Add urban BMPs here for 9 different land use type

Calculates combined BMP efficiency to account for multiple BMPs on a single land use

Calculates the average number of months for manure application per year with varying application frequencies across the watershed

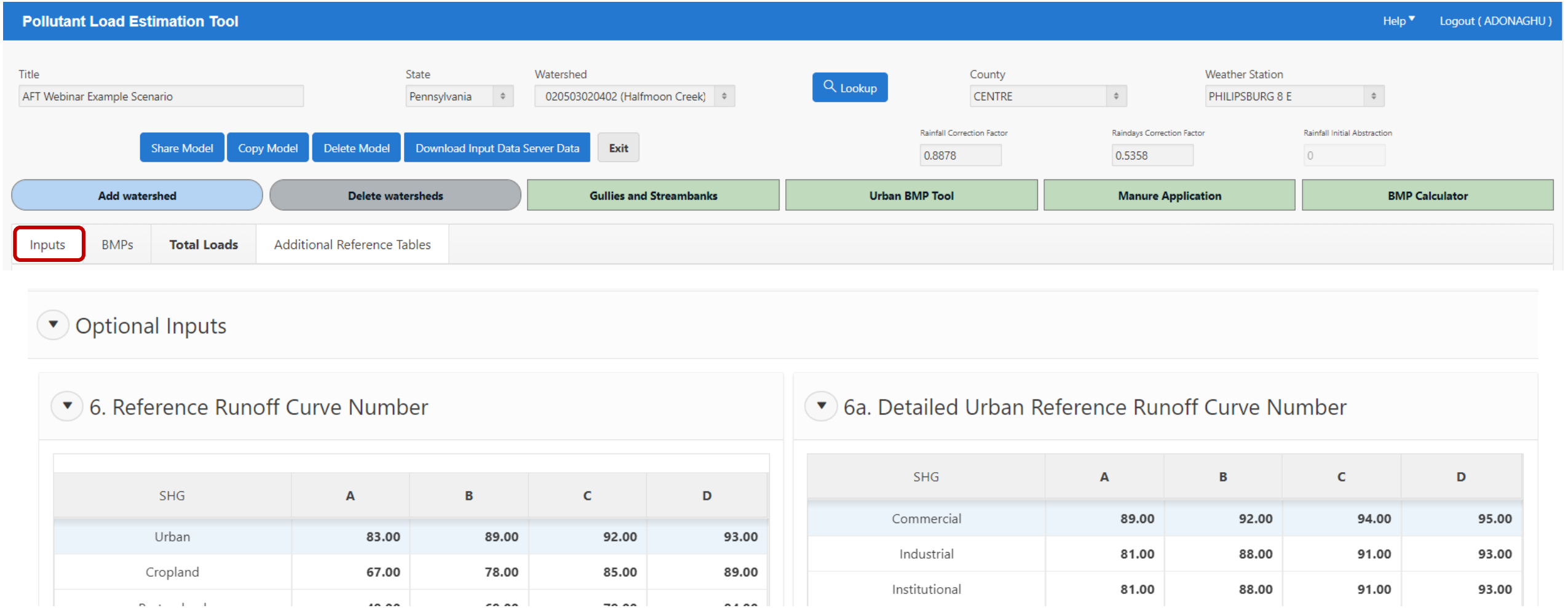
Multiple BMPs applied to one land use can be configured in *parallel*, *series*, or a *combination*



Inputs Module

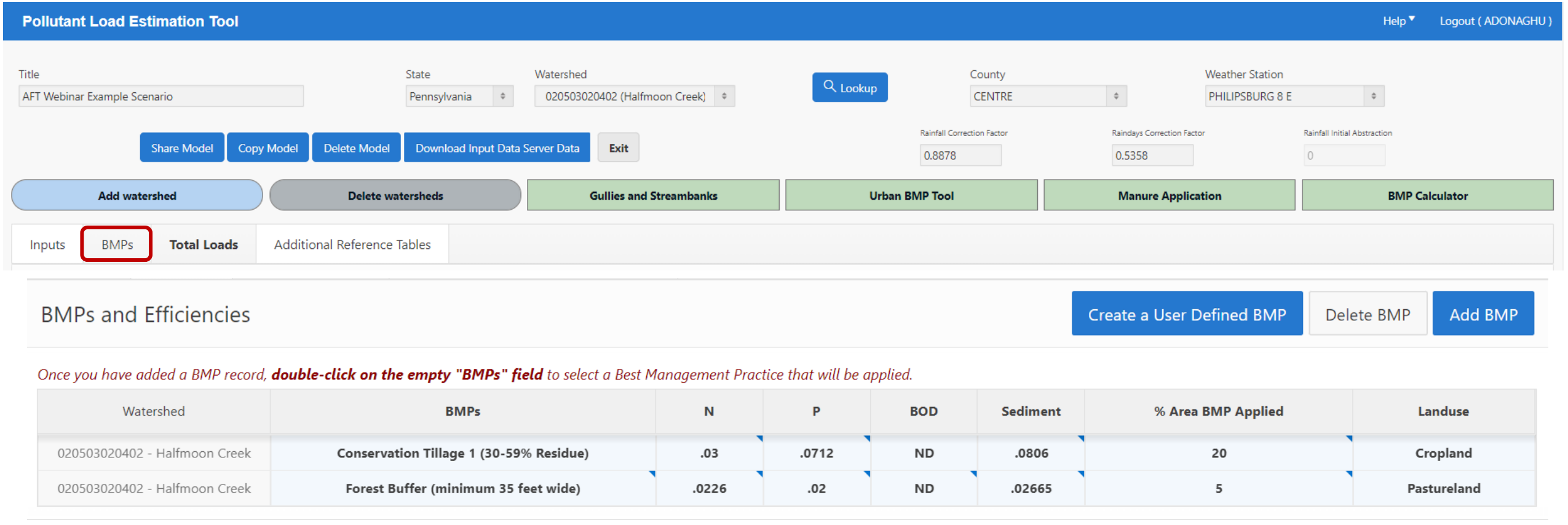
There are 10 input tables

- Tables 1-5 are populated based on input server data
- Tables 6 – 10 are default values
- All values can be customized



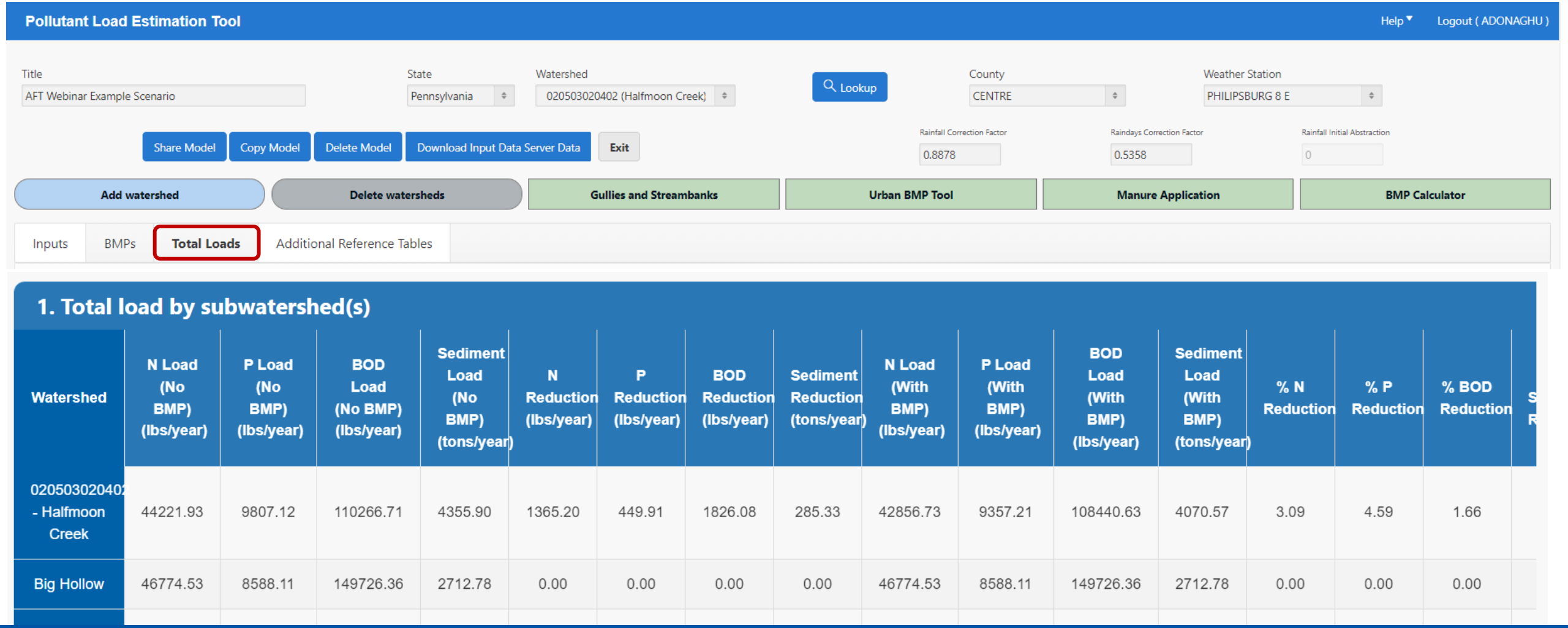
BMPs module

- Provides a single table where the BMPs are entered for all watersheds
- All land uses are included in the BMPs module (expect urban): cropland, feedlots, pasture, forest, and user-defined



Total Loads module

Shows the final results of the modeled calculations in terms of watershed pollutant loads and load reduction from BMPs

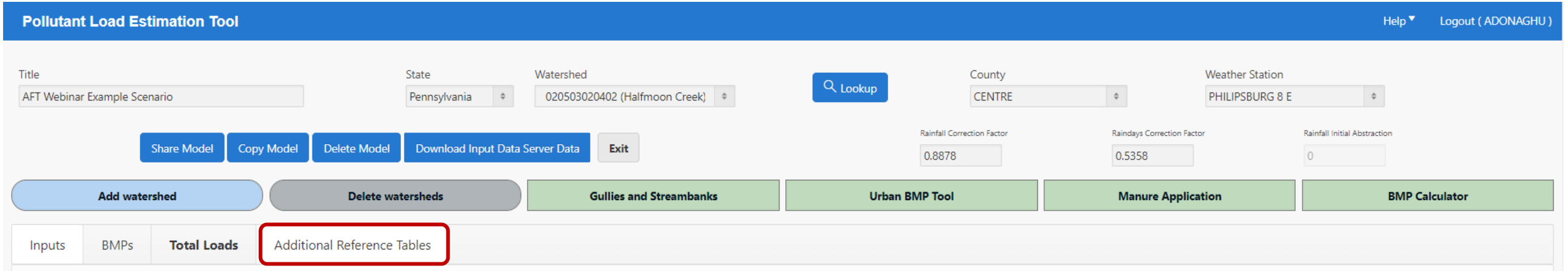


1. Total load by subwatershed(s)

Watershed	N Load (No BMP) (lbs/year)	P Load (No BMP) (lbs/year)	BOD Load (No BMP) (lbs/year)	Sediment Load (No BMP) (tons/year)	N Reduction (lbs/year)	P Reduction (lbs/year)	BOD Reduction (lbs/year)	Sediment Reduction (tons/year)	N Load (With BMP) (lbs/year)	P Load (With BMP) (lbs/year)	BOD Load (With BMP) (lbs/year)	Sediment Load (With BMP) (tons/year)	% N Reduction	% P Reduction	% BOD Reduction	S R
020503020402 - Halfmoon Creek	44221.93	9807.12	110266.71	4355.90	1365.20	449.91	1826.08	285.33	42856.73	9357.21	108440.63	4070.57	3.09	4.59	1.66	
Big Hollow	46774.53	8588.11	149726.36	2712.78	0.00	0.00	0.00	0.00	46774.53	8588.11	149726.36	2712.78	0.00	0.00	0.00	

Additional references module

Provides default values used in calculations in conjunction with input data to determine loads



1. animal weights used to calculate animal equivalent units
2. soil infiltration rates
3. feedlot nutrient ratios
4. septic overcharge pollutant concentrations reaching streams
5. wastewater nutrients and volume
6. BMP efficiency values

“Quick Guide” Demo

Getting started is easy…

- Visit the PLET landing page
  - https://epa.gov/nps/plet
- Scroll down to the "**Model Documentation**" section and click "**Link to PLET**"
- Enter your email to create an account

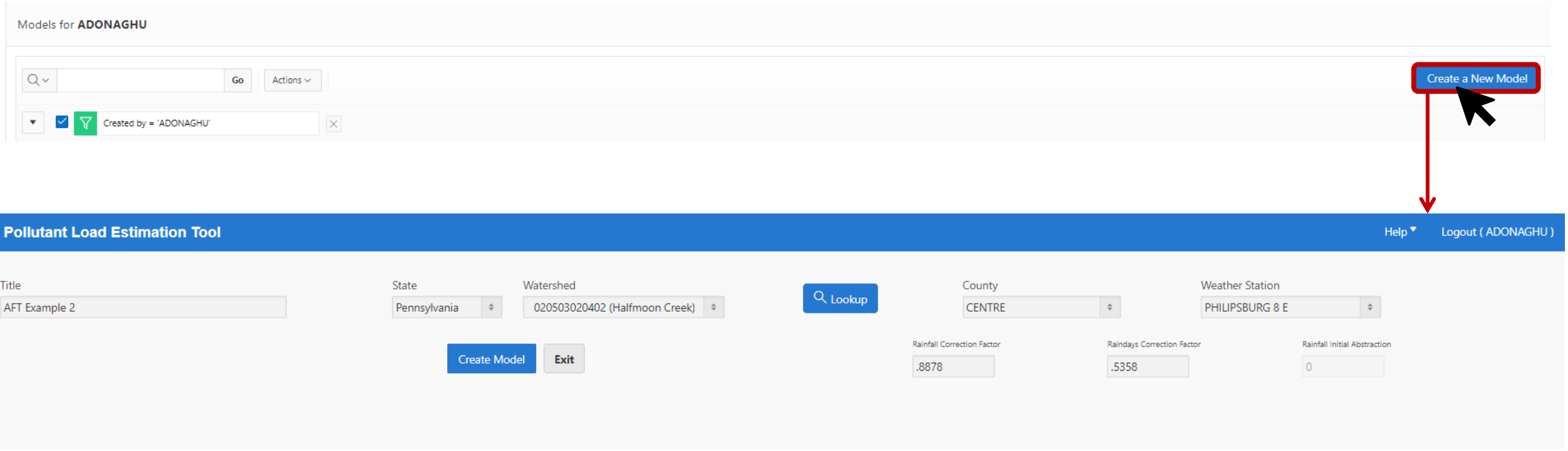
Create a new model

Model Documentation

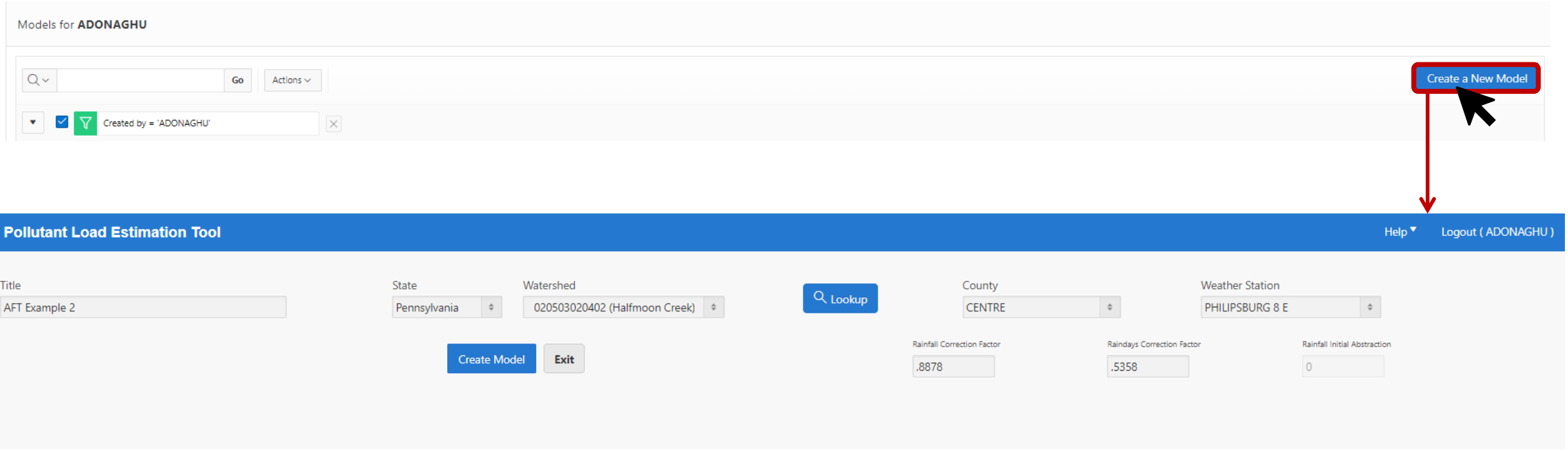
PLET Version 1.0

- Link to PLET
- User's Guide: Pollutant Load Estimation Tool (PLET) version 1.0 (pdf) (6.34 MB, April 2022)
  508 compliant user guide for the pollutant load estimation tool.
- BMP Descriptions (pdf) (3.48 MB, April 2023)
  This document provides definitions for best management practice (BMPs) used in the Pollutant Load Estimation Tool (PLET).

Step 1: Access the PLET model interface and click on the Create a New Model button in the upper right-hand corner



Step 2: Name the model and select the state where the modeled area is located and the primary watershed



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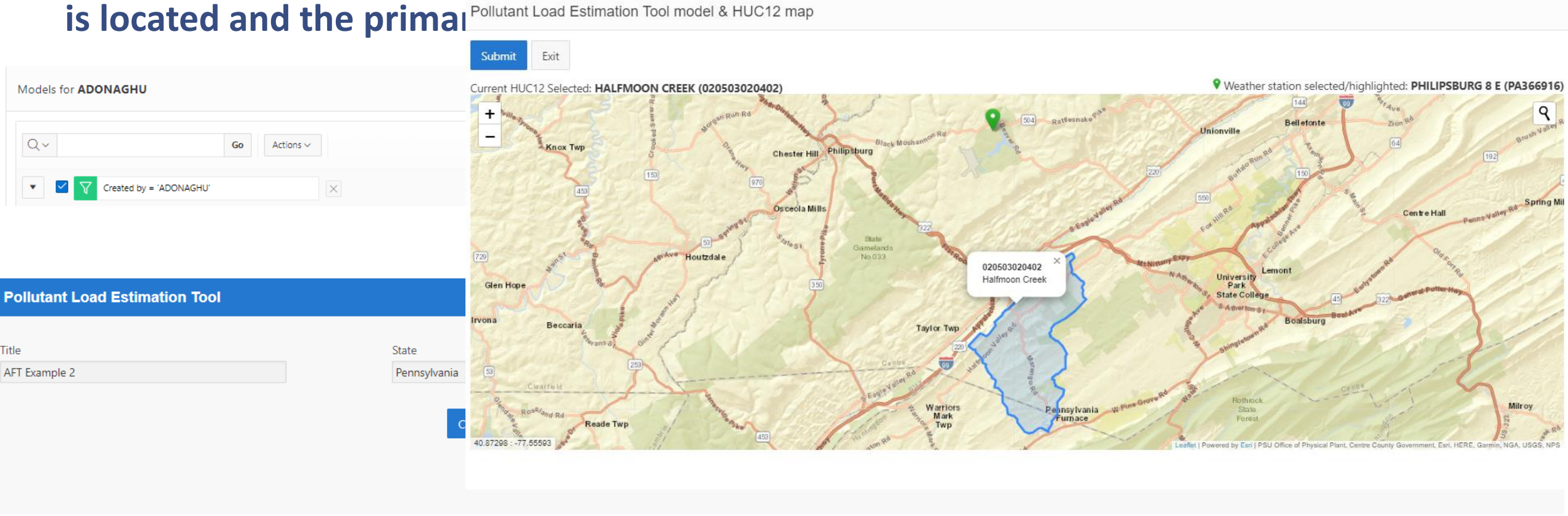

Step 3: Add as many watersheds or modeled areas as needed for the scenario.

Title: AFT Webinar Example Scenario | State: Pennsylvania | Watershed: 020503020402 (Halfmoon Creek) | Lookup | County: CENTRE | Weather Station: PHILIPSBURG 8 E

Share Model | Copy Model | Delete Model | Download Input Data Server Data | Exit

Rainfall Correction Factor: 0.8878 | Raindays Correction Factor: 0.5358 | Rainfall Initial Abstraction: 0

Add watershed | Delete watersheds | Gullies and Streambanks | Urban BMP Tool | Manure Application | BMP Calculator

Inputs | BMPs | **Total Loads** | Additional Reference Tables

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020503020402 - Halfmoon Creek	B	1159.79	2729.45	2668.73	8694.97	0.00	1.21	15254.1549	0-24%	41.83	120.43	0.5756
Big Hollow	B	5116.40	1192.26	1448.90	3170.46	0.00	0.64	10928.6561	0-24%	41.83	120.43	0.5756

2. Agricultural Animals (Animal Count)

Watershed	Beef Cattle	Young Beef	Dairy Cattle	Young Dairy Stock	Swine (Hog)	Feeder Pig	Sheep	Horse	Chicken	Turkey	Duck	# Of Months Manure Applied to Cropland	# Of Months Manure Applied to Pastureland
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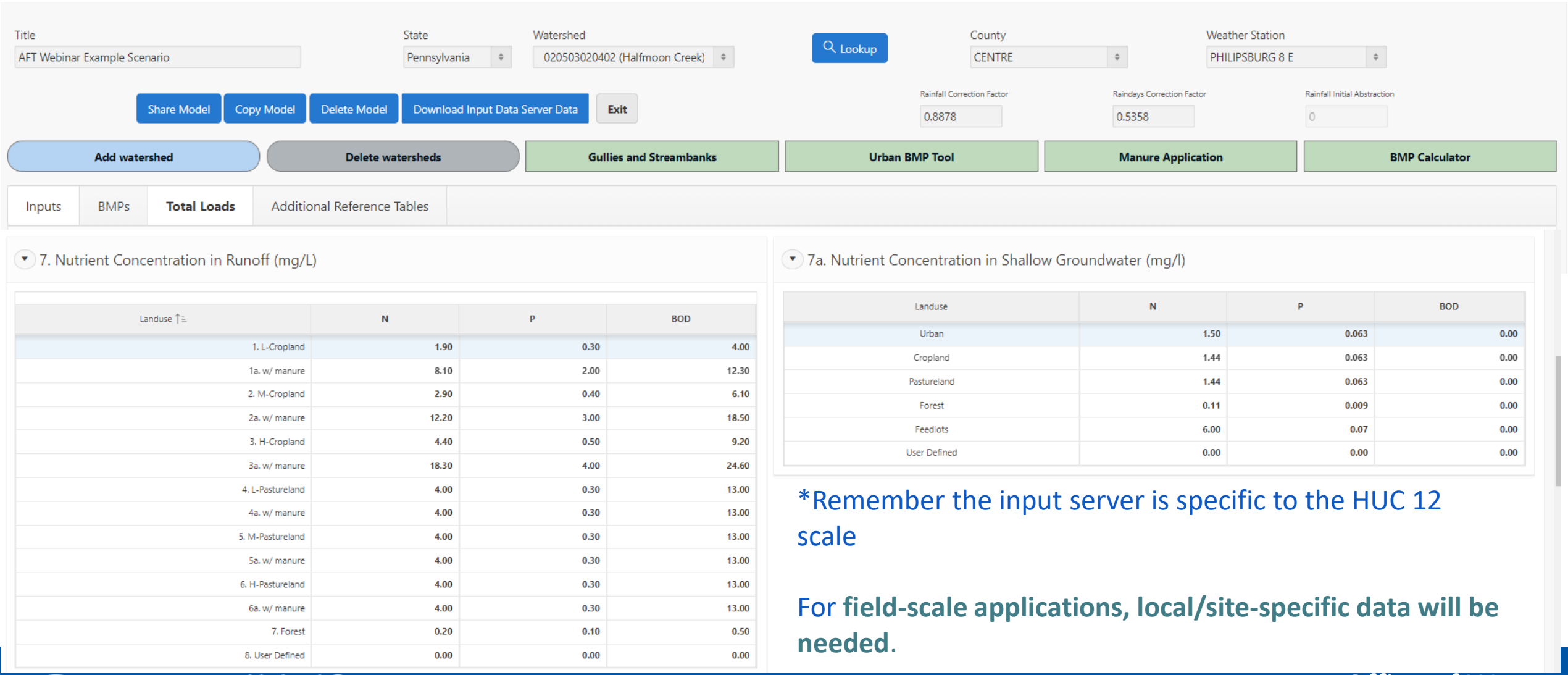
Big Hollow	445.00	0.00	254.00	0.00	159.00	0.00	40.00	76.00	276.00	0.00	7.00	0.00	0.00

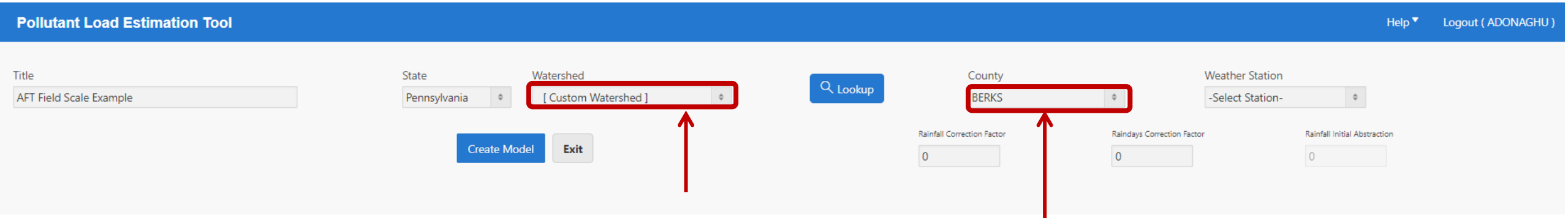
Step 4-7: If detailed information* is available, modify inputs in tables 1-10 as needed.



*Remember the input server is specific to the HUC 12 scale

For **field-scale applications, local/site-specific data will be needed**.

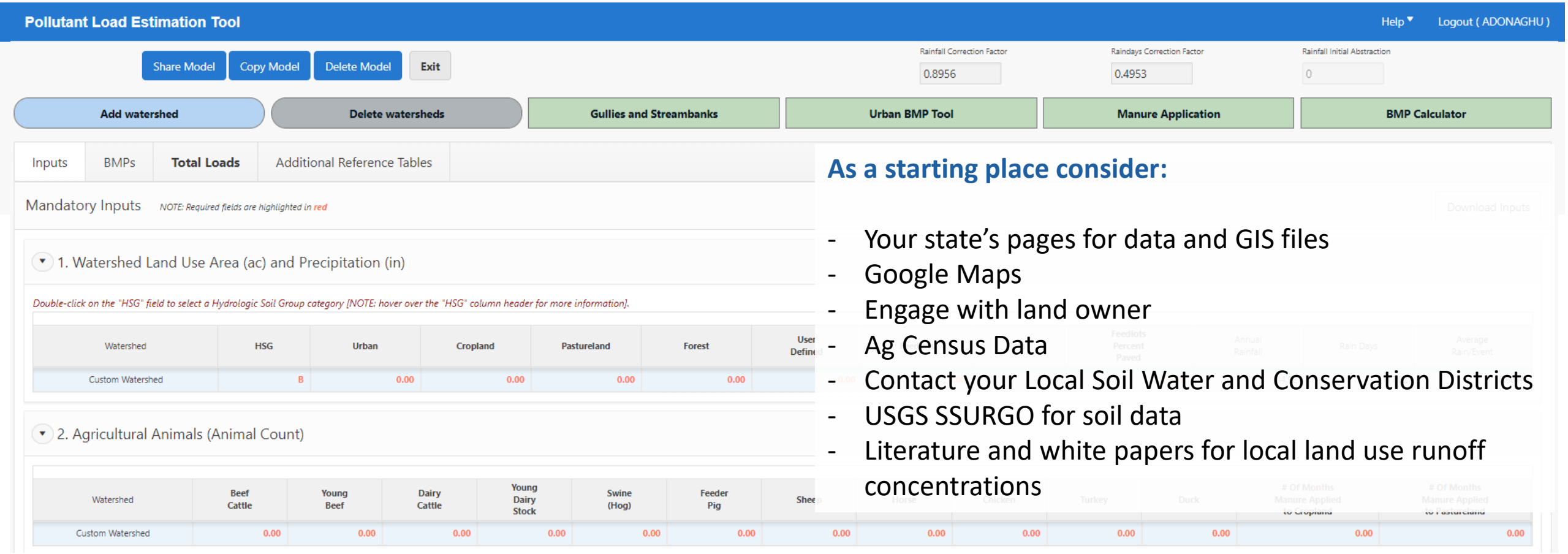
Step 4-7: For scales smaller than a HUC12 scale, user can add a “custom watershed”.



Select custom watershed

Select county and closet weather station to determine rain data

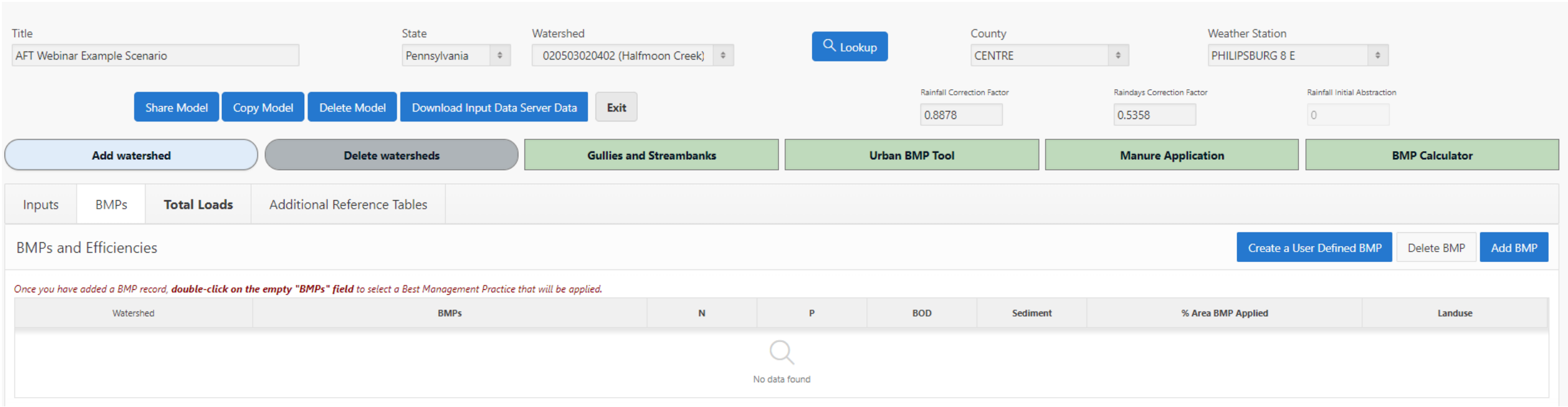
Step 4-7: User will need to collect necessary data to populate required data fields.



As a starting place consider:

- Your state's pages for data and GIS files
- Google Maps
- Engage with land owner
- Ag Census Data
- Contact your Local Soil Water and Conservation Districts
- USGS SSURGO for soil data
- Literature and white papers for local land use runoff concentrations

Step 8: Add best management practices (BMPs) to the model scenario.



Example Scenario:

Cropland Total Acreage: 2729

4 BMPs Implemented:

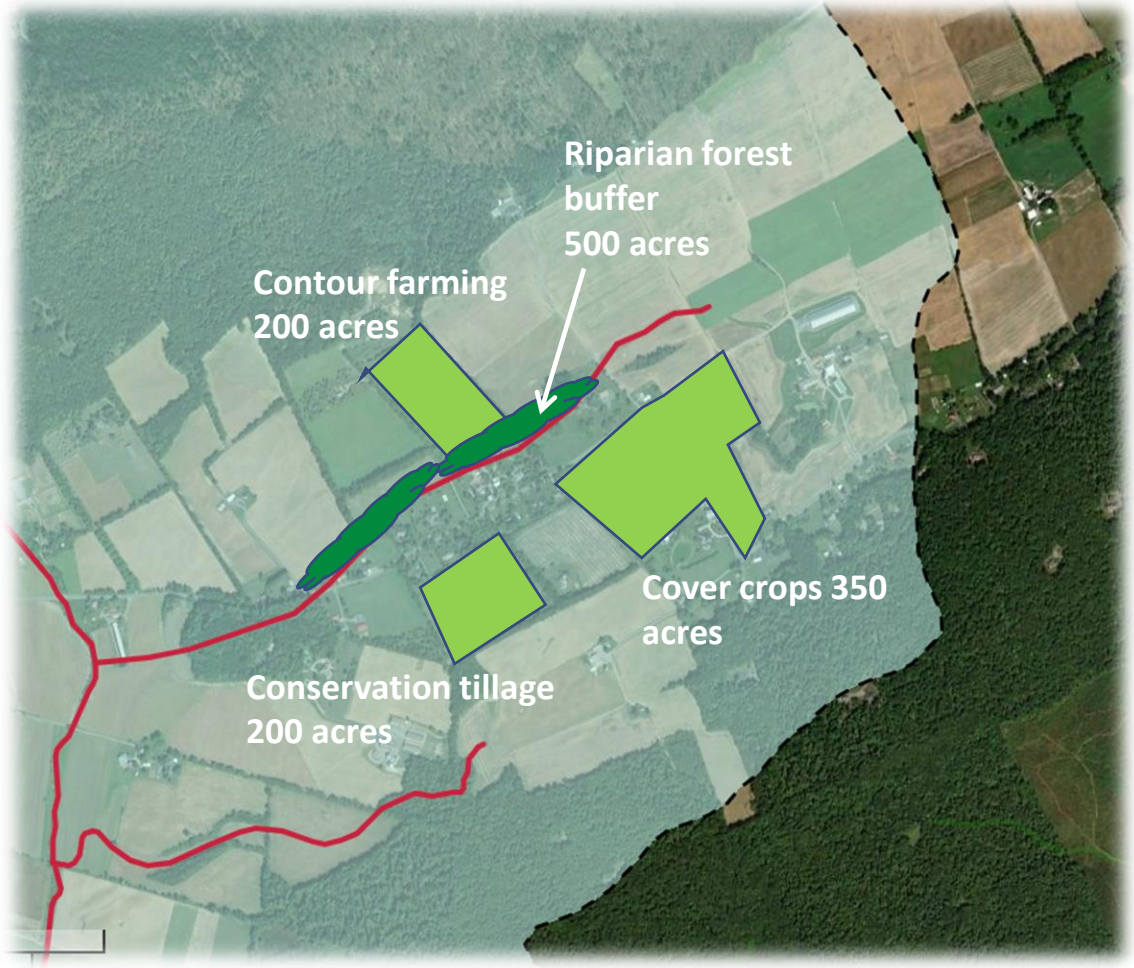
350 acres of cover crops

200 acres of conservation tillage

500 acres treated by Riparian Forest Buffer

200 acres of contour farming

$$\frac{1{,}050}{2{,}729} = 38\%$$



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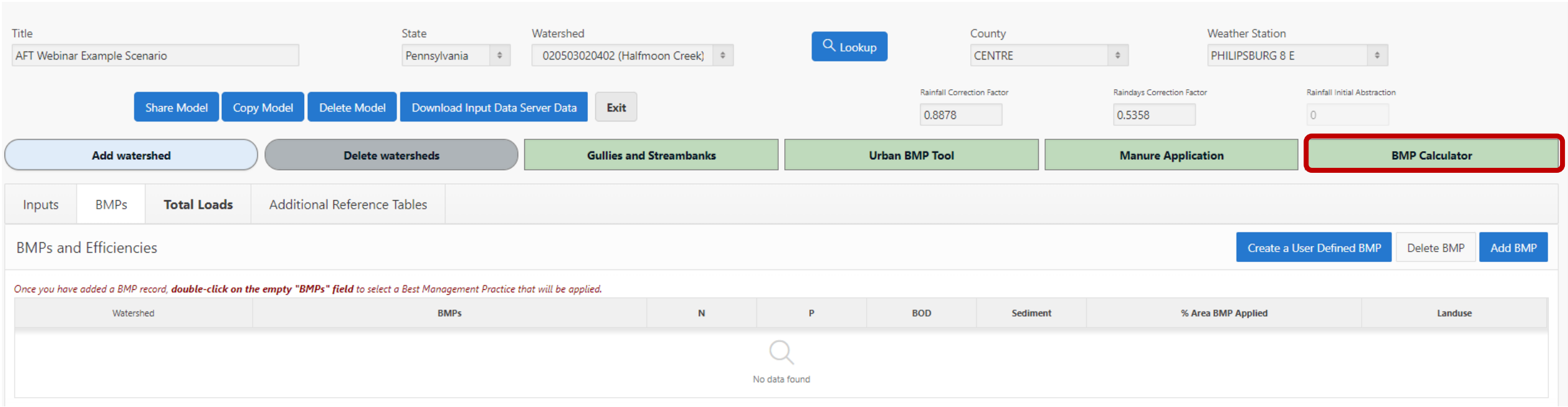
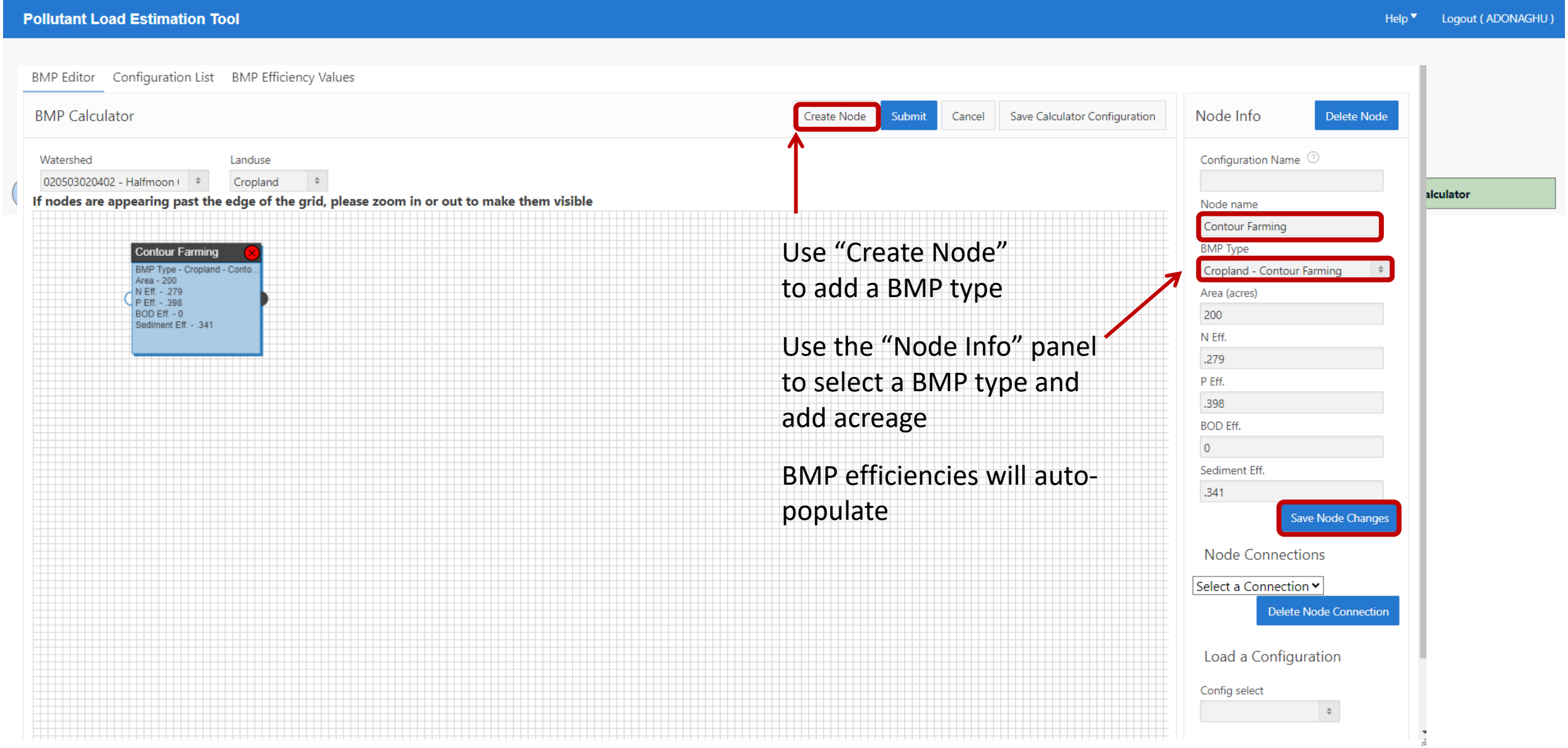



Pollutant Load Estimation Tool
Help
Logout (ADONAGHU)
BMP Editor
Configuration List
BMP Efficiency Values
BMP Calculator
Create Node
Submit
Cancel
Save Calculator Configuration
Node Info
Delete Node
Watershed
020503020402 - Halfmoon
Landuse
Cropland
If nodes are appearing past the edge of the grid, please zoom in or out to make them visible
Contour Farming
BMP Type - Cropland - Conto...
Area - 200
N Eff. - .279
P Eff. - .398
BOD Eff. - 0
Sediment Eff. - .341
Use “Create Node” to add a BMP type
Use the “Node Info” panel to select a BMP type and add acreage
BMP efficiencies will auto-populate
Configuration Name
Node name
Contour Farming
BMP Type
Cropland - Contour Farming
Area (acres)
200
N Eff.
.279
P Eff.
.398
BOD Eff.
0
Sediment Eff.
.341
Save Node Changes
Node Connections
Select a Connection
Delete Node Connection
Load a Configuration
Config select

BMP Editor | Configuration List | BMP Efficiency Values

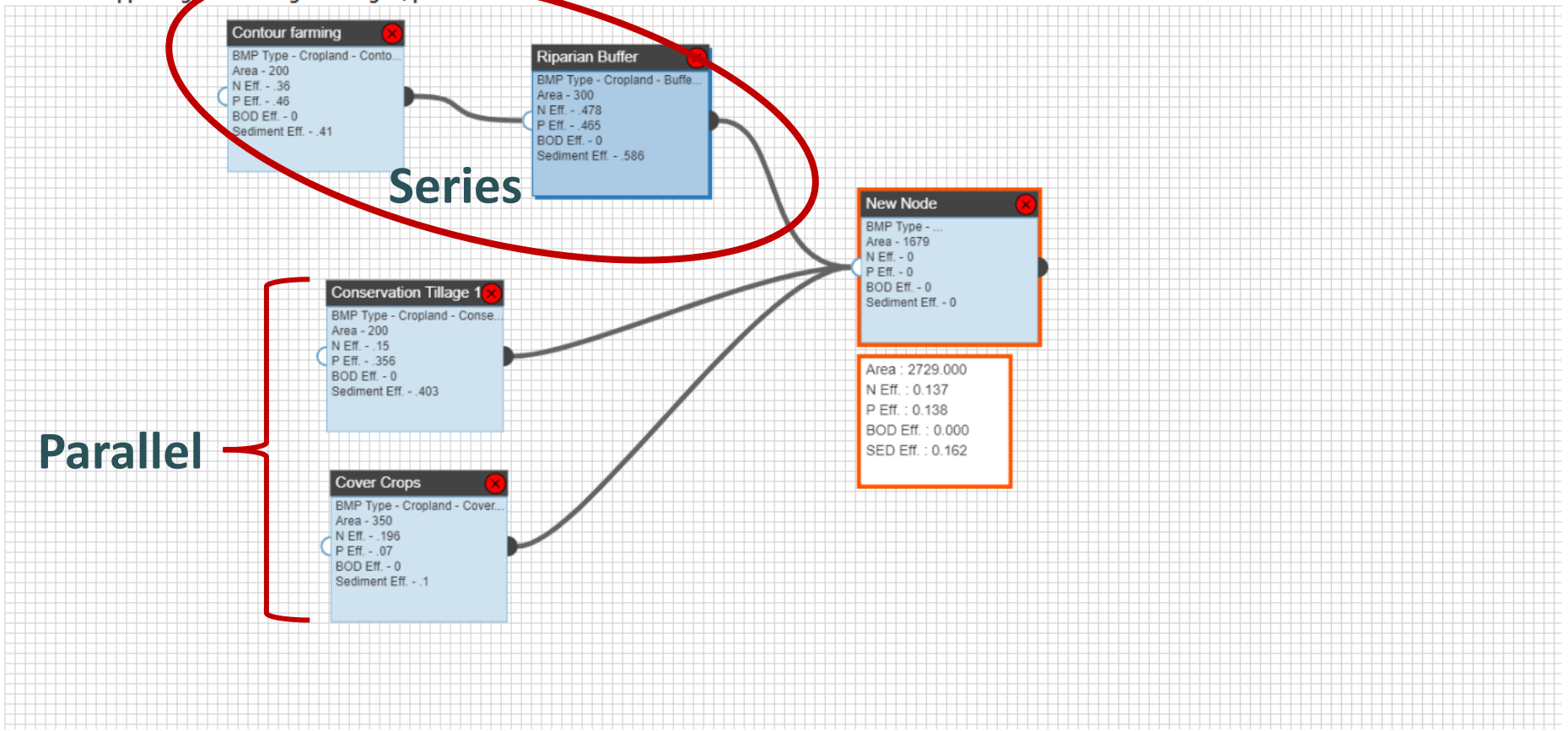
BMP Calculator

Create Node | Submit | Cancel | Save Calculator Configuration

Watershed: 020503020402 - Halfmoon (

Landuse: Cropland

If nodes are appearing past the edge of the grid, please zoom in or out to make them visible



Node Info | Delete Node

Configuration Name: AFT Example

Node name: Riparian Buffer

BMP Type: Cropland - Buffer - Forest (100ft

Area (acres): 300

N Eff.: .478

P Eff.: .465

BOD Eff.: 0

Sediment Eff.: .586

Save Node Changes

Node Connections

Select a Connection

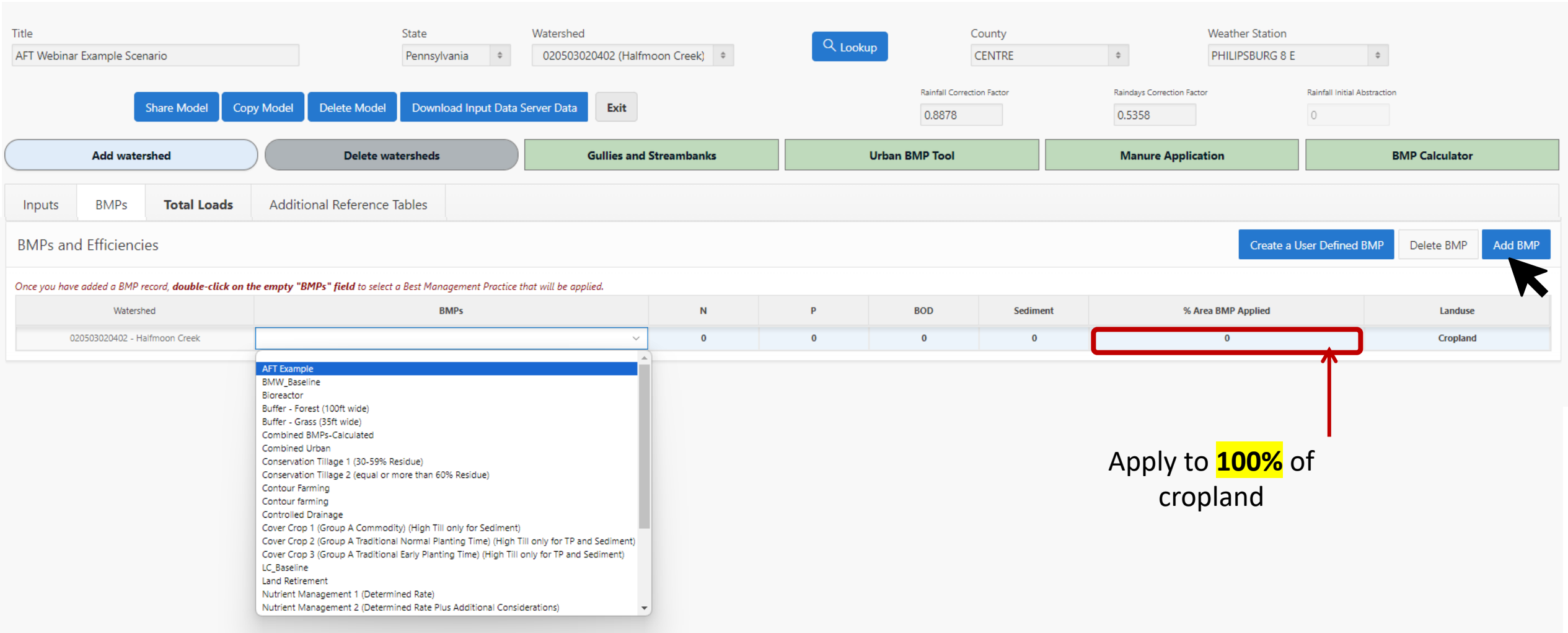
Delete Node Connection

Load a Configuration

Config select: AFT Example

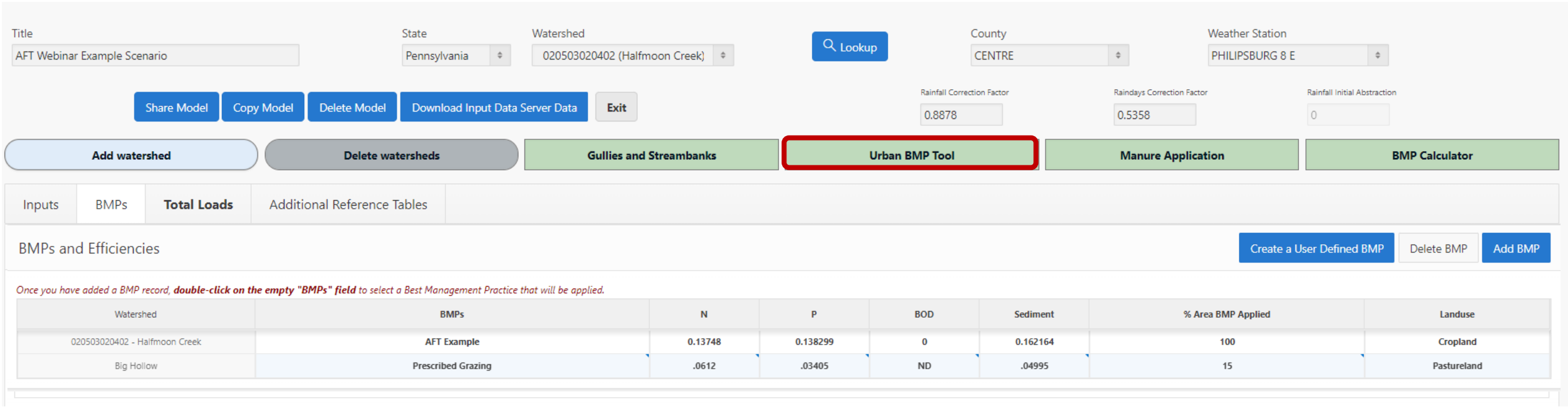
MP Calculator

Step 8: Add best management practices (BMPs) to the model scenario.

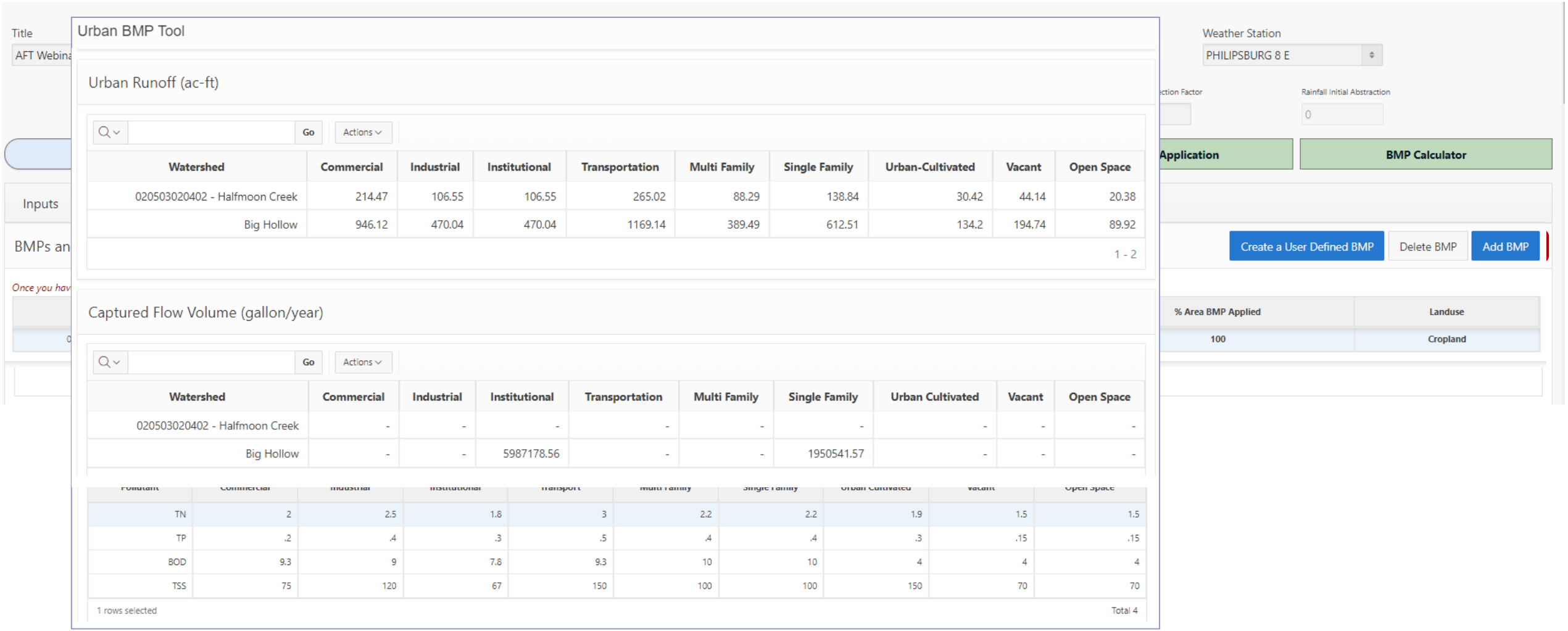


Apply to **100%** of cropland

Step 8: Add best management practices (BMPs) to the model scenario.



Step 8: Add best management practices (BMPs) to the model scenario.



Step 9: View the estimates of loads and load reductions in the Total Loads Module.

Pollutant Load Estimation Tool Help Logout (ADONAGHU)

Inputs | BMPs | **Total Loads** | Additional Reference Tables

Loads Calculated — Download

☐ Groundwater load calculation ☐ Treat all subwatersheds as part of a single watershed

1. Total load by subwatershed(s)

Watershed	N Load (No BMP) (lbs/year)	P Load (No BMP) (lbs/year)	BOD Load (No BMP) (lbs/year)	Sediment Load (No BMP) (tons/year)	N Reduction (lbs/year)	P Reduction (lbs/year)	BOD Reduction (lbs/year)	Sediment Reduction (tons/year)	N Load (With BMP) (lbs/year)	P Load (With BMP) (lbs/year)	BOD Load (With BMP) (lbs/year)	Sediment Load (With BMP) (tons/year)	% N Reduction	% P Reduction	% BOD Reduction	% Sediment Reduction
020503020401 - Halfmoon Creek	44221.93	9807.12	110266.71	4355.90	2727.44	820.24	3422.48	534.76	41494.49	8986.89	106844.24	3821.13	6.17	8.36	3.10	12.28
Big Hollow	46774.53	8588.11	149726.36	2712.78	464.39	57.10	138.20	22.33	46310.14	8531.01	149588.16	2690.46	0.99	0.66	0.09	0.82
TOTAL	**90996.46**	**18395.23**	**259993.07**	**7068.68**	**3191.83**	**877.34**	**3560.68**	**557.09**	**87804.63**	**17517.89**	**256432.39**	**6511.59**	**3.51**	**4.77**	**1.37**	**7.88**

2. Total load by land uses (with BMP)

Sources	N Load (lb/yr)	P Load (lb/yr)	BOD Load (lb/yr)	Sediment Load (t/yr)
Urban	34302.12	5272.44	130885.12	790.10
Cropland	23452.94	6847.26	50056.23	4327.73

- Examples of project types (3)
- Where to learn more?
- Future updates

Examples of project types: watershed-base plans (WBPs)

Table 19- Prioritized Nutrient Load Reductions required (lbs/day)

Priority	Reach ID	BASINS TN Load (lbs/day)	TN Load Reduction Required (lbs/day)	BASINS TP Load (lbs/day)	TP Load Reduction Required (lbs/day)
1 (TP) & 2 (TN)	Reach 4 (Mora below confluence with Wolf Creek including Wolf Creek subwatershed)	3.175	1.424	0.348	0.209

Example: WBP for the Mora River Upper Canadian Plateau

- Pollutant loading rate determined using EPA's Better Assessment Science Integrating Point and Nonpoint Sources (BASINS)
- Load reductions for BMP implementation were calculated using STEPL

Special thanks to Brian Fontenot, EPA R6 for highlighting this project!

Conservation Tillage	Cover Crops	Nutrient Management	Prairie Strips	Rotational Grazing	Regenerative Agriculture
Conservation tillage on 50% or more* acres	Cover crops on 25% of acres	Precision nutrient management on an additional** 50% of conservation tillage acres	5% of acres south of Green Bay treated with prairie strips	Rotational grazing on 25% of pasture acres	Combination of all previous scenarios

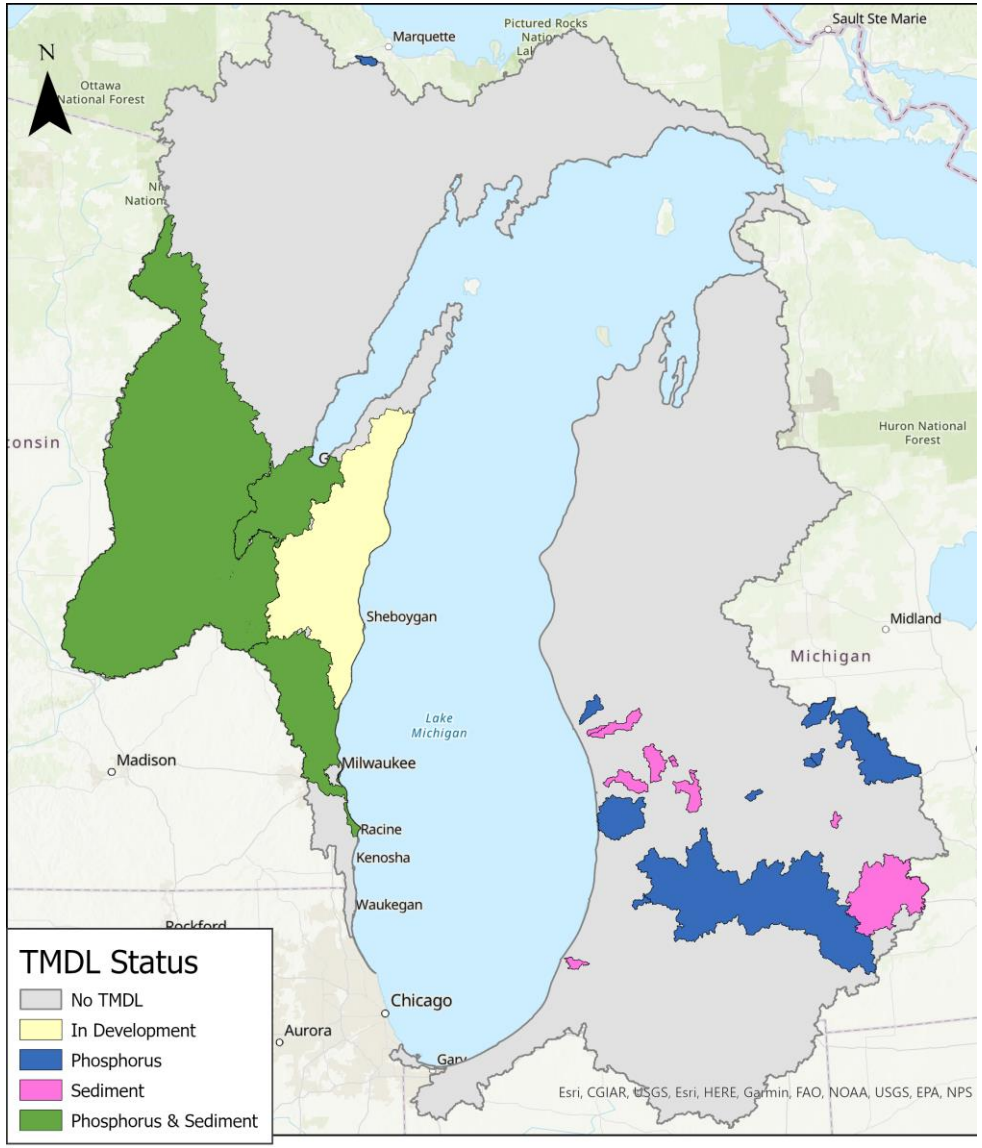
* If current adoption is greater than 50%, add an additional 10% of acres. Adoption rates based on 2021 conservation tillage adoption rates from the Operational Tillage Information System (OpTIS); data supplied by Regrow Ag.

** We assumed that all row crop acres using cover crops or no-till practices also use precision nutrient management.

Groups involved: General Mills, Sand County Foundation

Examples of project types: evaluating the impact of regenerative ag practices

- Considering 6 different BMP adoption scenarios (above)
- Current focus includes the **Phosphorus** and **Sediment** TMDLs
- Anticipated outcomes: estimation of Phosphorus load reductions and comparison to water quality goals

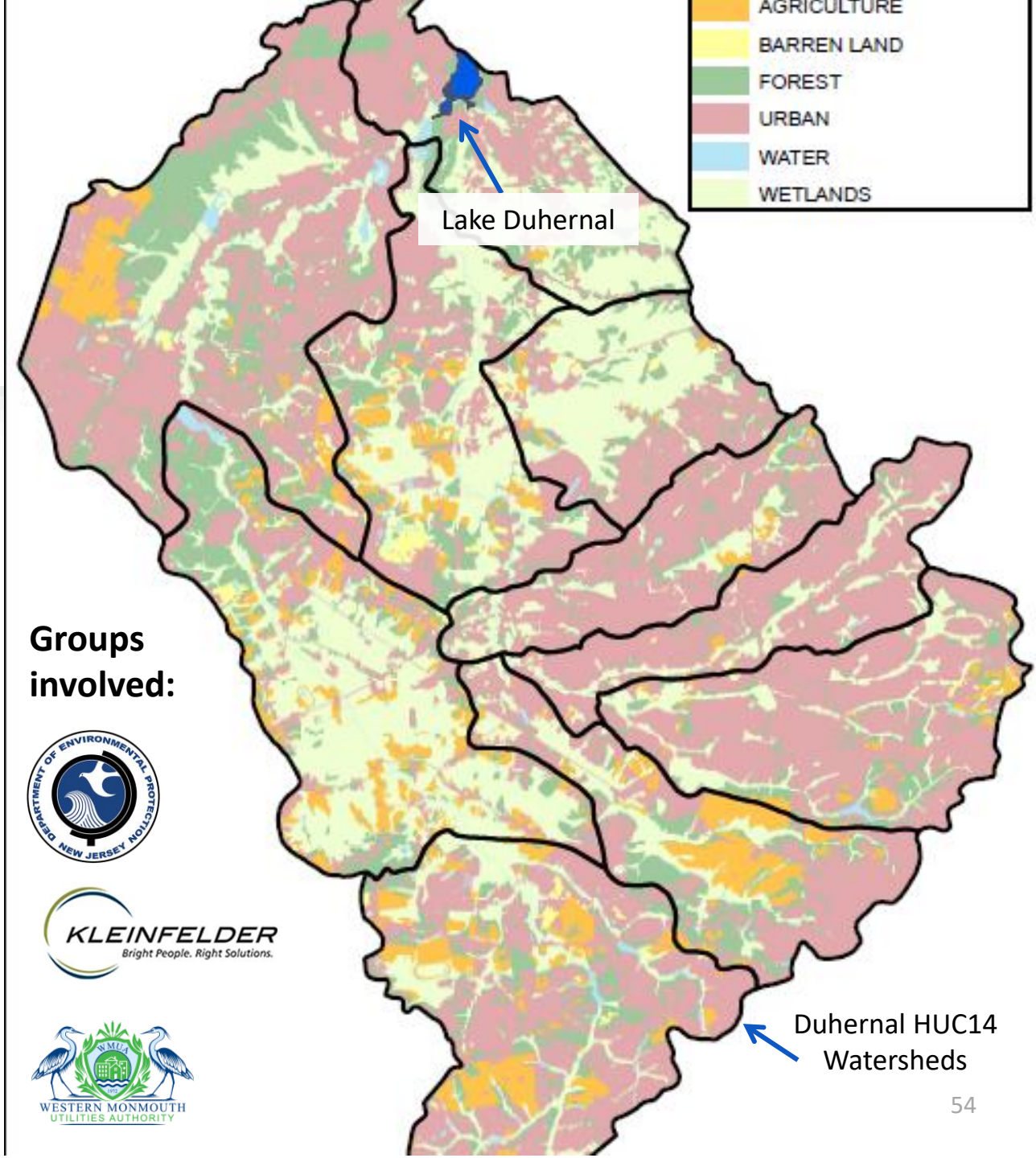


Lake Michigan Basin

Special thanks to Haleigh Summers, Sand County Foundation for sharing this project!

Examples of project types: watershed and lake protection plan

- Evaluating the use of PLET to determine nonpoint source loads to Lake Duhernal
- Conducting **wet weather sampling** to determine current **event mean concentrations (EMCs)** for land uses for comparison with model calculated nonpoint source loads.
- Future phases of the project will determine candidate locations for BMPs and associated TP load reductions

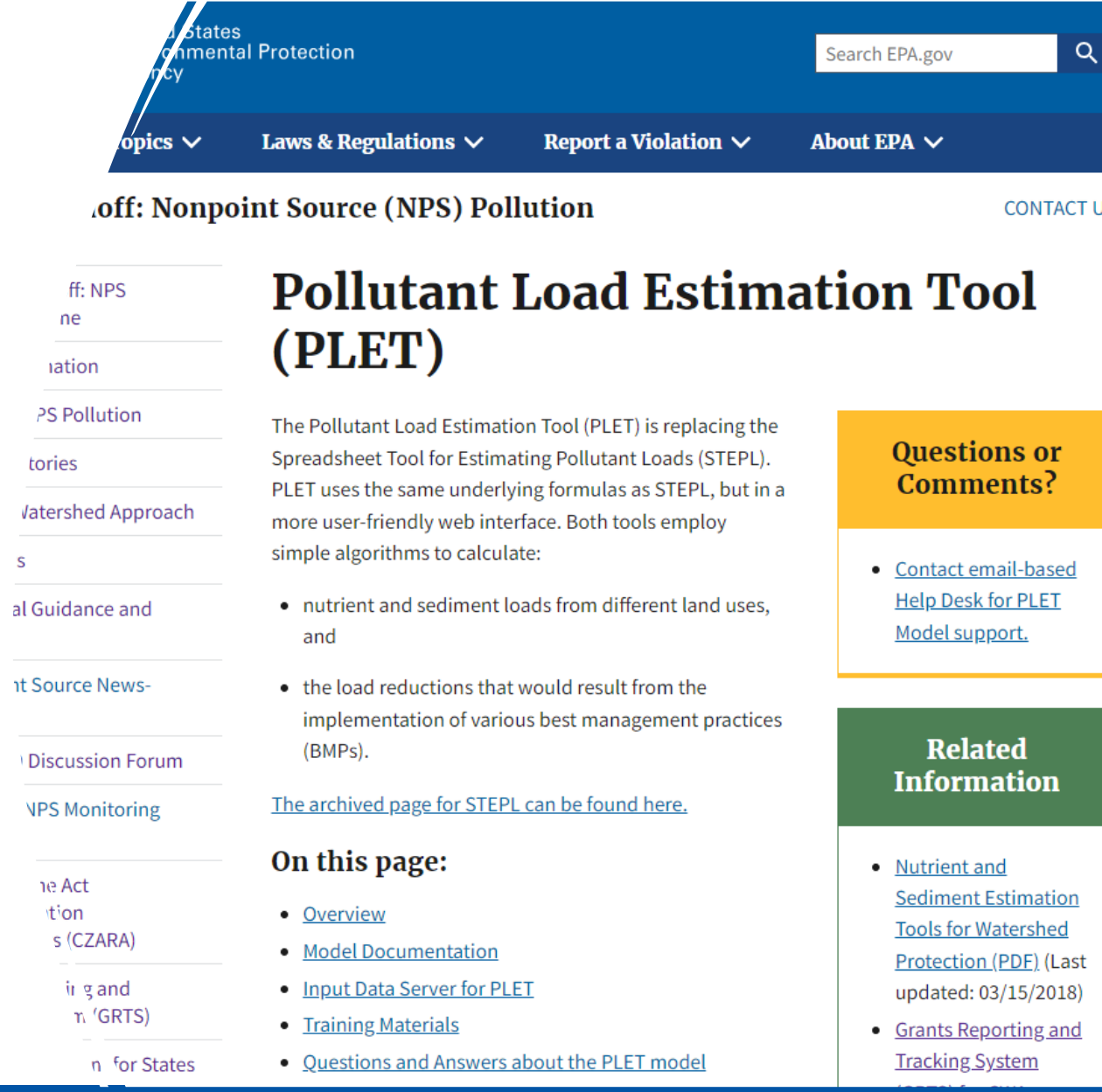


Groups involved:

Special thanks to Erin Dovel, Kleinfelder for sharing this project!

Want to learn more?

- PLET Website
- PLET User Guide → See the PLET Quick Guide
- BMP Definition Doc
- PLET Training Videos
- Help Desk Email: **plet@tetratech.com**



Looking ahead

Be on the look out for new release coming soon!

We are always evaluating opportunities to update and improve

- Water quality outcomes of protection work
- Integrating the most recent data into the input data server
- Refining BMP efficiencies based on the latest science
- Suggestions from you—the user

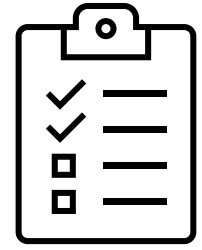
Stay in touch!

- **Email:** donaghue.adrienne@epa.gov

Questions?

Next steps in our outcomes estimation journey

- ❑ Join November 1st for the PTMApp Web Tool webinar
- ❑ Fill out the 6-question (2-min) online evaluation survey
- ❑ Schedule a free “coaching” session with us
  - ❑ **Email atappross@farmland.org, RE: Coaching Request**
- ❑ Order a free print copy of the OET Guide
  - ❑ Keyword: “AFT outcomes tools”



Please keep in touch: outcomestools@farmland.org

Aysha