DTAP
Delaware Targeting And Planning Tool

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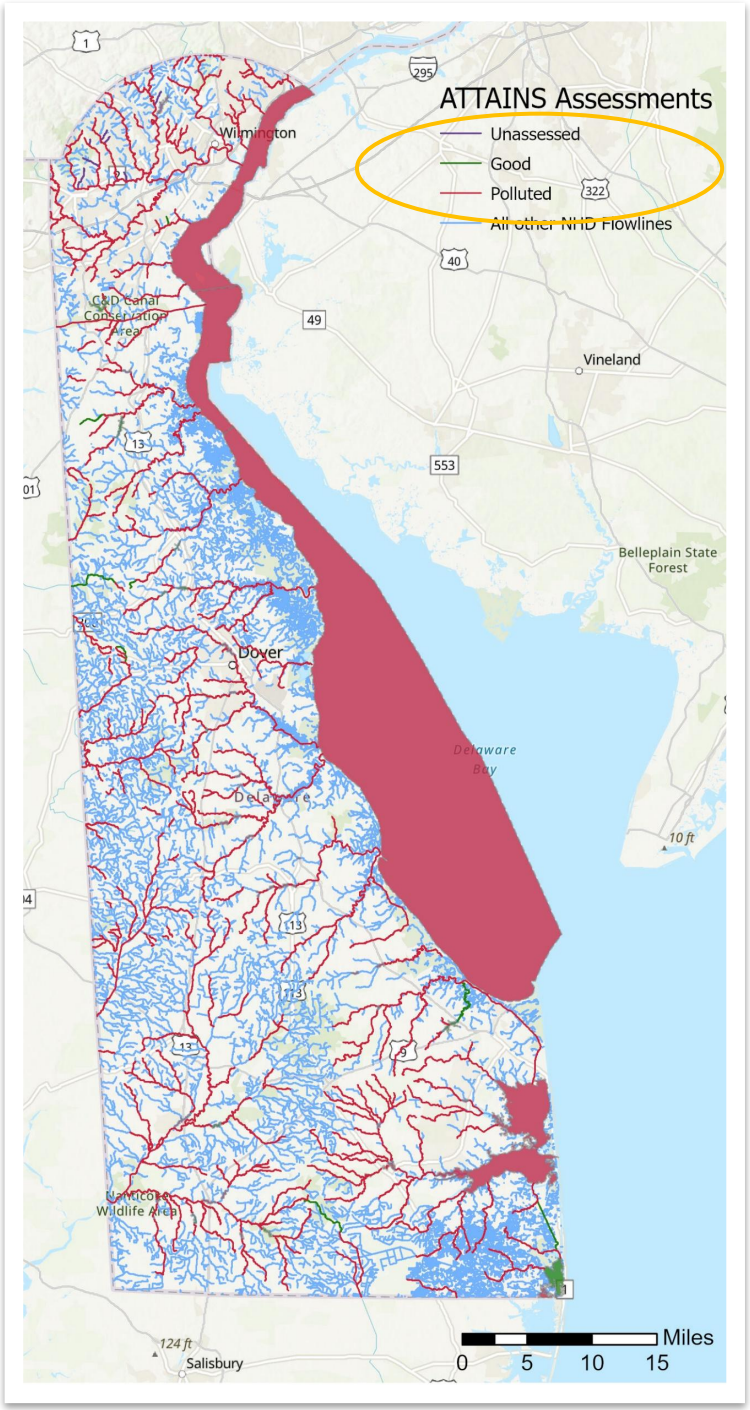
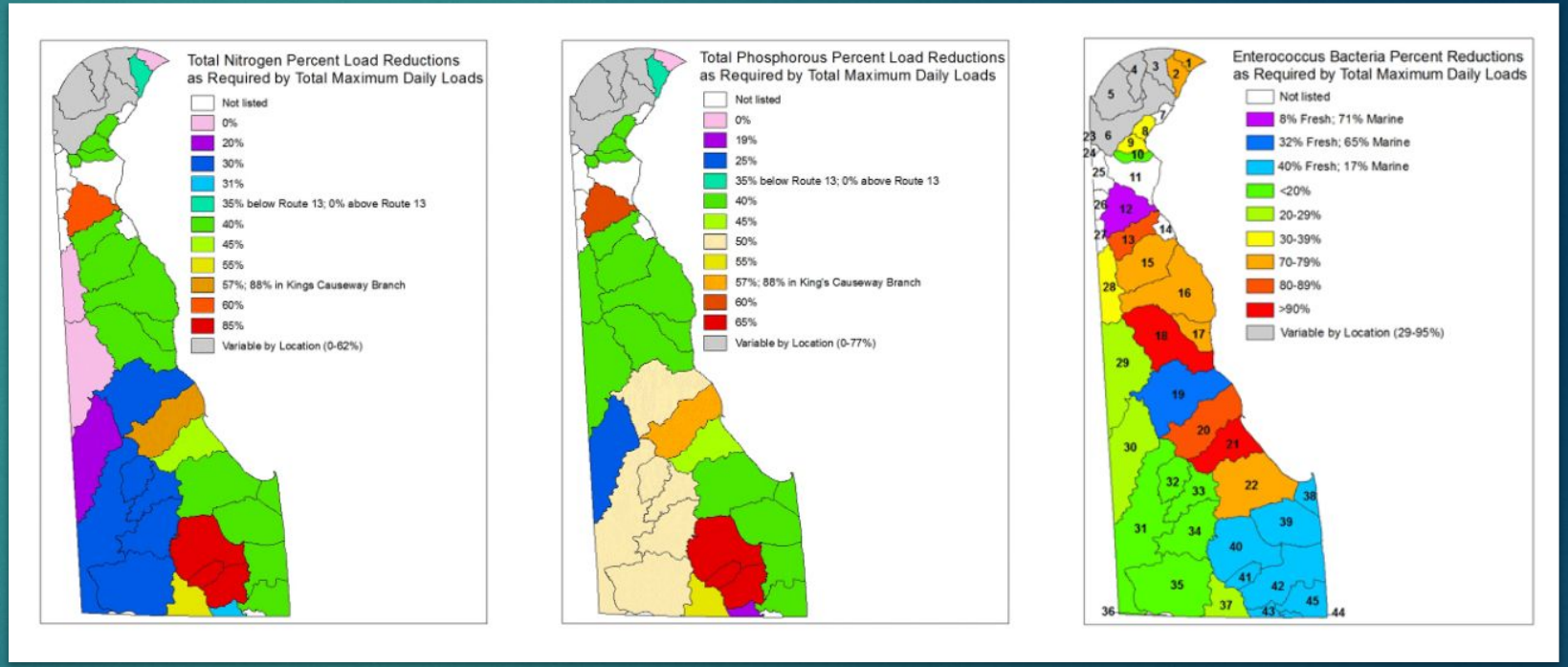
Watershed Assessment and Management Section



DTAP History



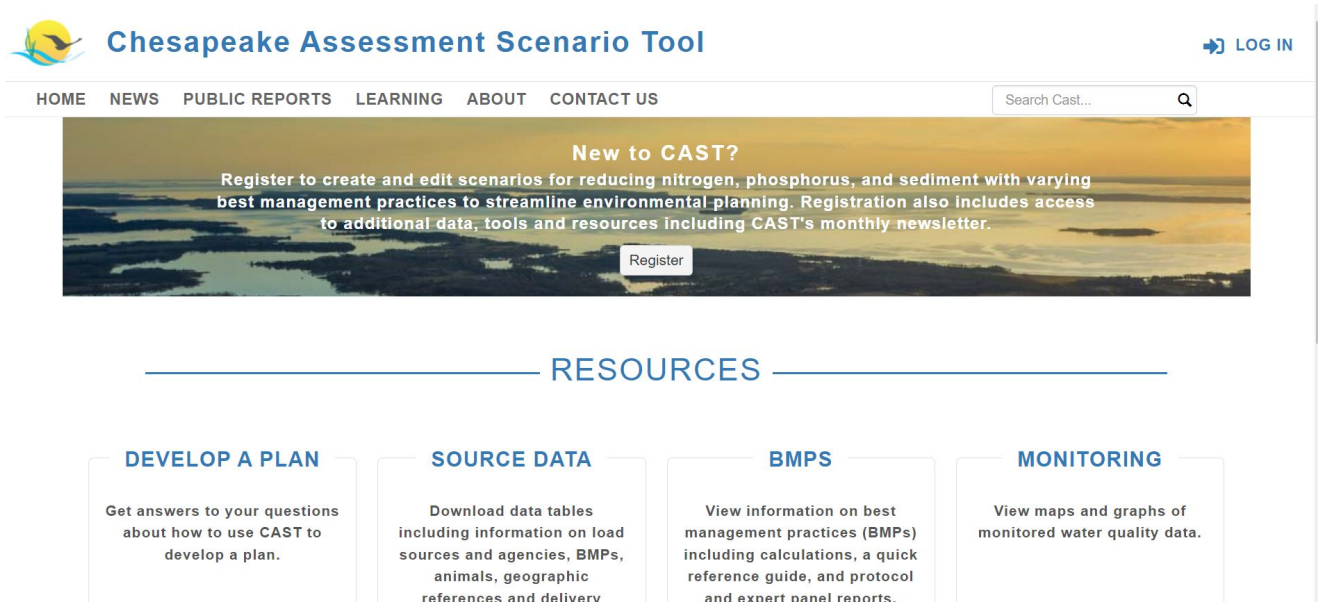
- TMDLs!

How can we accelerate water quality improvement?

- Understand background/baseline loads
- Model impacts of current BMPs
- Evaluate impacts of potential/future BMPs to get closer to TMDLs

Driscoll Drones

Started with CAST…



A web-based nitrogen, phosphorus and sediment load estimator tool where users specify a geographical area, and then select BMPs to develop plans to meet goals.

How do we want to customize to meet DE's needs?

What worked and what didn't?

Delaware Targeting and Planning Tool

Goals of DTAP

A Delaware-specific tool that can help model background loads and identify BMPs to achieve water quality standards

DTAP is intended to be a *modeling* tool–
not a regulatory tool.

Identify opportunities to reach load reduction goals for TMDLs, WIPs, PCSs, etc.

Major differences between DTAP & CAST

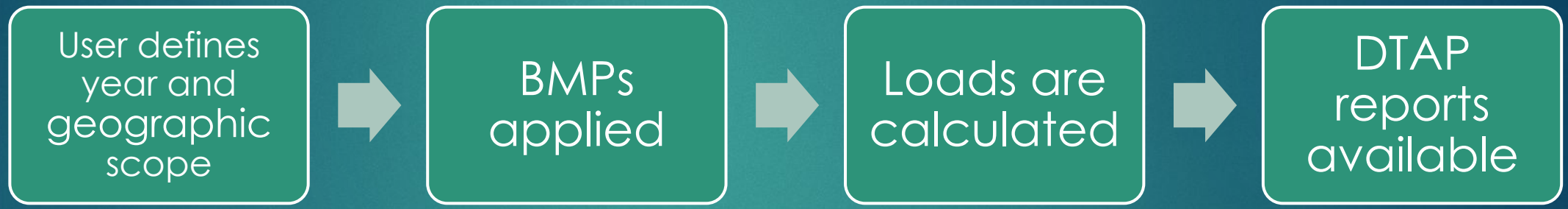
- Evaluating impacts to local streams (TMDLs) vs. bay-wide
  - Edge of Stream = the load that reaches the edge of a small stream
  - Edge of Tide = the load that reaches the edge of the tidal portion of the Bay
  - DTAP is currently a water quality model and ***not*** a hydrodynamic model
- Modeling statewide and a various scales
- Modeling nitrogen, phosphorus, sediment AND bacteria
- Simplified/condensed list of BMPs

1. Edge of Tide vs. Edge of Stream

CAST

DTAP

How does DTAP work?

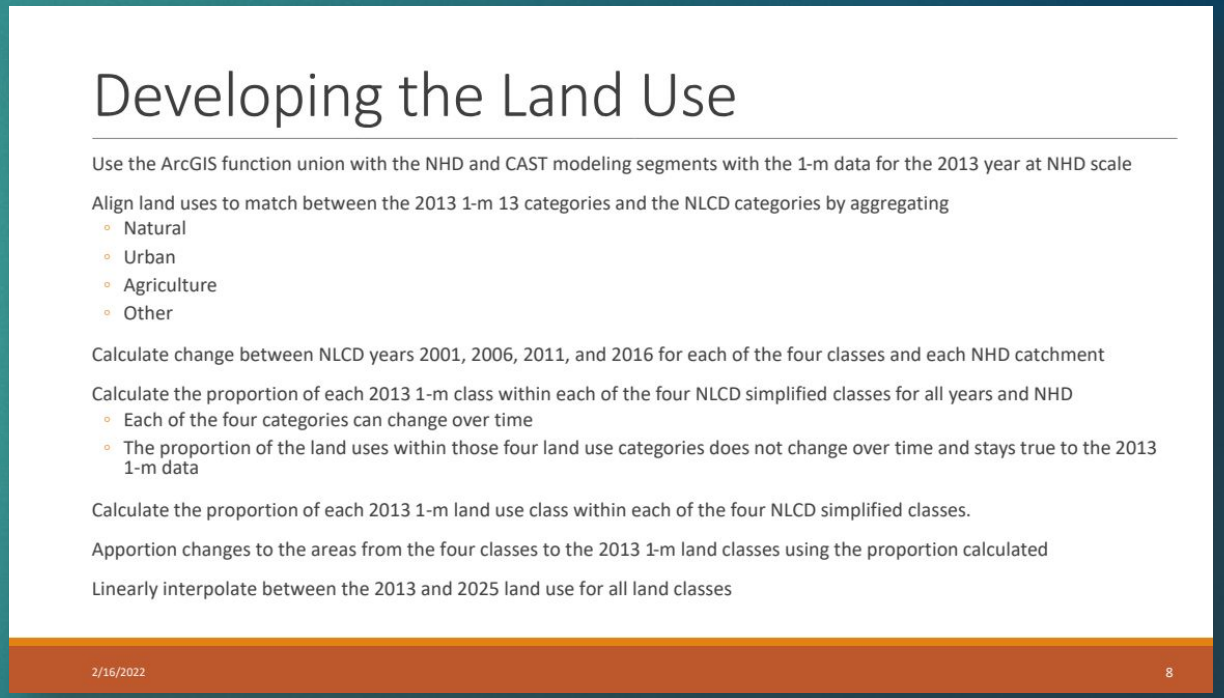


User defines year and geographic scope → BMPs applied → Loads are calculated → DTAP reports available

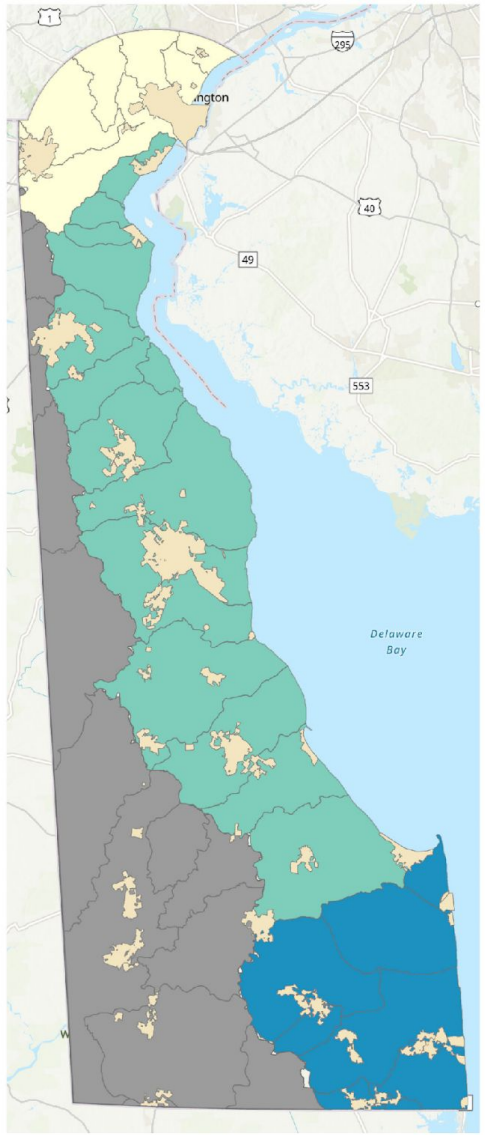
- Choose landuse/base conditions for years 1990-2025

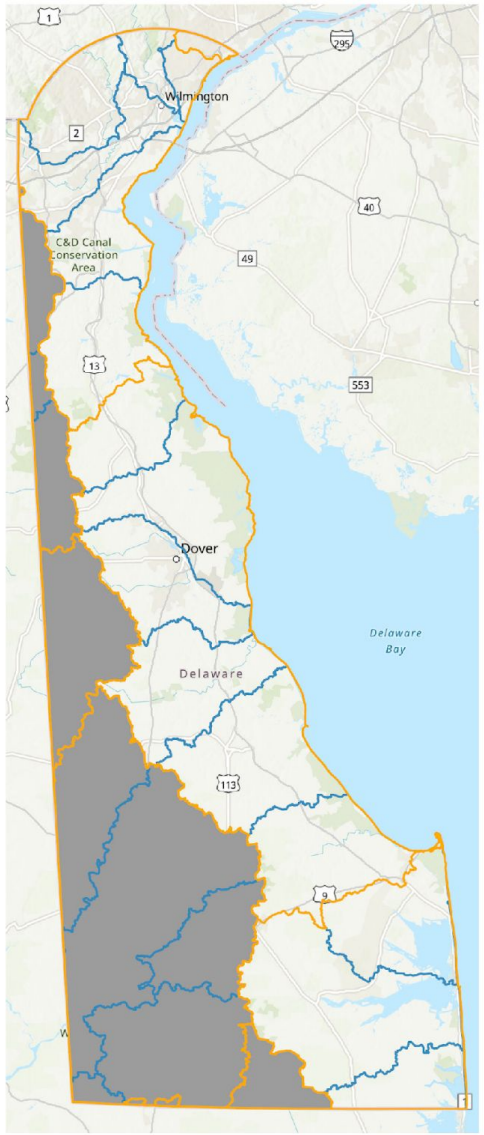
- An average hydrological condition used for all years

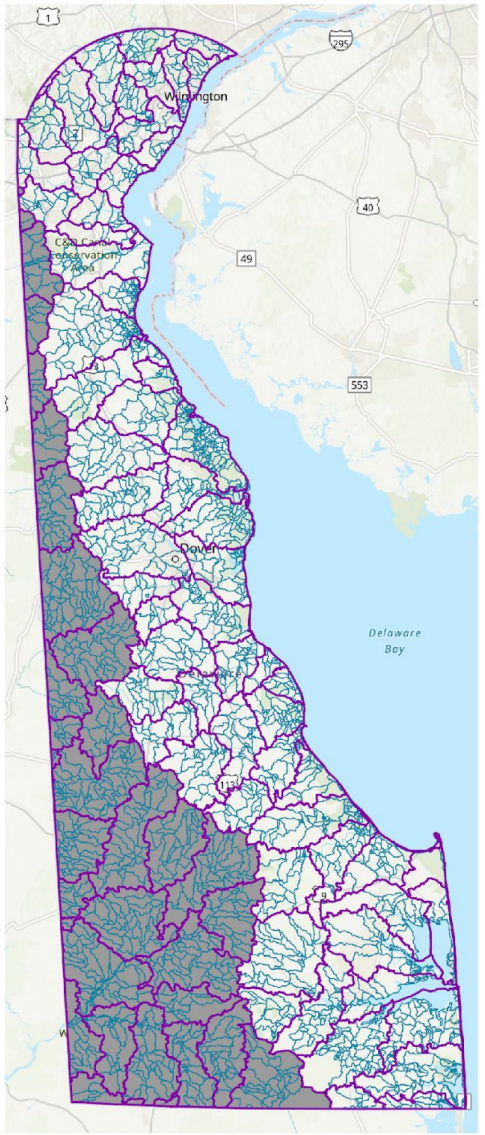
- Geographic scales – next slide



Olivia Devereux's CIB STAC presentation 2/16/2022







DTAP:
Scenario Scales

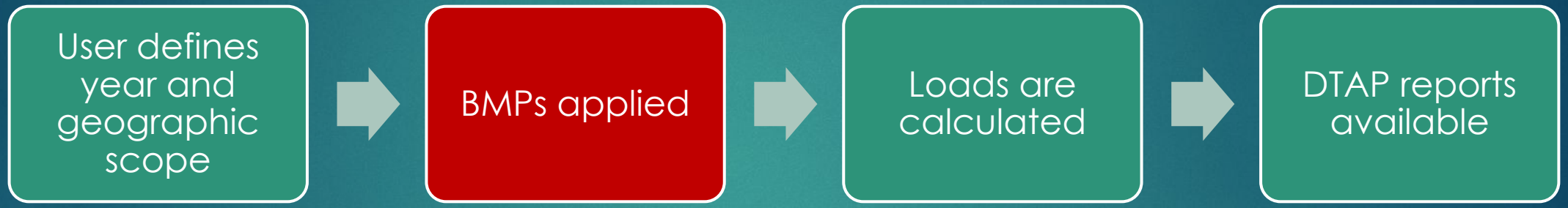
Major Basins
- Piedmont
- Delaware Bay
- Inland Bays/Atlantic Ocean
- Historic Watersheds
- Municipalities
- HUC8 (Delaware Only)
- HUC10 (Delaware Only)
- HUC 12 (Delaware Only)
- NHD Plus V2 Catchments
- Chesapeake Watershed

Miles
0 5 10 15

Major basin, historic watersheds & municipalities

HUC8 (orange)
HUC 10 (blue)

HUC12 (purple)
NHD


User defines year and geographic scope
BMPs applied
Loads are calculated
DTAP reports available

DTAP BMPs

Sector	BMP Type	BMP
Agriculture	Efficiency	Ag Erosion & Sediment Control
Agriculture	Efficiency	Ammonia Emissions Reduction
Agriculture	Efficiency	Conservation Plans
Agriculture	Efficiency	Cover Crop
Agriculture	Efficiency	Ditch Controls
Agriculture	Efficiency	Nutrient Management
Agriculture	Efficiency	Pasture Management
Agriculture	Efficiency	Streambank Fencing
Agriculture	Efficiency	Tillage Management
Agriculture	Landuse Change	Forest Buffer
Agriculture	Landuse Change	Grass Buffer
Agriculture	Landuse Change	Land Retirement
Agriculture	Landuse Change	Tree Planting
Agriculture	Landuse Change	Wetland Creation/Restoration
Agriculture	Pound Reduction	Manure Transport
Agriculture	Pound Reduction	Waste Management System
Developed	Efficiency	Erosion and Sediment Control- Level 2
Developed	Efficiency	Pet Waste Education
Developed	Efficiency	Runoff Reduction
Developed	Efficiency	Stormwater Treatment
Developed	Landuse Change	Impervious surface elimination to pervious surface
Natural	Pound Reduction	Shoreline Erosion Control
Natural	Pound Reduction	Stream Restoration
Septic	Efficiency	Septic Denitrifcation and Pumping
Septic	Pound Reduction	Septic Connection
Septic	Pound Reduction	Sliplines

Forest Buffer: Forest buffers are linear wooded areas that help filter nutrients, sediments and other pollutants from runoff as well as remove nutrients from groundwater. The recommended buffer width is 100 feet, with a 35 feet minimum width required.

Synonymous BMPs: Tree/Shrub Establishment, Windbreak/Shelterbelt Establishment, Urban Forest Buffer, Urban Forest Planting, Riparian Forest Buffer, CREP Hardwood Tree Planting (CP3A), Riparian Forest Buffer (NRCS 391), Riparian Buffer (FSA CP22), CREP Riparian Forest Buffer, Riparian Forest Buffer, Woodland Buffer Filter Area

BMP Efficiency Rates:

BMP Name	Nitrogen	Phosphorus	Sediment	Impacts bacteria?
Forest Buffer efficiencies differ depending upon land use where it's implemented:				
Ag open land	0.65	0.42	0.56	No
Commercial	0.25	0.5	0.5	No
Construction	0.25	0.5	0.5	No
Cultivated Crops, pasture/hay & production area	0.65	0.42	0.56	No
Highway	0.25	0.5	0.5	No
Multi & Single Family Residential	0.25	0.5	0.5	No
Open Space	0	0	0	No

Grass Buffer: Grass buffers are linear strips of grass or other non-woody vegetation maintained to help filter nutrients, sediment and other pollutants from runoff. The recommended buffer width for buffers is 100 feet, with a 35 feet minimum width required. Vegetated open channels are modeled identically to grass buffers.

Synonymous BMPs: Grassed waterway, filter strip, field buffer, Riparian Herbaceous Cover (NRCS 390), Filter Strip (NRCS 393), Filter Strip (FSA CP21), Field Border (NRCS 386), Grass Waterway (NRCS 412), Noneasement (FSA CP8A), Vegetated Filter, Vegetative Buffer Strip, Vegetated Open Channel

BMP Efficiency Rates:

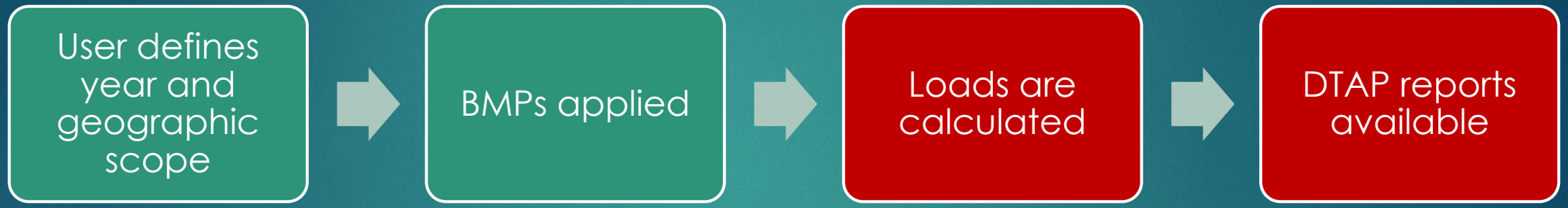
BMP Name	Nitrogen	Phosphorus	Sediment	Impacts bacteria?
Grass Buffer	0.46	0.42	0.56	No

DTAP BMP guide currently being developed to help users select correct BMP

BMPs can be entered into DTAP manually or by using statewide BMP data.

Statewide BMP data are available for use in DTAP. Data are from DNREC's BMP Tracking & Reporting Tool, but there are still major gaps in statewide data in the tool.

Models are only as good as the data put into them!


User defines year and geographic scope
BMPs applied
Loads are calculated
DTAP reports available

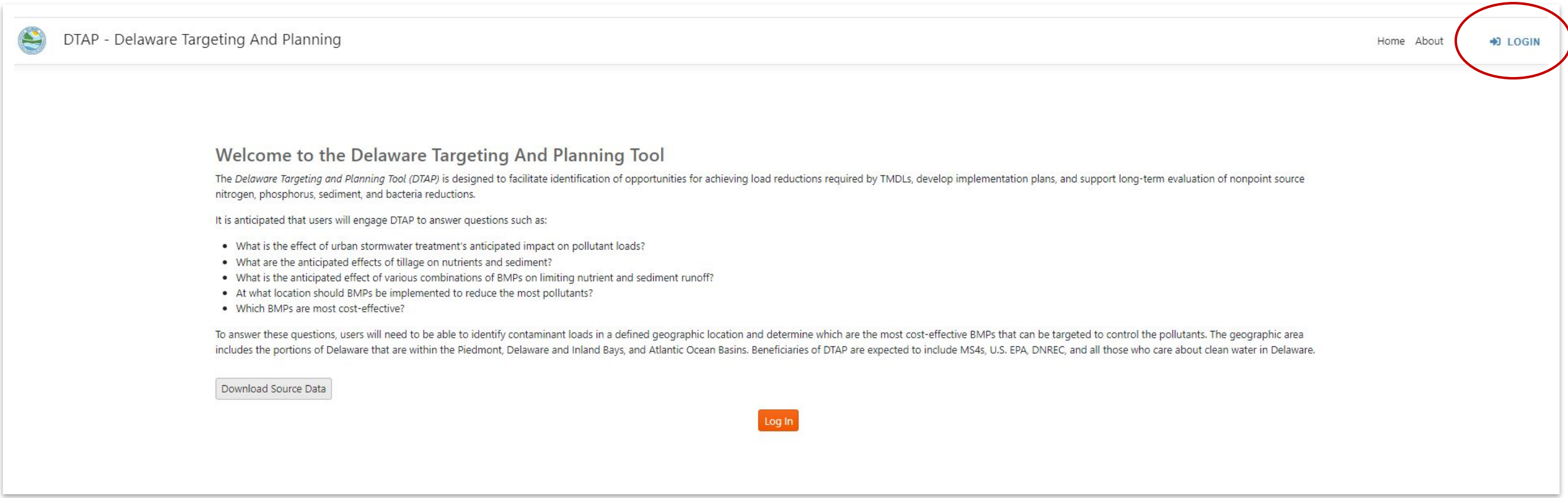
Report Type
Scenario Loads Report
Scenario Loads Comparison
Scenario Land Use
Land Use Comparison
BMP Summary Report
BMP Input File
BMP – Submitted vs. Credited

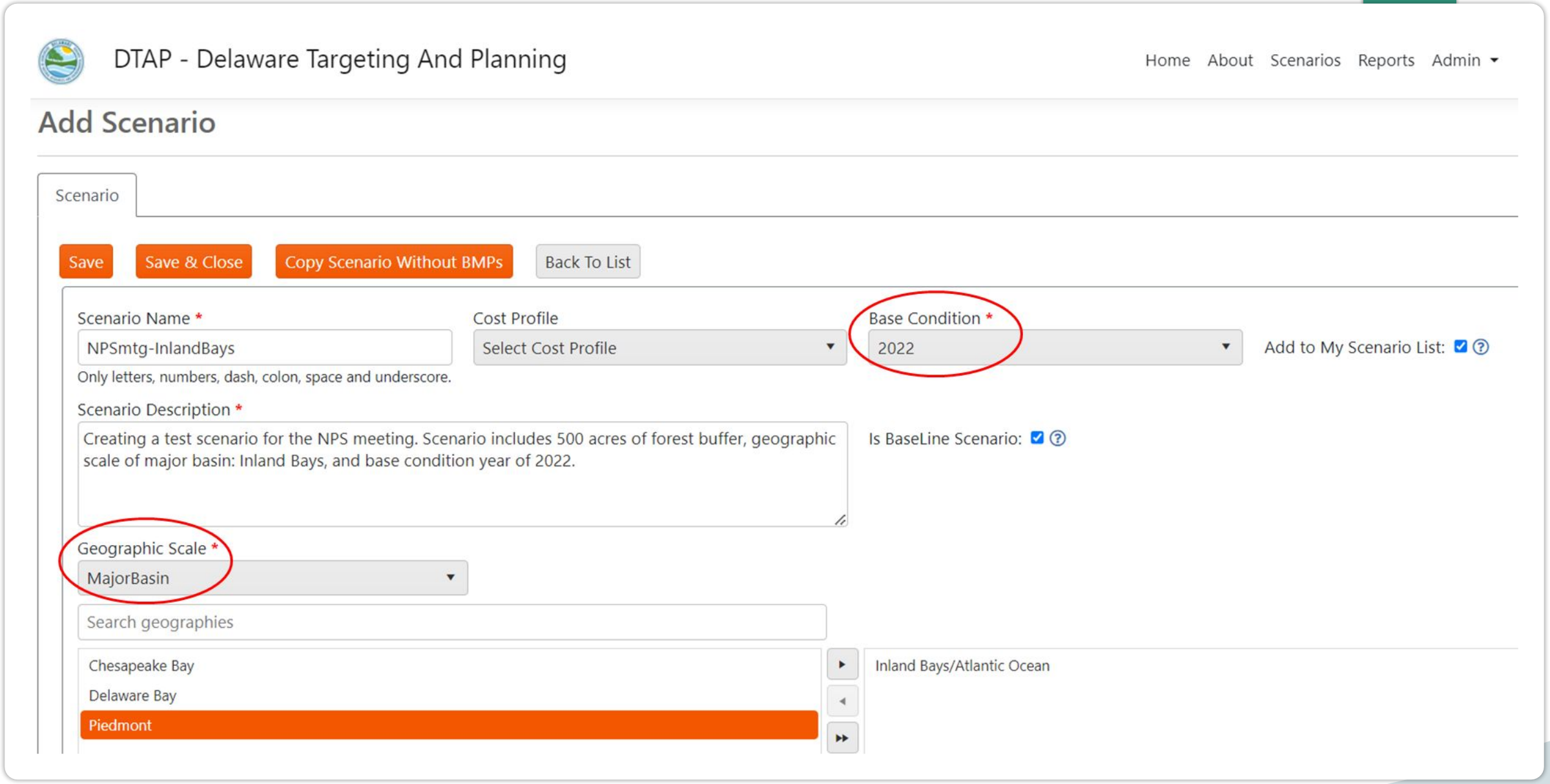
Project Example

What would be the impact of converting 500 acres of crops to forest buffers in the Inland Bays Basin in 2022?

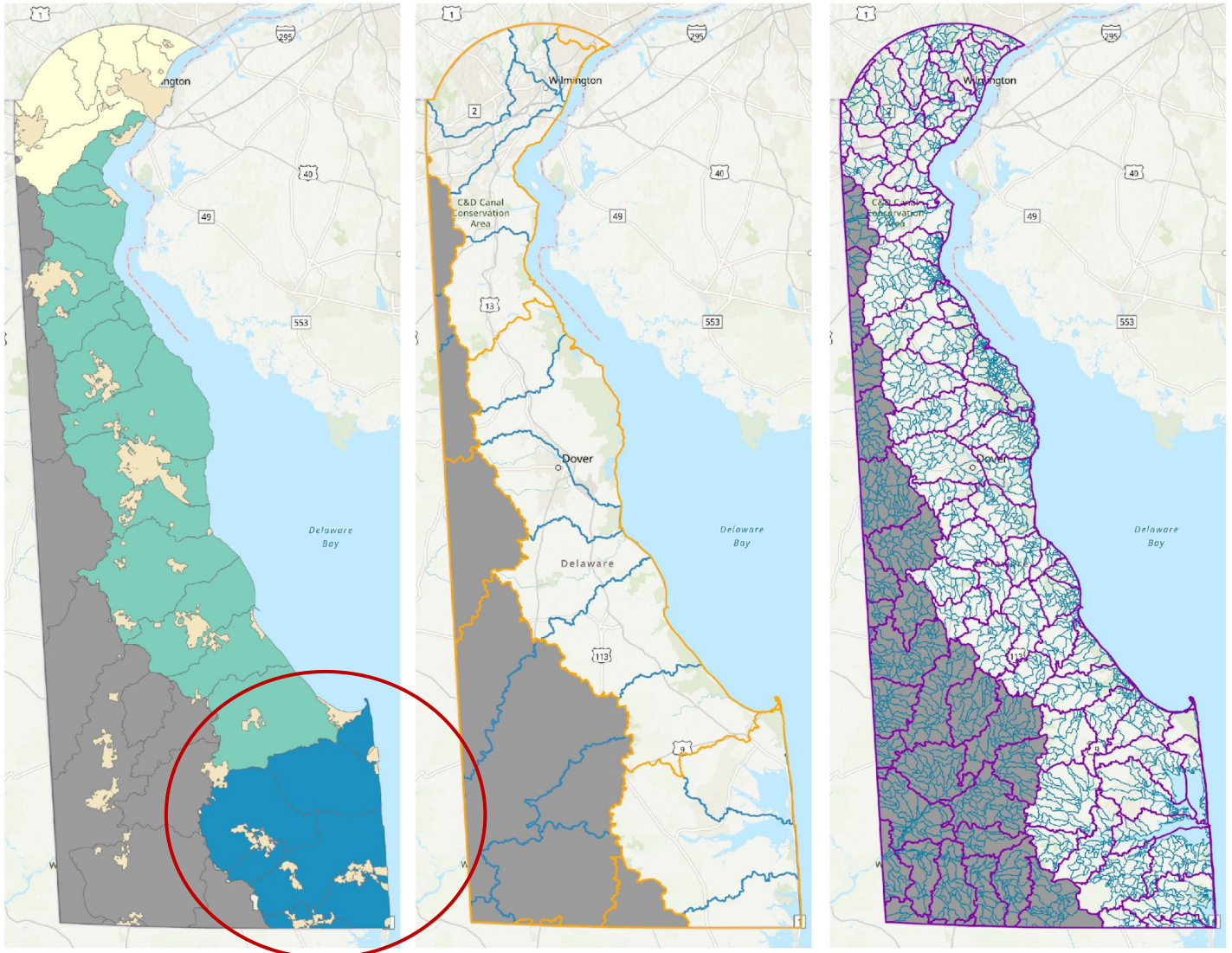
Driscoll Drones

All users will need a valid login (managed by DTAP team in DNREC)





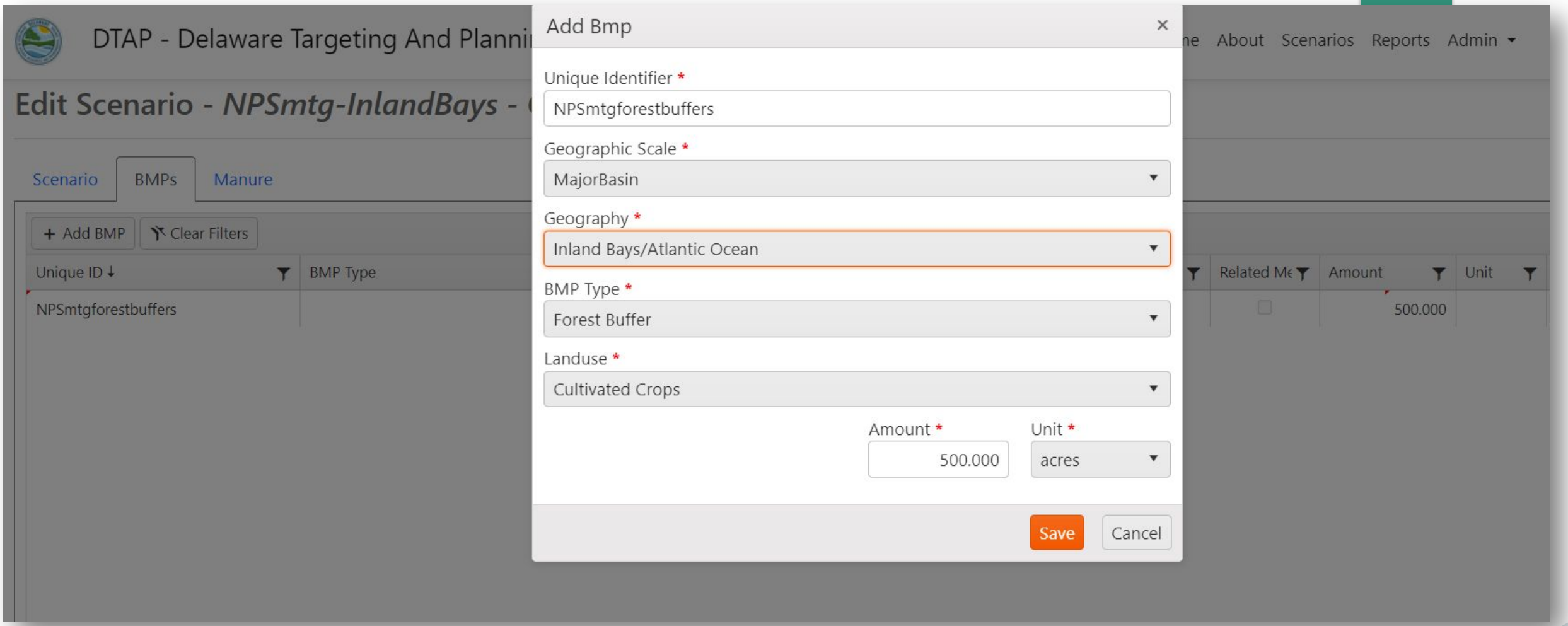
Step 1 – Create scenarios & base conditions. Define base condition year and geographic scale.



Major basin, county & municipality

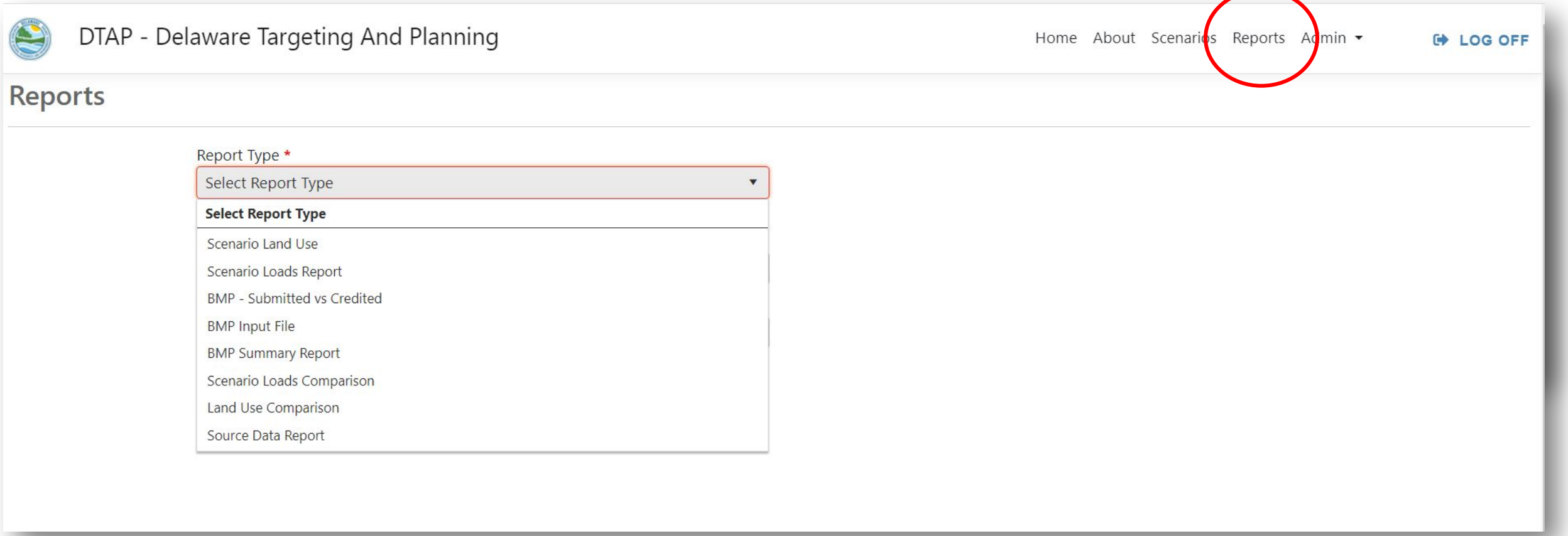
HUC8 (orange)
HUC 10 (blue)

HUC12 (purple)
NHD



Step 2 – Add BMPs

- Manually enter BMPs through user interface
- Use Excel template to upload
- Import all BMPs from DE BMP Tracker for a particular year



Step 3 – Run model with "reports"

	A	B	C	D	E	F	G	H
1	BaseYear	GeographyFullName	SectorName	LanduseName	NPSmtg-InlandBays Acres	NPSmtg-InlandBays - BMPsadded Acres	NPSmtg-InlandBays - BMPsadded Acres Diff	
2	2022	Inland Bays/Atlantic Ocean	Agriculture	Agricultural Open Land	0.00	0.00	0.00	
3	2022	Inland Bays/Atlantic Ocean	Agriculture	Cultivated Crops	50,049.40	49,549.40	-500.00	
4	2022	Inland Bays/Atlantic Ocean	Agriculture	Pasture/Hay	2,830.76	2,830.76	0.00	
5	2022	Inland Bays/Atlantic Ocean	Agriculture	Production Area	179.03	179.03	0.00	
6	2022	Inland Bays/Atlantic Ocean	Developed	Commercial	13,940.00	13,940.00	0.00	
7	2022	Inland Bays/Atlantic Ocean	Developed	Construction	2,173.18	2,173.18	0.00	
8	2022	Inland Bays/Atlantic Ocean	Developed	Highway	5,606.56	5,606.56	0.00	
9	2022	Inland Bays/Atlantic Ocean	Developed	Multi-Family Residential	7,870.25	7,870.25	0.00	
10	2022	Inland Bays/Atlantic Ocean	Developed	Single Family Residential	30,226.30	30,226.30	0.00	
11	2022	Inland Bays/Atlantic Ocean	Natural	Forest	48,617.40	49,117.40	500.00	
12	2022	Inland Bays/Atlantic Ocean	Natural	Harvested Forest	740.37	740.37	0.00	
13	2022	Inland Bays/Atlantic Ocean	Natural	Open Space	11,490.80	11,490.70	-0.10	
14	2022	Inland Bays/Atlantic Ocean	Natural	Water	9,134.14	9,134.14	0.00	
15	2022	Inland Bays/Atlantic Ocean	Natural	Wetland	22,539.20	22,539.20	0.00	
16	2022	Inland Bays/Atlantic Ocean	Septic	Septic	0.00	0.00	0.00	
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... | Scenario Loads-Bacteria-Sector | **Scenario Loads-Acres-Detailed** | Scenario Loads-TN-Detailed | Scenario Loads-TP-Detailed | Scenario Loads-TSS-Detailed | Scenario Loads-Bacteria-Detaile

First double check the acres – looks good!

BaseYear	GeographyFullName	SectorName	LanduseName	NPSmtg-InlandBays TnLbs	NPSmtg-InlandBays - BMPsadded TnLbs	NPSmtg-InlandBays - BMPsadded TnLbs Diff
2022	All	All	All	5,731,633.8	5,672,001.8	-59,632.0

Read Me | Scenario Loads-Acres-Summary | **Scenario Loads-TN-Summary** | Scenario L

BaseYear	GeographyFullName	SectorName	LanduseName	NPSmtg-InlandBays TnLbs	NPSmtg-InlandBays - BMPsadded TnLbs	NPSmtg-InlandBays - BMPsadded TnLbs Diff
2022	Inland Bays/Atlantic Ocean	Agriculture	Agricultural Open Land	0.0	0.0	0.0
2022	Inland Bays/Atlantic Ocean	Agriculture	Cultivated Crops	3,289,580.0	3,228,660.0	-60,920.0
2022	Inland Bays/Atlantic Ocean	Agriculture	Pasture/Hay	68,862.9	68,862.9	0.0
2022	Inland Bays/Atlantic Ocean	Agriculture	Production Area	526,383.0	526,383.0	0.0
2022	Inland Bays/Atlantic Ocean	Developed	Commercial	354,426.0	354,426.0	0.0
2022	Inland Bays/Atlantic Ocean	Developed	Construction	88,226.0	88,226.0	0.0
2022	Inland Bays/Atlantic Ocean	Developed	Highway	175,774.0	175,774.0	0.0
2022	Inland Bays/Atlantic Ocean	Developed	Multi-Family Residential	102,995.0	102,995.0	0.0
2022	Inland Bays/Atlantic Ocean	Developed	Single Family Residential	508,416.0	508,416.0	0.0
2022	Inland Bays/Atlantic Ocean	Natural	Forest	114,306.0	115,594.0	1,288.0
2022	Inland Bays/Atlantic Ocean	Natural	Harvested Forest	18,799.6	18,799.6	0.0
2022	Inland Bays/Atlantic Ocean	Natural	Open Space	37,951.4	37,951.4	0.0
2022	Inland Bays/Atlantic Ocean	Natural	Water	94,799.1	94,799.1	0.0
2022	Inland Bays/Atlantic Ocean	Natural	Wetland	41,309.8	41,309.8	0.0
2022	Inland Bays/Atlantic Ocean	Septic	Septic	309,805.0	309,805.0	0.0

... | Scenario Loads-TP-Sector | Scenario Loads-TSS-Sector | Scenario Loads-Bacteria-Sector | Scenario Loads-Acres-Detailed | **Scenario Loads-TN-Detailed** | Scenario Loads-TP-Detailed | Scenario L

Let's look at nitrogen loads

Results

- What would be the impact of converting 500 acres of crops to forest buffers in the Inland Bays Basin in 2022?

Pollutant	Scenario Δ
Nitrogen (lbs/yr)	-59,632
Phosphorus (lbs/yr)	-474
Sediment (lbs/yr)	-444,796
Bactera (MPN)	* Still in development

Other ways to utilize DTAP

- Quantify cumulative impacts of BMP implementation
- Look at trends towards meeting TMDLs (WIPs, PCSs, etc.)
- Pollutant hot spot analyses
- Analyze land use change

Opportunities are endless!

Inland Bays Basin

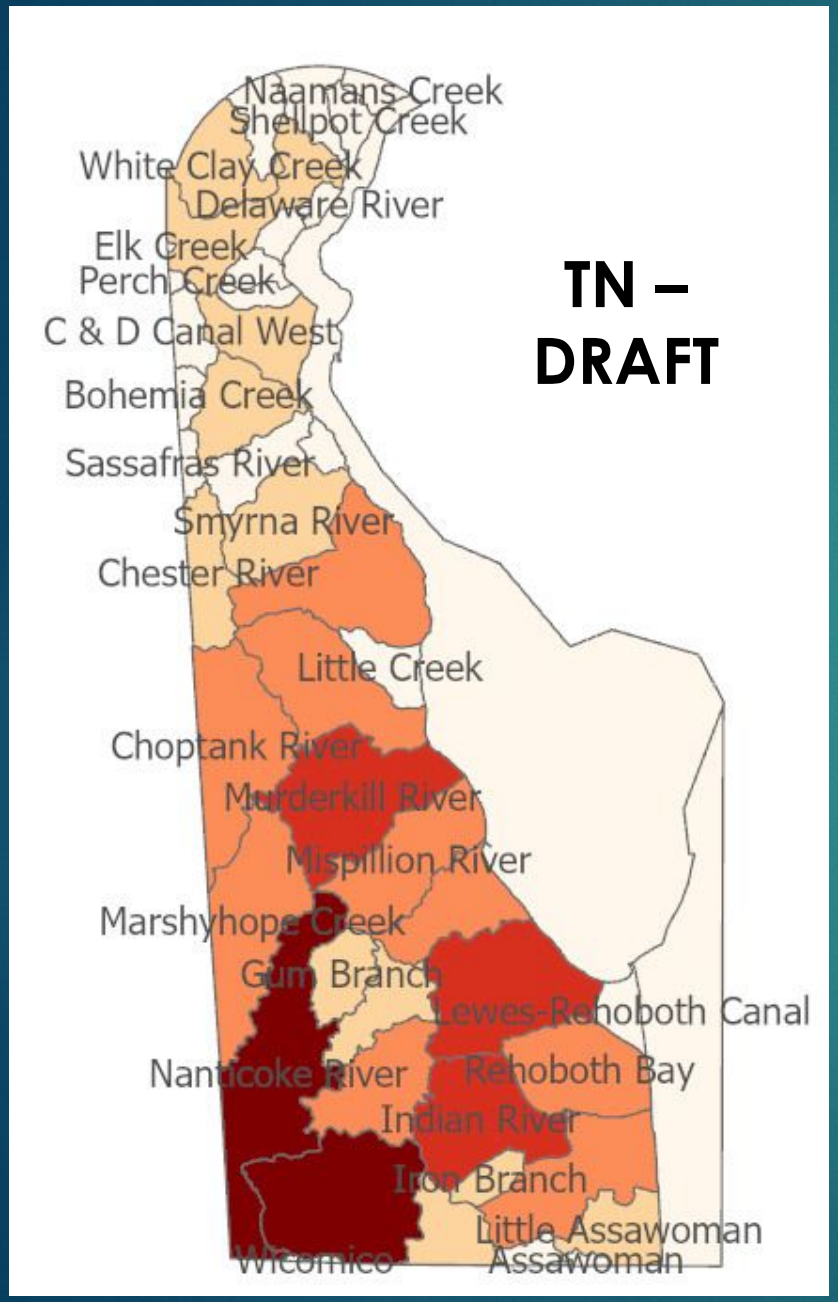
	1990 acres	2000 acres	2010 acres	2020 acres
Agriculture	**63,241**	**62,925**	**58,432**	**54,095**
Agricultural Open Land	24	0	0	0
Cultivated Crops	58,867	58,814	55,026	51,015
Pasture/Hay	4,130	3,891	3,229	2,904
Production Area	221	220	177	176
Developed	**42,994**	**45,127**	**52,058**	**58,362**
Commercial	10,658	11,243	13,016	13,769
Construction	25	36	548	1,964
Highway	4,342	4,550	5,200	5,528
Multi-Family Residential	5,994	6,407	7,424	7,788
Single Family Residential	21,975	22,890	25,870	29,313
Natural	**99,163**	**97,346**	**94,907**	**92,940**
Forest	53,376	51,879	50,490	48,965
Harvested Forest	813	790	769	746
Open Space	11,643	11,777	11,464	11,475
Water	9,973	9,802	9,264	9,146
Wetland	23,358	23,098	22,921	22,608
Grand Total	**205,397**	**205,397**	**205,398**	**205,398**

DRAFT – for discussion purposes only

Example:

Land use change(acres) throughout the decades

* No BMPs included in this analysis*


Naamans Creek
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White Clay Creek
Delaware River
Elk Creek
Perch Creek
C & D Canal West
Bohemia Creek
Sassafras River
Smyrna River
Chester River
Little Creek
Choptank River
Murderkill River
Mispillion River
Marshyhope Creek
Gum Branch
Lewes-Rehoboth Canal
Nanticoke River
Rehoboth Bay
Indian River
Iron Branch
Little Assawoman
Wicomico
Assawoman
TN – DRAFT


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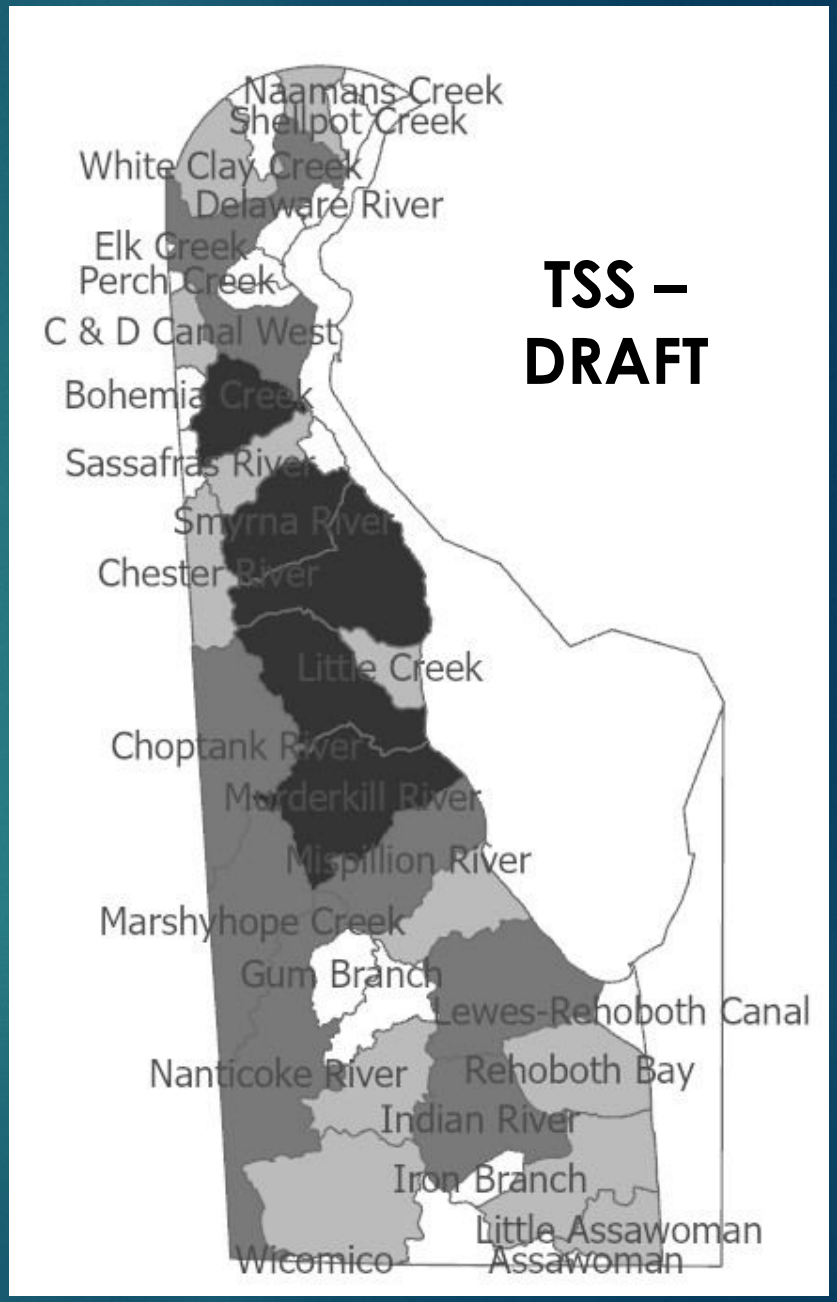
TP – DRAFT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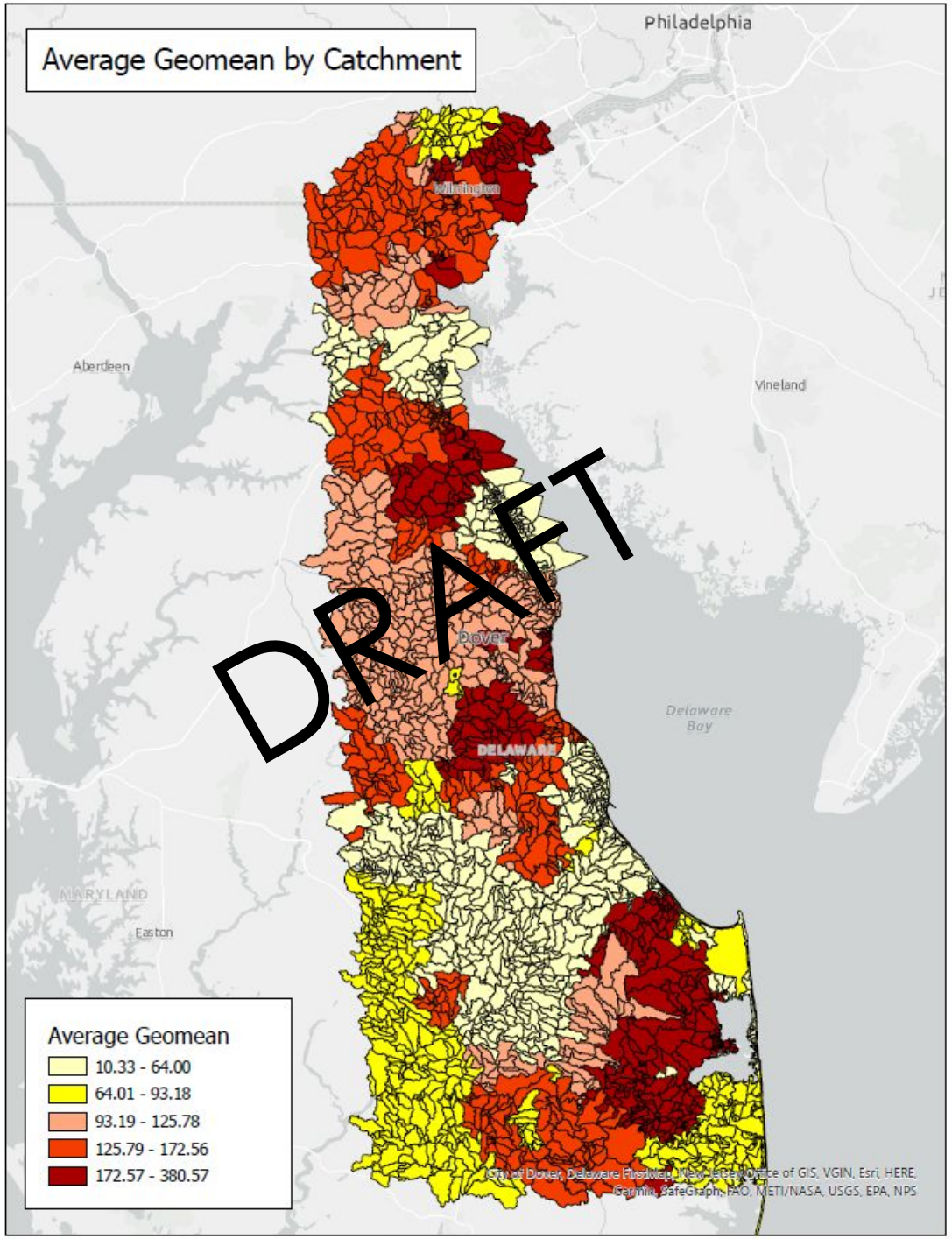
TSS – DRAFT



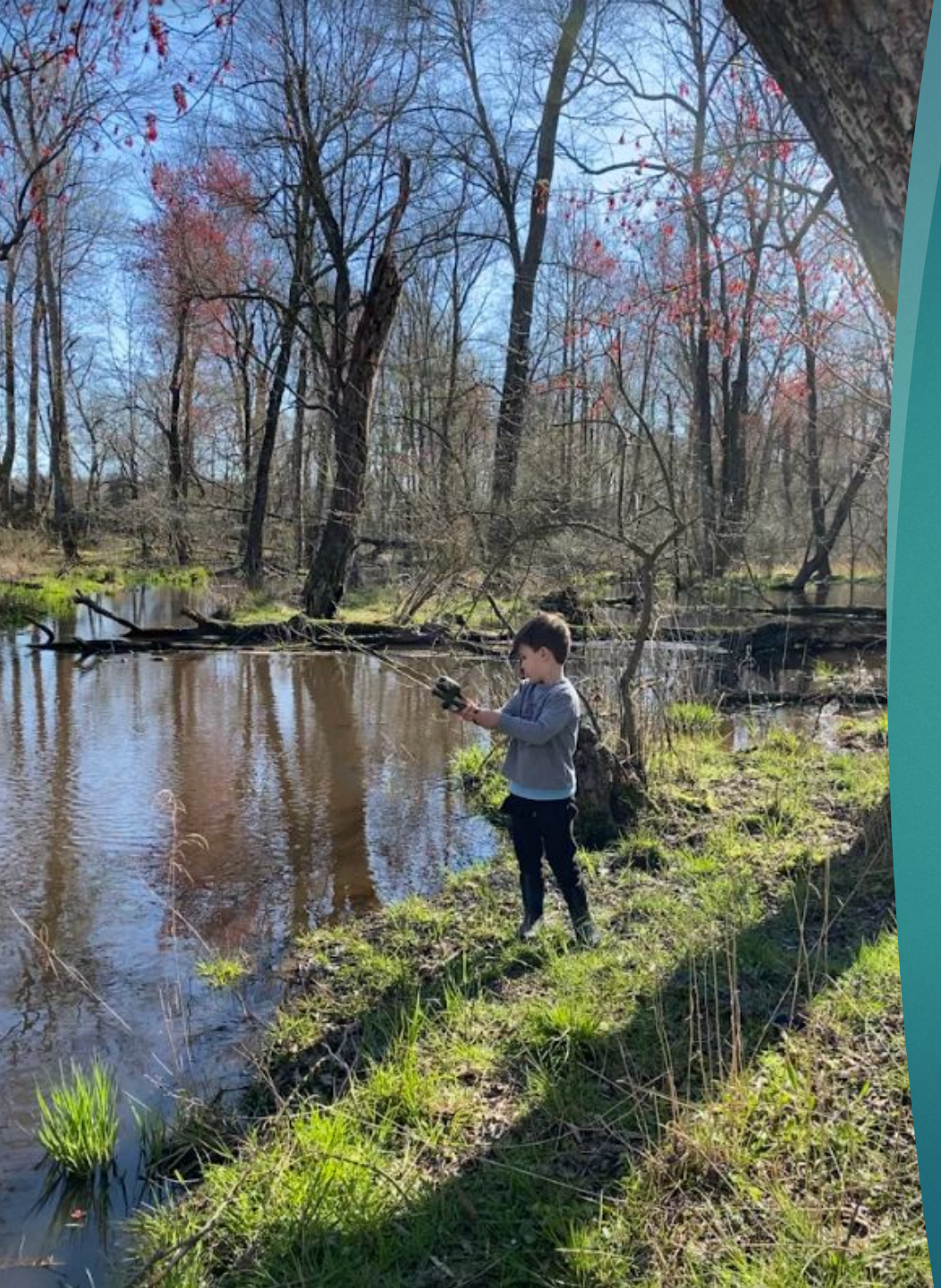
Bacteria –

much more complicated than we anticipated!


Photo credit: Deborah Springer

Next steps

- Testing of PHASE 1 has begun
  - Looking for and working out bugs
- PHASE 2
  - Create an optimization tool that identifies optimal BMPs to improve water quality in a cost-effective manner
  - Development just began and current contract extends to 2025



Questions?

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Watershed Assessment and Management Section

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*Thank you to Driscoll Drones for allowing me to use their pictures