Aggregating Watershed Restoration Efforts for Measurable Ecosystem Improvements

The World We Live In? Drivers for our Work?

https://www.chesapeakebay.net/what/programs/total_maximum_daily_load

Most Visited Getting Started

Chesapeake Bay Program
Science. Restoration. Partnership.

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Discover the Chesapeake | Learn the Issues | State of the Chesapeake | Take Action | In the News | Who We Are | What We Do

WHAT WE DO > PROGRAMS & PROJECTS > CHESAPEAKE BAY TMDL

Chesapeake Bay TMDL

The Chesapeake Bay Total Maximum Daily Load (TMDL) is a federal "pollution diet" to restore the Chesapeake Bay and its vast network of streams, creeks and rivers.

Chesapeake Bay TMDL

NEW YORK STATE

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Department of Environmental Conservation

Recreation | Nature | Prevent & Control Pollution | Regulatory | News & Learning | Search

Home » Lands and Waters » Lakes and Rivers » Chesapeake Bay Watershed Program » Phase III Watershed Implementation Plan

Phase III Watershed Implementation Plan

New York's Final Phase III Watershed Implementation Plan

DEC released the Draft Phase III Watershed Implementation Plan (WIP) for New York's Chemung and Susquehanna River Basins for public comment on April 10, 2019. Below are DEC's response to EPA's Evaluation and response to public comments received.

Main Document: Final Phase III Watershed Implementation Plan for New York's Chemung and Susquehanna River Basins (PDF)

Appendices:

Appendix A: Revisions to CAFO ECL and CWA General Permits (PDF)

Appendix B: Hydrogeomorphic Regions in New York (PDF)

Appendix C: Cover Crop Watershed Model Efficiencies (PDF)

Appendix D: Delivery Factors for Bay-Significant Wastewater Treatment Facilities (PDF)

Appendix E: Delivered and Discharged Loads from Non-Significant Wastewater Treatment Facilities (PDF)

Appendix F: Explanation of New York's Draft Phase III WIP Planning Targets (PDF)

DEC Response to Public Comments (PDF)

EPA Evaluation of New York Draft Phase III Watershed Implementation Plan (PDF)

DEC Response to EPA Evaluation (PDF)

Find on this Page

Phase III WIP Scheudle

Upcoming Events

Links Leaving DEC's Website

Upper Susquehanna Watershed Forum Registration

PDF Help

For help with PDFs on this page, please call 518-402-8086.

Contact for this Page

Division of Water
625 Broadway Albany, NY 12233-3508
518-402-8086
Send us an email

This Page Covers


What Are Your Goals?
How Do You Achieve Them?

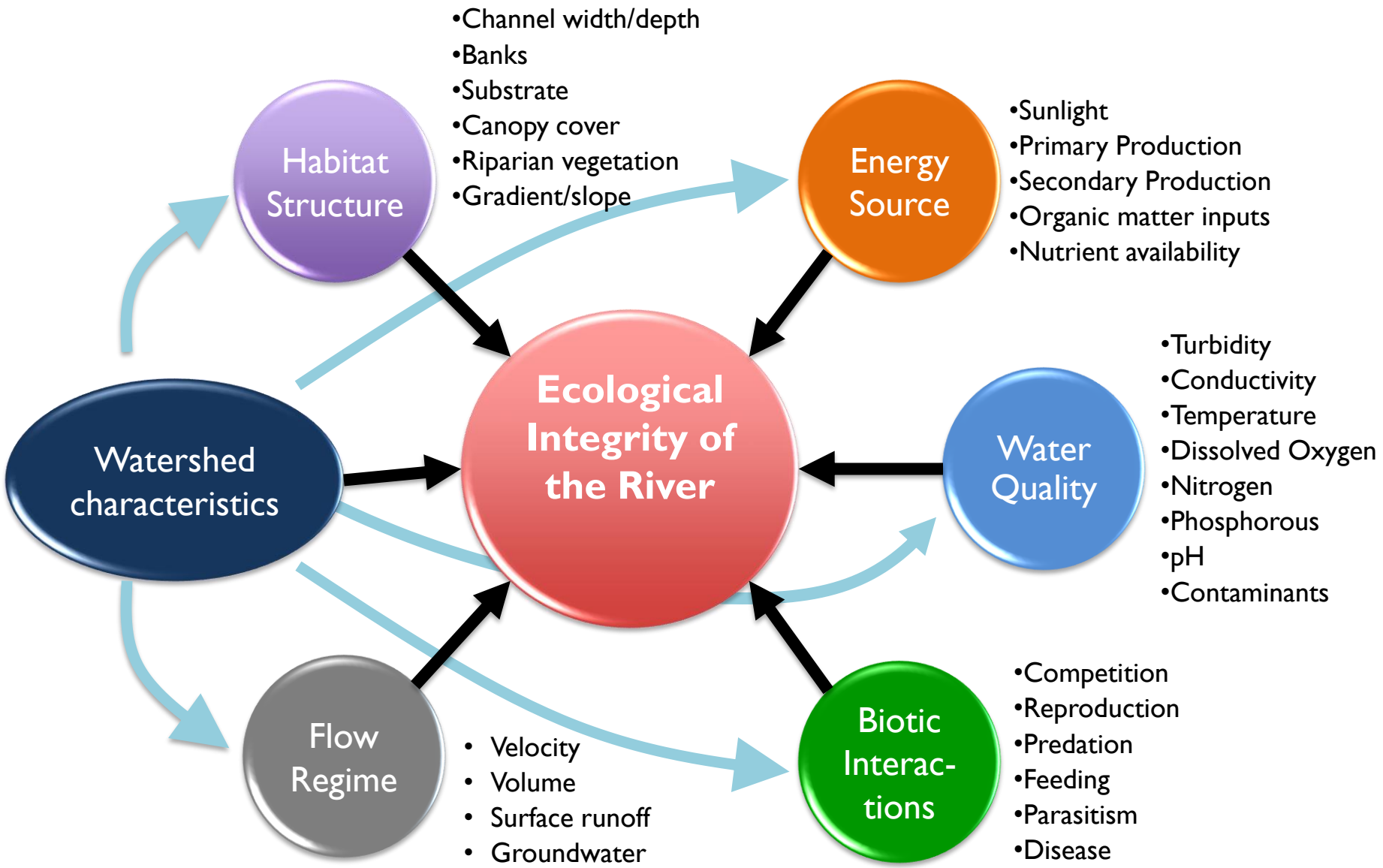
What Are Your Goals?

- Reduce:
  - Sediment
  - Pathogens
  - Nitrogen and Phosphorous Pollution
  - Flooding & Excessive Runoff
  - Temperature
- Removal of Impaired Status – Clean Water Act
- Wild Trout

Wild Brook Trout?


What Are Your Goals?
How Do You Achieve Them?

What will we do or change?



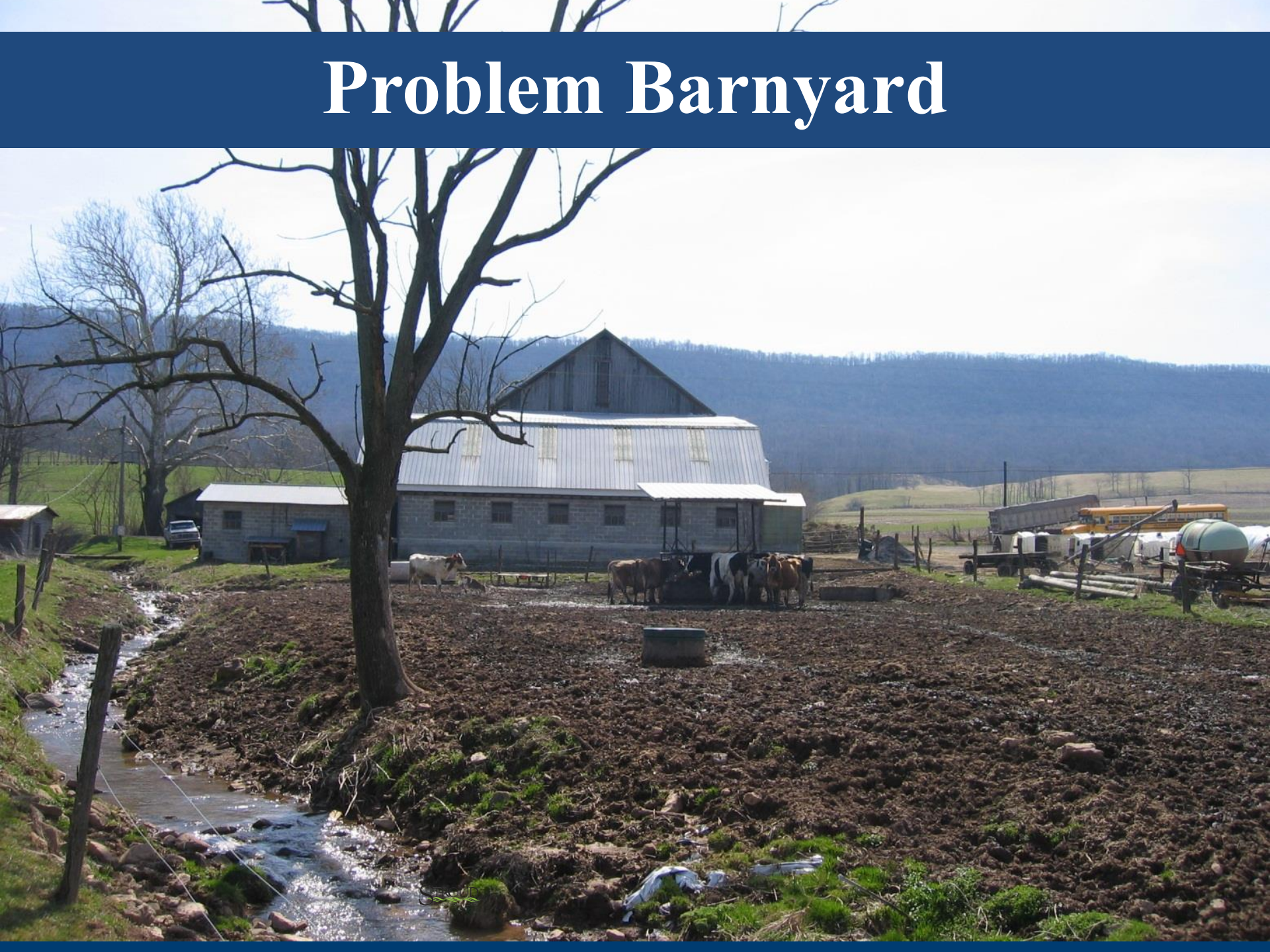
STROUD WATER RESEARCH CENTER


What will we do or change?
Improved Crop Field Management
Stabilize Roadway
Improve Pasture Management
Plant Forest Buffer
Exclude Livestock From Stream
Stop Barnyard Runoff
Manure Storage

What will we impact?:

- **Bacteria**
- **Sediment**
- **Water Temp**
- **Infiltration/Hydrology**
- **Soil Carbon?**
- **Macroinvertebrates**
- **Fish**
- **Algae**

Problem Barnyard



Improved Barnyard

Lititz Run – Before Forest Buffer

Lititz Run - 18 Year Old Forest

Other Measurable Outcomes?:

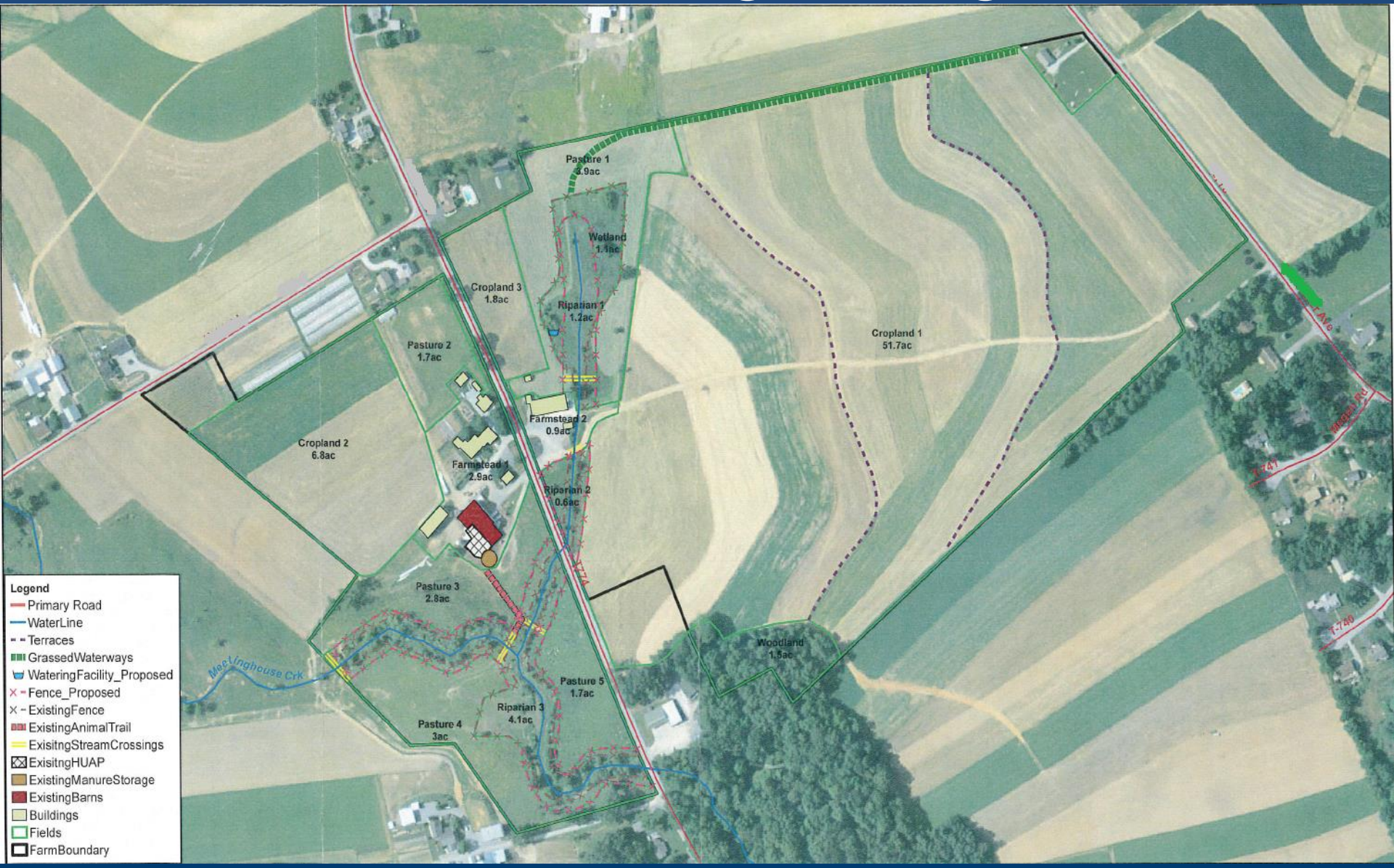
- **Milk Production**
- **Herd Health**
  - **Infectious Disease**
  - **Hoof Problems**

Happy & Healthy Cows

What Are Your Goals?

- Reduce:
  - Sediment
  - Pathogens
  - Nitrogen and Phosphorous Pollution
  - Flooding & Excessive Runoff
- Removal of Impaired Status – Clean Water Act
- Wild Trout

Typical Farm Project
How Much Change is Enough?



How Many Farms is Enough?

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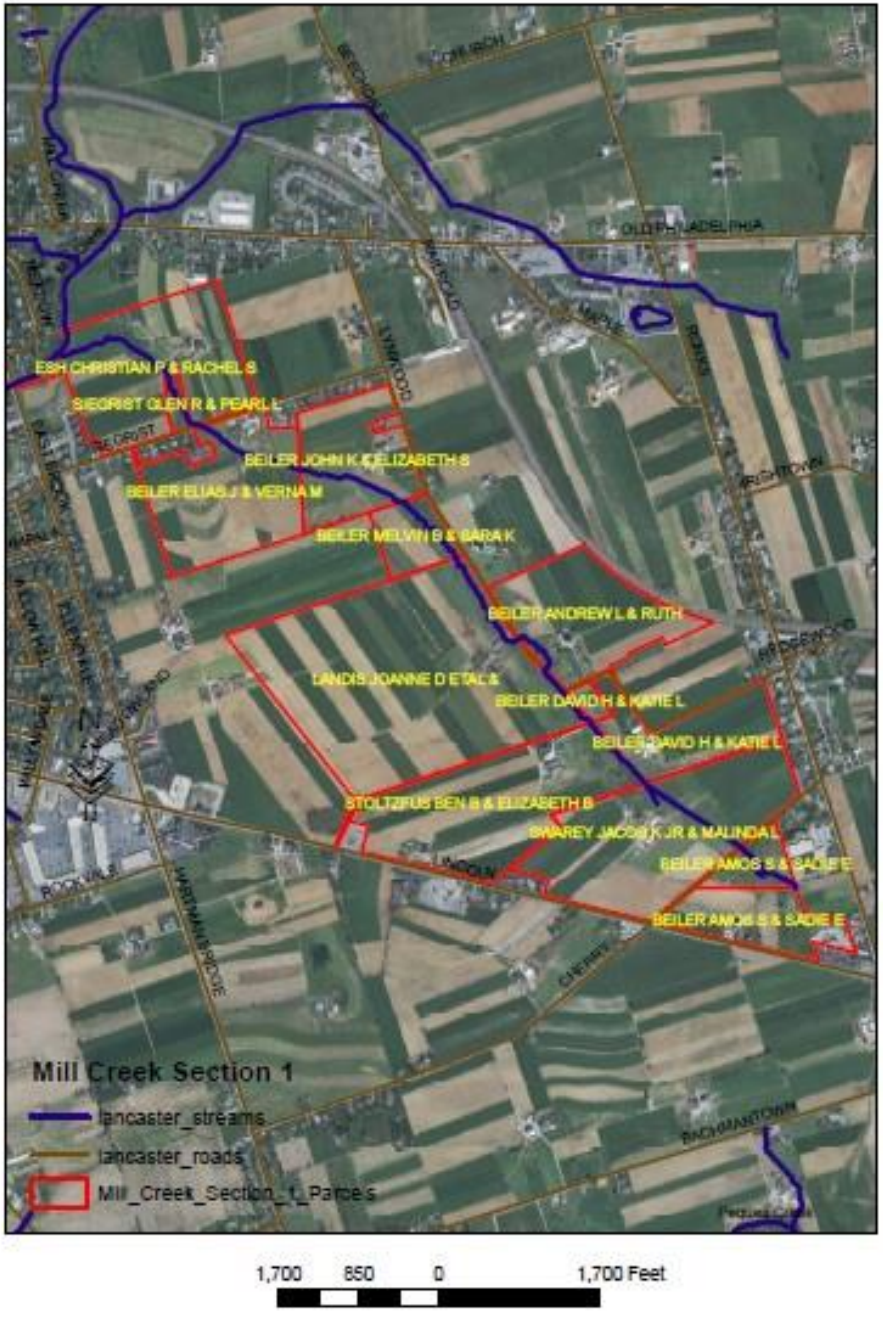
Lancaster Mill Creek Section 1



13 Parcels
11 farms

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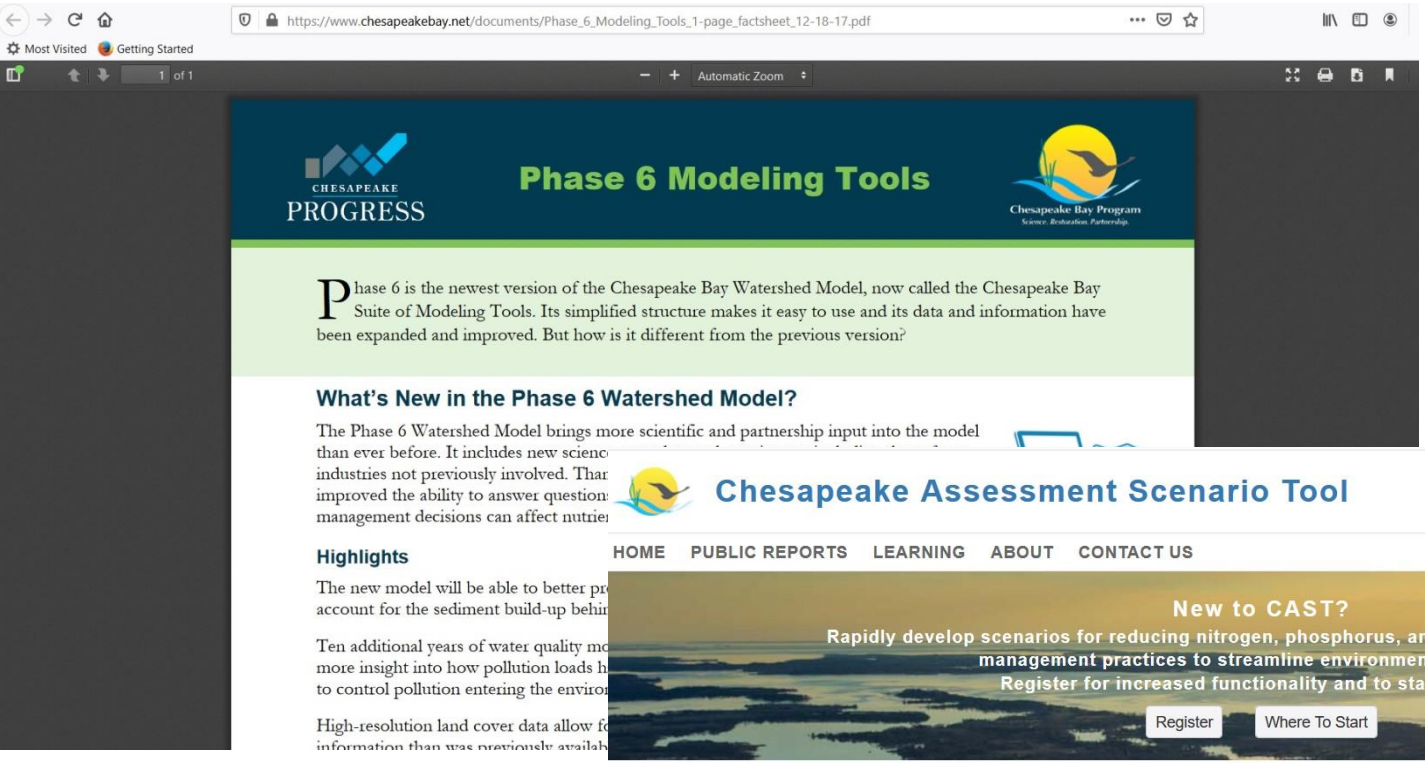
The Role of Modeling



RESOURCES

DEVELOP A PLAN

Get answers to your questions about how to use CAST to develop a plan.

Develop A Plan

SOURCE DATA

Download data tables including information on load sources and agencies, BMPs, animals, geographic references and delivery factors.

View Source Data

BMPS

View information on best management practices (BMPs) including calculations, a quick reference guide, and protocol and expert panel reports.

Learn More

MAP TOOLS & SPATIAL DATA

View geographical information and shapefiles.

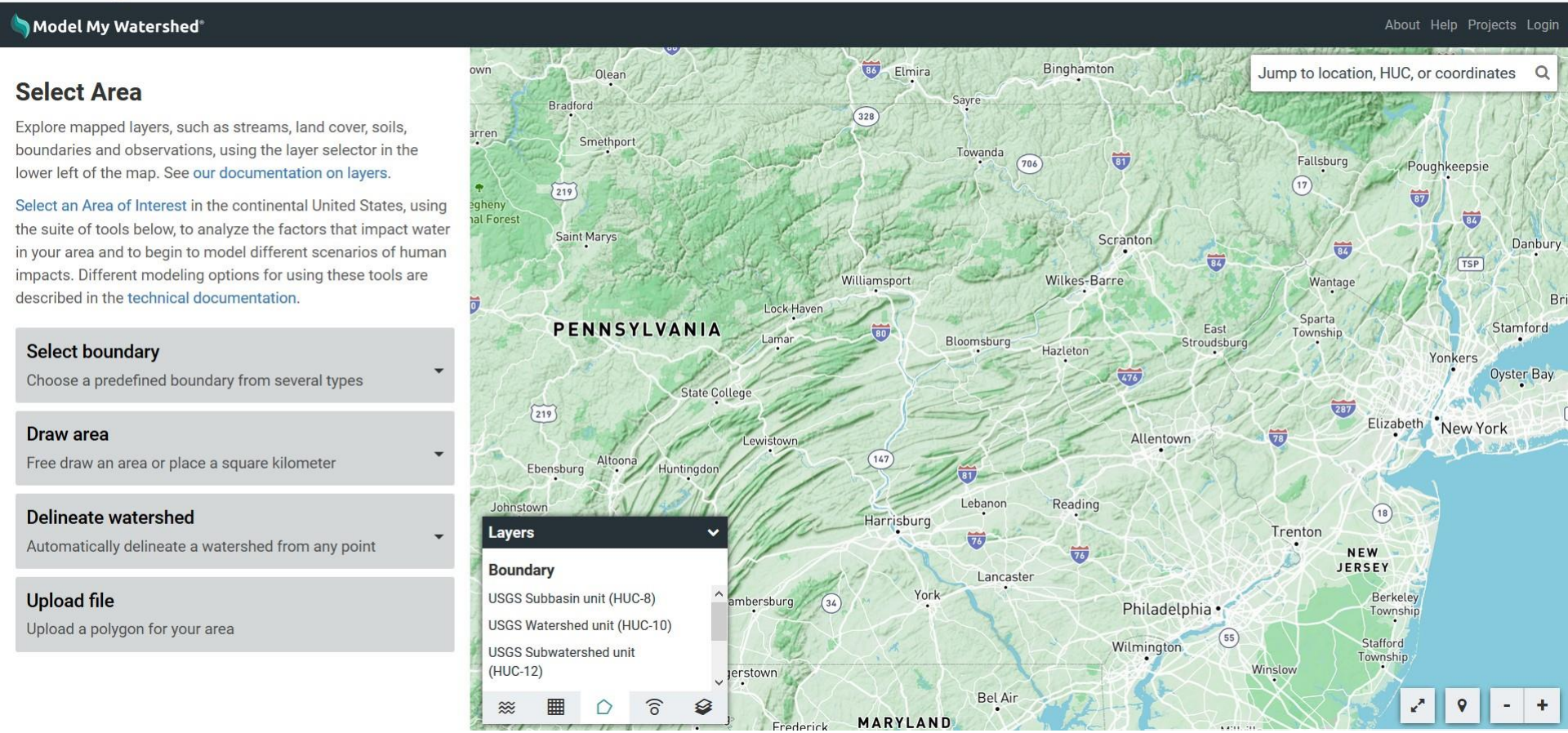
COSTS

Download BMP costs data and view cost profiles for each state and Chesapeake Bay

TRACK TMDL PROGRESS

View helpful information on verification, river trends, how to submit progress data via

Model My Watershed



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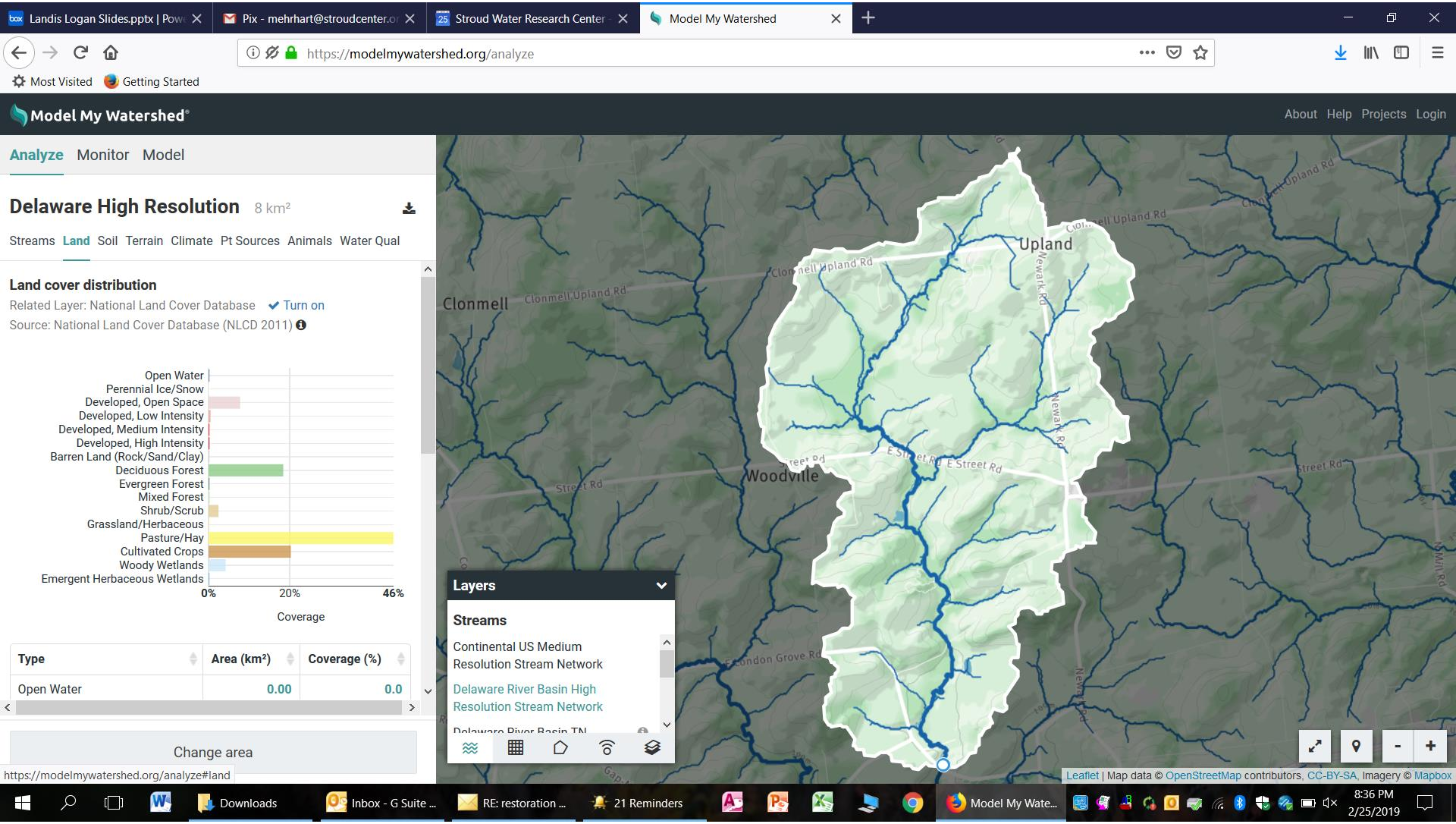

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E London Grove Rd
Spencer Rd
Spencer Rd
McCue Rd
McCue Rd
Google

Landis Logan Slides.pptx | Pow | Pix - mehrhart@stroudcenter.or | Stroud Water Research Center | Model My Watershed

https://modelmywatershed.org/project/

Most Visited | Getting Started

Model My Watershed

About Help Projects Login

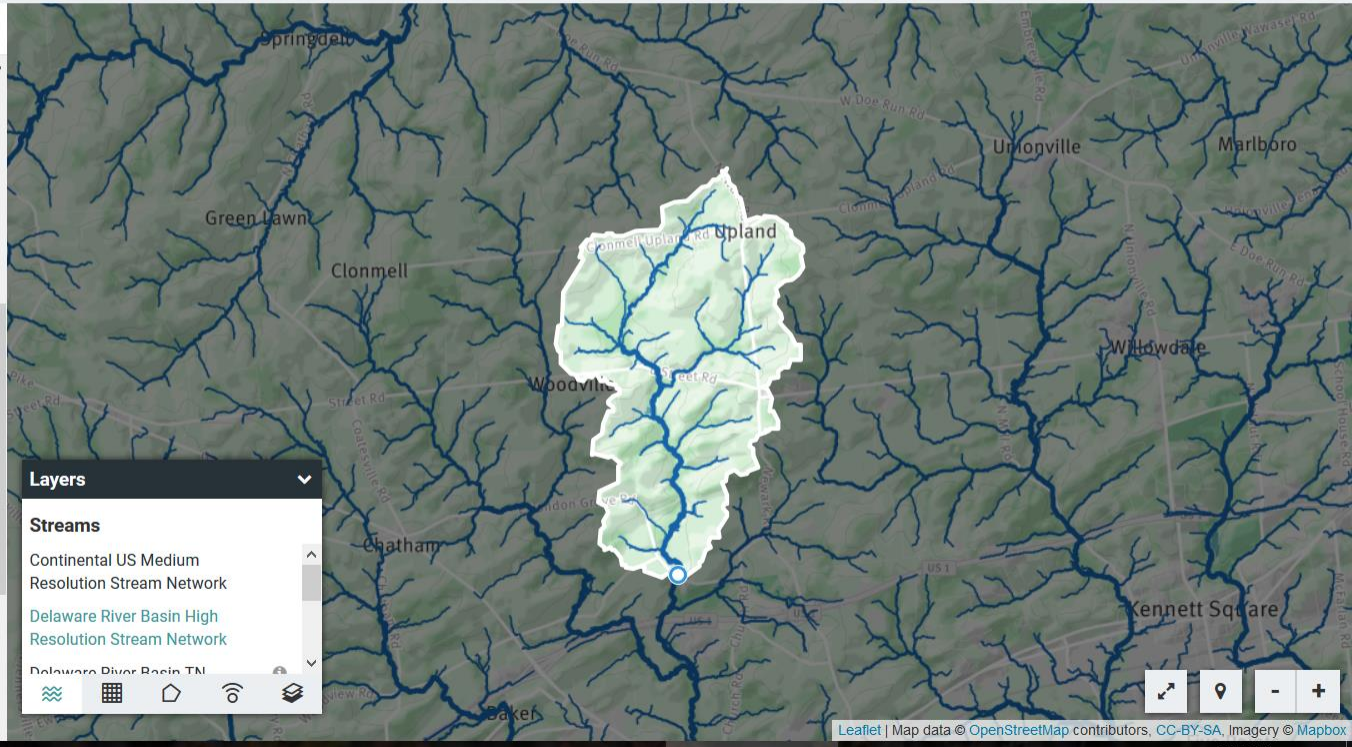
Untitled Project | Details | Analyze | Monitor | Model | New Project

Current Conditions

Export GMS | Add changes to this area

Hydrology | Water Quality

Sources	Sediment (kg)	Total Nitrogen (kg)	Total Phosphorus (kg)
Hay/Pasture	57,209.4	252.2	98.1
Cropland	369,987.6	1,285.0	429.5
Wooded Areas	558.7	8.1	0.9
Wetlands	150.1	13.4	0.8
Open Land	101.3	1.5	0.1
Barren Areas	0.0	0.0	0.0
Low-Density Mixed	45.3	1.0	0.1
Medium-Density Mixed	14.7	0.2	0.0
High-Density Mixed	0.0	0.0	0.0
Low-Density Open Space	729.3	15.5	1.7
Farm Animals	0.0	966.6	220.9
Stream Bank Erosion	33,401.0	21.0	9.0
Subsurface Flow	0.0	13,049.1	116.9
Point Sources	0.0	23.4	3.0



Downloads | Inbox - G Suite ... | RE: restoration ... | 21 Reminders | Model My Wate... | 8:37 PM 2/25/2019

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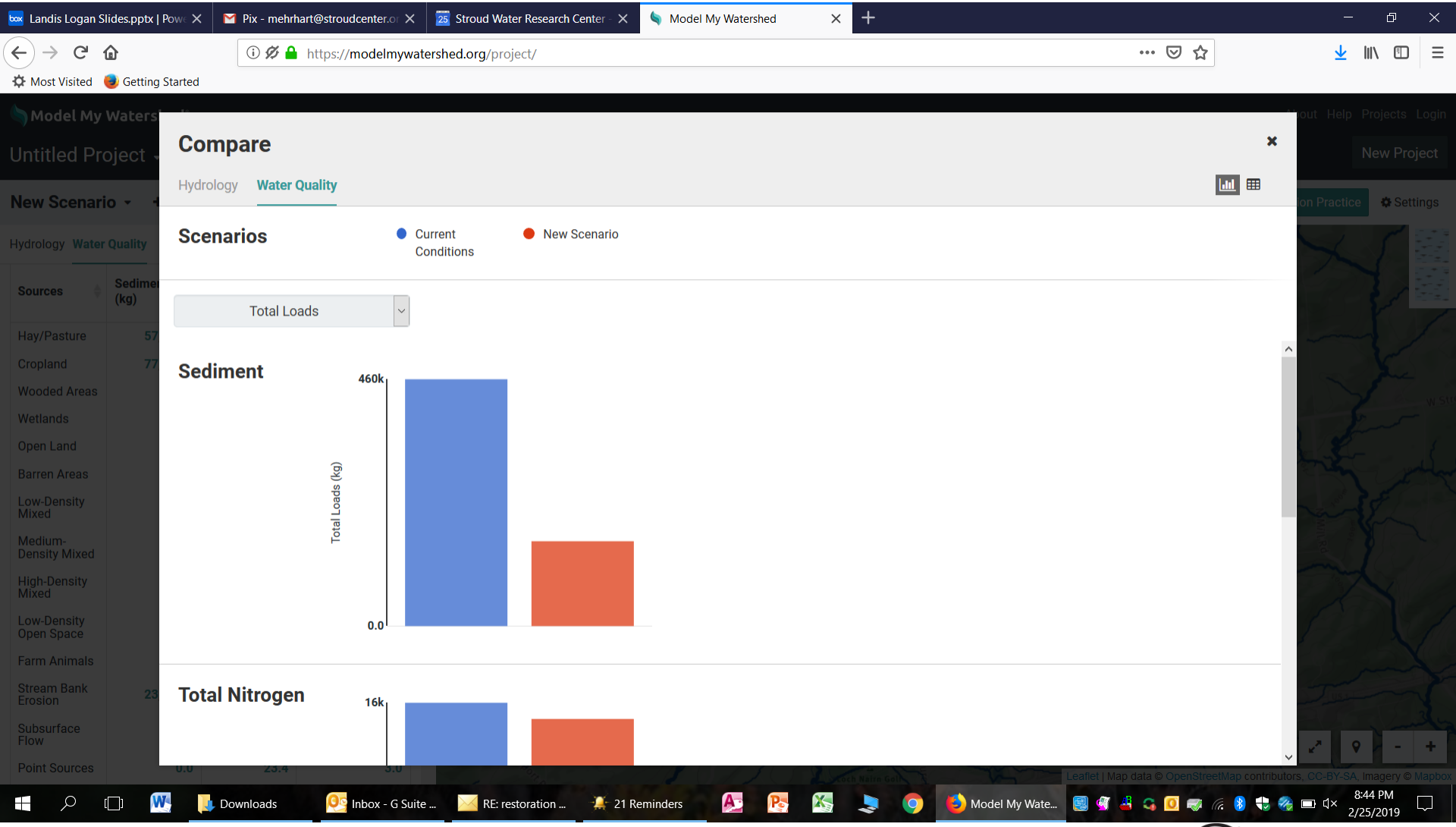

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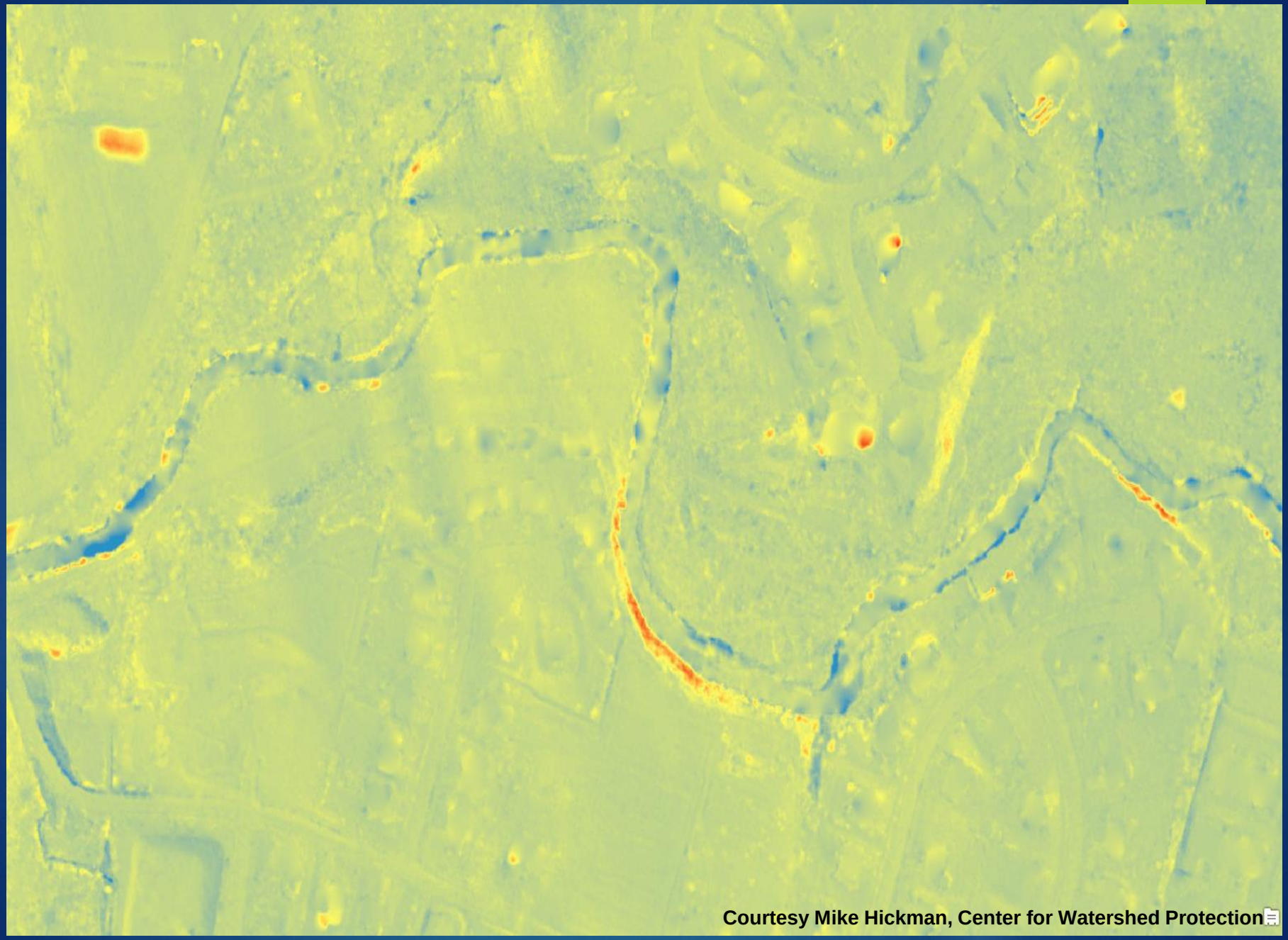
E London Grove Rd
Spencer Rd
Spencer Rd
McCue Rd
McCue Rd
Google



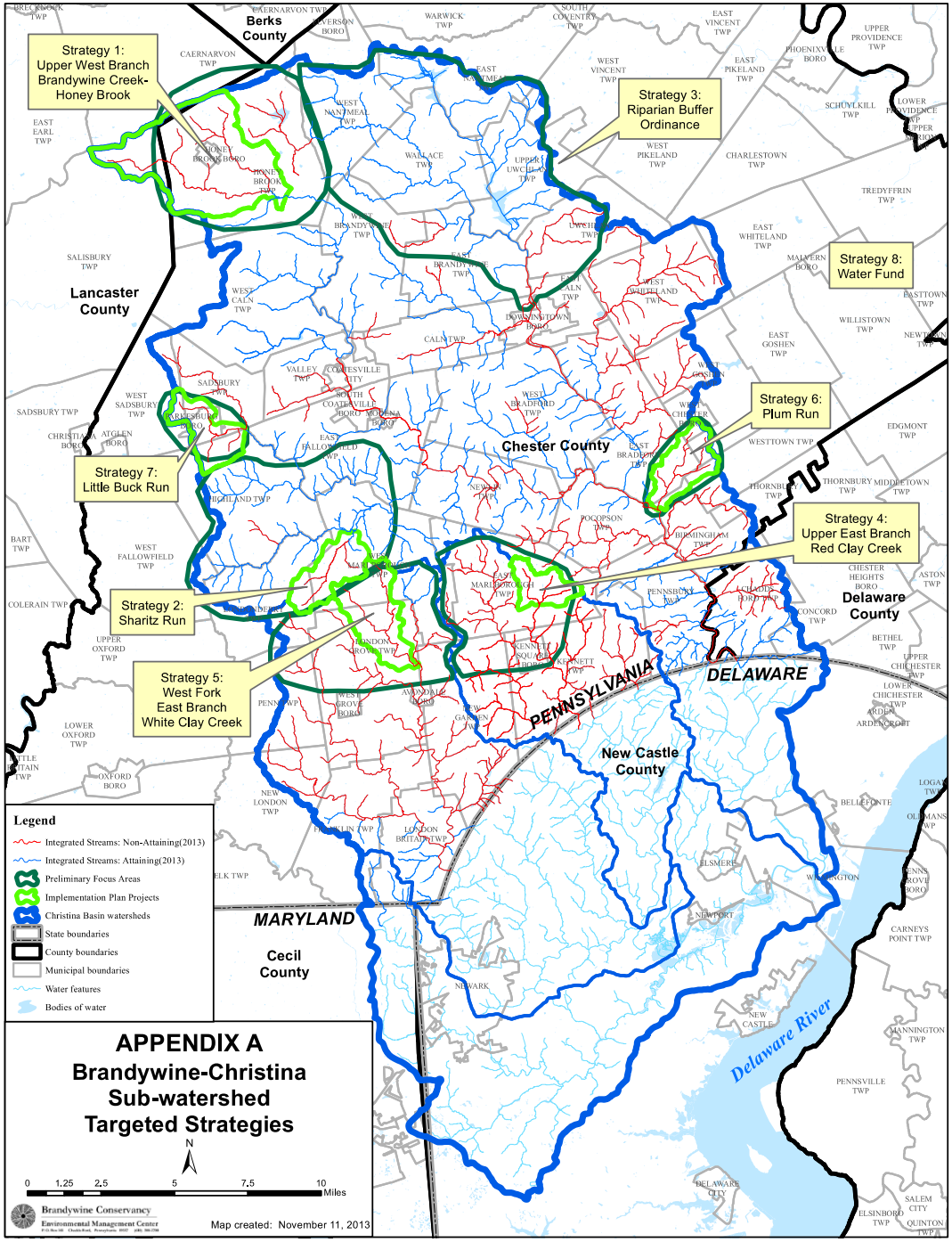
Courtesy Mike Hickman, Center for Watershed Protection

MapShed PRP Default Rate, BANCS Results, and DEM Differencing

BMP Number	Default Rate Estimated in TMDL Plan at 115 lb/ft (tons/yr)	BANCS Method (tons/yr)	Watershed DEM Differencing Erosion ± Error (tons/yr)	Watershed DEM Differencing Erosion Error Percentage (%)
4	57.5	18.6	6.1 ± 2.4	39.4%
5	66.1	68.9	9.5 ± 2.0	20.8%
9	193.7	206.9	33.4 ± 12.6	37.8%
10	115.0	62.7	-72.2 ± -13.9*	-19.3%*
12	103.5	25.8	10.2 ± 2.8	27.2%

*Net Deposition

Courtesy Mike Hickman, Center for Watershed Protection



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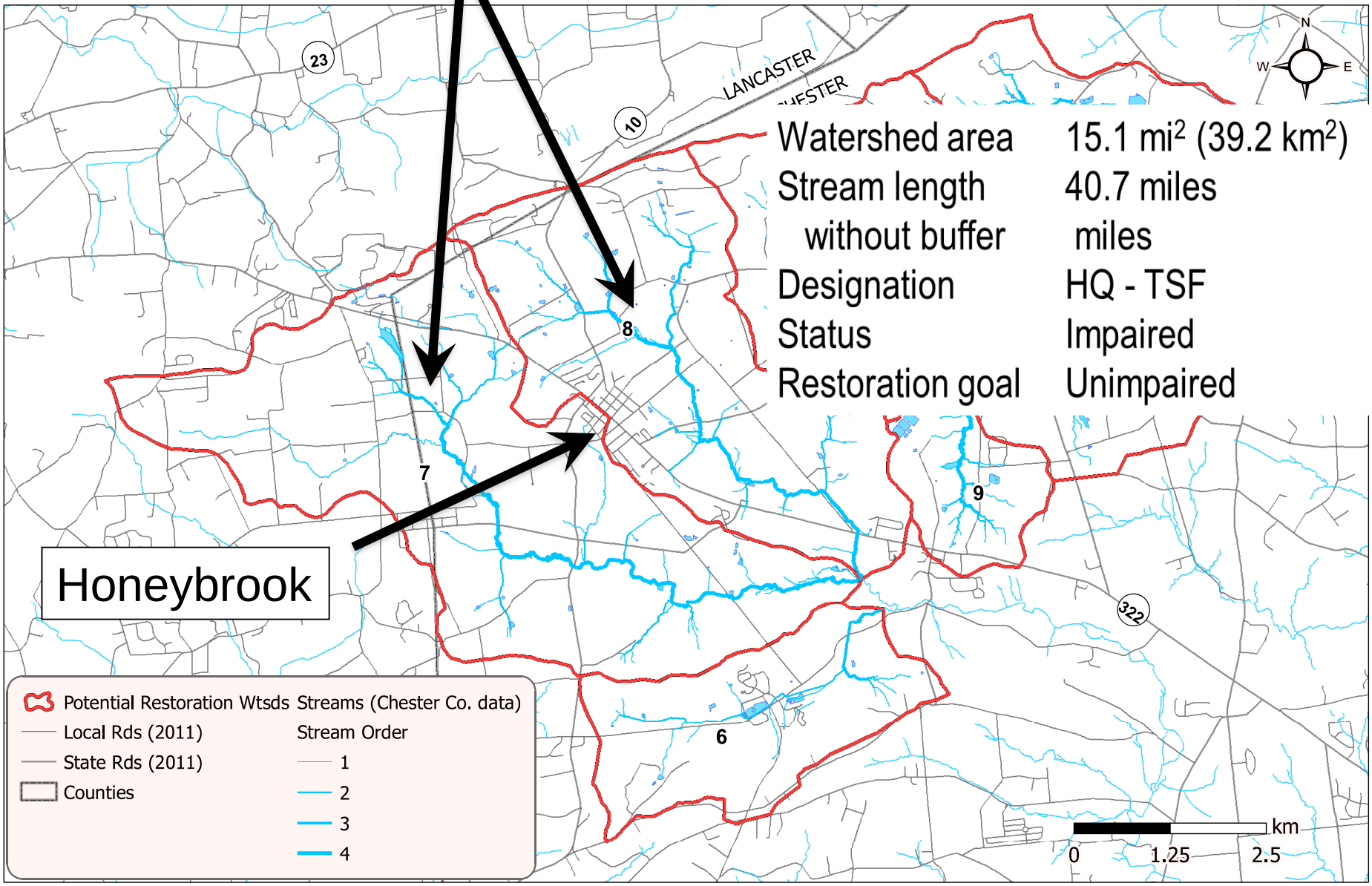
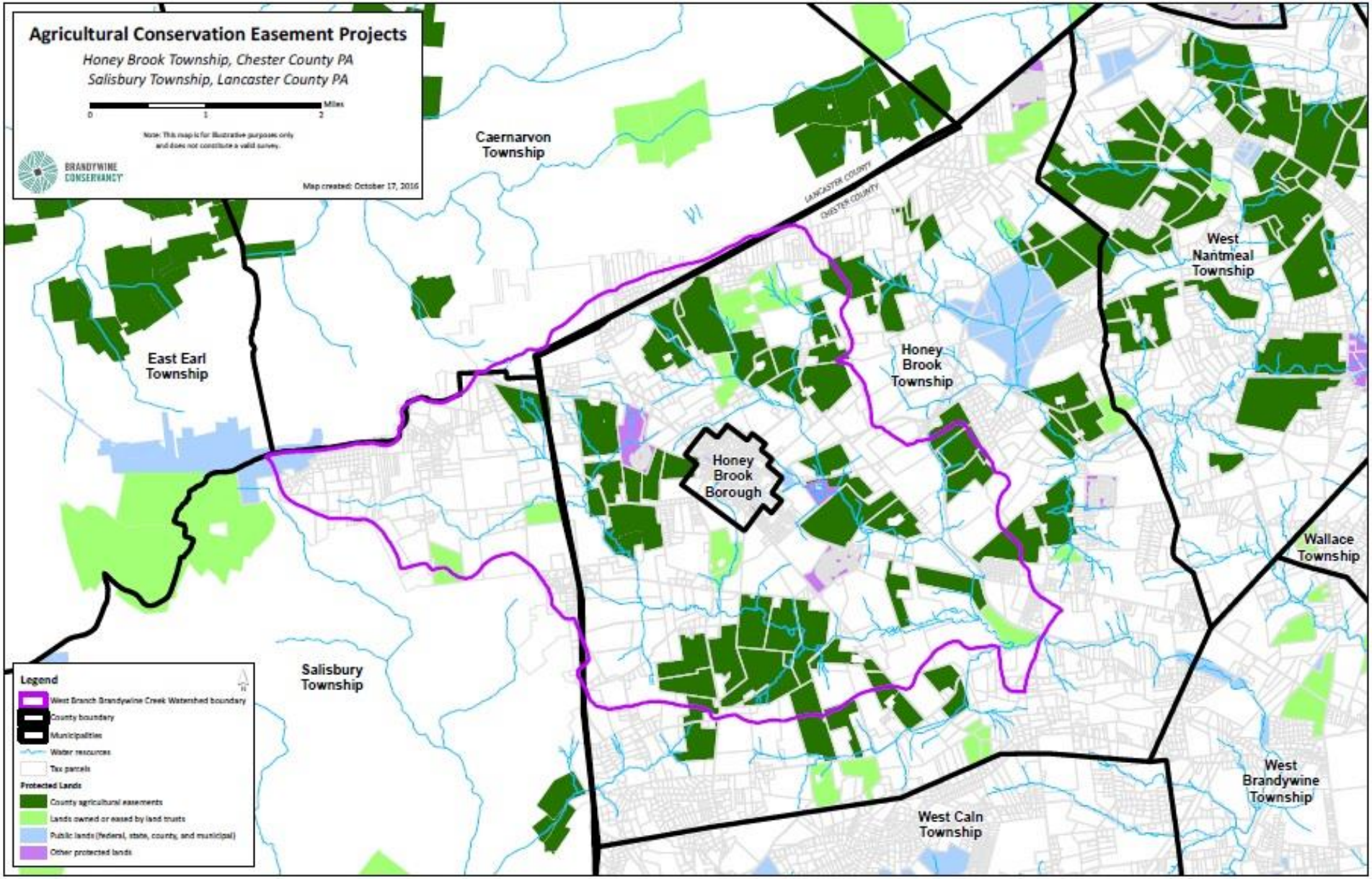
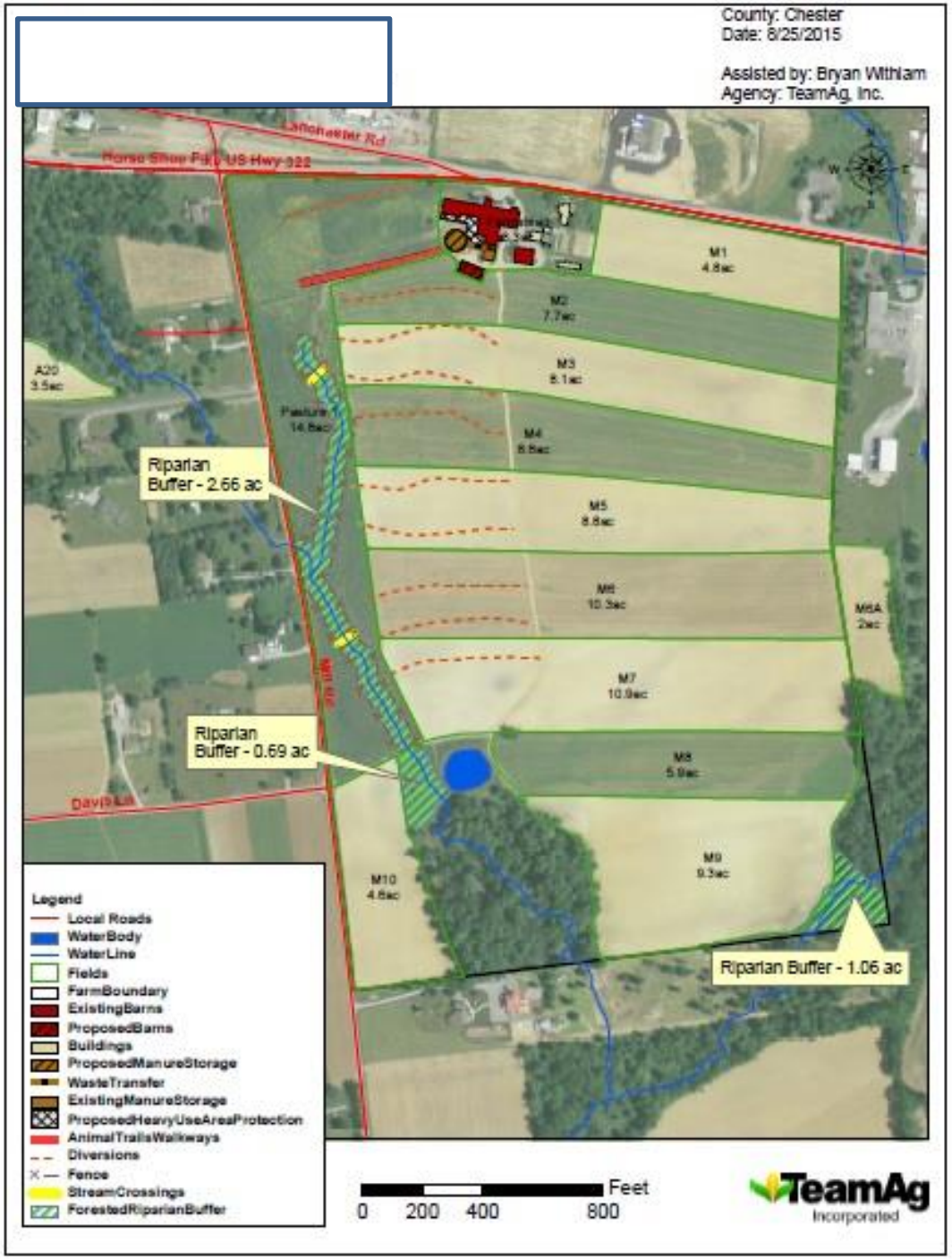
West Branch Brandywine Creek - Honeybrook





STROUD WATER RESEARCH CENTER

Conservation Plan



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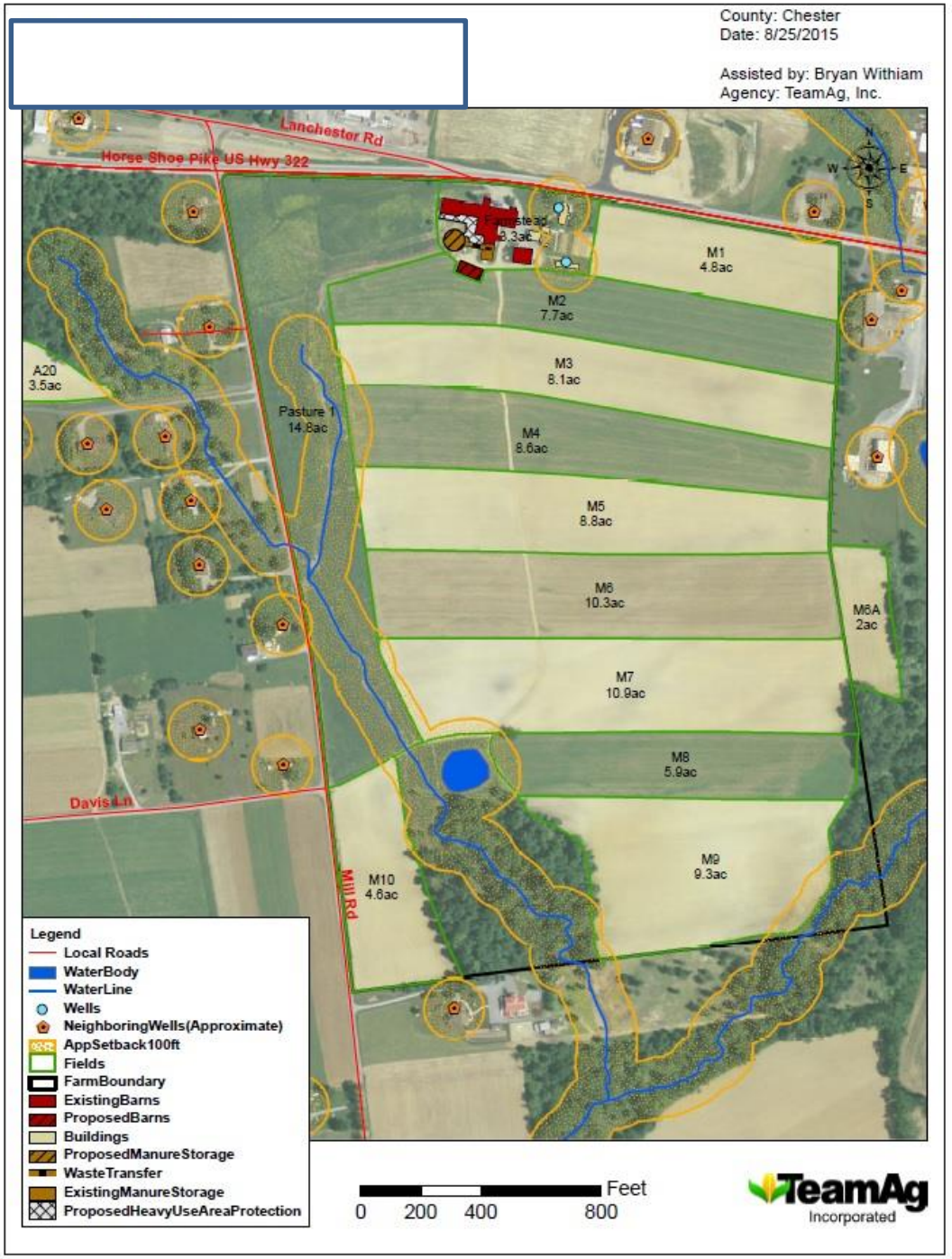
Manure Management Plan



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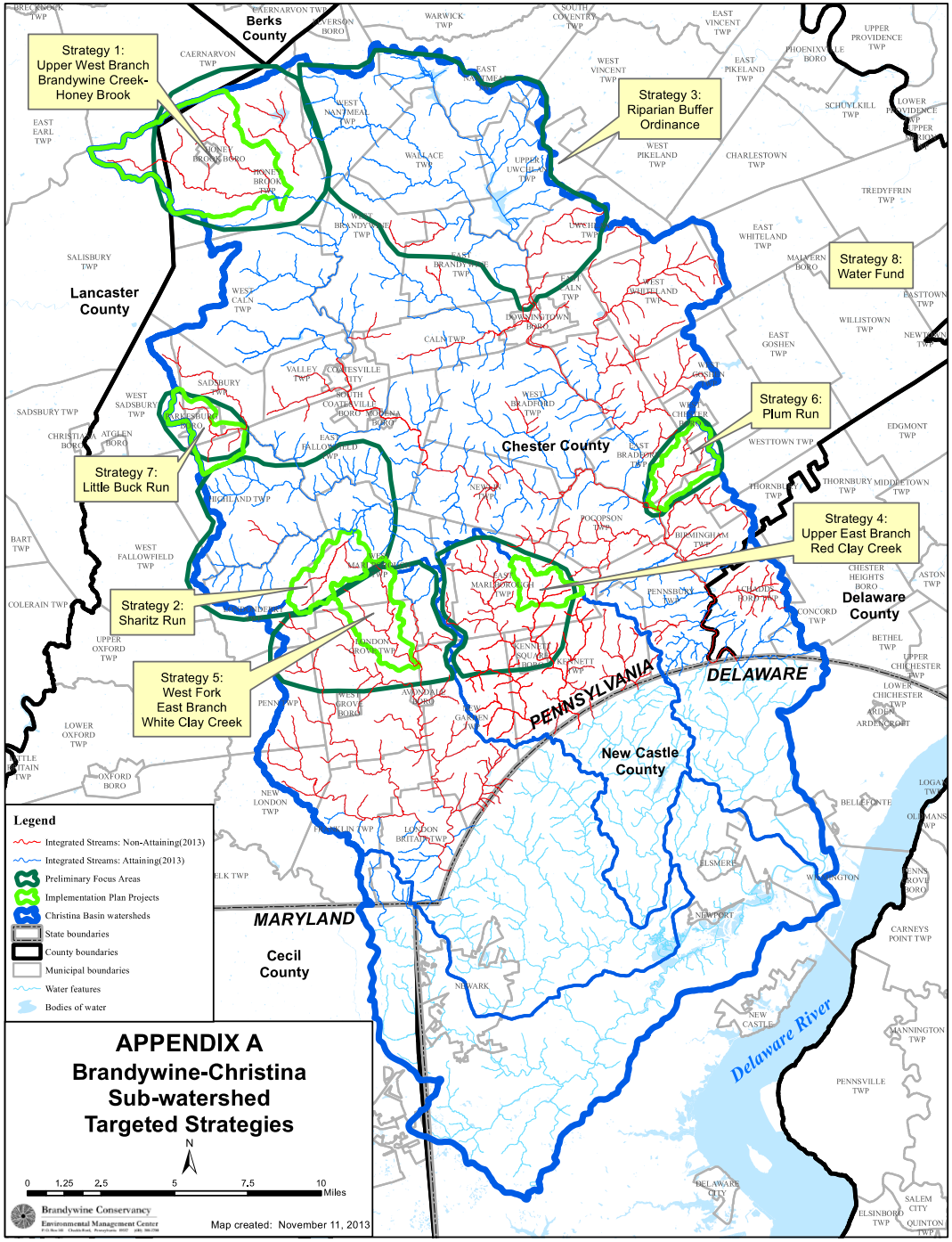

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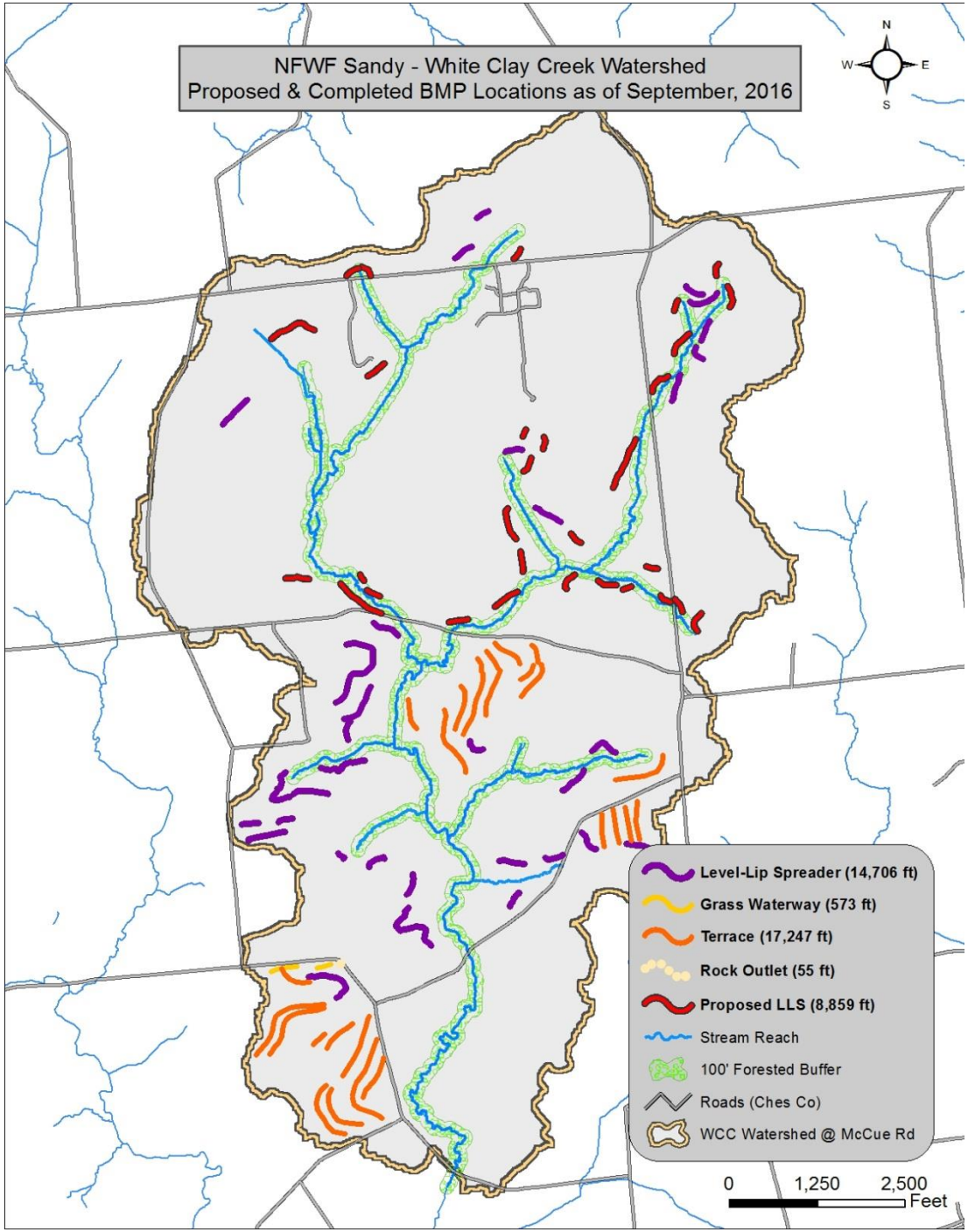

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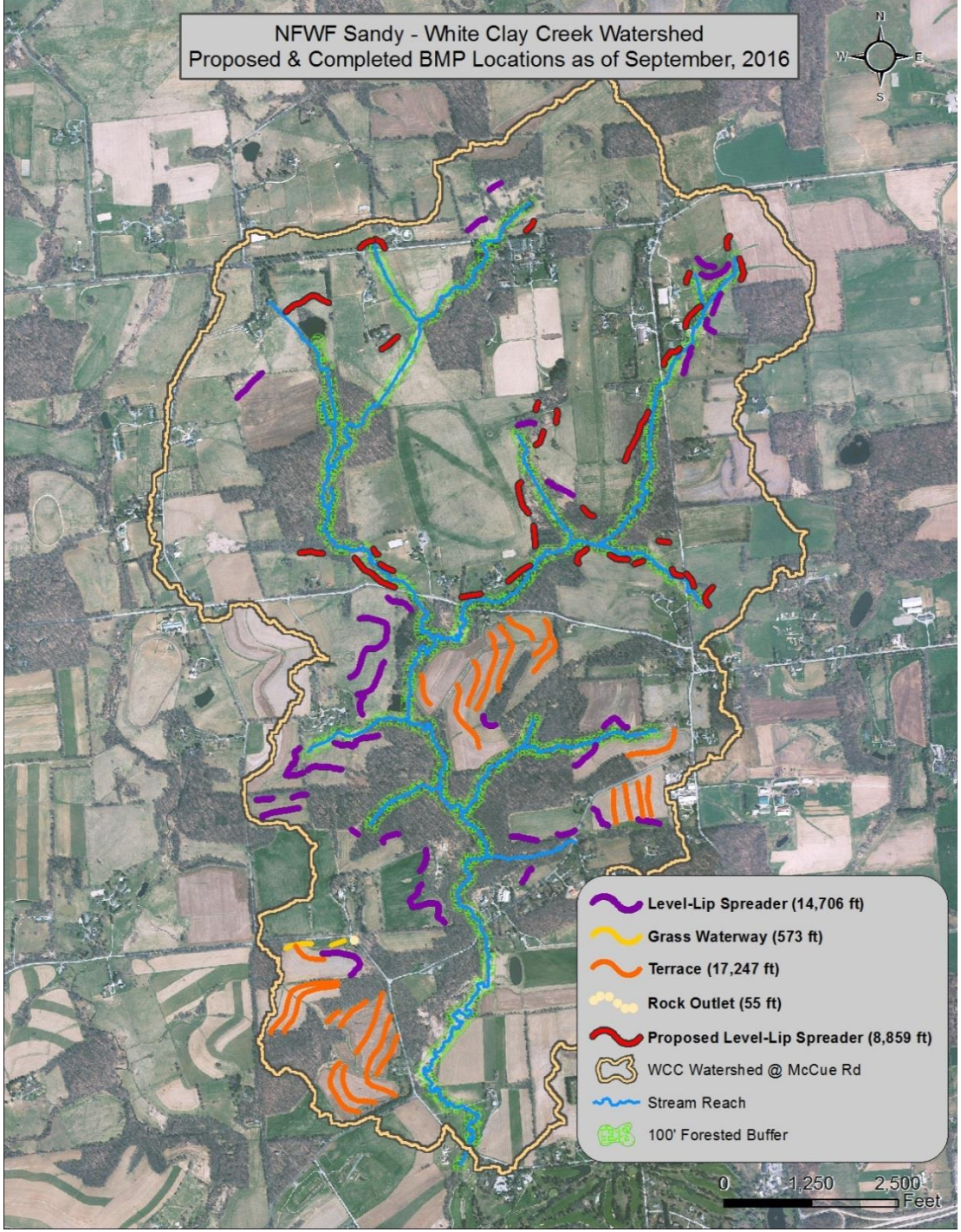

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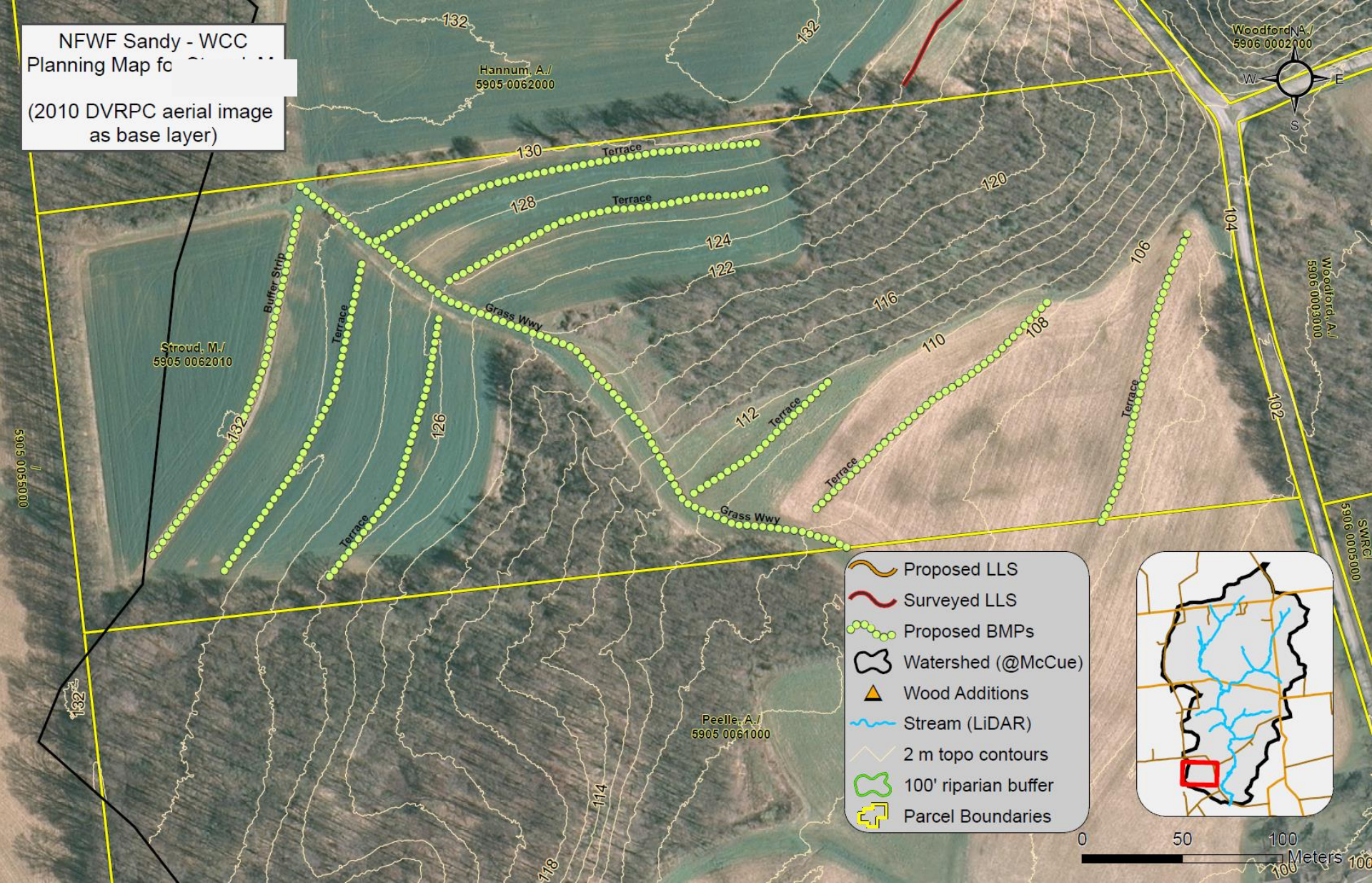
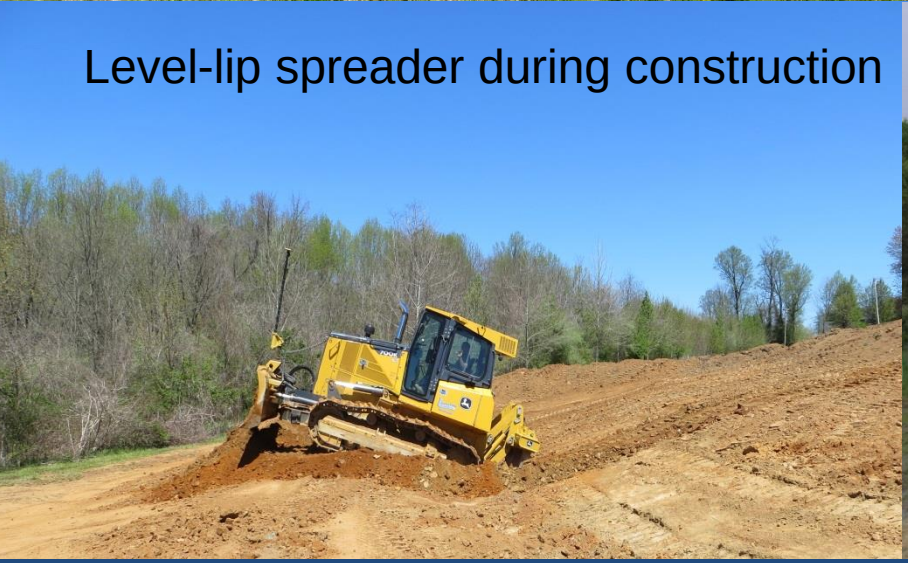


STROUD WATER RESEARCH CENTER

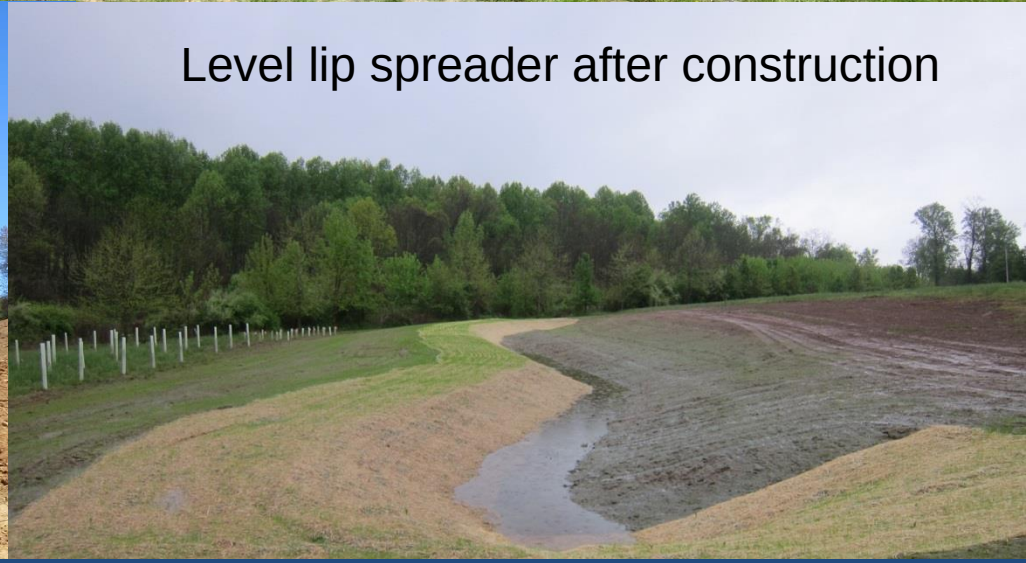
“Level-lip spreader” located behind Stroud Water Research Center before construction

Level-lip spreader during construction

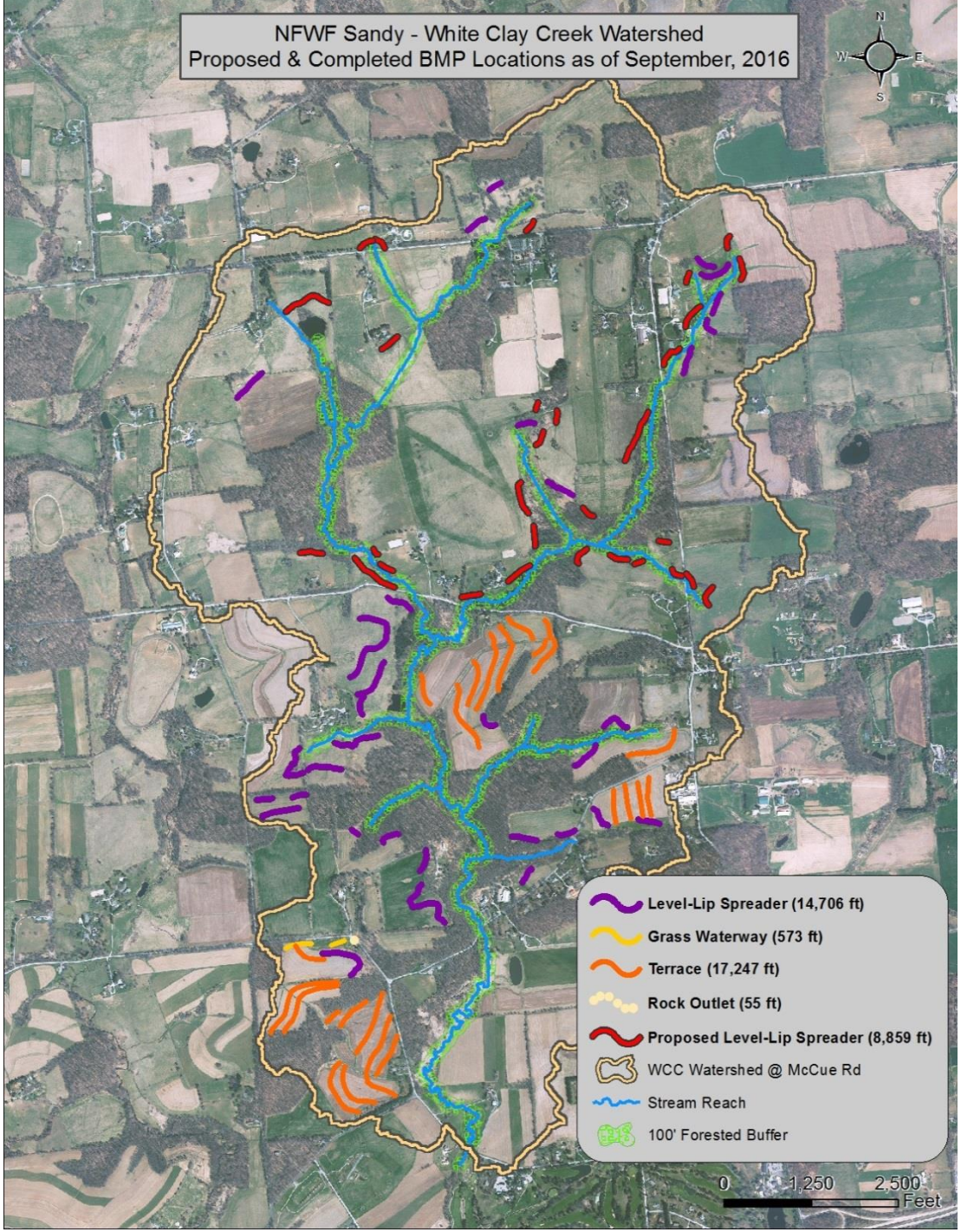
Level-lip spreader during construction



Level lip spreader after construction



“Level-lip spreaders” are shallow conservation swales built along the contour of the slope that collect surface runoff during rainstorms. With most storms the water that is collected will infiltrate into the ground, sediments settle out, and the water flows as groundwater to the stream. In big storms the water will flow over the level-lip evenly into the streamside forest before reaching the stream. Level-lip spreaders help reduce flooding and prevent nutrients and sediments from reaching the stream. These swales are being designed by Chester County Conservation District in partnership with the Stroud Center.

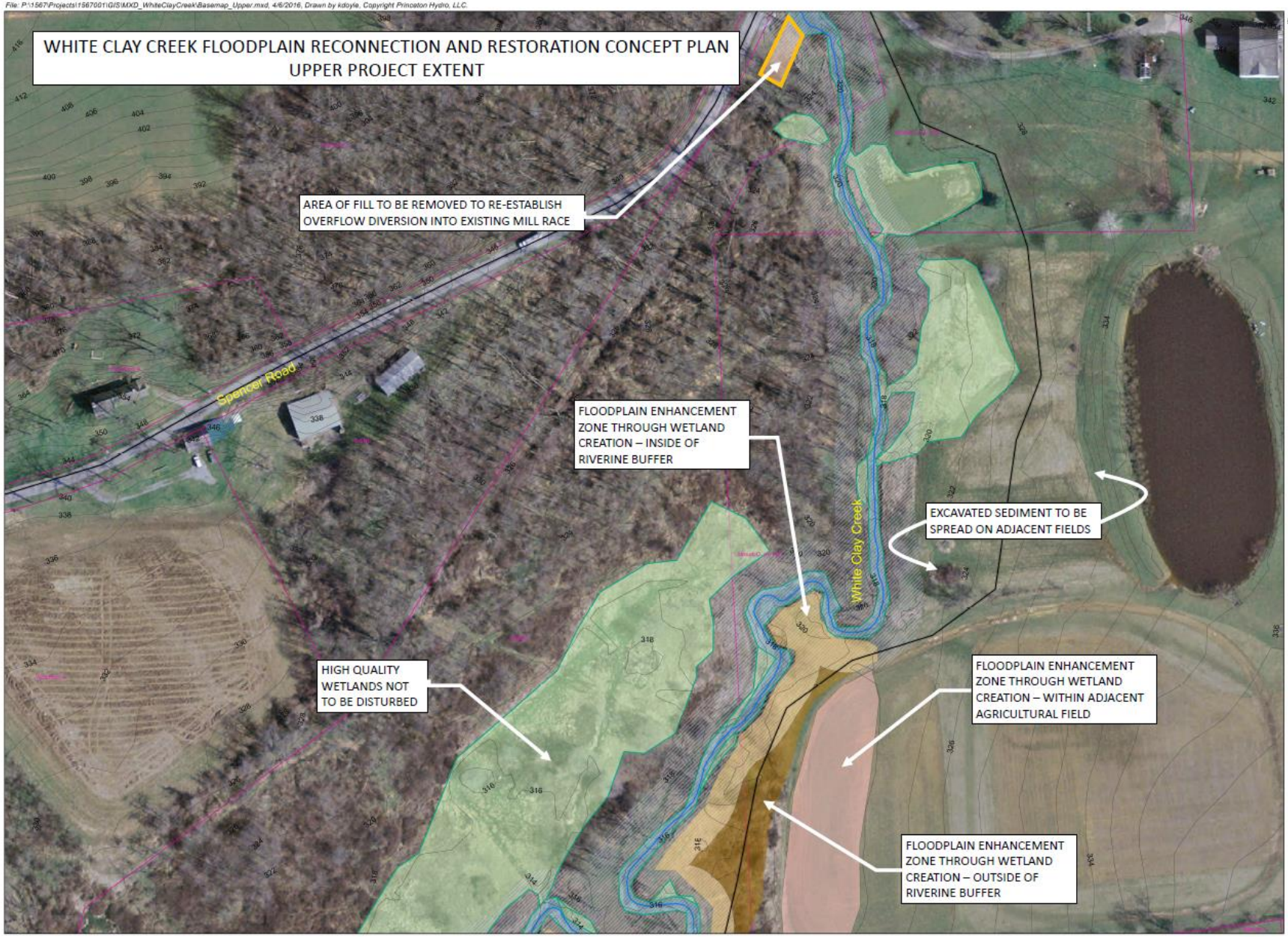


STROUD WATER RESEARCH CENTER


Planted Apr 2007
Photo Aug 2008

Spring 2014

WHITE CLAY CREEK FLOODPLAIN RECONNECTION AND RESTORATION CONCEPT PLAN
UPPER PROJECT EXTENT



PENNSYLVANIA COUNTY MAP

PRINCETON HYDRO, LLC.
1108 OLD YORK ROAD
P.O. BOX 720
RINGOES, NJ 08551
*with offices in NJ, PA and CT

1 inch = 50 feet

0 100 Feet

NOTES:

PROJECT EXTENTS

STROUD RESEARCH CENTER
FLOODPLAIN RECONNECTION AND RESTORATION
WHITE CLAY CREEK
CHESTER COUNTY, PENNSYLVANIA

Legend

- Site Access
- Stream line - from LiDAR
- Wetland Line

Sediment Excavation

- Outside Buffer
- Within Buffer
- Optional
- 50' Stream Buffer

Wetland Areas

Delineation

- Waters
- Wetlands
- Parcels

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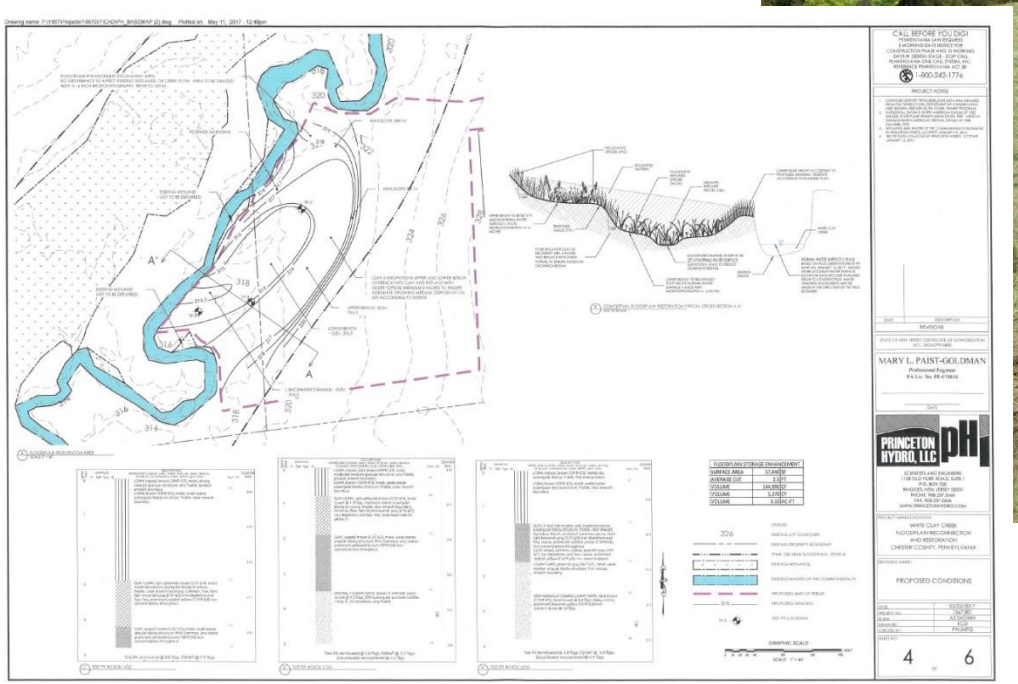
Flood Storage

Level Lip Spreaders and Wetland storage totals over 9,200 m^3 of storage
That's approximately 25% of a 2 inch, 24 hour storm event

How Do Other Factors Impact Flood Storage and Timing?



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Conserving Water Quantity and Quality by Improving Soil Health

Photo: Kelley King, King Photography

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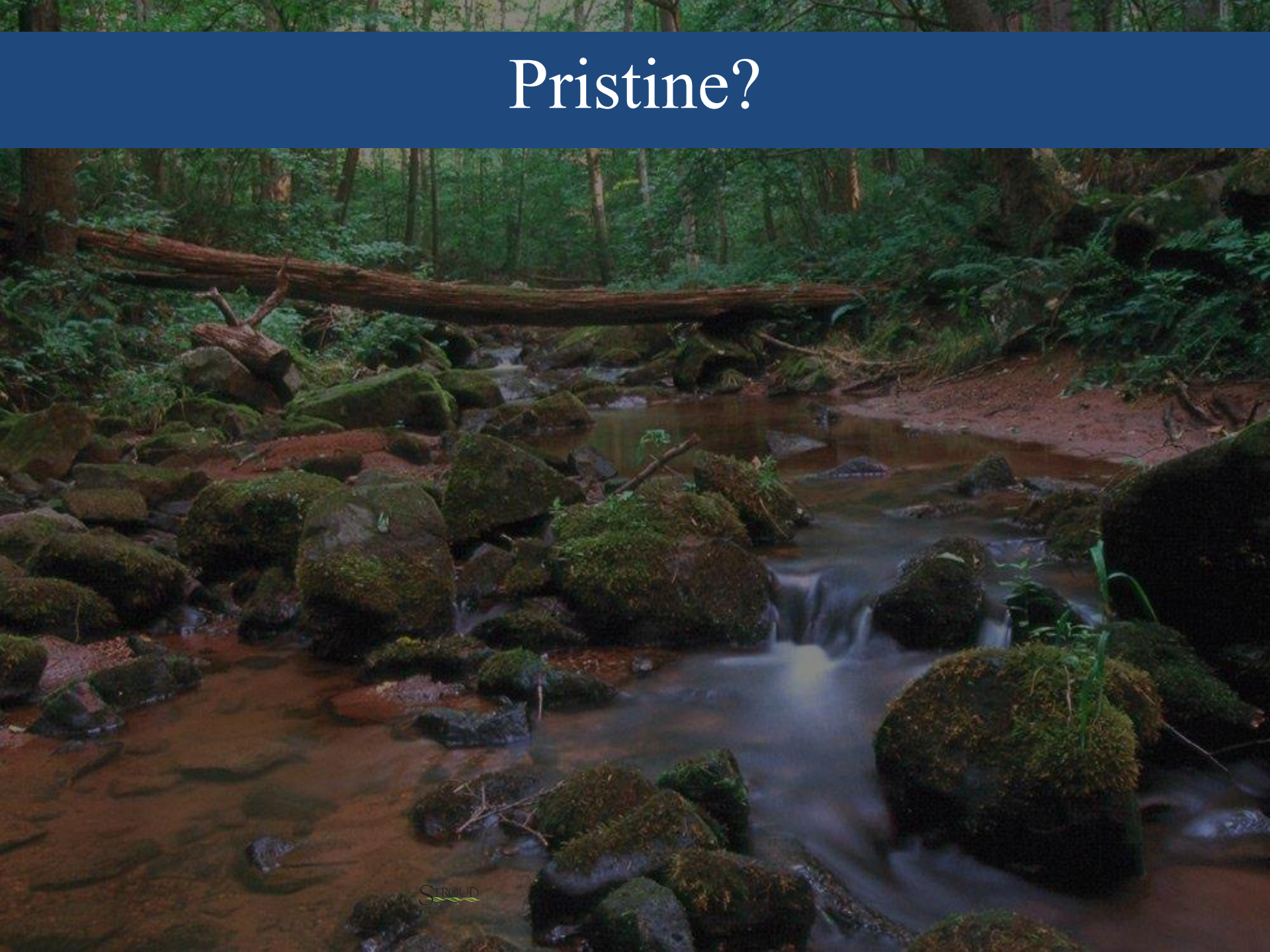
Field 6.1
No cover crop
Field 6.2
Yes cover crop


3x-4x Increase in Water Iinfiltration

Pristine?



What Are Your Goals?

How Do You Achieve Them?

Current Conditions and Progress Toward Restoration Goals

Brandywine Headwaters

White Clay Creek

Red Clay Creek

Plum Run

What Makes the DRWI Unique?

Prioritized Measurable Outcomes

https://vectorcatalyst.ca/what-goal-to-pursue-first-prioritize-your-goals/

What Makes the DRWI Unique?

Prioritized Measurable Outcomes

- Defining and Quantifying Goals
- Aggregating Effort
- Monitoring Progress and Outcomes

What is the Restoration Goal?

Can it be Quantified?

Monitoring

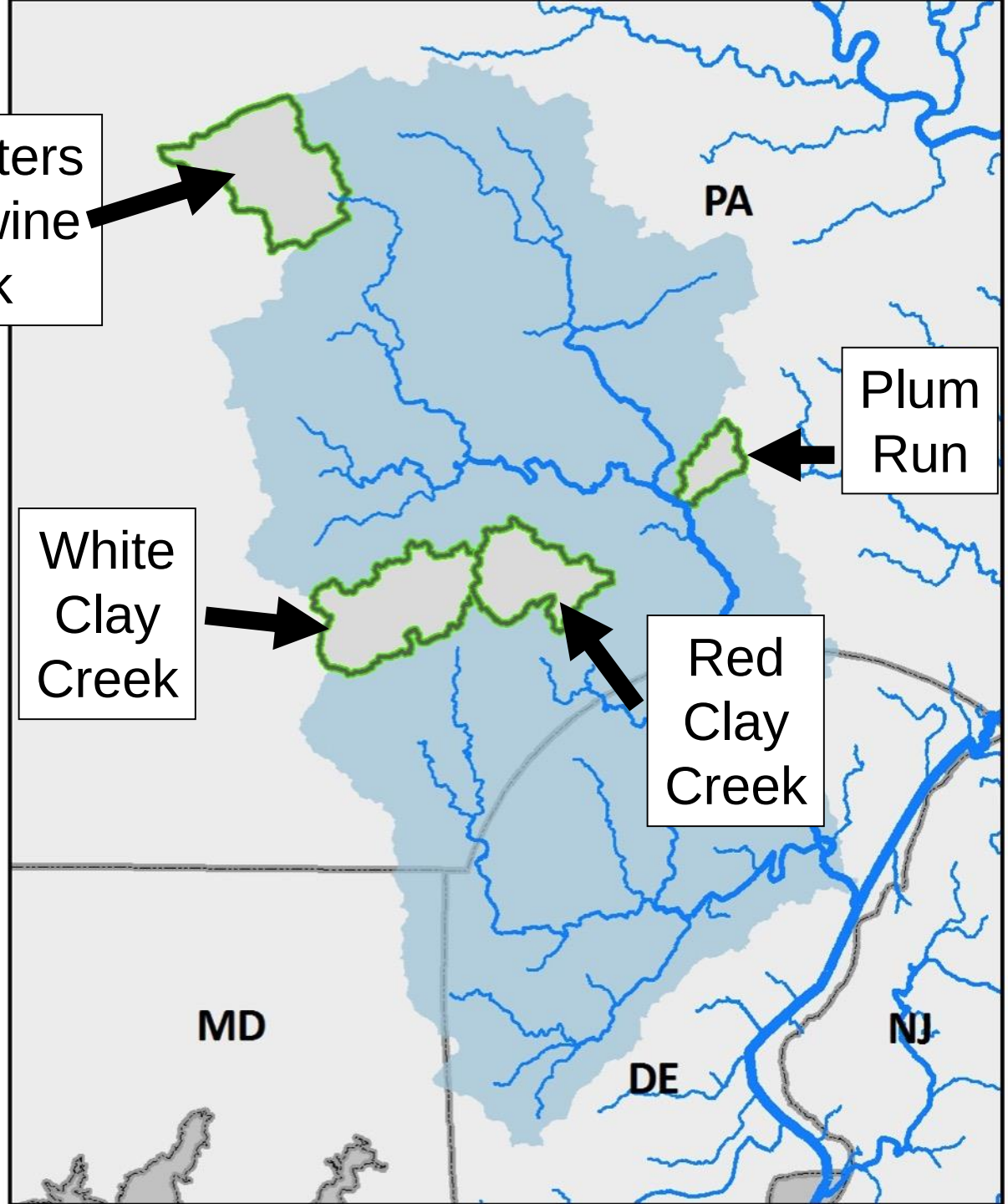
Has the Restoration Goal Been Reached?

What is the Rate of Change?

Before

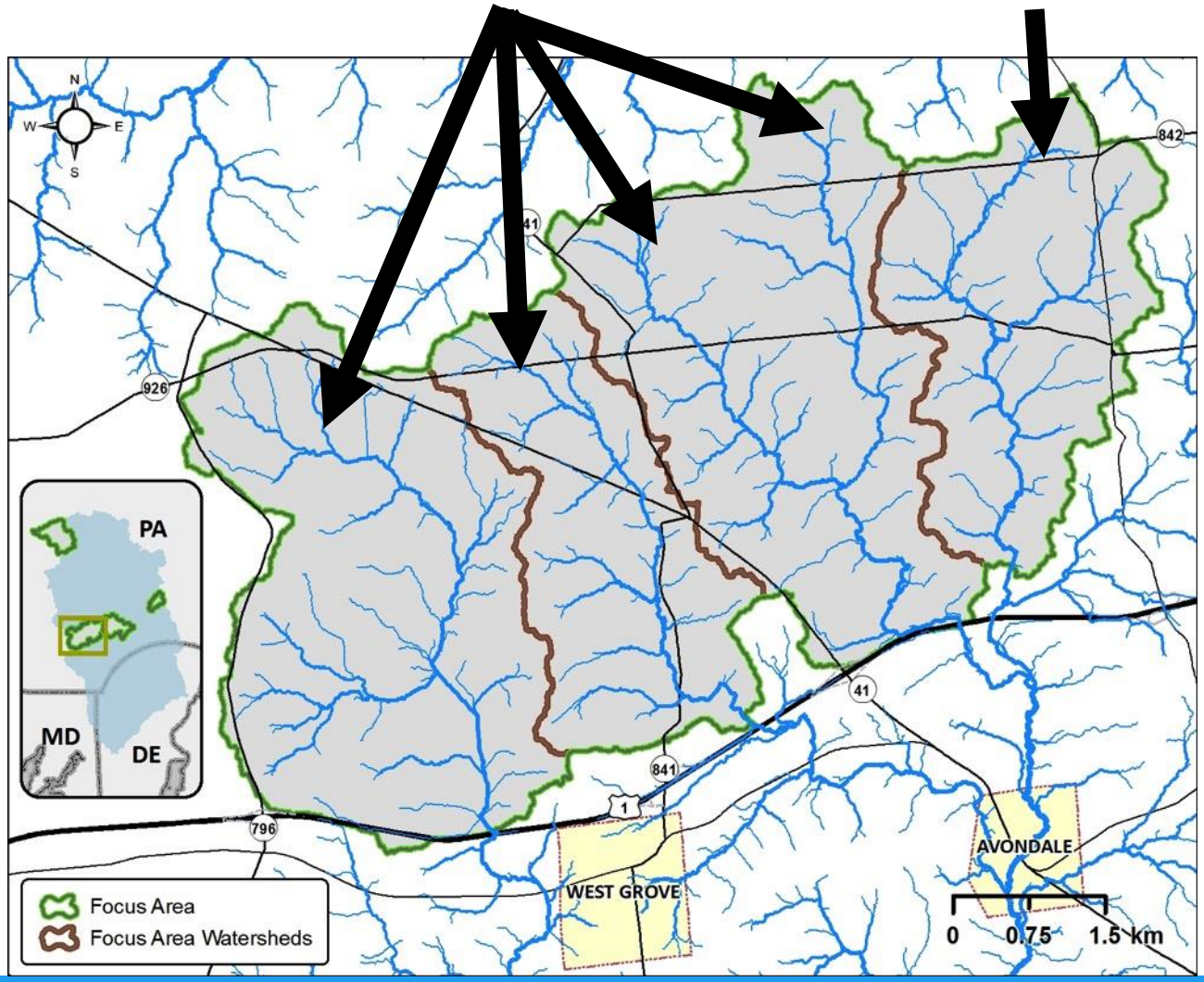
After

Brandywine Christina Cluster



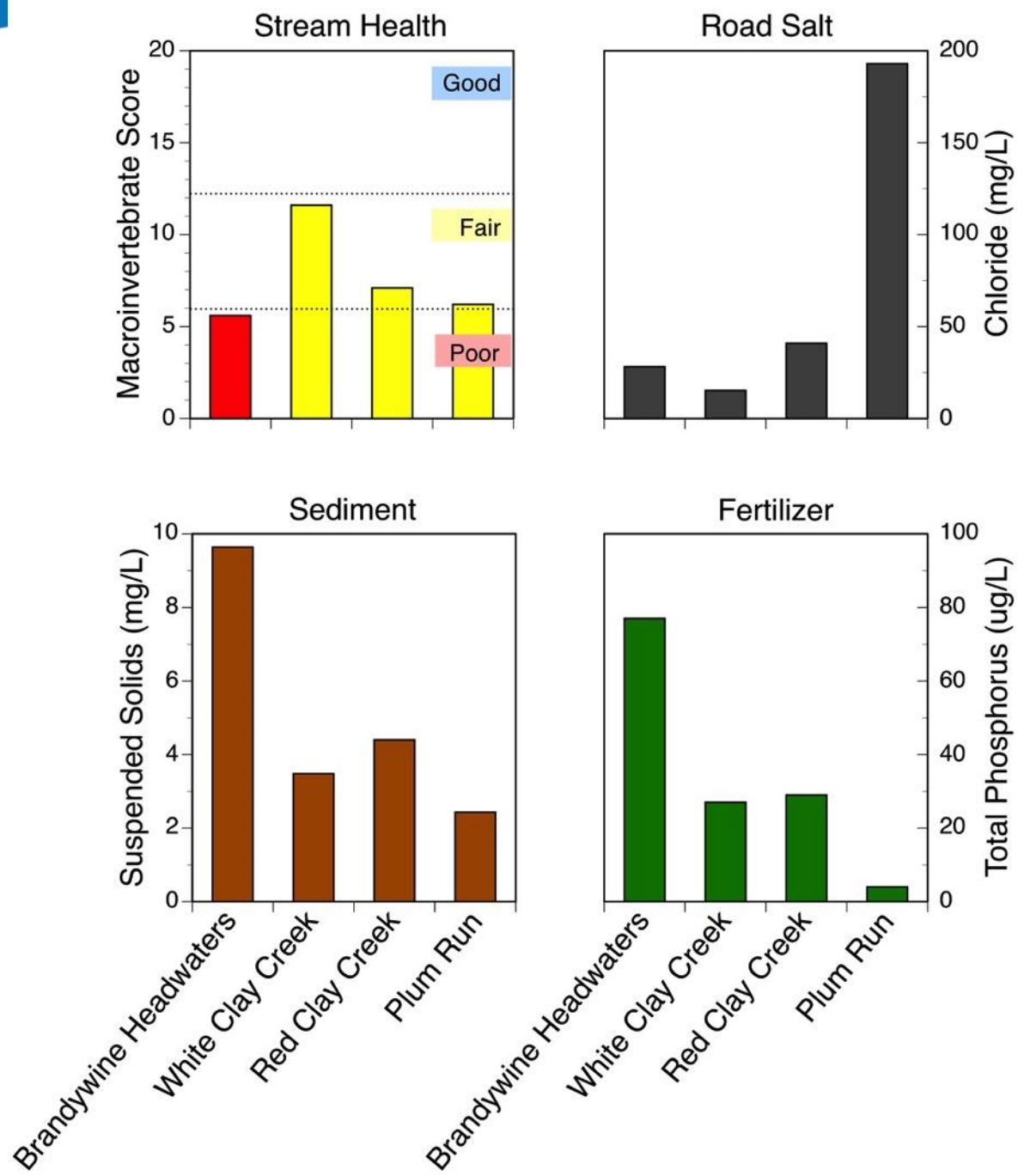
White Clay Restoration Replicates

Restoration Target EV with Wild Trout

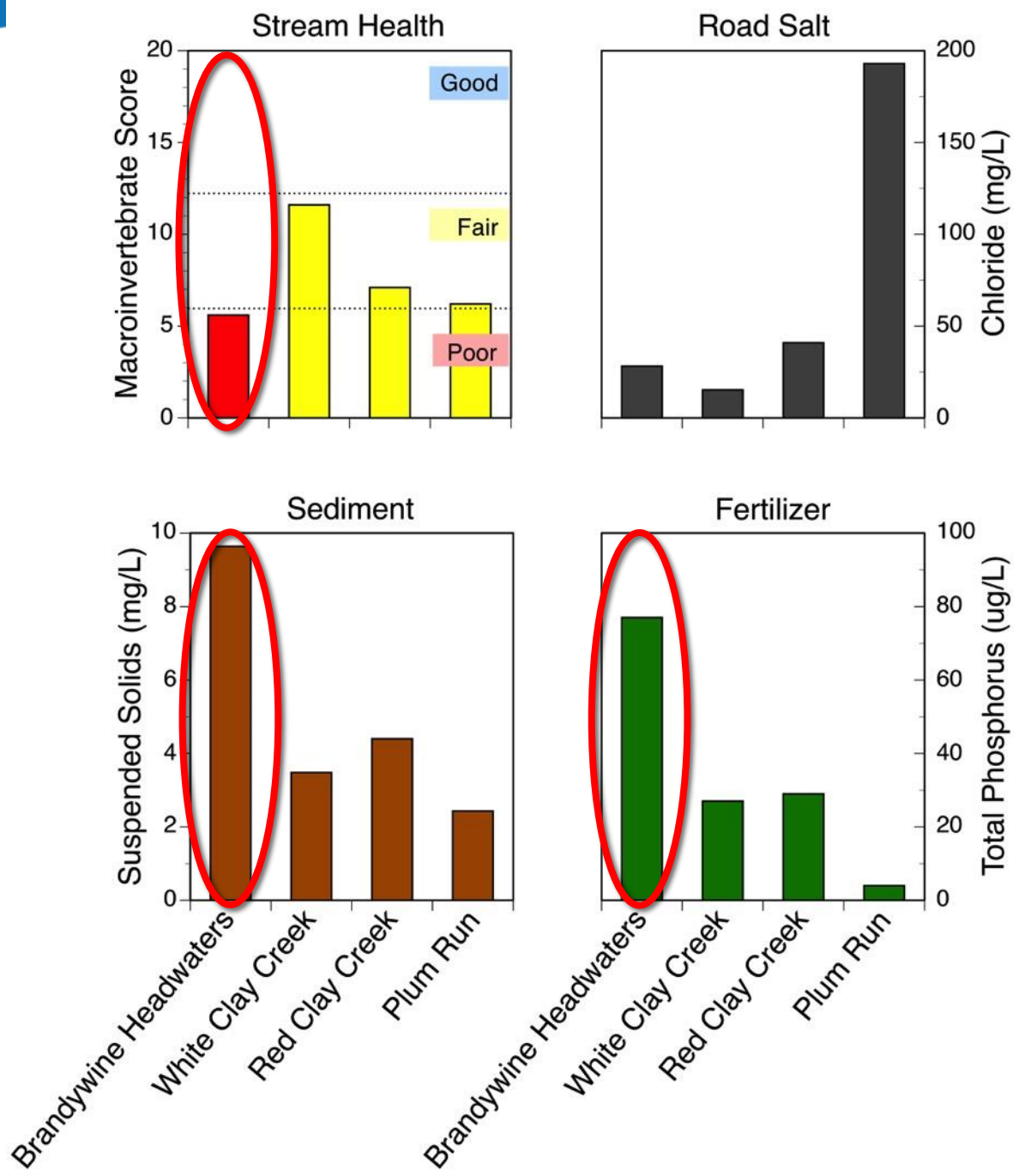


Brandywine Christina Cluster

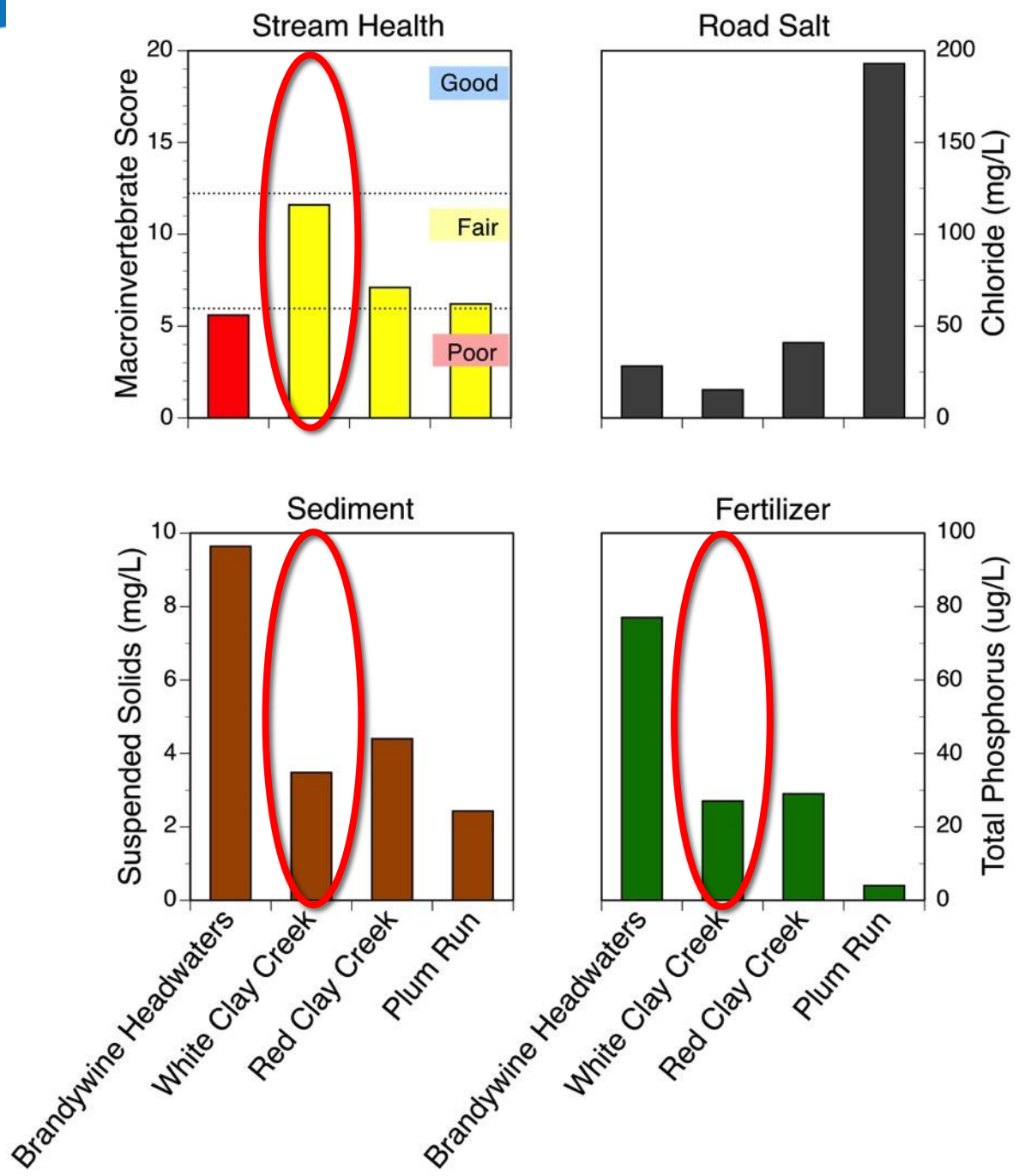
Each focus area is different



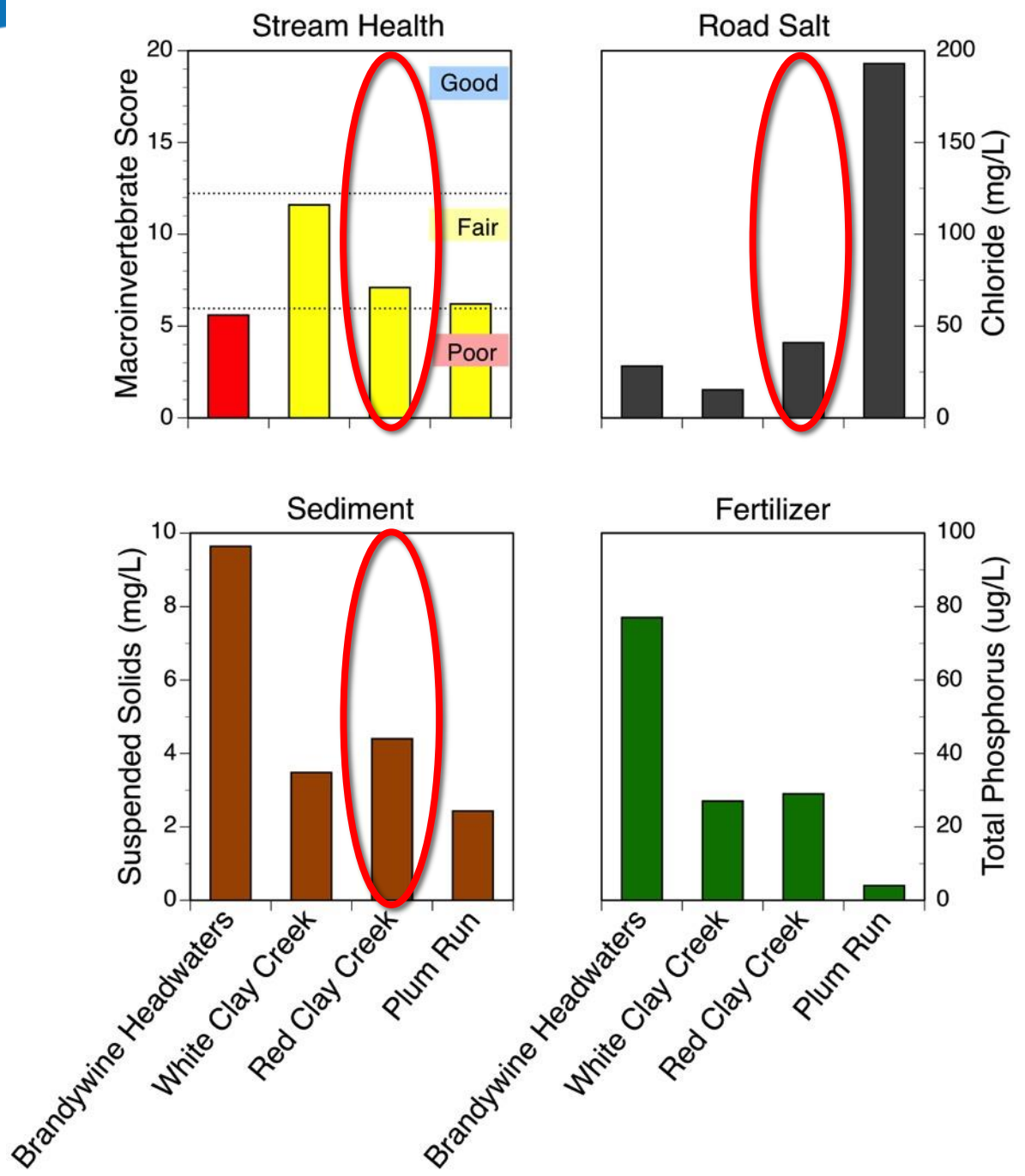
Brandywine Headwaters Focus Area



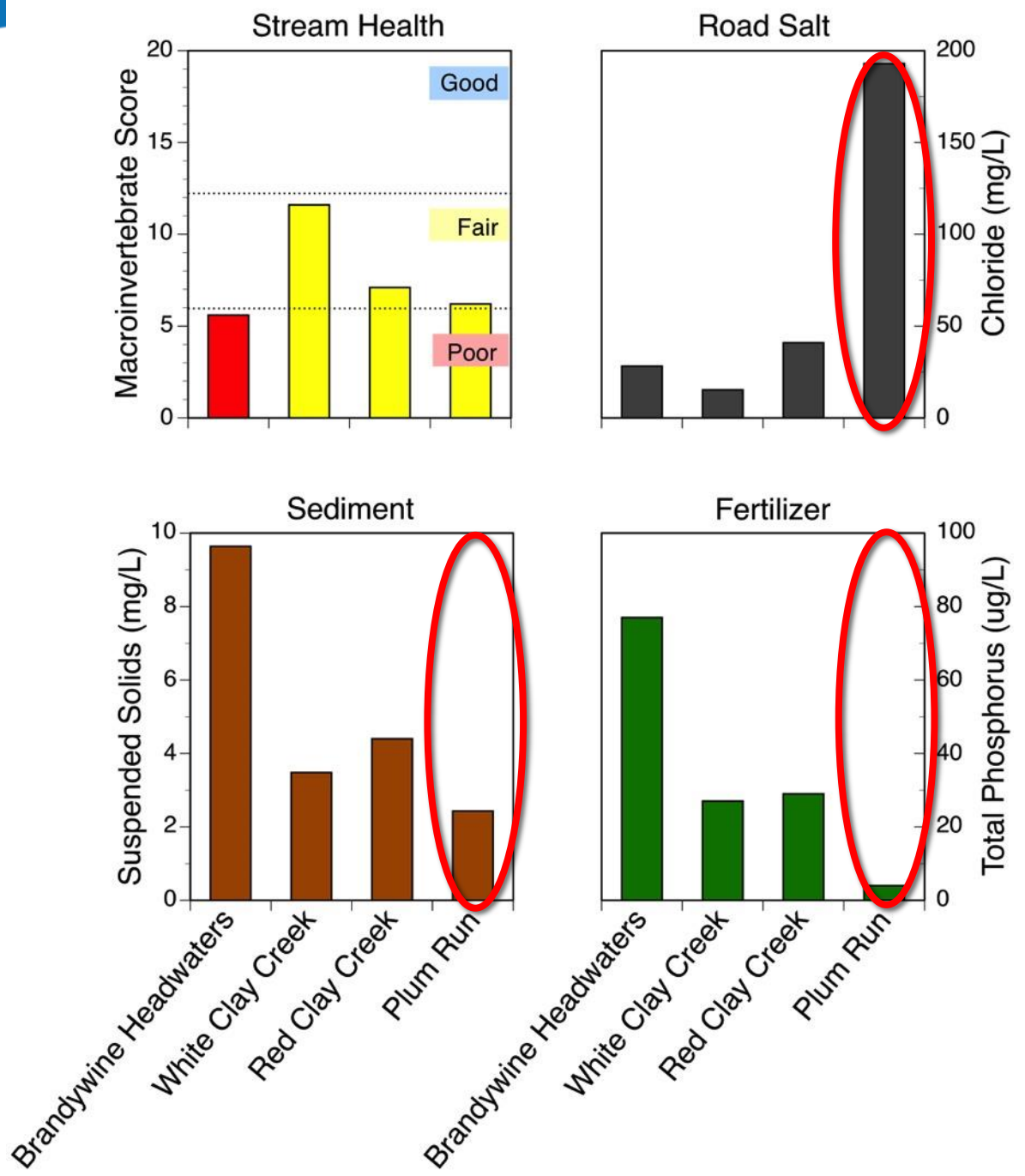
White Clay Creek Focus Area



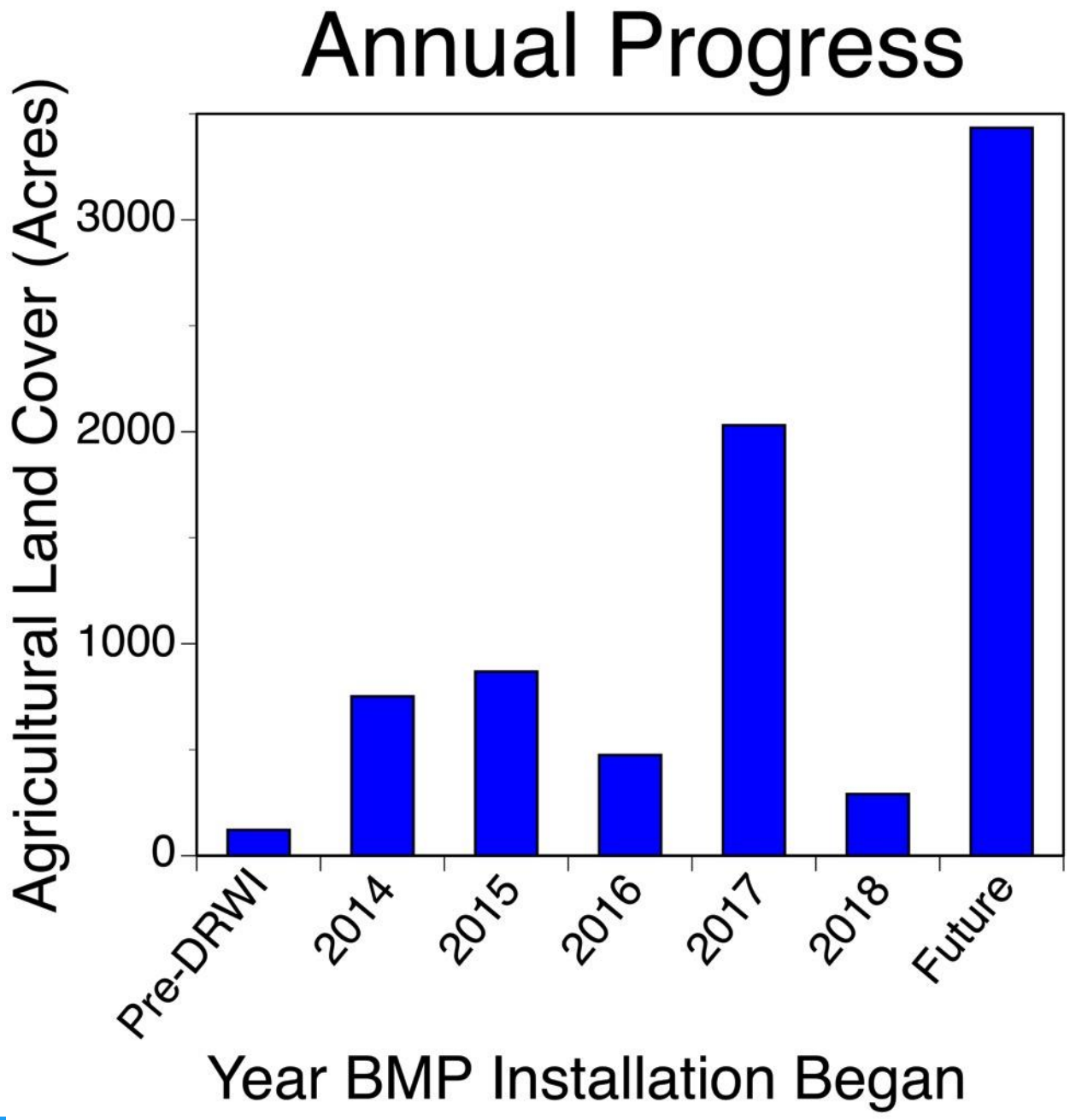
Red Clay Creek Focus Area



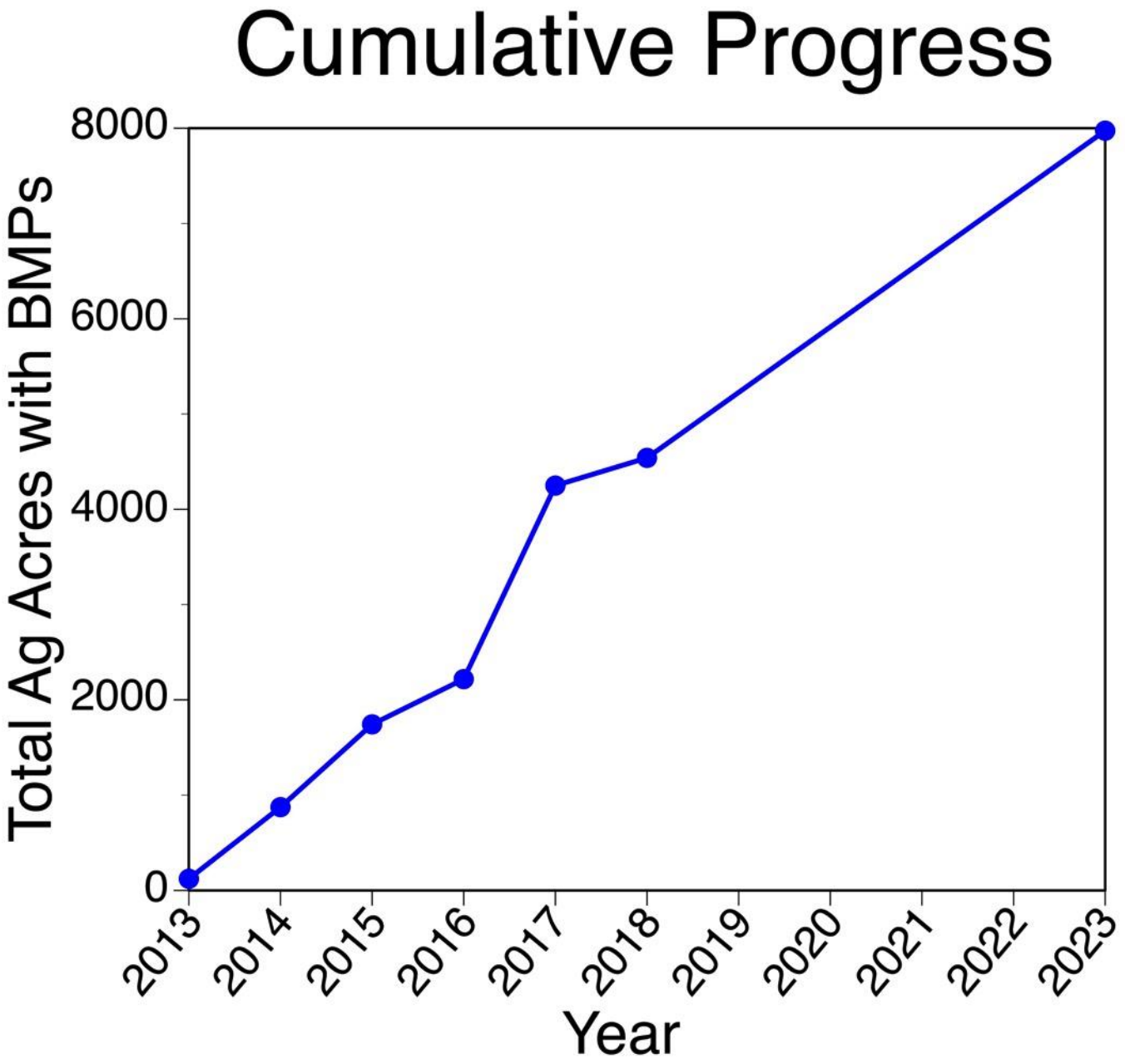
Plum Run Focus Area



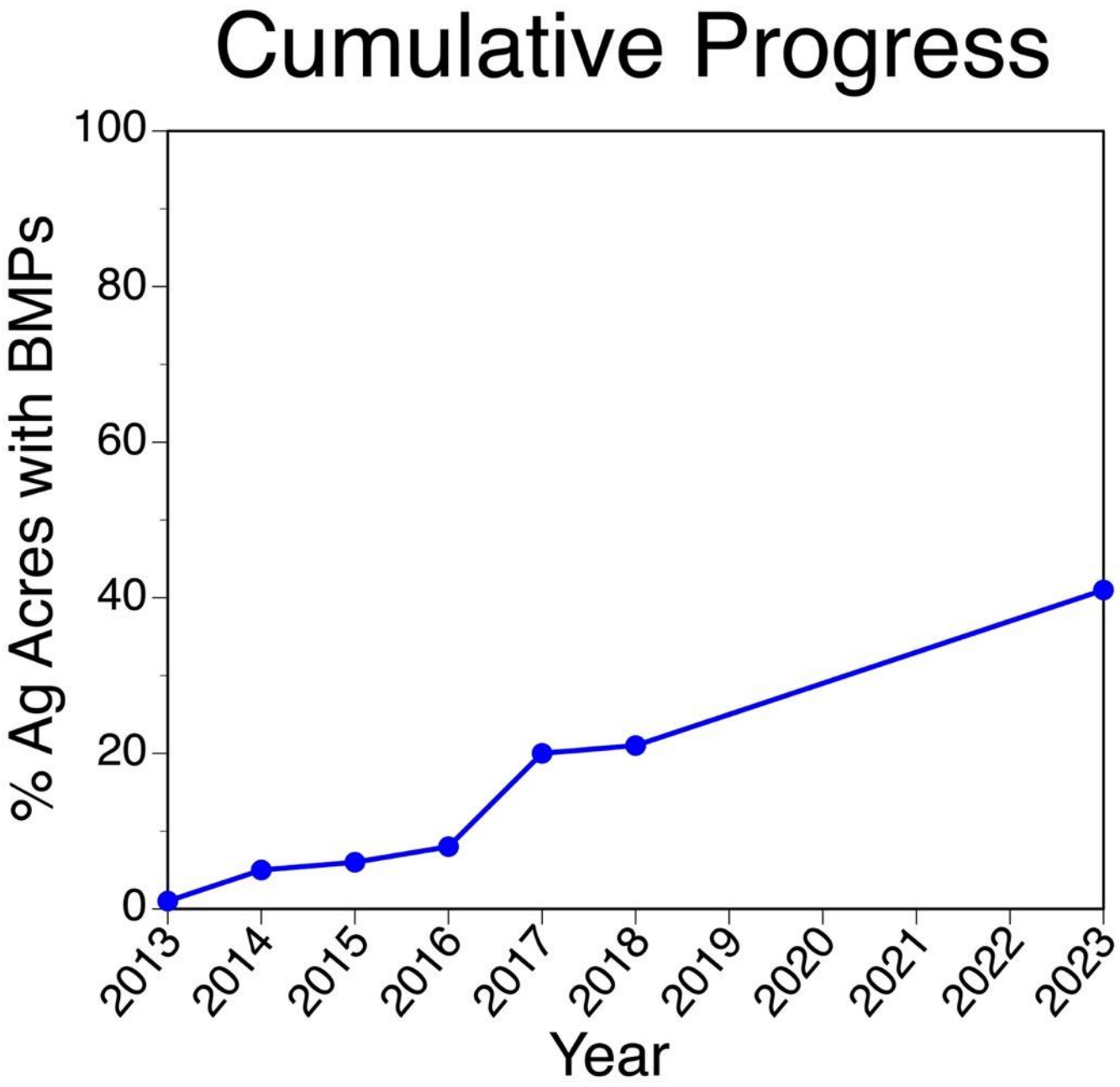
Brandywine Christina Cluster



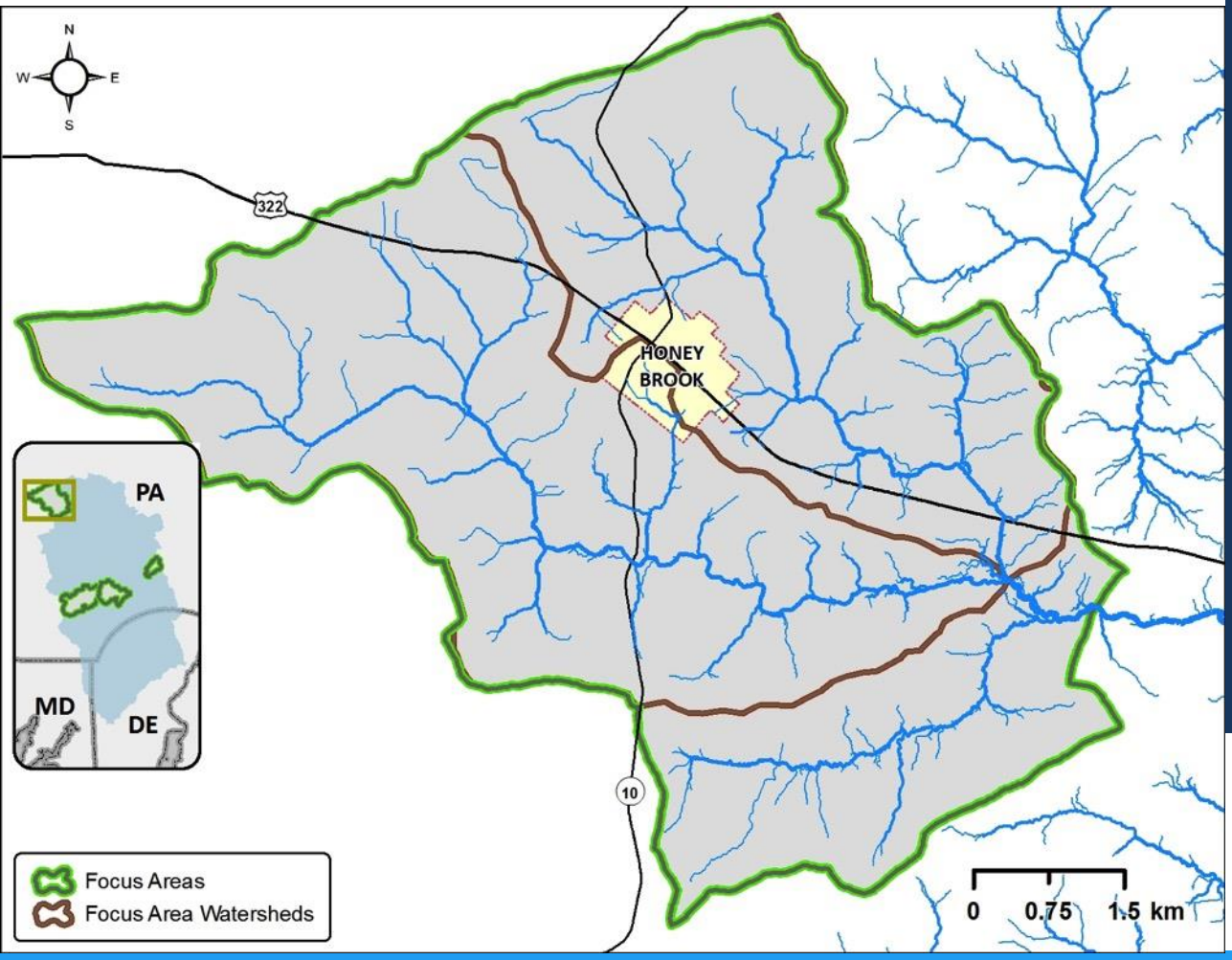
Brandywine
Christina
Cluster



Brandywine
Christina
Cluster



Headwaters WB Brandywine Cr



48 km ^{2}
29 km of stream

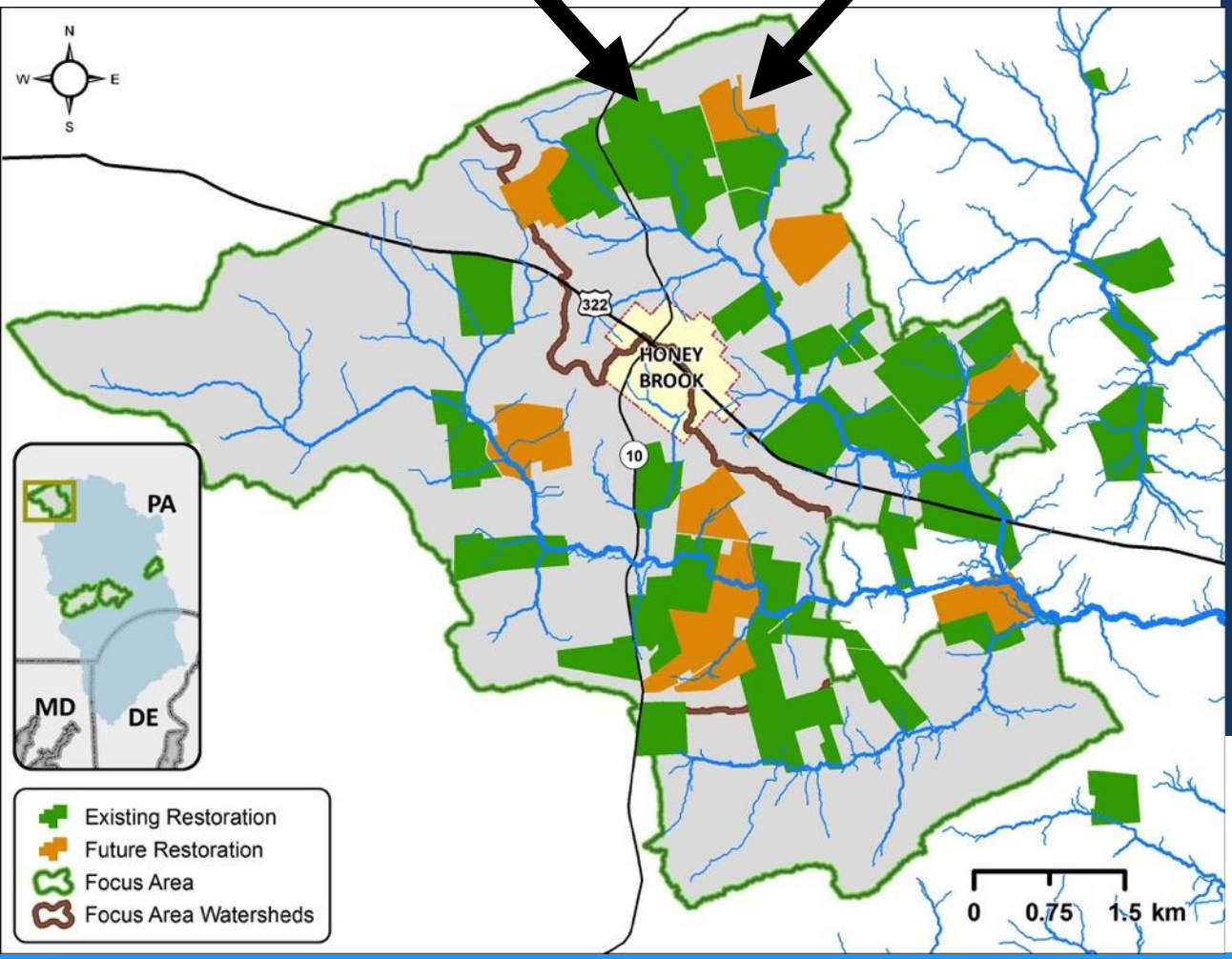
High Quality
Trout Stocking Fishery

Impaired

Goal is
Unimpaired

Existing Projects

Future Projects



Headwaters WB Brandywine Cr

48 km ^{2}
29 km of stream

High Quality
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Goal is
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Headwaters WB Brandywine Cr

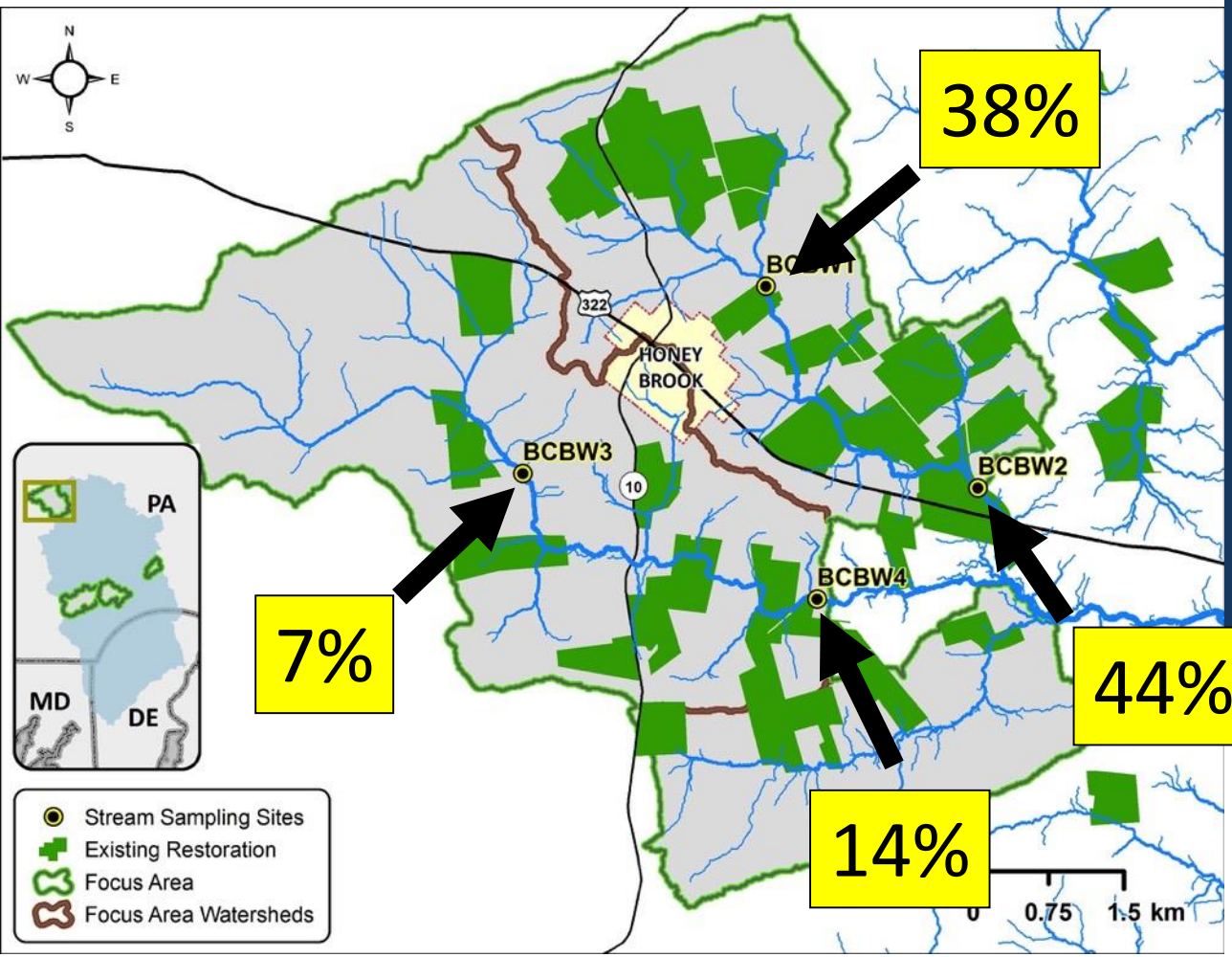
48 km ^{2}
29 km of stream

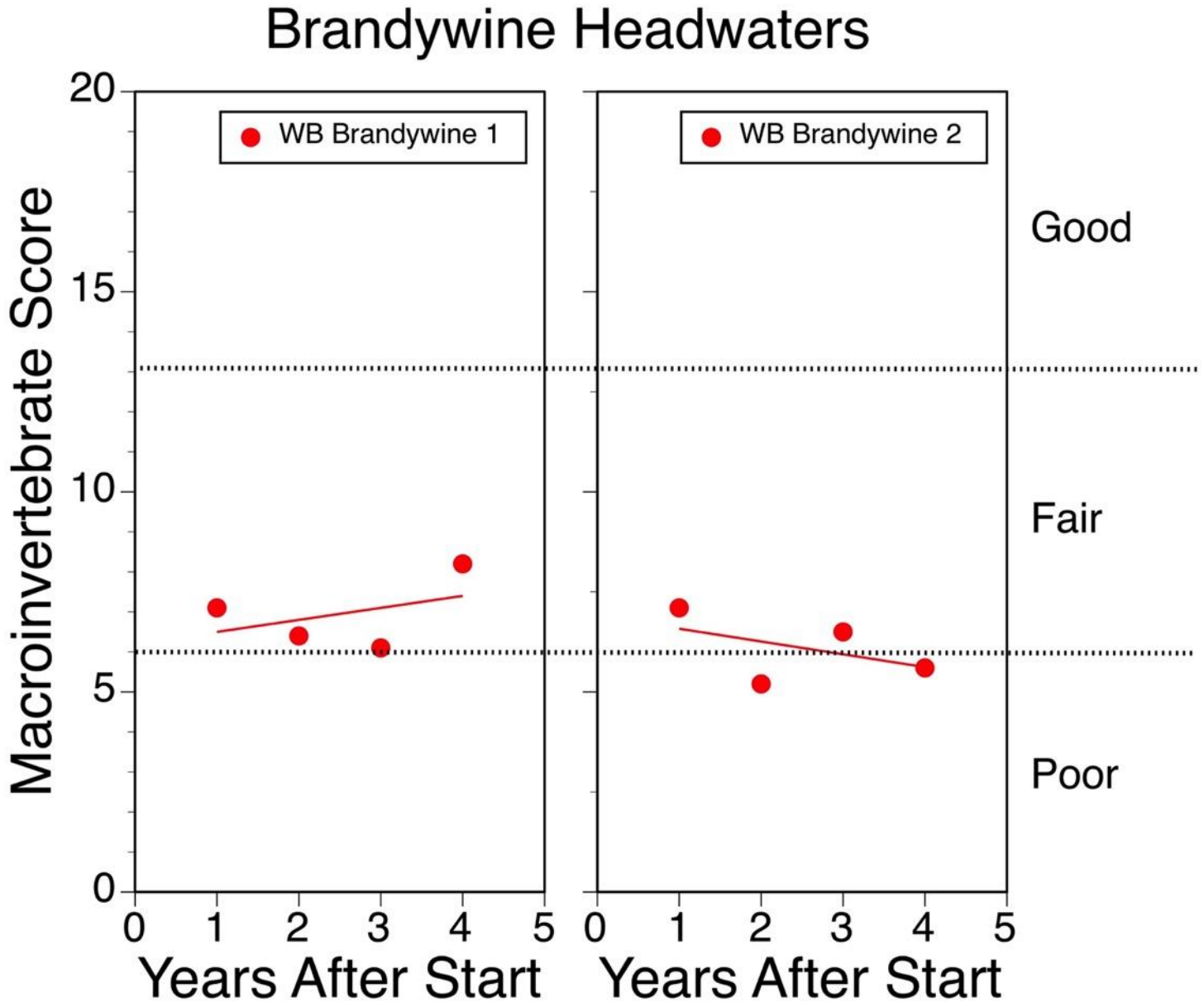
High Quality
Trout Stocking Fishery

Impaired

Goal is
Unimpaired

Existing projects as % of agricultural lands




Brandywine Headwaters
WB Brandywine 1
WB Brandywine 2
Macroinvertebrate Score
20
15
10
5
0
Good
Fair
Poor
0
1
2
3
4
5
Years After Start
Years After Start

Valley Creek Tributary to Susquehanna River

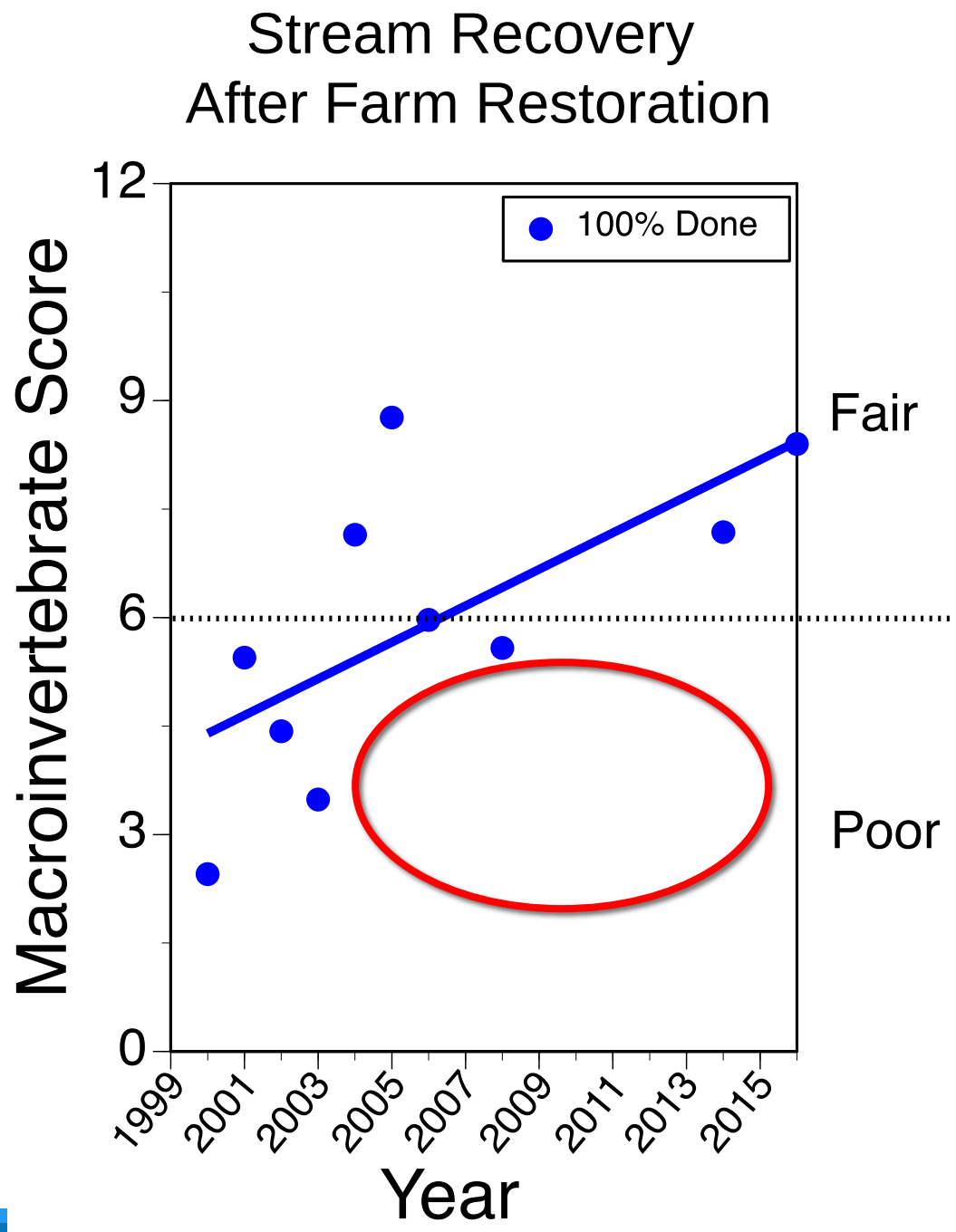
10 km ^{2}

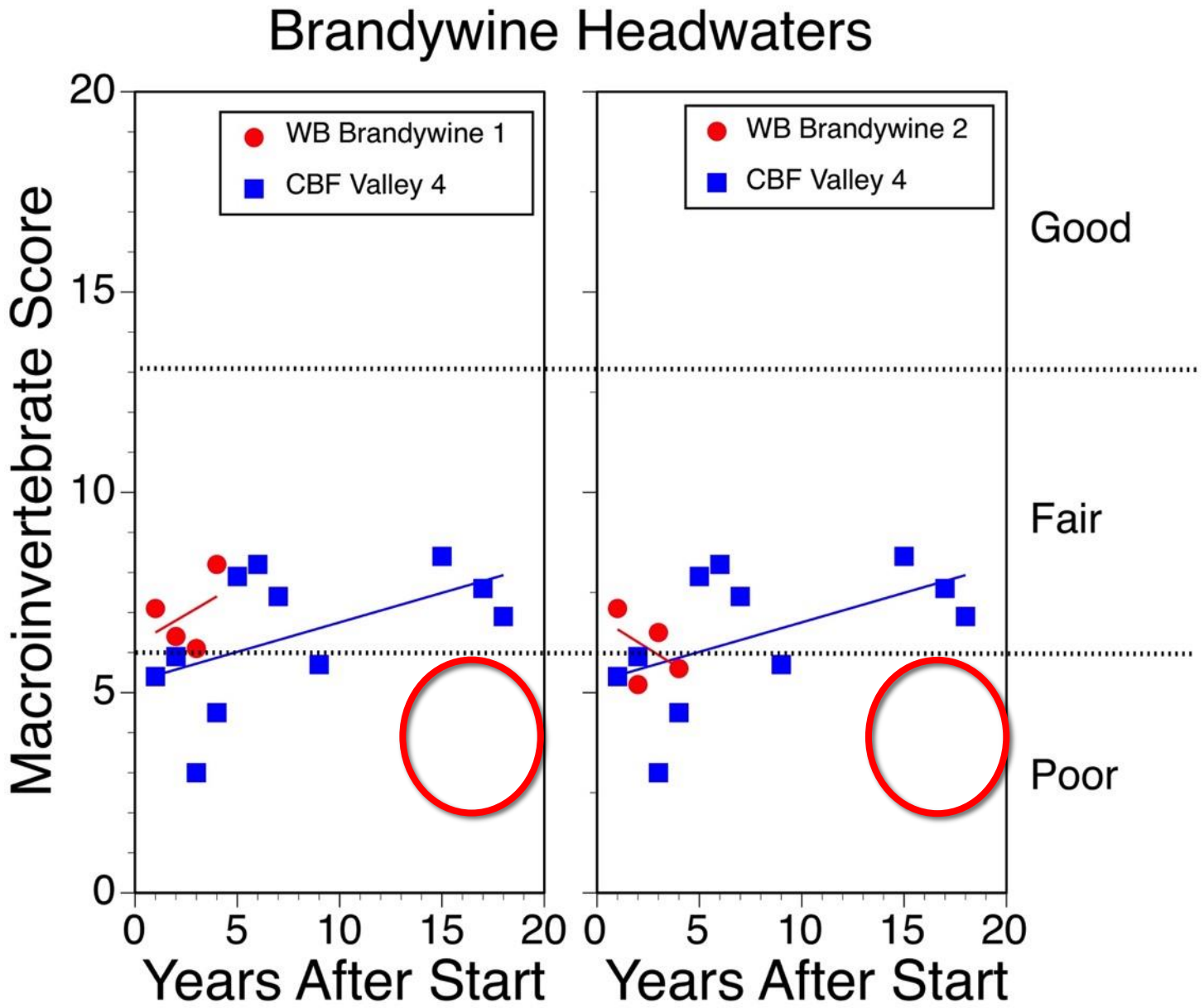
3.5 km of stream

Apr 1999

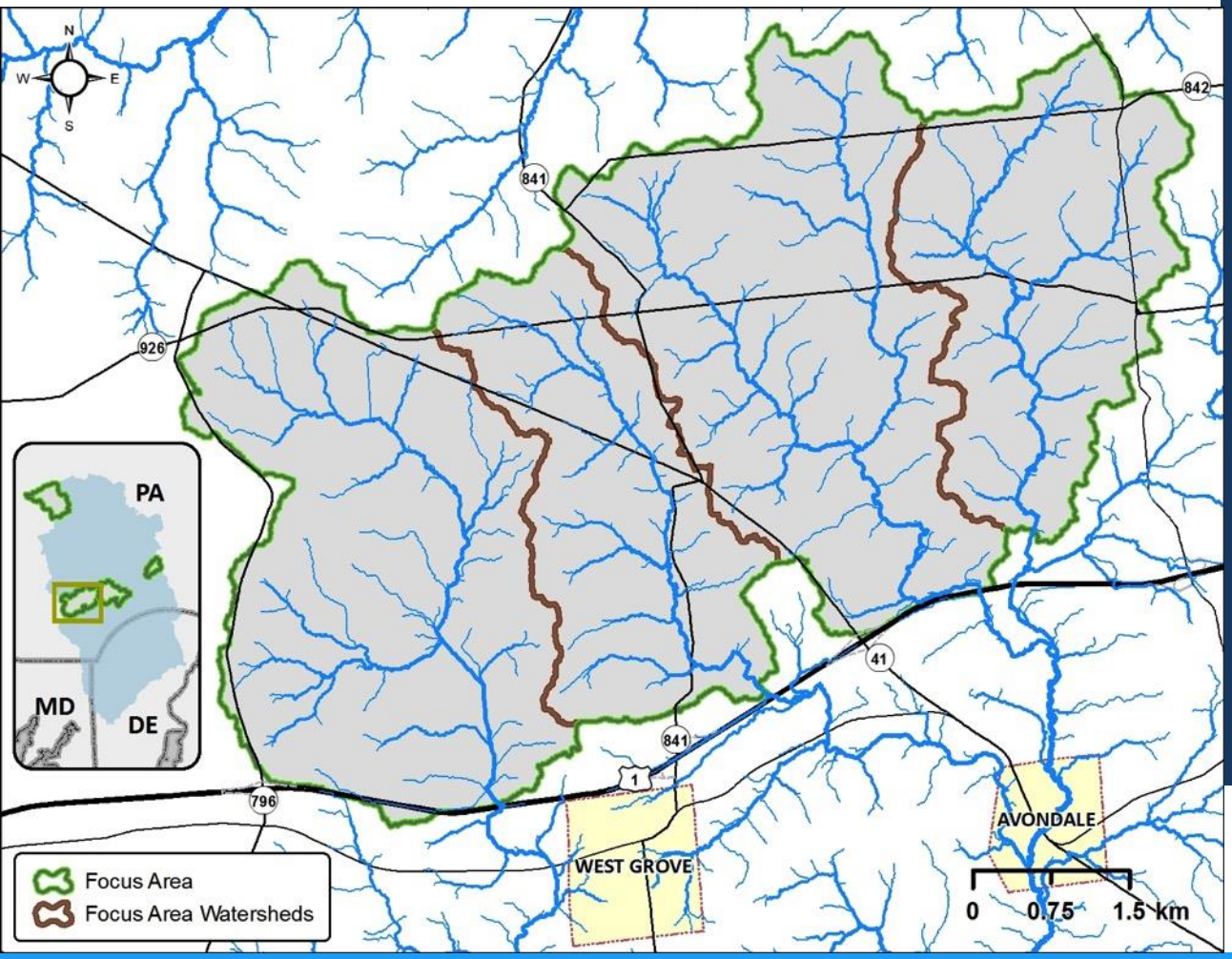
Aug 2016

Comparison of stream condition 2000 versus 2016




Brandywine Headwaters
Macroinvertebrate Score
20
15
10
5
0
WB Brandywine 1
CBF Valley 4
WB Brandywine 2
CBF Valley 4
Good
Fair
Poor
0
5
10
15
20
Years After Start
Years After Start

White Clay Creek



43 km ^{2}
34 km of stream

Exceptional Value
Cold Water Fishery

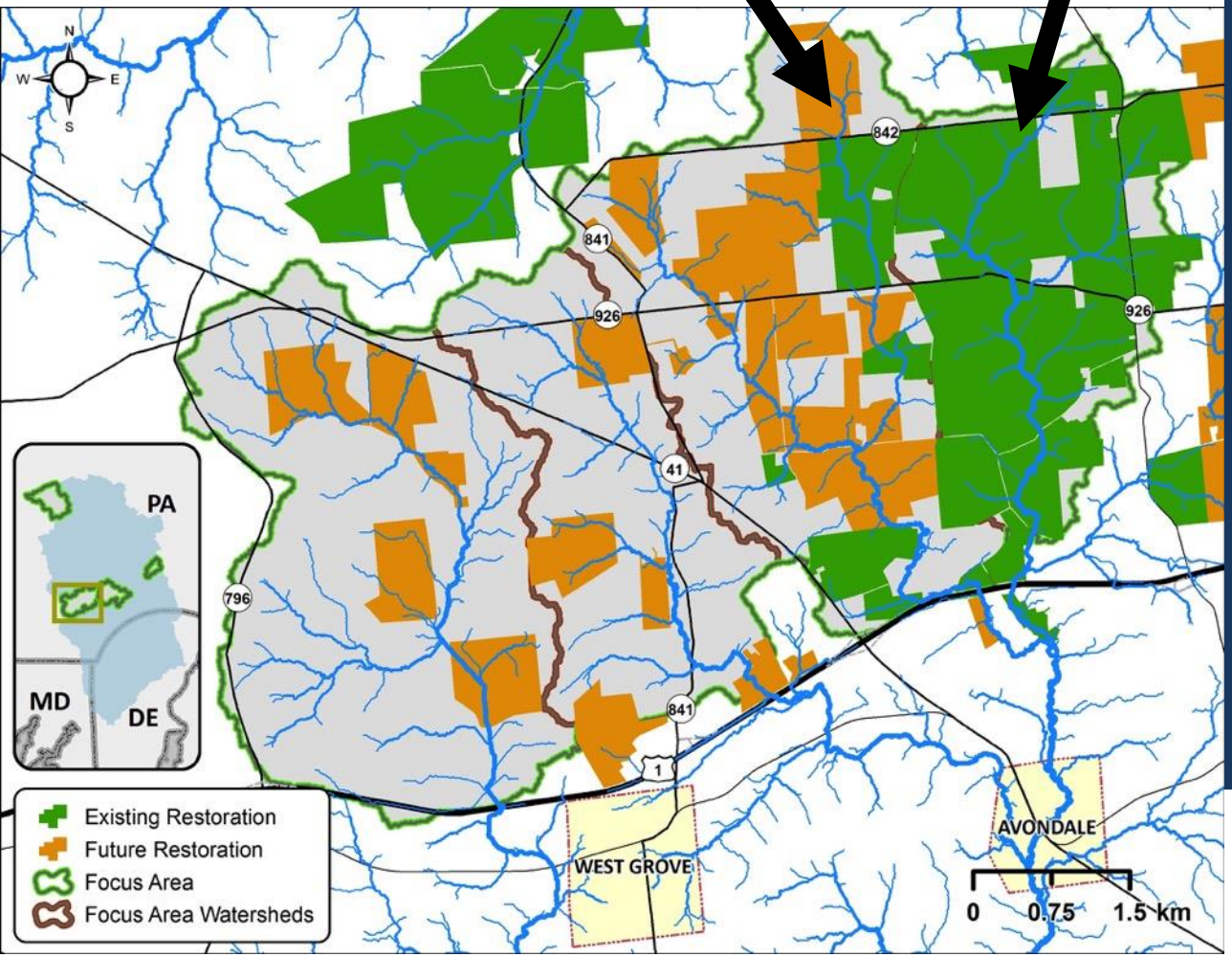
Impaired

Goal is
Unimpaired
&
Wild Trout

White Clay Creek

Future projects

Existing Projects



43 km ^{2}
34 km of stream

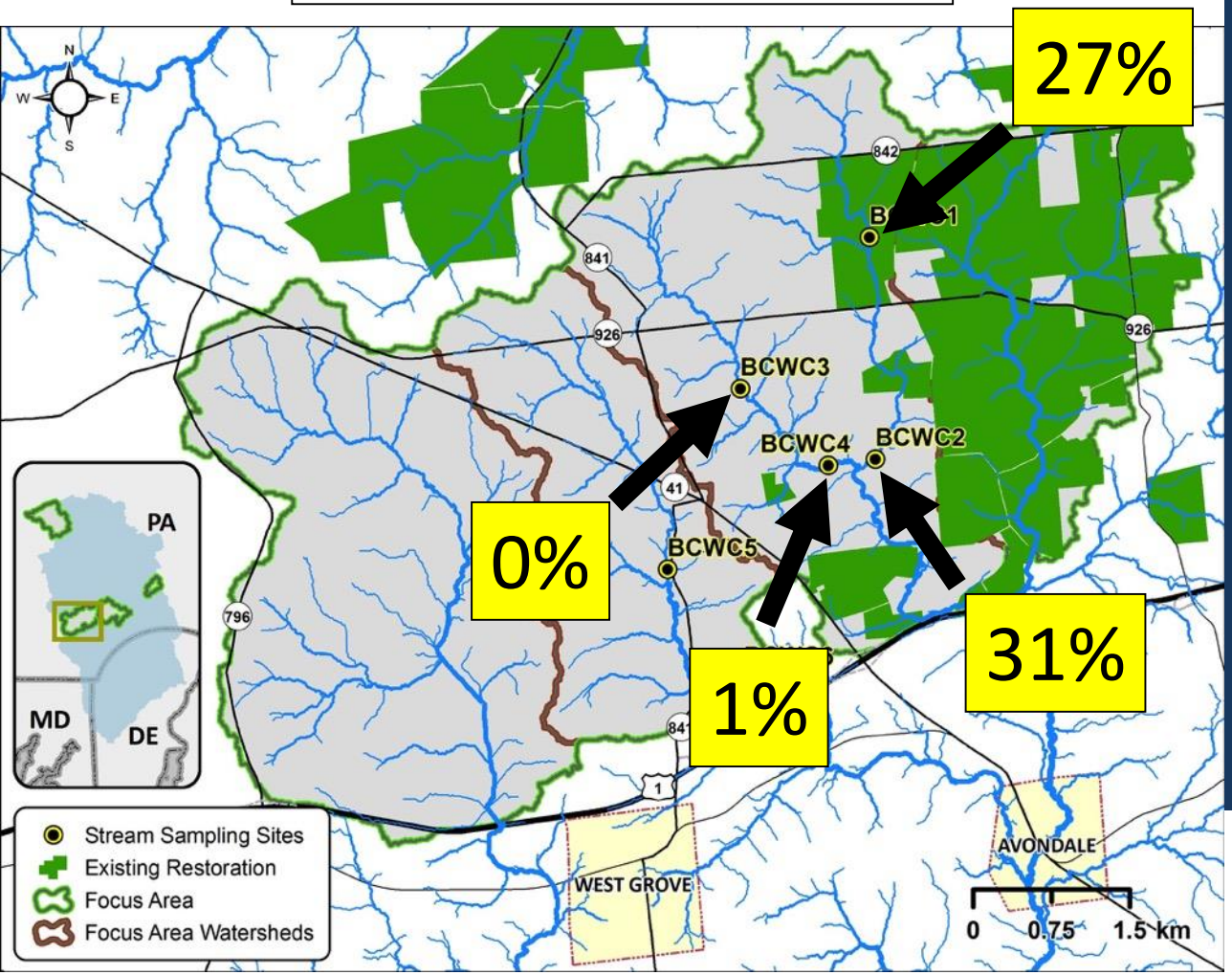
Exceptional Value
Cold Water Fishery

Impaired

Goal is
Unimpaired
&
Wild Trout

White Clay Creek

Existing projects as % of agricultural lands

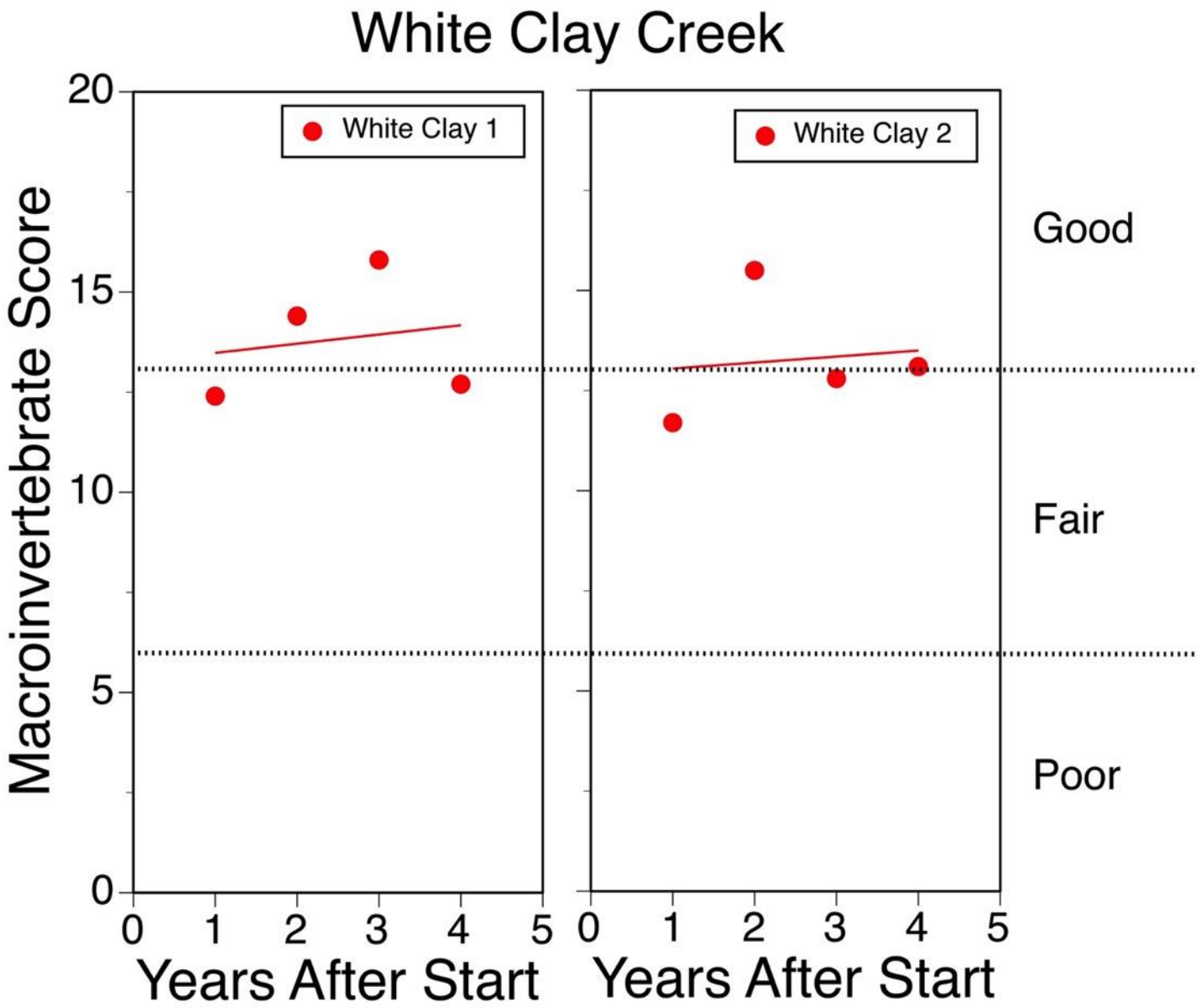


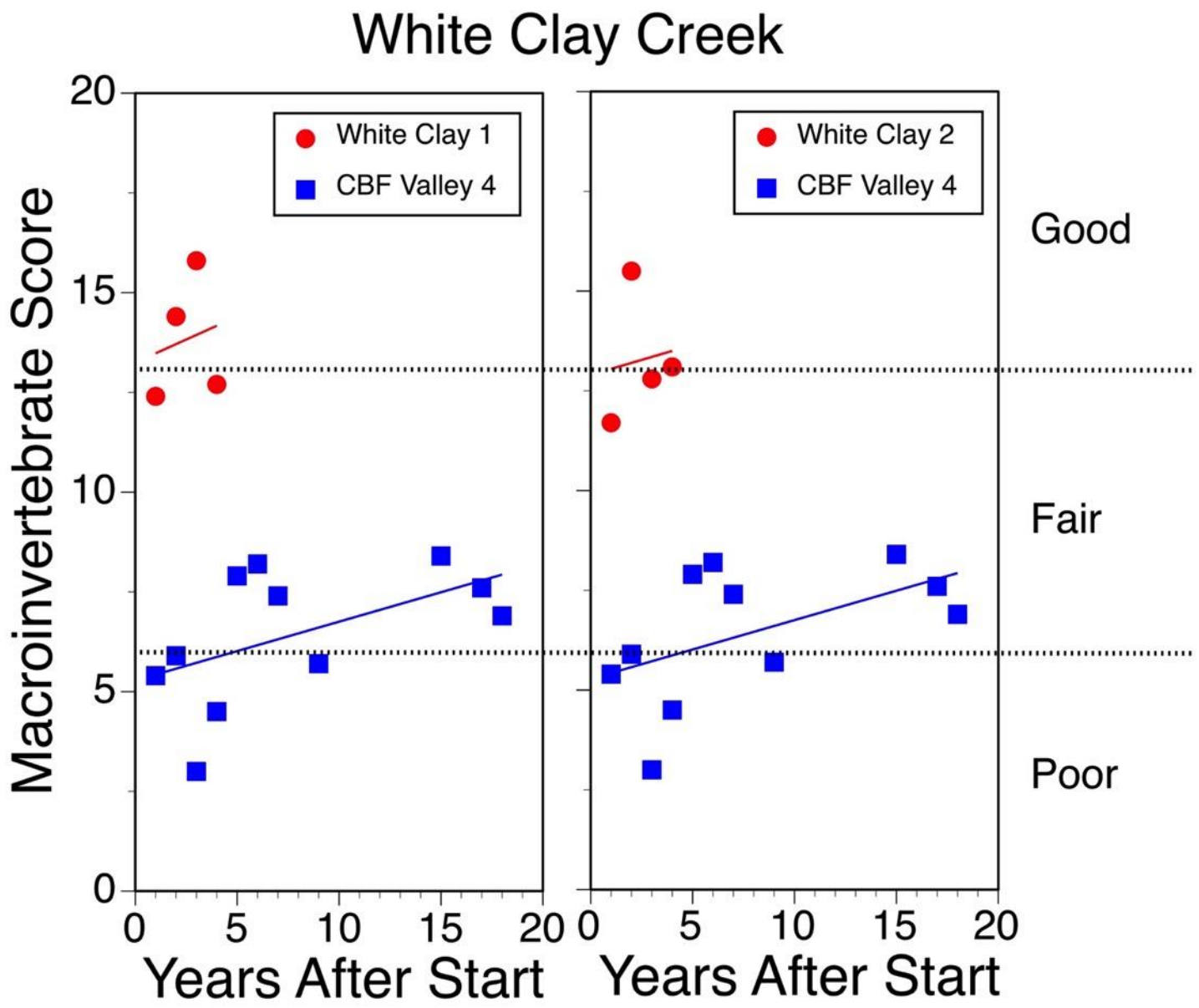
43 km ^{2}
34 km of stream

Exceptional Value
Cold Water Fishery

Impaired

Goal is
Unimpaired
&
Wild Trout


White Clay Creek
Macroinvertebrate Score
20
15
10
5
0
White Clay 1
White Clay 2
Good
Fair
Poor
0 1 2 3 4 5
Years After Start
0 1 2 3 4 5
Years After Start


White Clay Creek
Macroinvertebrate Score
20
15
10
5
0
White Clay 1
CBF Valley 4
White Clay 2
CBF Valley 4
Good
Fair
Poor
0
5
10
15
20
Years After Start
Years After Start

Headwaters BC
White Clay Creek
Red Clay Creek
Plum Run

2,927 tons of
sediment per year

8,953 lbs of
phosphorus per year

https://www.drawingtutorials101.com/how-to-draw-simple-dump-truck

https://feedyardfoodie.wordpress.com/2013/03/28/march-madness/

Headwaters BC
White Clay Creek
Red Clay Creek
Plum Run

293 truckloads
sediment per year

224 truckloads
manure per year

https://www.drawingtutorials101.com/how-to-draw-simple-dump-truck

https://feedyardfoodie.wordpress.com/2013/03/28/march-madness/

Summary

- Project progress is strong
  (27 – 44% complete in some areas)

- Current conditions support Focus Area goals – unimpaired vs wild trout

- Too early to see ecological outcomes – need more projects and time

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Current Conditions and Progress Toward Restoration Goals

Middle Schuylkill Cluster

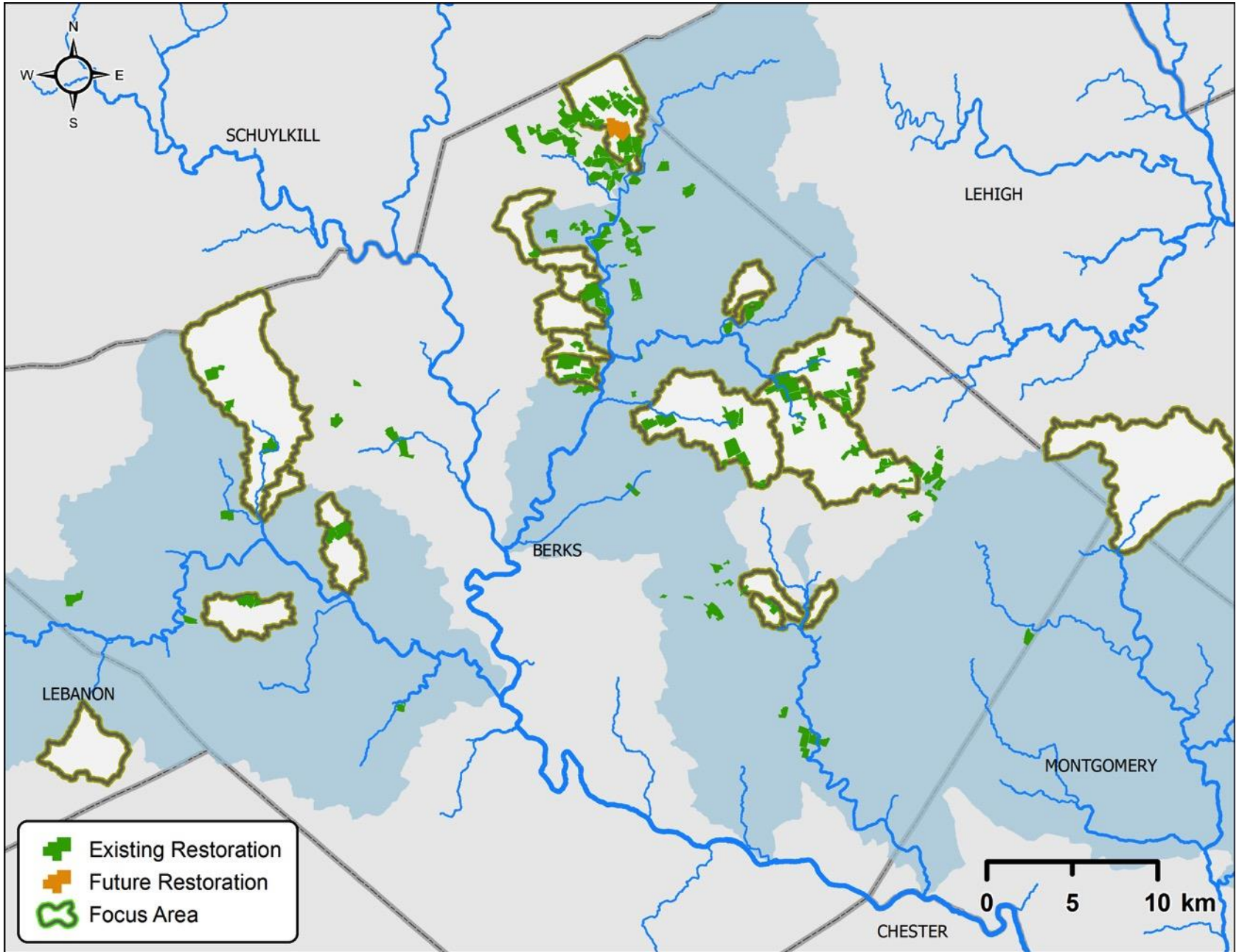
Licking Creek

Spring Creek

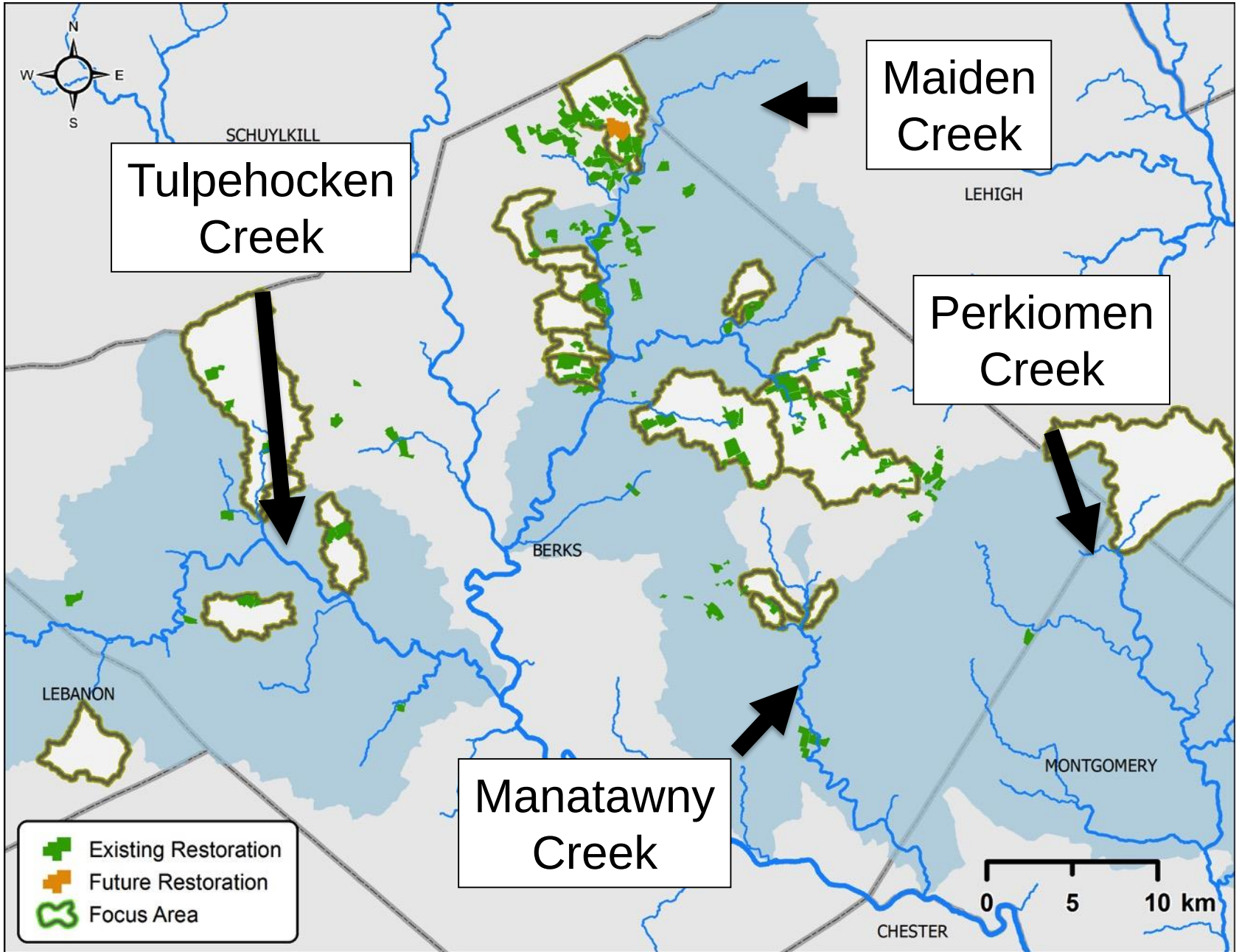
Manor Creek

Rice Tributary

Middle Schuylkill Cluster

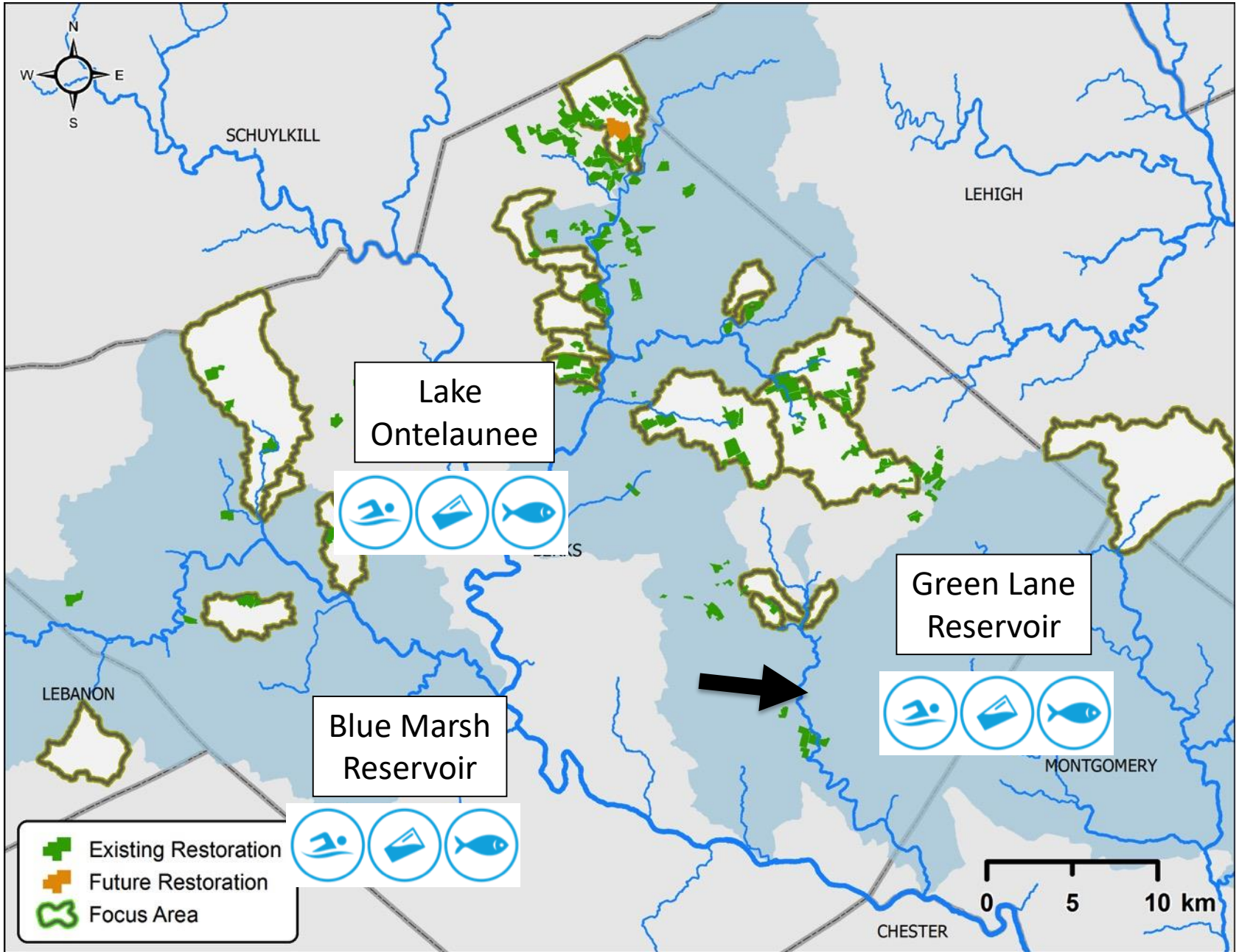


Middle Schuylkill Cluster



Middle Schuylkill Cluster

Middle Schuylkill Cluster



Middle Schuylkill Water Monitoring

Monitoring is like traveling.

There are lots of ways to do it.

They all serve a purpose.

But they are not all equal.

Data Challenges/Lessons Learned

Source water concerns may ≠ Restoration goals

Regulatory requirements may ≠ Restoration goals

Engagement events may ≠ Restoration monitoring

Project monitoring may ≠ Focus Area monitoring

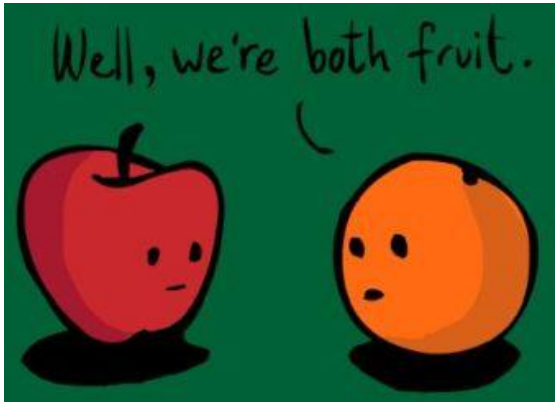
Data Challenges/Lessons Learned

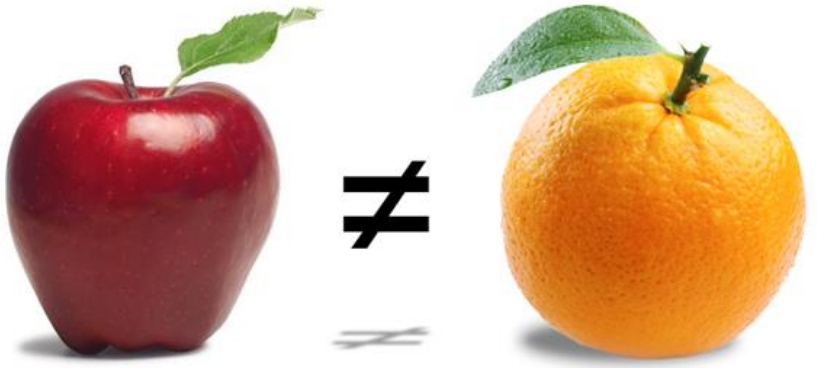
Site matters

Season matters

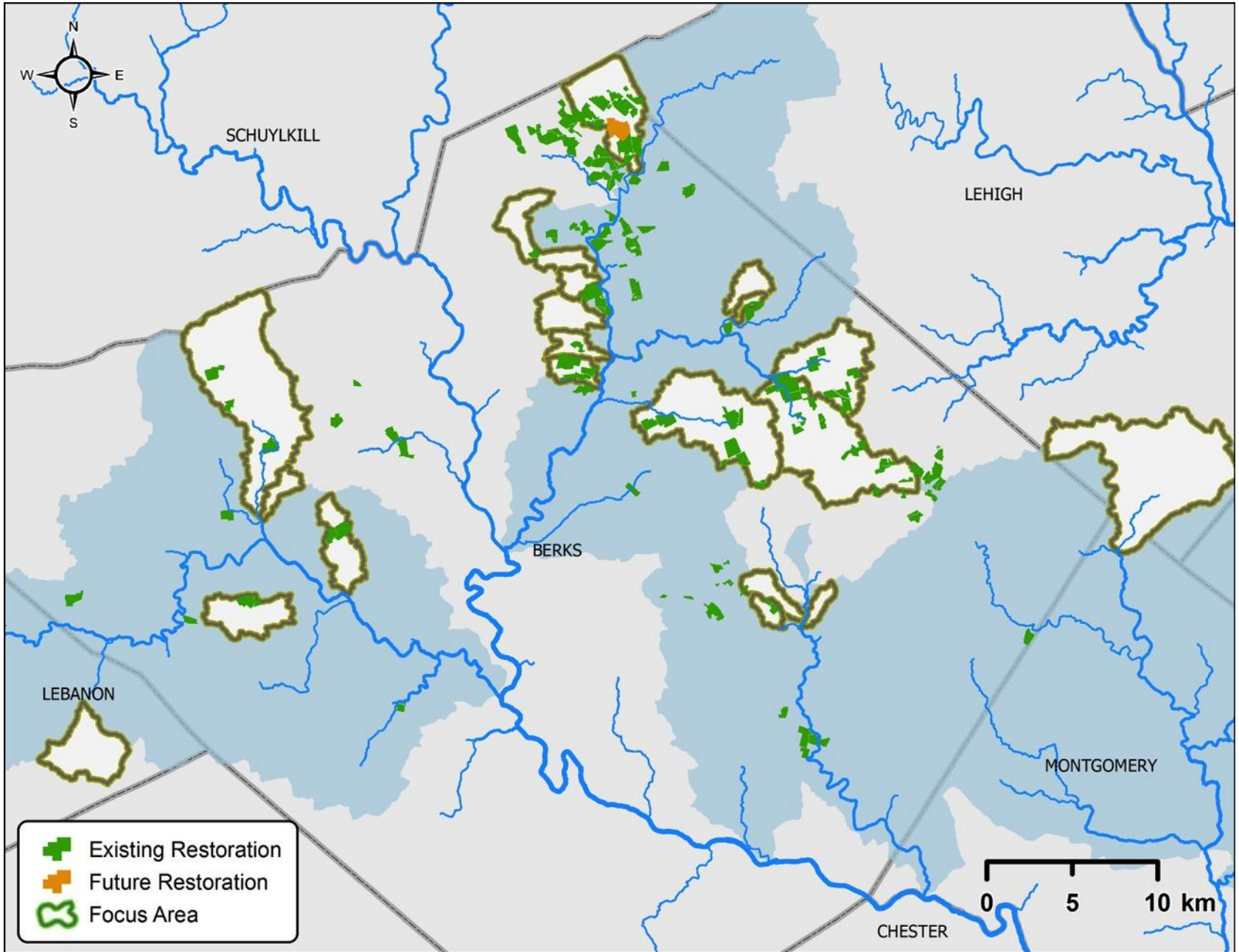
Variable measured matters

Rigor matters

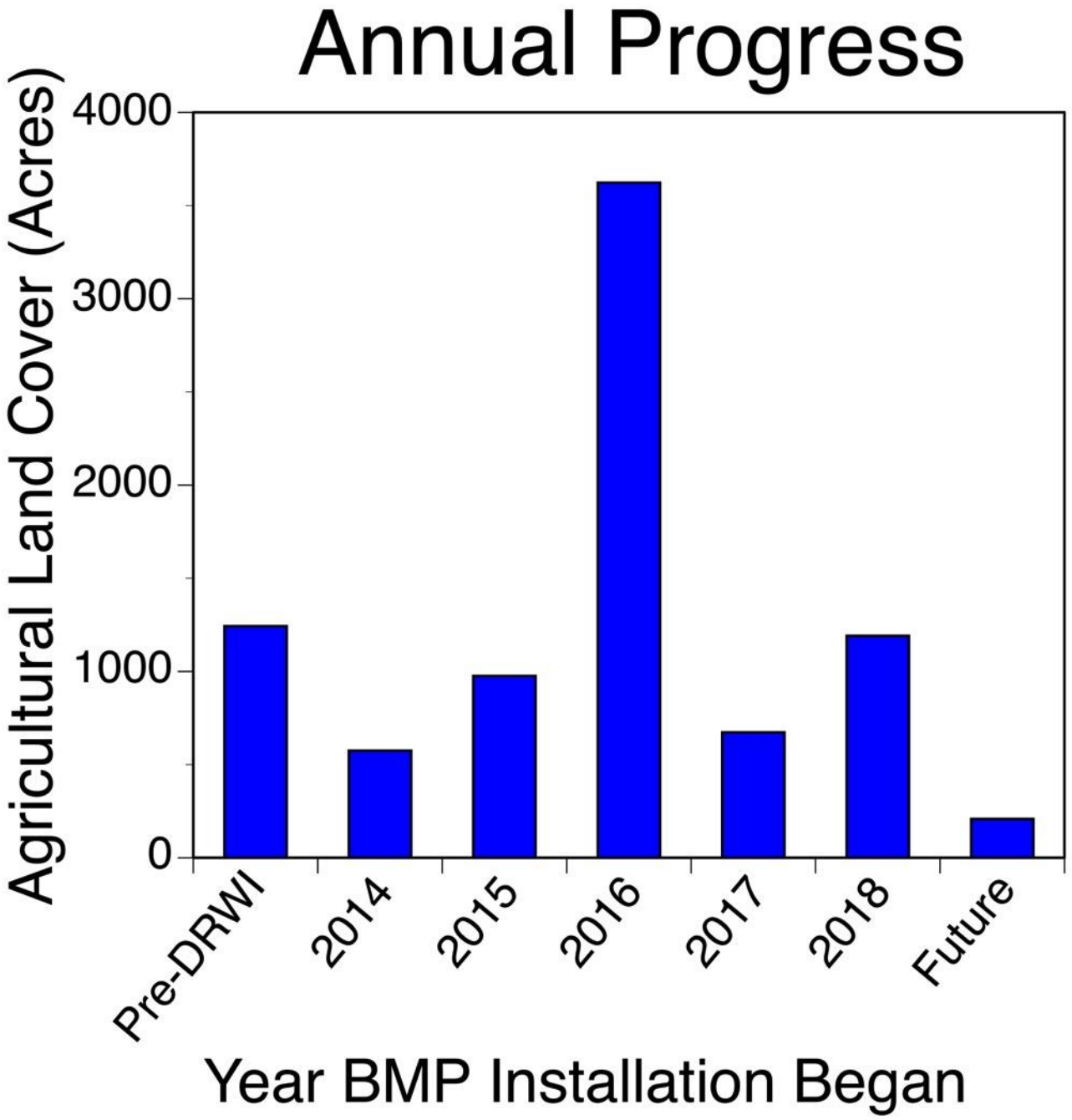




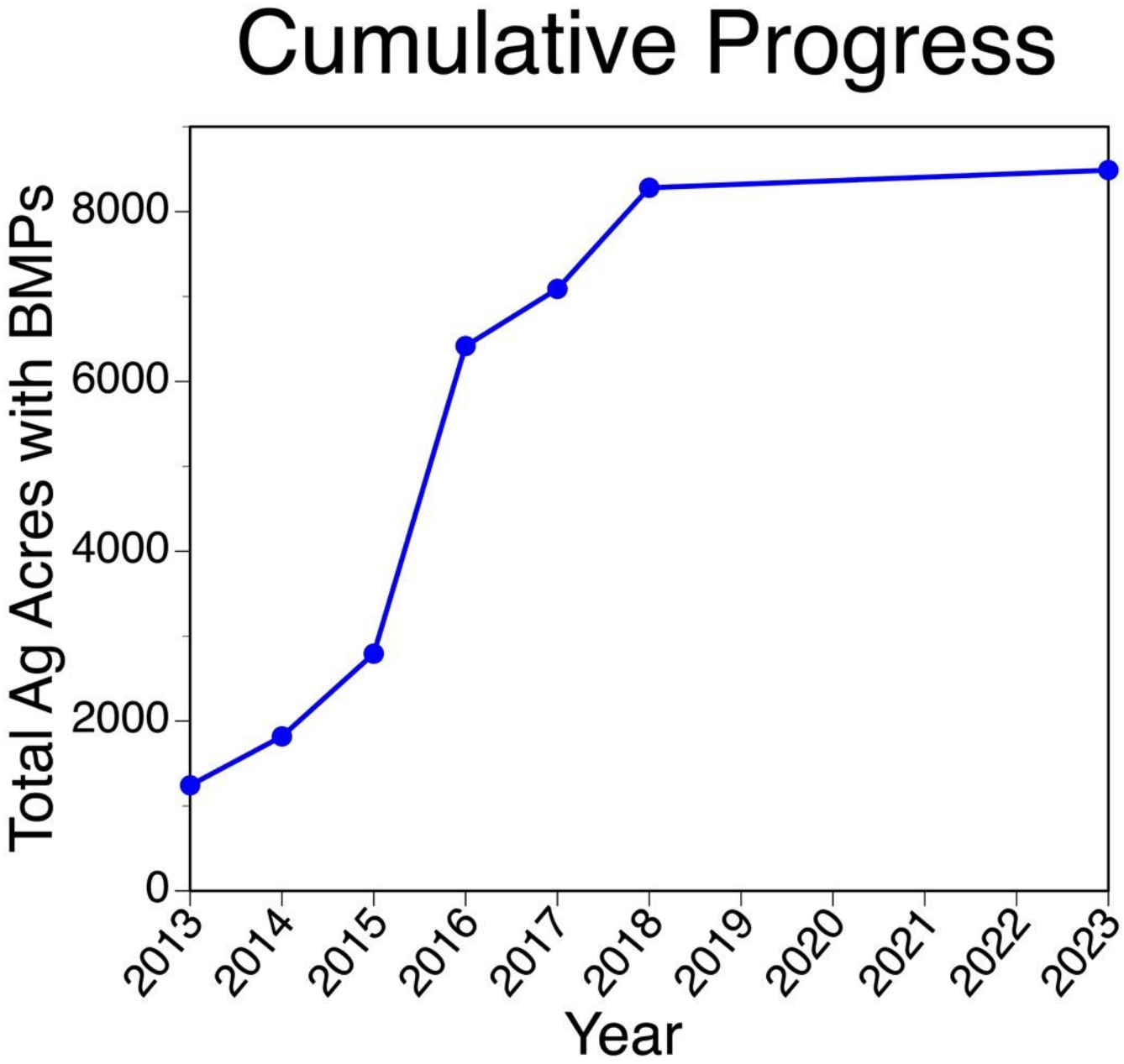
Middle Schuylkill Cluster



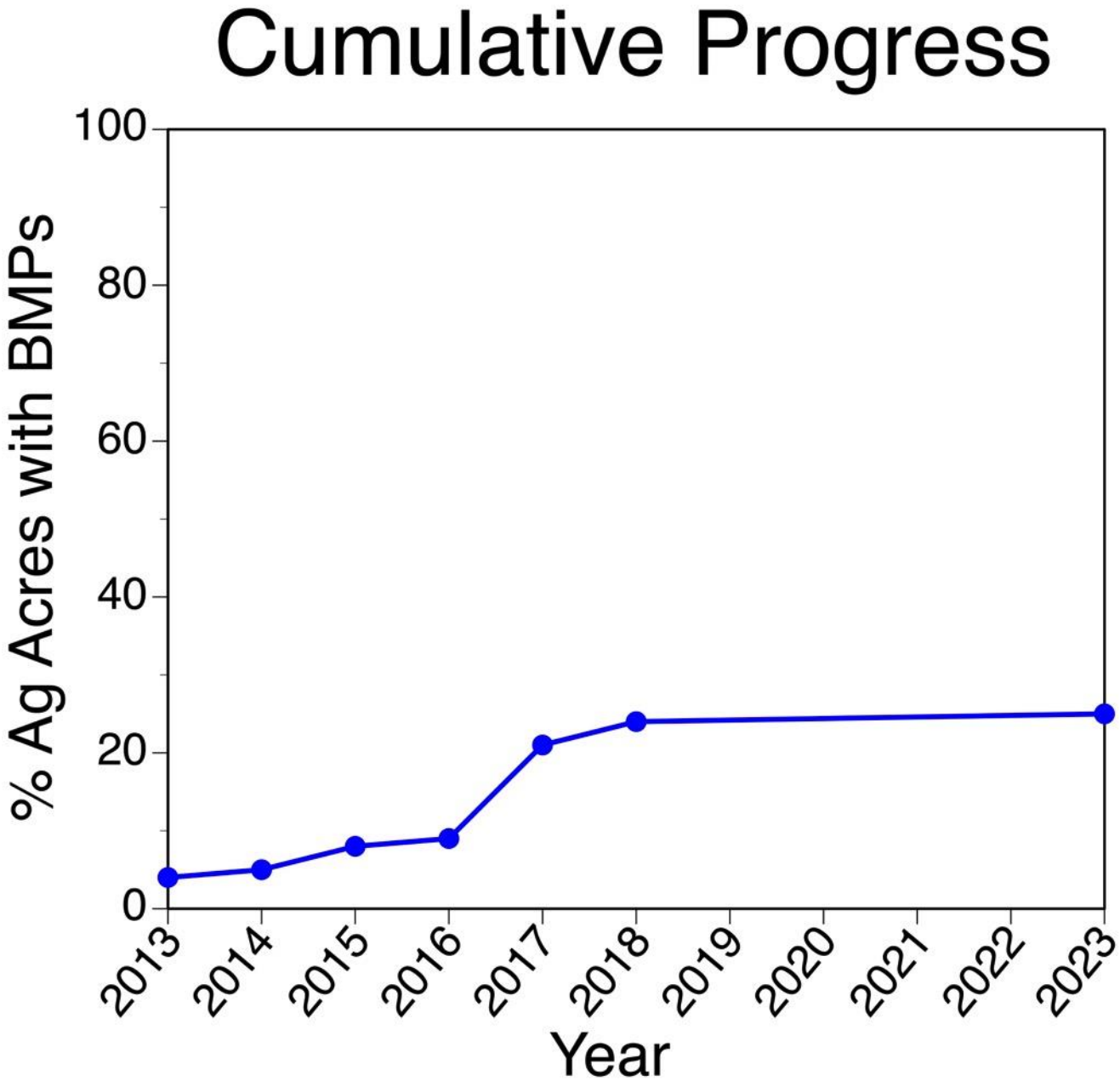
Middle Schuylkill Cluster

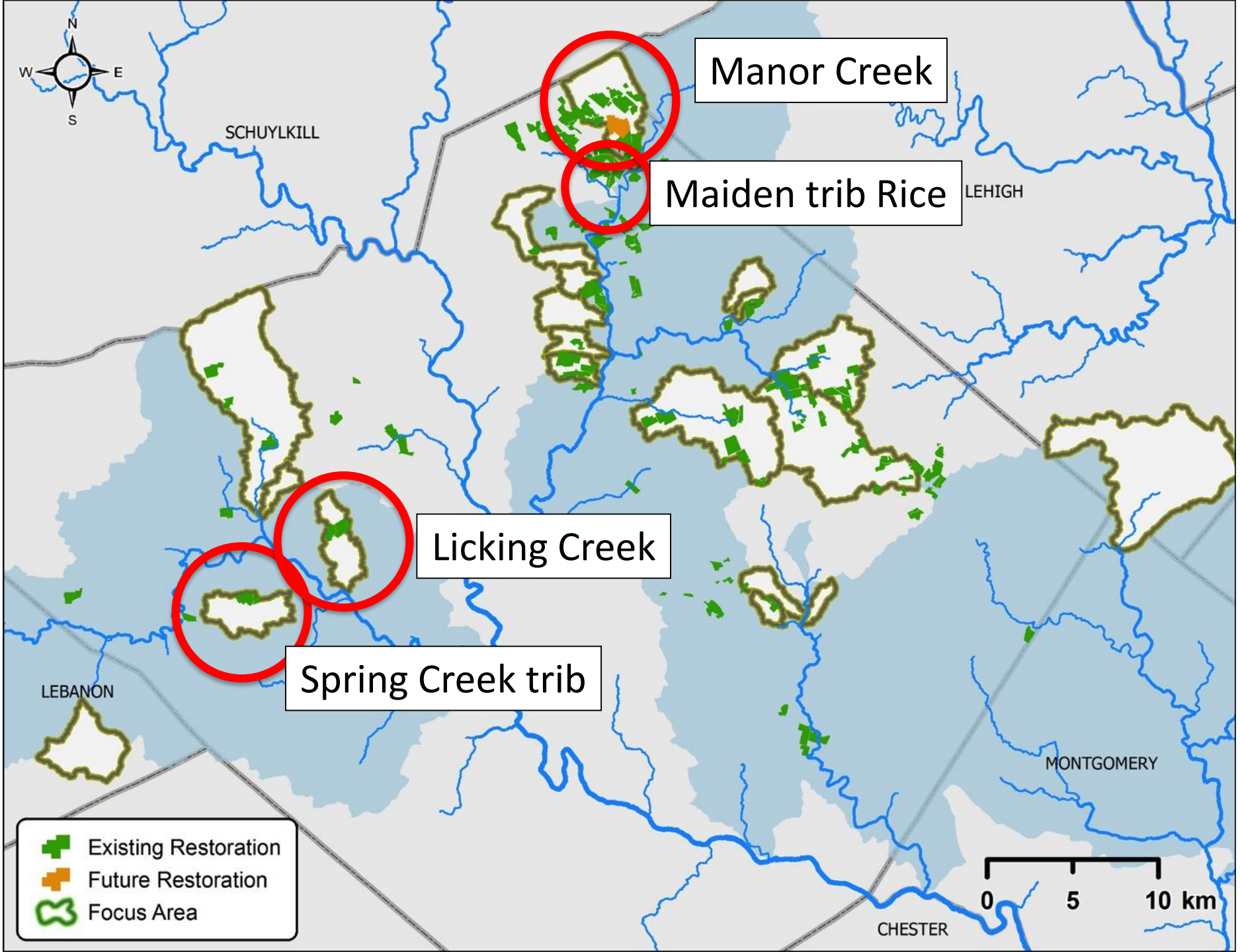


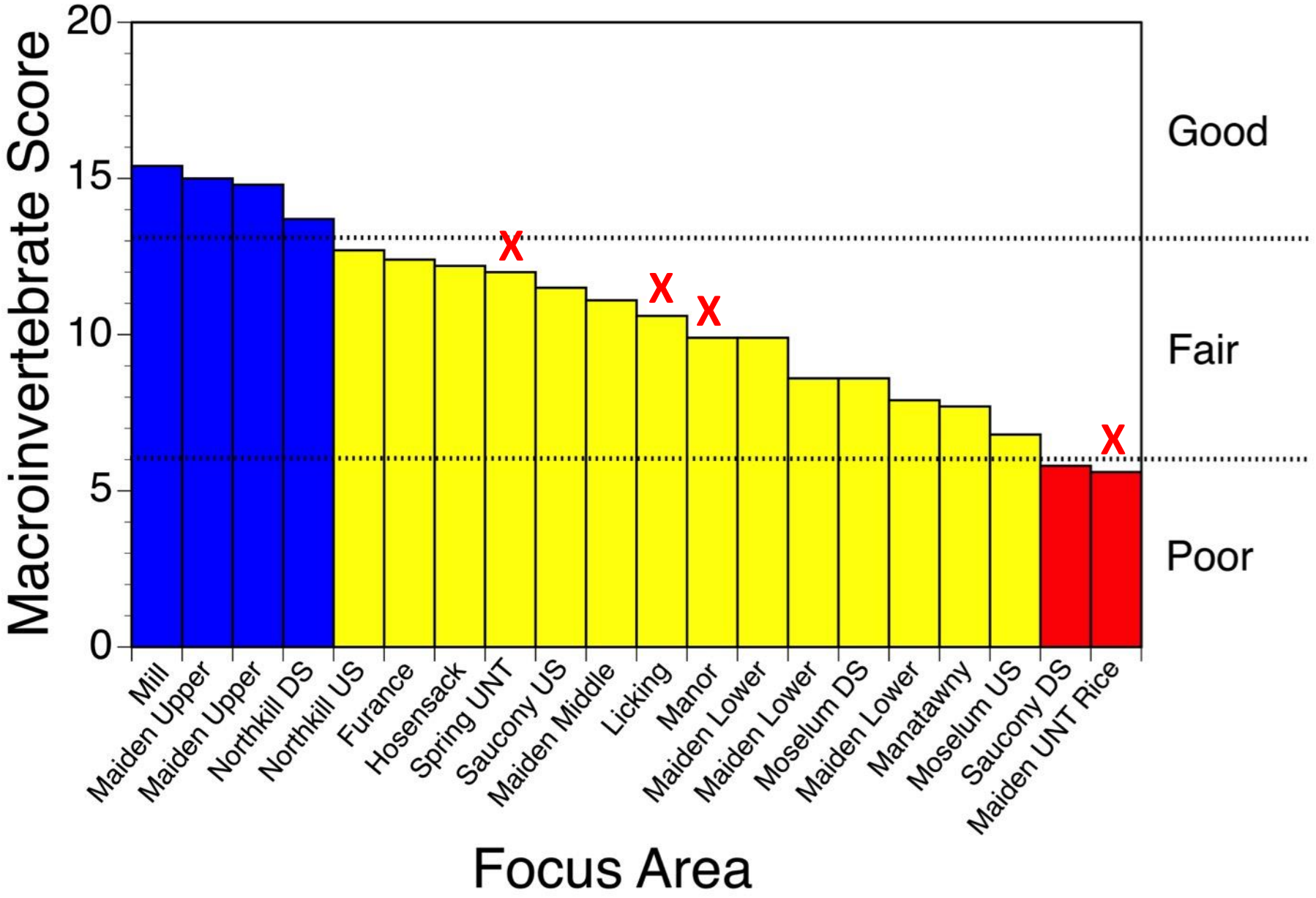
Middle Schuylkill Cluster

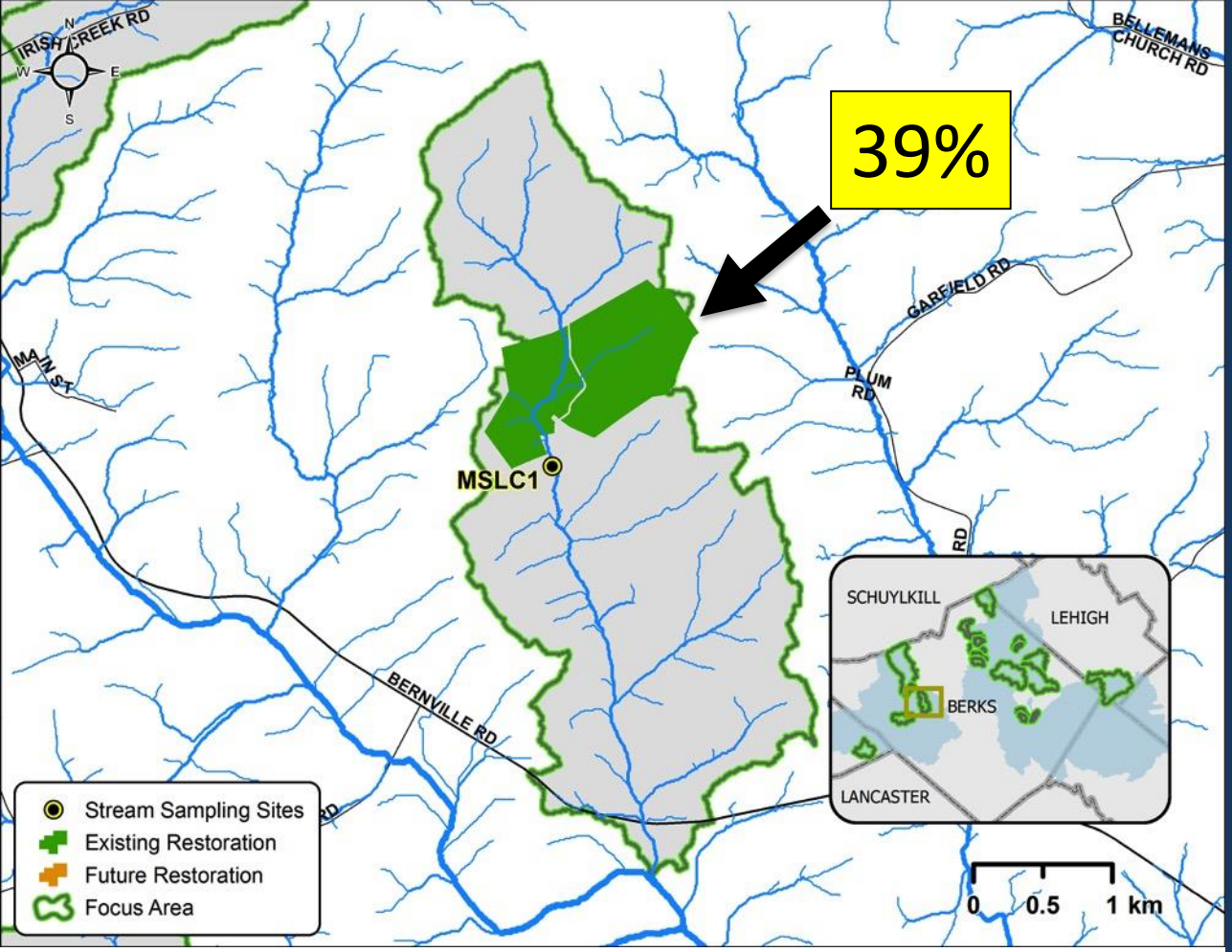


Middle Schuylkill Cluster




N
W
E
S
SCHUYLKILL
Manor Creek
Maiden trib Rice
LEHIGH
Licking Creek
Spring Creek trib
LEBANON
MONTGOMERY
CHESTER
Existing Restoration
Future Restoration
Focus Area
0
5
10 km


Macroinvertebrate Score
20
15
10
5
0
Good
Fair
Poor
X
X
X
X
Mill
Maiden Upper
Maiden Upper
Northkill DS
Northkill US
Furance
Hosensack
Spring UNT
Saucony US
Maiden Middle
Licking
Manor
Maiden Lower
Maiden Lower
Moselum DS
Maiden Lower
Manatawny
Moselum US
Saucony DS
Maiden UNT Rice
Focus Area



Licking Creek in Tulpehocken

4 km ^{2}

3.7 km of stream

29% forest

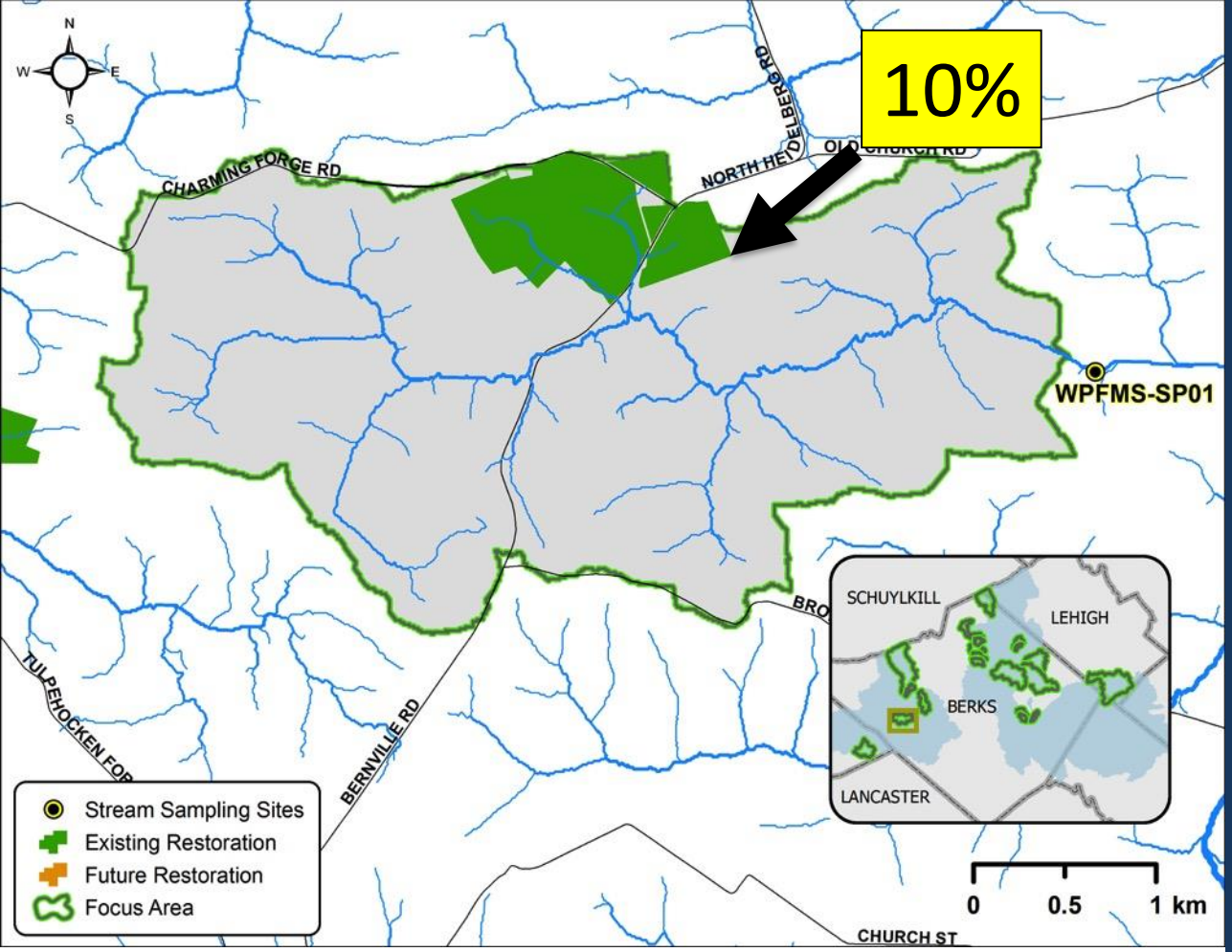
45% pasture

20% row crop

Trout Stocking Fishery

UnImpaired

Goal is Cold Water Fishery



Spring Creek in Tulpehocken

10 km ^{2}

6.8 km of stream

23% forest

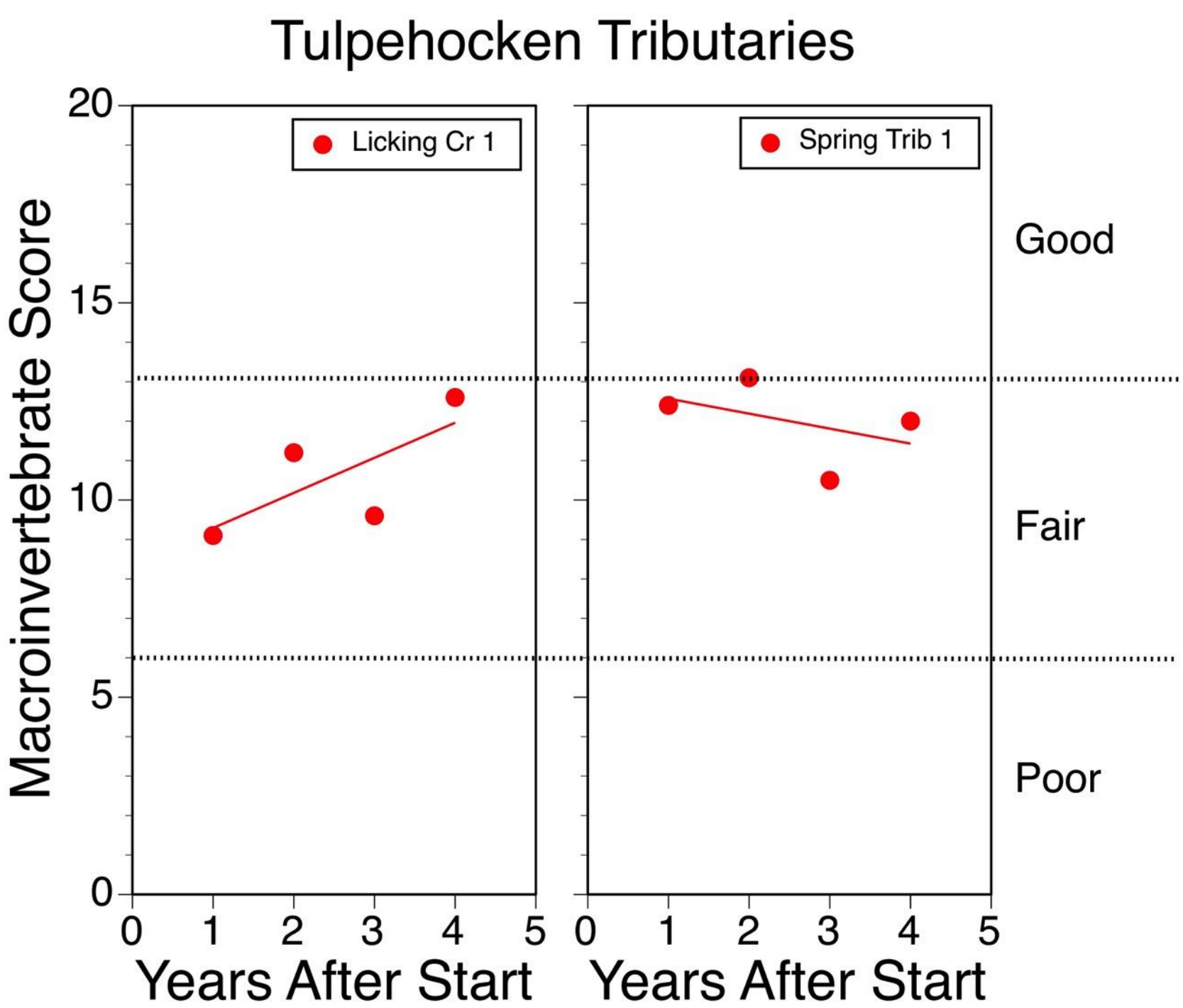
43% pasture

23% row crop

Trout Stocking Fishery

Unimpaired?

Goal is improved Trout Stocking Fishery


Tulpehocken Tributaries
Licking Cr 1
Spring Trib 1
Macroinvertebrate Score
20
15
10
5
0
Good
Fair
Poor
0
1
2
3
4
5
Years After Start
Years After Start

Valley Creek Tributary to Susquehanna River

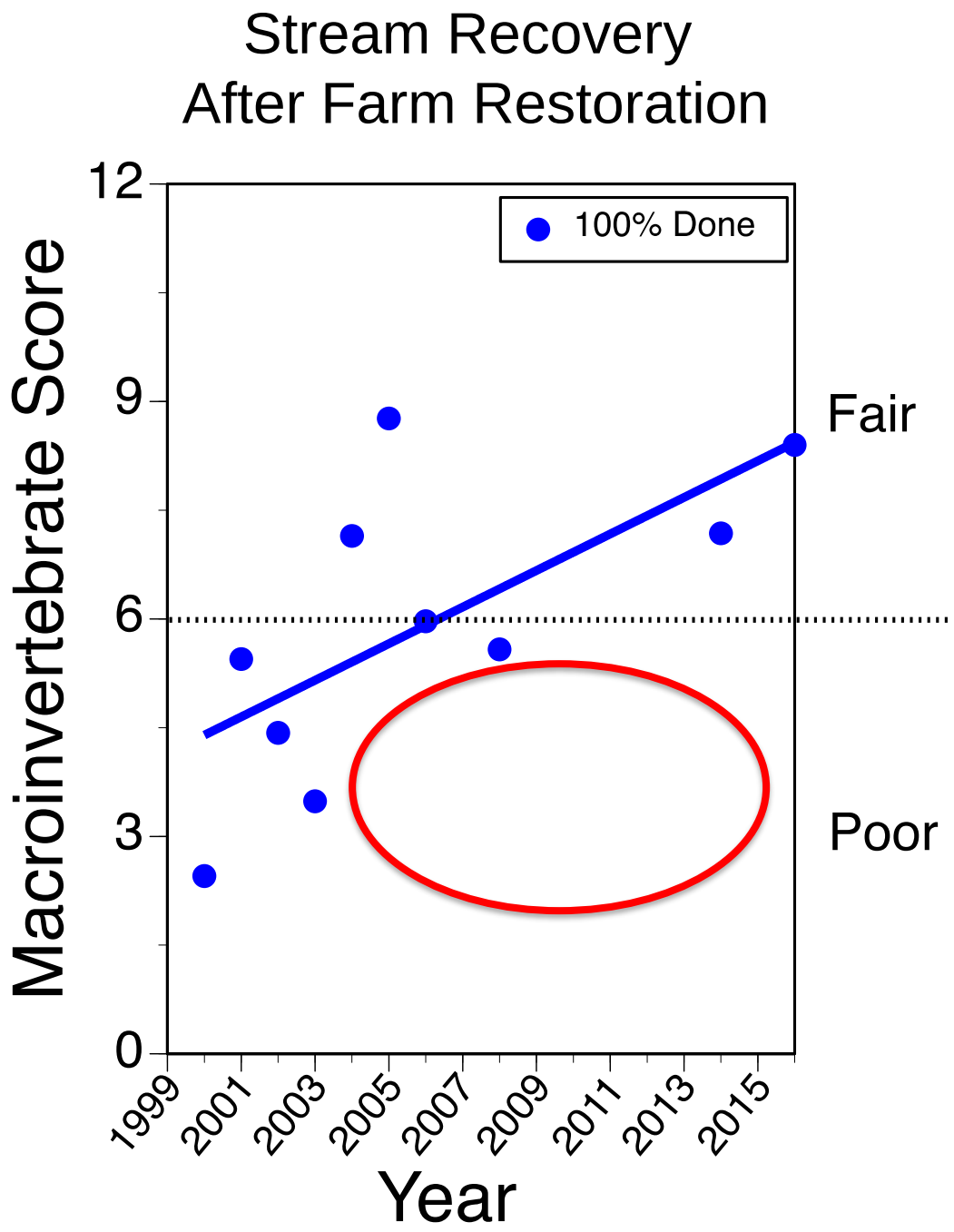
10 km ^{2}

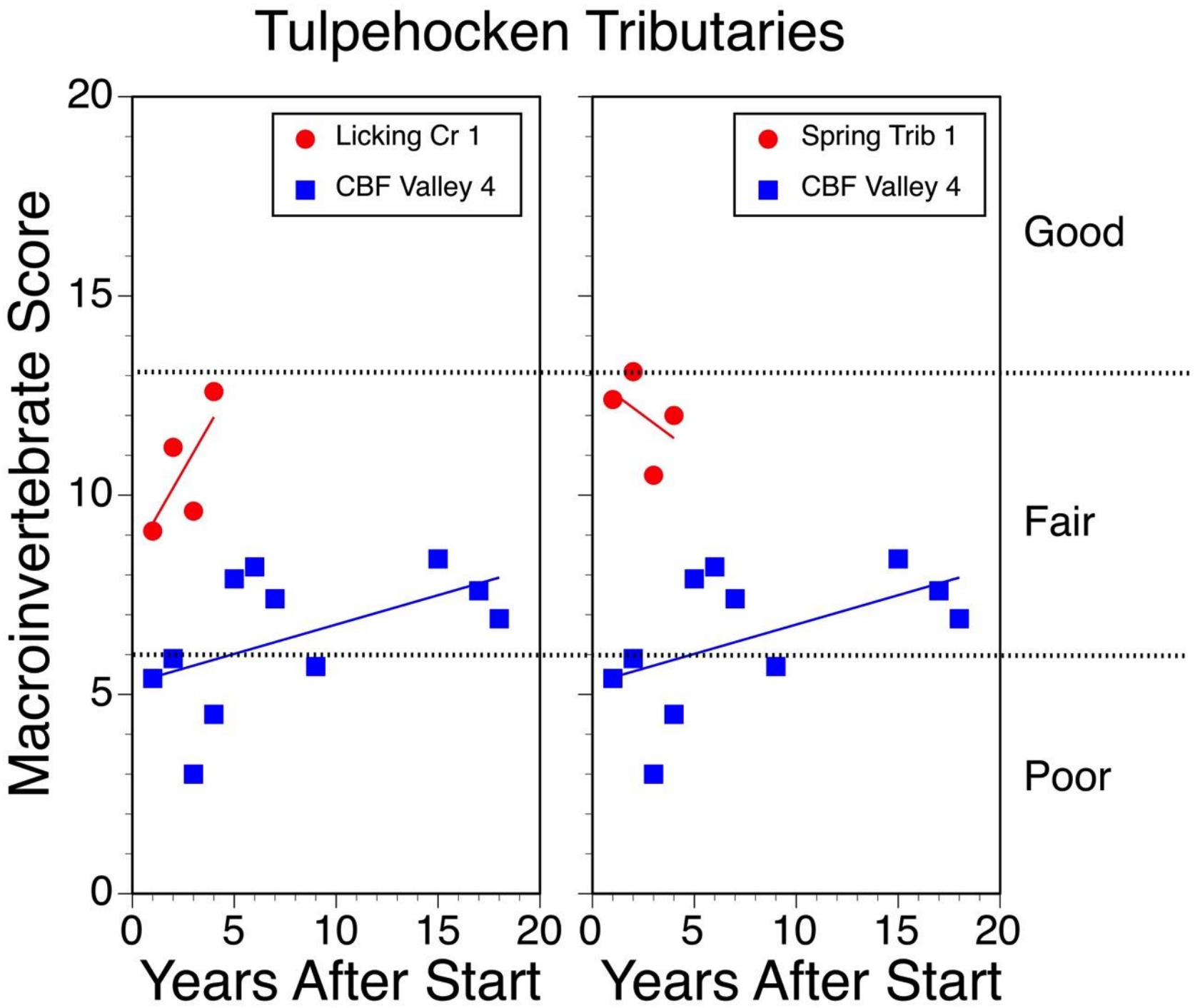
3.5 km of stream

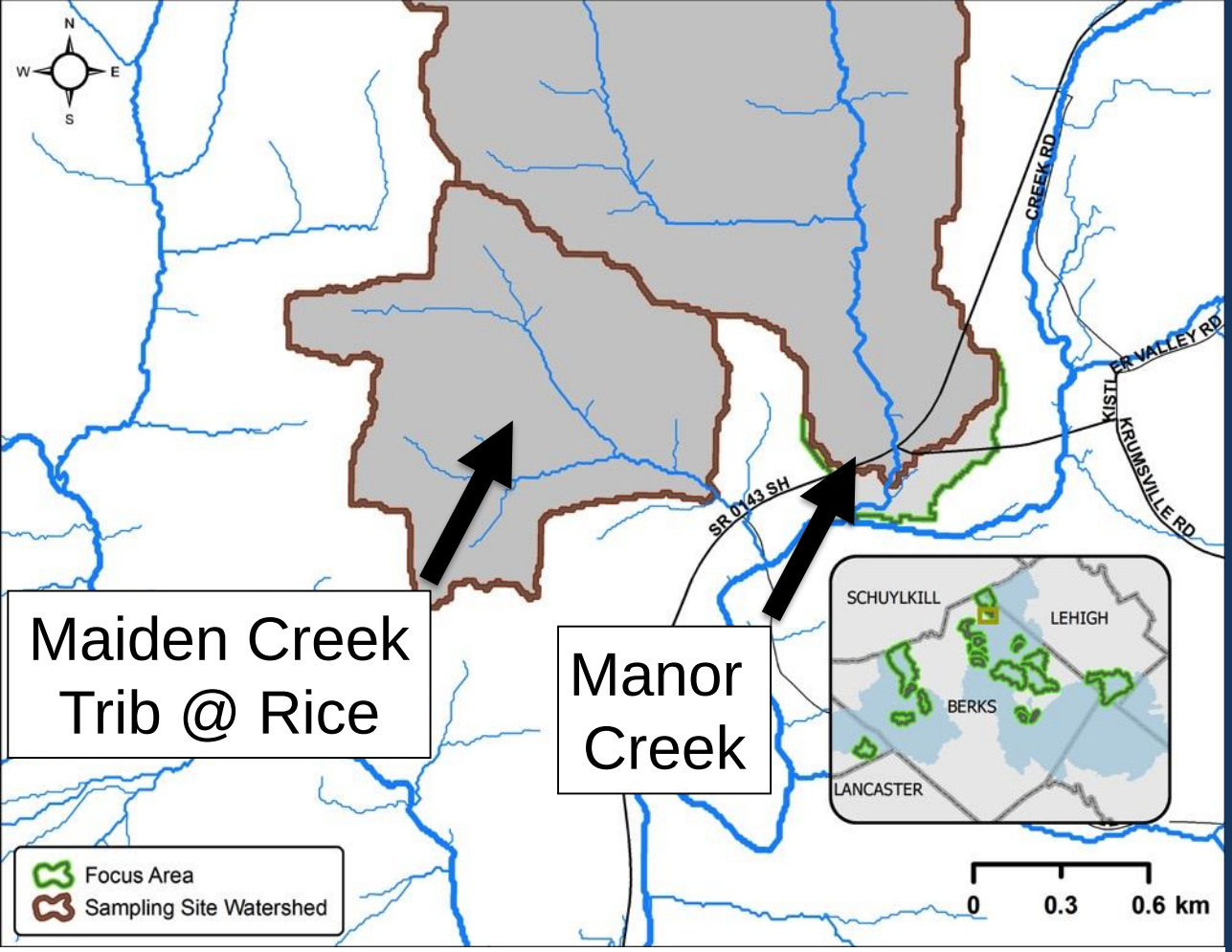
Apr 1999

Aug 2016

Comparison of stream condition 2000 versus 2016




Tulpehocken Tributaries
Licking Cr 1
CBF Valley 4
Spring Trib 1
CBF Valley 4
Macroinvertebrate Score
20
15
10
5
0
Good
Fair
Poor
0
5
10
15
20
Years After Start
Years After Start



Maiden Trib @ Rice Farm

1 km ^{2}

6.8 km of stream

5% forest

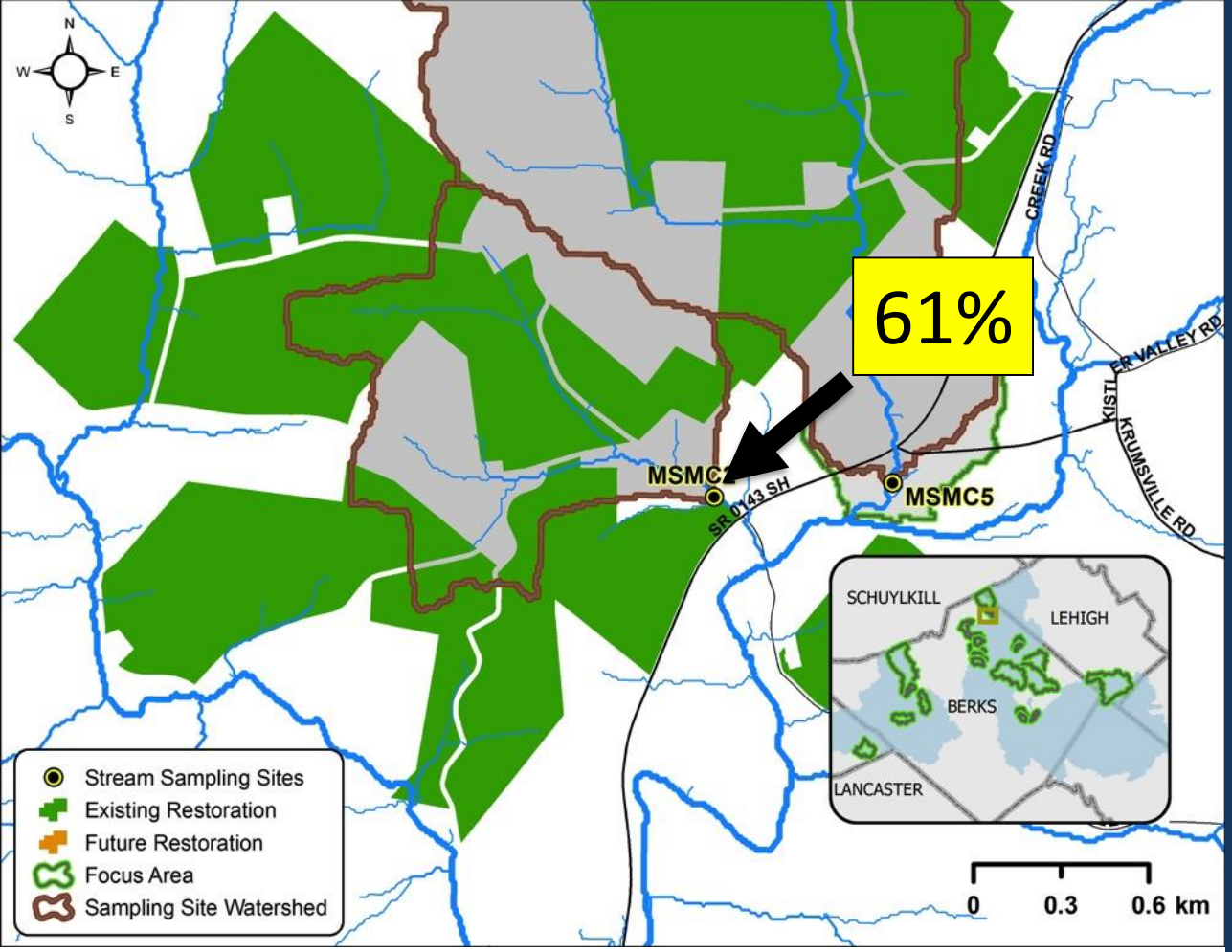
47% pasture

31% row crop

Cold Water Fishery

Unimpaired?

Goal is improved Cold Water Fishery



Maiden Trib @ Rice Farm

1 km ^{2}

6.8 km of stream

5% forest

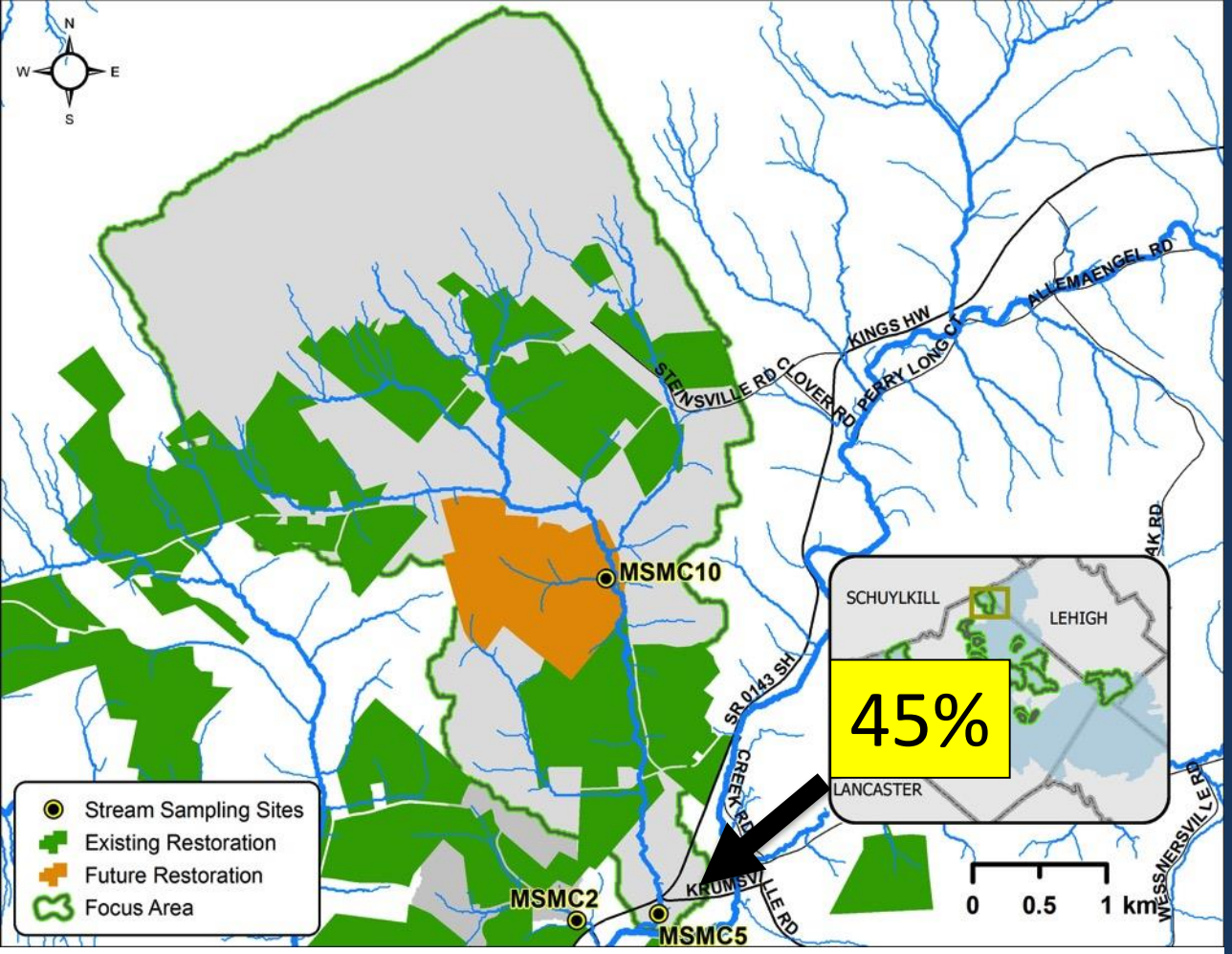
47% pasture

31% row crop

Cold Water Fishery

Unimpaired?

Goal is improved Cold Water Fishery



Manor Creek in Maiden

17 km ^{2}

5.8 km of stream

52% forest

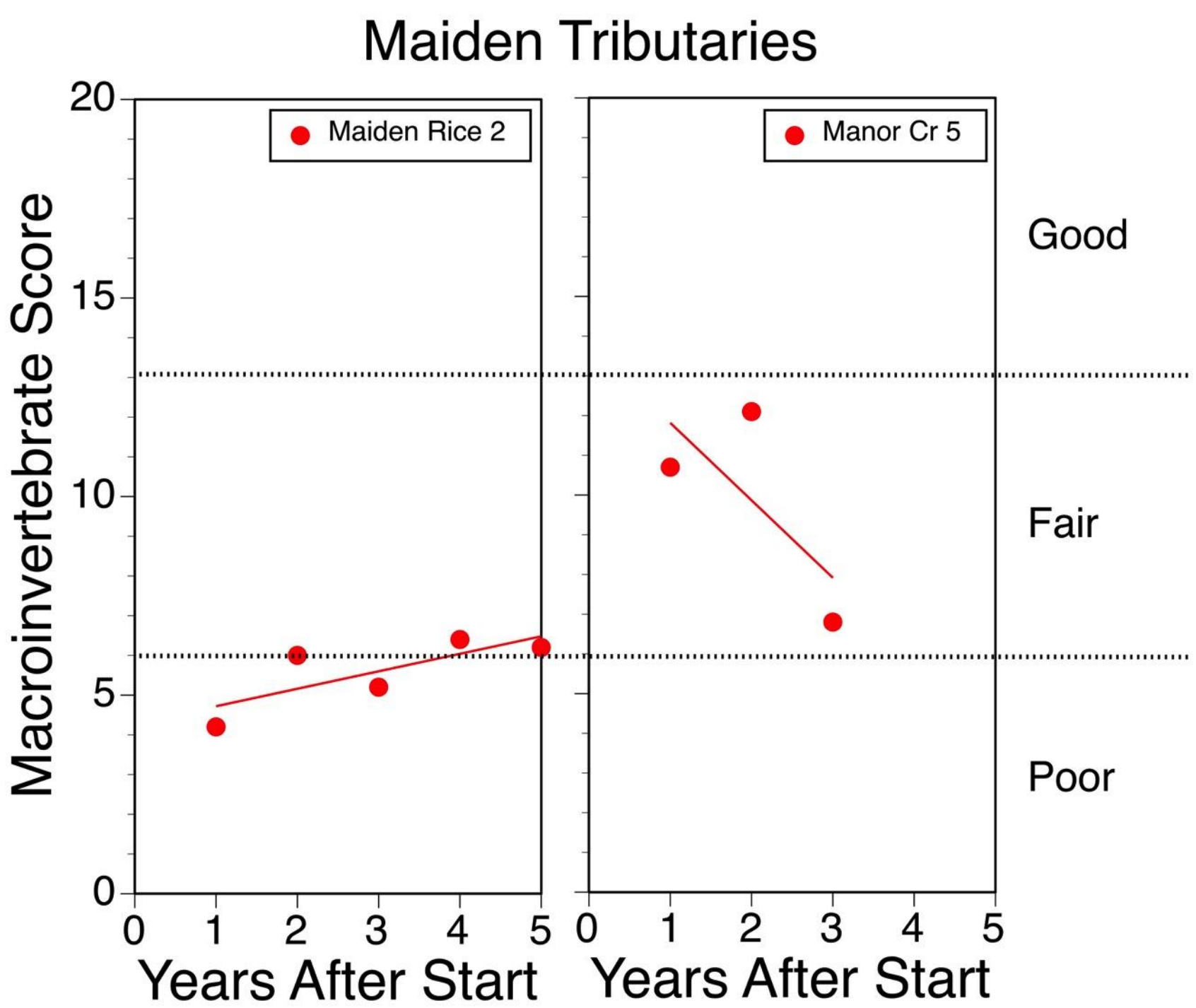
26% pasture

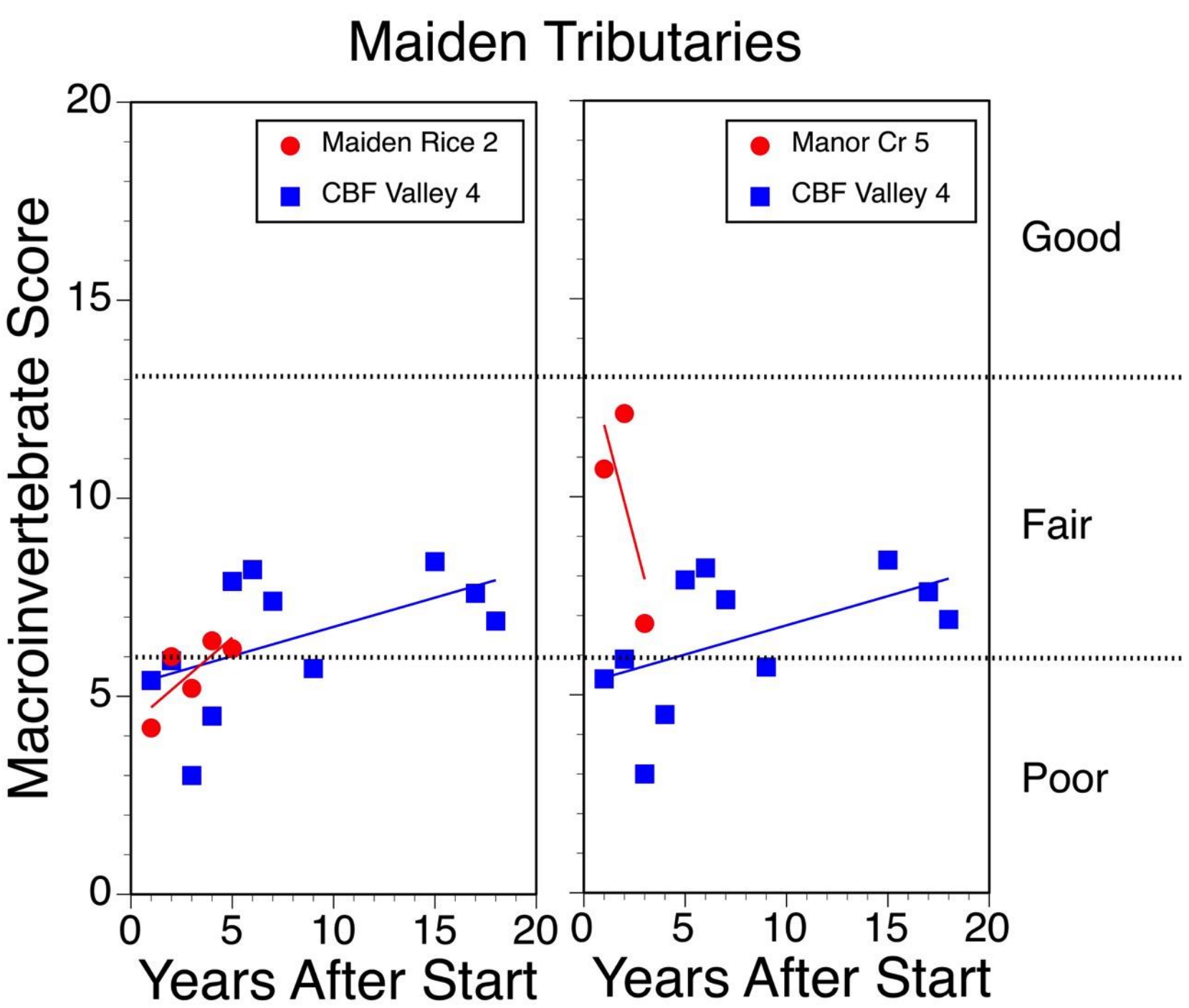
18% row crop

Cold Water Fishery

Unimpaired

Goal is improved Cold Water Fishery


Maiden Tributaries
Maiden Rice 2
Manor Cr 5
Macroinvertebrate Score
20
15
10
5
0
Good
Fair
Poor
0
1
2
3
4
5
Years After Start
Years After Start


Maiden Tributaries
Macroinvertebrate Score
20
15
10
5
0
Maiden Rice 2
CBF Valley 4
Manor Cr 5
CBF Valley 4
Good
Fair
Poor
0
5
10
15
20
Years After Start
Years After Start

Middle Schuylkill Cluster Phase 1 & 2

6,294 tons of sediment per year

17,910 lbs of phosphorus per year

https://www.drawingtutorials101.com/how-to-draw-simple-dump-truck

https://feedyardfoodie.wordpress.com/2013/03/28/march-madness/

Middle Schuylkill Cluster Phase 1 & 2

629 truckloads
sediment per year

448 truckloads
manure per year

https://www.drawingtutorials101.com/how-to-draw-simple-dump-truck

https://feedyardfoodie.wordpress.com/2013/03/28/march-madness/

877 truckloads
sediment and manure
per year

8770 truckloads
sediment and manure
in years

5.1 miles of trucks line up
bumper-to-bumper
per year

51 miles of trucks
over 10 years

Summary

- Project progress is strong
  (45 – 61% complete in some areas)

- Current conditions may support higher Focus Area goals – unimpaired ➔ cold water fishery ➔ wild trout

- Too early to see ecological outcomes – need more projects and time

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