Addressing Impairment in Beaver Dam Lake and Beaver Creek

UW-Madison Water Resources Management Practicum 2017

Outline

Introduction

4 Study Components

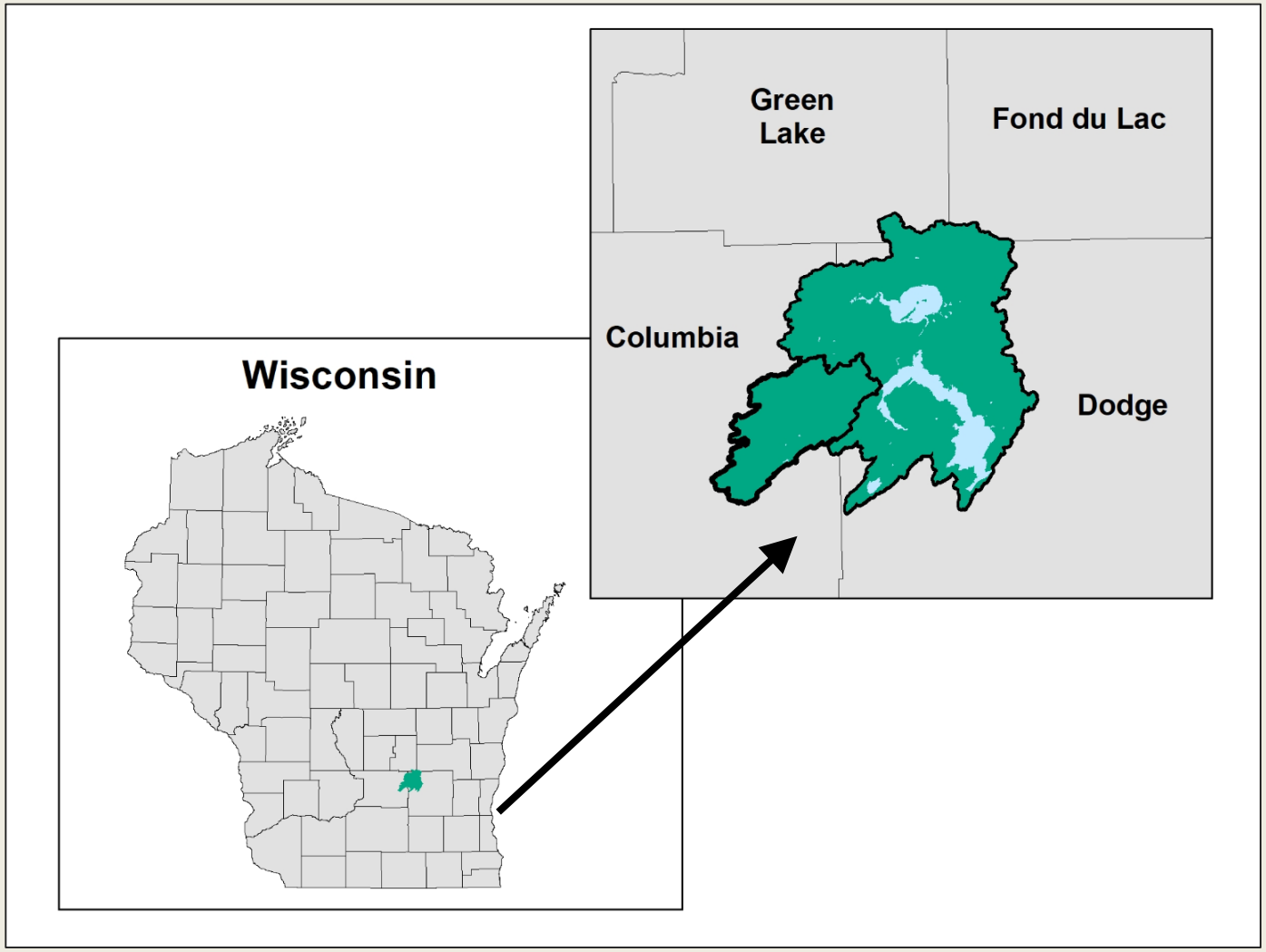
- Stakeholder
- Upland
- In-Stream
- In-Lake

Recommendations

Questions

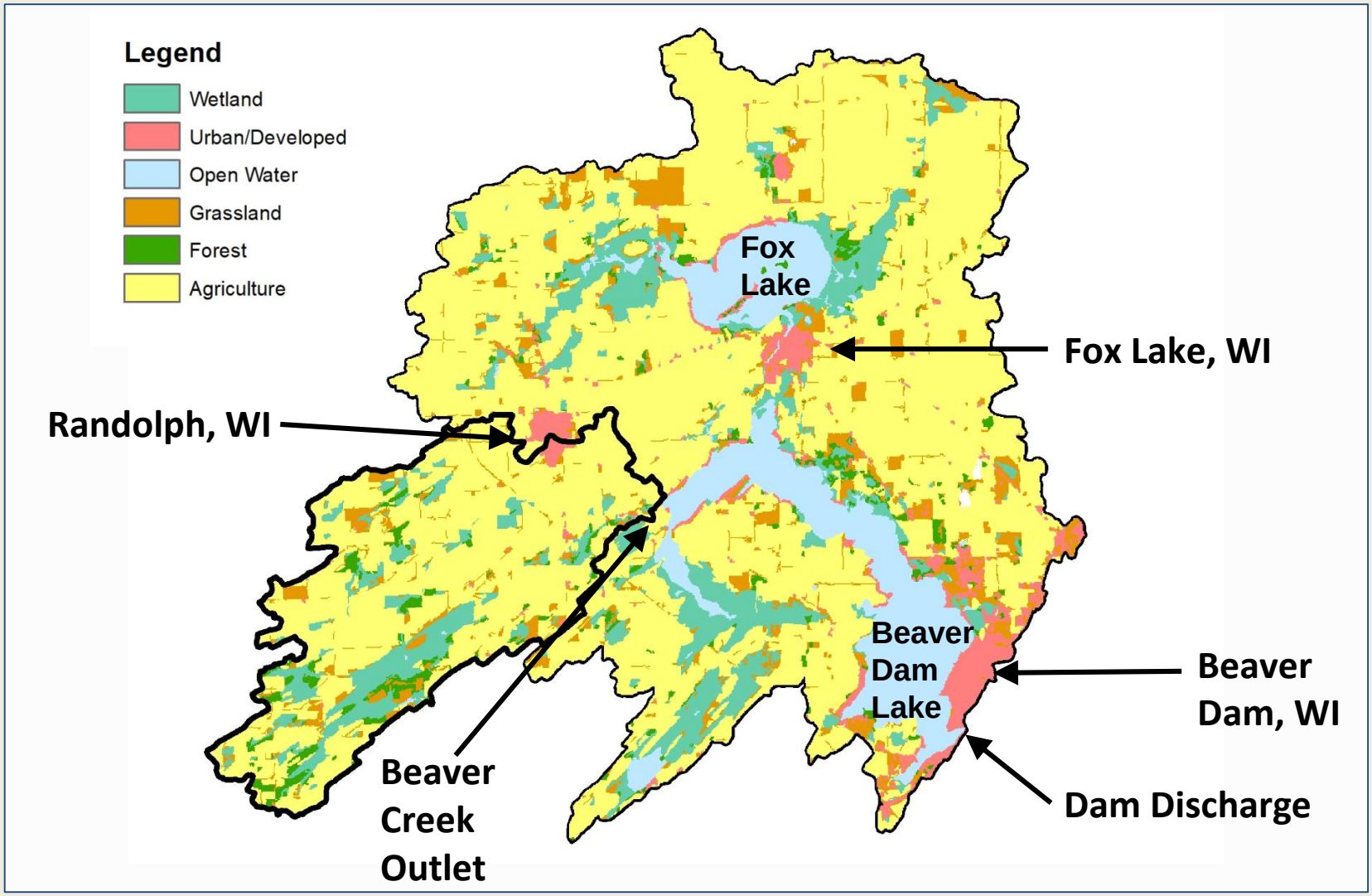
Introduction

Watershed



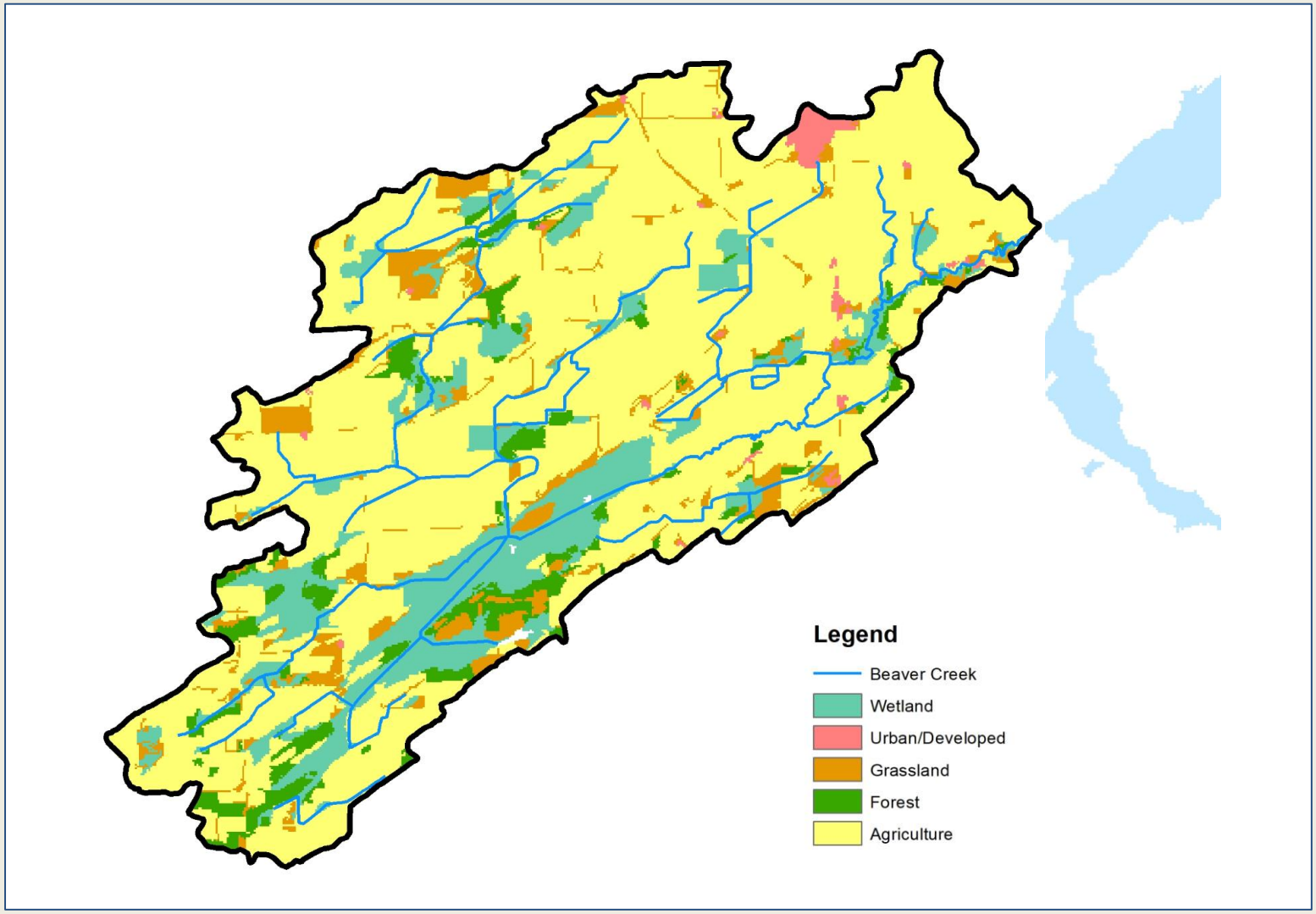
Introduction

Watershed



Introduction

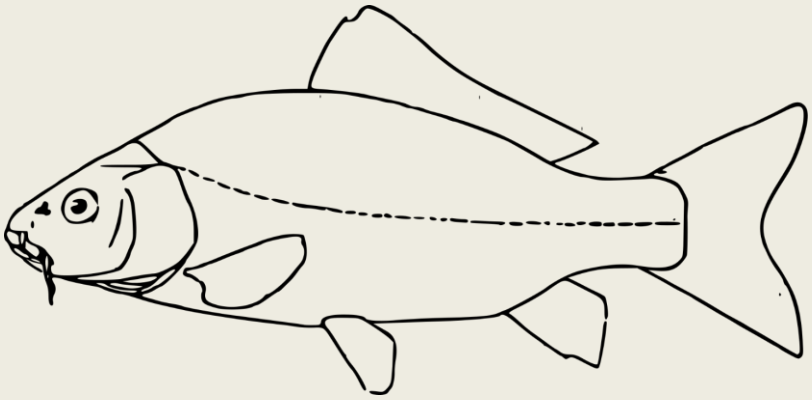
Watershed



Introduction

Problem Statement

- Algae blooms
  - Phosphorus
  - Shallow
  - Warm temps
  - Carp



Introduction

BDLIA Partnership

Beaver Dam Lake Improvement Association, Inc.

Onterra, LLC

Lake Management Plan

UW-WRM

WDNR Lake Planning Grant

Introduction

Scope of Study

1. **Engage Stakeholders** to assess community priorities and barriers to action
2. Assess current state of **Beaver Dam Lake** and add to existing knowledge of water quality issues
3. Assess water quality, biological health, and deposited sediment phosphorus content of **Beaver Creek**
4. Analyze **Upland** land use connections to water quality

Component 1

Stakeholder Engagement

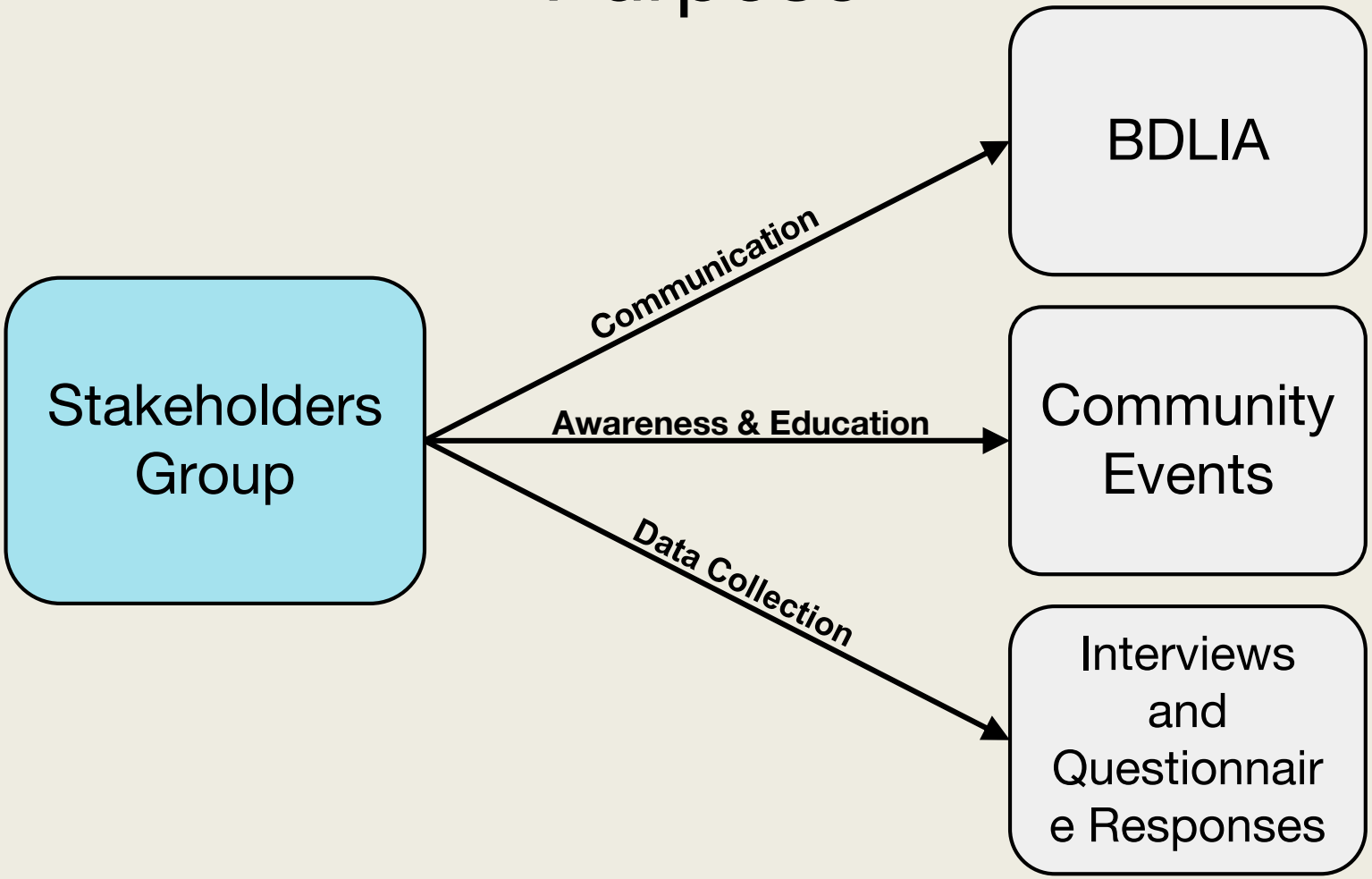
Beaver Dam Lake

Beaver Creek

Upland Beaver Creek

Stakeholders

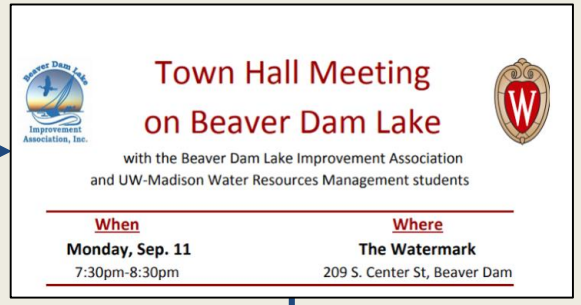
Purpose

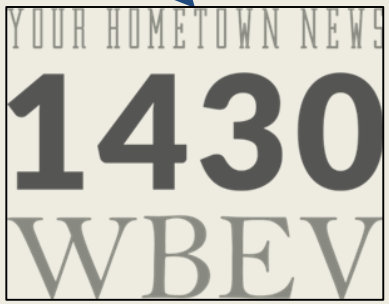


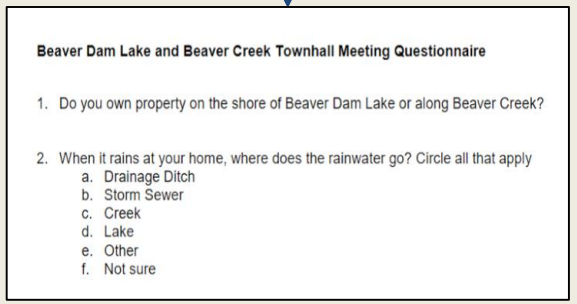
Stakeholders

Events

Awareness & Education







Stakeholders

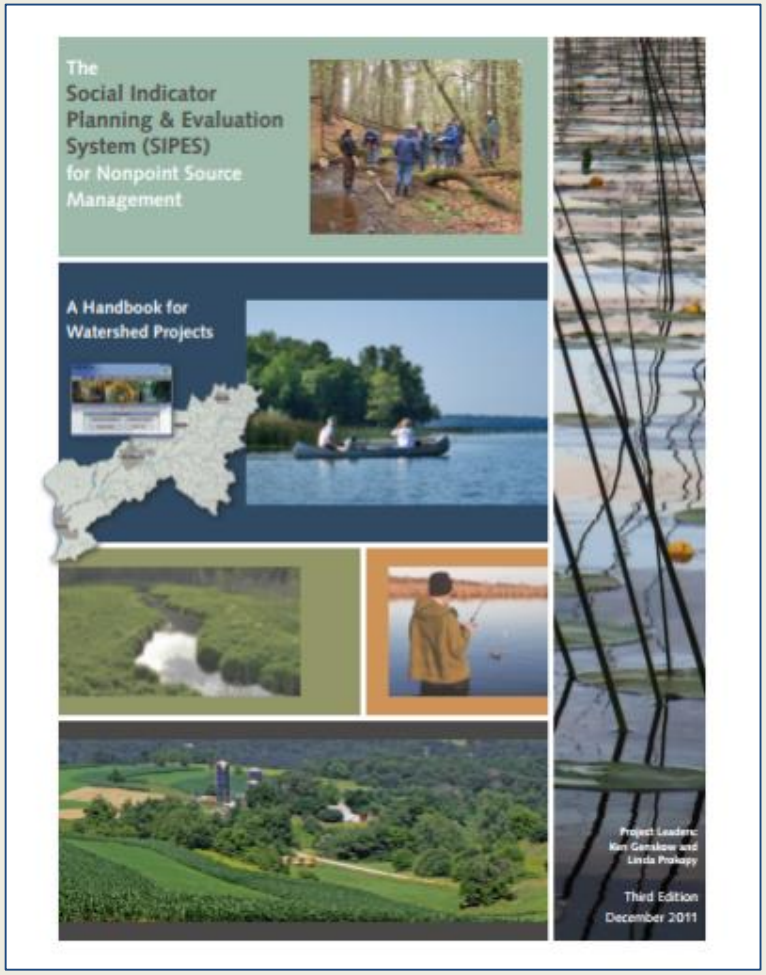
Questionnaire

Administered at:

- Interviews
- Town hall meeting
- Kiwanis Club meeting

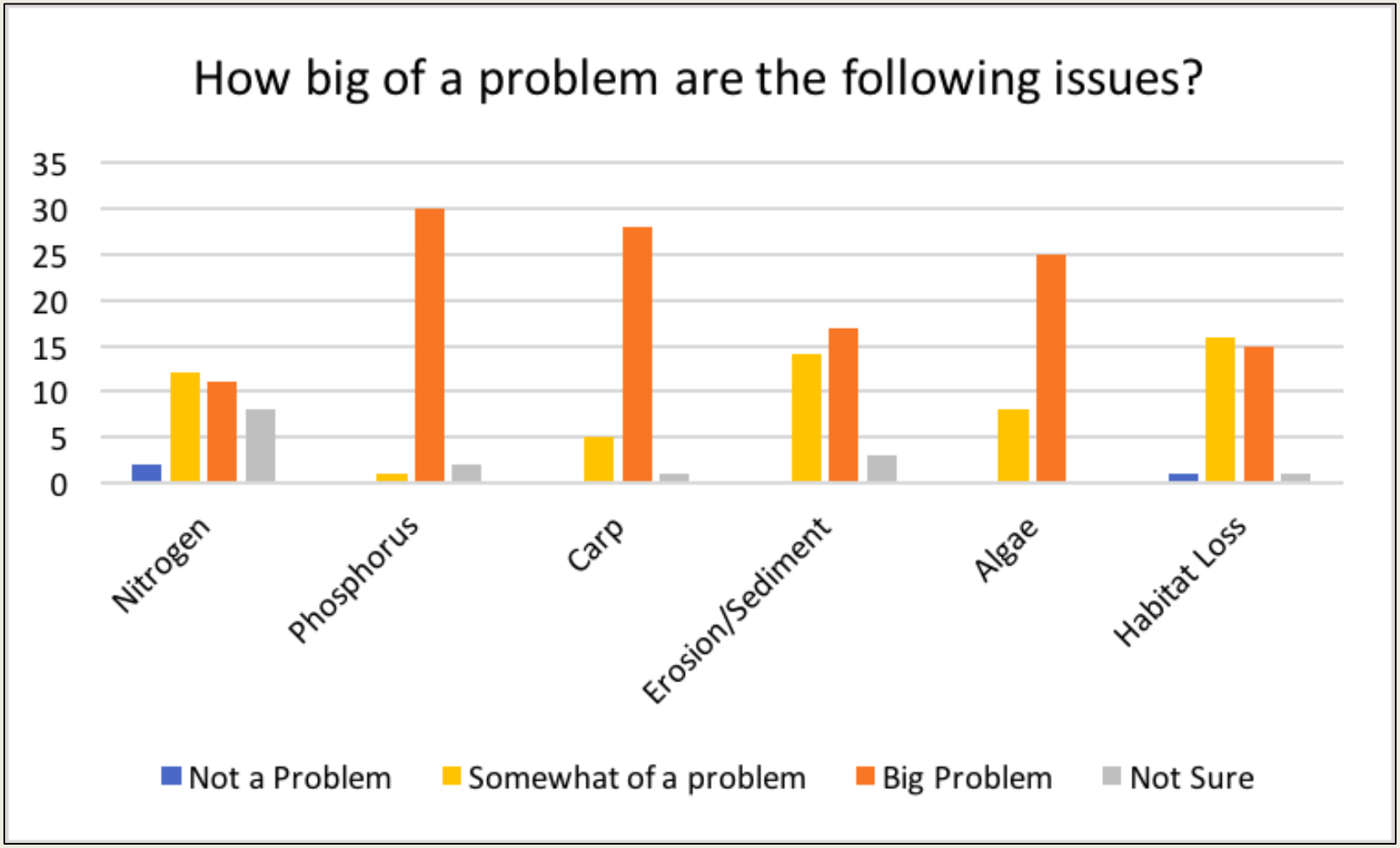
Questions:

- Understanding of “watershed”
- Perceptions of lake and creek health
- Recreational usage
- Willingness to assist with water quality improvement efforts



Stakeholders

Questionnaire

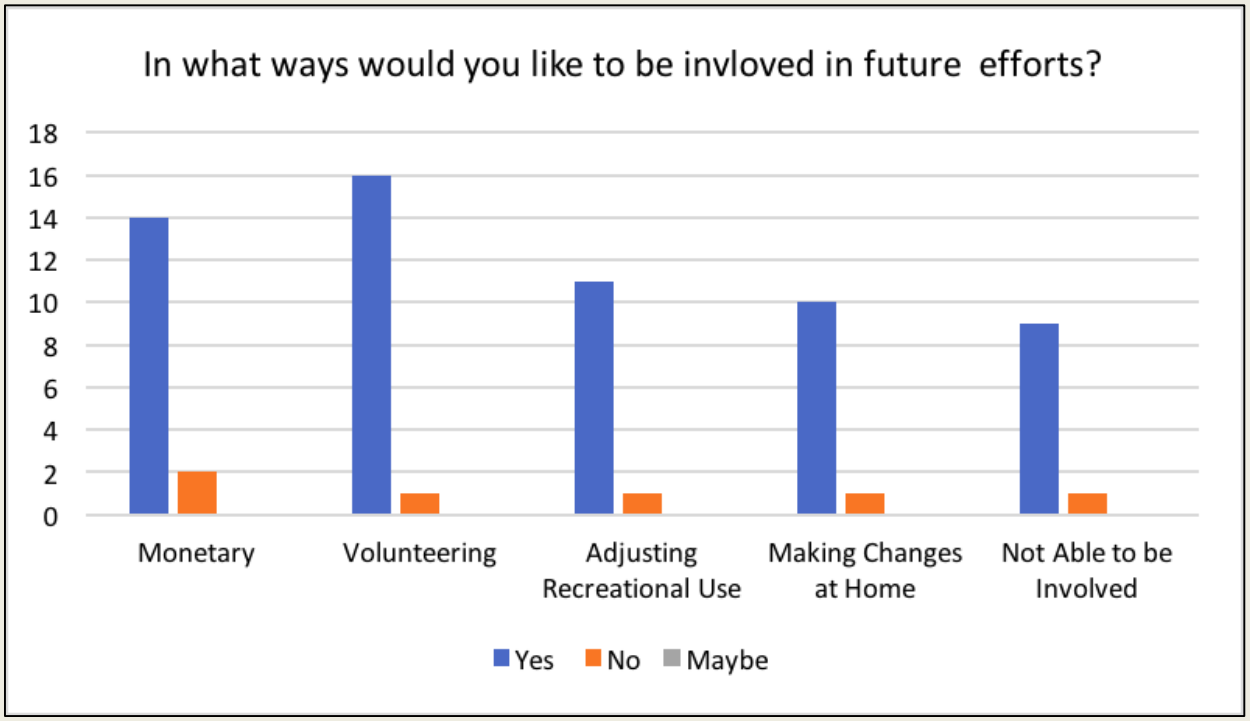


Stakeholders

Questionnaire

Community sees value in improving water quality

- 76.6% believe there are economic benefits for community
- 67.6% would increase recreational usage if water quality improved



Stakeholders

Producer Interviews

Interviews with landowners

**Semi-structured, open-ended

Questions

- Understanding of “watershed”
- Perceptions of lake and creek health
- Land management
- Recreation
- Information seeking behaviors

Stakeholders

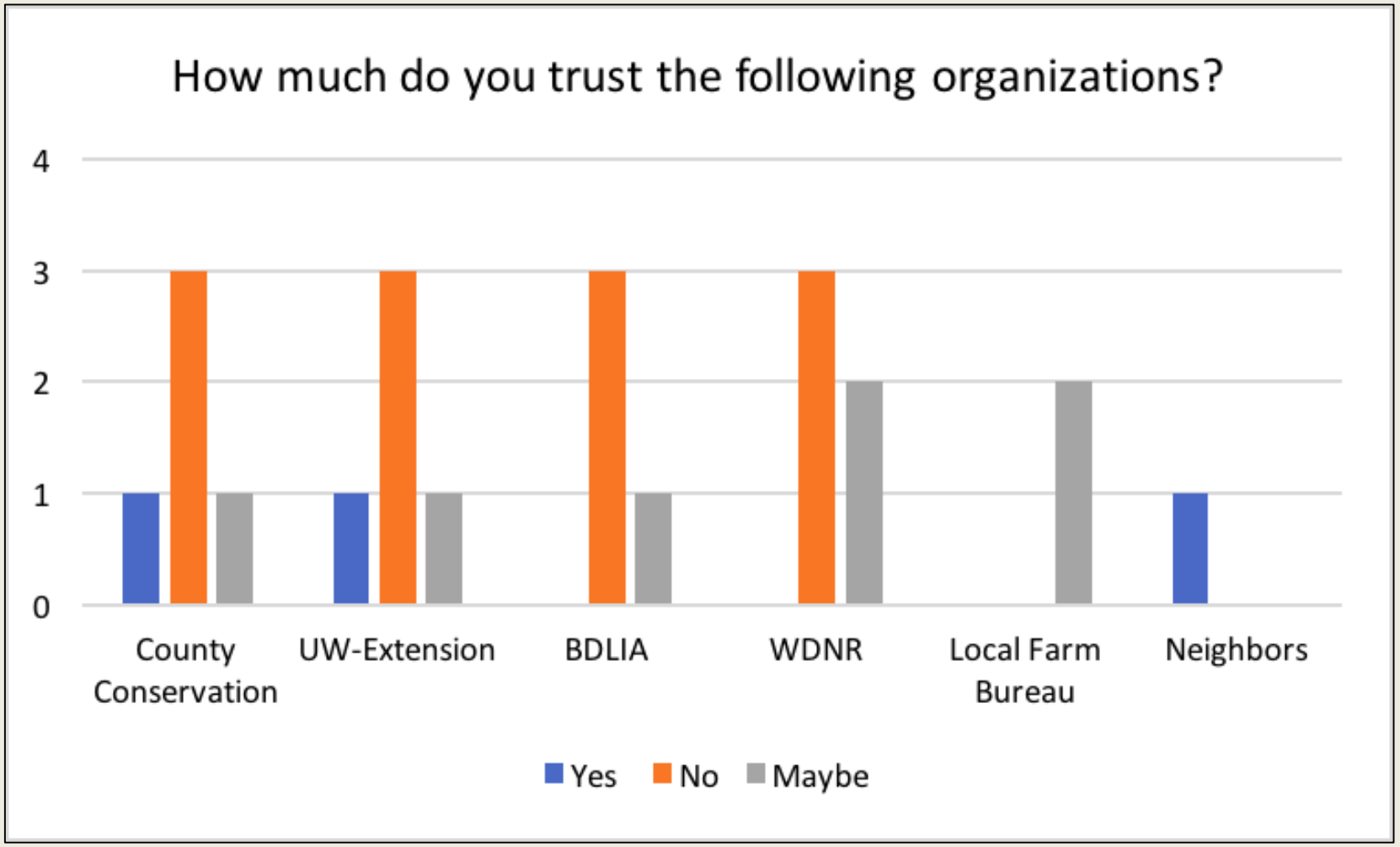
Producer Interviews

Interviews with landowners

- 6 producers
- Generally well aware of BMPs, largest barrier financial
- Disconnect between producers and lake
  - Fishing for recreation, but rarely
  - 4/5 unwilling to contribute to water quality improvement efforts

Stakeholders

Producer Interviews



Component 2

Stakeholder Engagement

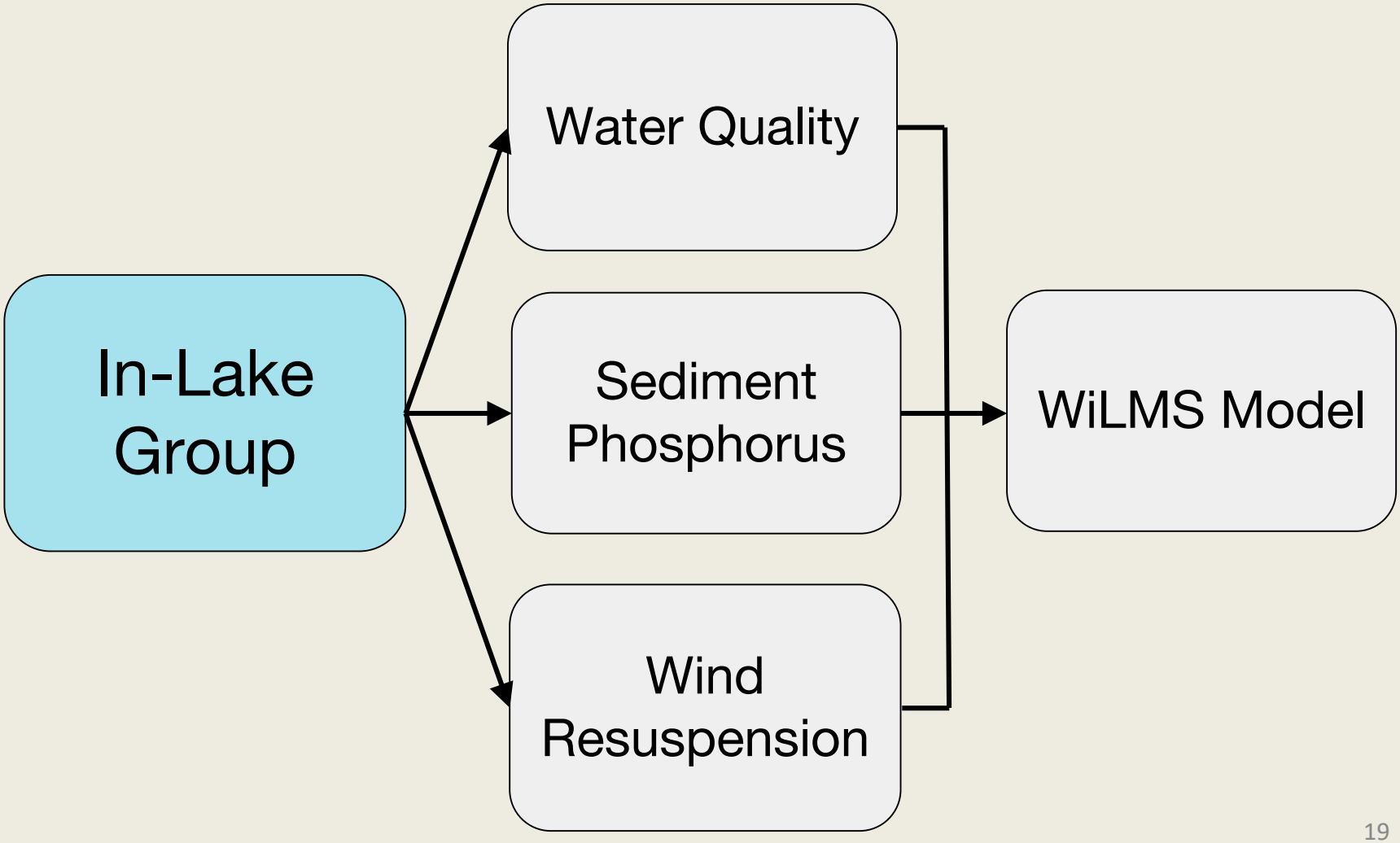
Beaver Dam Lake

Beaver Creek

Upland Beaver Creek

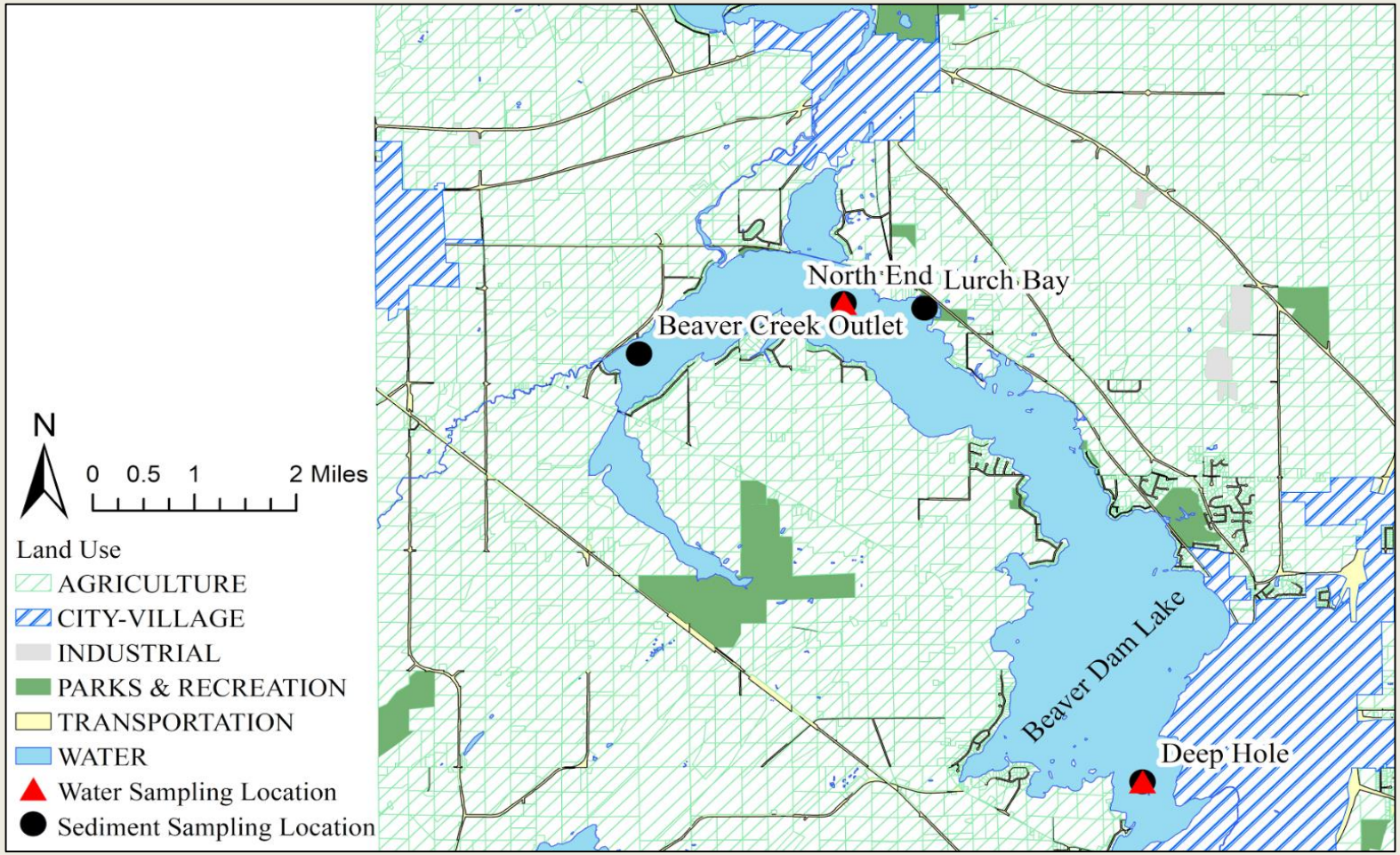
Beaver Dam Lake

Purpose



Beaver Dam Lake

Sampling Locations



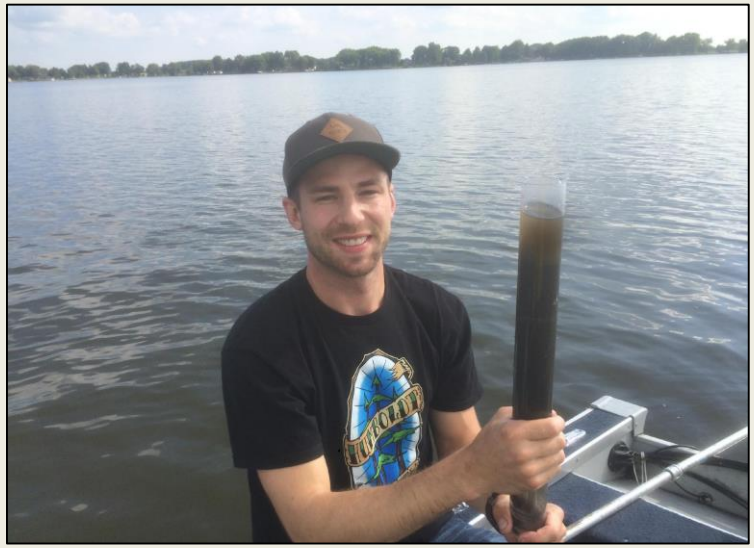
Beaver Dam Lake

Variables of Interest

Field Measurements

Lab Analyses

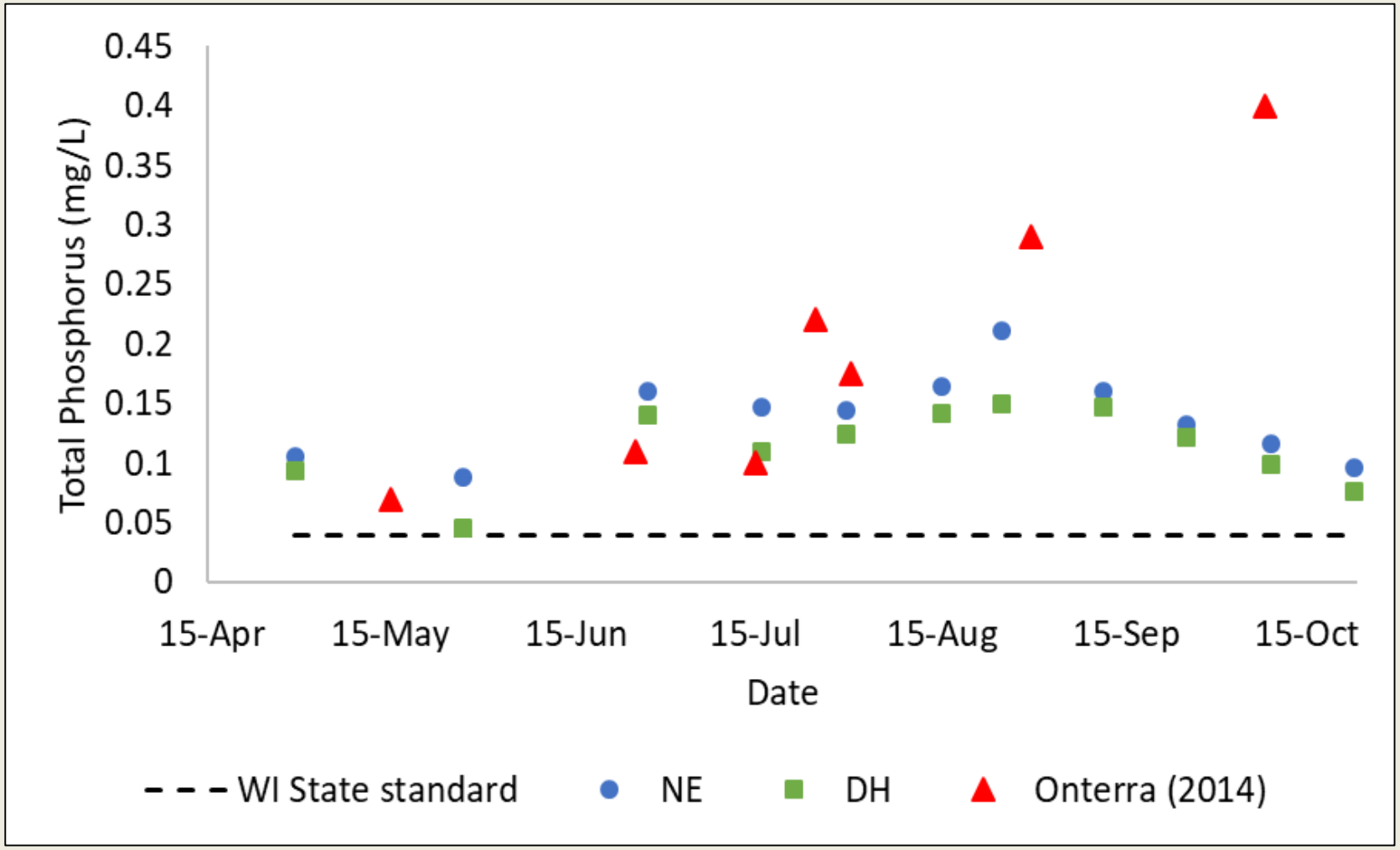
- Total Phosphorus (TP) in water
- Total Phosphorus (TP) in sediment
- PH



*Biweekly sampling for a total of 11 samples

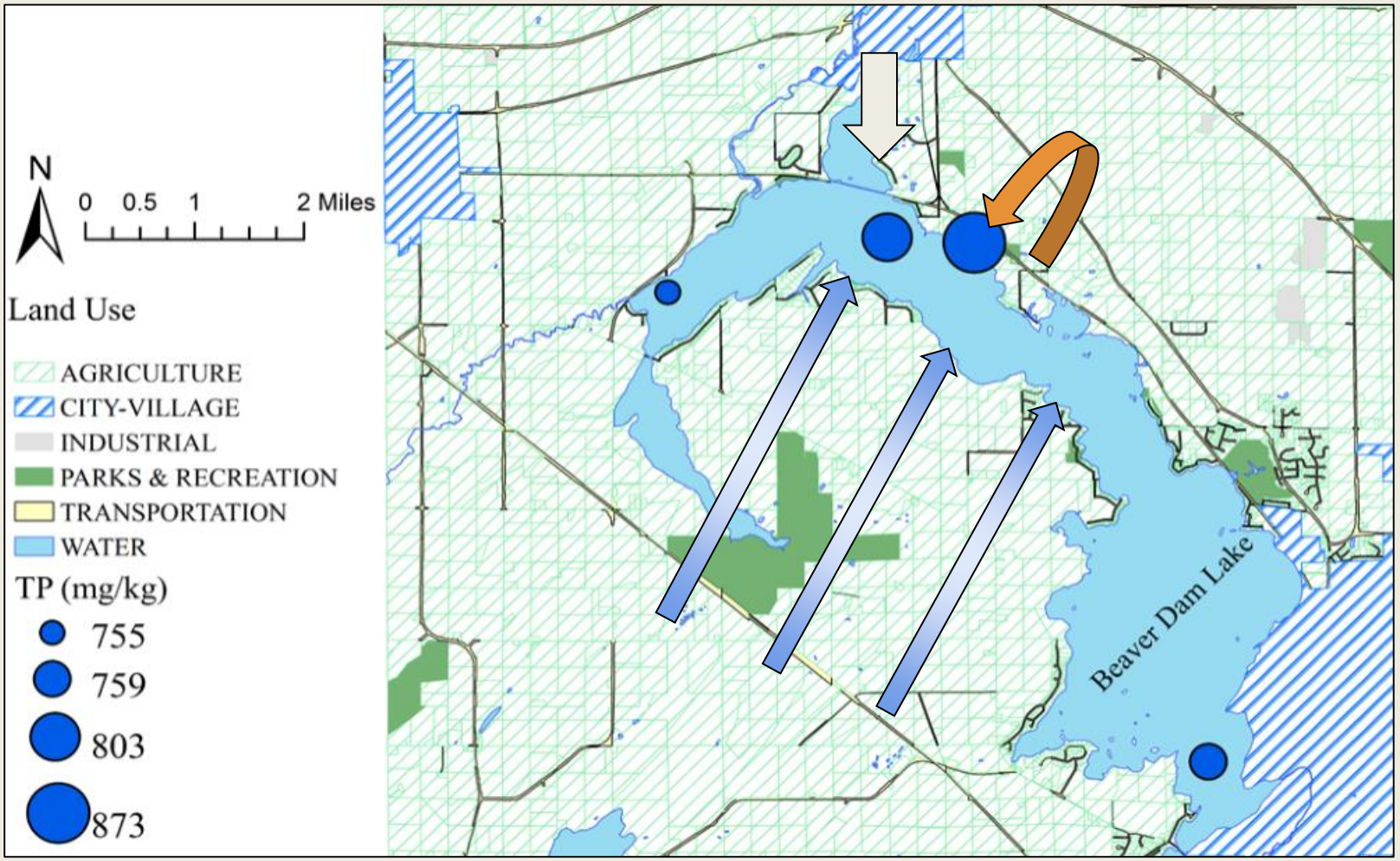
Beaver Dam Lake

Water Quality Results - TP



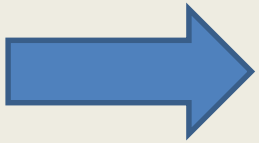
Beaver Dam Lake

Sediment TP



Beaver Dam Lake

P Modeling



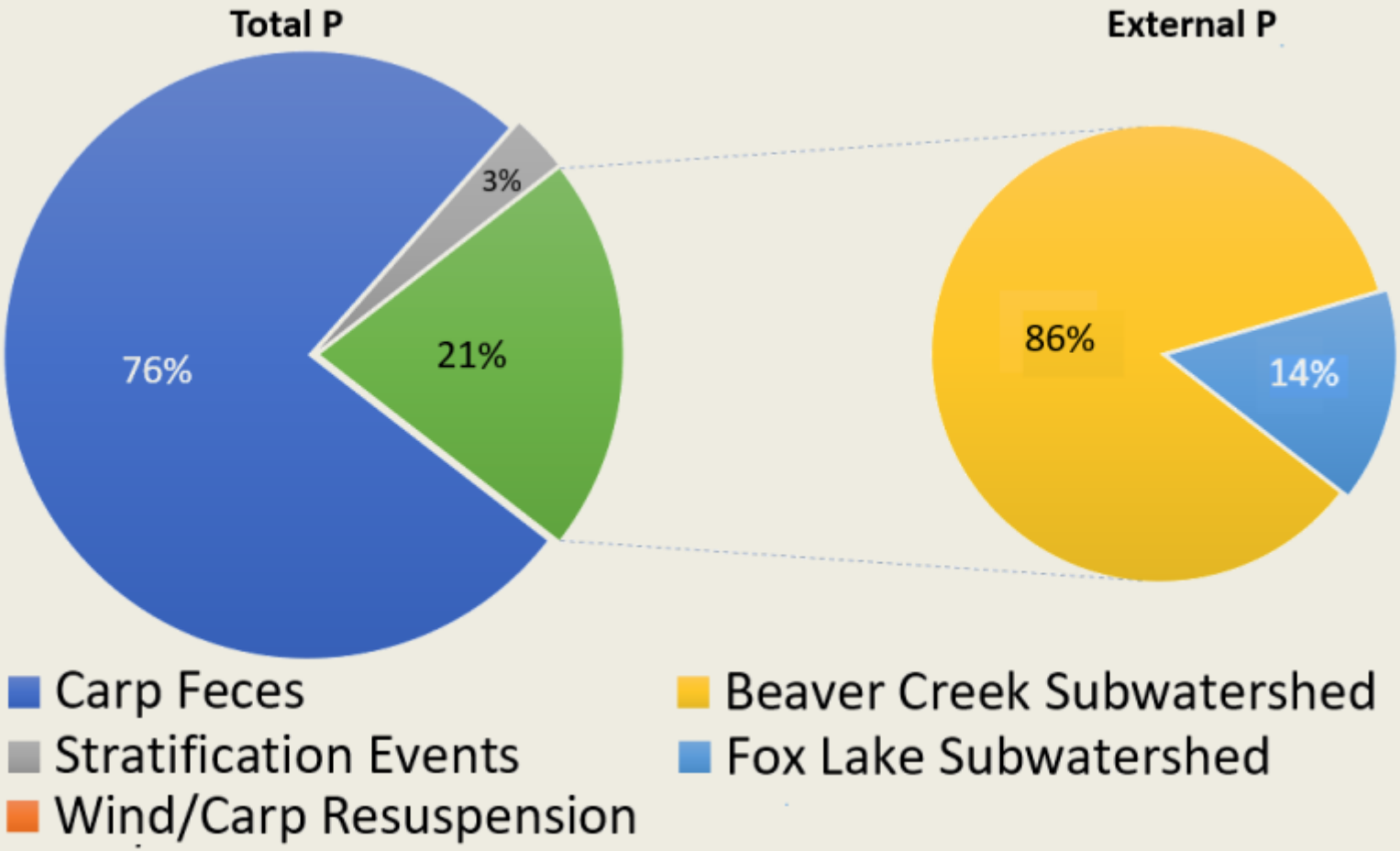
Total in-lake phosphorus

Data

- Water quality
- Wind speed/direction
- Carp densities

Beaver Dam Lake

P Sources



Component 3

Stakeholder Engagement

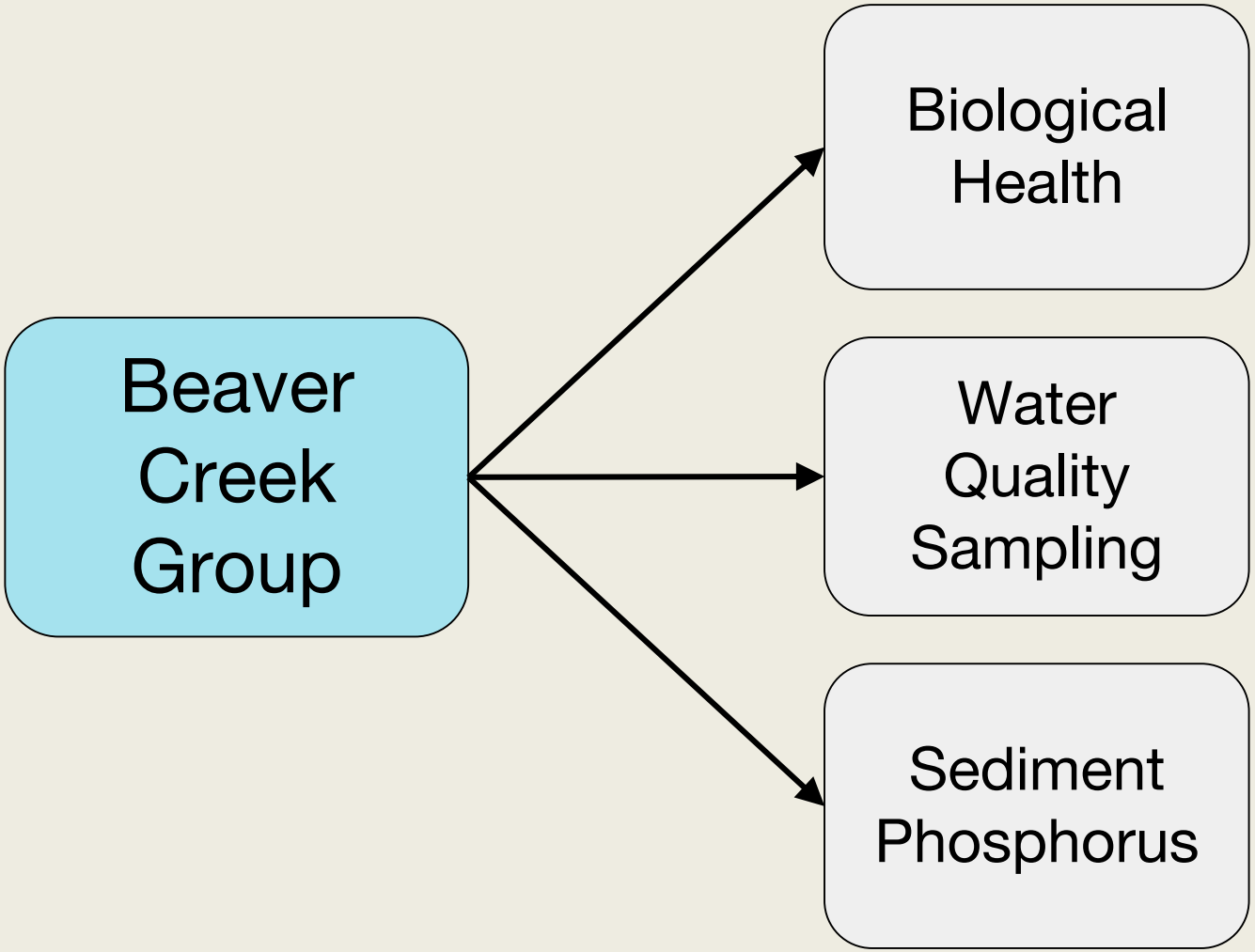
Beaver Dam Lake

Beaver Creek

Upland Beaver Creek

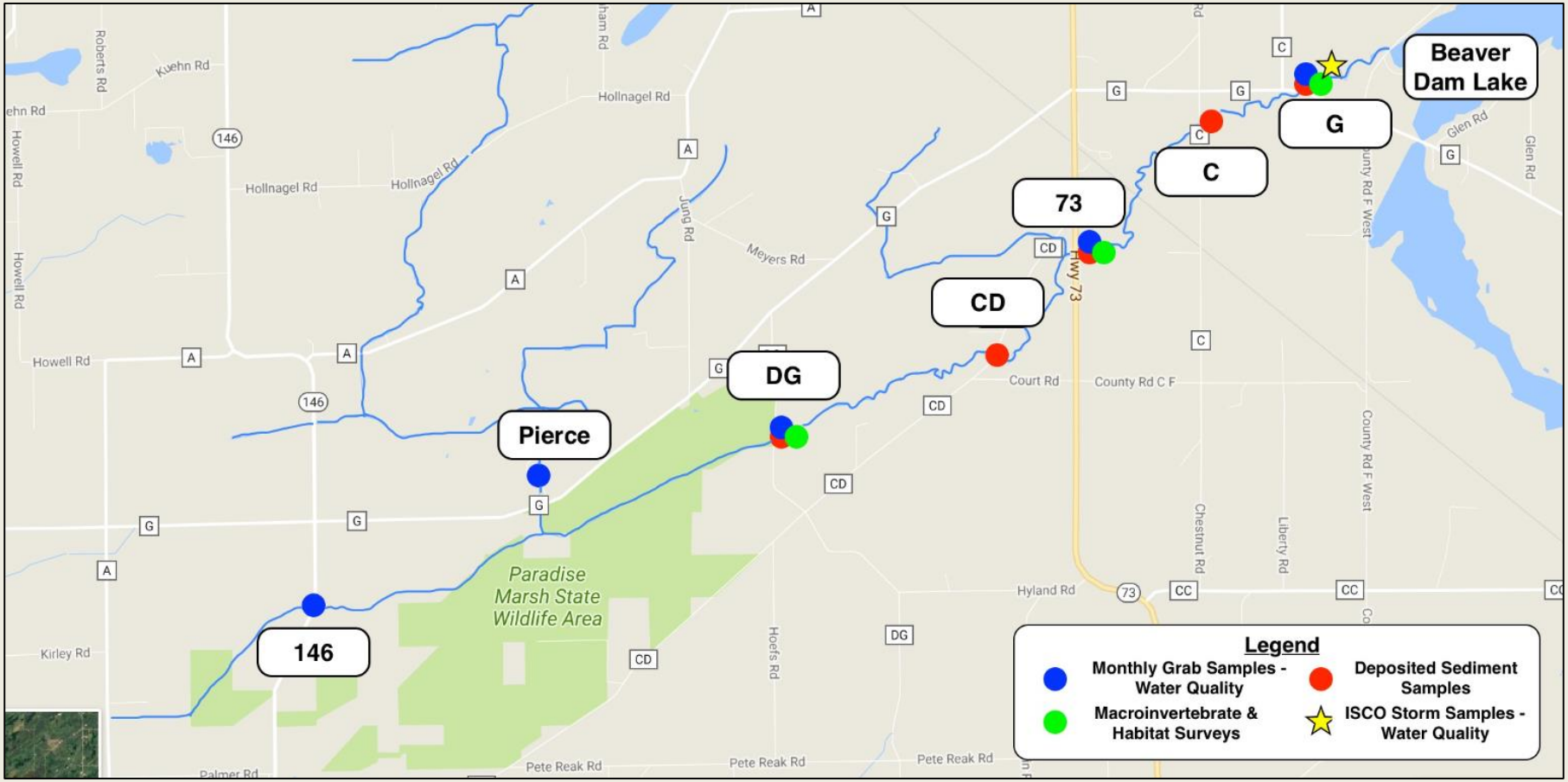
Beaver Creek

Purpose



Beaver Creek

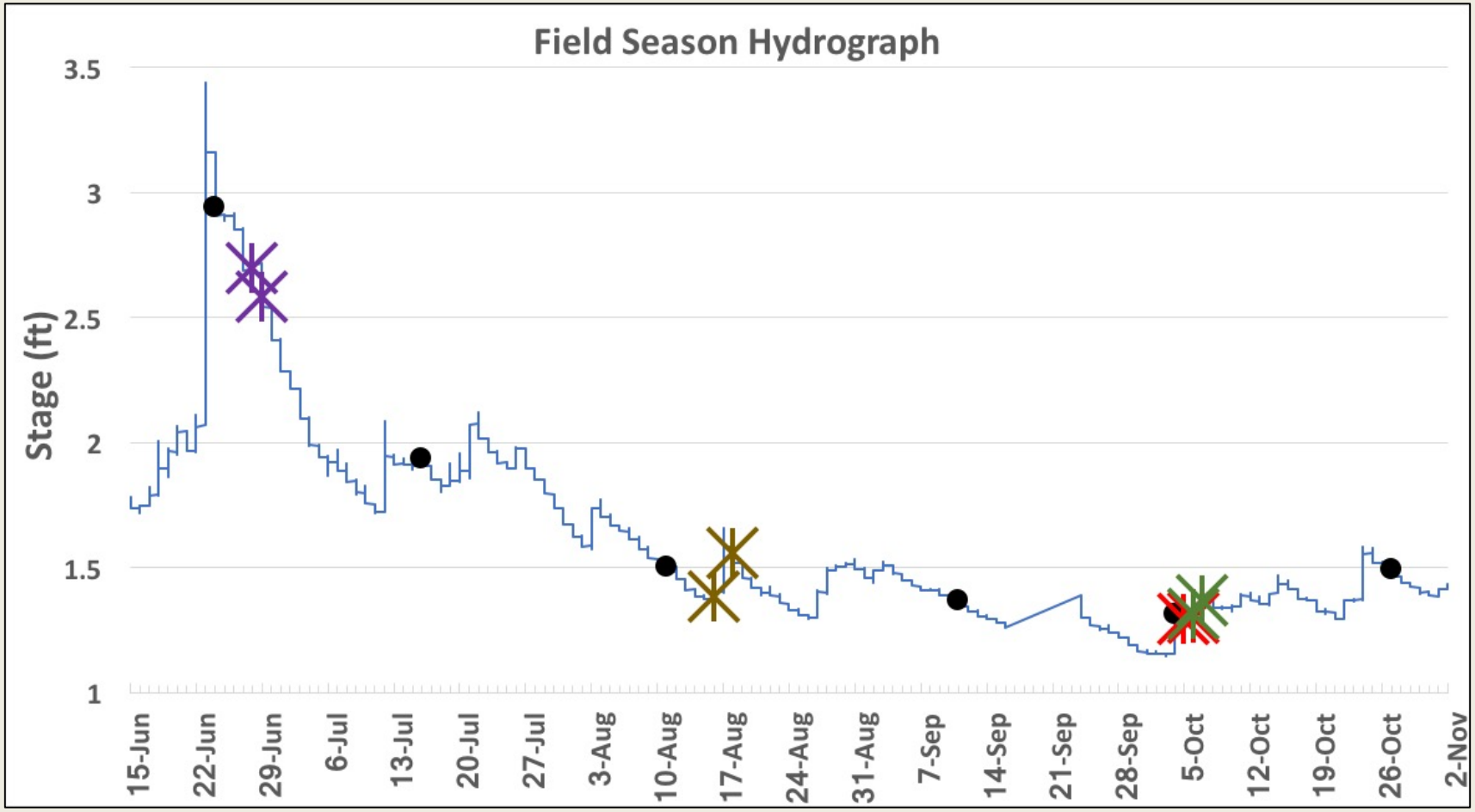
Sampling Sites



*Sites 146 and Pierce added in September

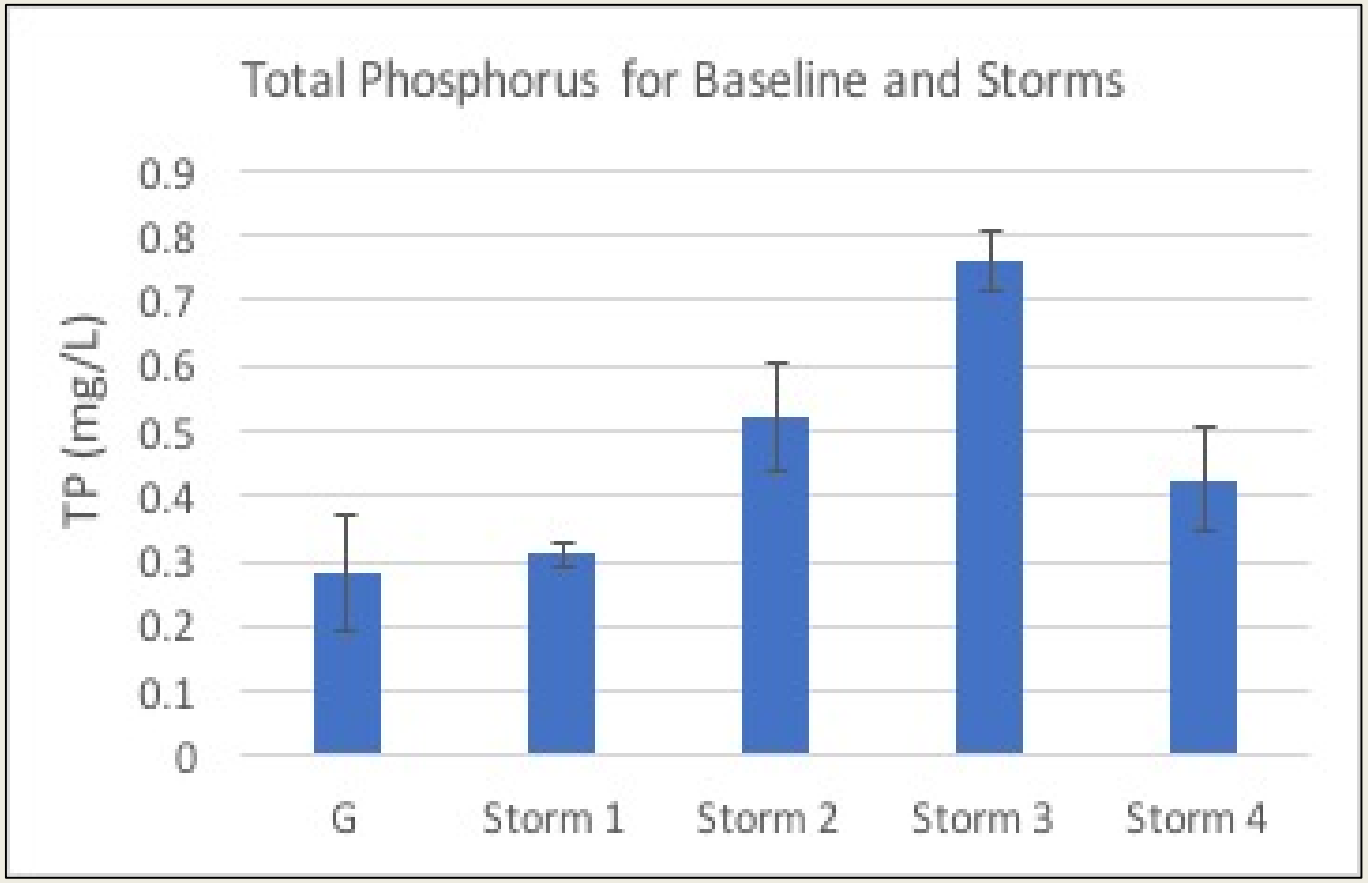
Beaver Creek

Stage Height



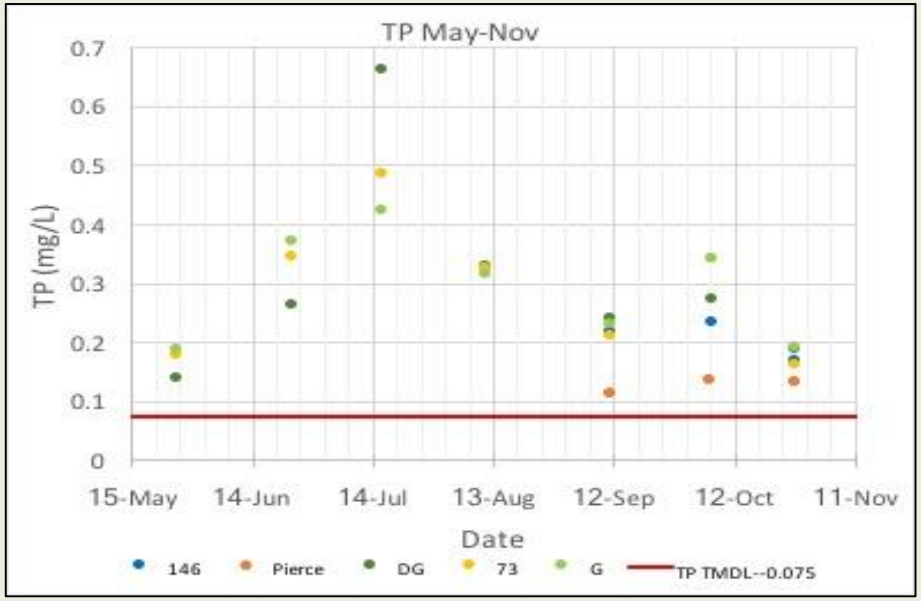
Beaver Creek

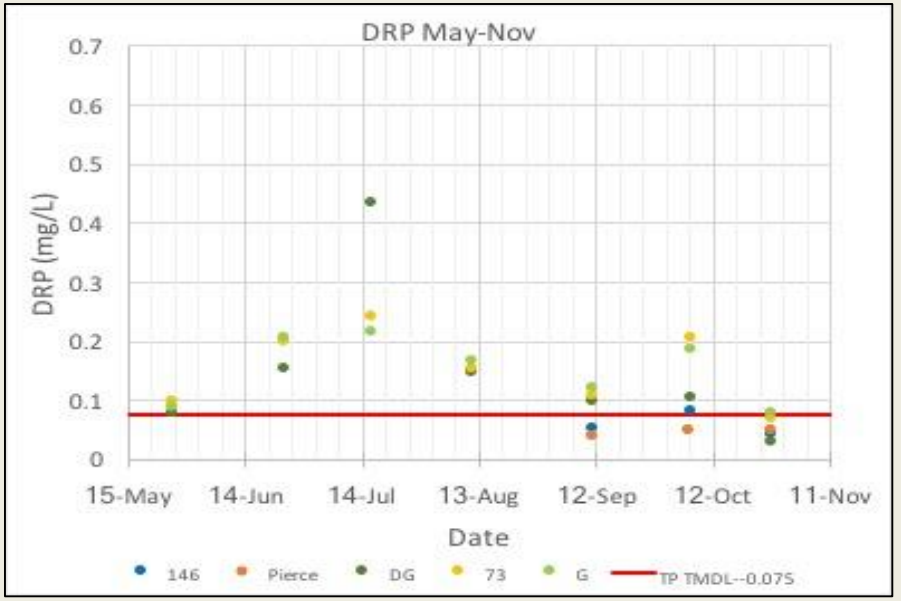
Storms & Baseline - TP



Beaver Creek

Water Quality TP & DRP





Beaver Creek
Macroinvertebrates

3 Sample Sites, 2 Sampling Days

**UWEX Citizen Monitoring Index

Site	Spring Score	Fall Score
DG	1.73	2
73	2.3	2
G	2.3	2.1

1.0-2.0 = Poor, 2.1-2.5 = Fair, 2.6-3.5 = Good

Beaver Creek

Habitat Assessment

In-Stream

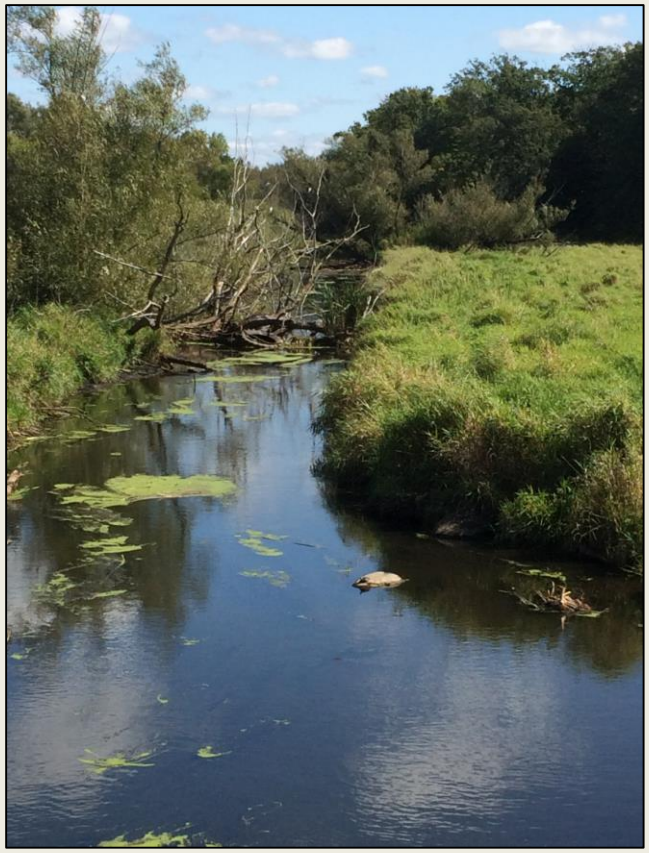
**UWEX Wadeable Stream Index for Fish Habitat Quality

Site	Habitat Score
DG	48
73	33
G	54.5

<20=Poor, 20-60=fair, 60-80=Good,
>80=Excellent

Beaver Creek
Habitat Assessment

Riparian Buffers



Site	Buffer Score
DG	15/15
73	15/15
G	7.5*/15

Beaver Creek

Habitat Assessment

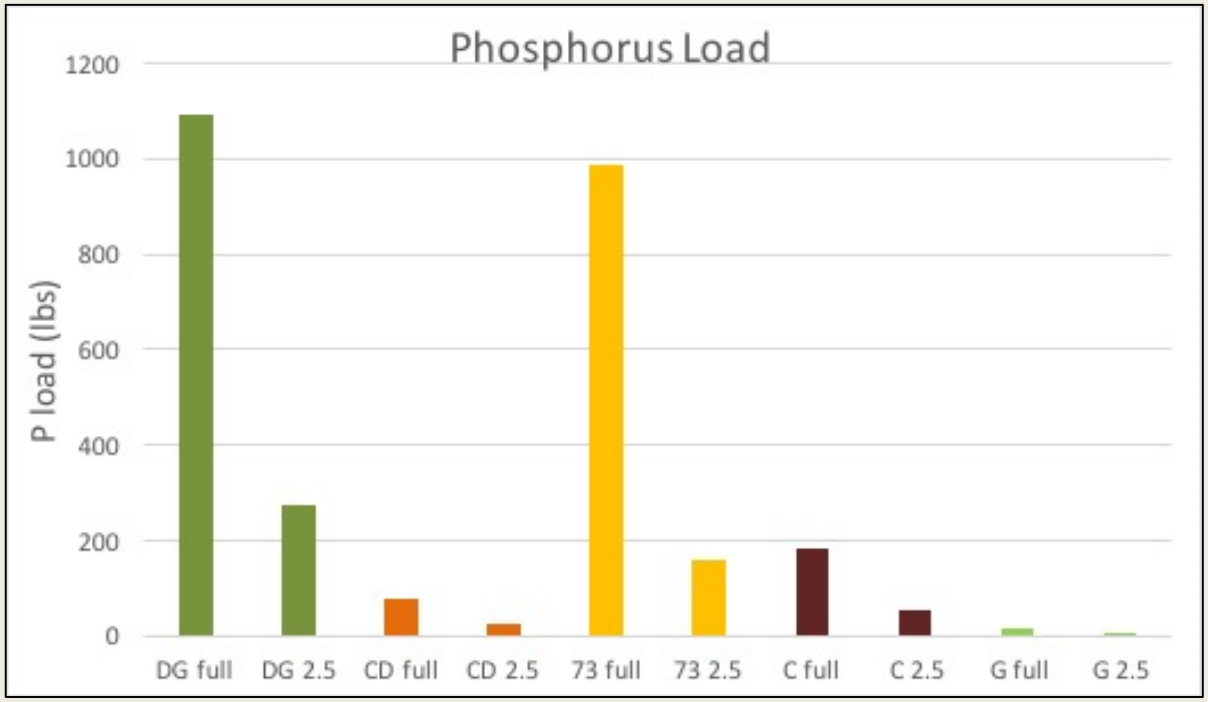
Fine Sediments and Erosion

Site	Erosion Score
DG	5/15
73	10/15
G	15/15

Site	Fine Sediment Score
DG	5/15
73	0/15
G	10/15

Beaver Creek

Sediment P Load



Component 4

Stakeholder Engagement

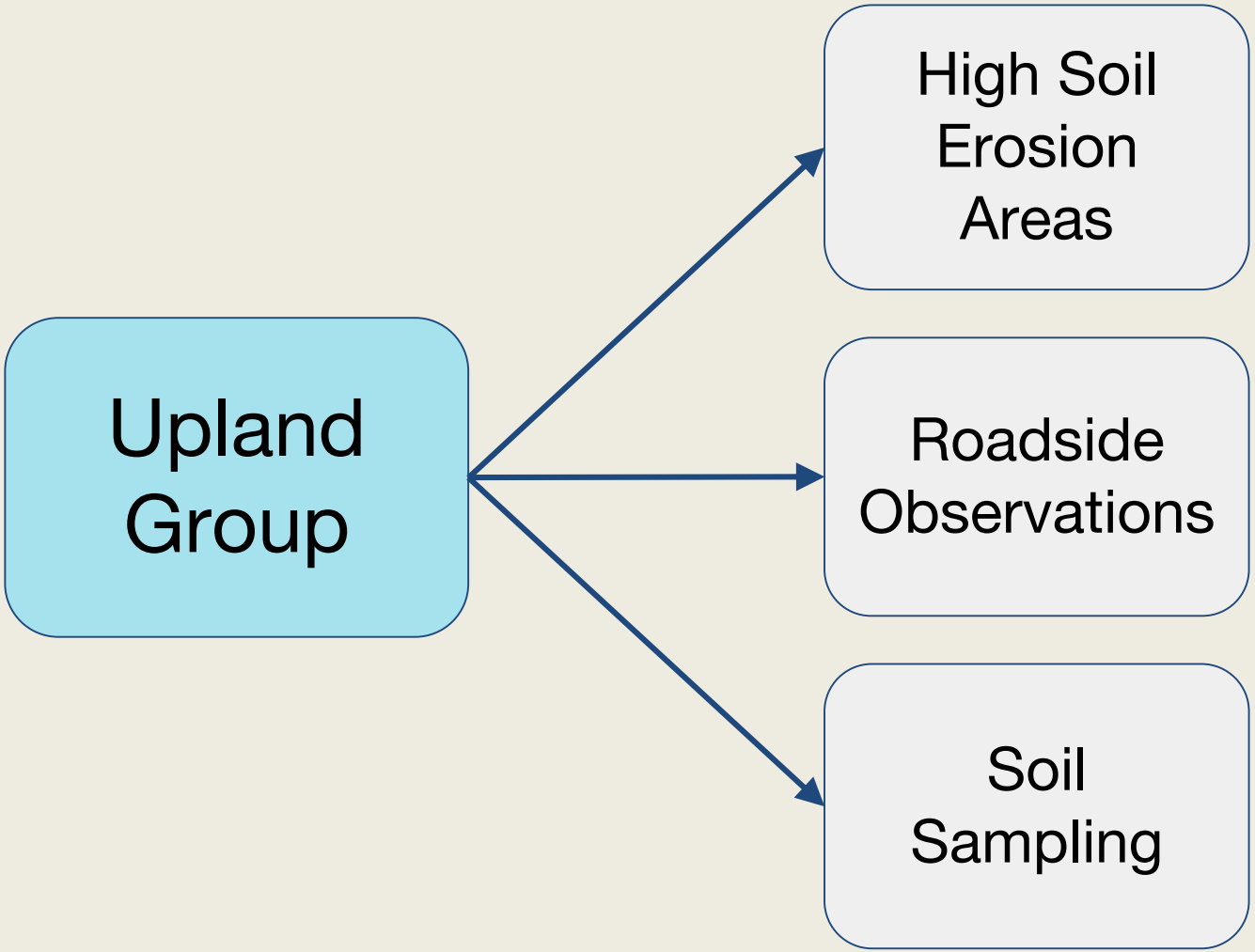
Beaver Dam Lake

Beaver Creek

Upland Beaver Creek

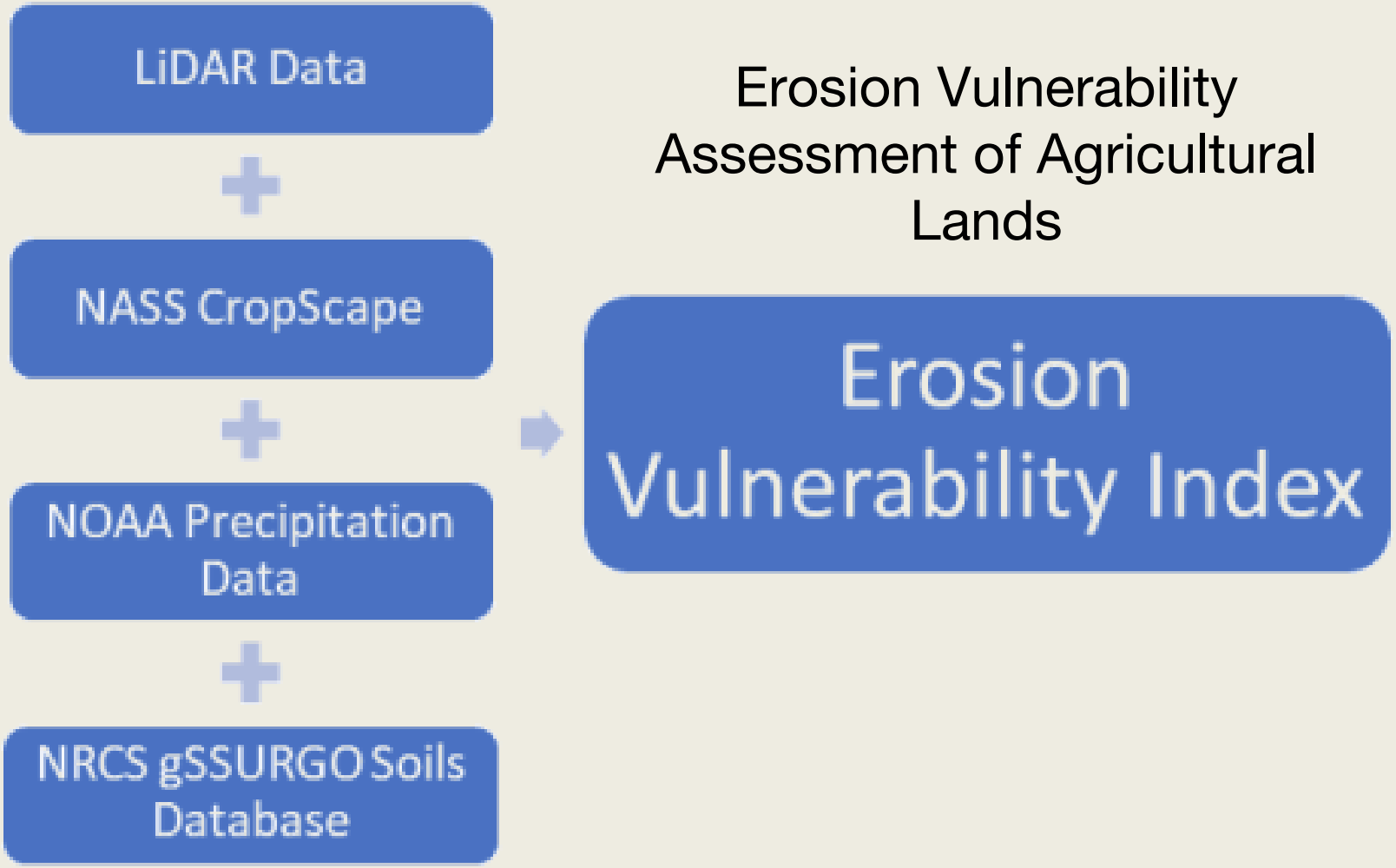
Upland Beaver Creek

Purpose



Upland Beaver Creek

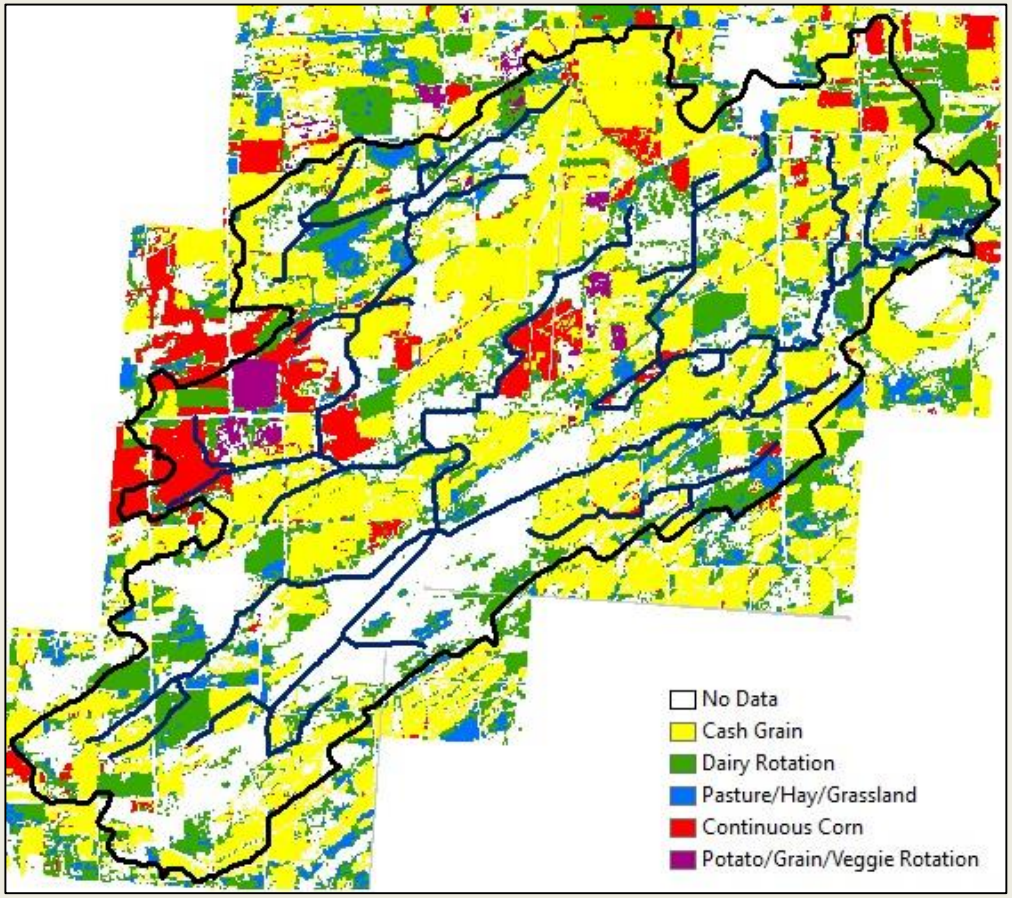
EVAAL Model



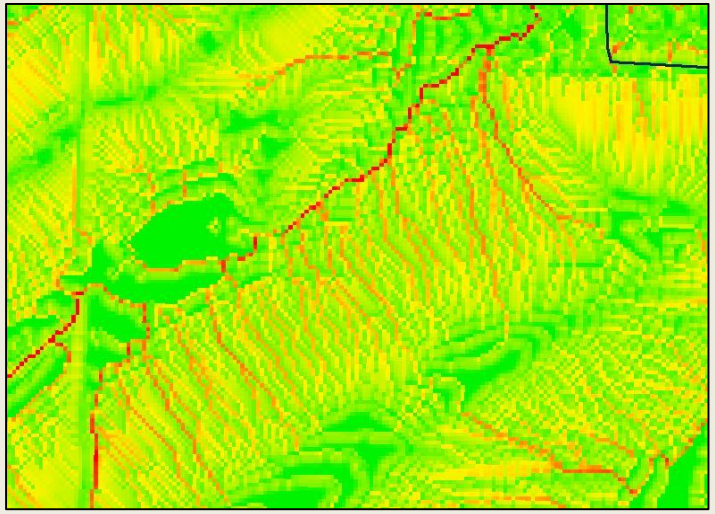
Upland Beaver Creek

EVAAL Outputs

2012-2016 Crop Rotations



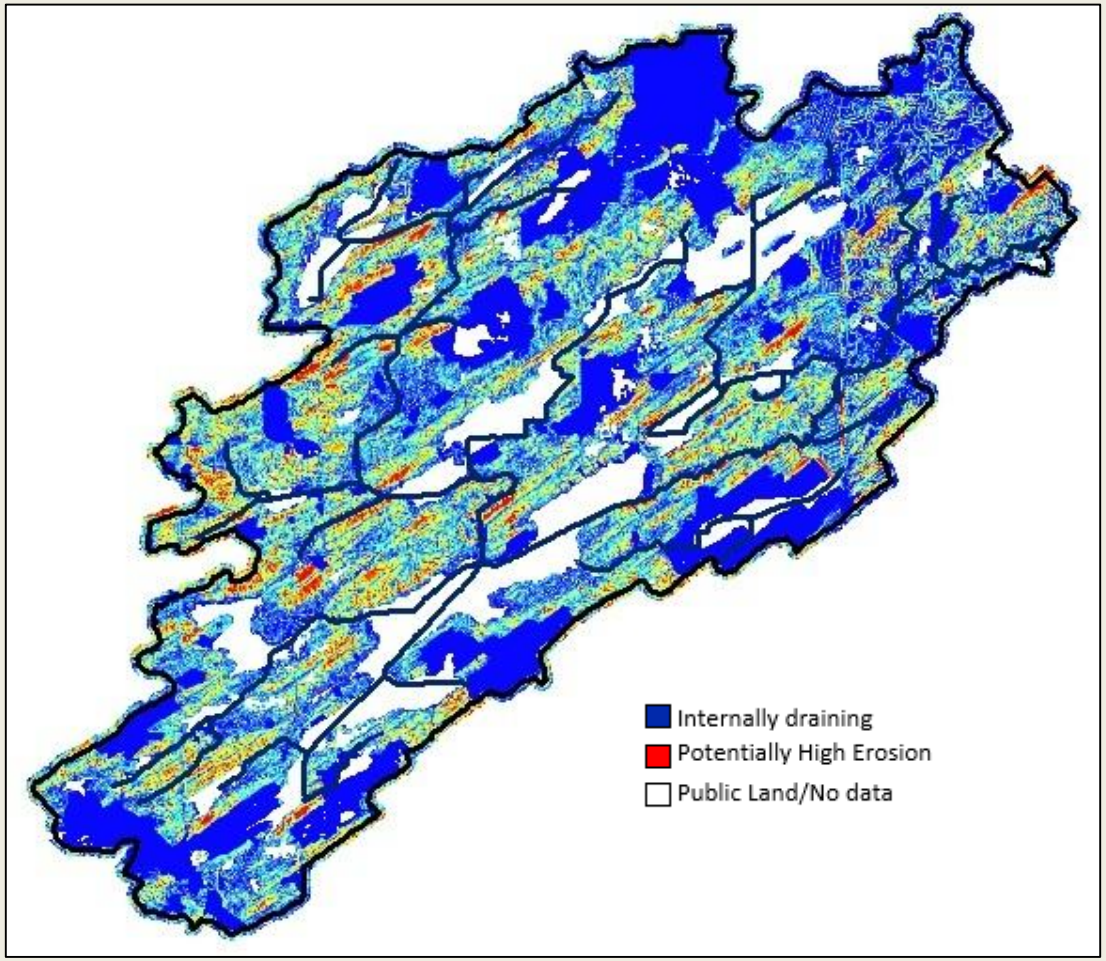
Stream Power Index



Upland Beaver Creek

Final EVAAL Results

Erosion Vulnerability Index



Upland Beaver Creek

Roadside Observations

Upland Beaver Creek

Roadside Observations

Upland Beaver Creek

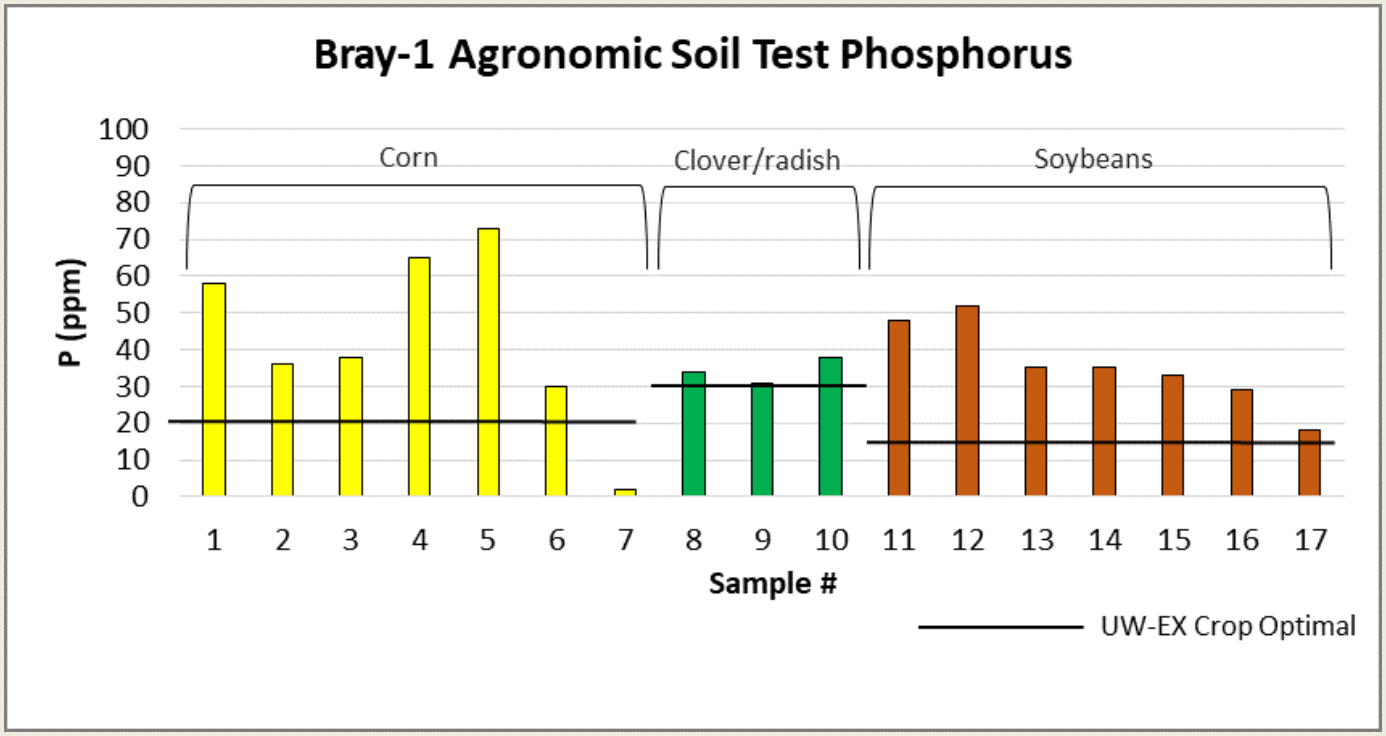
Soil Sampling

Upland Beaver Creek

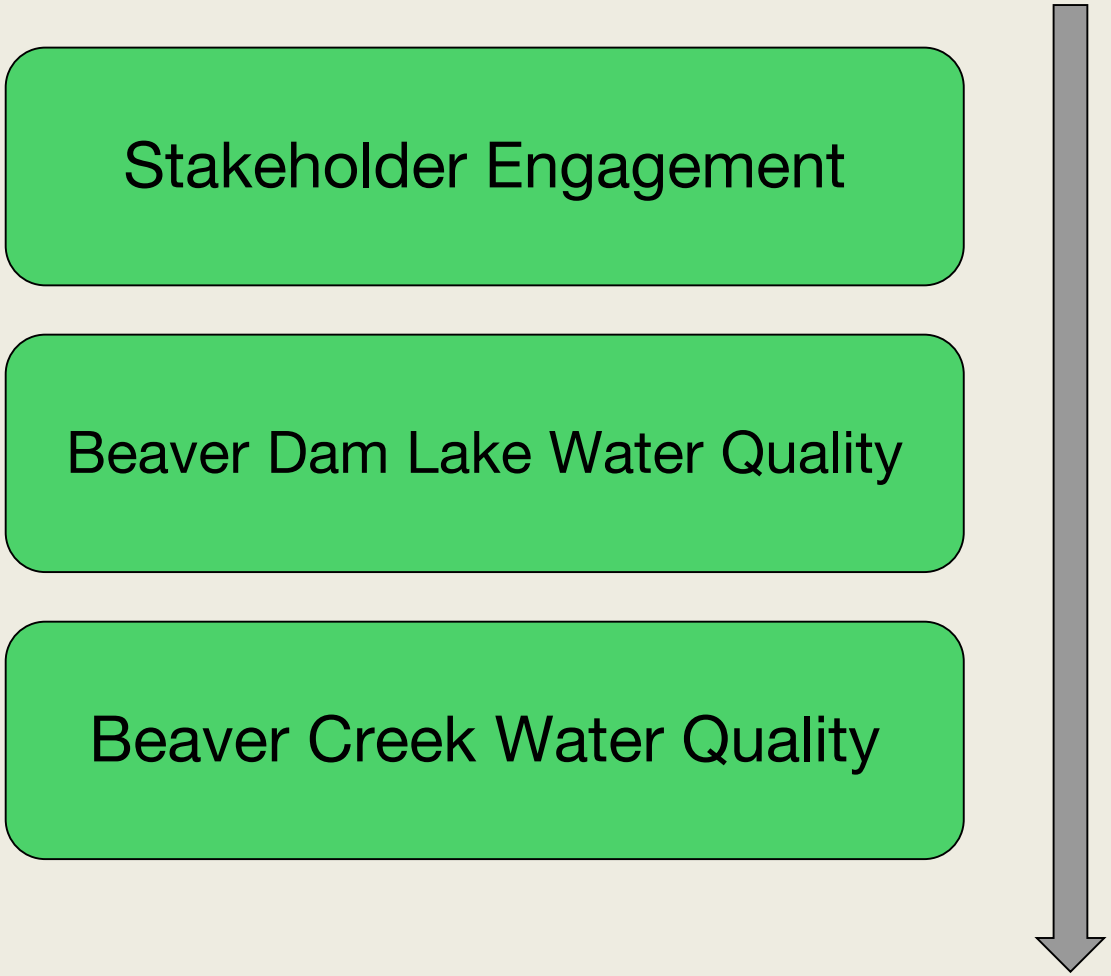
Soil P Sampling

Upland Beaver Creek

Soil Sampling Results



Recommendations Outline



Recommendations

Stakeholder Engagement

School Partnership Water Studies

Recommendations

Stakeholder Engagement

Regular Workshop/Volunteer Events

Recommendations

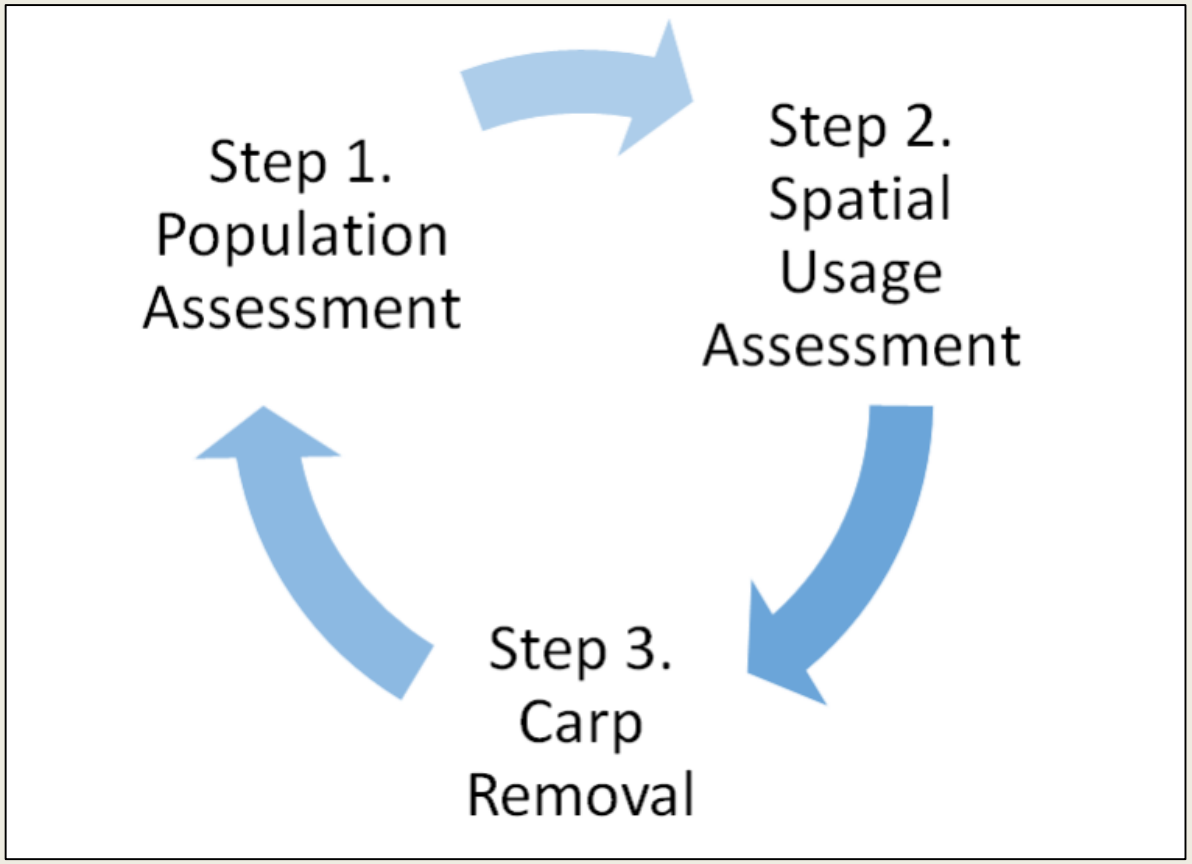
Stakeholder Engagement

Farmer Led Council in Columbia County

Recommendations

Lake Water Quality

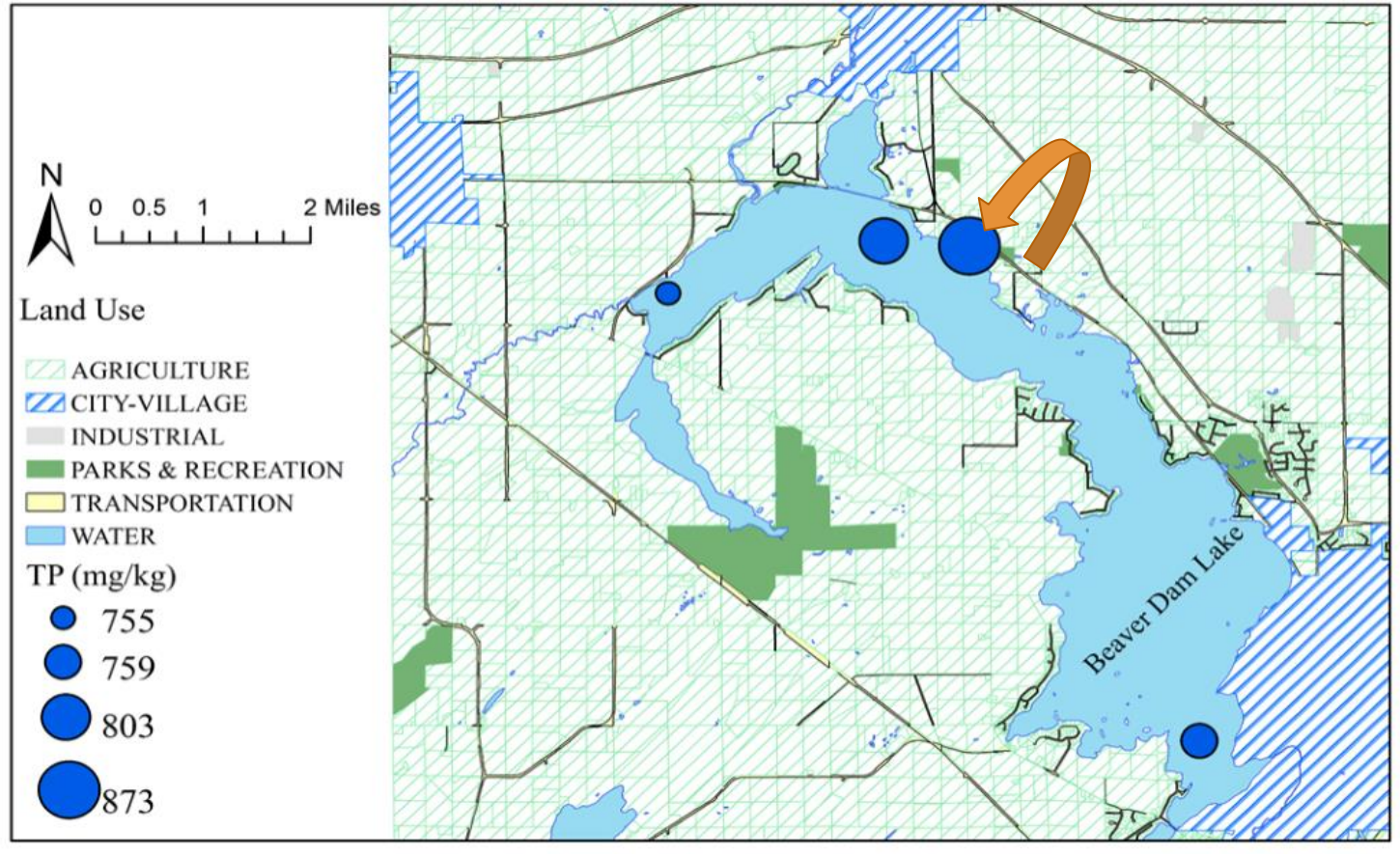
Active Carp Management Plan



Recommendations

Lake Water Quality

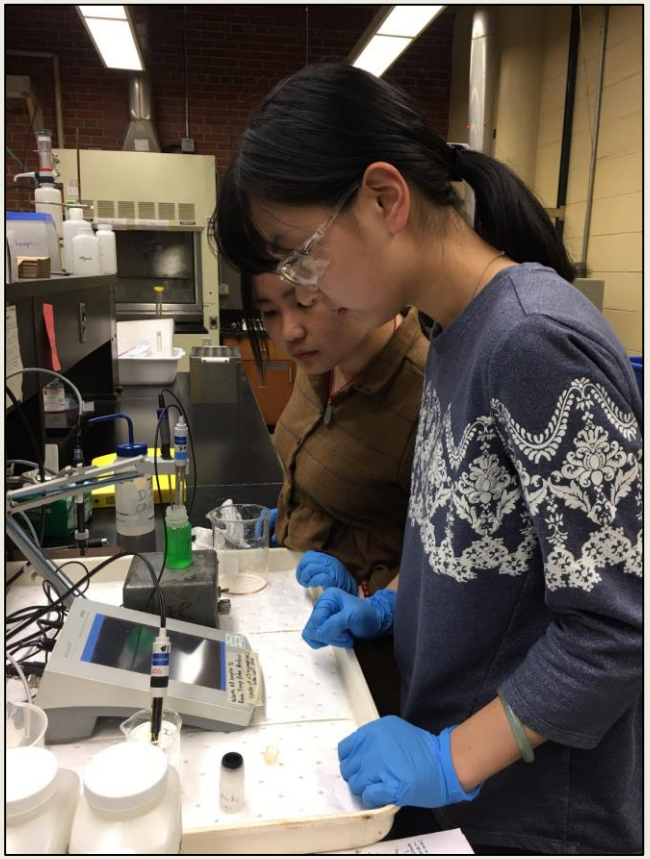
Shoreline Erosion Assessment



Recommendations

Lake Water Quality

Regular Lake Condition Monitoring



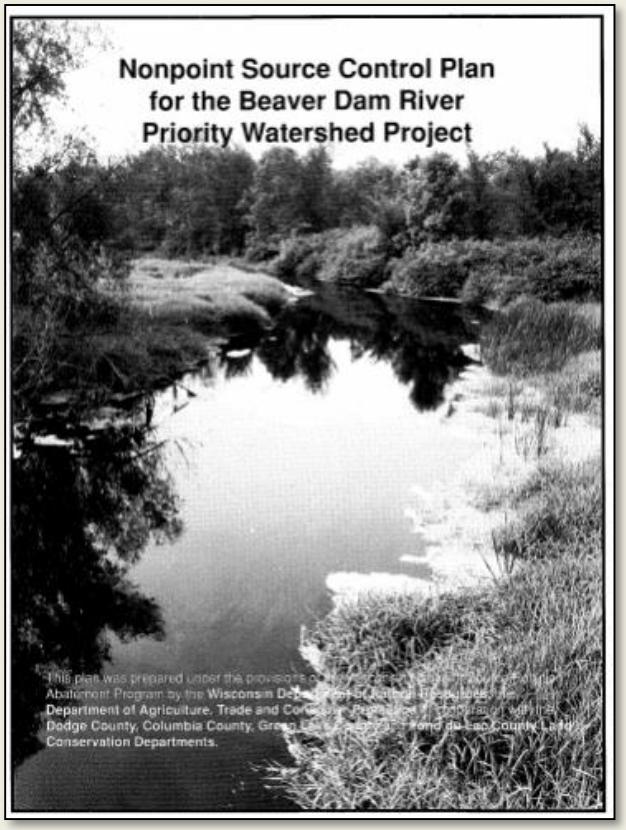
Recommendations

Creek Water Quality

Update Watershed Plan

EPA 9 Key Element Framework

1. **Identify the causes and sources** that need to be controlled to achieve pollutant load reductions. This includes quantifying significant sources and background levels using maps and tables.
2. **Estimate the pollutant load reductions** expected from selected management measures.
3. **Describe management measures** that need to be implemented to achieve load reductions. Map priority areas for implementing practices.
4. **Estimate amounts of technical and financial assistance needed,** associated costs, and/or the sources and authorities that will be relied upon, to implement the Plan.
5. **Develop an information & education component** to encourage participation and Plan implementation.
6. **Develop a schedule** for implementing the management measures identified in the Plan.
7. **Describe interim, measurable milestones** to assess if the Plan is being implemented.
8. **Identify a set of criteria** to determine whether Plan objectives are or are not being achieved over time. Outline how and when the Plan will be revised if progress is not being made.
9. **Develop a monitoring component** to evaluate the effectiveness of the implementation efforts over time using criteria from elements 6, 7 and 8.



Recommendations

Creek Water Quality

Regular Stream Monitoring

- Determine P contribution of all tributaries to Lake
- Continue evaluating stream health
  - Expand on biotic surveys
    - Fish surveys
    - Habitat assessment
- Assess contribution of Paradise Marsh

Thank You!

To our many partners

Beaver Dam Lake Improvement Association

Wisconsin Department of Natural Resources

Agricultural Producers

Anita Thompson, UW-Madison WRM Advisor

Bill Foley
Ken Schmidt
Robert Bird
John Bohonek
Kurt Calkins
Andrew Craig
Michael A. Miller
Theresa Nelson
Mark Riedel
Mike Sorge
Sarah Gatzke
Faith Fitzpatrick
Ken Genskow
Laura Good
Zach Zopp
Dale Macheel
Chin Wu
Rob Montgomery
Bill Boettge
Dale Robertson
Brenton Butterfield
Jaclyn Meyer

Fox Wolf Watershed?

Creek Water Quality

- WDNR Lake Planning Grant? (Plus other grants)
- Nine Key Element Plan/Watershed Plan status?
- Social Indicators/SIPES Survey?
- EVAAL Modeling (internships)?


BEWARE
OF
BEAVER

?


Old Style