

Addressing Impairment in Beaver Dam Lake and Beaver Creek

UW-Madison Water Resources
Management Practicum 2017



Outline

Introduction

4 Study Components

Stakeholder

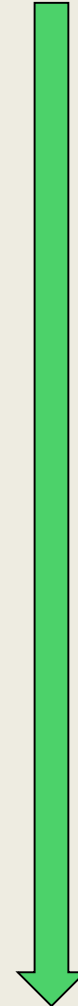
Upland

In-Stream

In-Lake

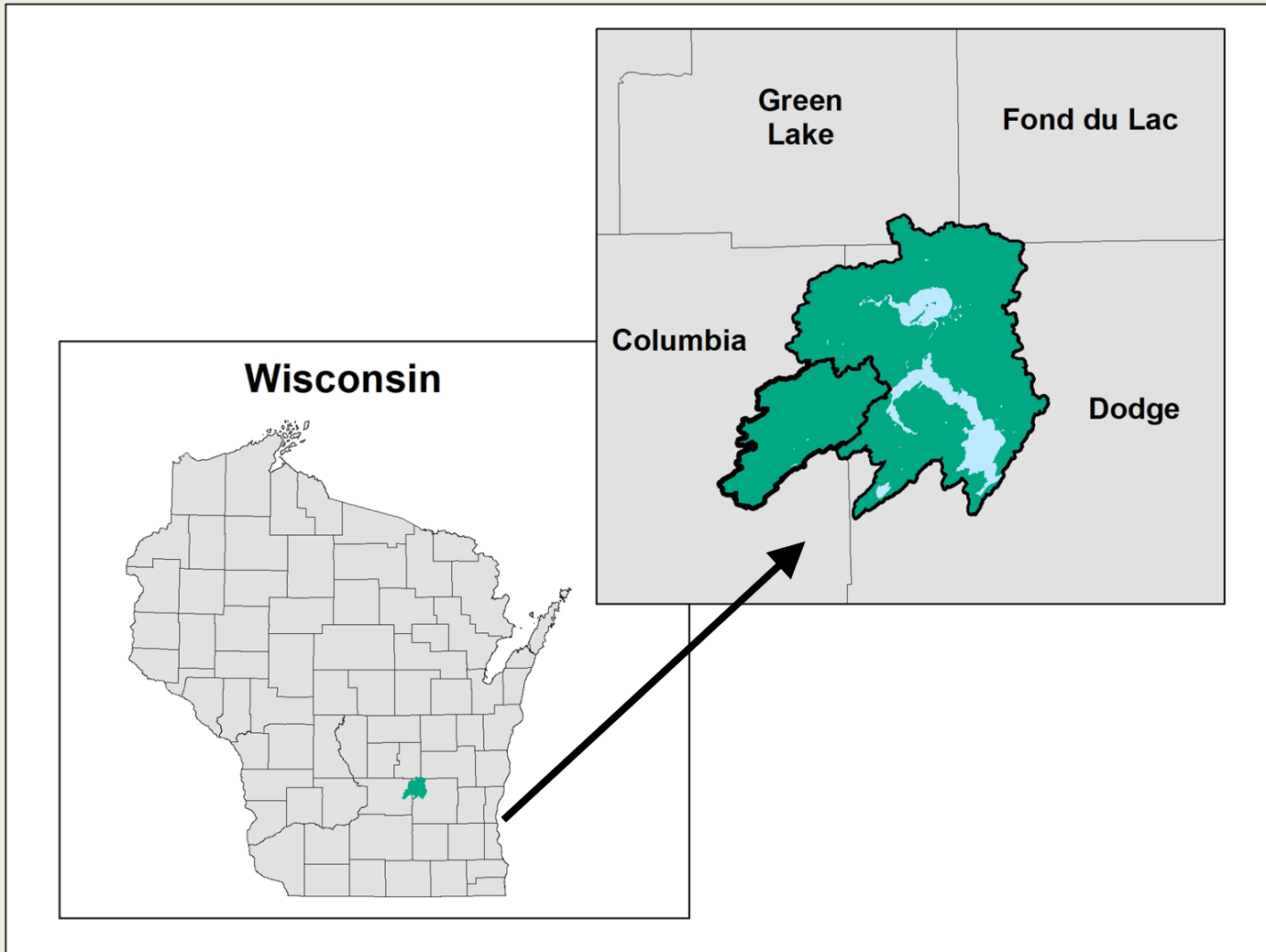
Recommendations

Questions



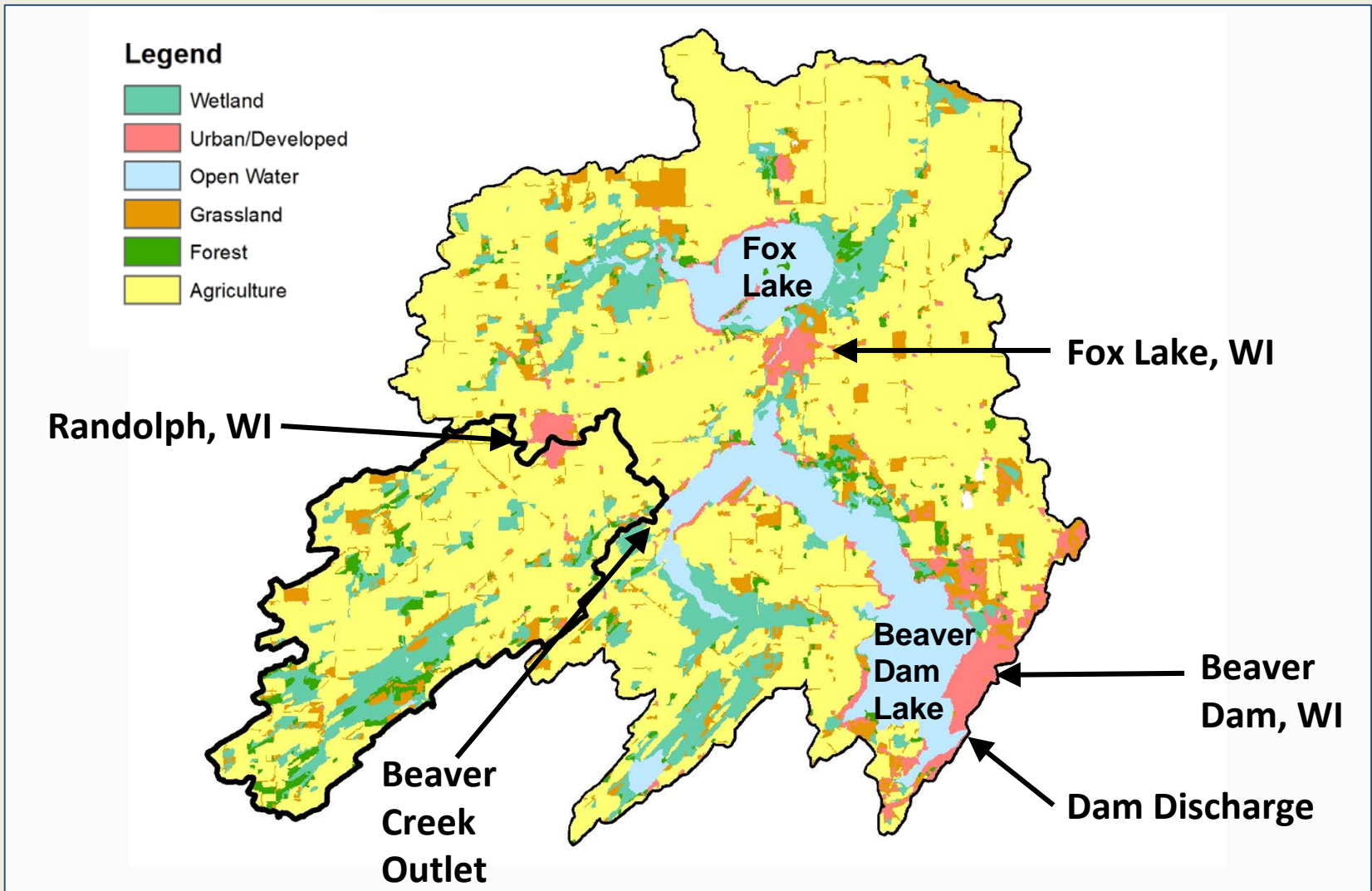
Introduction

Watershed



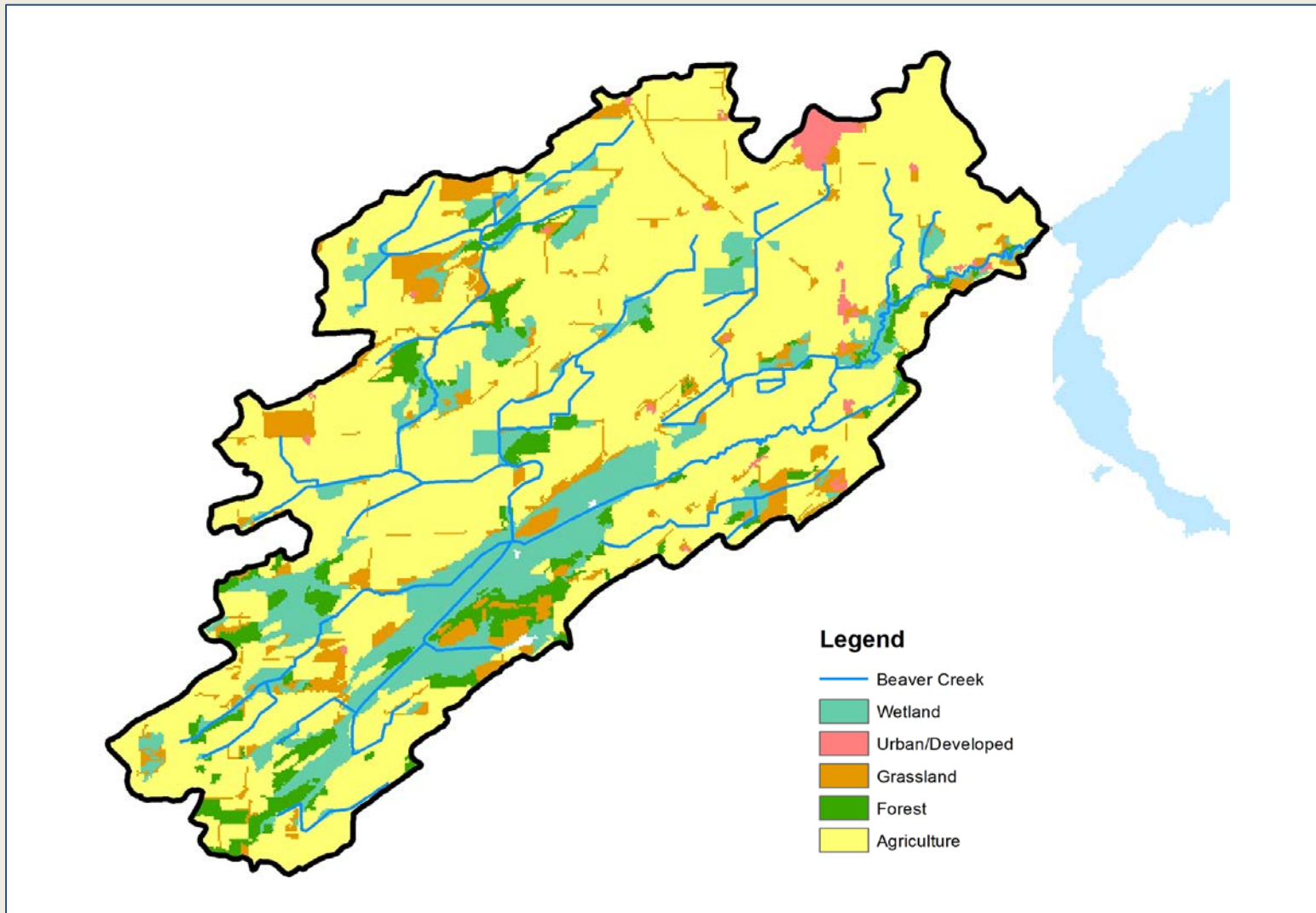
Introduction

Watershed



Introduction

Watershed



Introduction

Problem Statement

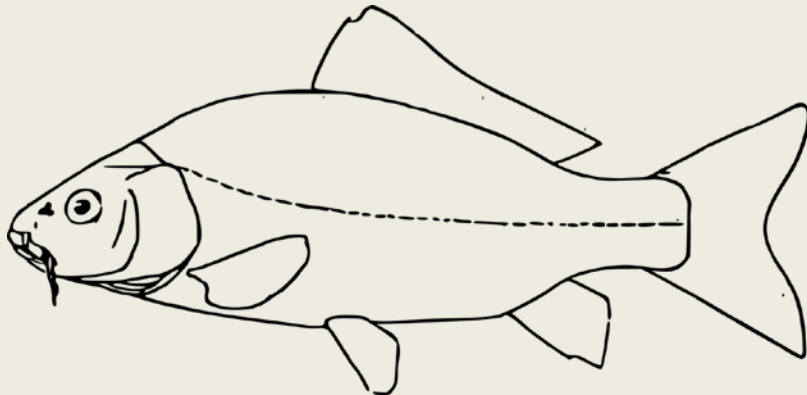
Algae blooms

Phosphorus

Shallow

Warm temps

Carp



Introduction

BDLIA Partnership



**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

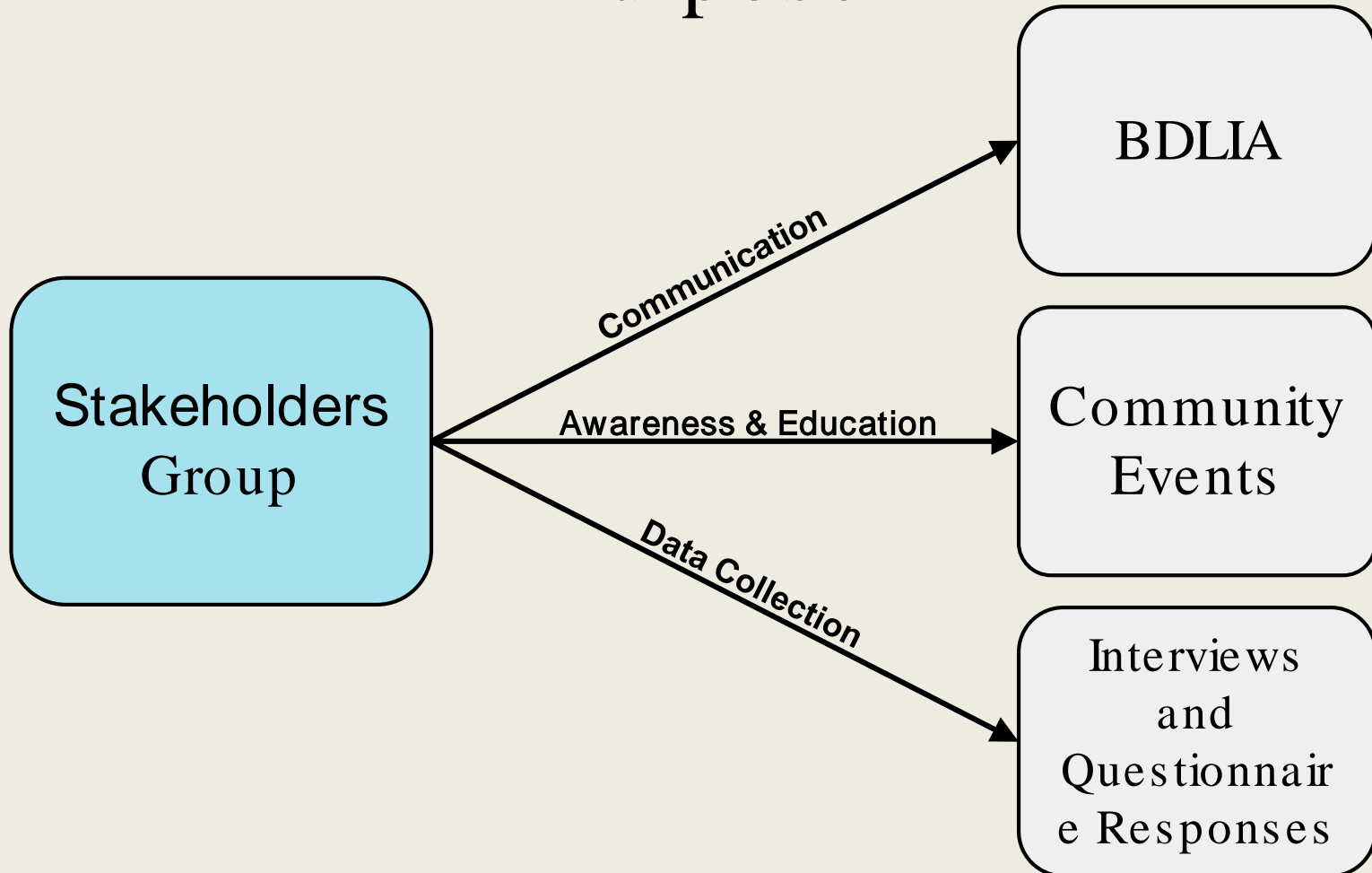
Beaver Dam Lake

Beaver Creek

Upland Beaver Creek

Stakeholders

Purpose





Stakeholders

Events

Awareness
& Education



 **Town Hall Meeting on Beaver Dam Lake** 

with the Beaver Dam Lake Improvement Association and UW-Madison Water Resources Management students

When **Monday, Sep. 11** **Where** **The Watermark**
7:30pm-8:30pm 209 S. Center St, Beaver Dam

 **BEAVER DAM LAKE IMPROVEMENT ASSOCIATION, INC.**
NEWSLETTER
www.bdlla.org



YOUR HOMETOWN NEWS
1430
WBEV

Beaver Dam Lake and Beaver Creek Townhall Meeting Questionnaire

1. Do you own property on the shore of Beaver Dam Lake or along Beaver Creek?
2. When it rains at your home, where does the rainwater go? Circle all that apply
 - a. Drainage Ditch
 - b. Storm Sewer
 - c. Creek
 - d. Lake
 - e. Other
 - f. Not sure

Stakeholders

Questionnaire

Administered at:

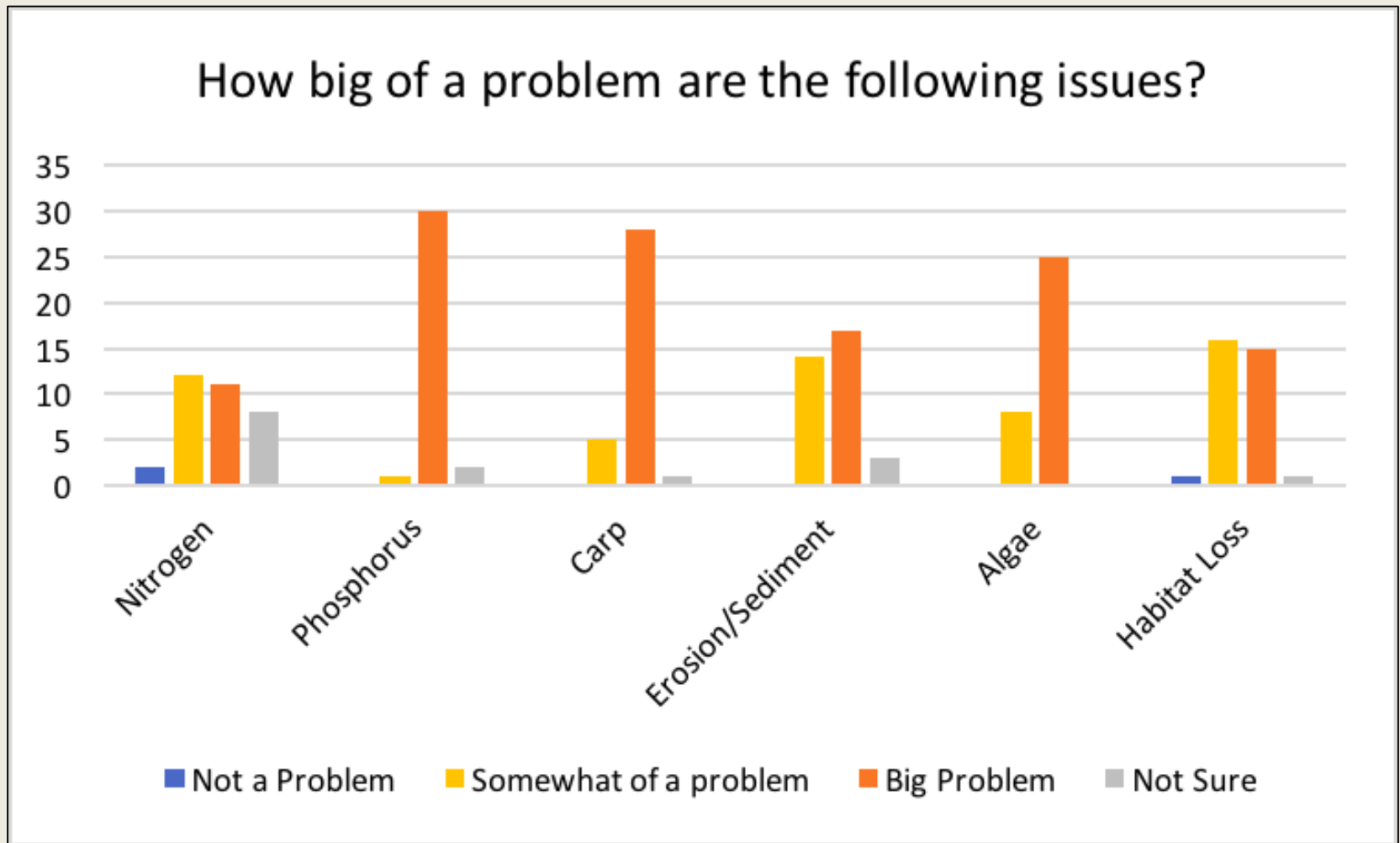
- Interviews
- Town hall meeting
- Kiwanis Club meeting

Questions:

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



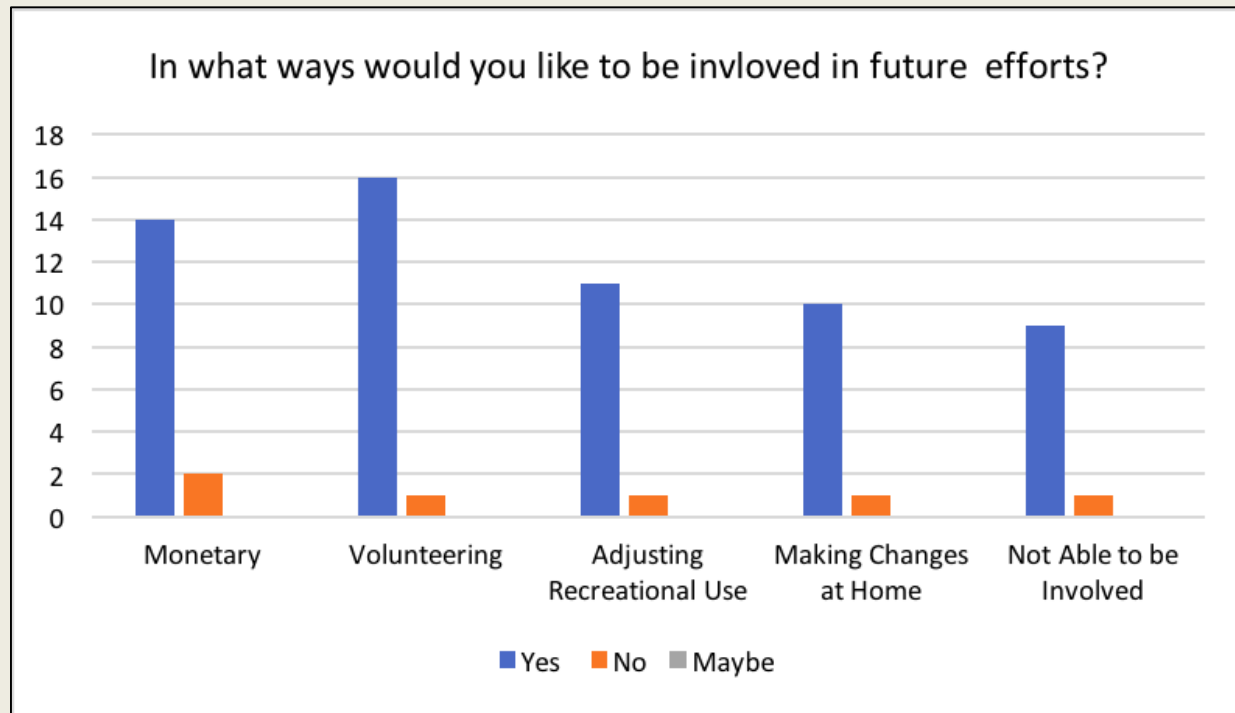
Stakeholders Questionnaire



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

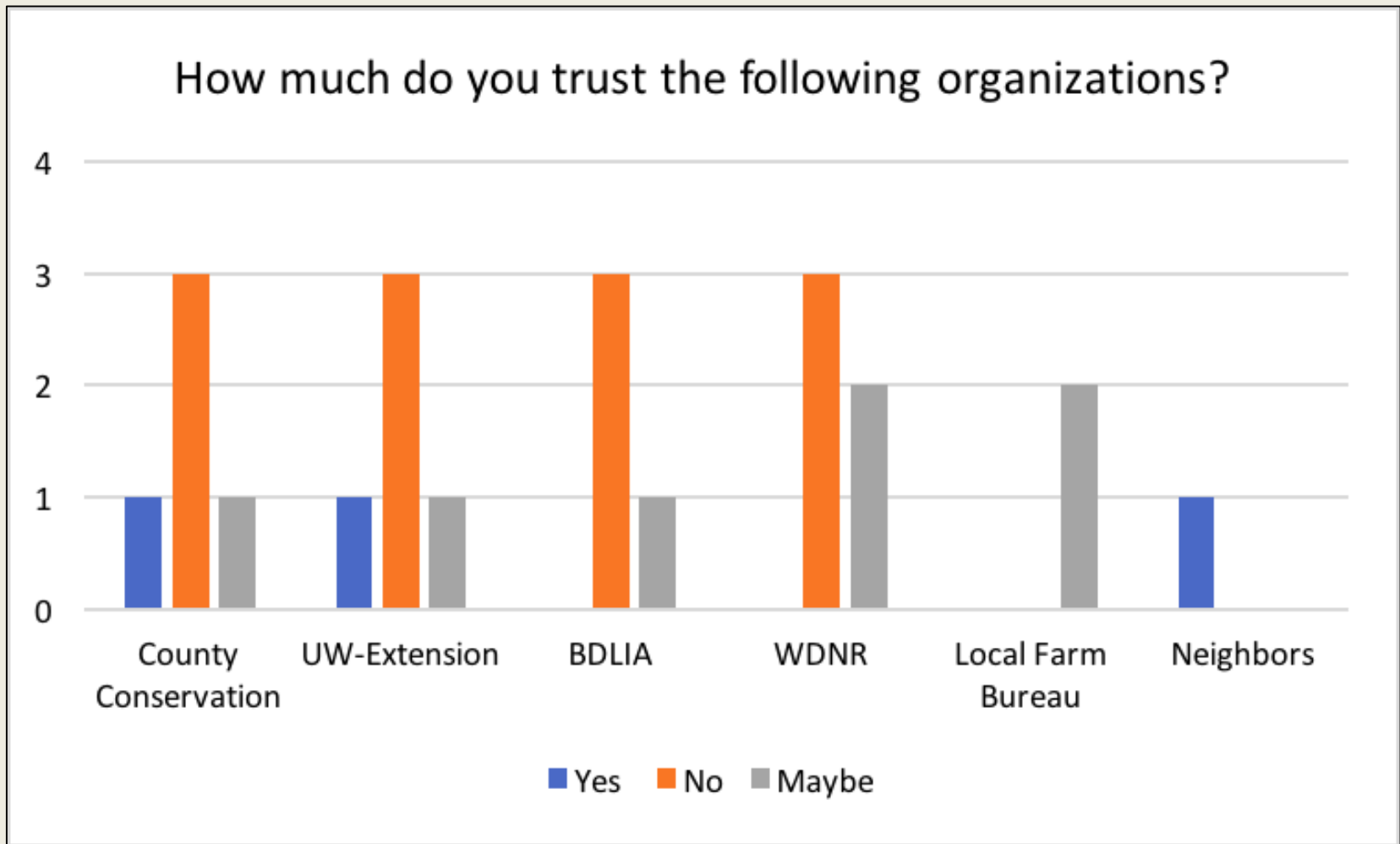
Producer Interviews

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

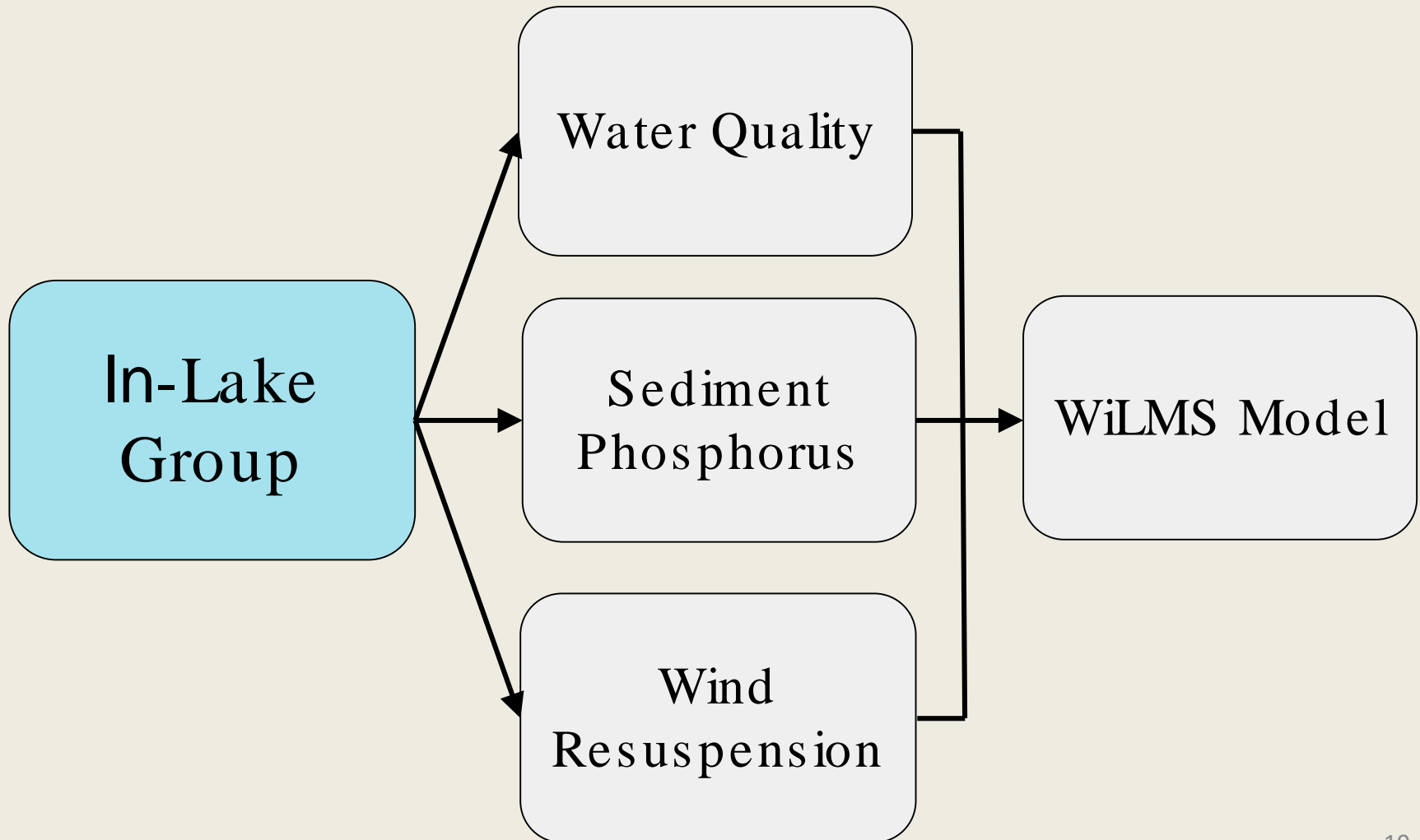
Beaver Dam Lake

Beaver Creek

Upland Beaver Creek

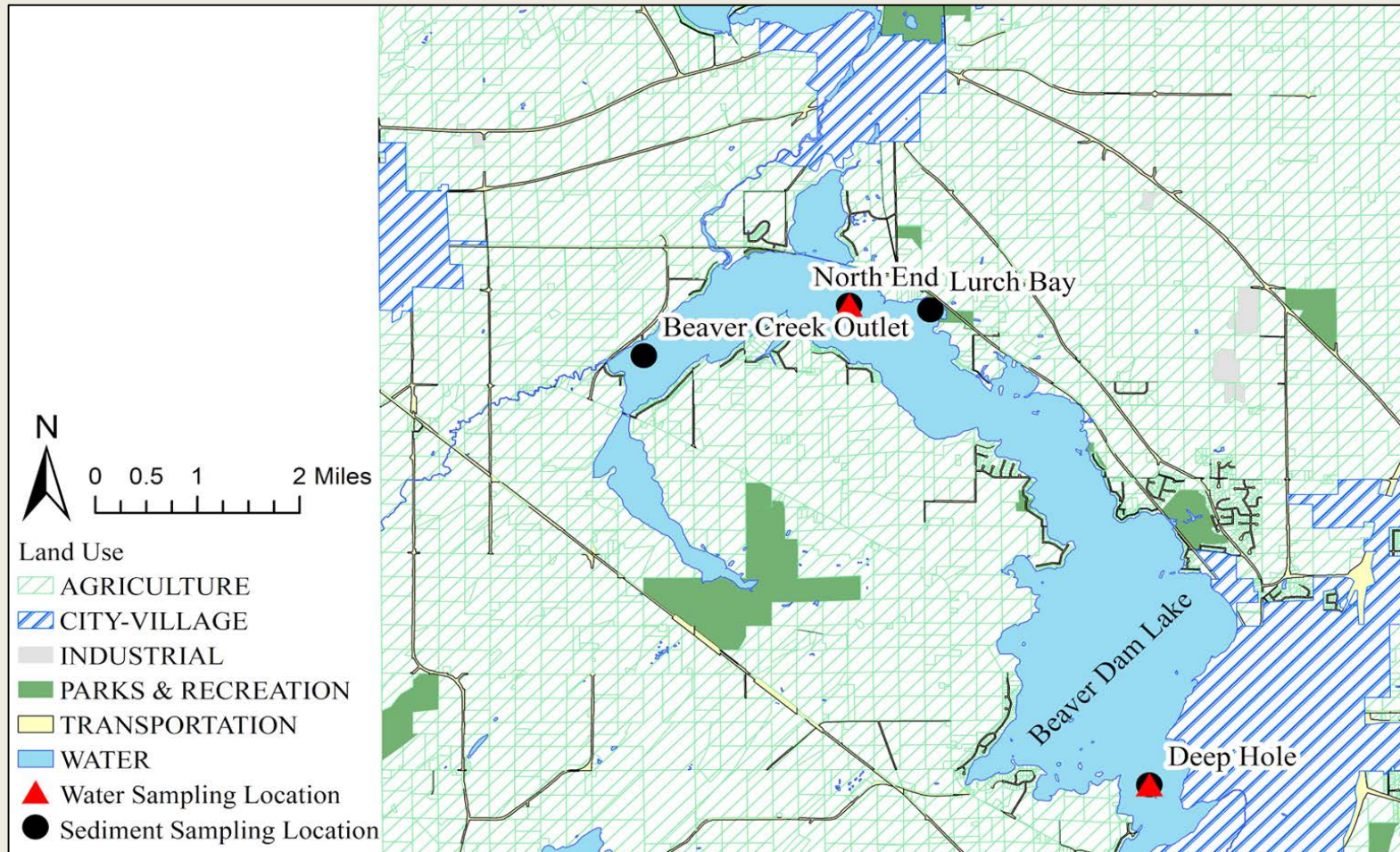
Beaver Dam Lake

Purpose



Beaver Dam Lake

Sampling Locations



Beaver Dam Lake

Variables of Interest

Field Measurements

Lab Analyses

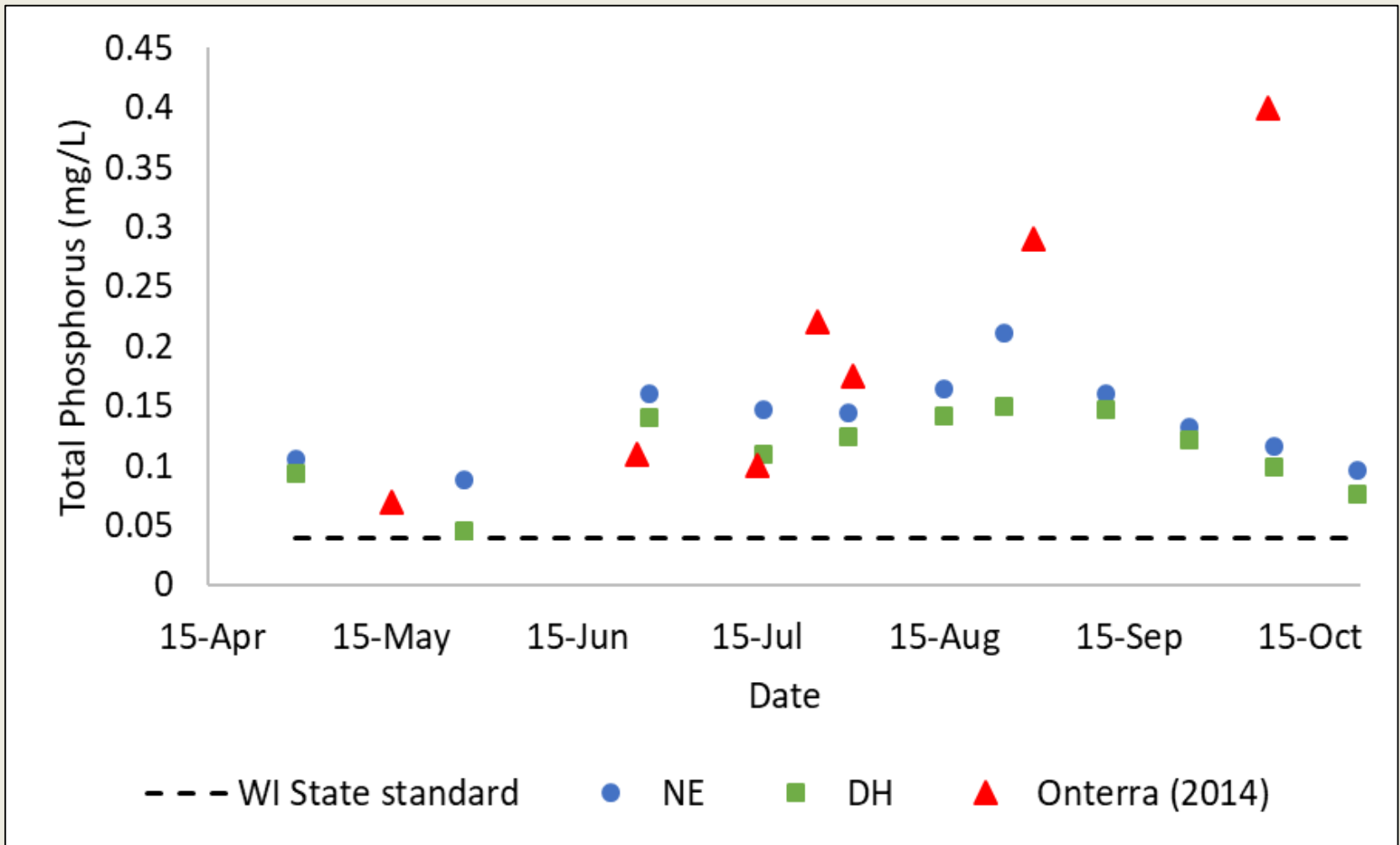
- Total Phosphorus (TP) in water
- Total Phosphorus (TP) in sediment
- PH

*Biweekly sampling for a total of 11 samples



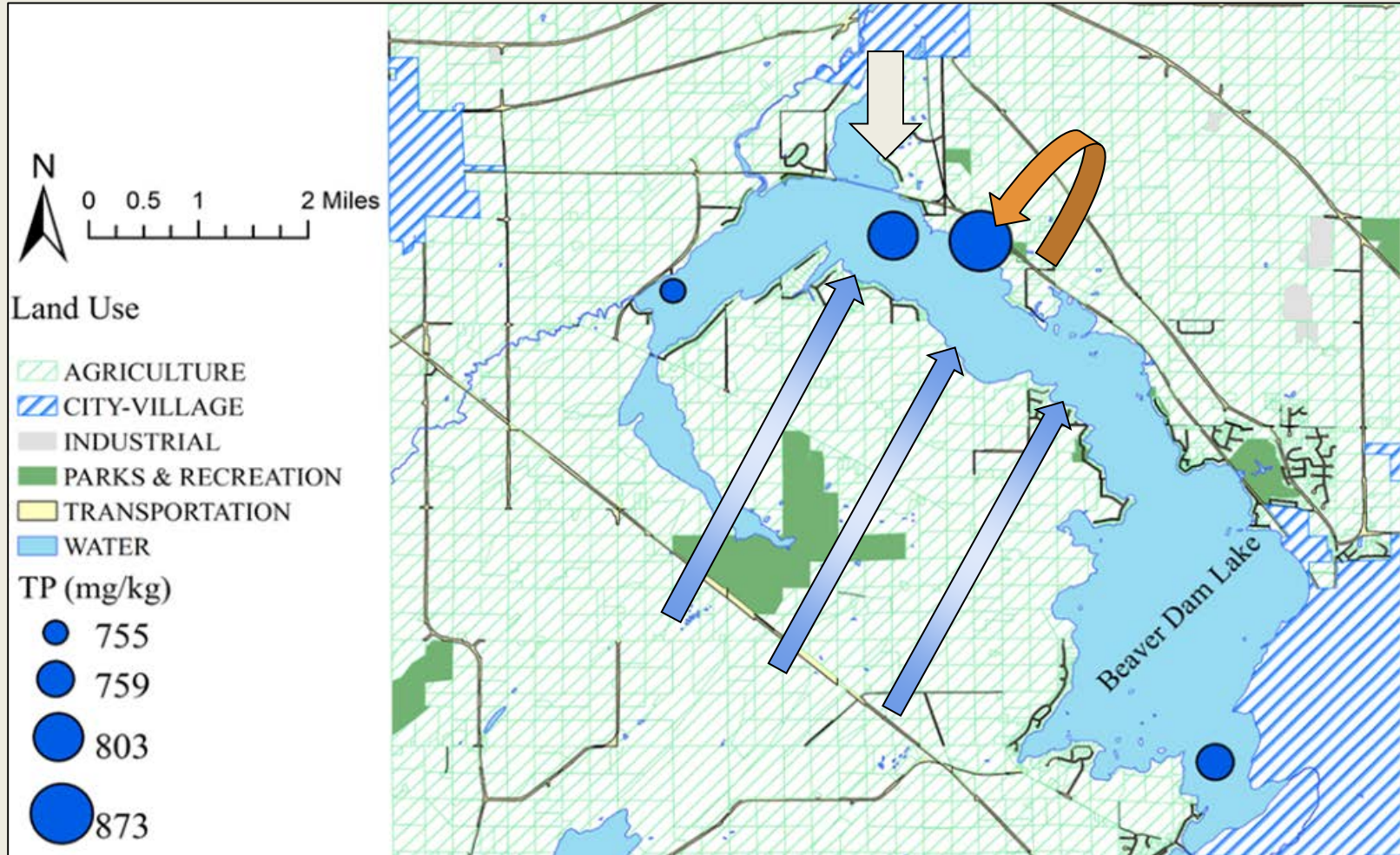
Beaver Dam Lake

Water Quality Results - TP



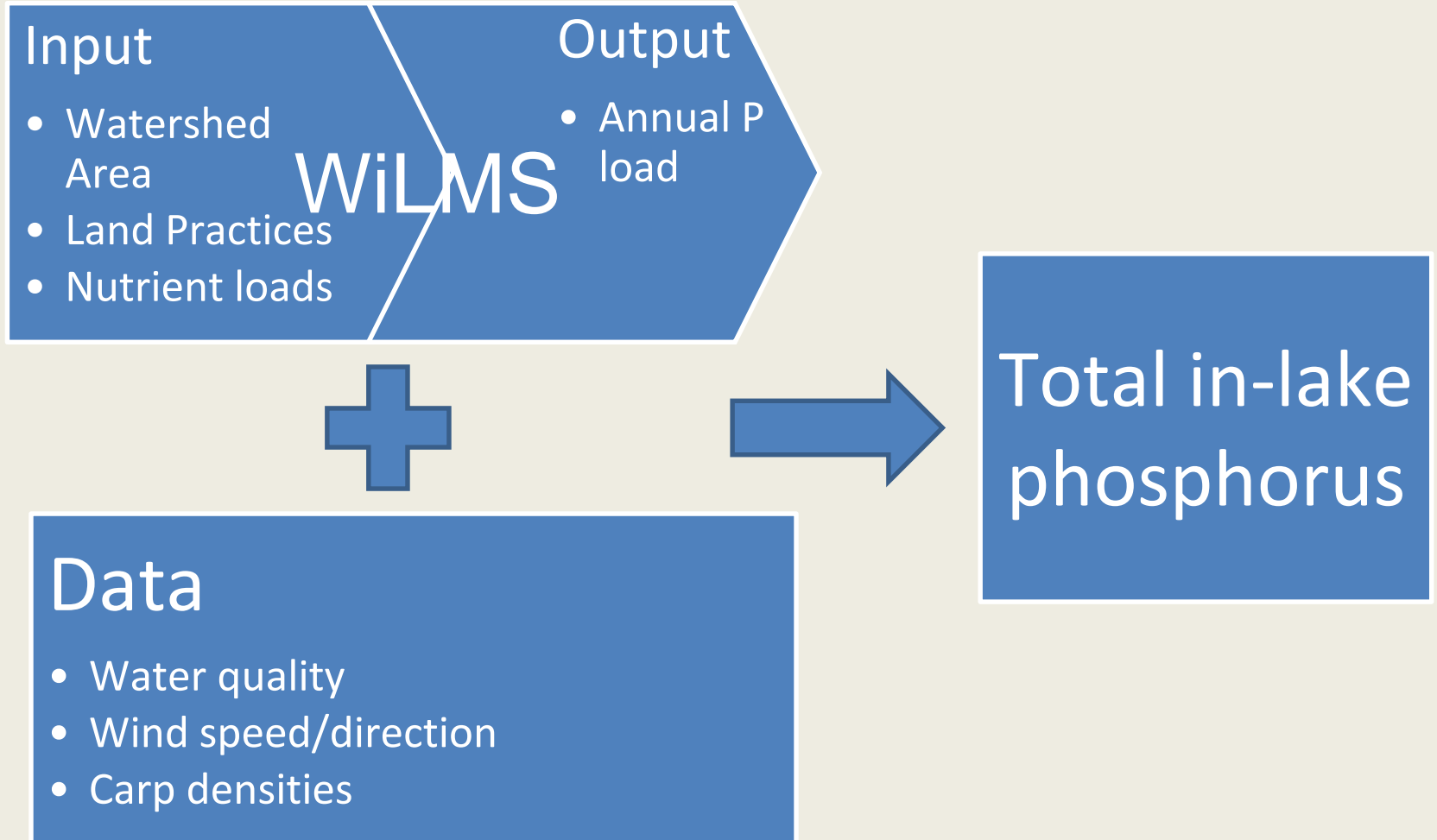
Beaver Dam Lake

Sediment TP



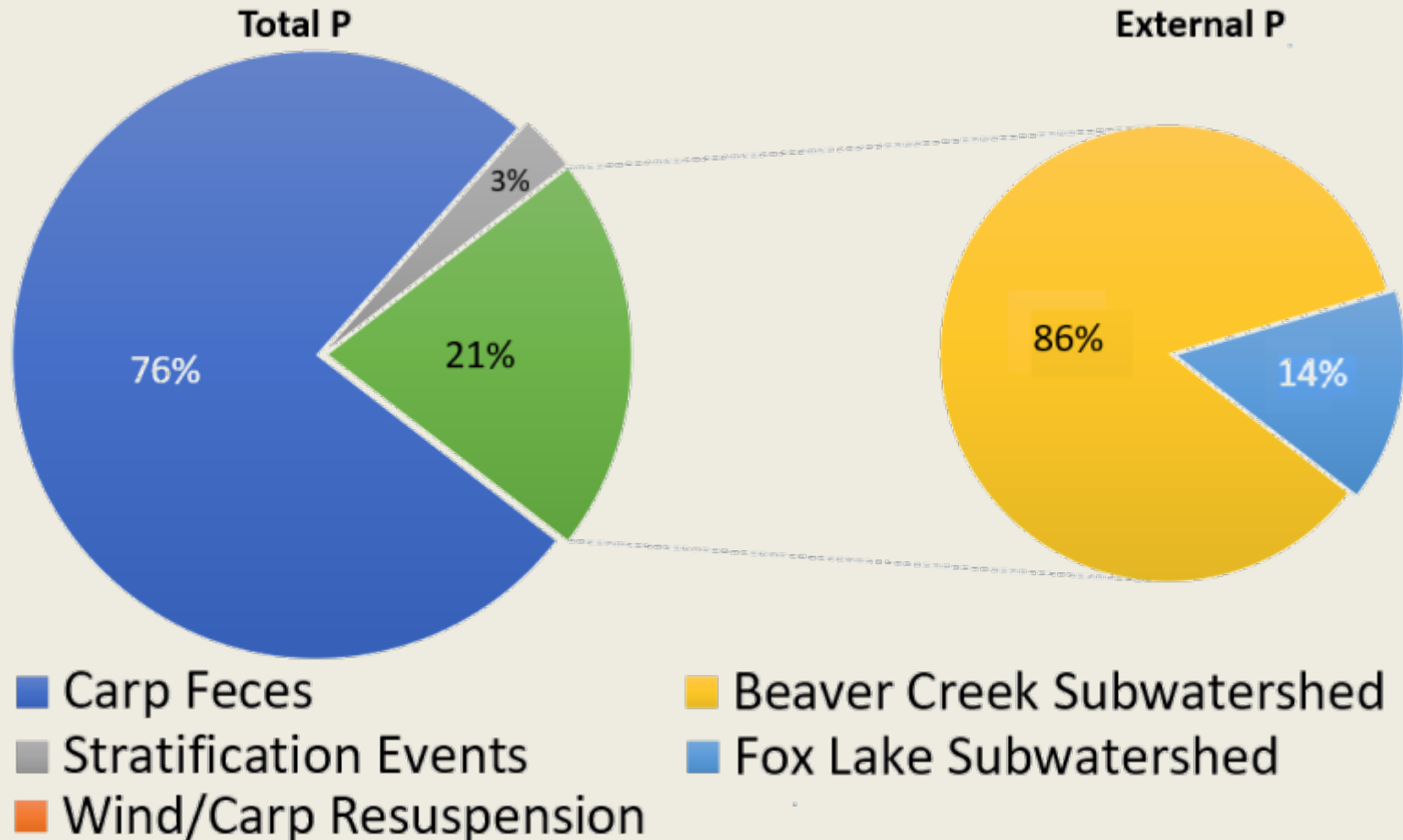
Beaver Dam Lake

P Modeling



Beaver Dam Lake

P Sources



Component 3

Stakeholder Engagement

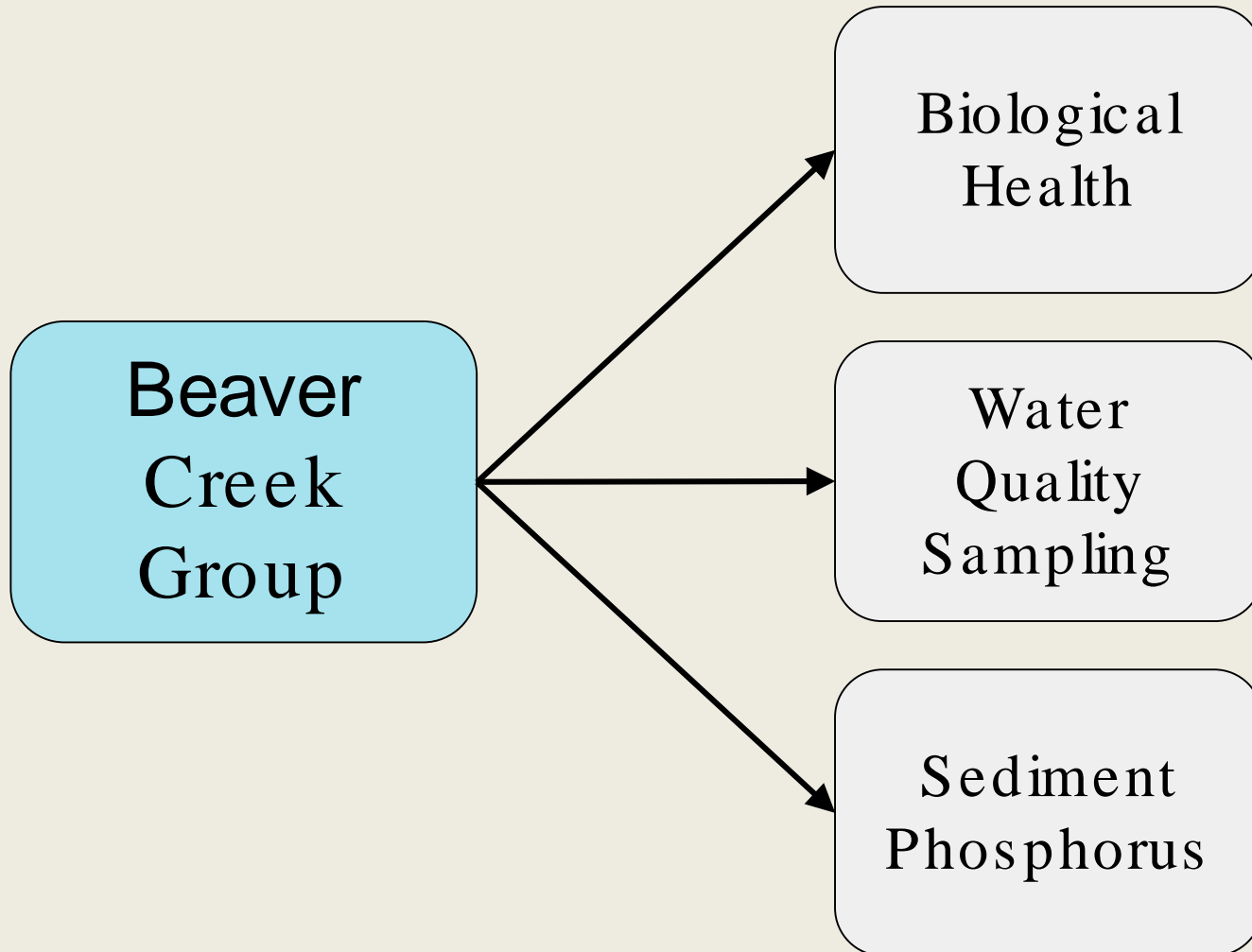
Beaver Dam Lake

Beaver Creek

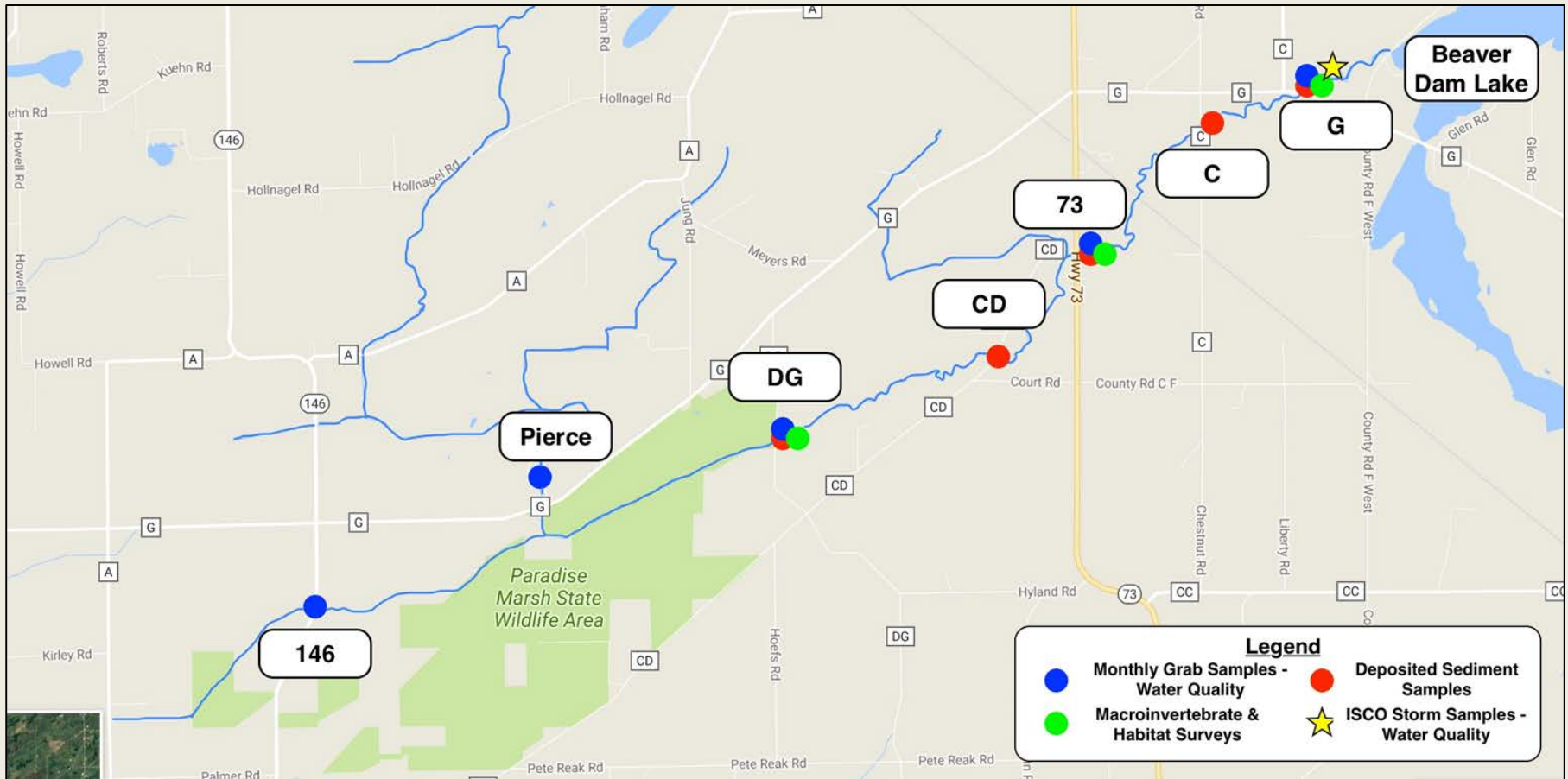
Upland Beaver Creek

Beaver Creek

Purpose

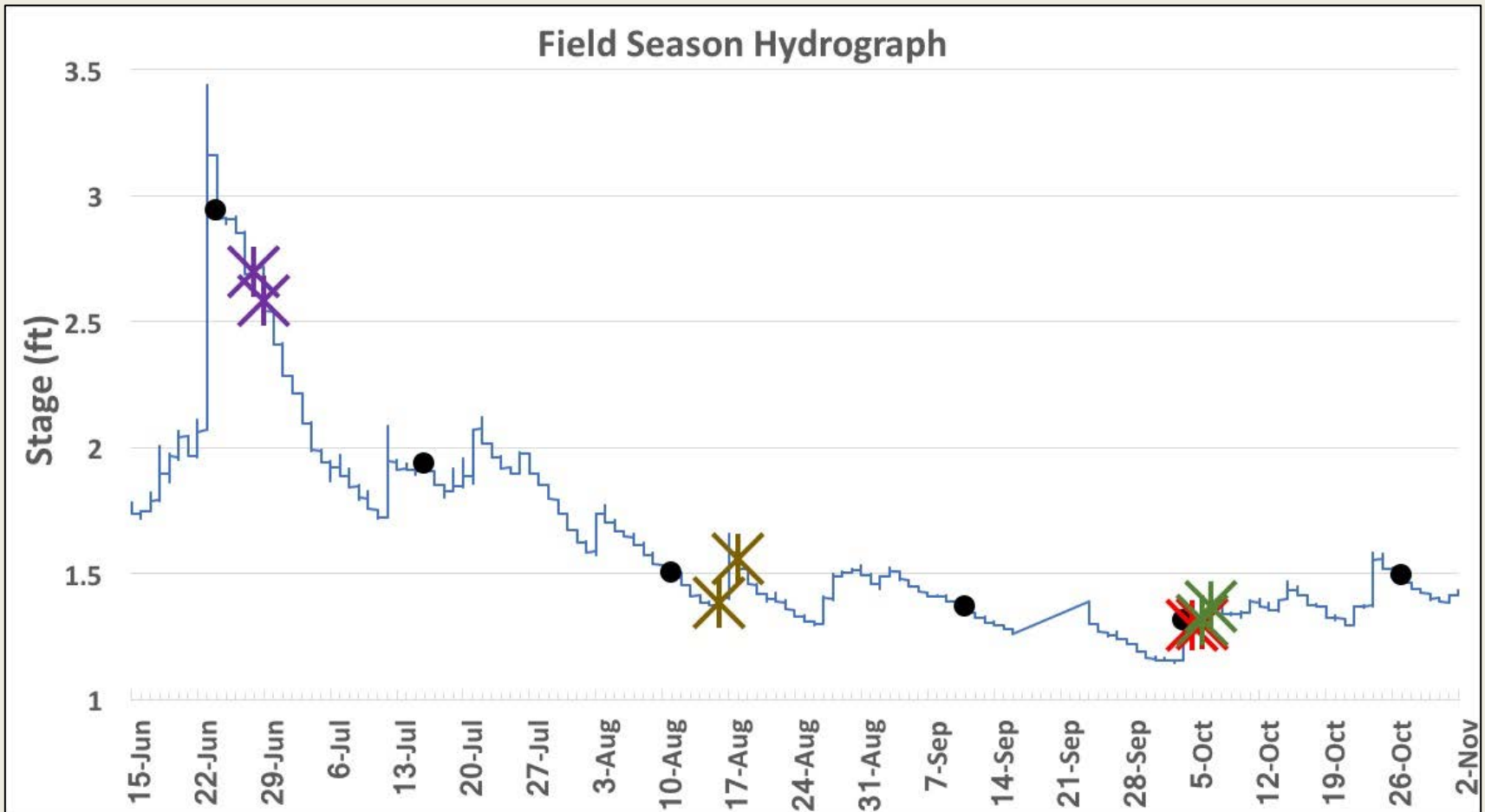


Beaver Creek Sampling Sites



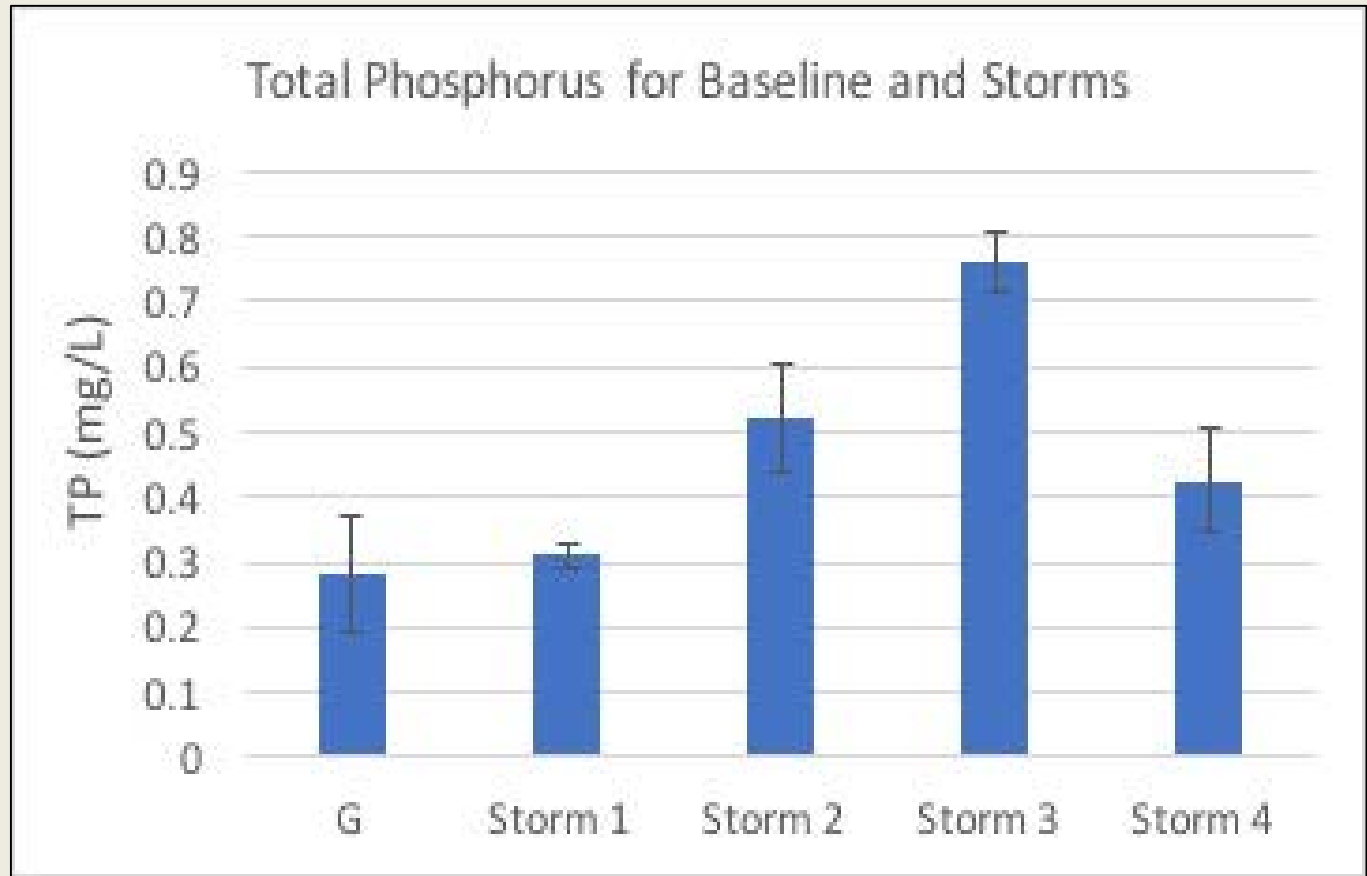
*Sites 146 and Pierce added in September

Beaver Creek Stage Height



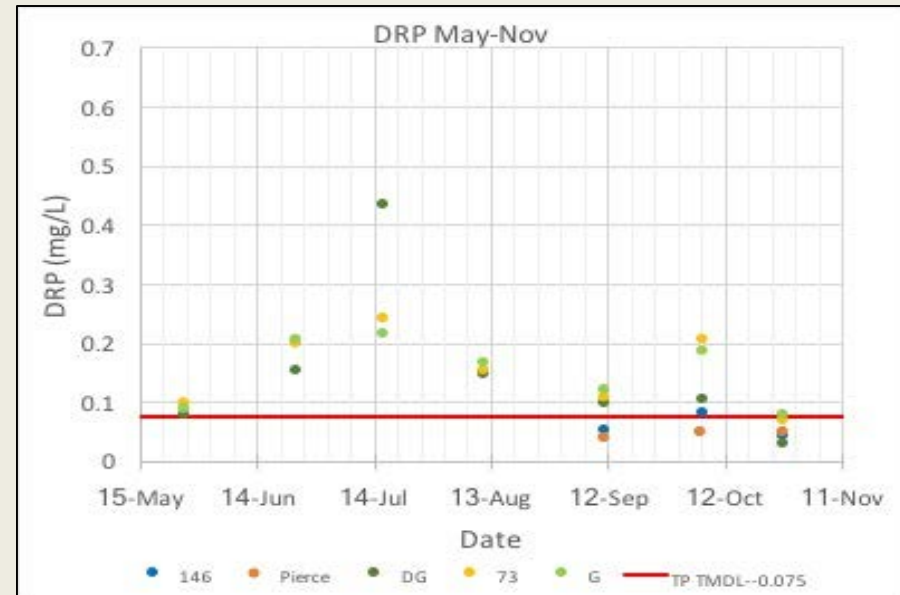
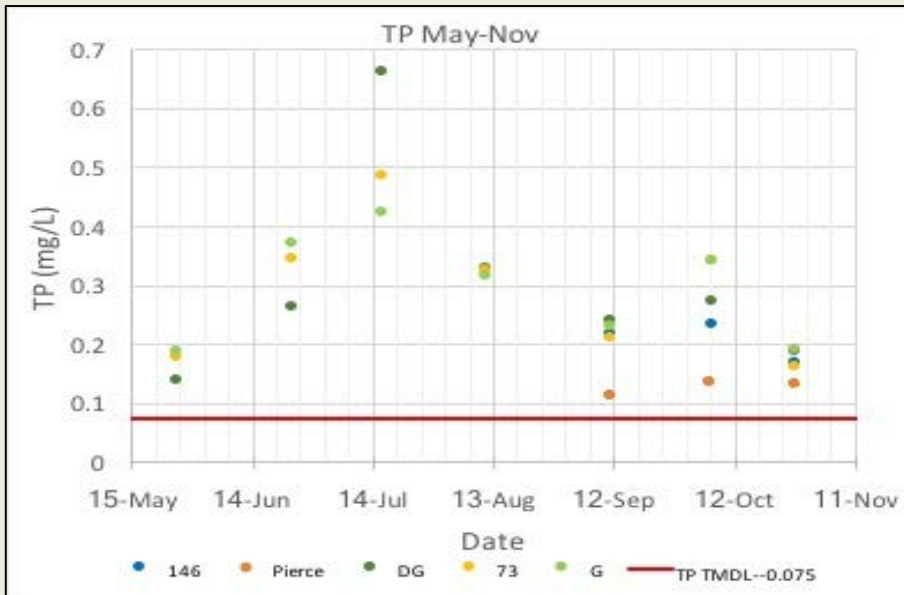
Beaver Creek

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

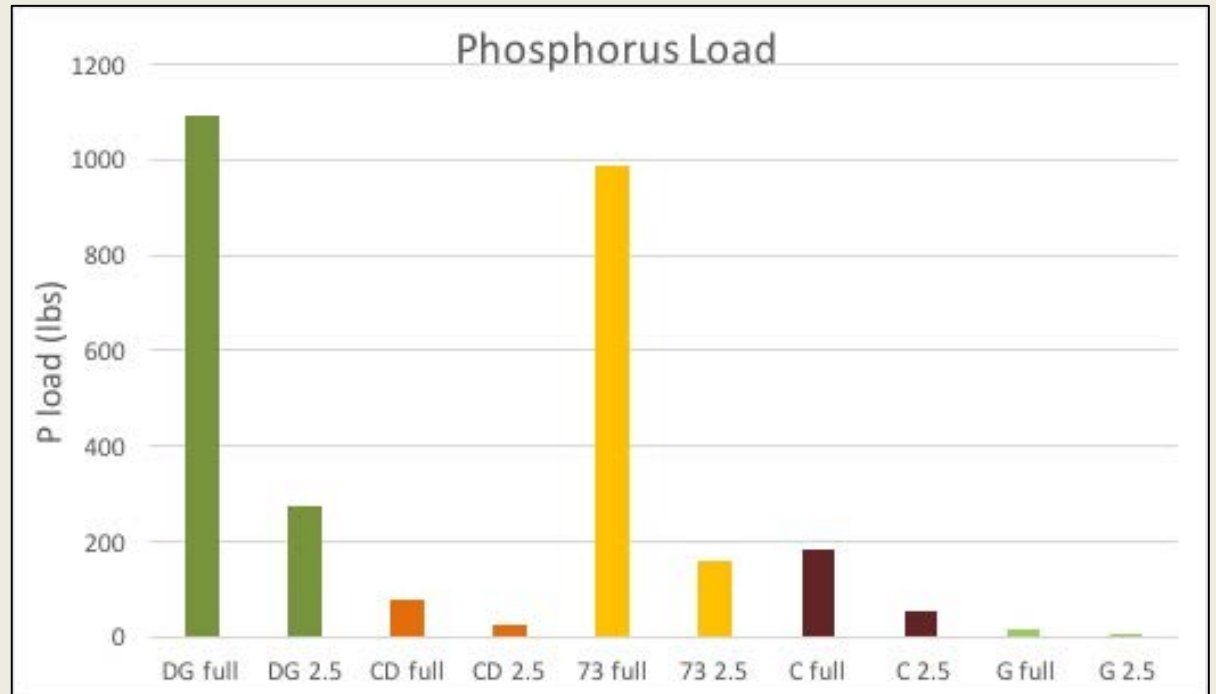


Site	Erosion Score
DG	5/15
73	10/15
G	15/15

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

Beaver Creek

Sediment P Load



Component 4

Stakeholder Engagement

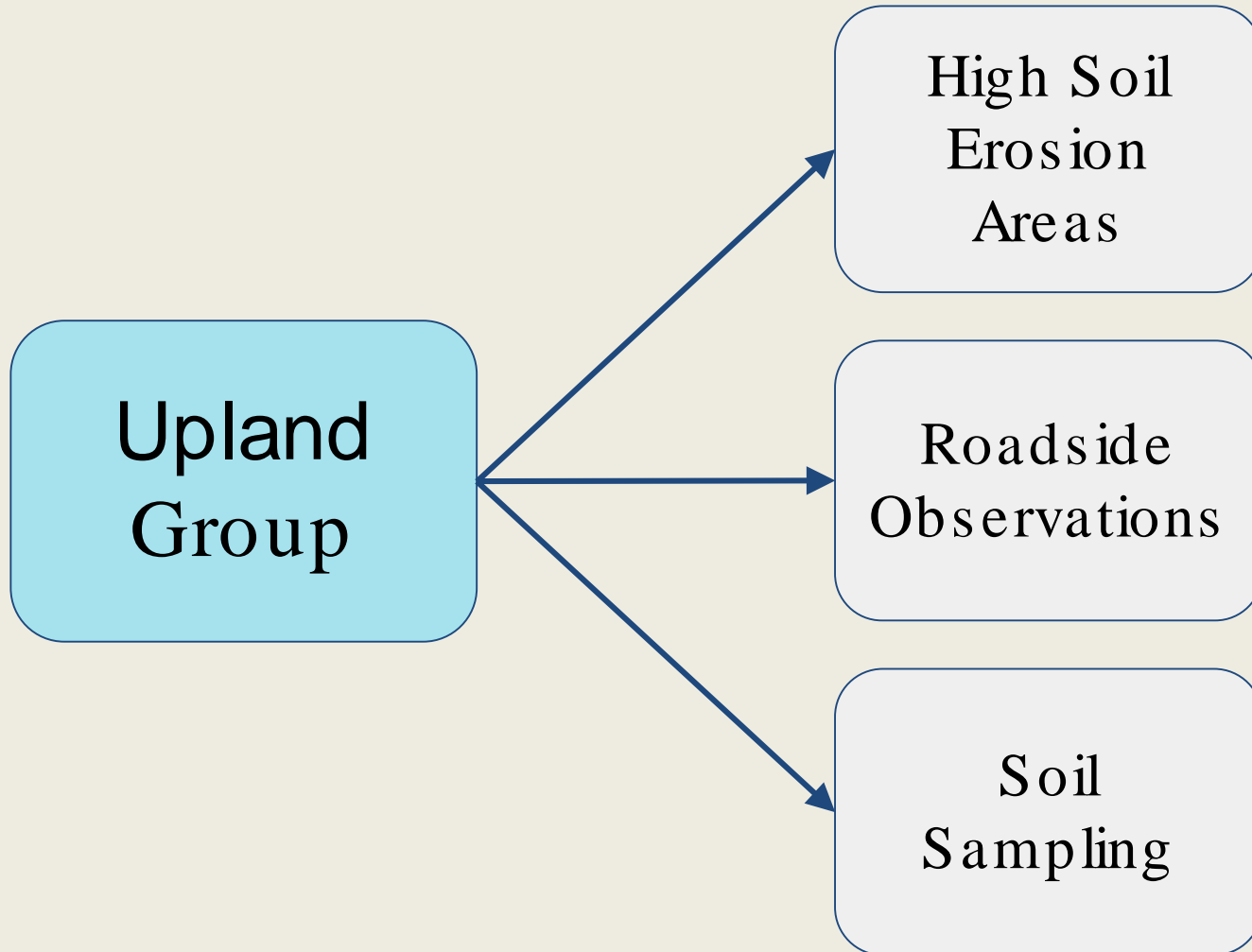
Beaver Dam Lake

Beaver Creek

Upland Beaver Creek

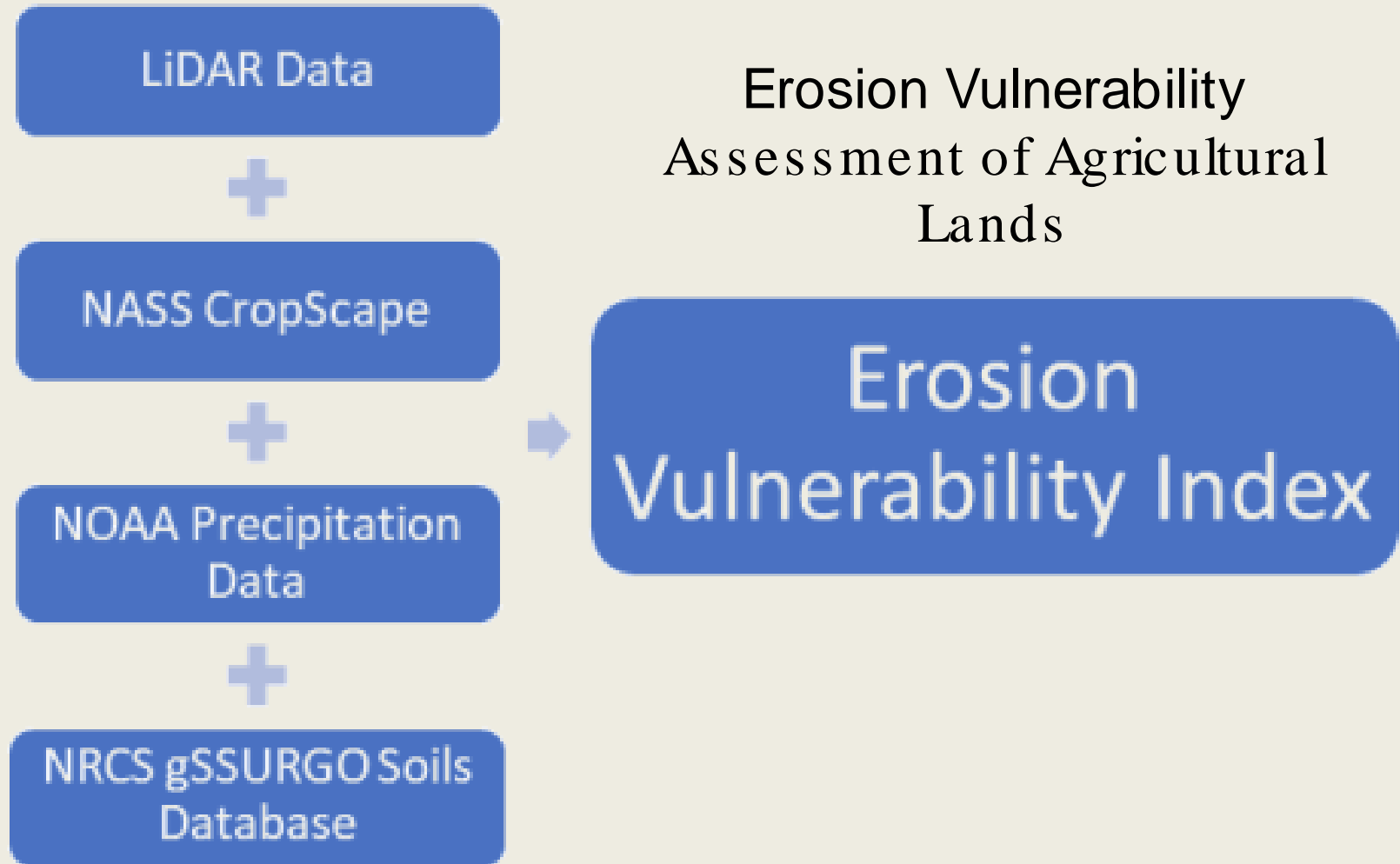
Upland Beaver Creek

Purpose



Upland Beaver Creek

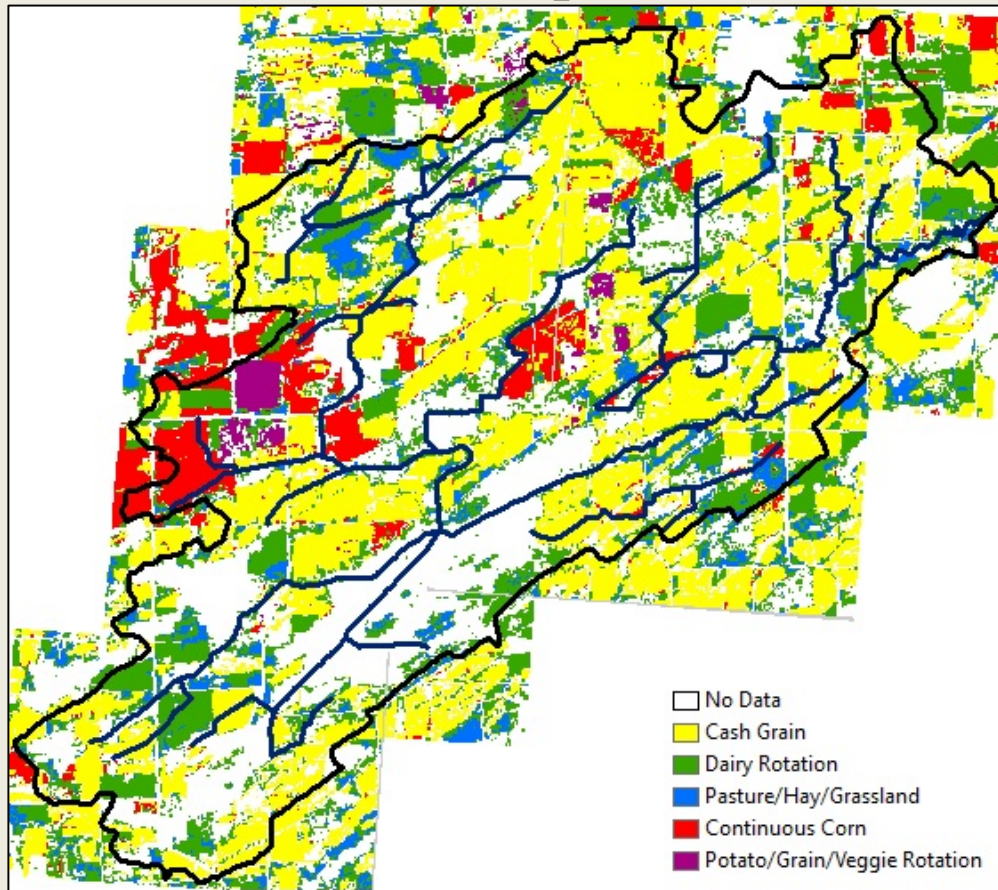
EVAAL Model



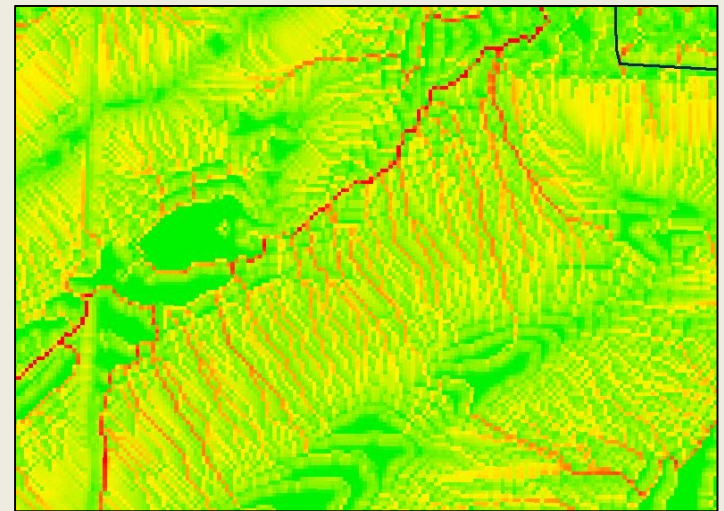
Upland Beaver Creek

EVAAL Outputs

2012-2016 Crop Rotations



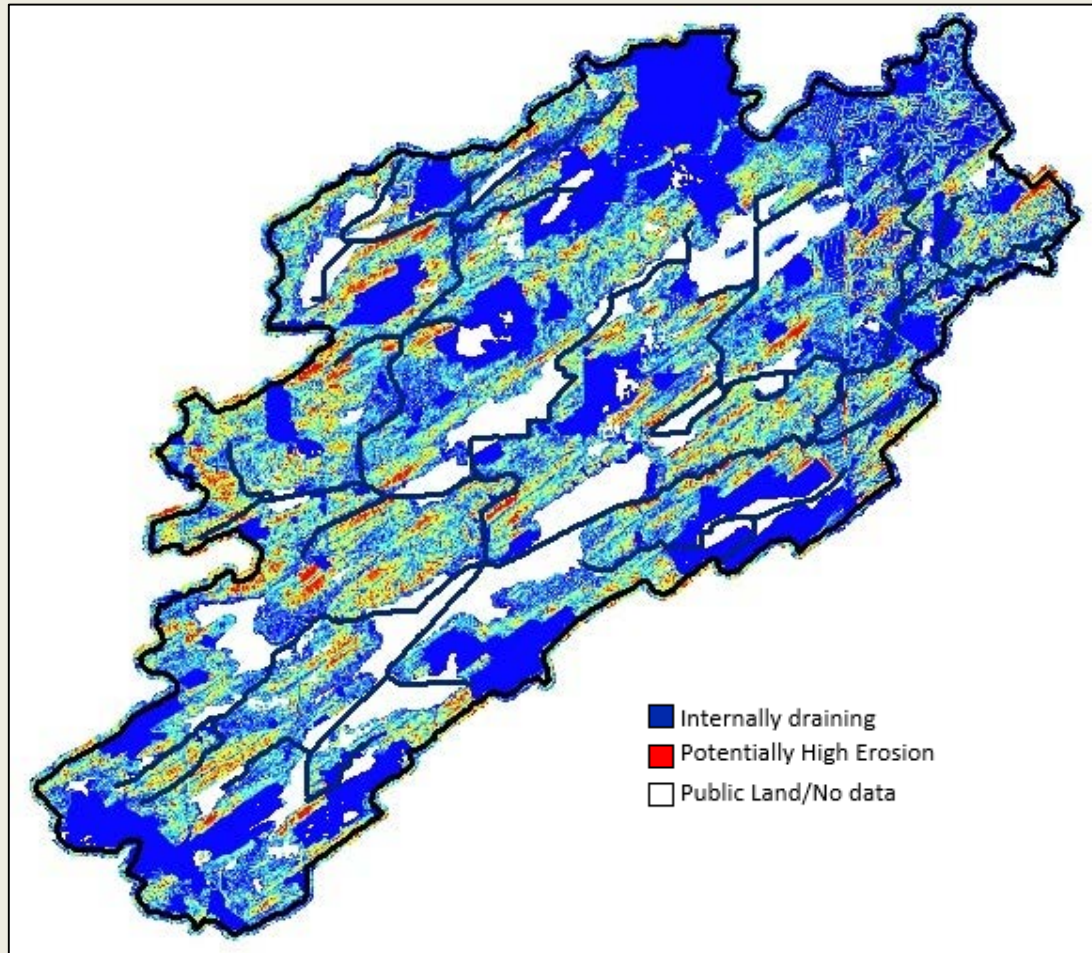
Stream Power Index



Upland Beaver Creek

Final EVAAL Results

Erosion Vulnerability Index



Upland Beaver Creek

Roadside Observations



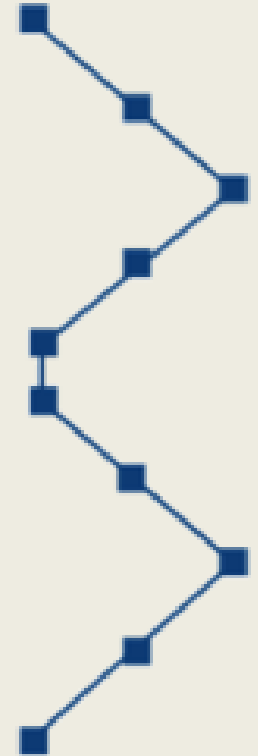
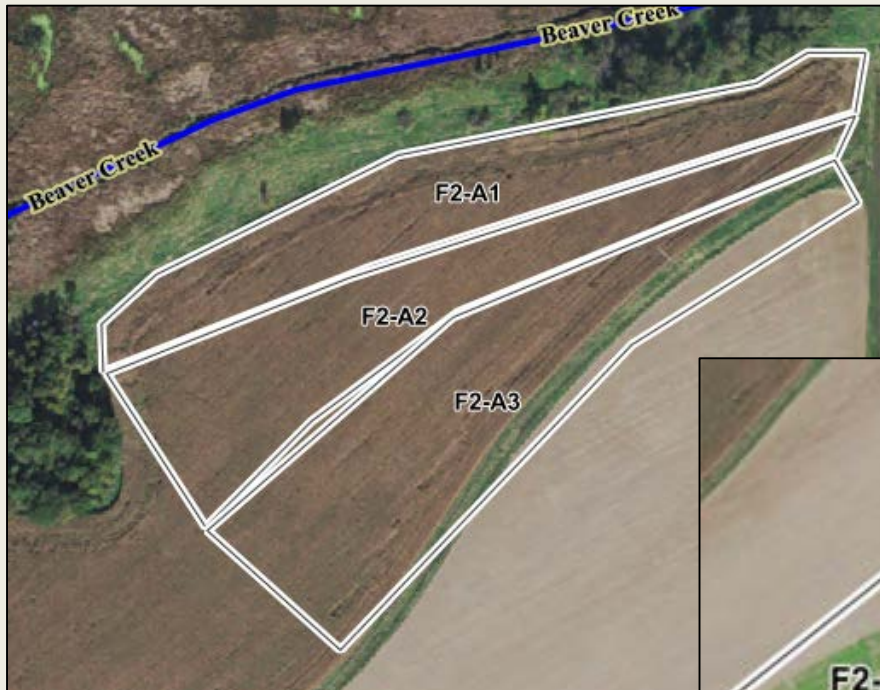
Upland Beaver Creek

Roadside Observations



Upland Beaver Creek

Soil Sampling



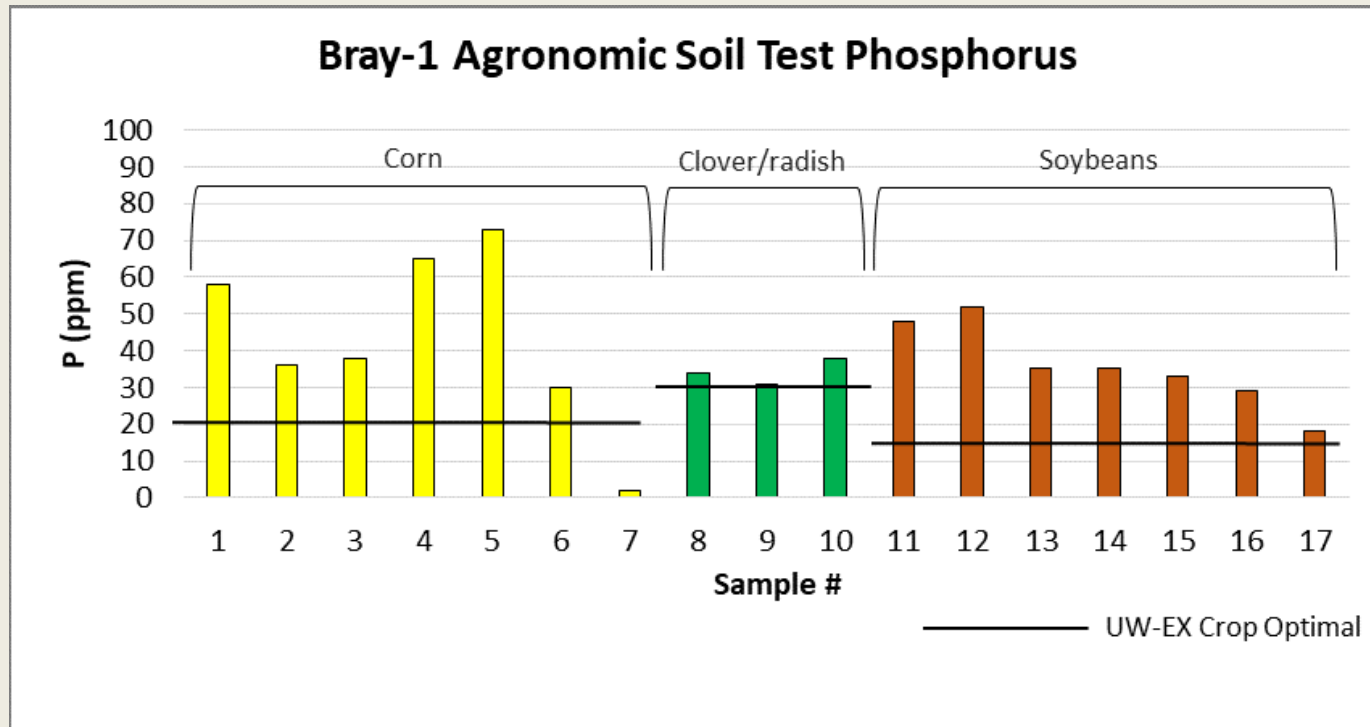
Upland Beaver Creek

Soil P Sampling



Upland Beaver Creek

Soil Sampling Results

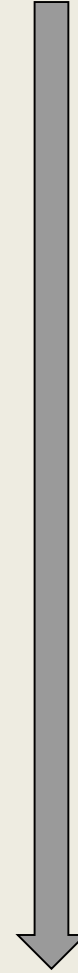


Recommendations Outline

Stakeholder Engagement

Beaver Dam Lake Water Quality

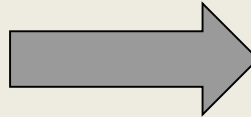
Beaver Creek Water Quality



Recommendations

Stakeholder Engagement

School Partnership Water Studies



Recommendations Stakeholder Engagement

Regular Workshop/Volunteer Events



Recommendations

Stakeholder Engagement

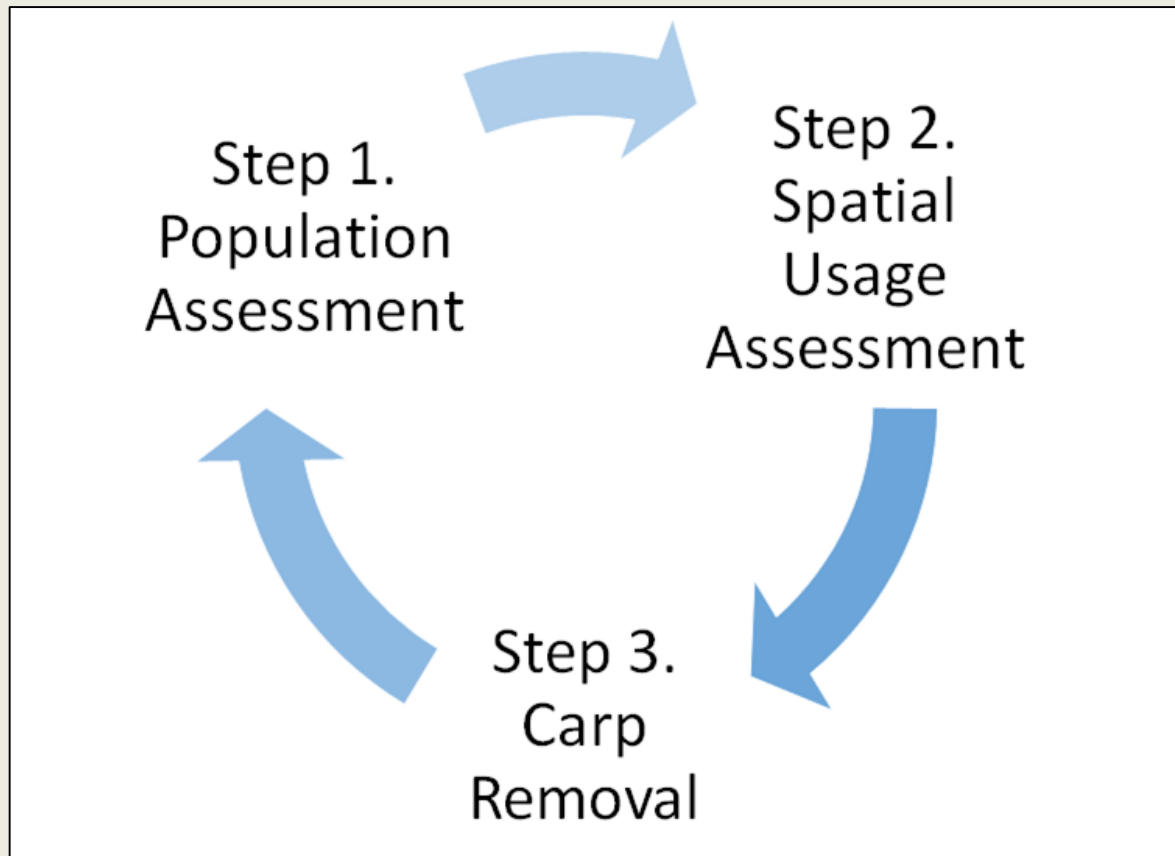
Farmer Led Council in Columbia County



Recommendations

Lake Water Quality

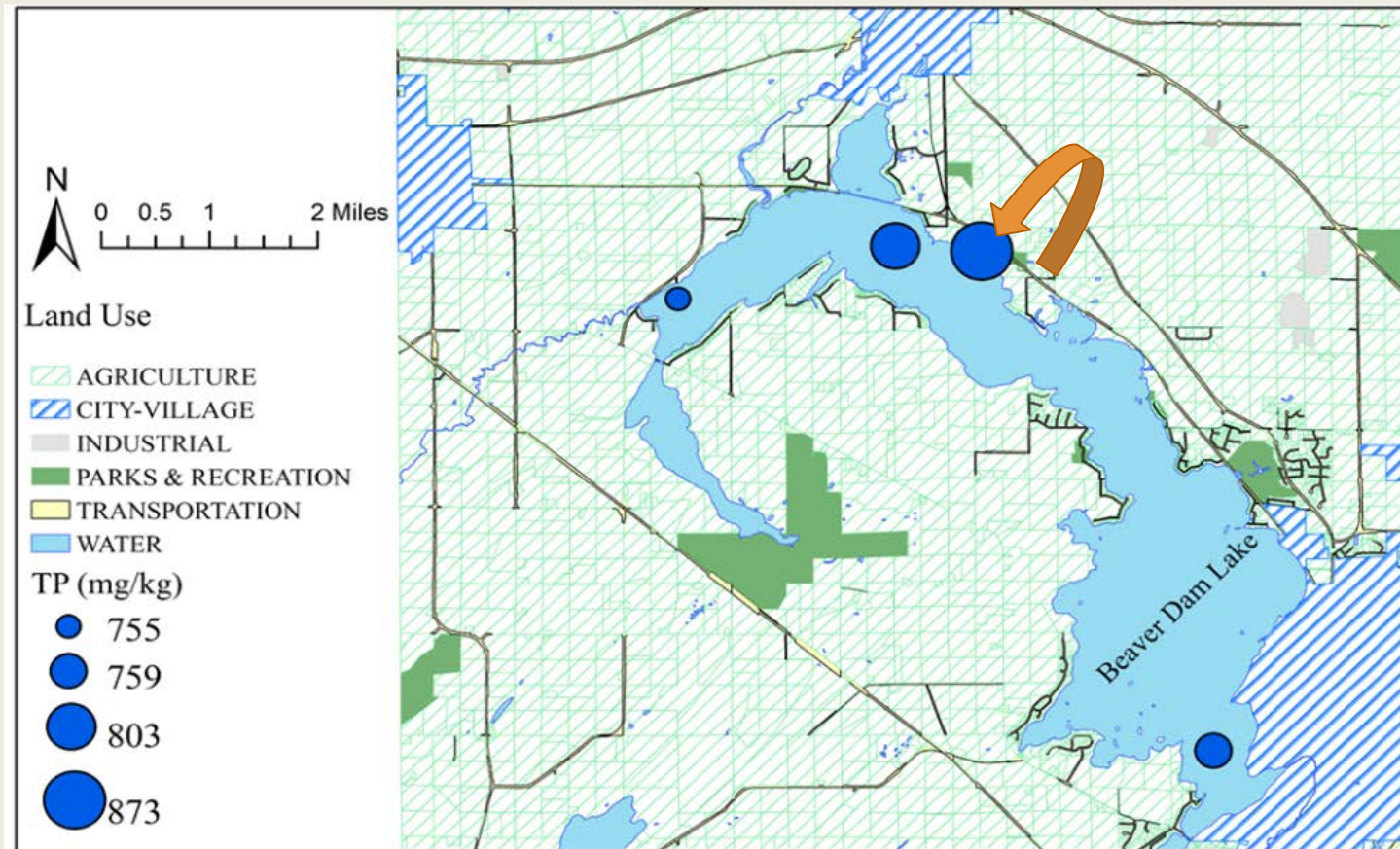
Active Carp Management Plan



Recommendations

Lake Water Quality

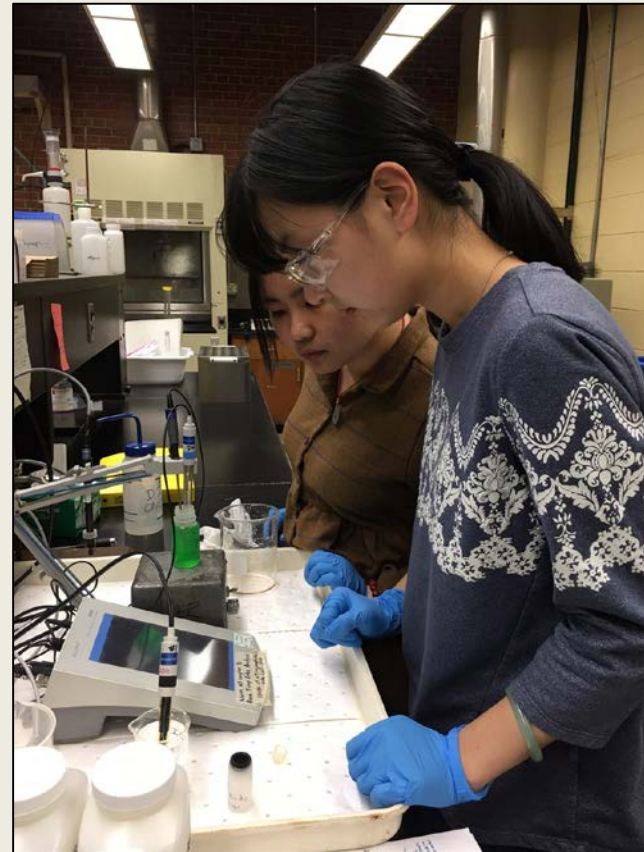
Shoreline Erosion Assessment



Recommendations

Lake Water Quality

Regular Lake Condition Monitoring

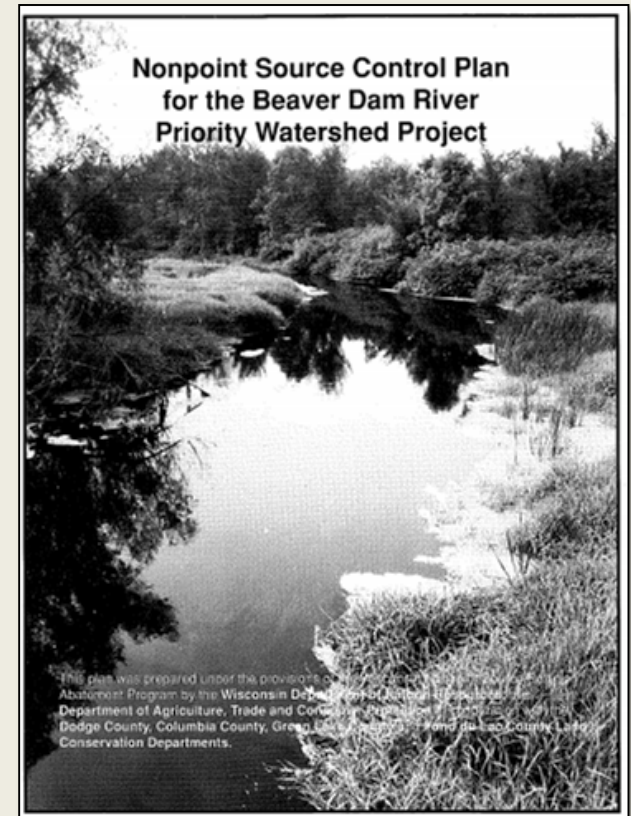


Recommendations

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.	5 Develop an information & education component to encourage participation and Plan implementation.
2 Estimate the pollutant load reductions expected from selected management measures.	6 Develop a schedule for implementing the management measures identified in the Plan.
3 Describe management measures that need to be implemented to achieve load reductions. Map priority areas for implementing practices.	7 Describe interim, measurable milestones to assess if the Plan is being implemented.
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.	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)?



?

