

# Sediment, Phosphorus & Bacteria: Identifying Sources and Determining Solutions

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# Rock Lake

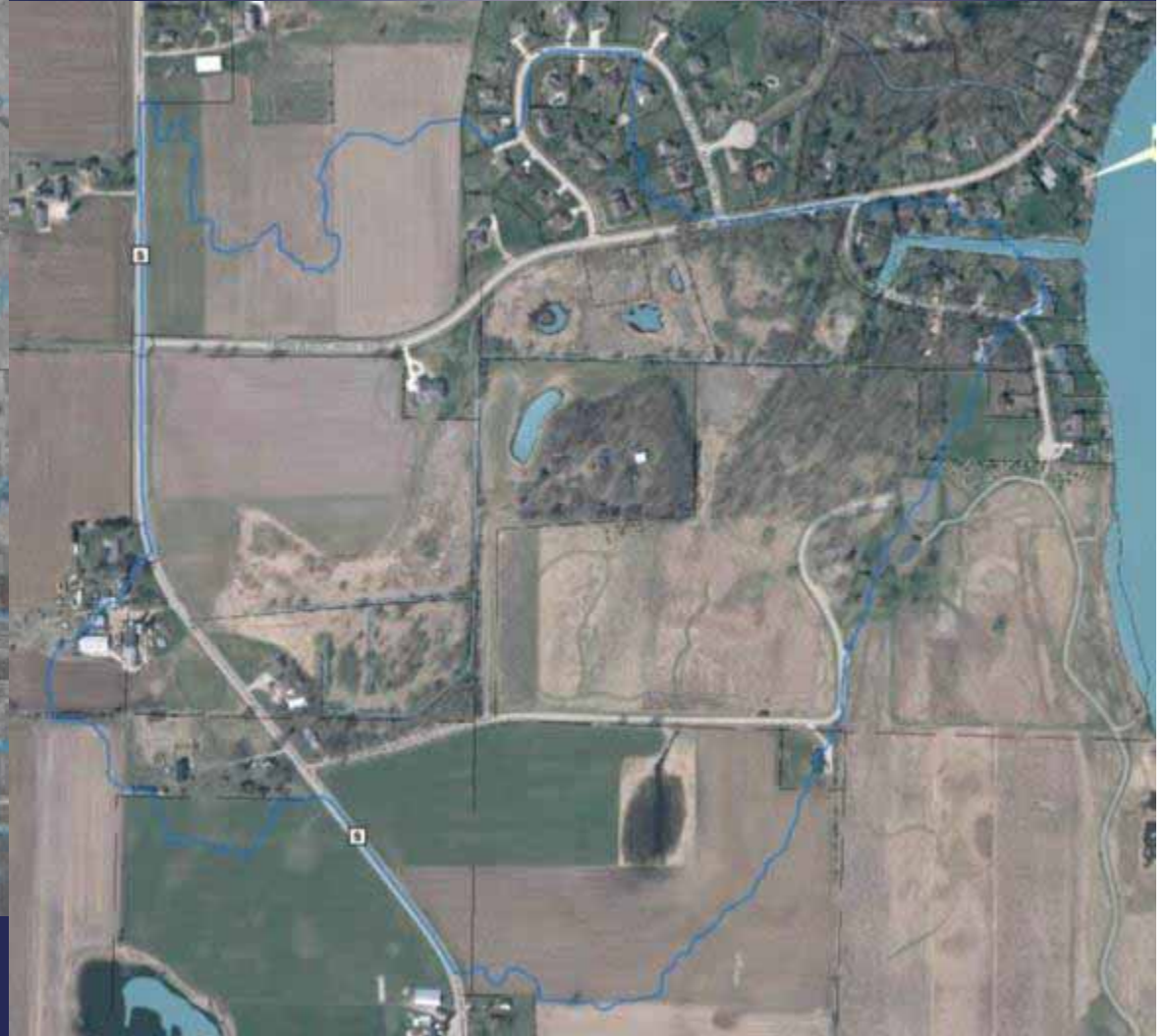
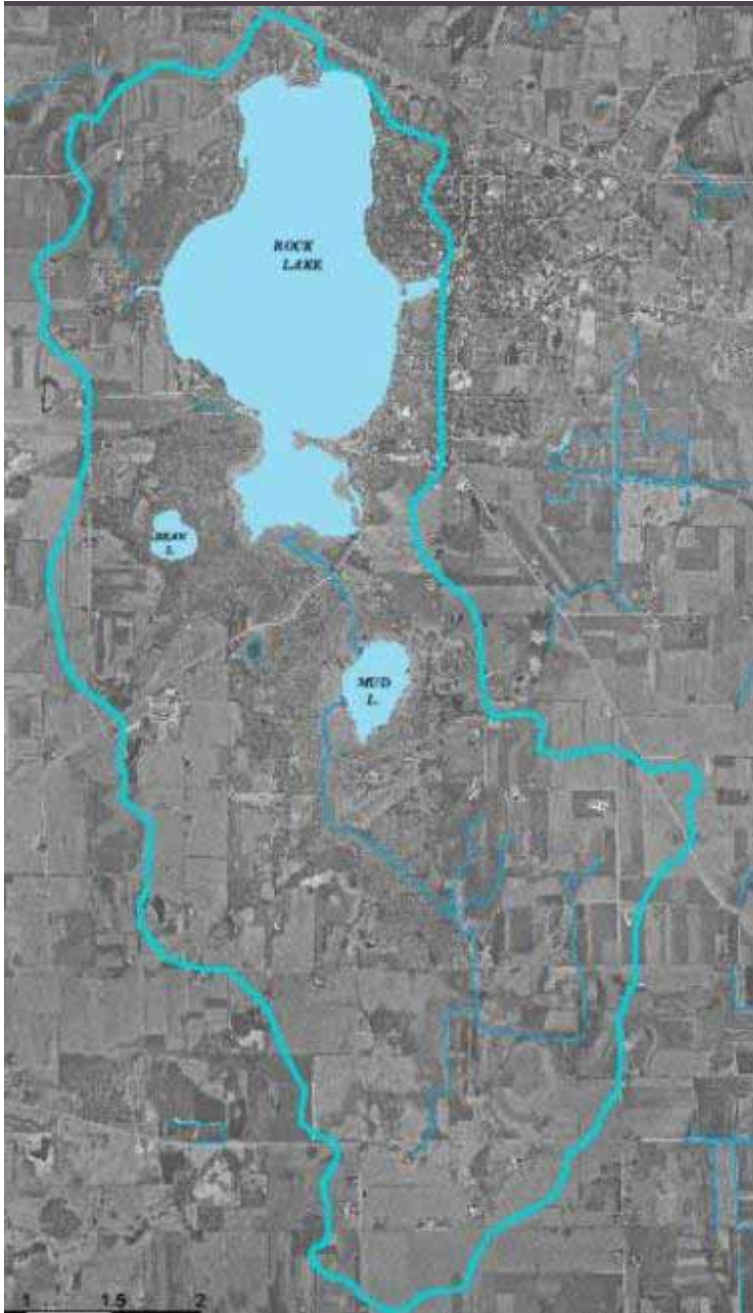
High Quality Lake in Jefferson County

Ave Summer Water  
Clarity = 13 ft

Ave Summer  
Phosphorus = 14.5  
(better than State  
standard of 30  $\mu\text{g}/\text{l}$ )

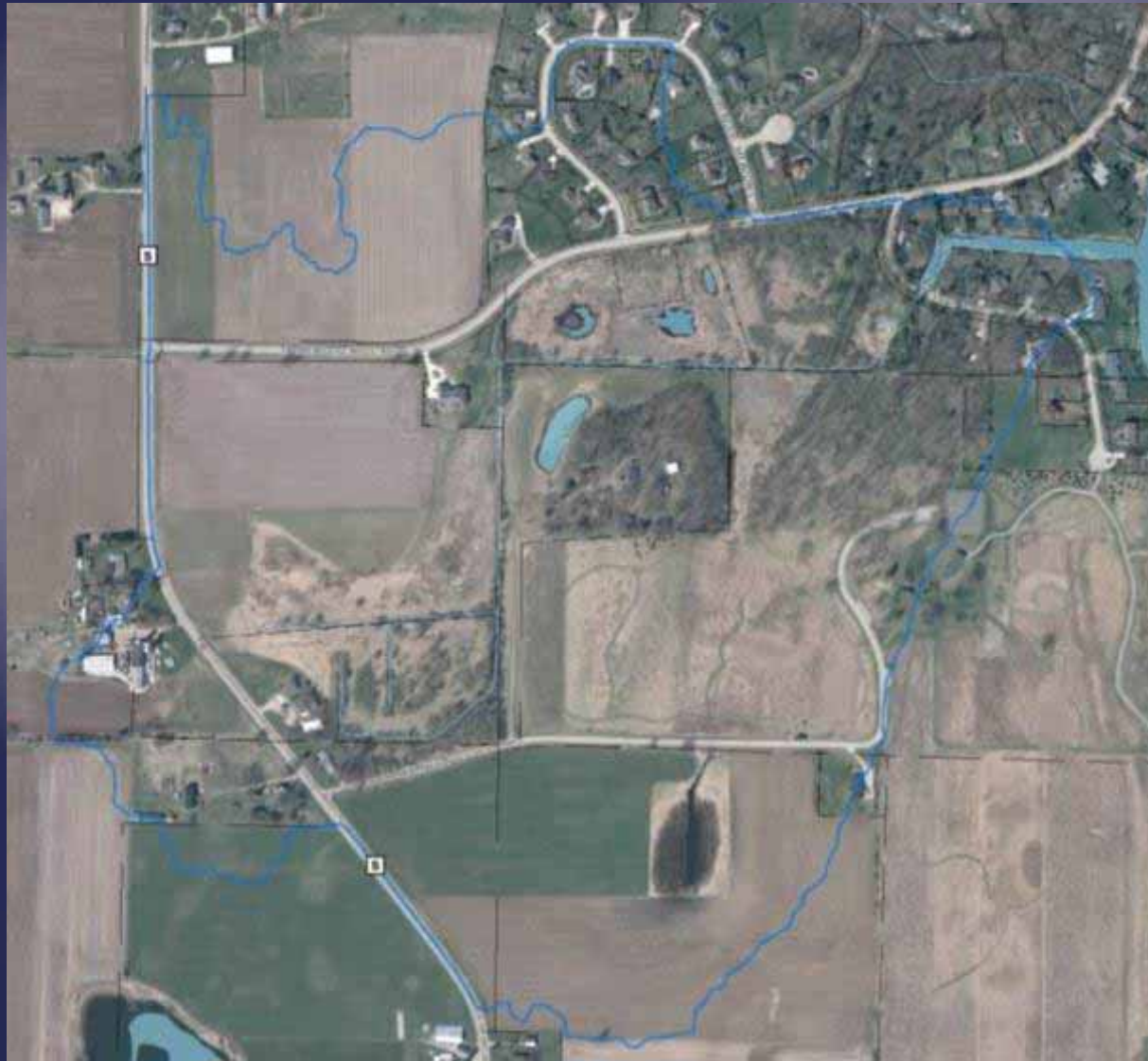


Watersheds:  
Rock Lake = 15.1 sq mi  
Miljala = 0.3 sq mi





# Watershed Characteristics



# Dredging





# Problems Identified

- Sediment
- Phosphorus
- Bacteria



# RLIA Involvement

Decided to work on finding sources of problems  
& potential solutions

1 Small Scale Lake Planning Grant

- Underwater Habitat Investigations

2 Large Scale Lake Planning Grants

- Montgomery Associates Resource Solutions

University of Wisconsin-Madison

Water Resources Management Program

# RLIA Involvement

## Landowner communications

- Many individual & group meetings with landowners
- Many public meetings

## Forging Partnerships

- Jefferson County Parks Department
- Landowners – some who are uncertain
- Advice from various experts
- Input from regulatory authorities





## Water Resources Management Program

Graduate Students provided:

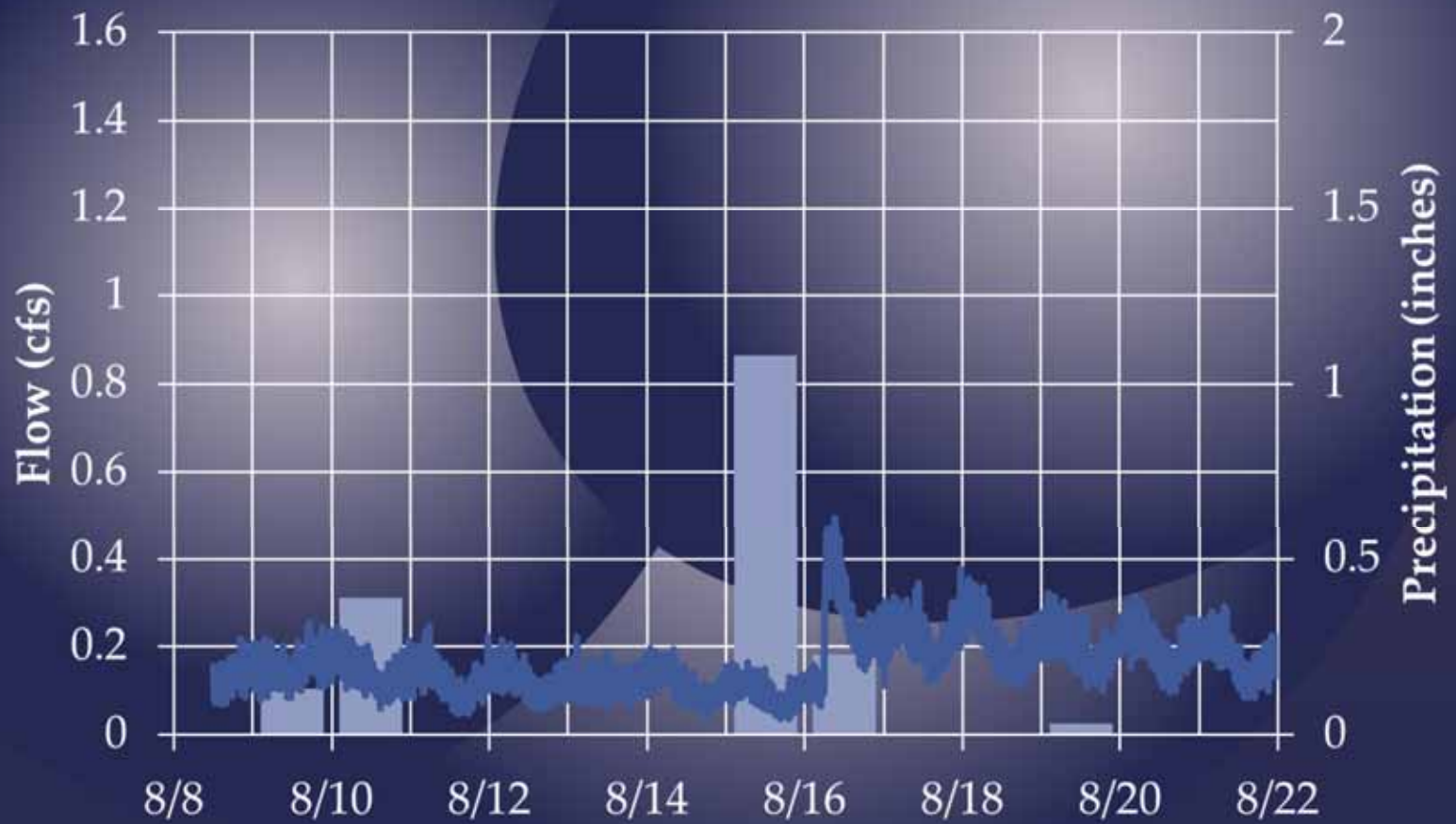
- Field work
- Monitoring equipment
- Data analysis
- Communication with experts
- Public meeting presentations



★★★★ Landowner & Citizen Buy-in ★★★★★

# Water Flow

## Flow at Cedar Lane Culvert





# Total Phosphorus:



*B: Base Flow sampling of Total Phosphorous on 08/07/12 in mg/L*  
*S: Storm Flow Sampling of Total Phosphorous on 08/16/12 in mg/L*

Legend

-  Land Parcel Boundaries
-  Ditch



# Phosphorus

## Groundwater

- Low concentrations (<0.005 mg/L)

## Surface water

- Concentrations highest in upstream reaches
- Percent dissolved orthophosphate high
- Increase during storm events

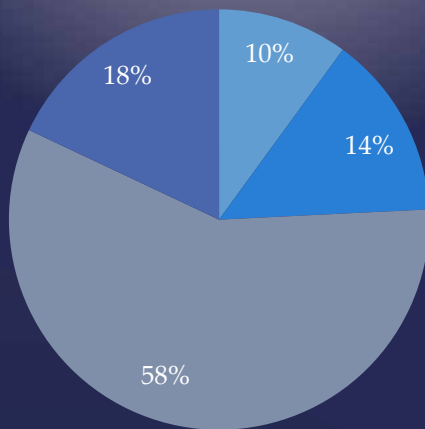


# Sediment Samples



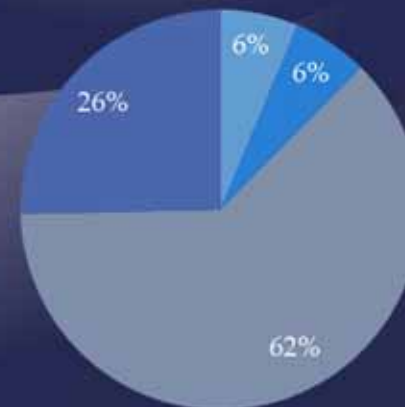
## Cores Sampled - October 2011

■ % OM/Peat   ■ % Coarse Sand   ■ % Fine Sand   ■ % Silt/Clay



## Cores Sampled - June 2012

■ % OM/Peat   ■ % Coarse Sand   ■ % Fine Sand   ■ % Silt/Clay



# Sediment

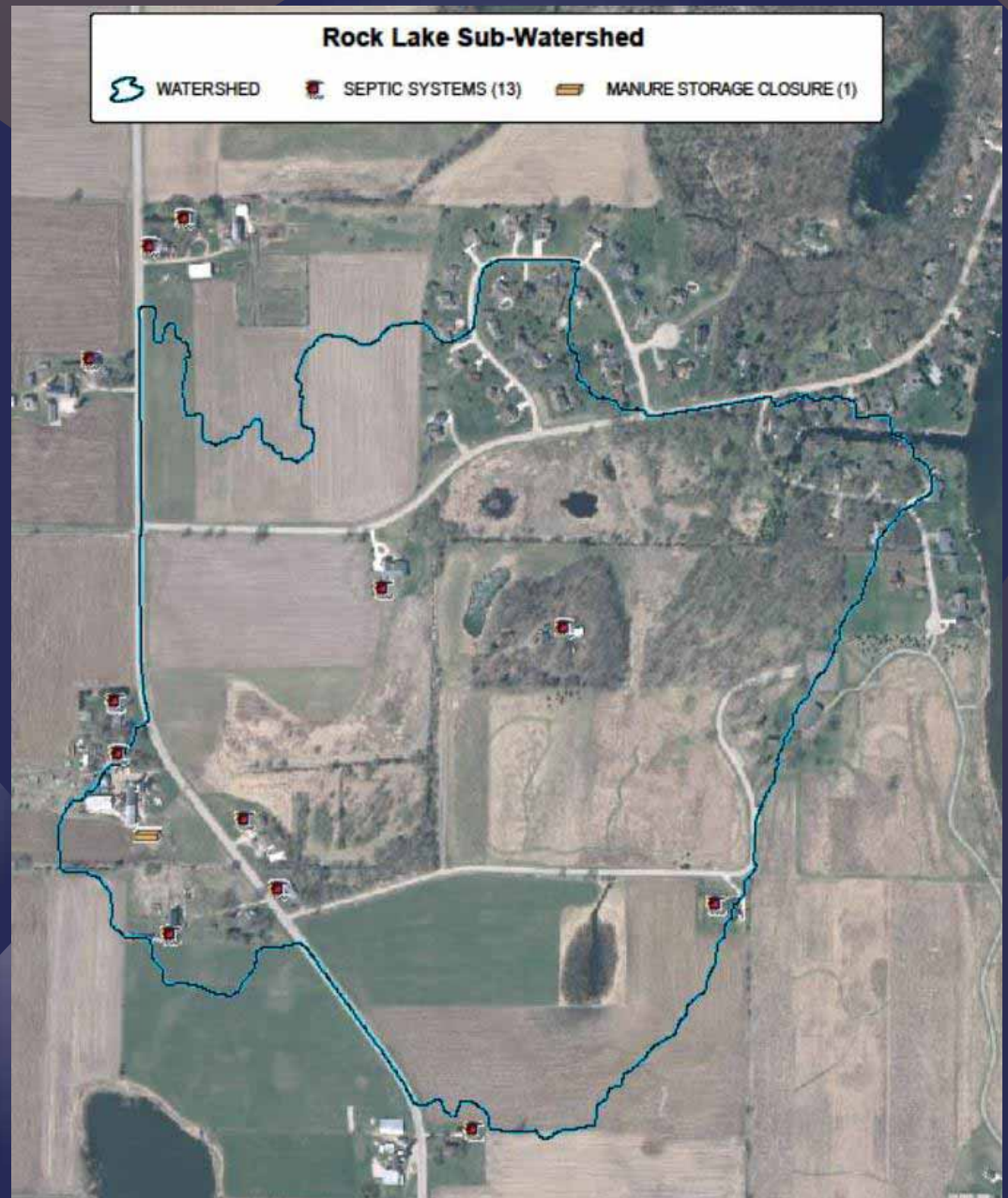
- Sediment is mostly sand with some muck
- Major sediment source: ditch bed and banks
- Sediment moves during high water flows



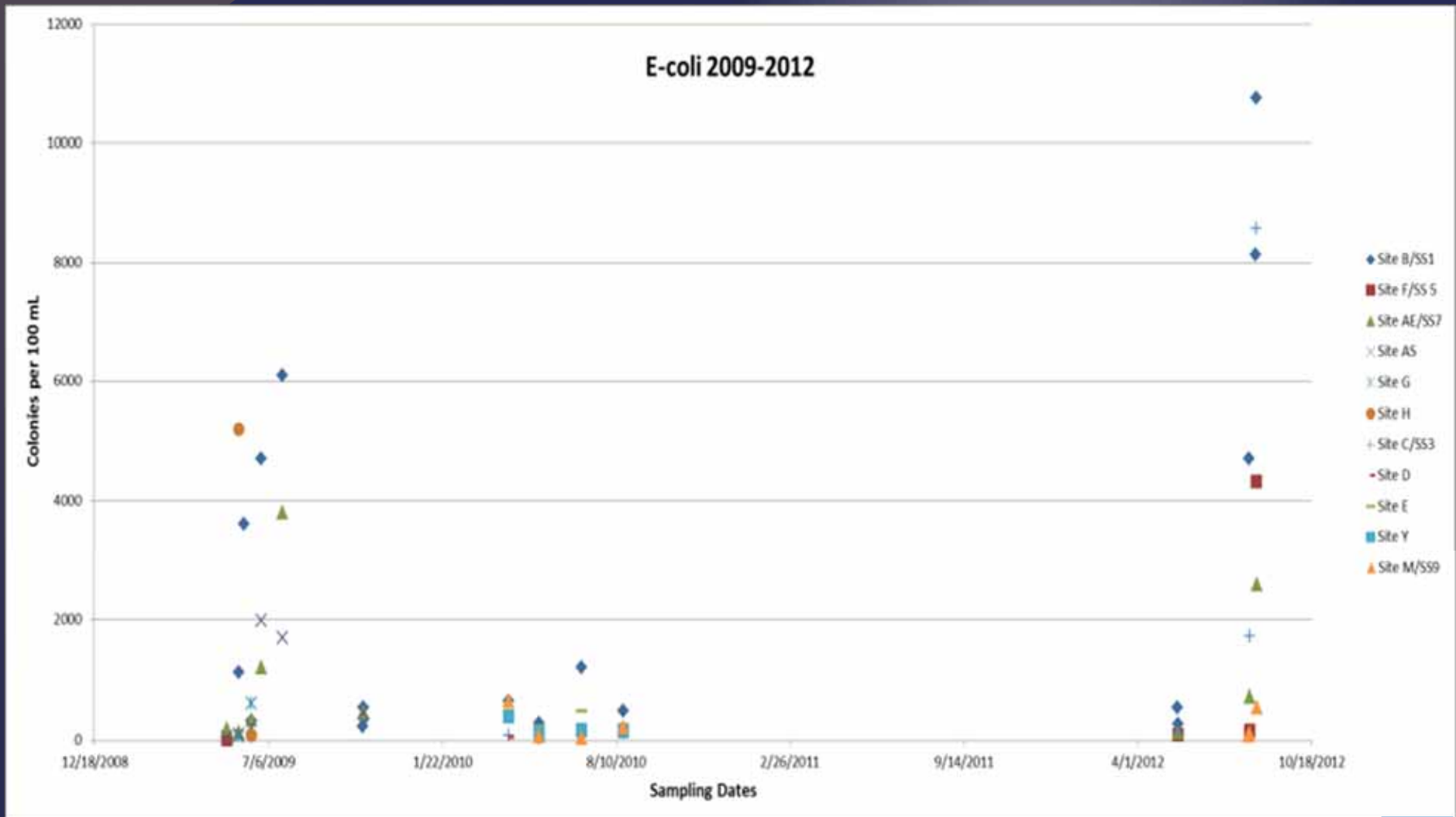


# Bacteria

- Septic survey
- E. Coli and fecal coliform testing
- Nitrate sampling
- COD testing



# Bacteria Survey Results



# Bacteria

- E. Coli and fecal coliform persist above recreational use standards in Channel
- Not related to septic systems
  - Higher bacteria concentrations during runoff events
- Likely sources: wildlife, manure spreading & colonies in sediment
  - Sediment & bacteria flushed out in events





# Recommendation

## Keep Turbidity Curtain Until Not Needed

- Reduces sediment & pollutant load to channel
- Needs repairs
- Ongoing dredging costs several thousand dollars
- DNR permit renewal required



# Recommendation

Work with farmers on nutrient management

- Could reduce P load
- Voluntary measures on private, working land
- Time commitment for communication



# Recommendation

Promote stormwater green infrastructure



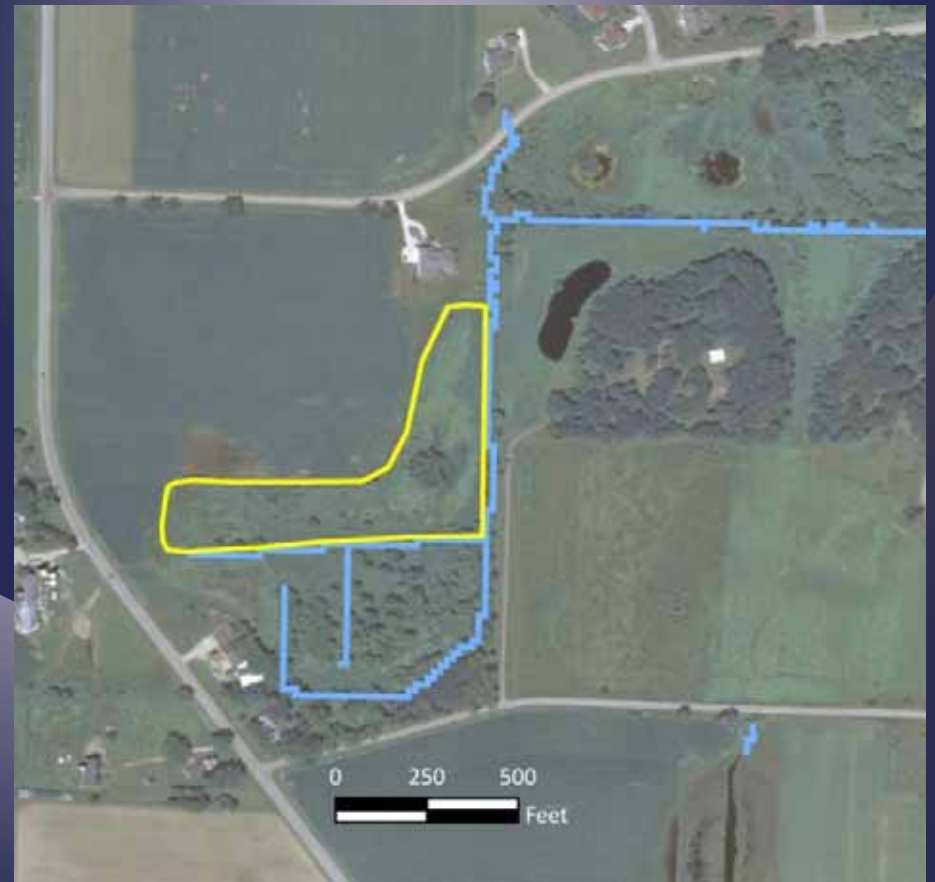
- Reduce sediment & P
- Small source compared to fields & channel erosion
- Education needed for voluntary measures



# Recommendation

## Improve vegetated buffer

- Reduce sediment & P
- Landowner cooperation needed
- \$10,000 to establish 6 acre buffer
- Ongoing maintenance needed



# Recommendation

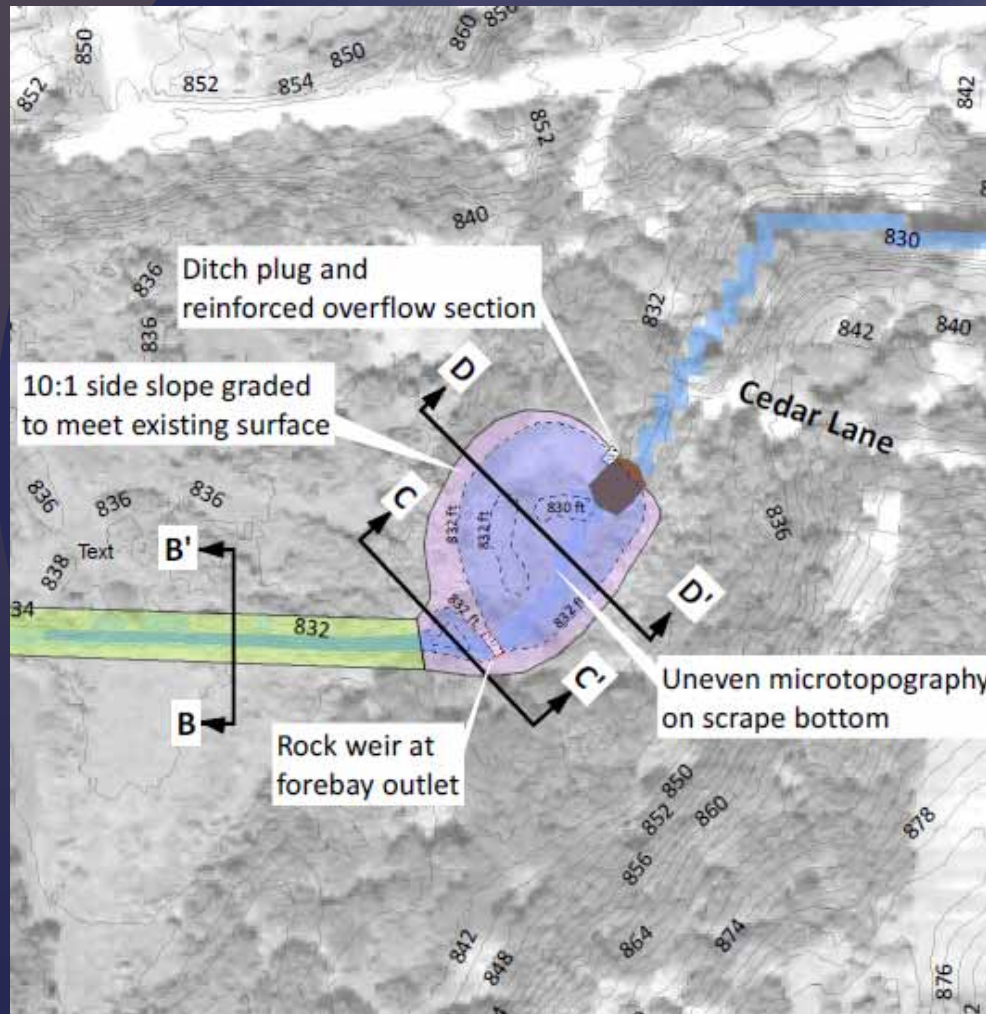
## Stabilize ditch banks

- Major sediment source
- Re-slope & vegetate banks
- Landowner cooperation needed
- Permits needed
- \$40,000 for 1200 ft
- Ongoing maintenance needed



# Recommendation

## Restore marsh



- Reduces sediment, P & bacteria
- Shallow wetland scrape and water level control
- Permits needed
- Land access needed
- \$50,000 for 0.75 ac
- Ongoing maintenance



# Next Steps

- Communications
- Involvement – small steps: remove box elder trees, allow access to land
- Involvement – larger projects
- Permitting – Federal, State, County, Town
- Securing funds – grants, match requirements, etc.

# \$\$\$ Funding Options \$\$\$

- Department of Natural Resources grants
- Federal & State conservation programs
- Private sources such as Wisconsin Waterfowl Association, Ducks Unlimited, land trusts

# Partnerships



THE UNIVERSITY  
**WISCONSIN**  
MADISON





# Acknowledgements

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# Questions?

