

The Effects of Urbanization on Baird Creek, Green Bay, WI



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Presentation Outline

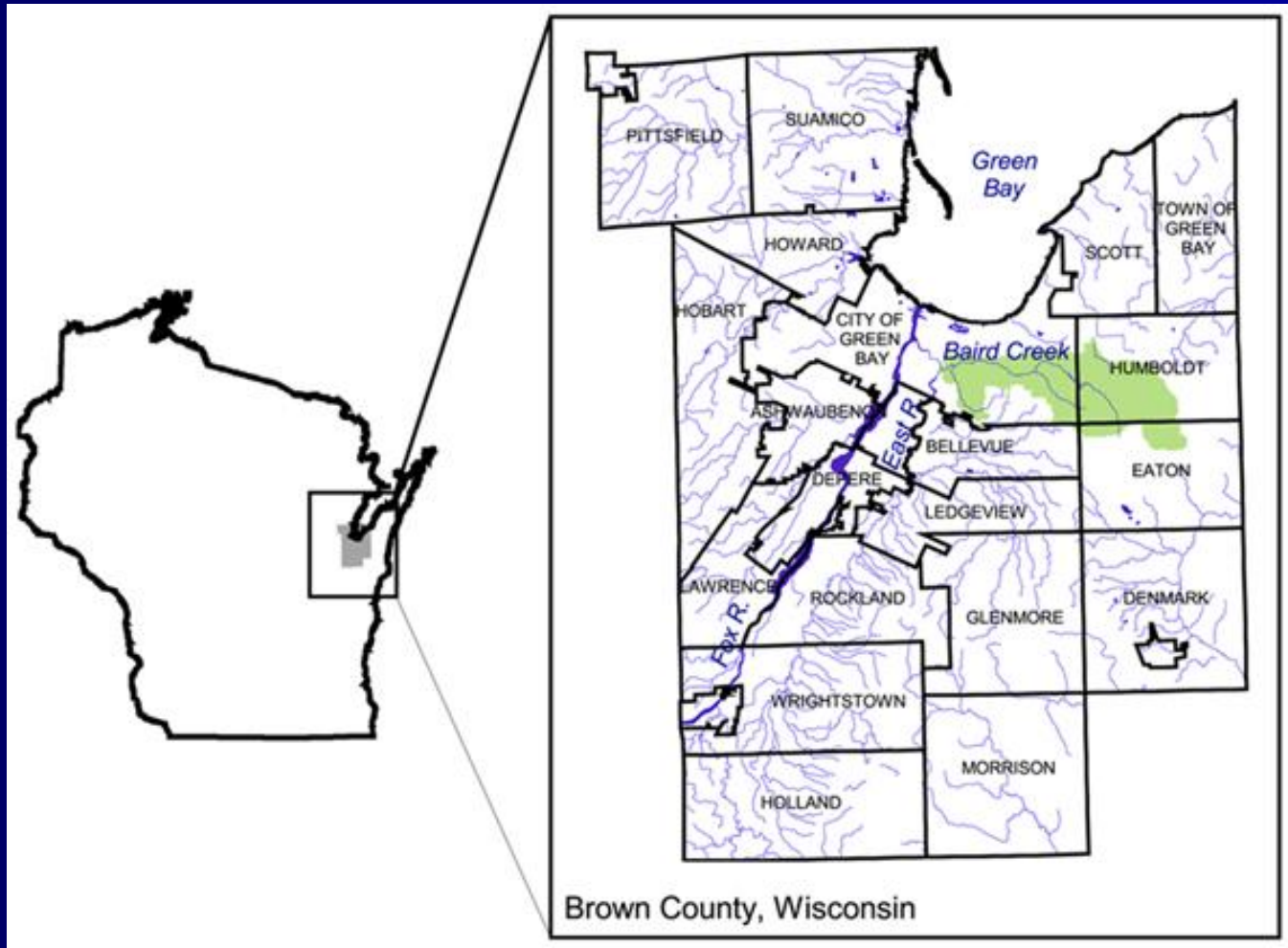
- Overview of the Baird Creek Watershed
- Research Objective
- Methods
- Results
- Conclusions



Overview of the Baird Creek Watershed

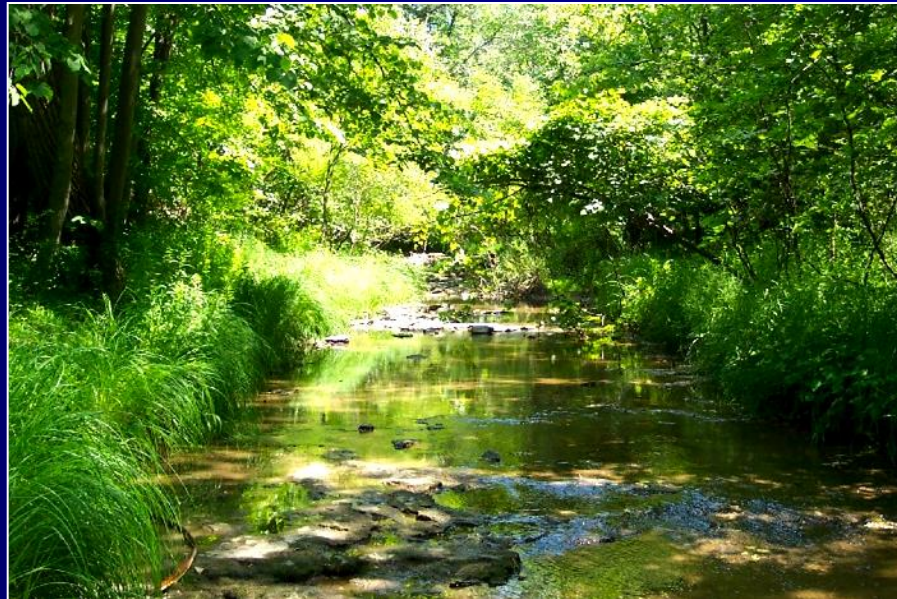


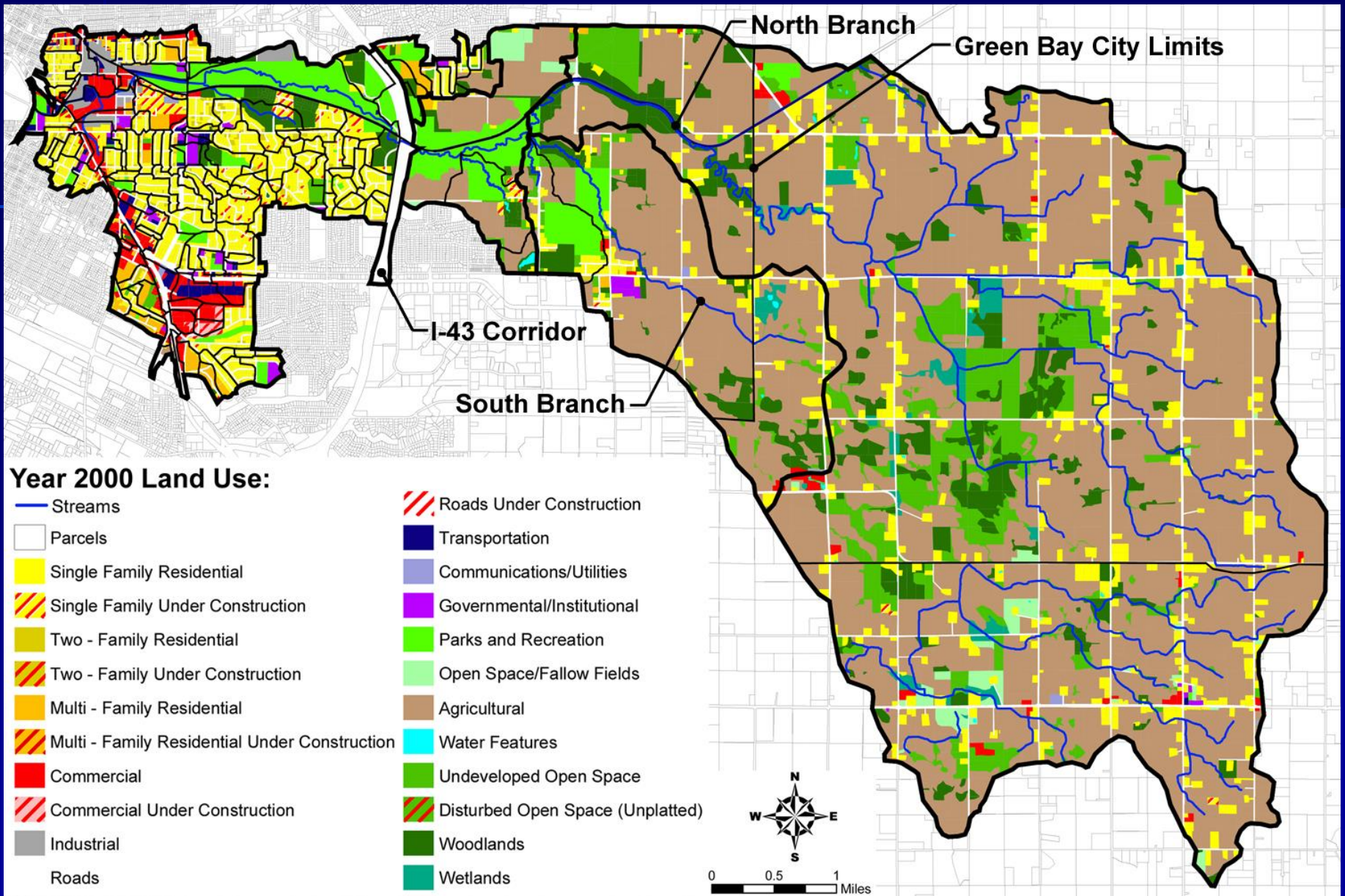
The Baird Creek Watershed



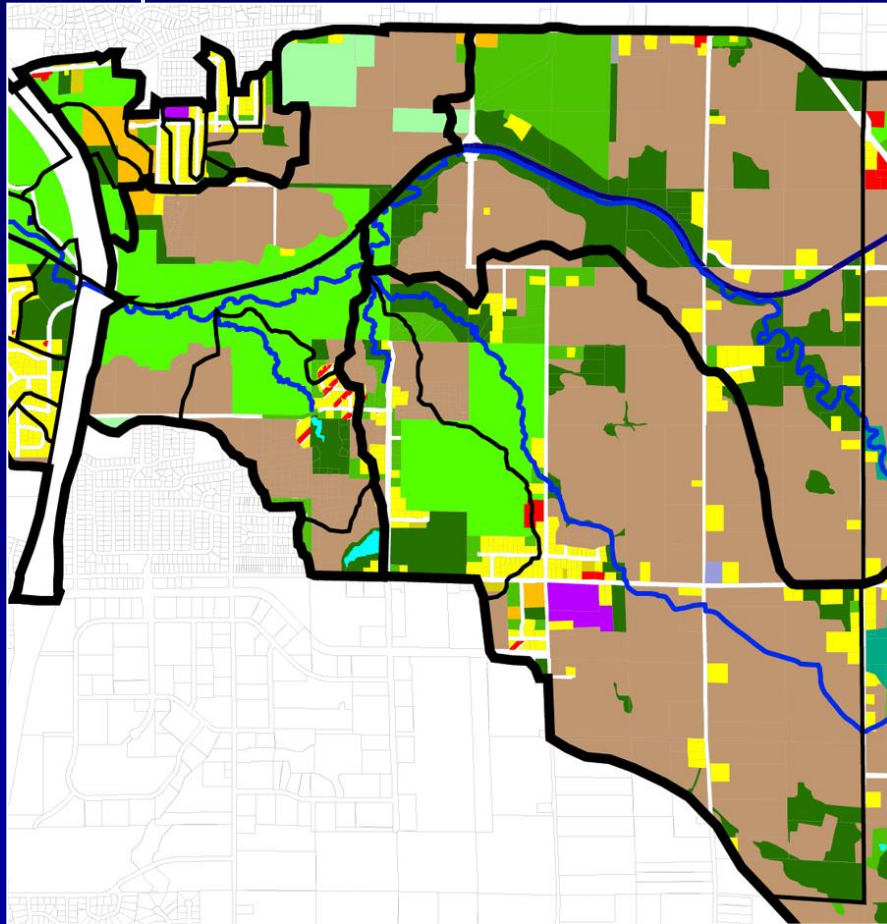
Baird Creek is Unique

- Diverse fish community
- Baird Creek Greenway
- Active community support

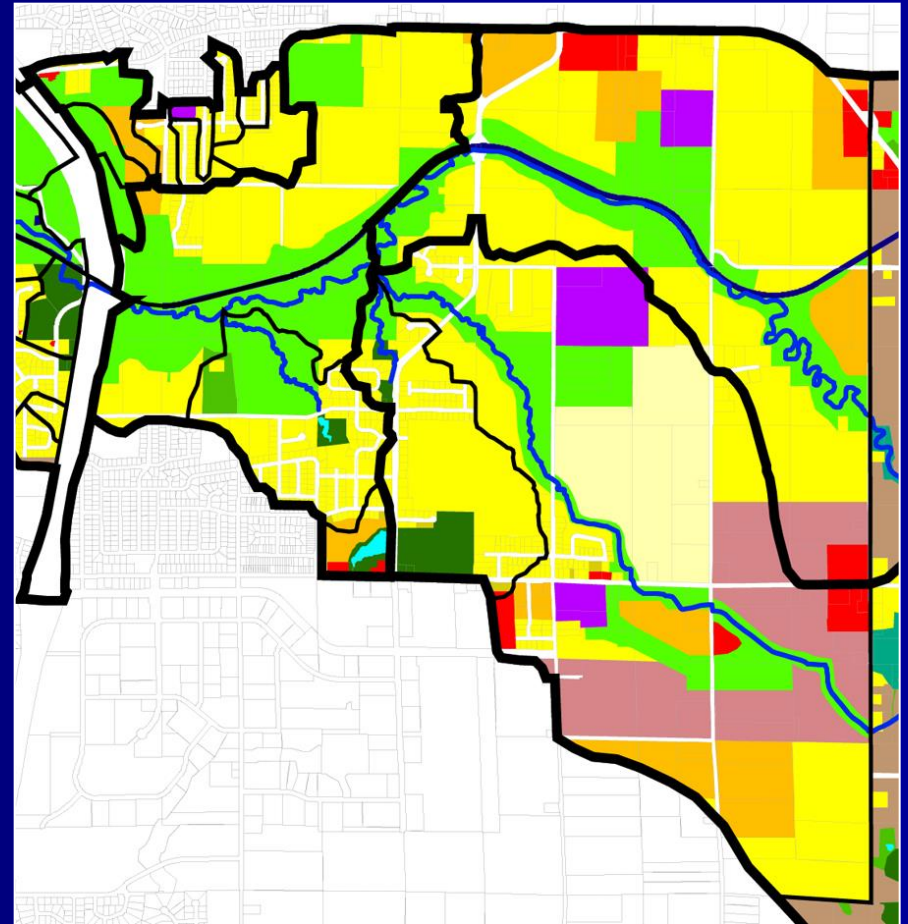




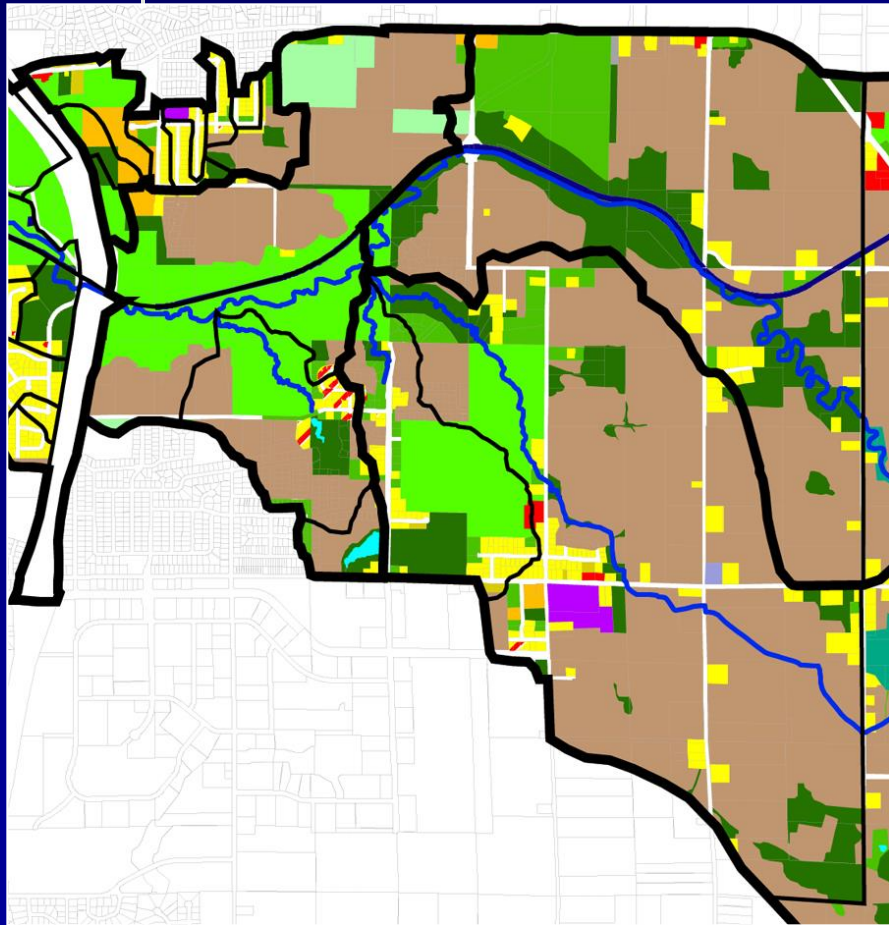
2000 Land Use



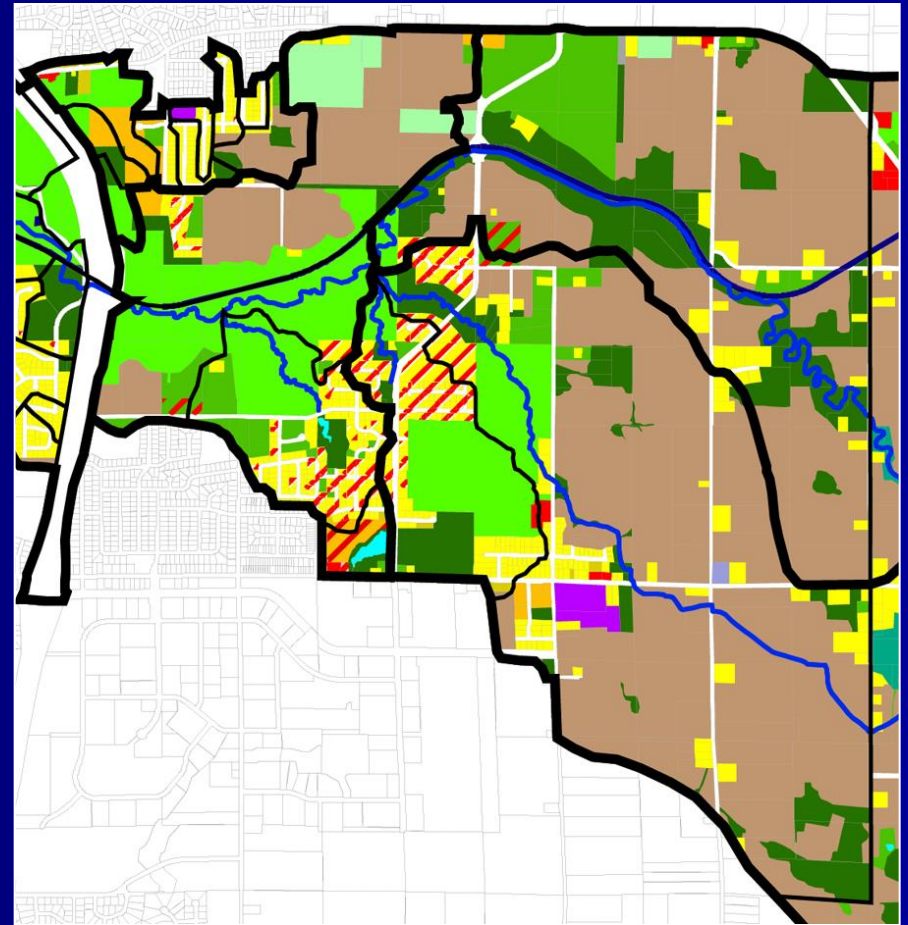
Projected 2022



2000 Land Use



2004 Land Use



South vs. North Branches



Research Objective:

- Determine what impact the transition from agriculture to urban land use is having on water quality in Baird Creek
 - Sediment and phosphorus concentrations and loads
 - Evaluating stream biota populations

Methods



Methodology

- Three sampling locations:
 - USGS Station on Superior Road
 - South and North Branches at confluence
- Precipitation data recorded at USGS site
- Event samples at USGS site triggered by flow, at other sites on hourly intervals
- Low-flow samples collected at all sites using the EWI method

YSI 6200

Multiparameter Sonde



Discharge Calculations

- Upstream sites calculated using a flow meter, sonde readings, and staff gages
- High flows utilized the float method



Biological Sampling

- Performed by UWM lab assistants on South Branch and at USGS site
- Fish and invertebrates collected using a stream or backpack electrofisher

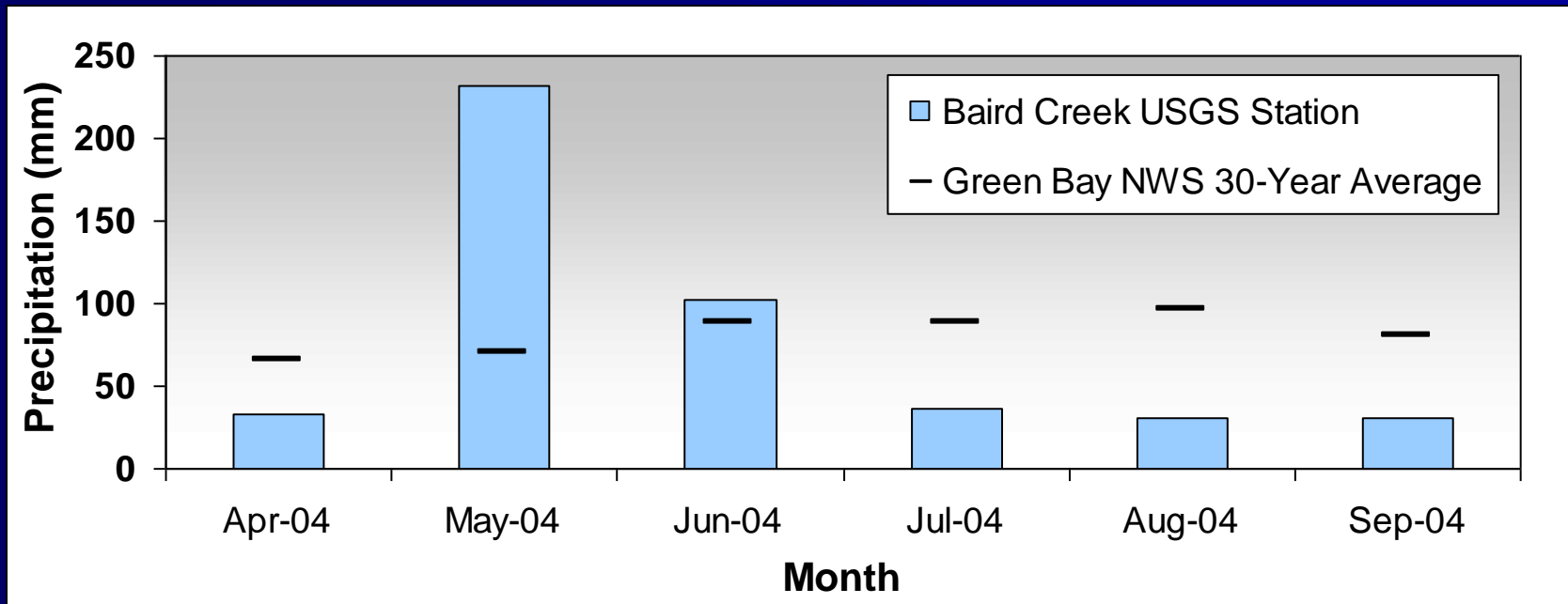


Results



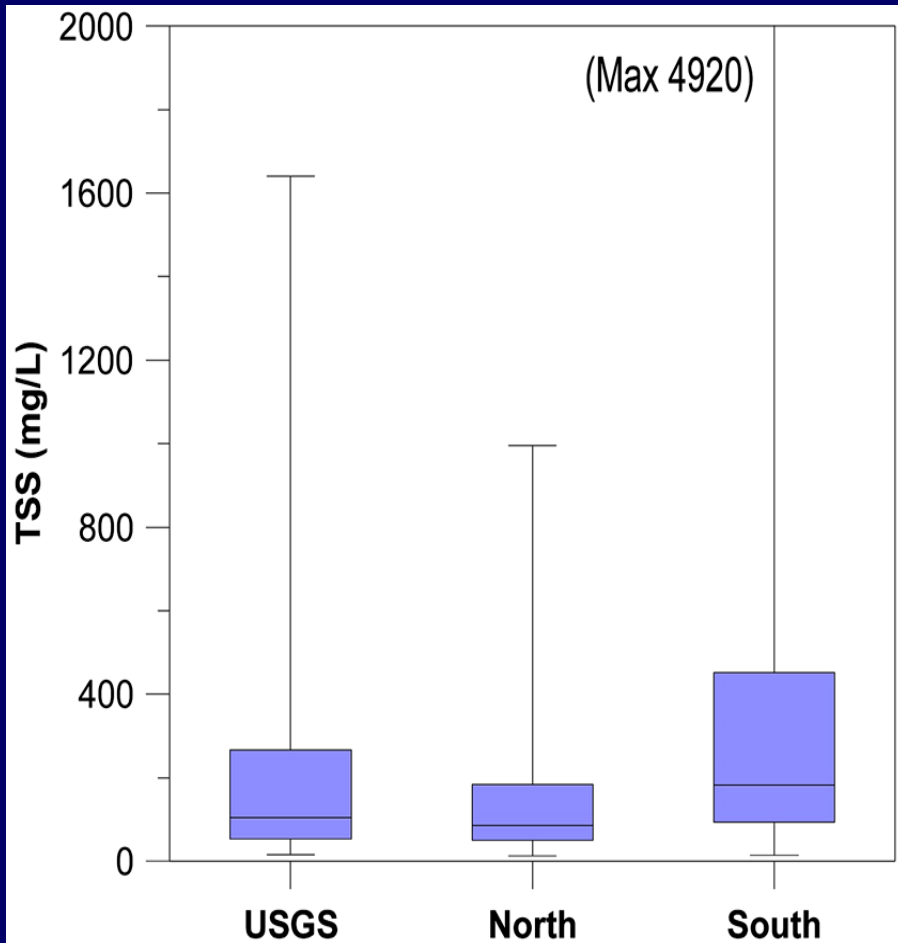
2004 Precipitation

- It rained and rained...then stopped!
- No sonde data upstream from May 2004

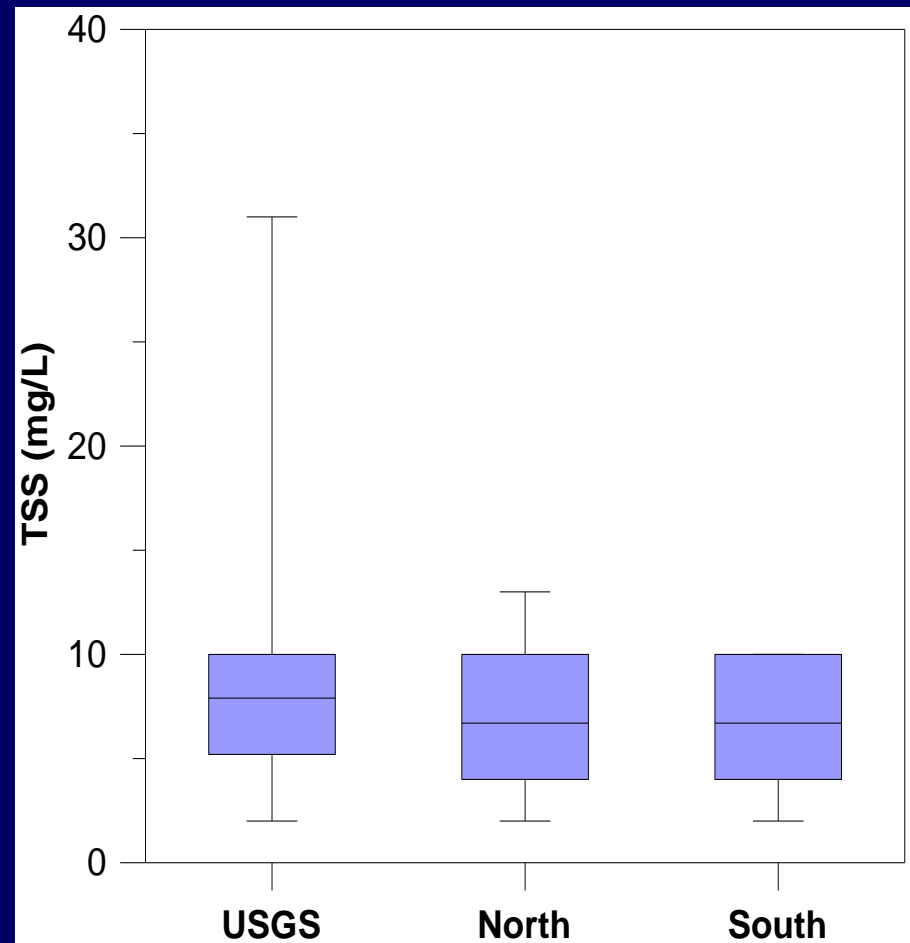


Sediment Samples

Event

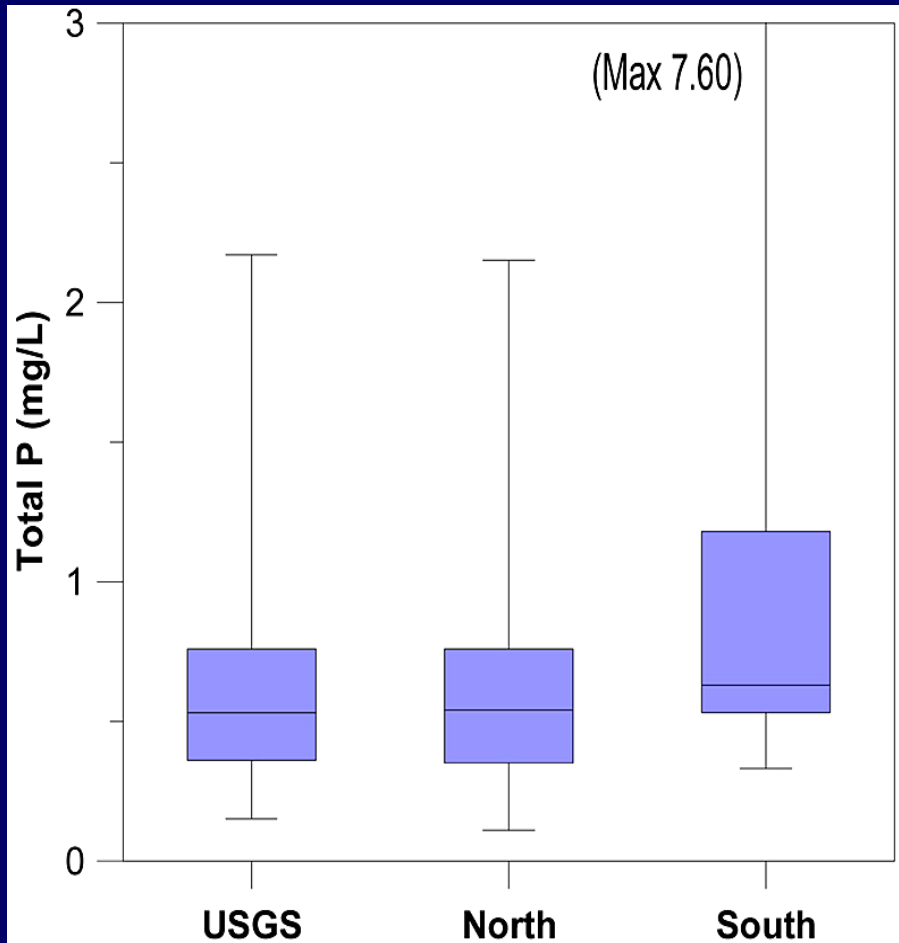


Low Flow

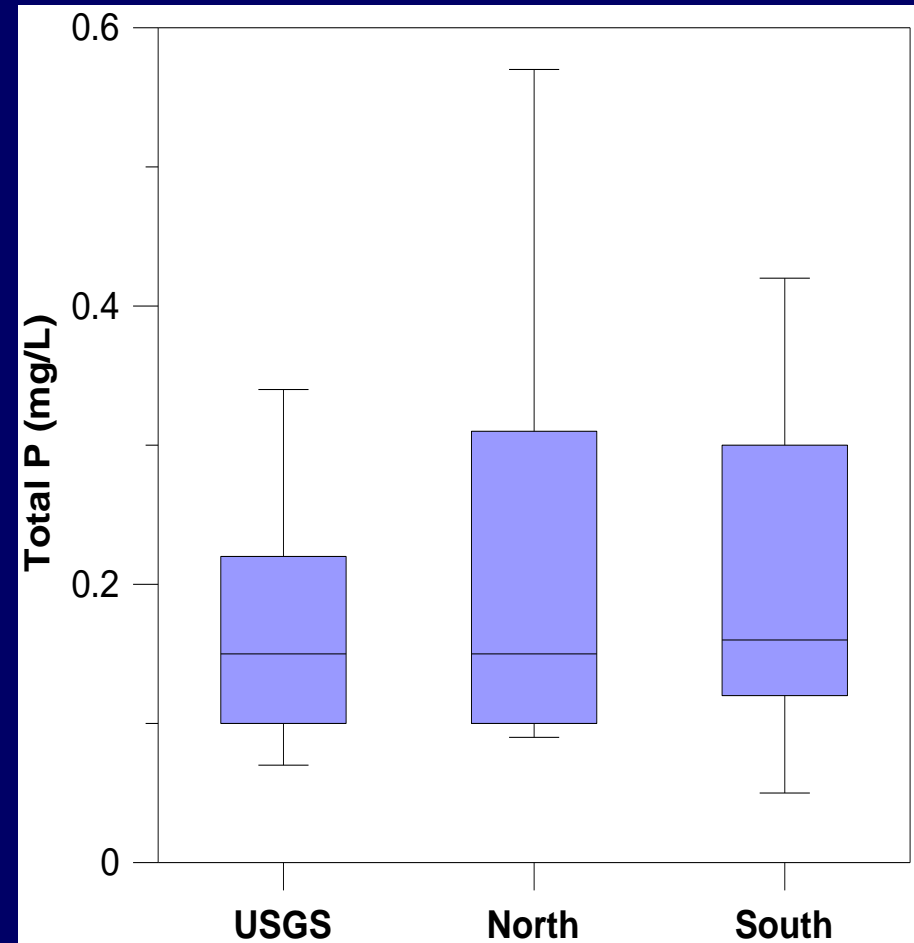


Total Phosphorus Samples

Event

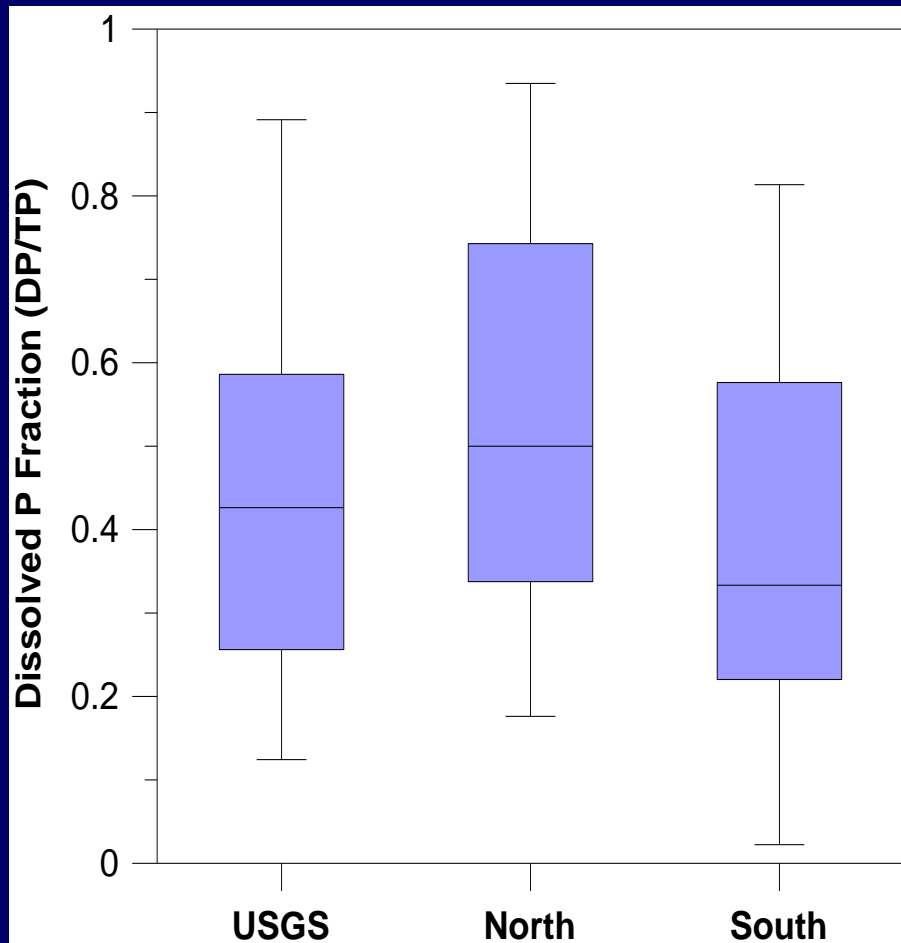


Low Flow

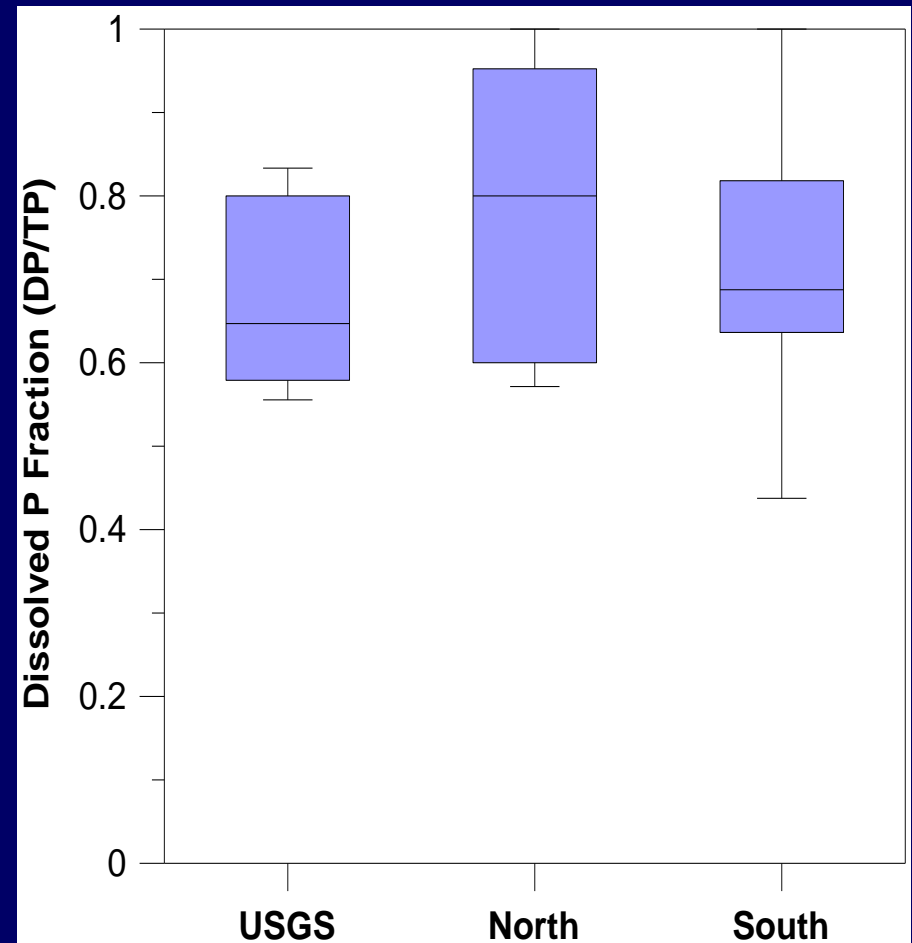


Dissolved Phosphorus Samples

Event



Low Flow



Fish Trends (1998-2004)

- Decline of sensitive fish species:
 - Redside Dace, Fantail Darter, Rosy Face Shiner
- Increase of tolerant fish species:
 - Blacknose Dace, Green Sunfish



<http://fish.dnr.cornell.edu>

Load Calculations

- USGS calculated loads downstream based on sediment concentrations
- Loads also calculated both at USGS site and North Branch site using relationship between TSS-Turbidity
- South Branch sampling difficulties prevent accurate load calculations

South Branch Difficulties...

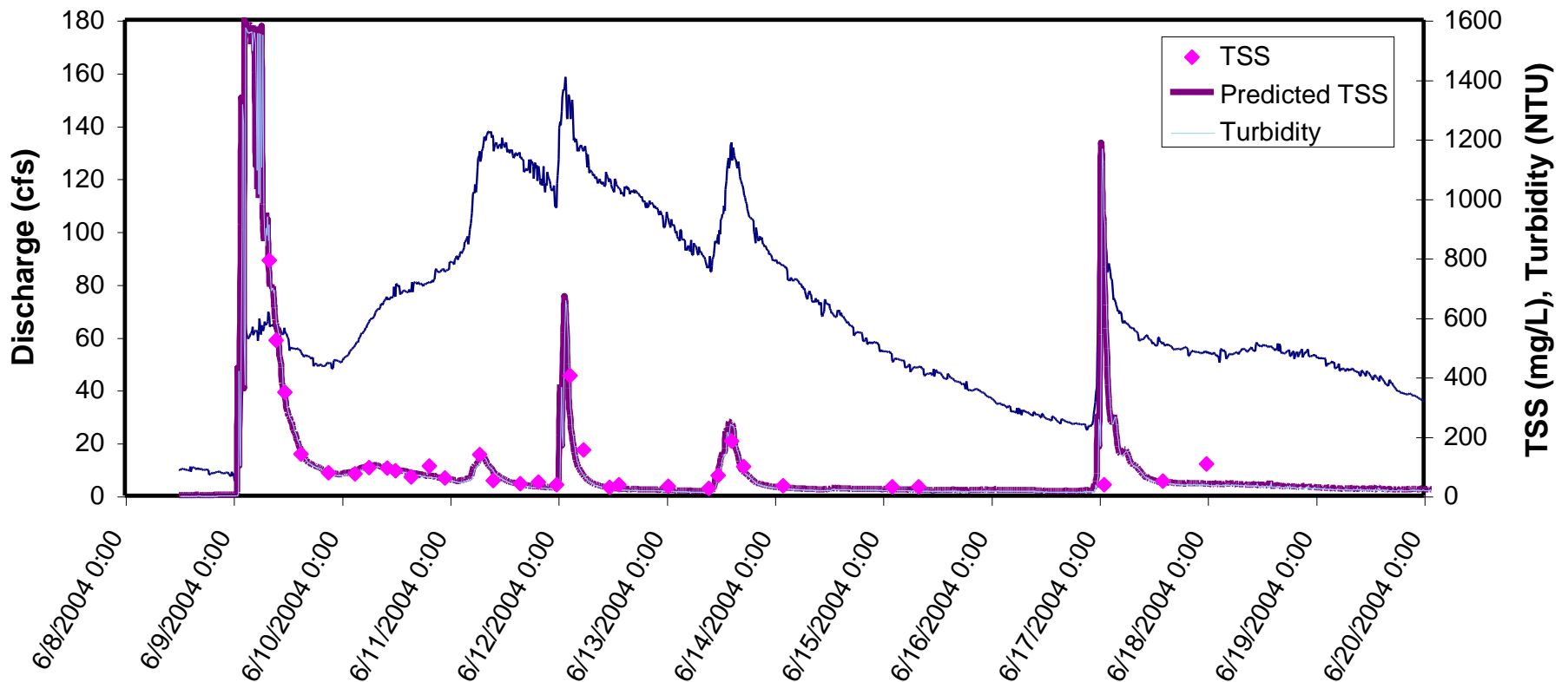


South Branch Difficulties...



North Branch Sediment Load

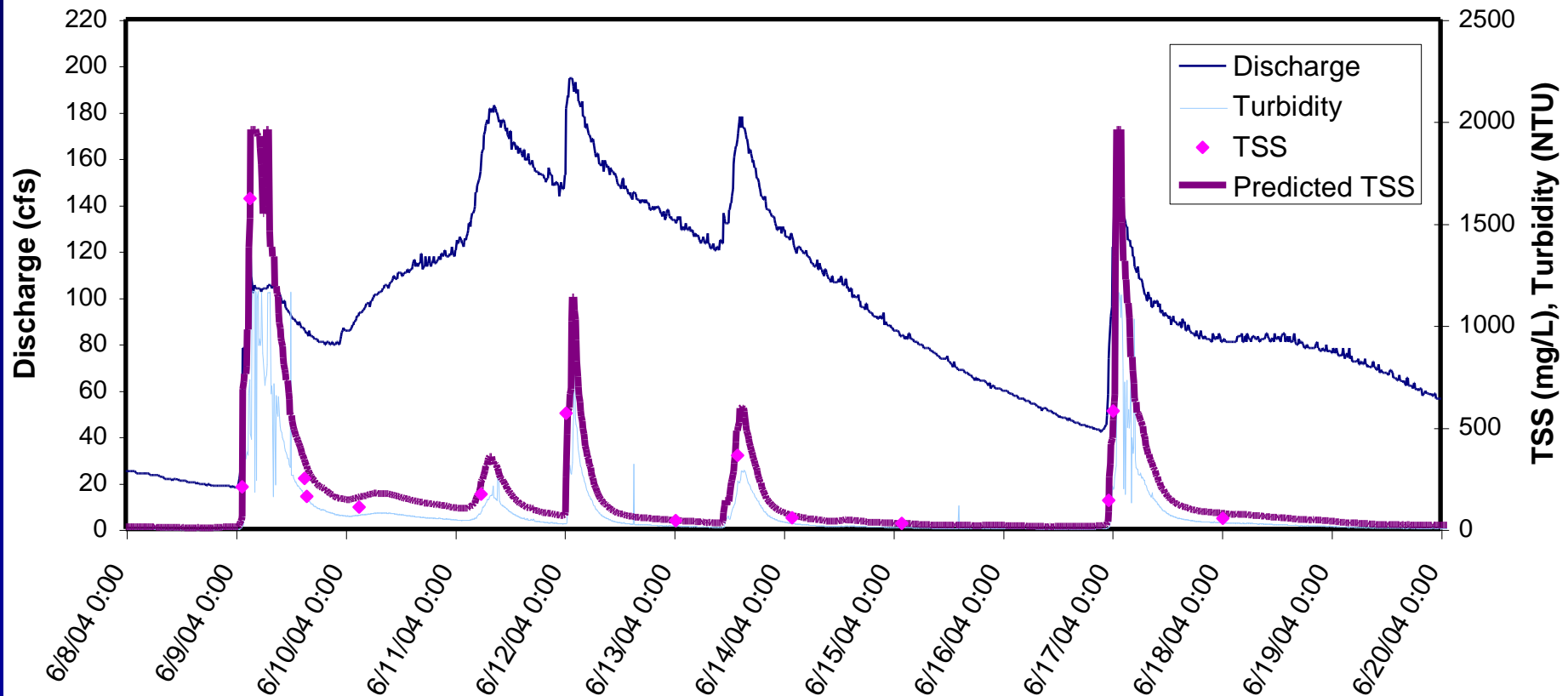
Baird Creek - North Branch
June 8 - June 20, 2004



Downstream USGS Site Sediment Load

Baird Creek - USGS Station

June 8 - June 20, 2004



Sediment Load Comparison

June 8 – June 20, 2004

	Mean Daily Discharge ft ³ /s	Turbidity Predicted Suspended Solids Load, metric tons	USGS Predicted Suspended Solids Load, metric tons	Percent Difference
USGS Station	97.2	583.0	531.0	+10%
North Branch	67.2	192.4	NA	NA

- **North Branch:**
 - 65-70% of total discharge
 - 30-40% of total sediment load

Conclusions



Conclusions

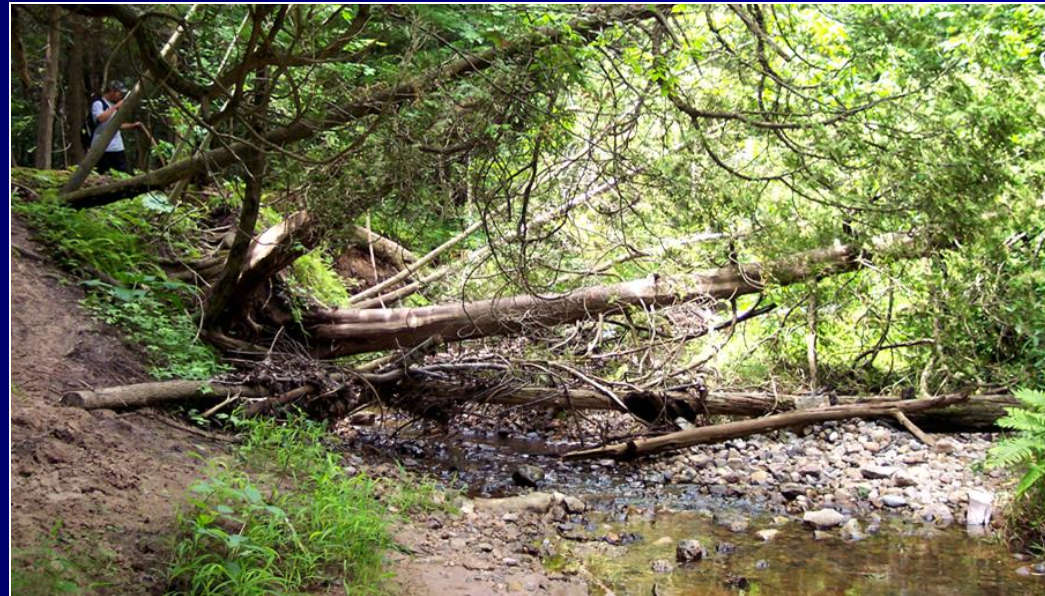
- South Branch TSS concentrations are significantly higher than North Branch
- South Branch Total P concentrations are significantly higher than North Branch or USGS Station
- Declining sensitive fish species may be result of increased sediment load due to changing landscape

Conclusions

- North Branch only contributes 30-40% of the sediment load during summer storm events
- Thus, only 18.5% of the watershed upstream of the USGS station is contributing 60-70% of the sediment
- Bank erosion?

Opportunities for Future Research

- Particle size analysis for sediment
- Detailed channel geomorphology assessment



Acknowledgements

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