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Cumulative Impacts of BMP Implementation – Maumee River Basin

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Project Director

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Purdue University

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Partners

- Collaborative project involving
  - Purdue University
  - St. Joseph River Watershed Initiative
  - St. Marys River Watershed Project
  - Upper Maumee Watershed Project
  - Maumee River Basin Commission
  - Indiana State Department of Agriculture
  - USDA - NRCS
  - The Nature Conservancy

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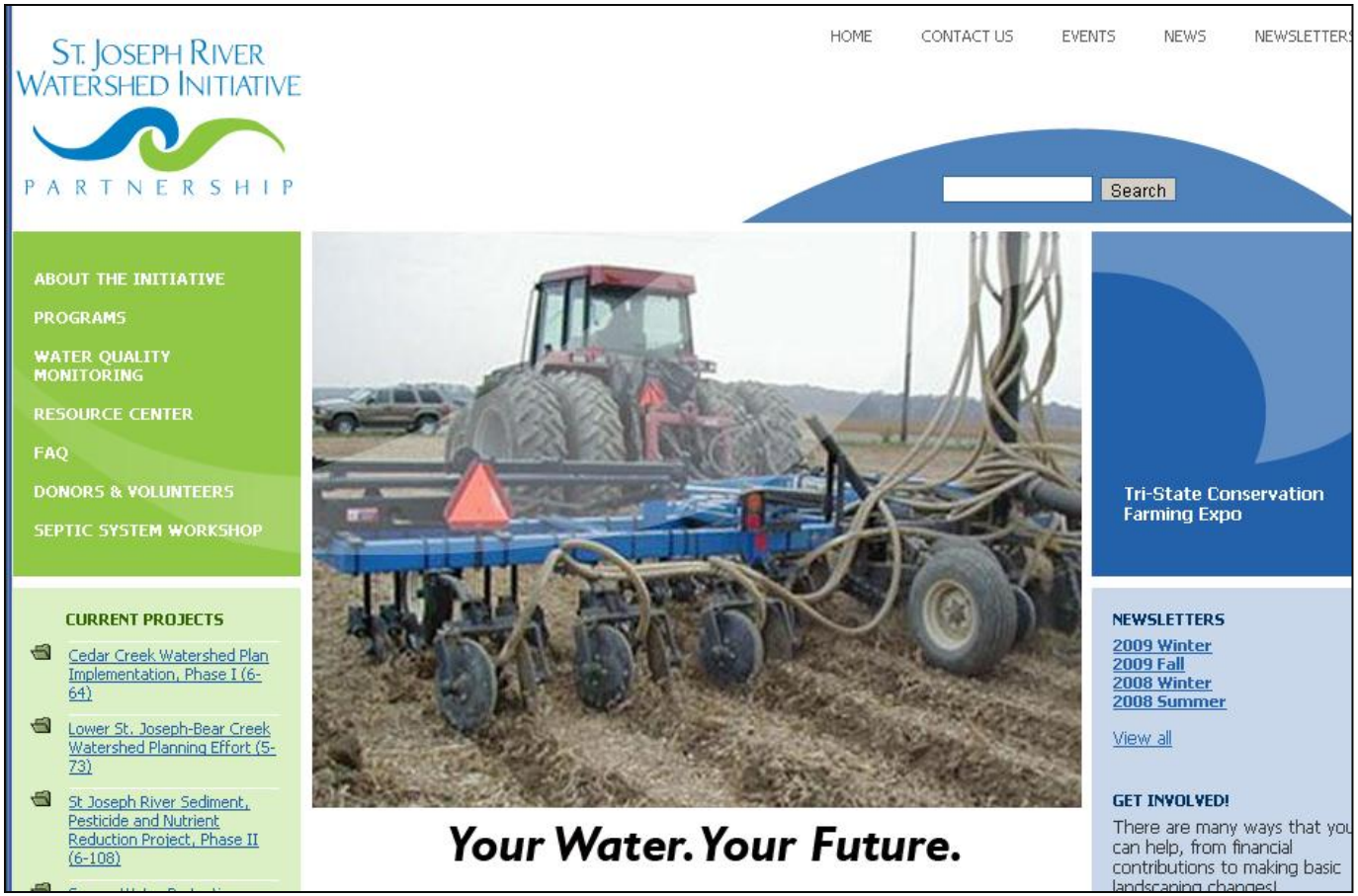
Overall Project Goal

Watershed modeling to inform watershed management



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Overall Project Goal

Watershed modeling to inform watershed management

1. Estimate potential water quality improvements due to the installation of BMPs.
2. Work with watershed groups to include BMP modeling results into their watershed management plans

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Watershed Plans

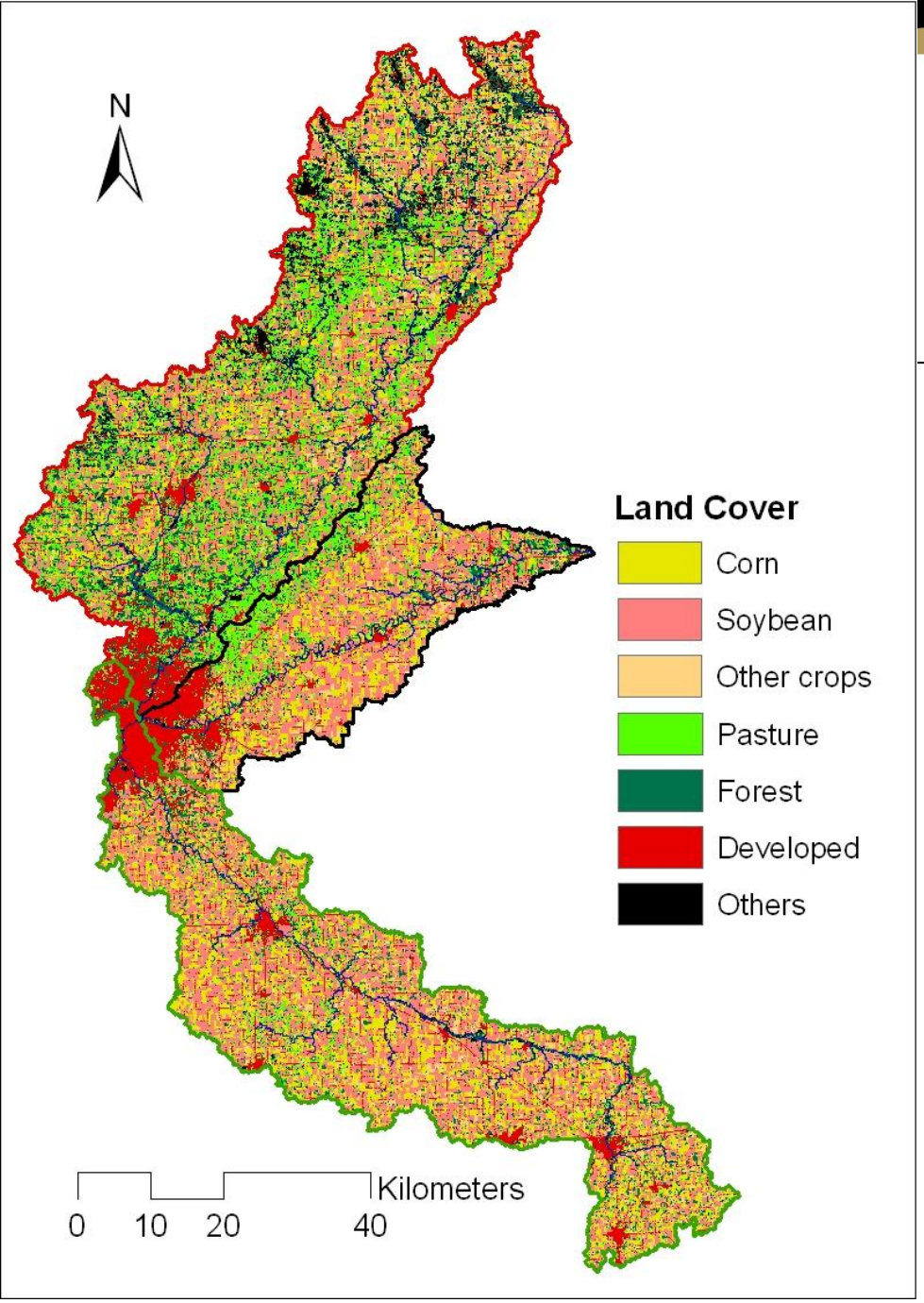
- Define current issues, critical areas, and plans for restoration

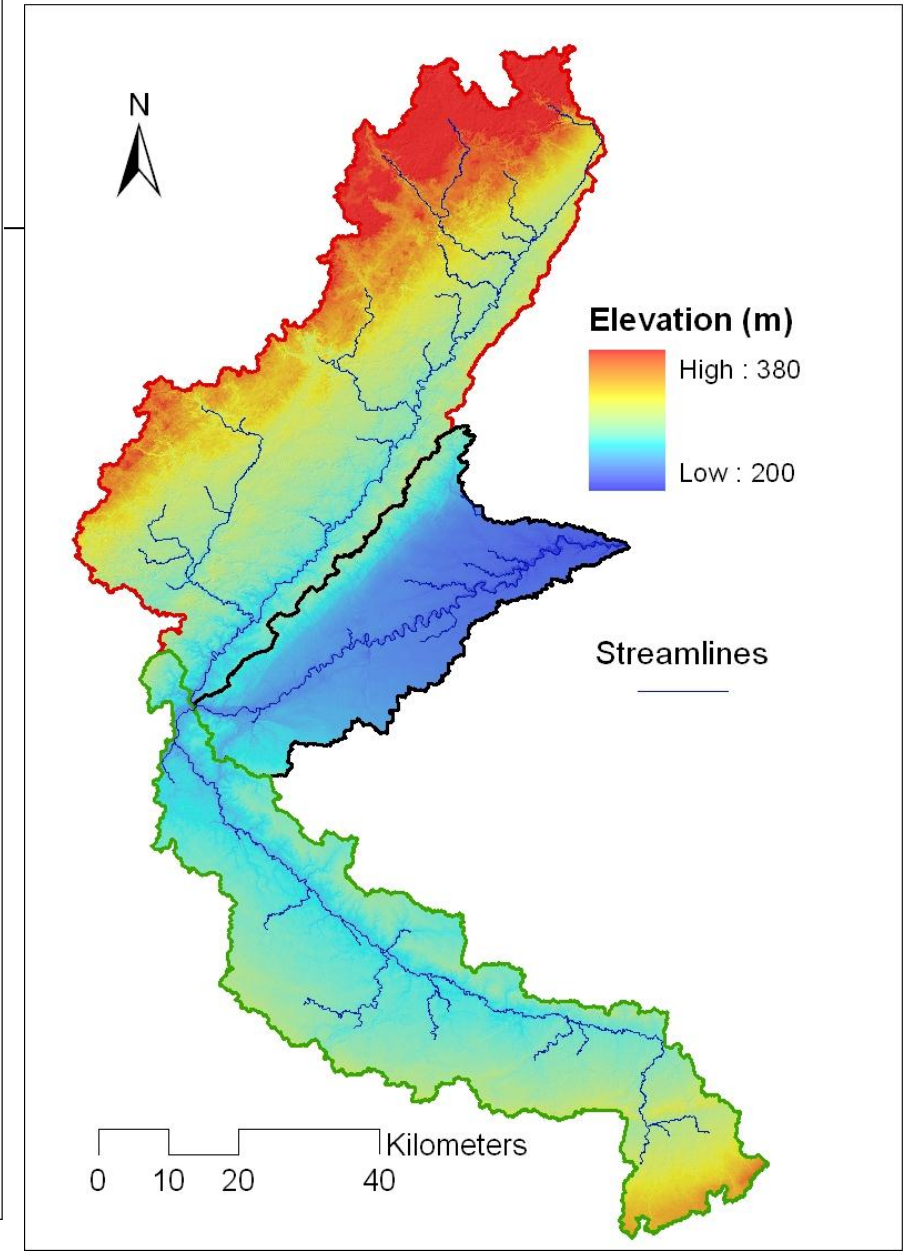
Lower St. Joseph – Bear Creek
Watershed Management Plan

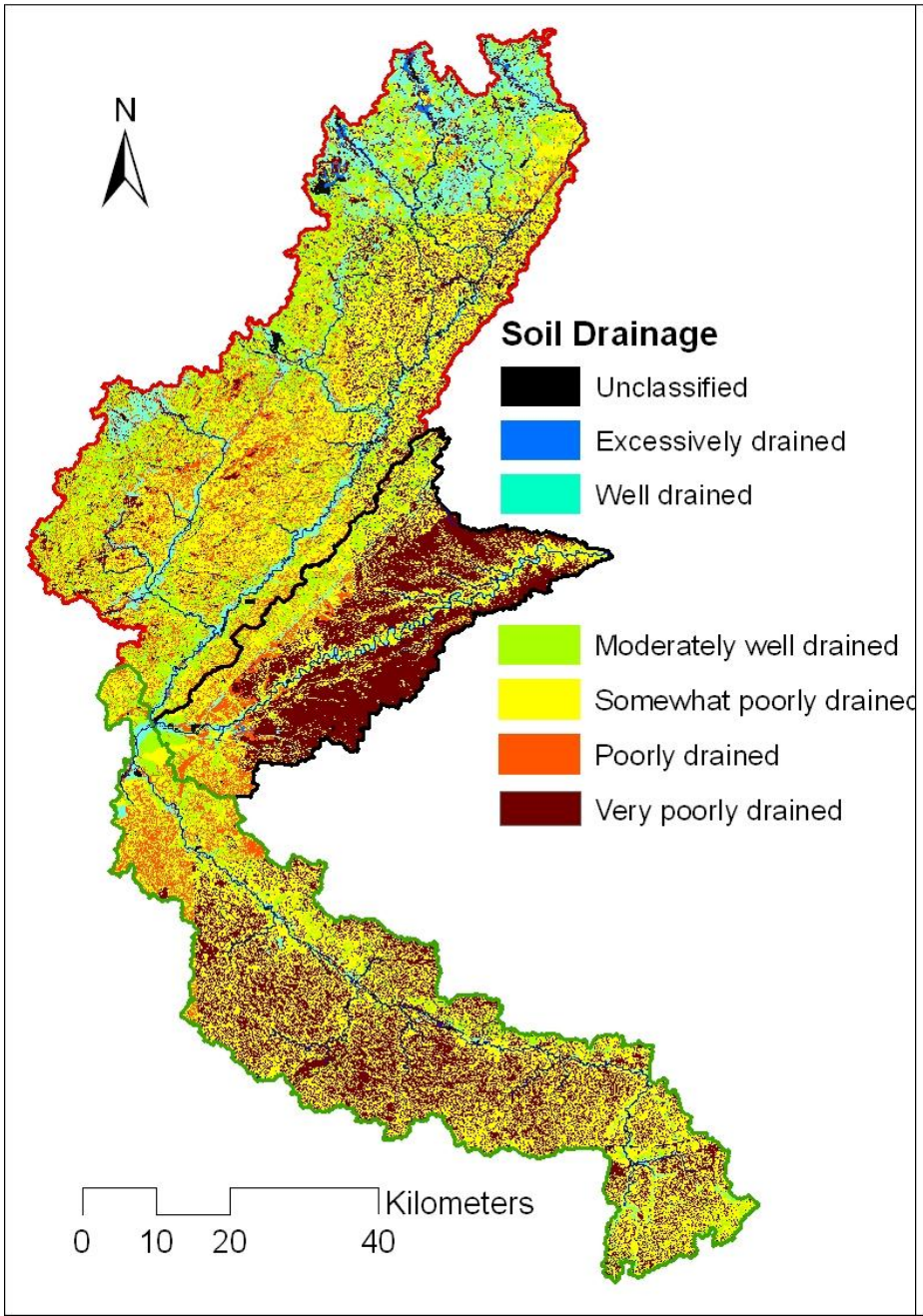
Prepared by:
The St. Joseph River Watershed Initiative
3718 New Vision Drive
Fort Wayne, Indiana 46845

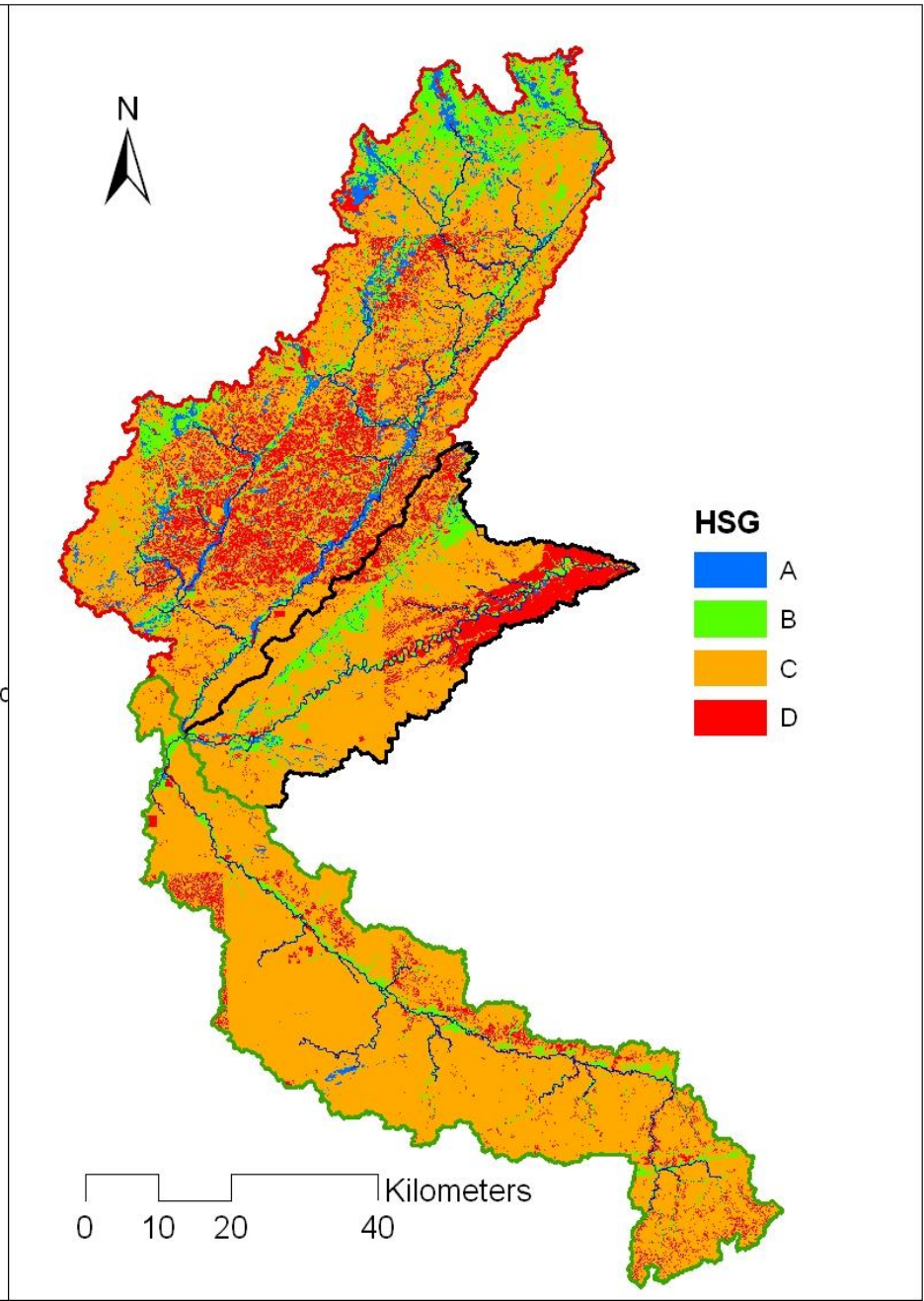
With funding from:
The City of Fort Wayne, Water Utilities Department
Under CWA Section 205(j) Grant, ARN A305 5-73
from the Indiana Department of Environmental Management

Input Data


N
Land Cover
Corn
Soybean
Other crops
Pasture
Forest
Developed
Others
Kilometers
0 10 20 40


N
Elevation (m)
High : 380
Low : 200
Streamlines
Kilometers
0 10 20 40


N
Soil Drainage
Unclassified
Excessively drained
Well drained
Moderately well drained
Somewhat poorly drained
Poorly drained
Very poorly drained
Kilometers
0 10 20 40


N
HSG
A
B
C
D
Kilometers
0 10 20 40

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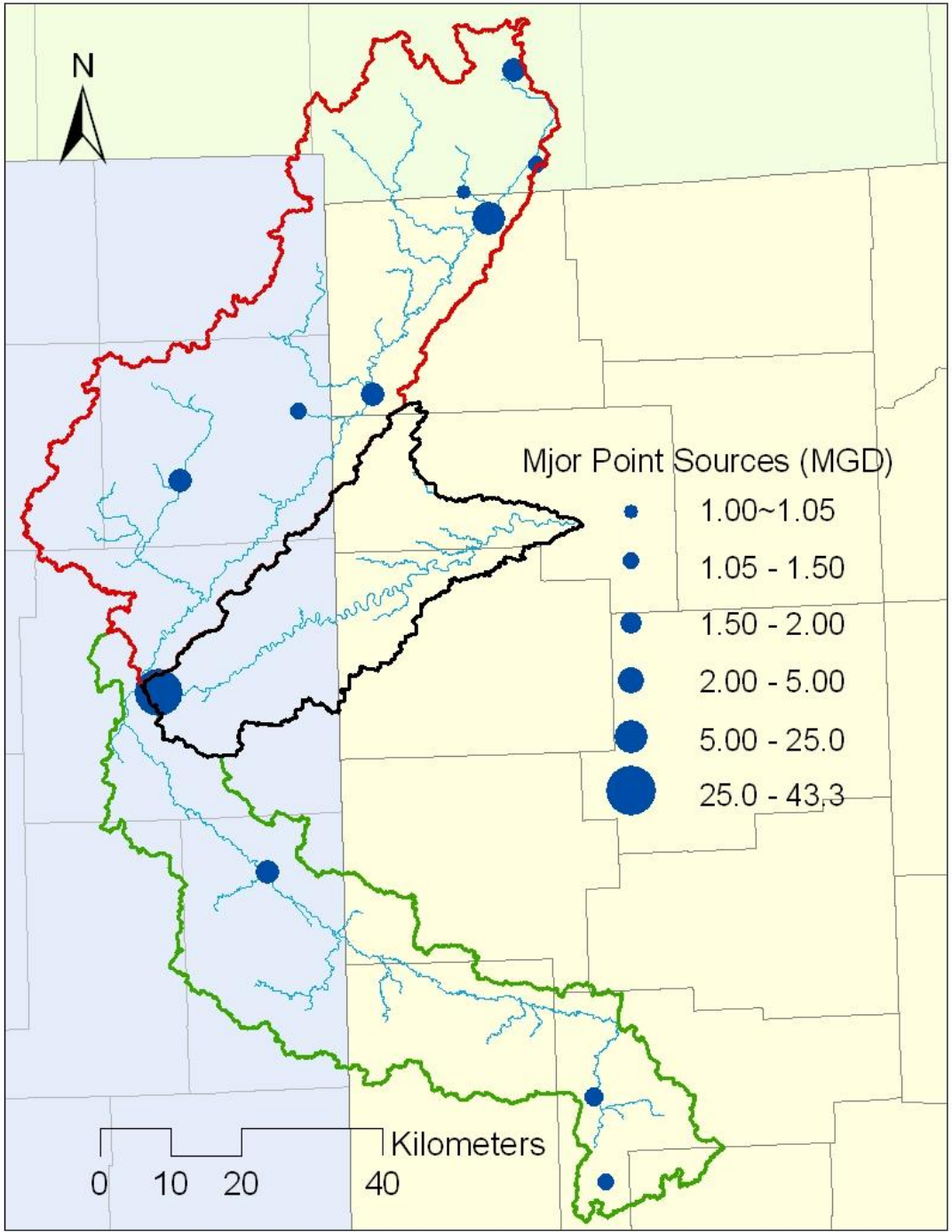
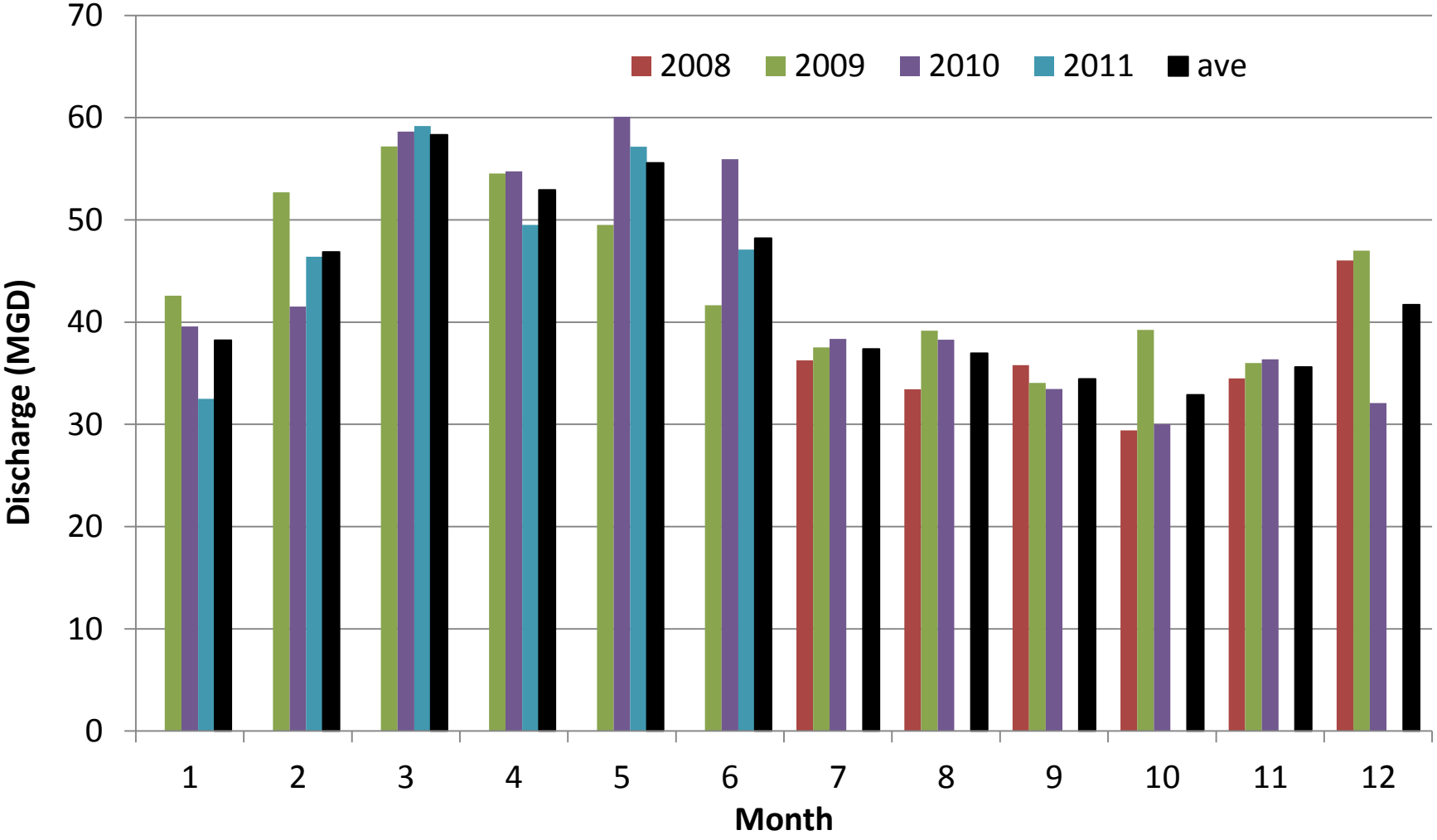
- **Input data:** Point Sources (Municipal Wastewater Treatment Plants)



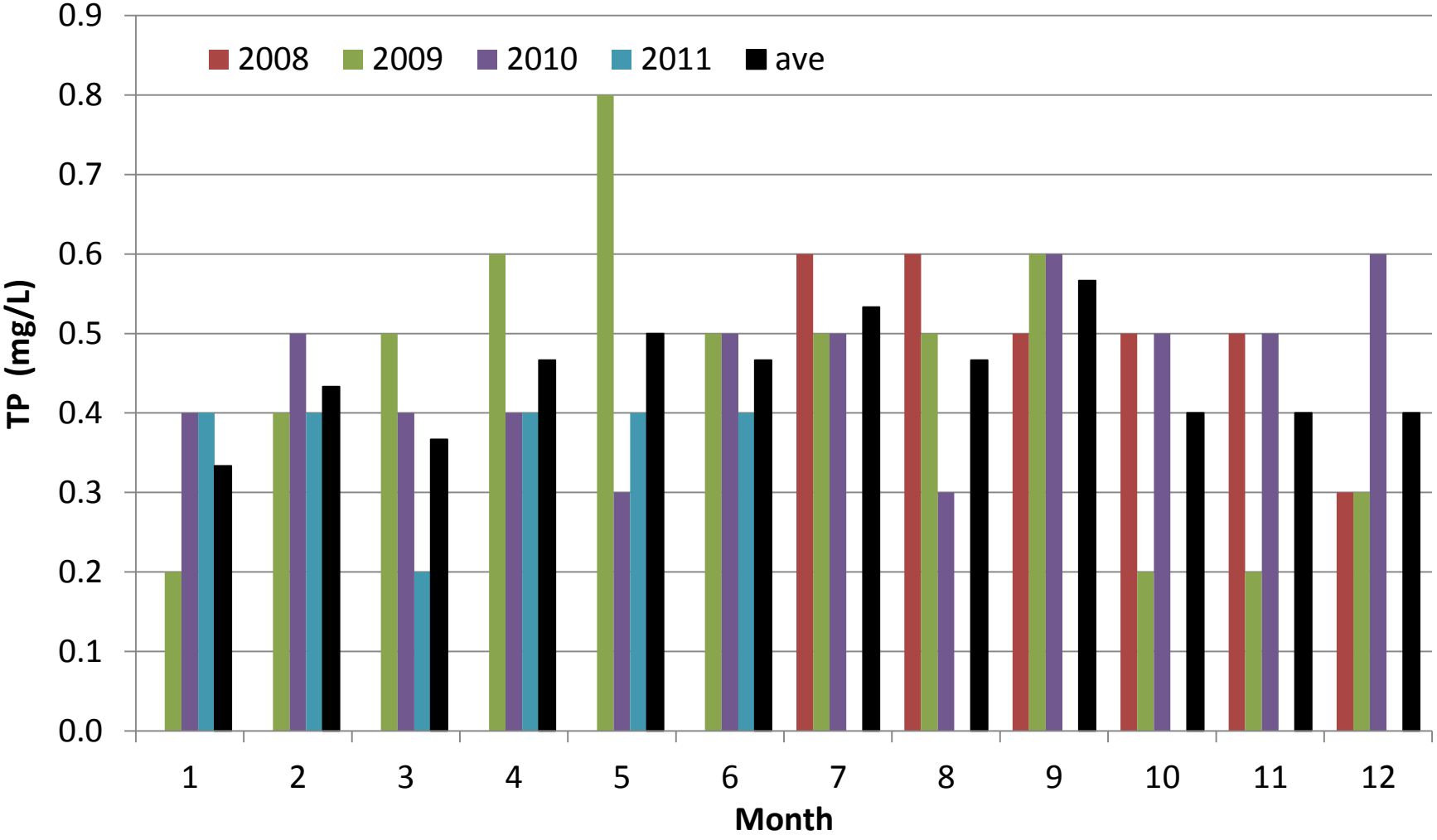
Water Quality Data

- EPA-ECHO point source – Discharge by month



Water Quality Data

- EPA-ECHO point source –Phosphorus by month



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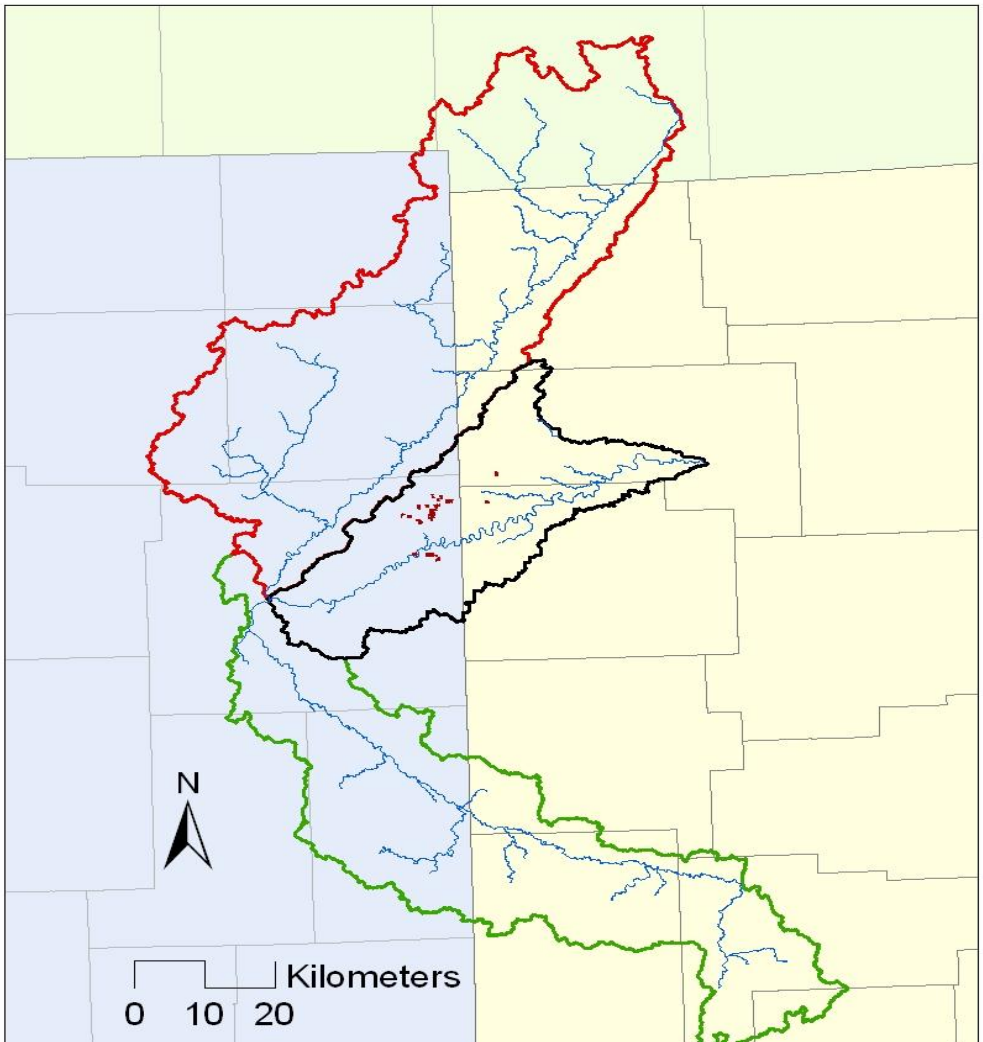
Input data: Cultural data from farmer interviews



Home Insert Page Layout Formulas Data Review View Developer

C3 | Example

Crop Information

Farm Name	Example	Field ID	102511103			Crop	Beans
Field	3009	Watershed	Upper Maumee			Previous crop	Corn
Year	2011	Grower	102			Acres	107.1
		Field #	103			Crop Rotation	C/B

Planting Information

Planting Date	Planter Make	Planter Model	# Rows	Spacing (")	Acres	Row Clnrs (Y/N)	Other
7-May-11	John Deere	1770	32	15	107.1	Y	

Commerial Fertilizer Applied

Date applied	Analysis	Appl Type	Rate/Ac -	Unit	Total Qty -	Unit	Equipment	Appl. Depth (
17-Dec-09	0-0-60	Broadcast-VRT	188.0	lb.	10.0674	ton	Teragator 1903	Broadcast
17-Dec-09	11-52-0	Broadcast-VRT	42.0	lb.	2.2491	ton	Teragator 1903	Broadcast
17-Dec-09	21-0-0	Broadcast-VRT	39.0	lb.	2.08845	ton	Teragator 1903	Broadcast
				lb.		ton		
				lb.		ton		

Manure / Biosolids Applied

Date applied	Analysis	Appl Type	Rate/Ac -	Unit	Total Qty -	Unit	Equipment	Appl. Depth (

Herbicides:

Date applied	Type	Rate/Ac -	Unit	Total Qty -	Unit	Equipment	
6-Nov-10	Fall Burndown Glyphosate, Cloak, 2-4-D					4730	JD Sprayer
25-Jun-11	Roundup Powermax					4730	
13-Jul-11	Ascend		oz		oz	4730	

Insecticides / Fungicides

Date applied	Type	Rate/Ac -	Unit	Total Qty -	Unit	Unit Price	Total cost
None							

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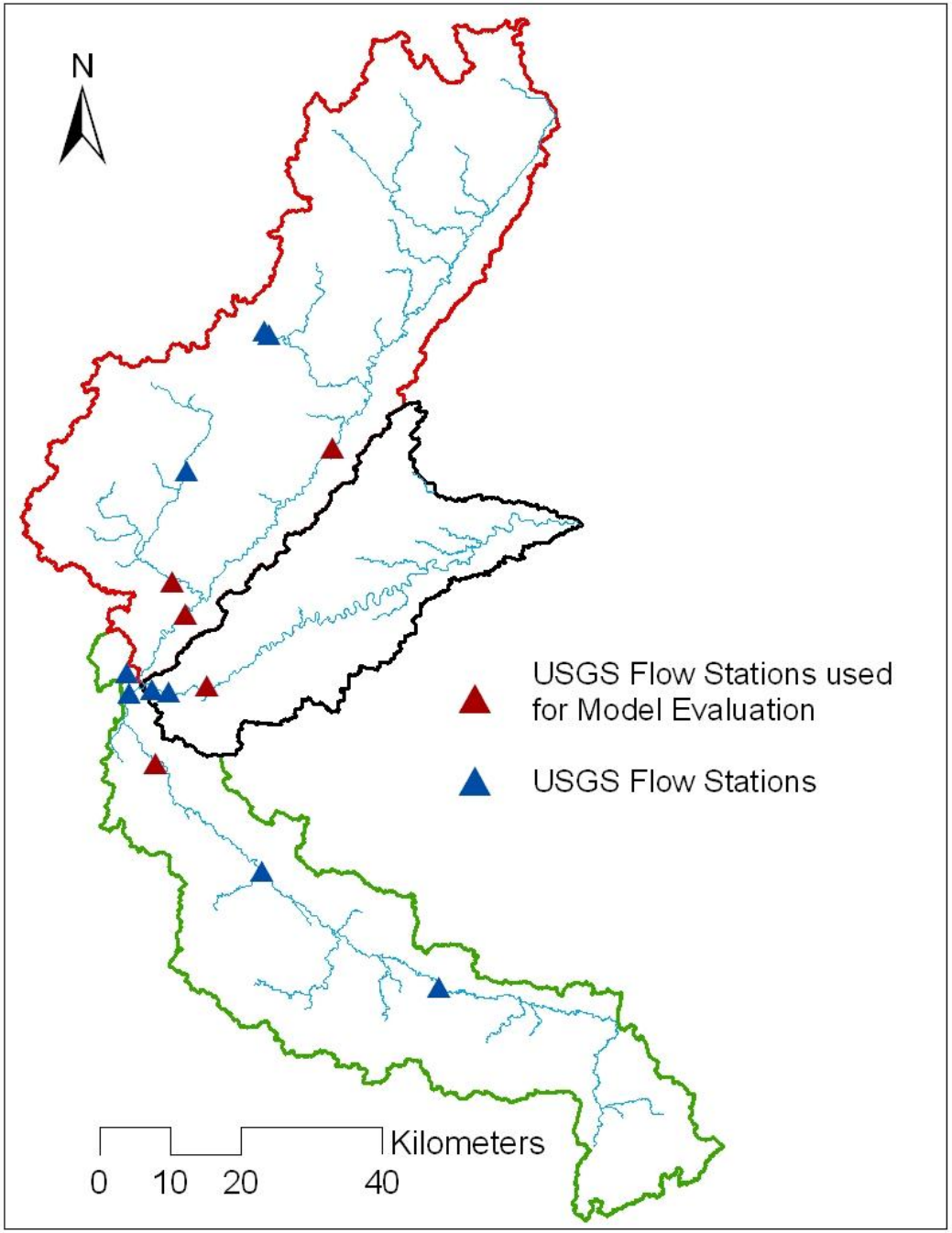
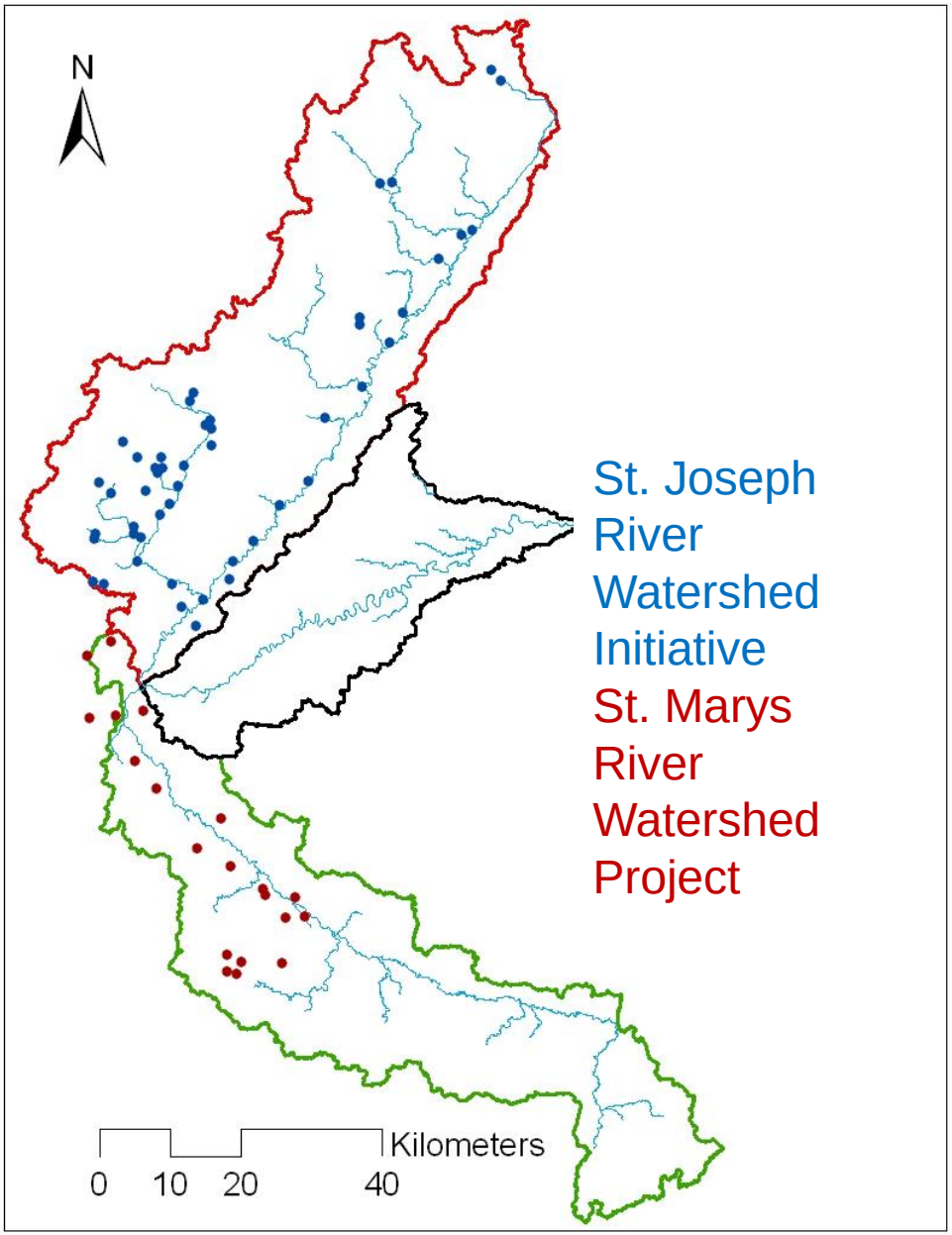
Data for Model Calibration and Evaluation: 1. Flow

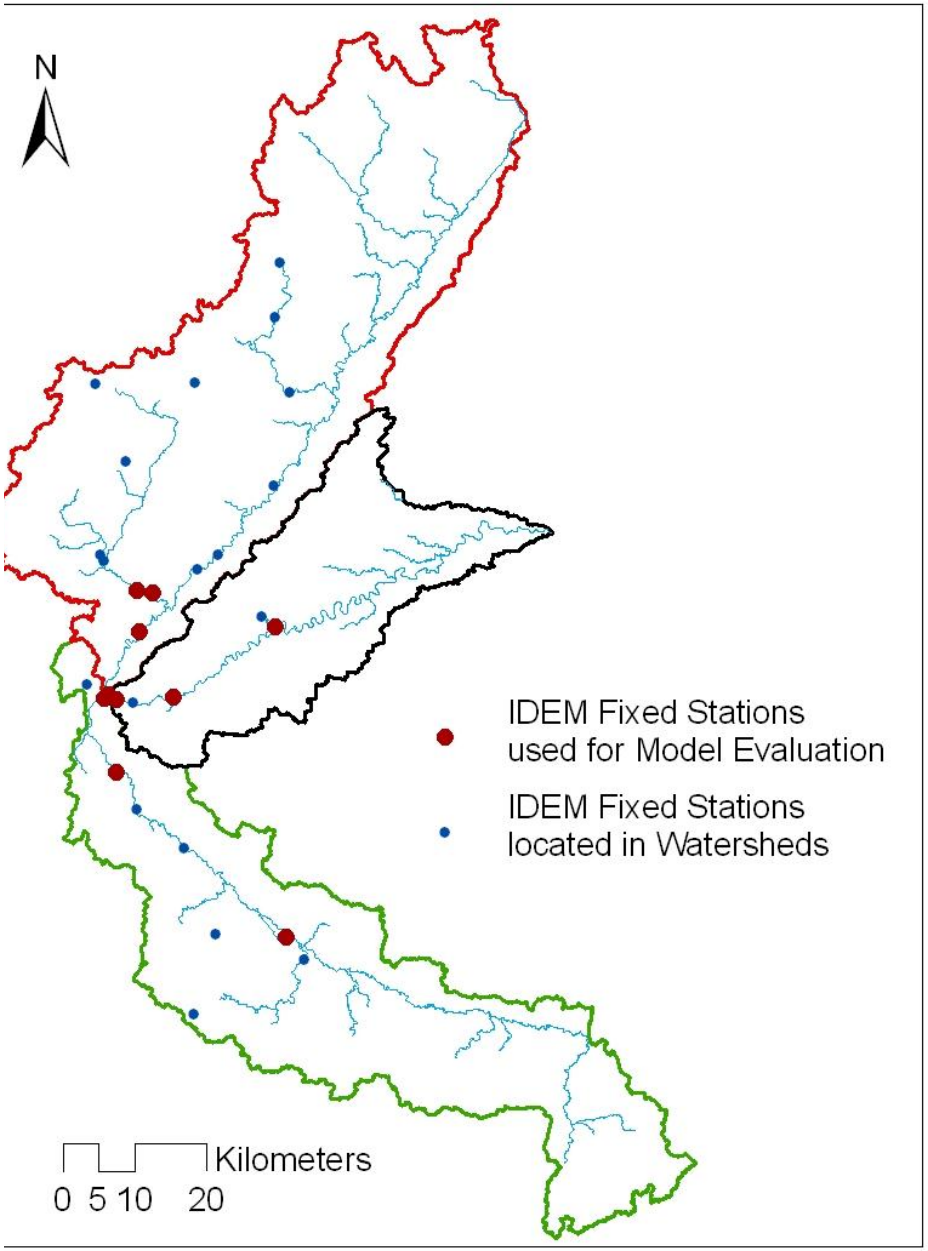


Data for evaluation: Water Quality from Indiana Department of Environmental Management data

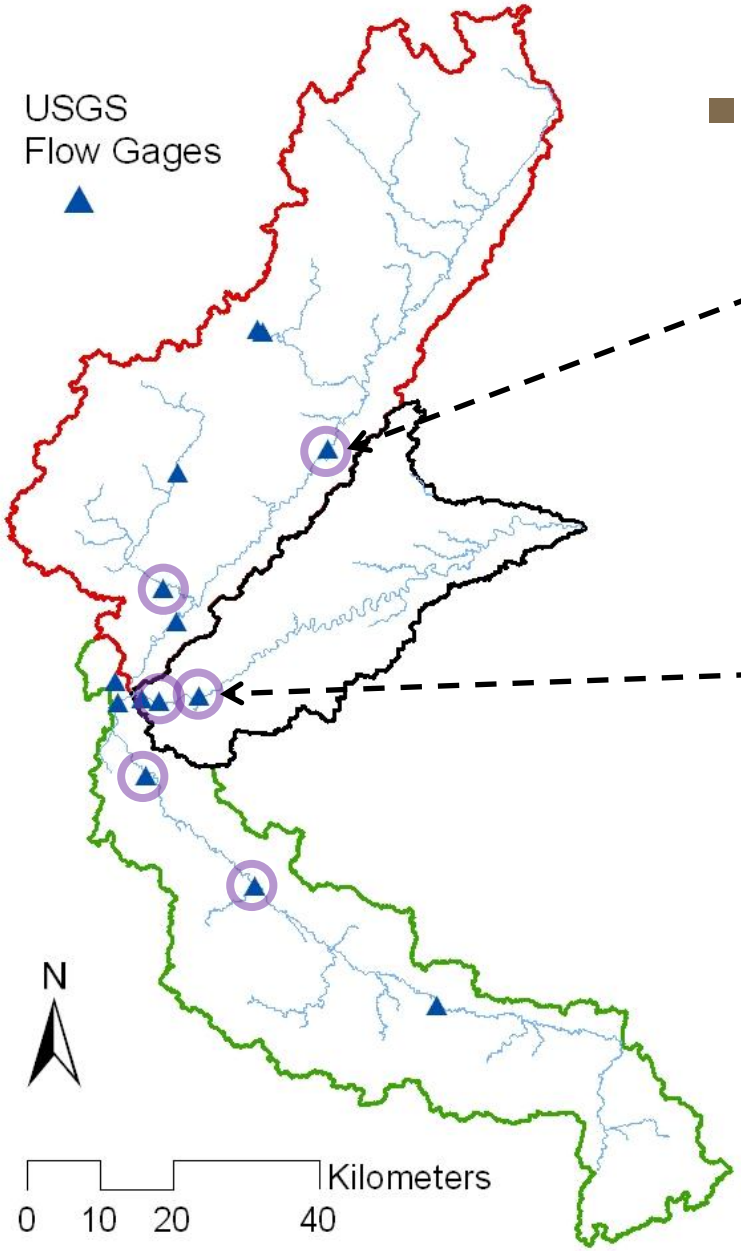
Watershed	Station Name	Begin	End	No. Samples		
				TSS	TP	NO3+ NO2
St. Joseph	LEJ100-0002	2001	2010	102	99	100
	LEJ100-0003	1991	2010	210	211	190
	LEJ090-0008	1999	2001	24	27	27
	LEJ090-0026	2001	2010	87	101	105
St. Mary	LES060-0004	1990	2010	217	217	195
	LES060-0005	1991	2010	217	214	199
	LES040-0007	1991	2010	217	218	203
Upper Maumee	LEM010-0012	2001	2010	102	108	99
	LEM010-0013	1991	2010	219	221	222
	LEM010-0014	1991	2010	227	232	231

Data for evaluation: Water Quality



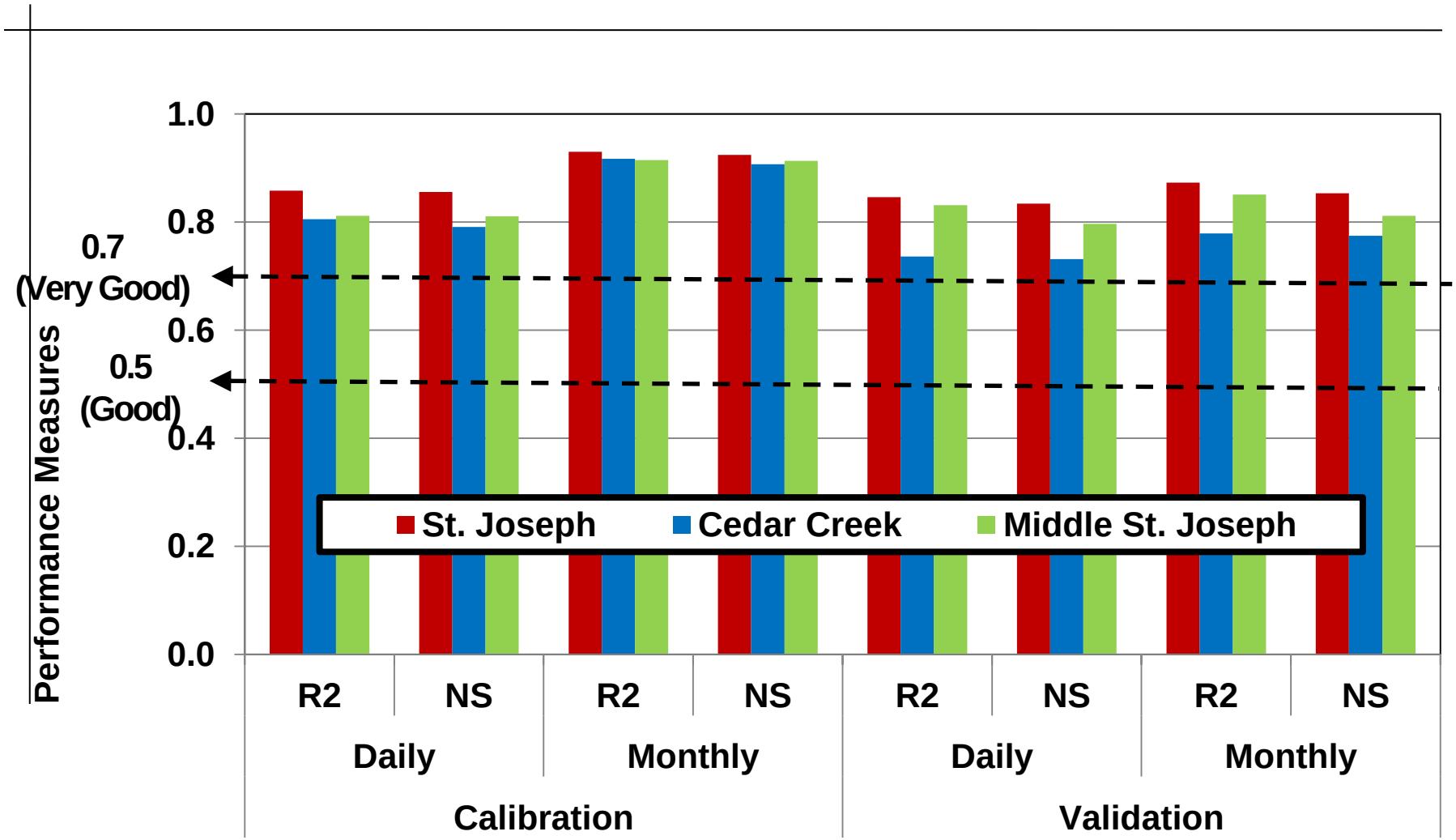


Data for evaluation: Water Quality

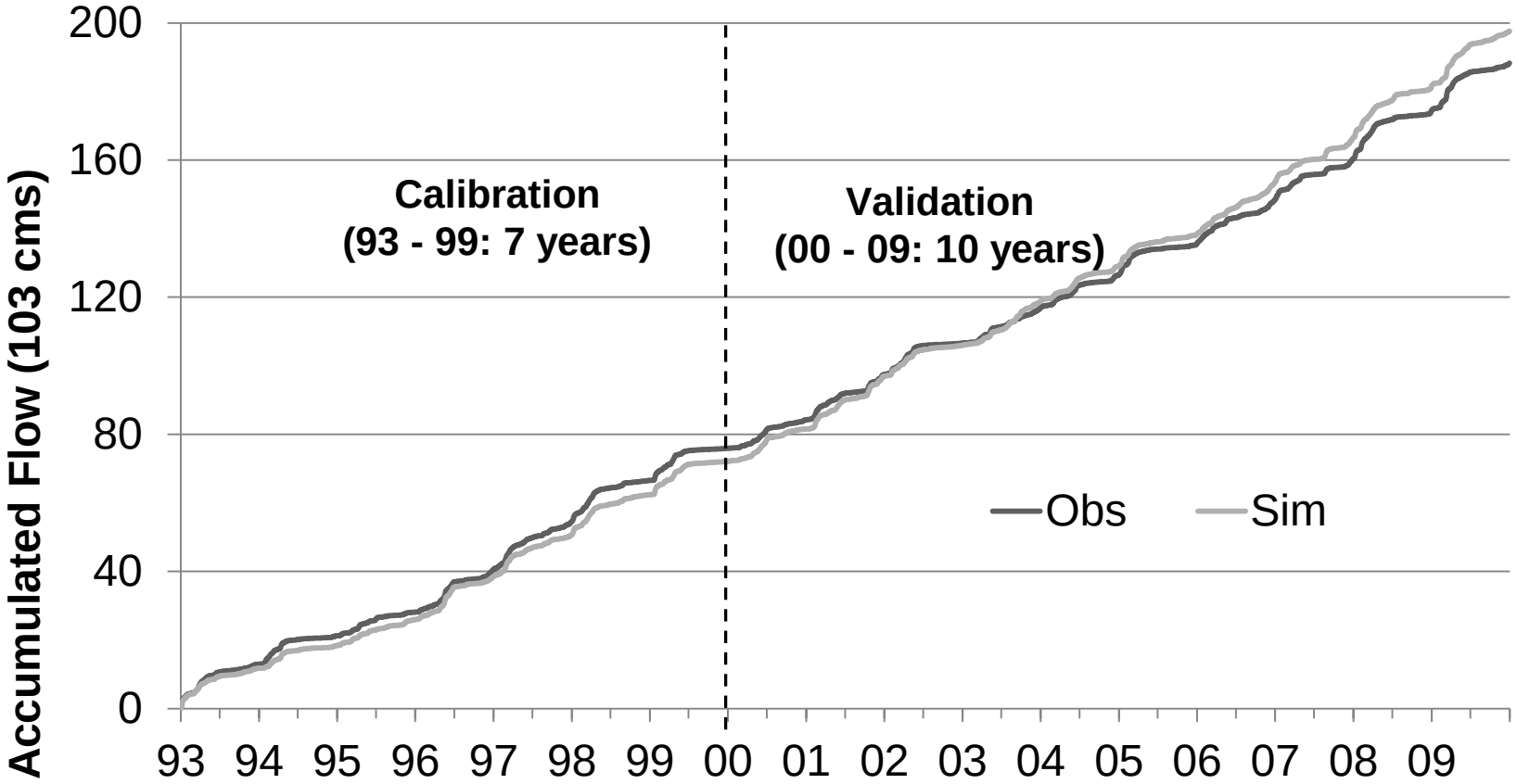


- USGS water quality
  - Newville USGS station
    - Defiance, OH: St. Joseph
    - SS (suspended sediment, 85), TP (88), & NO3 (89) between 1996 and 2004
  - Newhaven USGS station
    - Allen, IN: Upper Maumee
    - SS (suspended sediment, 32), TP (33), & NO3 (33) between 1996 and 1998

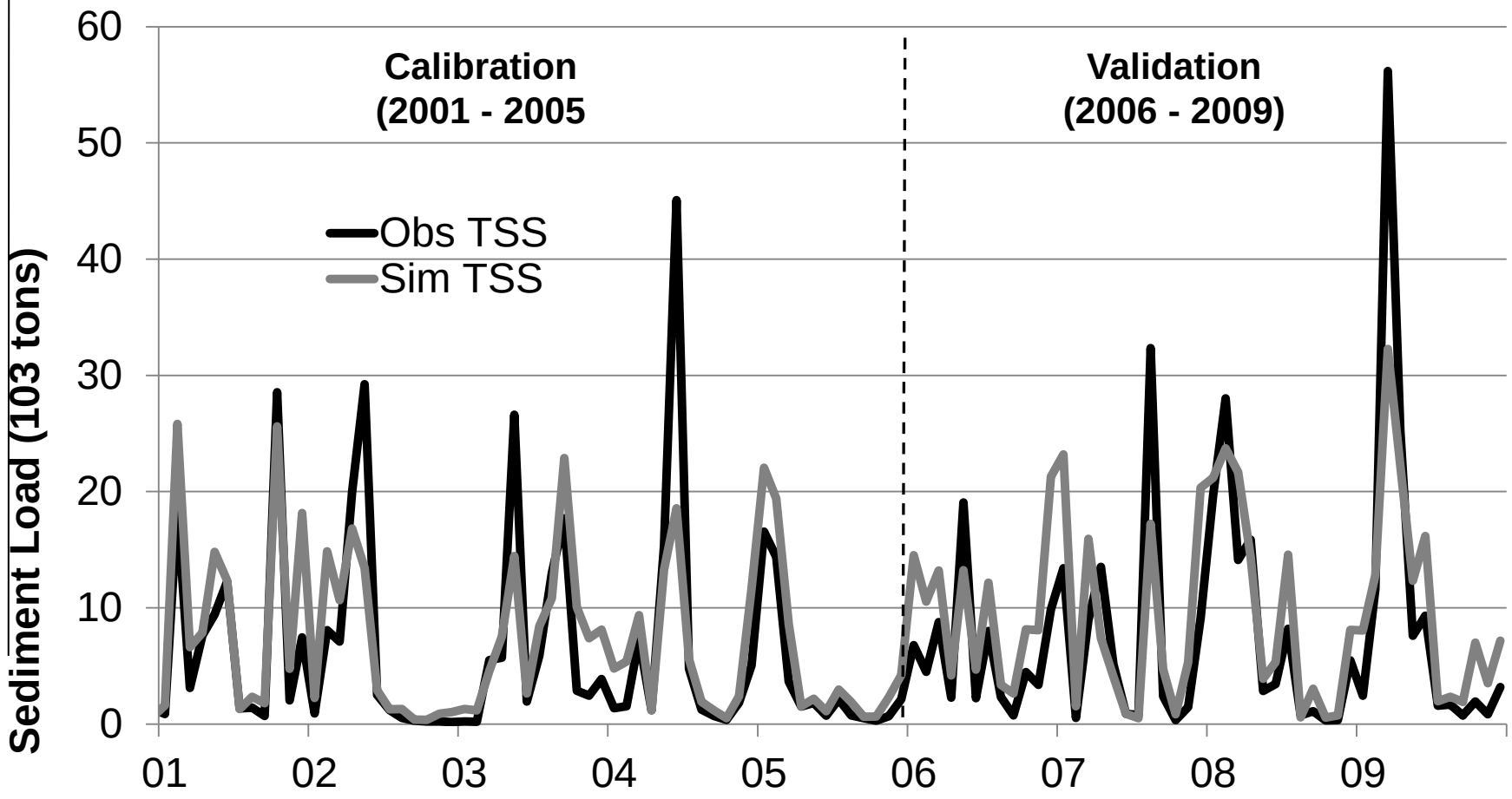
Calibrated Hydrology Simulation



Calibrated Hydrology Simulation



TSS Simulation – St. Joseph



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DOE Funded Project

- Overall goal is to conduct a watershed-scale sustainability assessment of multiple energy crops and removal of crop residues
- Assessment conducted in two watersheds representative of Upper Midwest
  - Wildcat Creek watershed
  - **St. Joseph River watershed**
- Four year project (2010-2014) funded by DOE

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- Project website
  - https://engineering.purdue.edu/watersheds/projects/wleb/