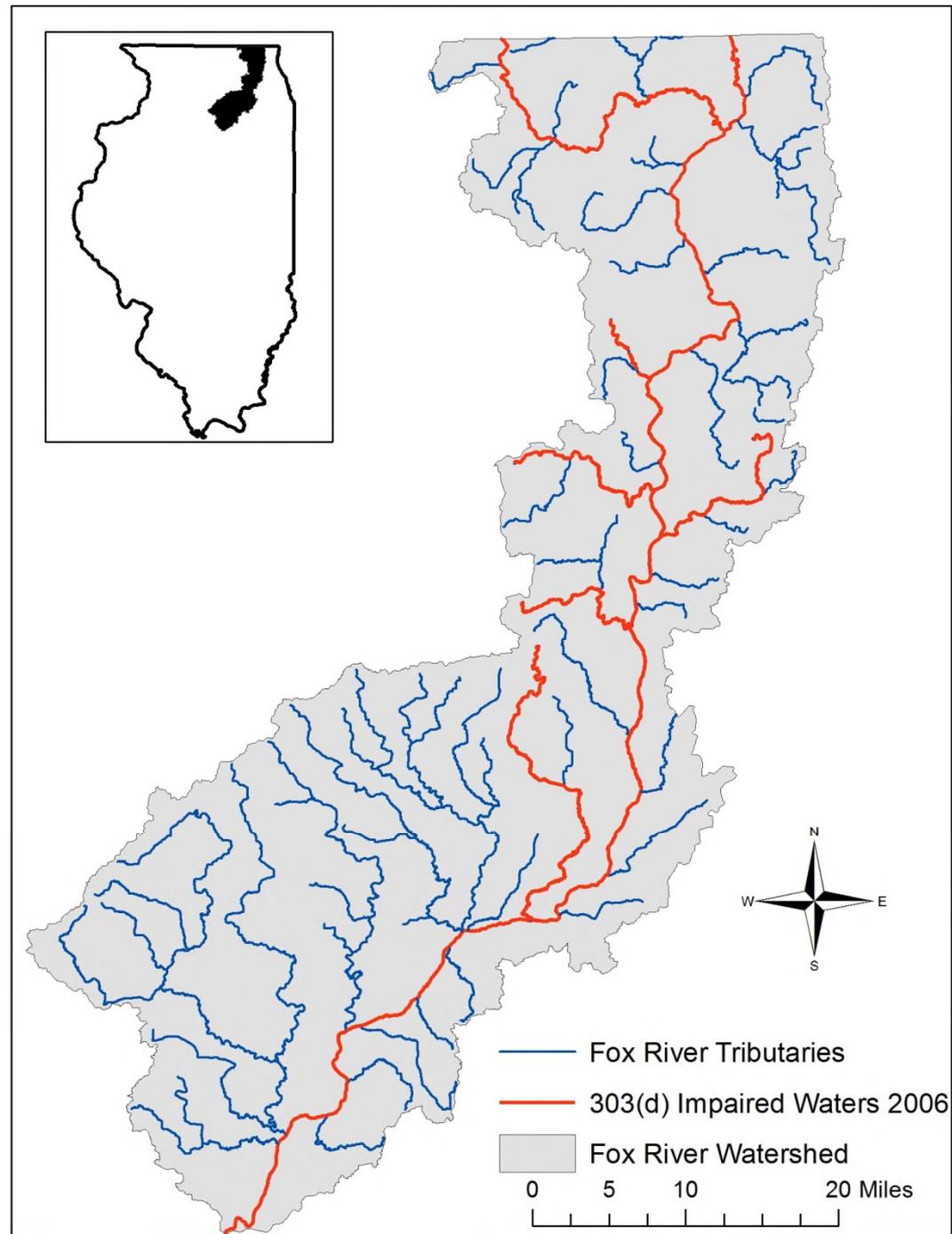


FOX RIVER ILLINOIS LOW FLOW DISSOLVED OXYGEN MONITORING: A COLLABORATIVE EFFORT

Acknowledgements

- Fox River Study Group (FRSG)
- Deuchler Environmental Inc. (DEI)
- USGS
- Fox Metro Water Reclamation District
- Fox River Water Reclamation District
- First Environmental Laboratories

- Fox River in Illinois and several significant tributaries listed as impaired by the Illinois EPA in 2006
- Drains 1720 square miles in Illinois
- Watershed is home to about 450,000 people



- Impairments include Dissolved Oxygen, Total Phosphorus, Suspended Solids and Aquatic Algae
- Sources for listing include hydromodification, urban runoff and combined sewer overflows



- Fox River Study Group (FRSG) is a stakeholder group representing the diverse interests utilizing the river
- ISWS began working with the FRSG in 2002 to prepare and execute a plan to investigate water quality issues throughout the watershed
- A modeling program was developed that would allow stakeholders to investigate efficient methodologies to address water quality issues
- A monitoring program was developed to support the modeling effort

Two Part Monitoring

- A two year water quality monitoring program was conducted between October 2009 and September 2011 in order to support HSPF watershed model.
- Low Flow Monitoring: 72-hour intensive monitoring effort in June 2012 to support the QUAL2K modeling component.

Low Flow Study Components

- Development and submittal of QAPP
- Training for field crews from DEI and ISWS to ensure data comparability
- Continuous Monitoring of DO and constituent sampling
 - Had to be carried out under certain flow regime, less than 360 cfs at Algonquin and 523 cfs at Montgomery
- Discharge measurements at selected locations
- Benthic Algae sampling
- Sediment Oxygen Demand measurements

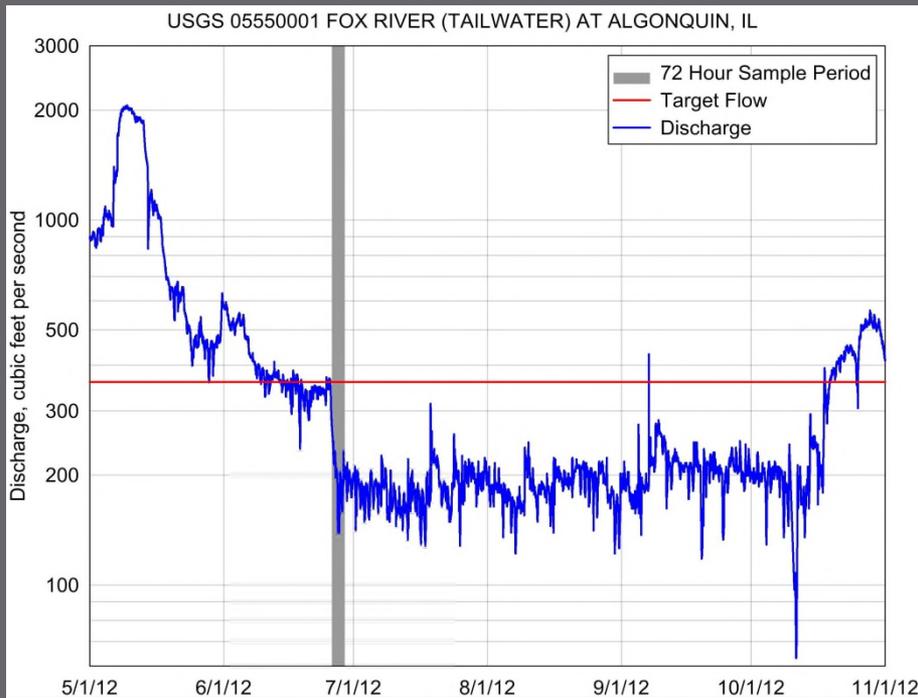
Training

- Held at DEI on 6/25/2012
- Necessary to ensure data comparability
- QAPP presented to all field staff from both groups
- All field forms and procedures reviewed

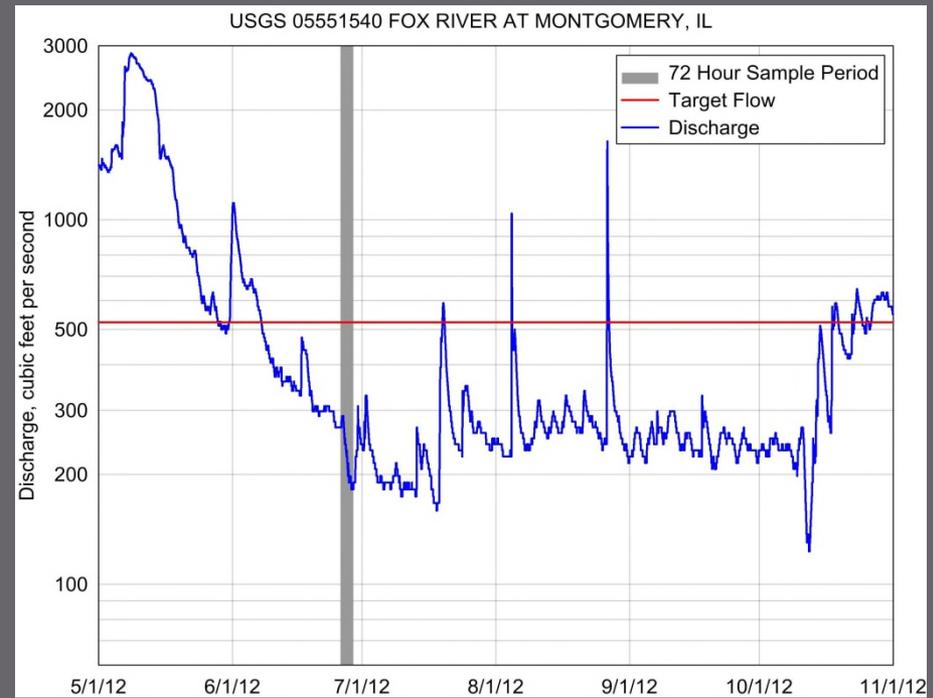


Target Flows reached in late June

Algonquin

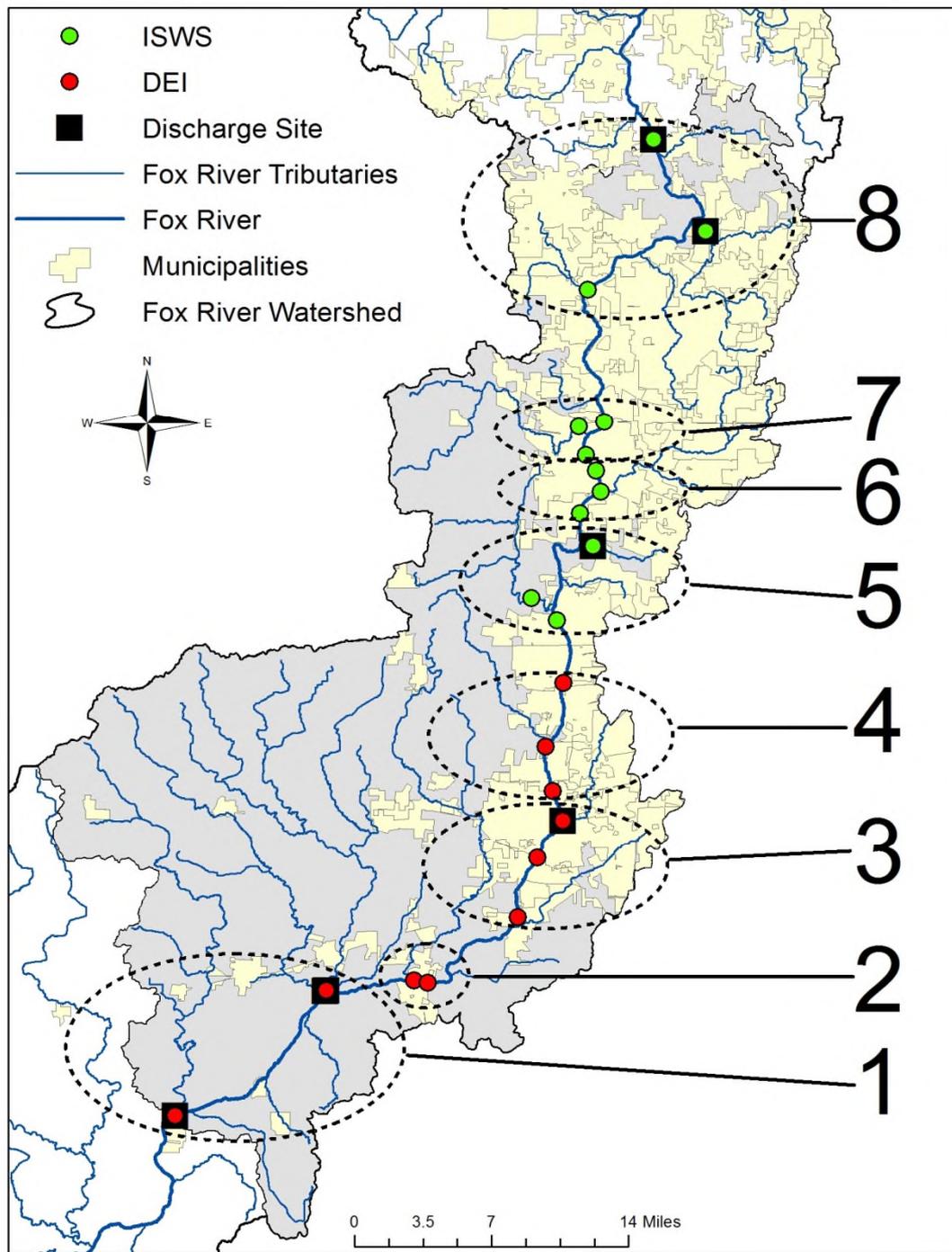


Montgomery

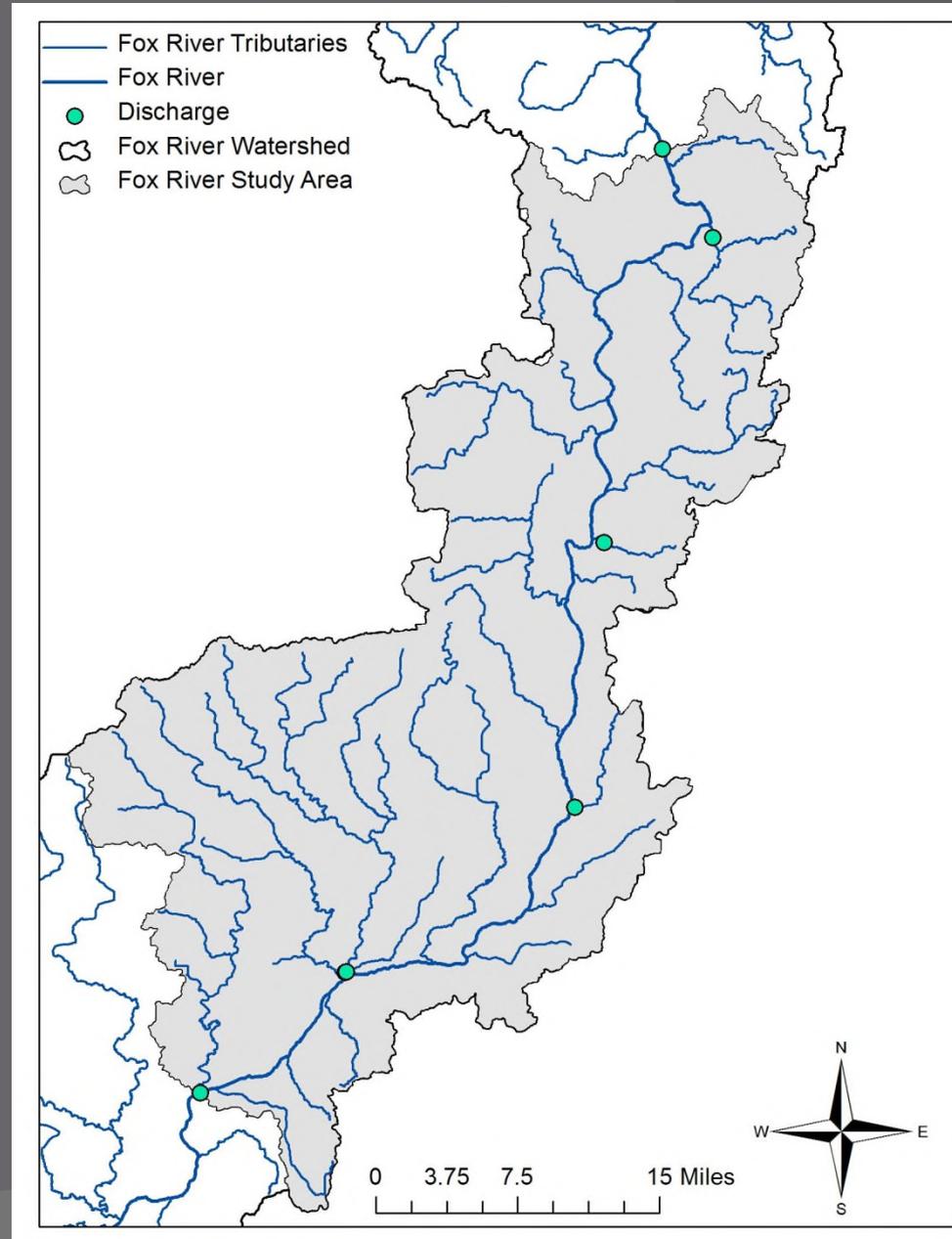


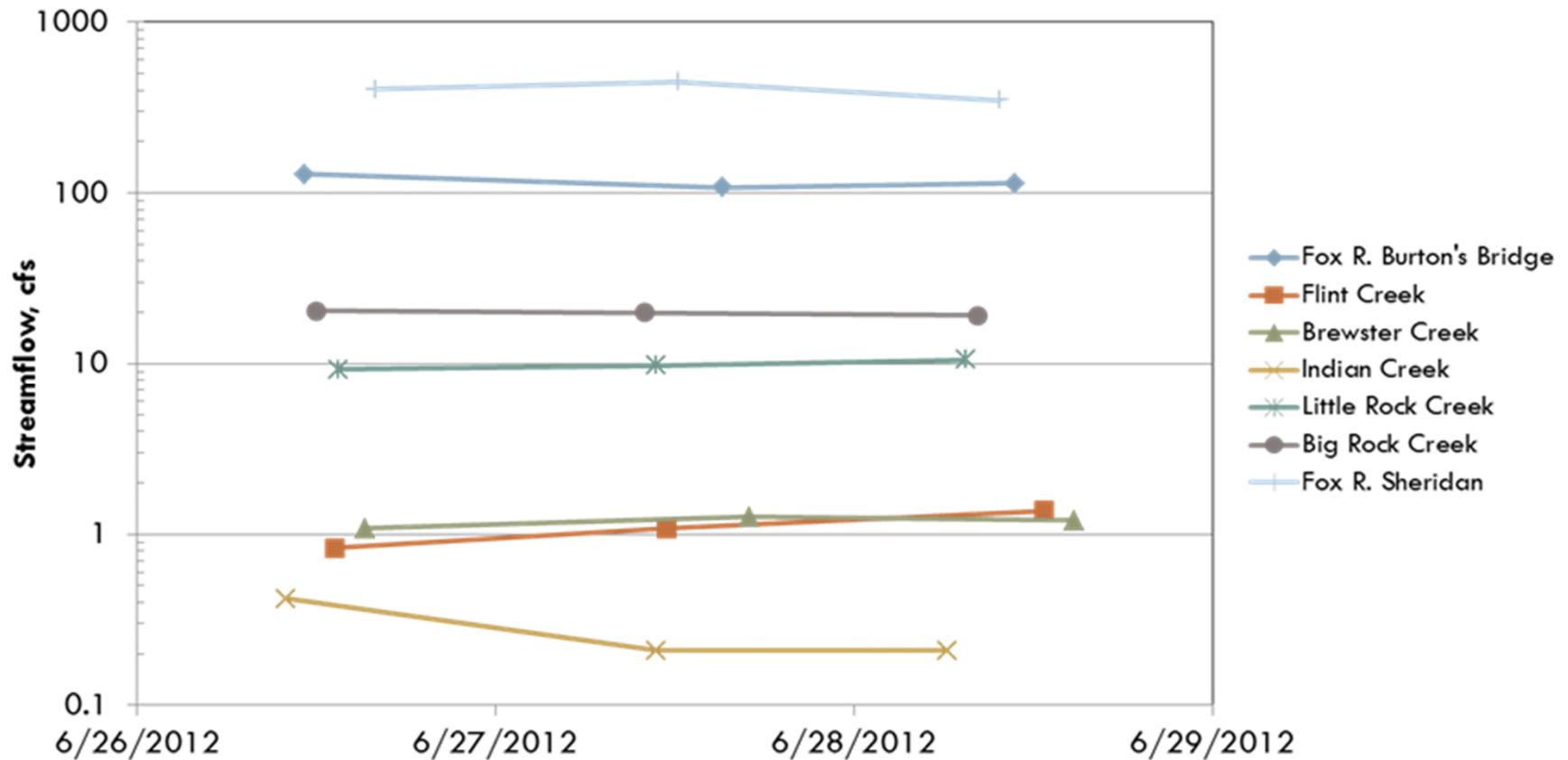
Sampling Schedule

Data Collected	# of Sites	Day 1-3									
			4-7 AM		11-2 PM		4-7 PM				
Water Quality Profile	13										
Continuous Monitoring	13										
Water Quality Sampling (ortho-P, TP, NO3, NO2, TKN, NH3, CBOD5, TSS, TOC, Alkalinity)	23										
Water Quality Sampling (VSS, Chl)	23										
Benthic Algae	5		once during the 72-hr sampling period								
Sediment Oxygen Demand	3										
Discharge Measurements	7		once / day								



Discharge measurements were performed by the USGS DeKalb office

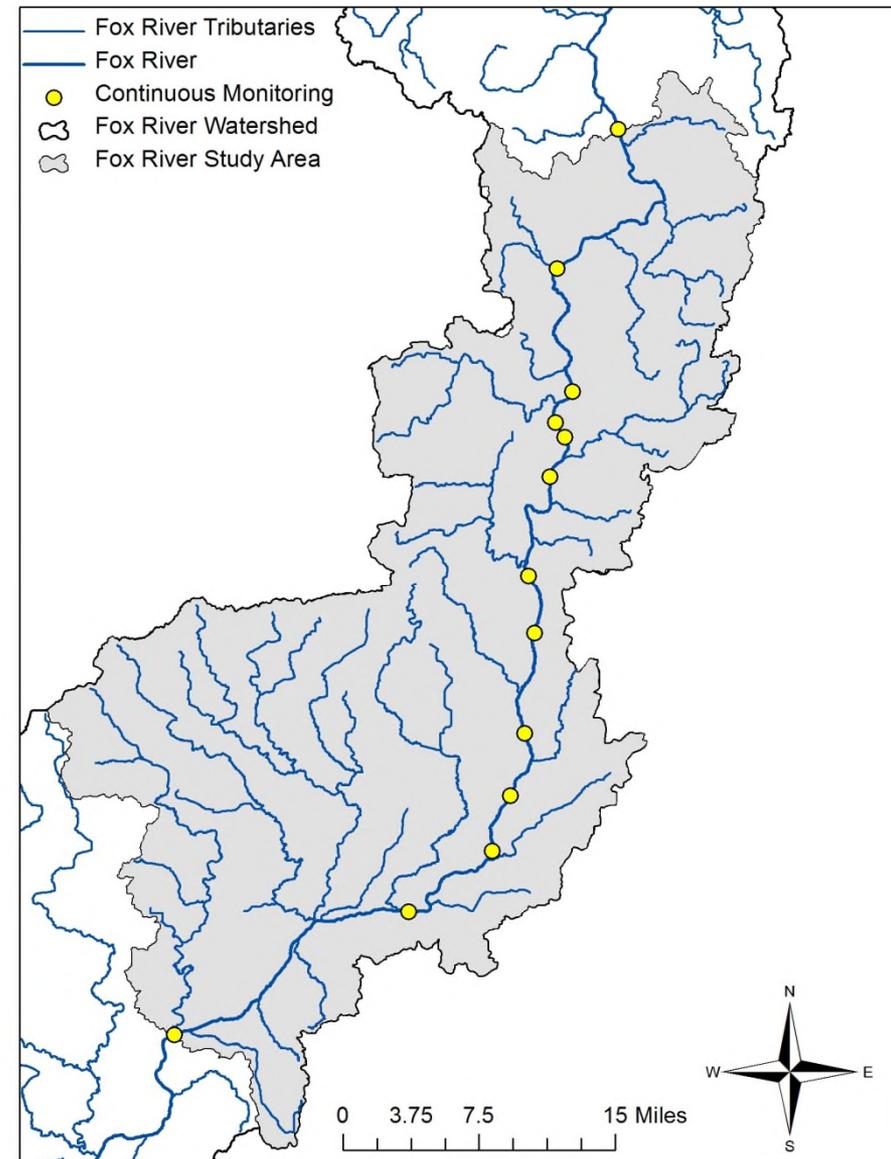




Flows were consistent during 72-hr sampling period

Dissolved Oxygen Monitoring

- Cross-section profiles to determine sonde placement
- Sondes deployed at 13 Fox River sites
- Continuous data collection
 - 15-min interval

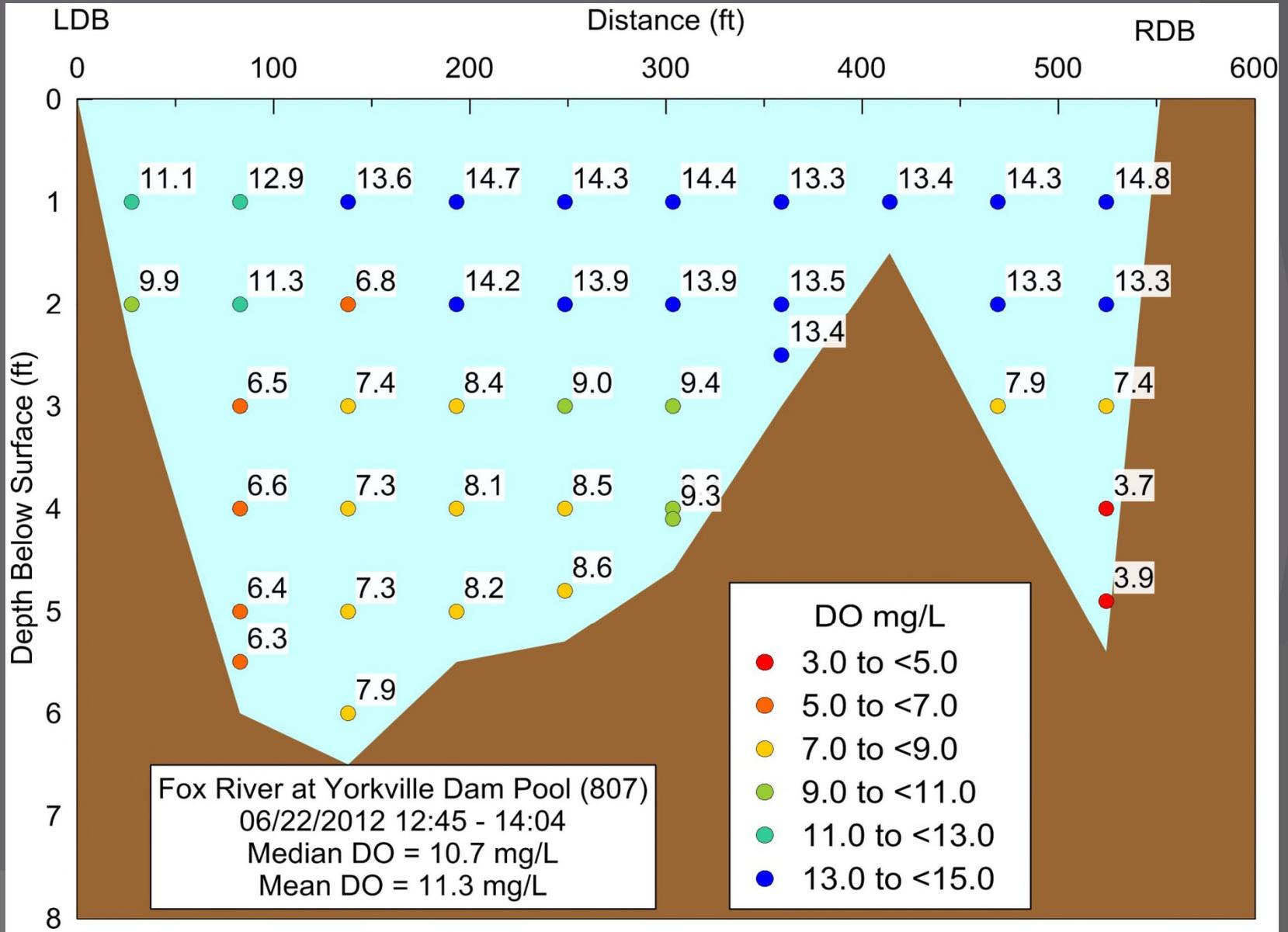


DO Instrumentation

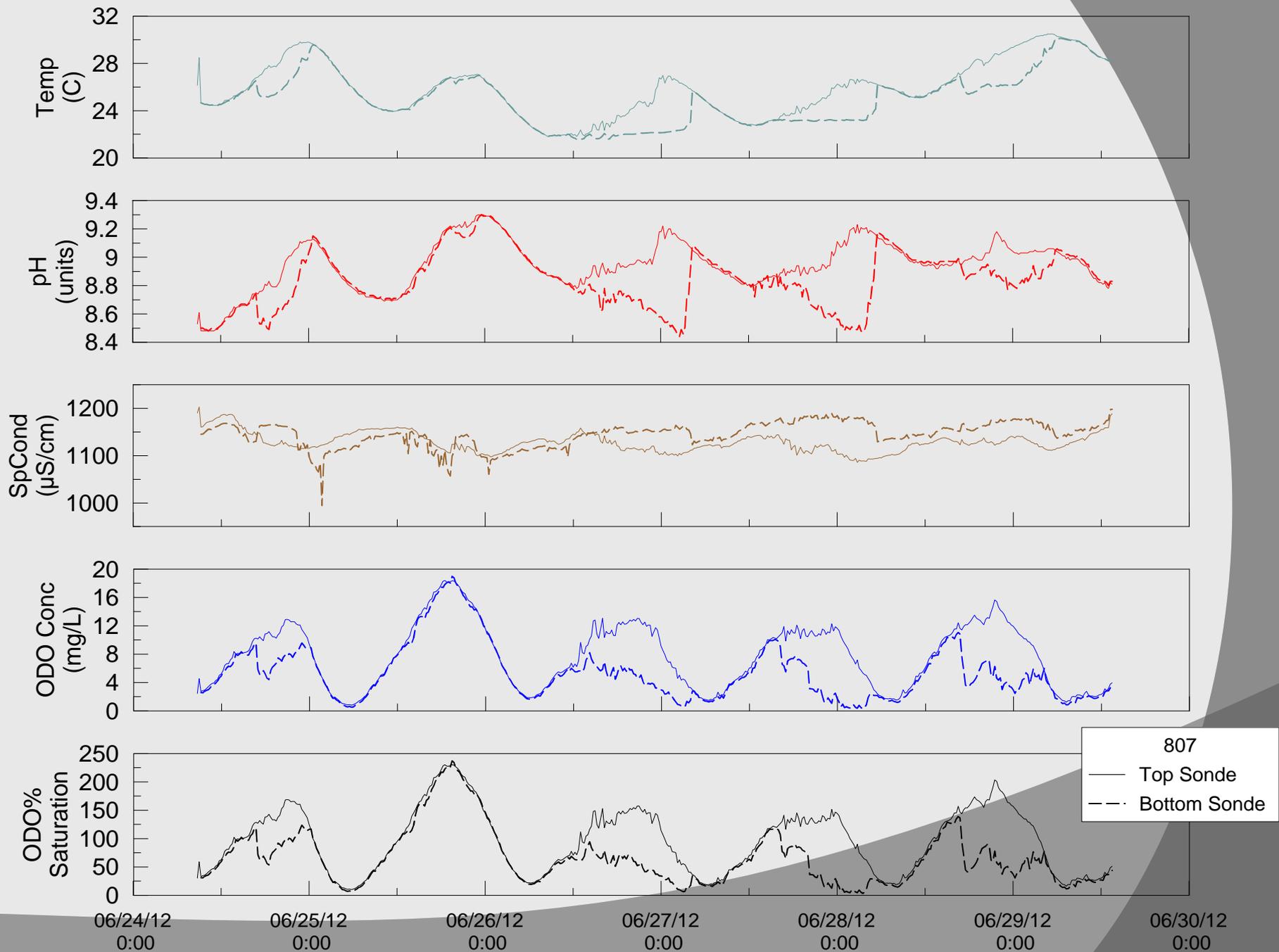
- YSI sondes
- Dissolved oxygen
- Temperature
- pH
- Conductivity



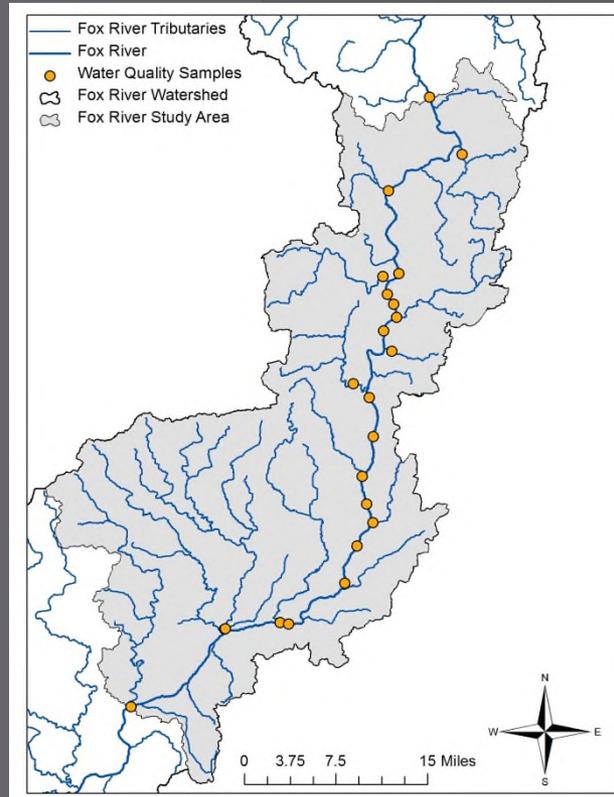
DO Profiles



Raw Data. Not all measurements in-stream.



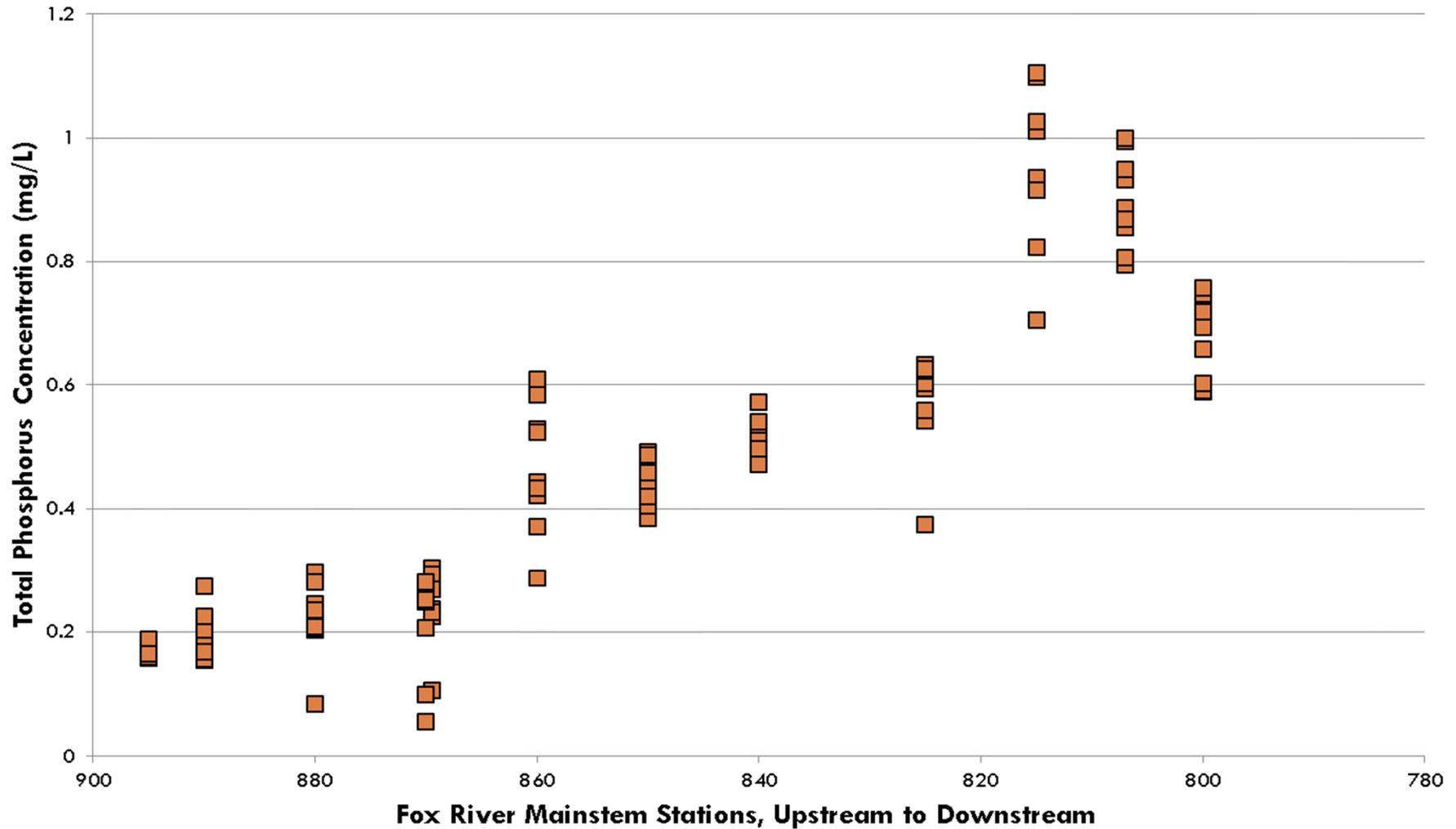
Water Quality Sampling



Analysis	Abbreviation	Frequency	
Alkalinity	alk	Three times a day	
Carbonaceous Biochemical Oxygen Demand	CBOD ₅		
Orthophosphate	Ortho-P		
Ammonia	NH ₃		
Nitrite	NO ₂		
Nitrate	NO ₃		
Total Kjeldahl Nitrogen	TKN		
Total Organic Carbon	TOC		
Total Phosphorus	TP		
Total Suspended Solids	TSS		
Chlorophyll a	Chl a		Once per day (during daylight hours)
Volatile Suspended Solids	VSS		

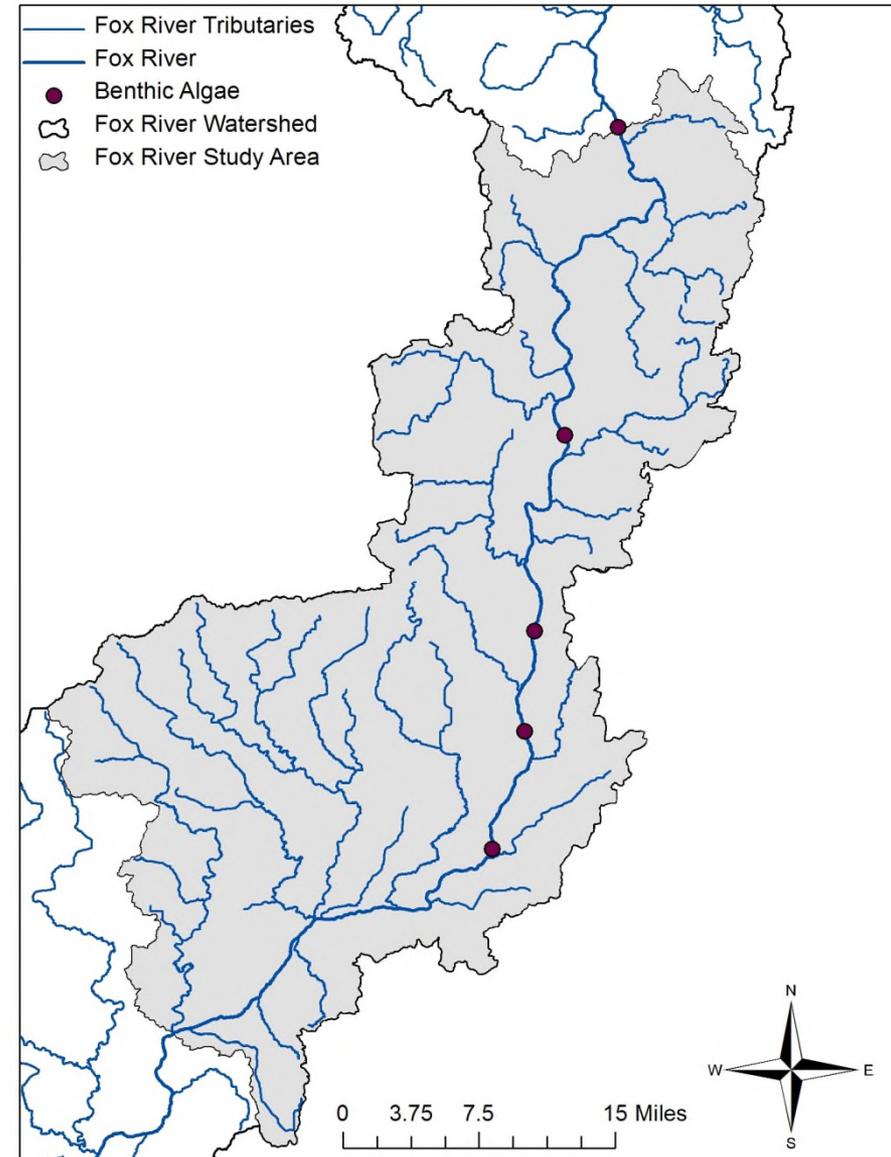


TP Concentrations During Sampling



Benthic Algae Sampling

⦿ Performed by DEI



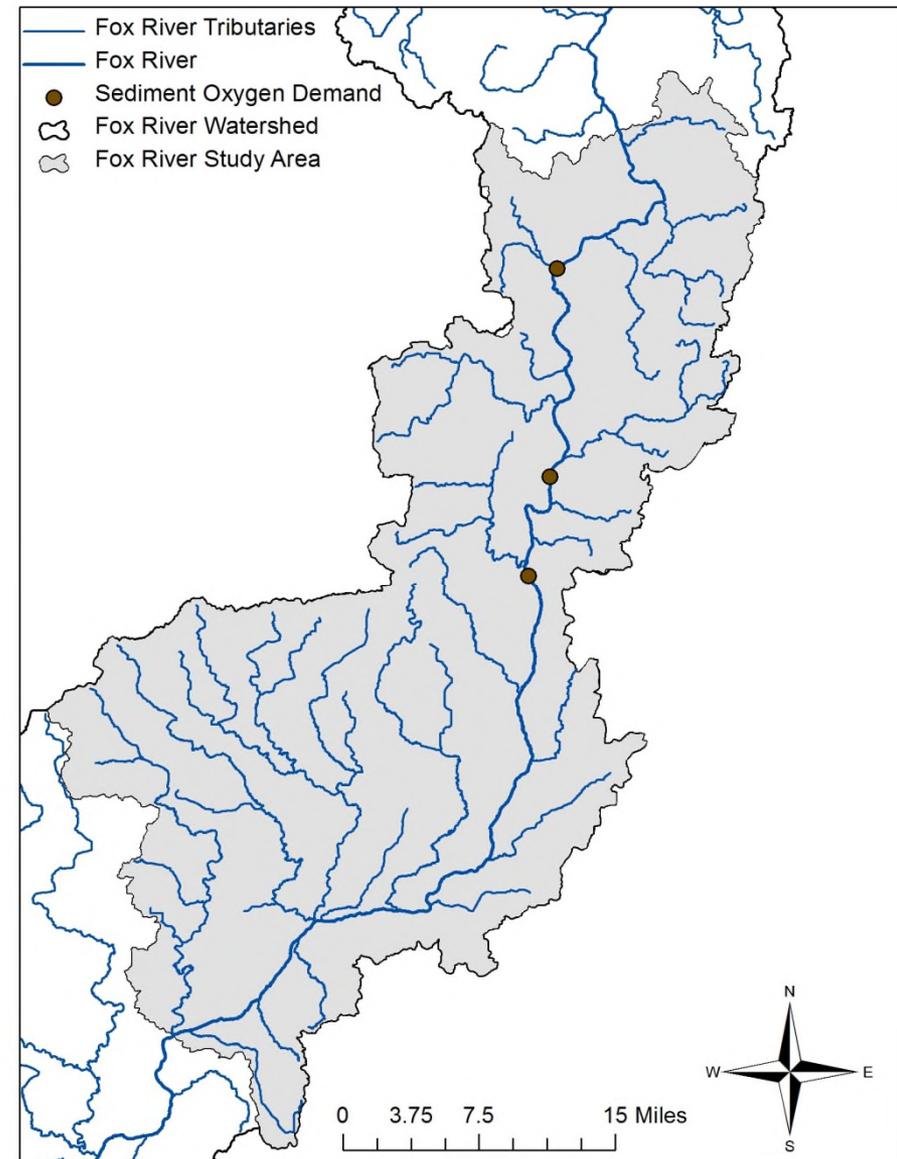
Benthic Algae Results

Site	Results
895	749 – 1100 mg/m ³
869.5	548 – 560 mg/m ³
840	52.1 – 83.4 mg/m ³
832	448 – 3460 mg/m ³
815	742 – 821 mg/m ³



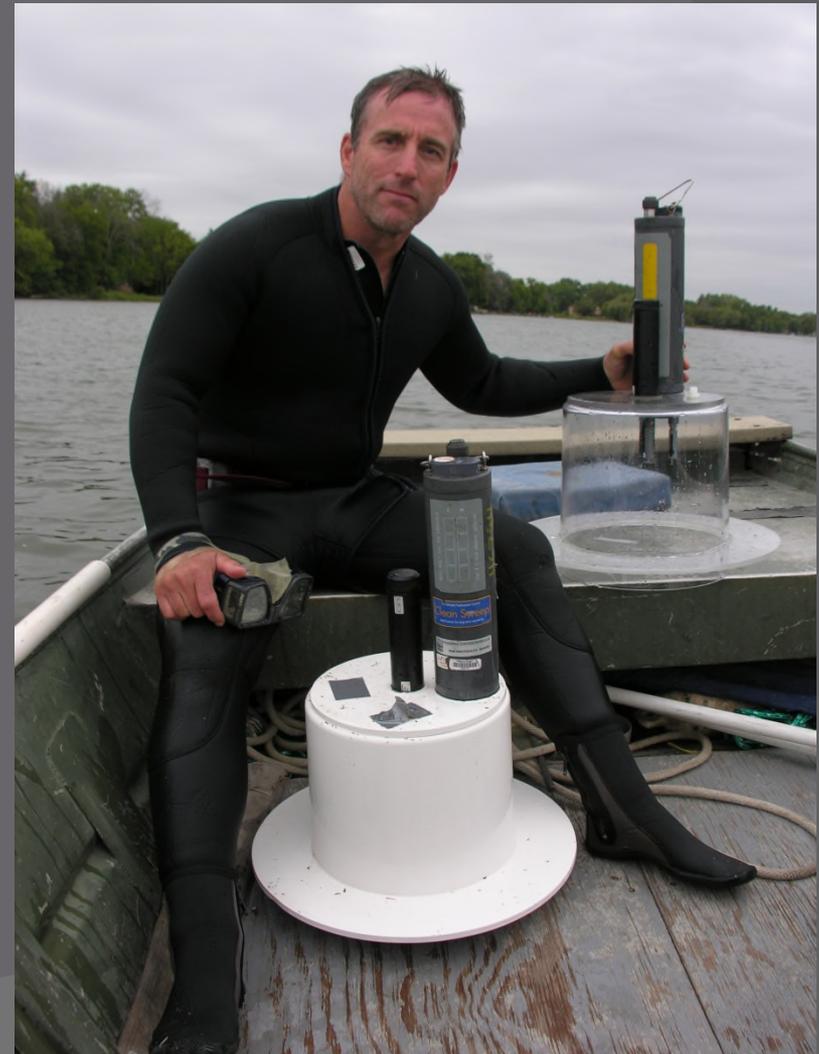
SOD Measurements

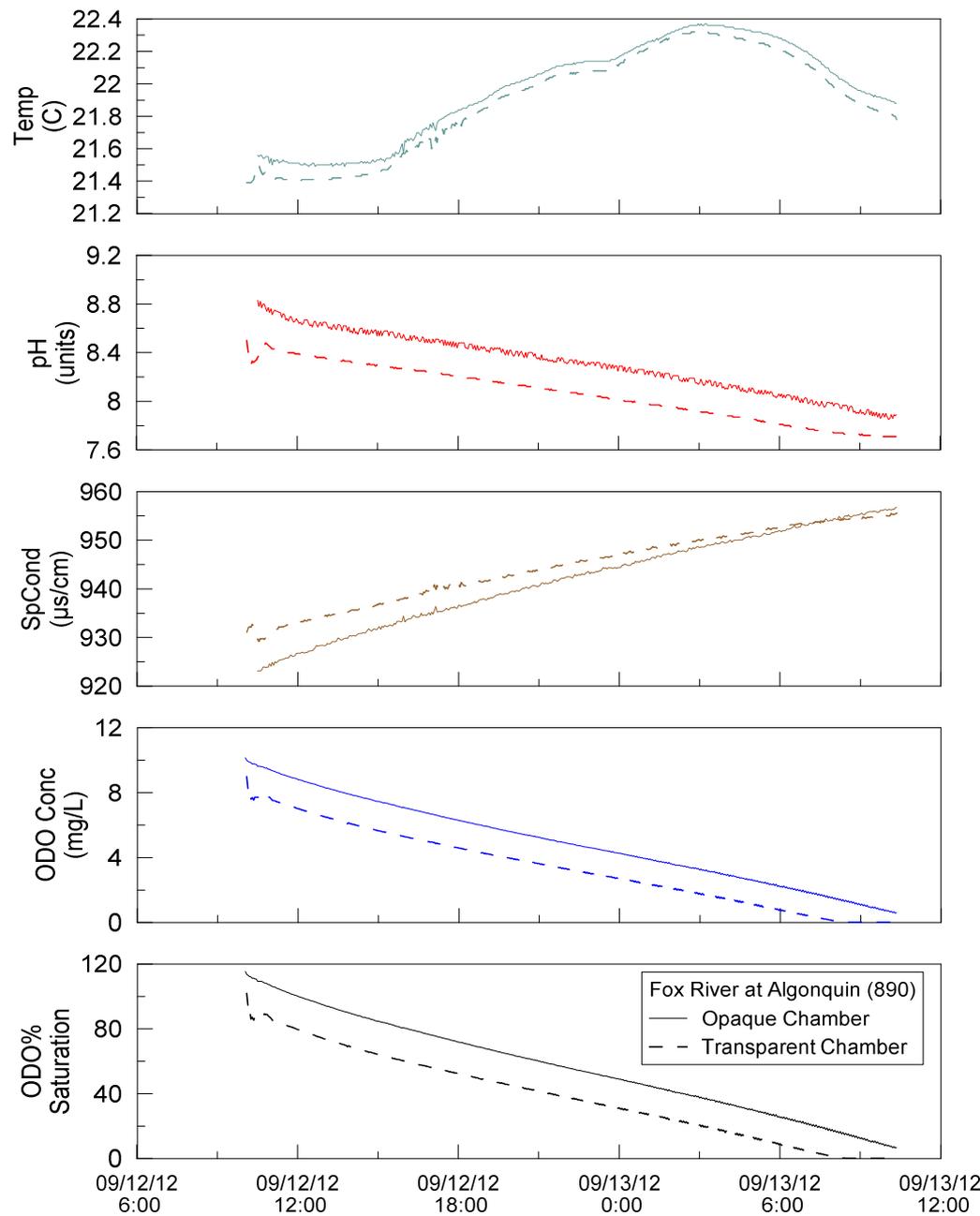
● Performed by ISWS



SOD Determination Setup

- 24-hour deployments
- 3-minute data interval
- Dark and light chambers provide information on the impact of light availability
- Known volume of water isolated against known area of sediment
- Water inside chamber continuously stirred





Fox River Watershed Investigation
<http://ilrdss.isws.illinois.edu/fox/>

Illinois State Water Survey
<http://www.isws.illinois.edu/>

Fox River Study Group
<http://www.foxriverstudygroup.org/>



Again my thanks to:

FRSG

DEI

FRWRD

Fox Metro

USGS

ISWS staff who
made this effort
successful

