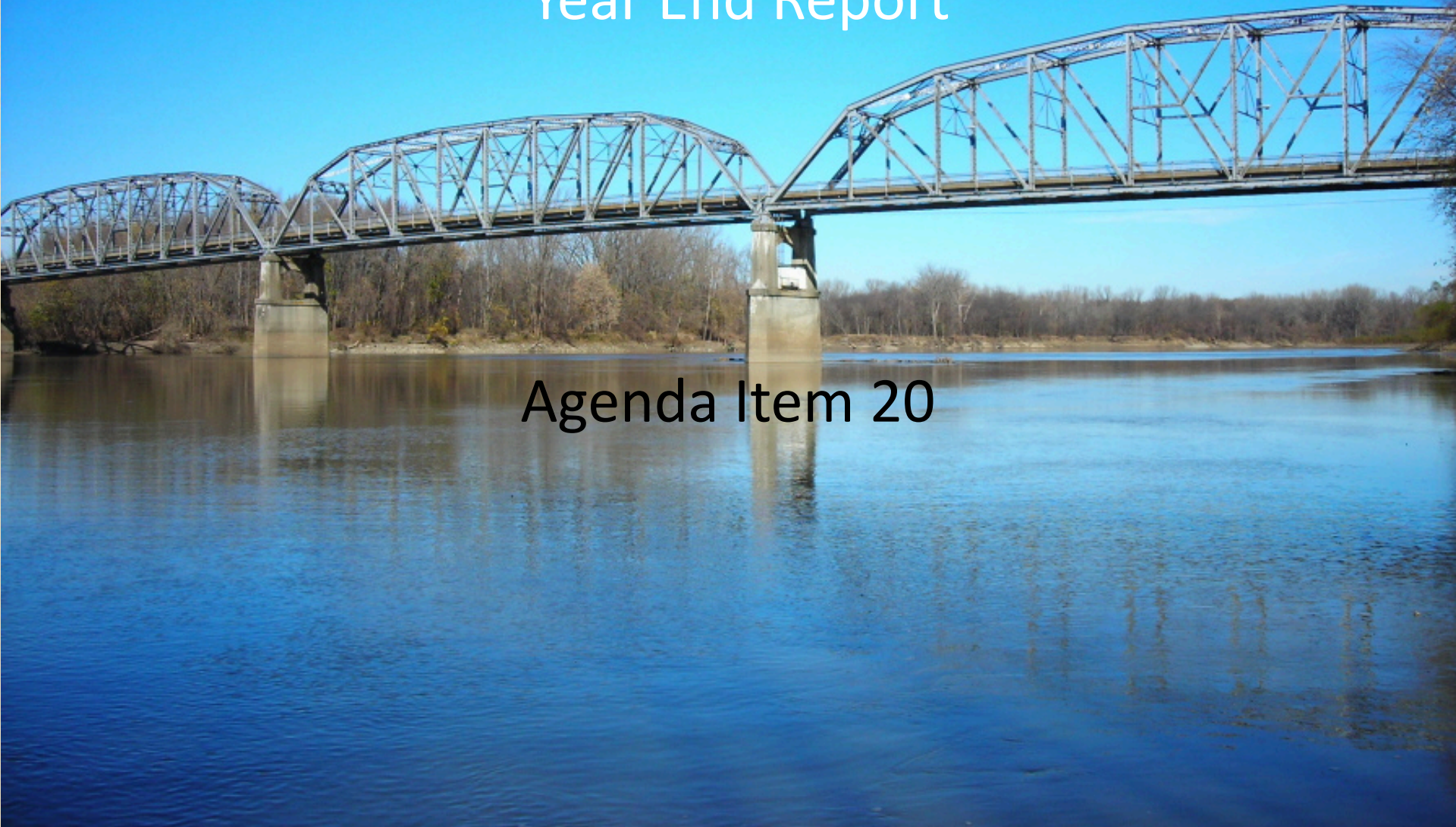


Wabash River Continuous Monitor Project: Year End Report

Agenda Item 20

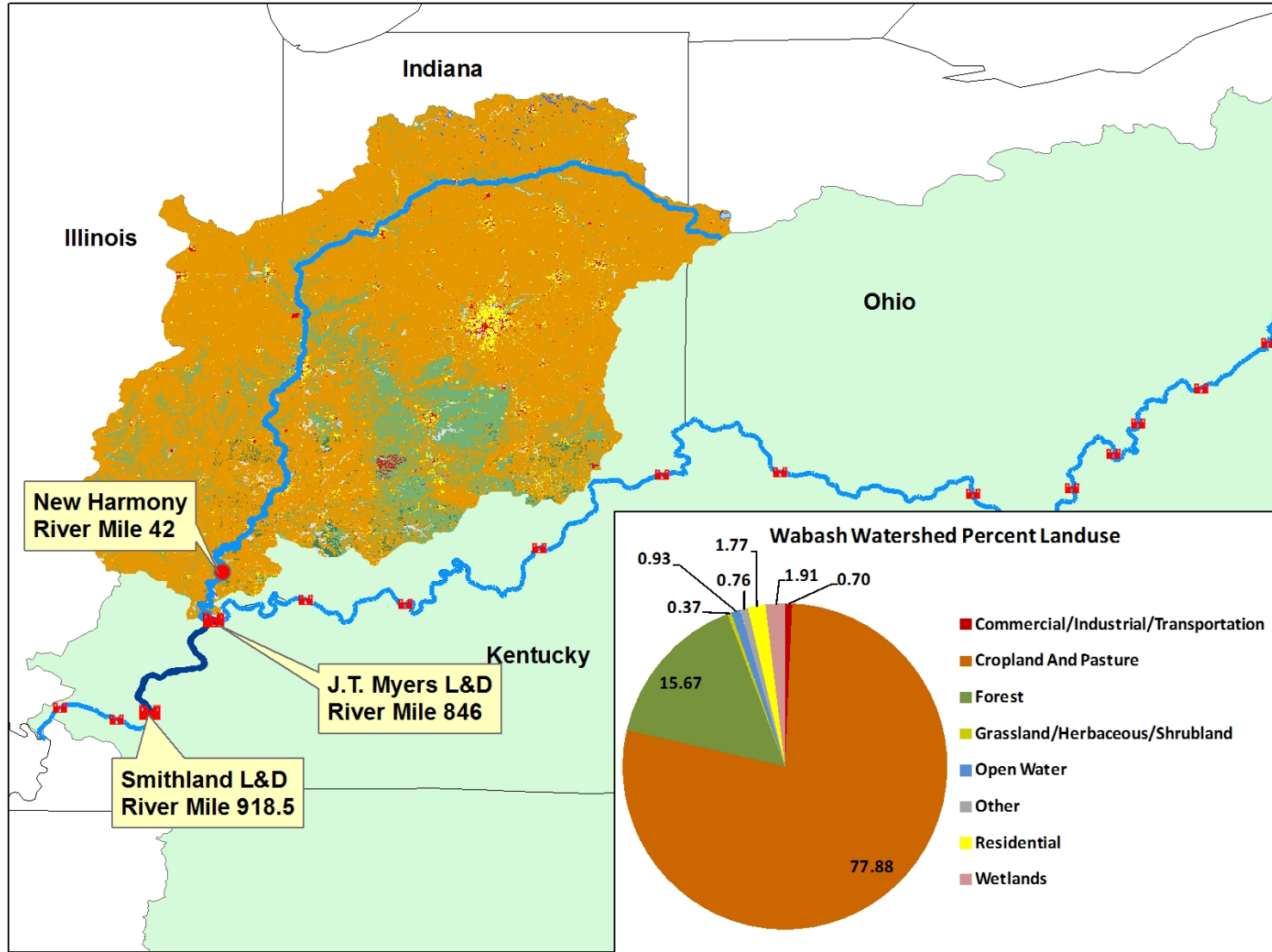


Project Goals

- 3 year project (continuation of a 1 year project). Data collected from 7/1/2010 to 1/22/2015.
- Determine annual load of nutrients from Wabash River and at JT Myers on the Ohio River.
- Evaluate the Wabash River as a possible cause of low dissolved oxygen in the Smithland Pool.

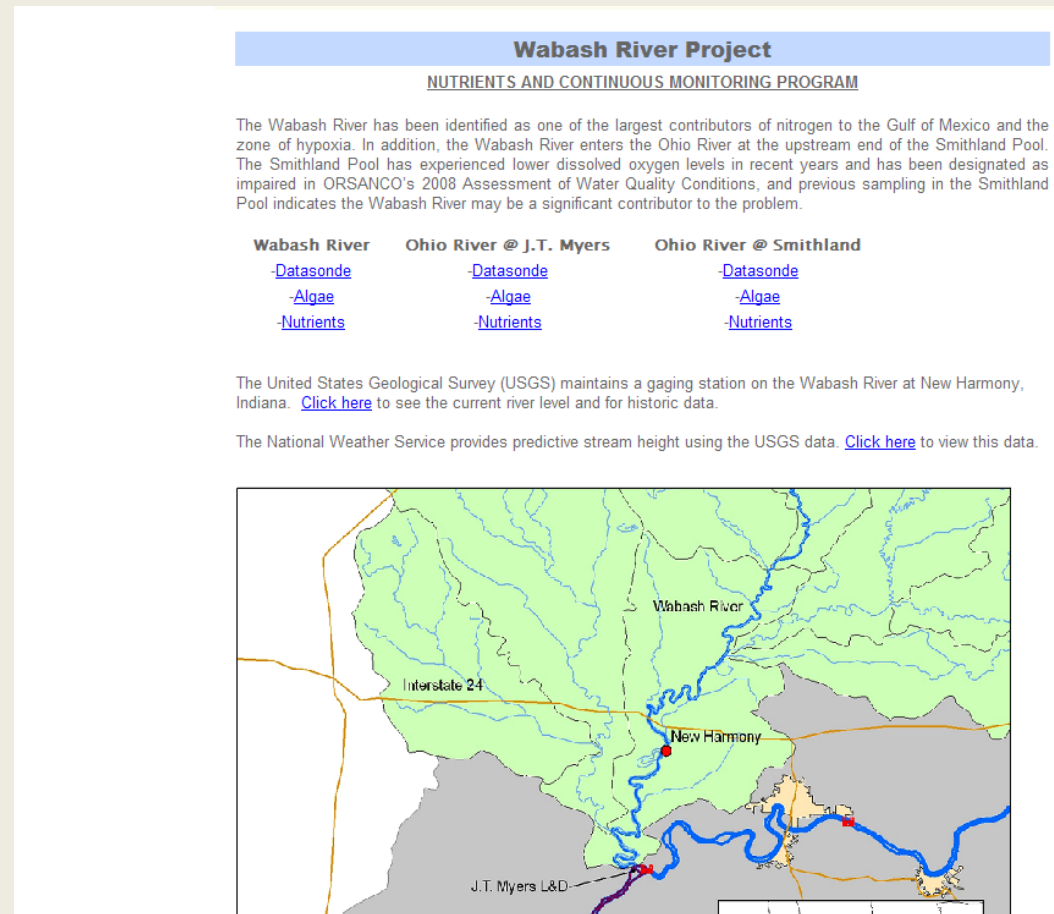


Project Location



Parameters

- Continuous monitor data downloaded 3/day
 - pH, conductivity, temp, turbidity, dissolved oxygen, chlorophyll a
- Nutrients collected every 2 weeks
 - Ammonia, TKN, Nitrate/Nitrite, Total Phosphorus, BOD, TSS, Algae, Chlorophyll
 - Ohio River samples collected during summer months
- Data available on website



Goal 1: Load Calculation

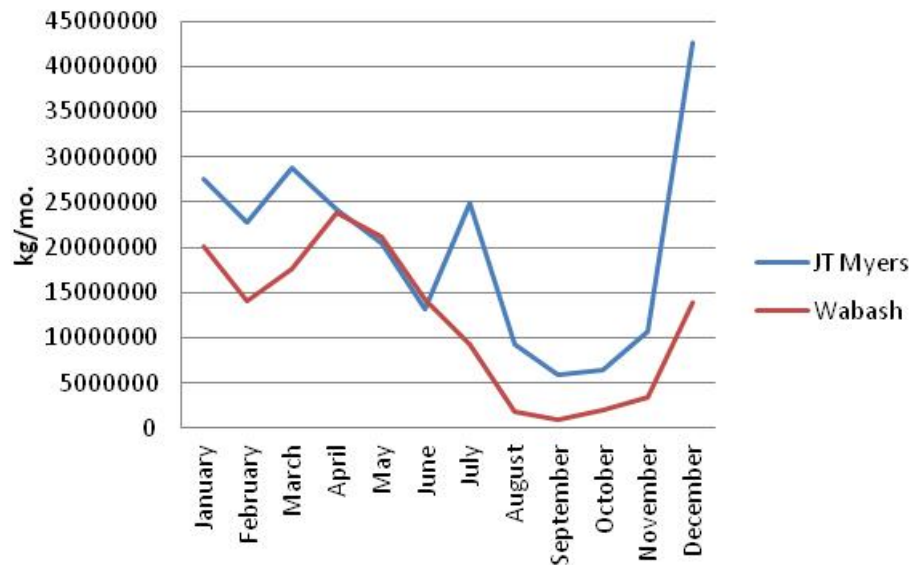
- USGS LOADEST
 - FORTRAN program for estimating loads
- Uses a time series of streamflow and constituent concentration data.
- Develops a regression model of the constituent load.
- This model is then used to estimate loads over the specified time interval.

LOADEST Inputs

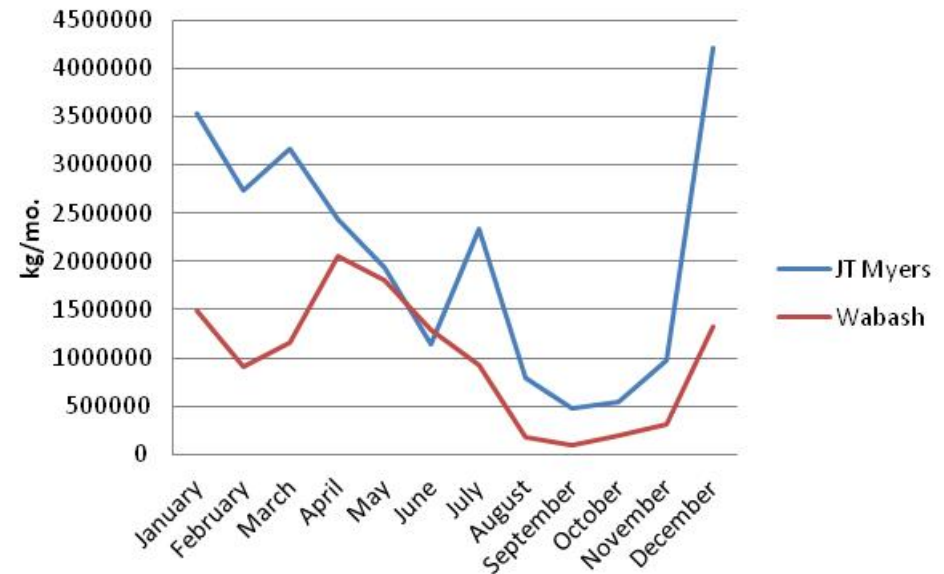
- Wabash River
 - 30 nutrients samples
 - TN calculated by adding TKN and Nitrate/Nitrite
 - Flow data from USGS gauge at New Harmony
 - New Harmony 29,234 sq mi (88% of watershed)
- Ohio River at JT Myers
 - 20 Nutrients Samples
 - Project only collects summer time data.
Additional data provided by Bi-monthly Program
 - TN calculated by adding TKN and Nitrate/Nitrite
 - Flow data from COE Cascade

Load Comparison of Ohio and Wabash Rivers

Nitrogen Load (2013)



Phosphorus Load (2013)



Load Calculations

Wabash River

- 1 Year load 1/1/2013 to 12/31/2013
 - Flow for model year – 15,956,730 cfs
 - Flow range from 2001-2013
 - 10,207,480 cfs – 17,737,490 cfs
 - 2nd highest flow year since 2001
- **161,382** metric tons TN
- **13,344** metric tons TP

Ohio River at JT Myers

- 1 Year load 1/1/2013 to 12/31/2013
 - Flow for model year – 52,933,850 cfs
 - Flow range from 2001-2013
 - 35,605,368 cfs – 87,999,200 cfs
 - Average flow year
- **236,941** Metric tons TN
- **24,317** metric tons TP

Goal 2: Causes of DO Impairment

- Evaluation of DO data
- Evaluation of nutrient concentrations
- BOD as a source of DO impairment
- Algae as a source of DO impairment

Dissolved Oxygen

Station	Max Flux	# days >6mg/L Flux	# days <5 mg/L average	# days <4 mg/L instant
Wabash R.	10.94	44	6	14
JT Myers L&D	2.29	0	0	0
Smithland L&D	4.71	1	0	0

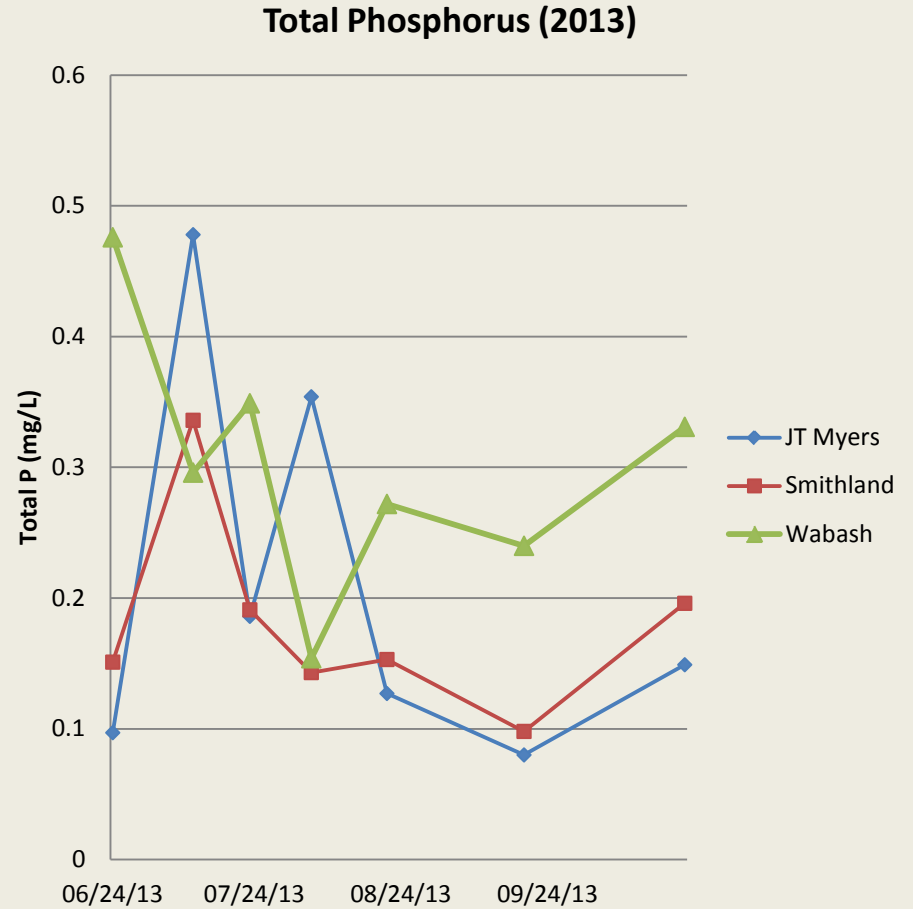
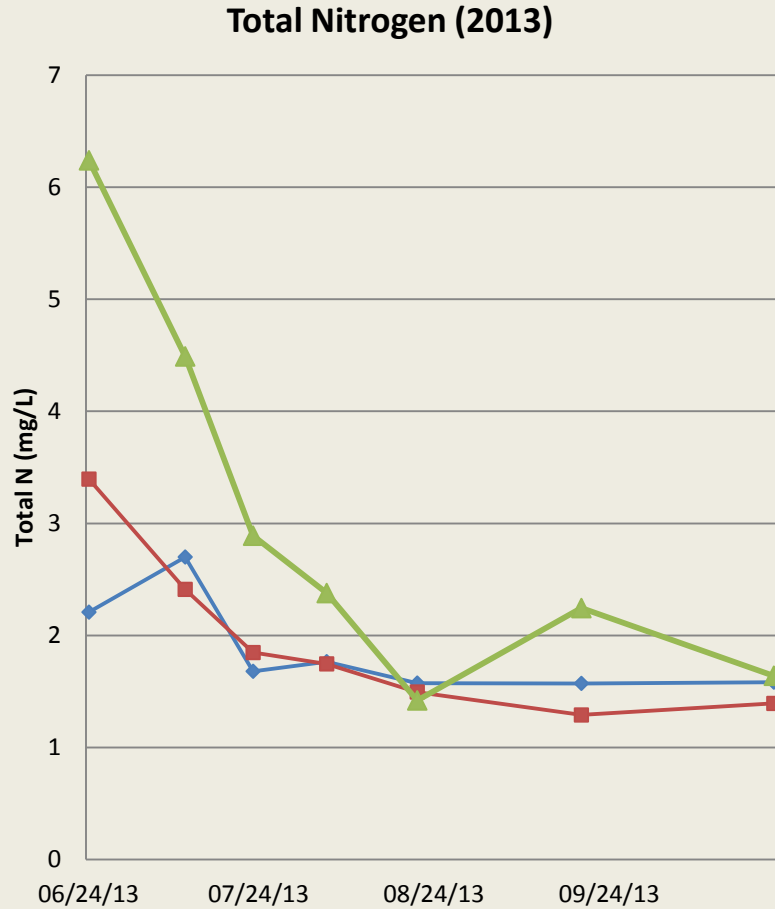
Diurnal flux is caused by algal respiration

Wabash R. low DO associated with large diurnal flux

JT Myers/Smithland low DO associated with minimal diurnal flux

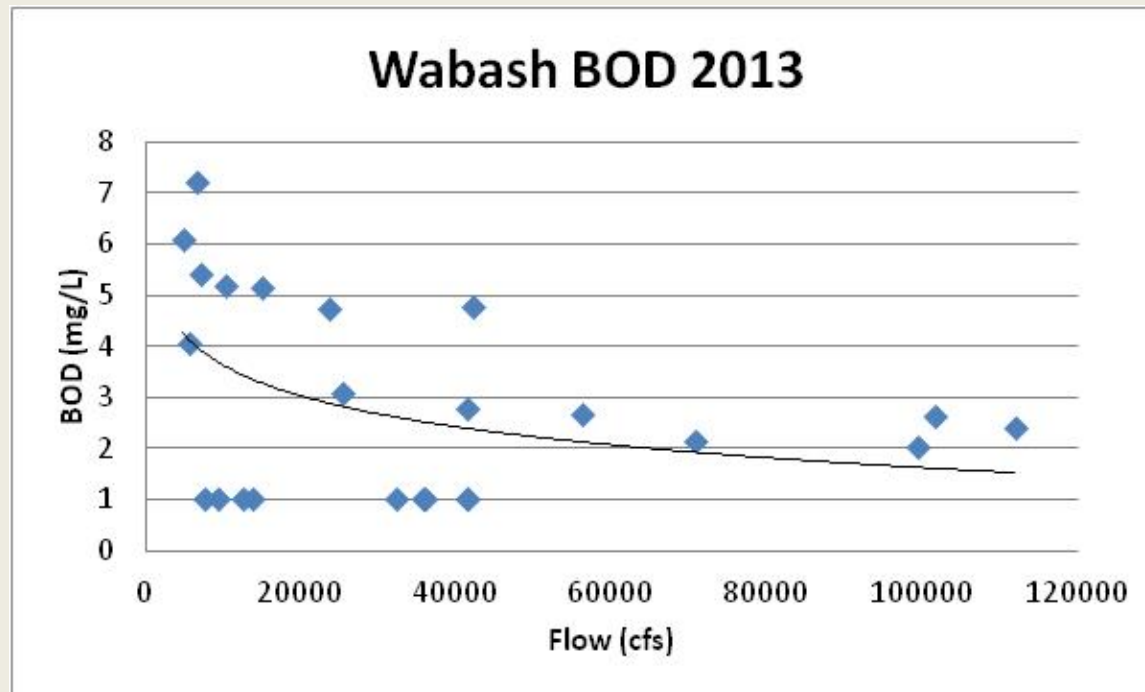
Period: 7/1/2010 to 9/30/2011 (2 summers)

Nutrient Comparison

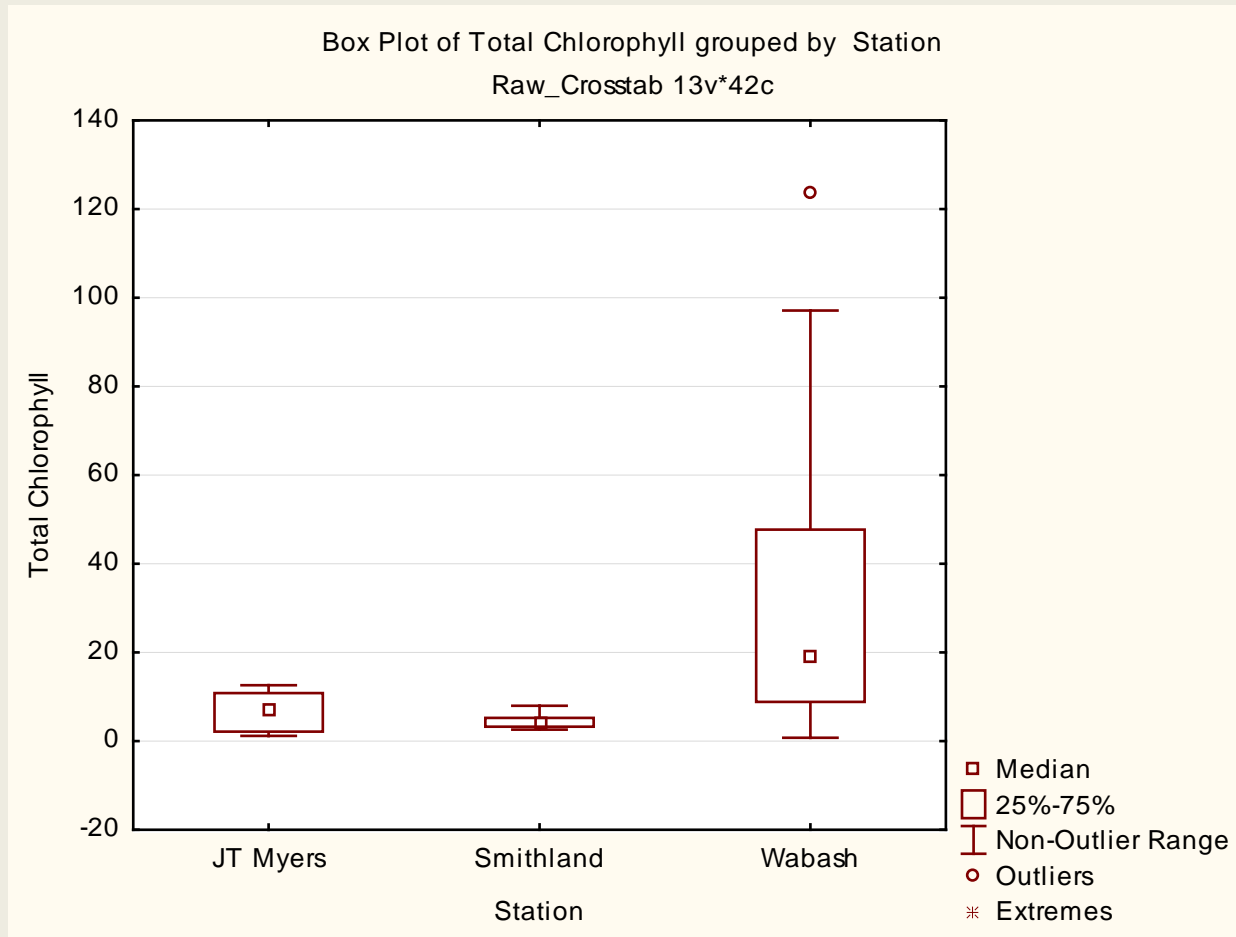


Biochemical Oxygen Demand

	Wabash	JT Myers	Smithland
# BOD Detections	15	1	1



Chlorophyll *a*



Conclusions

- Wabash River continues to be a major source of nutrients.
 - For study period Wabash River was 40.5% of N load, 35.4% of P load
- No DO Standard exceedances on Ohio River
 - DO pattern indicates Ohio River low DO not caused by algae
- Algae concentration does not show effect of Wabash River on Smithland Pool
- High water year on the Wabash River. Low problem year for DO on the Ohio River
- Wabash River is a source of BOD to Ohio River.
 - BOD primarily associated with algae blooms