

# What amount of nutrients are entering and leaving Kentucky?



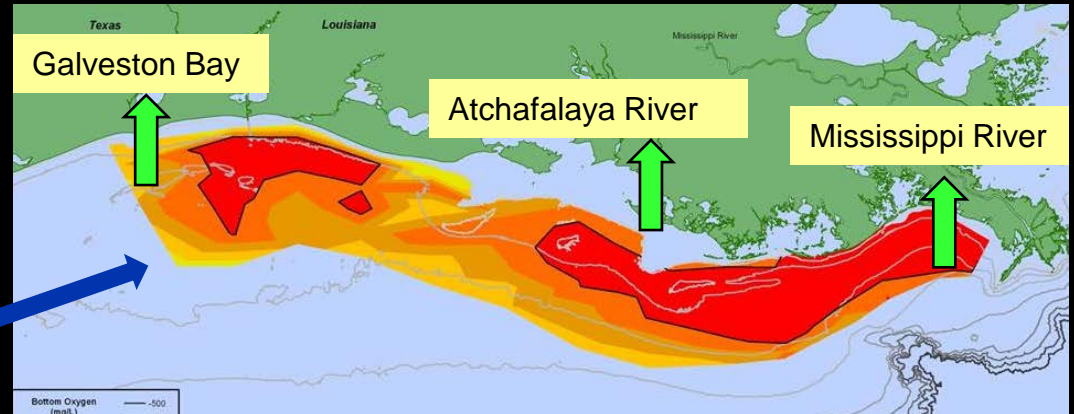
# Partnership



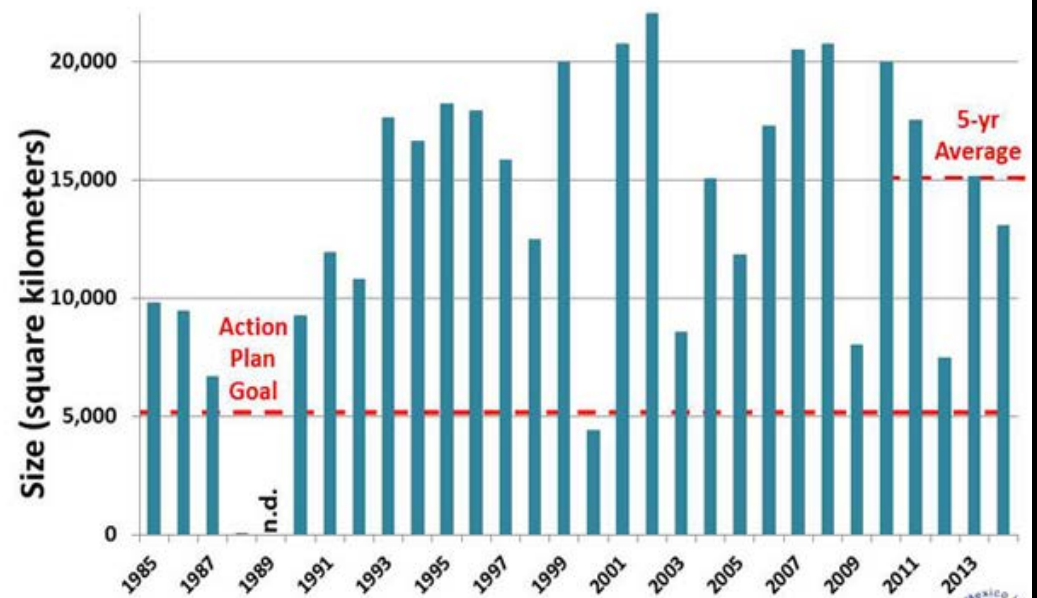
Governor's  
Office of  
Agricultural  
Policy



# The Nutrients Issue

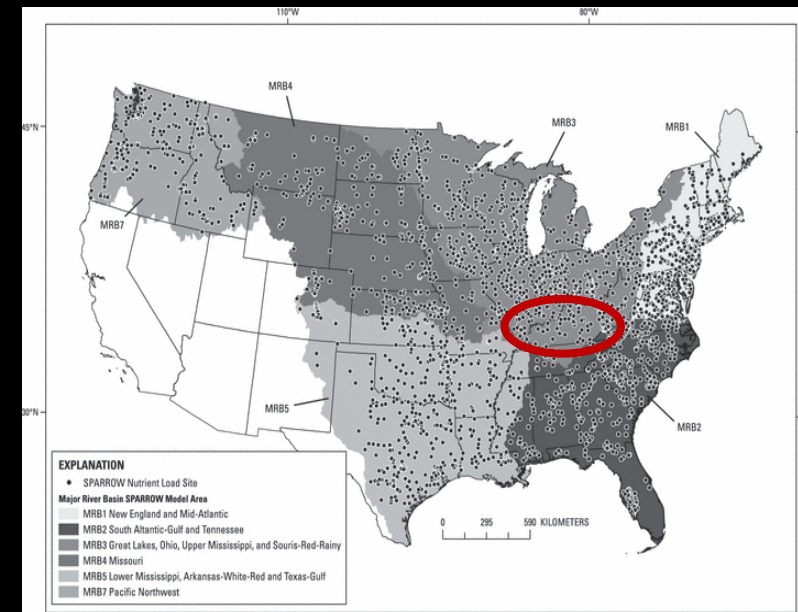
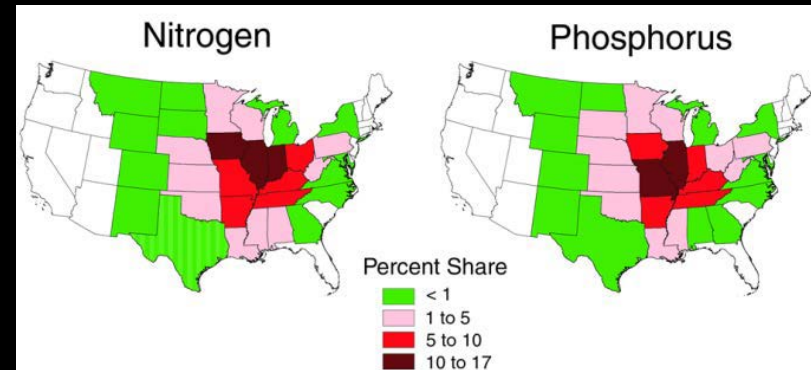


Size of bottom-water hypoxia in mid-summer



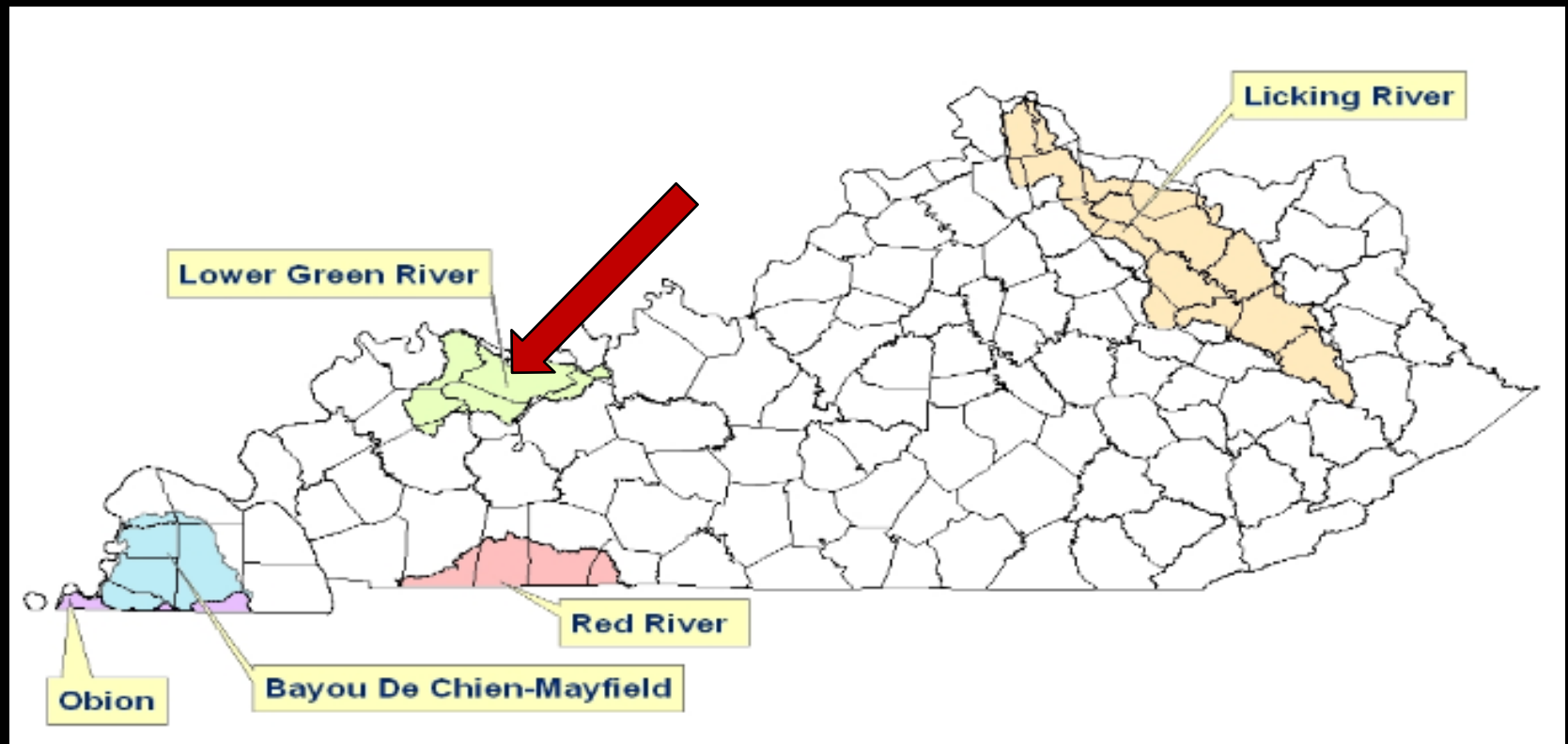
# The Nutrients Issue

- USGS SPARROW model
- Kentucky listed as one of nine states with the largest nutrient delivery to the Gulf
- Only 52 Kentucky sites met minimum criteria for including in model
  - Few monitoring sites in western Kentucky
  - Several western Kentucky basins ranked in Top 150 basins for TN & TP yields



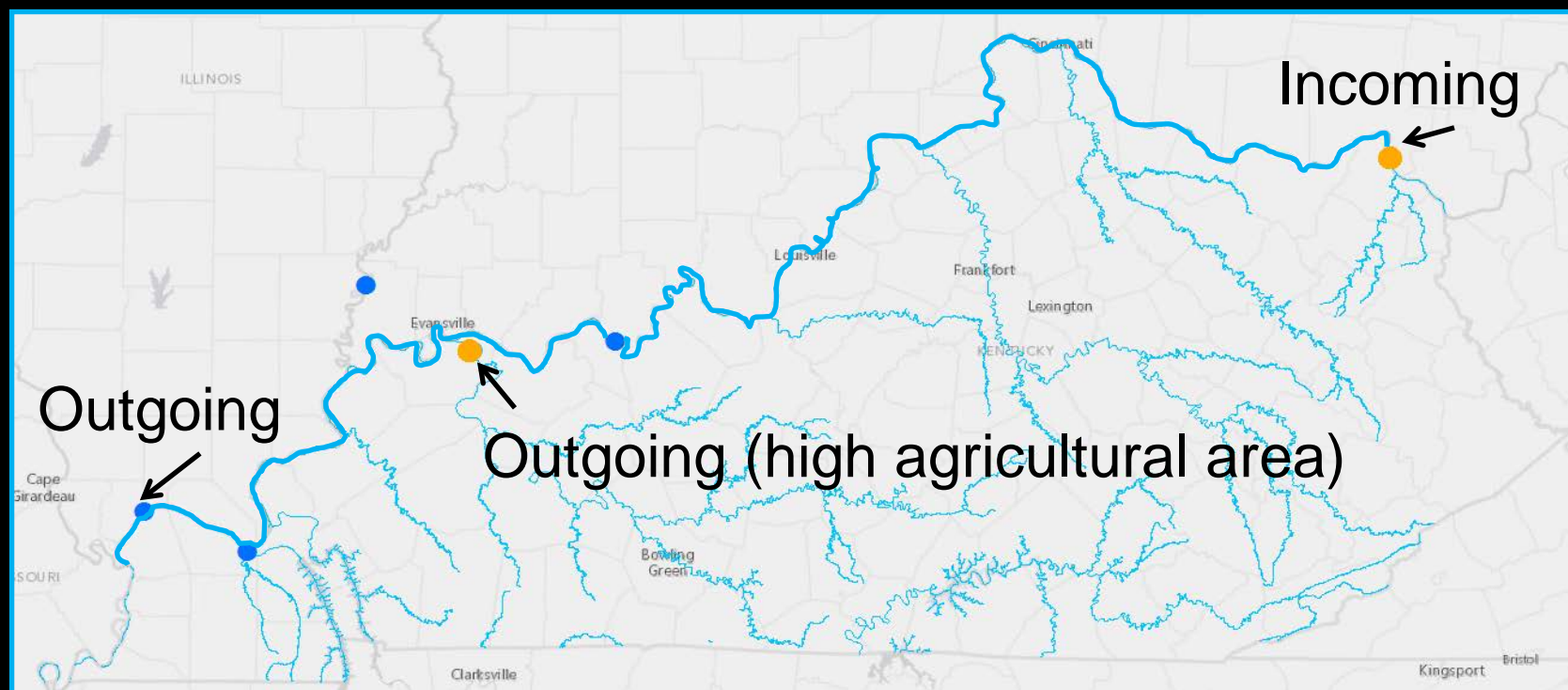
# The Nutrients Issue

- NRCS—Mississippi River Basin Healthy Watersheds Initiative (MRBI)



# Project Goal

- Bracket concentrations and loads of nutrients transported into and discharged from the Ohio River along the Kentucky border

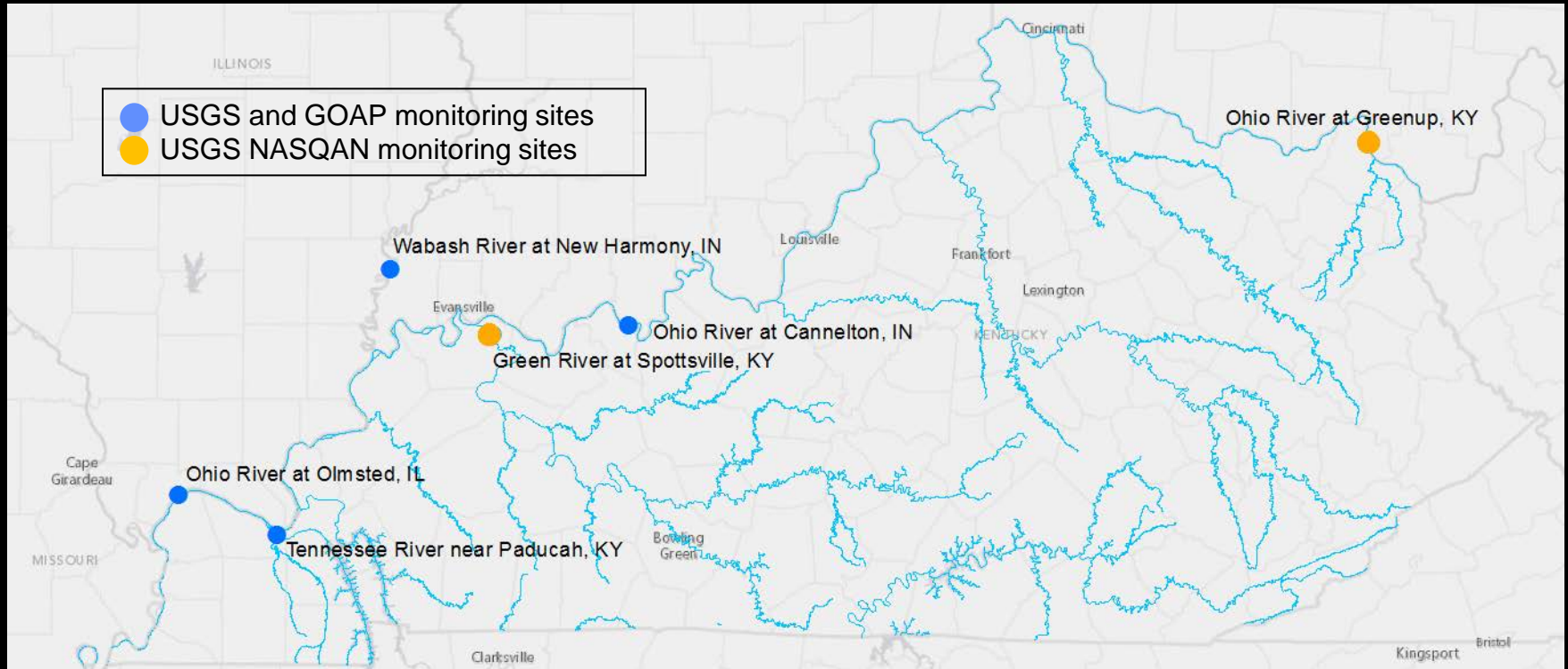


# Project Objectives

- **Measure nutrient concentrations and streamflow to estimate loads and yields**
  - **Ohio River at Greenup, KY—incoming**
  - **Ohio River at Olmsted, IL—outgoing**
  - **Green River at Spottsville, KY—outgoing from highly agricultural area in western part of Kentucky**
- **Establish a new real-time streamflow and water-quality station in the Lower Green River Basin**



# Site Location





# Definitions

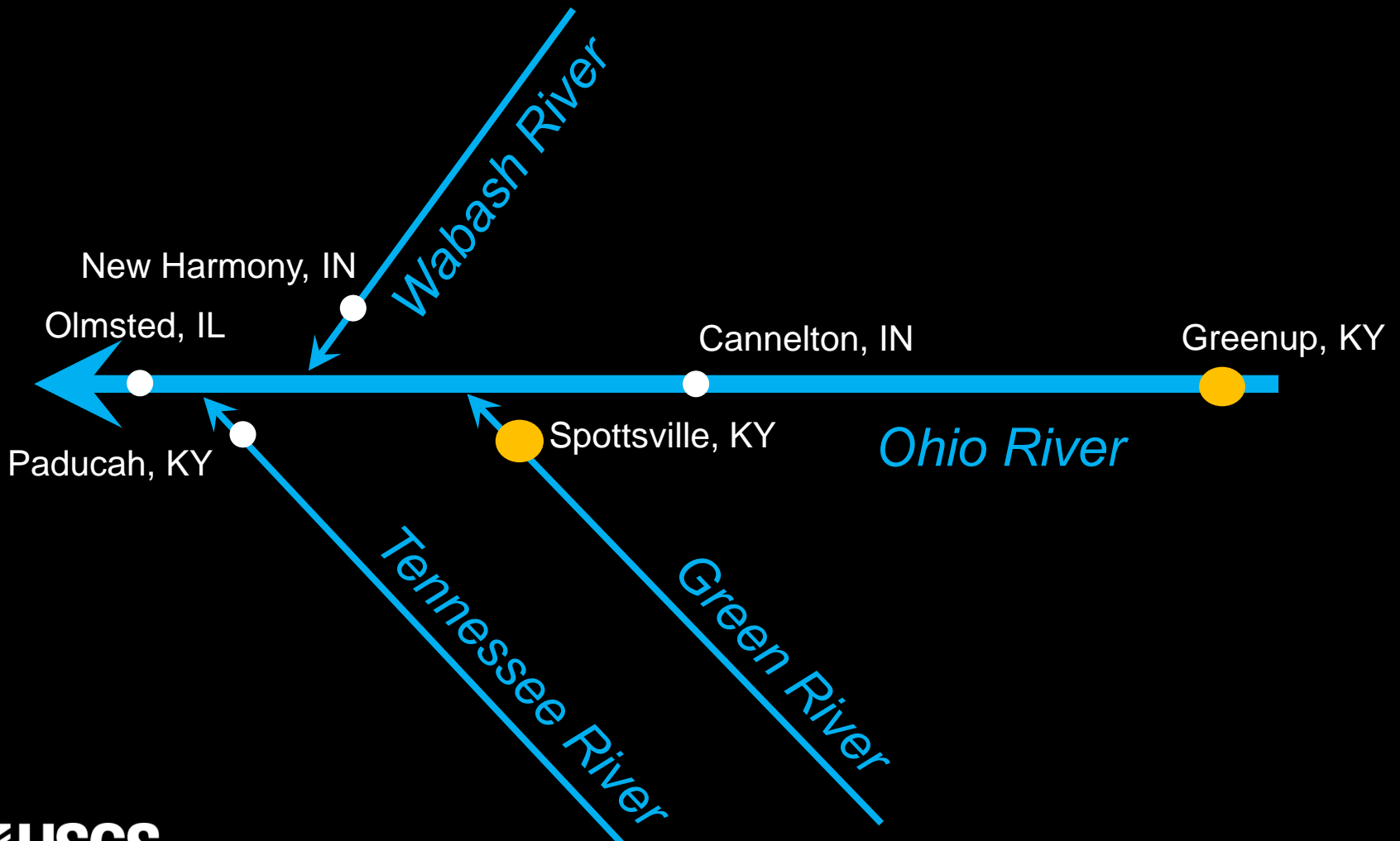
- **Load:** Amount of constituent (mass) that passes a given point on the river over a given time
  - Streamflow (discharge) **MULTIPLIED BY** nutrient concentration in streamwater
- **Yield:** Load per unit basin drainage area
  - Nutrient load **DIVIDED BY** basin area
  - When making comparisons among basins, yield is more useful than loads, because the influence of the basin area is removed.

# Load Estimations

- **USGS Load Estimator (LOADEST)**
  - **Calibration data**
    - Continuous streamflow and
    - Nutrient concentrations
  - **7-parameter regression model**
  - **Calculate daily loads**
  - **Aggregate into annual loads**

# Schematic of the Ohio River Basin

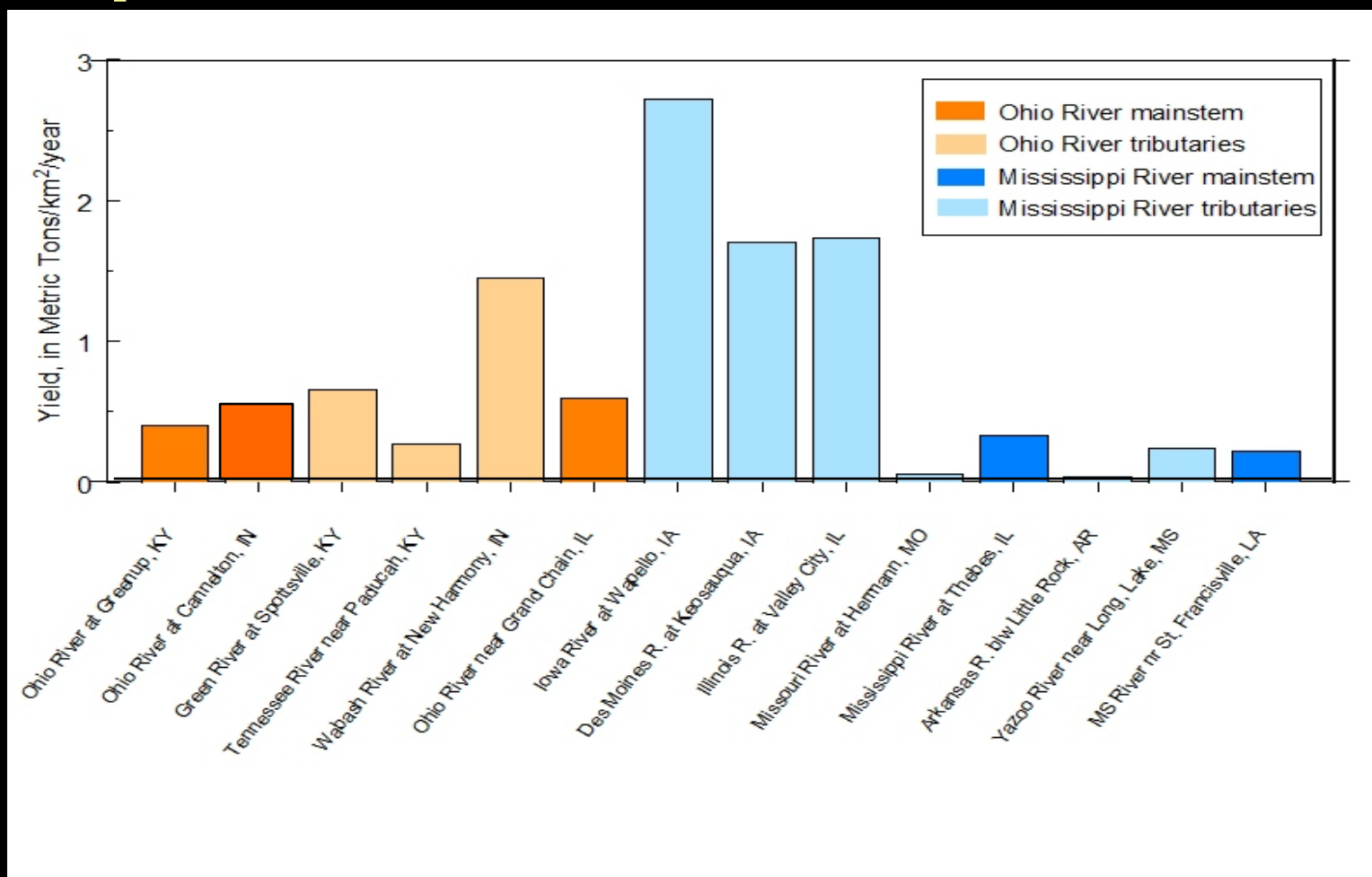
## USGS NASQAN and GOAP sampling sites



# Nitrite plus Nitrate Loads—Preliminary Findings

				NO <sub>2</sub> +NO <sub>3</sub> (Metric Tons as N)		
					LOADEST AMLE 95% Confidence Interval	
Site ID	Site name	Drainage area (km <sup>2</sup> )	Average flow (m <sup>3</sup> /s)		Lower Confidence Interval	Upper Confidence Interval
03216600	Ohio River at Greenup, KY <b>(incoming)</b>	161,000	2,810	<b>64,100</b>	58,600	70,000
03321500	Green River at Spottsville, KY <sup>1</sup>	23,778	425	15,800	9,100	19,500
03609750	Tennessee River nr Paducah, KY <sup>2</sup>	104,500	2,420	28,600	24,900	32,700
03378500	Wabash River at New Harmony, IN <sup>2</sup>	75,716	952	110,000	75,800	154,000
03612500	Ohio River near Grand Chain (Olmsted), IL <b>(outgoing)</b>	526,000	8,930	<b>314,000</b>	287,000	343,000

# Nitrite plus Nitrate Yields—Preliminary Findings

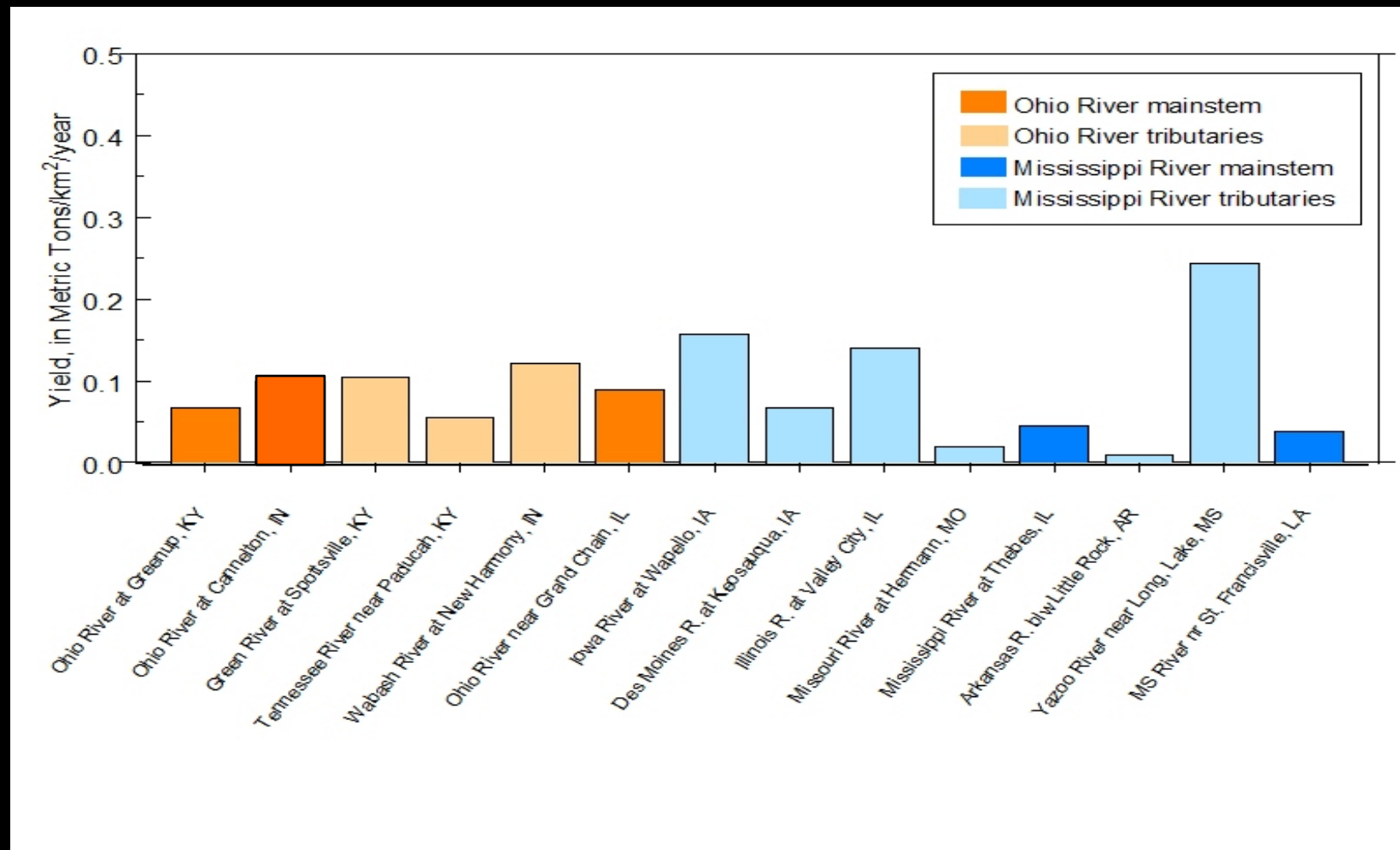


# Total Phosphorus Loads—Preliminary Findings

				Total Phosphorus (Metric Tons as P)		
					LOADEST AMLE 95% Confidence Interval	
Site ID	Site name	Drainage area (km <sup>2</sup> )	Average flow (m <sup>3</sup> /s)	LOADEST AMLE Predicted Flux	Lower Confidence Interval	Upper Confidence Interval
03216600	Ohio River at Greenup, KY <b>(incoming)</b>	161,000	2,810	<b>10,800</b>	7,000	16,100
03321500	Green River at Spottsville, KY <sup>1</sup>	23,778	425	2,500	1,770	3,450
03609750	Tennessee River nr Paducah, KY <sup>2</sup>	104,500	2,420	5,740	5,250	6,270
03378500	Wabash River at New Harmony, IN <sup>2</sup>	75,716	952	9,180	7,950	10,600
03612500	Ohio River near Grand Chain (Olmsted), IL <b>(outgoing)</b>	526,000	8,930	<b>47,000</b>	42,600	51,800



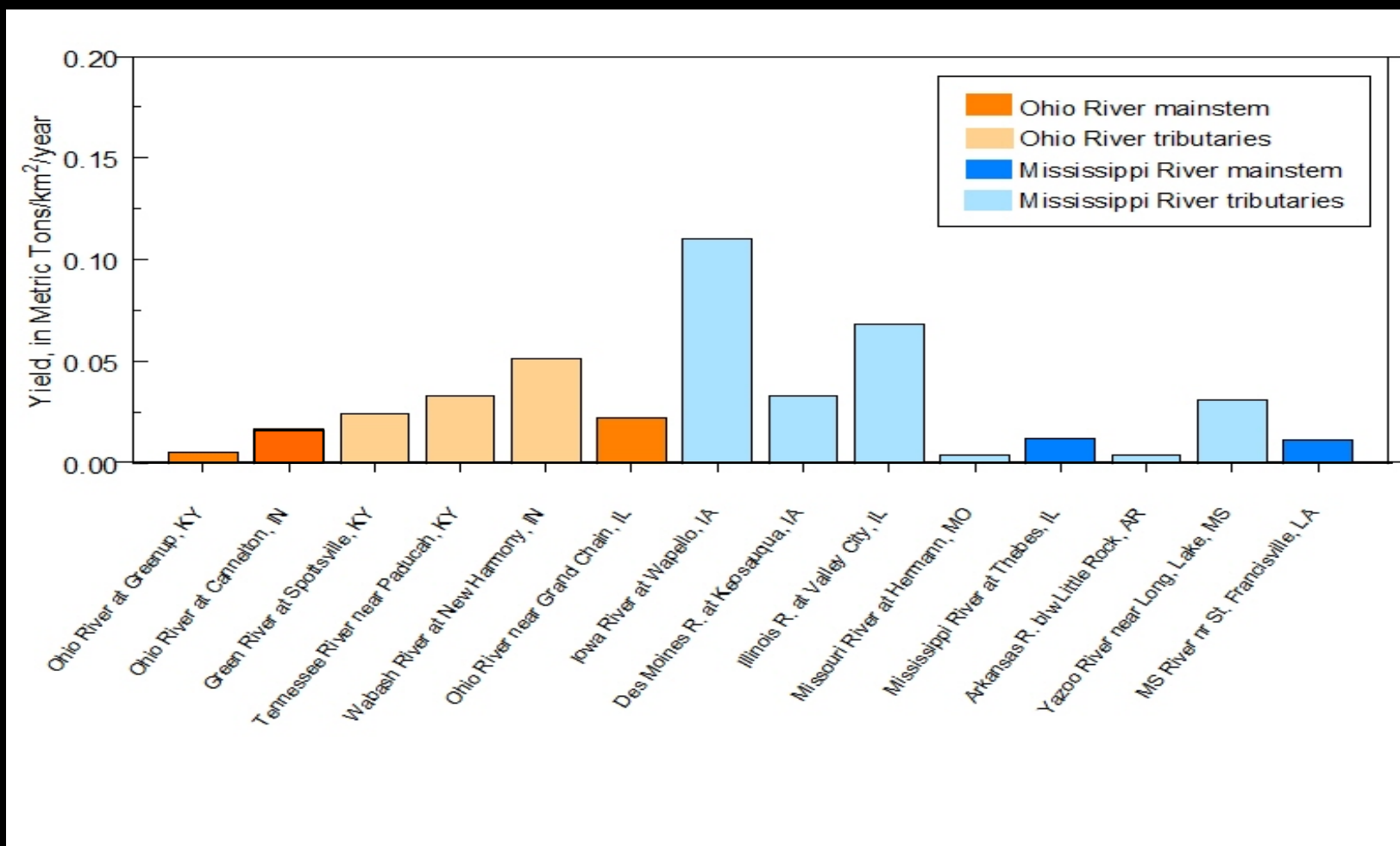
# Total Phosphorus Yields—Preliminary Findings



# Orthophosphorus Loads—Preliminary Findings

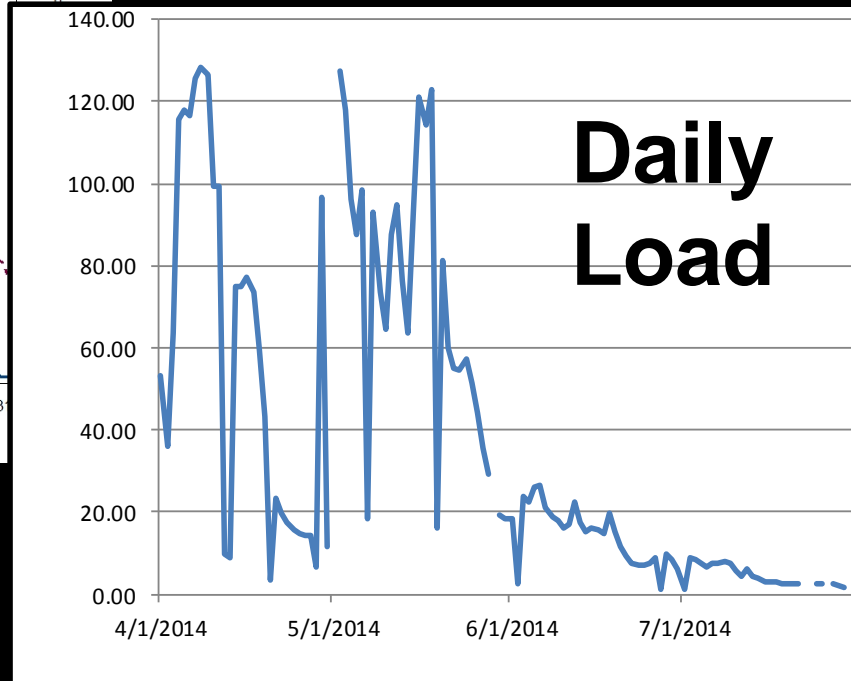
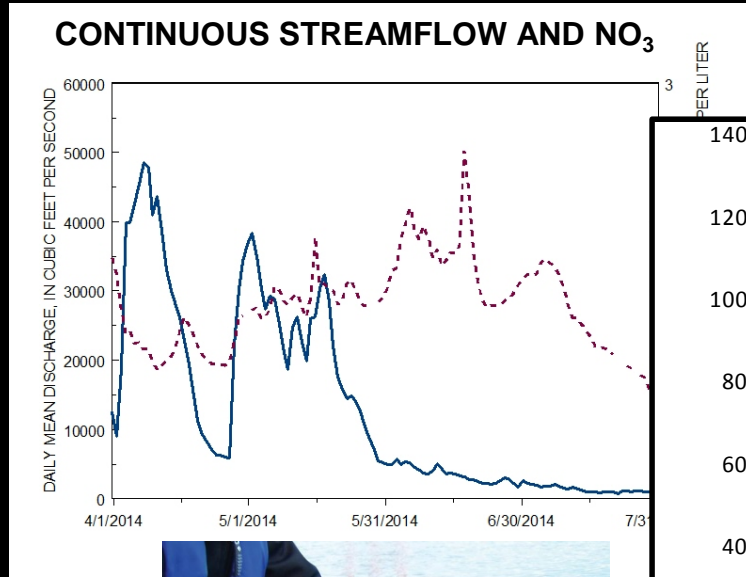
				Orthophosphorus (Metric Tons as P)		
				LOADEST AMLE Predicted Flux	LOADEST AMLE 95% Confidence Interval	
Site ID	Site name	Drainage area (km <sup>2</sup> )	Average flow (m <sup>3</sup> /s)		Lower Confidence Interval	Upper Confidence Interval
03216600	Ohio River at Greenup, KY <b>(incoming)</b>	161,000	2,810	<b>830</b>	660	1,030
03321500	Green River at Spottsville, KY <sup>1</sup>	23,778	425	560	450	690
03609750	Tennessee River nr Paducah, KY <sup>2</sup>	104,500	2,420	3,490	2,770	4,340
03378500	Wabash River at New Harmony, IN <sup>2</sup>	75,716	952	3,870	2,280	6,160
03612500	Ohio River near Grand Chain (Olmsted), IL <b>(outgoing)</b>	526,000	8,930	<b>11,400</b>	10,500	12,400

# Orthophosphorus Yields—Preliminary Findings

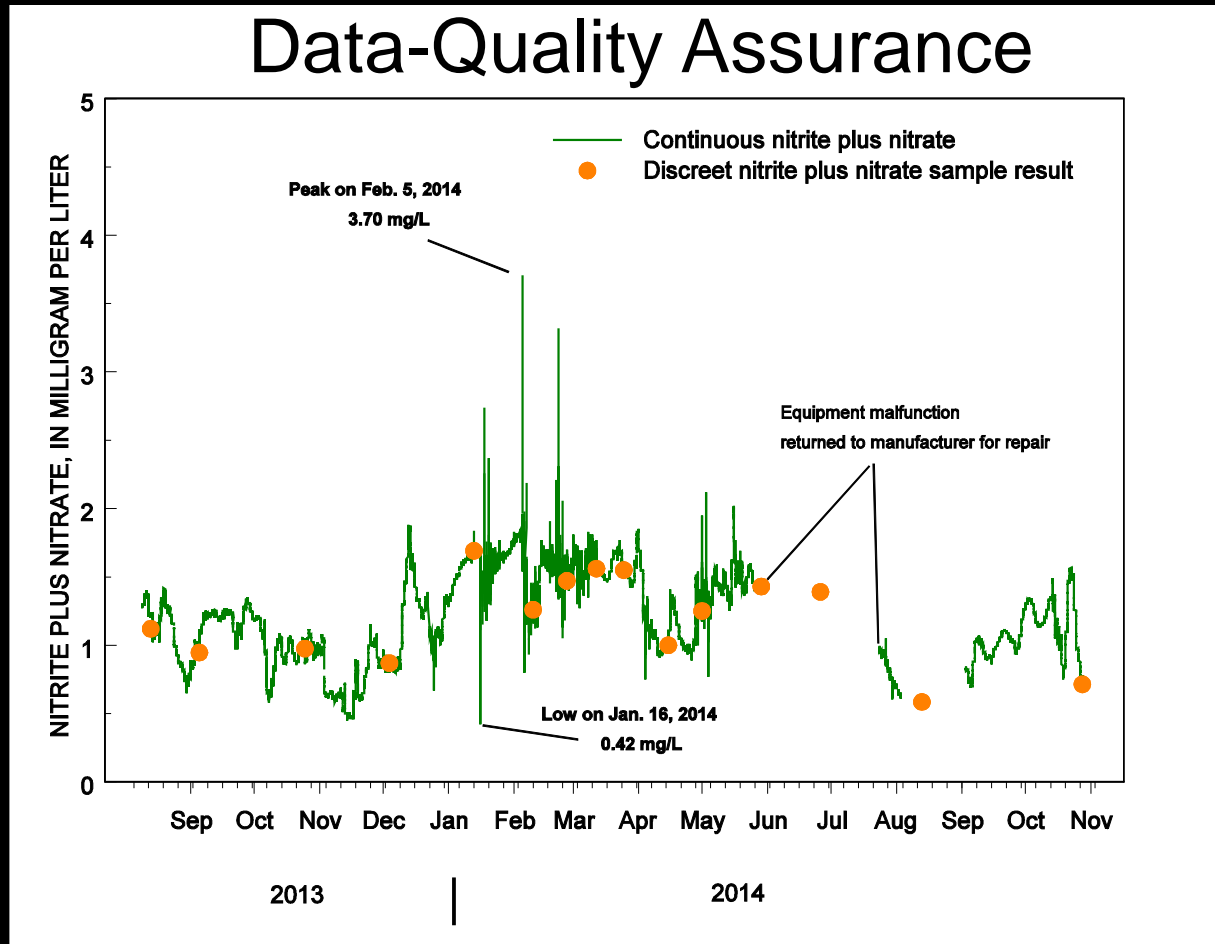


# Real-time Nitrate Data

## Green River at Spottsville, KY



# Real-time data—cont.



# Challenges/Needs

- Decline in the # of sites with sufficient water-quality data to compute accurate annual loads
  - Prioritize
- Long-term water-quality monitoring
- Real-time continuous nitrate monitoring
- Continue collaborative approach



# Thank you!



## Contact Information

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502-493-1943

***“We will be known forever by the  
tracks we leave.”***

***(American Indian Proverb)***