

**Streamflow and Nitrogen, Phosphorus, and  
Silica Flux at Selected Sites in the  
Mississippi River Basin, 1980-2005**

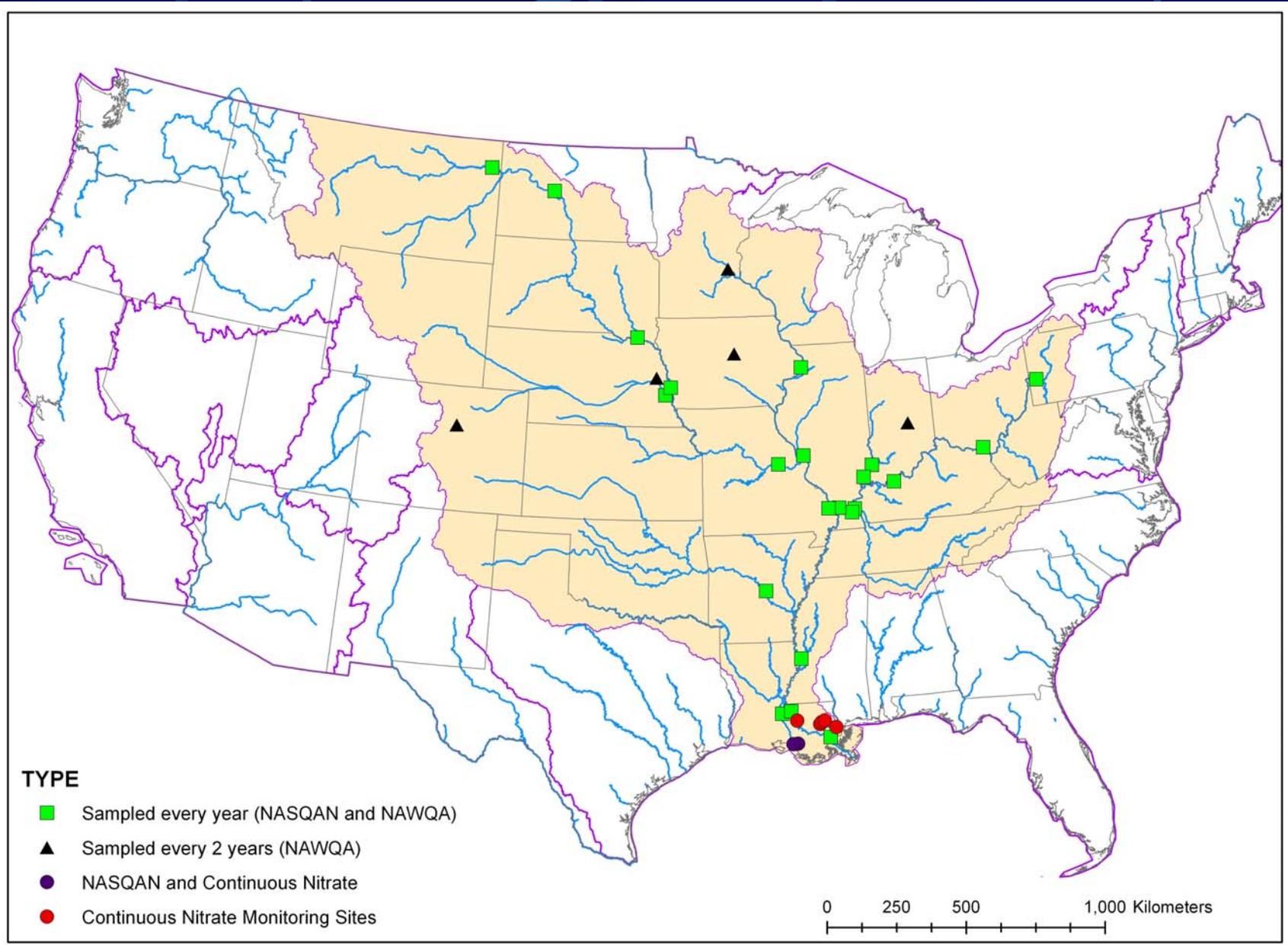
**William Battaglin, USGS, Lakewood, CO  
and Brent Aulenbach, USGS, Atlanta, GA**

# Research Question

- Nutrient Task Force Action Plan Short-term Action 11
  - By 12/2005, and every five years thereafter, the Task Force will assess the nutrient load reductions achieved and response of the hypoxic zone, water quality throughout the Basin, and economic and social effects. Based on this assessment, the Task force will determine appropriate actions to continue to implement this strategy or, if necessary, revise the strategy.

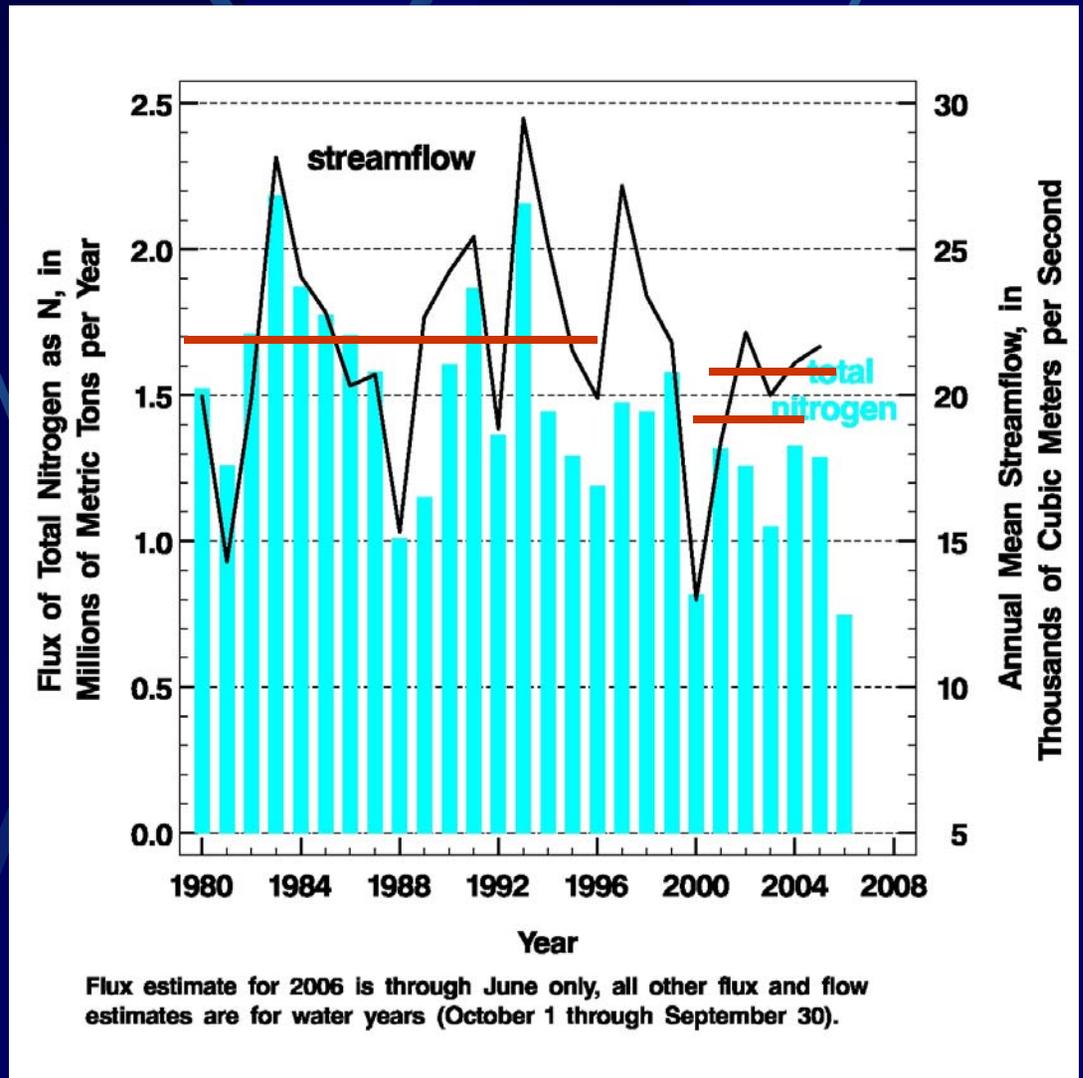


# New Mississippi Monitoring Network



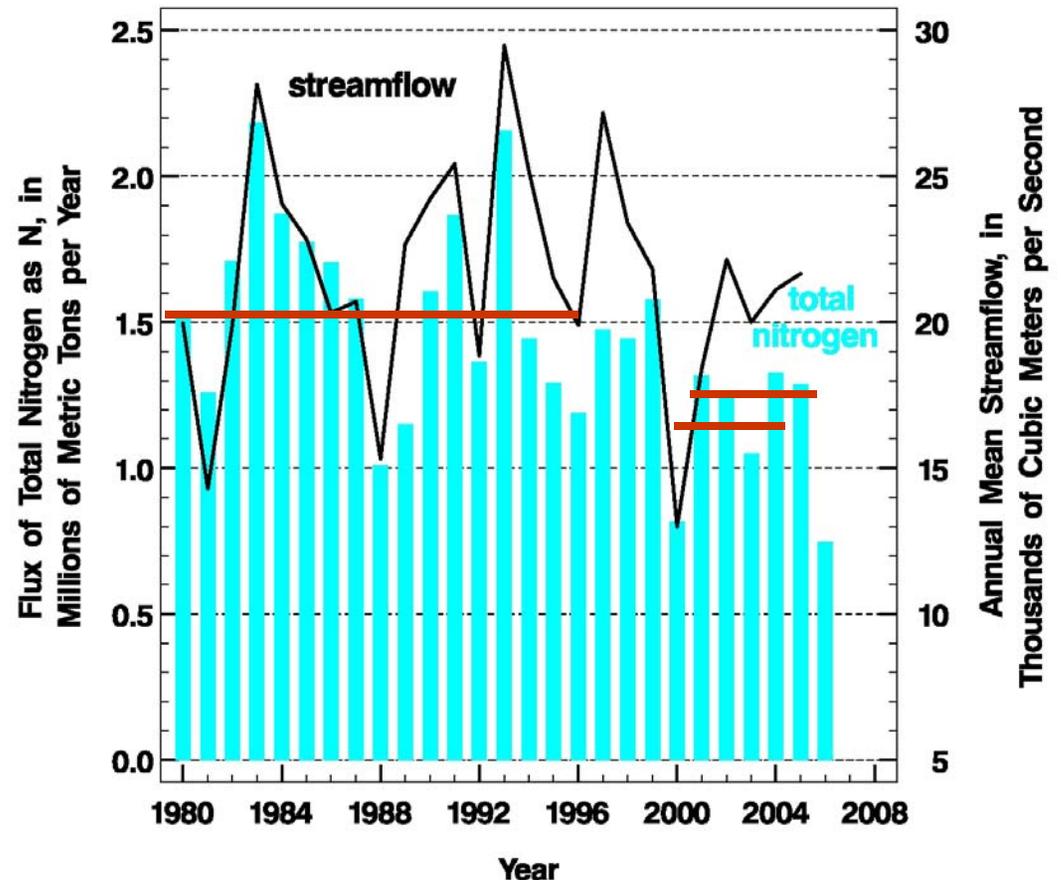
# Flux to Gulf of Mexico: Streamflow

- 1980-96 Average
  - 21,950 M<sup>3</sup>/s
- 2001-2005 Average
  - 20,660 M<sup>3</sup>/s
  - 5.8% decrease
- 2000-2004 Average
  - 18,930 M<sup>3</sup>/s
  - 13.7% decrease
- Five 5-year windows
  - 9.5% decrease
- 2006 only part year



# Flux to Gulf of Mexico: Total Nitrogen

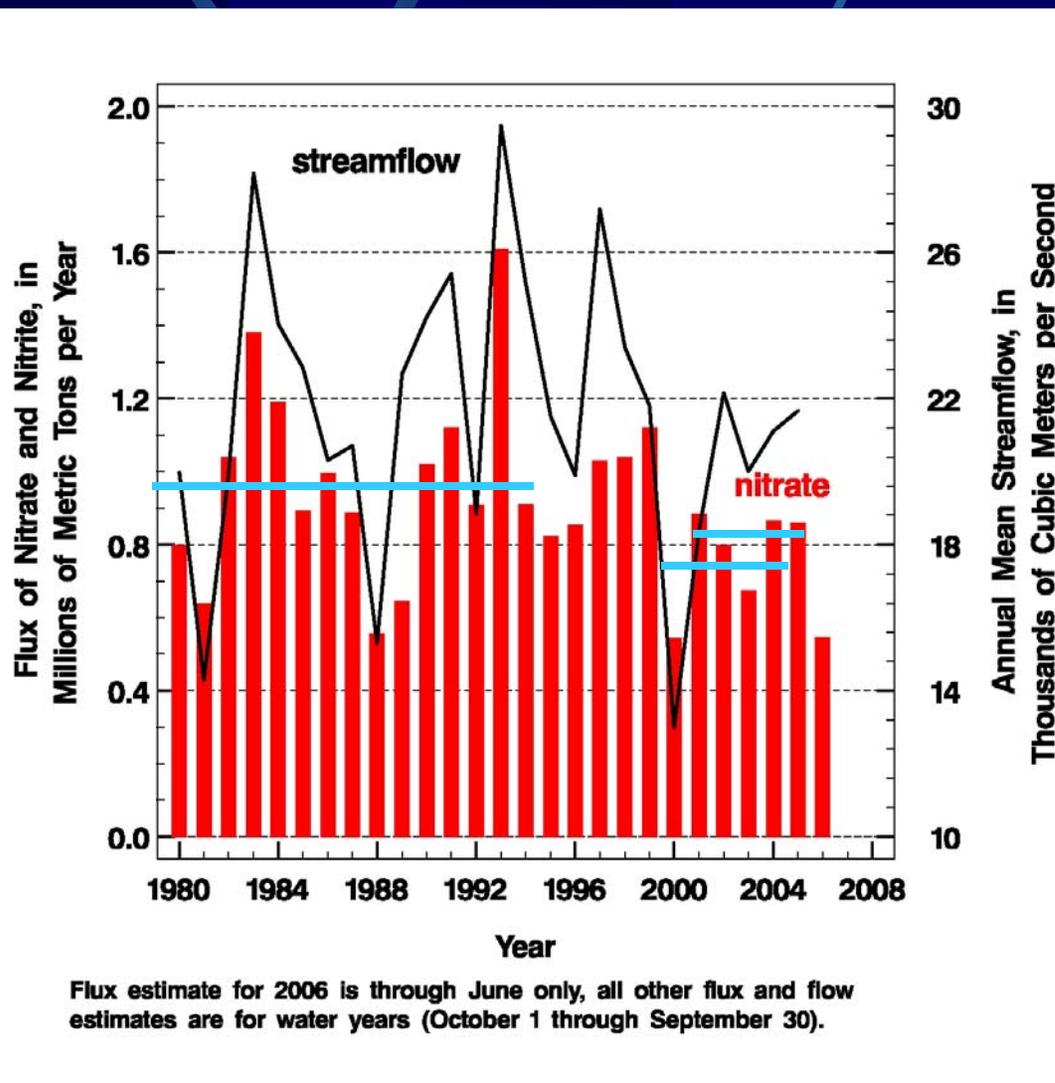
- 1980-96 Average
  - 1.569 MMT
- 2001-2005 Average
  - 1.247 MMT
  - 20.5% decrease
- 2000-2004 Average
  - 1.153 MMT
  - 26.5% decrease
- Five 5-year windows
  - 18.8% decrease



Flux estimate for 2006 is through June only, all other flux and flow estimates are for water years (October 1 through September 30).

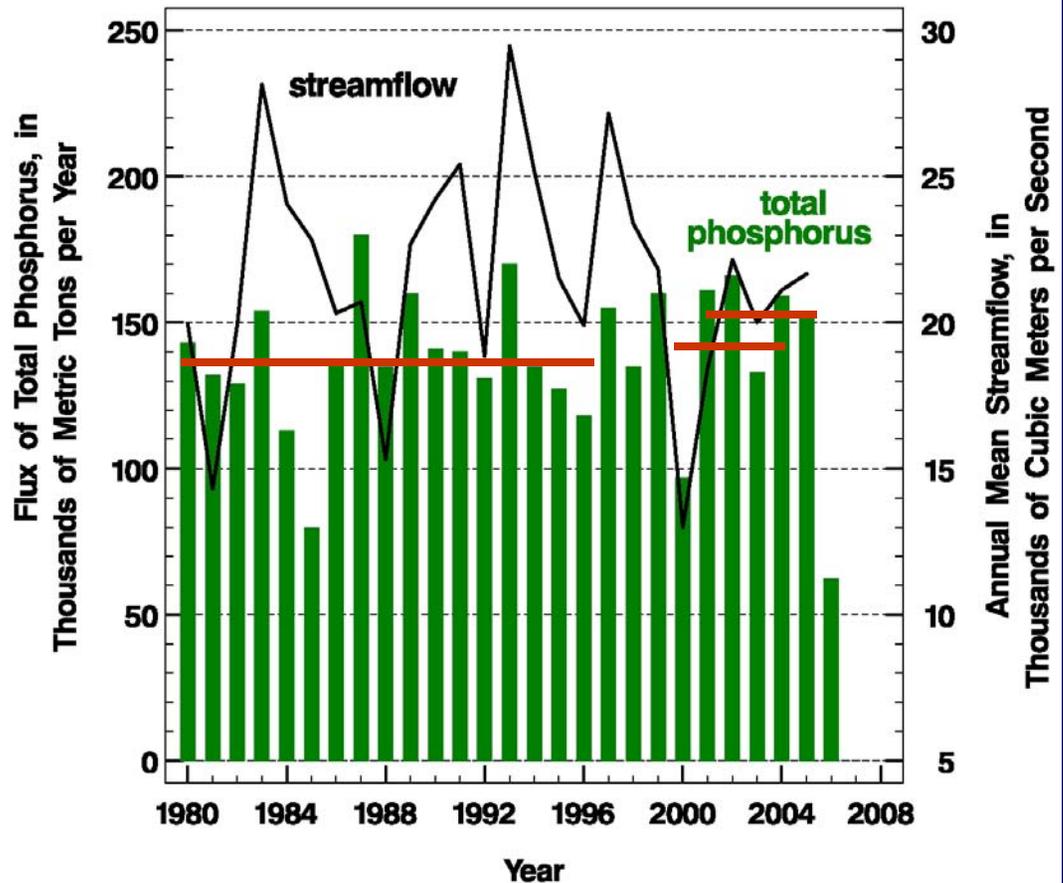
# Flux to Gulf of Mexico: Nitrate

- 1980-96 Average
  - 956,900 MT
- 2001-2005 Average
  - 816,600 MT
  - 13.3% decrease
- 2000-2004 Average
  - 753,600 MT
  - 20.8% decrease
- Five 5-year windows
  - 12.4% decrease



# Flux to Gulf of Mexico: Total Phosphorus

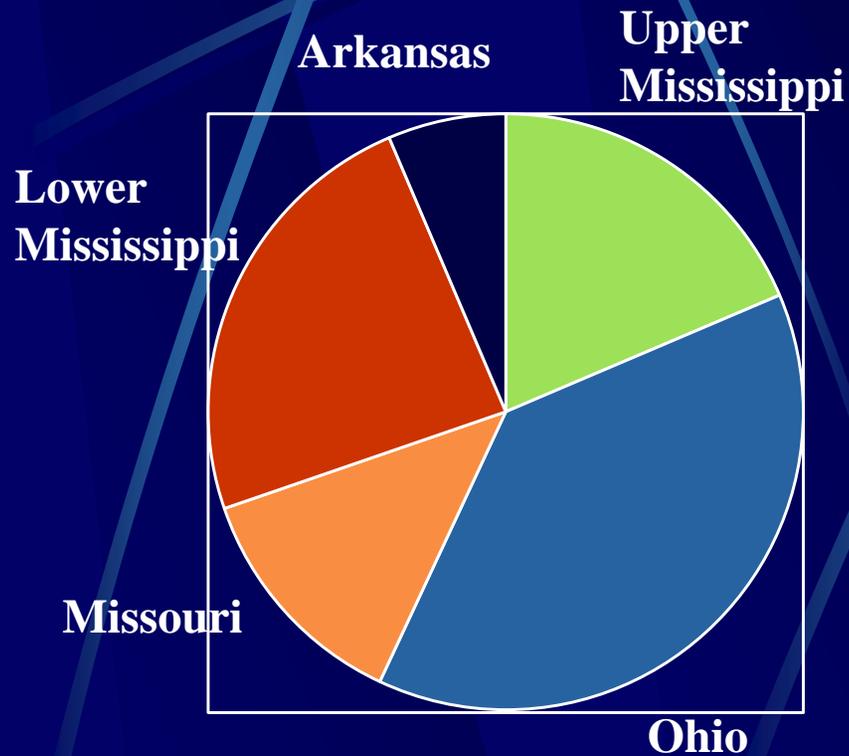
- 1980-96 Average
  - 136,700 MT
- 2001-2005 Average
  - 154,200 MT
  - 12.8% increase
- 2000-2004 Average
  - 143,100 MT
  - 4.7% increase
- Five 5-year windows
  - 6.2% increase



Flux estimate for 2006 is through June only, all other flux and flow estimates are for water years (October 1 through September 30).

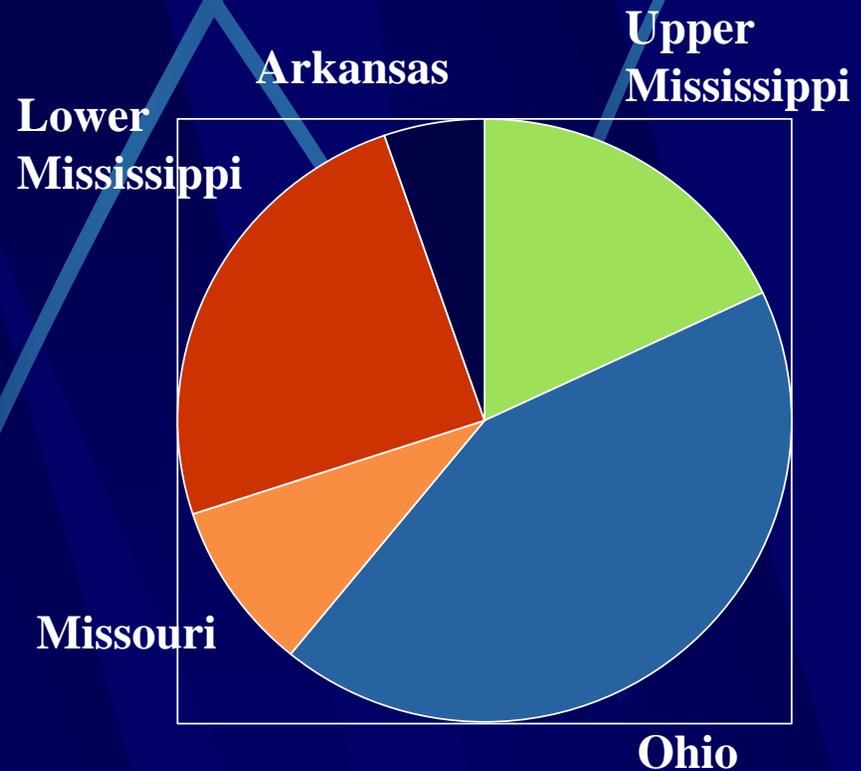
# Sources of Streamflow

1980-1996



19% Upper Mississippi  
and 38% Ohio

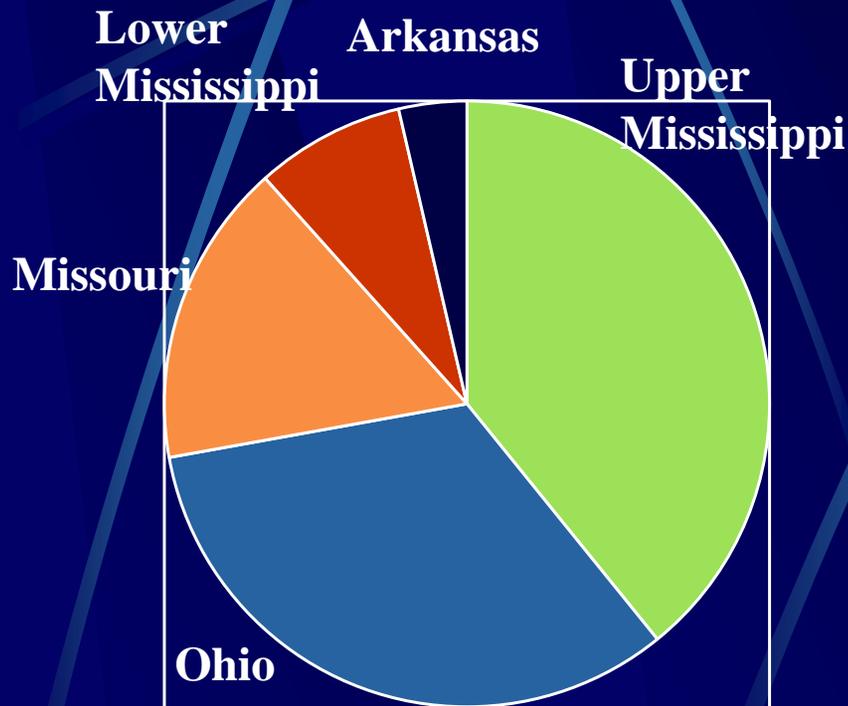
2001-2005



18% Upper Mississippi  
and 43% Ohio

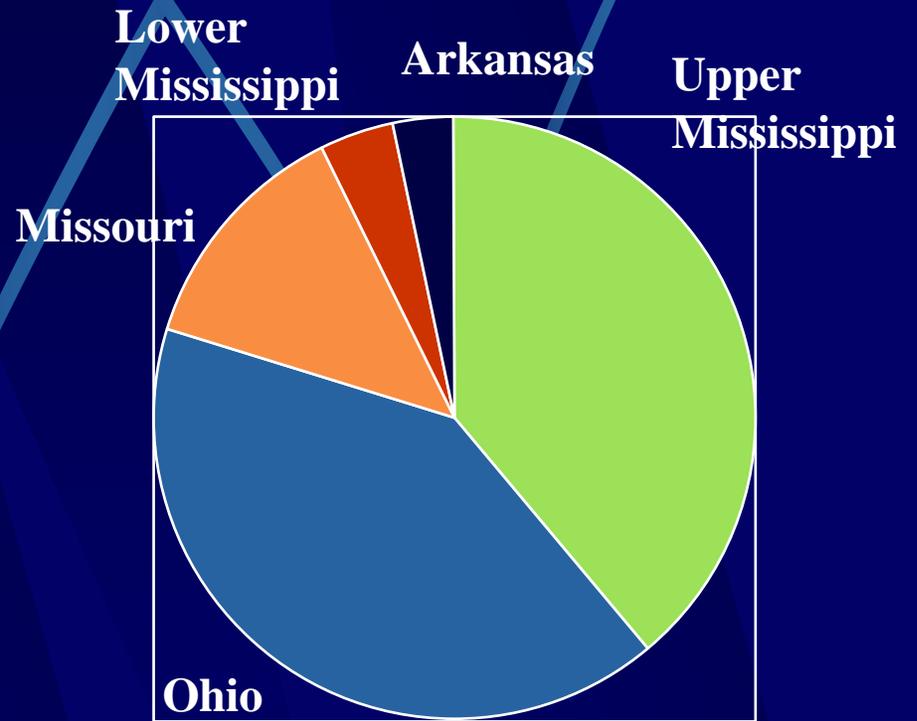
# Nutrient Sources: Total Nitrogen

1980-1996



39% Upper Mississippi  
and 33% Ohio

2001-2005



39% Upper Mississippi  
and 41% OH

# New USGS Nutrients-Hypoxia Web Page



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## Nutrients in the Mississippi River Basin and Hypoxia in the Gulf of Mexico

The USGS provides scientific information to support management actions intended to reduce excess nutrients in the Mississippi River Basin and [Hypoxia in the Gulf of Mexico](#). USGS has participated in the [Mississippi River/Gulf of Mexico Watershed Nutrient Task Force](#) since its inception in 1997. The information USGS provides includes:

- [Nutrient Fluxes for the Mississippi River Basin and Sub-basins](#)
- [Real-time Streamflow and Water Quality \(Mississippi River Basin Discharge to the Gulf\)](#)
- [More Mississippi River Basin Streamflow and Water Quality Info](#)
- [Models Describing Sources and Potential Causal Factors for Excess Nutrients in the Mississippi River Basin](#)
- [Research on Nutrient Transport, Fate, and Effects](#)
- [Other USGS Info on the Gulf of Mexico](#)



**Monitoring Networks and Data:** USGS conducts nutrient flux monitoring through the [National Stream Quality Accounting Network \(NASQAN\)](#), which is designed to characterize the concentrations and flux of sediment and chemicals in the Nation's largest rivers ([Current NASQAN Monitoring Network](#)). Sufficient measurements are made to estimate monthly chemical fluxes. Additional stations are monitored for nutrients by the [National Water Quality Assessment Program](#) and the [Cooperative Water Program](#) (conducted in cooperation with state and local agencies). However, the monitoring frequency at most of these sites is not sufficient to estimate monthly fluxes. All data collected by USGS is available through the [National Water Information System \(NWIS\)](#).

[Links to Information from Other Federal Agencies and Other Sources](#)

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U.S. Department of the Interior | U.S. Geological Survey  
URL: [http://toxics.usgs.gov/toxics-in/new\\_hypoxia/index.html](http://toxics.usgs.gov/toxics-in/new_hypoxia/index.html)  
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See - <http://toxics.usgs.gov/hypoxia>

# Summary and Conclusions



- Comparisons of streamflow and nutrient flux between 1980-1996 and 2001-2005 time periods
- Annual streamflow decreased as did annual fluxes of total nitrogen, nitrate, orthophosphate, and silica.
  - Total phosphorus flux increased
- Spring streamflow decreased as did spring fluxes of total nitrogen, nitrate, orthophosphate, and silica.
  - Total phosphorus flux increased
- Proportionally more water and nutrients came from the Ohio Basin than the Upper Mississippi Basin during 2001-2005
  - Upper Mississippi about the same

