

# Illinois Benchmark Sediment Monitoring Program

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# Overview

- Illinois BSMP background
  - Program
  - Network
- Results
  - Long-term annual mean concentration and yields
  - Trends at Illinois River Basin stations

# Background

- BSMP established in 1980; network of 15 monitoring stations located throughout Illinois
- Goal of the BSMP:
  - Develop comprehensive, long-term sediment dataset to provide a means for investigating and quantifying long-term trends that may be occurring in Illinois watersheds
- Other applications:
  - Identify watersheds with high erosion rates
  - Identify areas of potential water supply degradation
  - Evaluate effectiveness of erosion control programs
  - Estimate sediment loads in nearby unmeasured streams

# Network Description

- All stations except one are located at USGS streamgaging stations
- Instantaneous suspended sediment load is then computed using the instantaneous discharge and concentration for each sample
- Types of suspended sediment samples are collected:
  - weekly [citizen observers]
  - cross-section calibration [ISWS staff]

# Typical Sediment Sampling Box



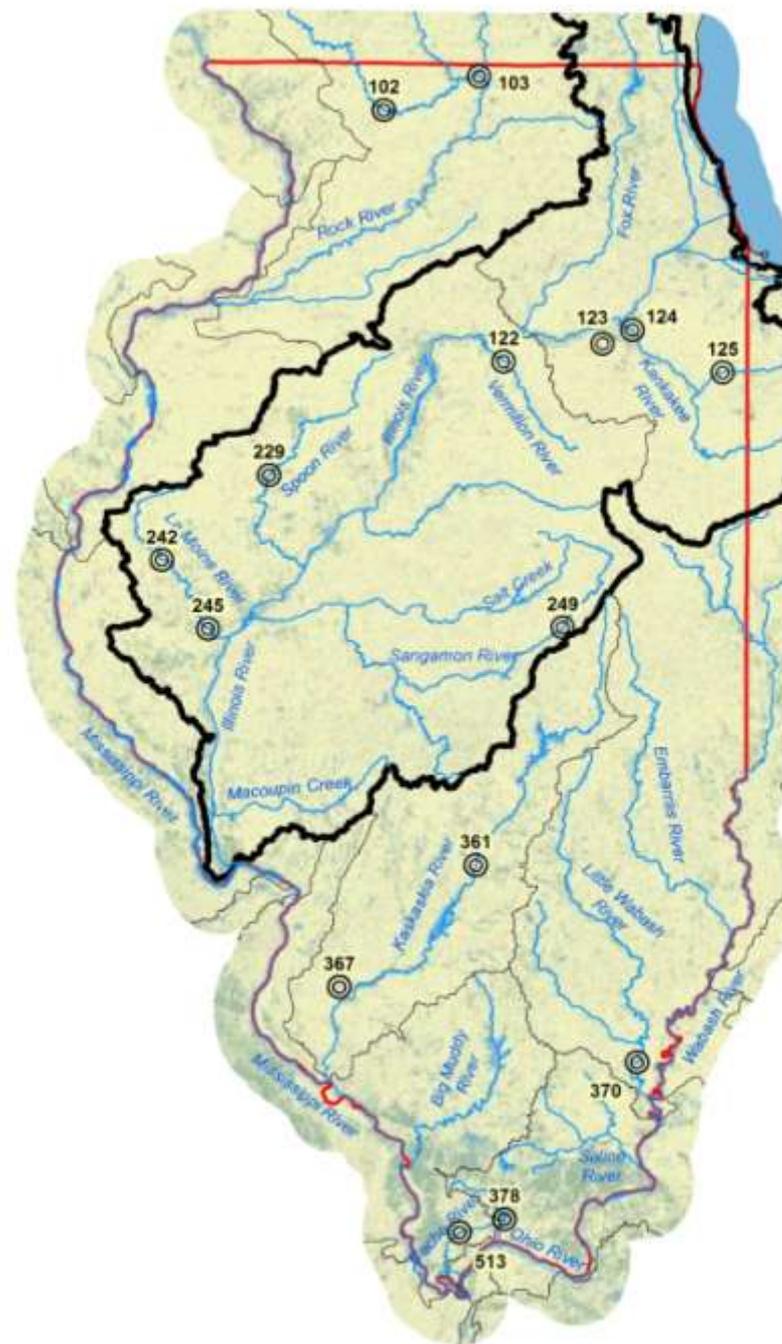
Weekly samples are taken at a fixed location over the thalweg of the main channel using a California-style sediment box that houses a cable, reel, and DH-59 depth-integrated sampler

Sangamon River at Monticello (249)

# BSMP Station information

<i>ISWS number</i>	<i>USGS number</i>	<i>Station name</i>	<i>Period of record</i>	<i>Water years</i>
102	05435500	Pecatonica River at Freeport	1981, 1982, 1984-present	30
103	05437500	Rock River at Rockton	1981-present	31
<b>122</b>	<b>05555300</b>	<b>Vermilion River near Leonore</b>	<b>1984-present</b>	<b>28</b>
<b>123</b>	<b>05542000</b>	<b>Mazon River near Coal City</b>	<b>1981-1997, 2002-present</b>	<b>26</b>
<b>124</b>	<b>05527500</b>	<b>Kankakee River near Wilmington</b>	<b>1983-present</b>	<b>29</b>
<b>125</b>	<b>05520500</b>	<b>Kankakee River at Momence</b>	<b>1982-1985, 1987, 1988, 1991, 1993-present</b>	<b>26</b>
<b>229</b>	<b>05569500</b>	<b>Spoon River at London Mills</b>	<b>1981-1987, 1992, 1994-present</b>	<b>26</b>
<b>242</b>	<b>05584500</b>	<b>La Moine River at Colmar</b>	<b>1981-1988, 1993-present</b>	<b>27</b>
<b>245</b>	<b>05585000</b>	<b>La Moine River at Ripley</b>	<b>1984-1990, 1993-present</b>	<b>26</b>
<b>249</b>	<b>05572000</b>	<b>Sangamon River at Monticello</b>	<b>1981-present</b>	<b>31</b>
361	05592500	Kaskaskia River at Vandalia	1981-1988, 1990-present	30
367	05594800	Silver Creek near Freeburg	1981, 1982, 1984-1988, 1990- 2010	28
370	03381500	Little Wabash River at Carmi	1981-1985, 1993-present	24
378	03612000	Cache River at Forman	1981-present	31
513	NA	Cache River at Ullin	1995-present	17

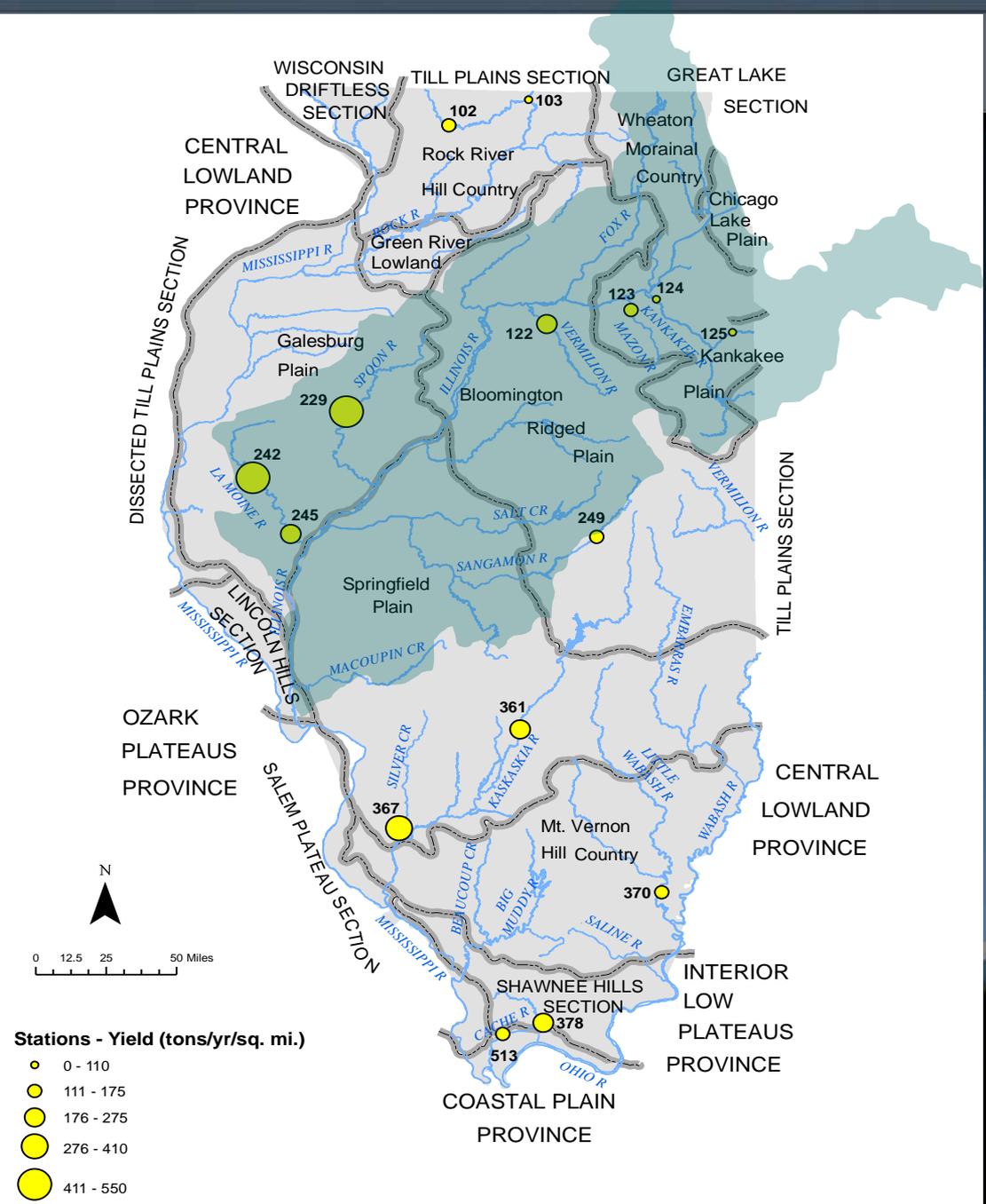
# BSMP Stations



# Study analyzed data through 2005

- Compute 25-year means
  - Sediment concentrations
  - Sediment yields
- Trends analysis for annual means
  - Discharge
  - Concentration
  - Loads

# Suspended Sediment Yield, 25-year mean



# Trend Results (WY1981-2005)

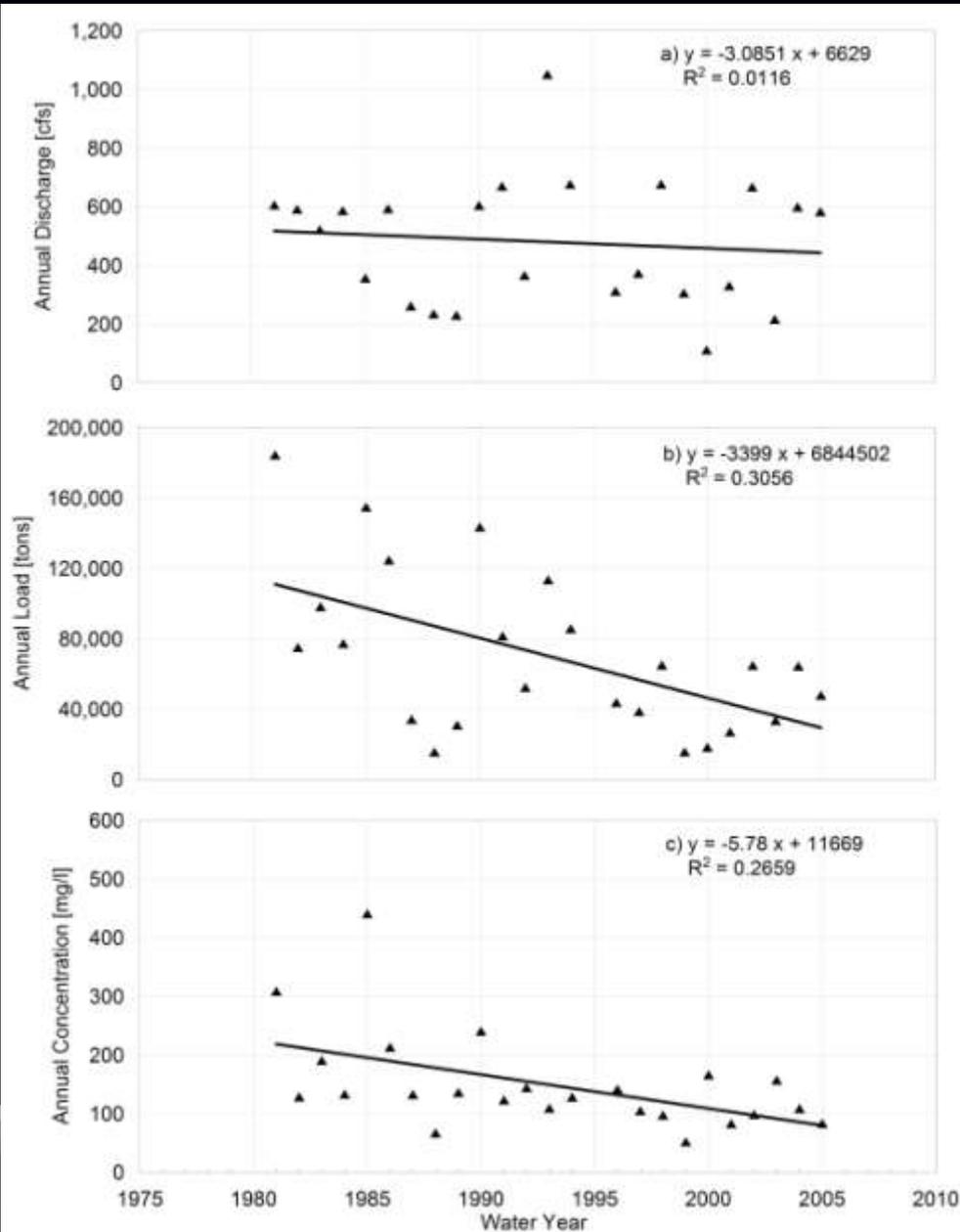
ISWS#	Station location	$\tau$ coefficients			Two-sided $p$ values			WY	Trends <sup>1</sup>		
		$\tau_D$	$\tau_{SL}$	$\tau_{SC}$	$\tau_D$	$\tau_{SL}$	$\tau_{SC}$		$\tau_D / \tau_{SL}, \tau_{SC}$	$\tau_D$	$\tau_{SL}$
122	Vermilion River near Leonore	-0.2	-0.219	-0.2381	0.1682	0.1742	0.139	25/21	↔	↔	↔
123	Mazon River near Coal City	-0.2121	-0.5	-0.45	0.1759	<b>0.0079</b>	<b>0.017</b>	22/16	↔	↓	↓
124	Kankakee River near Wilmington	-0.2133	-0.4737	-0.4632	0.1412	<b>0.0039</b>	<b>0.0048</b>	25/20	↔	↓	↓
125	Kankakee River at Momence	-0.2	-0.2121	0.2727	0.1682	0.3727	0.2437	25/12	↔	↔	↔
229	Spoon River at London Mills	-0.1933	-0.5425	-0.4771	0.1831	<b>0.0019</b>	<b>0.0064</b>	25/18	↔	↓	↓
242	La Moine River at Colmar	-0.0667	-0.3684	-0.345	0.6572	<b>0.0301</b>	<b>0.0424</b>	25/19	↔	↓	↓
245	La Moine River at Ripley	-0.2267	-0.462	-0.3918	0.1176	<b>0.0064</b>	<b>0.0209</b>	25/19	↔	↓	↓
249	Sangamon River at Monticello	-0.0867	-0.3478	-0.3841	0.5593	<b>0.0185</b>	<b>0.0092</b>	25/24	↔	↓	↓

(90% confidence limits)

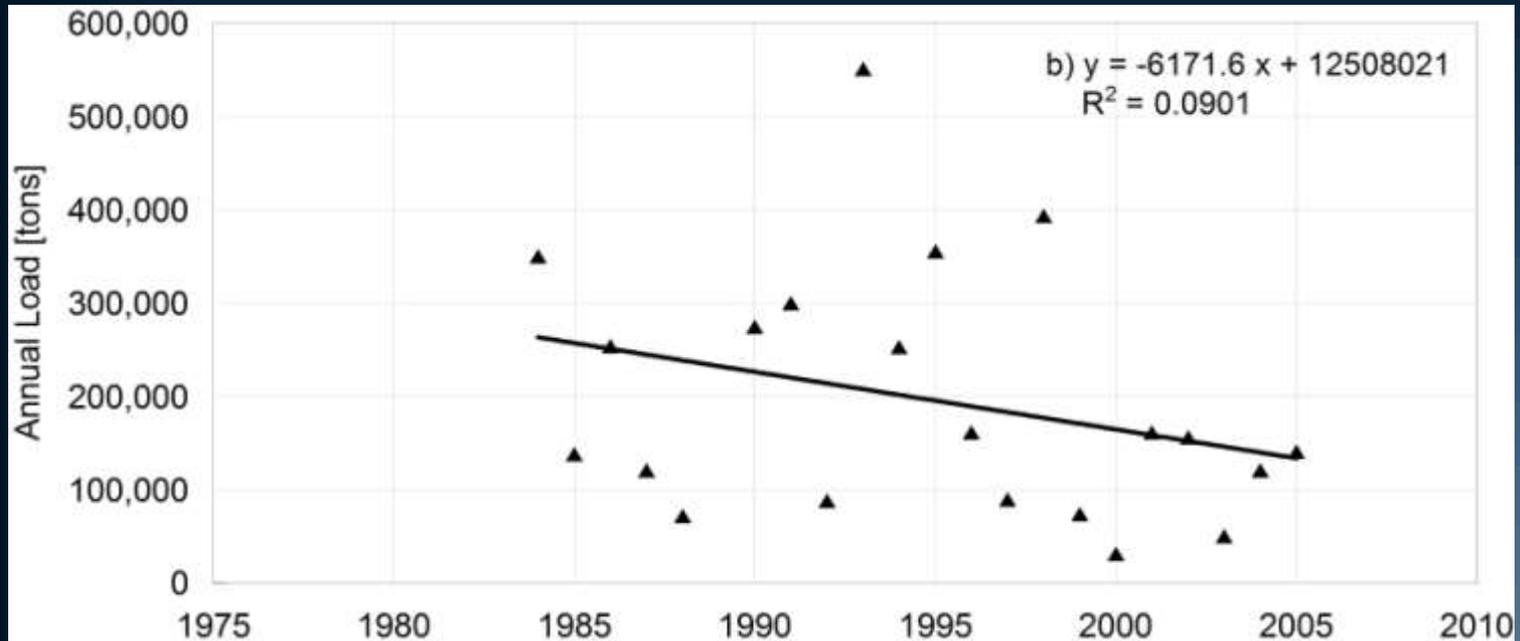
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		$\tau_D$	$\tau_{SL}$	$\tau_{SC}$
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124	Kankakee River near Wilmington	↔	↓	↓
125	Kankakee River at Momence	↔	↔	↔
229	Spoon River at London Mills	↔	↓	↓
242	La Moine River at Colmar	↔	↓	↓
245	La Moine River at Ripley	↔	↓	↓
249	Sangamon River at Monticello	↔	↓	↓

# Discharge, Load & Concentration Trends

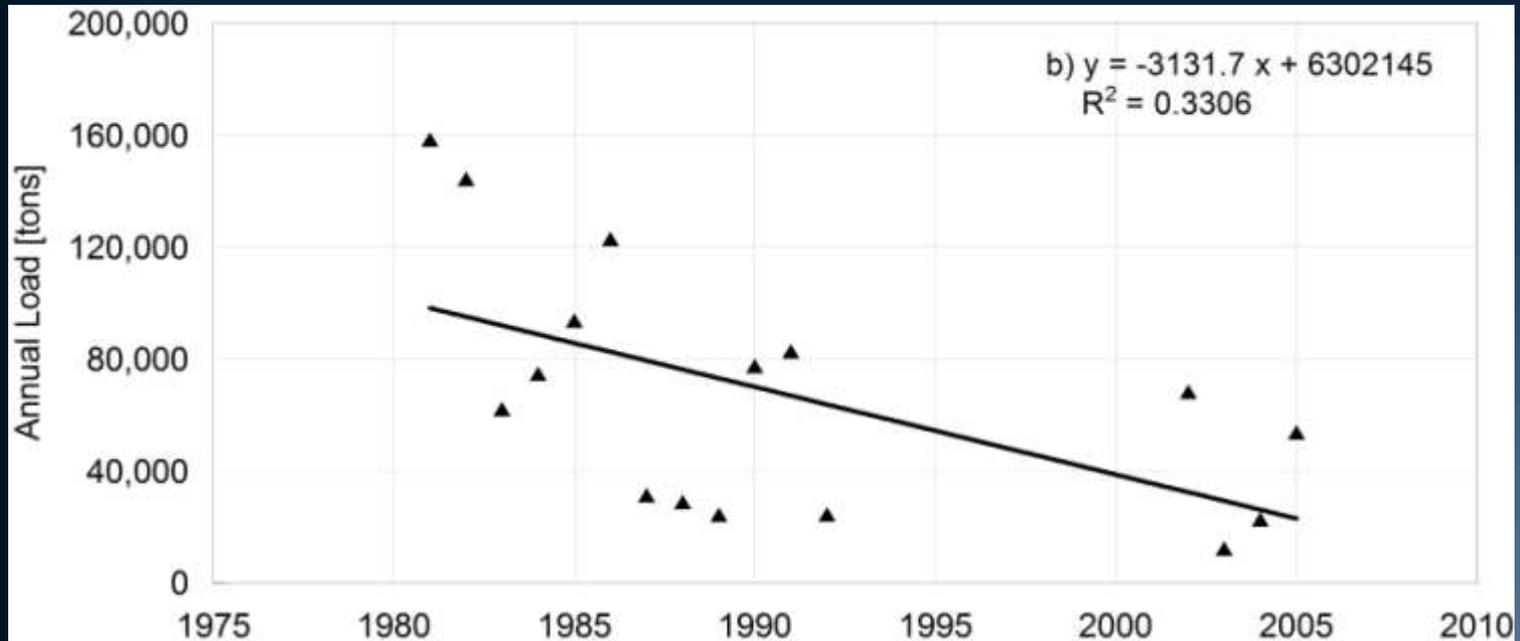
Spoon River at London Mills (249)



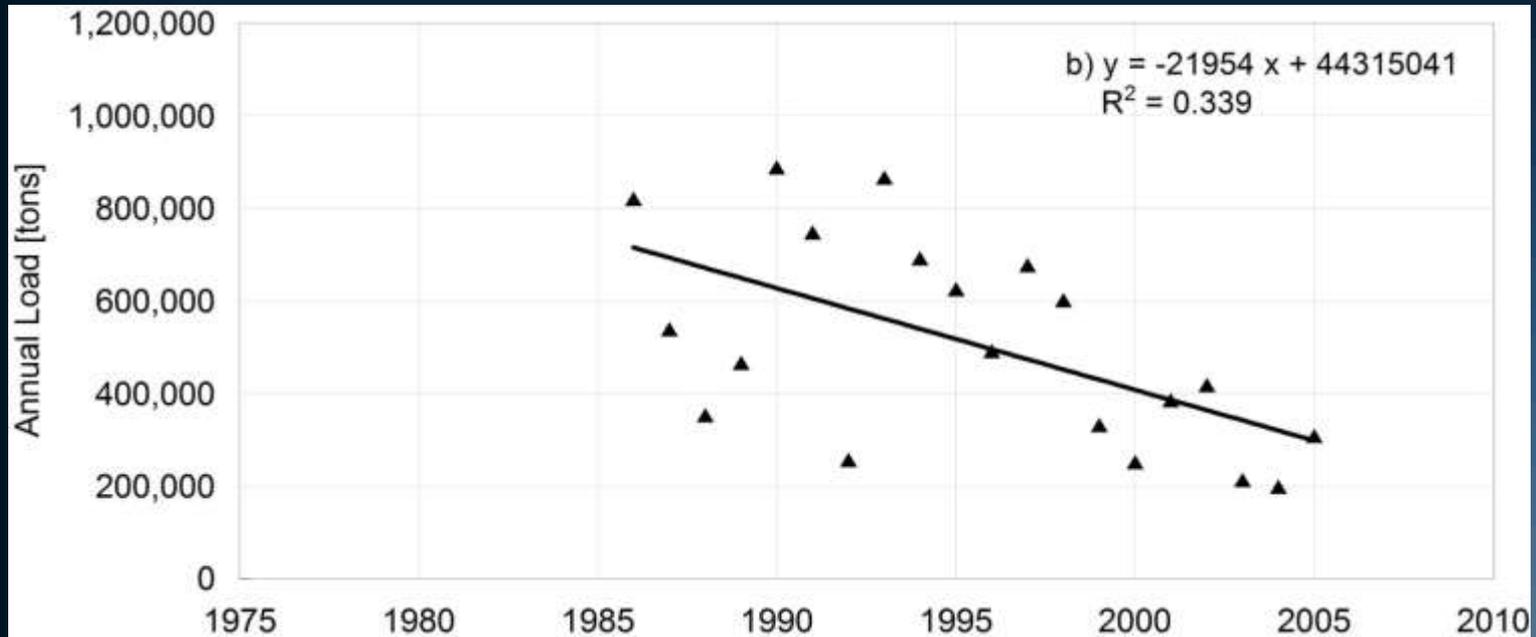
# Vermilion River near Leonore (122)



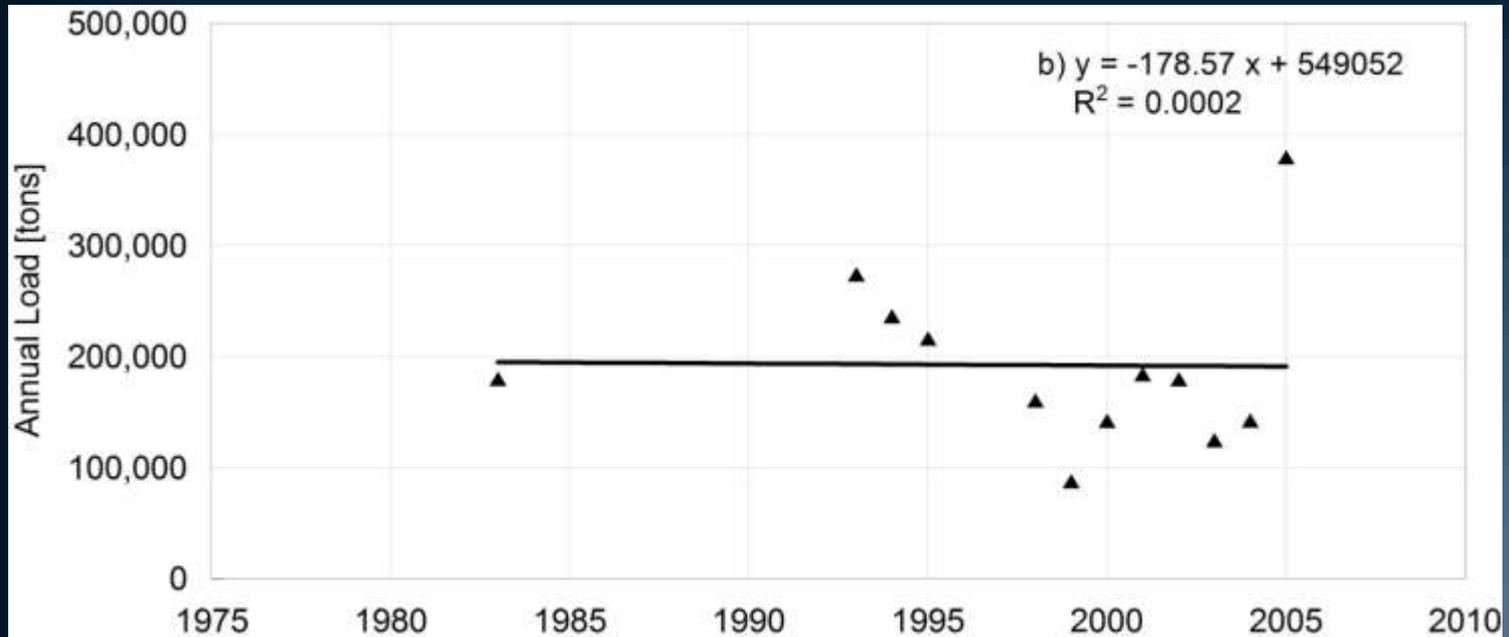
# Mazon River near Coal City (123)



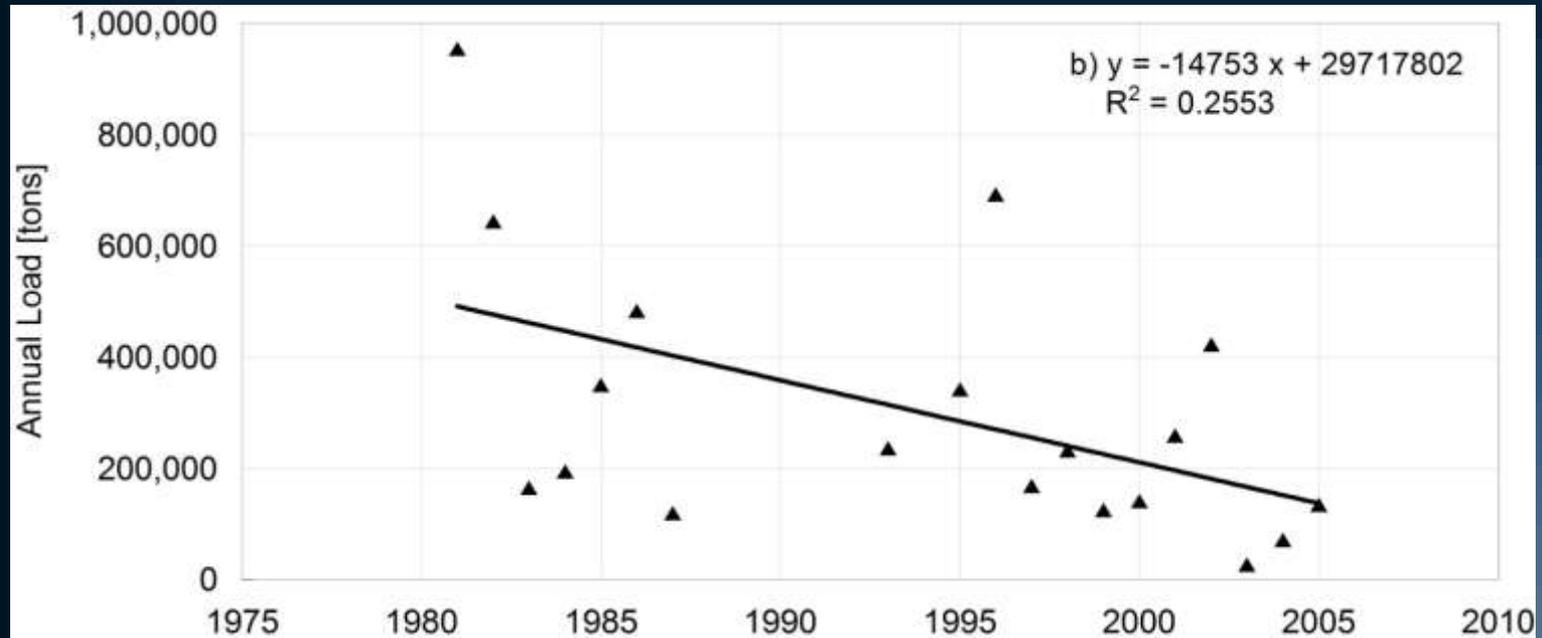
# Kankakee River near Wilmington (124)



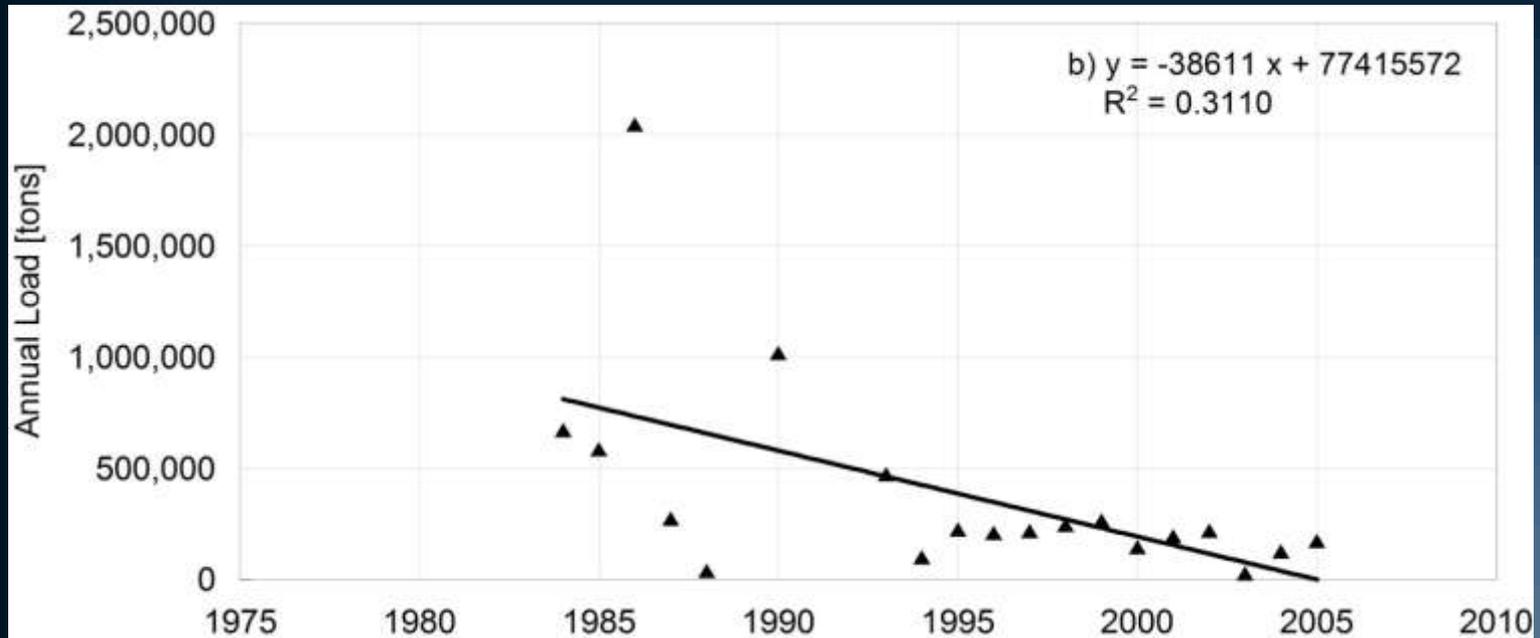
# Kankakee River at Momence (125)



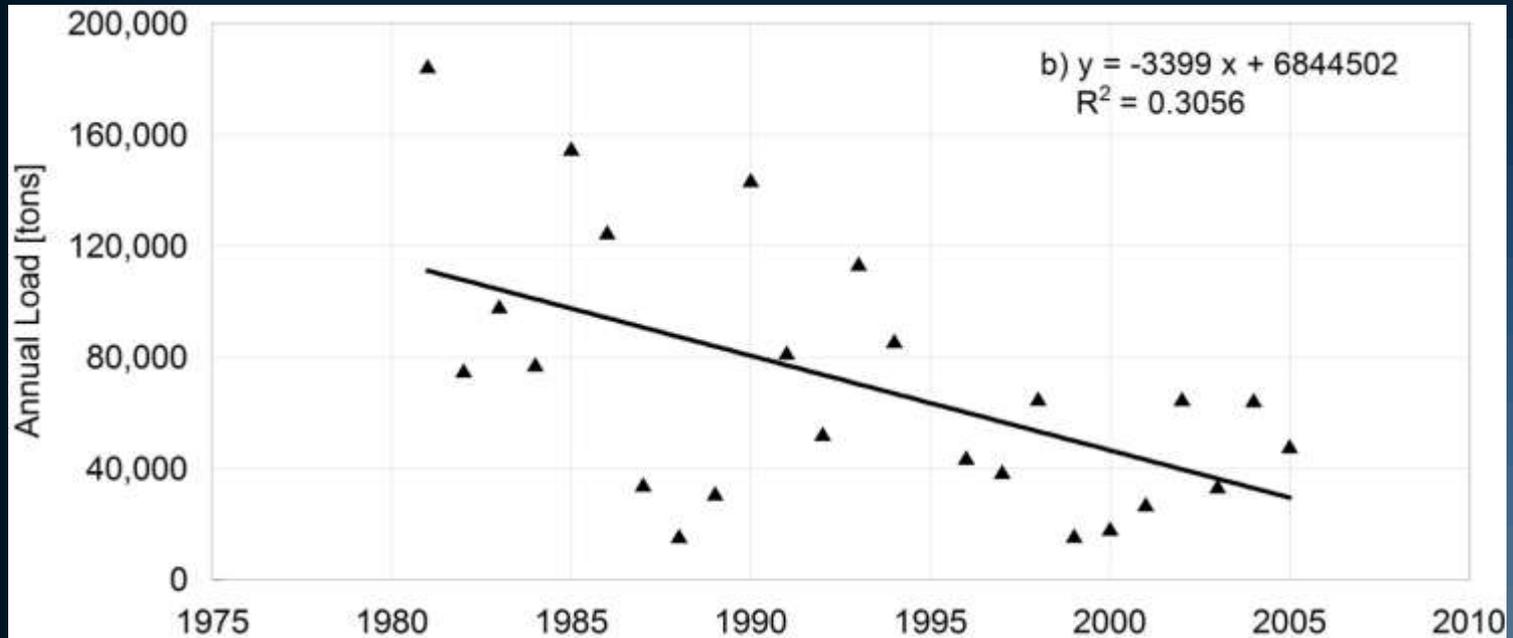
# La Moine River at Colmar (242)



# La Moine River at Ripley (245)



# Sangamon River at Monticello (249)



# Summary

- Illinois River tributary BSMP stations
  - 25-yr mean sediment concentrations and loads are highest in the downstream (west) tributary watersheds
  - All 8 stations have no trend for discharge
  - 6 of 8 BSMP stations have statistically significant decreasing trends for sediment from 1980's through 2005
  - ISWS report is in progress

*Thank you!*