Lake Decatur Watershed 15-year Monitoring: Nitrates and Trends

Laura L. Keefer, Erin Bauer & Momcilo Markus
Illinois State Water Survey
Prairie Research Institute
University of Illinois
Champaign, Illinois

ILLINOIS STATE WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

ILLINOIS

Acknowledgements

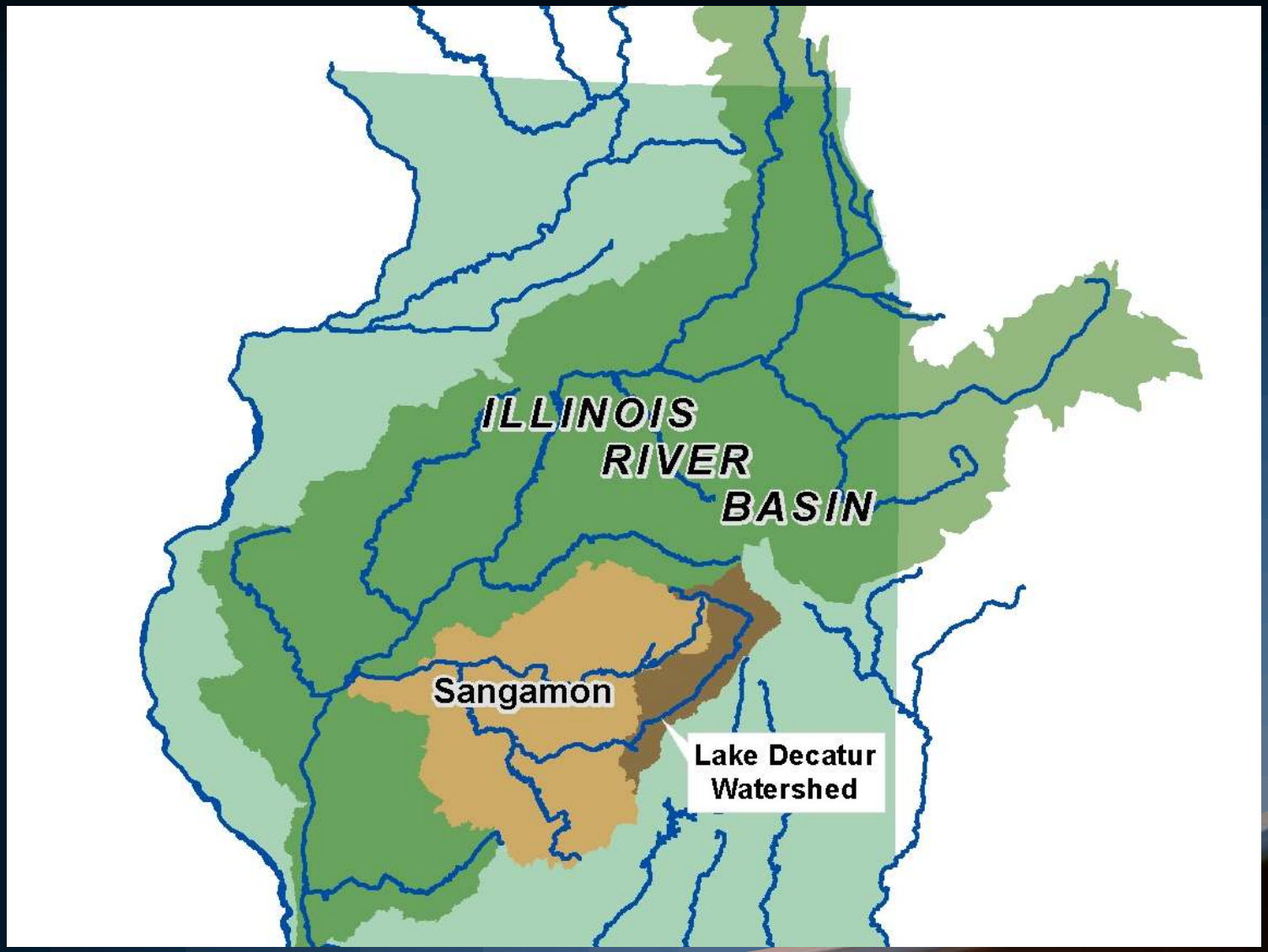
- City of Decatur, Keith Alexander
- ISWS Staff

Field staff	*Data processing*	*Lab analysis*
Louis Arighi	Ben Bromiel	Sue Bachman
Bill Bogner	Brian Chaille	Saada Hamdy
Kevin Rennels	Brad Chapin	Troy Foster
Amy Russell	Robert Gardner	Sofia Lazovski
Susan Shaw	Sandy Jones	Matt Lowell
James Slowikowski	David Preston	RuthAnn Nicols
Josh Stevens	Mary Richardson	Todd Peters
Marguerite Tan	Amy Russell	Lavany Reddy
Ryan Williams	Susan Shaw	Lauren Sievers
		Loretta Skowron
		Kay Surratt
		Dan Webb

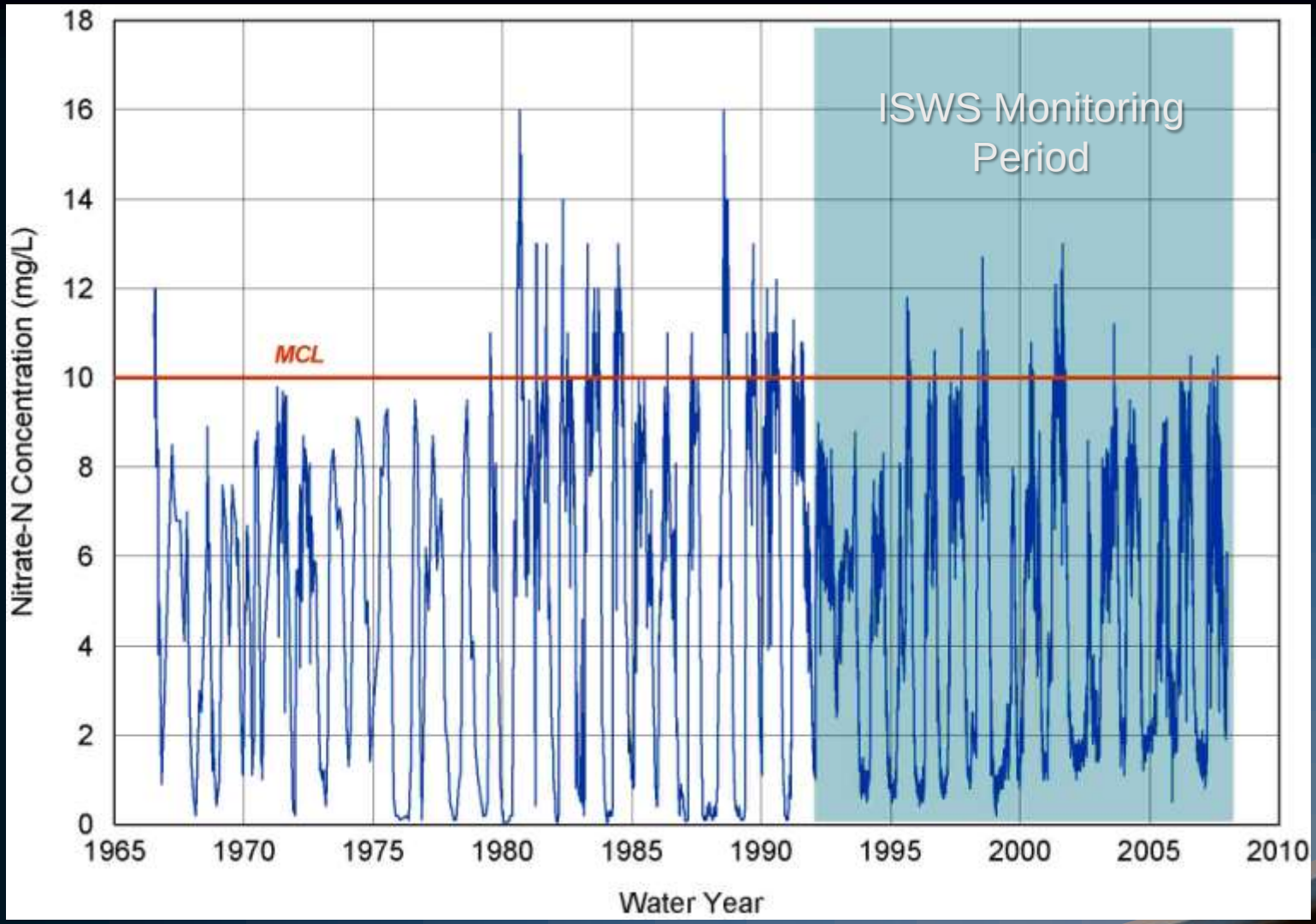
Overview

- Watershed background
  - Historical nitrate-N levels in Lake Decatur
  - Change in land cover
- Summary of 15-year monitoring data
- Spatial and temporal observations
- Nitrate-N trends

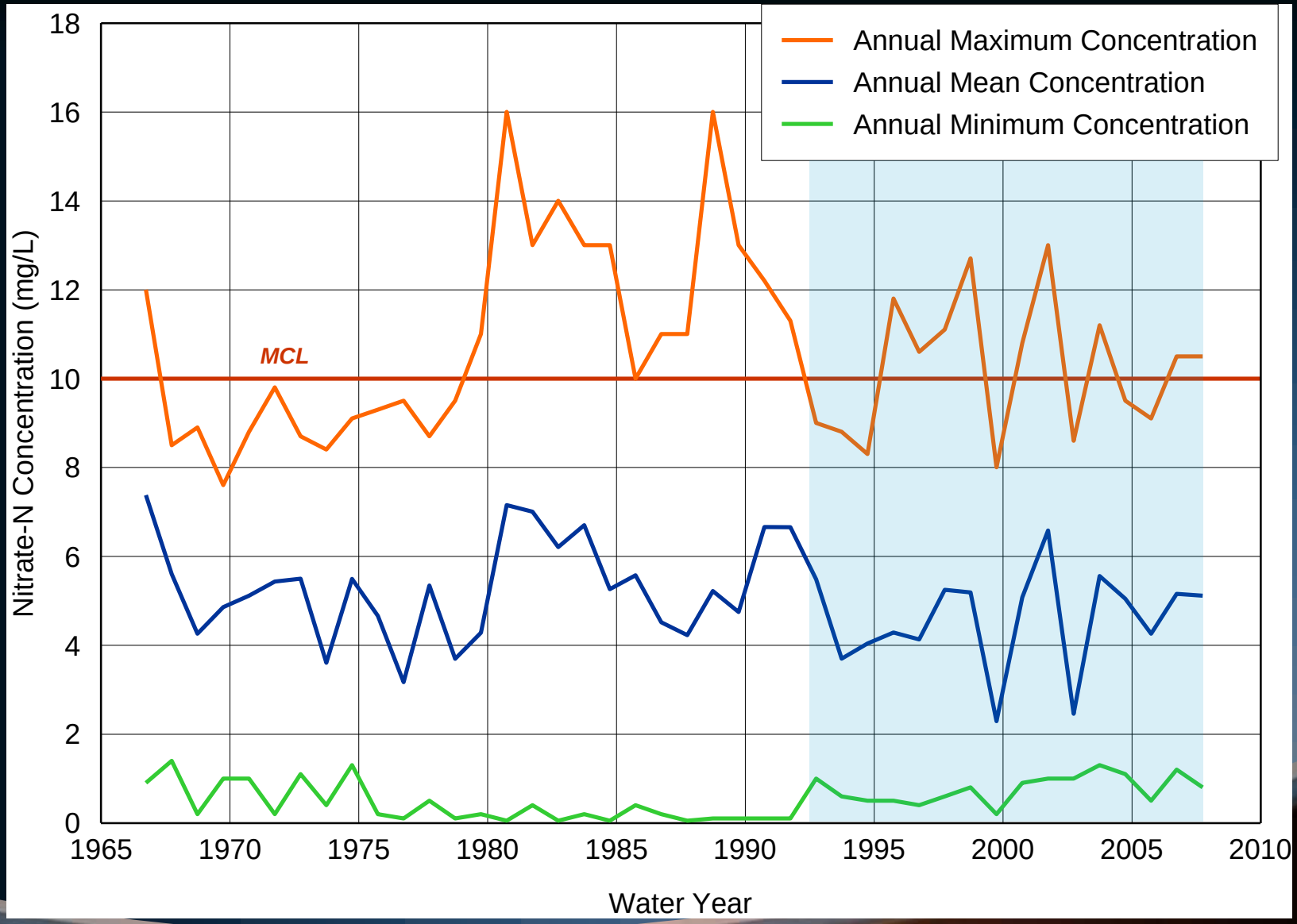
Lake Decatur Watershed



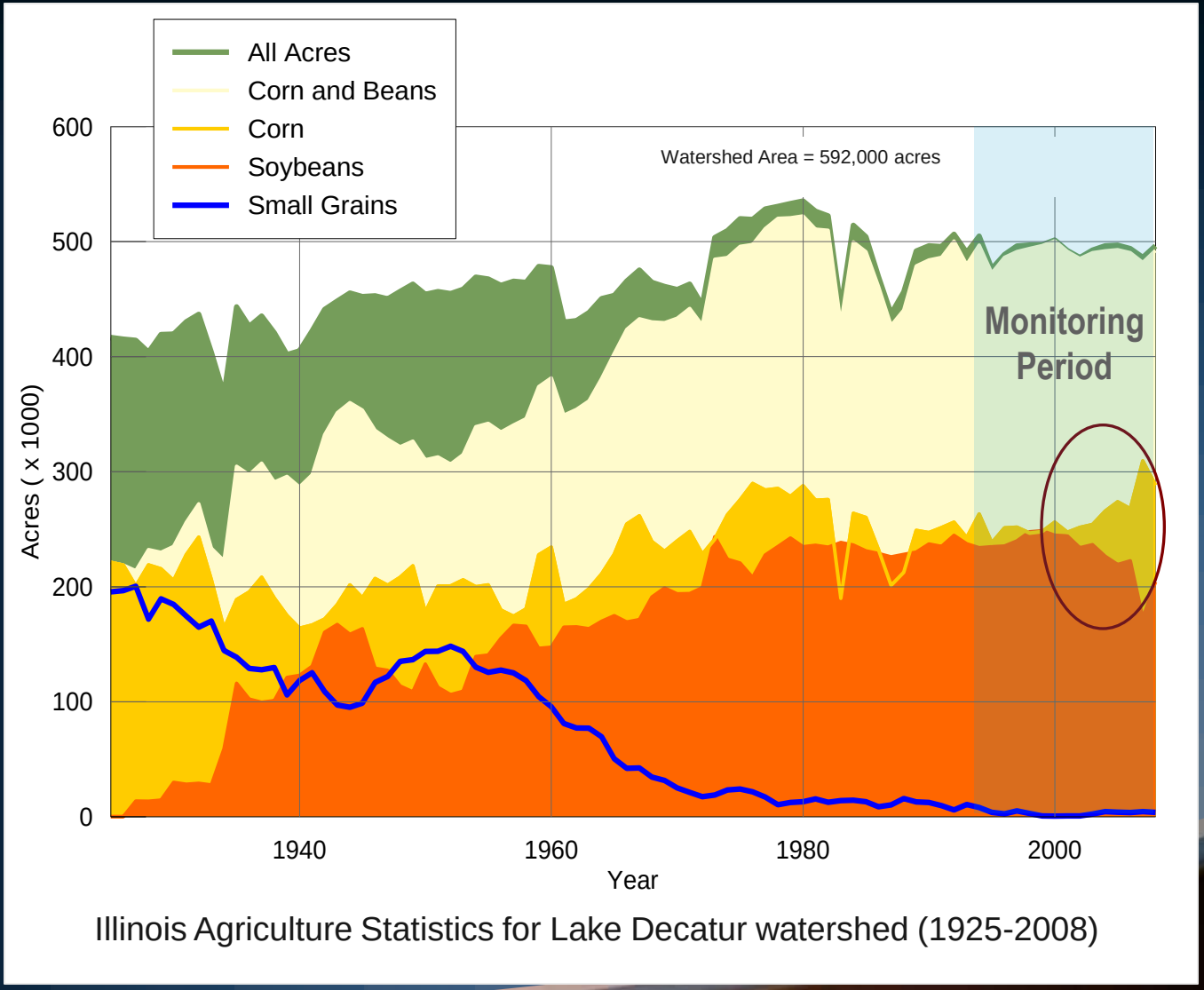
Lake Decatur Nitrate Levels (1967-2008)



Lake Decatur Nitrate Levels (1967-2008)

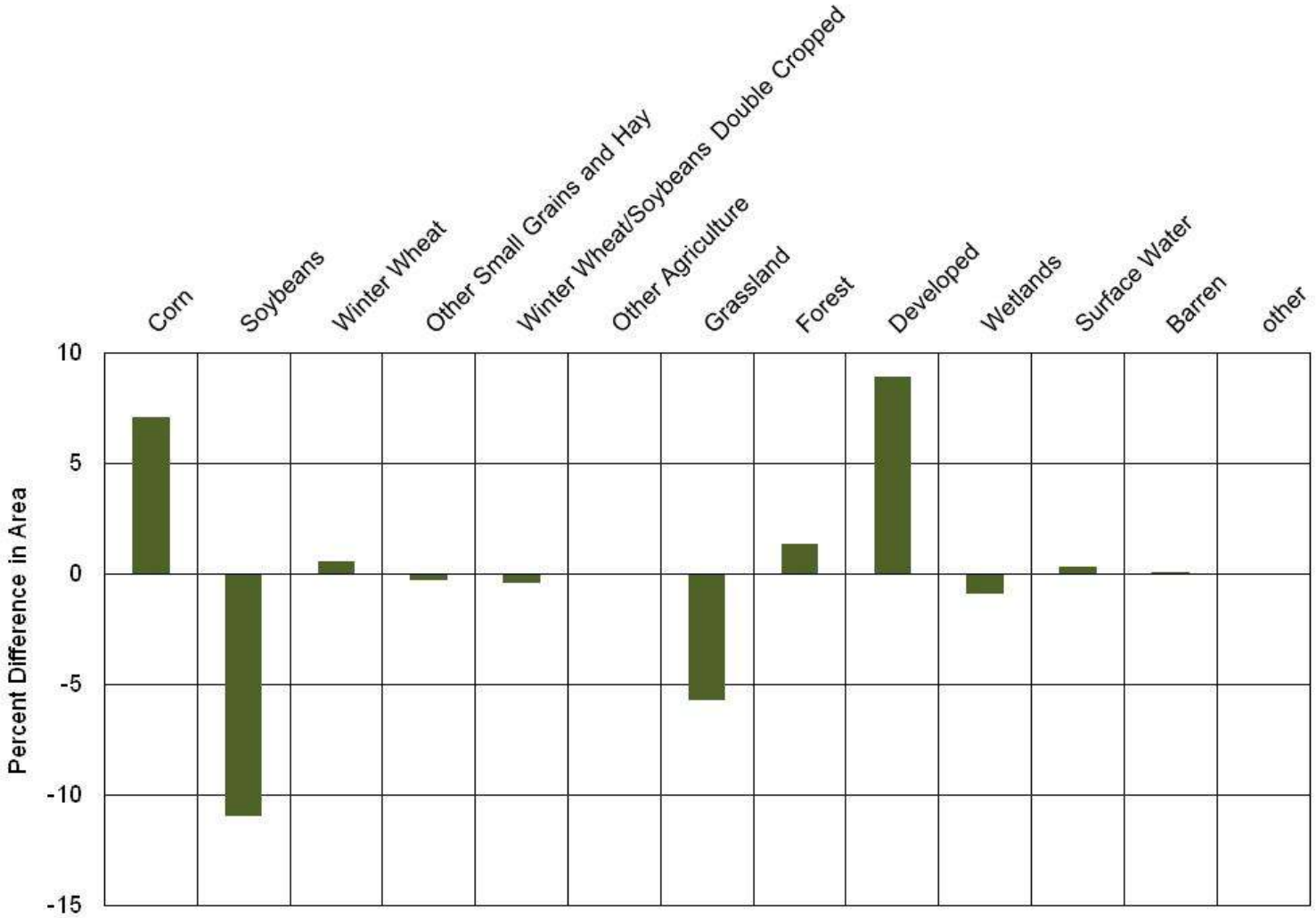


Watershed Land Use/Cover

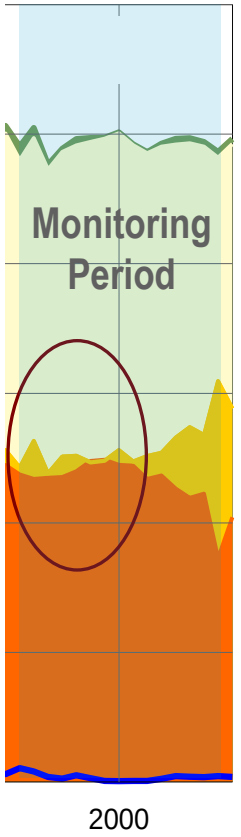


Illinois Agriculture Statistics for Lake Decatur watershed (1925-2008)

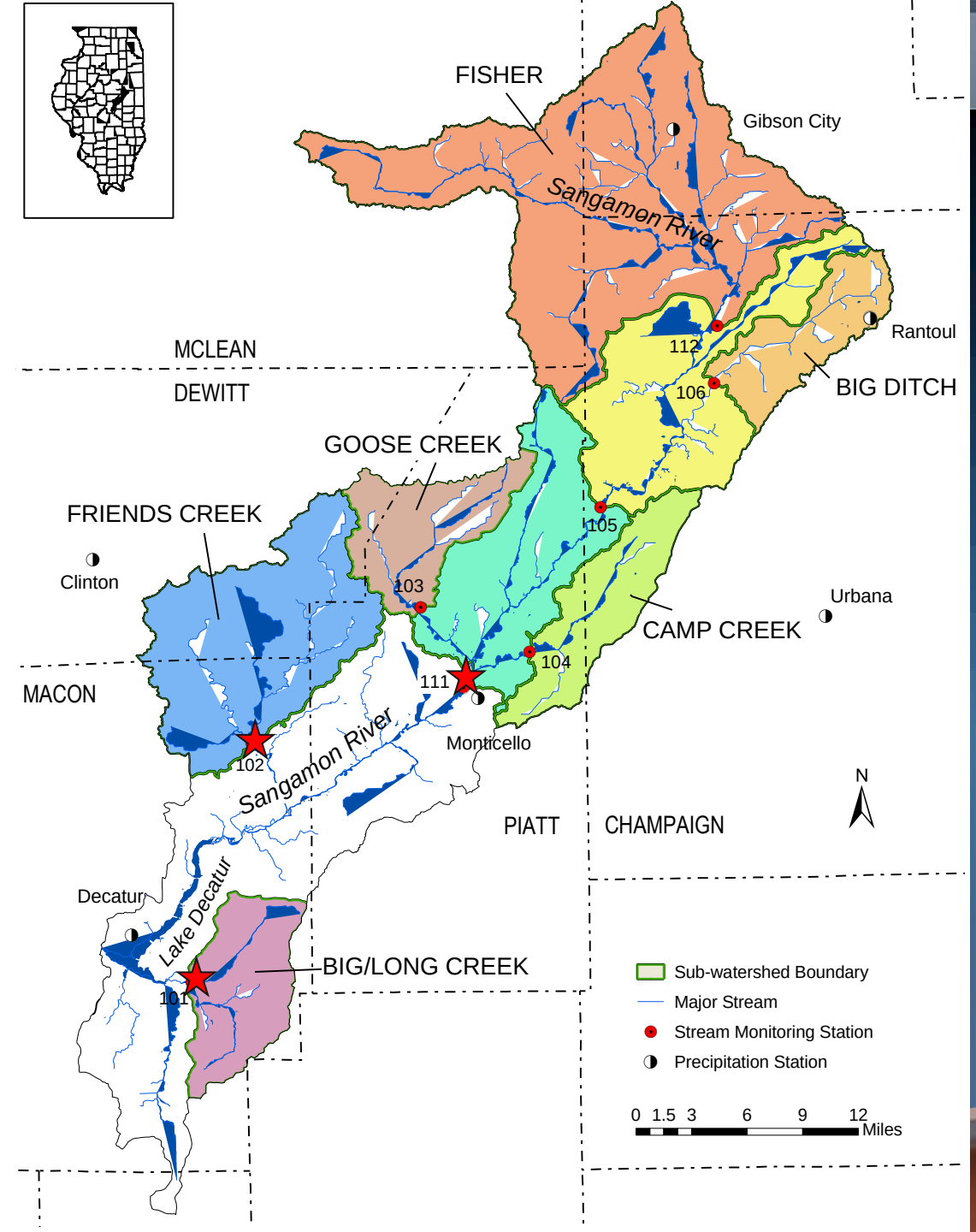
Watershed Land Use/Cover



Change in percent watershed area by NASS land cover categories between 1999 & 2008



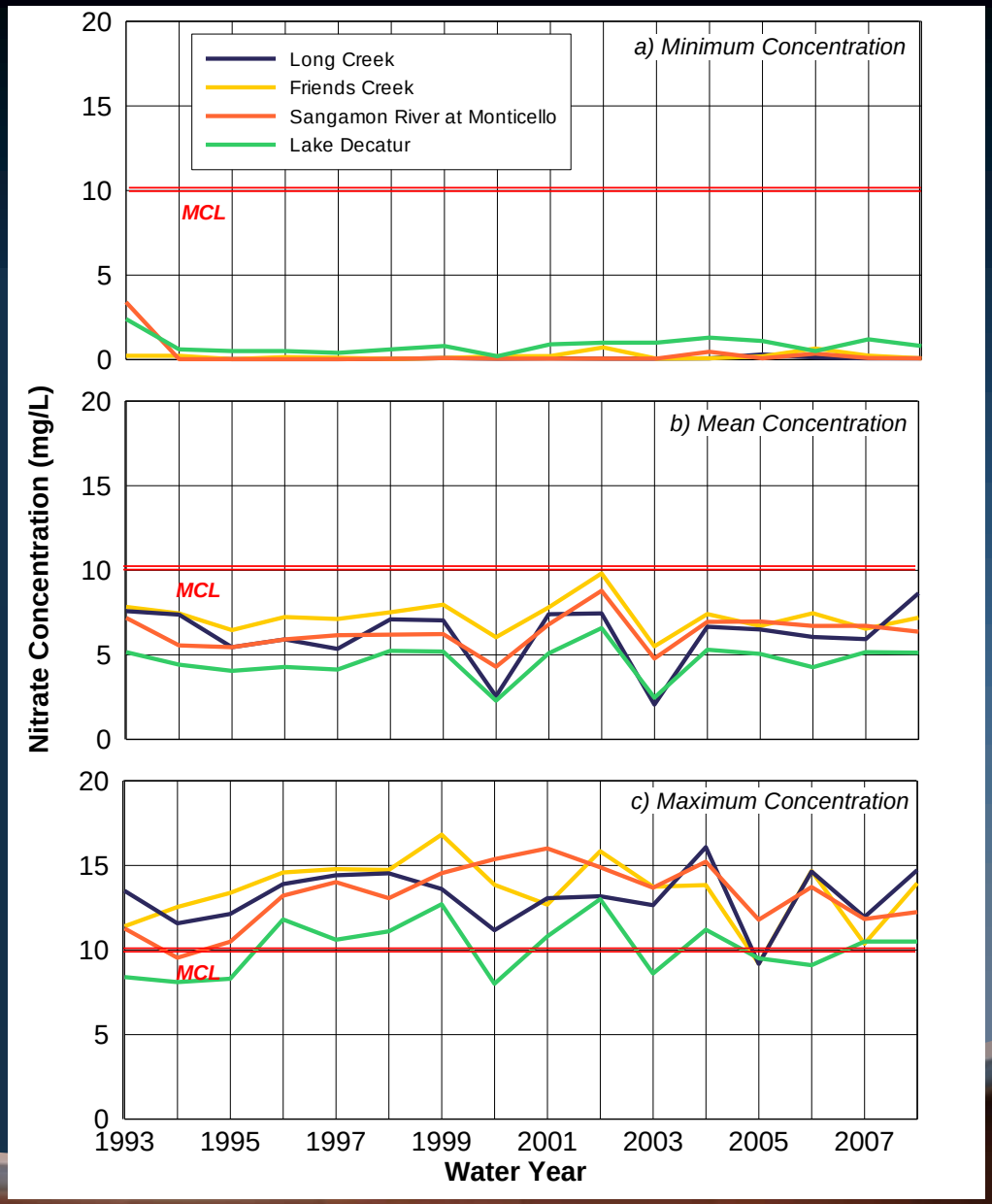
925-2008)



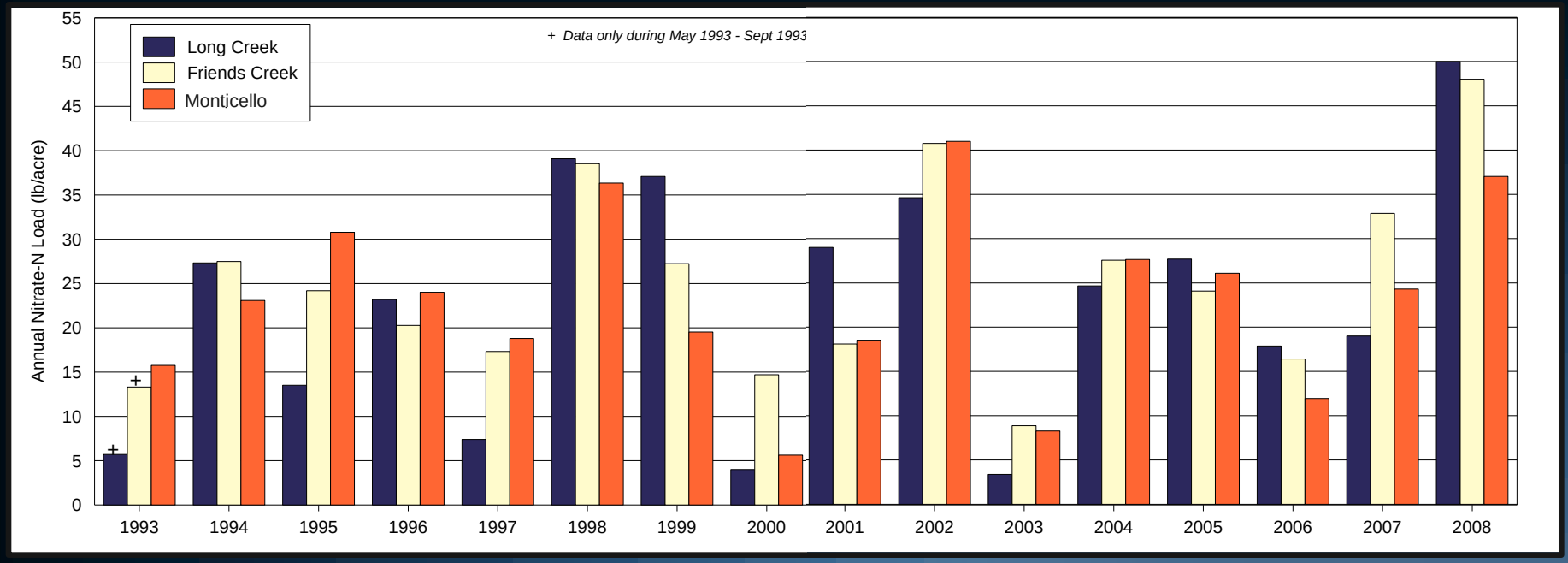
Location and monitoring period of stations

101: WY 1993-2008
102: WY 1993-2008
103: WY 1993-2000
104: WY 1993-2002
105: WY 1993-2003
106: WY 1993-2003
111: WY 1993-2008
112: WY 1993-2000

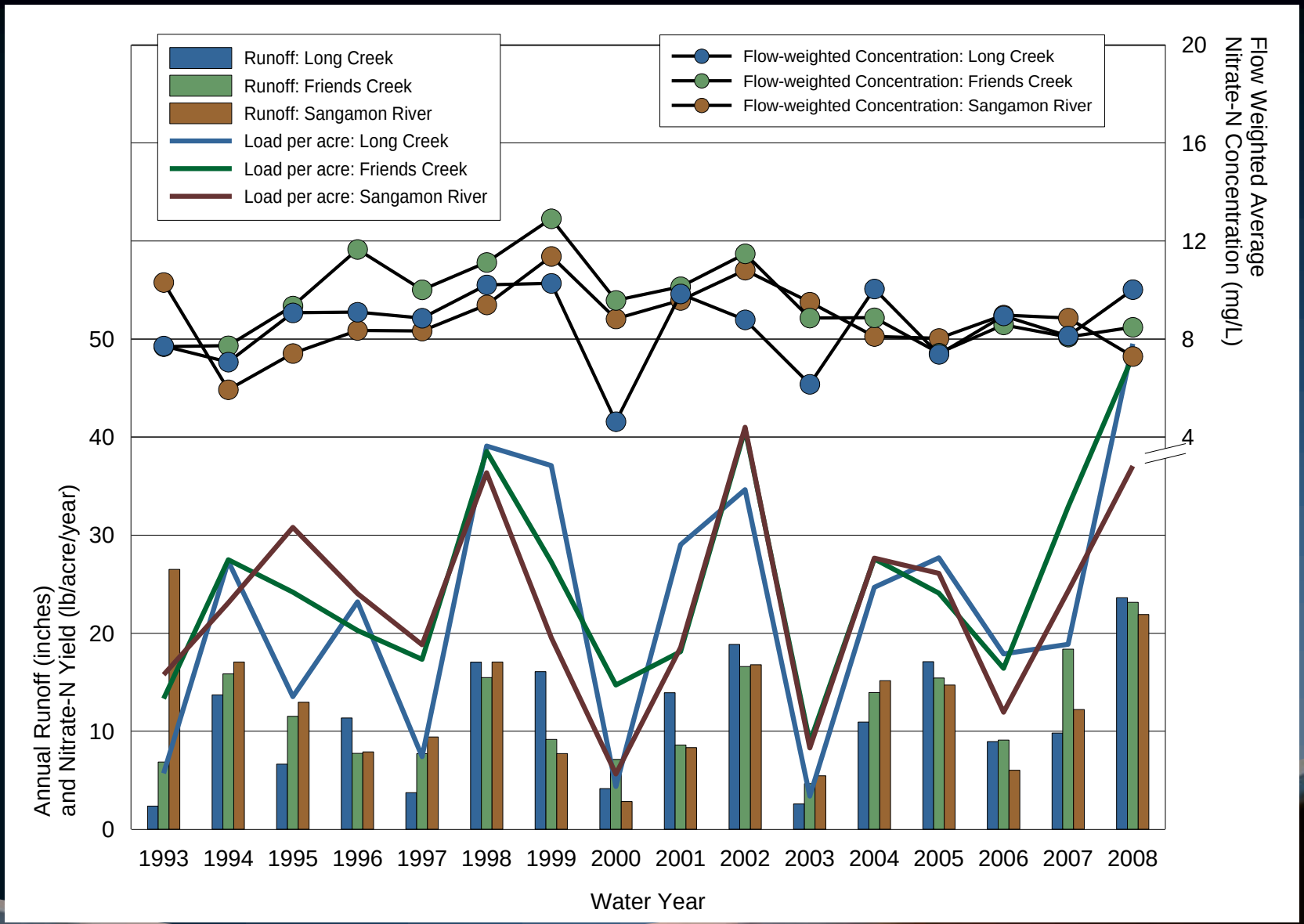
Nitrate-N Concentrations



Nitrate Loads (lb/acre)



Flow-weighted Nitrate-N Concentrations



Project & long-term data period investigation

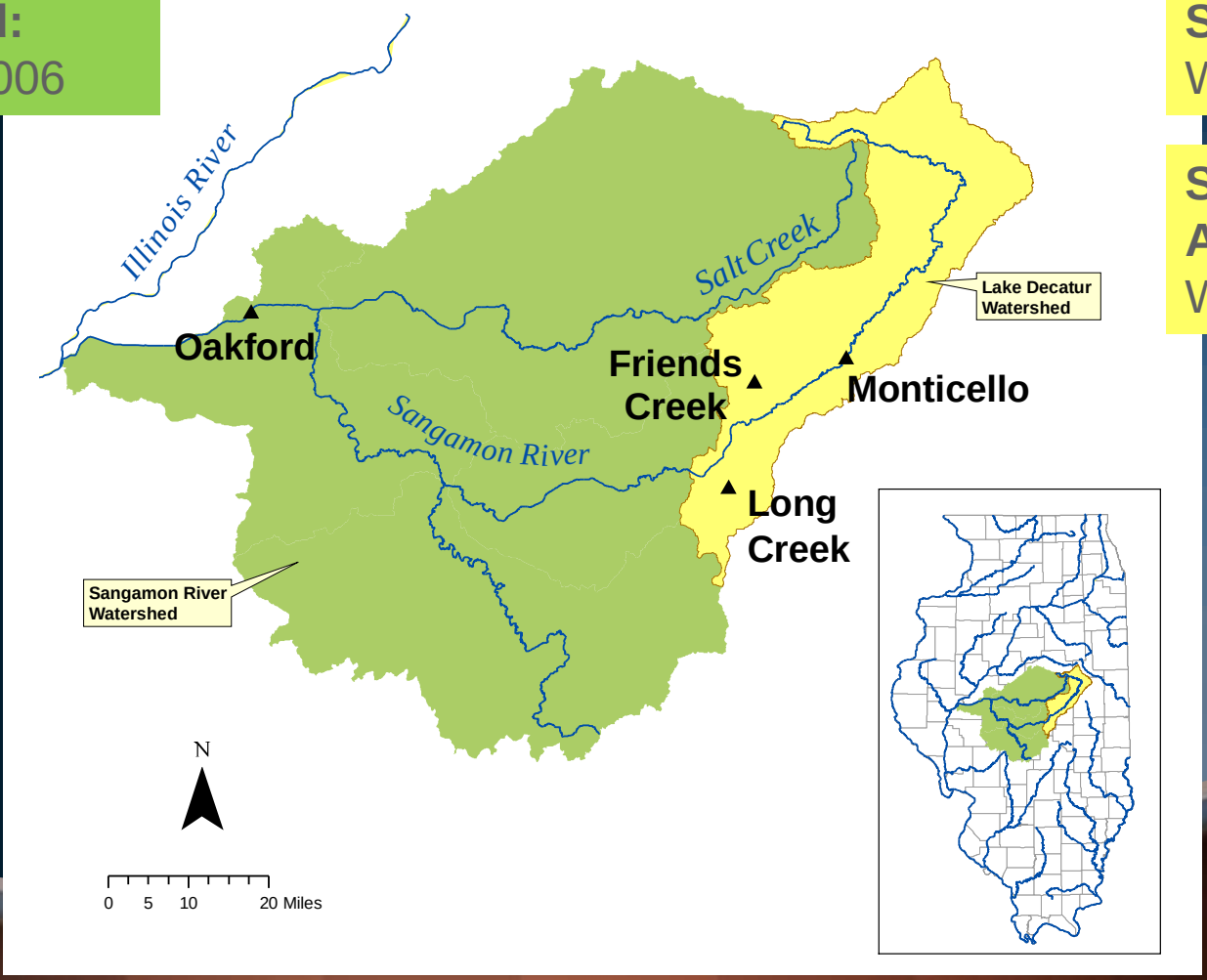
1975 — 1994 — 2008

1975 — 1994 — 2006

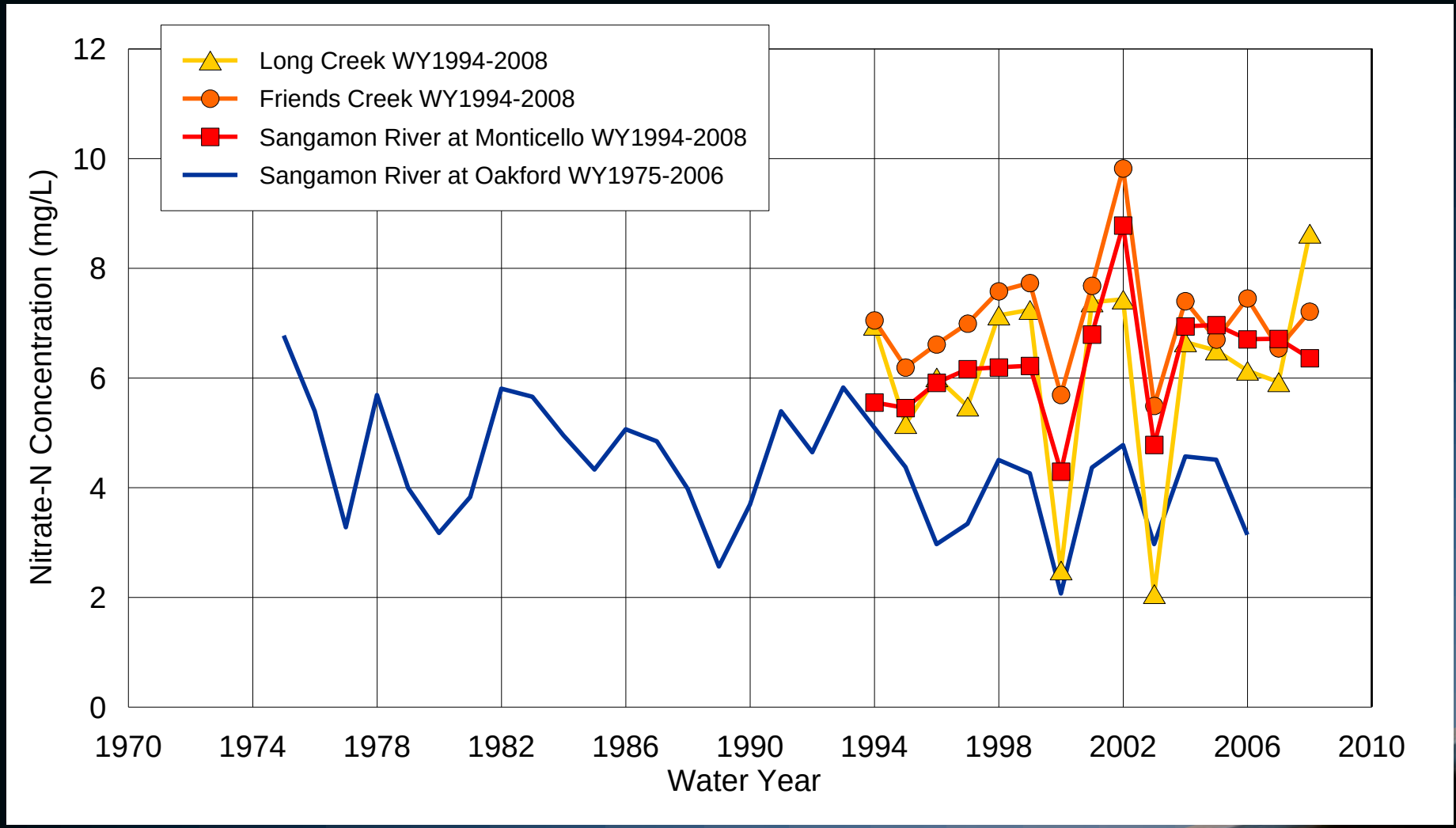
Sangamon River At Oakford: WY1975-2006

Project Stations: WY1994-2008

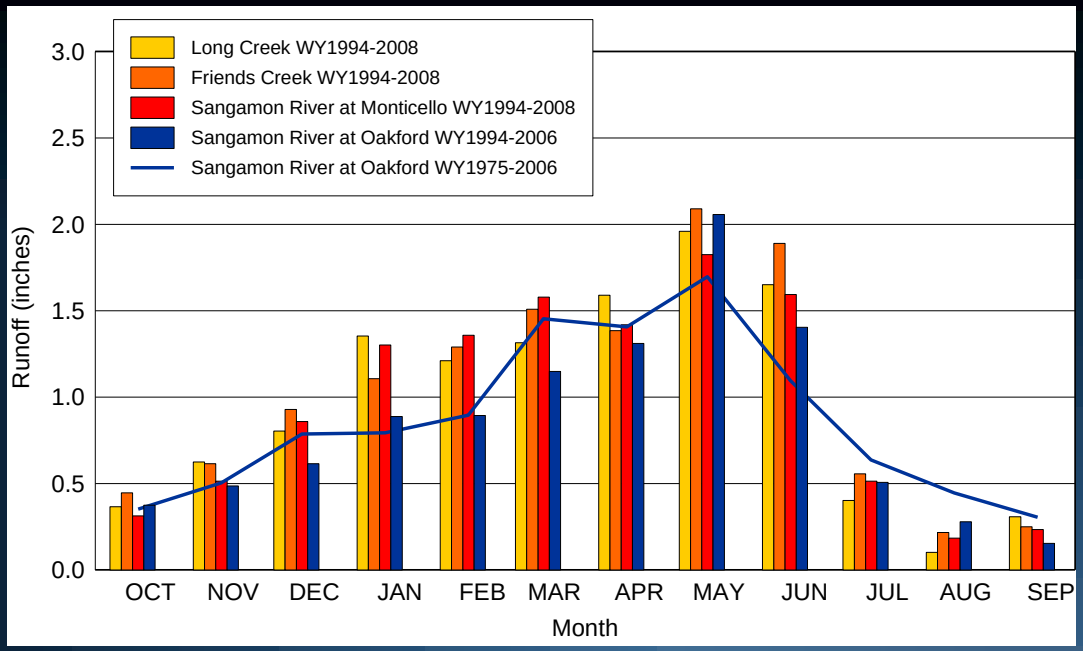
Sangamon River At Oakford: WY1994-2006



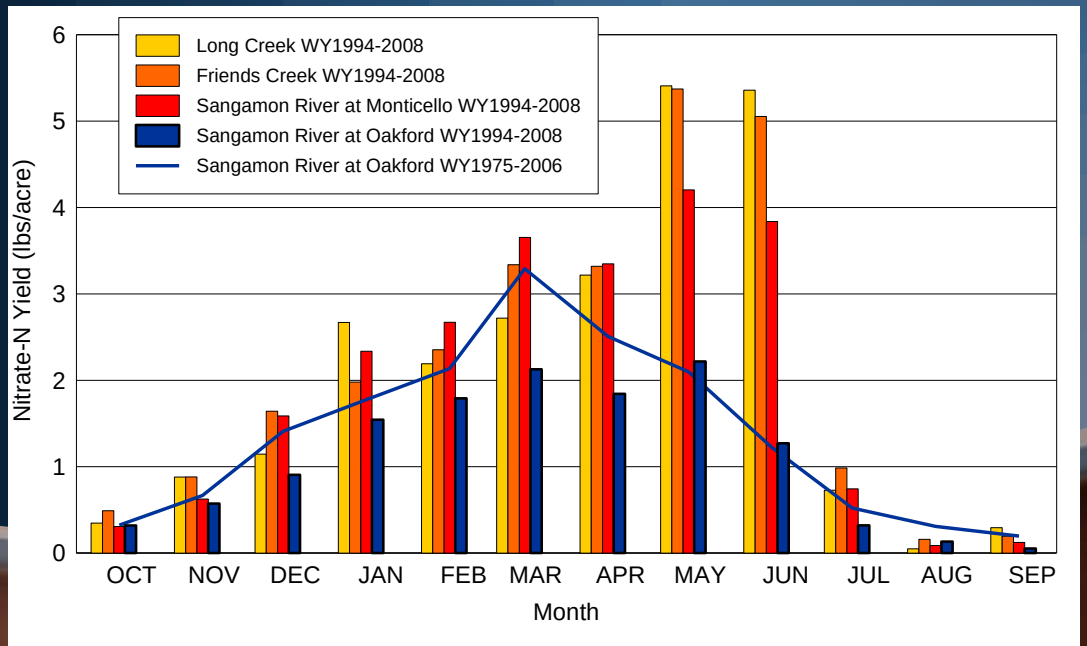
Annual Average nitrate-N concentrations



Average Monthly Nitrate Runoff and Yield

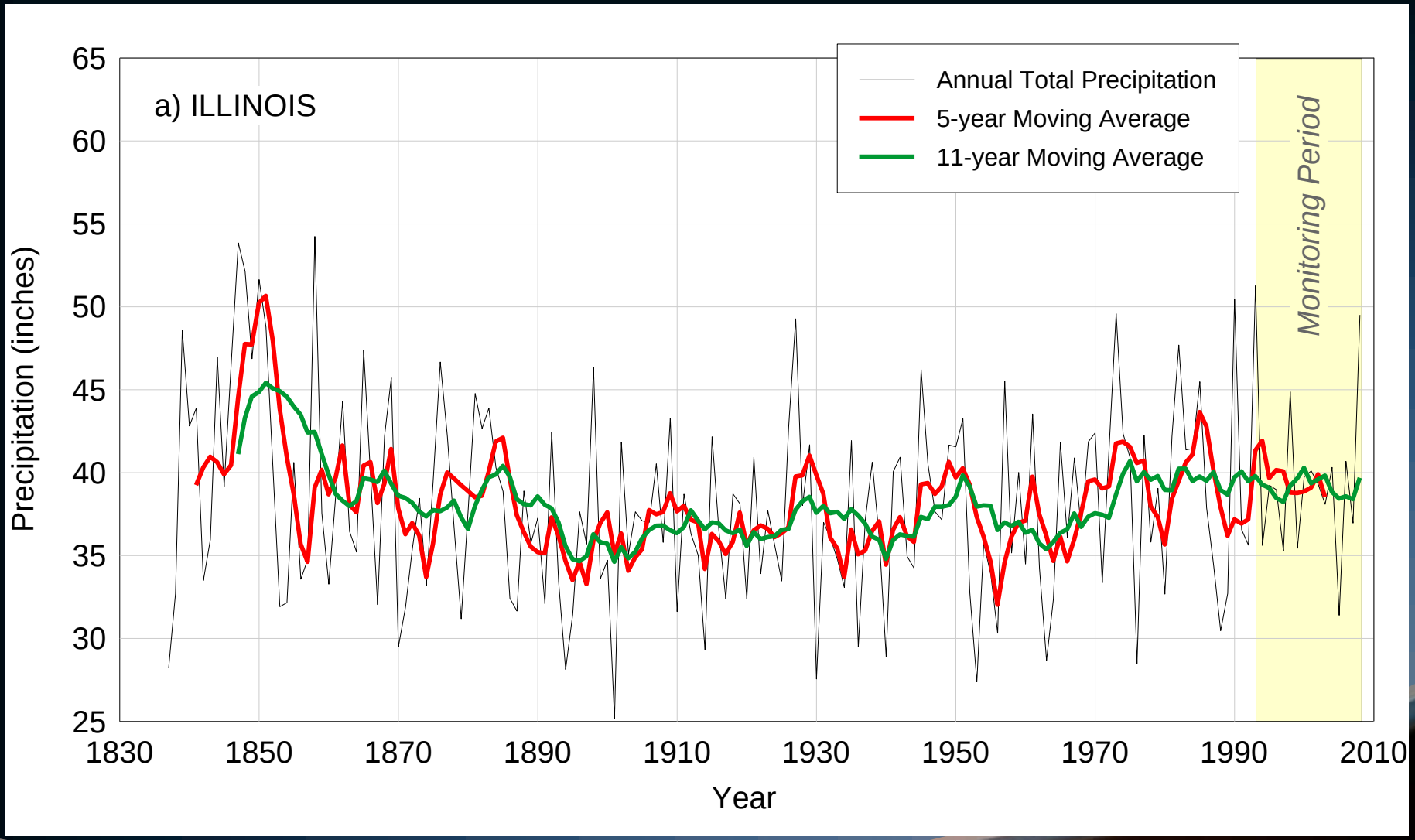


Runoff

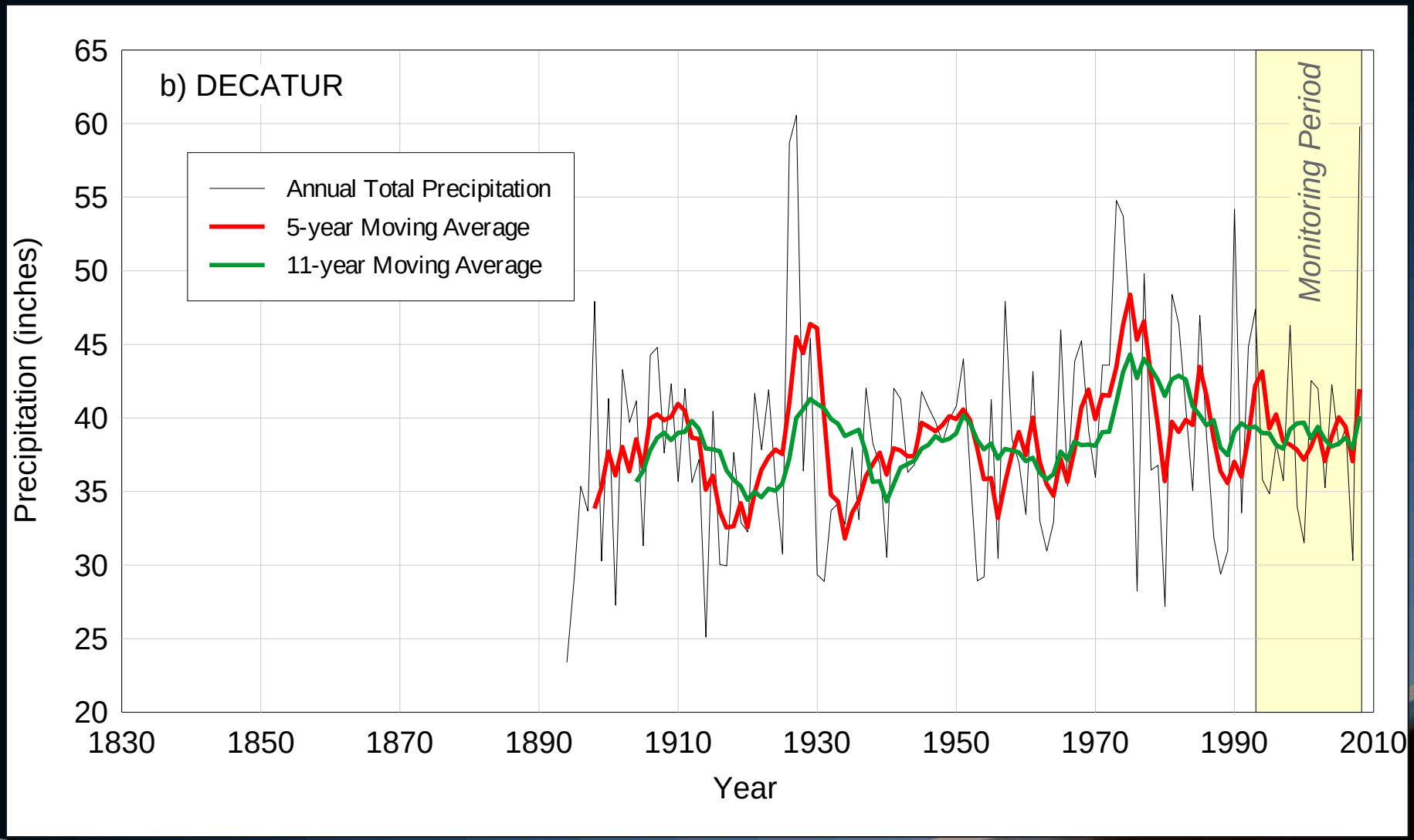


Load

Annual and Moving Average Precipitation



Annual and Moving Average Precipitation



Discharge, Concentration, & Yield Trends

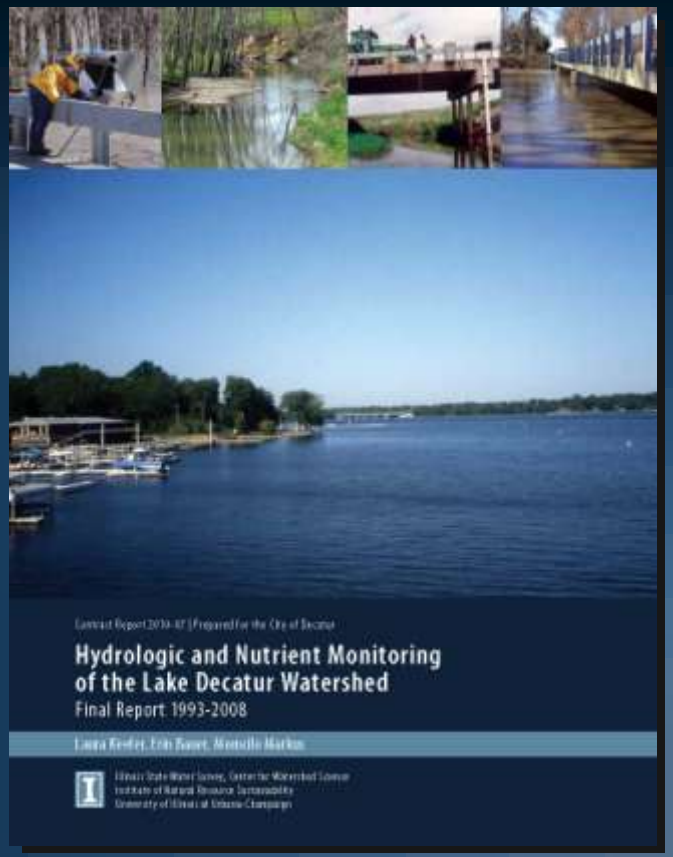
	STATION NAME AND DURATION	SIGNIFICANCE LEVEL	DECREASING TREND		NO TREND				INCREASING TREND	
			95	90	80	70	70	80	90	95
OVERLAPPING TIME PERIOD	Long Creek WY1994-2008	Discharge								
		NO_3 Concentration								
		NO3 Yield								
	Friends Creek WY1994-2008	Discharge								
		NO_3 Concentration								
		NO3 Yield								
	Sangamon R. at Monticello WY1994-2008	Discharge								
		NO_3 Concentration								
		NO3 Yield								
	Sangamon R. at Oakford WY1994-2006	Discharge								
		NO_3 Concentration								
		NO3 Yield								
LONGER-TERM PERIOD	Sangamon R. at Oakford WY1975-2006	Discharge								
		NO_3 Concentration								
		NO3 Yield								

Significant Trends Based on Kendall-Tau Test (Orange), T-Test (Blue), and Hotelling-Pabst Test (Grey), for Variable Confidence Levels

Observations

- Monitoring period was wet:
  - 8 of 15 years above 30-yr mean annual precipitation
  - Monticello 100-yr streamflow record shows 4 of top 11 total annual discharges occurred during monitoring
- Nitrate-N
  - Concentrations decreased as drainage area increased
  - Loads were disperse around watershed and varied from year to year
- Project stations had no significant trends in discharge and yields
- Based on trends during project and long-term data analysis, possible no significant change in nitrate yields for Lake Decatur watershed since 1975

Thank you!



http://www.isws.illinois.edu/pubdoc/CR/ISWSCR2010-07.pdf