Hydrologic, Sediment, and Nutrient Load Trends in the Illinois River Watershed

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Acknowledgments

Contributors

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- Jim Slowikowski
- Kip Stevenson

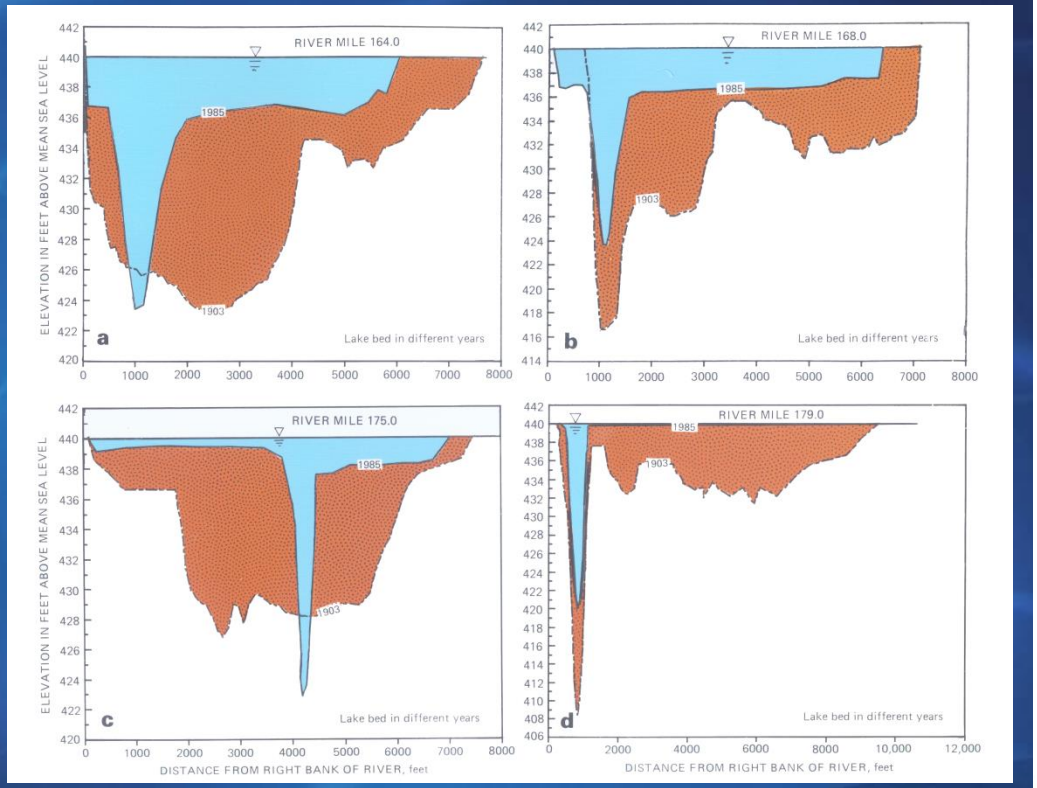
Background

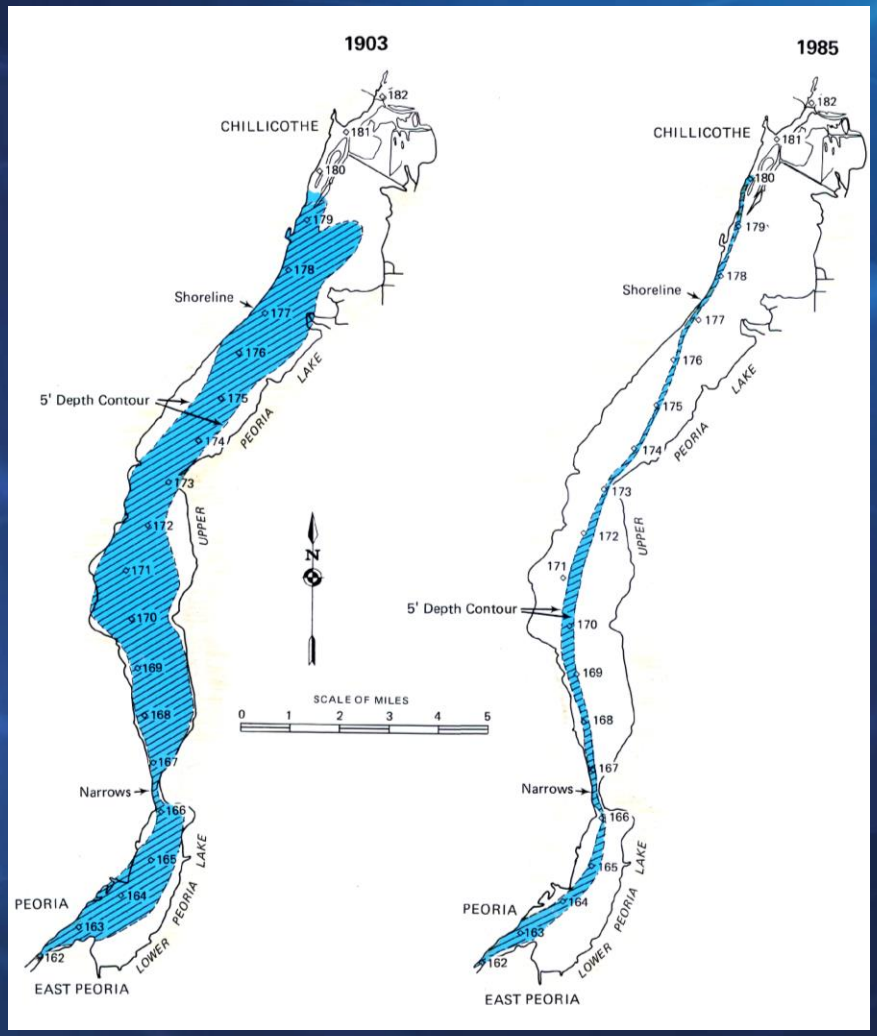
- The Illinois River is one of the major tributaries of the Mississippi River. It drains nearly half of the state.
- The Illinois River valley (that includes the main river, backwater lakes, side channels, and floodplain) is a significant ecological resource in the nation.
- Many bottomland lakes along the river valley have lost much of their capacity to sediment accumulation. Illinois is one of the major contributors of nutrients to the Gulf of Mexico that has been impacted by hypoxia for a long time.

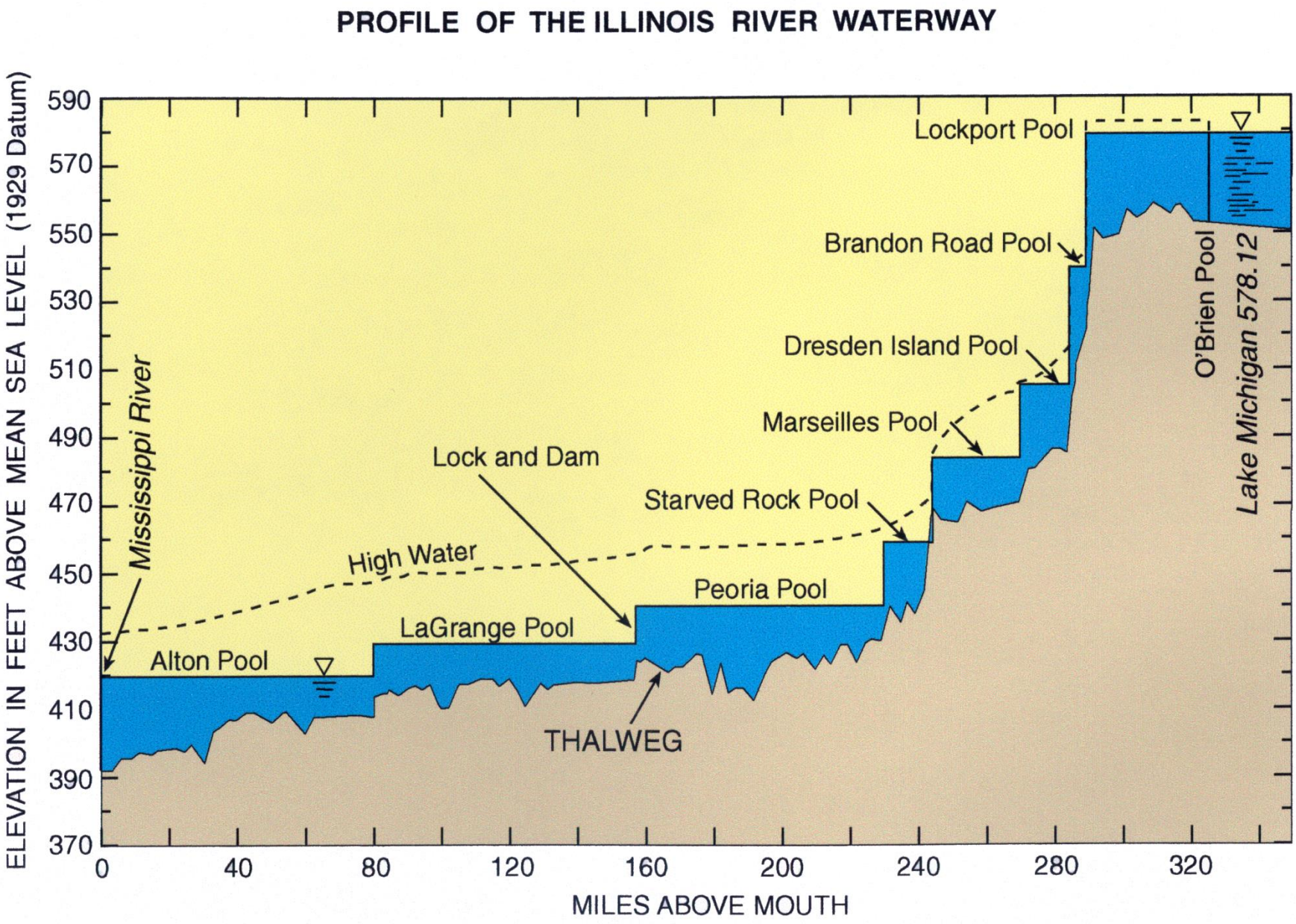
Background
(concluded)

- Erosion and sedimentation has long been recognized as the principal causes for most of the environmental and ecological problems in the Illinois River valley.
- At the present there are many initiatives including the Illinois River Conservation Enhancement Program (CREP), and several others that are addressing the erosion and sedimentation problem in the Illinois River watershed.

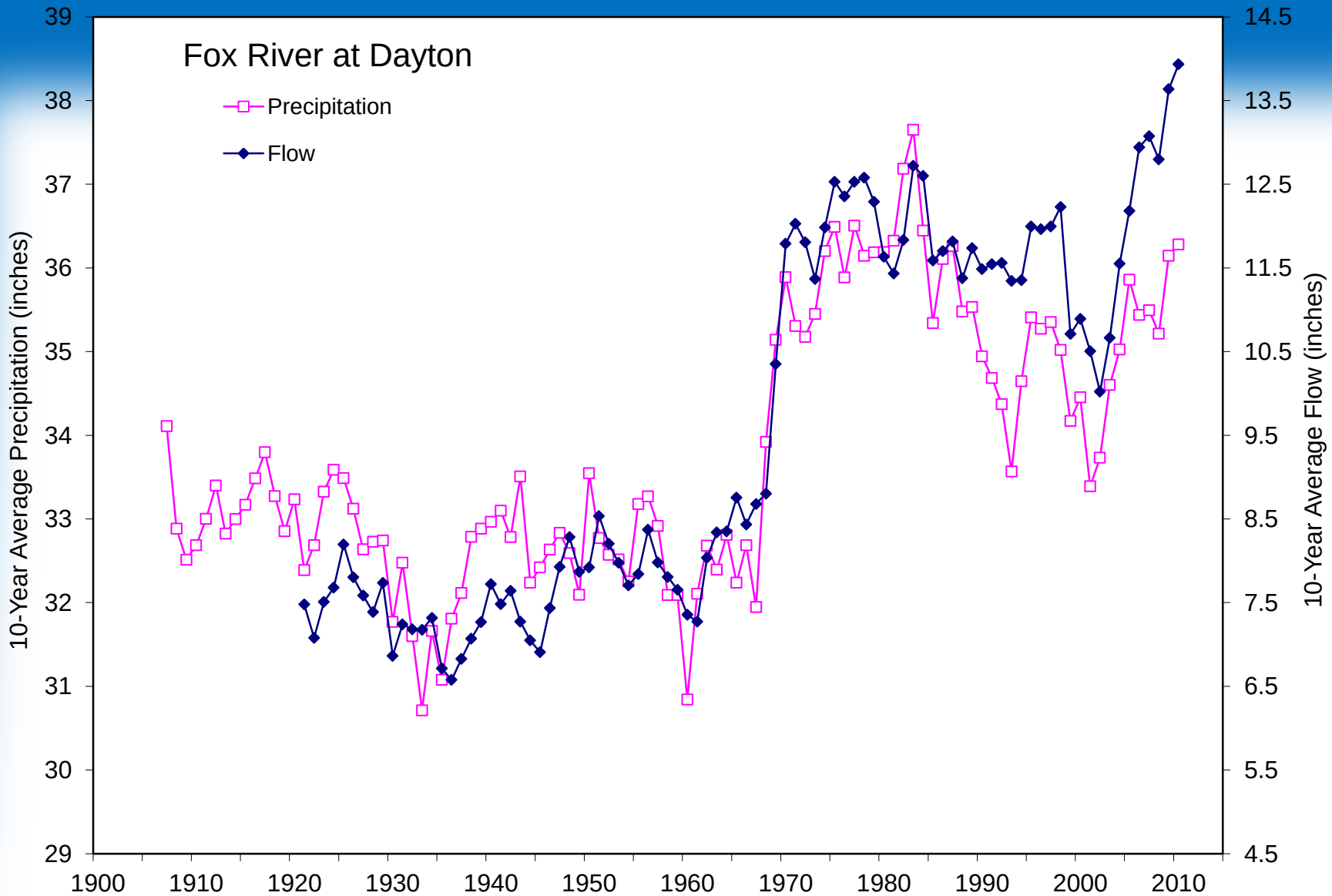
Sedimentation in Peoria Lake

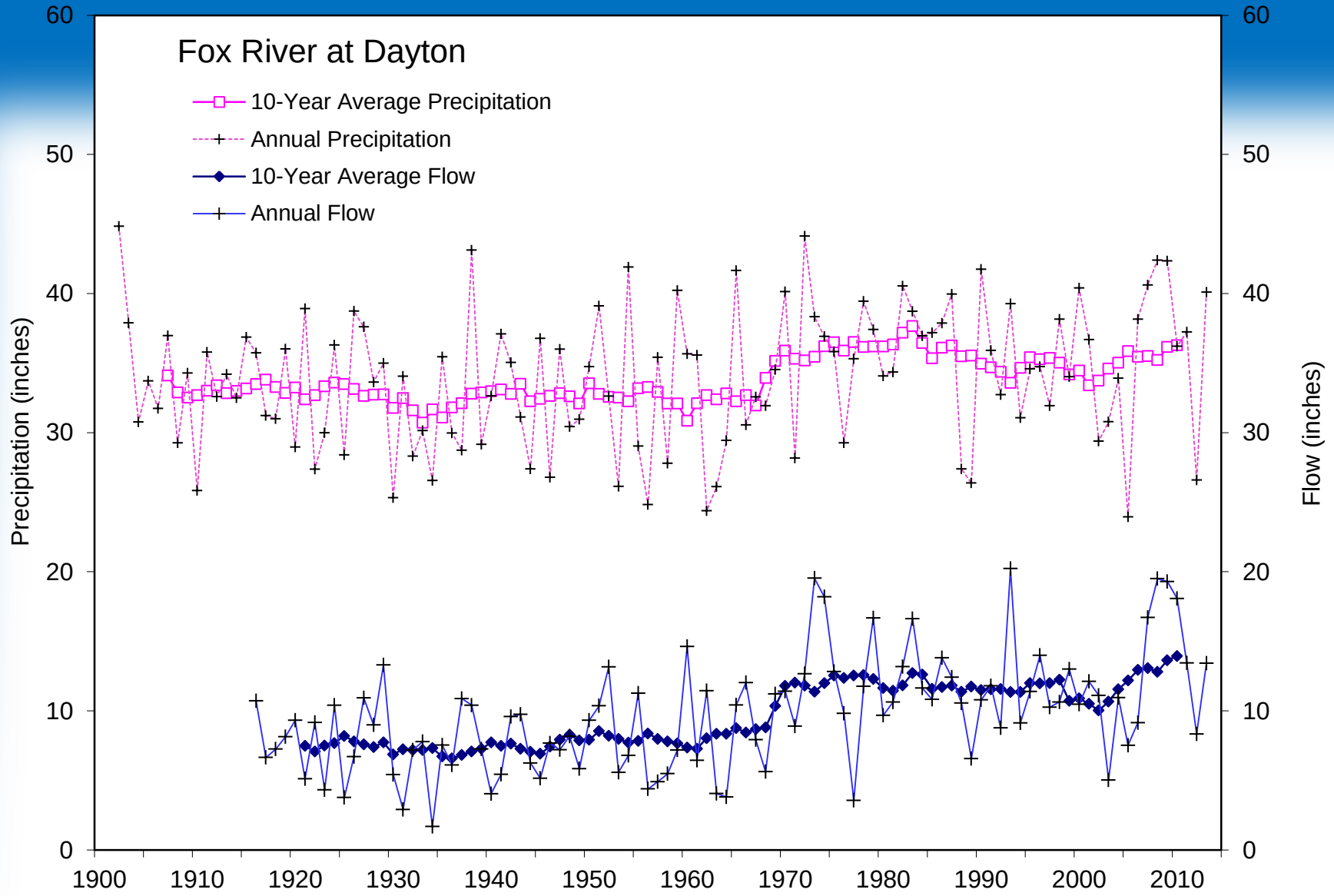


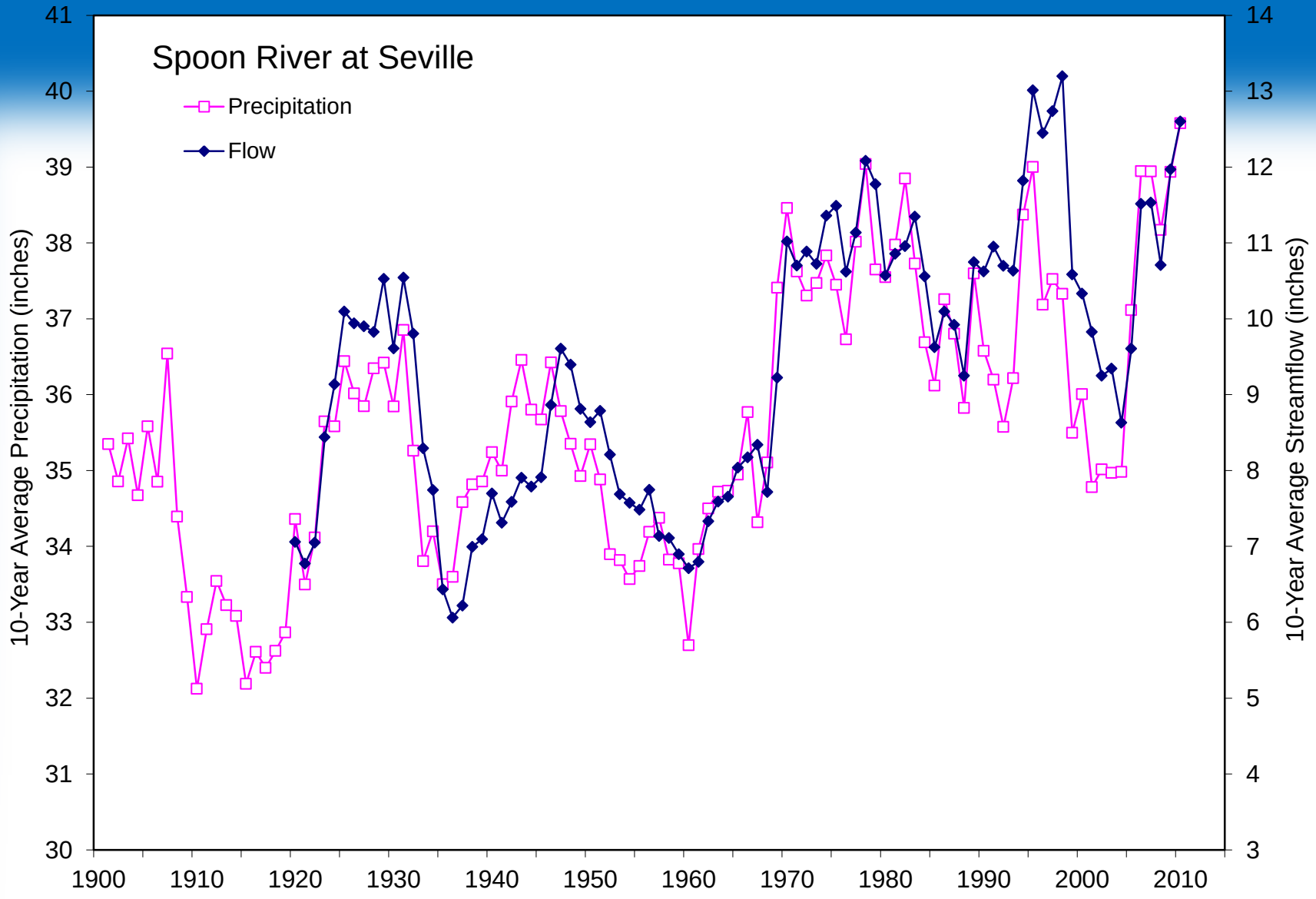


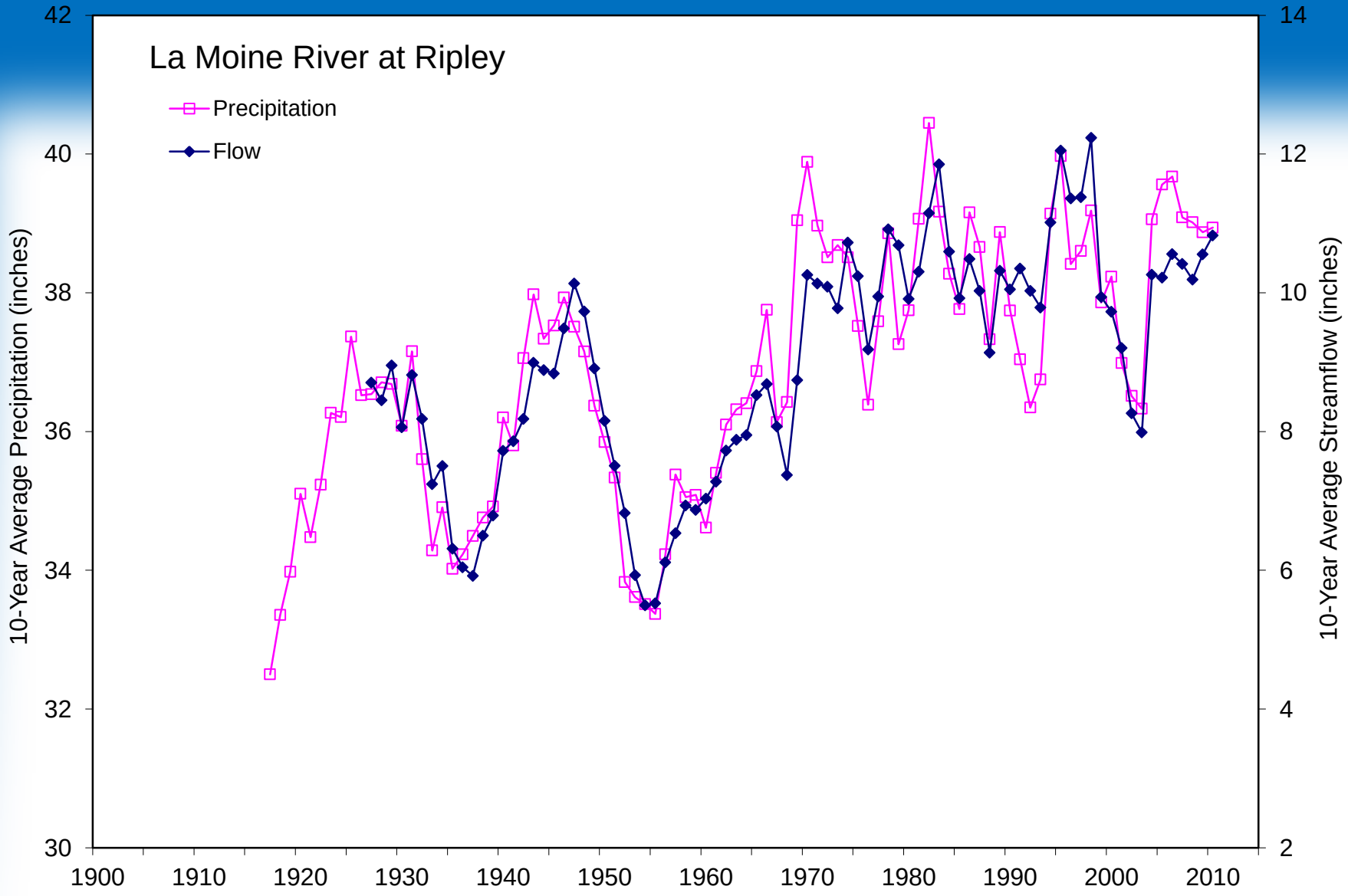

PROFILE OF THE ILLINOIS RIVER WATERWAY
ELEVATION IN FEET ABOVE MEAN SEA LEVEL (1929 Datum)
590
570
550
530
510
490
470
450
430
410
390
370
0
40
80
120
160
200
240
280
320
MILES ABOVE MOUTH
Mississippi River
Alton Pool
LaGrange Pool
Lock and Dam
Peoria Pool
Starved Rock Pool
Marseilles Pool
Dresden Island Pool
Brandon Road Pool
Lockport Pool
O'Brien Pool
Lake Michigan 578.12
High Water
THALWEG

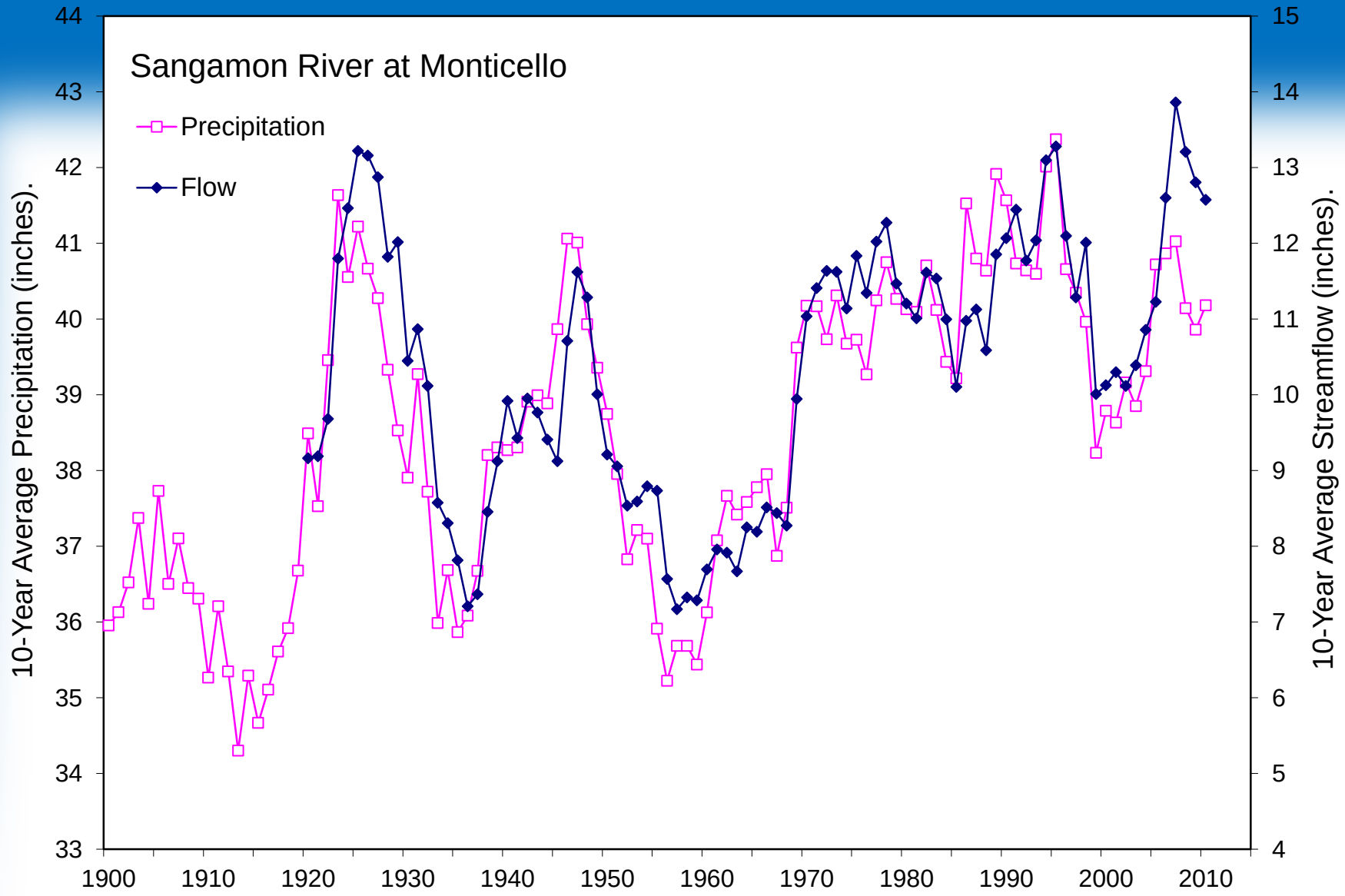
Long-Term Precipitation and Streamflow Variability and Trends

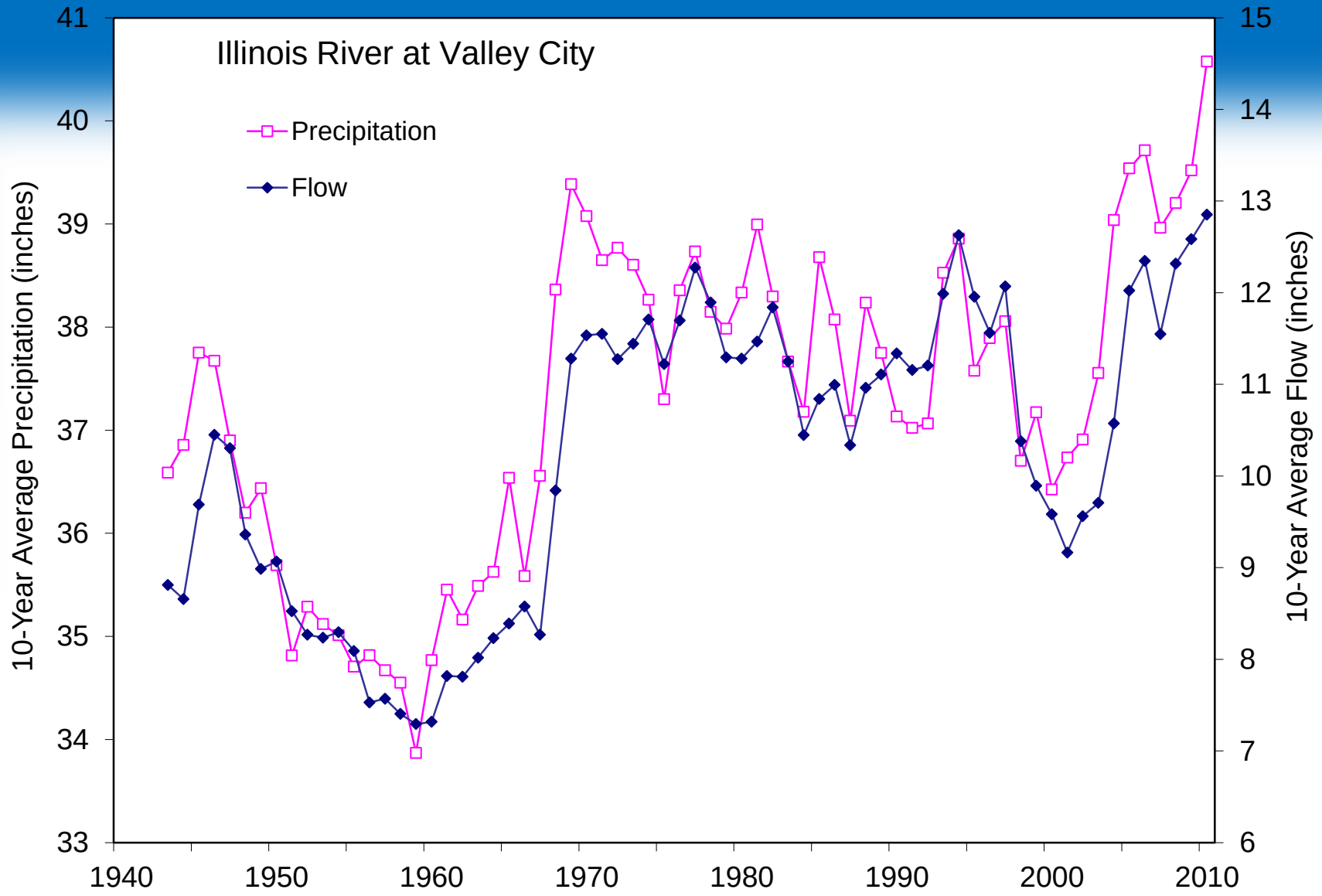

Fox River at Dayton
Precipitation
Flow
10-Year Average Precipitation (inches)
10-Year Average Flow (inches)
39
38
37
36
35
34
33
32
31
30
29
14.5
13.5
12.5
11.5
10.5
9.5
8.5
7.5
6.5
5.5
4.5
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010


Fox River at Dayton
10-Year Average Precipitation
Annual Precipitation
10-Year Average Flow
Annual Flow
Precipitation (inches)
Flow (inches)
0
10
20
30
40
50
60
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

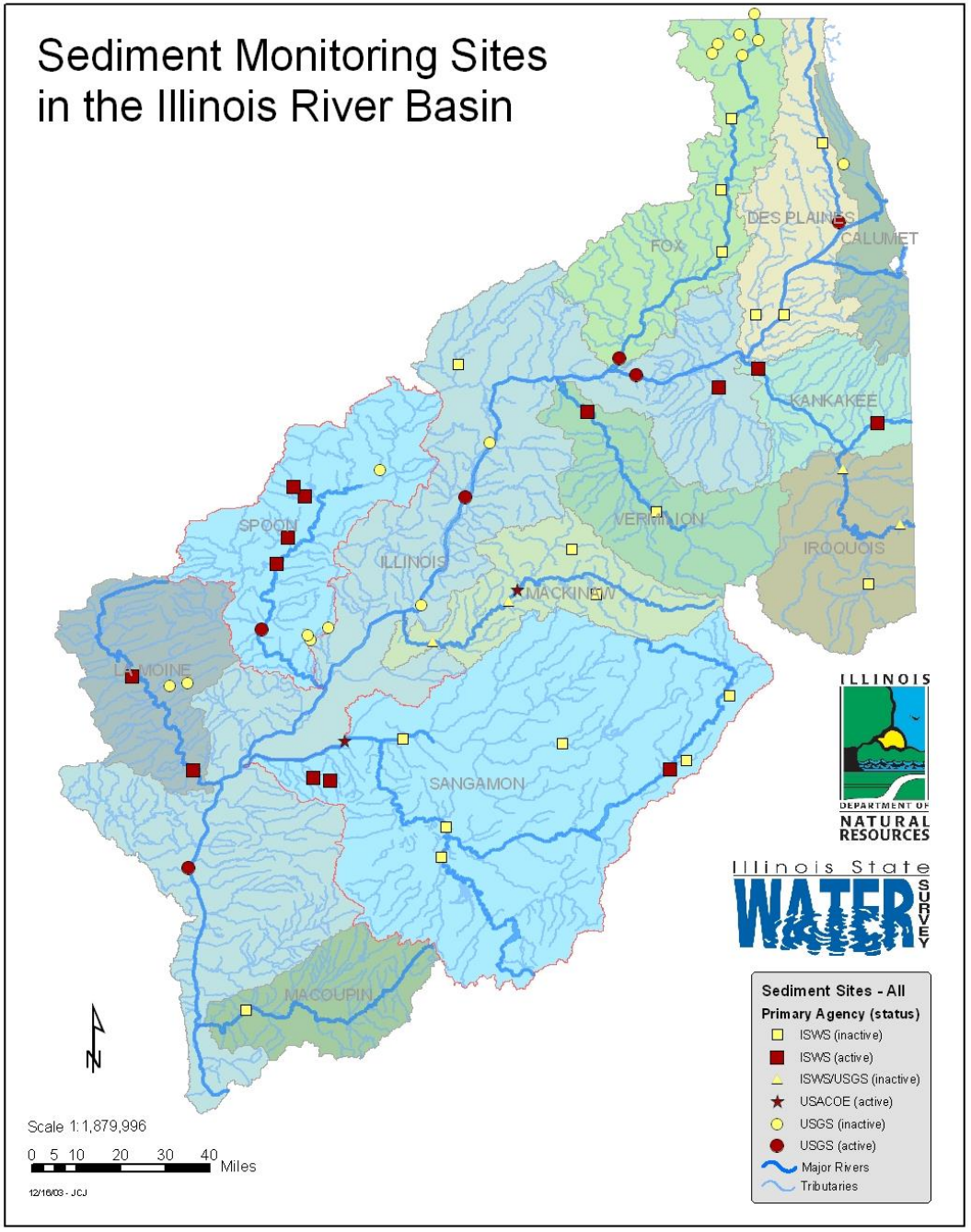

Spoon River at Seville
Precipitation
Flow
10-Year Average Precipitation (inches)
10-Year Average Streamflow (inches)
41
40
39
38
37
36
35
34
33
32
31
30
14
13
12
11
10
9
8
7
6
5
4
3
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010


La Moine River at Ripley
Precipitation
Flow
10-Year Average Precipitation (inches)
10-Year Average Streamflow (inches)
42
40
38
36
34
32
30
14
12
10
8
6
4
2
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

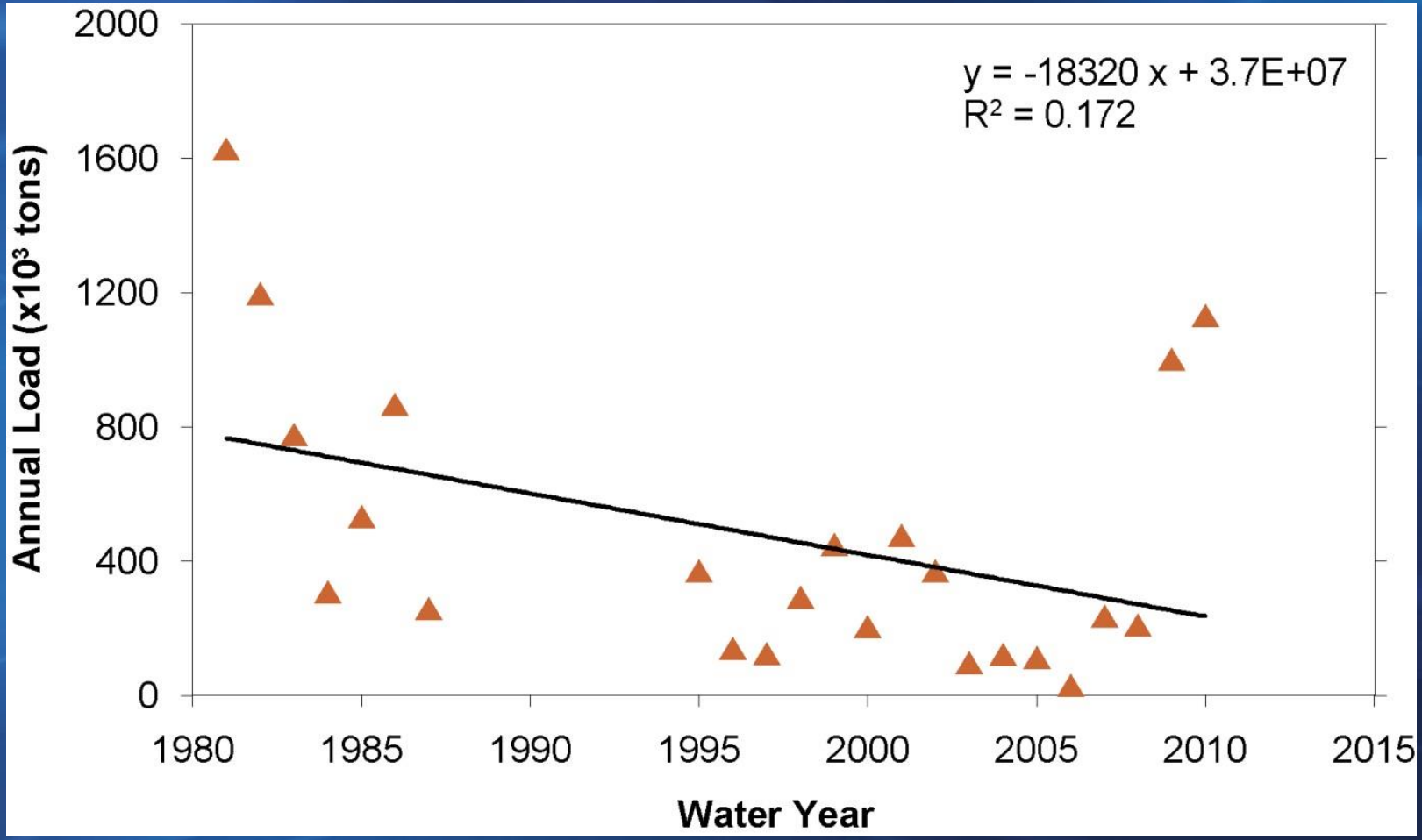

Sangamon River at Monticello
Precipitation
Flow
10-Year Average Precipitation (inches).
10-Year Average Streamflow (inches).
44
43
42
41
40
39
38
37
36
35
34
33
15
14
13
12
11
10
9
8
7
6
5
4
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010


Illinois River at Valley City
Precipitation
Flow
10-Year Average Precipitation (inches)
10-Year Average Flow (inches)
41
40
39
38
37
36
35
34
33
15
14
13
12
11
10
9
8
7
6
1940
1950
1960
1970
1980
1990
2000
2010

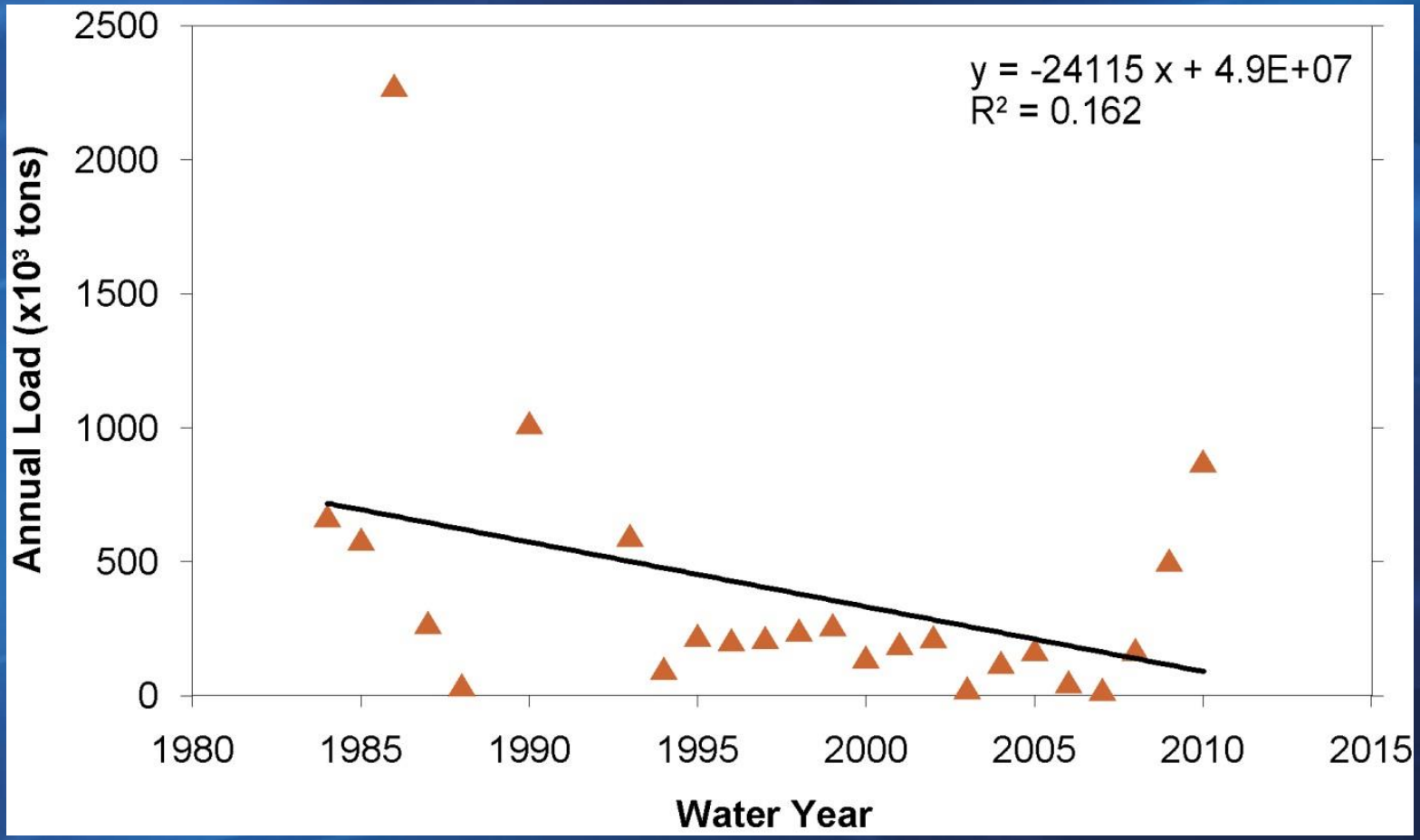
Trends in Sediment Transport


Sediment Monitoring Sites
in the Illinois River Basin
DES PLAINES
CALUMET
FOX
KANKAKEE
VERMILION
IROQUOIS
SPOON
ILLINOIS
MACKINAW
LA MOINE
SANGAMON
MACOUPIN
N
Scale 1:1,879,996
0 5 10 20 30 40
Miles
12/16/03 - JCJ
ILLINOIS
DEPARTMENT OF
NATURAL
RESOURCES
Illinois State
WATER SURVEY
Sediment Sites - All
Primary Agency (status)
ISWS (inactive)
ISWS (active)
ISWS/USGS (inactive)
USACOE (active)
USGS (inactive)
USGS (active)
Major Rivers
Tributaries

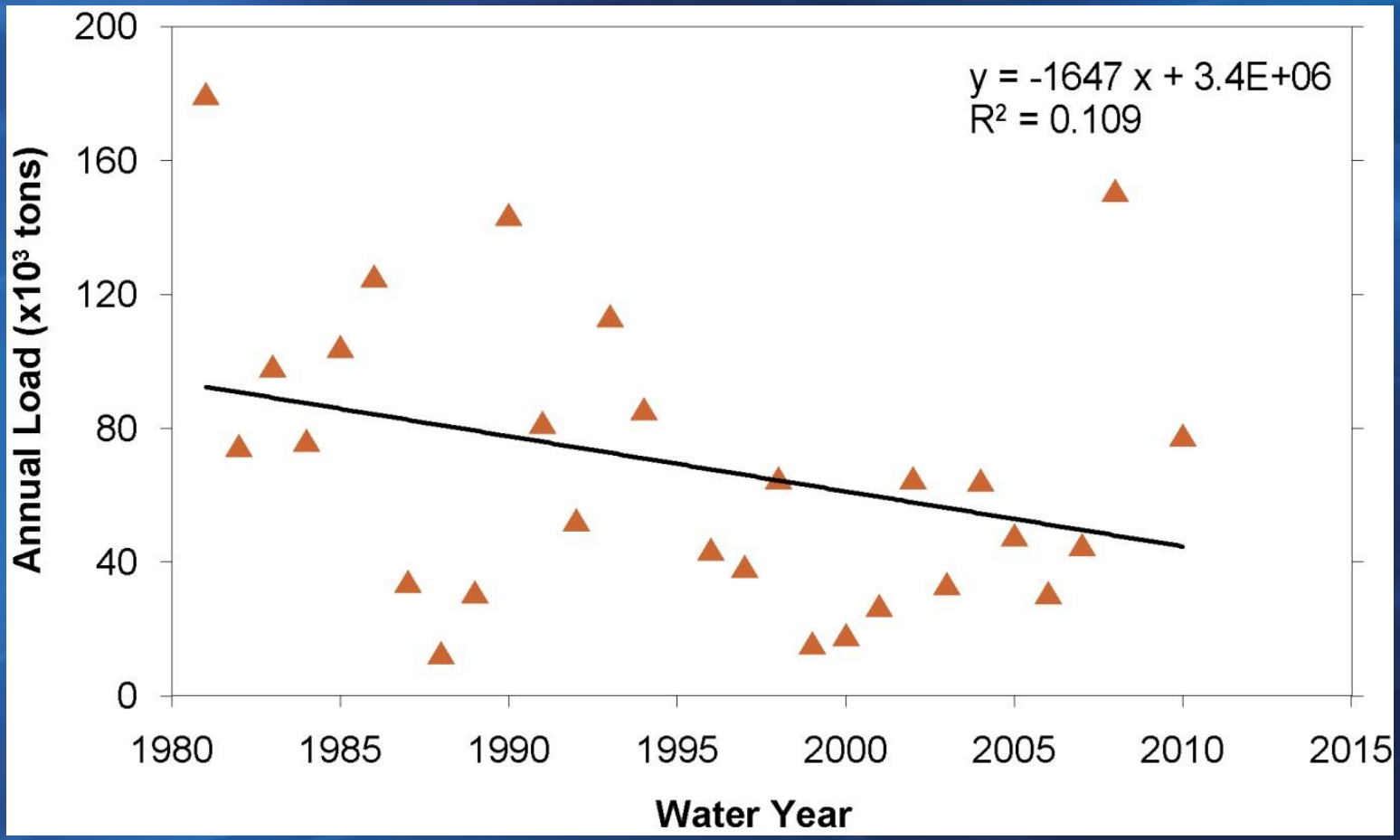
Trends in sediment load at Spoon River at London Mills (Illinois Benchmark Sediment Network)



Trends in sediment load at LaMoine River at Ripley, IL (Illinois Benchmark Sediment Network)

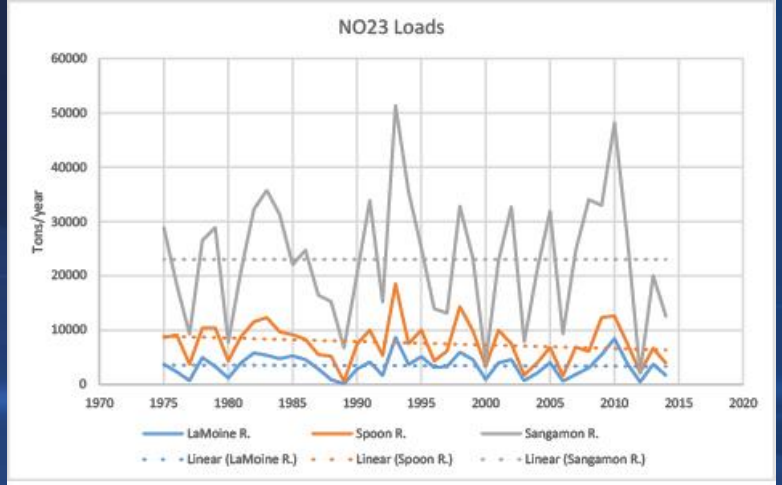


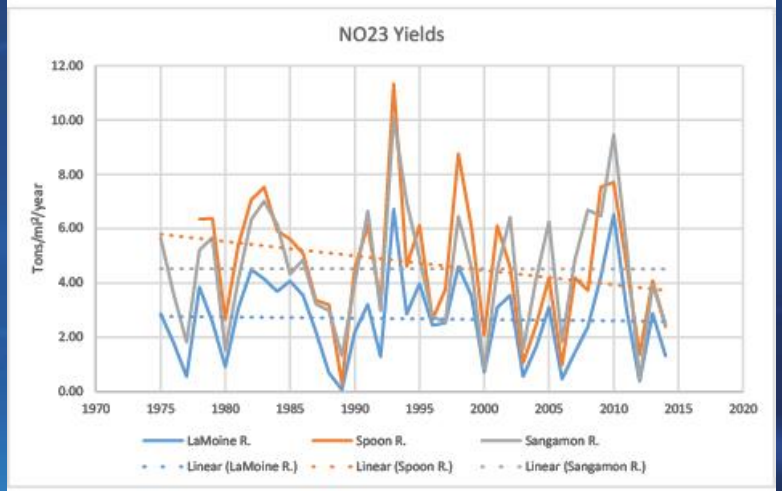
Trends in sediment load at Sangamon River at Monticello, IL (Illinois Benchmark Sediment Network)

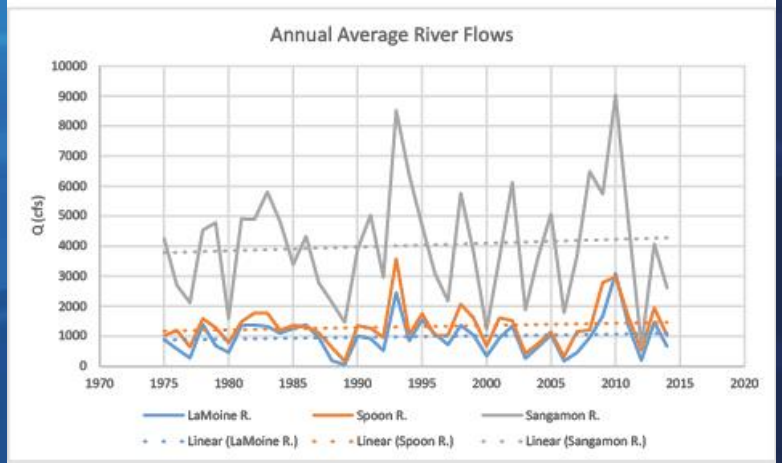


Trends in Nutrient Transport

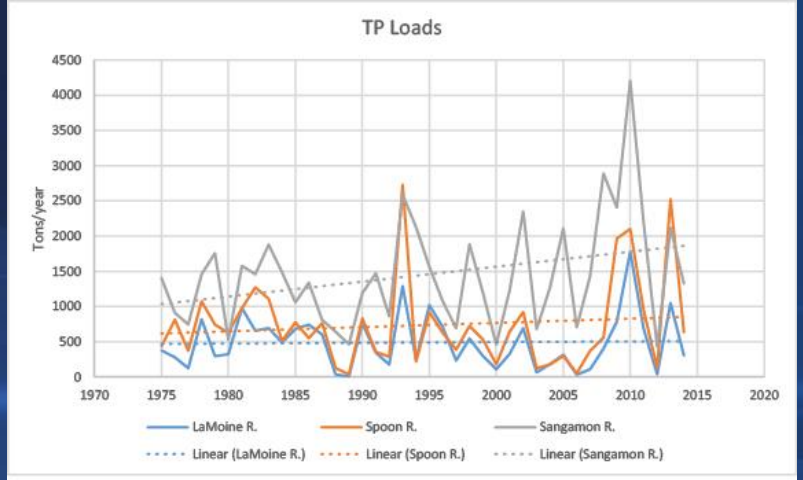
Nitrate and Nitrite Load, Yield and Flow: Tributary Streams

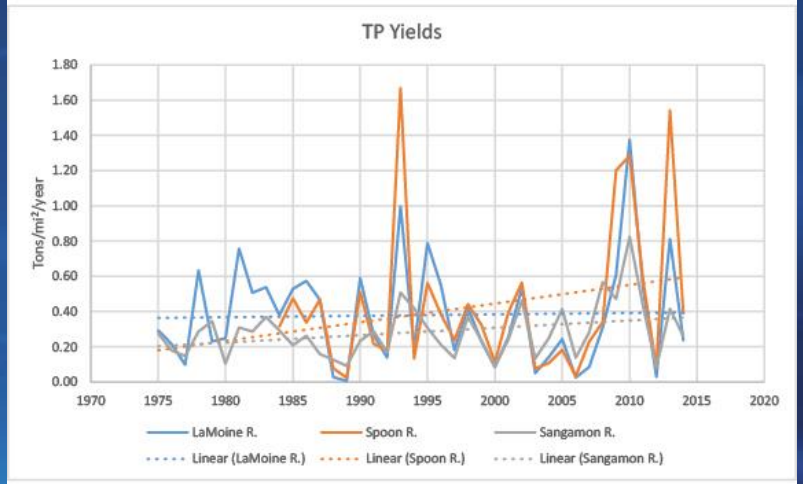


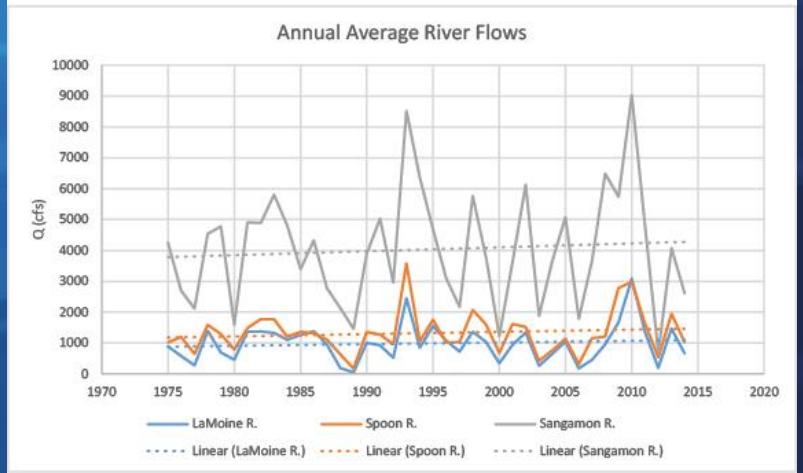




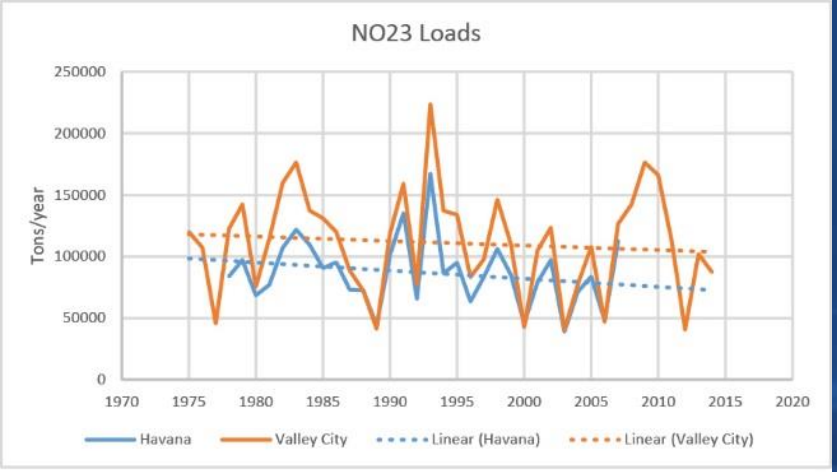
Total Phosphorus Load, Yield and Flow: Tributary Stations

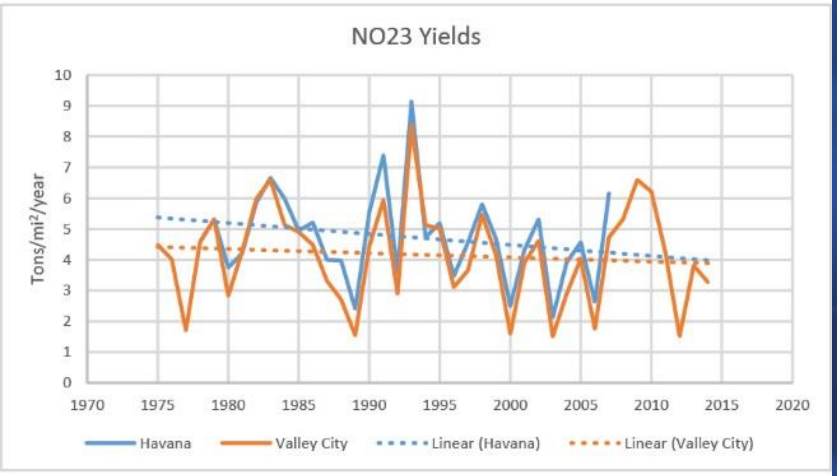


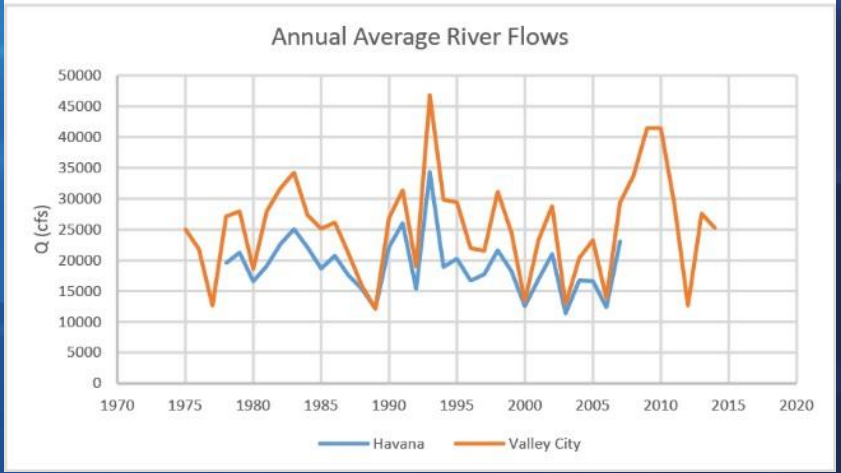




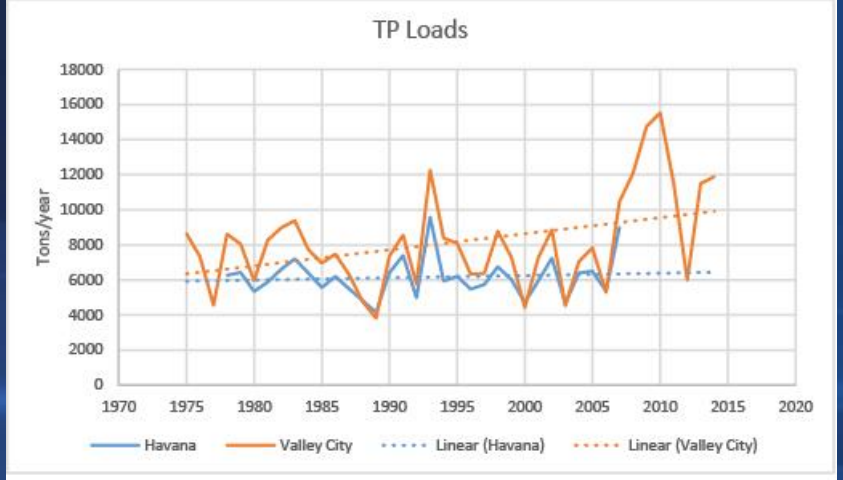
Nitrate and Nitrite Load, Yield and Flow: Main Channel Streams

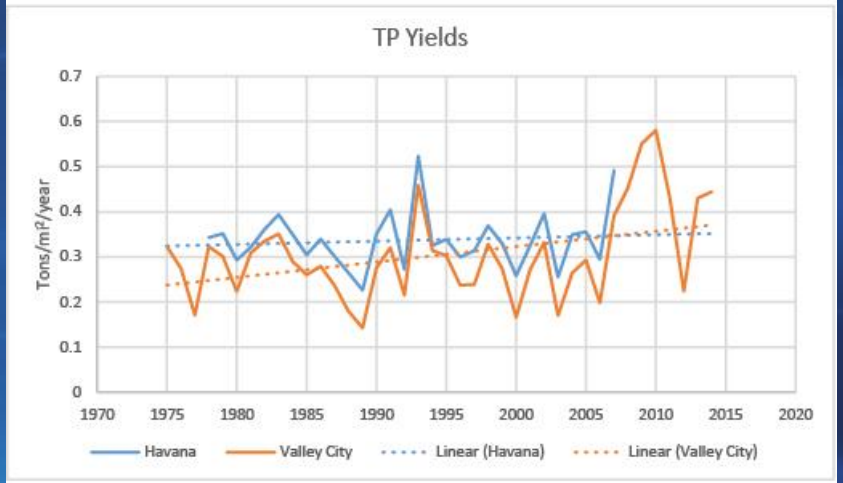


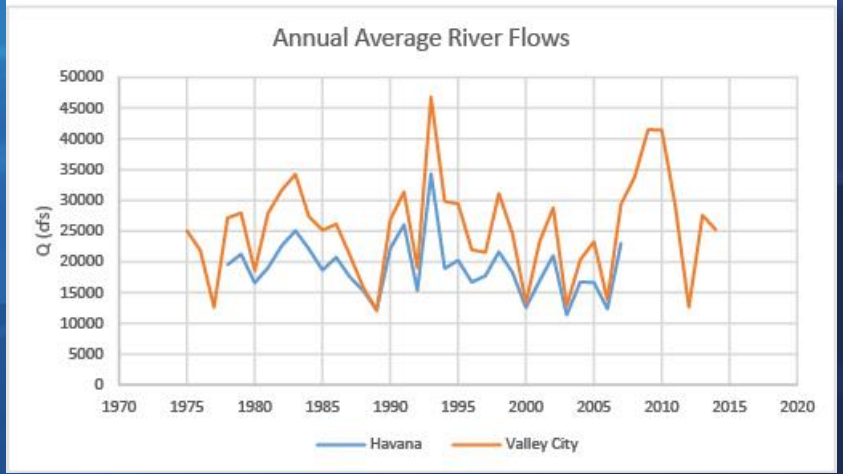




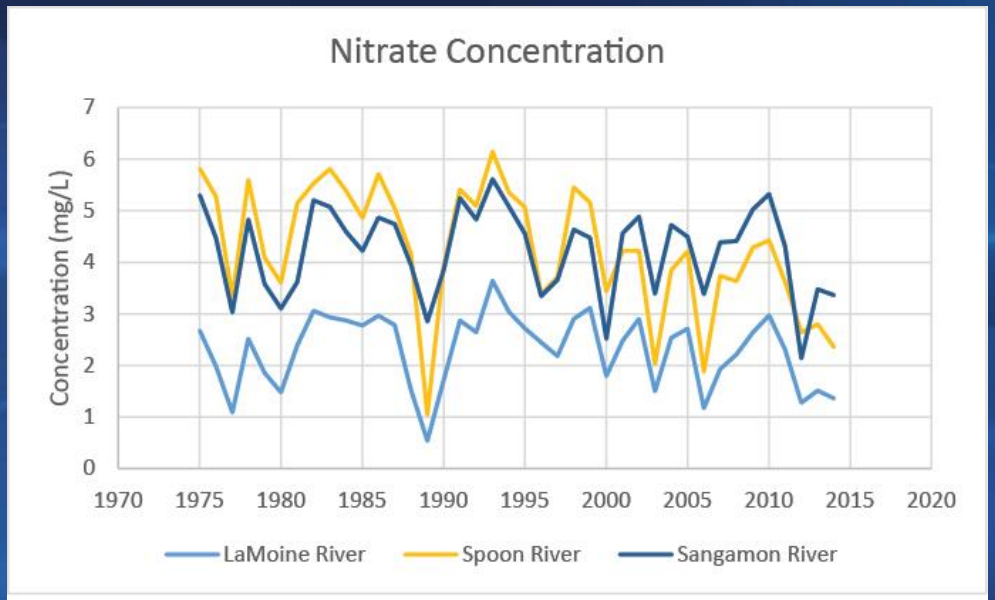
Total Phosphorus Load, Yield and Flow: Main Channel Stations

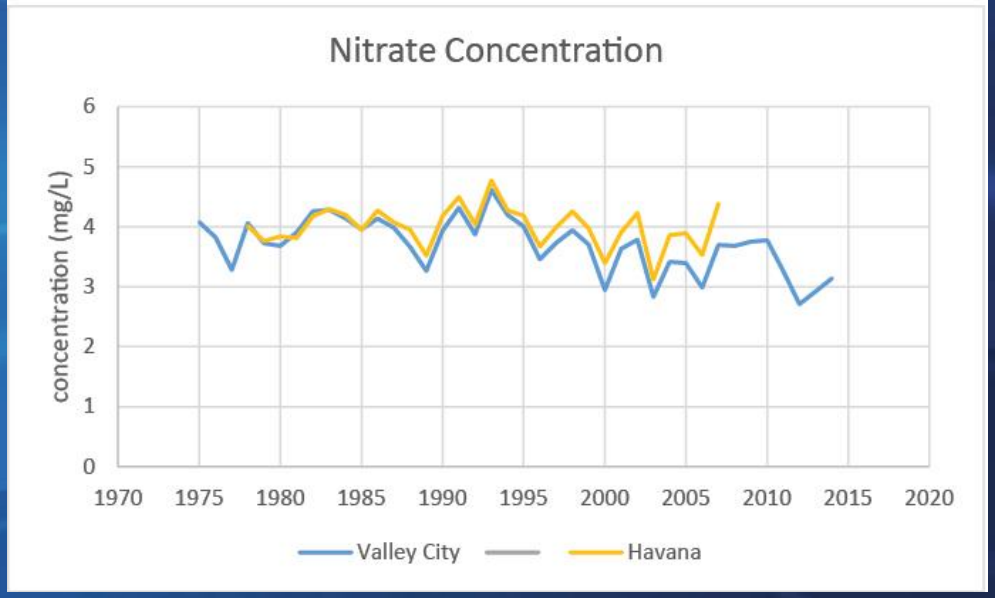




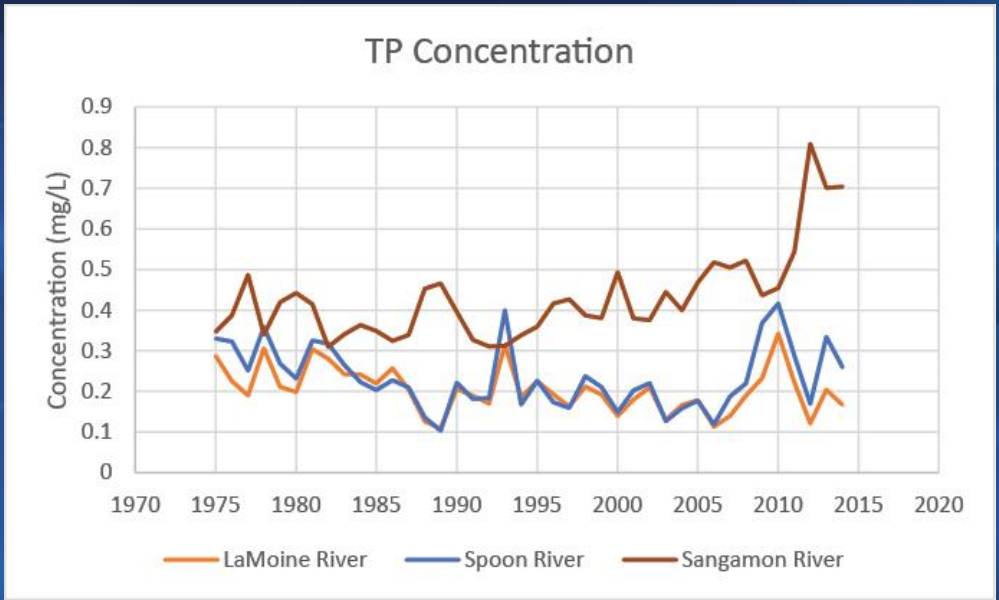


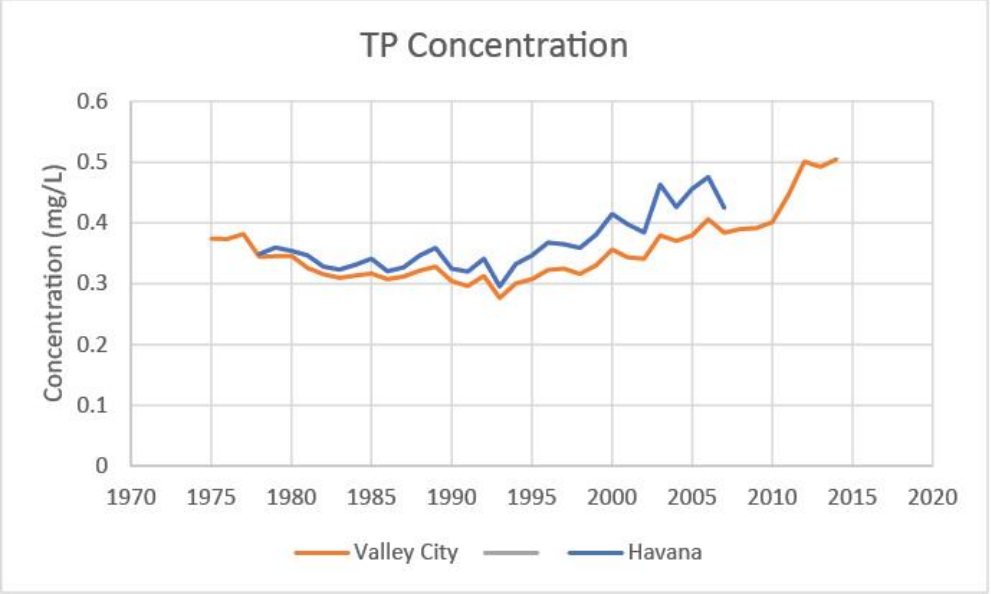
Nitrate and Nitrite Concentration





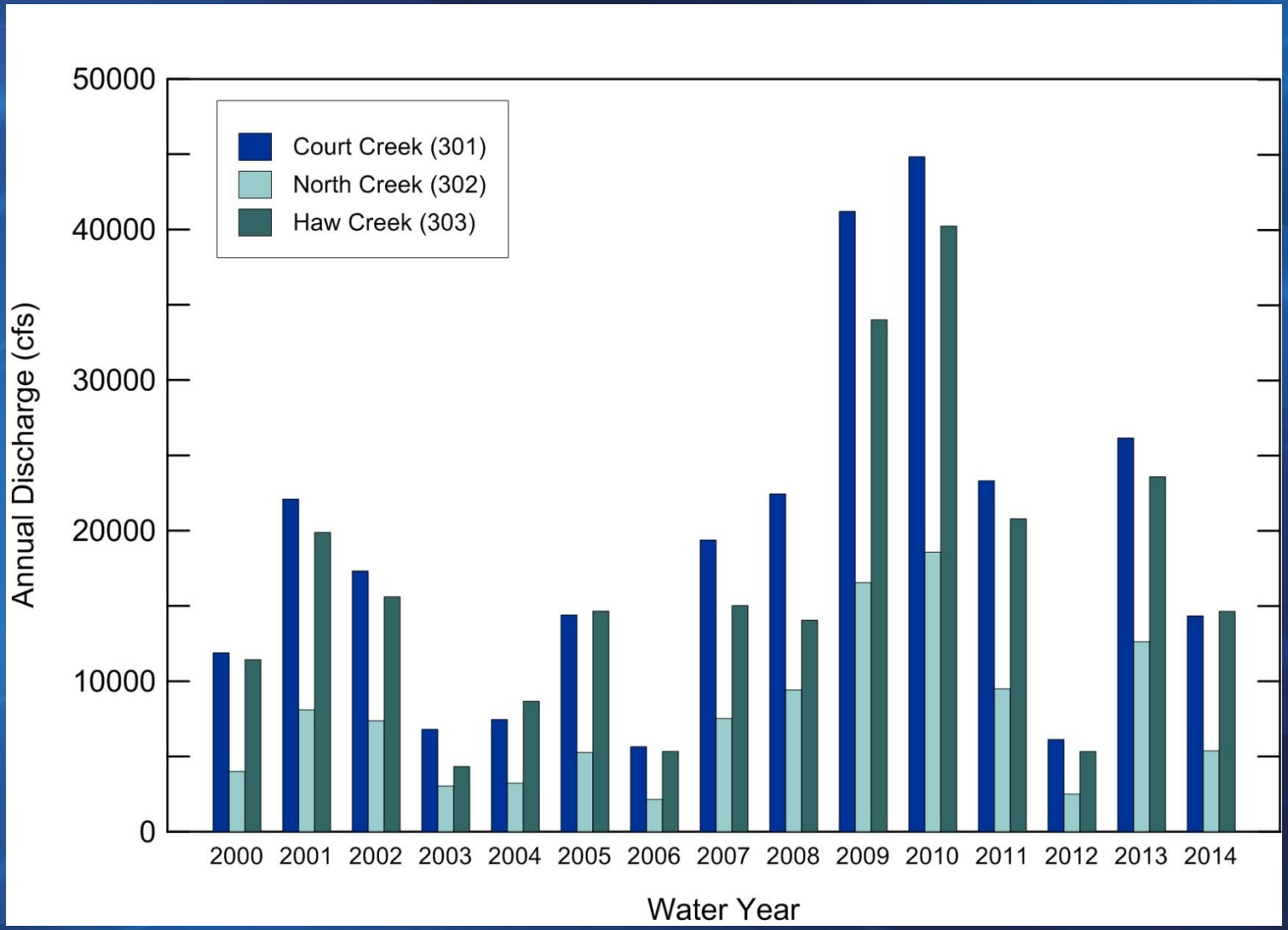
Total Phosphorus Concentration



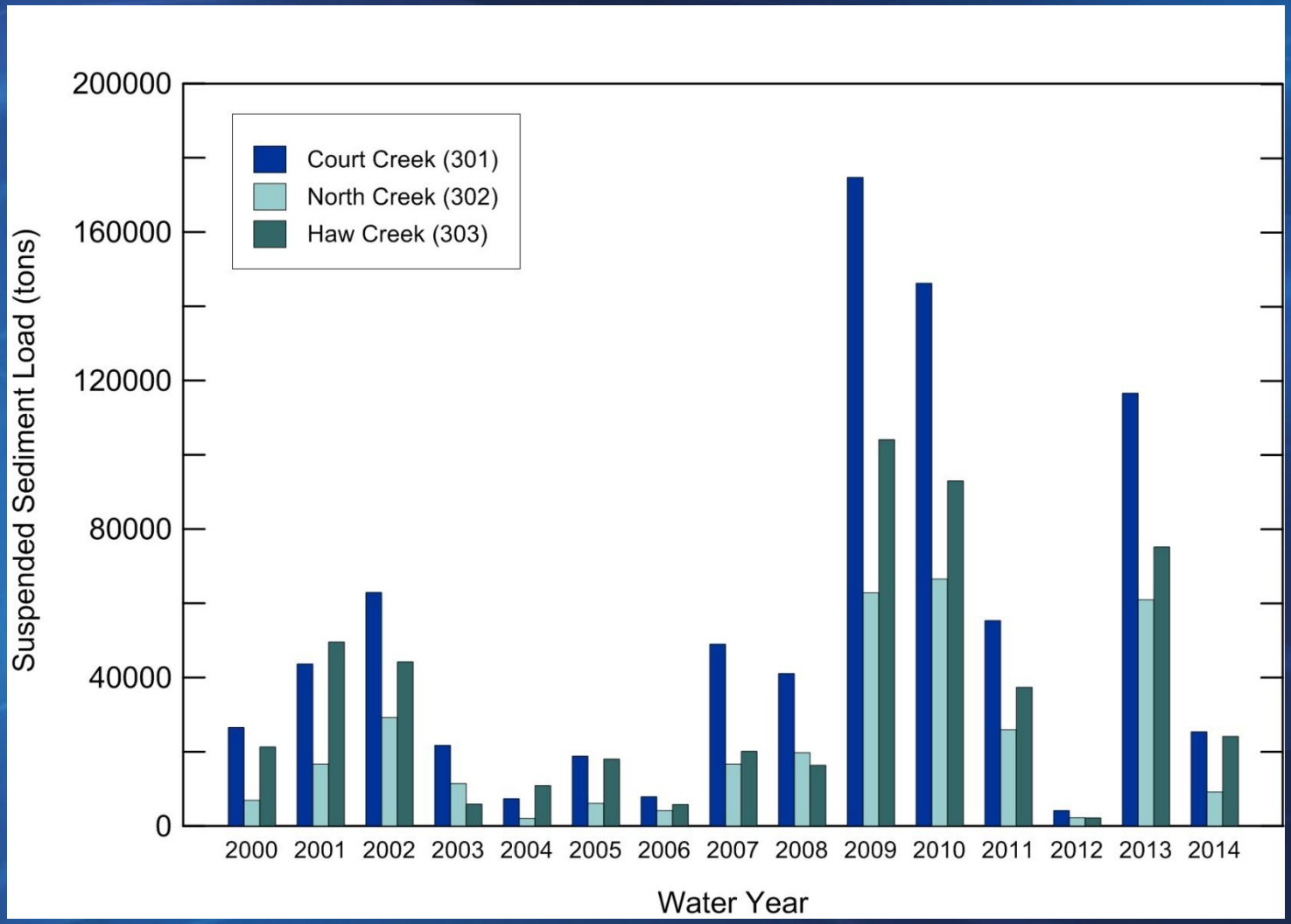


CREP Intensive Monitoring Data

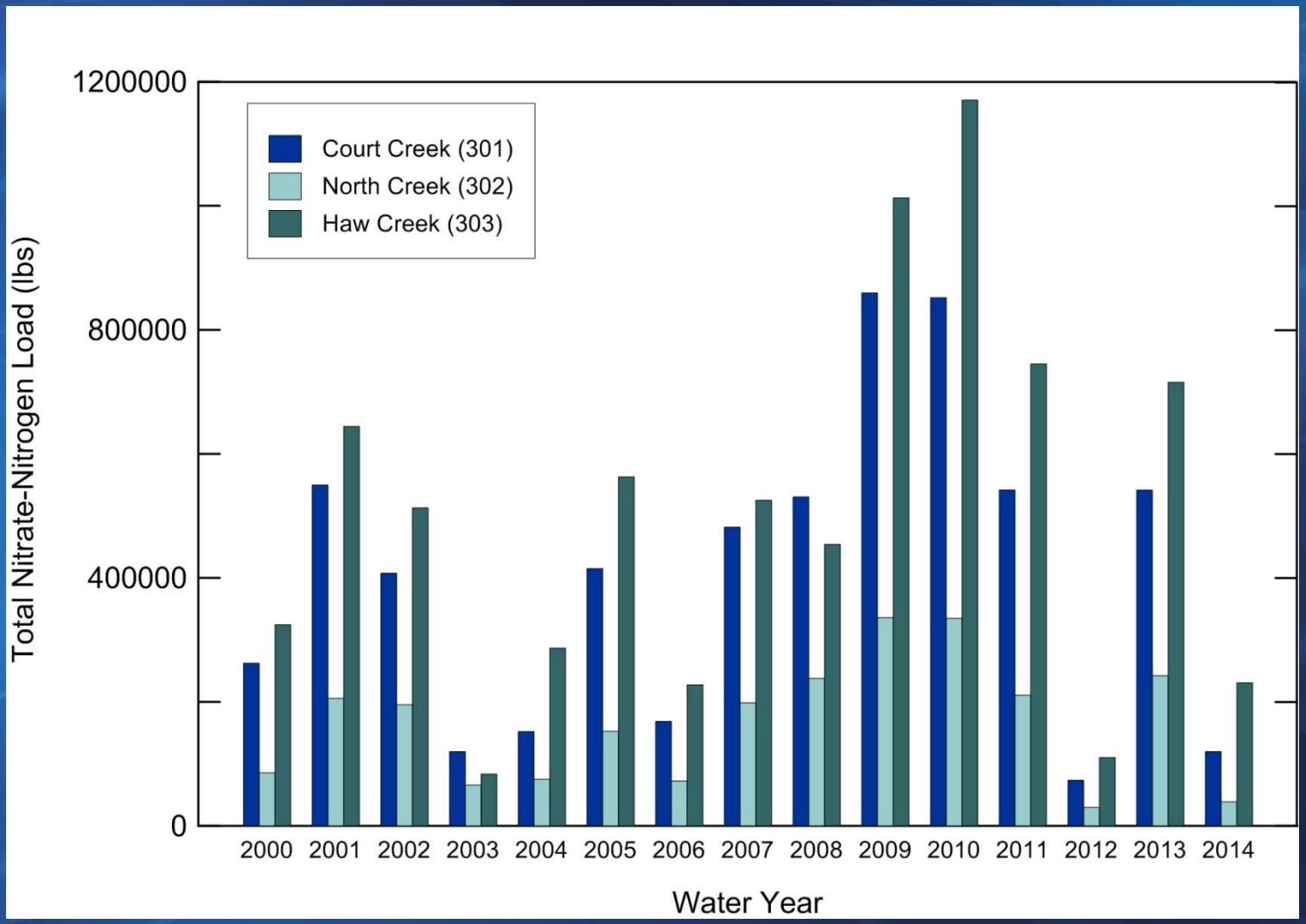
Annual streamflow at the five CREP monitoring stations



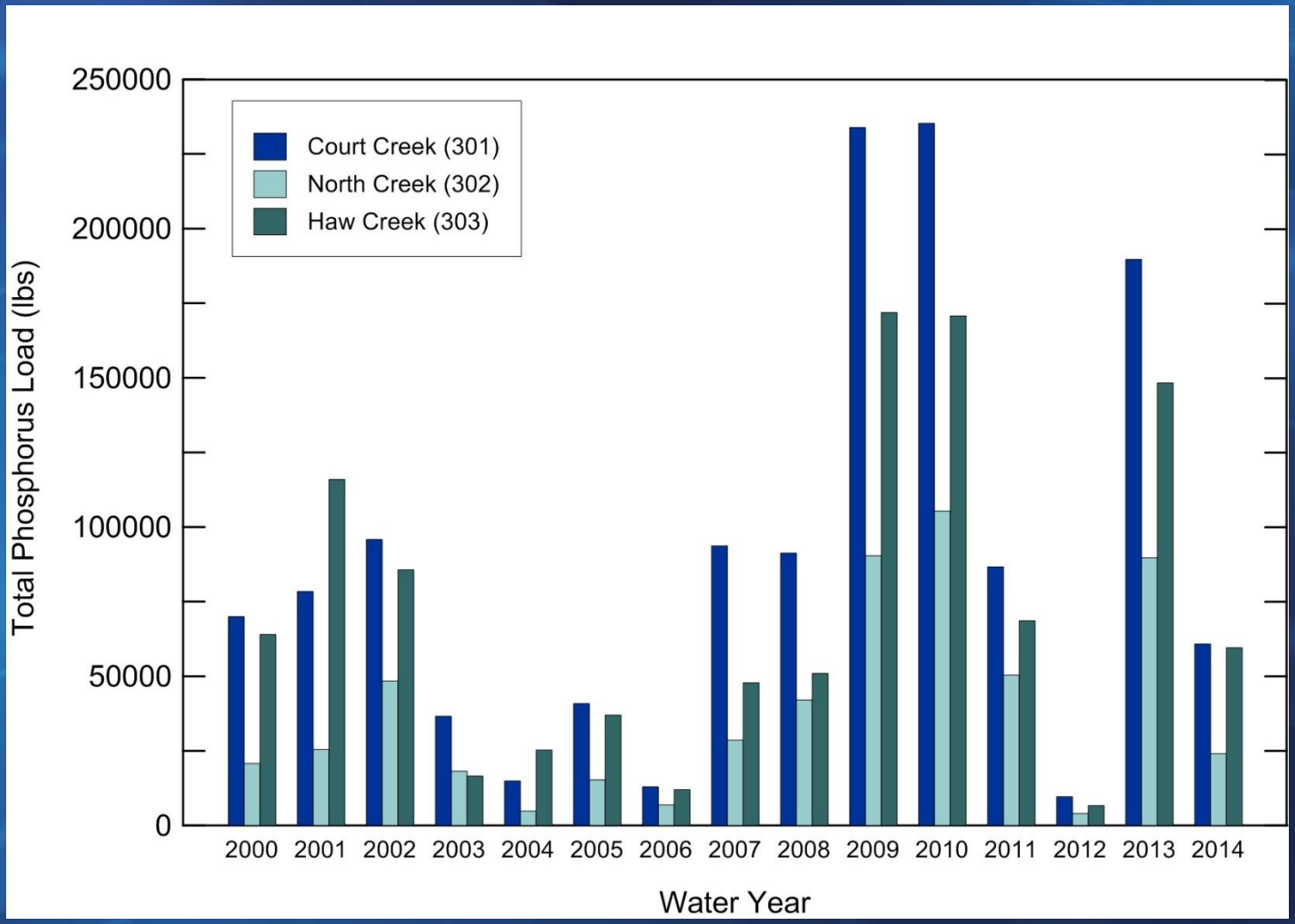
Annual suspended sediment loads at the five CREP monitoring stations



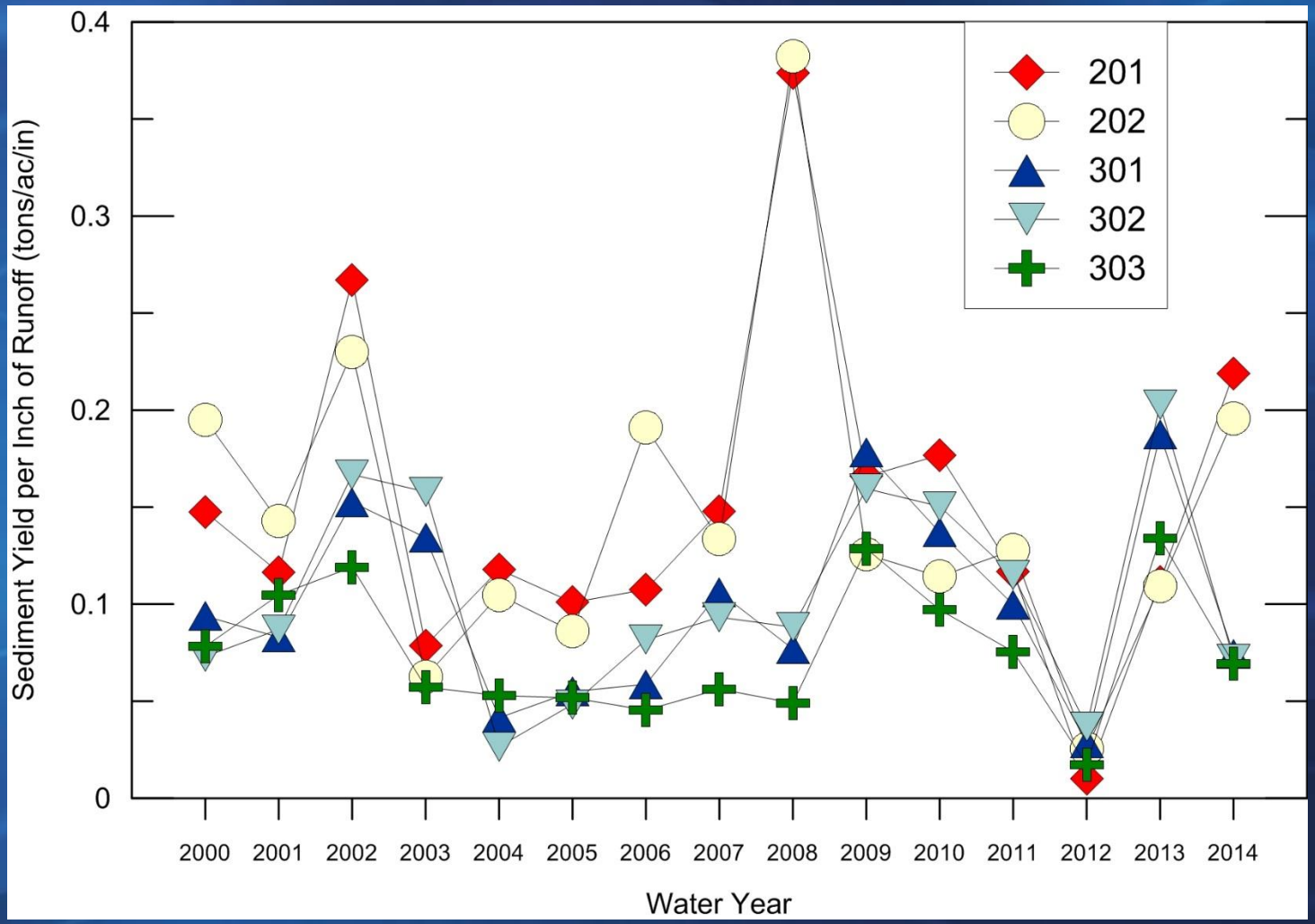
Annual nitrate-N loads at the five CREP monitoring stations



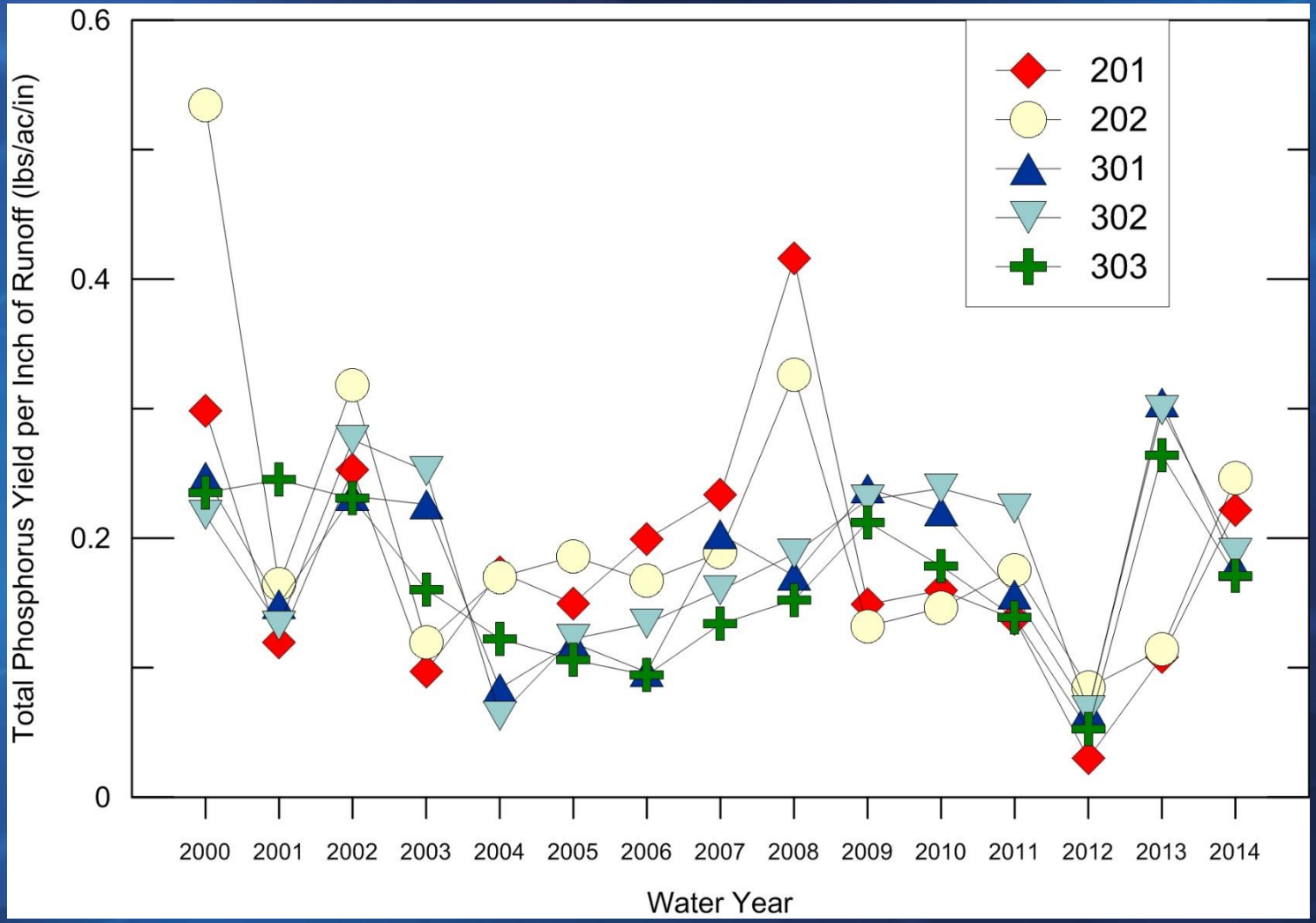
Annual phosphorus loads at the five CREP monitoring stations



Variability of sediment yield per inch of runoff for CREP monitoring stations



Variability of total phosphorus yield per inch of runoff for CREP monitoring stations



Summary

- Availability of long-term data is extremely useful for assessing changes in watersheds: land use, hydrology, water quality, sediment, and habitat.
- We can document and detect change over time – however, it should be acknowledged that it takes time to see some of these changes and thus quick assessments are not reliable.
- With the collection of the appropriate data and the proper use of watershed models and statistical methods, we can evaluate the effects of watershed projects successfully.

Summary
(concluded)

- The trend analysis show that sediment and nitrogen (Nitrate + Nitrite) delivery to the Illinois River has either stabilized or decreased in recent years. However, Phosphorous (especially dissolved Phosphorous) delivery has increased.
- Overall progress is being made in restoring the Illinois River.

Thank You!

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