River Nutrient Trends from Minnesota's Watershed Pollutant Load Monitoring Network

NWQMC 10th National Monitoring Conference

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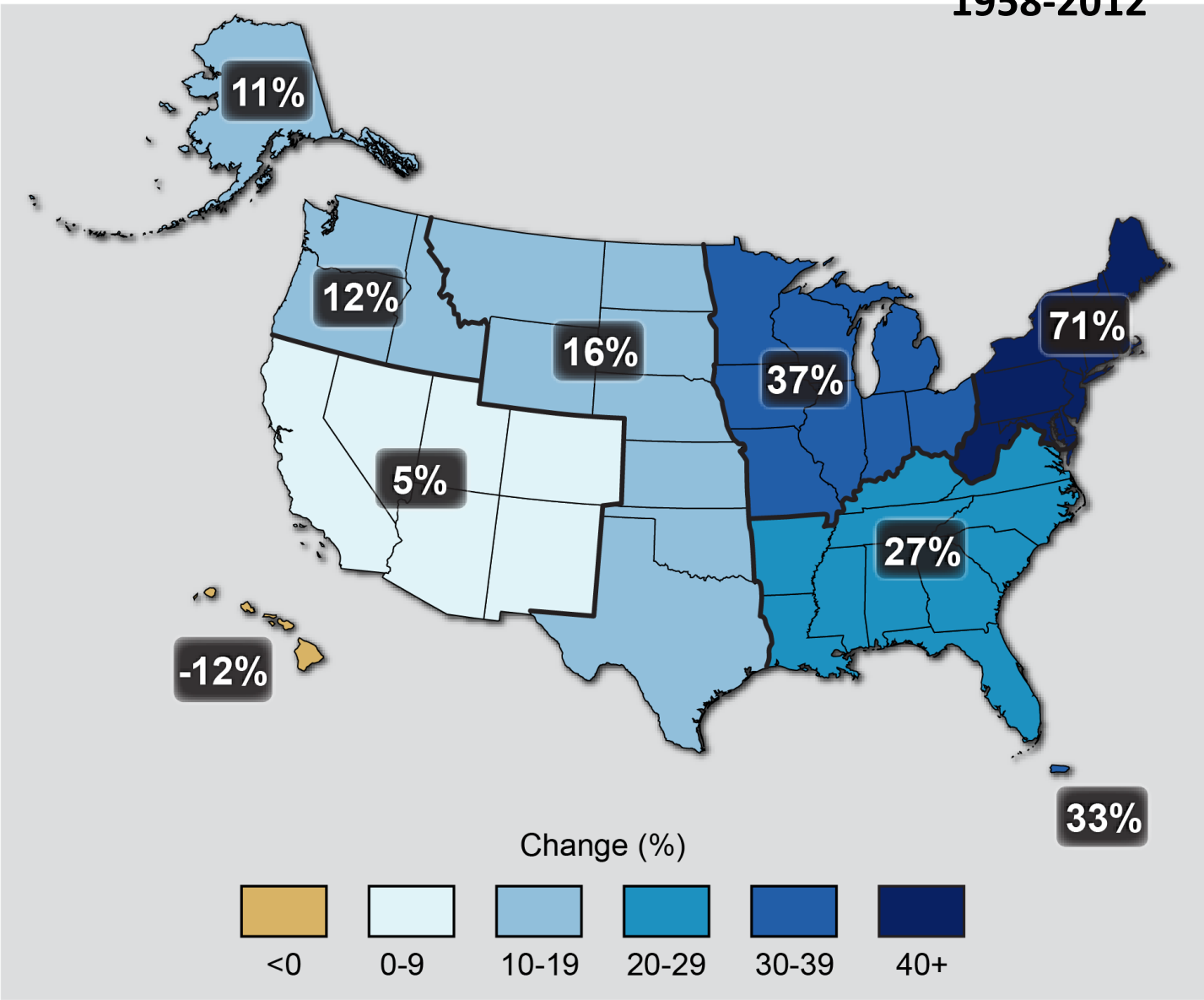
May 5, 2016

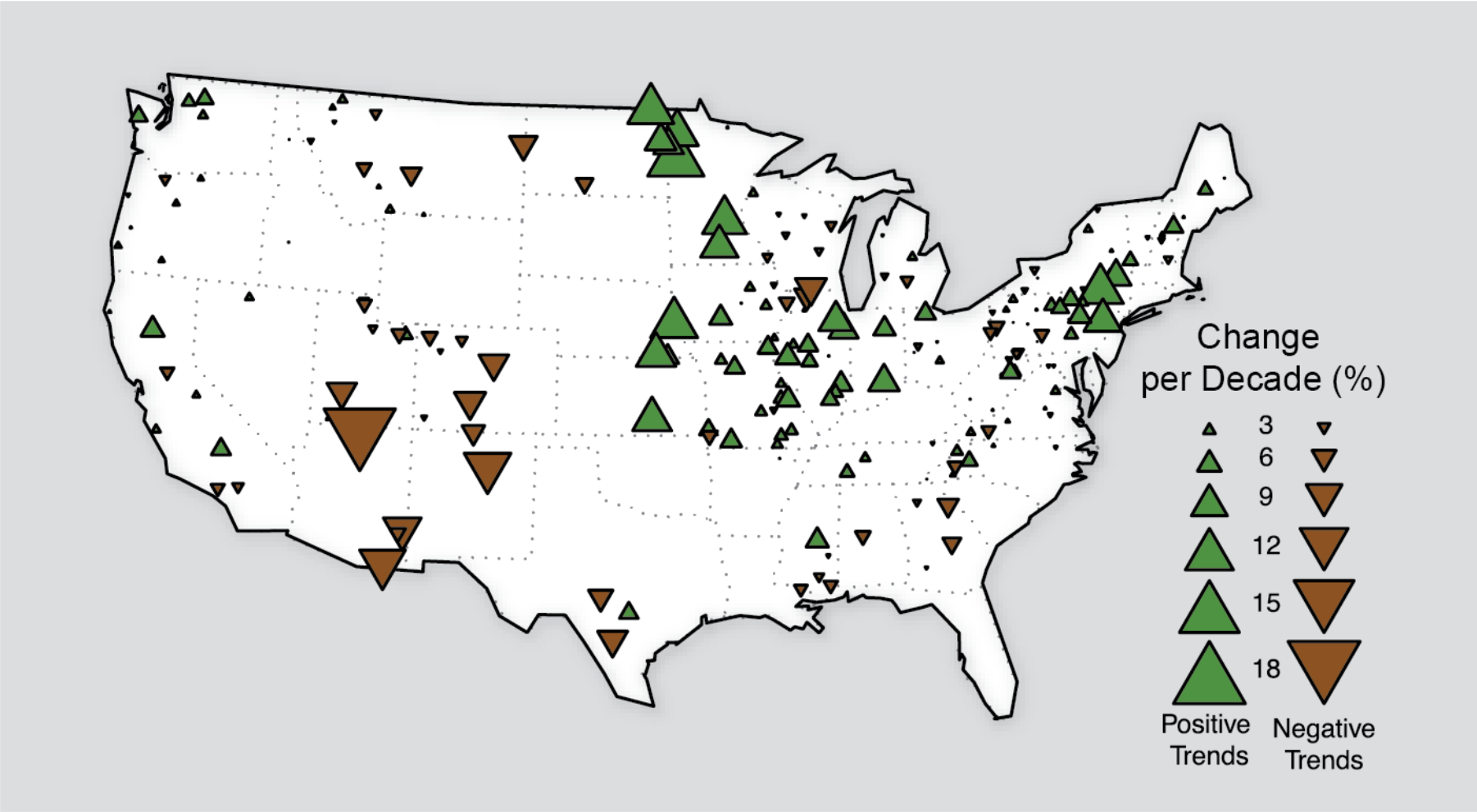
Observed Change in Very Heavy Precipitation

1958-2012

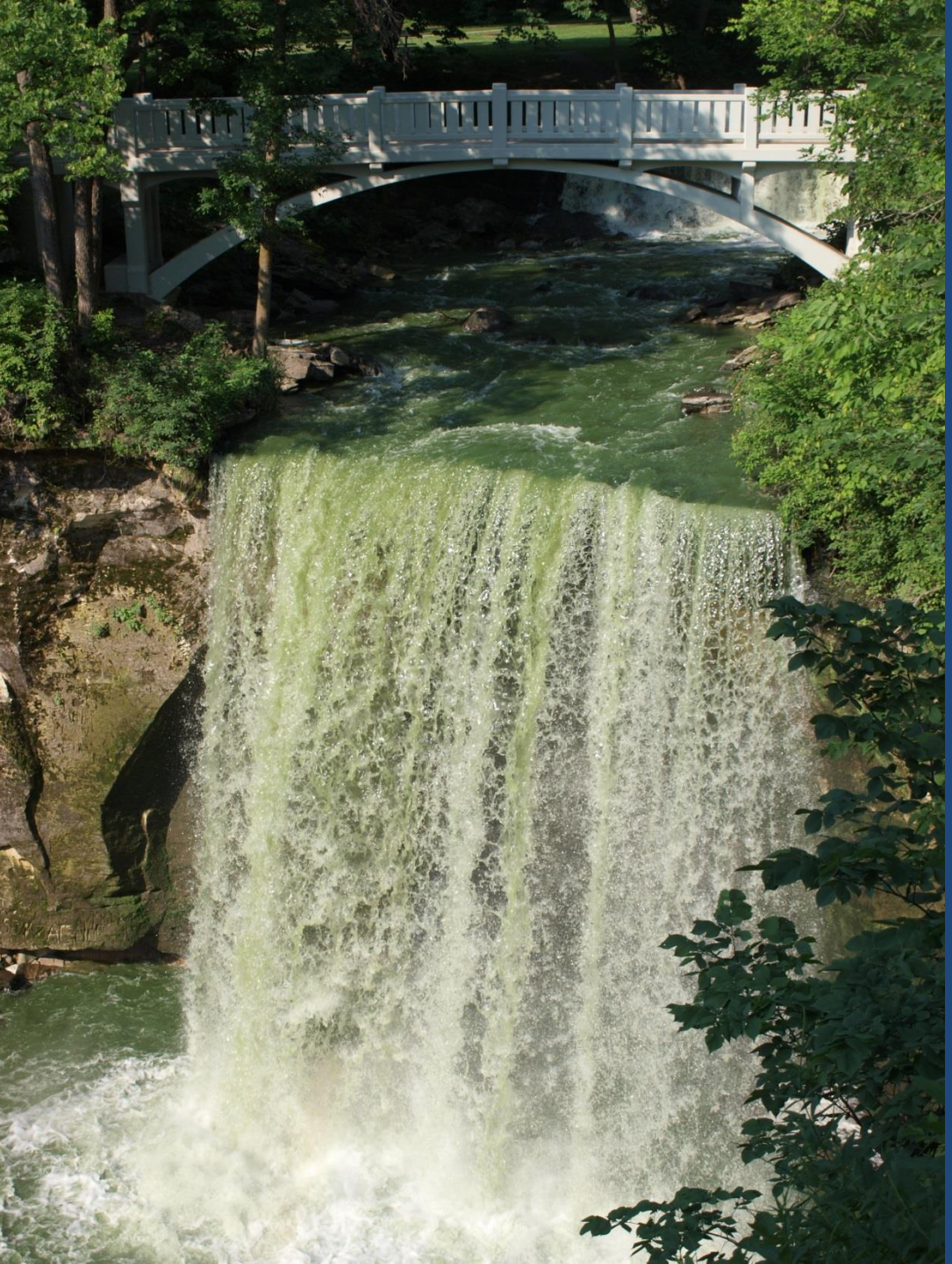


2014 National Climate Assessment. U.S. Global Change Research Program

Trends in Flood Magnitude (1920's-2008)



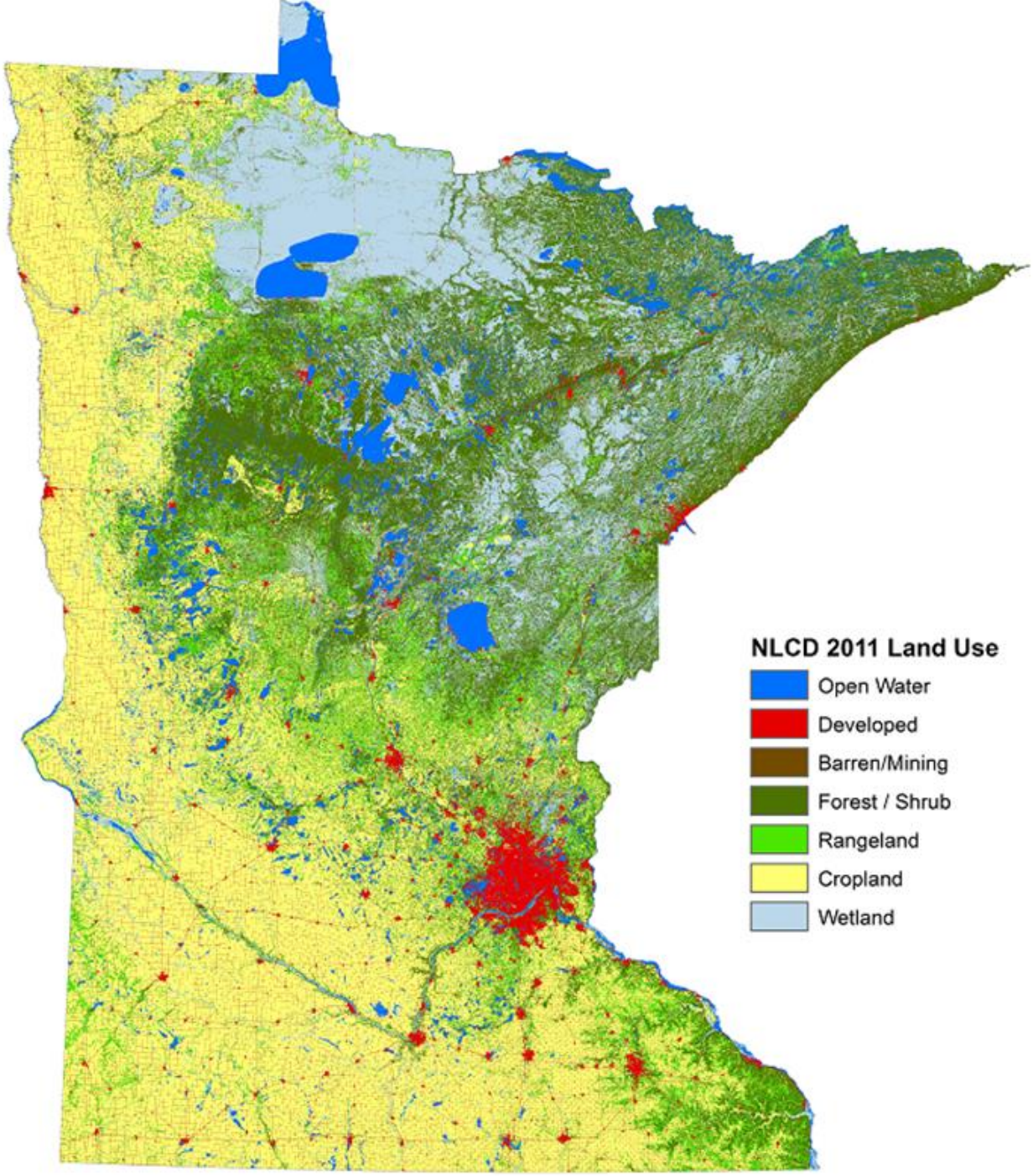
2014 National Climate Assessment. U.S. Global Change Research Program



Minneopa Creek

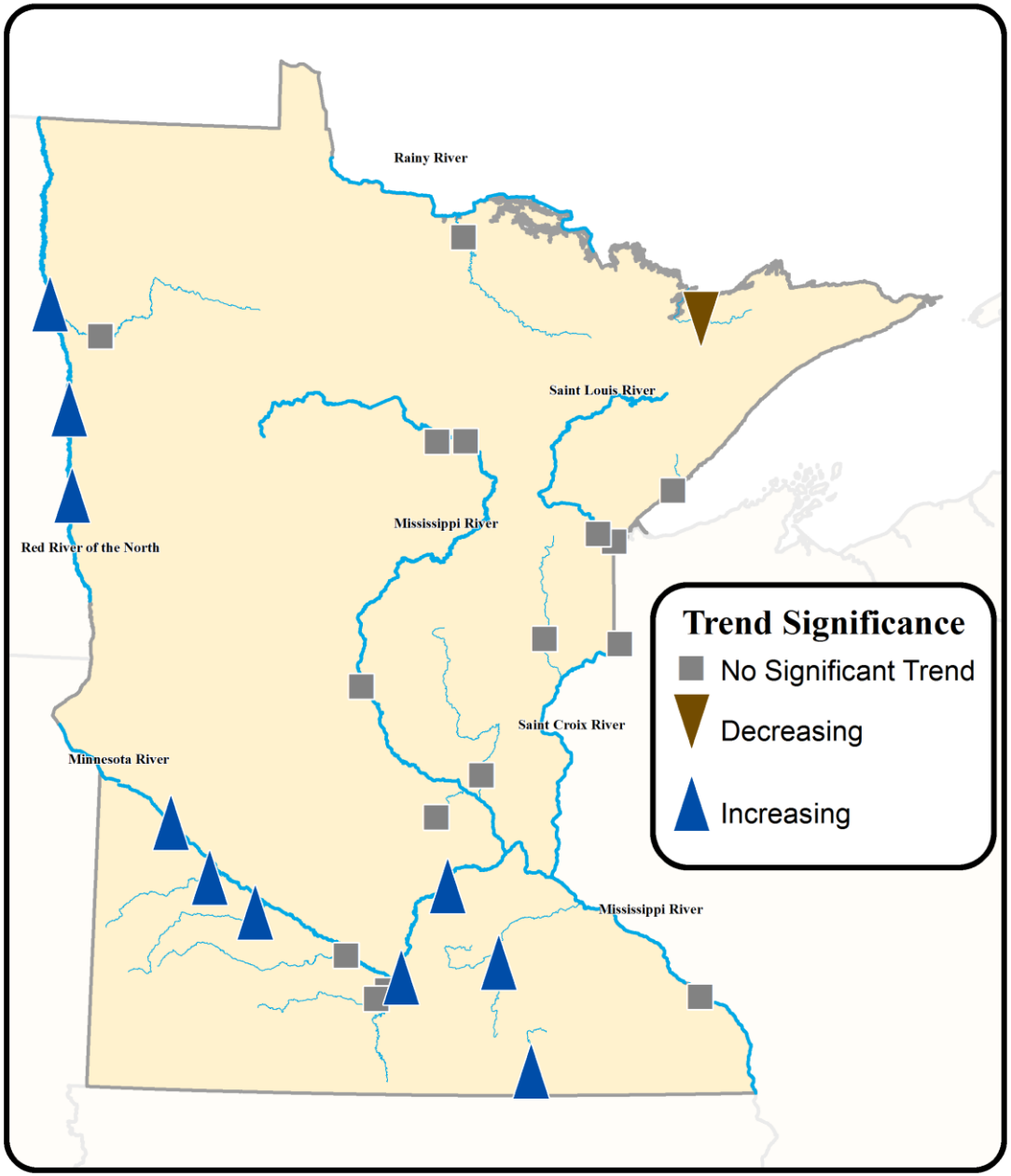
Headwaters:
Lake Crystal

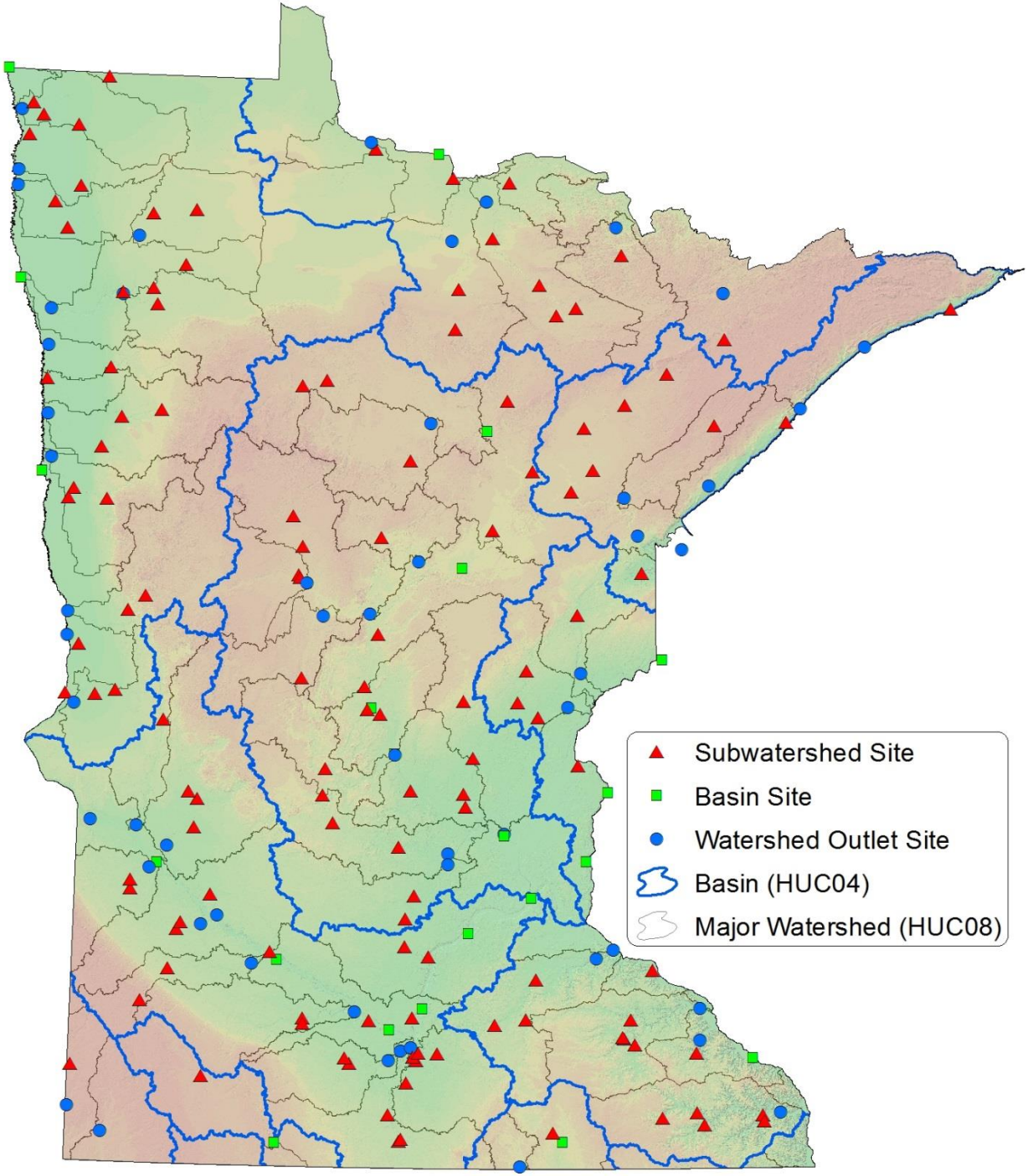
Location:
South-Central
Minnesota


NLCD 2011 Land Use
Open Water
Developed
Barren/Mining
Forest / Shrub
Rangeland
Cropland
Wetland

Mean Daily Discharge

Long Term Trends: Discharge





CLEAN WATER LAND & LEGACY AMENDMENT

199 Long-Term WPLMN Stations

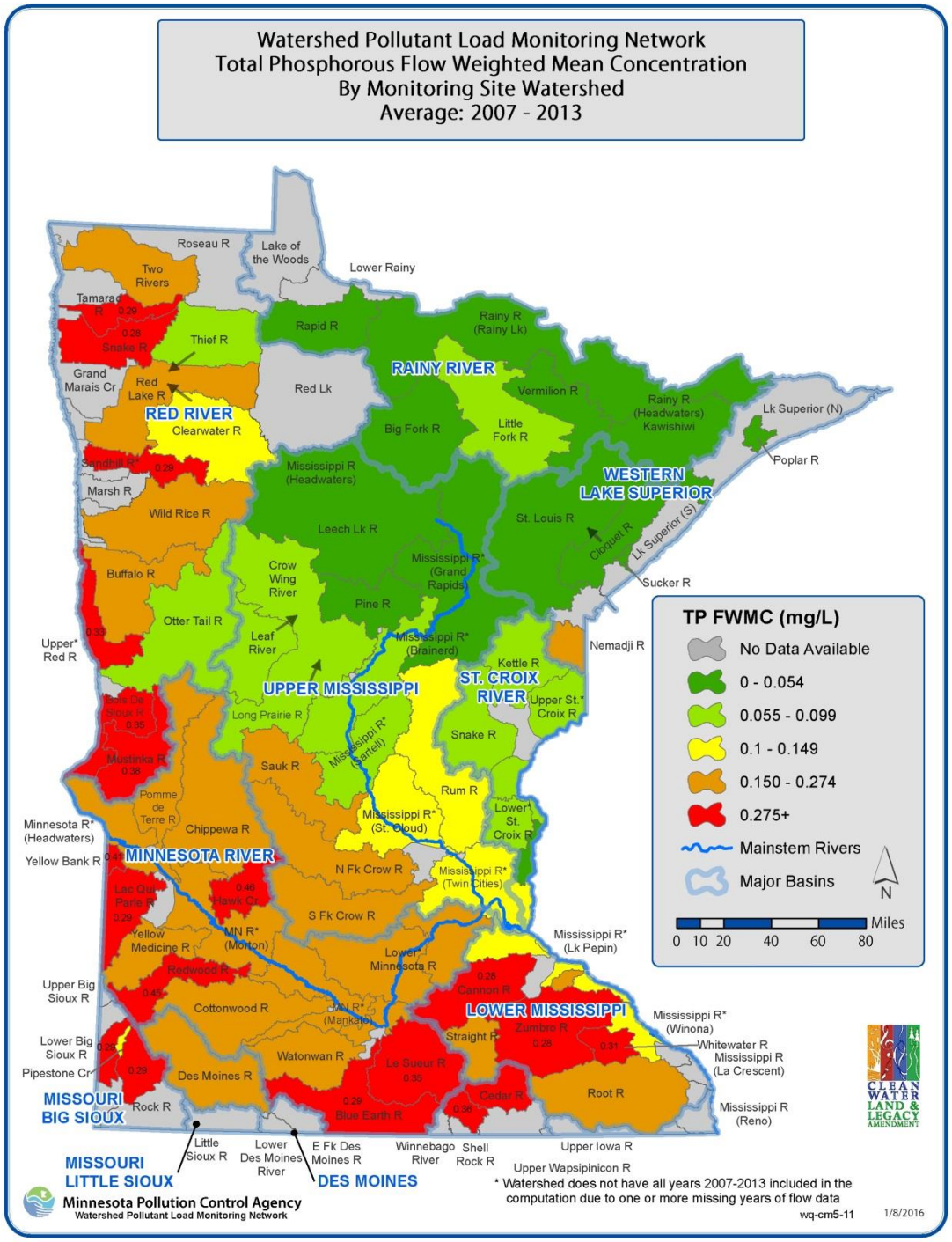
- 22 Basin Scale
  - Year-round ~ 35 samples per year
- 52 Major Watershed Outlet
  - Year-round ~ 35 samples per year
- 125 Subwatershed Scale
  - Seasonal (open water) ~ 25 samples per year

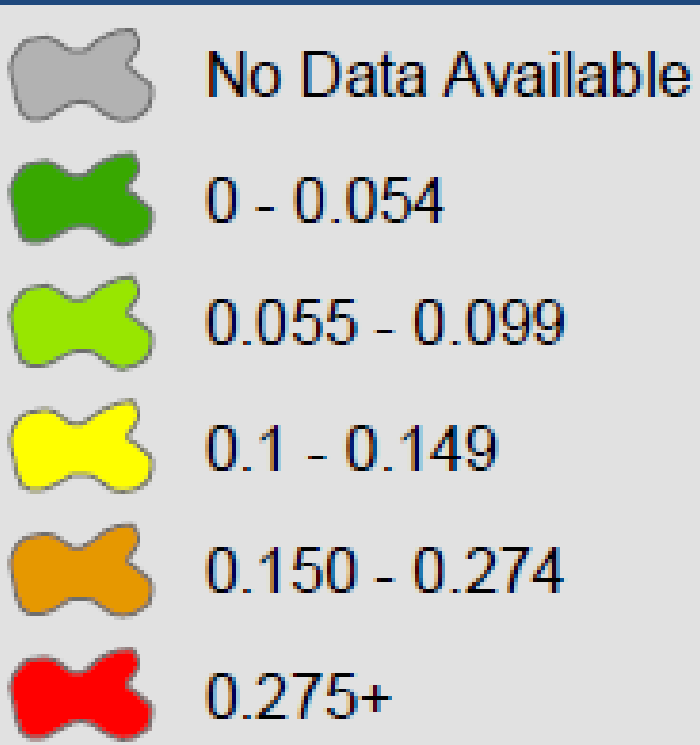
Continuous stream gaging at all sites by USGS and Minnesota Department of Natural Resources

Structure and Budget

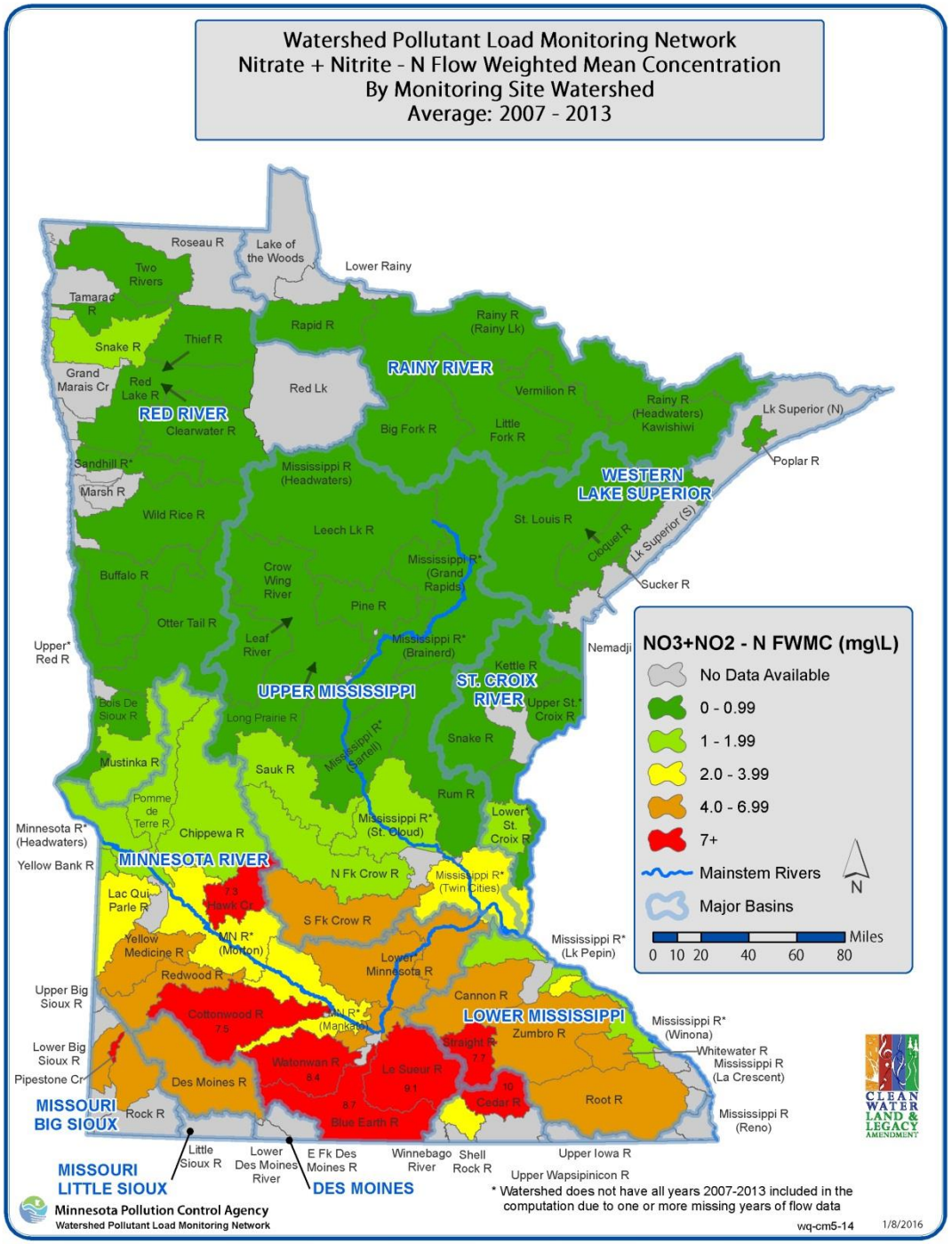
- 8.5 MPCA Staff + 1 Supervisor
- 16 Local Partner Agencies
- Annual Budget (not including stream gaging)
  - Staff and Indirect - $875,000
  - Lab and Equipment - $310,000
  - Partner Contracts - $1,200,000
  - Total - $2,385,000

TOTAL PHOSPHORUS (MG/L)





NITRATE + NIRTRITE - N (MG/L)



No Data Available

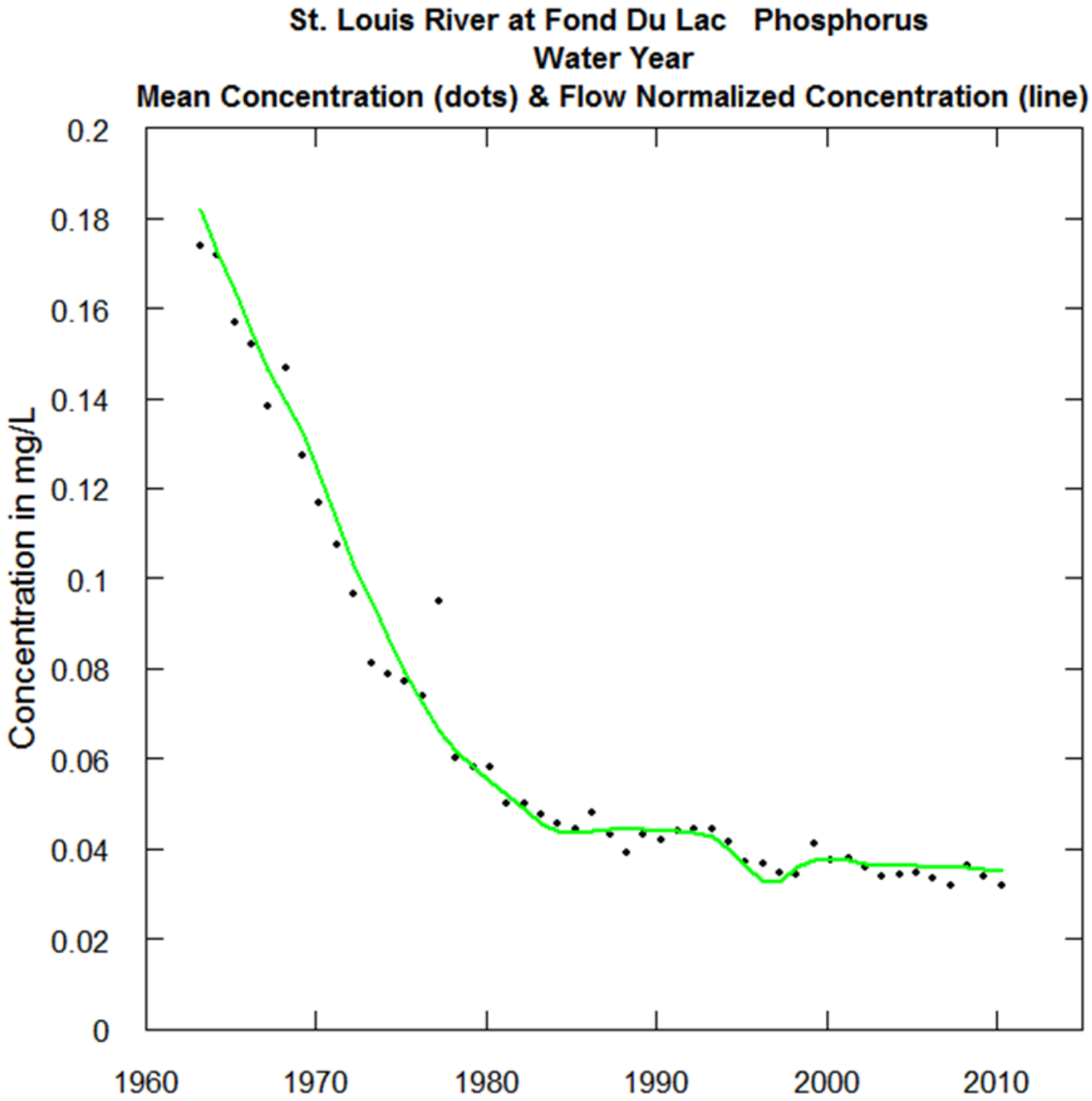
0 - 0.99

1 - 1.99

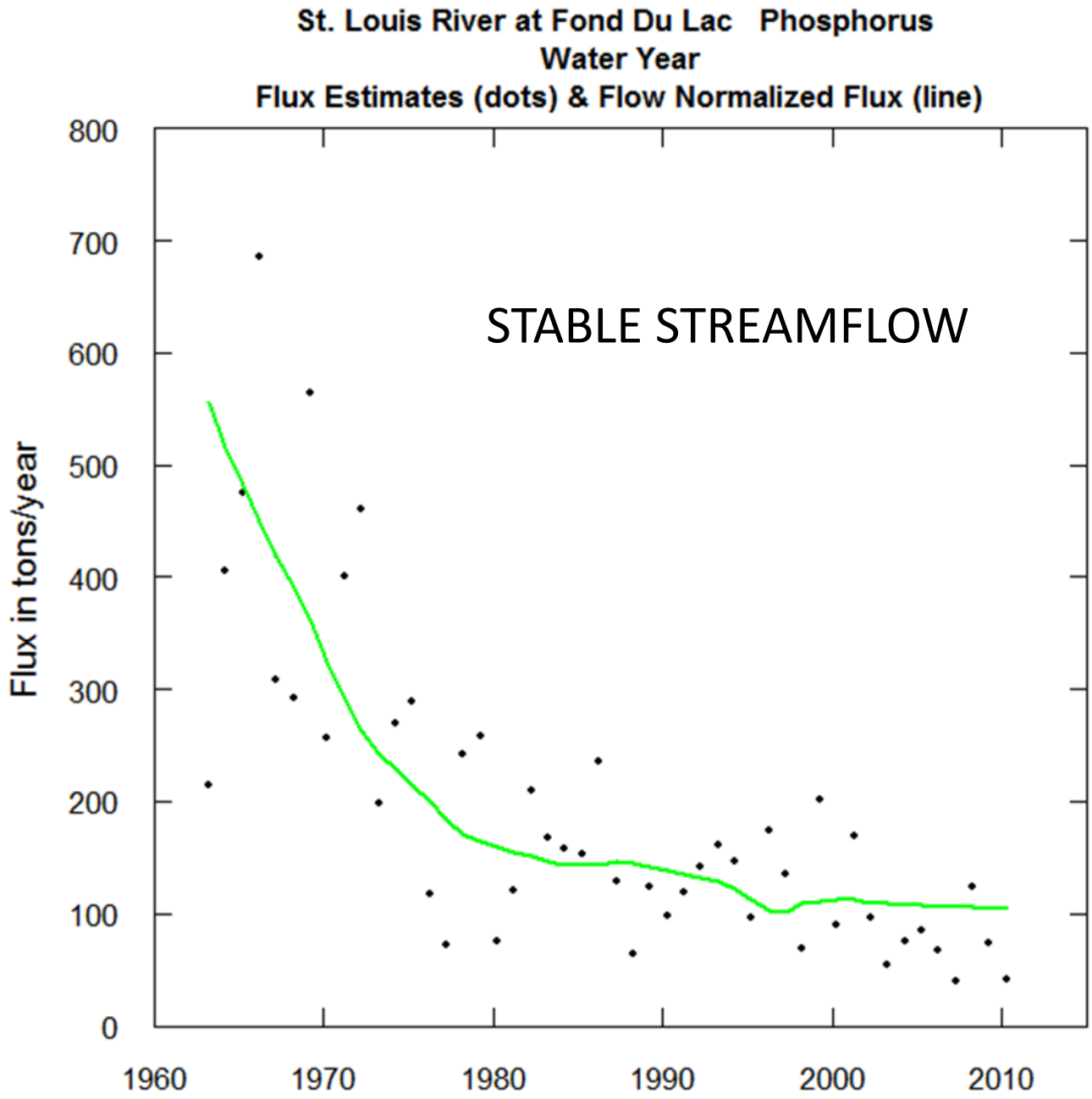
2.0 - 3.99

4.0 - 6.99

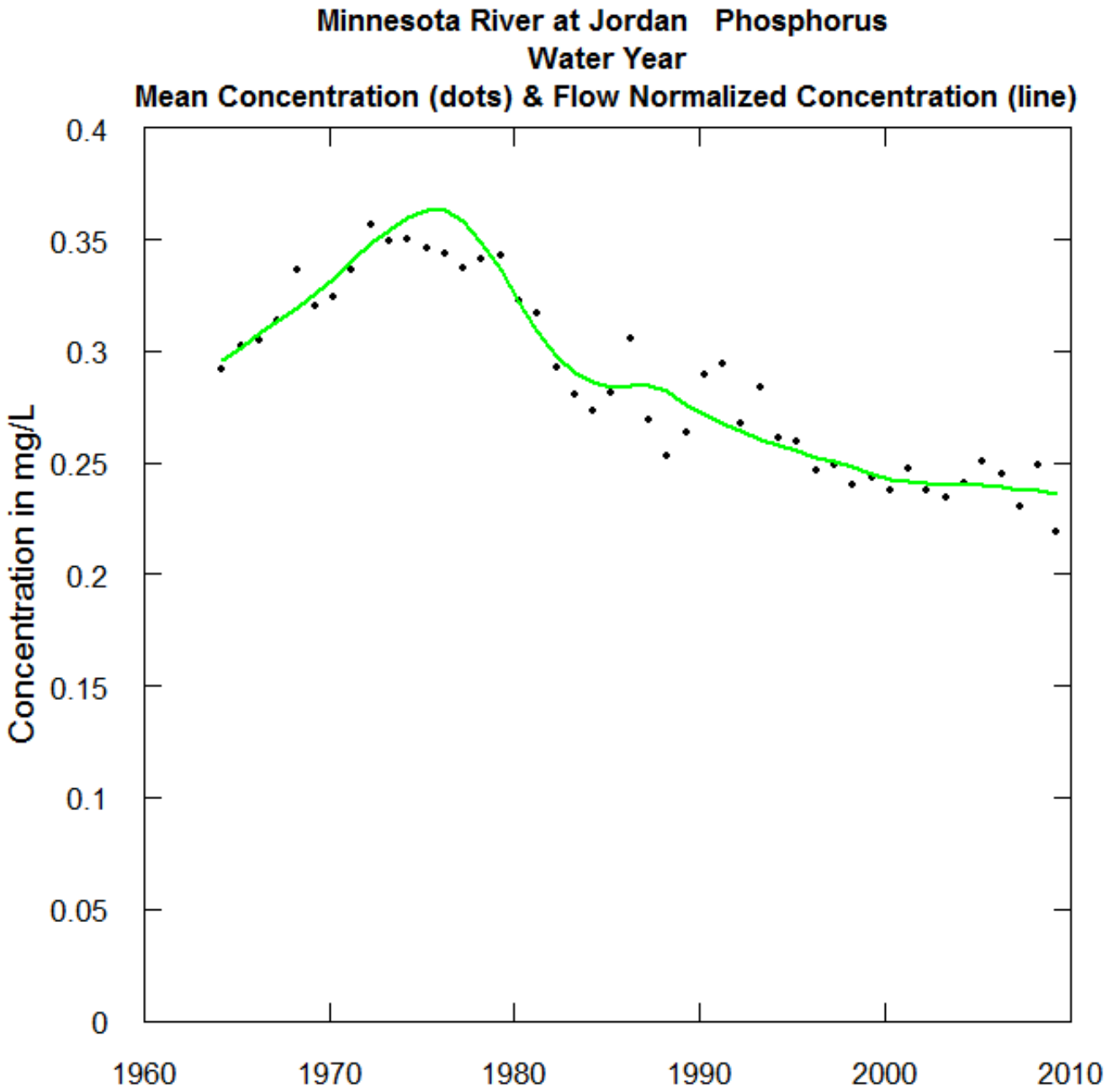
7+



TOTAL PHOS. CONC.



TOTAL PHOS. FLUX



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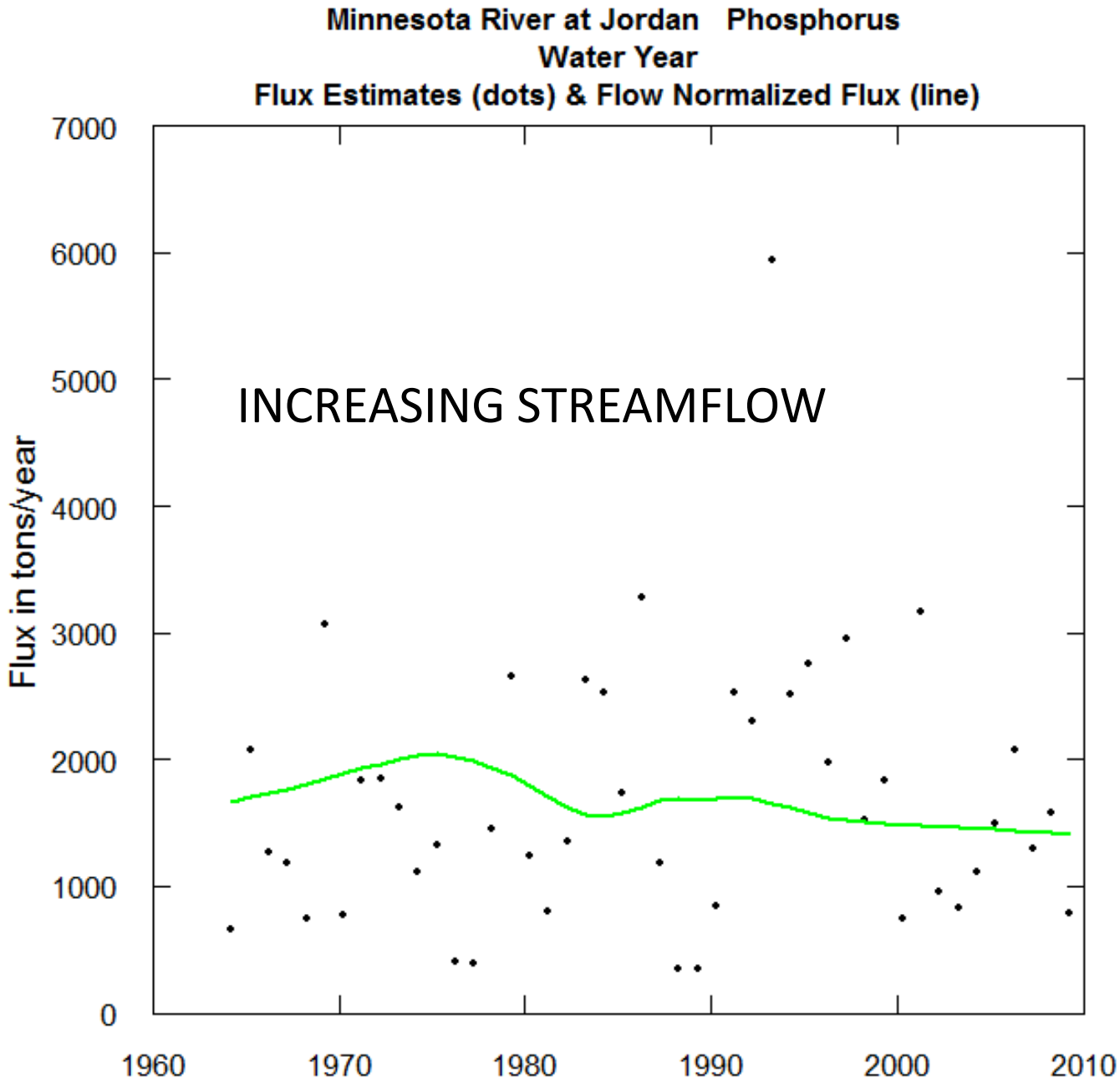

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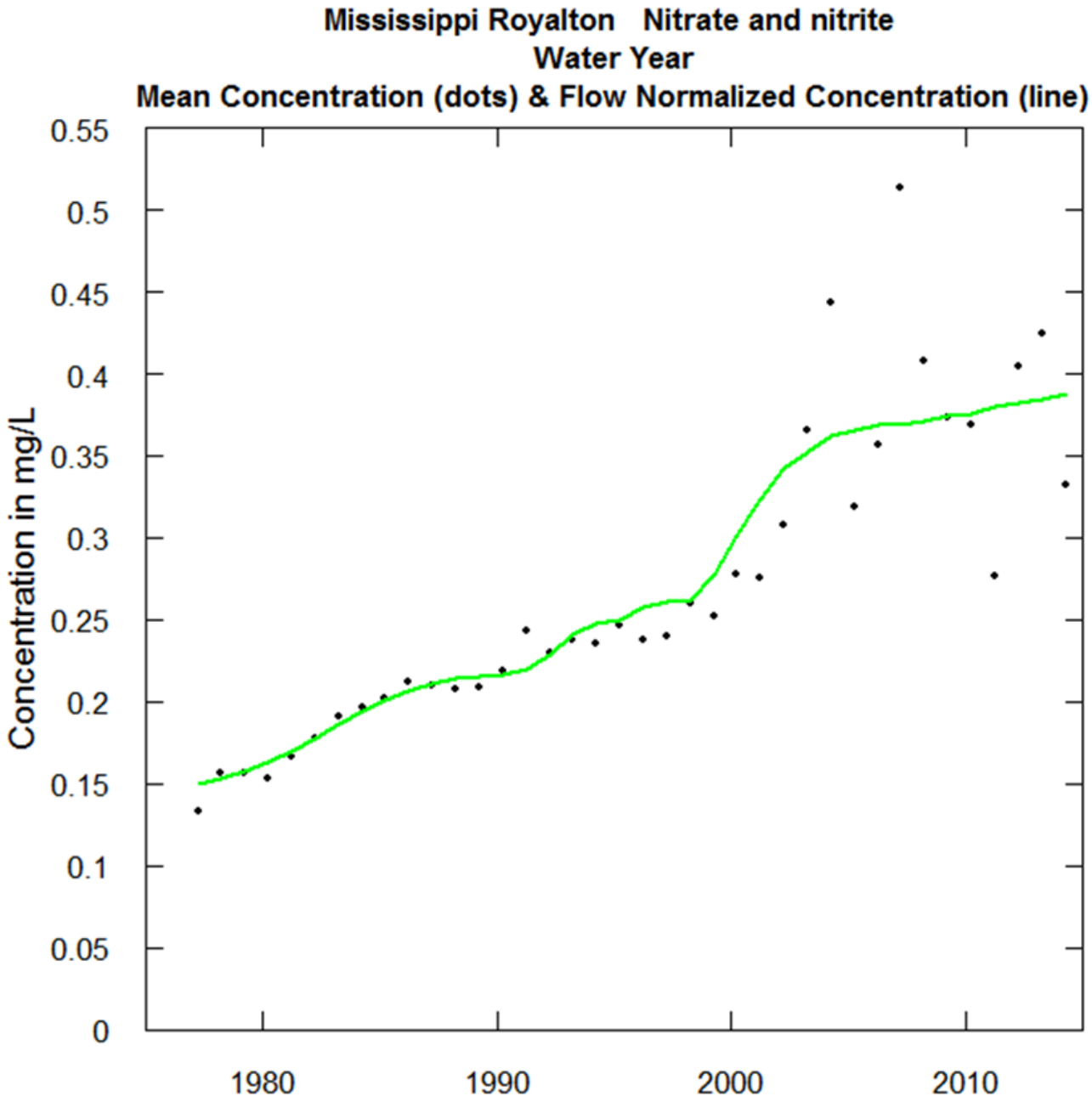
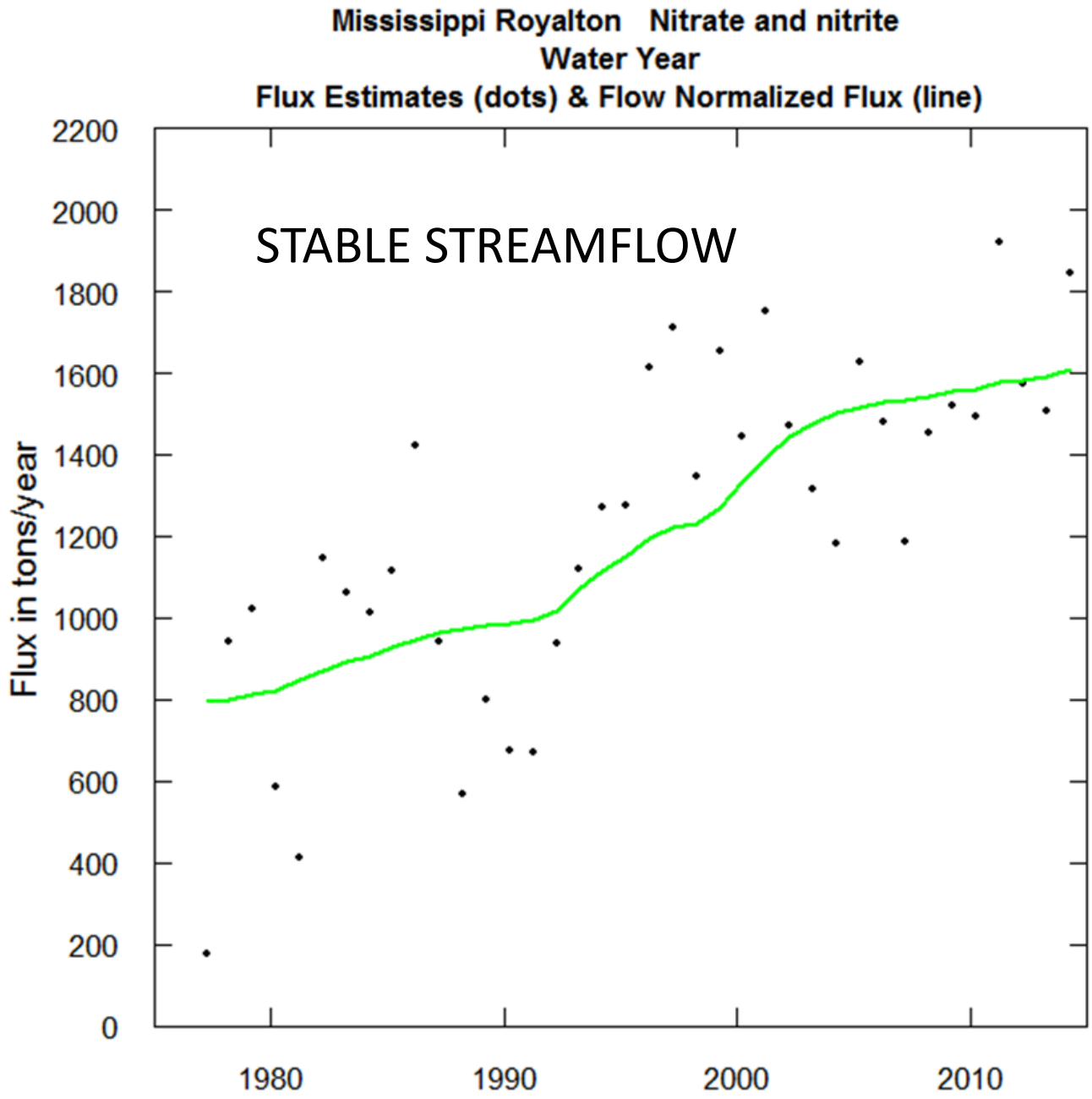

Mississippi Royalton Nitrate and nitrite
Water Year
Mean Concentration (dots) & Flow Normalized Concentration (line)
Concentration in mg/L
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1980
1990
2000
2010

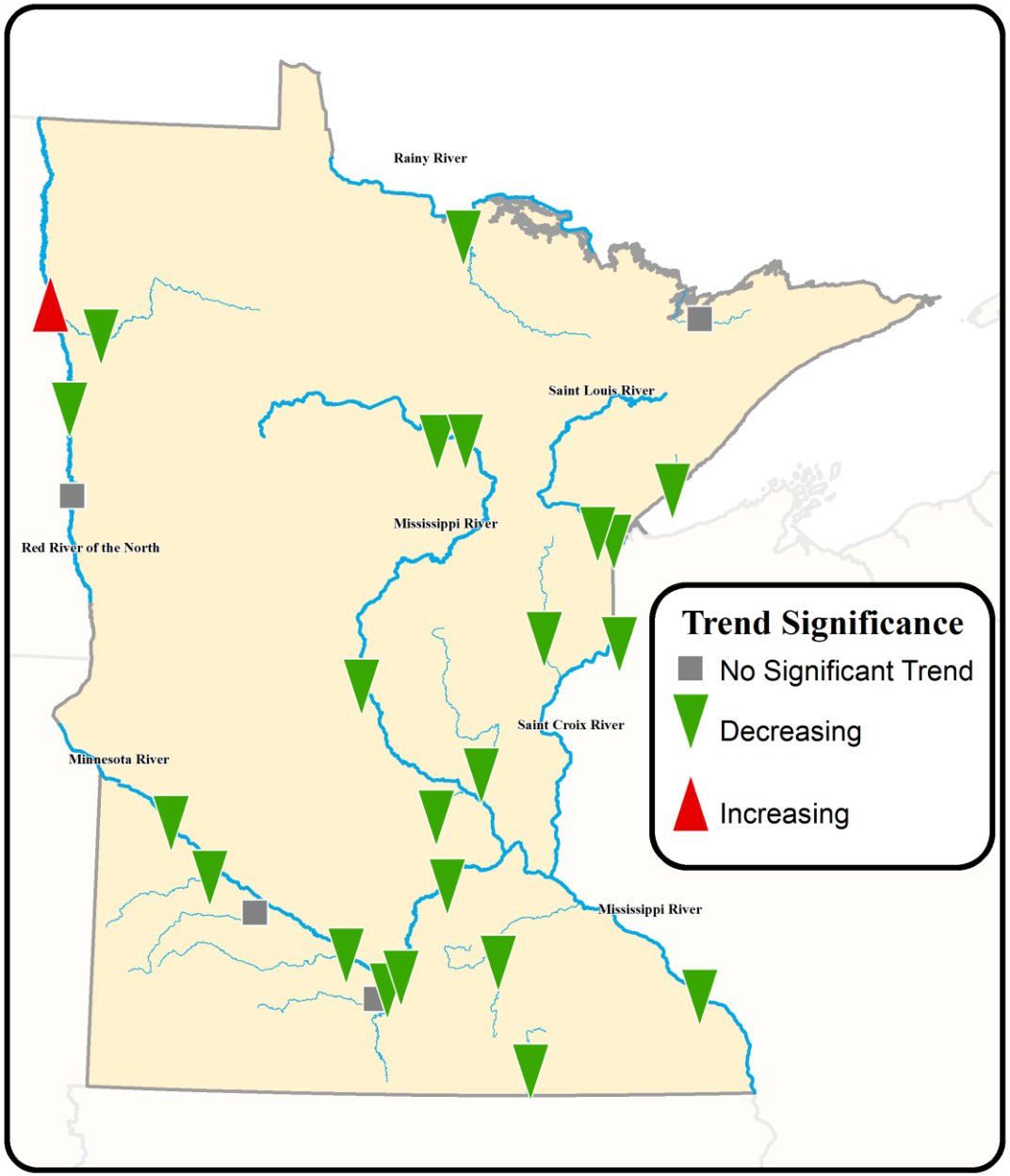
NO2 + NO3 CONC.


Mississippi Royalton Nitrate and nitrite
Water Year
Flux Estimates (dots) & Flow Normalized Flux (line)
STABLE STREAMFLOW
Flux in tons/year
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
1980
1990
2000
2010

NO2 + NO3 FLUX

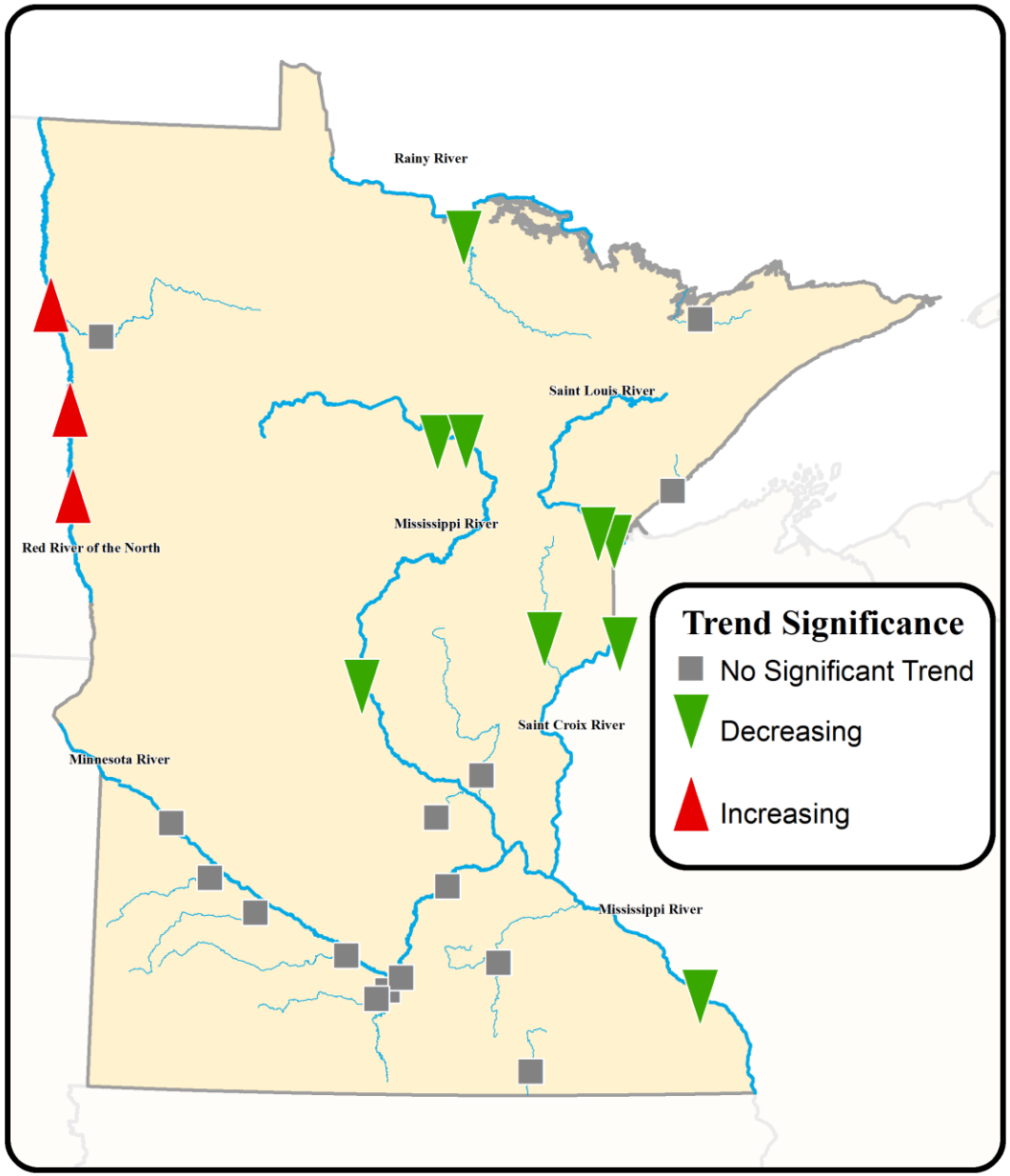
Phosphorus Concentration

Long Term Trends: Phosphorus Concentration



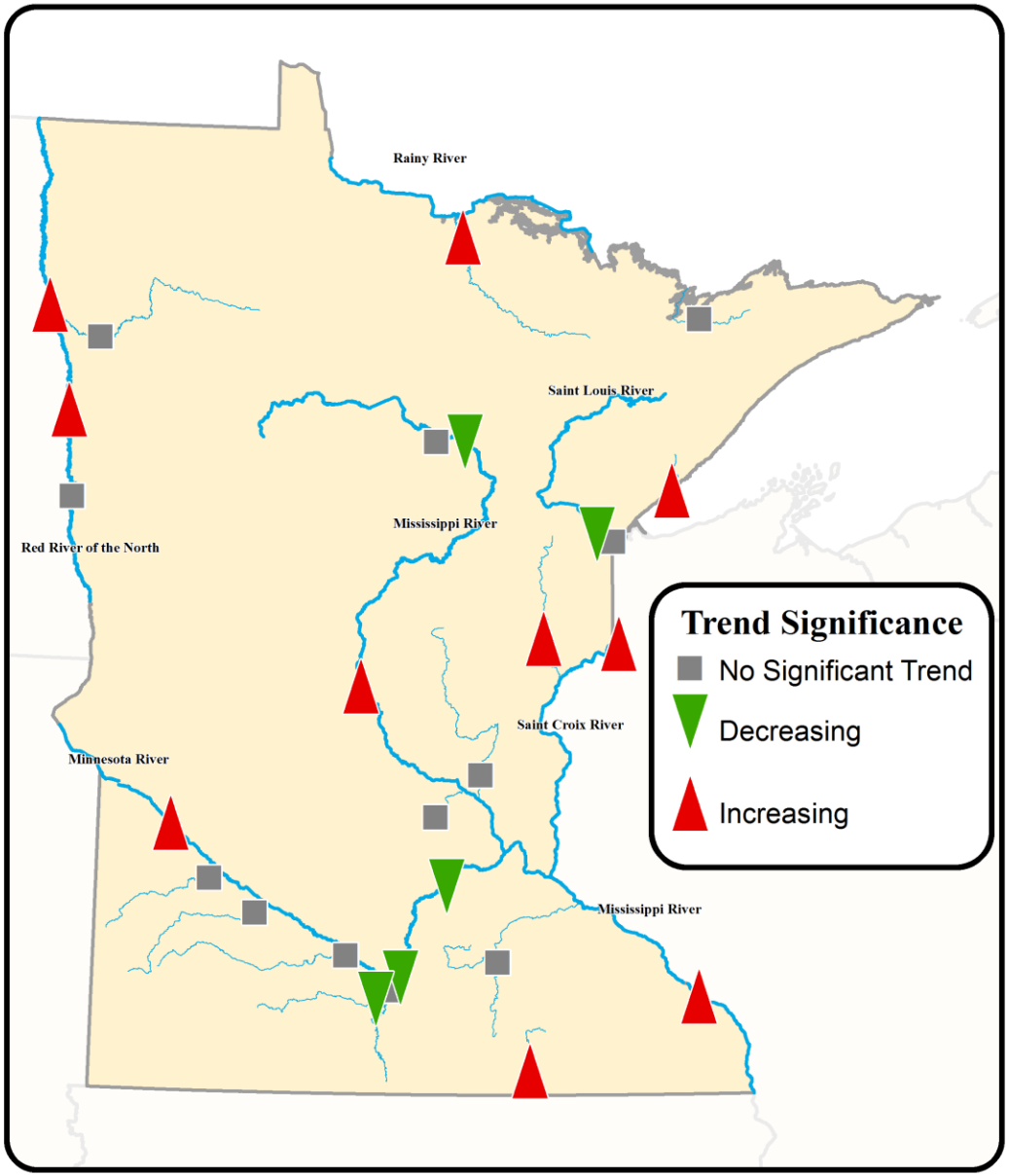
Phosphorus Loading

Long Term Trends: Phosphorus Loading



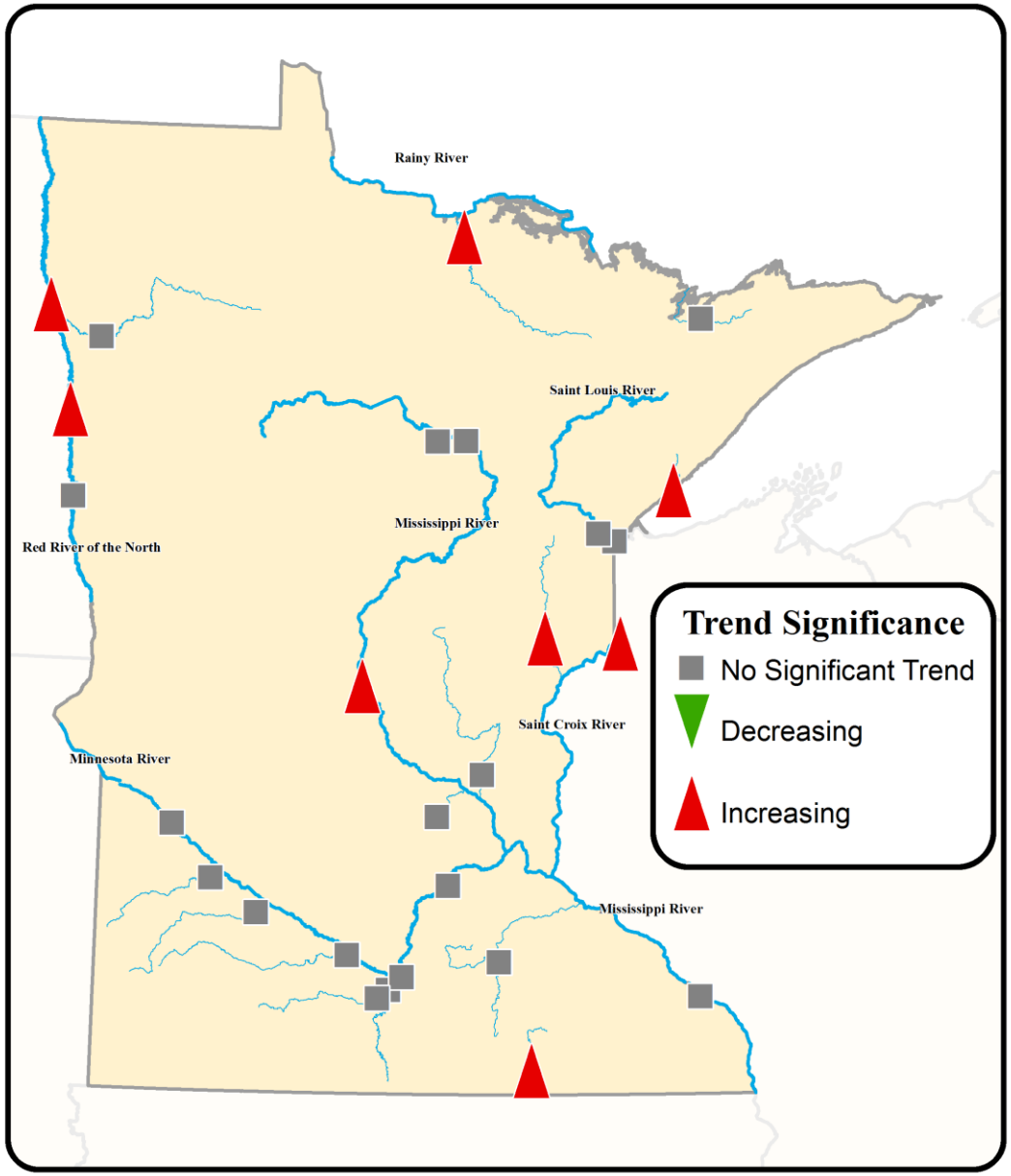
Nitrate + Nitrite Concentration

Long Term Trends: Nitrate-Nitrite Concentration



Nitrate + Nitrite Loading

Long Term Trends: Nitrate-Nitrite Loading



Summary

- Streamflows up in southern and western MN (agricultural/urban areas)
- Phosphorus concentrations down statewide
- Phosphorus load trends mixed
- Nitrate concentration trends mixed
- Nitrate loads up, or no trend

THANK YOU

QUESTIONS?

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www.pca.state.mn.us/water/watershed-pollutant-load-monitoring-network