Illinois NLRS Nutrient Monitoring Council

Virtual Meeting
September 26, 2024
9:30 AM - Noon

Illinois Department of Agriculture

Illinois Environmental Protection Agency

Illinois Extension
University of Illinois Urbana-Champaign

Illinois Nutrient Loss Reduction Strategy

Welcome

Trevor Sample, Illinois Environmental Protection Agency

Roles

Welcome: *Trevor Sample, IEPA & NMC Working Group Chair*

Moderator: *Joan Cox, Illinois Extension*

Technology Assistance: *Libby Brasel, Illinois Extension*

Meeting minutes: *Amanda Christenson, Illinois Extension*

ILLINOIS
NUTRIENT LOSS
REDUCTION STRATEGY

Attendance

Please type your name and affiliation into the chat box.

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REDUCTION STRATEGY

Agenda

9:30 – 9:40 am (10 min.)	**Welcome and Water Dashboard Preview** Trevor Sample, Illinois Environmental Protection Agency
9:40 – 10:00 am (20 min.)	**Continuous Gage Statewide Nutrient Loads** Luis Garcia, United States Geological Survey Q & A
10:00 – 10:25 am (25 min.)	**HUC 8 Loads and Yields** Jenny Murphy, United States Geological Survey Q & A
10:25 – 10:30 am (5 min.)	**Break**
10:30- 10:50 am (20min.)	**Illinois River Basin Study Update** Jim Duncker, United States Geological Survey Q & A
10:50 – 11:10 am (20 min.)	**New Continuous Water Quality Monitoring on The Emiquon Preserve** Sara Sawicki, Illinois Natural History Survey Q & A
11:10 – 11:35 (25 min.)	**NARPs and NPDES: What We Have Learned and Next Steps** Mila Marshall and Albert Ettinger, Sierra Club IL Q & A
11:35 – Noon (25 min.)	**NMC Member Updates** Members may share updates or prompt open discussion.

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NLRS Dashboard Development

Nutrient Monitoring Council

9/26/2024

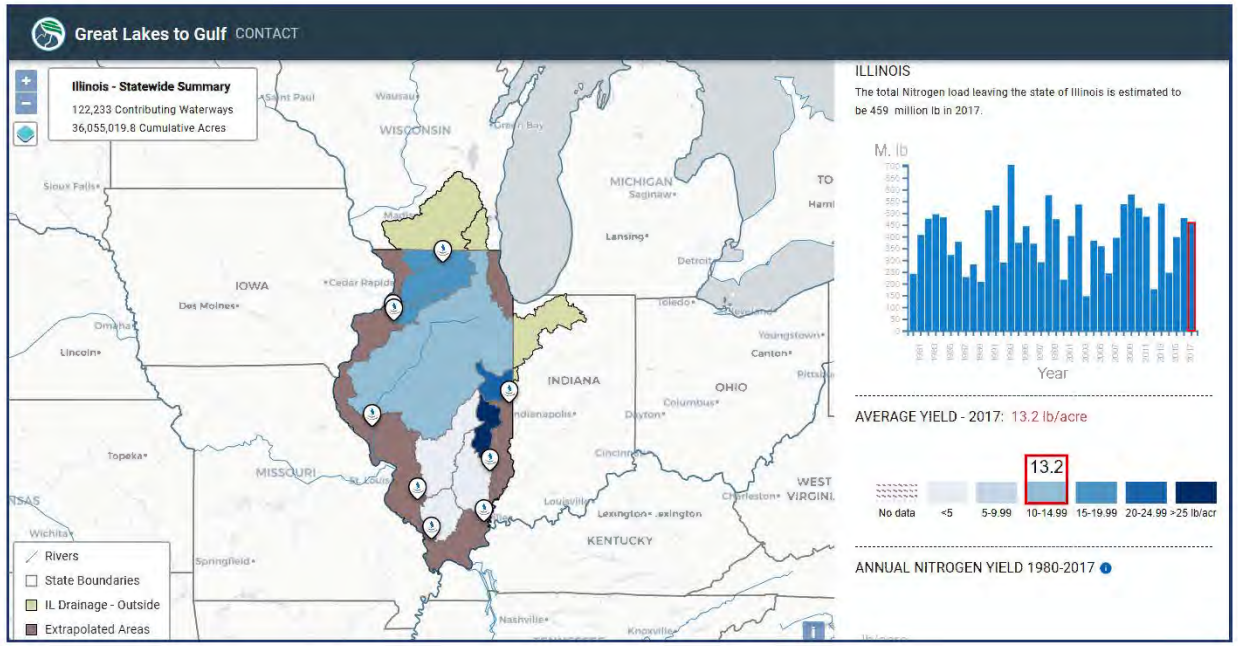
Trevor Sample

Illinois Environmental Protection Agency

ILLINOIS NUTRIENT LOSS REDUCTION STRATEGY

NLRS Dashboard Development

- Steering Committee is working with National Great Rivers Research and Education Center and the U of I National center for Supercomputing Applications.
- Dashboards will use the Great Lakes to Gulf Virtual Observatory, Illinois portal platform.
- This will replace the Biennial Reports previously used for tracking and reporting metrics.



ILLINOIS NUTRIENT LOSS REDUCTION STRATEGY

NLRS Dashboard Development

- Data will be updated annually, and an Executive Summary will be completed each year.
- Dashboards will allow interactive data reported both temporal and spatially.
- Data will be downloadable by users.

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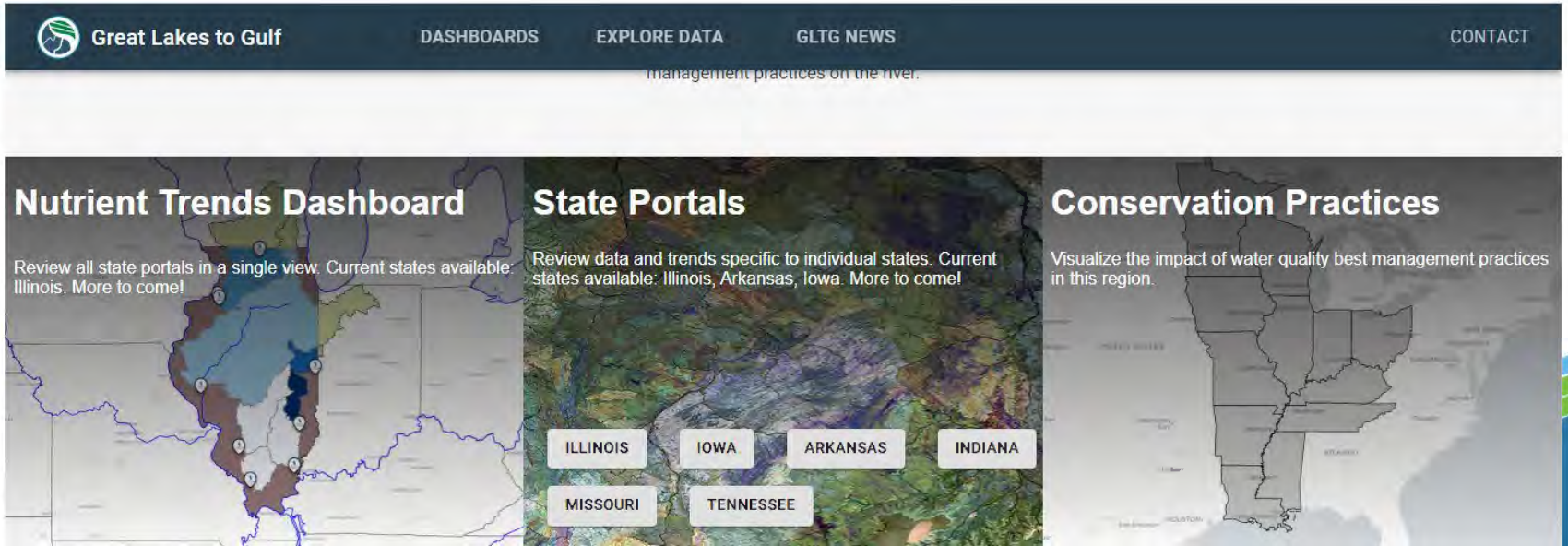
NLRS Dashboard Development

- Currently in early stages of development
- Using Iowa and Minnesota nutrient dashboards as examples
- Previous reporting for NLRS data did not capture implementation data spatially, just reported statewide.
- Extension staff will be working with partners to collect data with associated watershed HUCs for interactive maps
  - HUC 8 and HUC 12
  - County
  - 2011-2022
- Includes all data previously reported for Biennial Reports
  - Resources, Outreach/Education, Land and Facility measures, Water.

ILLINOIS NUTRIENT LOSS REDUCTION STRATEGY

NLRS Dashboard Development

- Aiming to have dashboards online by end of 2025.
- Performance Benchmark Group and Policy Working Group members will have opportunities for input and review.
- Once the 2011-2022 data has been posted, we will begin working on 2023-2025 data.



ILLINOIS NUTRIENT LOSS REDUCTION STRATEGY

NLRS Dashboard Development

- Great Lakes to Gulf
  - https://greatlakestogulf.org/#/
- Iowa Dashboard
  - https://nrstracking.cals.iastate.edu/tracking-iowa-nutrient-reduction-strategy
- Minnesota Dashboard
  - https://www.pca.state.mn.us/air-water-land-climate/reducing-nutrients-in-waters
  - https://public.tableau.com/app/profile/mpca.data.services/viz/Long-termStreamTrends/Pollutantconcentrations
  - https://public.tableau.com/app/profile/mpca.data.services/viz/CWAA-Bestmanagementpracticesbywatershed/Bestmangementpracticesbywatershed

ILLINOIS NUTRIENT LOSS REDUCTION STRATEGY

Nitrate and Phosphorus Loads from Illinois Rivers:

Preliminary Water Year 2023 Update

Photographs by C. Peake, U.S. Geological Survey

Luis Garcia

Central Midwest Water Science Center

luisgarcia@usgs.gov

with:

Illinois Environmental Protection Agency

U.S. Department of the Interior
U.S. Geological Survey

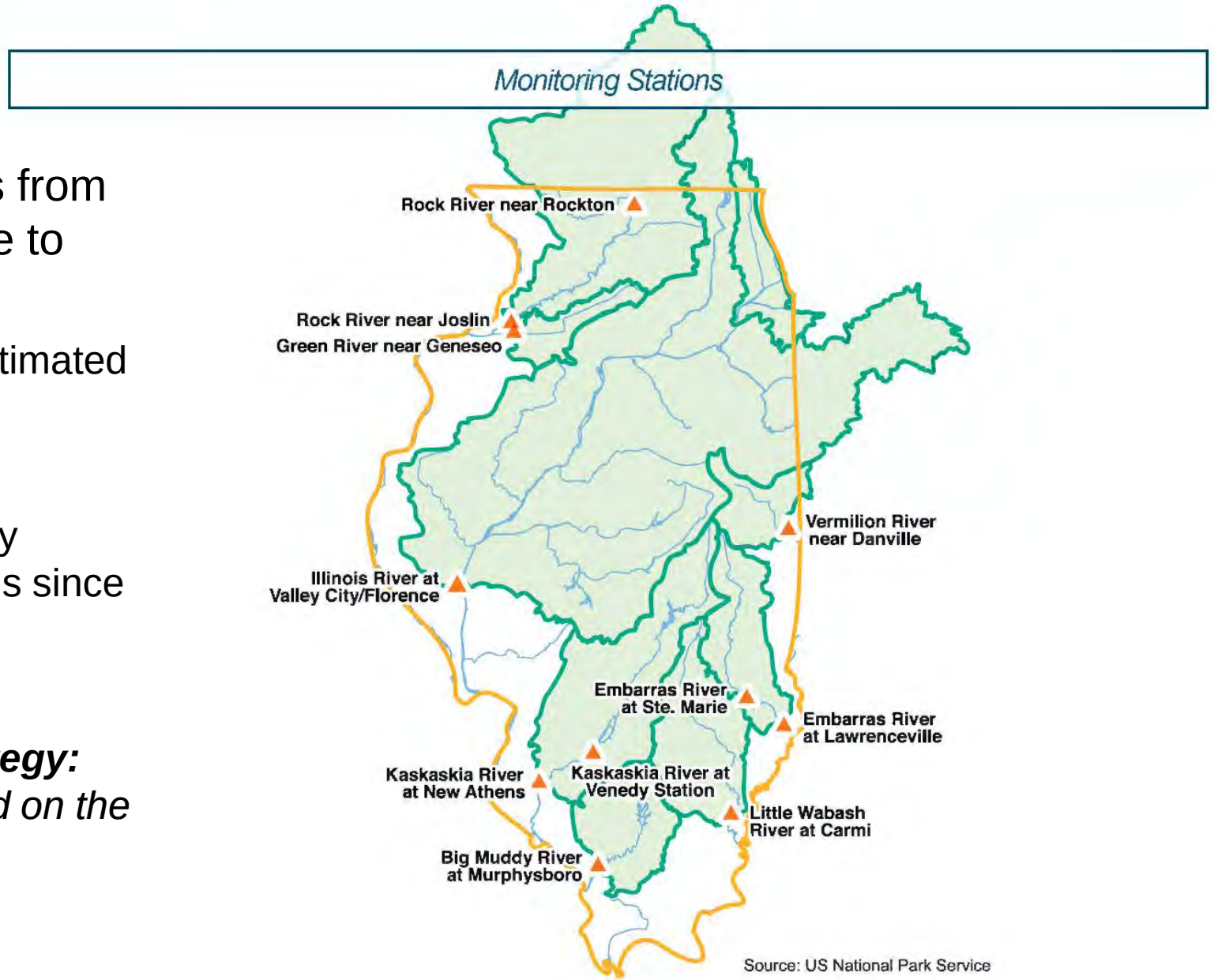
Methods

Monitor changes in nutrient loads from Illinois' eight largest rivers relative to the 1980–96 baseline.

Baseline: Water years 1980–1996 estimated by periodic sampling.

Super Gage: Continuous water-quality monitoring sites used to estimate loads since 2019.

Illinois nutrient loss reduction strategy: *Since 2017, progress assessed based on the 5-year average loading.*



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Super gage setup:

-Continuous Streamflow

-Continuous Water-quality

All Sites

- Nitrate
- Turbidity

Big Muddy, Illinois

- Dissolved oxygen
- Temperature
- Specific Conductance
- pH

Illinois, Kaskaskia

- Dissolved Phosphate

Photographs by C. Peake and L. Shotton, U.S. Geological Survey

USGS

EXPLANATION

- 5-Year Rolling Average Streamflow
- 5-year Rolling Average Load
- Baseline
- 25% Reduction
- 45% Reduction
- Annual Phosphate Load (millions lbs/yr)

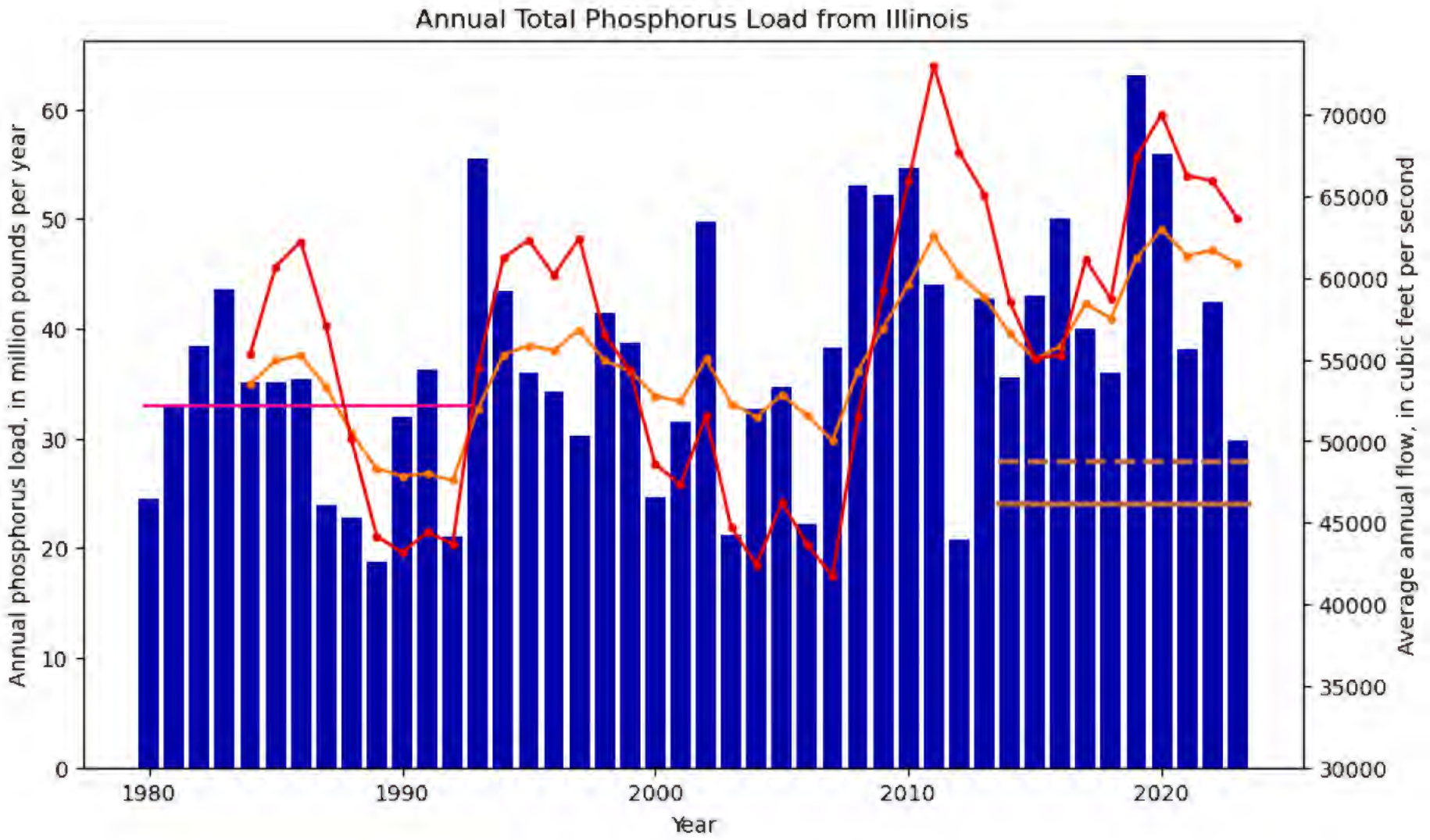
Relative to 1980–96 baseline:

WY23 Loads:

- Total Phosphorus -11%
- Streamflow -30%

5-year mean loads:

- Total Phosphorus +33%
- Streamflow +18%



USGS

EXPLANATION

- 5-Year Rolling Average Streamflow
- 5-year Rolling Average Load
- Baseline
- 15% Reduction
- 45% Reduction
- Annual Nitrate Load (millions lbs/yr)

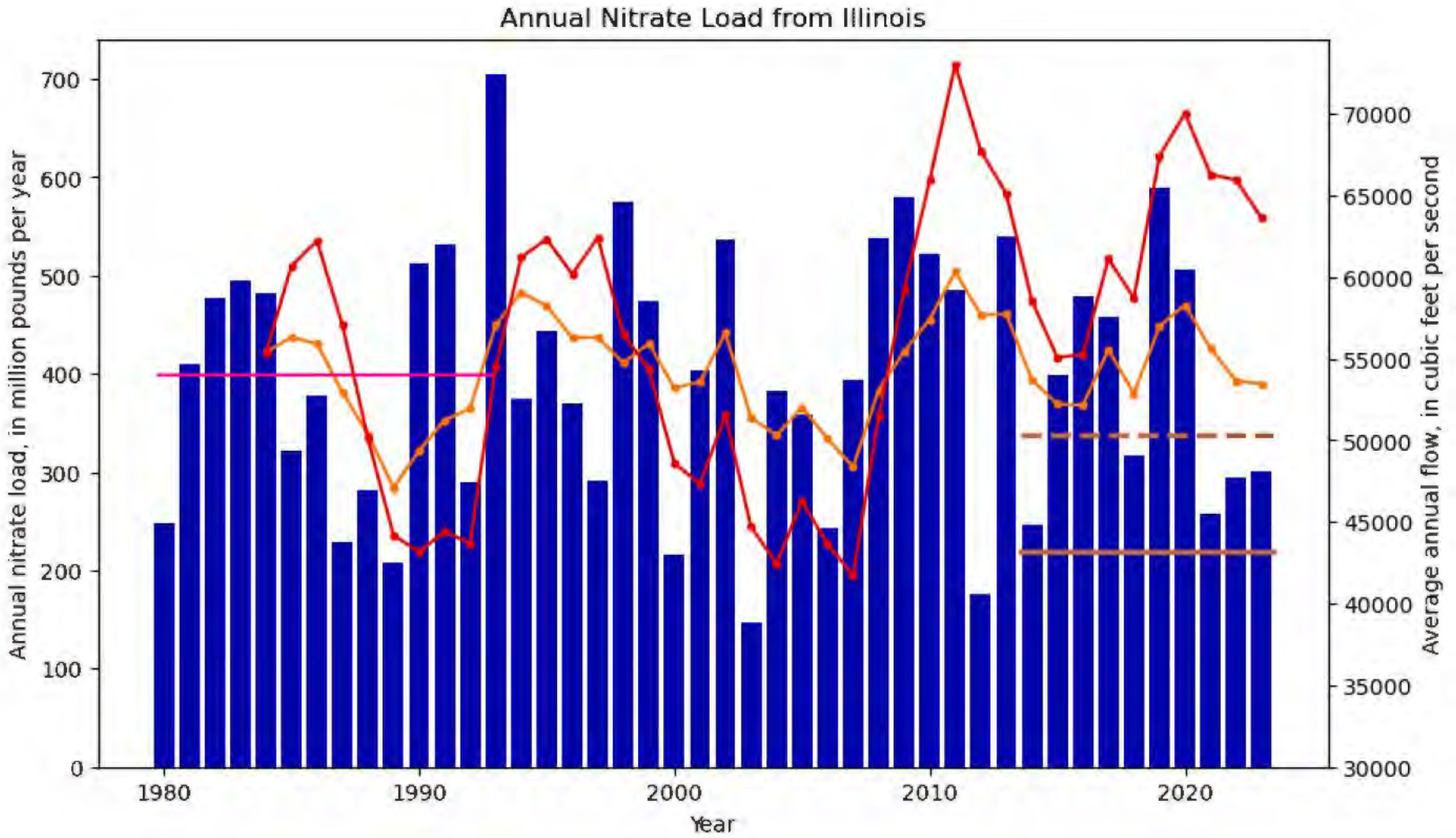
Relative to 1980–96 baseline:

WY23 Loads:

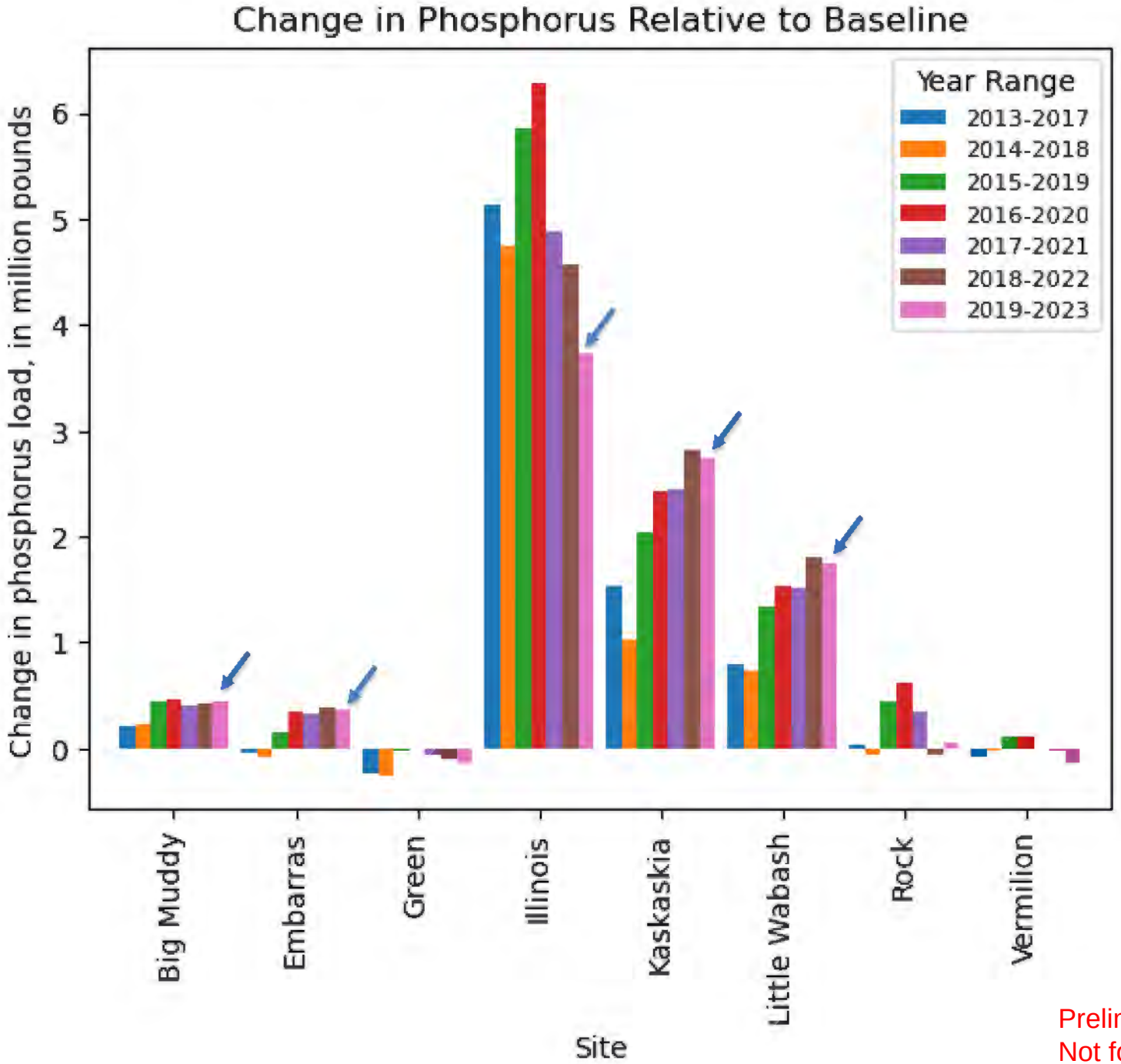
- Total Nitrate -25%
- Streamflow -30%

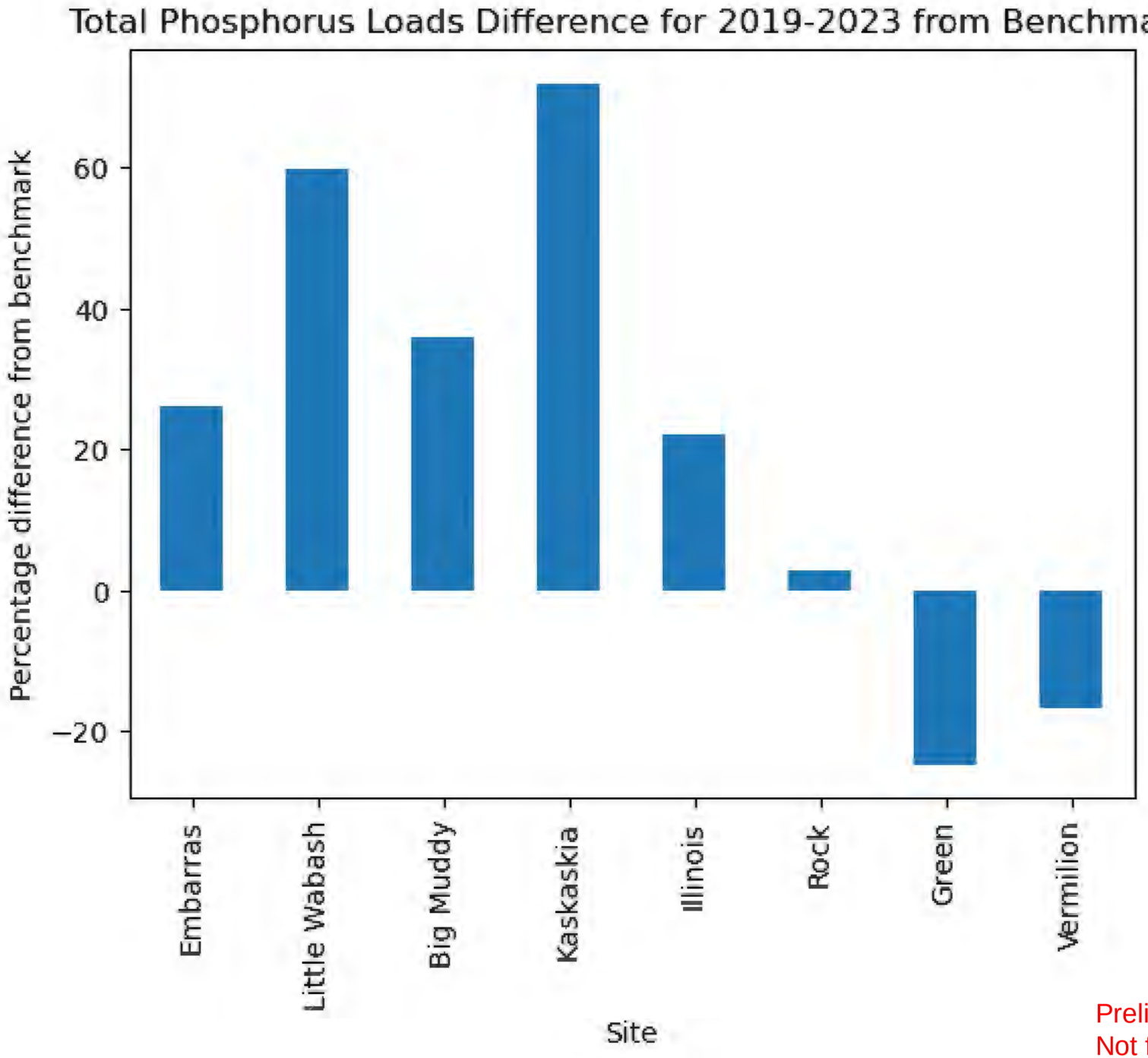
5-year mean loads:

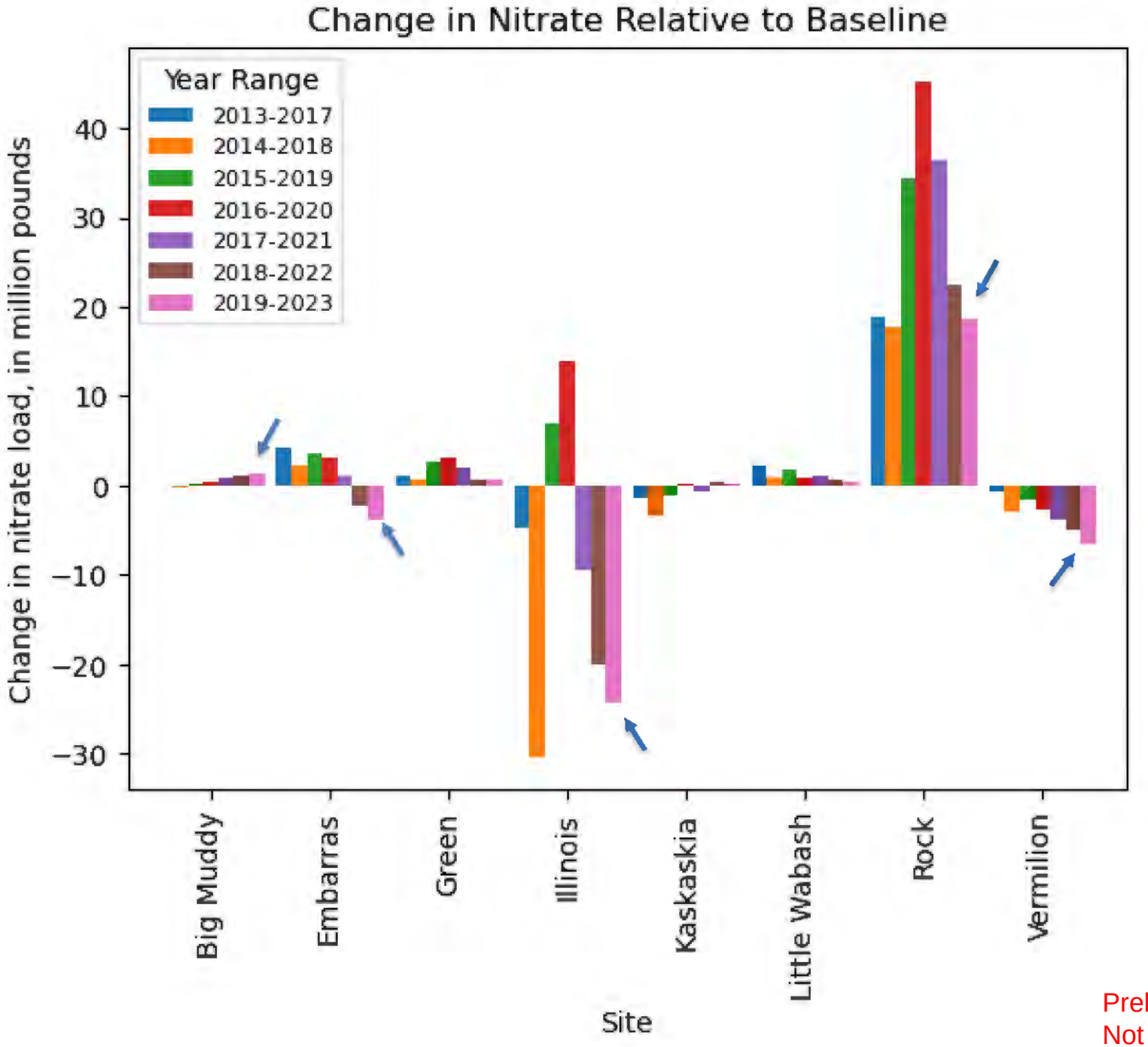
- Total Nitrate -4%
- Streamflow +18%



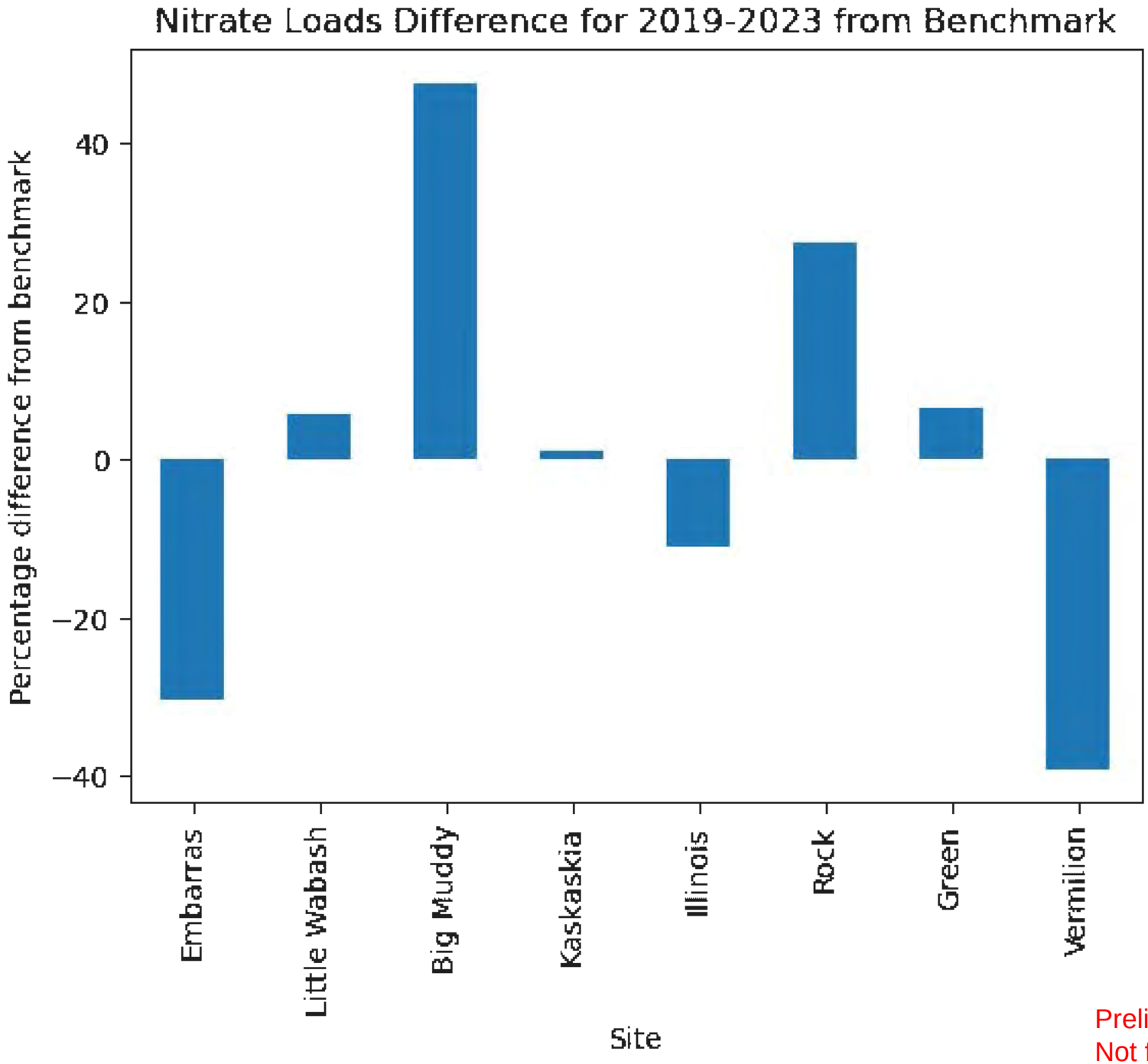
USGS

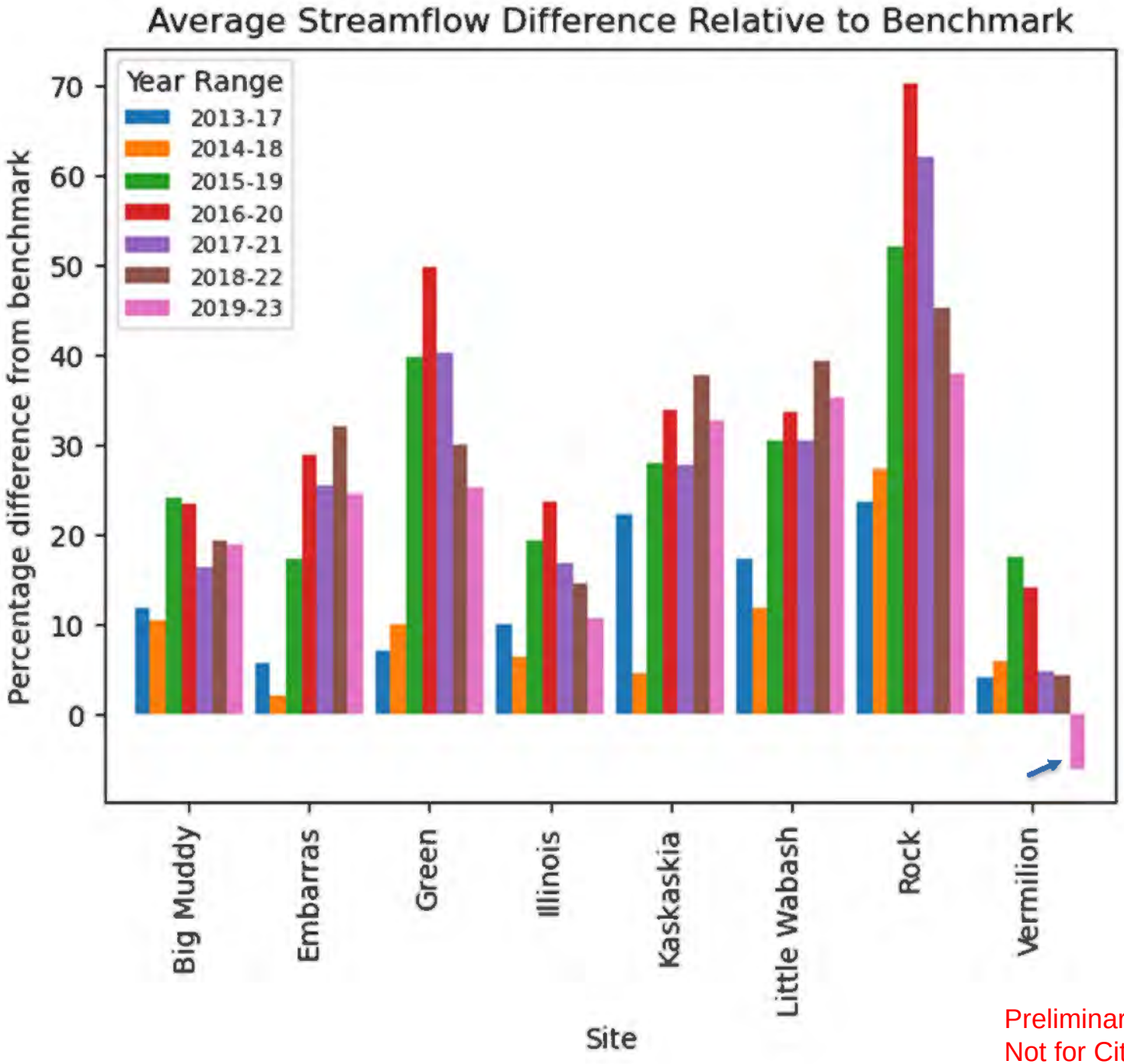




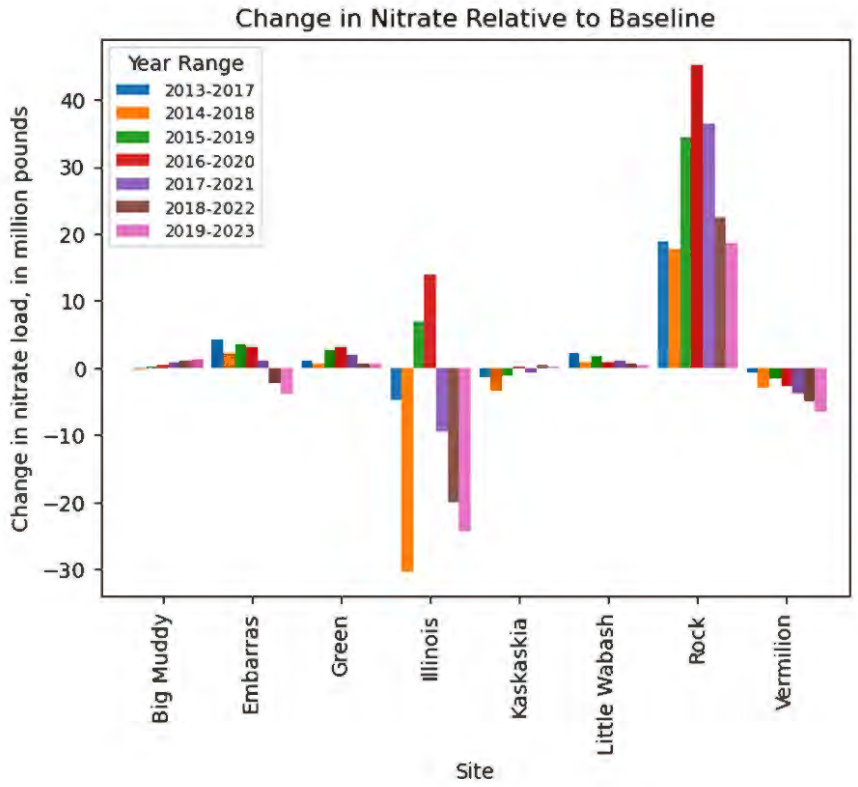


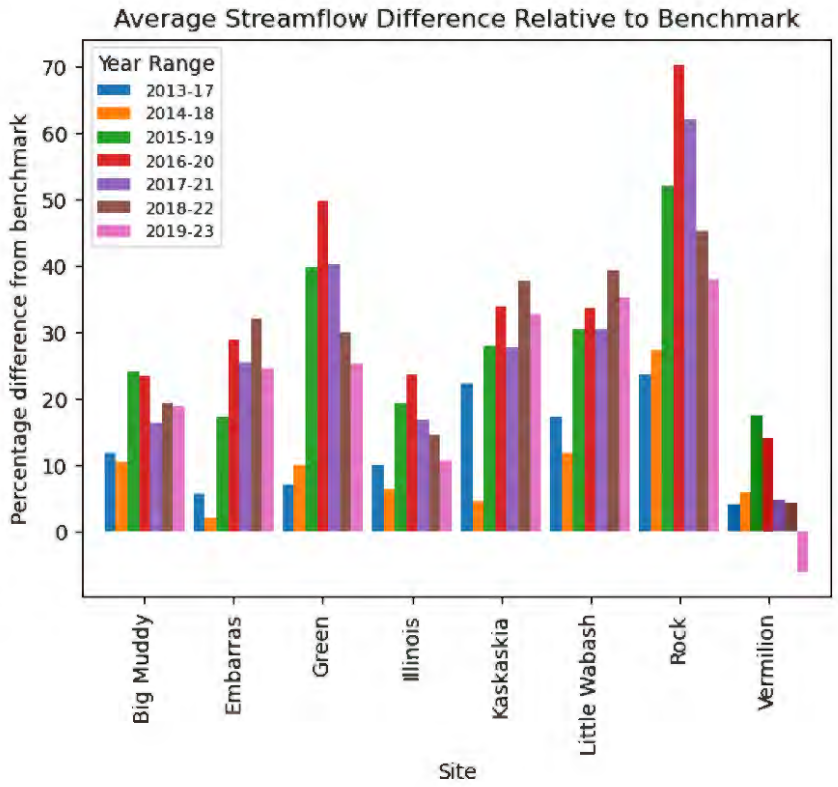
USGS

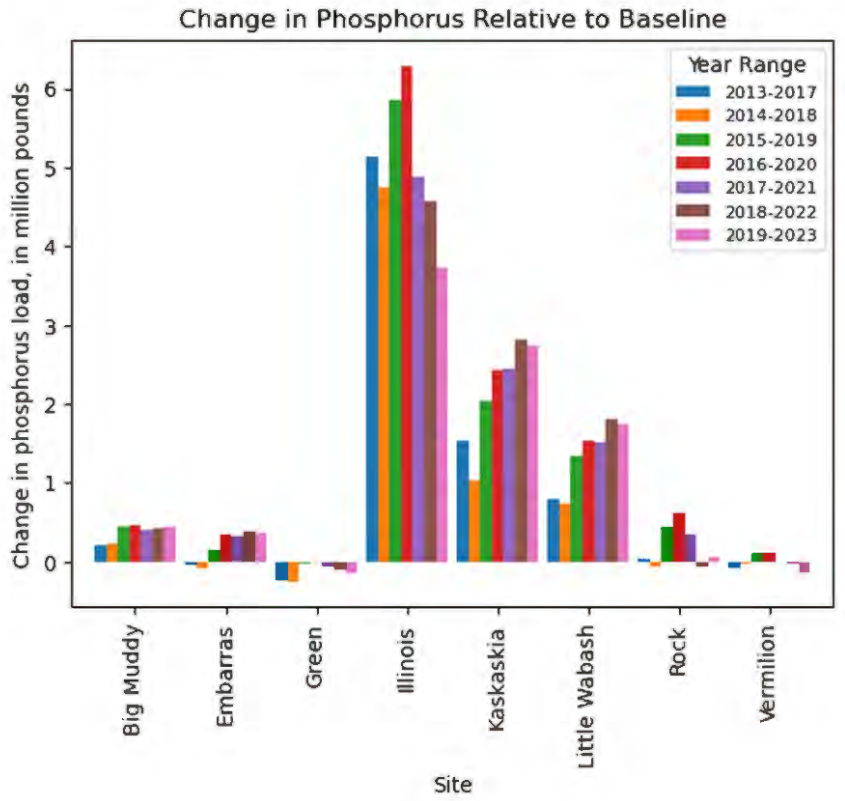




5-year average plots of nitrate, streamflow, and total phosphorus







USGS

Water Year (WY) 2023 by the numbers

Relative to the 1980–96 baseline:

- WY23 Loads:
  - Total Phosphorus -11%
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- 5-year mean loads:
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A water year is the period from October 1 to September 30 and is designated by the year in which it ends; for example, water year 2023 was from October 1, 2022, to September 30, 2023.

Photograph by U.S. Geological Survey

USGS

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Photograph by U.S. Geological Survey

Nutrient Loads and Yields Across Illinois Watersheds (HUC8s)

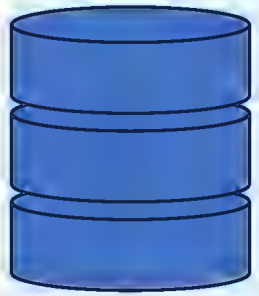
Nutrient Loss Reduction Strategy, Nutrient Council Meeting

September 26, 2024 (virtual)

U.S. Department of the Interior
U.S. Geological Survey

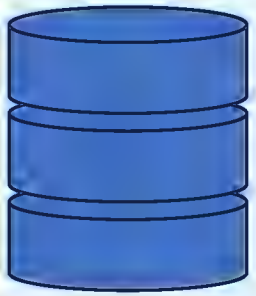
Jenny Murphy, Hannah Podzorski, Brock Kamrath, Lindsey Schafer

Water quality data sources



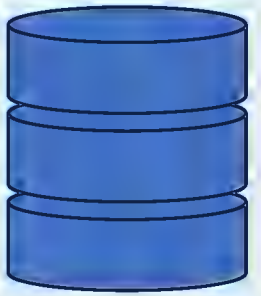
Water Quality Portal (WQP)

+



Recent Samples from *IEPA

+



Legacy IEPA Data from *STORET

USGS

*Illinois Environmental Protection Agency (IEPA)
*STOrage and RETrieval (STORET) Data Warehouse

Water quality data

Data preparation

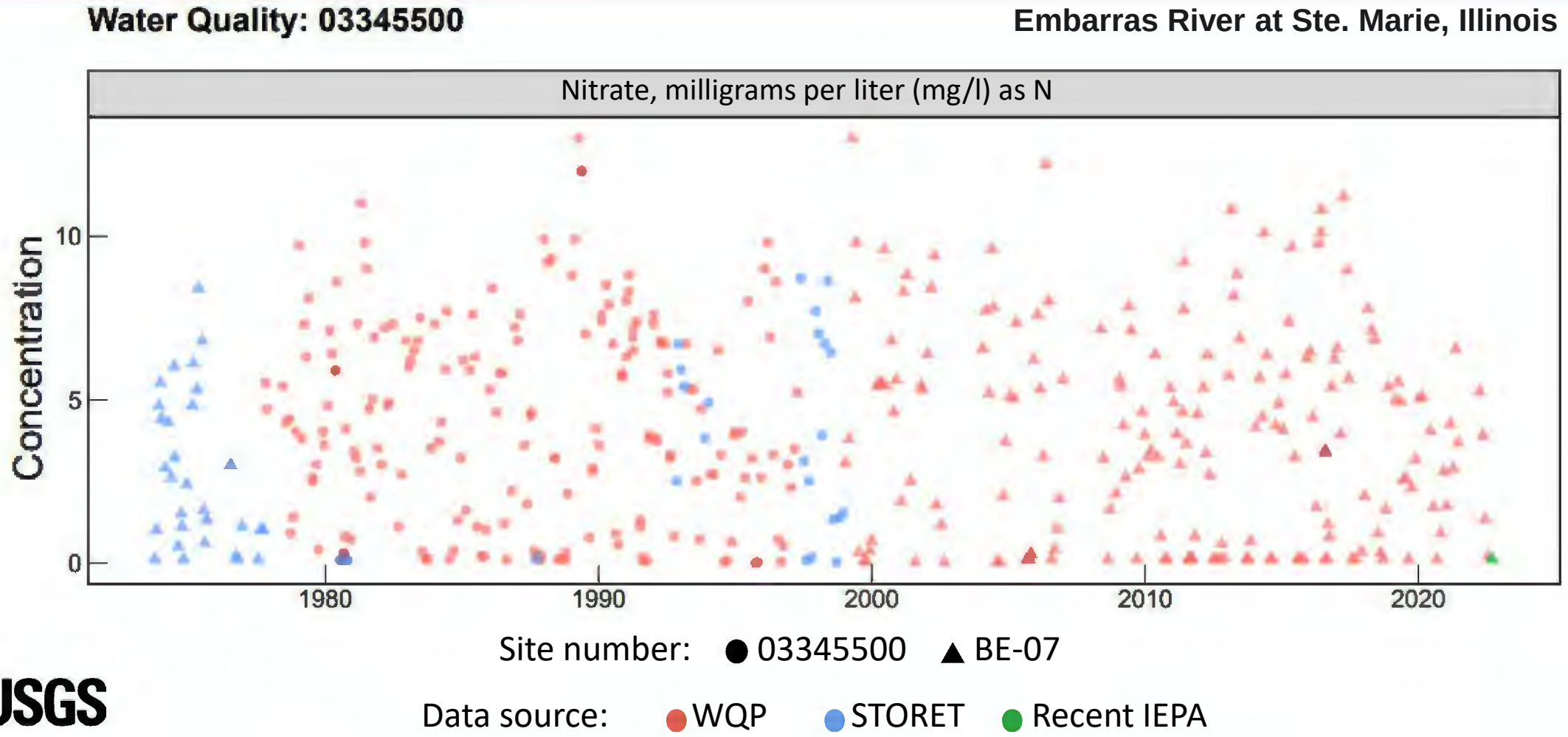
- Harmonize metadata
- Standardize constituent names and units

Quality assurance

- Missing results/units
- Zeros
- Duplicate records
- Qualifier
- Non-detects

USGS

Example of water quality time series



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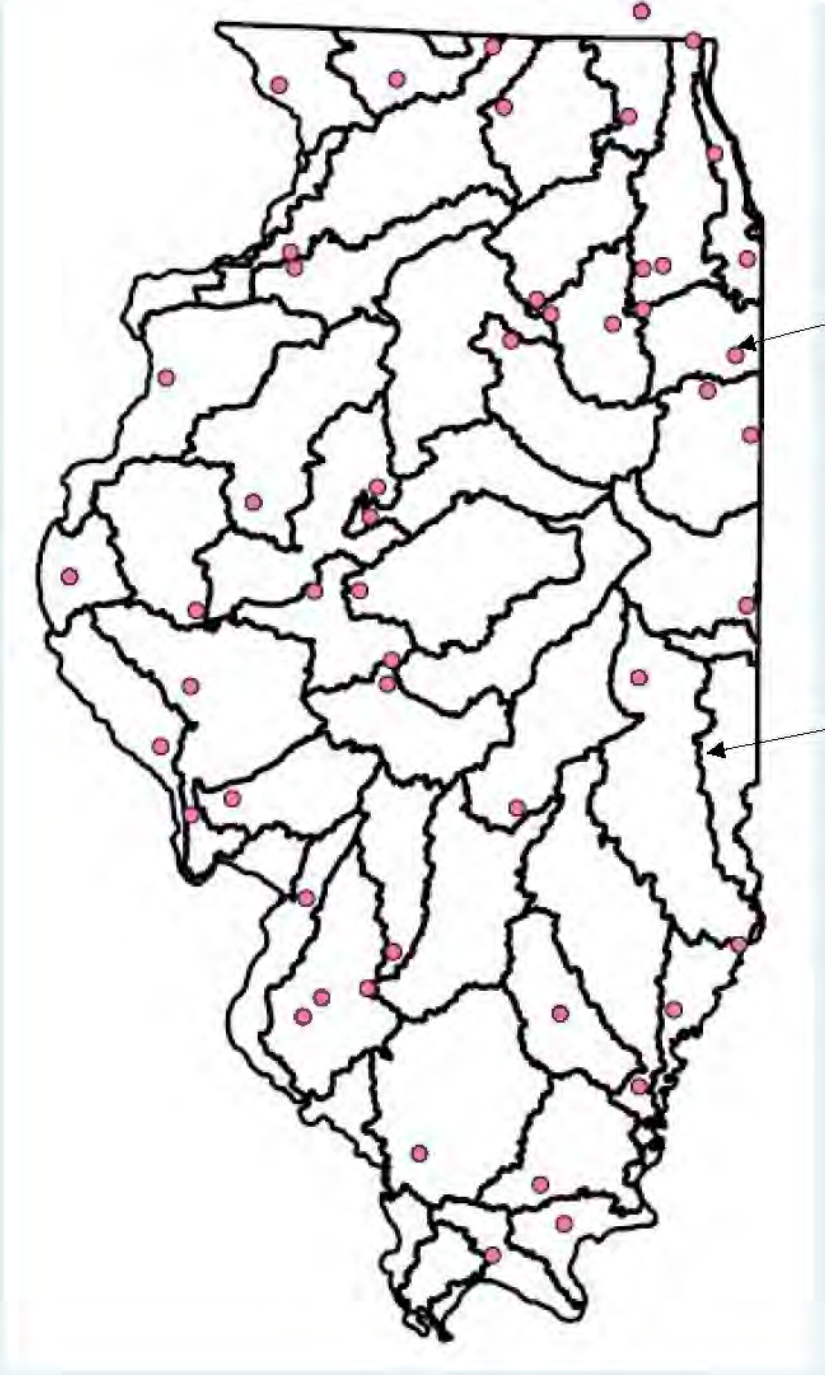
IEPA ambient sites



Weighted Regressions on Time, Discharge, and Season (WRTDS)

$$\ln(c) = \beta_0 + \beta_1 Q + \beta_2 t + \beta_3 \sin(2\pi t) + \beta_4 \cos(2\pi t) + \varepsilon$$

Concentration

Stream flow

Time trend

Seasonal cycle

Random component

USGS

Weighted Regressions on Time, Discharge, and Season (WRTDS)

$$\ln(c) = \beta_0 + \beta_1 Q + \beta_2 t + \beta_3 \sin(2\pi t) + \beta_4 \cos(2\pi t) + \varepsilon$$

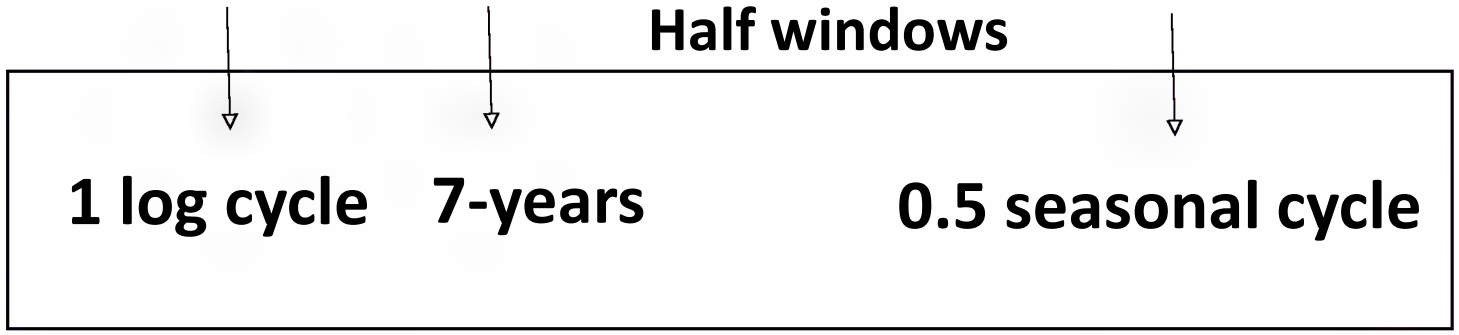
Concentration

Stream flow

Time trend

Seasonal cycle

Random component



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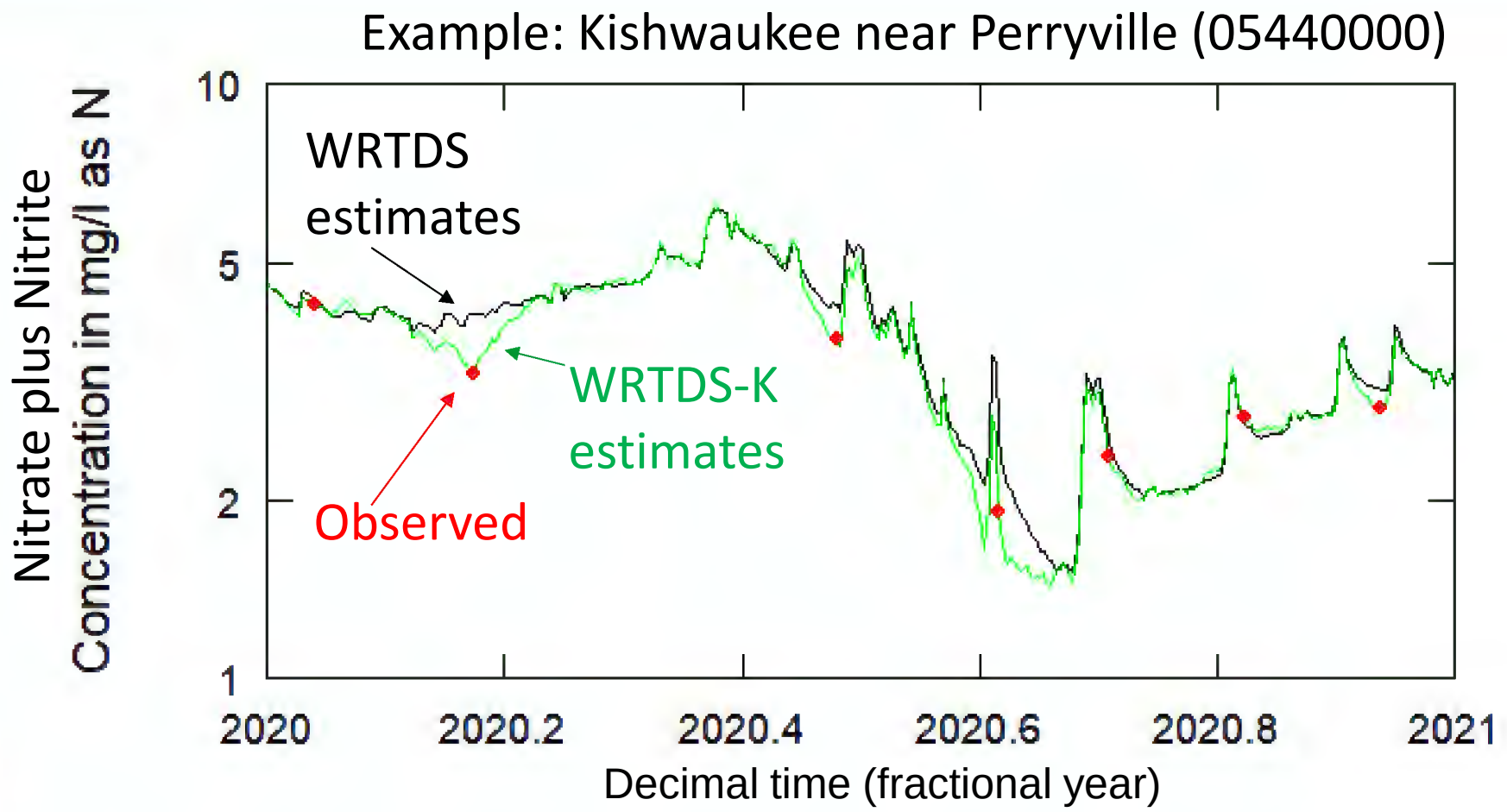
Weighted Regressions on Time, Discharge, and Season – Kalman Filter (WRTDS-K)



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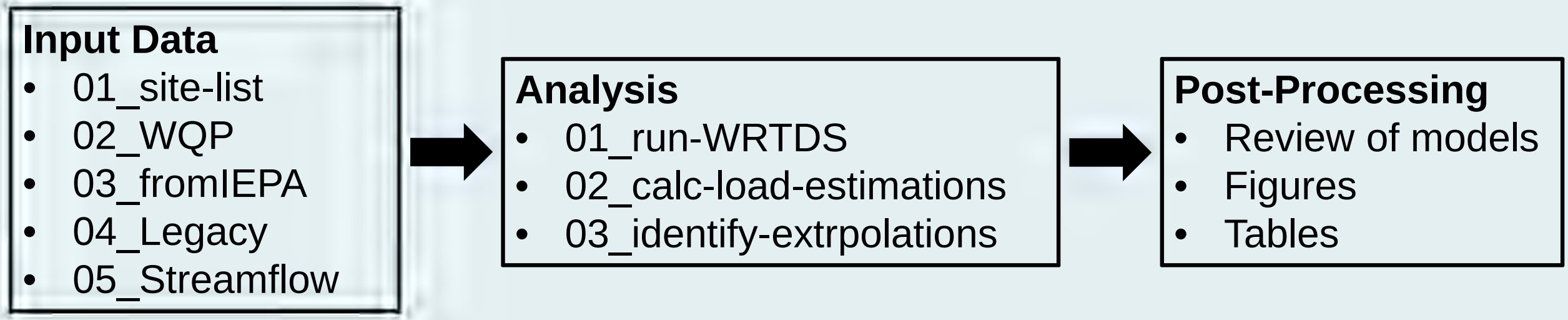
Overall workflow for ambient site loads



USGS

Data release contents: Ambient site loads

Estimation of Annual and Monthly Loads of Nitrate + Nitrite, Total Phosphorous, and Dissolved Phosphorus in Illinois for Water Years 1974 to 2022

Add ▾ | View ▾ | Manage Item ▾

Dates

Publication Date : 2024
Start Date : 1974
End Date : 2022

Citation

Hannah L. Podzorski, Jennifer C. Murphy, Brock J. Kamrath, Lindsey A. Schafer, 2024, Estimation of Annual and Monthly Loads of Nitrate + Nitrite, Total Phosphorous, and Dissolved Phosphorus in Illinois for Water Years 1974 to 2022: , https://doi.org/10.5066/xxxxxxxx.

Summary

This data release contains data in support of "XXXXXXXXXX" (Kamrath and others, 2025). It contains input and output data used to estimate Total Nitrate + Nitrite, Dissolved Phosphorous and Total Phosphorous loads for sites in Illinois from 1974 to 2022.

The input data includes "input-data_WQ.csv", which contains water quality data for Total Nitrate + Nitrite, Dissolved Phosphorous and Total Phosphorous. The water quality data comes from 1) the Water Quality Portal (WQP), 2) the Illinois Environmental Protection Agency (IEPA), and 3) the Environmental Protection Agency (EPA) STORET warehouse. The WQP includes the most complete record of U.S. Geological Survey and IEPA water quality samples. The most recent IEPA water quality samples, which are not yet in the WQP, were provided directly from IEPA. Legacy IEPA data that is housed via the EPA STORET warehouse was used to fill in any gaps in the data record. See the Entity and Attribute section for details.

Map »

Communities

- USGS Data Release Products ❋

Associated Items

Associate an Item

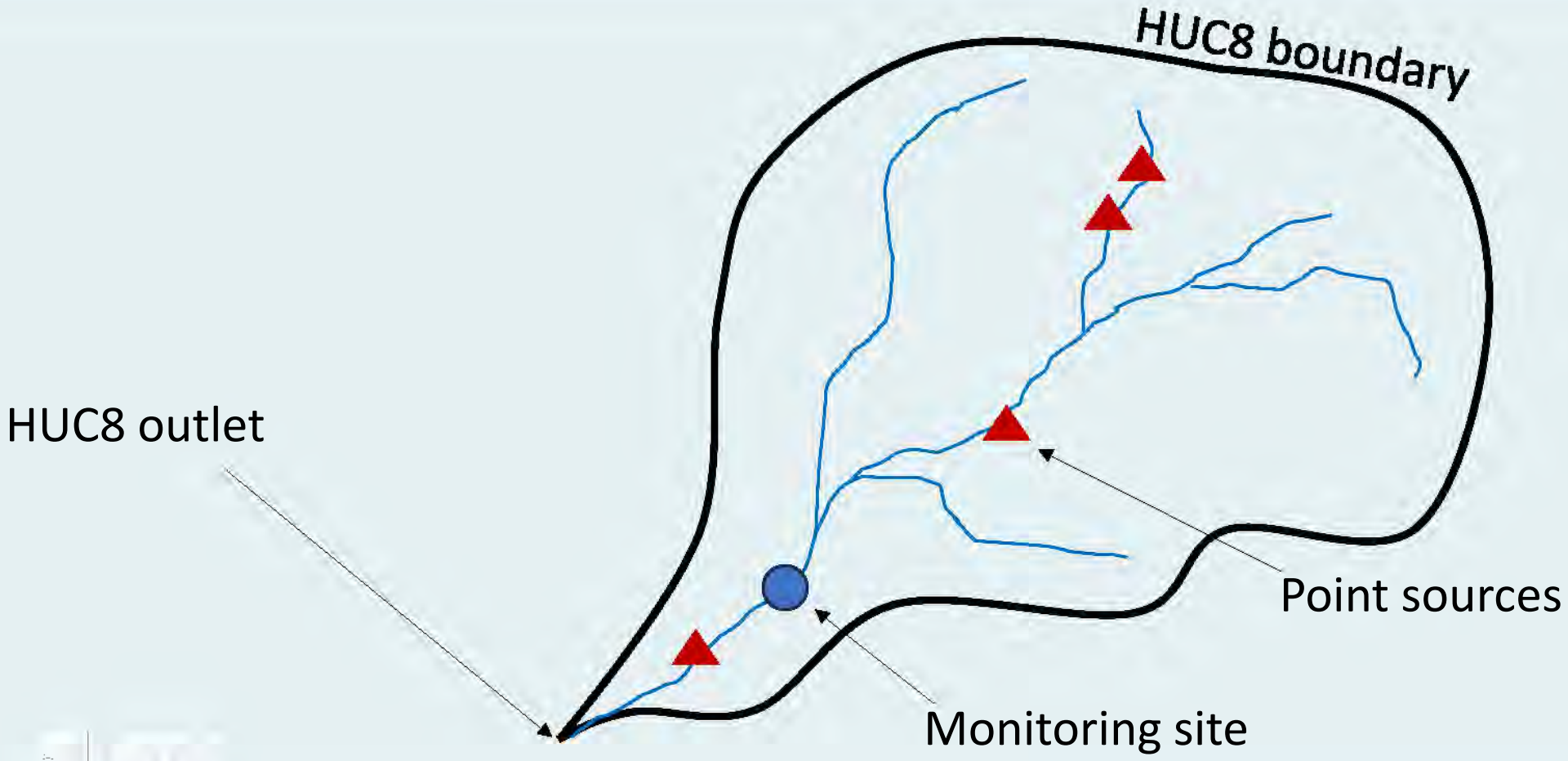
Tags

USGS

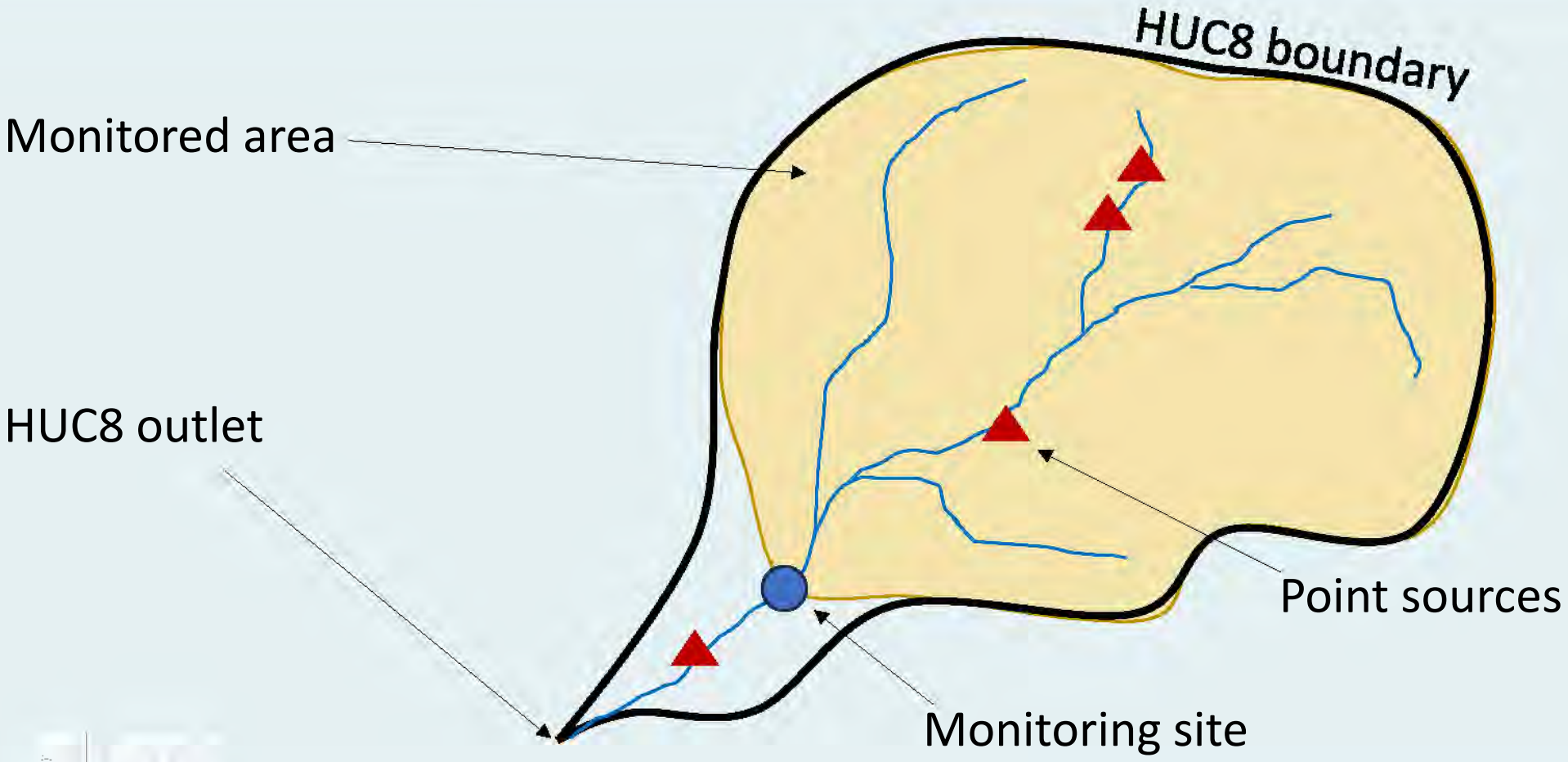
HUC8 load and yield computations

USGS

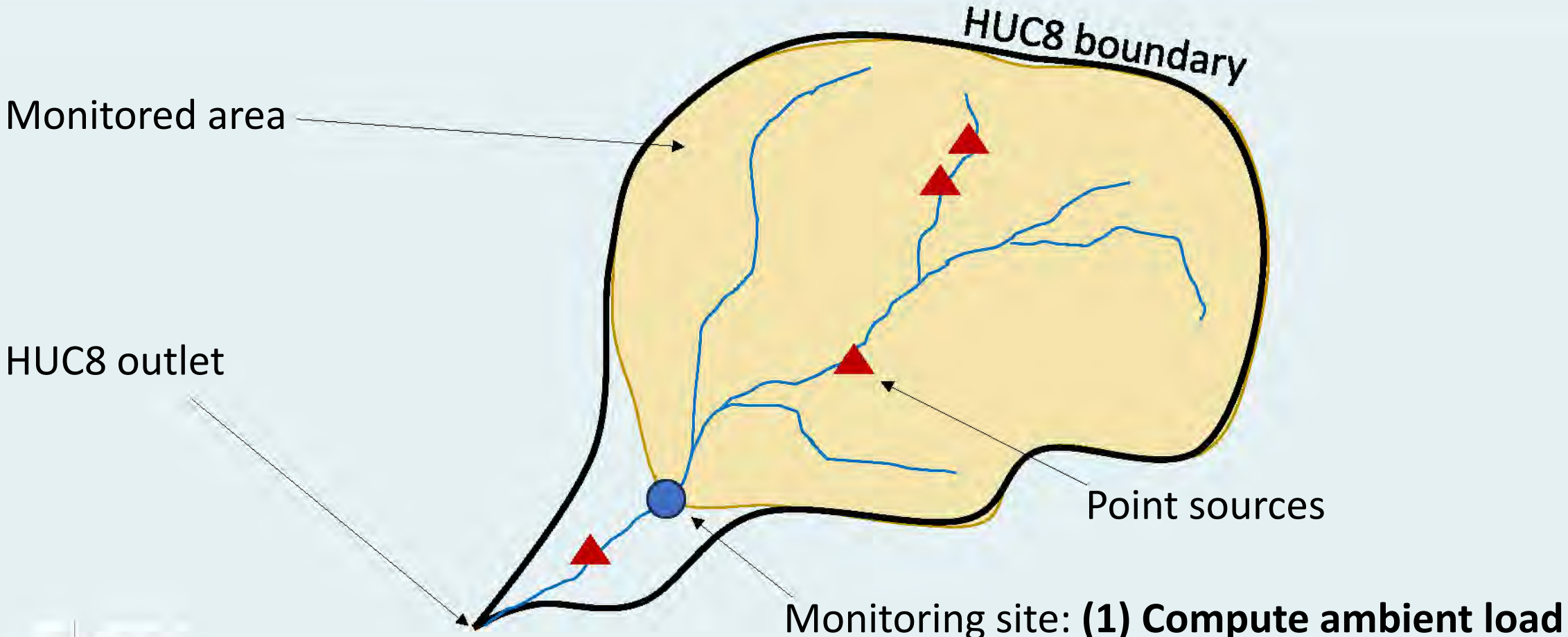
Ambient loads → HUC8 loads



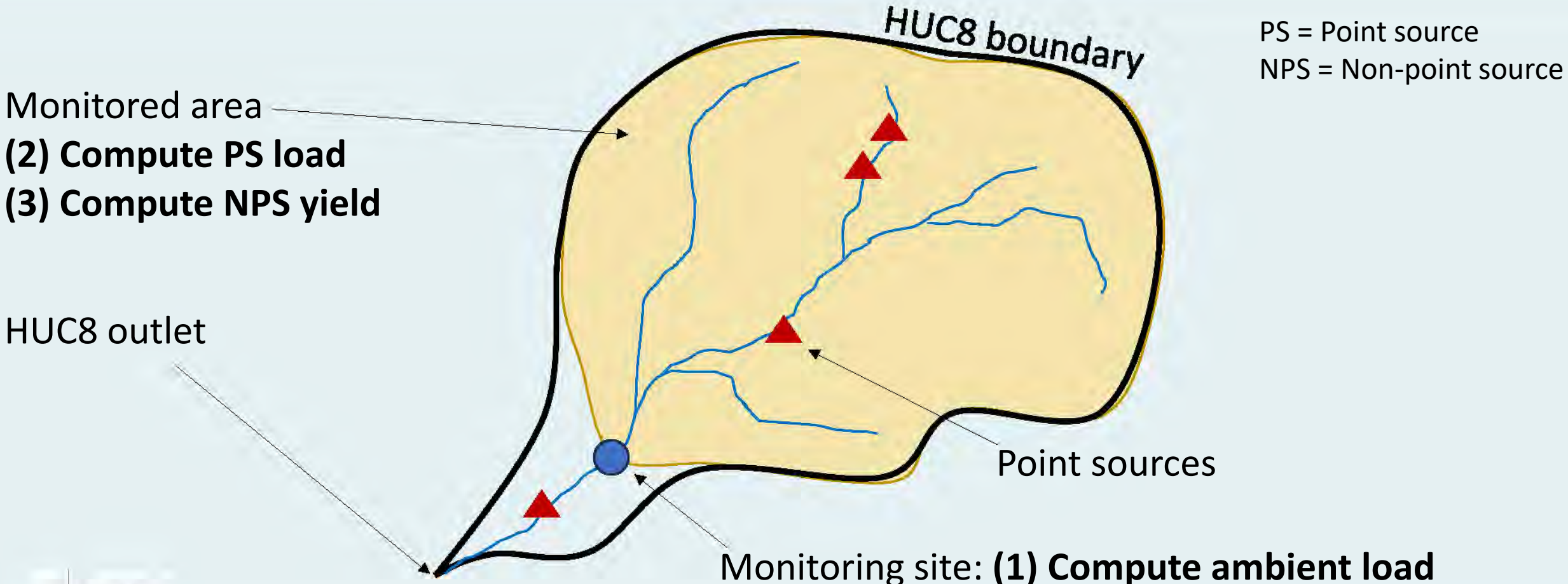
Ambient loads → HUC8 loads



Ambient loads → HUC8 loads



Ambient loads → HUC8 loads

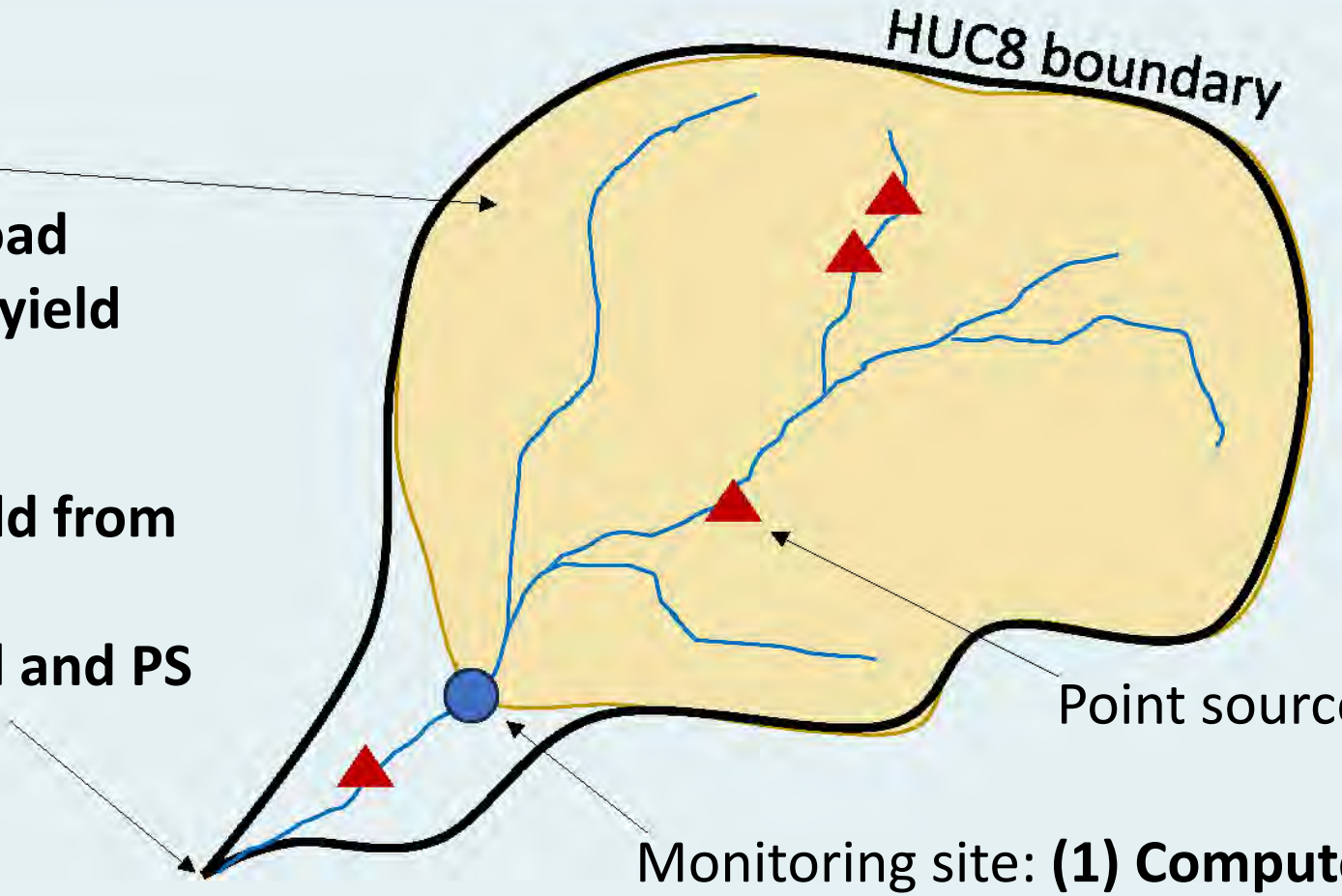


Ambient loads → HUC8 loads

PS = Point source
NPS = Non-point source

Monitored area
(2) Compute PS load
(3) Compute NPS yield

HUC8
(4) Apply NPS yield from monitored area
(5) Compute total and PS loads & yields

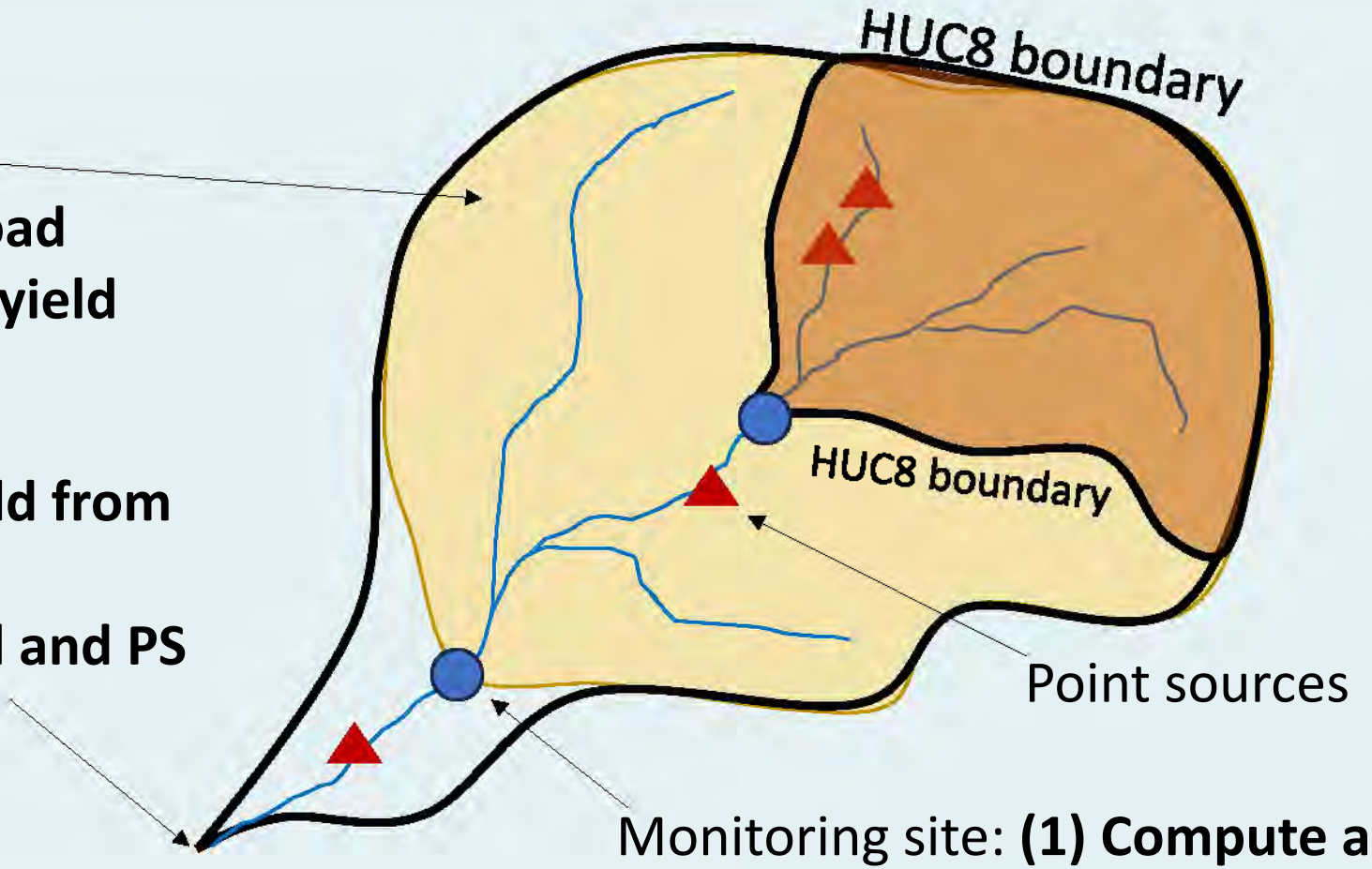


Ambient loads → **Incremental** HUC8 loads

PS = Point source
NPS = Non-point source

Monitored area
(2) Compute PS load
(3) Compute NPS yield

HUC8
(4) Apply NPS yield from monitored area
(5) Compute total and PS loads & yields



2018–2022 HUC8 summary
[preliminary]

USGS

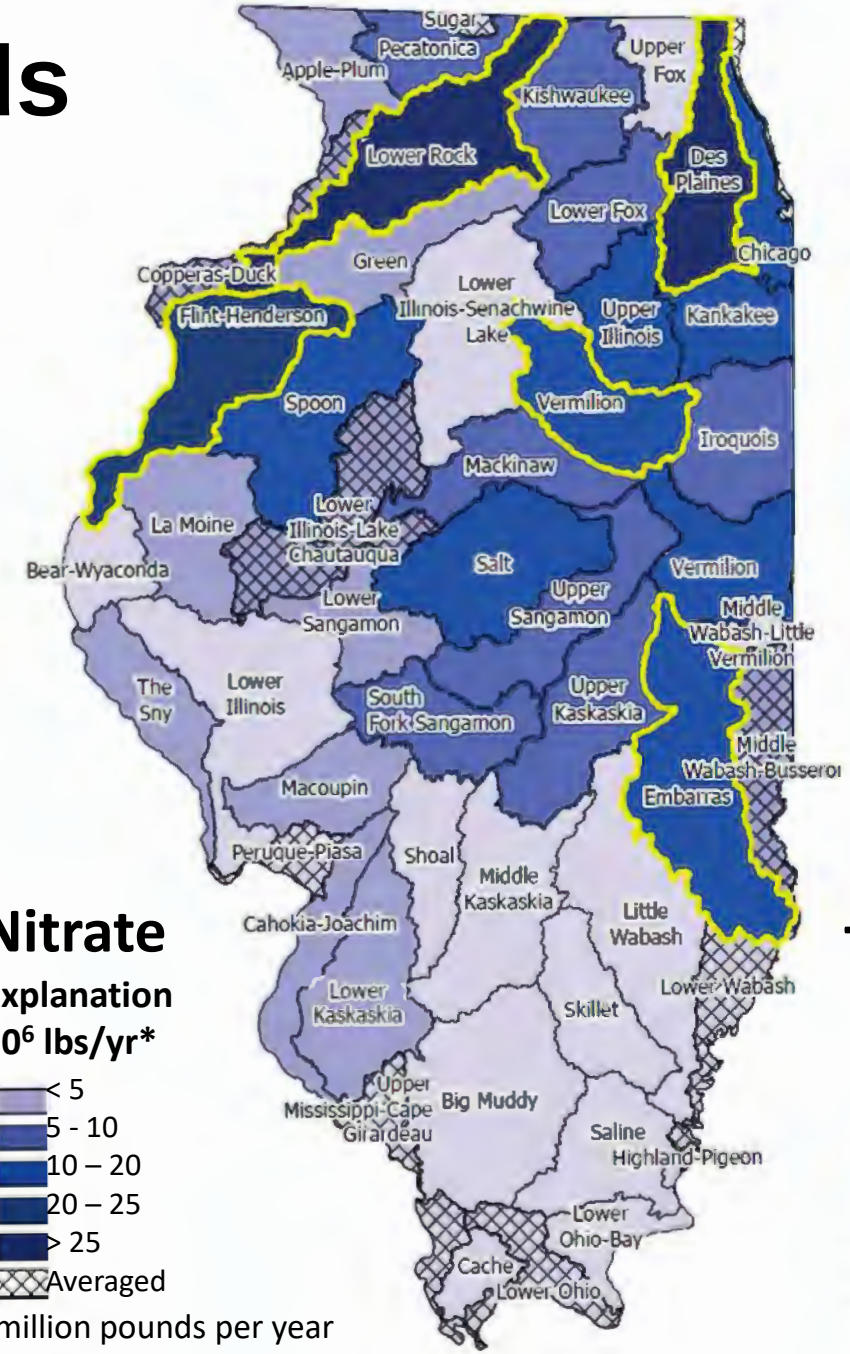
Incremental **loads** by HUC8

Top 5 – Nitrate

Des Plaines
Lower Rock
Flint-Henderson
Vermilion (IL)
Embarras (Lawrenceville)

Top 5 – Total Phosphorus

Chicago
Embarras (Lawrenceville)
Des Plaines
Little Wabash
Lower Kaskaskia

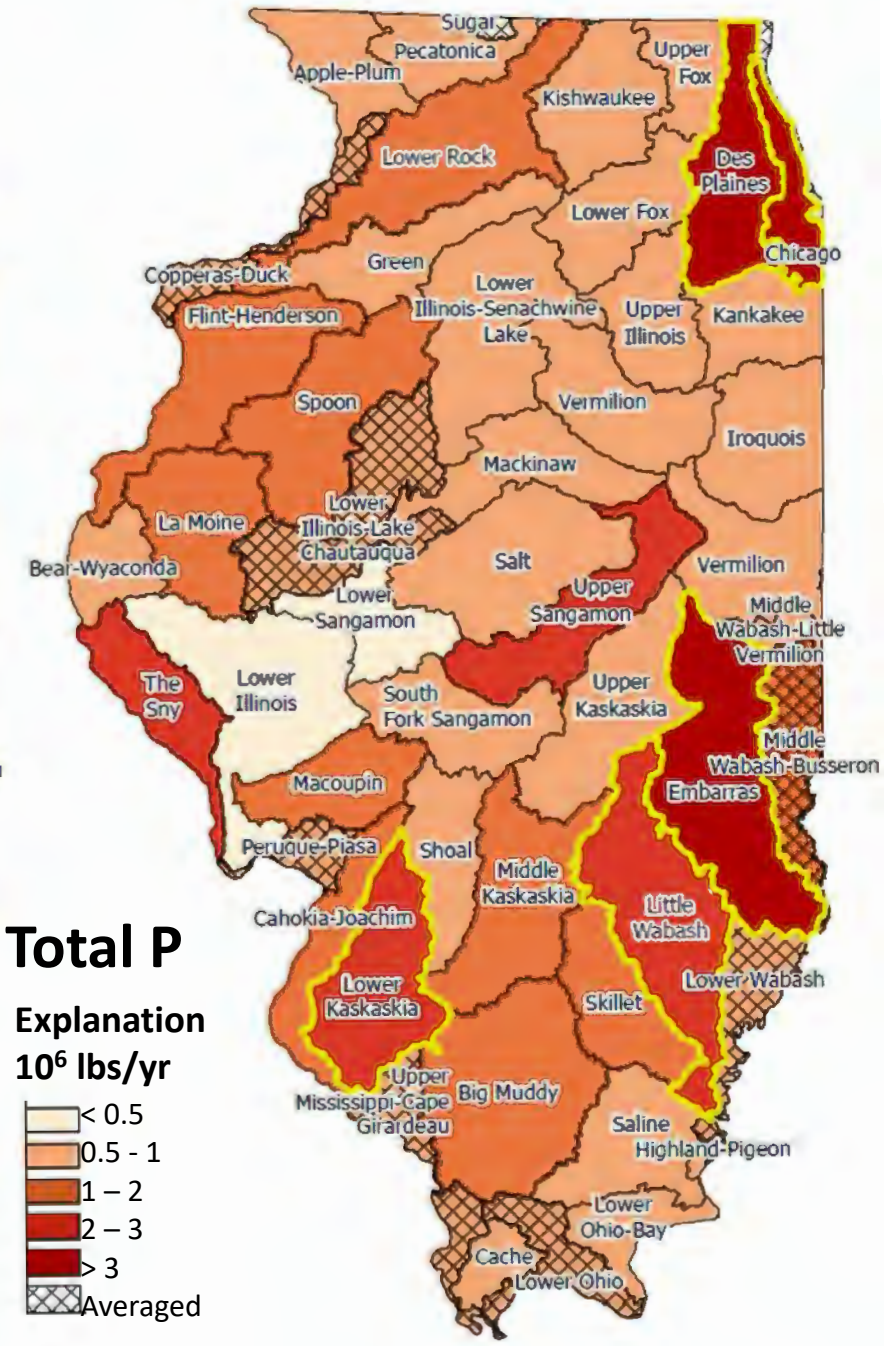


Nitrate

Explanation
10^6 lbs/yr*

- < 5
- 5 - 10
- 10 – 20
- 20 – 25
- > 25
- Averaged

*million pounds per year



Total P

Explanation
10^6 lbs/yr

- < 0.5
- 0.5 - 1
- 1 – 2
- 2 – 3
- > 3
- Averaged

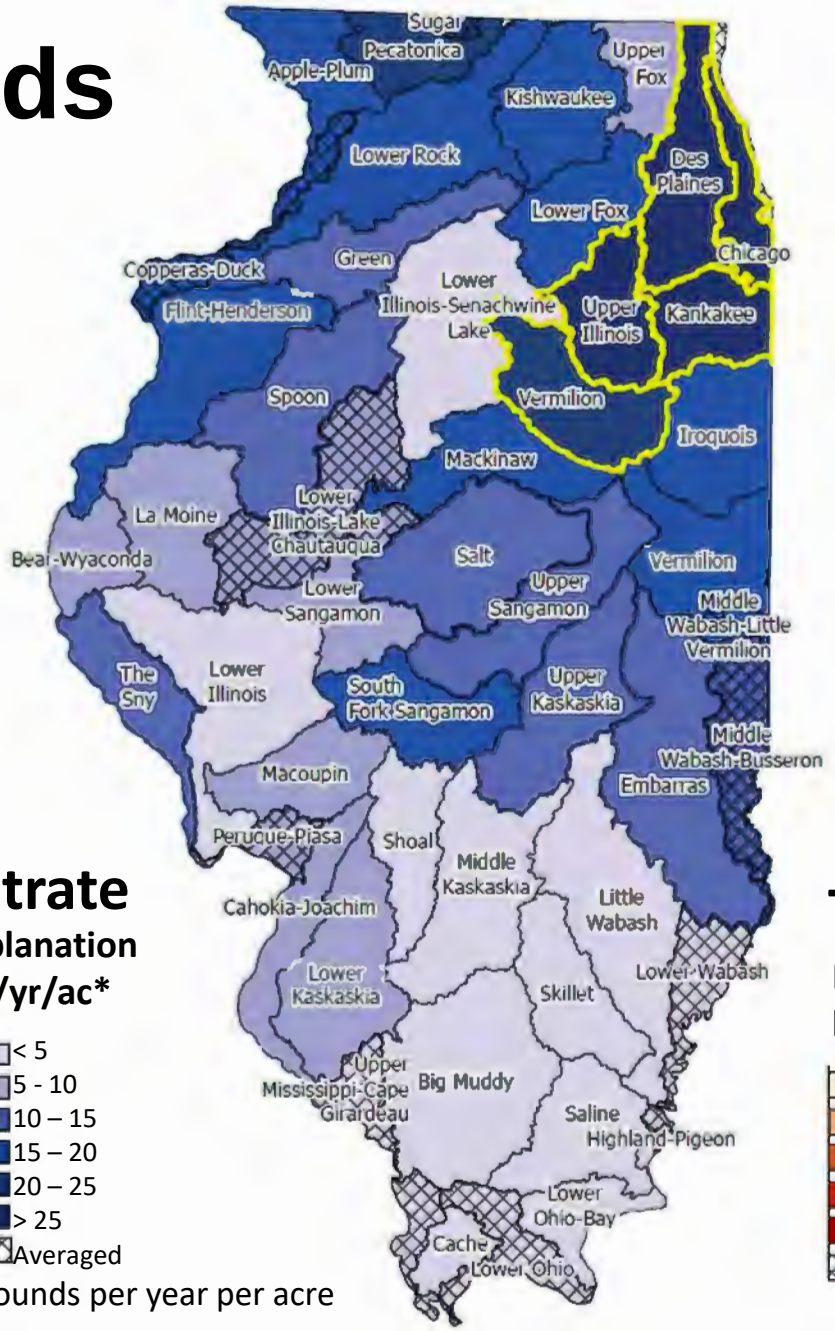
Incremental **yields** by HUC8

Top 5 – Nitrate

Chicago
Des Plaines
Kankakee
Upper Illinois
Vermilion (IL)

Top 5 – Total Phosphorus

Chicago
The Sny
Des Plaines
Cahokia-Joachim
Upper Sangamon

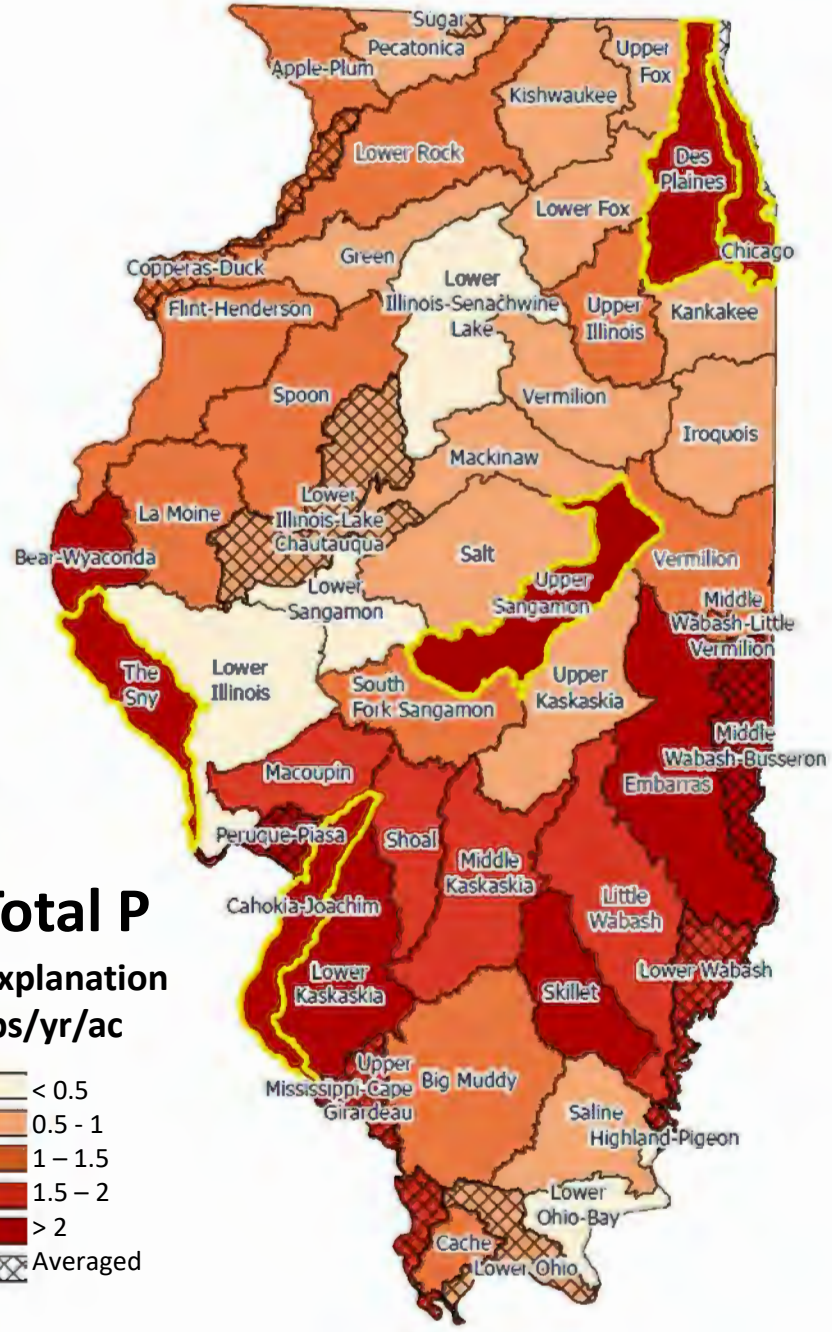


Nitrate

Explanation
lbs/yr/ac*

- < 5
- 5 - 10
- 10 – 15
- 15 – 20
- 20 – 25
- > 25
- Averaged

*pounds per year per acre

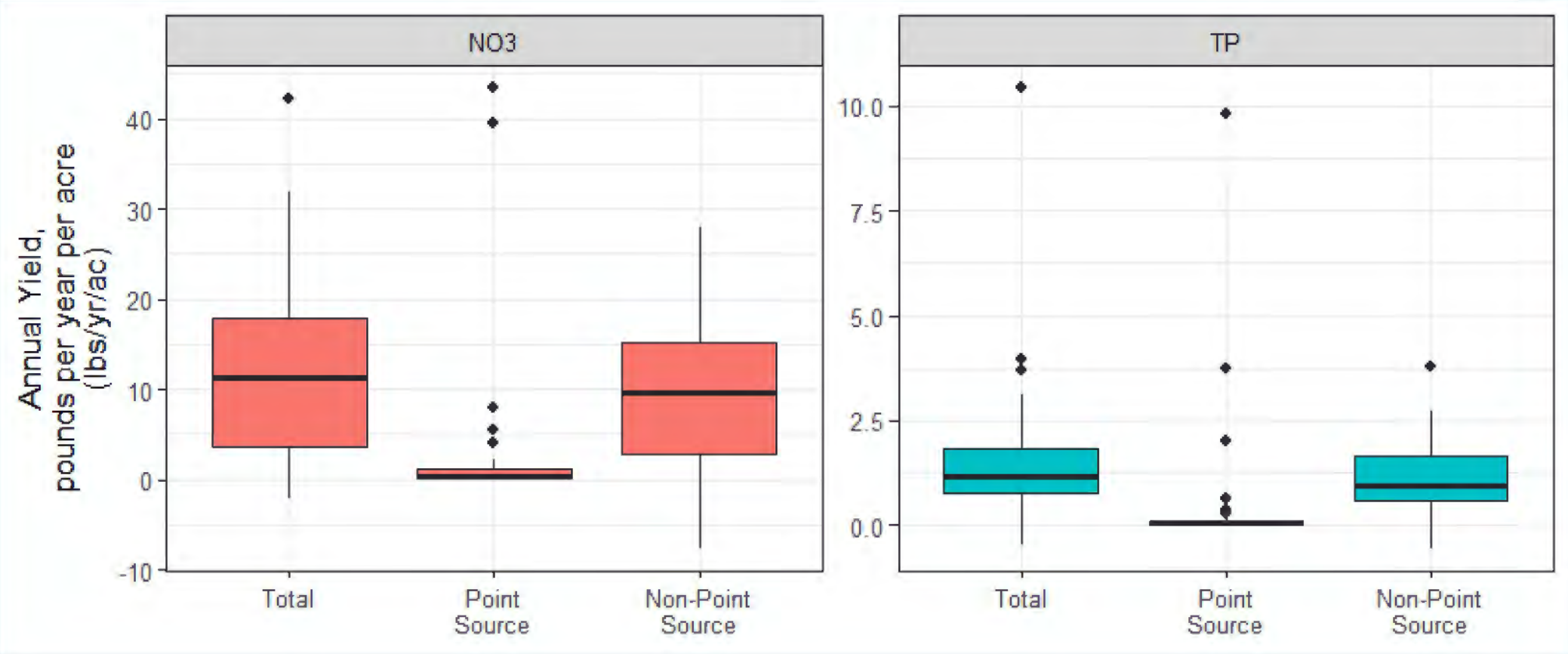


Total P

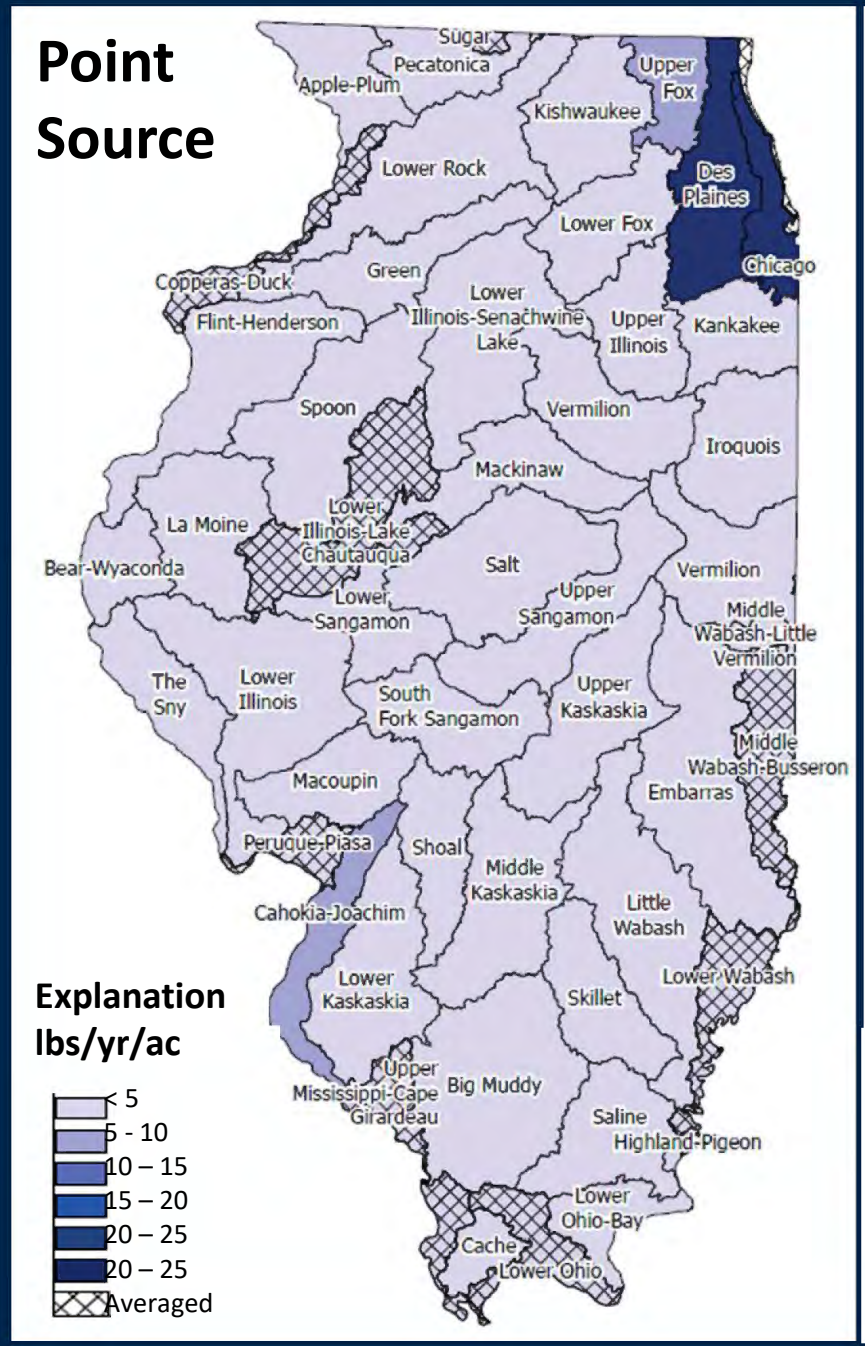
Explanation
lbs/yr/ac

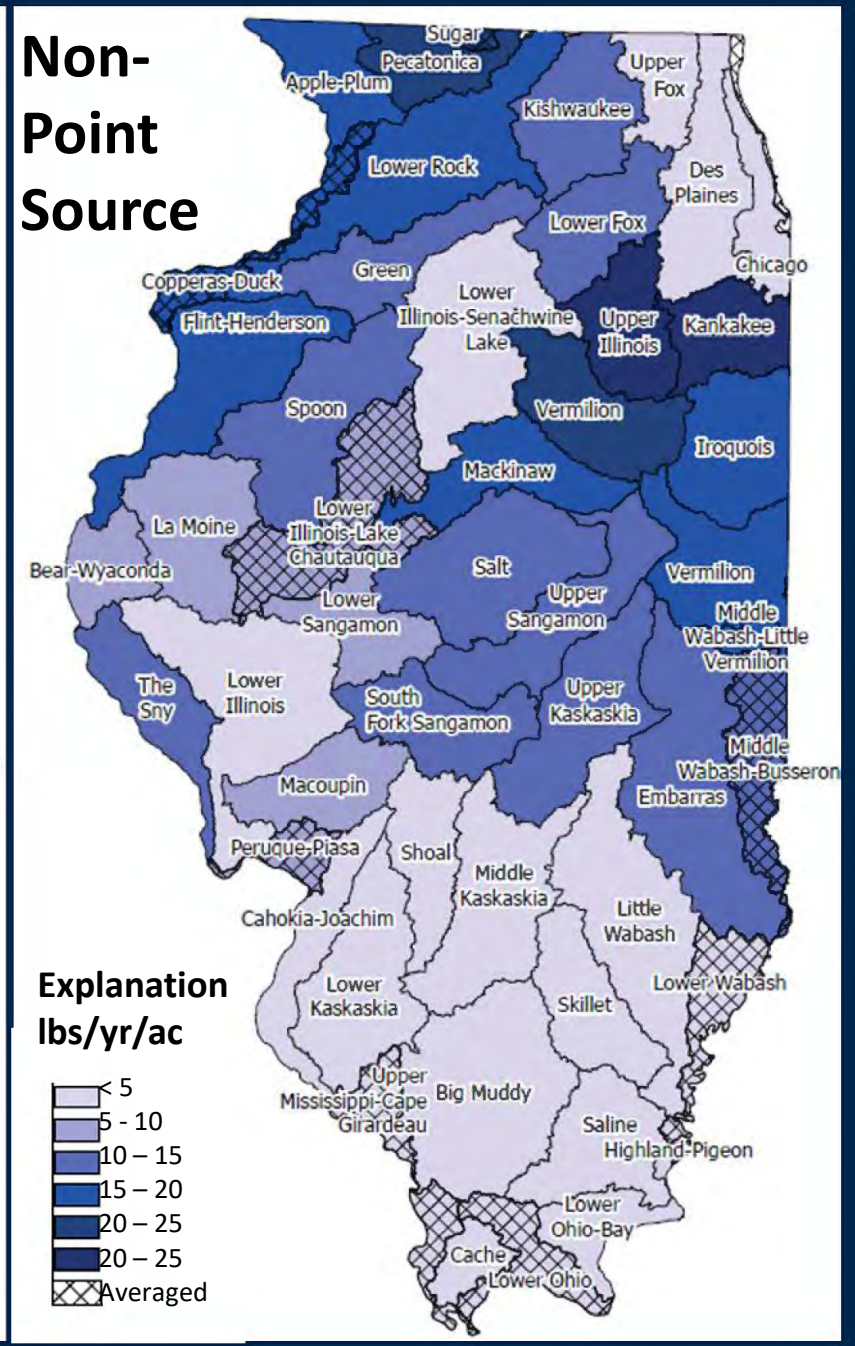
- < 0.5
- 0.5 - 1
- 1 – 1.5
- 1.5 – 2
- > 2
- Averaged

Incremental yields across all HUCs

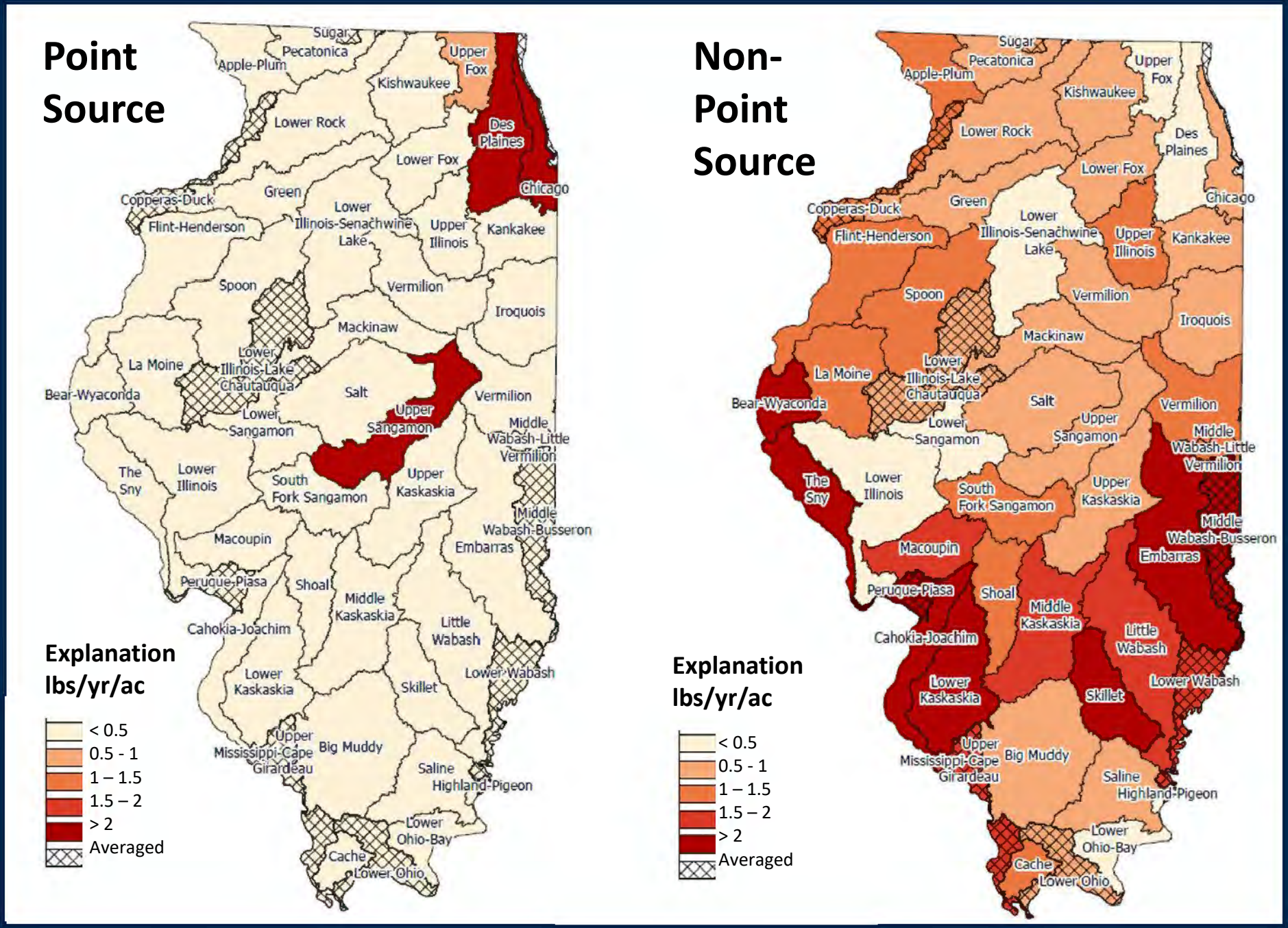


NO3 annual yields by HUC8





TP annual yields by HUC8



USGS

Changes over 3 periods
[preliminary]

1997–2011 = Baseline
2012–2017
2018–2022 = Recent (this update)

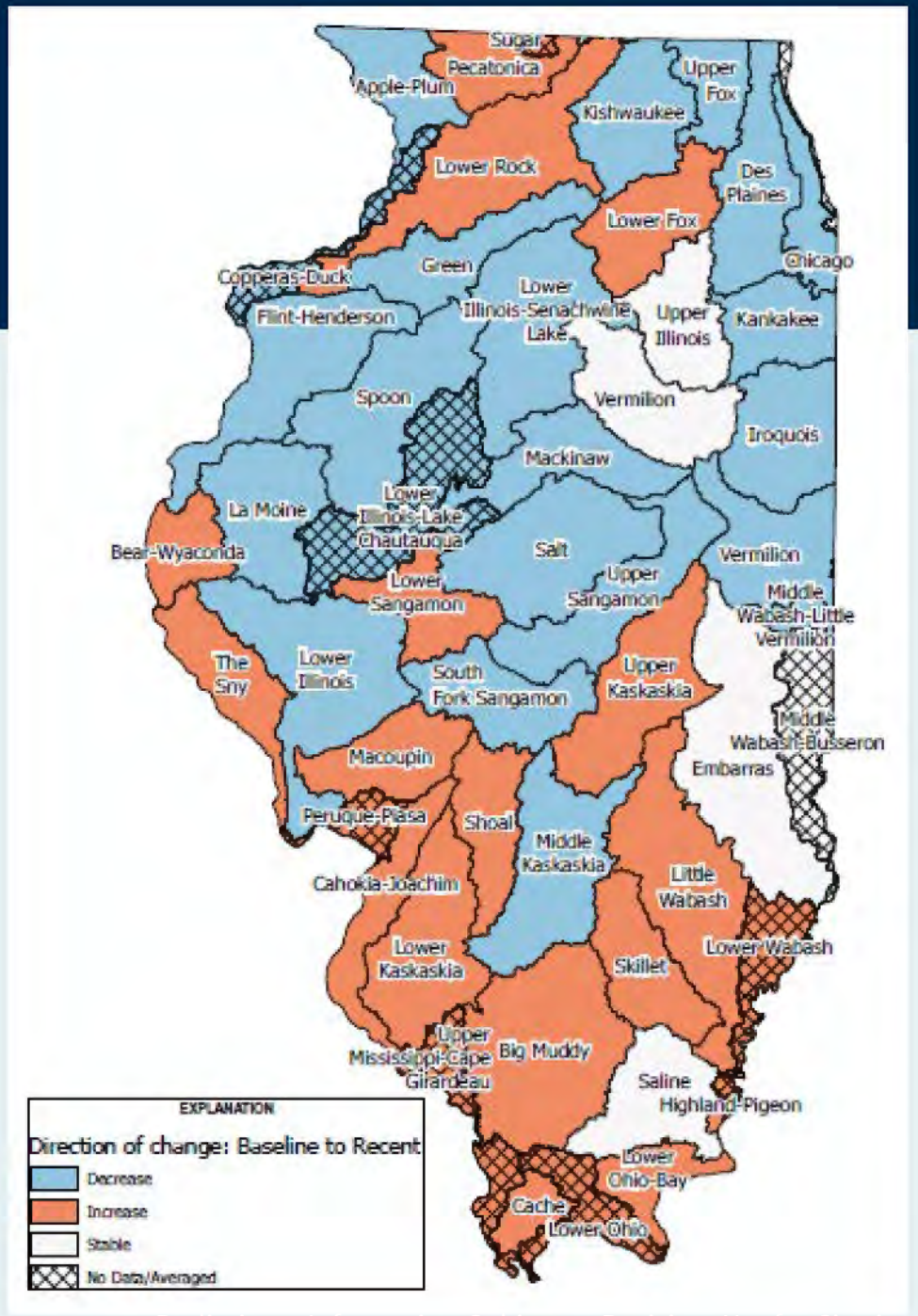
USGS

Change in NO3 yields

Direction of change:
Baseline to Recent

Number of HUC8s

	NO3	TP
Decrease	22	
Increase	23	
Stable (+/- 5%)	5	

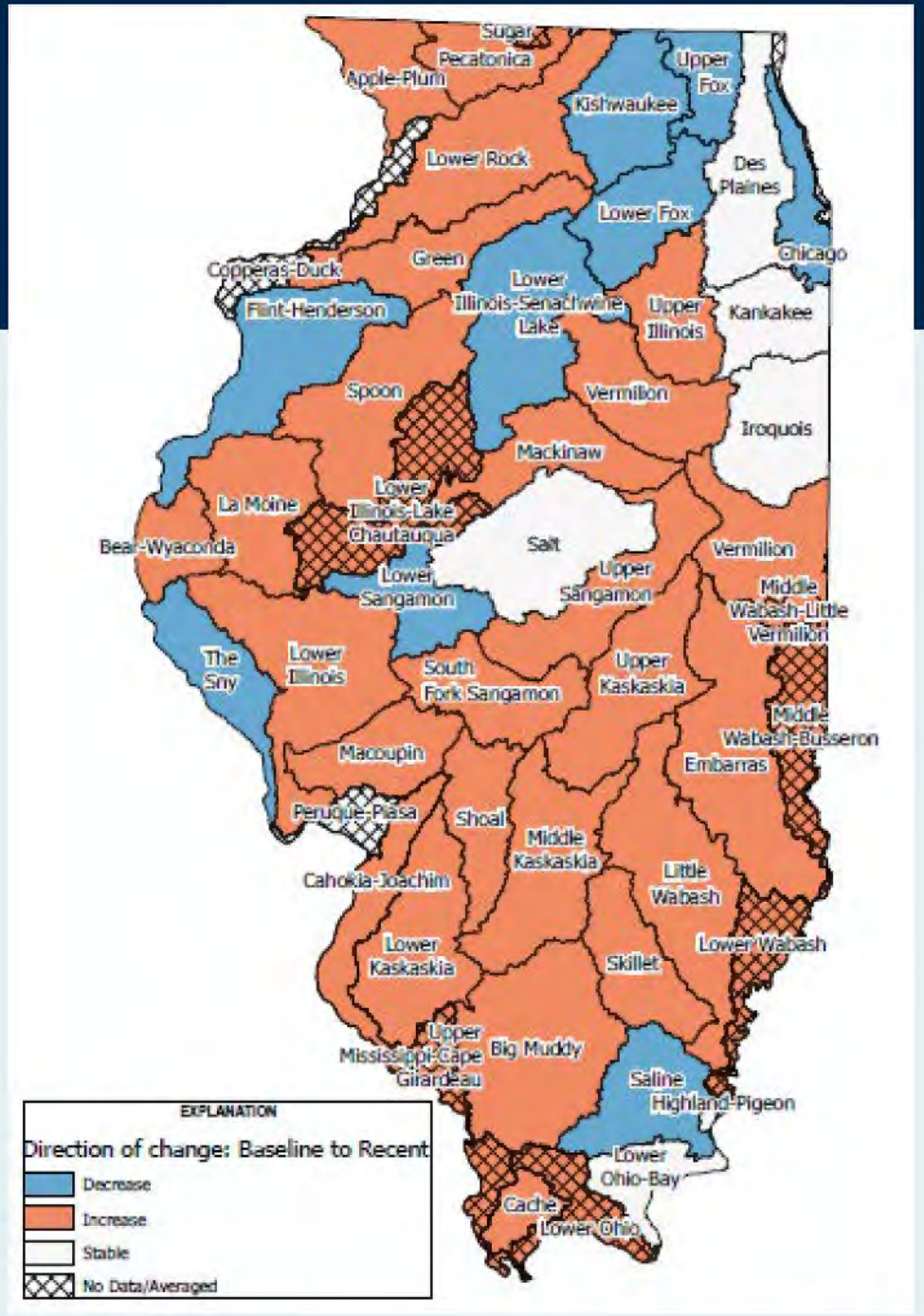


Change in TP yields

Direction of change:
Baseline to Recent

Number of HUC8s

	NO3	TP
Decrease	22	11
Increase	23	32
Stable (+/- 5%)	5	7



Annual yield over 3 periods

Direction of change:
Baseline to Recent

Number of HUC8s

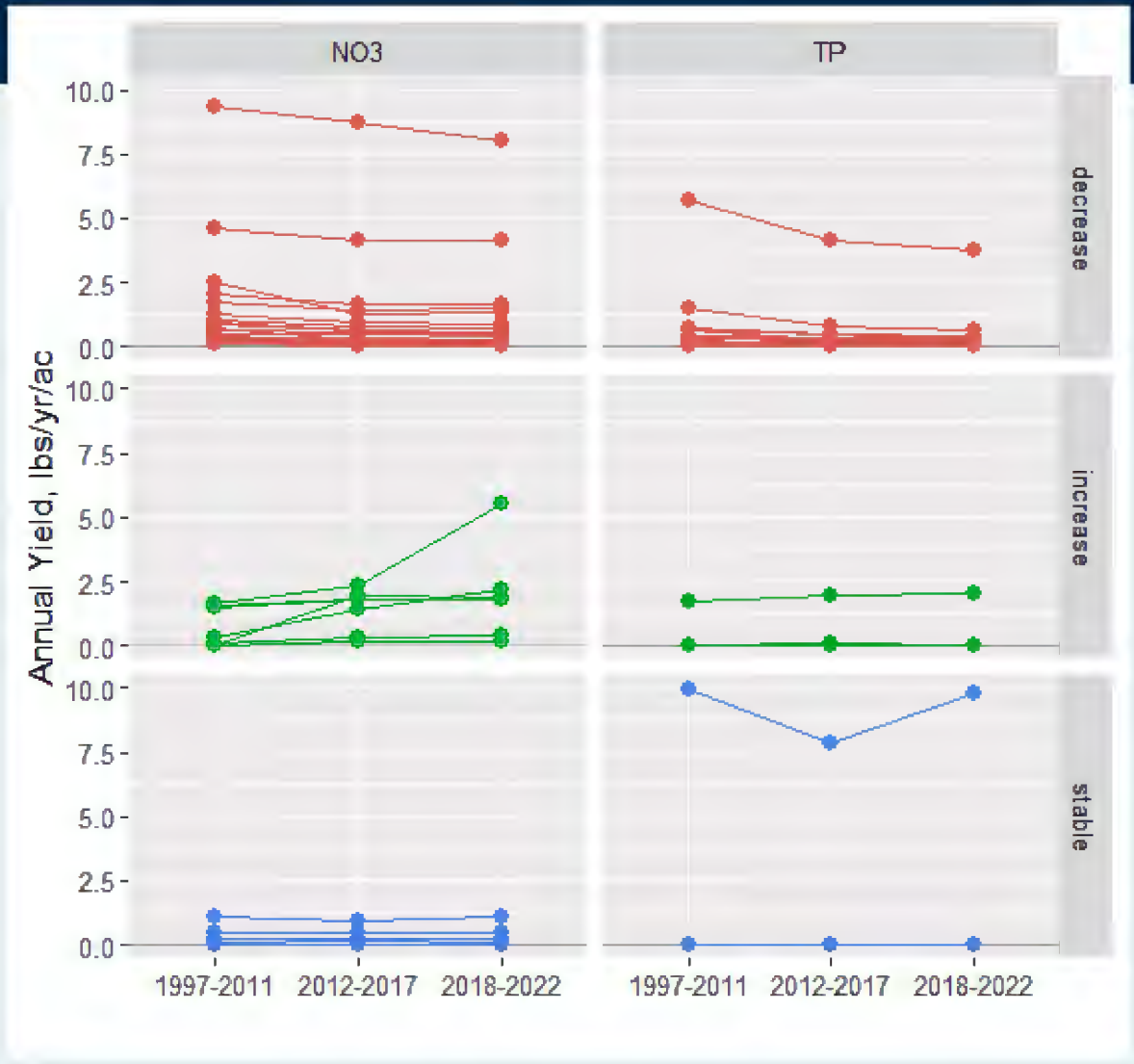
	NO3	TP
Decrease	22	11
Increase	23	32
Stable (+/- 5%)	5	7

Annual **point source** yield over 3 periods

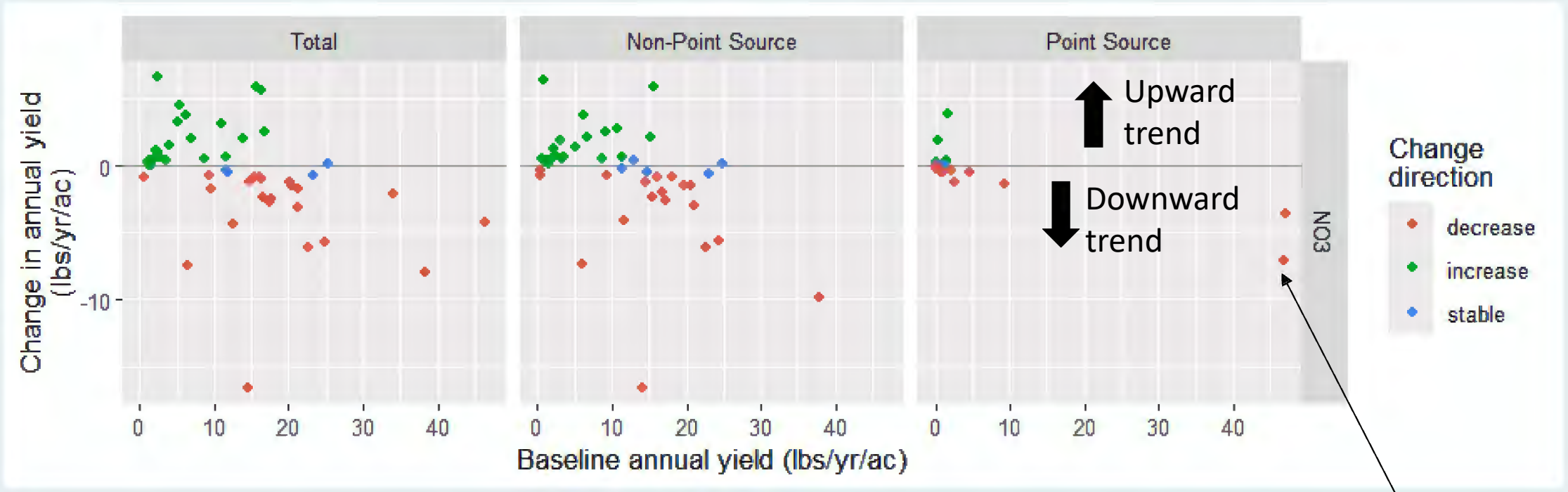
Direction of point source change:
Baseline to Recent

Number of HUC8s

	NO3	TP
Decrease	31	31
Increase	7	4
Stable (+/- 5%)	12	15

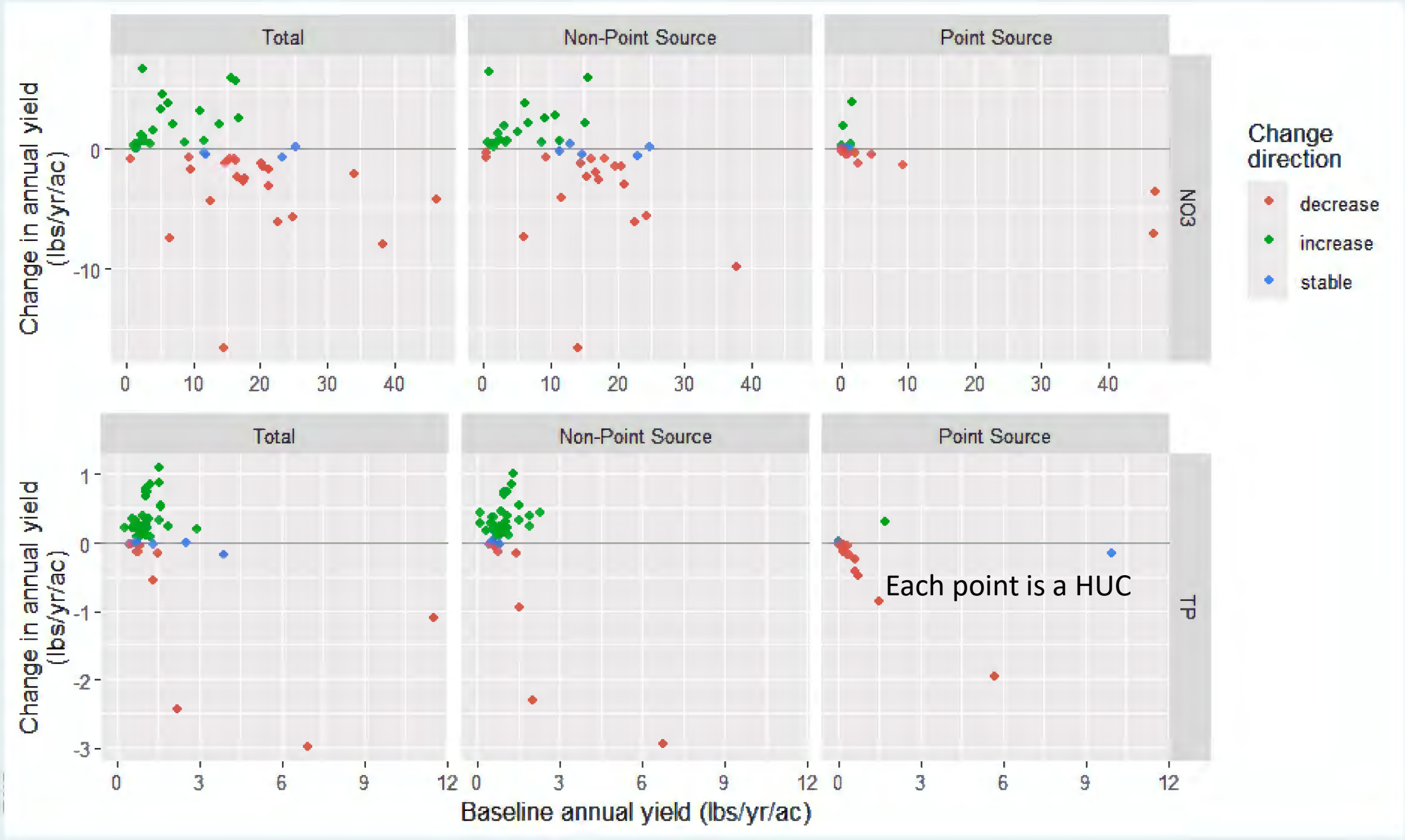


USGS



Each point is a HUC

USGS



NLRS-Priority watersheds

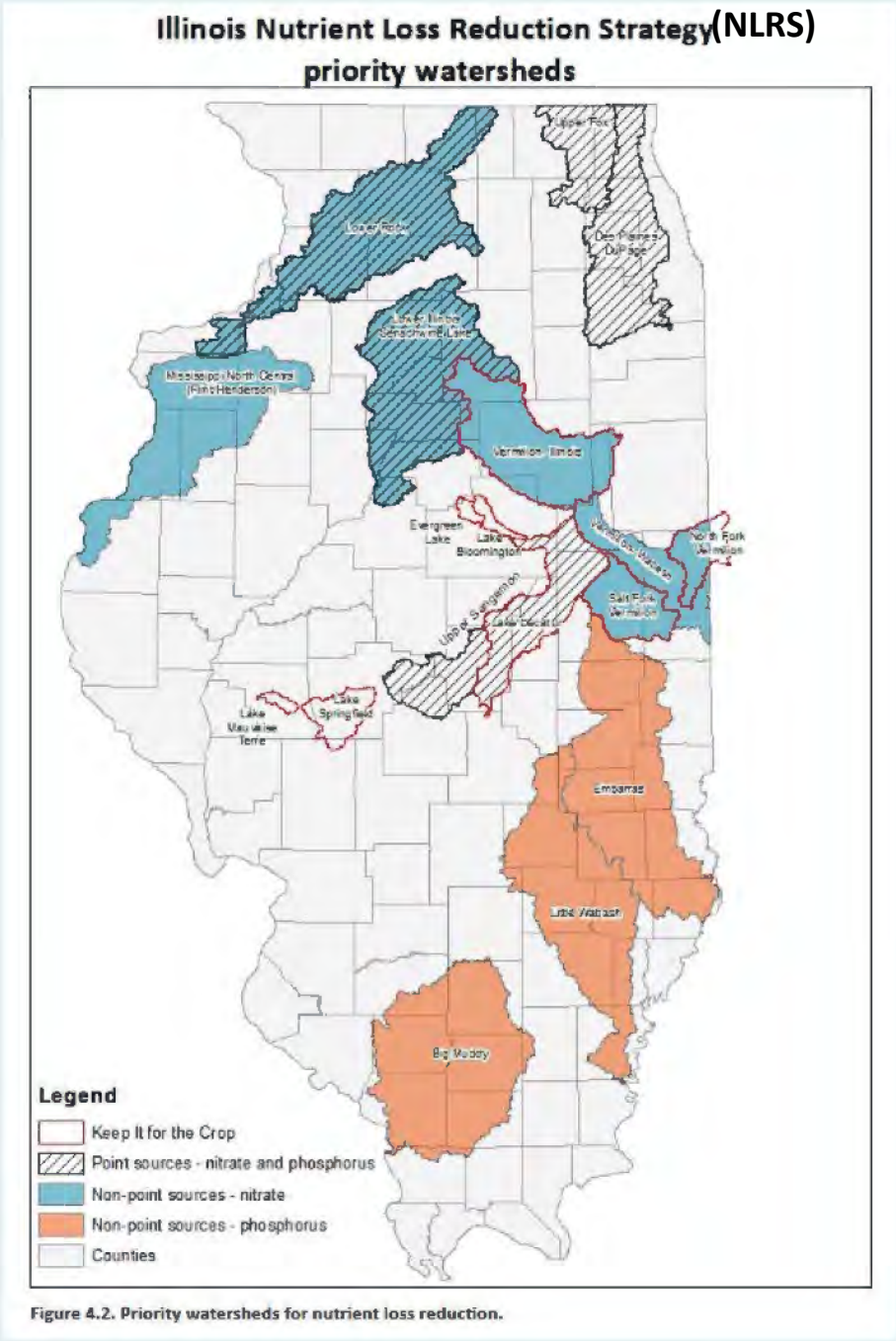
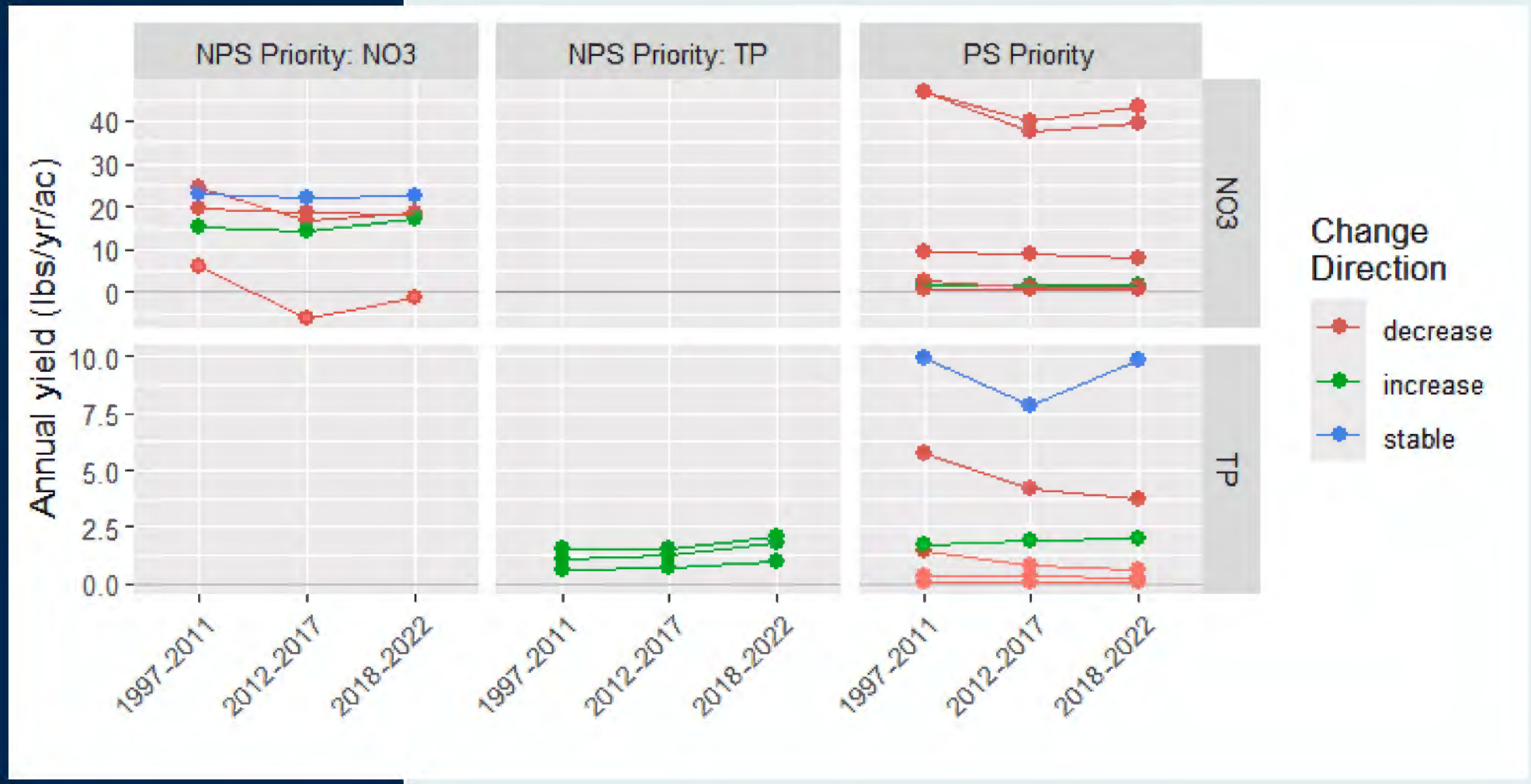


Figure 4.2. Priority watersheds for nutrient loss reduction.



USGS

Next steps

- Dissolved vs. particulate phosphorus percentages
- Water yields

Forthcoming products

- Data release of ambient site loads
- Data release of HUC8 incremental loads and yields
- Report describing status and changes across Illinois watersheds

USGS

5-minute break

If you have recently joined, please type your name and affiliation into the chat box.

ILLINOIS
NUTRIENT LOSS
REDUCTION STRATEGY

Illinois River Basin
Next Generation Water Observing System (NGWOS) Update

Jim Duncker
Hydrologist
U.S. Geological Survey, Central Midwest Water Science Center

U.S. Department of the Interior
U.S. Geological Survey

Illinois River Basin focus topics

Focus Topic 1: **Nutrients**. How are excess nutrients affecting water availability, both groundwater and surface water, in the Illinois River Basin?

Focus Topic 2: **Harmful Algal Blooms (HABs)**. What are drivers of riverine HABs formation, persistence, and transport? How can HAB effects on water availability be forecast and most efficiently managed?

Photographs by U.S. Geological Survey

USGS

Super gages

Super gage network-super gages provide continuous water quality measurements at fixed locations on the mainstem of the Illinois River and major tributaries within the basin. NGWOS expanded the network of super gages from 2 to 15 in the Illinois River Basin to give better information on the spatial distribution of nutrient loads within the basin.

USGS

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Continuous monitoring-Super gages

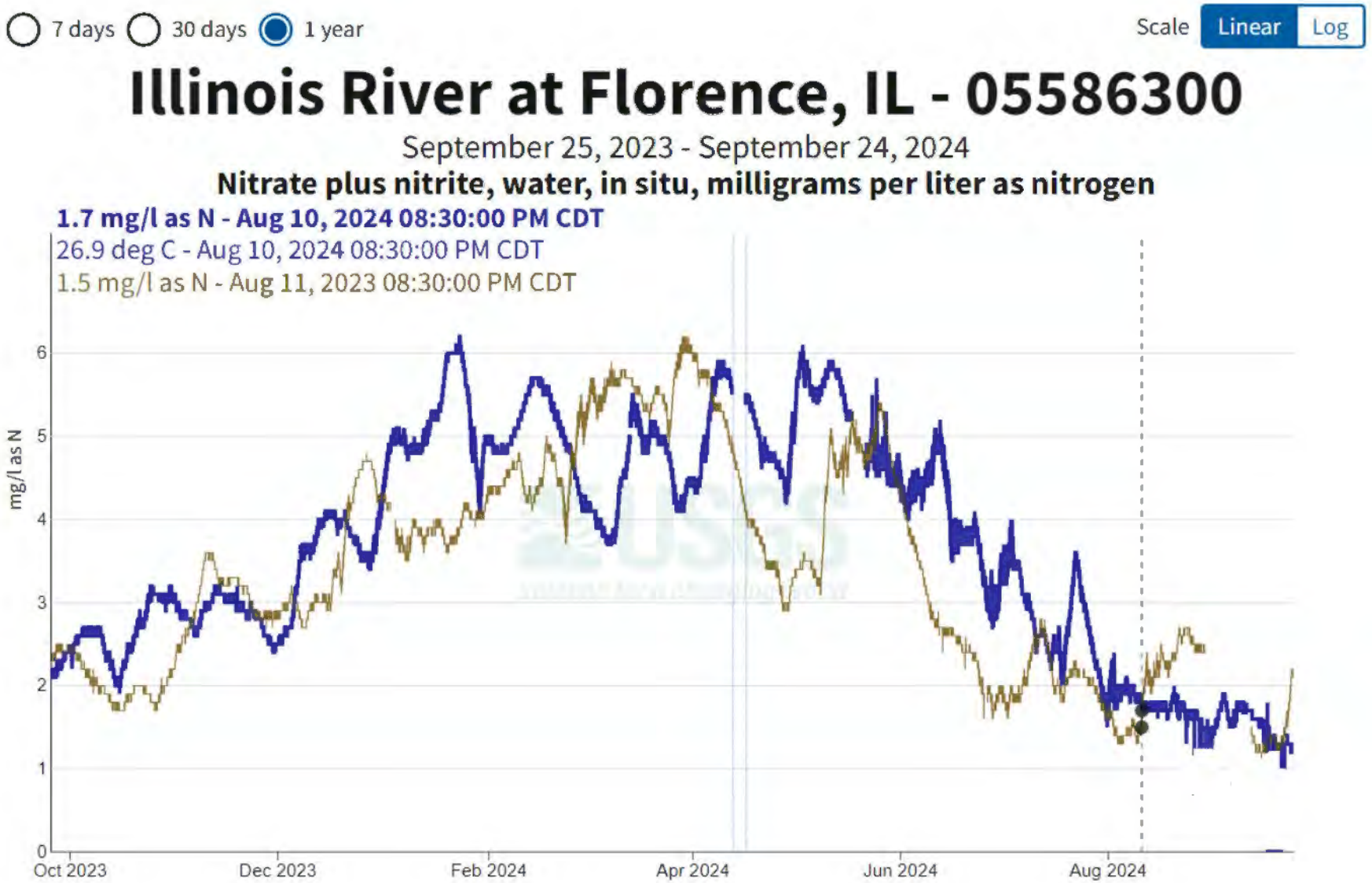
Photograph by U.S. Geological Survey

- Continuous river stage and discharge
- Continuous water quality
  - Water temperature
  - pH
  - Dissolved oxygen
  - Specific conductance
  - Chlorophyll-a
  - Phycocyanin
  - Turbidity
  - Photosynthetic Active Radiation (PAR)
- HABs camera imagery

Note: “Super gage” is loosely defined and sensors may vary between sites

USGS

Super gage data



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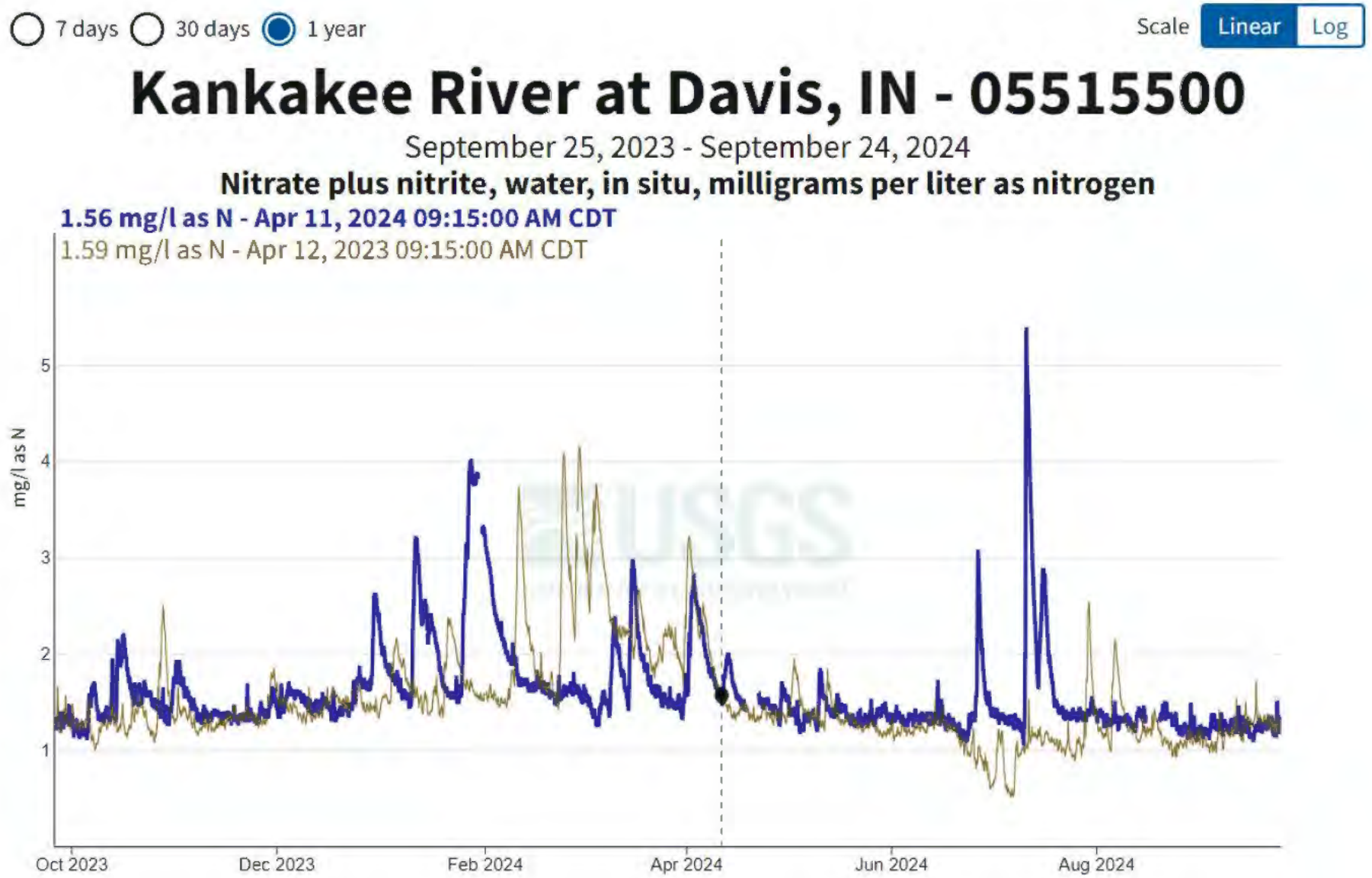
Super gage data



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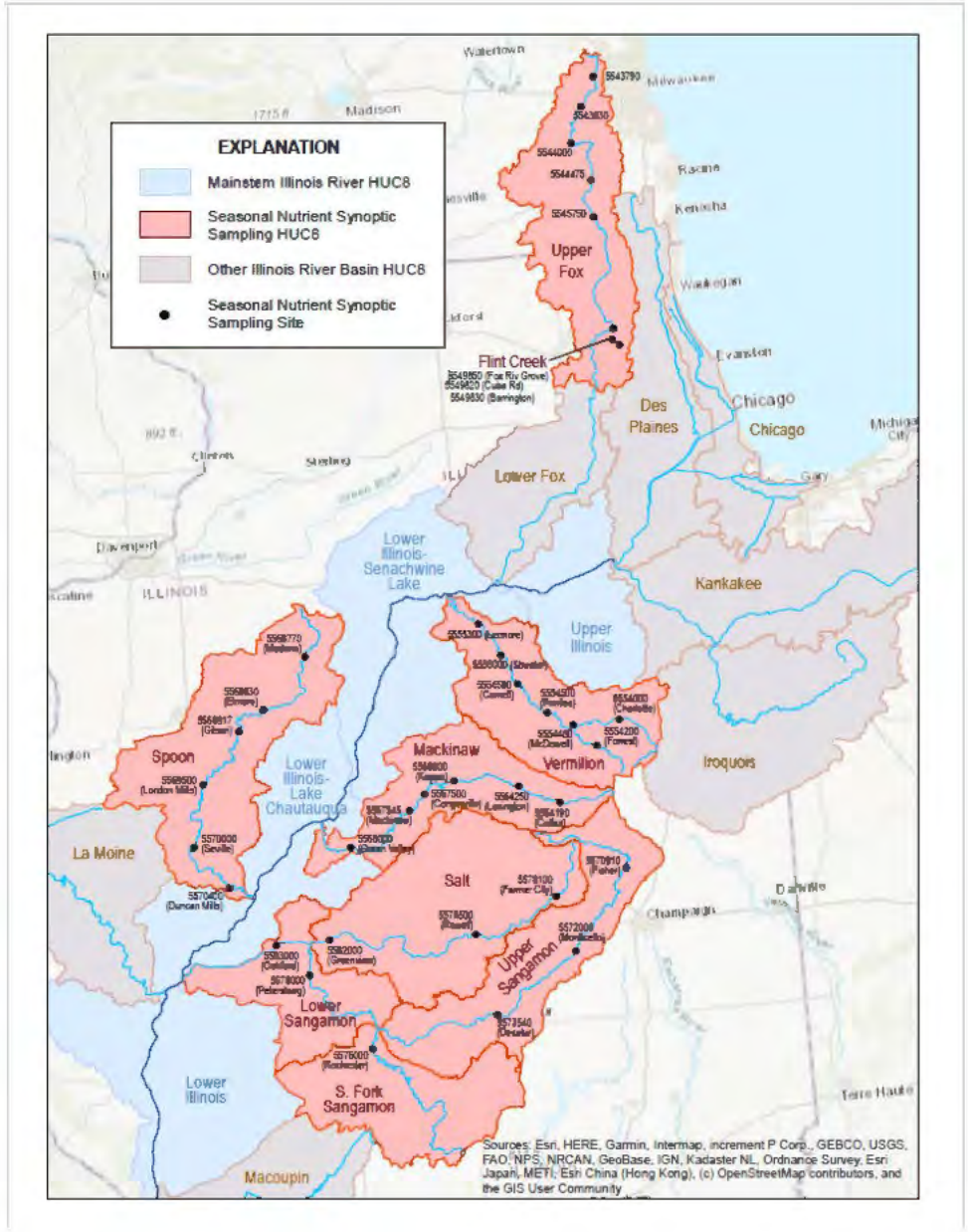
Synoptic sampling – HUC8 tributaries

- Sampling selected HUC8 (hydrologic unit code, 8; major) tributaries
- Sampling at 6-9 locations per tributary basin, from low-order streams and ditches to the tributary mouth
- Focus on discrete sampling for C, N, and P.
- Provide a snapshot of WQ conditions.
- Coordinating withsatellite overpass schedule

USGS

Synoptic sampling sub-basins



- Upper Fox River
- Flint Creek
- Vermilion River
- Mackinaw River
- Spoon River
- Sangamon River

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Sediment source tracking

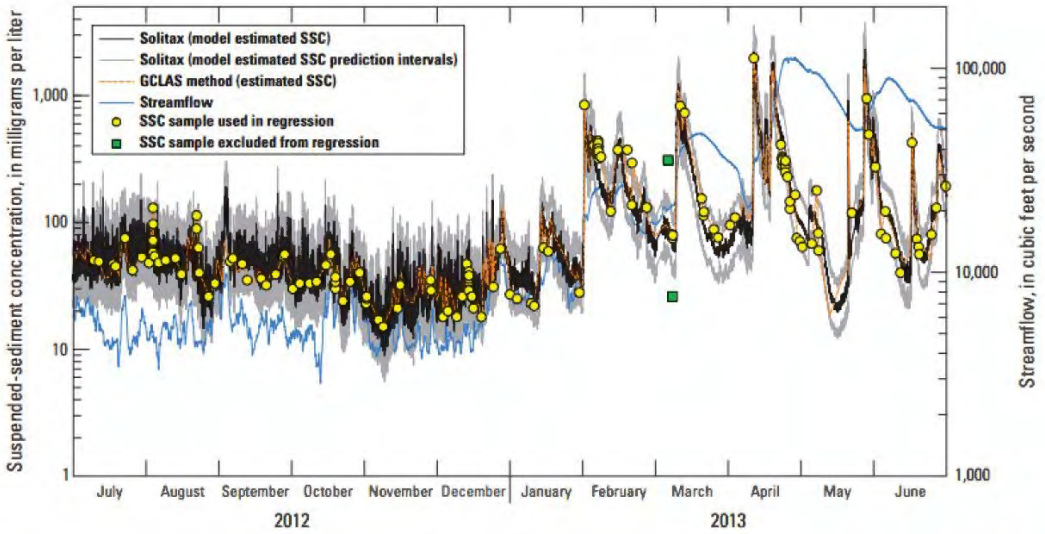

Figure 7. Time series streamflow and suspended-sediment concentration (SSC) for samples, modeled SSC (estimated) for SOLITAX, and Graphical Constituent Loading Analysis System (GCLAS) method. The results use turbidity data from the Illinois River at Florence, Illinois (05586300), and samples collected at the Illinois River at Florence, Ill. (05586300) (125 samples), and the Illinois River at Valley City, Ill. (05586100) (15 samples), and streamflow data reported at the Illinois River at Valley City, Ill. (05586100).

Indian Creek near Fairbury gage is 100% operational. Indian Creek is significant source of sediment to Peoria Pool of the Illinois River.

Photograph by M. Demissie, Illinois State Water Survey

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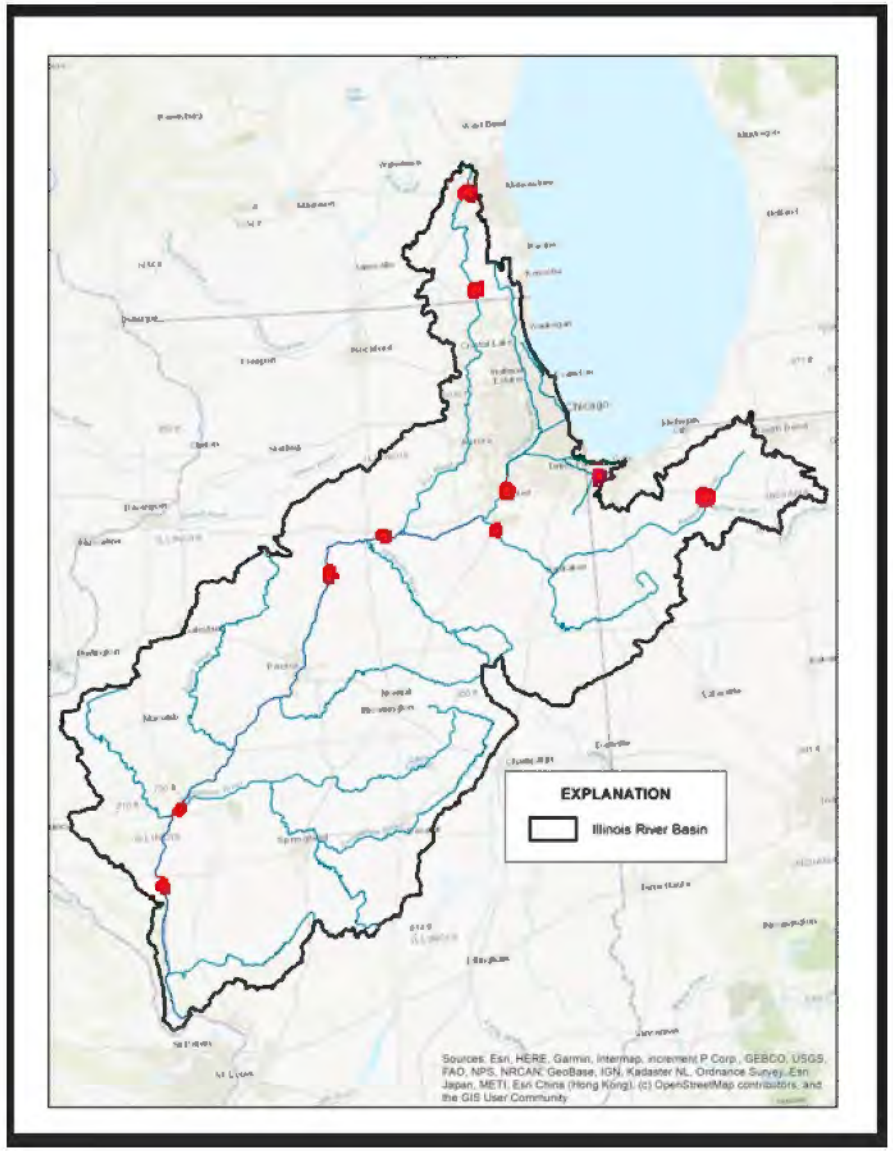
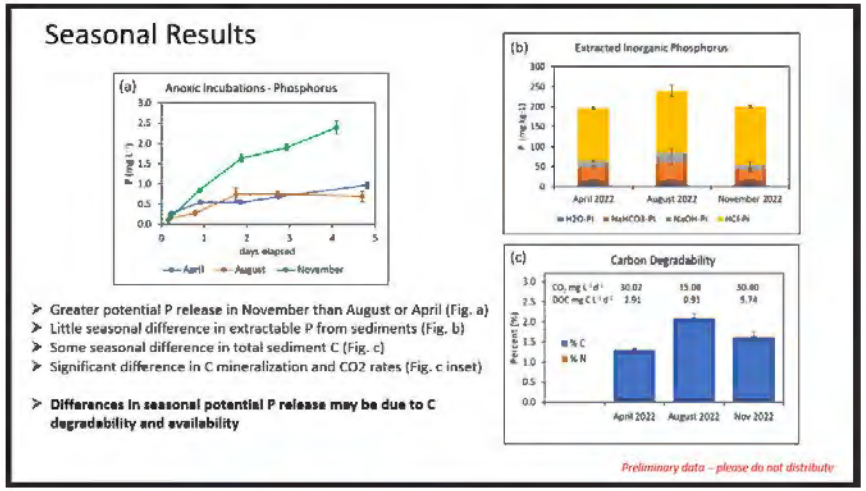
Legacy phosphorus recon survey

Reaches to be sampled

USGS Site ID	Site Name
05553800	ILLINOIS RIVER NR LOCK AND DAM AT STARVED ROCK, IL
05553700	ILLINOIS RIVER AT STARVED ROCK, IL
05545750	FOX RIVER NEAR NEW MUNSTER, WI
05543830	FOX RIVER AT WAUKESHA, WI
05538020	DES PLAINES RIVER IN LOCK CHANNEL AT ROCKDALE, IL
05537980	DES PLAINES RIVER AT ROUTE 53 AT JOLIET, IL
05536356	GRAND CALUMET RIVER AT COLUMBIA AV AT HAMMOND, IN
05527500	KANKAKEE RIVER NEAR WILMINTON, IL
05515500	KANKAKEE RIVER AT DAVIS, IN





Photographs by U.S. Geological Survey

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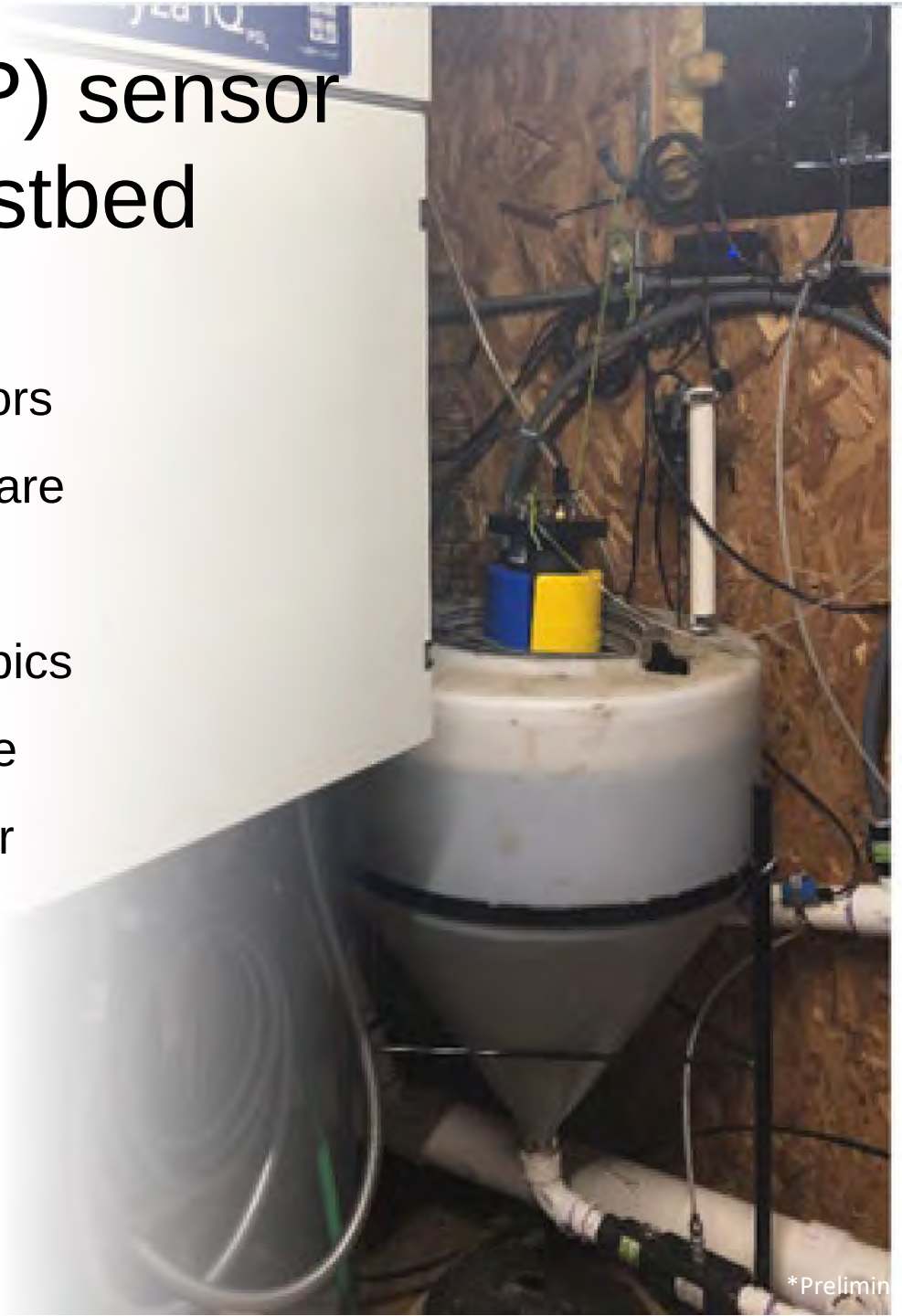
Nutrient (N and P) sensor evaluation testbed

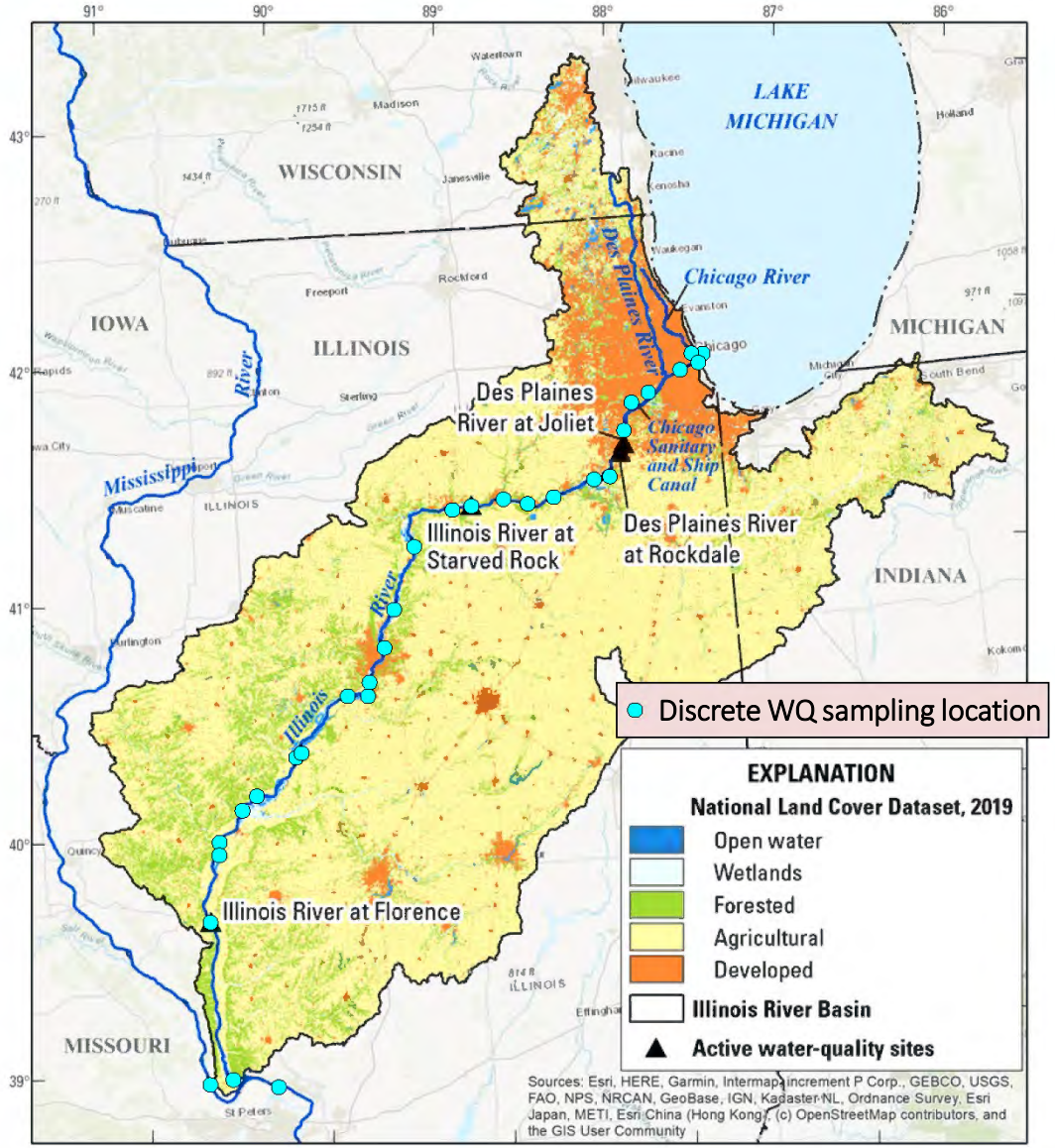
- Continuous N and P sensors from various manufacturers are currently being evaluated in Urbana. The basin focus topics and CMWSC expertise make the ILRB an ideal location for these evaluations.



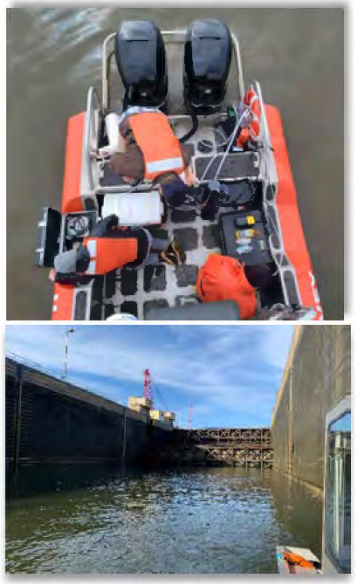
USGS

FLAMe Water Quality Sampling Campaigns

- Lake Michigan to Mississippi River (~335 miles)
- Seasonal (May, August, November 2022; March 2023)
- 7–8 days per campaign
- 30 discrete sampling locations along mainstem, incoming tributaries, backwaters for nutrients (N, P, C), major ions, dissolved CO_2 & CH_4, C isotopes, dissolved organic matter chemical characterization, PFAS, pharmaceuticals, algal communities (select sites)



Map courtesy of J. Sharpe, U.S. Geological Survey



Photographs by U.S. Geological Survey

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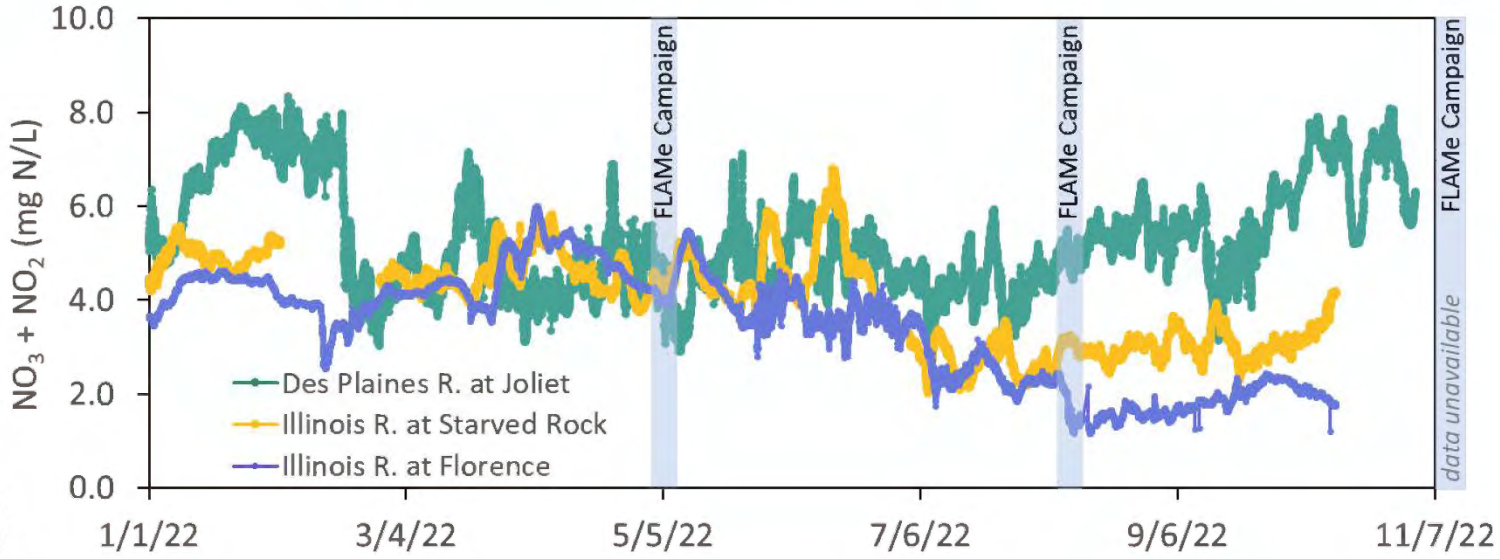
Nitrate Data - FLAMe Campaigns + NGWOS

- Greatest NO_3 concentrations consistently observed in Chicago metropolitan area (often above first super gage).
- Lower NO_3 concentrations downstream, especially in late summer (consistent with N removal through reactive processes).



FLAMe campaigns provide high-resolution "snapshots" of water quality over *large spatial scales*.

NGWOS fixed stations provide high-resolution water quality data over *time*.

USGS

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Testbed-Nutrient Diffusing Substrates

Photographs by U.S. Geological Survey

- Determine which nutrient(s) are limiting algal growth, toxin production, and species composition
- Respiration measurements using PreSens sensor (closed chamber technique)
- oxygen measurements can tell us about **stream metabolism** (the balance between respiration and photosynthesis)
- light chambers are used for net primary productivity (autotrophs) and the dark are used for community respiration (heterotrophs)
- **gross primary productivity /stream metabolism.**
- When a HAB occurs the communities shift thus altering these rates

USGS

HABs-discrete sampling

Photograph by U.S. Geological Survey

- HABs-discrete sampling Starved Rock pool
- HABs team successfully sampled a HABs events in June 2021 and September 2024
- Discrete water quality sampling verifies in-situ sonde data
- Discrete sampling occurs at select locations throughout the year
- Samples analyzed by National Water Quality Lab.

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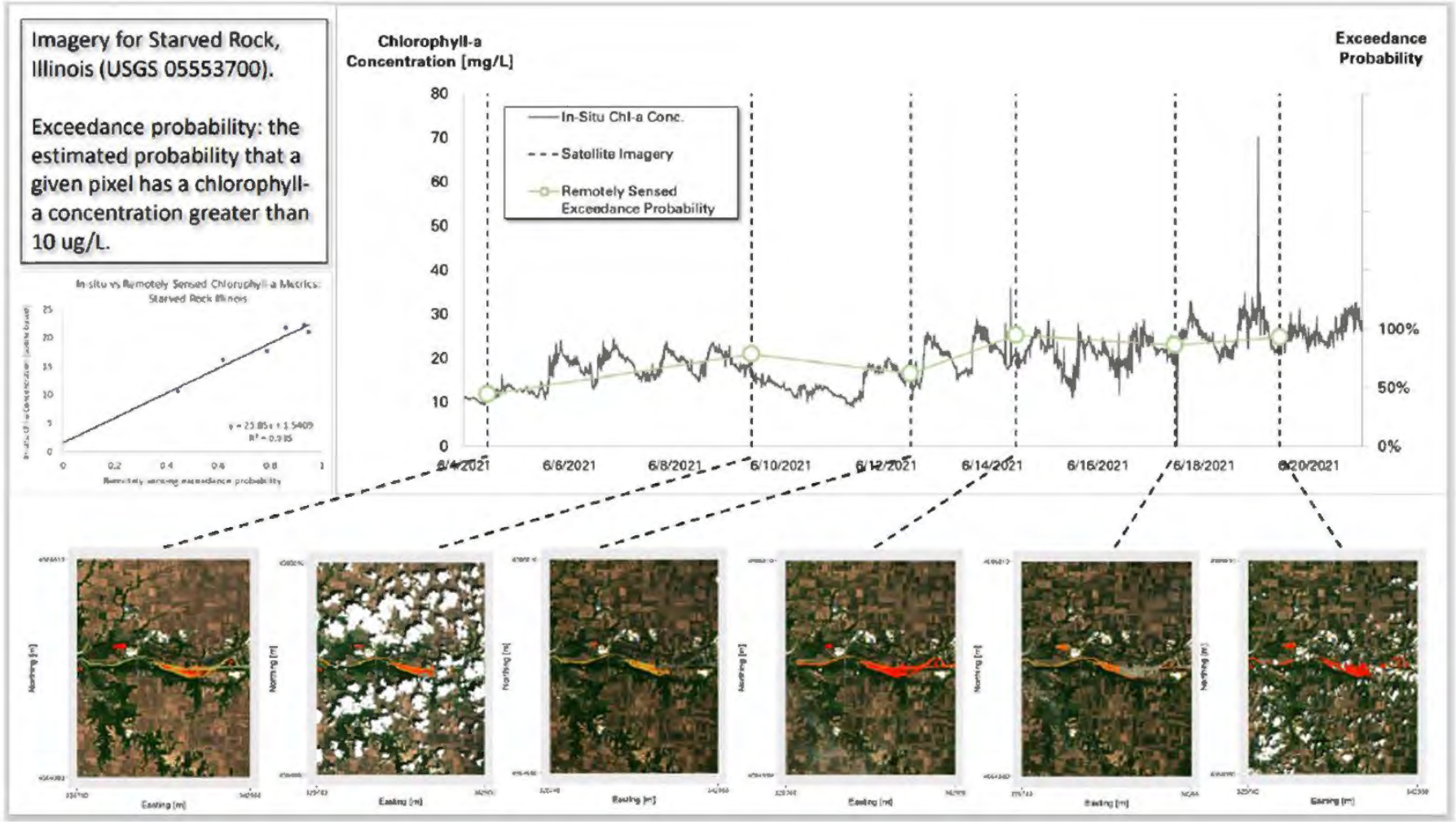
Remote sensing – water quality



June 2021 HABs event on Illinois River showing good correlation between in-situ water quality sonde chlorophyll-*a* readings and Sentinal 2 satellite imagery

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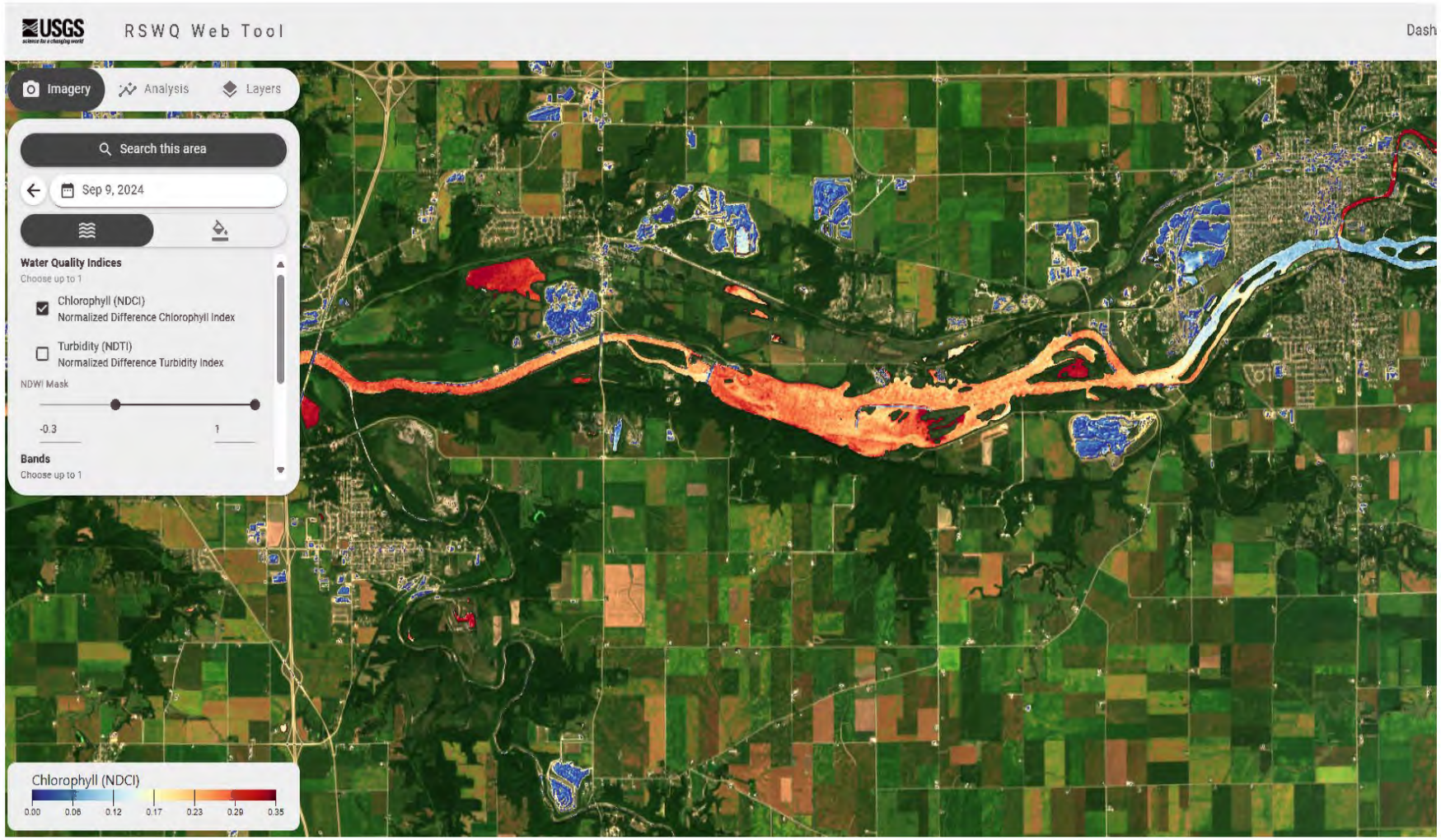
Remote sensing-water quality



Correlating Sentinel 2 satellite imagery with chlorophyll-*a* from in-situ sonde data and discrete sampling enables mapping the spatial extent of blooms. Successfully demonstrated during June 2021 bloom in the Starved Rock Pool of the Illinois River.

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Other Illinois River Basin NGWOS activities

- Airborne geophysical survey
- Ground-based geophysical measurements
- Urban hydrology testbed
- fDOM instrumentation testbed
- Cosmic ray soil moisture monitoring testbed
- Irrigation metering
- Environmental DNA monitoring testbed
- Algal community sampling
- Downhole 3D velocity meter
- Satellite-based water quality (chlorophyl)

USGS

Thank you!

USGS

Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

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New Continuous Water Quality Monitoring on The Emiquon Preserve

S.Sawicki

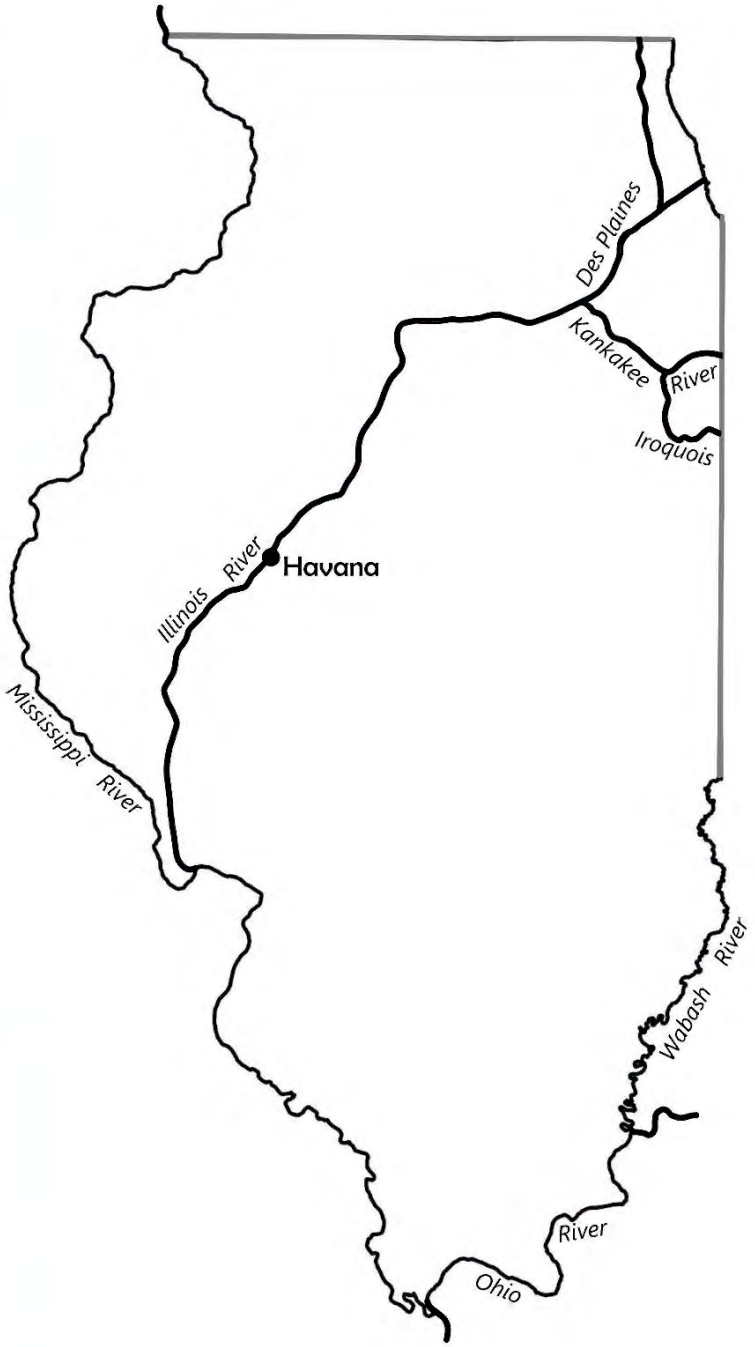
Illinois River Biological Station - Illinois Natural History Survey - Prairie Research Institute

National Great Rivers Research and Education Center

The Nature Conservancy

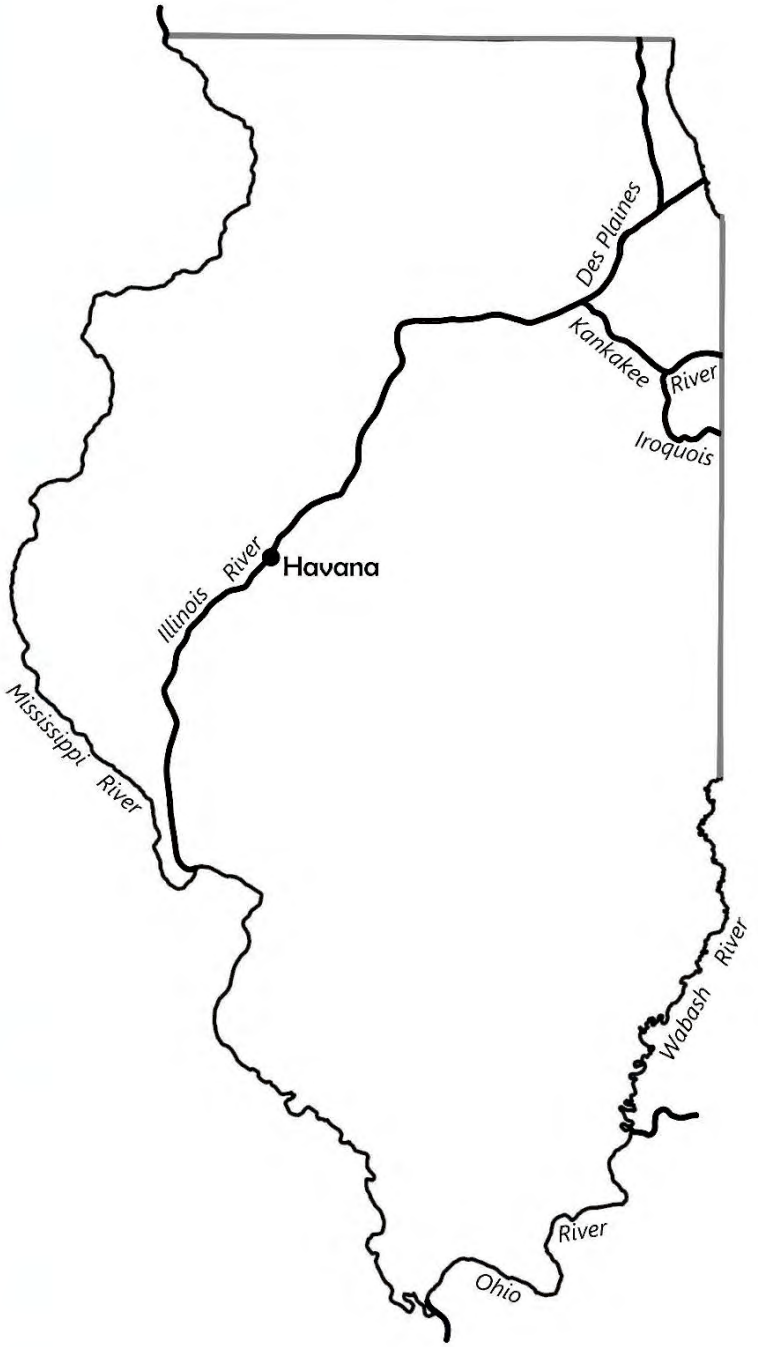
Quick reminder of last year's presentation…

The Emiquon Preserve



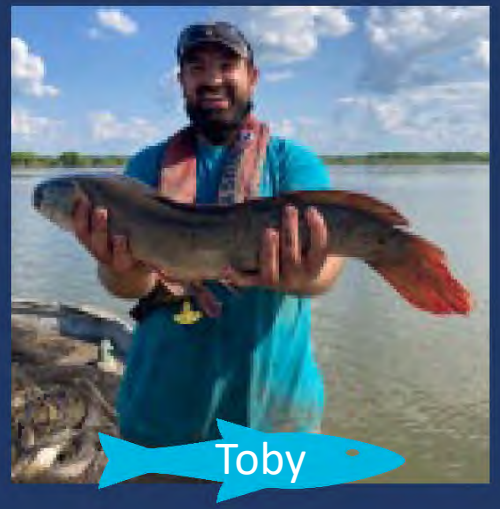
The Emiquon Preserve

The Nature Conservancy



IRBS at The Emiquon Preserve

- Vegetation
- Electrofishing



ILLINOIS DEPARTMENT OF NATURAL RESOURCES

The Nature Conservancy

GREON

- Great Rivers Ecological Observation Network (GREON) for scientists, managers, and the public
- Started 2013
- Mississippi River Watershed
- Used to be 6 buoys, but most retired
- Sometimes called PISCES: Pontoon for In-situ Characterization of Environmental Systems

How we got one on the Emiquon

Illinois River Biological Station Havana

USGS science for a changing world

The National Great Rivers Research & Education Center

The Nature Conservancy

So, what is this thing?

So, what is this thing?

Solar panels

Cellular modem

- Peristaltic pump
- Data Logger
- Batteries

So, what is this thing?

Vaisala Weather Transmitter:
- Wind Speed
- Wind Direction
- Air Temp
- Barometric Pressure
- Rain
- Hail

LI-COR:
- Photosynthetically Active Radiation (PAR)

YSI EXO-2 sonde:
- DO
- Algae
- DOM
- Turbidity
- SC
- Temp

SUNA:
- Nitrate

So, what is this thing?

Vaisala Weather Transmitter:
- Wind Speed
- Wind Direction
- Air Temp
- Barometric Pressure
- Rain
- Hail

Every 15 min

LI-COR:
- Photosynthetically Active Radiation (PAR)

YSI EXO-2 sonde:
- DO
- Algae
- DOM
- Turbidity
- SC
- Temp

Once per hour

SUNA:
- Nitrate

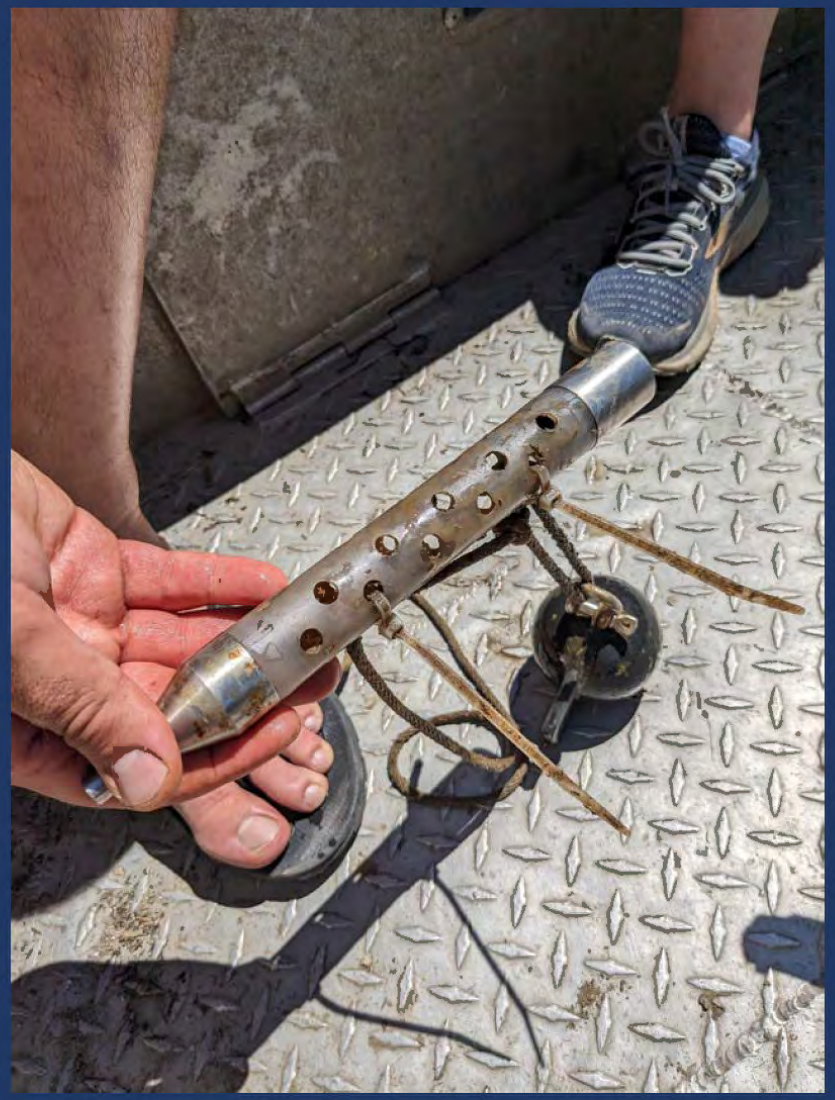
Challenges so far:

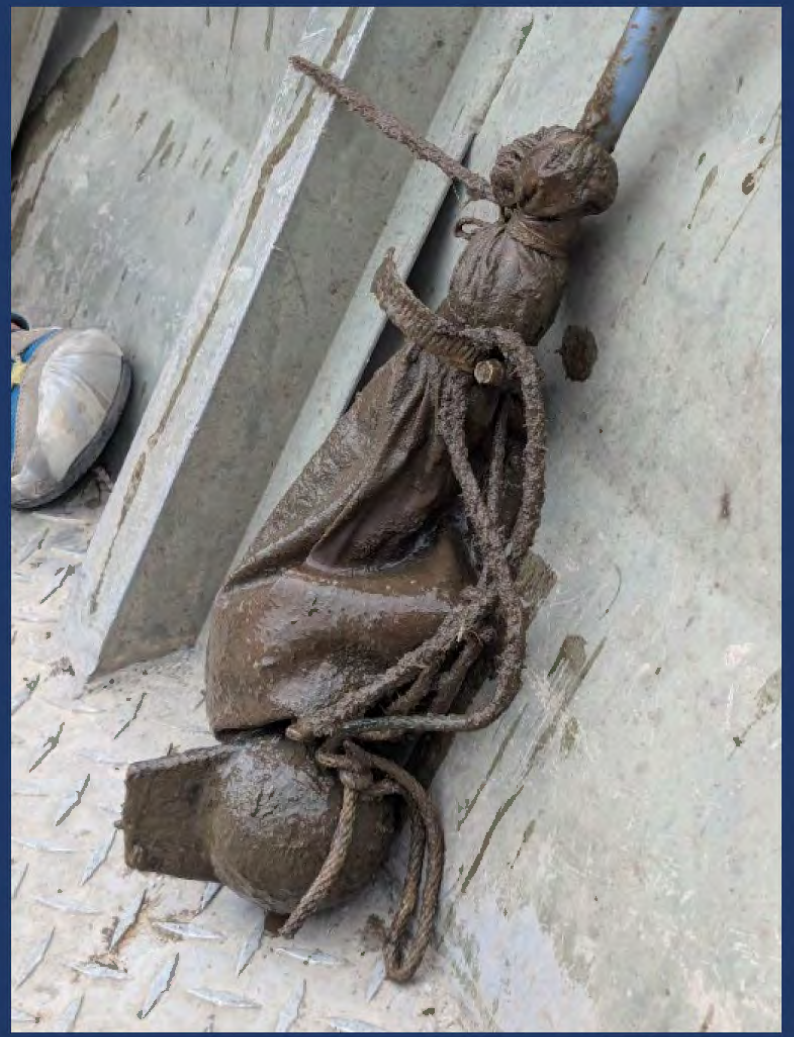
Nonmoving water (not river)

Challenges so far:

Midge (chironomid) larvae

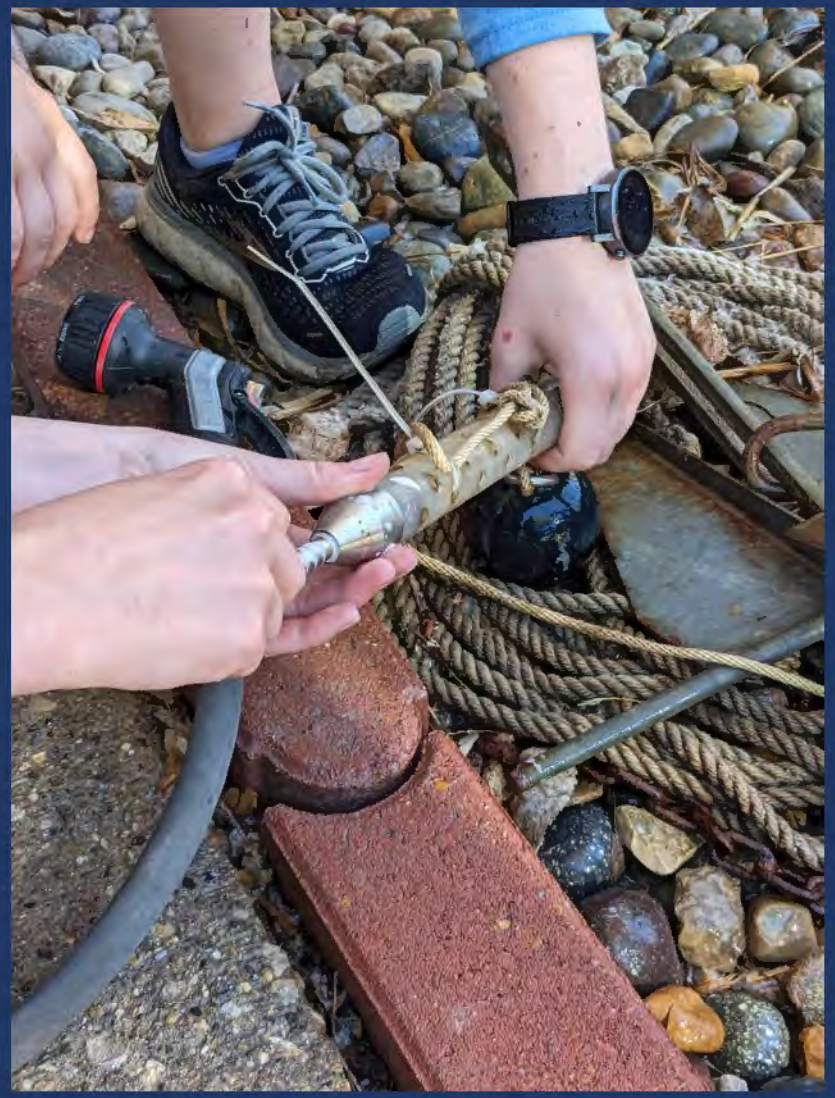
Via: Flickr





Challenges so far:

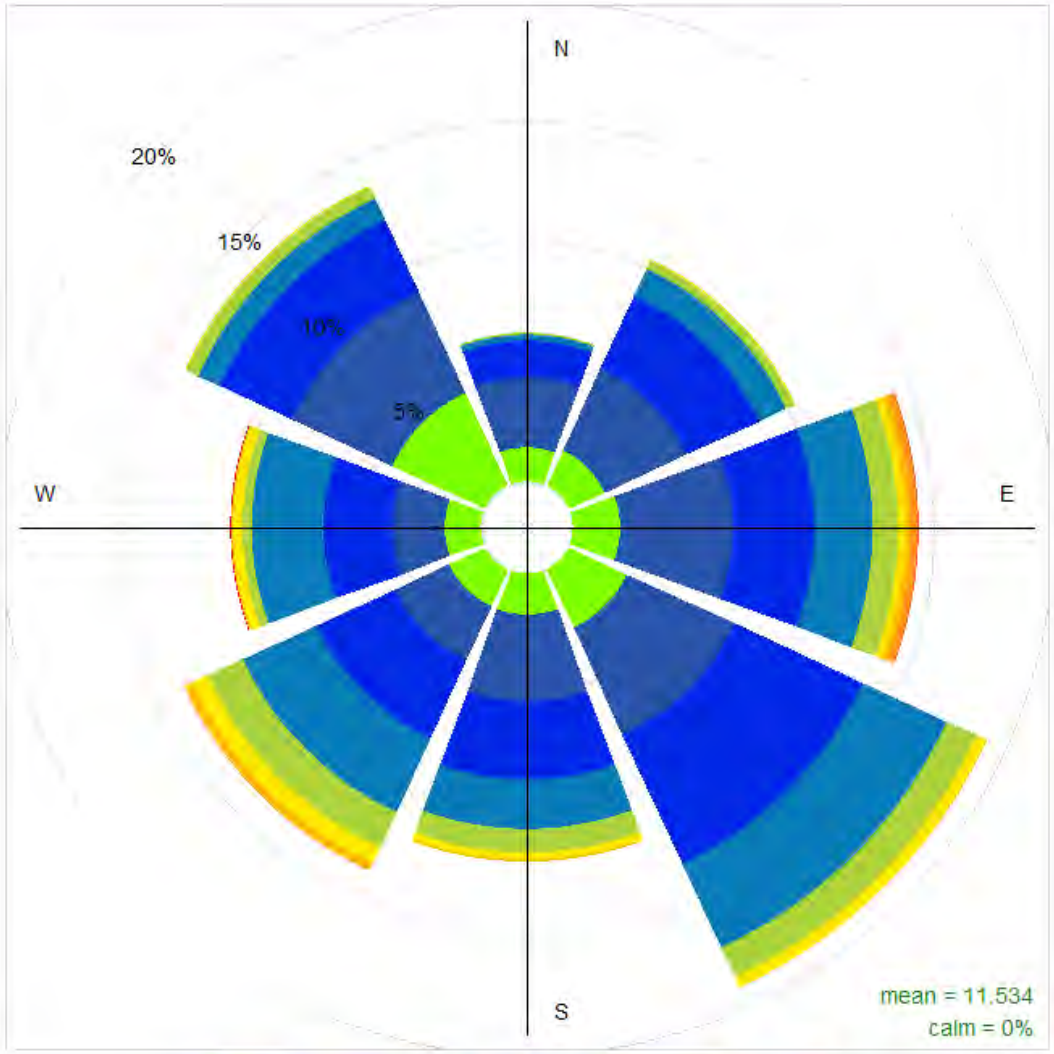
Challenges so far:



Questions:

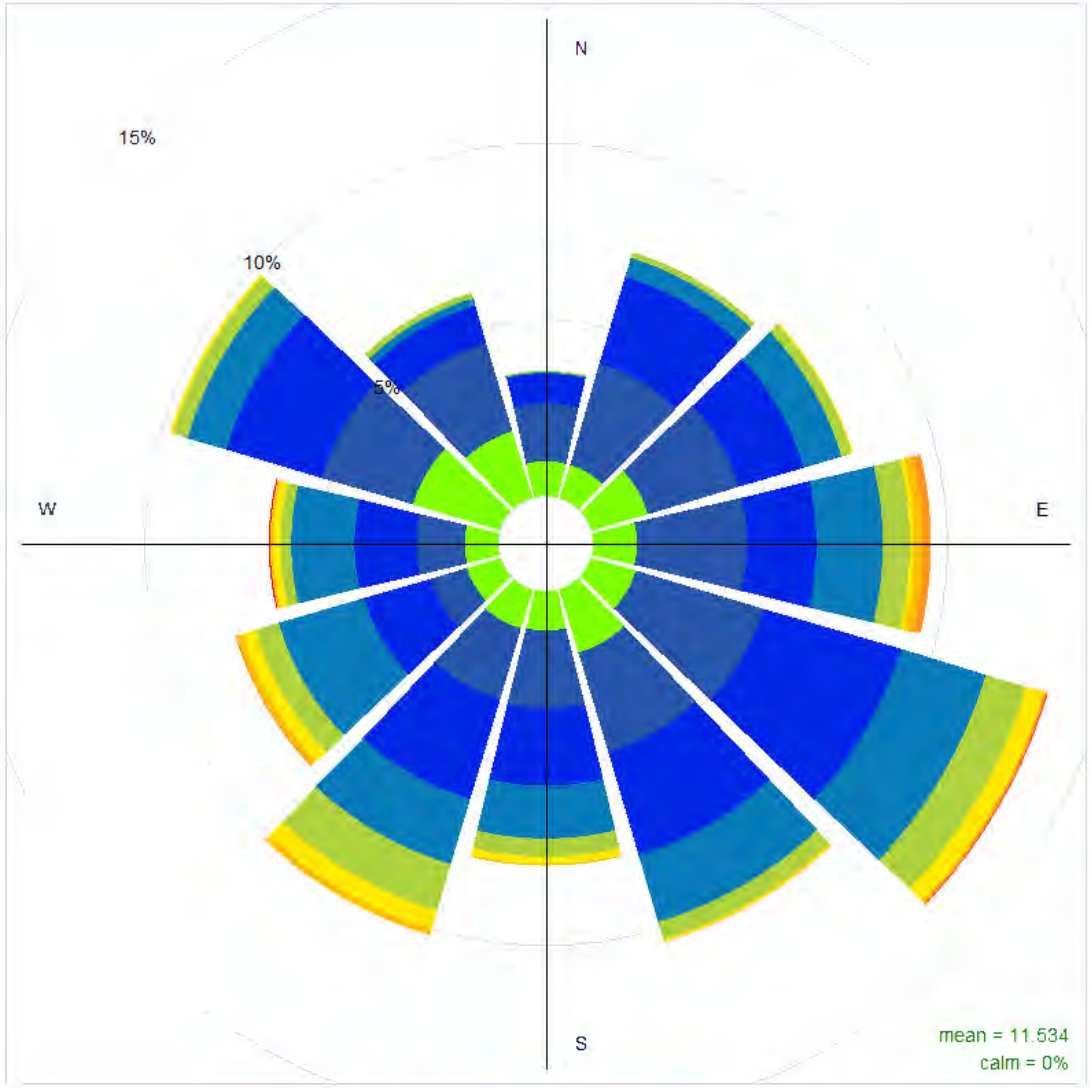
- What could be the main driver of Turbidity at the Emiquon?
- How does wind affect Turbidity?
- Do we affect Turbidity when we pass in boats?
- How does the Emiquon compare to the Illinois River main channel?

What we know so far:



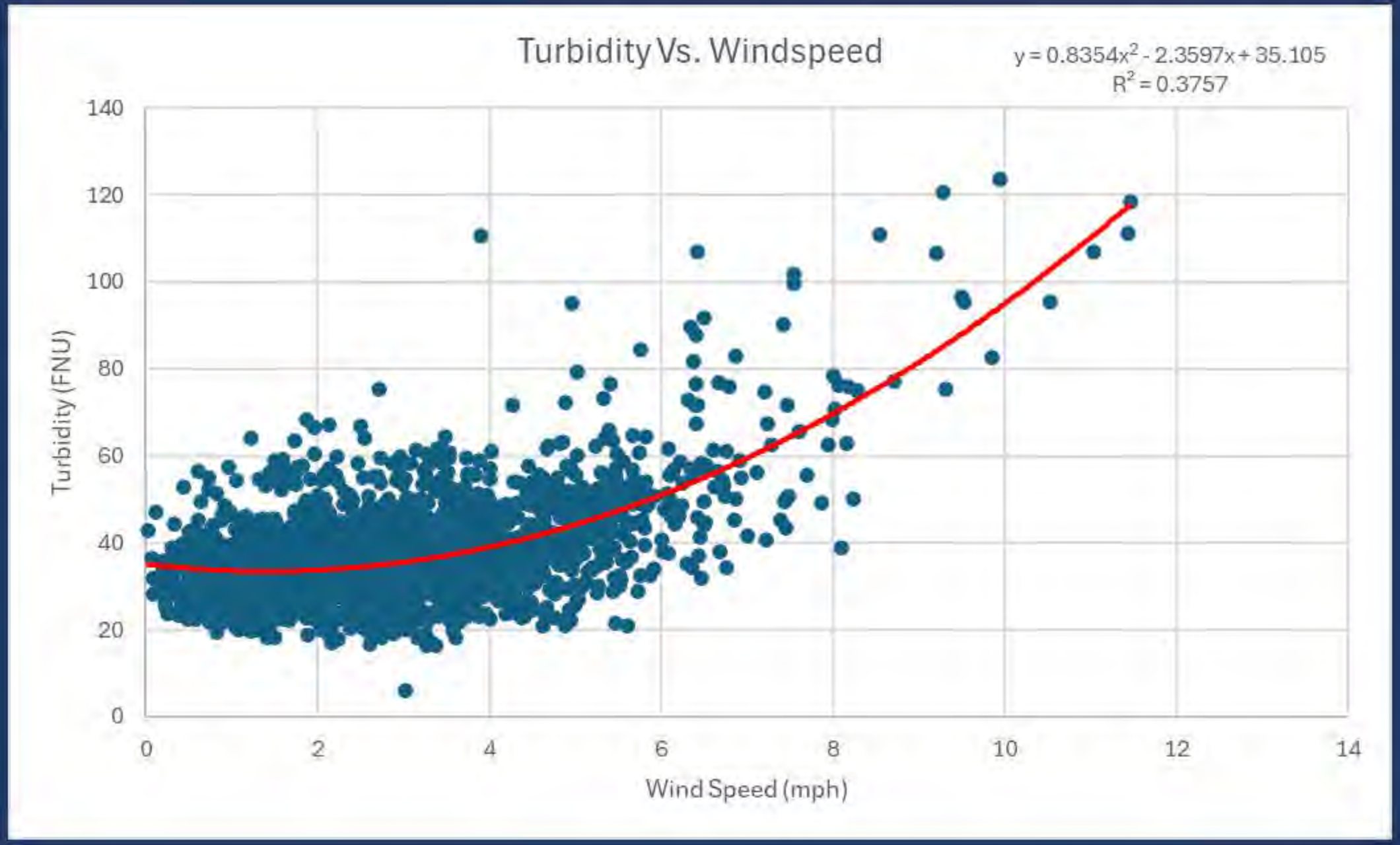
May-August

Most frequent winds come from SE – nearly 20%
Strongest winds come from E and W – red
Most frequent wind speeds are 5-20 km/hr – blues (3-12 mph)



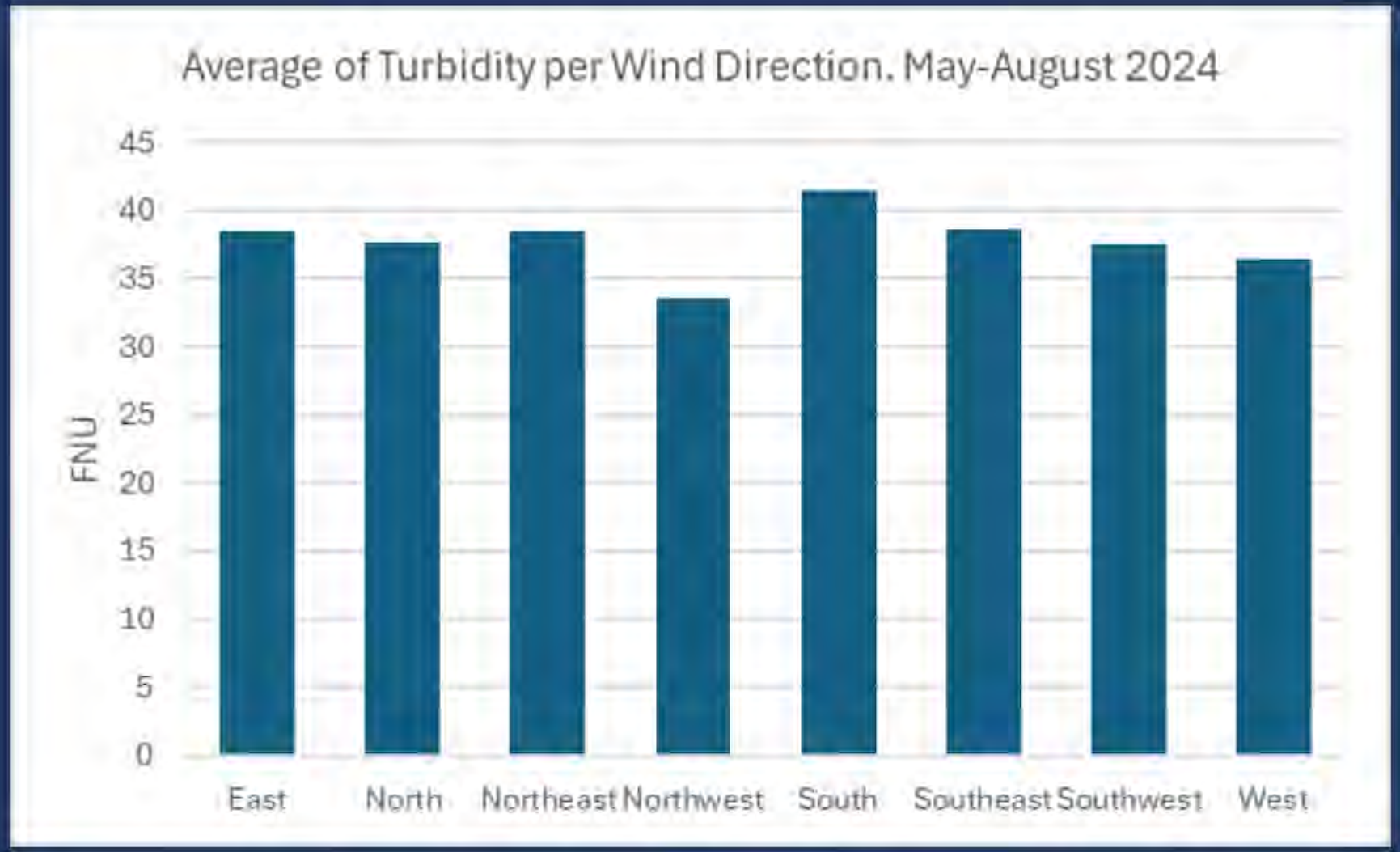
May-August

Most frequent winds come from ESE – nearly 15%



Polynomial regression

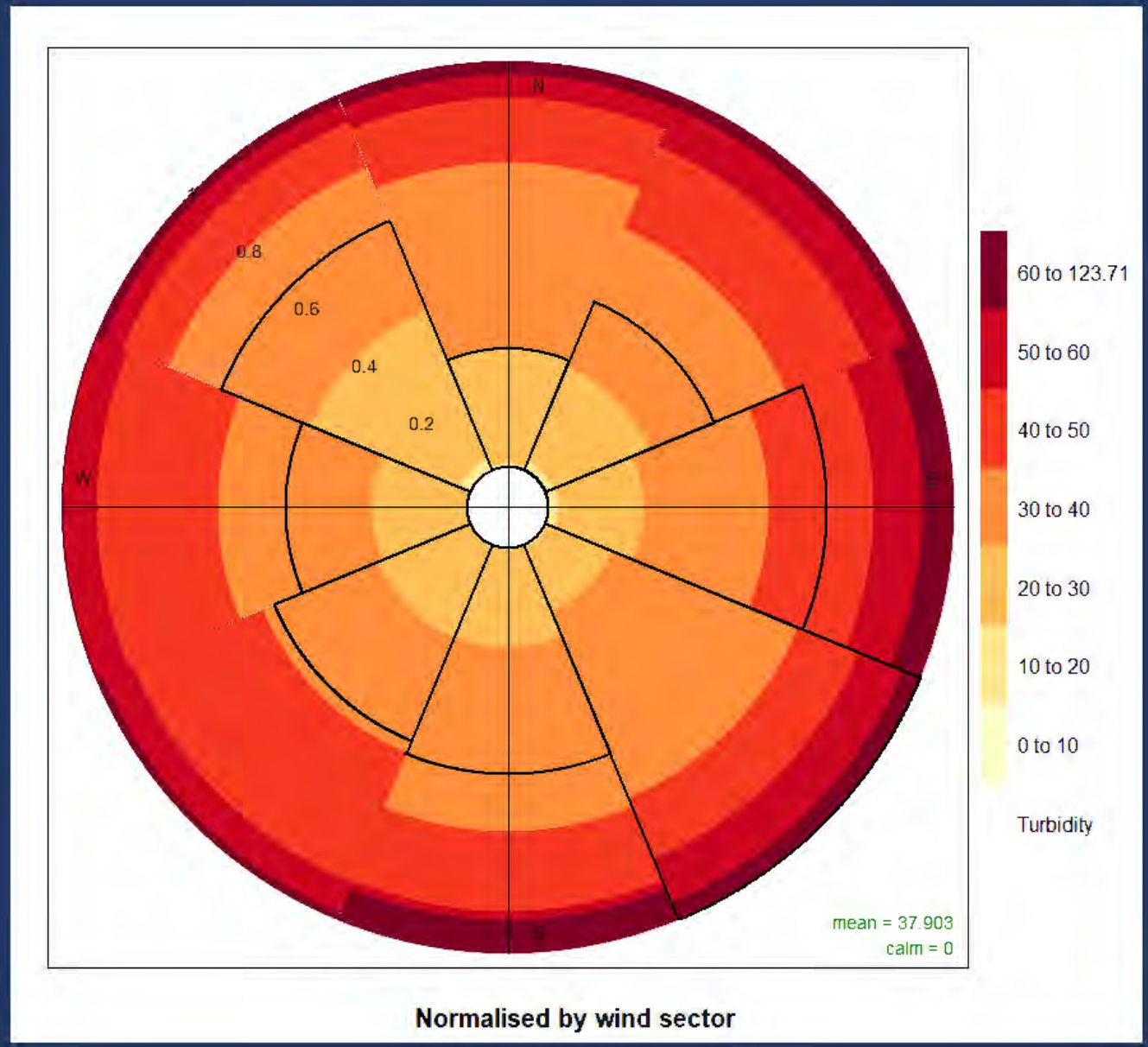
Credit: Toby Holda (IRBS)


Average of Turbidity per Wind Direction. May-August 2024
FNU
45
40
35
30
25
20
15
10
5
0
East
North
Northeast
Northwest
South
Southeast
Southwest
West

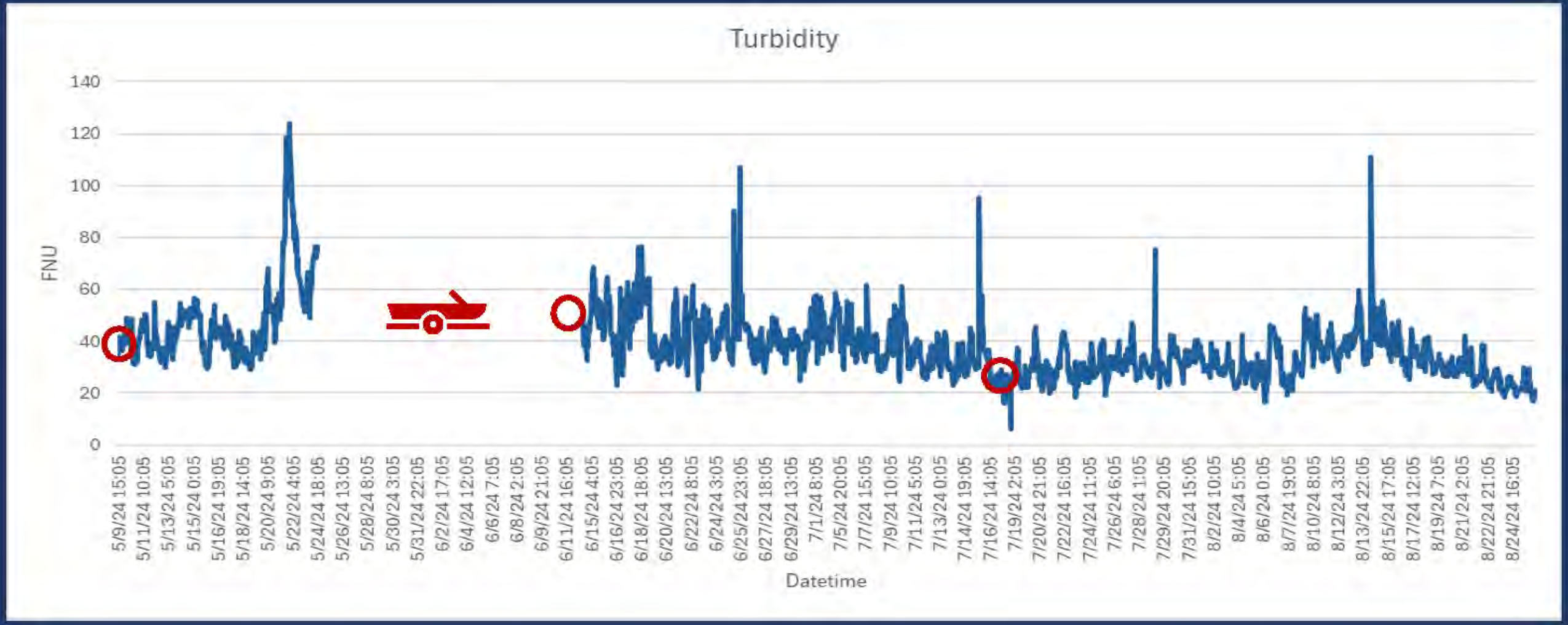
May-August

Variation of Turbidity between wind sectors isn't too crazy

For E and S winds, a greater proportion of the time the concentration is made up of high Turbidity (FNU)



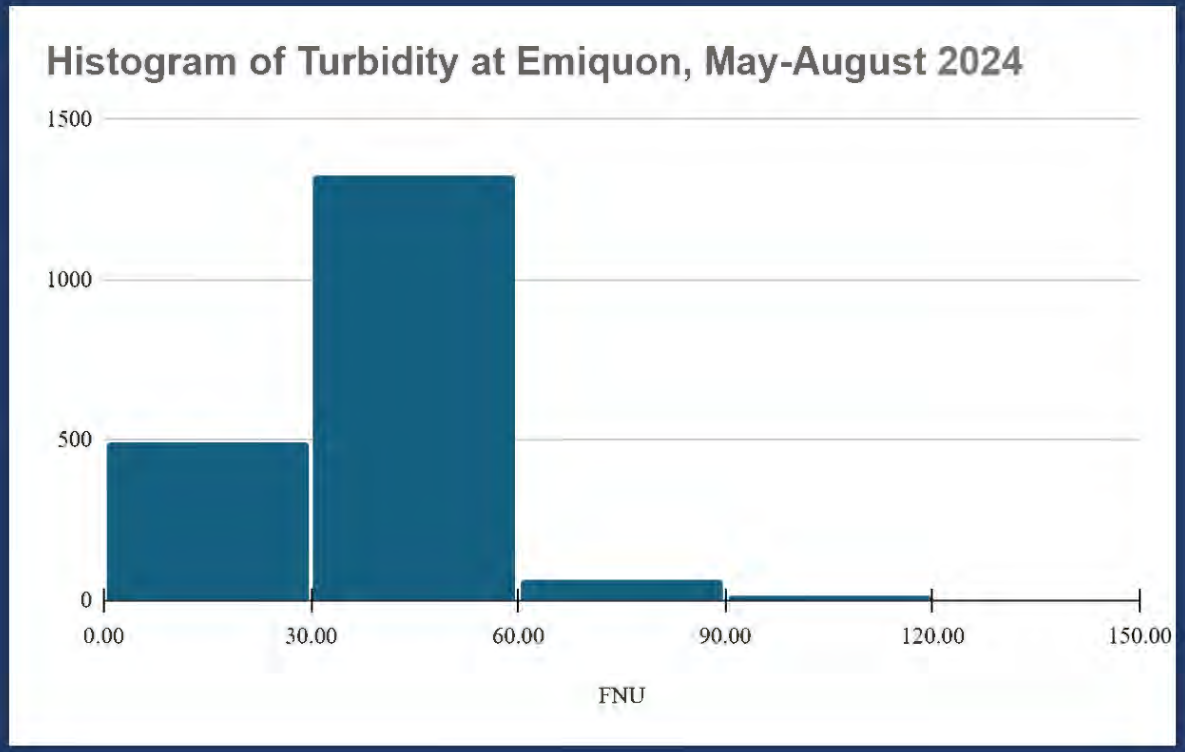
Are we affecting Turbidity?

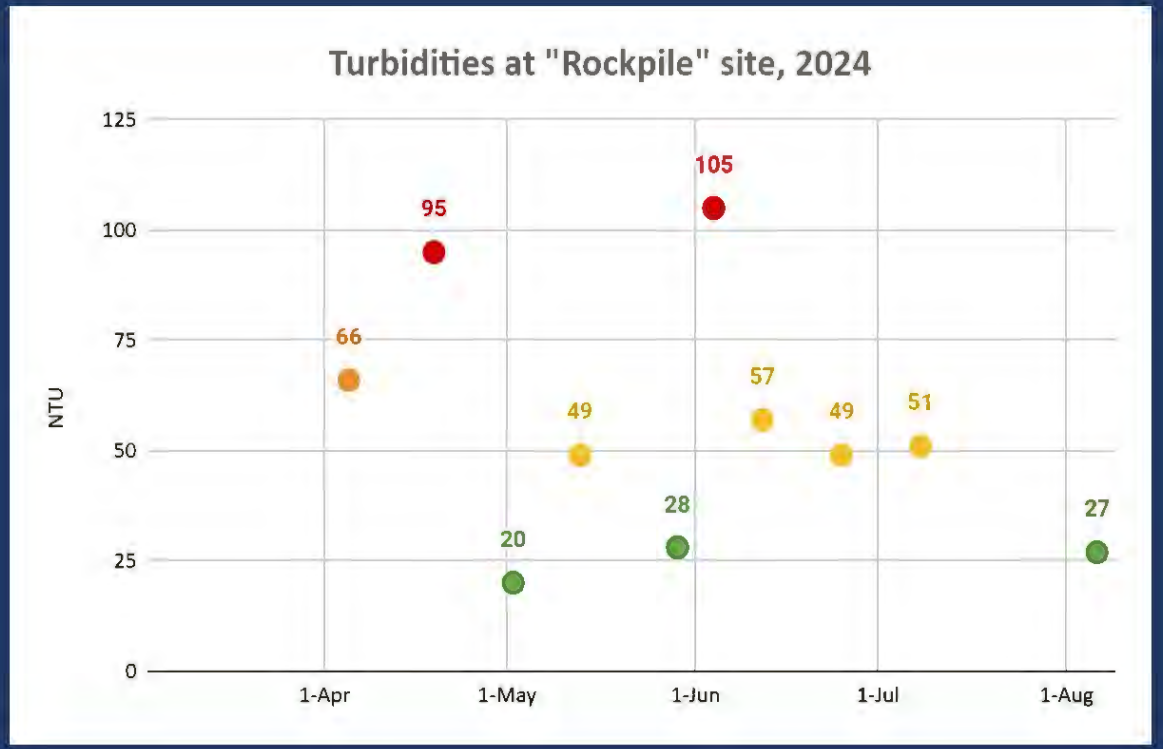


To be determined…

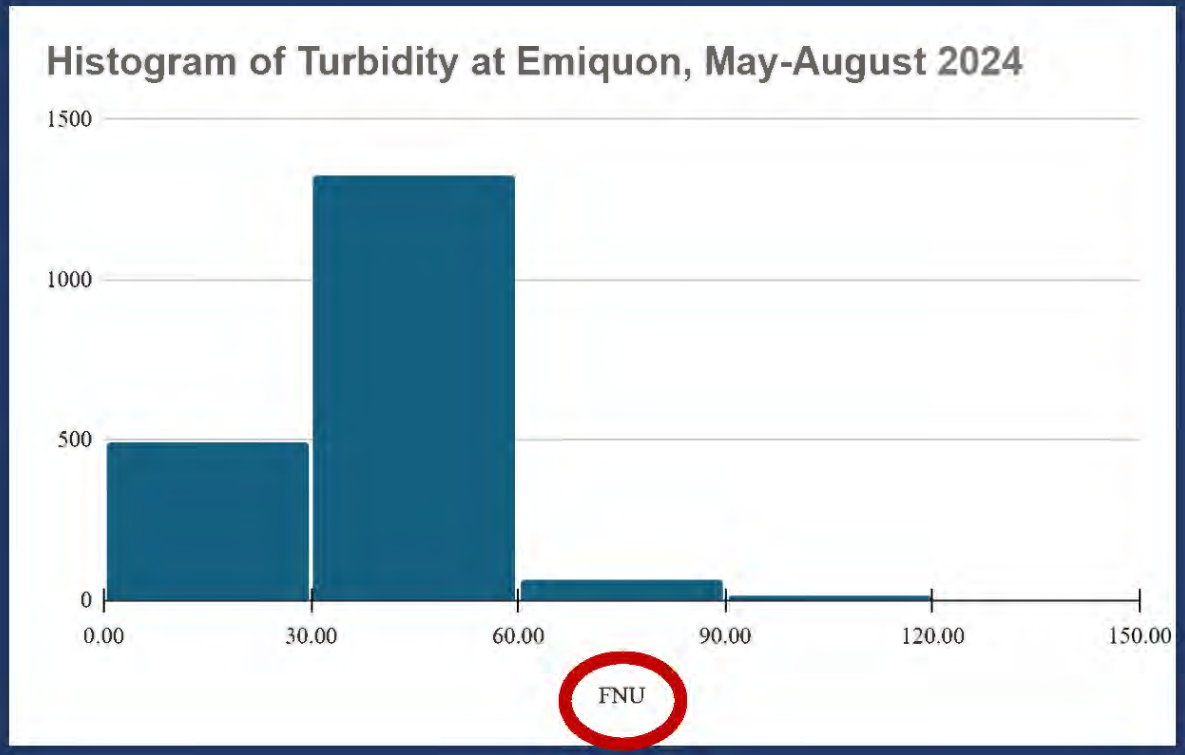
Comparison to Illinois River

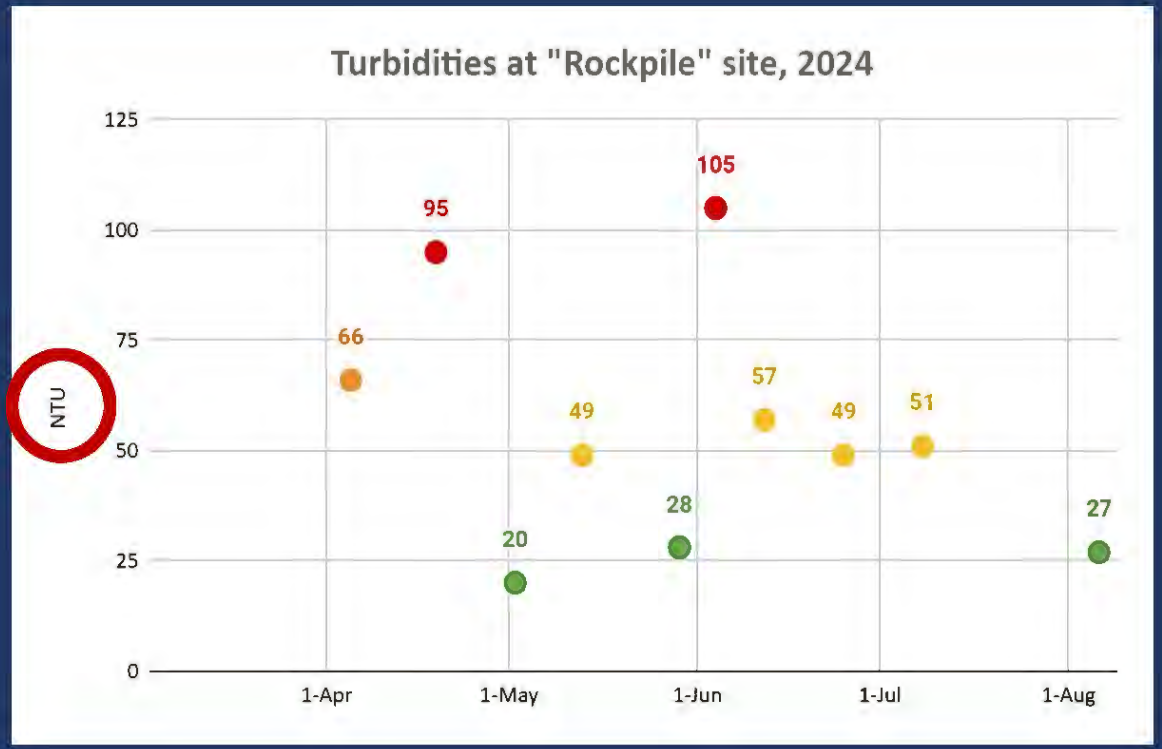
Comparison to Illinois River





Comparison to Illinois River





Formazin Nephelometric Unit (FNU)

Nephelometric Turbidity Unit (NTU)

calibrate the intensity of scattered light
at 90 degrees from a beam of light

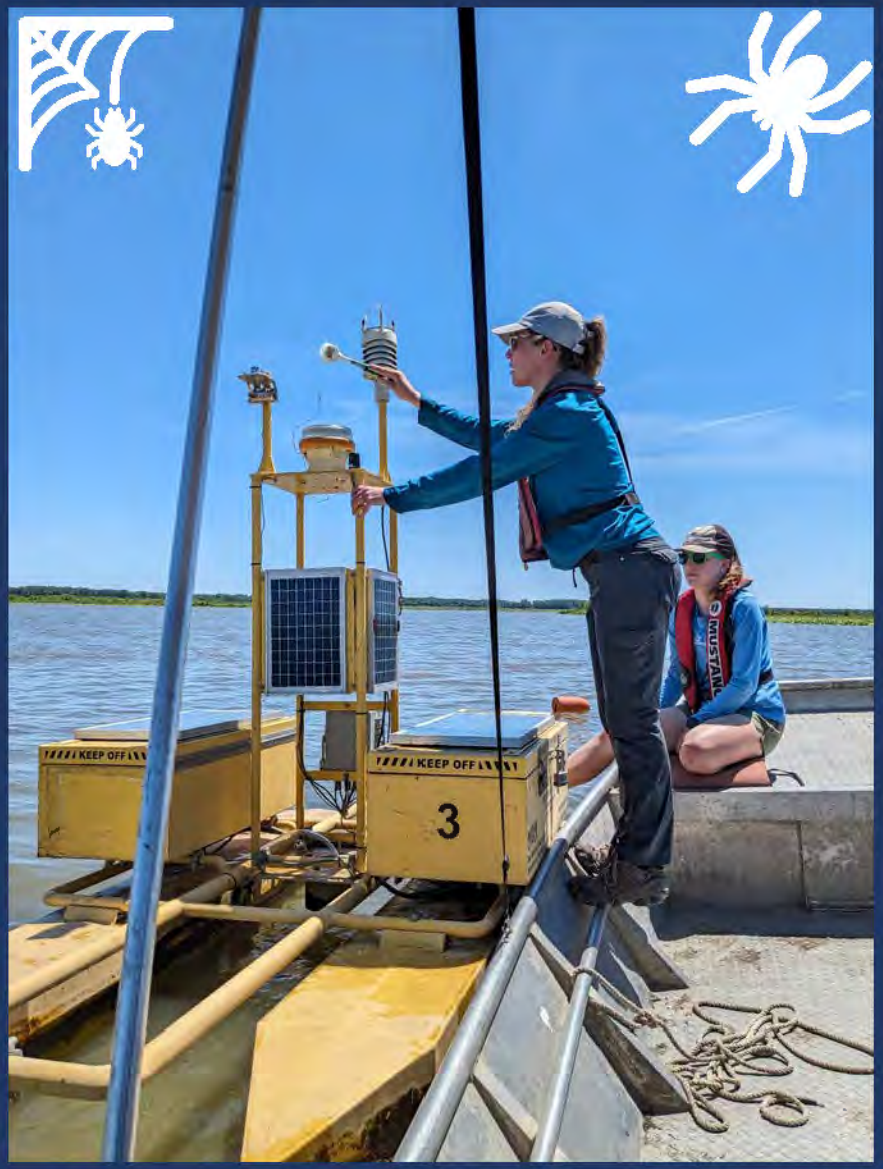
infrared light

white light

Thank You

- University of IL UC
  - IL Natural History Survey
- NGRREC
  - John, Jen, and Teresa
- Kathi Jo Jankowski (USGS)
- The Nature Conservancy
  - Thanks Sally for the pictures!
- Toby
- My wonderful technicians

Illinois River Biological Station
Havana



Questions?

NARPS and NPDES:What we have learned and Next Steps

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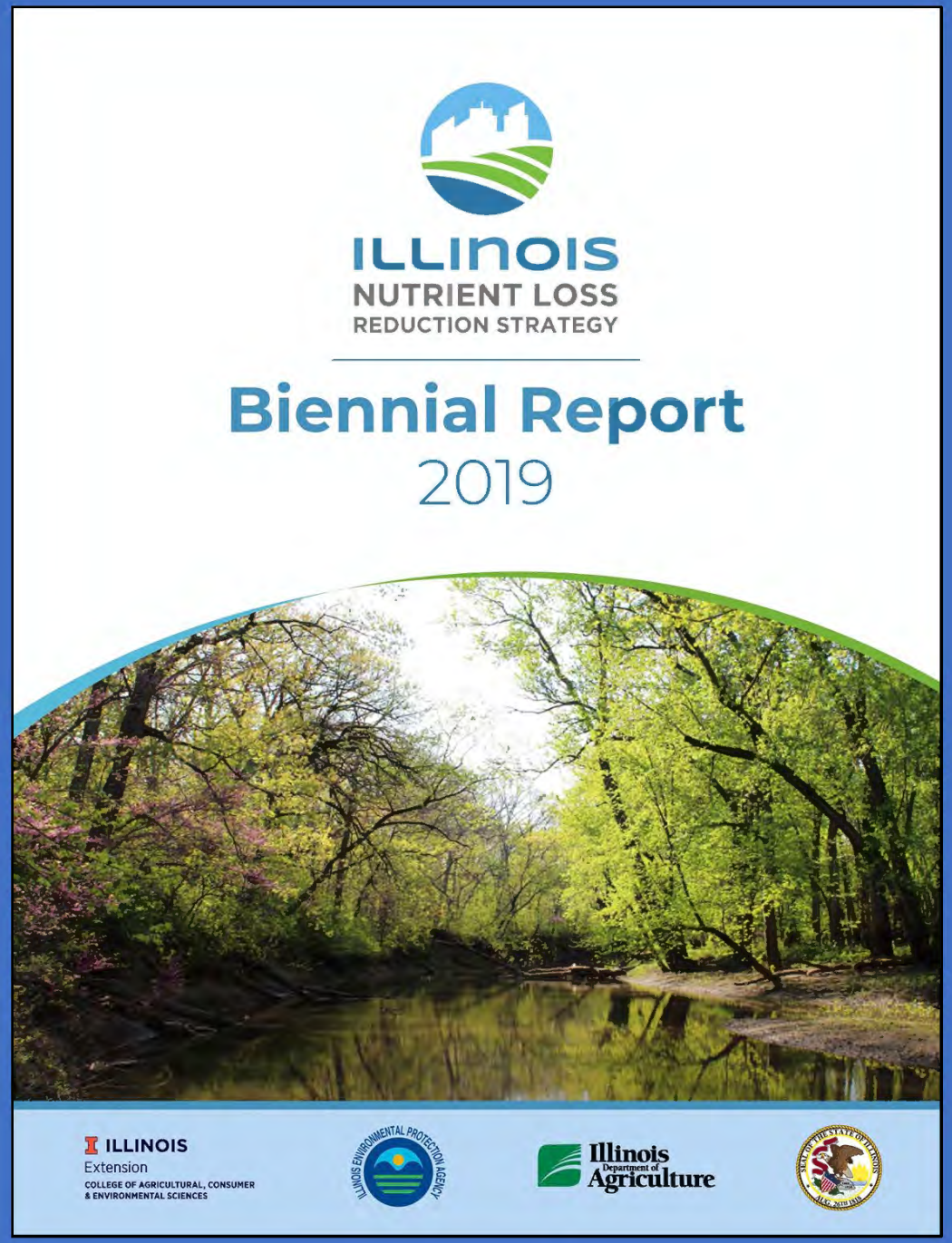
9-26-2024



Nutrient Reduction Special Conditions

- All major wastewater treatment plants
  - 1 million gallons per day (1 MGD+) and larger
- Reduce phosphorus discharges
  - to 0.5 mg/L by approx. 2030 (some variations)
- Wastewater plants must develop Nutrient Assessment & Reduction Plans by 2023-2024
  - if discharging to nutrient-impacted waters

NARPS as NPDES Special Conditions

- IEPA has accepted 30 NARPS
- Documents were made available online
  - https://epa.illinois.gov/topics/water-quality/watershed-management/narps.html
- Sierra Club provided informal shared comments on NARPS
  - ELPC and Mississippi River Collaborative
  - Submitted on 8/16/24
- Now awaiting IEPA response to comments
- Extensions were granted

FACILITY/NAME ↓	NUTRIENT ASSESSMENT REDUCTION PLAN
West Shoal Creek Watershed City of Litchfiled	NARP
Village of Rantoul	NARP
Sycamore/Dekalb Watershed Planning Area	NARP
North Branch Chicago River	NARP
MWRDGC (Stickney)	PARP
MWRDGC (O'Brien)	PARP
MWRDGC (Lemont)	PARP
MWRDGC (Calumet)	Phosphorus Assessment Reduction Plan (PARP)

NARPS as NPDES Special Conditions

- Most of the permittees and their consultants did not involve stakeholders despite efforts by the Sierra Club to help them do so.

- We opposed to relying on the current NARP documents to write NPDES permits due to the lack of community outreach and stakeholder engagement as to almost all of the NARPs.

- None of the NARPs that have been submitted fulfill the requirements of the permit conditions of NPDES permits requiring the preparation of NARPs.

NARPS as NPDES Special Conditions

Resources Provided & Outreach

- WWTF operator outreach
- Attendance at watershed meetings
- WWTF survey for understanding needs
- Development of Simple NARP Guidance Tool
- SCIL Stakeholder Best Engagement Practices Guideline
- NARP Stakeholder Engagement Reporting Template

Our Ask

- Proper consultation and engagement be conducted before NARPS are accepted
- Urged IEPA to explicitly interpret meaningful stakeholder engagement using the documents we have provided and finally provide an updated calendar for NARP public outreach opportunities

NARPS as NPDES Special Conditions

- About 15 new NARPs since January of 2024
  - Via NPDES permit tracking
  - IEPA did communicate they provided Sierra Club support to NARP holders
- NARP process is still being developed by Bureau of Water
- Unknown as to when we will get feedback on comments and how IEPA will respond
- Next ones are due December 2025

Nutrient assessment and reduction plans (NARPs)

- Preparation of nutrient assessment and reduction plans is required as a special condition of NPDES permits of major dischargers (greater than 1 MGD) discharging pollutants to waters where there is a “risk of eutrophication.”
- “Risk of eutrophication” is determined by looking at certain dissolved oxygen (DO) diel fluctuation and supersaturation data and pH.

NARP language – Read on your own

- SPECIAL CONDITION 21. The Agency has determined that the Permittee's treatment plant effluent is located upstream of a waterbody or stream segment that has been determined to be at risk of eutrophication due to phosphorus levels in the waterbody. This determination was made upon reviewing available information concerning the characteristics of the relevant waterbody/segment and the relevant facility (such as quantity of discharge flow and nutrient load relative to the stream flow).
- A waterbody or segment is at risk of eutrophication if there is available information that plant, algal or cyanobacterial growth is causing or will cause violation of a water quality standard.
- The Permittee shall develop, or be a part of a watershed group that develops, a Nutrient Assessment Reduction Plan (NARP) that will meet the following requirements:
- The NARP shall be developed and submitted to the Agency by December 31, 2023. This requirement can be accomplished by the Permittee, by participation in an existing watershed group or by creating a new group. The NARP shall be supported by data and sound scientific rationale.
- The Permittee shall cooperate with and work with other stakeholders in the watershed to determine the most cost-effective means to address the risk of eutrophication. If other stakeholders in the watershed will not cooperate in developing the NARP, the Permittee shall develop its own NARP for submittal to the Agency to comply with this condition.
- In determining the target levels of various parameters necessary to address the risk of eutrophication, the NARP shall either utilize the recommendations by the Nutrient Science Advisory Committee or develop its own watershed-specific target levels.
- The NARP shall identify phosphorus input reductions from point sources and non-point sources in addition to other measures necessary to remove the risk of eutrophication characteristics that will cause or may cause violation of a water quality standard. The NARP may determine, based on an assessment of relevant data, that the watershed does not have a risk of eutrophication related to phosphorus, in which case phosphorus input reductions or other measures would not be necessary. Alternatively, the NARP could determine that phosphorus input reductions from point sources are not necessary, or that phosphorus input reductions from both point and nonpoint sources are necessary, or that phosphorus input reductions are not necessary and that other measures, besides phosphorus input reductions, are necessary.
- The NARP shall include a schedule for the implementation of the phosphorus input reductions and other measures. The NARP schedule shall be implemented as soon as possible and shall identify specific timelines applicable to the permittee.
- The NARP can include provisions for water quality trading to address the phosphorus related risk of eutrophication characteristics in the watershed. Phosphorus/Nutrient trading cannot result in violations of water quality standards or applicable antidegradation requirements.

Or as stated in another permit

- *The Permittee shall submit electronically … by December 31, 2023 [Plan] that identifies phosphorus input reductions by point source discharges, non-point source discharges and other measures necessary to remove DO and offensive condition impairments and meet the applicable dissolved oxygen criteria in 35 Ill. Adm. Code 302.206 and the narrative offensive aquatic algae criteria in 35 Ill. Adm. Code 302.203.*

Short Answer – We learned a lot but not much of what we were supposed to learn

- Simply stated, Nutrient Assessment and Reduction Plans are to establish what the tolerable level of phosphorus is that will prevent violation of water quality standards and develop a plan for reaching those targets.
- As a 2021 document prepared by Geosyntec Consultants which worked on many of the NARPs, states, NARPs need to "establish water quality targets," to "determine phosphorus input reductions to address impairments," to develop a timeline, and to take many other necessary actions. https://epa.illinois.gov/content/dam/soi/en/web/epa/topics/water-quality/watershed-management/narps/nbww-narp.pdf, recognizes the need to (see p. 1-4).

No Targets, No Plans to reach targets

- Some very useful data has been developed on water quality in some waters
- Data generally confirms that there is eutrophication or risk of eutrophication in the waters involved, but
- With the exception of one NARP, targets for phosphorus reduction to eliminate the risk have not been set.
- Without targets, no plans to meet targets have been set.
- We do not agree with the target set by the one NARP that even purports to set a target.

What the NARPs have proposed

- NARPs designed to date have (with one exception) proposed that the permittee involved do whatever it is already required to do, generally to meet an effluent limit of 0.5 mg/L as annual average.
- There is generally also some window dressing about how the permittee in the future will contact non-point sources and other sources and try to limit their pollution.
- Several NARPs denounce upstream sources of pollution without recognizing that the permittee in question is upstream of someone else
- Illinois River has had high levels of toxic cyano-bacteria many years.

Outreach to Stakeholders has been sorely lacking

Nutrient Monitoring Council Member Updates

If you have a member update,
please type "update" in the chat box.

ILLINOIS
NUTRIENT LOSS
REDUCTION STRATEGY

Next Working Group Meeting

Performance Benchmark Committee Meeting
Tuesday, October 22 from 9:30 am – Noon
In person at the Illinois Soybean Association Office
in Bloomington Illinois

Contact NLRS@Illinois.edu
if you have any questions.

Thank you

Thank you

Contact NLRS@Illinois.edu if you have any questions.

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