Illinois NLRS
Policy Working Group

Virtual Meeting
September 1, 2022

Illinois Department of Agriculture

Illinois Environmental Protection Agency

Illinois Extension
University of Illinois Urbana-Champaign

Illinois Nutrient Loss Reduction Strategy

Roles

Facilitator: *Eliana Brown, University of Illinois Extension*

Technology Assistance: *Layne Knoche, U of I Ext.*

Meeting minutes: *Joan Cox, U of I Ext.*

Welcome to Noah Bell, NLRS Student worker

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REDUCTION STRATEGY

Attendance

Please type your name and affiliation into the chat box.

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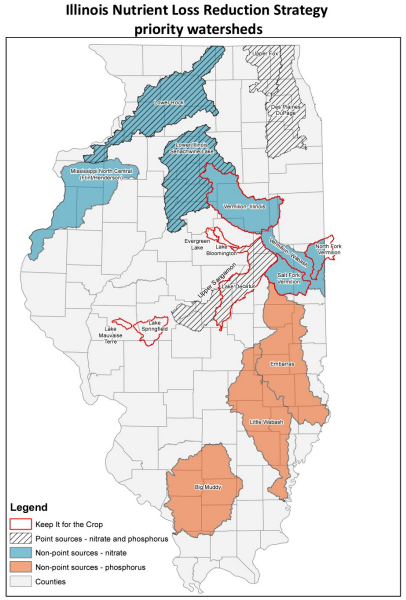
Nicole Haverback,
Illinois Extension Watershed Associate

Serving NLRS phosphorus-priority watersheds (Embarras and Little Wabash Rivers)

Effingham Extension Office
nlh@illinois.edu (309) 945-3066



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Agenda

9:00	**Welcome and Introduction of Illinois Extension Watershed Associate, Nicole Haverback,** *Trevor Sample, IEPA and Eliana Brown, U of I Ext.*
9:10	**NLRS Biennial Report –Partner Survey Summary** *Joan Cox, U of I Ext.* Open Discussion
9:40	**Photo/Talent Releases for the Biennial Report** *Eliana Brown, U of I Ext.* Q & A
9:50	**Nontraditional NARP Conversations: Stakeholder Engagement 101** *Mila Marshall, Sierra Club* Q & A
10:10	**Agriculture Water Quality Partnership Forum Meeting Recap** *Michael Woods, IDOA* Q & A
10:25	**Nutrient Monitoring Council Meeting Recap** *Trevor Sample, IEPA* Q & A
10:40	**Round Robin Partner Updates**
11:00	**Adjourn**

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NLRS Biennial Report Partner Survey Results

Joan Cox, University of Illinois Extension

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Policy Working Group partner perspectives on:

A. USES
B. CONTENT
C. STYLE & STRUCTURE
D. TIMING

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Survey Response

- 10 organizations
- Non-government (6)
- Industry (2)
- Local/state government (2)

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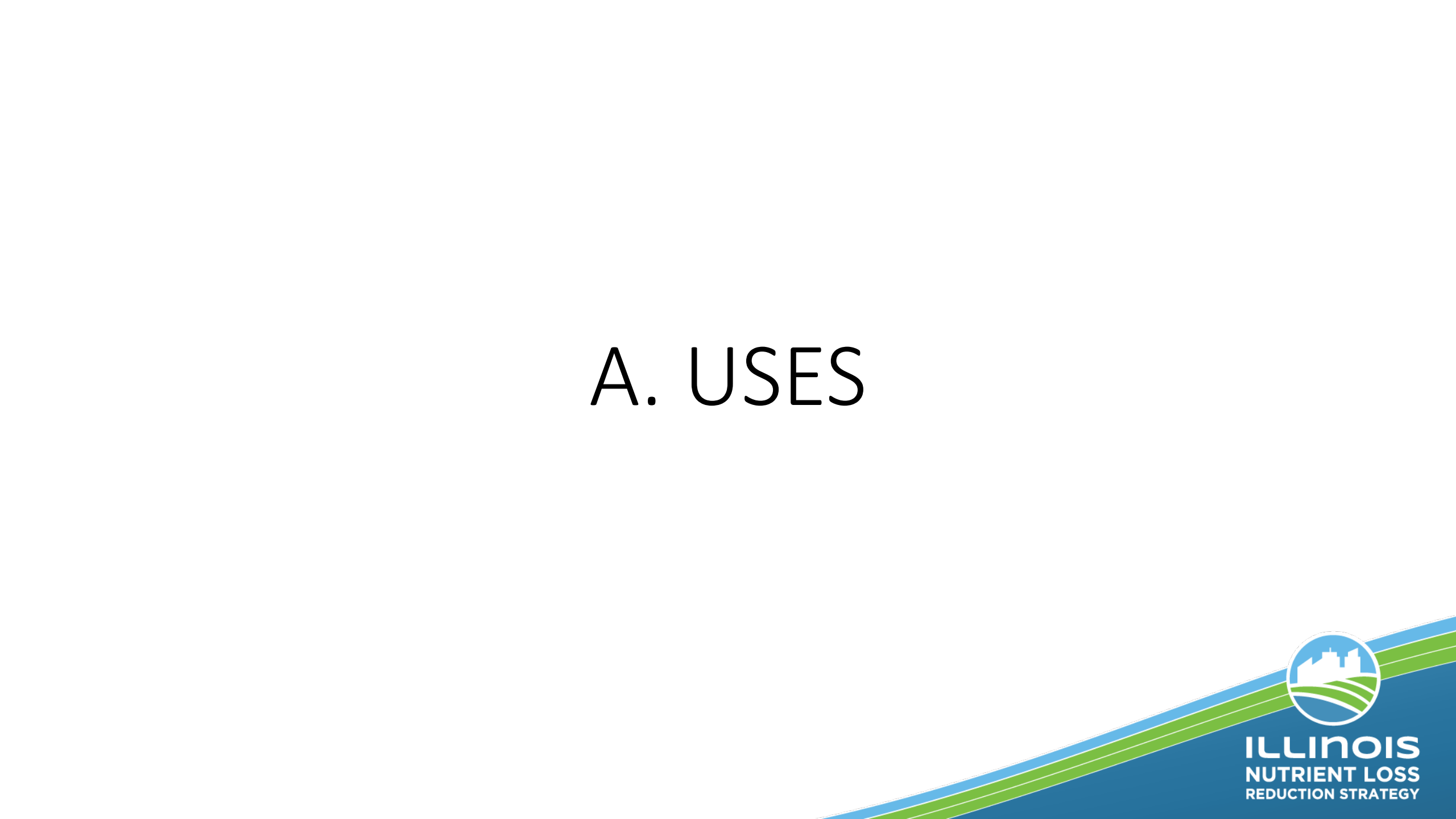
A. USES



A1: Please describe ways in which you *personally* use the report. 10 responses

- Cite activities
- Showcase nutrient reduction issue to farmers
- Understand practice implementation progress and where additional work is needed
- Understand monitoring results and nutrient reduction progress
- Develop policy recommendations
- Inform research and cite when speaking about nutrient loads and practice implementation rates
- Use as a reference
- Understand specific sources of nutrients
- Glean practice implementation trends

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A1: Please describe ways in which you ***personally*** use the report. 10 responses

- 4 – to cite when communicating with others (speaking, writing)
- 3 – to understand practice implementation progress
- 2 – to understand additional work and research needs
- 2 – to understand nutrient *loads*
- 2 – to understand nutrient *reduction progress*
- 1 – to understand nutrient *sources*
- 1 – to develop policy recommendations

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A2: Please indicate all ways in which the organization you represent uses the report. 10 responses

- to support future research **(5)**
- to inform new grant proposals **(5)**
- to guide funding allocations **(4)**
- to guide development of products or programming **(5)**

Note: 8 organizations indicated they use the report in more than one of these ways. And 3 organizations indicated they use the report in ALL these ways.

Other responses:

- for partnerships with other stakeholders such ag sector
- to urge improved science
- to maintain awareness of activity in the field and support policy decisions and positions

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A3: In your opinion, who is the audience for the report. 10 responses

- Hypoxia Task Force
- Stakeholder groups
- Stakeholder group leaders
- Public
- Illinois residents
- Anyone trying to decide what to do about nutrient pollution in Illinois
- State agencies
- Partner Organizations
- Government officials
- Legislators
- Farmers
- Landowners
- Utilities
- Regulatory Agencies
- US EPA Region 5
- Media
- Environmental groups
- Agricultural industry
- Comment:

  Suggested priority audiences: policy makers, program managers, and decision makers

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B. CONTENT

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B1: What are your favorite features of the report? 10 responses

- Pictures
- Conservation practice numbers/acres
- Executive summary
- Stakeholder reports [partner narratives and updates]
- Summary of the state of the science
- Graphics showing scenario progress
- Nutrient load data
- Charts showing practice adoption rate
- Illustrations of data tracking over time
- Details on nutrient monitoring results and source areas
- Comment:

  Suggested access to raw data used so we can reference specific numbers of practice adoption and how much is needed to reach goals.

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B2: Please provide insights and recommendations for any areas of the report that could benefit from change. 8 responses

- Shorten it.
- Make it more readable.
- Include more analyses.
  - progress pace
  - pollution sources
  - program scalability
  - policy
  - funding
- Draw more conclusions.

B2: Suggested changes (cont.)

- Shorten it.
  - Remove text that is repeating information presented in charts. Only include text that provides further analysis of the charts.
  - Reduce text explaining data and use table/figure footnotes instead.
  - Present data in raw form in an appendix. This will avoid the formatting time, but still make data available for those who wish to dig further.
- Partner narratives/updates should shift to a shorter summary description and analysis, then provide a website link or a report supplement with organization's own description in more detail.

B2: Suggested changes (cont.)

- Make it more readable for a general audience.
  - Use a factsheet format.
- Agencies should analyze and interpret trends more.
- Draw more conclusions overall, so that agencies can create and adapt programming based on the conclusions.

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B2: Suggested changes (cont.)

- Include more analyses.
  - progress pace
    - Provide more explanation for slowness of progress.
  - pollution sources
    - Provide specific information that separates point and non-point sources.
    - Clarify why point source reductions have not led to decreased loads.
  - program scalability
    - The Policy Working Group should assess the opportunities for scaling up the State, Farm Bill, and Partner programs. Ex: Use the report to discuss a strategy to move from thousands to millions of acres practice implementation.
    - Don't report project and program details in the main report body. Instead provide an analyses of programs and projects. Analyze them based on audience, functionality (working/not working), net impact, efficiency, cost-effectiveness, scalability, required funding if scalable, and steps to scale it.
    - Policy Working Group should brainstorm ideas to improve scalability of programs and projects that are not working well.
- Policy
  - Provide strategy and recommendations.
- Funding
  - Provide strategy and recommendations.
  - Discuss how to achieve scenario goals through funding sources, portioned by amount of lobbied funds, fundraising, and farmer cost-share needed.

B2: Suggested changes (cont.)

- Shorten it.
- Make it more readable.
- Include more analyses.
  - progress pace
  - pollution sources
  - program scalability
  - policy
  - funding
- Draw more conclusions.

Performance Benchmark Committee

Zoom meeting on September 28, 2022, 2:00-3:00 P.M.

All Upcoming meetings on NLRS homepage: https://www2.illinois.gov/epa/topics/water-quality/watershed-management/excess-nutrients/Pages/nutrient-loss-reduction-strategy.aspx

Performance Benchmark Committee page: https://www2.illinois.gov/epa/topics/water-quality/watershed-management/excess-nutrients/Pages/Performance-Benchmark-Committee.aspx (Agenda and Zoom link posted 1-2 weeks prior.)

Email: Illinoisnlrs@gmail.com

Please prepare details to discuss:

- type of data analysis
- who would perform
- potential funding

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B3: Historically, the tables and graphs of the ag, point source, and stormwater chapters have showcased various years of data. Which years of data should be showcased in future reports? 10 responses

- 2011 baseline **(10)**
- historical report data (Ex: 201 through 2018) **(9)**
- previous cycle's data (Ex: 2019 and 2020) **(10)**

- Comment: It is helpful to include the annual trends. Over time the as we compile more data the presentation could be modified to a format such as line charts, etc.

B4: General comments about report content: 4 responses

- Make shorter summaries of partner contributions, and place partner details in a report supplement.
- Reduce text explaining data and use table/figure footnotes instead.
- Provide more explanation for the slowness of progress.
- Provide more explanation of how to improve program effectiveness and funding.
- Make it shorter and clearer overall.

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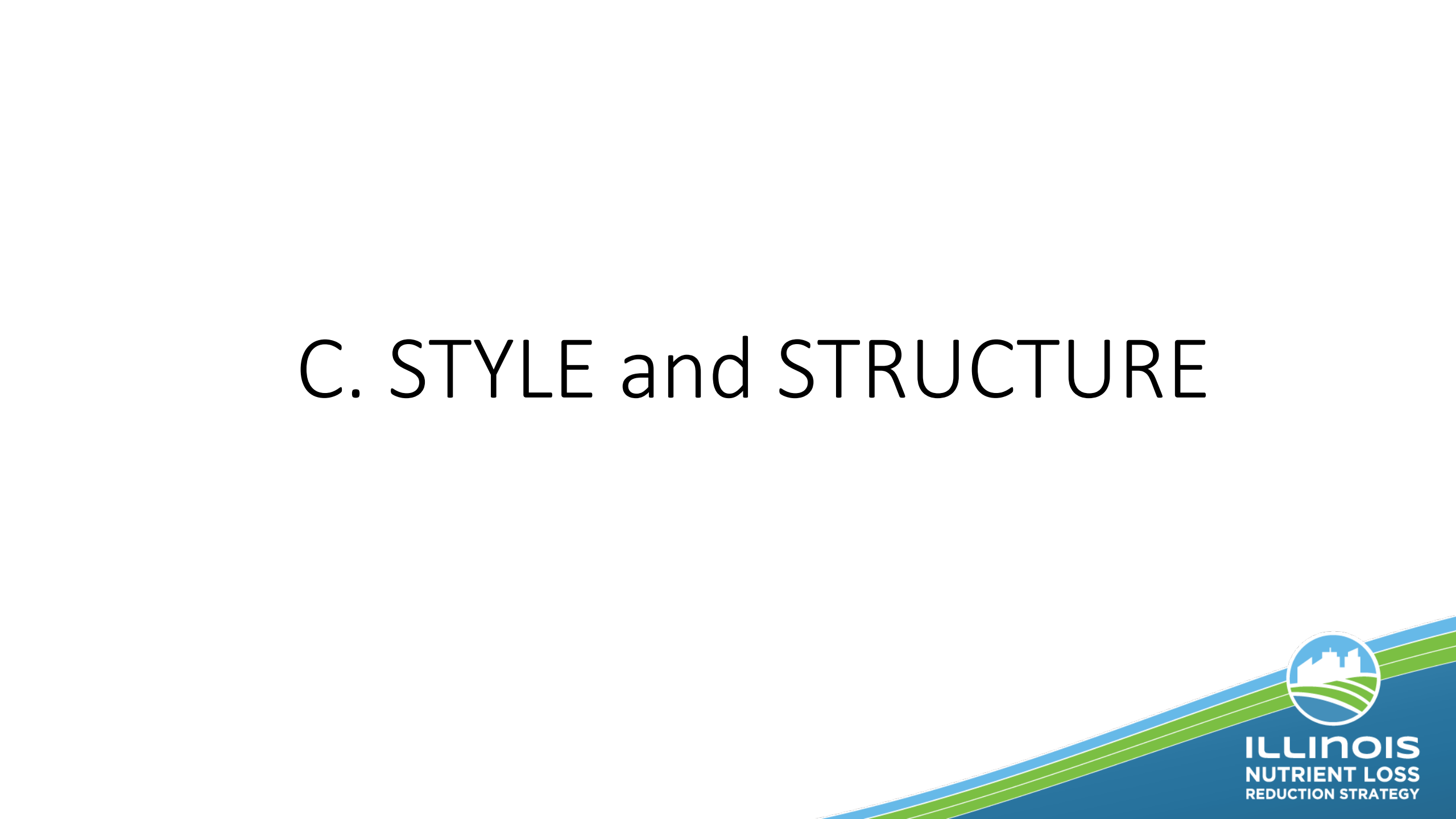
C. STYLE and STRUCTURE



C1: How important are photos? 9 responses

- Not important **(2)**
- Slightly important **(3)**

- Important **(3)**
- Very important **(1)**

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C2: Photos require documentation of a photo release form and talent release form. Please indicate whether your organization would submit photos and documentation. 8 responses

https://extension.illinois.edu/commit/release-forms

- Yes **(8)**
- No **(0)**

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C3: How important is it for Partner Narratives & Updates to read in the same voice, style, and structure as the body of the report? 9 responses

- Not important **(3)**
- Slightly important **(4)**

- Important **(2)**
- Very important **(0)**

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C4: Mark all statements with which you agree regarding your Partner Narrative & Update. 8 responses

- The production team should not edit the partner's submitted version. **(0)**
- The production team should preform minor grammatical edits to text. **(5)**
- The production team should perform edits to data displays and graphics. **(4)**
- The production team should re-write text, data display, and graphics to align with the voice, style, and structure of the full report. **(0)**

And…

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C4 (cont.): Mark all statements with which you agree regarding your Partner Narrative & Update. 8 responses

Note: 3 organizations indicated that the production team should preform minor grammatical edits to text **AND** edits to data displays and graphics.

- Comments:
  - The report should include analysis of the net impact, efficiency, and scalability of partner programs. This text can be formatted to align with the rest of the paper. The partner narratives and updates can be housed elsewhere as suggested below.
  - Edit as needed with respect to resources available to the production team.

C5: Are you in favor of displaying Partner Narratives & Updates in an online appendix, instead of the report body? 8 responses

- Yes **(5)**
- No **(3)**

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C6: General style and structure comments: 2 responses

- Use factsheets style.
- Shorten it.
- Agencies should analyze/interpret trends more.

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D. TIMING

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D1: For the 2023 Biennial Report, we need to re-align the timing with the administrative needs. What is your preference? 9 responses

- Keep an Aug. 31, 2023 release date. Report only 2021 data in the 2023 NLRS Report. Then, report the 2022 and 2023 data in the 2025 Biennial Report. The Annual Meeting stays in November of the release year. **(1)**

- Move to a Dec. 1, 2023 release date. Report 2021 and 2022 data in the 2023 Biennial Report. The Annual Meeting moves to January following the release year. **(8)**

D2: If you would like to share a reason(s) to support a particular launch date, please describe. 5 responses

- First meet the needs of U.S. EPA and HTF, then choose the date based on production team needs.
- The busiest time of year for meetings and holidays is Dec. – Feb. Therefore, keep the Annual Meeting in November, and keep the release date as August 31st.
- The quantity of data available for the report is more important than timing.
- The most recent information available to inform decisions should take precedence over timing, especially for this last report before the interim goal.
- Finish it by the end of the year.

General Comments:

- The report takes a lot of effort, and it is appreciated. Thank you for gathering partner information and ensuring accuracy of summarized information.

- More scientific analysis is needed.

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Conclusions

- Feedback?

- Biennial Report streamlining conclusions will be shared at the NLRS Annual Conference on Nov. 1, 2022, during the afternoon Policy Working Group meeting.

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Photos for Biennial Report

Thank you for being willing to provide photos!

New this time: Release Forms
Found on Extension Communications website:
https://extension.illinois.edu/commit/communications

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https://extension.illinois.edu/commit/communications

Communications

The Extension marketing and communications team provides direct service to educators and their program teams to shine a spotlight on the valuable content created and shared by Illinois Extension staff. Our goal is to provide the finishing touches to make your content sing and then to devise and implement plans that will help connect your content to residents of Illinois and beyond.

Updated social media guidance:

Deleting or hiding comments and blocking people on our social media posts should never be done without seeking guidance and approval from state marketing and communications team. In these instances, the state communications team will reach out to campus leaders to ensure the proper action is taken. Official campus social media commenting policy.

COMMUNICATIONS

MarComm Staff

Basic Communication Guidelines

Trainings

Annual Reports

Copyright, Attribution, and Fair Use

Data-Driven Decisions

Design Templates

Email Marketing

FYI

Updated social media guidance:

Deleting or hiding comments and blocking people on our social media posts should never be done without seeking guidance and approval from state marketing and communications team. In these instances, the state communications team will reach out to campus leaders to ensure the proper action is taken. Official campus social media commenting policy.

REQUIREMENTS FOR EXTENSION COMMUNICATIONS

Copyright and Attribution

Follow all copyright regulations for non-original content.

Email Marketing

Comply with CAN-SPAM email marketing requirements.

Required Statements

Include these required statements on documents.

Branding Logos

Use the right wordmark for the right situation.

https://extension.illinois.edu/commit/release-forms

Release Forms

Approved Forms

Talent Release Form

If you are planning to use an individual's image or likeness in media such as photographs or video, you should request written permission to do so. This applies to Facebook posts, marketing materials, promotional or educational videos, and other communication vehicles. We have a responsibility to allow people to decide if they are comfortable with their image being associated with our name.

Download the Talent Release Form. A few notes about using this form:

- You may accept digital signatures using Docusign or Adobe Sign.
- This form includes English and Spanish versions.
- A single form has space to accommodate the signatures of several "models."
- If you are hosting a multi-session gathering or running a club that meets on a recurring basis, you may complete this form once for the entire series.

Photography Release Form

https://publicaffairs.illinois.edu/resources/release-forms/

Release Forms

If you are planning to use an individual's image or likeness in media such as photographs, video, etc., you should request written permission to do so. Releases also should be completed and signed by any talent working with companies or individuals performing photography, video or audiotape on university premises. Use the forms below.

- Talent/model release for adults
  - Talent/model release for adults (pocket version)
- Talent/model release for minors

Notes:

- You may accept digital signatures using Docusign or Adobe Sign.
- This form includes **English and Spanish** versions.
- A single form has space to accommodate the signatures of ten "models."

TALENT RELEASE FORM (ADULTS) / FORMULARIO DE LIBERACIÓN DE TALENTO (ADULTOS)

I, the undersigned, do hereby consent to the use by The Board of Trustees of the University of Illinois ("University") of my image, voice, or both described below, in (1) the video, photograph, or audio recording described below; and (2) any video, photograph, or audio recording reproduced either in whole or in part from the video, photograph or audio recording described below: regardless of whether these materials are used for fundraising, advertising, publicity, or any other purpose on behalf of either the University or its Foundation.

I warrant that I have the full right and authority to grant this consent.

In addition, I waive all claims to compensation or damages based on the use of my image or voice, or both, by either the University or the Foundation. I also waive any right to inspect or approve the finished photograph or video or audio recording.

I understand that this consent is perpetual, that I may not revoke it, and that it is binding on me, my heirs and assigns.

I warrant that I am at least 18 years of age and that I am competent in my own name insofar as this consent is concerned, or that I am the parent or legal guardian authorized to sign on behalf of a person under age 18. I further attest that I have read this consent form and fully understand its contents.

The Undersigned represents my photo/videoVideo/Photo/Audio release: of the following:

Photography Release Form

This form serves as an agreement between a volunteer or community member and the University of Illinois to allow Illinois Extension to use photographs taken by the individual. A common example of when this would be needed is if you plan to have a volunteer or team of volunteers take photos of a specific subject, such as gardening techniques or field pests, and you want to use those images in a newsletter, educational publication, or social media graphic. Any photographs taken by non-staff members must have this license agreement in place before Illinois Extension can use the images.

Download the Photography Release Form. A few notes about using this form:

- You may accept digital signatures using Docusign or Adobe Sign.
- This form is in English.
- Each collection of photographs from a non-staff person must be accompanied by a new form.

LICENSE AGREEMENT: Non-Staff Photographer and Artist

I, _____ ,
grant The Board of Trustees of the University of Illinois ("University") a non-exclusive, irrevocable, fully paid up license to use the following works: [enter name, description, and approximate date of photograph(s)/work(s)]

_____

I understand that:

1. The works listed may be used by University for any non-profit purpose (such as educational activity or marketing) and may be modified by University as needed (such as cropping for format purposes).
2. My name will be listed with the works or otherwise acknowledged when reasonably possible.
3. I retain all other rights to the works.

I represent that:

1. I am age 18 or older.
2. I own the rights in the works sufficient to grant this license to University.

In summary

- If people are in the photo and they are recognizable, need them to sign the Talent Release Form.
- All photos need the Photography Release Form signed by the photographer.

Direct link:
https://extension.illinois.edu/commit/release-forms

Thank you again for being willing to provide photos!
Send to: IllinoisNLRS@gmail.com

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Agriculture Water Quality Partnership Forum Summary

Virtual Meeting held

June 15, 2022

Presented by: Michael Woods, IDOA

Illinois Department of Agriculture

Illinois Environmental Protection Agency

Illinois Extension
University of Illinois Urbana-Champaign

Illinois Nutrient Loss Reduction Strategy

June 2022

Ag Water Quality Policy Forum

We sough to:

capture ideas and approaches to advance volunteer ag efforts.

Ag Partners (non-gov partners) asked to provide overview of their…

“ideas and approaches to advance volunteer ag efforts”

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June 2022

Ag Water Quality Policy Forum

Steering Committee asked partners to prepare and share responses to these primer questions:

1. If you provide technical assistance, describe it, identify gaps and what is working or not working.
2. If you provide cost-share assistance, describe it, identify gaps and what is working or not working.
3. Based on NLRS ag implementation scenarios, we know we need to increase the pace and scale of practice adoption. Describe resources and partnerships for programs you are planning to implement in the next 3 years.
4. Looking on smaller scales, how can you catalyze practice adoption?
5. How can you engage the middle- to late-adopters to implement practices?

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June 2022

Ag Water Quality Policy Forum

The following organizations shared information during the call:

1. American Farmland Trust, *Kris Reynolds*
2. Illinois Corn Growers Association, *Greg Goodwin*
3. Illinois Farm Bureau, *Lauren Lurkins*
4. Illinois Fertilizer & Chemical Association, *Kevin Johnson*
5. Illinois Sustainable Ag Partnership, *Jean Brokish*
6. Nutrient Research and Education Council, *Shani Golovay*
7. Prairie Rivers Network, *Catie Gregg*
8. The Nature Conservancy, *Adrienne Marino*
9. Illinois Soybean Association, *Megan Miller*
10. Metropolitan Water Reclamation District of Greater Chicago, *Guanglong Tian*

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June 2022

Ag Water Quality Policy Forum

Summary

1. Illinois NGOs and Ag Industry partners have been **working to protect and improve water quality across the state**.
2. However, progress measured toward reduction targets at the watershed scale **has been challenging**, and many complex nutrient-related impacts from the non-point sector **remain to be addressed**.
3. All recognize the **need to increase voluntary efforts to reduce nutrient loss** as one of the key points related Illinois' NLRS efforts.

Details online at https://www2.illinois.gov/epa/topics/water-quality/watershed-management/excess-nutrients/Pages/Agriculture-Water-Quality-Partnership-Forum.aspx
in the 6/15/22 meeting minutes and presentation pdf.

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June 2022

Ag Water Quality Policy Forum

Summary

1. **Increased Management Practices** involving application rate, timing and method, plus the use of cover crops and reduced tillage are needed.
2. **Expanded Land Use Practices** including perennial energy crops, extend rotations, grazed pastures and land retirement are needed.
3. **Elevated Edge-of-Field Practices** involving drainage water management, wetlands, bioreactors, buffers, terraces and sediment control are needed.
4. **Expanded Nutrient Management Conversations** into impact on drinking water and climate.
5. **Augmented Funding (public and private)** is required to improve opportunities for nutrient management.
6. **Targeted Funding** that increases program flexibilities, launches new outreach campaigns to promote nutrient management's economic benefits, in addition to expanding partnerships to develop nutrient management plans.

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June 2022

Ag Water Quality Policy Forum

Summary

7. **Proposed Adoption of State Policy** to elevate action for nutrient management from agricultural nonpoint sources.
8. **Expansion of Agricultural Certification Programs** has been a prime opportunity to increase private sector investment in nutrient pollution-reducing conservation practices, and to raise consumer awareness of soil and water stewardship that improves water quality. Interest in these initiatives was highlighted to raise awareness of the most effective certification programs with the sustainability programs of corporations in the food supply chain.
9. **Further Development of a Policy Model** which would set quantitative nutrient reduction goals and binding water quality standards.
10. **Assess moving away from reliance on current, strictly voluntary measures**, and moving toward practices tied to performance-based standards.

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June 2022

Ag Water Quality Policy Forum

Summary

11. **Given the scope of the problem and the variability and complexity of conditions**, including geography, climate, cropping systems, and farm ownership and operations, it was stressed the **importance of considering all options** with proven efficacy and pursue strategies that encourage significant nutrient loss reduction through increased education, technical assistance, and performance-based policies.

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June 2022

Ag Water Quality Policy Forum

Additional information shared:

Biennial Report agriculture data sources update *Trevor Sample, Illinois EPA* discussed the AWQPF member survey solicited by the Steering Committee in April.

IL Climate-Smart Agriculture *Michael Woods, IDOA p*rovided background on Illinois climate change and its impact on agriculture and discussed funded and proposed Climate-Smart programs initiated by IDOA and AWQPF partners.

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Illinois NLRS
Nutrient Monitoring Council

Meeting Summary
August 2, 2022

Illinois Department of Agriculture

Illinois Environmental Protection Agency

Illinois Extension
University of Illinois Urbana-Champaign

Illinois Nutrient Loss Reduction Strategy

Agenda

9:00 (10 min.)	Welcome *Trevor Sample, Illinois Environmental Protection Agency*
9:10 (30 min.)	Statewide nutrient load update *Tim Hodson, United States Geological Survey* Q & A
9:40 (25 min.)	Illinois River Basin Phosphorus Loads 1979-2019 *Greg McIsaac, University of Illinois* Q & A
10:05 (5 min.)	Break
10:10 (35 min.)	Rock River Basin Nitrate Loads 1980-2019 *Greg McIsaac* Q & A
10:45 (30 min.)	Preliminary results for groundwater nitrate modeling in the Rock River region *Vlad Iordache, Illinois State Water Survey* Q & A
11:15 (30 min.)	Illinois River Basin next generation monitoring *Tim Straub, USGS Geological Survey* Q & A
11:45 (15 min.)	NMC Member Updates
NOON	Adjourn

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Nitrate and Phosphorus Loads from Illinois Rivers

Water Year 2021 Update

Timothy Hodson
Central Midwest Water Science Center
tohodson@usgs.gov

with:

Illinois Environmental Protection Agency

Methods

Replicates methods from previous biennial reports, except:

- **baseline period: water years 1984–1996***
- **current period: water years 2017–2021**
- **no subtraction for Rock River***
- **incorporates continuous water quality data**
- **error bars estimate 95% confidence interval**

2017-2021 Mean Statewide Nutrient Loads

- **Nitrate-Nitrogen: 427,455,019 lbs**
  - 1980-1996 Baseline 397,000,000 lbs
- **Total Phosphorus: 44,915,308 lbs**
  - 1980-1996 Baseline 34,000,000 lbs
  - Baseline for this presentation used 1984-1996 data. This information will be updated using 1980-1996 baseline for the NLRS Conference.

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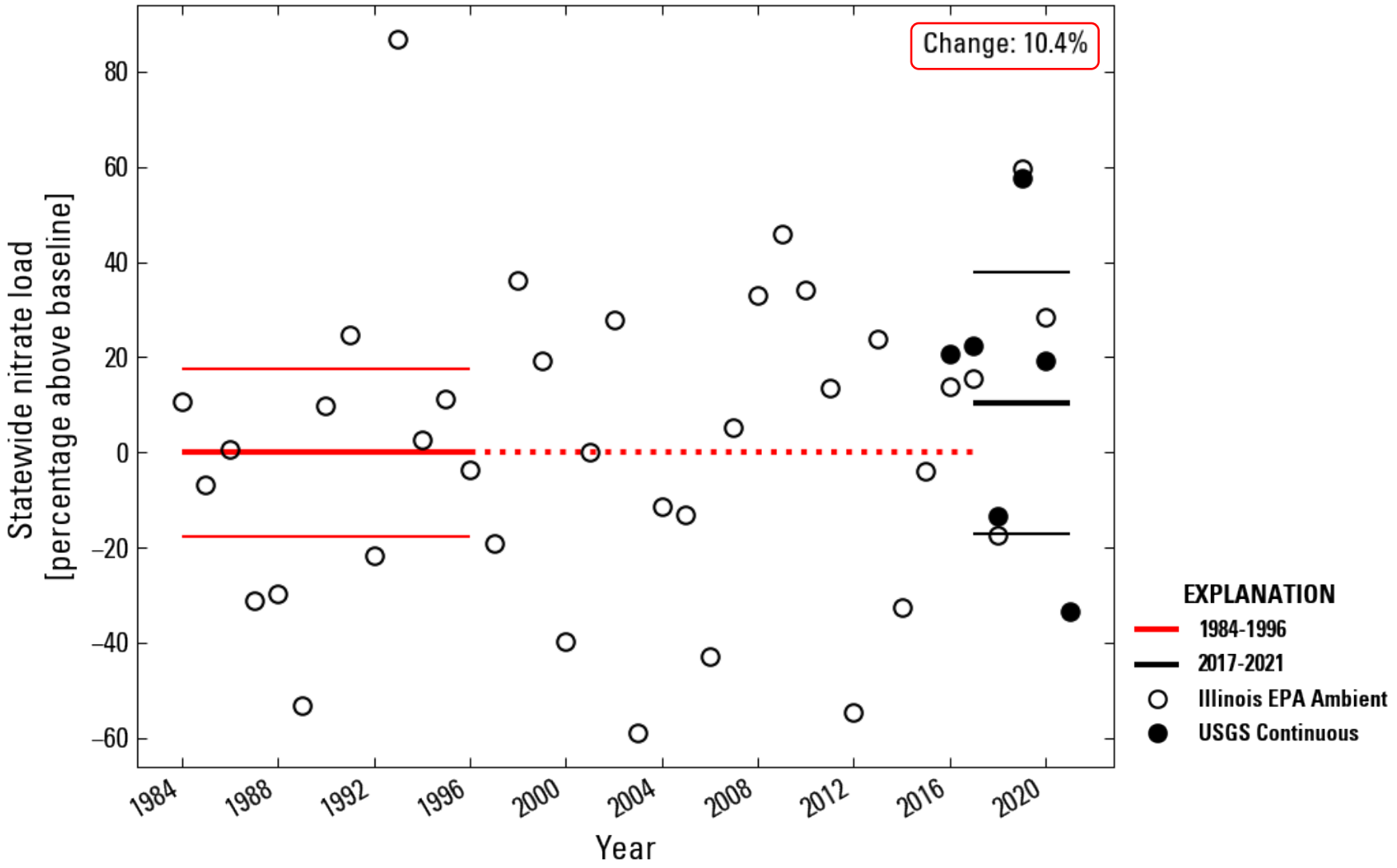
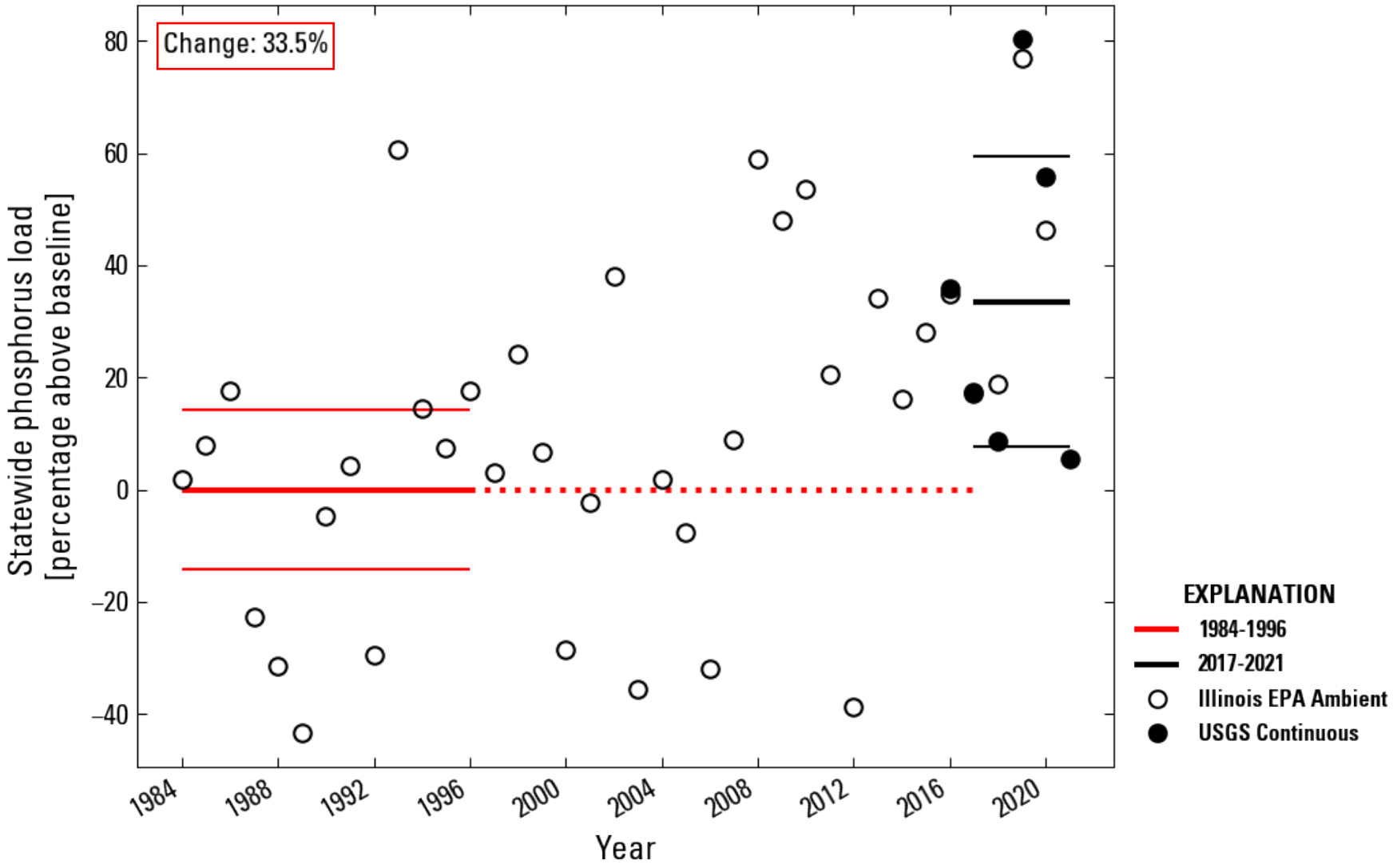
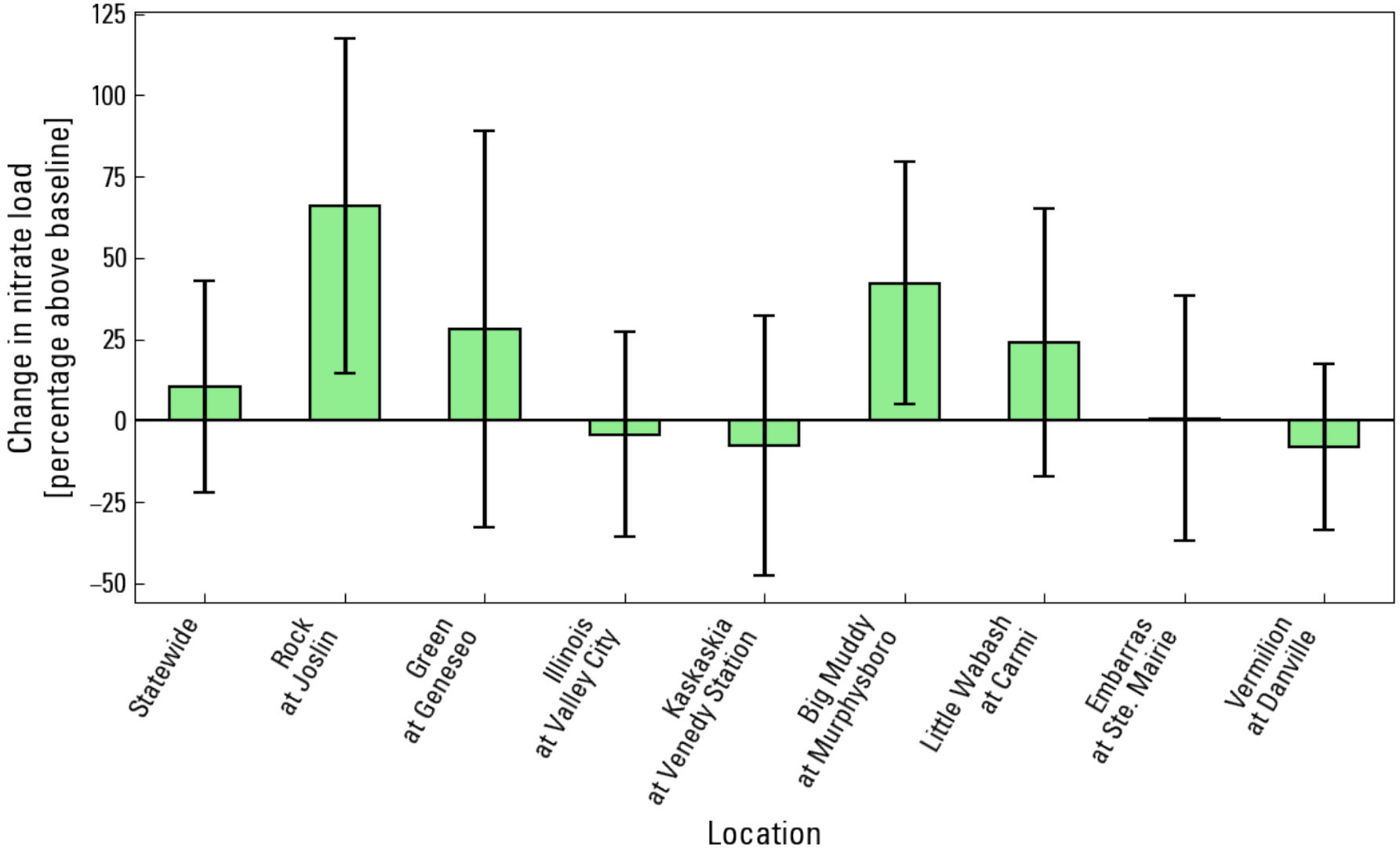
Statewide nitrate load



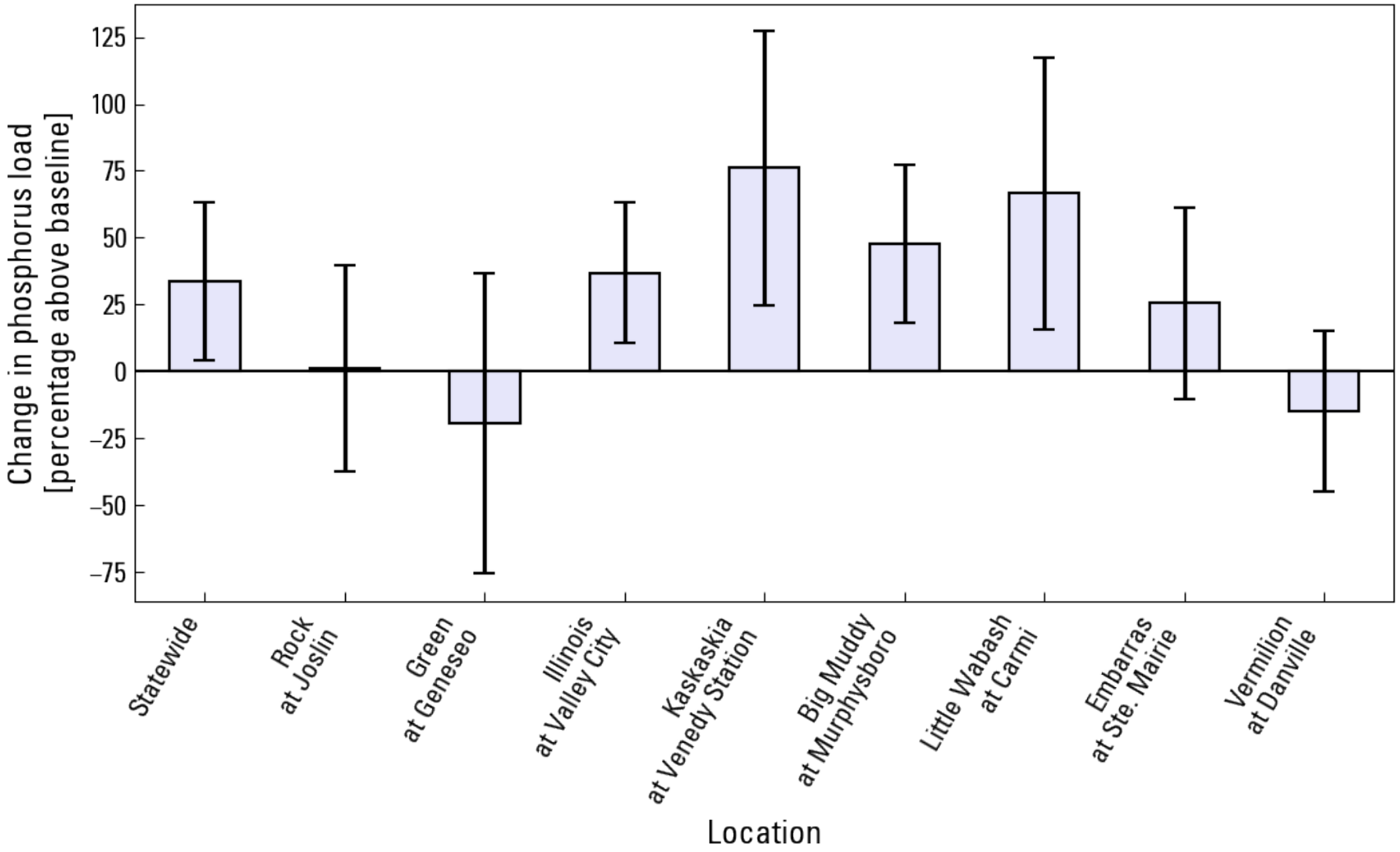
Statewide phosphorus load



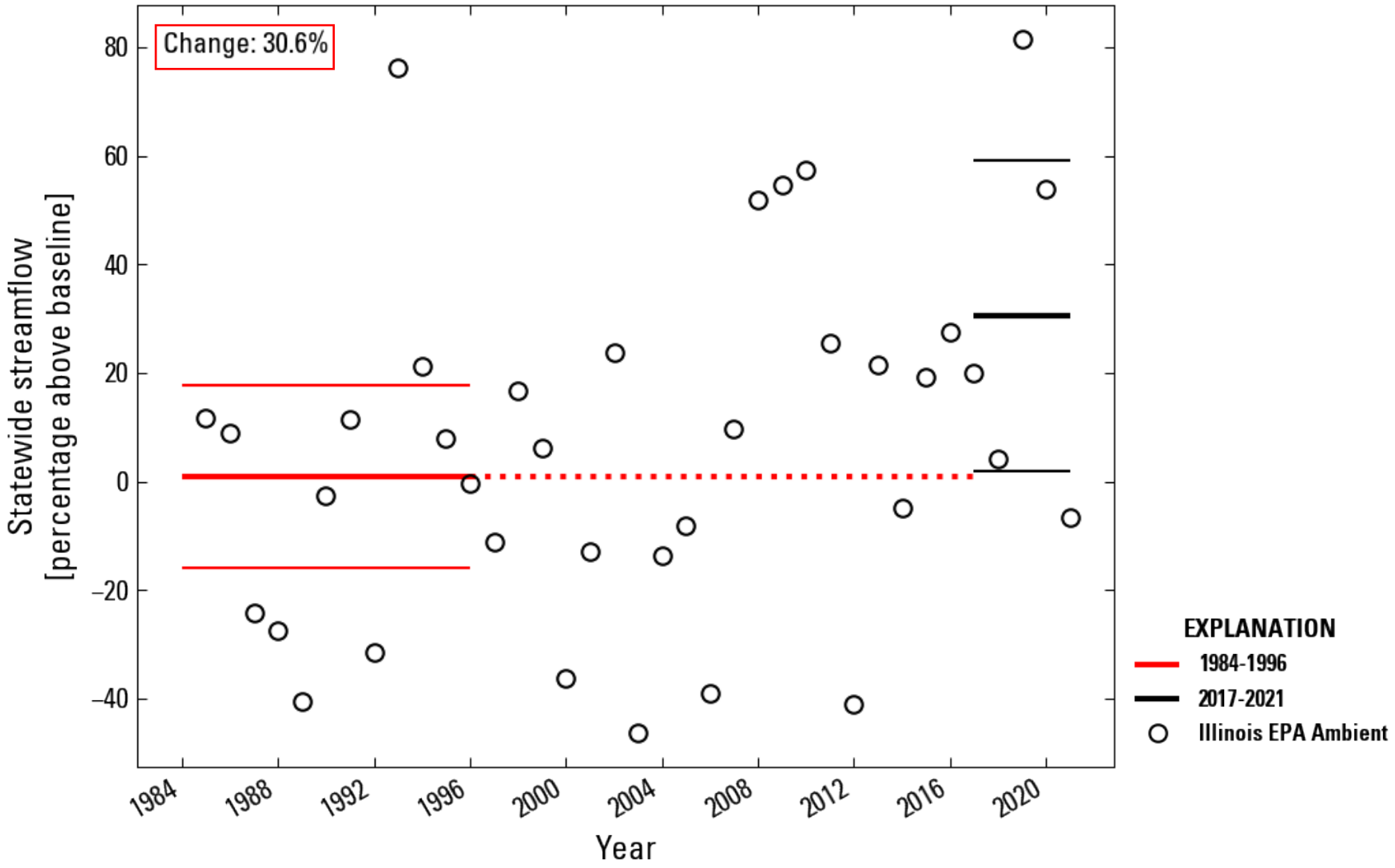
Change in nitrate relative to baseline



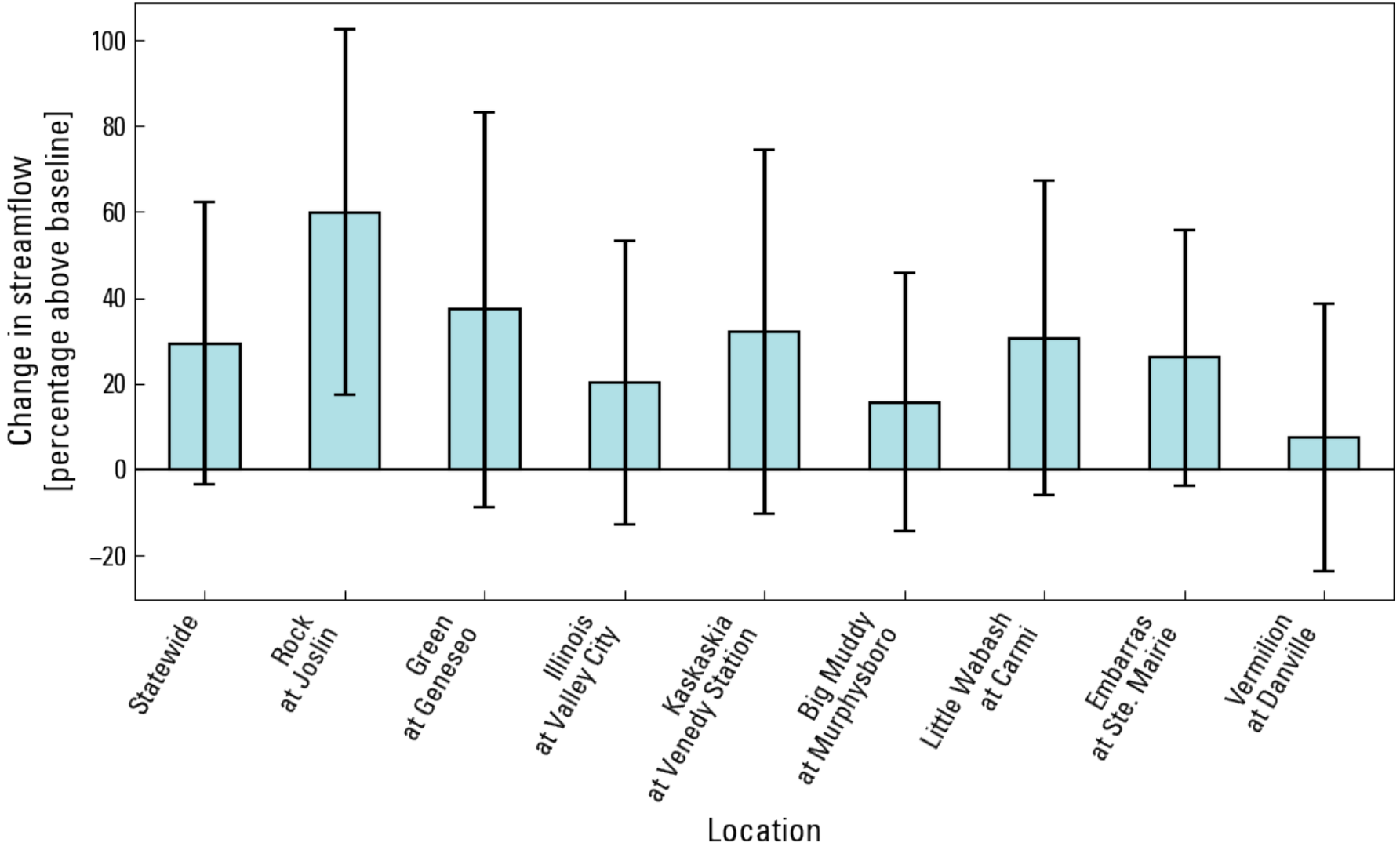
Change in phosphorus relative to baseline



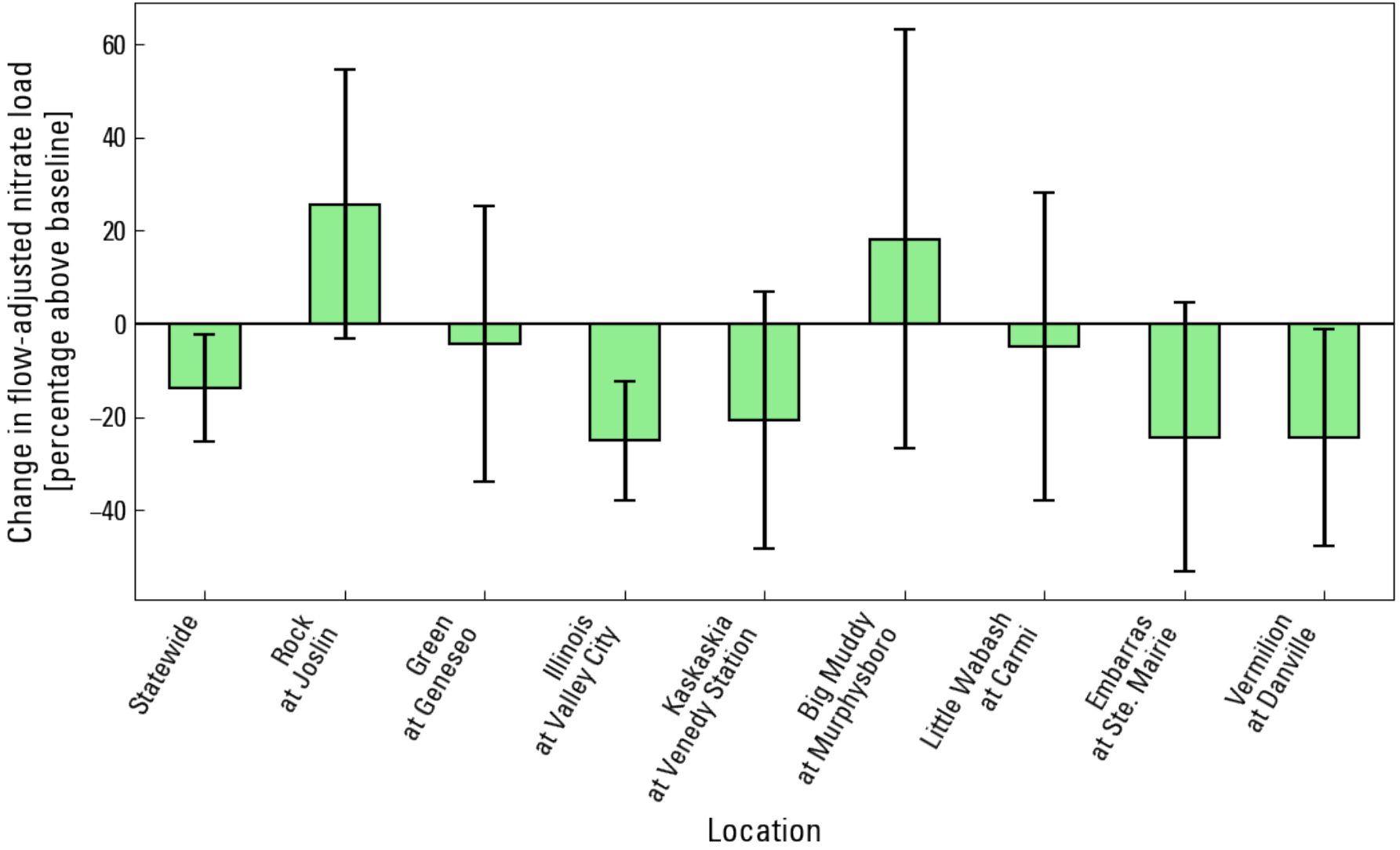
Statewide streamflow



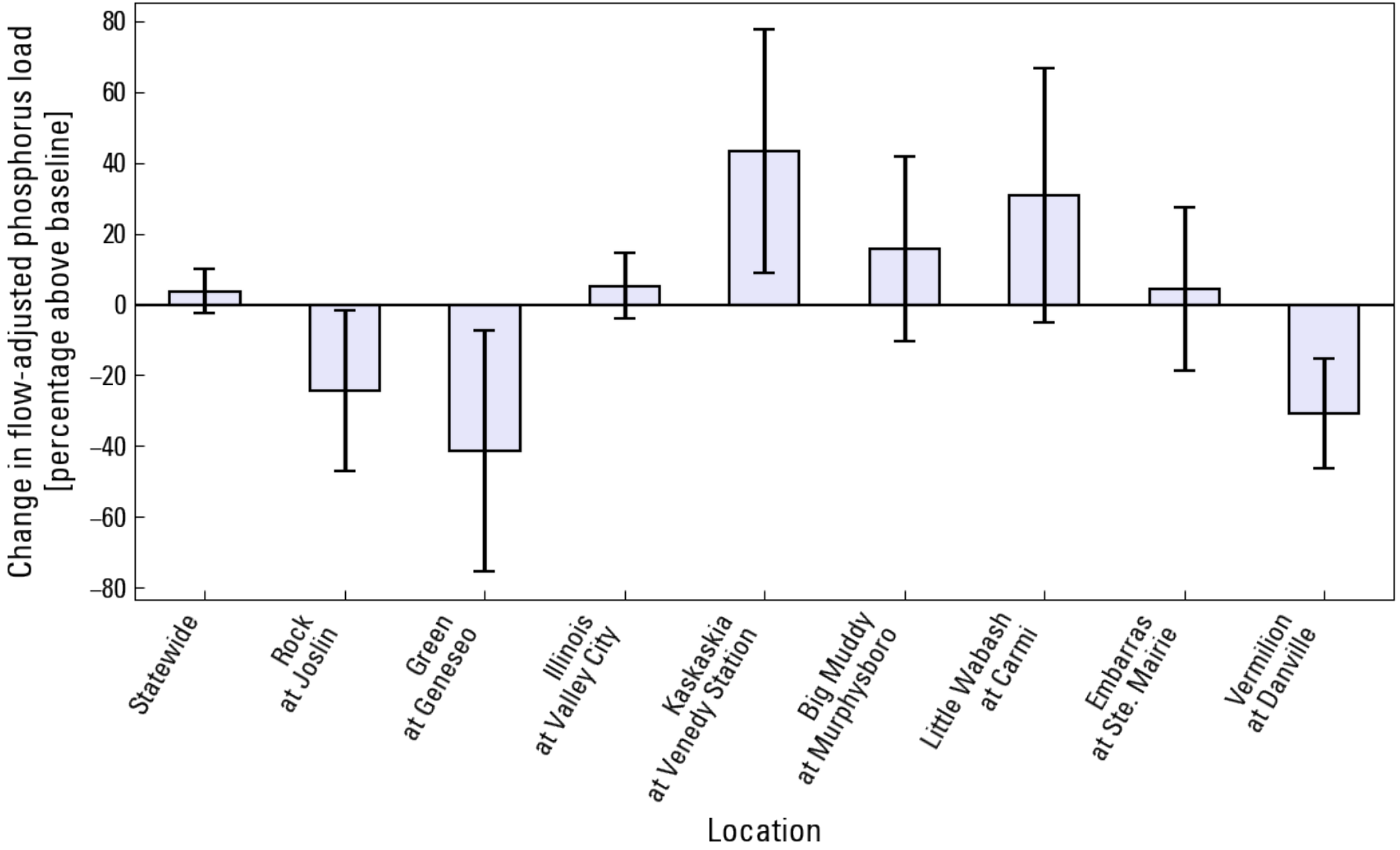
Change in streamflow relative to baseline



Change in flow-adjusted nitrate load



Change in flow-adjusted phosphorus load



Summary

1. Nitrate load has increased 10%, primarily from the Rock River
2. Phosphorus load has increased 30%, primarily from the Illinois, Kaskaskia, and Little Wabash Rivers
3. Streamflow has increased 30% statewide
4. Adjusting for streamflow, nitrate loads have declined 10%.
5. Adjusting for streamflow, phosphorus is approximately at the baseline load.

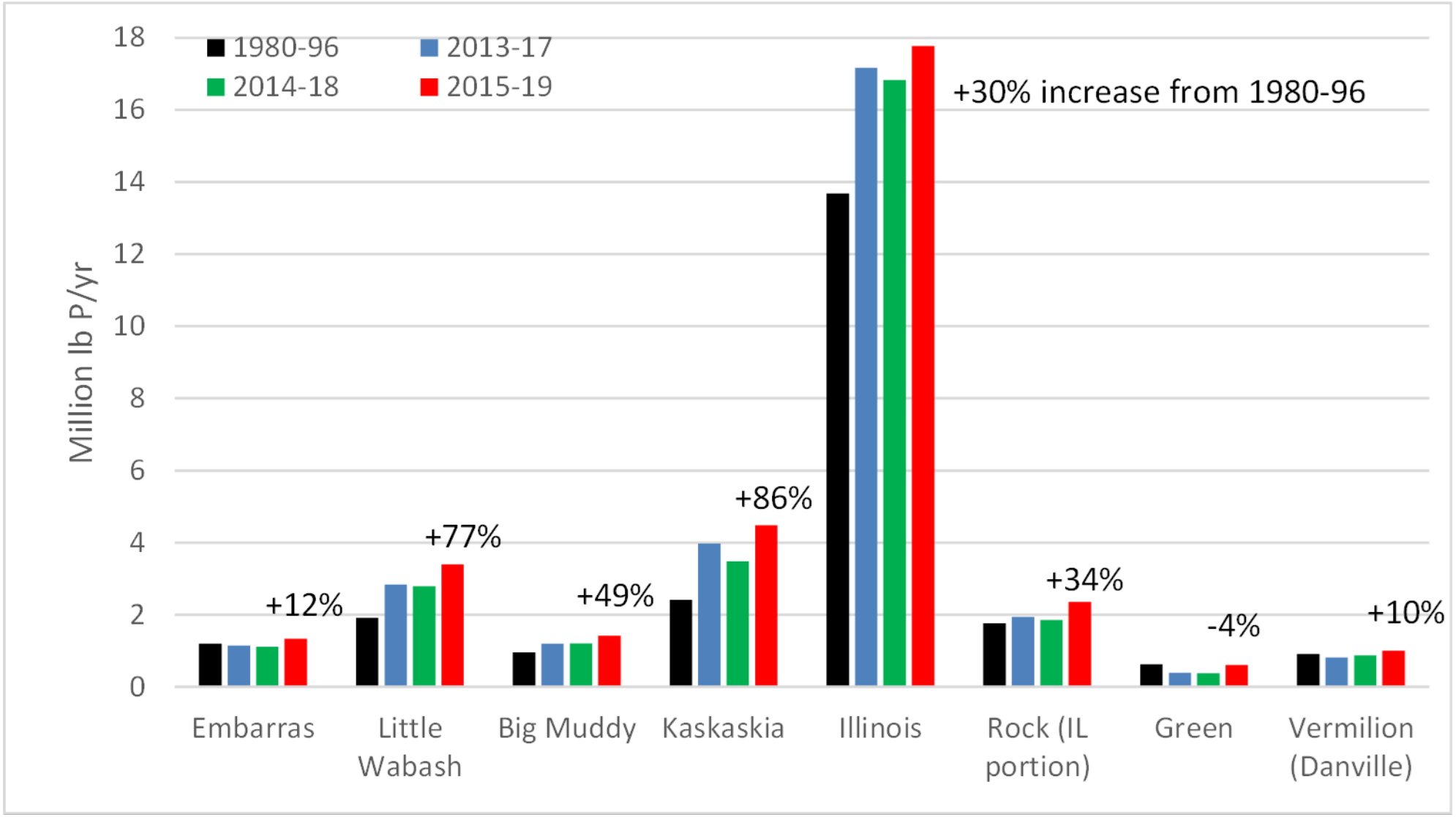
Phosphorus loads in the Illinois River Basin: 1980s-2019

Gregory McIsaac, UIUC Natural Resources and Environmental Sciences
Timothy Hodson, US Geological Survey
Momcilo Markus, Illinois State Water Survey
Rabin Bhattarai, UIUC Agricultural & Biological Engineering
Daniel Kim, UIUC Agricultural & Biological Engineering

Funding from: Illinois Nutrient Research and Education Council (NREC)
& US Geological Survey Cooperative Agreement

TP Load Estimates for Major Rivers draining Illinois

1980-96 baseline, 2013-17, 2014-18 and 2015-19



Estimated loads for the Illinois and Vermilion Rivers include reductions of 15% and 7%, respectively, to estimate the portion contributed by Indiana and Wisconsin, based on the proportion of each watershed that is outside of Illinois.

Project Objectives

Identify and quantify factors contributing to increased phosphorus loads in the Illinois River at Valley City

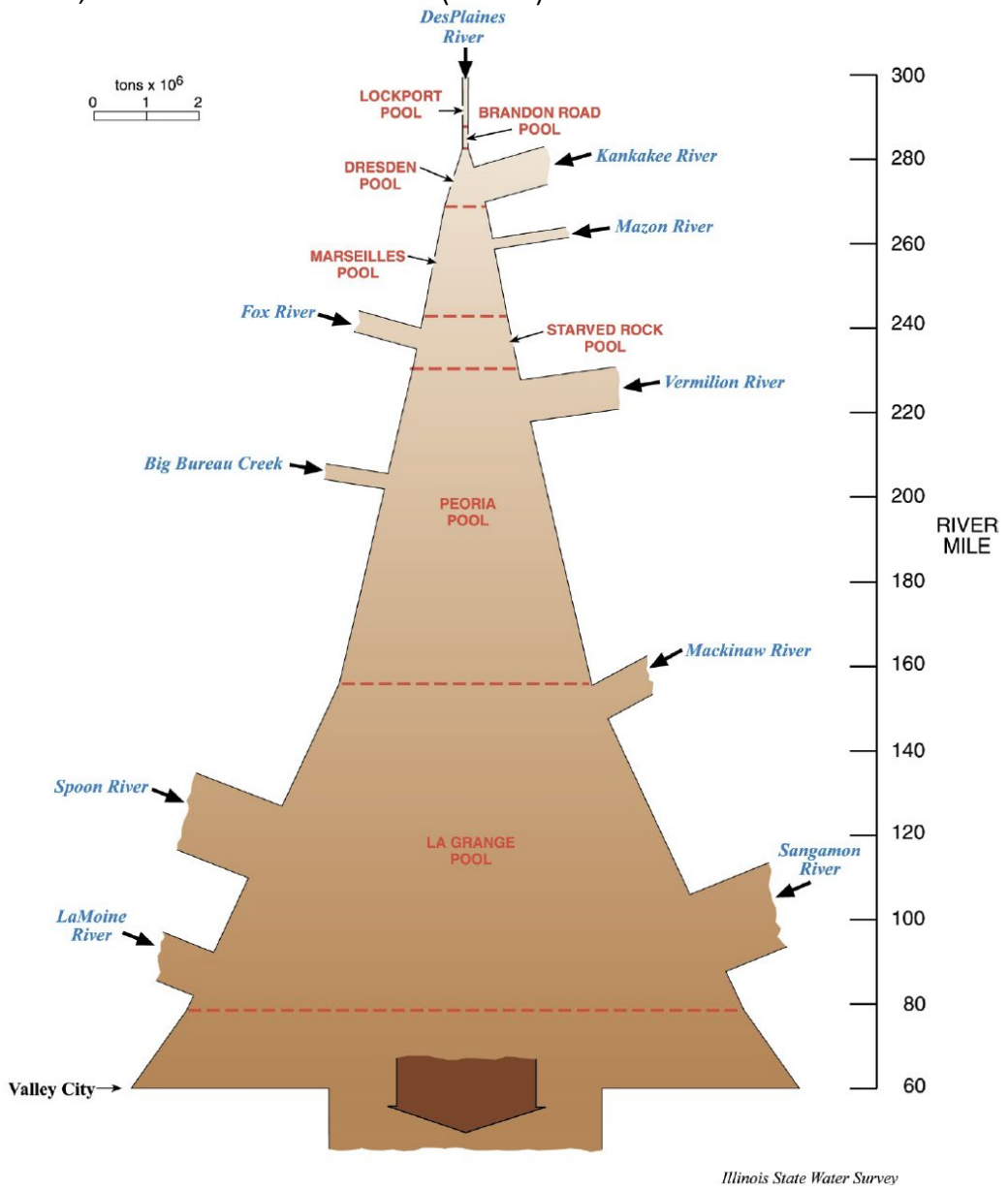
General Approach

1.Calculate long term riverine P loads for 41 subwatersheds

2. Identify factors that might explain spatial and temporal variations in P loads

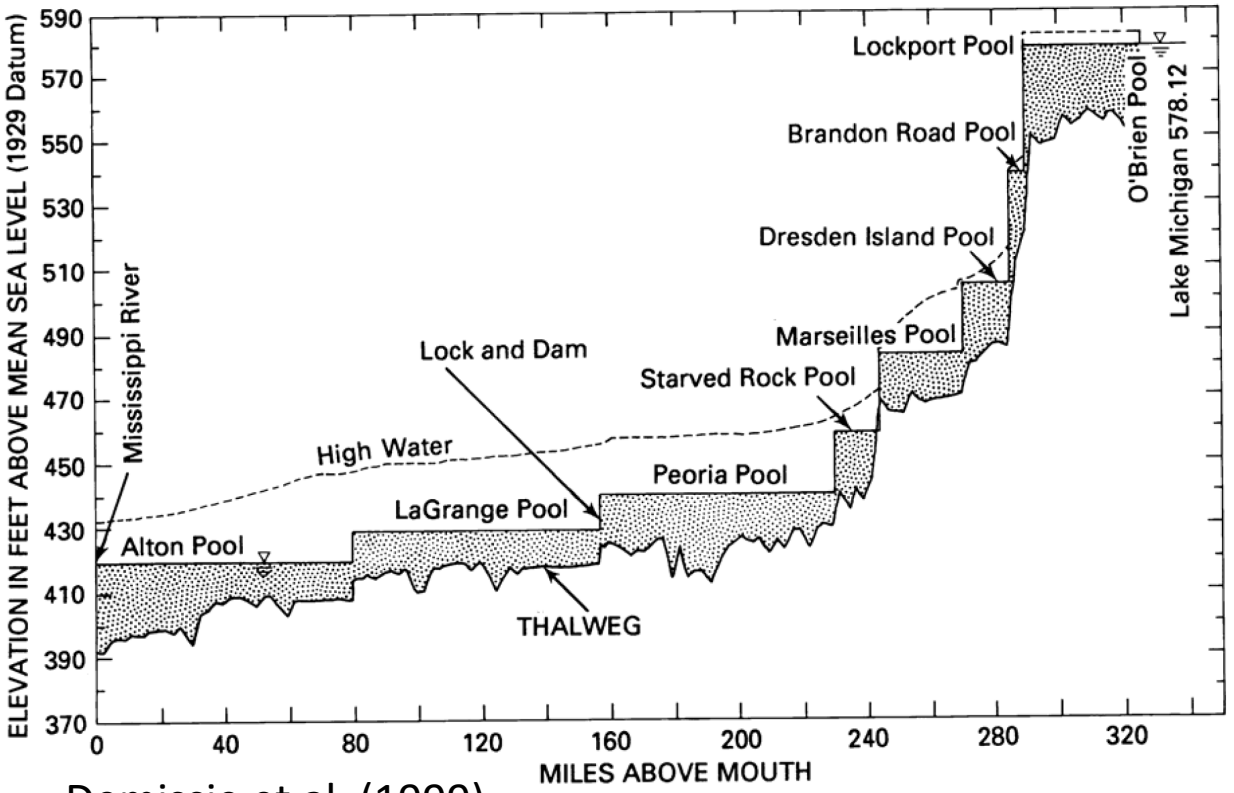
Illinois River Sediment budget 1981-2015

Demissie, Getahun and Keefer (2016)



https://www.isws.illinois.edu/pubdoc/RI/ISWSRI-122.pdf

Elevation profile of the Illinois River Waterway



Demissie et al. (1999)

The Illinois River below Marseilles and Starved Rock accumulates sediment.

Change from 1989-96 to 2015-19
Incremental Total Phosphorus (TP) yields

TP load per unit area for each watershed segment
kg P/ha-yr

Blue indicates decrease
Red indicates increase

TP yield (kg P/ha-yr) change from 1989–96 to 2015–19

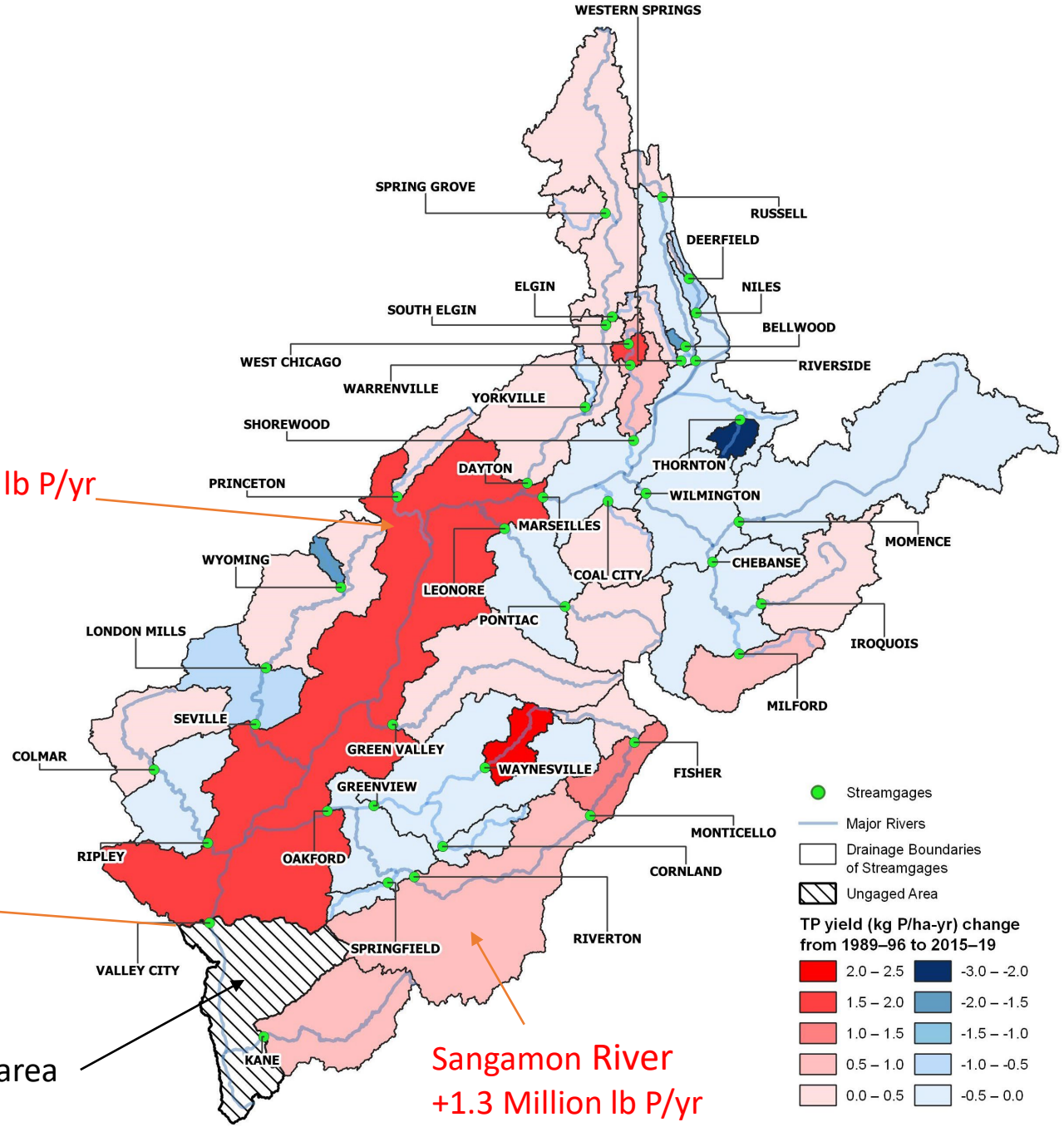
2.0 – 2.5	-3.0 – -2.0
1.5 – 2.0	-2.0 – -1.5
1.0 – 1.5	-1.5 – -1.0
0.5 – 1.0	-1.0 – -0.5
0.0 – 0.5	-0.5 – 0.0

+4.6 Millon lb P/yr

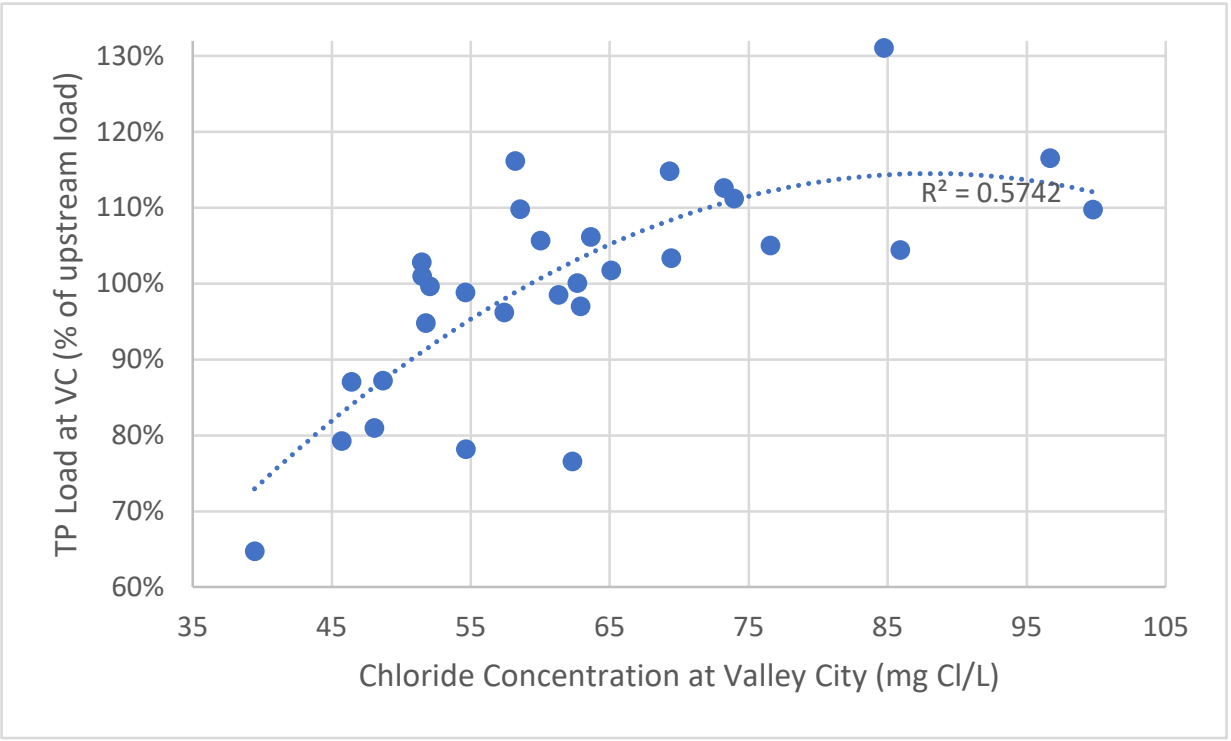
Change in load at Valley City:
+6 Million lb P/yr
(+39% from 1989-96)

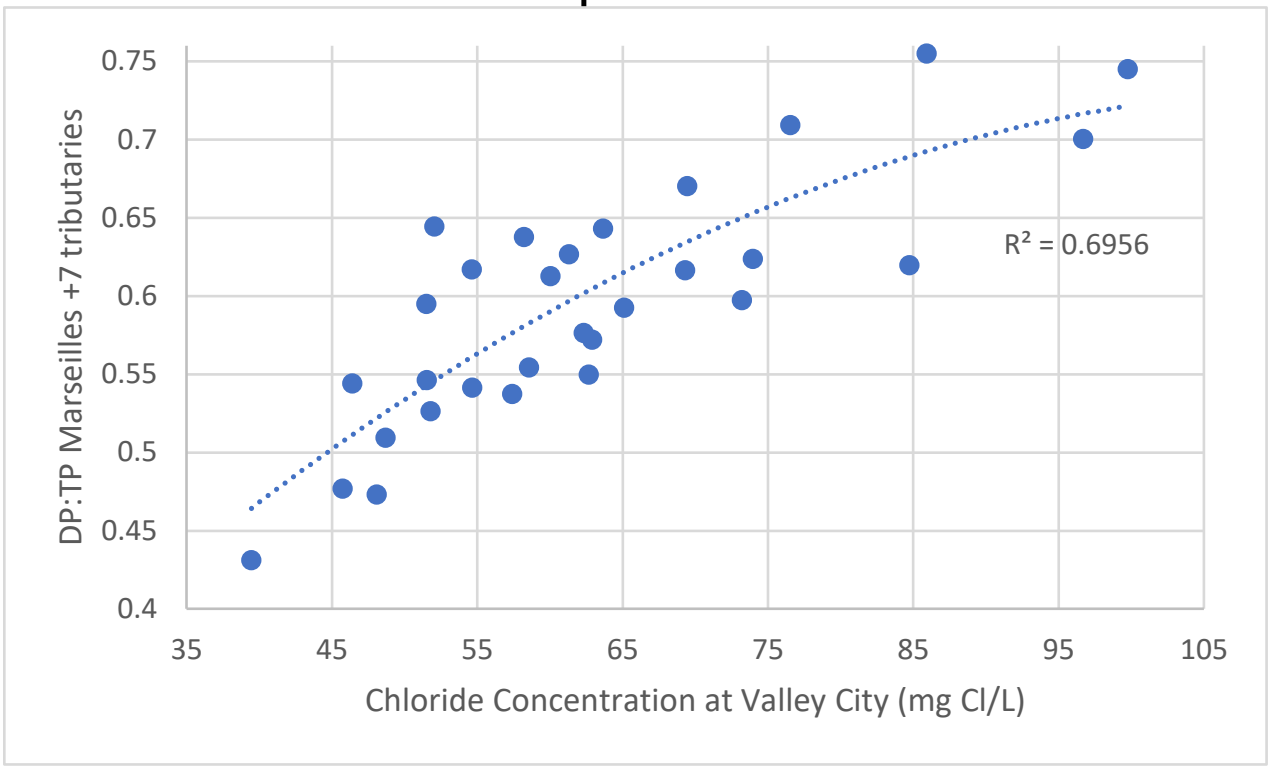
Ungauged area

Sangamon River
+1.3 Million lb P/yr



Several Confounding Correlations:
TP load at Valley City vs Chloride Concentration vs Upstream DP:TP





77% of the chloride increase came from above Marseilles + Fox R, while these contributed 16% of the increased DP load at Valley City

Because these two factors are highly correlated, we were unable to determine how much causation to assign to each.

Nitrate and sulfate concentrations were also correlated to these and can affect redox and P desorption.

Possible P sink: Zebra Mussels

- 1989 Observed in Chicago Sanitary and Ship Canal
- 1991 Observed at Marseilles, Hennepin, Bath and Pearl (below Valley City)
- Blodgett et al. (1997): population explosion in 1993, crash in 94-95
- Consume particulate P, excrete dissolved P
- Growing population could be a net sink of P, if it does not displace other consumers of P

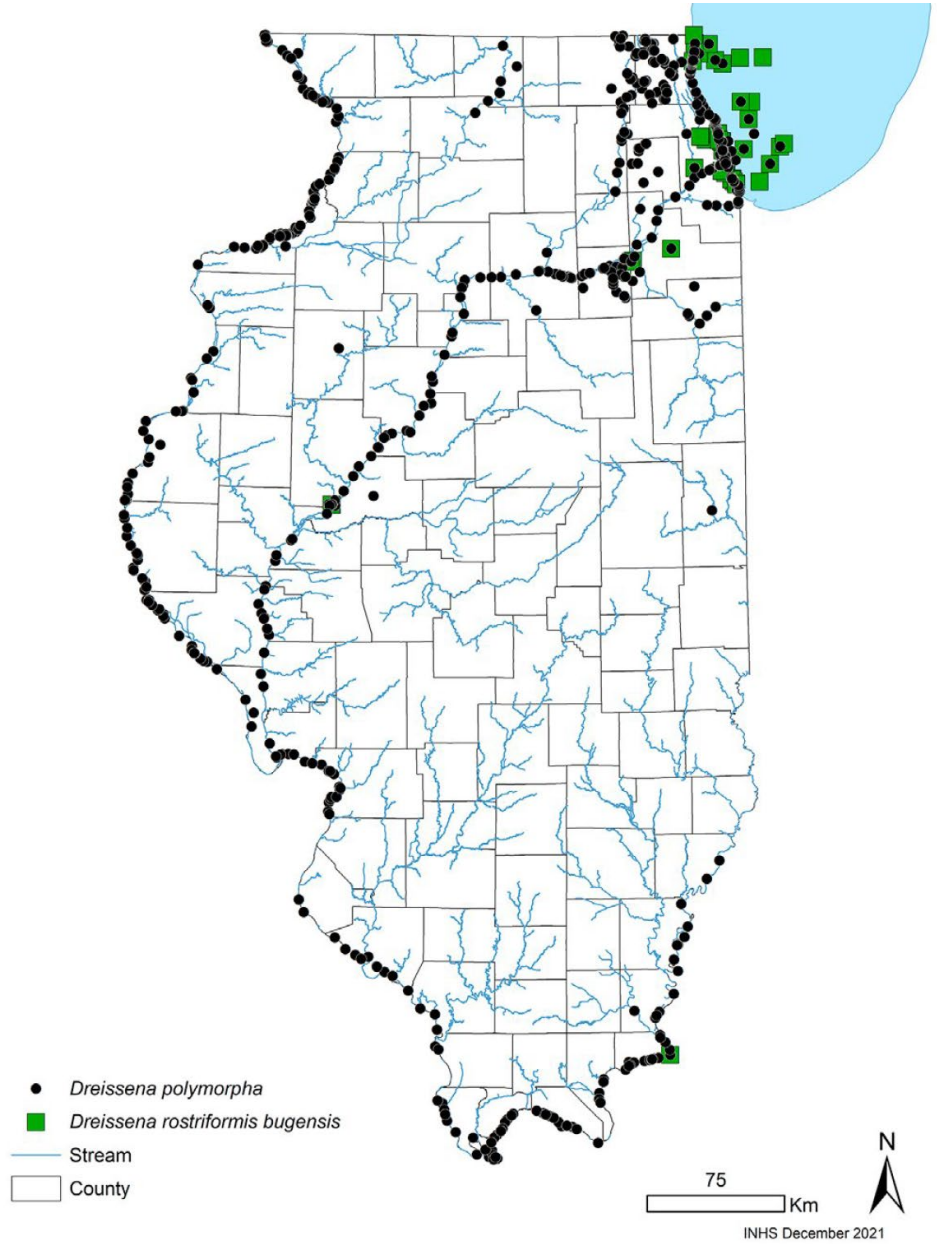


Figure 4 Distributions of Zebra Mussel *Dreissena polymorpha* and Quagga Mussel *Dreissena rostriformis bugensis* in Illinois. (Tiermann et al. 2022, INHS Bull. 43)

Summary & Conclusions

Increased TP load at Valley City from 1989-96 to 2015-15

78% came from the lower mainstem: the section of the Illinois River Basin between Marseilles and Valley City, excluding the monitored tributaries

22% came from the Sangamon River Basin (equal to SDD increased TP discharge)

Possible causes for increased TP loads between Marseilles and Valley City (excluding the Sangamon and other tributaries):

- Increased DP load resulting in less deposition
- Desorption from river sediments, possibly enhanced by changes in water chemistry (chloride, sulfate and nitrate)
- Zebra Mussel expansion during 1989-96 sequestered P
- Unidentified point source(s)
- CAFOs and more concentrated livestock

Summary & Conclusions

In many watersheds Dissolved P (DP) loads increased while Particulate P (PP) and Total Suspended Solid (TSS) loads decreased, possible consequences of conservation tillage and expanded tile drainage.

TP load reductions in tributaries draining Cook County were offset by increases in the suburbs (e.g., DuPage River), where population increased, and by increases from agricultural areas (e.g., Mazon River).

In agricultural watersheds (less than 9% developed land) changes in TP load were weakly correlated with changes in water yield.

Recommended Future Studies

Investigate factors influencing P desorption from and mobilization of Illinois River sediments (e.g., chloride, sulfate, zebra mussels).

Investigate reasons for large changes in TP yields from subwatersheds such as Spoon River, Indian Creek, Kickapoo Creek, and Sangamon River between Fisher and Monticello.

JOURNAL OF THE AMERICAN WATER RESOURCES ASSOCIATION
AMERICAN WATER RESOURCES ASSOCIATION

Spatial and Temporal Variations in Phosphorus Loads in the Illinois River Basin, Illinois USA

Gregory F. McIsaac, Timothy O. Hodson, Momcilo Markus, Rabin Bhattarai, and Daniel Chulgi Kim

Research Impact Statement: Phosphorus loads in the lower Illinois River increased 39% from 1989–1996 to 2015–2019, mostly due to a shift in the lower section of the watershed from sequestering phosphorus to becoming a net source.

ABSTRACT: Total phosphorus (TP) loads in many rivers in the north-central United States have increased, including the Illinois River at Valley City, Illinois, USA, which increased 39% from the periods 1989–1996 to 2015–2019 despite efforts to reduce loads from point and nonpoint sources. Here, we quantify long-term variations in phosphorus (P) loads in the Illinois River and its tributaries and identify factors that may be causing the variations. We calculated river loads of dissolved (DP) and particulate P (PP), total and volatile suspended solids (TSS and VSS), and other potentially related constituents at 41 locations. DP loads generally increased and PP and TSS loads generally decreased from 1989–1996 to 2015–2019. During 1989–1996, P accumulated in the lower basin between Marseilles and Valley City (excluding monitored tributaries). This portion of the basin is very flat and accumulates sediment. During 2015–2019, this section shifted from being a net sink to being a net source of P, accounting for 78% of the increased TP load at Valley City. We present evidence supporting several mechanisms that could have caused this shift: increased DP and chloride loads, reduced sulfate and nitrate concentrations influencing ionic strength and redox potential in the sediments, and increased VSS loads at Valley City possibly indicating greater algal production and contributing to hypoxia in lower river sediments. Additional research is needed to quantify the relative importance of these mechanisms.

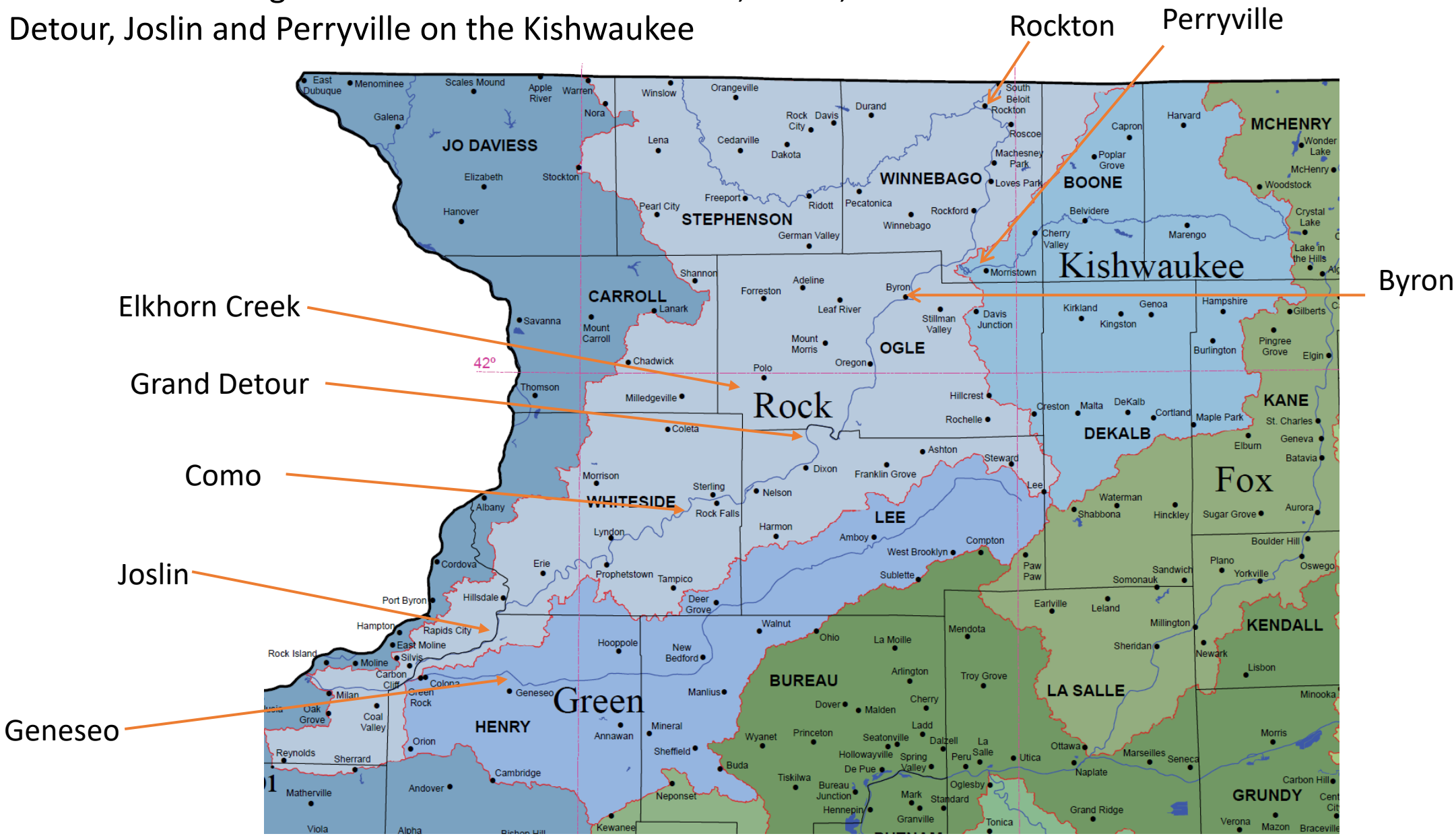
(KEYWORDS: phosphorus; freshwater; point source; nonpoint source.)

Lower Rock River Analysis

Partly funded by Illinois Corn Growers Association

Developed in consultation with Megan Dwyer and Daniel Perkins

Illinois portion of the Rock River Watershed with
USGS and IEPA monitoring locations identified at Rockton, Como,
Grand Detour, Joslin and Perryville on the Kishwaukee



Modified from ISWS

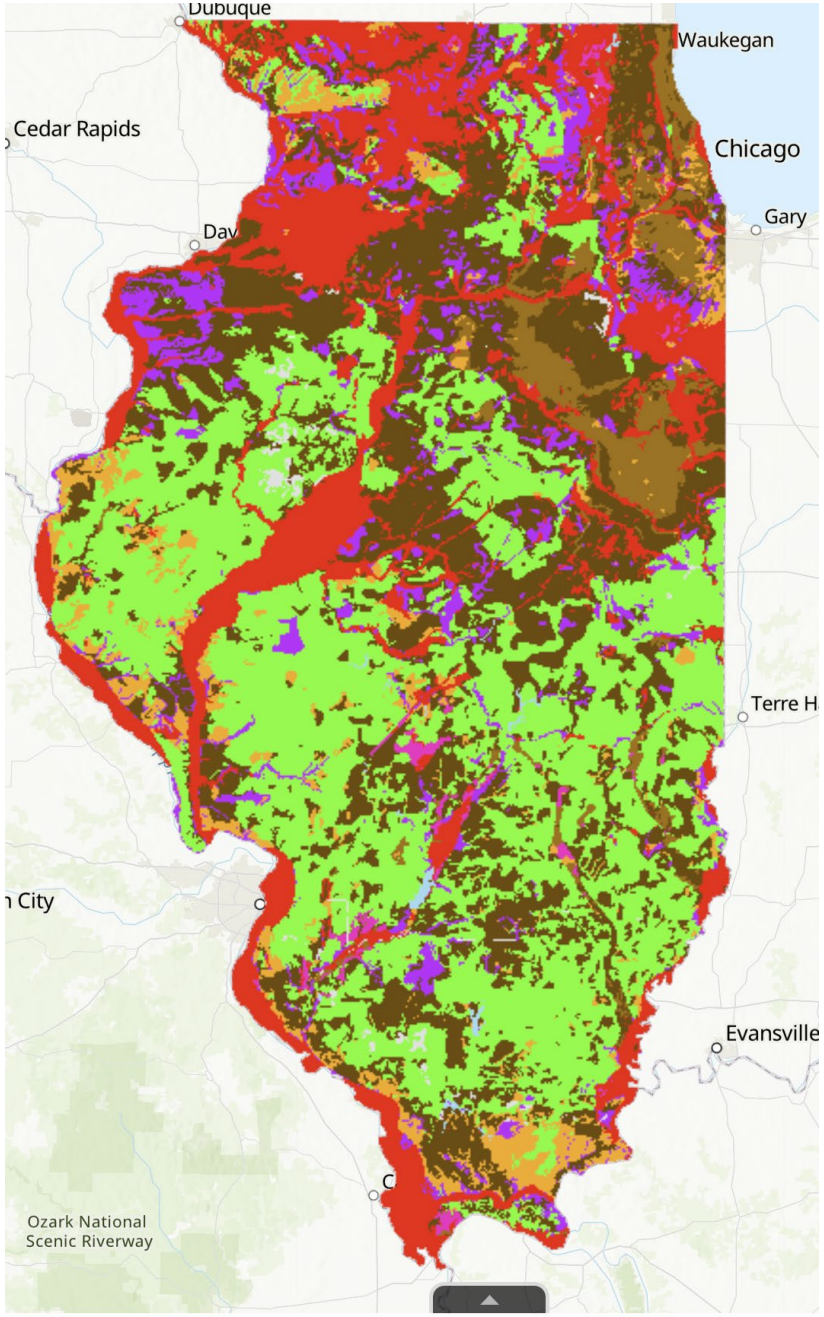
Potential for Aquifer Recharge

Source Water Assessment Protection Data

Water Resources

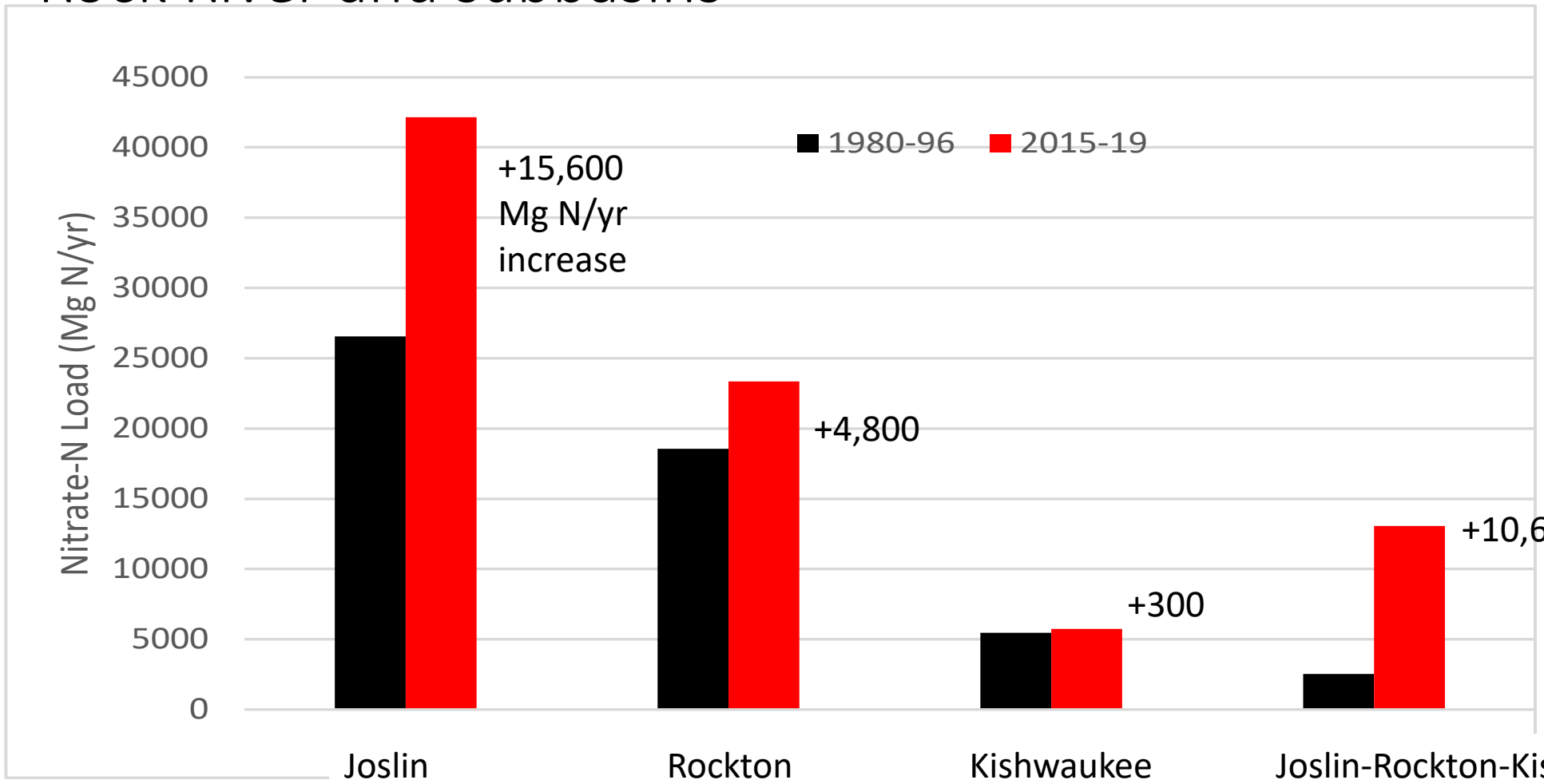
Potential for Aquifer Recharge

- Very High Potential for Recharge
- Very High to High
- High to Moderately High
- Moderately High to Moderate
- Moderate to Moderately Low
- Moderately Low to Low
- Low Potential for Recharge
- Water
- Disturbed Lands



https://illinois-epa.maps.arcgis.com/apps/webappviewer/index.html

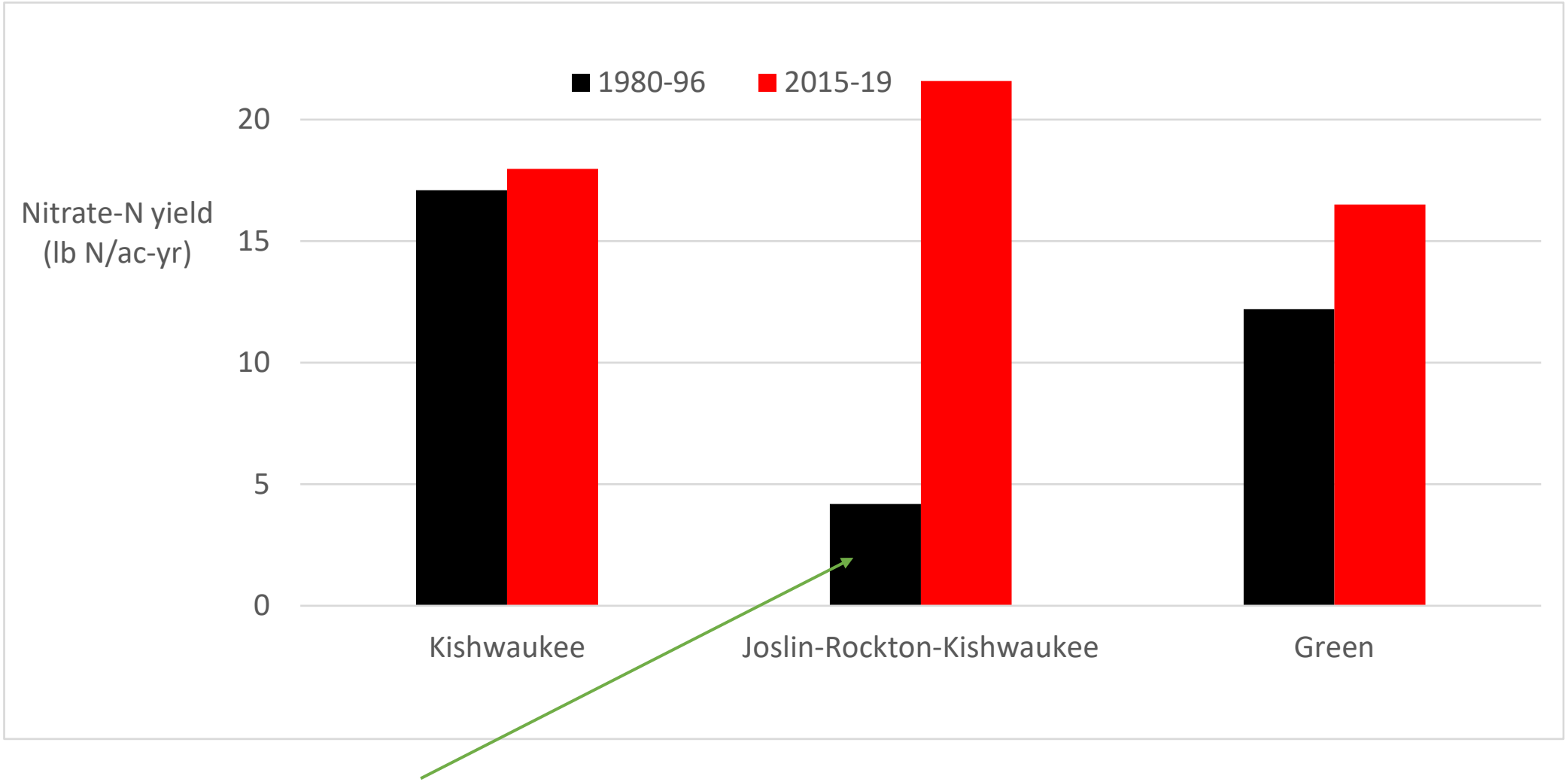
Nitrate-N loads 1980-96 and 2015-2019
Rock River and subbasins



67% of the load increase at Joslin comes from the portion of the watershed below Rockton and excluding the Kishwaukee at Perryville

Square miles:	9,549	6,363	1,099	2,087
<u>% of NO3-N load at Joslin:</u>				
1980-96	100%	70%	21%	9.6%
2015-19	100%	55%	14%	31%

Nitrate-N yield 1980-96 and 2015-2019
Rock River subbasins and neighboring Green River



Why so low? High in-stream denitrification? Or loss to groundwater? Or other?

Possible reasons for the 10,600 Mg N/yr increase in Nitrate-N yield from Lower Rock River watershed

- Increased corn-soy acres: 107,000 ac x 25 lb N/ac = est. +1200 Mg N/yr
- Increased irrigated acres: 45,000 ac x 25 lb N/ac = est. +510 Mg N/yr
- Increased precipitation and 75% increase in water yield: est. +1900 Mg N/yr
- Reduced in-stream denitrification from increased stream flow (maybe)
- Increased livestock (no)
- Increased point source N? (currently not large, but no data from 1980-96)

  Increased population of 44,000 people = ~200 Mg N/yr
- Flow measurement errors at Rockton? (maybe +2200 Mg N/yr?)
- Groundwater lag (could explain the low N yield 1980-96)
  - A combination of increased groundwater concentration and flow could plausibly account for about 5,000 Mg N/yr, possibly derived from cropland leaching 10 to 20 years earlier

Total of Estimates: 6,010 Mg N/yr

Summary of plausible **estimates** of NO_3-N sources

Increased precipitation and water yield may account for an increased load of about 1900 Mg N/yr

Expansion of corn-soy and irrigated acres in the Lower Rock River Basin may have contributed 1700 Mg N/yr

Overestimation of flow at Rockton may account for under estimation in the 1980-96 load by 2200 Mg N/yr

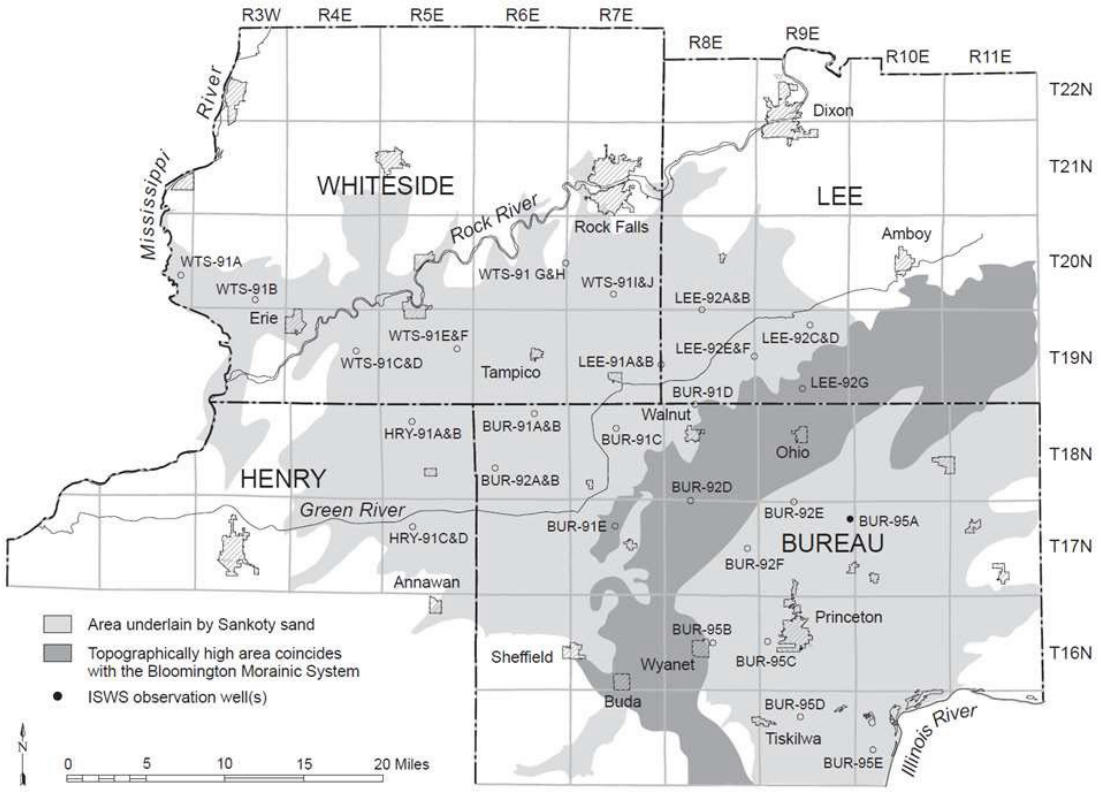
A combination of increased groundwater concentration and flow could plausibly account for about 5000 Mg N/yr, possibly derived from cropland leaching 10 to 20 years earlier

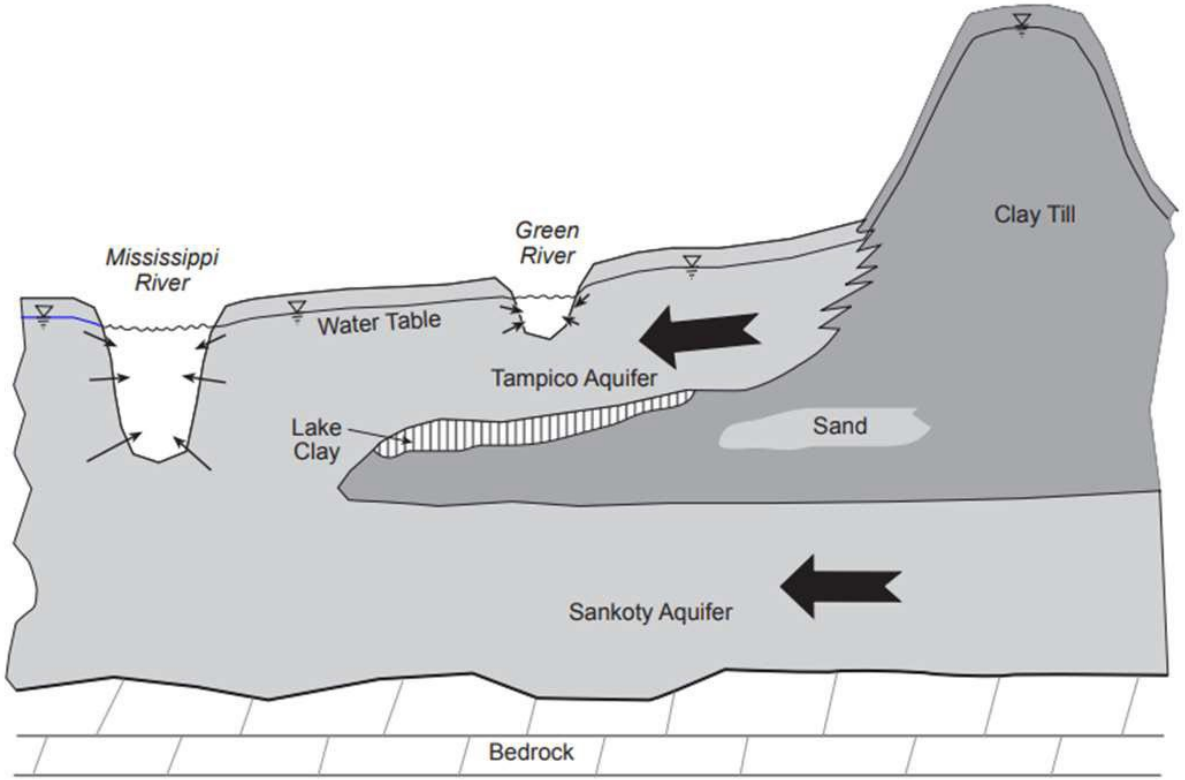
Preliminary results for groundwater nitrate modeling in the Rock River region

Vlad Iordache, Illinois State Water Survey

8/2/2022

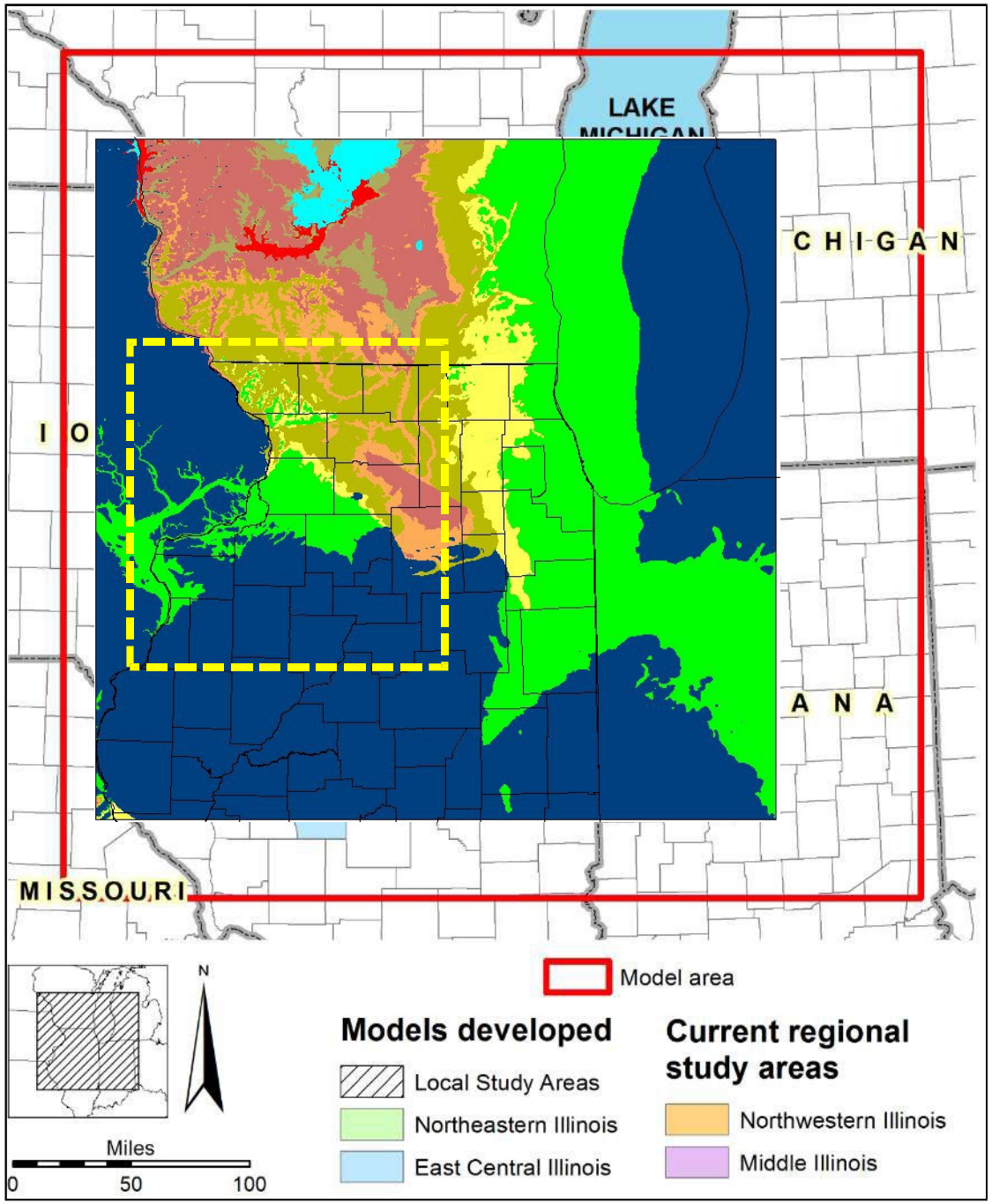
Funded by: Illinois Environmental Protection Agency


R3W
R4E
R5E
R6E
R7E
R8E
R9E
R10E
R11E
T22N
T21N
T20N
T19N
T18N
T17N
T16N
Mississippi River
Rock River
Green River
Illinois River
WHITESIDE
LEE
HENRY
BUREAU
Dixon
Rock Falls
Amboy
Erie
Tampico
Walnut
Ohio
Annawan
Princeton
Sheffield
Wyanet
Buda
Tiskilwa
WTS-91A
WTS-91B
WTS-91C&D
WTS-91E&F
WTS-91 G&H
WTS-91I&J
LEE-91A&B
LEE-92A&B
LEE-92C&D
LEE-92E&F
LEE-92G
BUR-91A&B
BUR-91C
BUR-91D
BUR-91E
BUR-92A&B
BUR-92D
BUR-92E
BUR-92F
BUR-95A
BUR-95B
BUR-95C
BUR-95D
BUR-95E
HRY-91A&B
HRY-91C&D
Area underlain by Sankoty sand
Topographically high area coincides with the Bloomington Morainic System
ISWS observation well(s)
0 5 10 15 20 Miles


Mississippi River
Green River
Clay Till
Water Table
Tampico Aquifer
Lake Clay
Sand
Sankoty Aquifer
Bedrock

Illinois Groundwater Flow Model

- Developed in coordination with ISGS and IDNR
- Models developed for two priority regions:
  - Northeastern IL
  - Mahomet Aquifer
- ALWAYS UPDATED
- Uniform grid spacing- 300 m
- 26 layers- 16 bedrock and 9 glacial

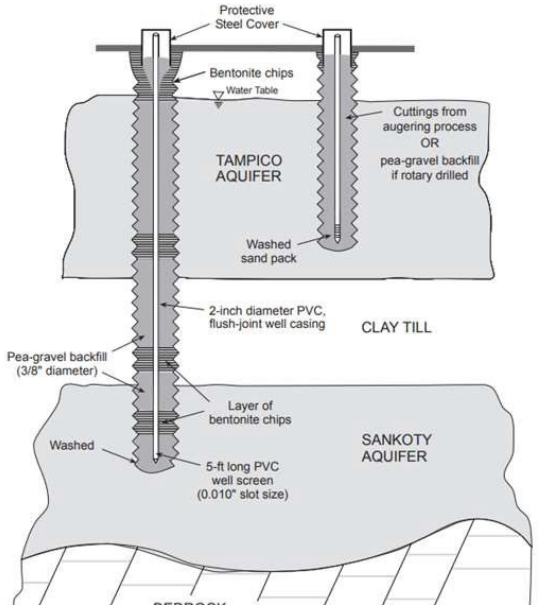


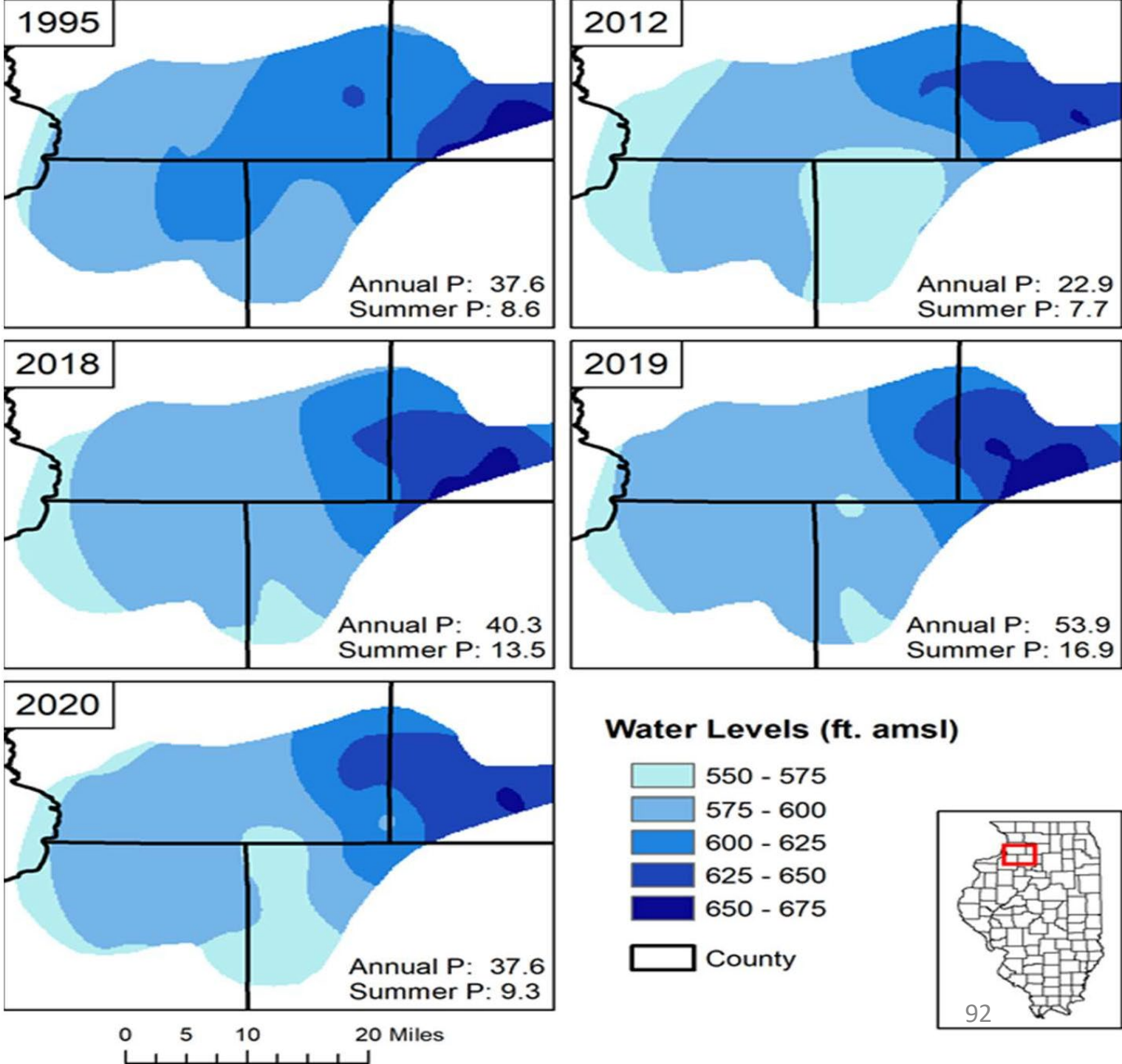
Phase 1: Compile available data

- Water quality
  - SW/GW [shallow and deep]
  - Temporal/spatial resolution
- Water demand
  - Public/Industrial – Steady State, Annual
  - Agriculture – Transient, Monthly
- Flow vectors

Data Sources Used

- Illinois EPA Public Water System Records
- Illinois State Water Survey Service Lab Records
- Illinois Dept of Agriculture surficial aquifer wells data (2000-2014)
- Illinois Water Inventory Program
  - Annual Survey of high-capacity water withdraws and use
    - Public water supplies, self-supplied Industrial/Commercial, and Agricultural irrigation


Protective Steel Cover
Bentonite chips
Water Table
TAMPICO AQUIFER
Cuttings from augering process OR pea-gravel backfill if rotary drilled
Washed sand pack
2-inch diameter PVC, flush-joint well casing
CLAY TILL
Pea-gravel backfill (3/8" diameter)
Layer of bentonite chips
Washed
SANKOTY AQUIFER
5-ft long PVC well screen (0.010" slot size)


1995
Annual P: 37.6
Summer P: 8.6
2012
Annual P: 22.9
Summer P: 7.7
2018
Annual P: 40.3
Summer P: 13.5
2019
Annual P: 53.9
Summer P: 16.9
2020
Annual P: 37.6
Summer P: 9.3
Water Levels (ft. amsl)
550 - 575
575 - 600
600 - 625
625 - 650
650 - 675
County
0 5 10 20 Miles

Let’s add nitrate! [Phase 2]

- Convert to transient model
  - 101 Stress Periods [SP]
  - 2/year
    - Start in 1980, end in 2030
    - 9 months without agriculture demand
    - 3 months with agriculture demand
- Apply nitrate as “contaminated” areal recharge
  - For initial runs 10mg/L NO3-N everywhere
- Assume no initial nitrate in groundwater

Next steps [Phase 3, end of August]

- Refine model inputs to better mimic reality
  - Nitrate application rates/timing/distribution
  - Irrigation demand/distribution
- Calibrate transient model to:
  - Water quality data [see table]
  - Summer flow conditions
- Quantify nitrogen load to Rock River at various points
- Conduct uncertainty analysis based on observed data

	Conc (mg/L)- simulated	Conc (mg/L)- observed
Rock Falls	8.0-9.5	2.0-6.0
Dixon	5.0-8.0	4.0-8.5
Byron	1.4-7.7	2.5-6.0

I need your help!

- Nitrate inputs (is 10 mg/L recharge a fair approximation)
- Legacy nitrate
- Nitrate data [especially recent]

Vlad Iordache
217.300.8779
iordach1@Illinois.edu

USGS
science for a changing world

Illinois River Basin Next Generation Monitoring

- Background
- Nutrients
  - Super gages
  - Synoptic nutrient surveys
  - Source Tracking
  - GW-SW interaction
- Harmful algal blooms
  - Discrete sampling
  - Remote sensing WQ
  - eDNA monitoring

Integrated Water Science Basins

10 Intensive Reference Basins to Drive the Future of Integrated Water Science:

- Regional focus areas for intensive observation, assessments, modeling, and prediction
- 10 river basins representative of larger water resource regions
- Goal: Establish 10 basins in 10 years
- Develop a deep, integrated understanding that can be extended to the broader region
- Basin selection process includes quantitative metrics and extensive stakeholder engagement

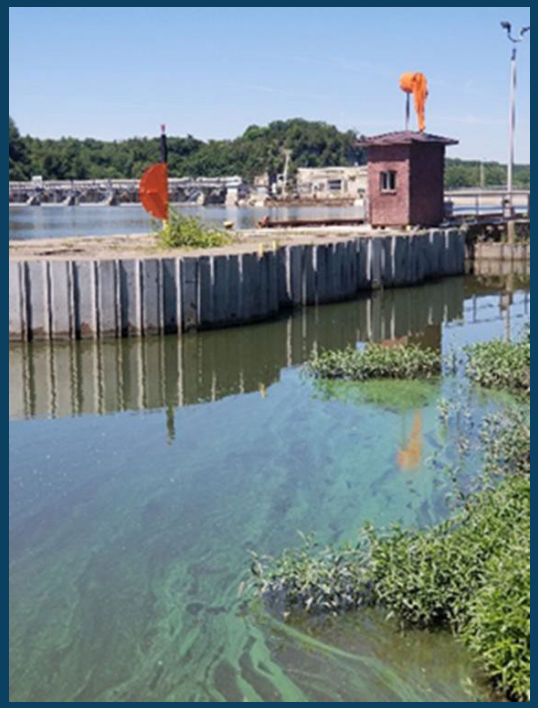
Integrated Water Science Initiative

Next Generation Water Observing System (NGWOS)

NGWOS collects real-time data on water quantity and quality in more affordable, rapid, and intensive ways than has previously been possible. The flexible monitoring approach enables USGS networks to evolve with new technology and emerging threats.

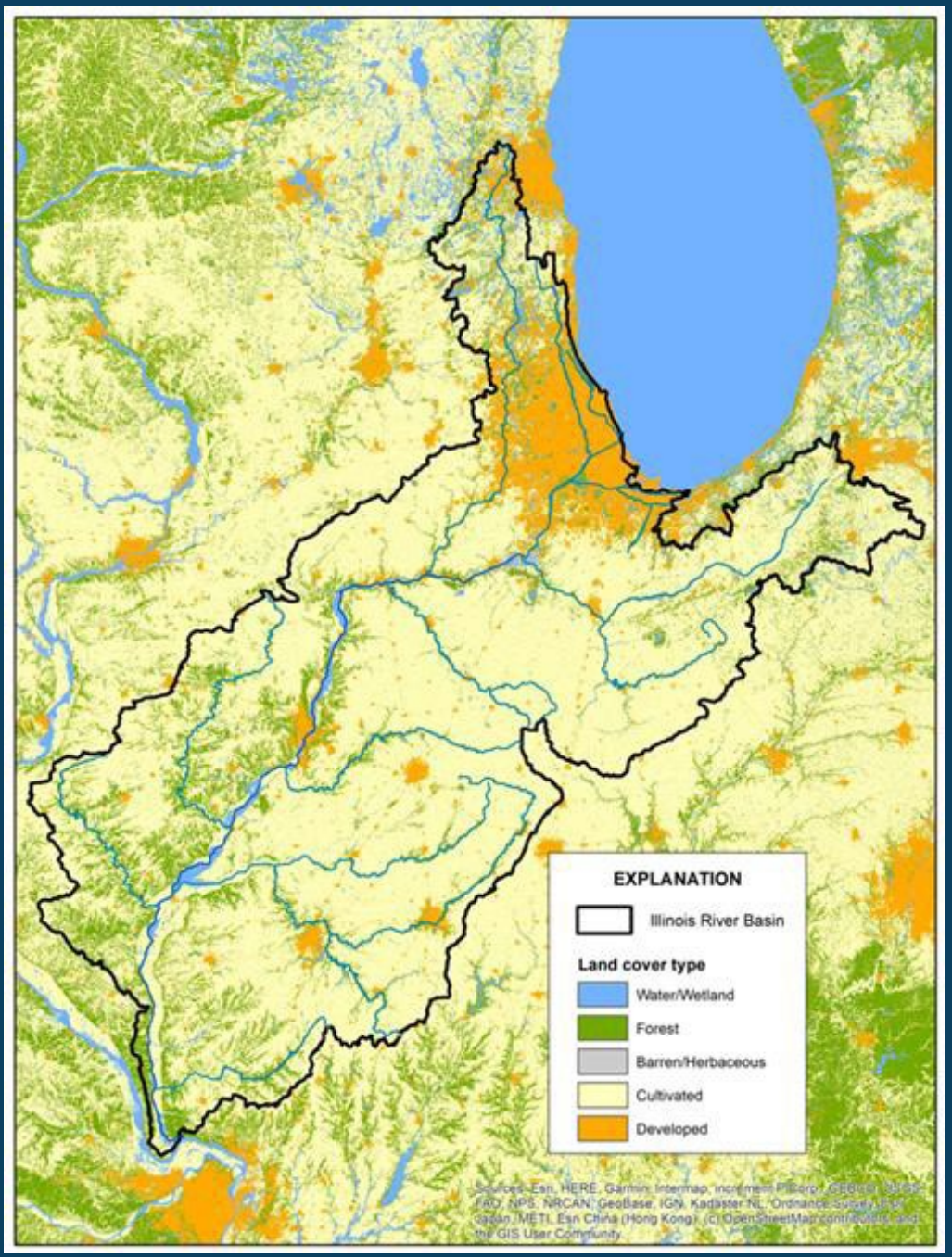
Integrated Water Availability Assessments (IWAA)

IWAAs examine the supply, use, and availability of the nation's water. These regional and national assessments evaluate water quantity and quality in both surface and groundwater, as related to human and ecosystem needs and as affected by human and natural influences.

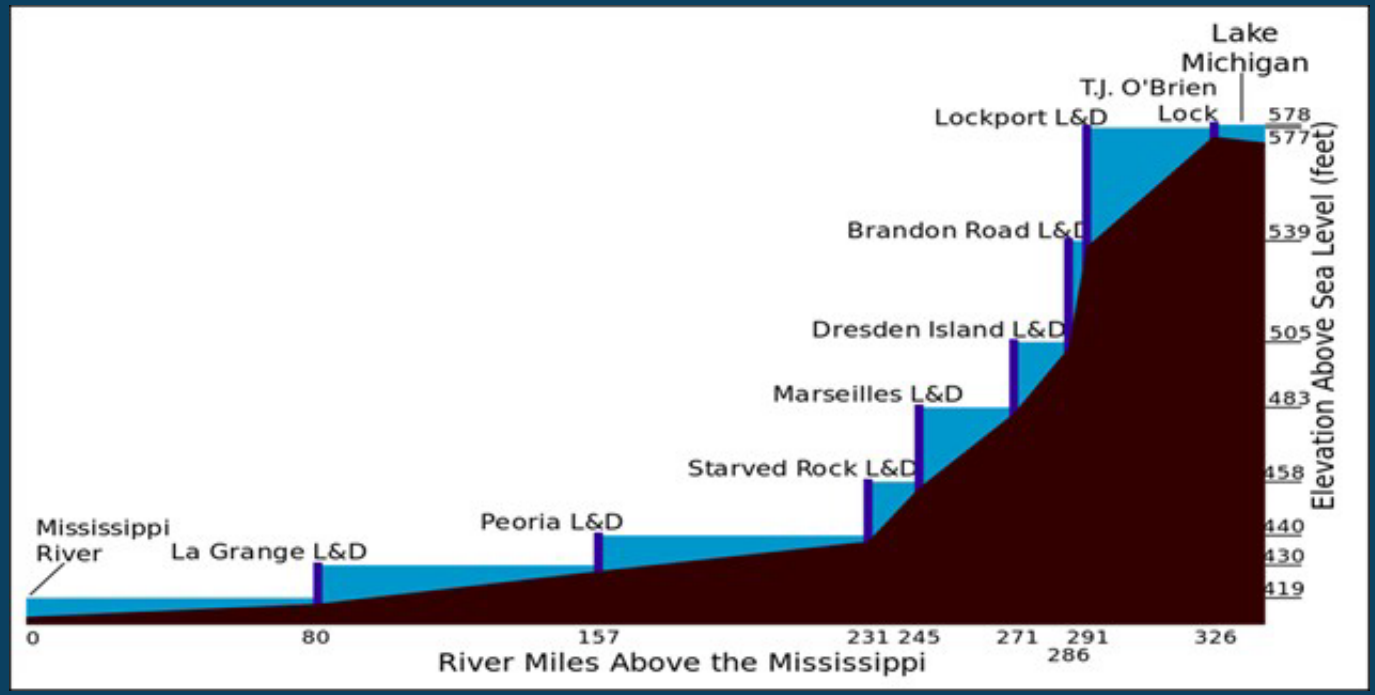


Illinois River Basin Priority Use Cases

1. Understanding the factors that contribute to **harmful algal blooms**
2. Understanding the sources, distribution and transport of **nutrients**

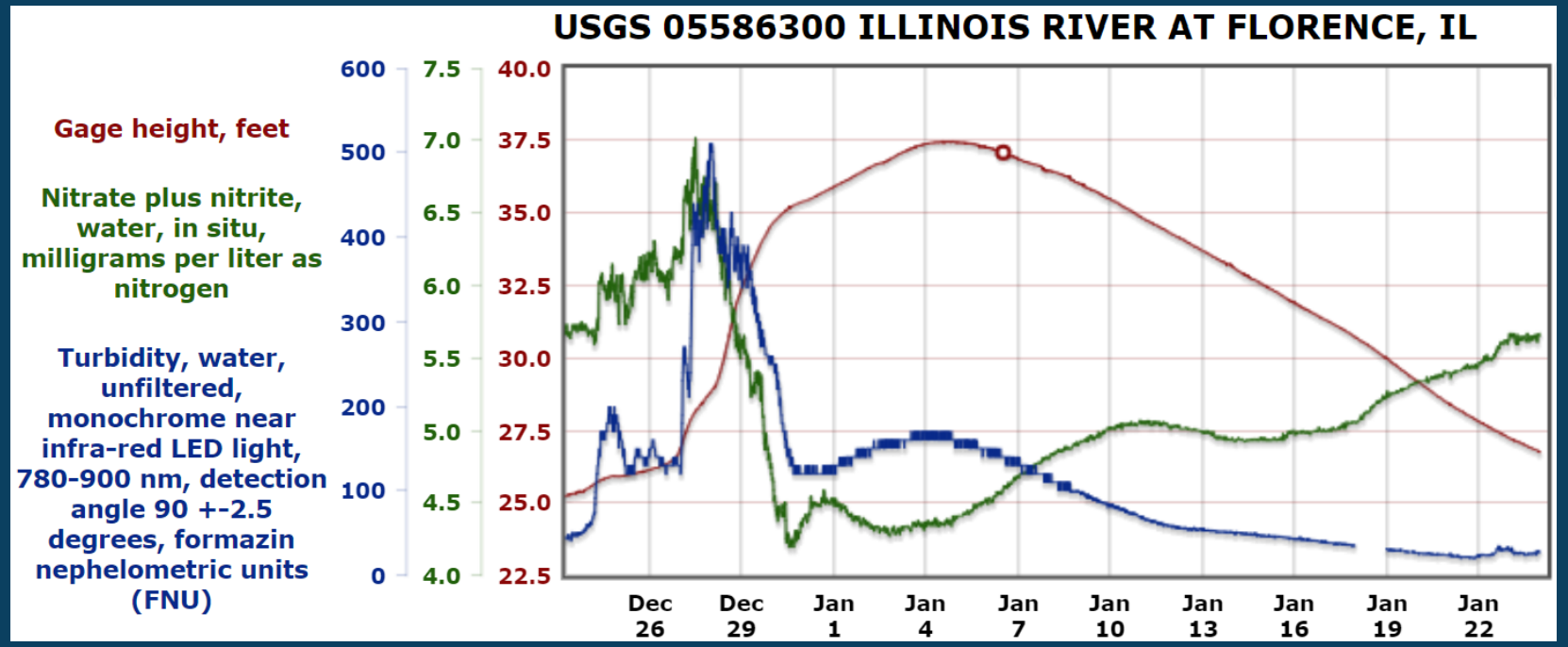


- 28,756 sq. mi drainage area
- Very diverse basin
- Major source of nutrients to Gulf Hypoxia
- Increasing frequency of HABs
- Engaged stakeholders w/in the basin
- Dense urban upper watershed
- Intensively managed agriculture lower watershed
- Illinois Waterway 273 mi in length



Dynamic Systems

- **Gage height, nitrate, and turbidity dynamics**



Data, Loadings, and Uncertainty

- Hodson, T.O., Terrio, P.J., Peake, C.S., and Fazio, D.J., 2021, Continuous monitoring and Bayesian estimation of nutrient and sediment loads from Illinois watersheds, for water years 2016–2020: U.S. Geological Survey Scientific Investigations Report 2021– 5092, 40 p., https://doi.org/ 10.3133/ sir20215092.

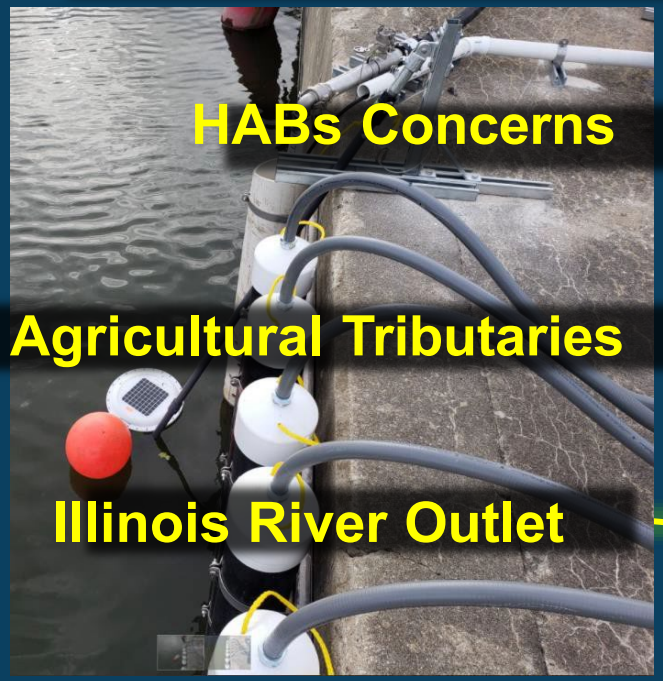
- Peake, C.S., and Hodson, T.O., 2022, Continuous monitoring of nutrient and sediment loads from the Des Plaines River at Route 53 at Joliet, Illinois, water years 2018–20 (ver. 1.1, February 2022): U.S. Geological Survey Scientific Investigations Report 2021–5125, 15 p., https://doi.org/ 10.3133/ sir20215125

Super Gage Network

to support Nutrient and HAB Priorities

Chicago/Urban Nutrients

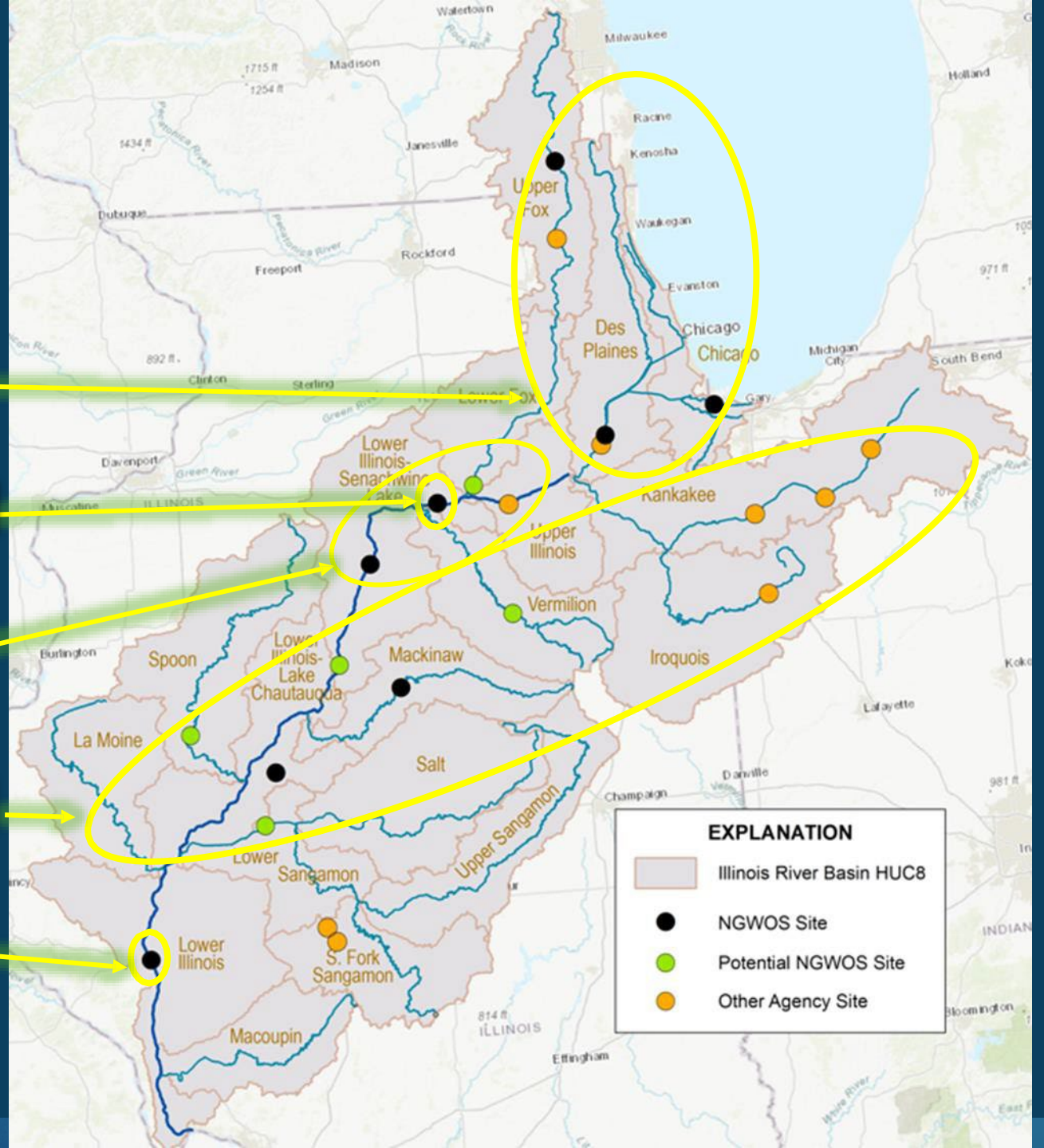
Starved Rock Testbed



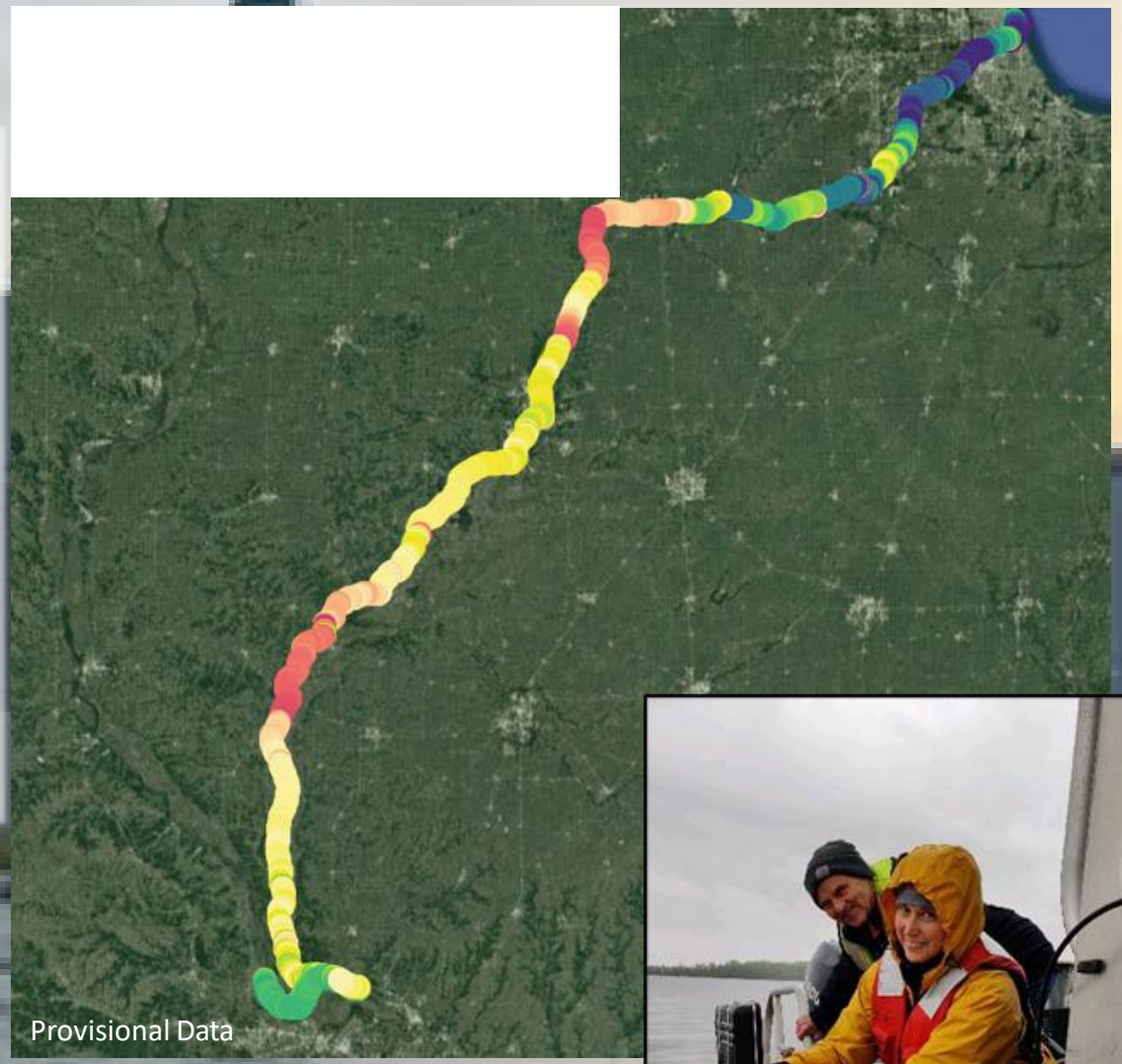
HABs Concerns

Nutrients in Agricultural Tributaries

Illinois River Outlet

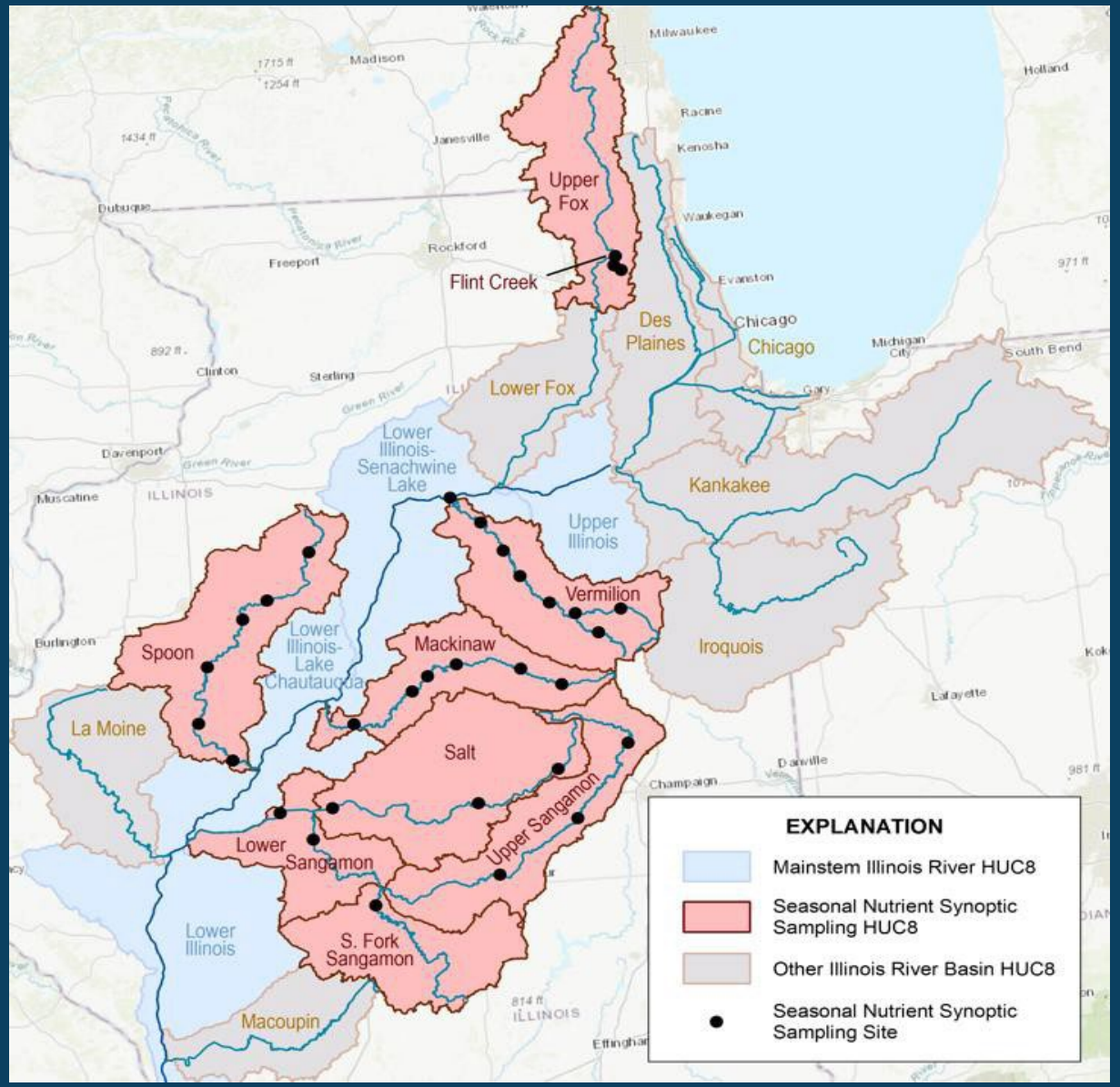


- Cruise of the entire IL River Waterway
  - Continuous flow-through water quality collection
  - May 3-7, 2022
  - August 8-13, 2022
  - Data will be used for modeled predictions to understand sources, transports, and sinks of carbon and nutrients at multiple scales



Seasonal Nutrient Synoptics

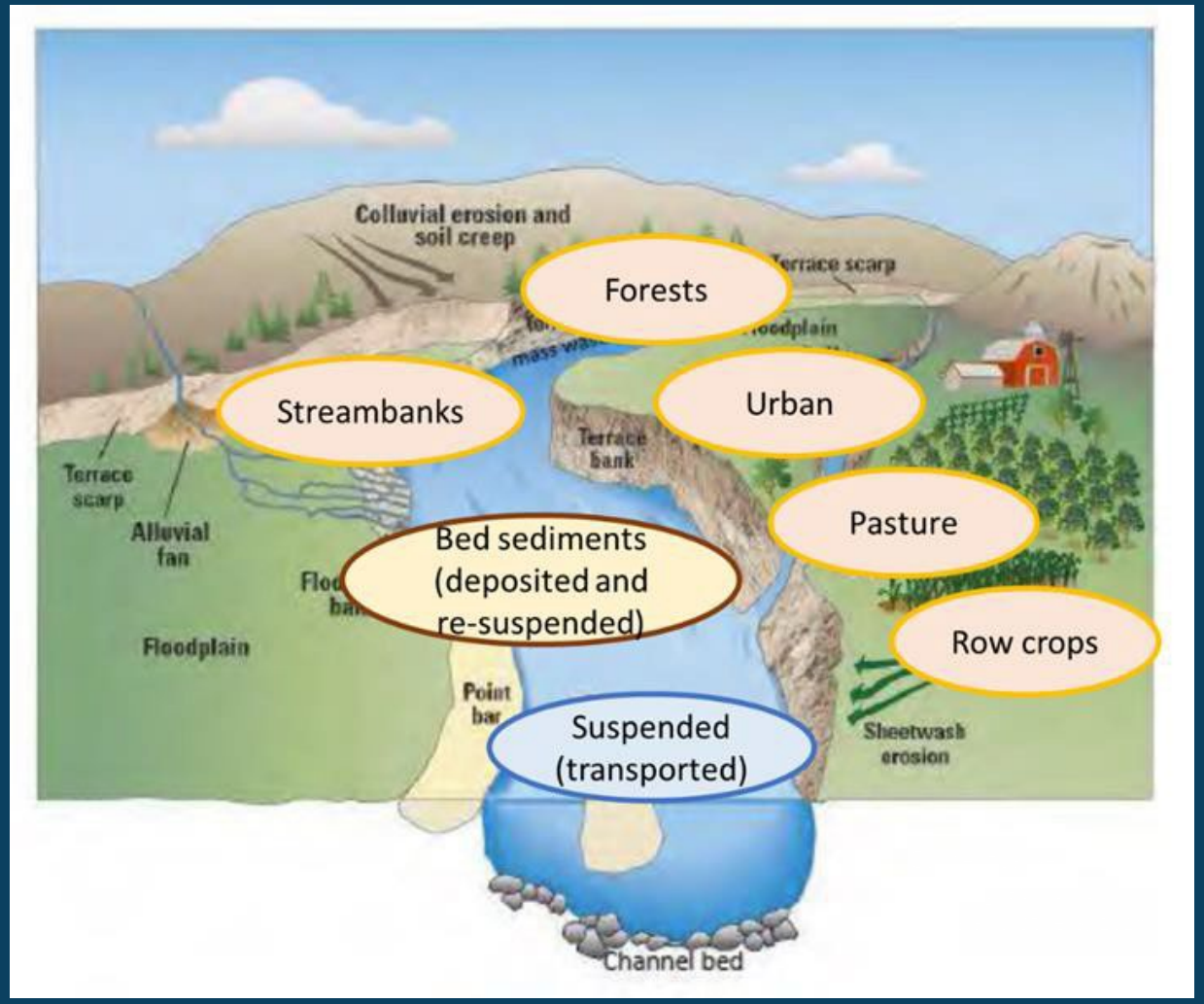
- 1-day “snapshot” from headwaters to mouth of major tributaries
- 6-8 sites per basin
- Nutrient focus
- Seasonal sampling schedules



Sediment and Nutrient Source Tracking

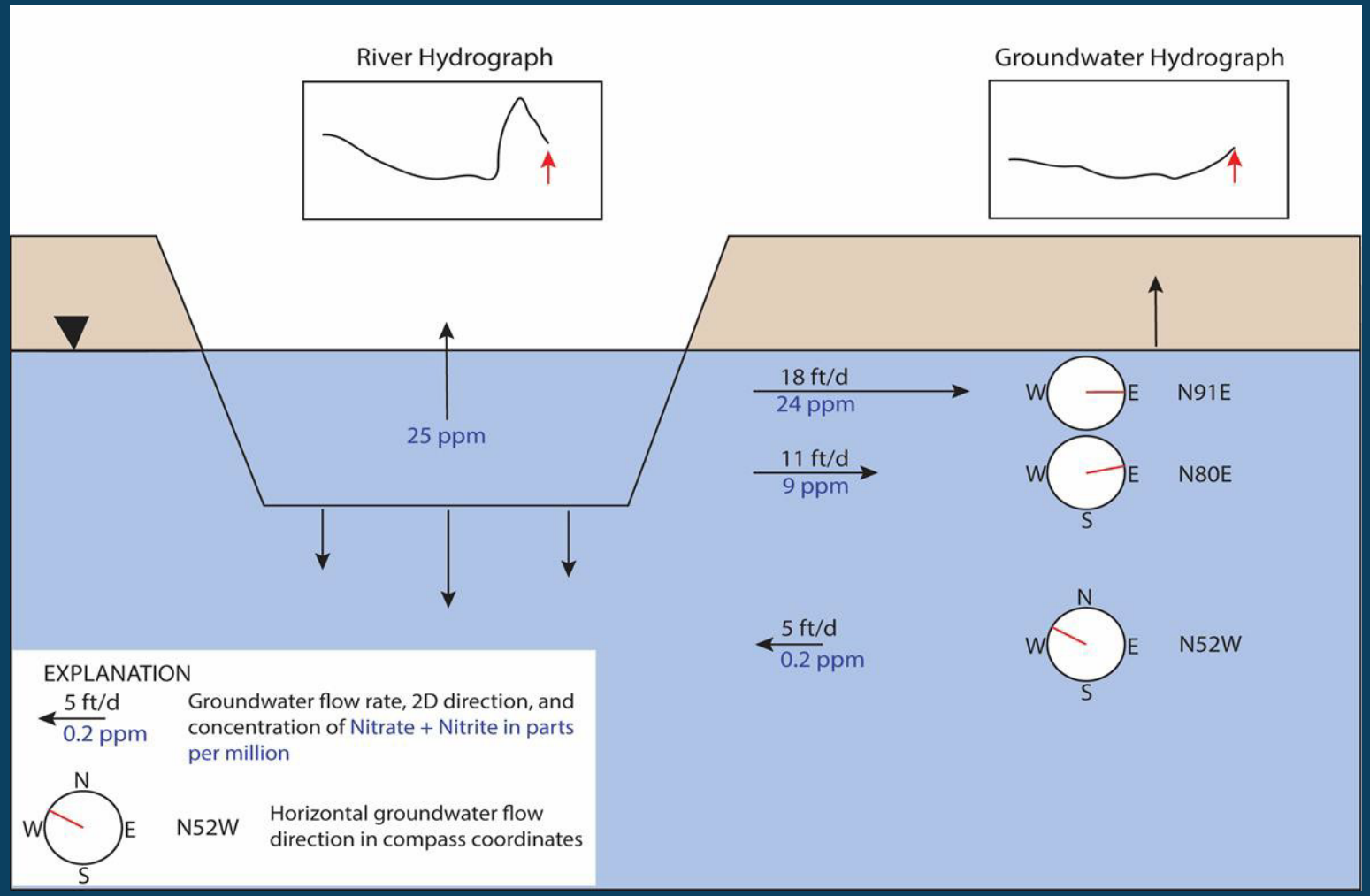
- Small stream in central Illinois

- Fingerprint tracers
  - particle size analysis
  - major and trace elements
  - nutrients
  - stable carbon (^{13}C) and nitrogen (^{15}N) isotopes
- Age tracers (suspended sediment and streambed sediment only)
  - Be-7, used to measure young (weeks to months) surface-derived sediments
  - Pb-210, used to measure older (decades) surface-derived sediments



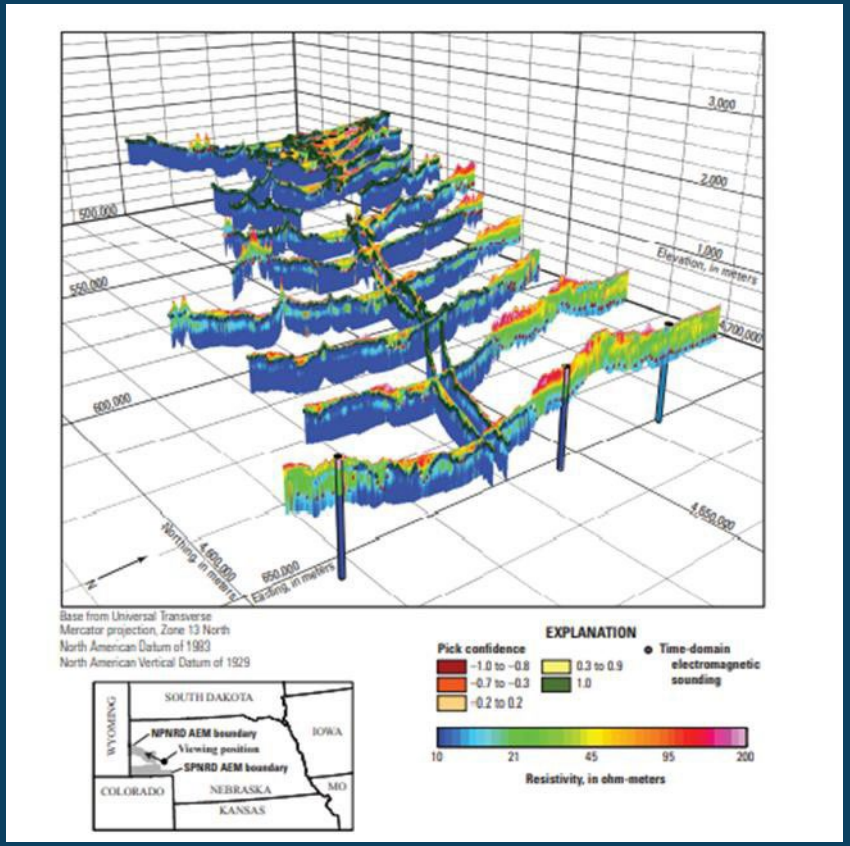
Groundwater-Surface Water Interaction and Nutrient Monitoring

- Quiver Creek Basin
- Kankakee River Basin



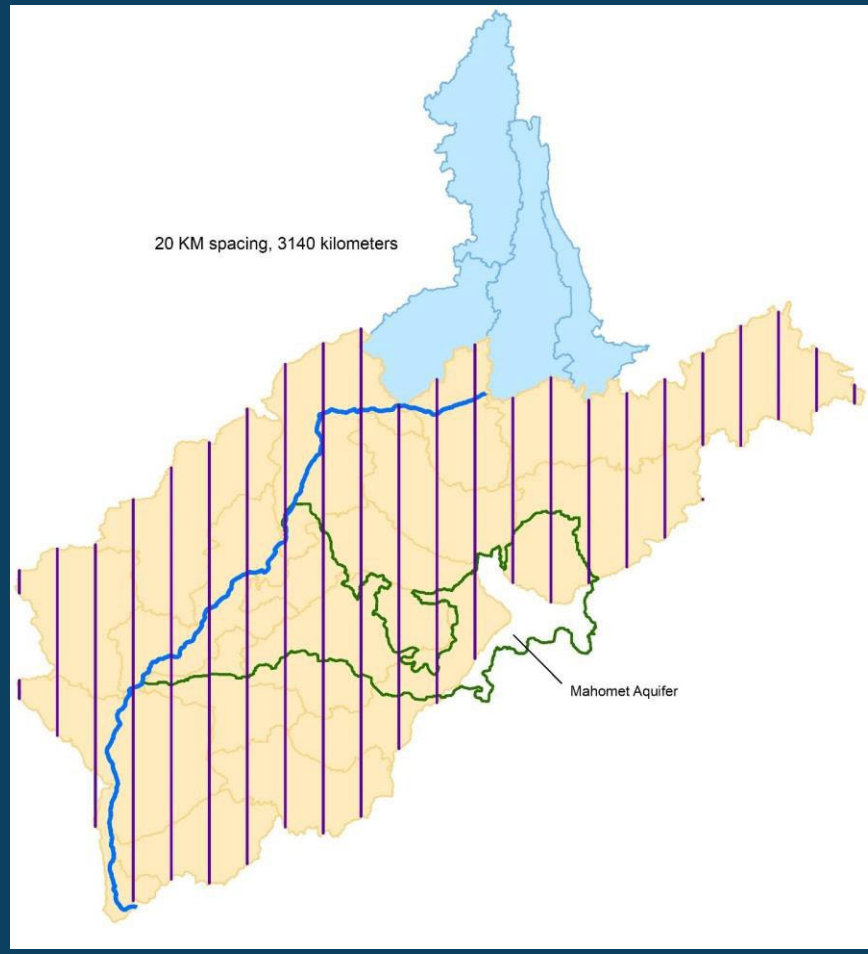
Geophysics-Airborne Electromagnetic (AEM) Survey

Upper Fox River Pilot FY22 and Lower Illinois FY23



Nebraska Example

Upper Fox River flight FY22



Lower Illinois River FY23

Jessie Garrett collecting CyanoHAB samples.
Photograph by Katherine Summers, U.S. Geological Survey

HABs Priority Objectives

- **Improve understanding of conditions driving CyanoHAB occurrences, magnitude, and duration**
- **Evaluate remote sensing of parameters potentially related to CyanoHABs (total chlorophyll, chlorophyll *a*, and phycocyanin)**
- **Improve understanding of conditions driving cyanotoxin and T&O production**
- **Evaluate multi-spectral imaging for monitoring CyanoHABs and other water quality characteristics**
- **Evaluate environmental DNA tracker potential to identify presence of CyanoHABs related species and use for early warning detection**

Thank you

ILLINOIS
NUTRIENT LOSS
REDUCTION STRATEGY

Annual NLRS Workshop

Tuesday, November 1, 2022

9:00 a.m. - 3:30 p.m.

Hybrid: Remote & in person options
IDOA John Block Bldg., IL State Fairgrounds
Registration is coming soon.

Contact: Lisa Merrifield, lmorrisn@illinois.edu

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