# Hypoxia Challenges and Opportunities, an Upper Mississippi River Perspective

**Water Environment Federation Pre-Conference Workshop:**
**Advancing Nutrient Trading Within the Circular Water Economy**
**May 28, 2025**

UMRBA
Upper Mississippi River Basin Association

# Outline

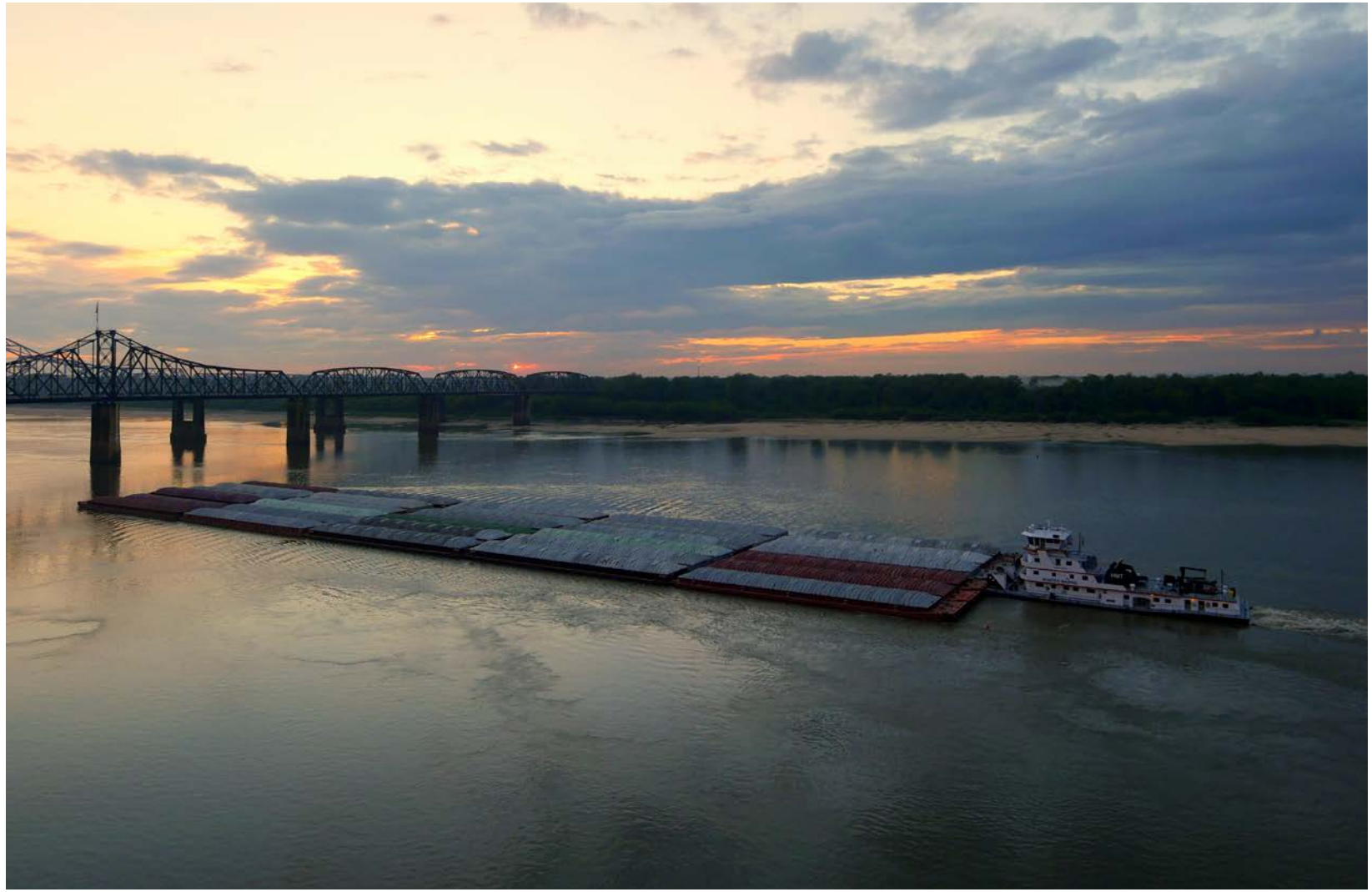
- “Tour” of the Upper Mississippi River Basin (UMRB)
- The Gulf Hypoxia Task Force (HTF) and impacts on water quality
- How the HTF and others are working together
- Case studies and regional collaboration hosted by UMRBA
- Highlights of the UMRB states’ implementation of their individual nutrient loss reduction strategies

# You Are Here

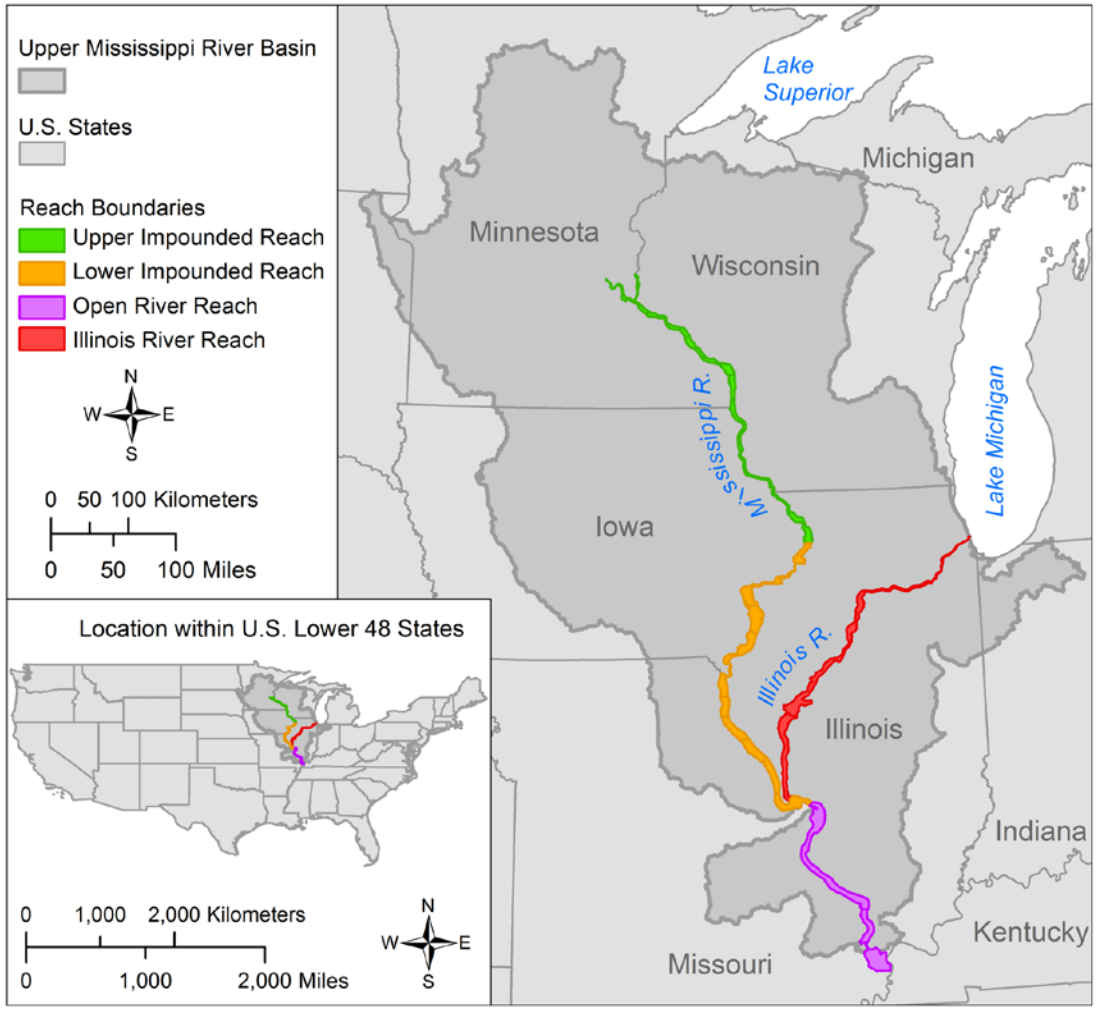

Thunder Bay
Superior Shoal
Lake Superio
Fargo
MINNESOTA
Sault Sainte M
Minneapolis
Saint Paul
Green Bay
WISCONSIN
MICHI
Sioux Falls
Madison
Milwaukee
Gran
Lake Michigan
Lans
IOWA
Chicago
Des Moines
Lincoln
ILLINOIS
Springfield
Indianap
Topeka
Kansas City
INDIANA
Jefferson City
Saint Louis
MISSOURI
Louisville
Wichita
Ohio
KENTU
Upper Mississippi River (HUC2)
Tulsa
National Geographic
Nashville

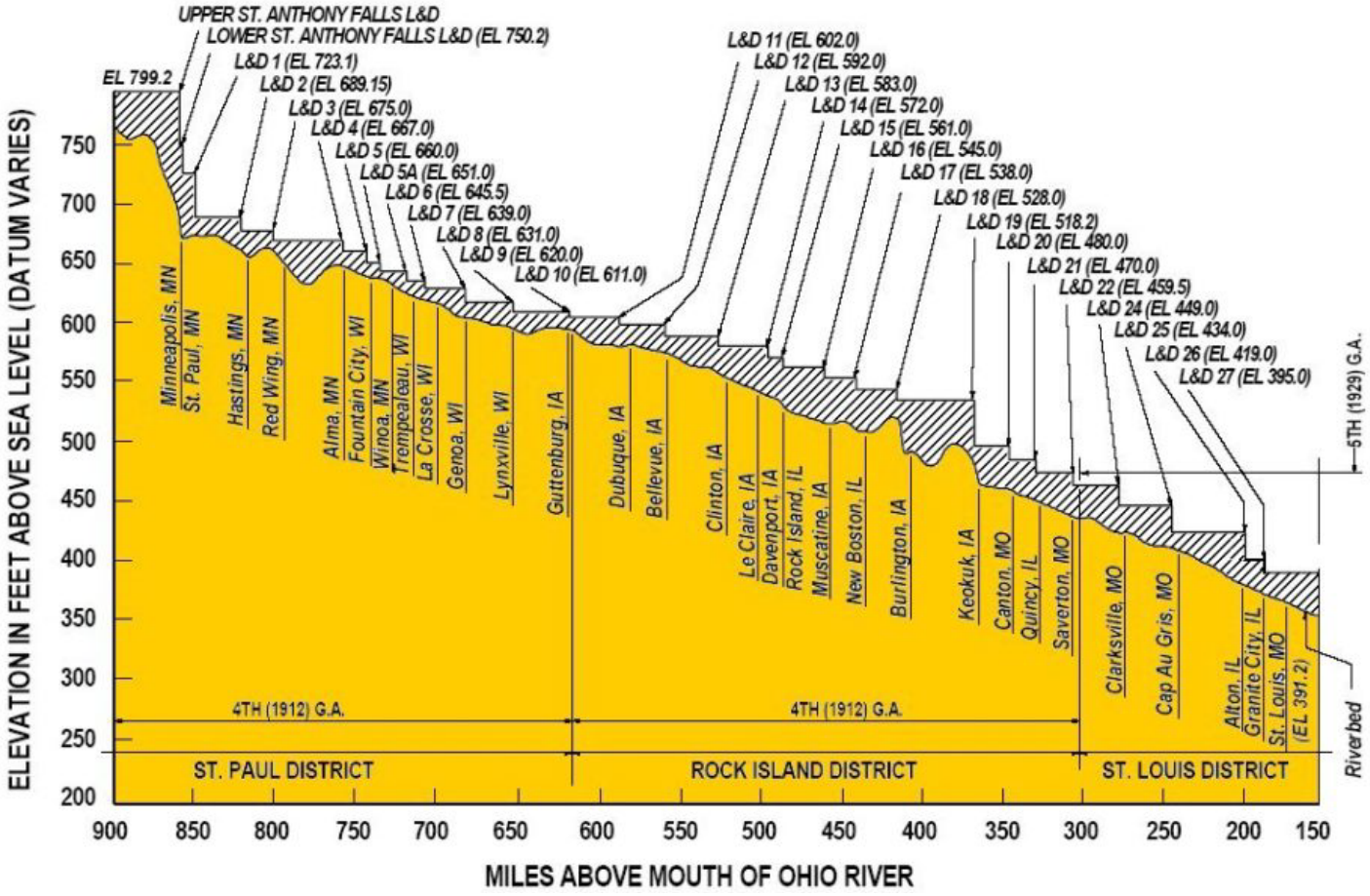
# Multi-Purpose Management

"nationally significant ecosystem and nationally significant commercial navigation system"

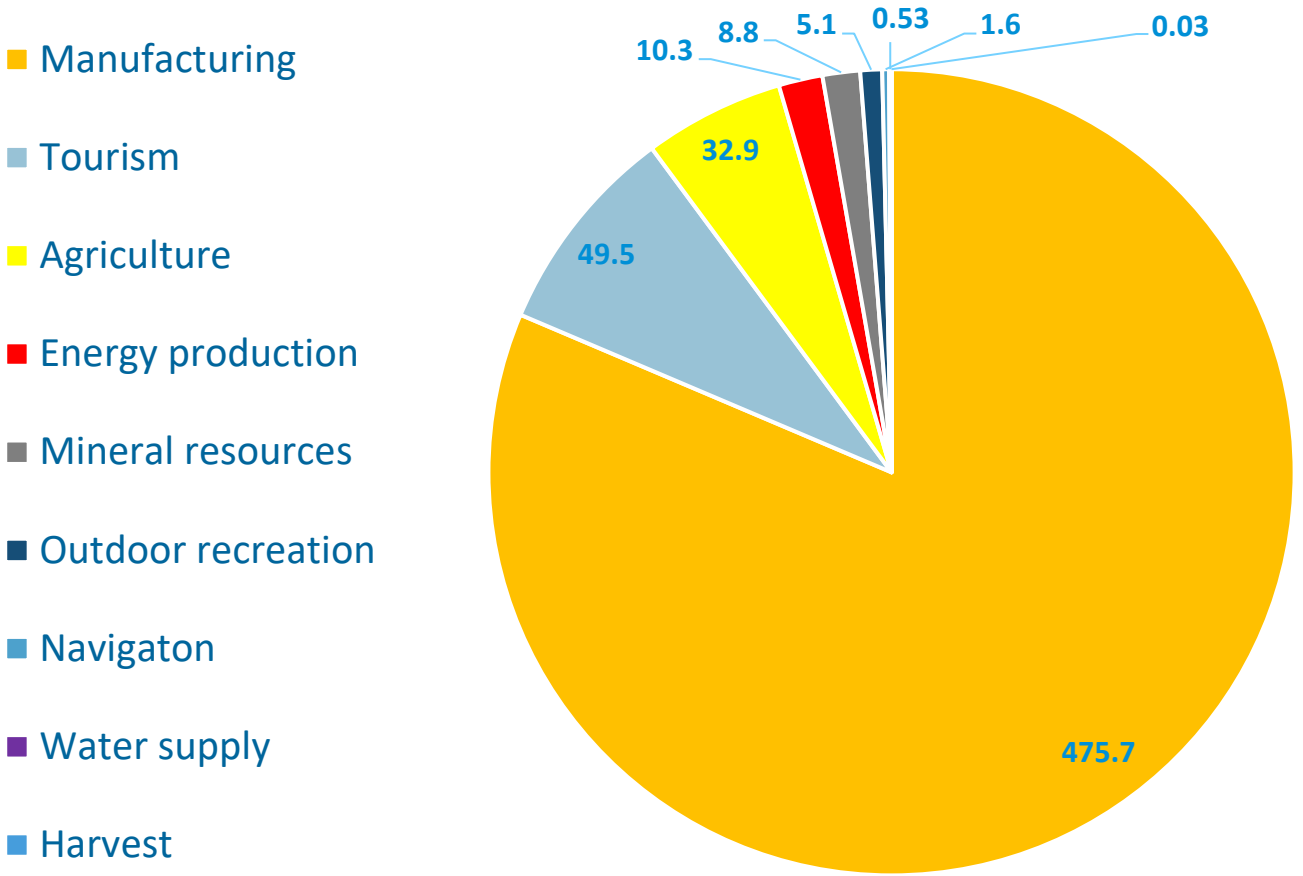


# Commercial Navigation



# The Upper Mississippi River is a vital resource for regional economic prosperity.




Economic sectors in the UMR and IWW corridors generate more than **$548 billion annually, supporting over 1.86 million jobs.**

**$54.6 billion from tourism and recreation, supporting over 686,000 jobs.**

http://www.umrba.org/umr-econ-profile.pdf

# The UMR has ecological value too

127 species of fish - 30 species of freshwater mussels - 300 species of birds



Photos: USFWS Flicker

# Upper Mississippi River Basin Association

## Governor-appointed interstate organization

## Facilitate cooperative action

- Cooperative planning, coordinated management
- Information exchange
- Regional positions
- Advocacy on states' behalf

# Gulf Hypoxia

**The Hypoxia Task Force is working collaboratively to address nutrient loading to the Gulf.**

- 12 Hypoxia Task Force States
- Federal agencies
- Tribes
- University partners
- Sub-basin committees
- Executive and coordinating committee bodies

# History of the Hypoxia Task Force


- 1997: Hypoxia Task Force was formed
- 1998: Harmful Algal Bloom and Hypoxia Research and Control Act (HABHRCA) was passed
- 2001: Action Plan was published
- 2002-2004: Sub-basin committees were formed
- 2008: Action Plan published

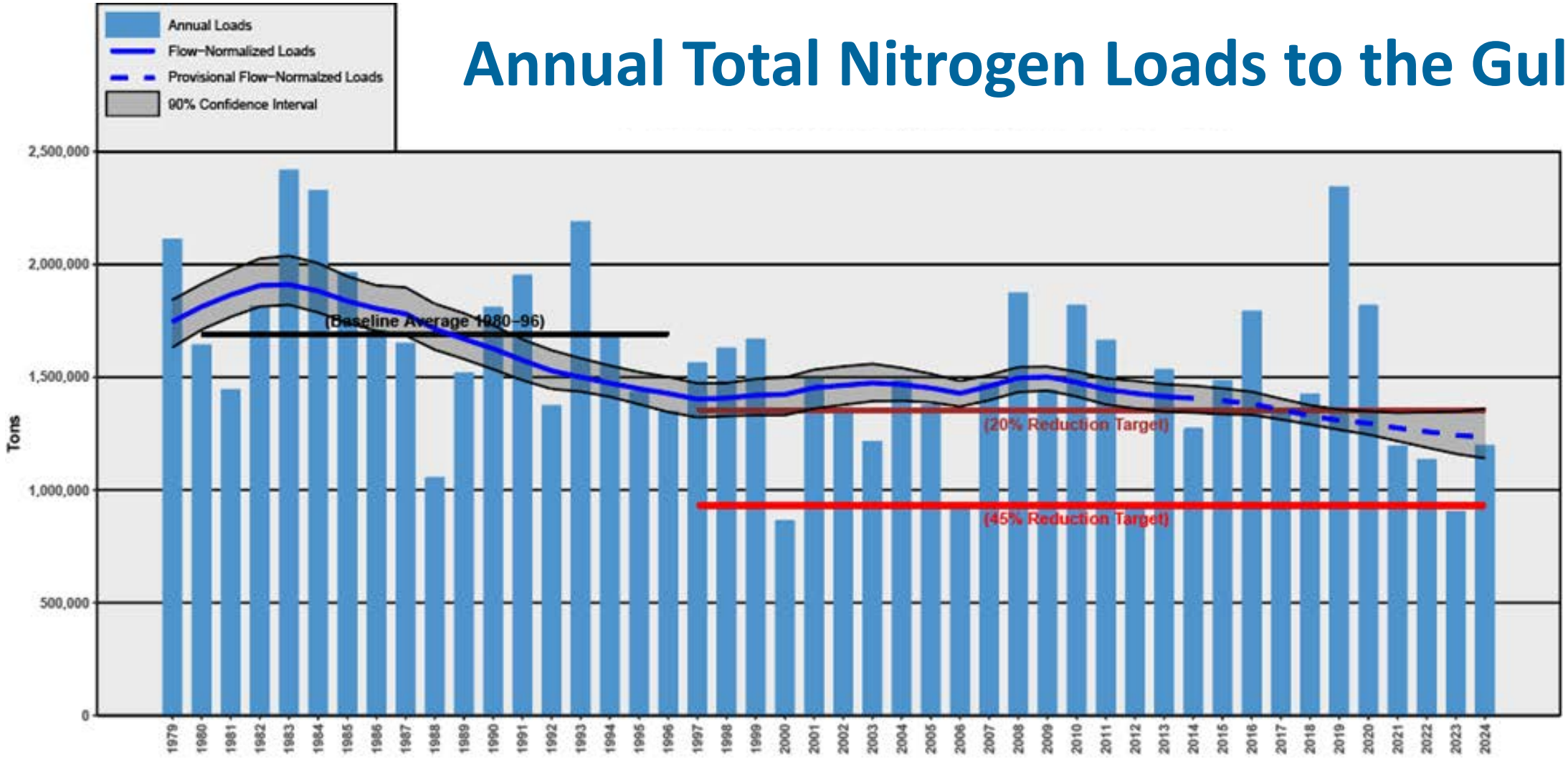
Credit: https://www.epa.gov/ms-htf

# History of the Hypoxia Task Force


- **2012-2015:** States developed individual nutrient reduction strategies
- **2014:** SERA-46 was formed
- **2015:** New Goal Framework was published
- **2020-present:** HTF Coordinating Committee formed workgroups
- **2022:** Bipartisan Infrastructure Law passed, establishing the Gulf Hypoxia Program
- **2025:** Interim target for nitrogen and phosphorus reduction goals

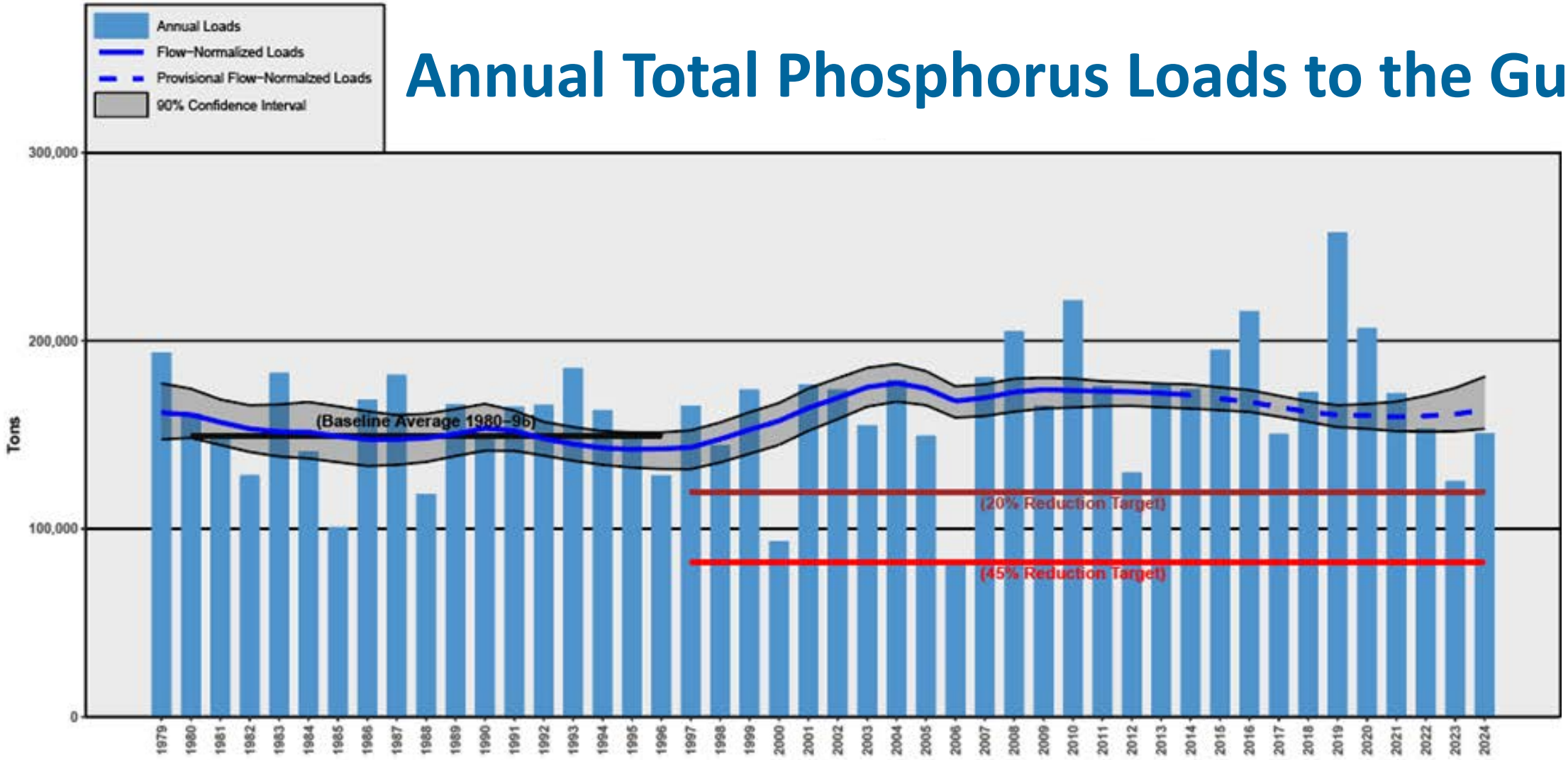
Credit: https://www.epa.gov/ms-htf

# Annual Total Nitrogen Loads to the Gulf




| Trend start period | Trend end year | Trend, in percent change | Lower 90% confidence interval | Upper 90% confidence interval | Trend attributed to changes in streamflow | Trend attributed to other changes in the watershed |
|---|---|---|---|---|---|---|
| 1980–1996 | 2024 | −27% | −36% | −19% | 0% | −27% |

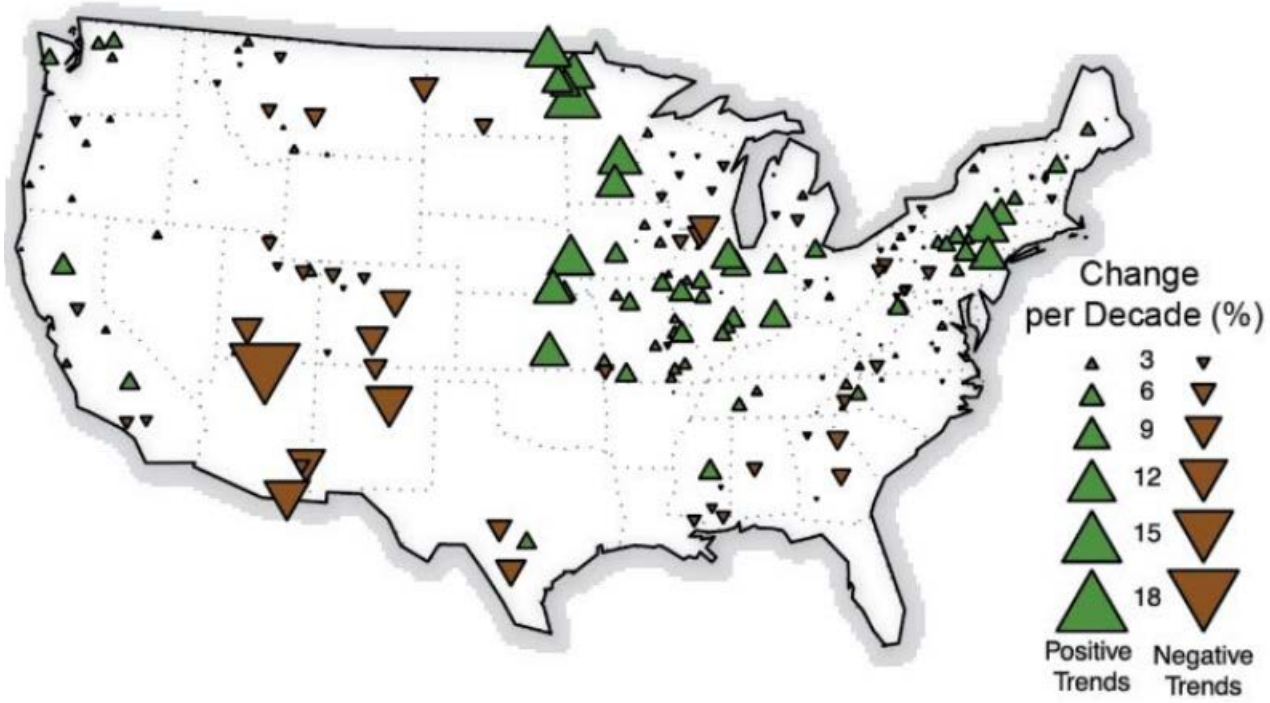
# Annual Total Phosphorus Loads to the Gulf




| Trend start period | Trend end year | Trend, in percent change | Lower 90% confidence interval | Upper 90% confidence interval | Trend attributed to changes in streamflow | Trend attributed to other changes in the watershed |
|---|---|---|---|---|---|---|
| 1980–1996 | 2024 | 9% | −5% | 19% | −1% | 10% |

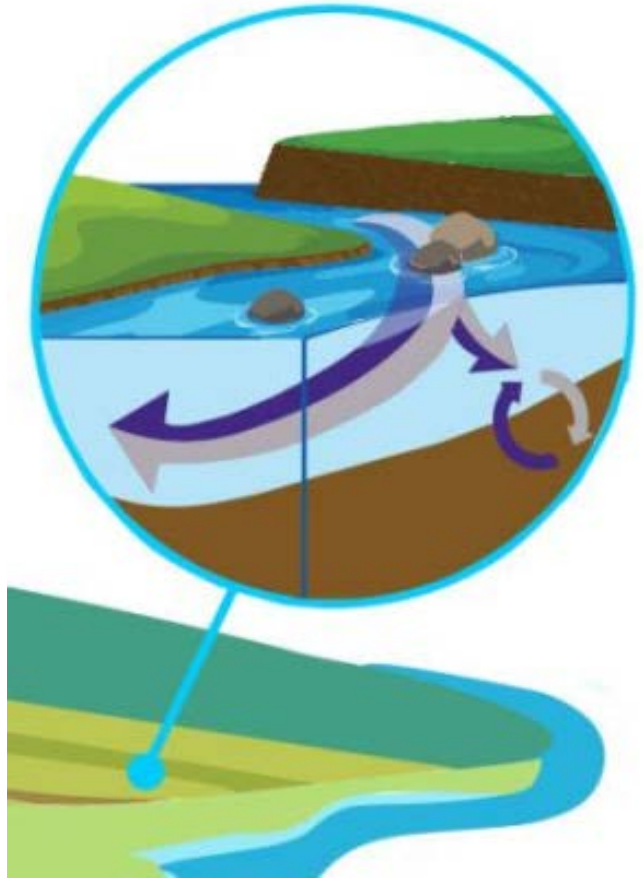
# Water Quality Trends are Complicated

- Climate Change
  - Trend magnitude and direction of annual flooding, 1920-2008 (Figure)



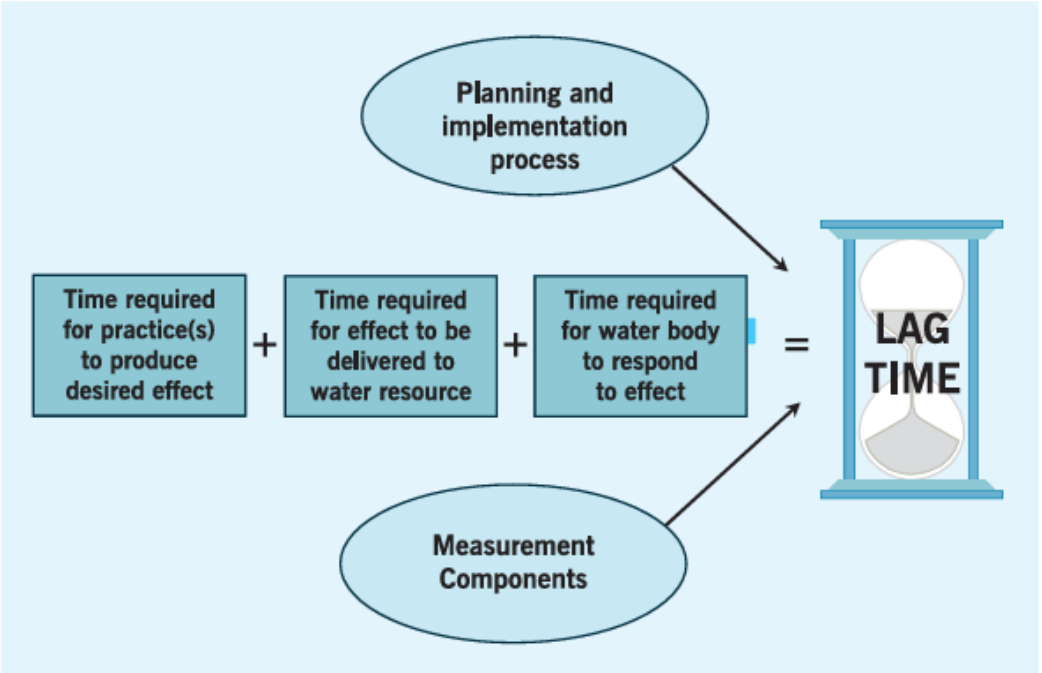
# Water Quality Trends are Complicated

- Legacy nutrients
  - **Edge of field:** Once phosphorus enters the stream, it can either be transported downstream or stored in streambanks or within the riverbed.



# Water Quality Trends are Complicated

- Lagged response between BMP implementation and water quality changes



# Upper Mississippi River Basin Specific Water Quality Trends

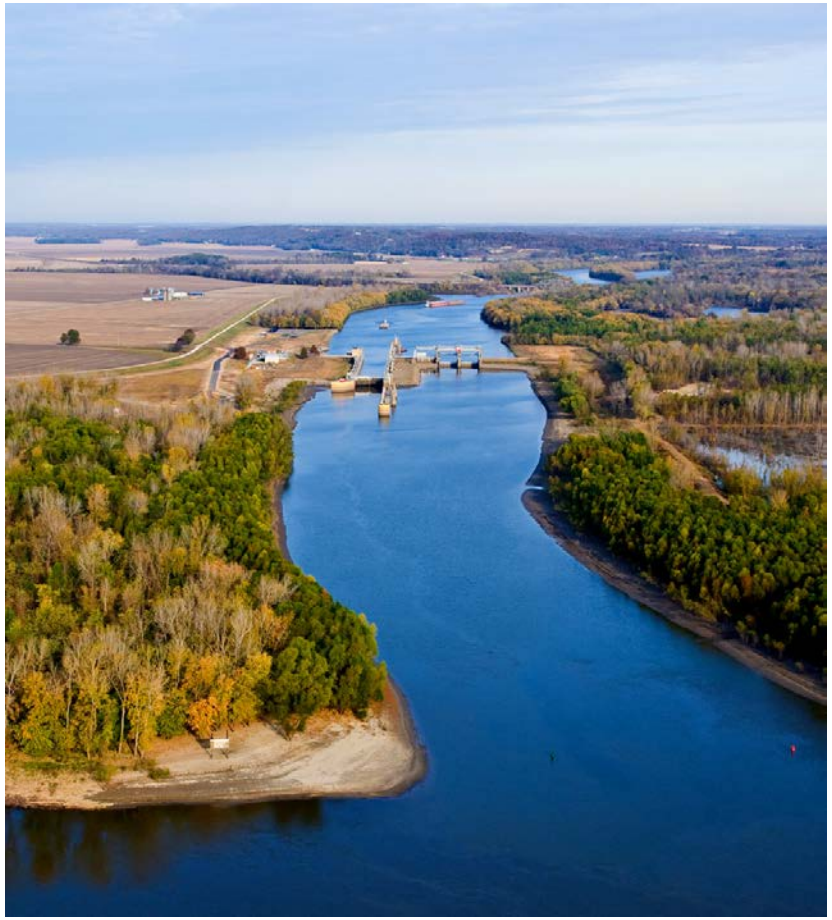
Upper Mississippi River Restoration Long Term Resource Monitoring evaluated 30-year water quality trends

UMRBA's *How Clean is the River?* Report, analyzed water quality data from 1989-2018

# Upper Mississippi River Interstate Nutrient Collaborations

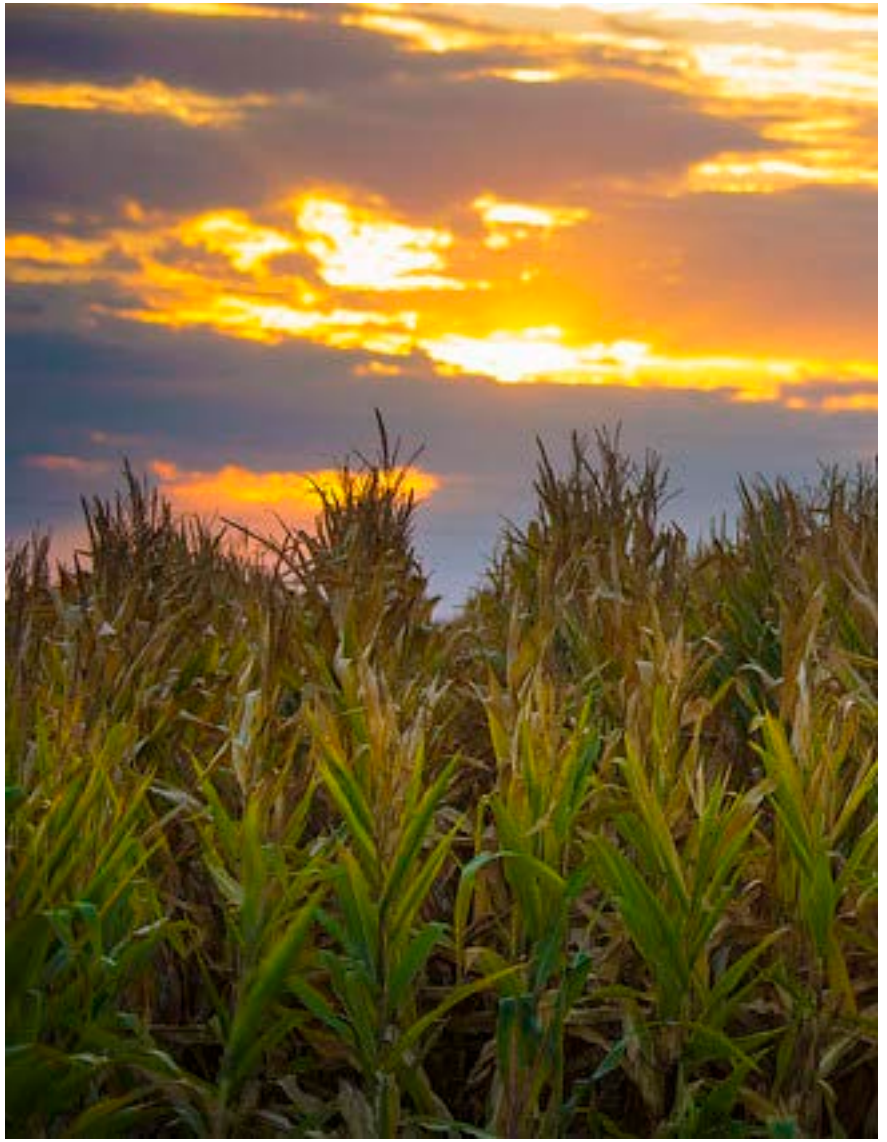
# UMRBA's Interstate Nutrient Collaborations

- Strengthen regional collaboration
- Facilitate and foster cooperative planning and coordinated management
- Exchange information
- Identify priorities and actionable items for collaborative action
- Develop regional positions on river resources issues (with consensus)



# Progress Tracking Workshop 2021

- Quantifying best management practice (BMP) effectiveness
- Efforts to capture private investment in BMPs
- Investigating water quality changes following nutrient loss reduction in a watershed
- Incorporating new datasets (e.g., surveys, farmer attitudes, new innovations in monitoring)



# Multi-Benefit Conservation Practice Workshop Series

# UMRBA's definition of Multi-Benefit Conservation Practices

A term to describe a singular conservation practice that provides more than one beneficial outcome. The beneficial outcomes may be any combination of agronomic, ecological, social, and financial.

# November 2022 Workshop One
# St. Louis, MO

- **Topics:** state of the science, research, communications/social science, and financial
- **65 participants** spanning state and federal agencies, nonprofits organizations (agriculture, environmental), universities, industry, and for-profit entities (food cooperatives)

# Communications and Social Science

What social science information can help communicate information about conservation practices with multiple benefits to a diverse group of landowners (i.e., middle and late adopters)?

- What We Know About Motivation for Conservation Practice Adoption
- Incorporating behavior change science for more effective conservation outreach
- Illinois Farm Bureau Nutrient Stewardship Programs and Initiatives

# *Are there ways of motivating adoption beyond formal training? What examples are there of non-traditional outreach approaches?*

- Incentivize and reward highly effective NRCS representatives
- Encourage farmer mentors for new conservation district staff
- Develop and implement a “text network” for farmers
- Host a monthly “watershed cafe” to train conservation staff on sales techniques and landowner relationship skills
- Convene events and employ marketing to sell the problem, not the practice
- Develop and fund a gov’t demonstration program that allows the respective entity to assume the risk

# Financial Information Sharing

What financial tools and incentives exist for land users to select conservation practices with multiple benefits?

- Scaling Climate and Water Smart Cropping Systems
- Minnesota Pilot Project to Increase Farmer Participation in Ecosystem Services Markets
- Single Fiscal Agent Models and Reducing Barriers for Practice Implementation (Batch and Build Model)

## *What financial research and tools are missing that could aid practitioners in increasing conservation practice with multiple benefit adoption?*

- Identify single points-of-contact for USEPA, NRCS, and cost share programs
- Shift the focus on yield to profitability and return on investment
- Develop opportunities to innovate, drive, and incentivize within existing programs – e.g., EQIP and SRF
- Map private programs to understand where funding is going and how it could be better deployed
- Test innovative financial mechanisms at a pilot or demonstration scale
- Help operating landowners develop business plans and ensure they feel financially competent.

# October 2023 Workshop Two
# St. Paul, MN

- **Theme:** Leverage points are places within a complex system where a small change in one thing can produce big changes in everything.
- **62 participants** spanning state and federal agencies, nonprofits organizations (agriculture, environmental), universities, industry, and for-profit entities (food cooperatives)

POLICY

FINANCIAL

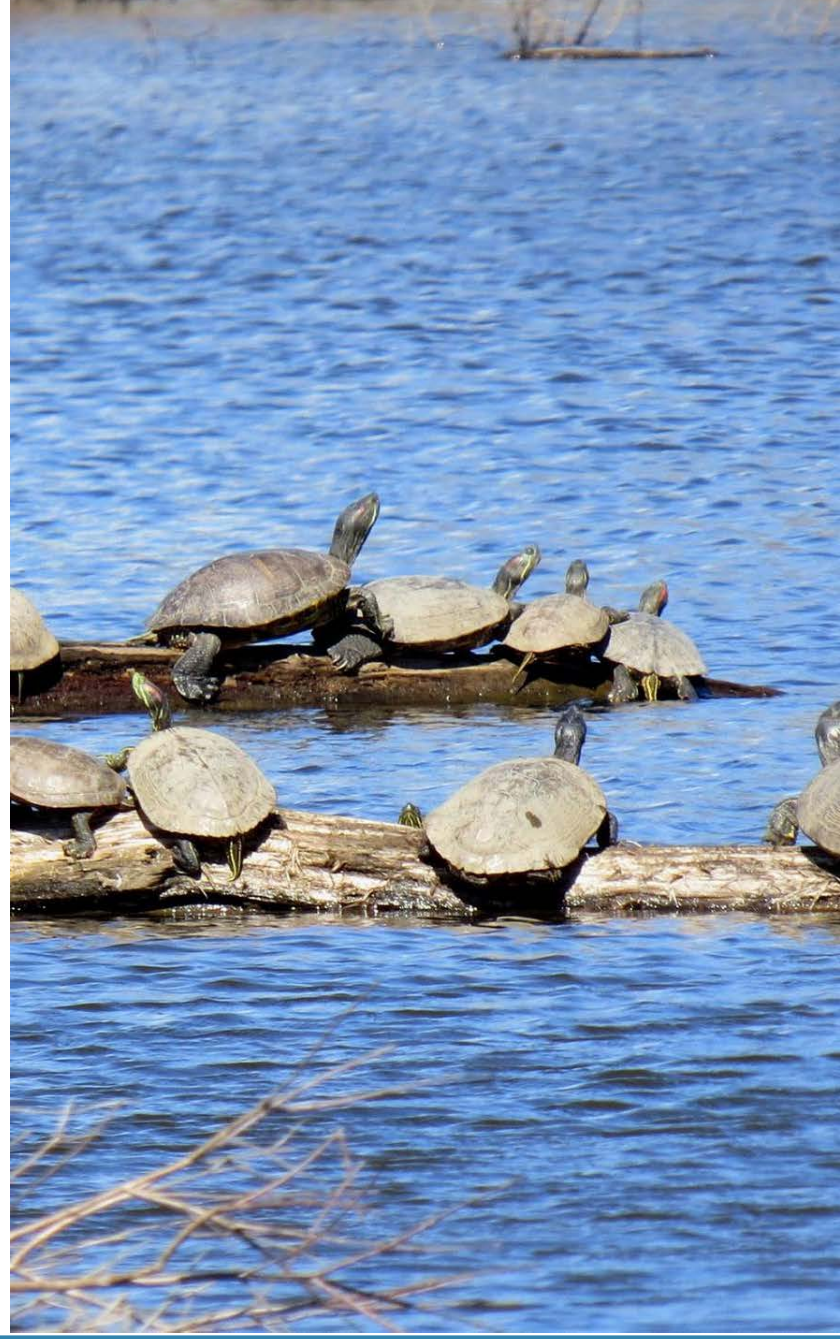
TECHNICAL

LEADERSHIP

PARTNERSHIPS

# Examples of Leverage Points

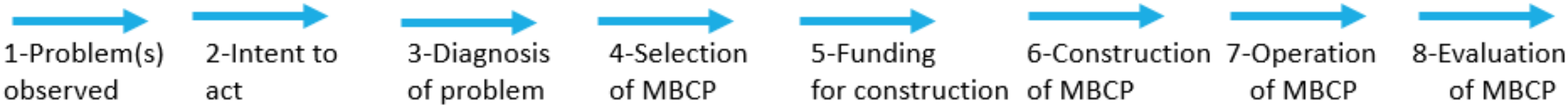
- **Improved and coordinated conservation technical assistance:** conservation agronomists, cross-agency conservation system specialists, and cross-sector coordination efforts
- **Innovative and streamlined funding mechanisms:** batch-and-build, pay-for-performance, local community-led grants



# Examples of Leverage Points

- **Peer-to-peer networks:** producer-led watershed groups, farmer and practitioner leadership development, meeting grants and facilitation
- **New partnerships:** ag-urban partnerships, new and beginning producers

# Evaluating the "System"




Possible sources of information, leadership, and support at each step:

| 1-Operation Issue | 2-Govt Agent | 3- Govt Agent | 4- Govt Agent | 5-Govt | 6-Private Company | 7-Land owner | 8-Govt Agent |
|---|---|---|---|---|---|---|---|
| Runoff Issue | Crop Consultant | Crop Consultant | Crop Consultant | Product Purchaser | Do-it-yourself | Operator (if rented) | Crop Consultant |
| Regulatory Issue | **Peer-to-Peer** | **Peer-to-Peer** | **Peer-to-Peer** | Personal finance | Govt agent | | **Peer-to-peer** |
| Aesthetic Issue | Personal Learning | Personal Learning | Personal Learning | Bank | NGO | | Personal Learning |
| | Family Network | Family Network | Family Network | | NGO | | Product Purchaser |

# Table Top Discussion Results

***What are 2-3 important improvements we, as a community of practice, could make in the "policy support space" for multi-benefit conservation practices? (In this context, "policy" can include laws, rules, and administrative procedures.)***

- Support bottom-up policies (as opposed to top-down)
- Streamline permitting
- Avoid prescribing "how" to allow for innovation and adaption
- Ensure policies are science-based, market-based, and incentive driven
- Broaden eligibility for urban-rural partnerships
- Replicate programs that have shown successes

## *What small changes in your organization's approach to multi-benefit conservation practices might you begin to advocate for based on the ideas and perspectives shared during the workshop?*

- Empower farmer leaders
- Structure multi-organizational efforts around where each entity can be most impactful
- Coordinate and share messaging among organizations
- Improved education and outreach for nonoperating landowners
- Pair conservation agronomists with farmer leaders
- Reduce barriers to entry for farmers in conservation programs

# Workshop Materials

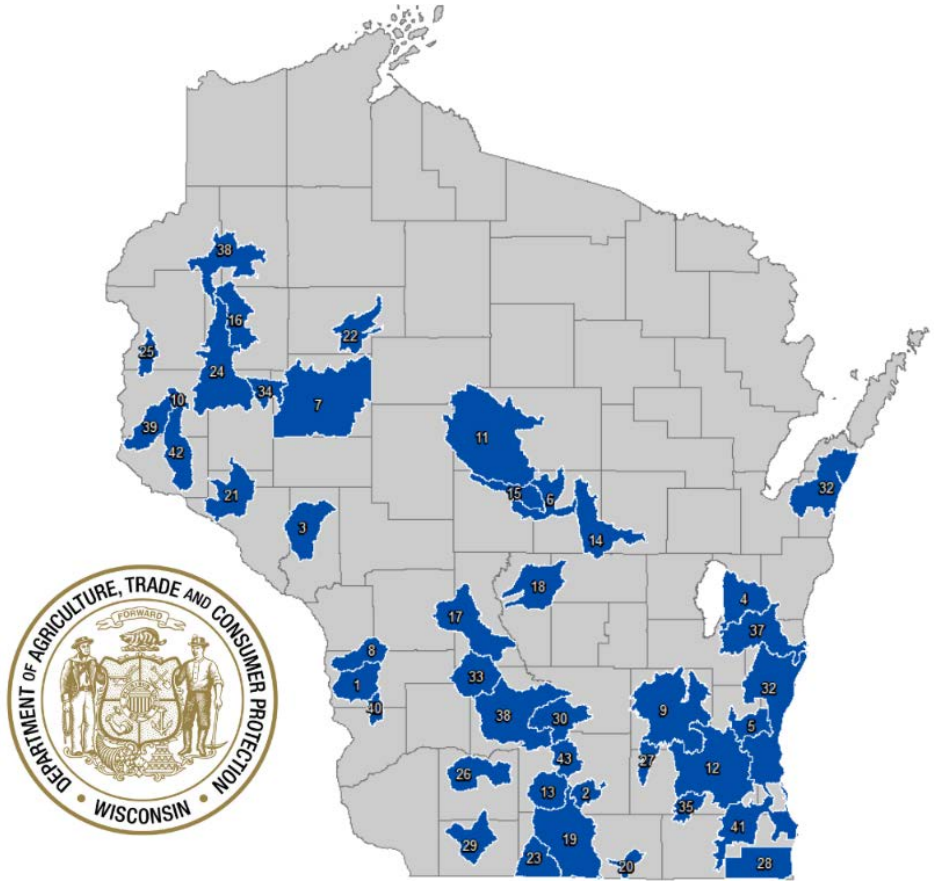
https://umrba.org/document/multi-benefit-workshops

# Innovative and Streamline Funding Mechanisms: Batch and Build

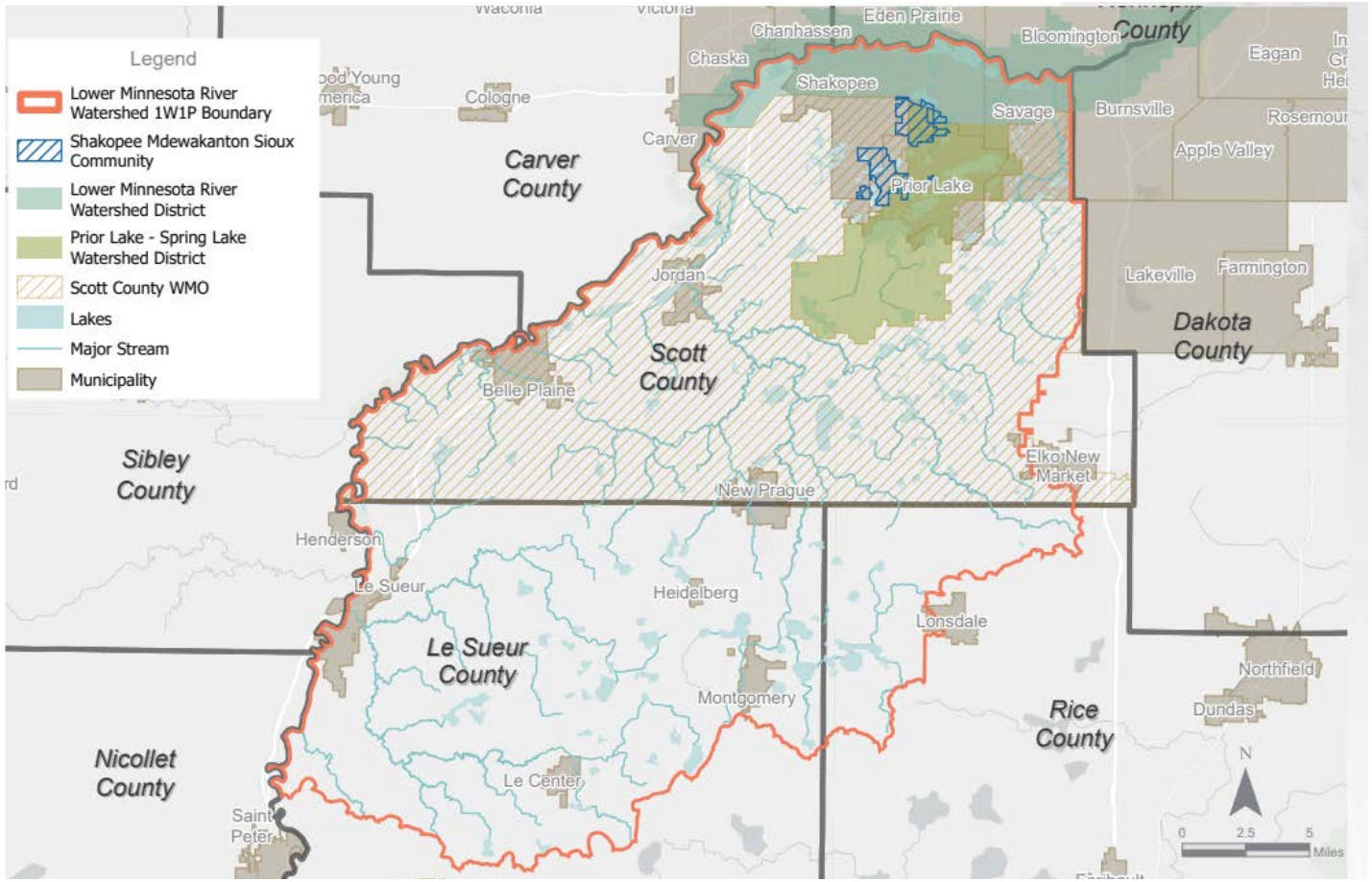
- Focused on edge of field practices – e.g., saturated buffer, bioreactor, and wetland
- “Batch” projects into single construction contracts
- Funding model reduces “hassle” factor

# Peer to Peer Networks: Wisconsin's Producer Led Watershed Groups

- Fosters local leadership to encourage participation in conservation



# Cross Sector Coordination: Minnesota's One Watershed, One Plan

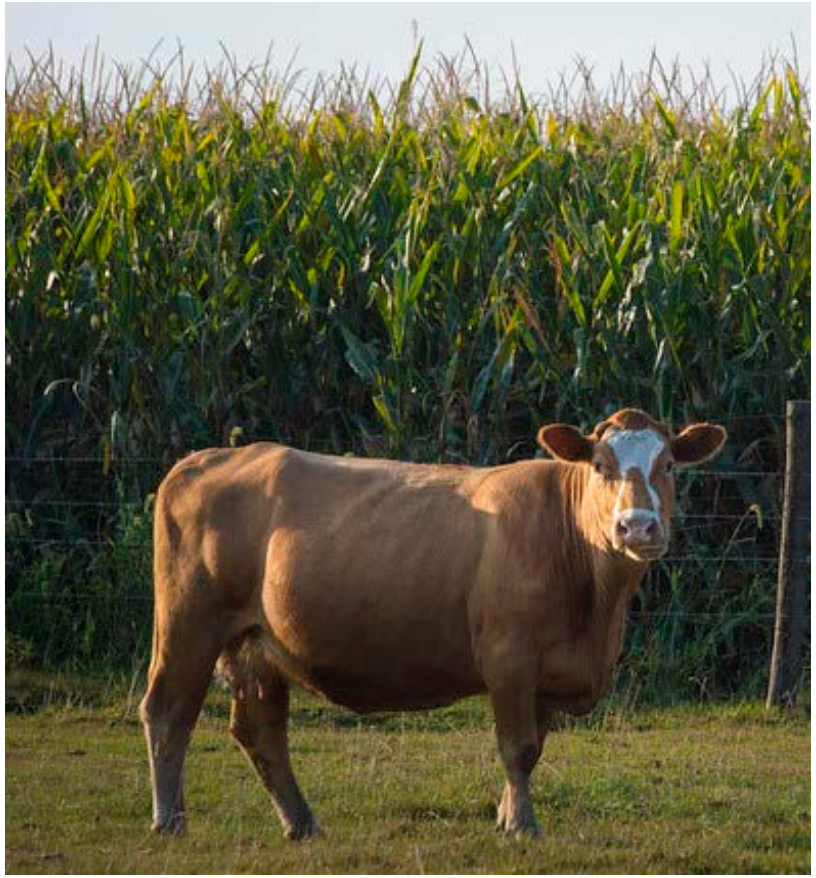


# Gulf Hypoxia Program

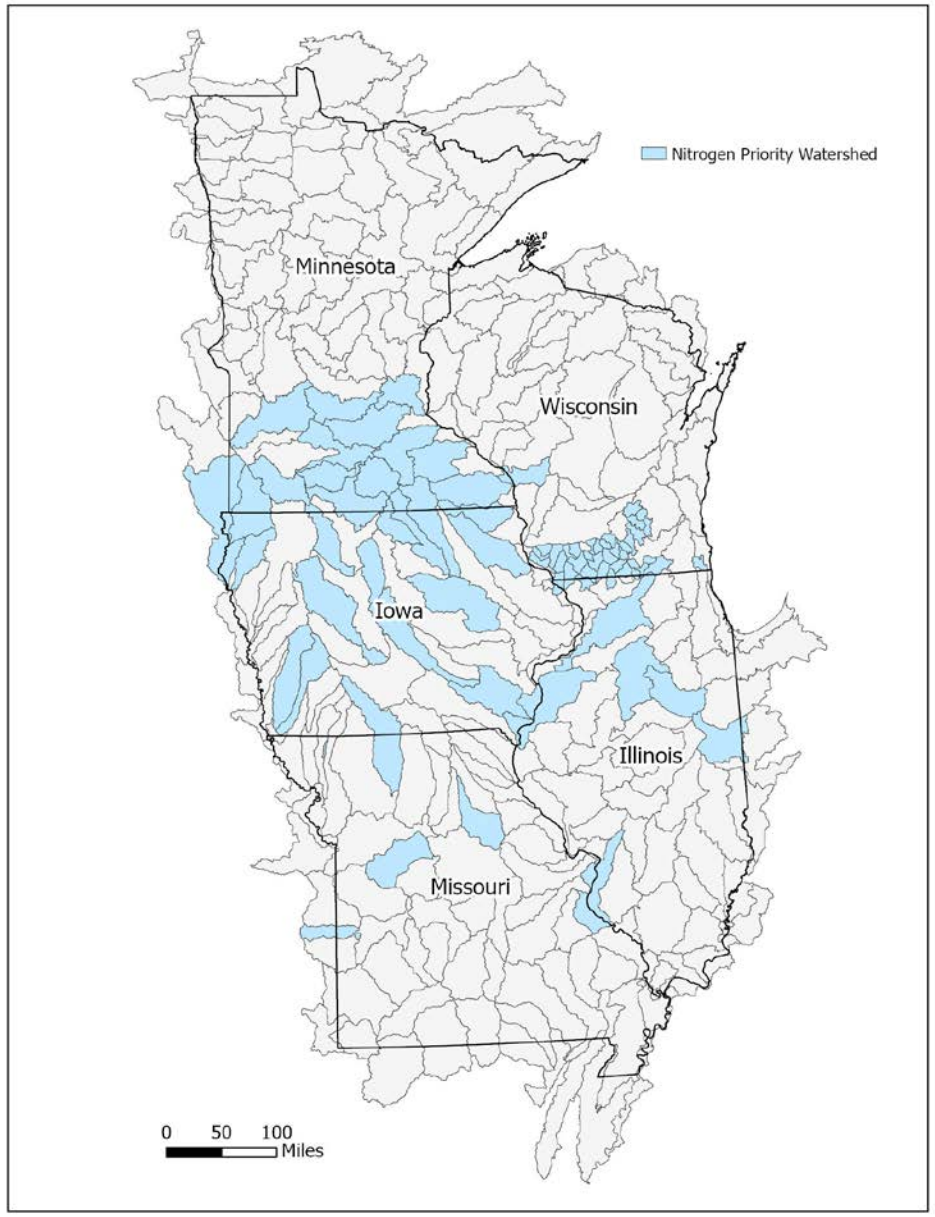
- **Bipartisan Infrastructure Law** authorized and appropriated the **Gulf Hypoxia Program**
  - **Dedicated funding** for the 12 Hypoxia Task Force states, eligible tribes, sub-basin committees, and the SERA-46 (land grant university consortium)

# UMRS Nutrient Loss Reduction Strategy

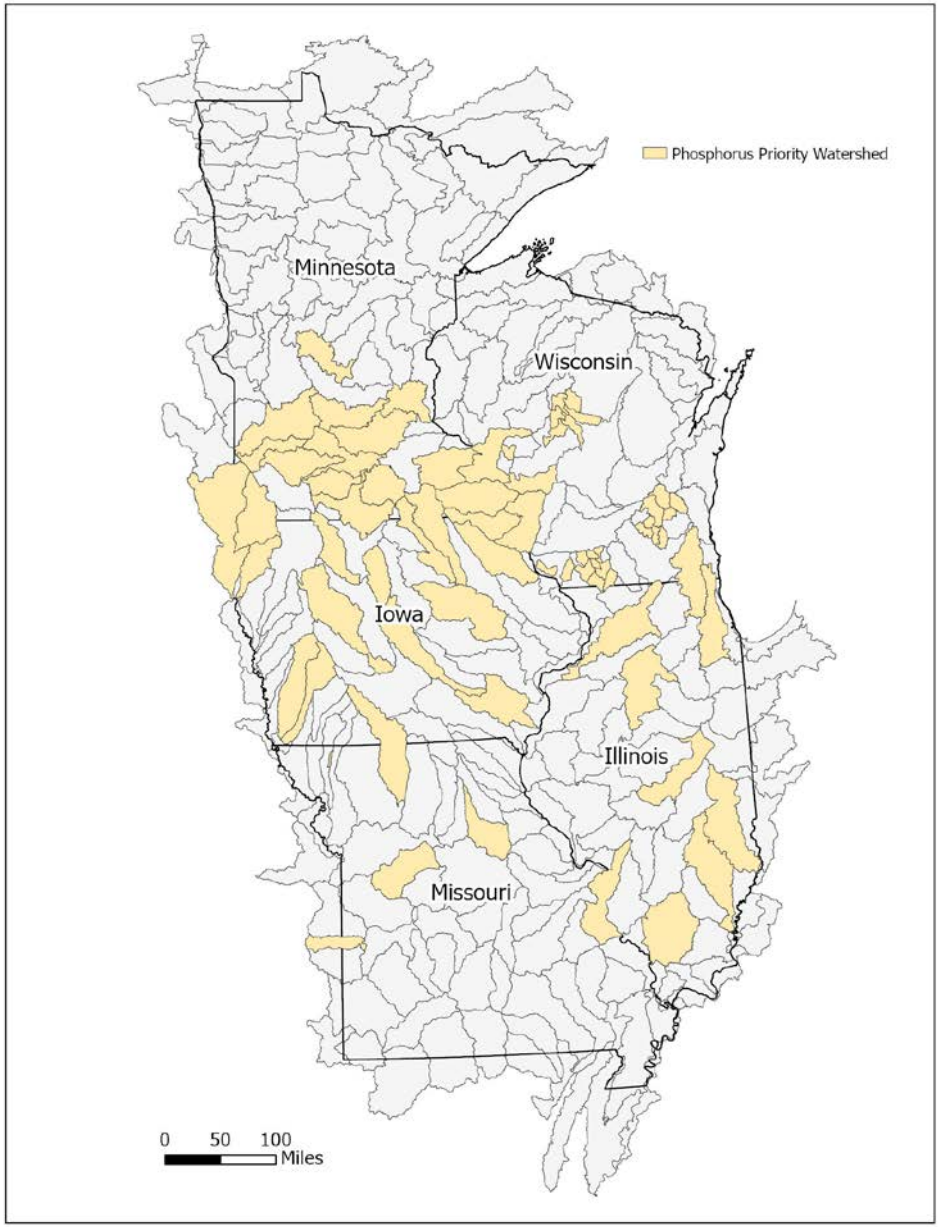
- **Purpose:** evaluate the individual nutrient loss reduction strategies from Iowa, Illinois, Missouri, Minnesota, and Wisconsin to evaluate similarities and differences among the strategies and identify interstate collaborative actions.



# Nitrogen Priority Watersheds



# Phosphorus Priority Watersheds



# Conclusions

- UMRBA recognizes that addressing nutrient loss requires cross-sector and multi-state collaboration and solutions.
- Multi-benefit conservation practices ensure soils are healthy, farmland is productive, and nutrients stay in place.
- UMRBA has introduced concepts such as systems mapping to identify leverage points of change and areas that are slowing or disincentivizing the implementation of multi-benefit conservation practices.

UMRBA
Upper Mississippi River Basin Association

Lauren Salvato
Water Quality Program Leader
lsalvato@umrba.org

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- NOAA: https://www.noaa.gov/sites/default/files/2022-03/Technical_Version_Upper_MS_River_Communicating_CC.pdf (link no longer works) (Slide 14)
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