2025 Minnesota Nutrient Reduction Strategy (NRS)

USDA NRCS State Technical Committee update
April 1, 2026

Matt Drewitz, MPCA Research Scientist
Corrie Layfield, MPCA Environmental Consultant

MINNESOTA

Topics today

- What is an NRS and why is it important
- Updates made to MN's NRS
- Progress to date
- Nutrient sources and science assessment
- Water quality trends and priorities
- Next steps for the NRS roll out
- Connections to SWCD and NRCS work

Your questions

Why are nutrients a problem?

When nutrient levels become too high, they can cause excessive algae growth, low oxygen levels, impact human health, contaminate groundwater and drinking water, and harm aquatic life and habitat.

These nutrients come from agricultural runoff, wastewater treatment plants, nitrate leaching from cropland, streambank erosion for phosphorus, and urban stormwater runoff.

Today – Where's the problem of excess nutrients?

Minnesota waters

Protect water from excess nitrogen and phosphorus

Downstream - south

Reduce the hypoxia/dead zone at the gulf

Downstream - north

Reduce the algae blooms in Lake Winnipeg

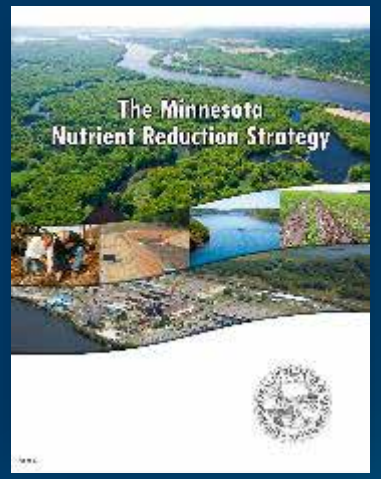
What is a Nutrient Reduction Strategy?

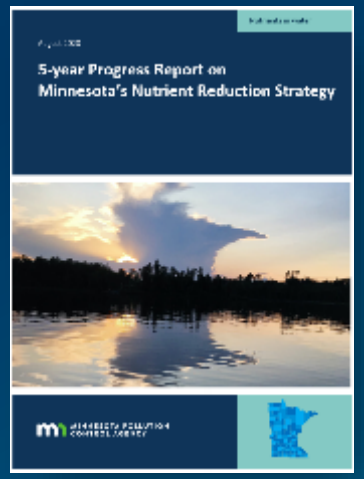
The NRS is a plan with a combination of state-level goals, approaches, and actions to address both point sources and nonpoint sources.

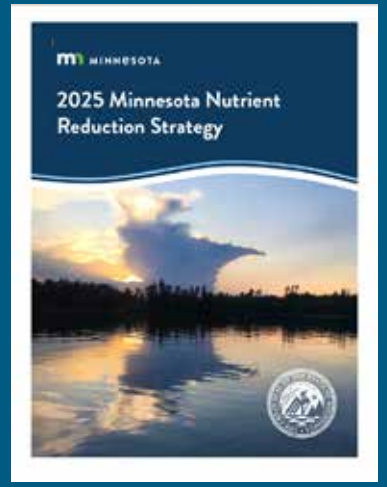
The goal is to improve water quality and protect ecosystems, both locally and downstream (i.e. the Gulf, Lake Winnipeg, Lake Superior).

Nutrients of concern for the Nutrient Reduction Strategy include both phosphorus and nitrogen entering Minnesota water bodies.

10-year update to Minnesota Nutrient Reduction Strategy







2014
Original strategy

2020
Progress report

2025
Updated & revised strategy

2040
Final Goals

2025 Minnesota NRS contributors

MINNESOTA

POLLUTION CONTROL AGENCY
DEPARTMENT OF AGRICULTURE
DEPARTMENT OF HEALTH
DEPARTMENT OF NATURAL RESOURCES
BOARD OF WATER AND SOIL RESOURCES
ENVIRONMENTAL QUALITY BOARD

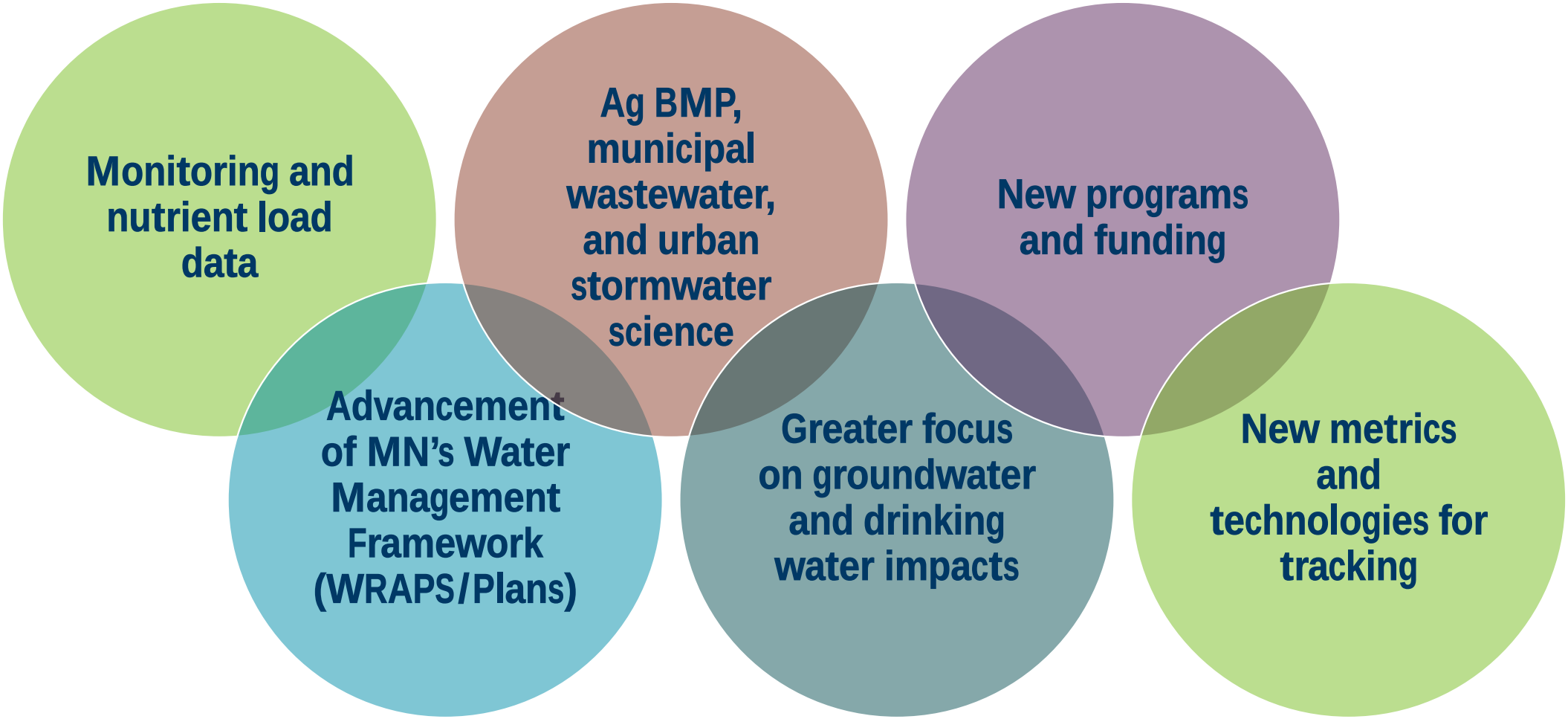
UNIVERSITY OF MINNESOTA
Driven to Discover®

METROPOLITAN COUNCIL

NRCS
Natural Resources Conservation Service

USGS
science for a changing world

What has been updated in Minnesota's 2025 NRS?



Minnesota's nutrient reduction goals by 2040

- For Minnesota's in-state lakes, streams, rivers & wells
- For out of state, to the north reduce about 50%
- To the south reduce about 45%
- To Lake Superior protect and improve

*Reductions from 1980s, 1990s baseline levels

Response—Public Comments:

- **Public Review—July 15 to September 10, 2025**
- **62 Letters**
  - 32 from private individuals
  - 30 from organizations/businesses/academic groups
  - 5 common topics
- **446 Comments**
  - 155 from a single letter
  - Many adaptations of a Land Stewardship Project template

Public comments: common topics

- General support from most commenters
- Regulations (more/less) related to all sectors
- Farmer/landowner education, incentives, and networking
- Continuous living cover (high support from many commentors)
- Data and monitoring: continue efforts, concerns about lack of progress with nitrogen
- Development of aquatic life/nitrate standards

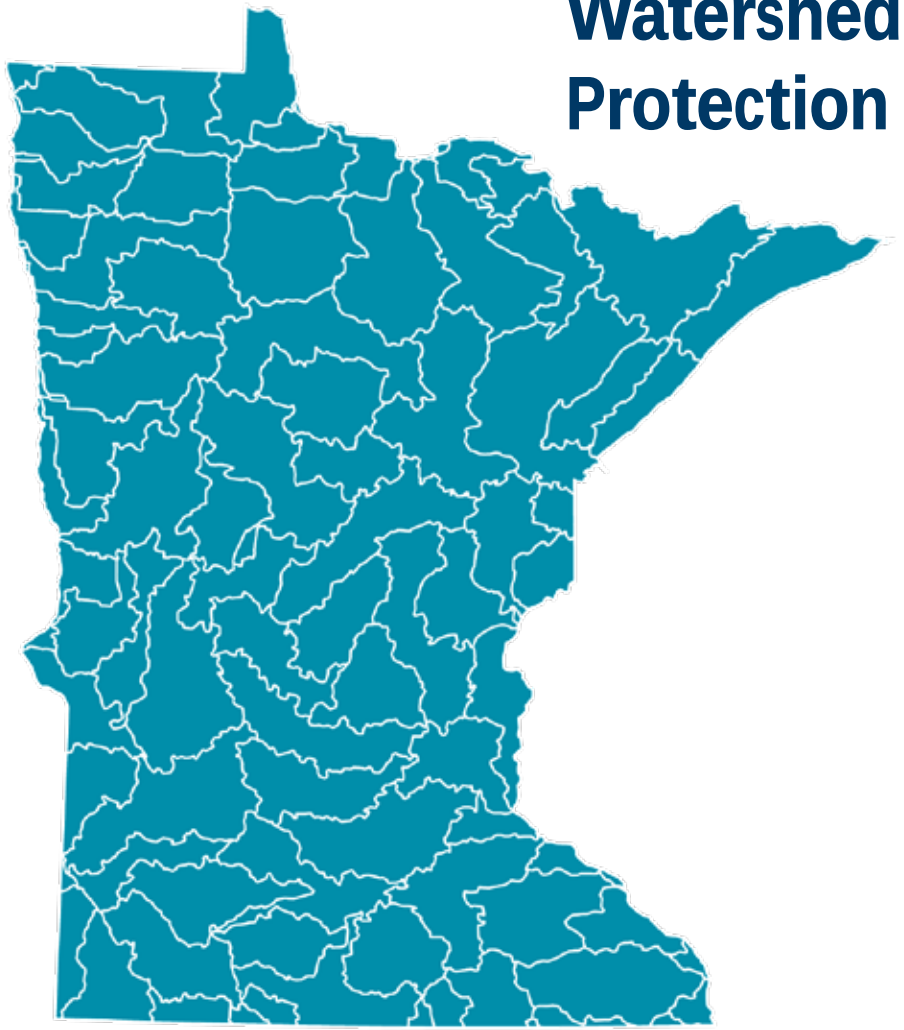
Progress to date

Progress takes cooperation at all scales

The Minnesota Water Management Framework

The framework connects state programs and local partners, encourages public participation, and uses the best available science to support decisions.

Completed 80 WRAPs



Watershed Restoration and Protection Strategies

Completed 1W1P actions

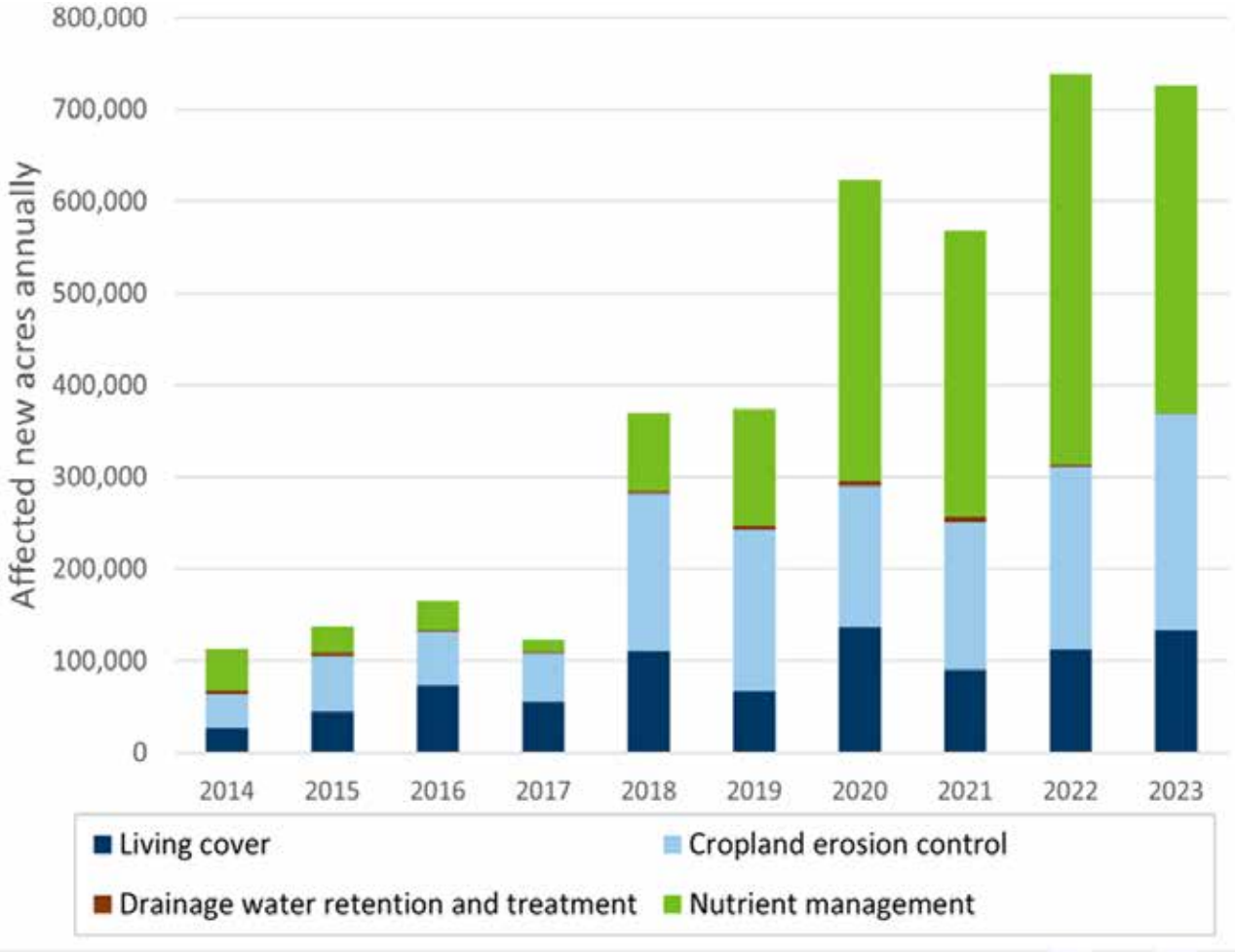
1 Watershed, 1 Plan program

CLEAN WATER LAND & LEGACY AMENDMENT

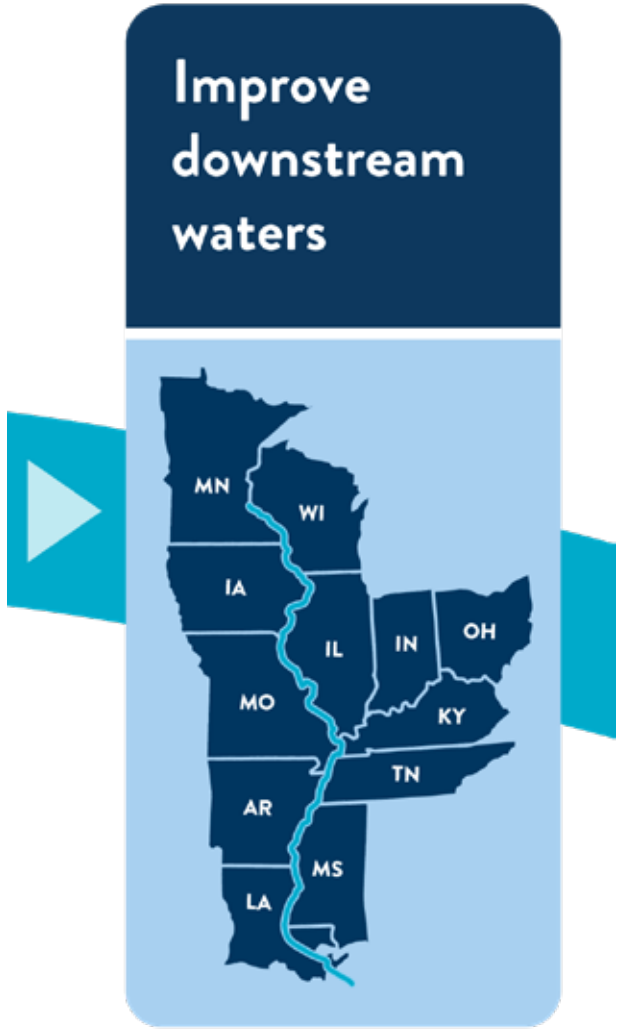
MINNESOTA

Agricultural land practices

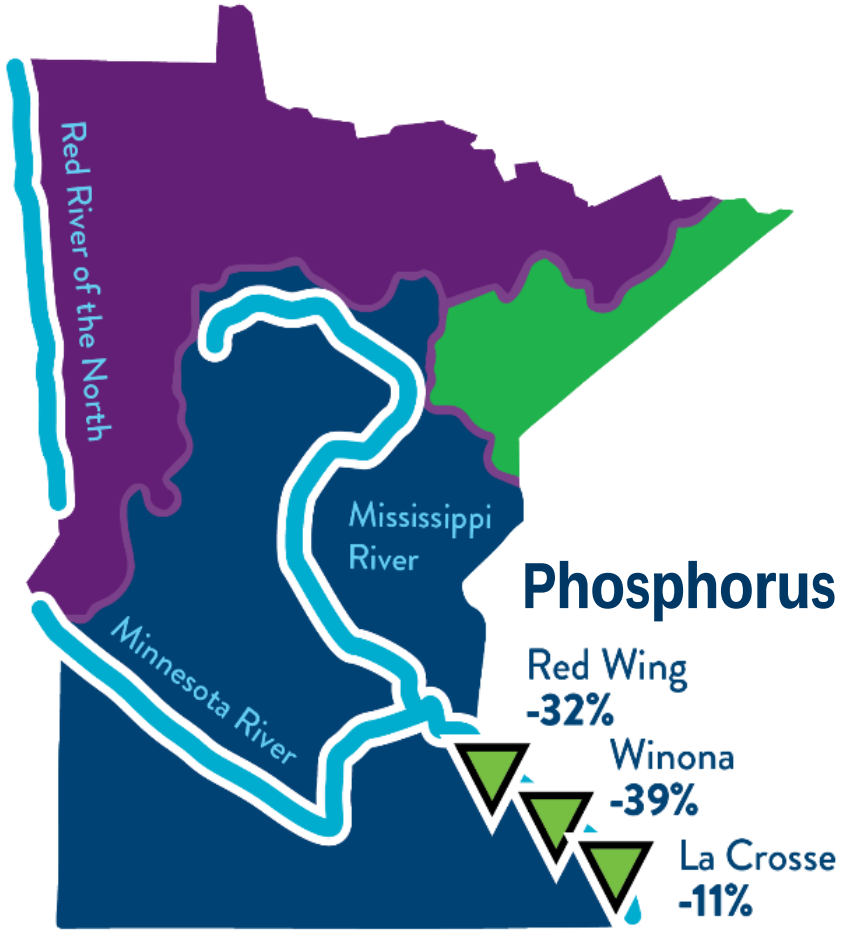
Government-funded acres of BMPs 2014-2023



Success – less phosphorus going to the Gulf

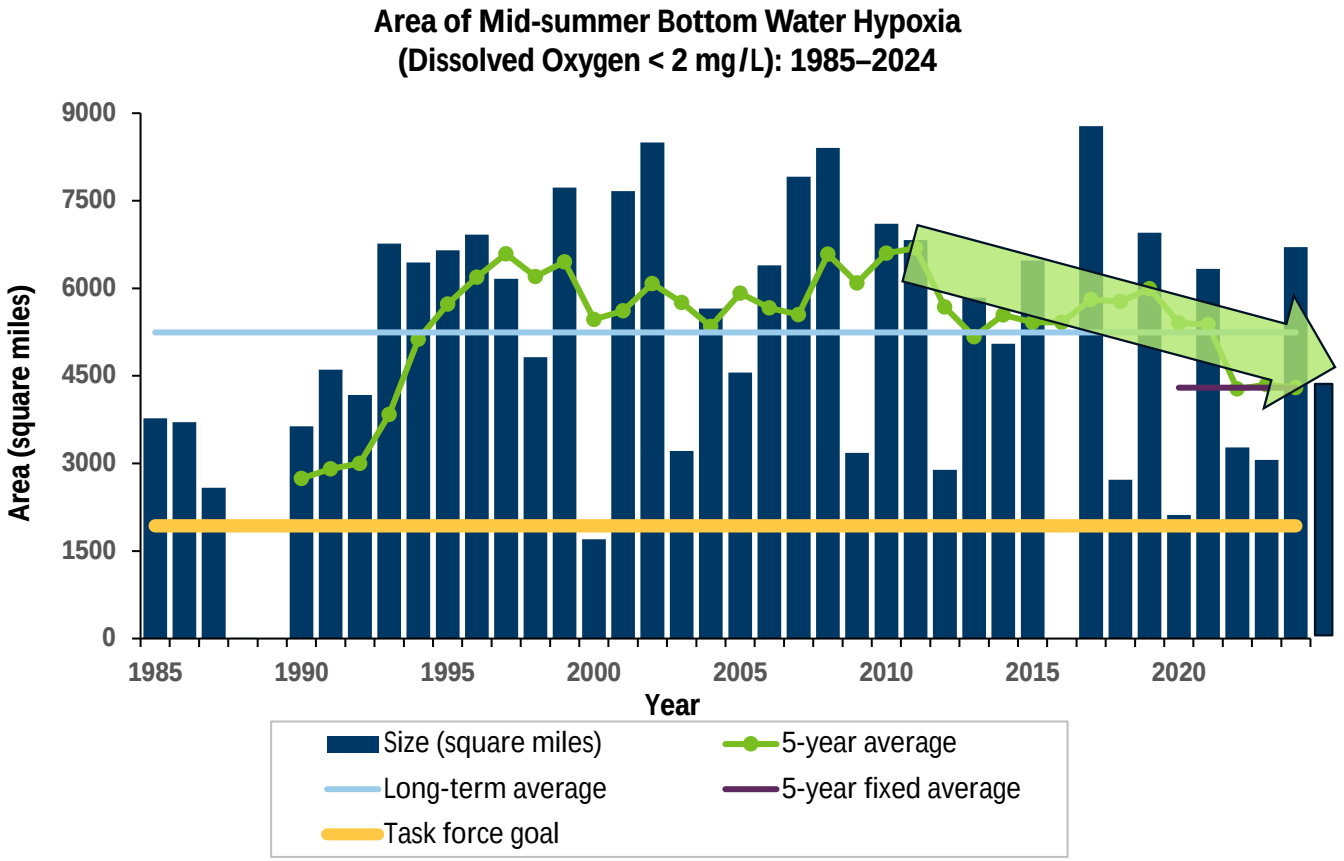


- 32% phosphorus reduction in Mississippi River at Red Wing (right)



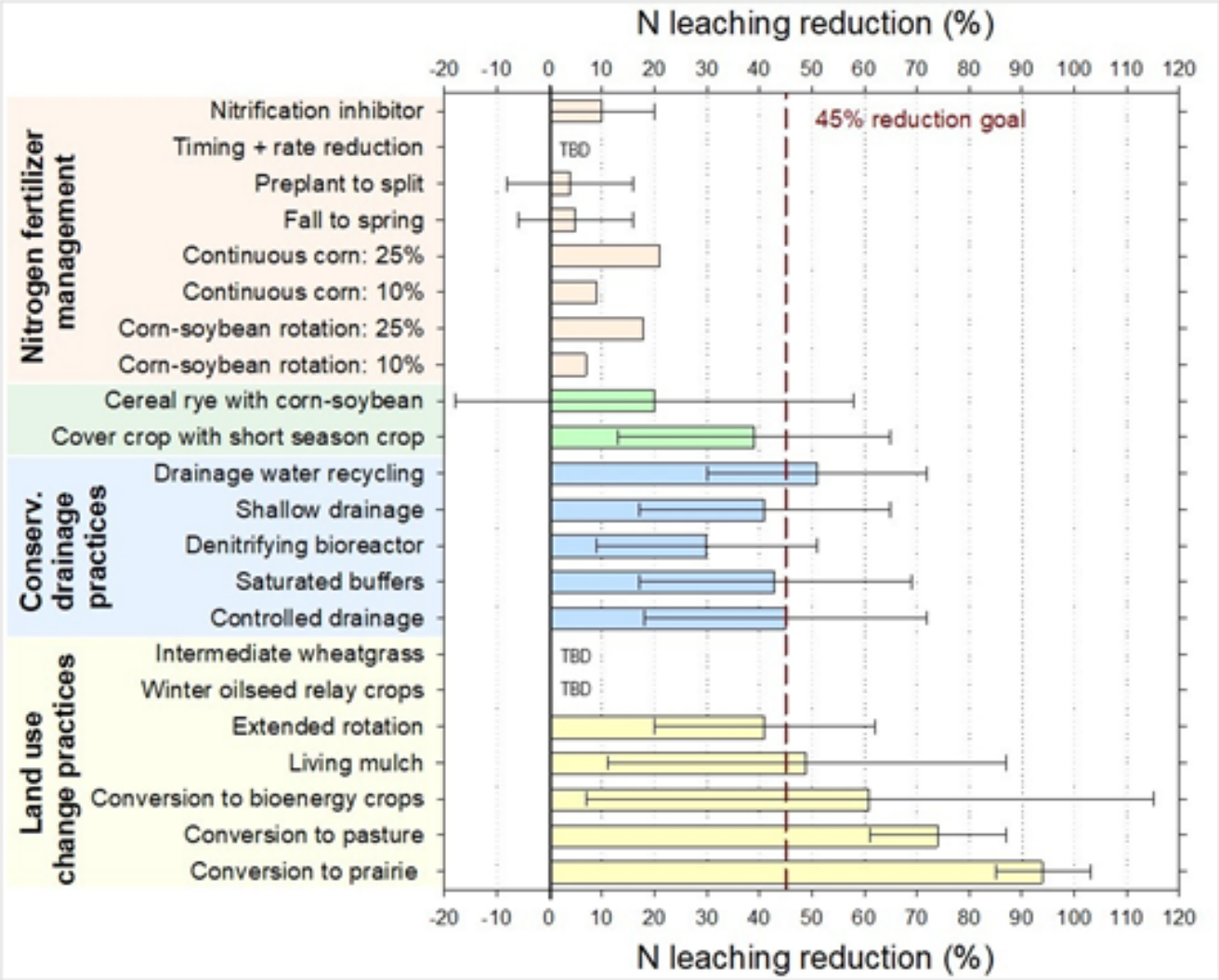
Gulf hypoxia zone improving since 2011

Seasonal hypoxia zone

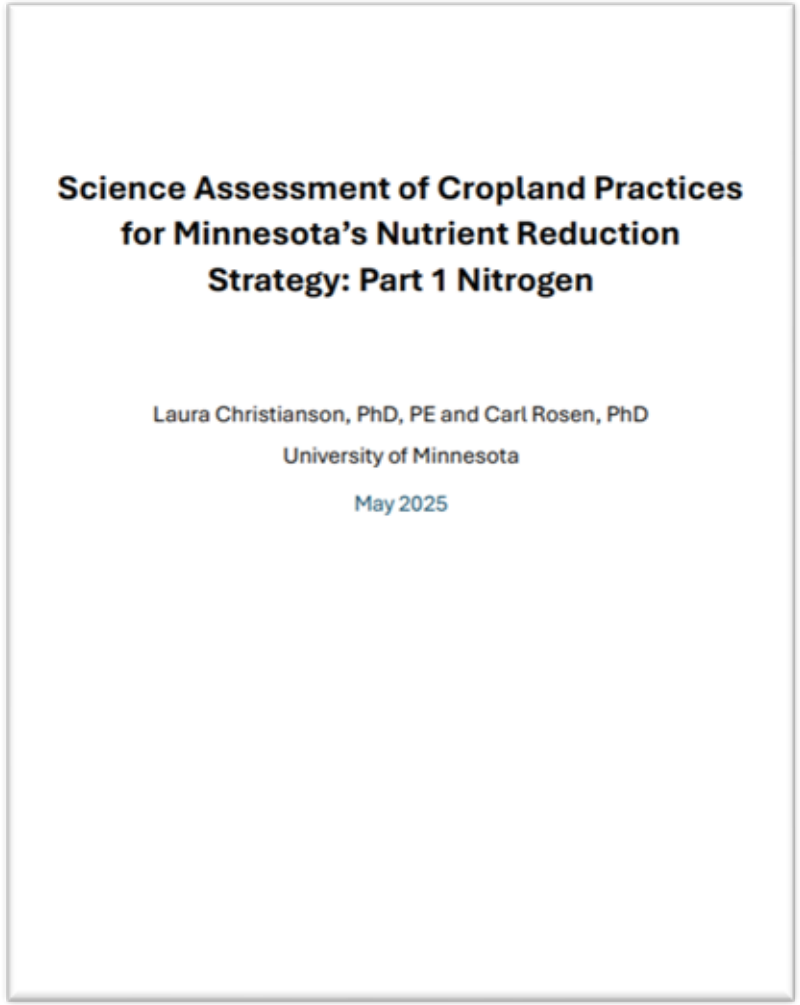


Updated science

Updated science shows practices that work to reduce nutrient loss



Source: Christianson and Rosen 2025.



Science Assessment of Cropland Practices for Minnesota's Nutrient Reduction Strategy: Part 1 Nitrogen

Laura Christianson, PhD, PE and Carl Rosen, PhD
University of Minnesota

May 2025

Chapter 5, Support Document 5-1, 5-2

Updated science supports more accurate predictions

Table 5-2. Summary of average phosphorus reduction efficiencies.

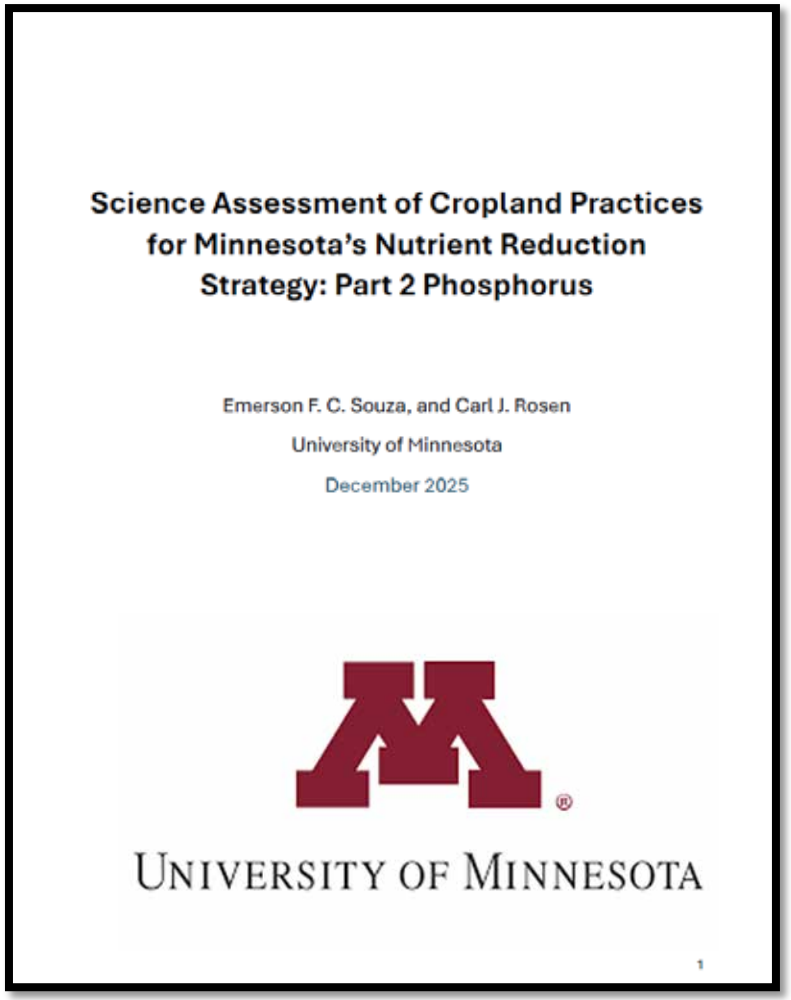
Practice	UMN 2025 TP reduction % average [a]	TP reduction efficiencies used in HSPF-SAM as defaults [b]	Iowa State University TP reduction % average [c]
(1) In-field phosphorus management			
Nutrient management: improved rates/timing		10%	
Nutrient management: precision/variable rate		15%	
Manure/fertilizer incorporation (no surface spreading)		35%	35% incorp < 1 week
Phosphorus subsurface banding	42.0%		25%
Drawdown soil phosphorus	25.5%		17%
Switch from fall to spring applications	18.4%		
(2) Continuous living cover increase			
Conservation crop rotation		30%	
Conversion row crops to prairie		84%	75%
Conversion row crops to pasture		59%	59%
Conversion to bioenergy crops			34%
Cover crops	21.5%	29%	18% winter rye & wheat; 30% seed mixes
(3) Reducing tillage and field runoff			
Conservation tillage	47%	33%	33%
No-till		68%	90%
Water and sediment control basin		85%	85%
Terrace		75%	77%
Grassed waterway		45%	
Buffers at field edge		67%	65%
Contour buffer strips		62%	
Contour strip cropping		44%	
Alternative tile intakes		66%	57%

Notes:

[a] Souza and Rosen 2025

[b] RESPEC 2024; HPSF-SAM = HSPF-Scenario Application Manager

[c] Iowa State University 2023 (draft)



Science Assessment of Cropland Practices for Minnesota's Nutrient Reduction Strategy: Part 2 Phosphorus

Emerson F. C. Souza, and Carl J. Rosen

University of Minnesota

December 2025

UNIVERSITY OF MINNESOTA

1

Chapter 5, Support Document 5-1, 5-2

Water quality trends and priorities

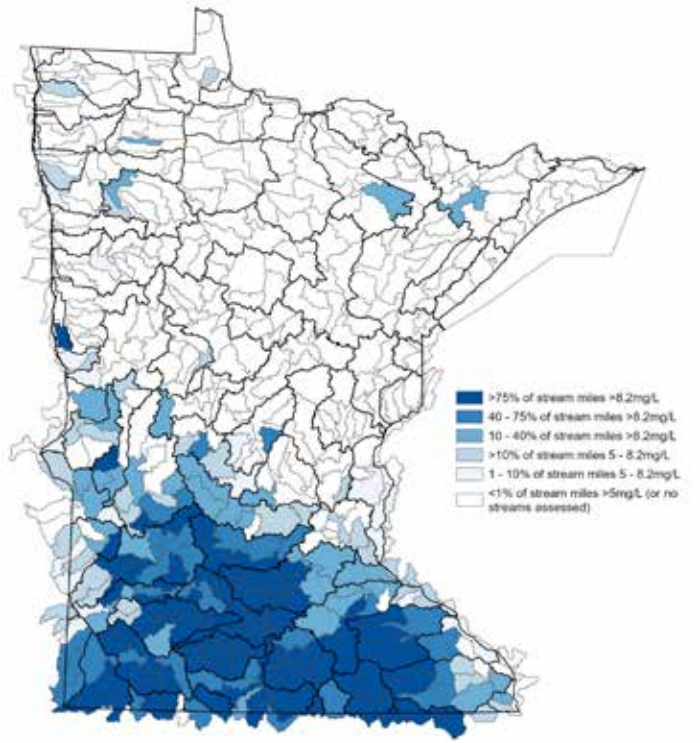
Monitoring sites

- Permanent monitoring sites
- Operated by state, regional, federal, and Canadian governments
- Monitoring data
  - Used to calculate results
  - Used to build our models

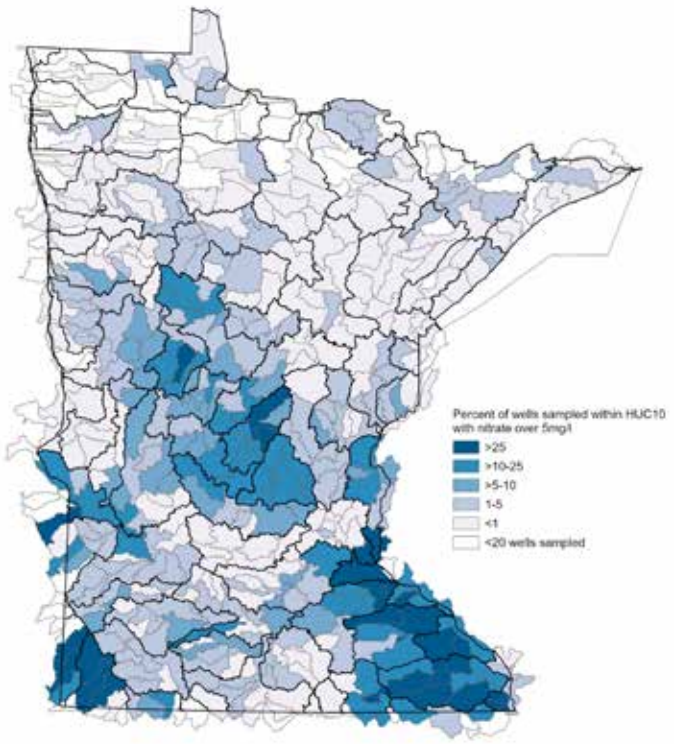
Remaining – Nitrate goals for the Gulf

In-state nitrate concentration reduction needs

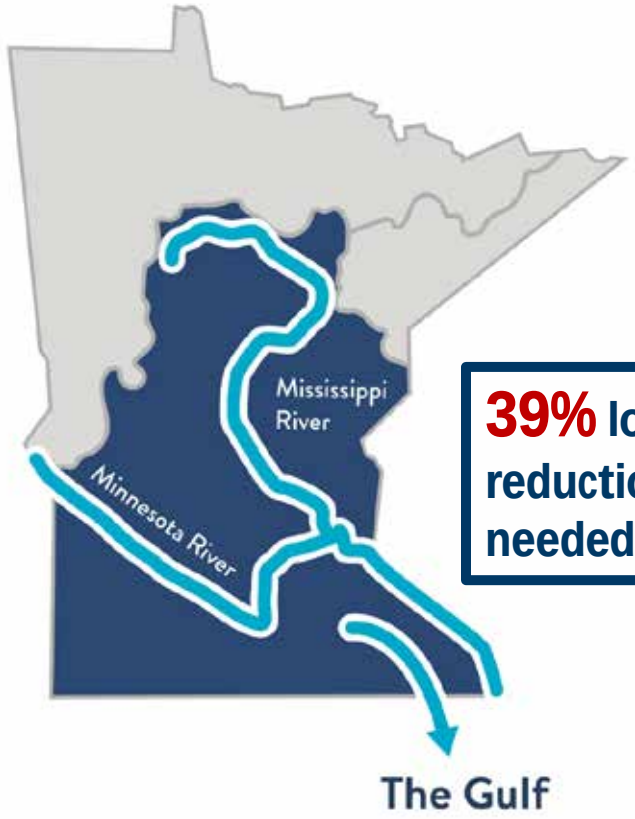
Stream aquatic life 32%



Drinking water wells 38%



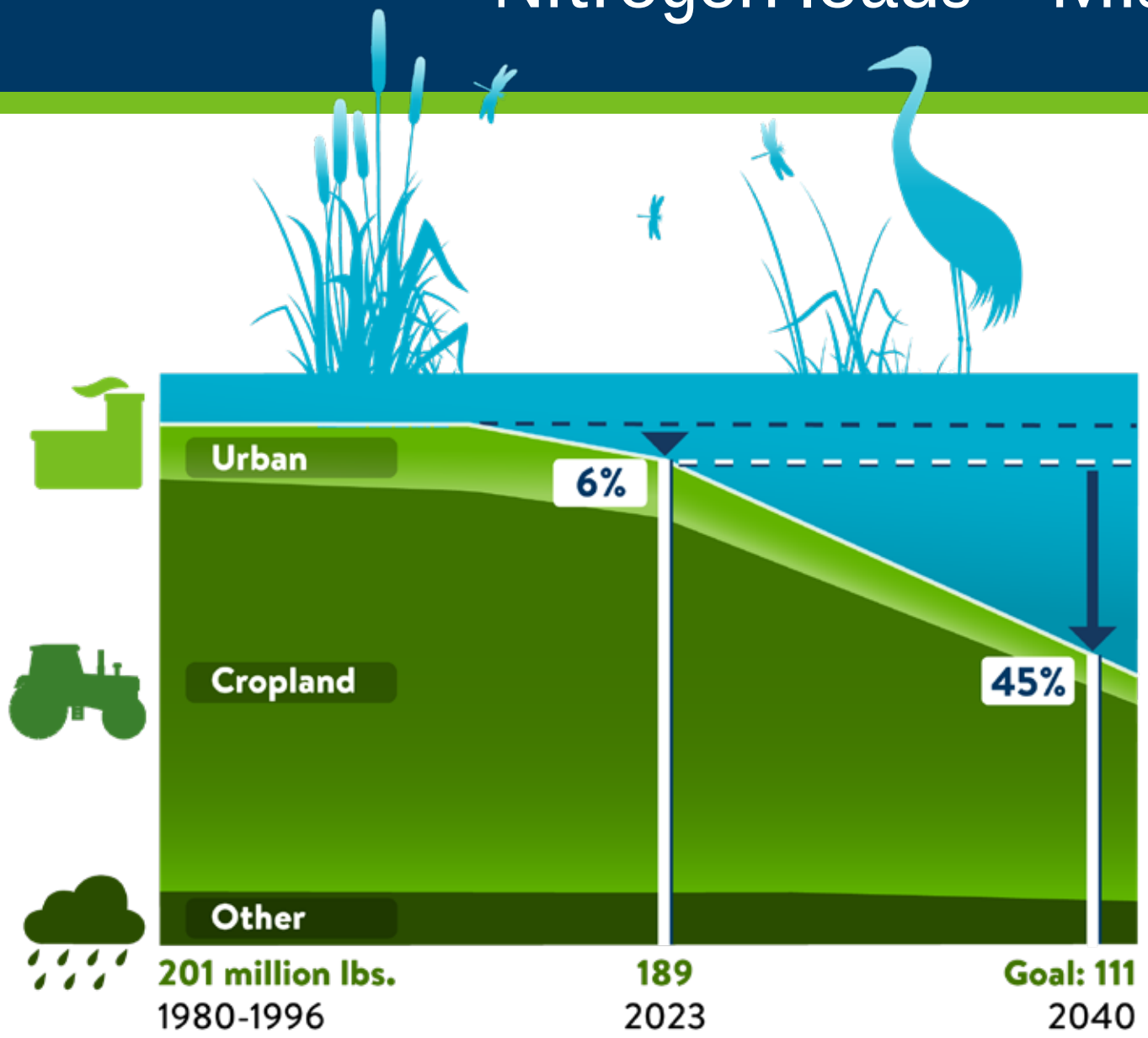
Downstream total nitrogen reduction needs



39% load reduction still needed

Chapters 2 and 3 – 2025 Minnesota NRS

Nitrogen loads – Mississippi River near state line



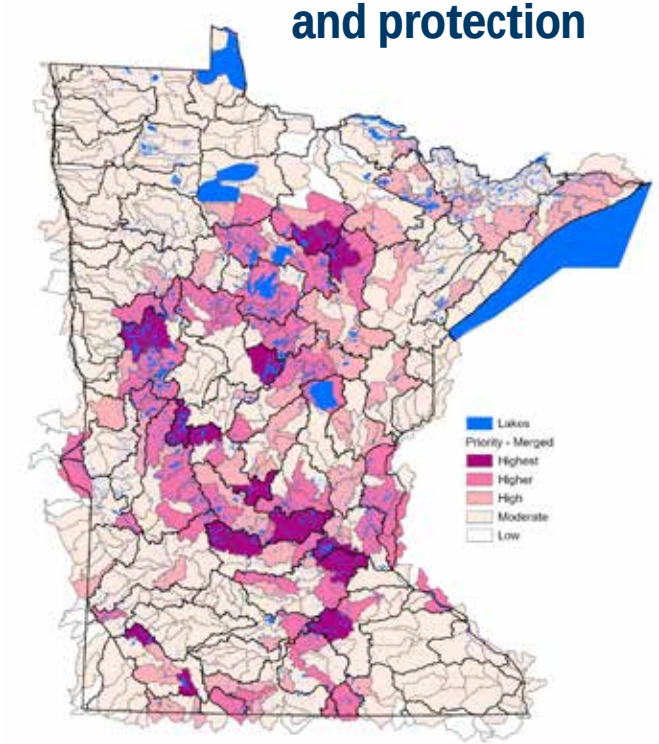
What practice changes and programs can achieve this large reduction?

Remaining – Phosphorus goals for the Gulf

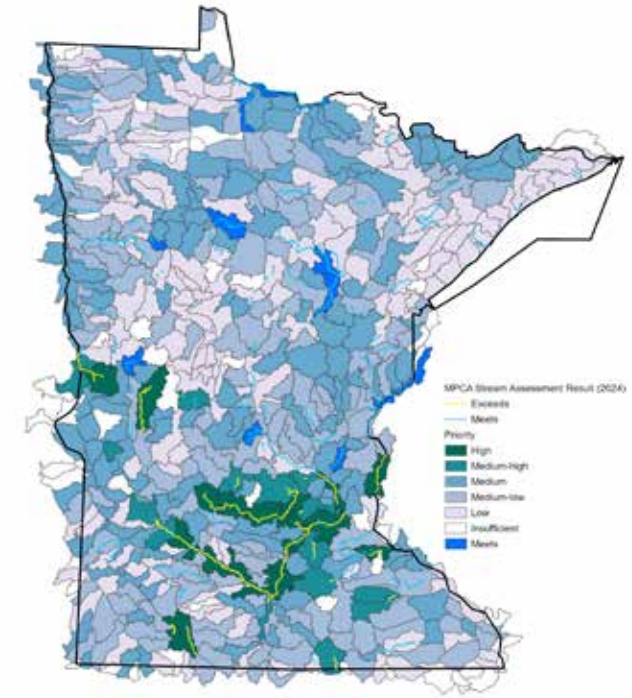
In-state phosphorus concentration reduction needs

42% avg reduction needed where impaired

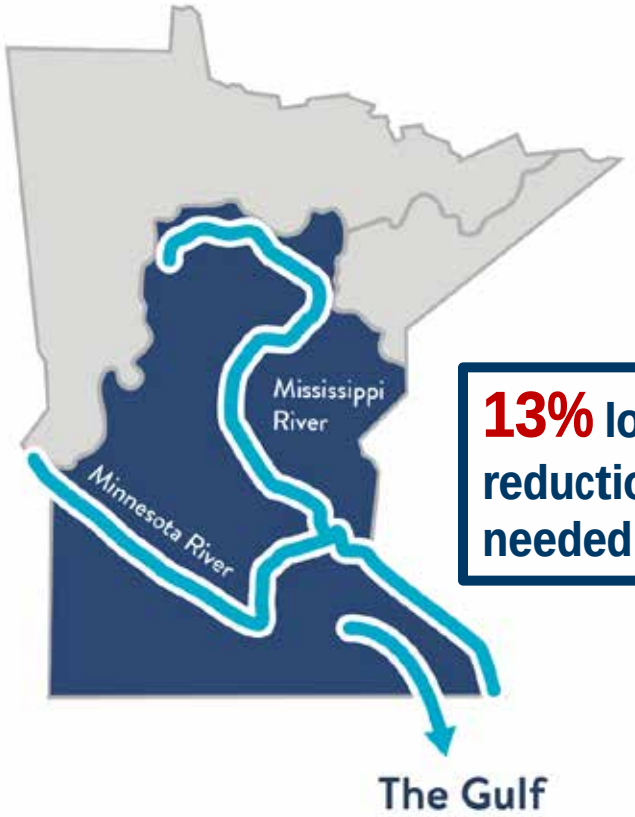
Lake eutrophication and protection



River eutrophication



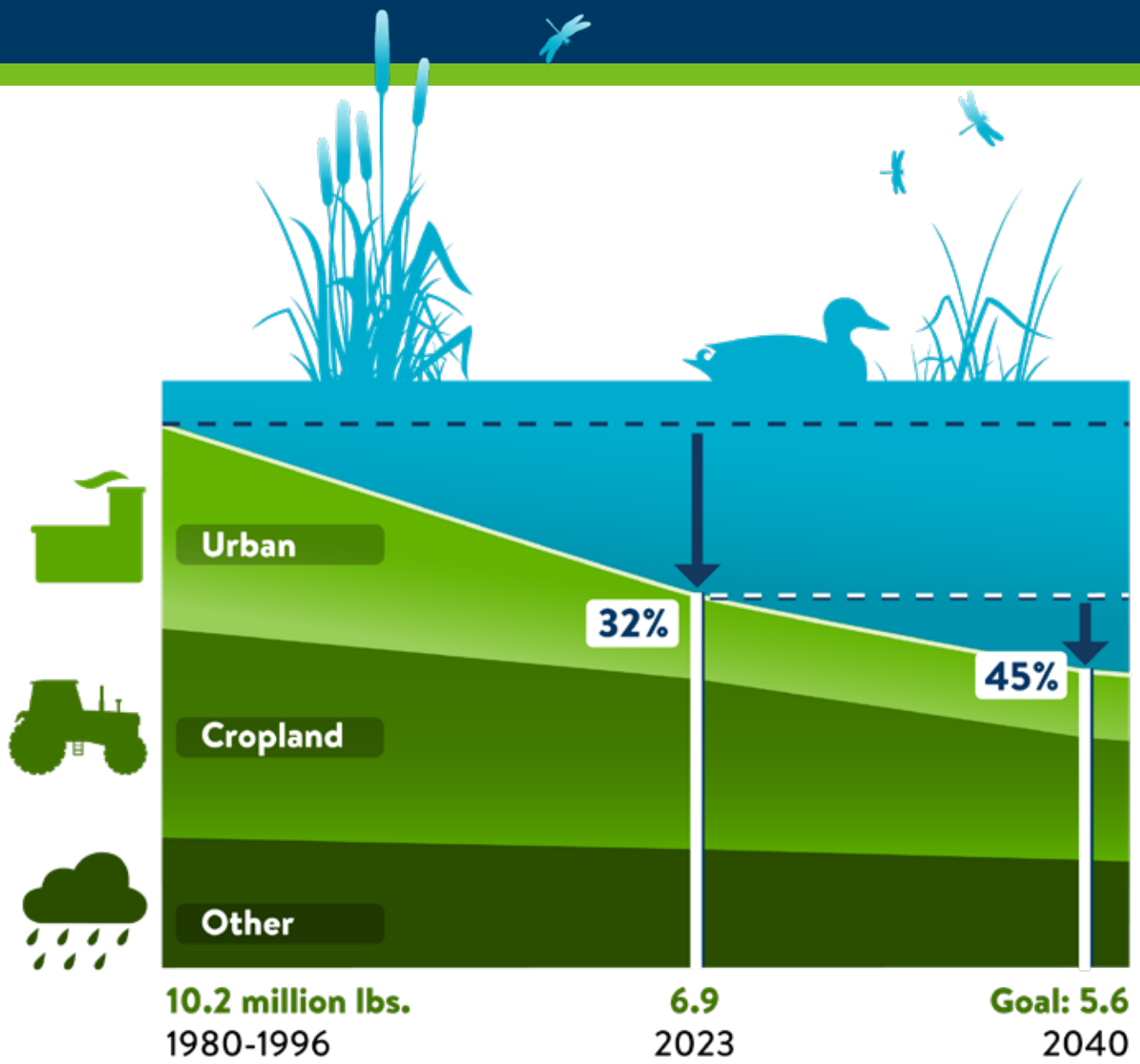
Downstream needs



13% load reduction still needed

Chapters 2 and 3 – 2025 Minnesota NRS

Phosphorus loads – Mississippi River near Iowa state line

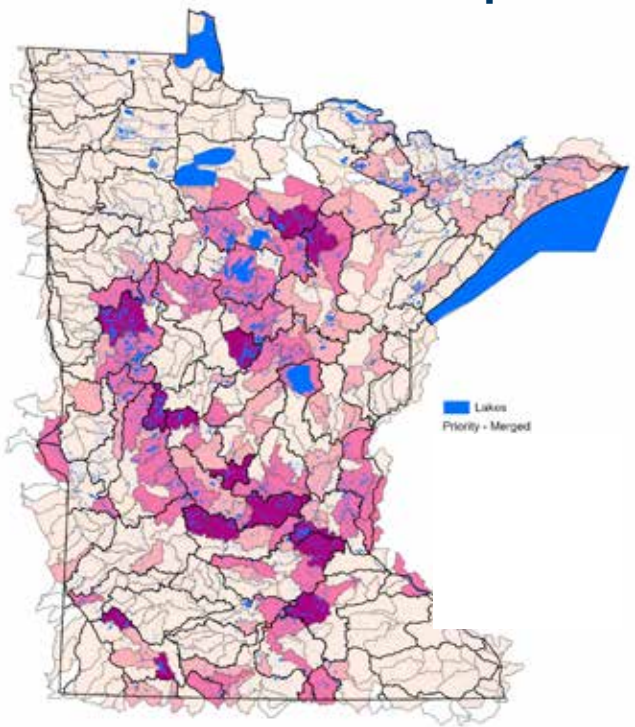


Phosphorus load goals can be met with the previous scenario

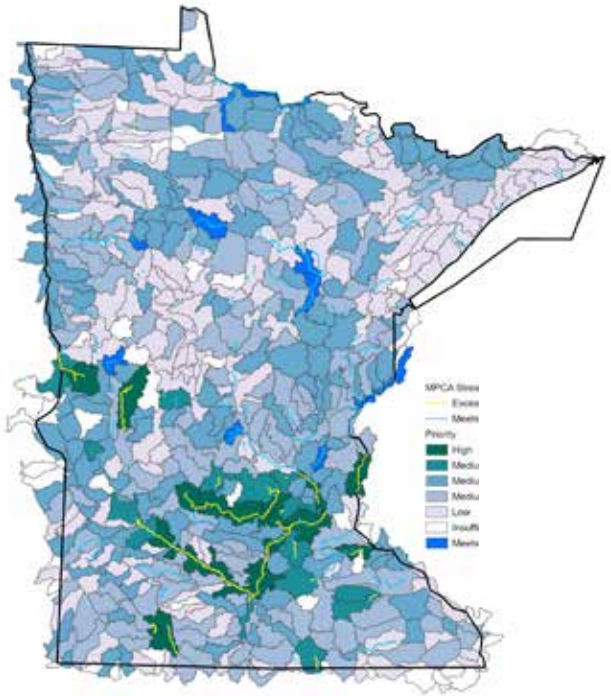
Remaining – Phosphorus goals for Lake Winnipeg

Fewer in-state reduction needs

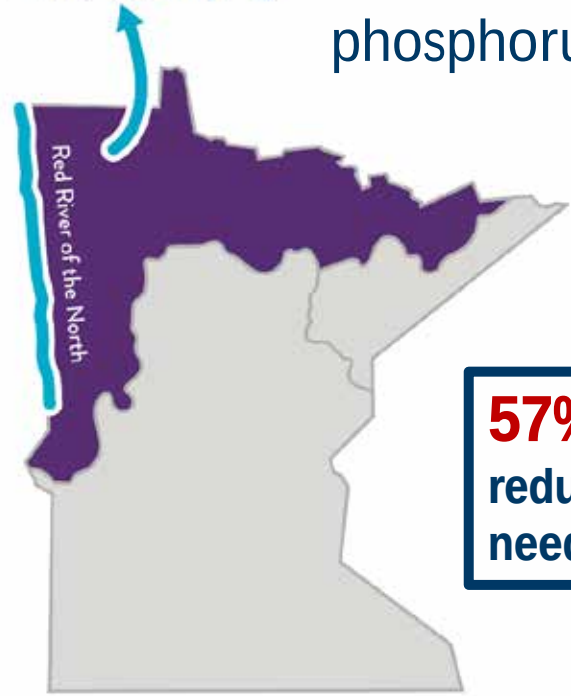
Lake eutrophication



River eutrophication



Downstream total phosphorus reduction needs



Dakotas add 2/3 total phosphorus load

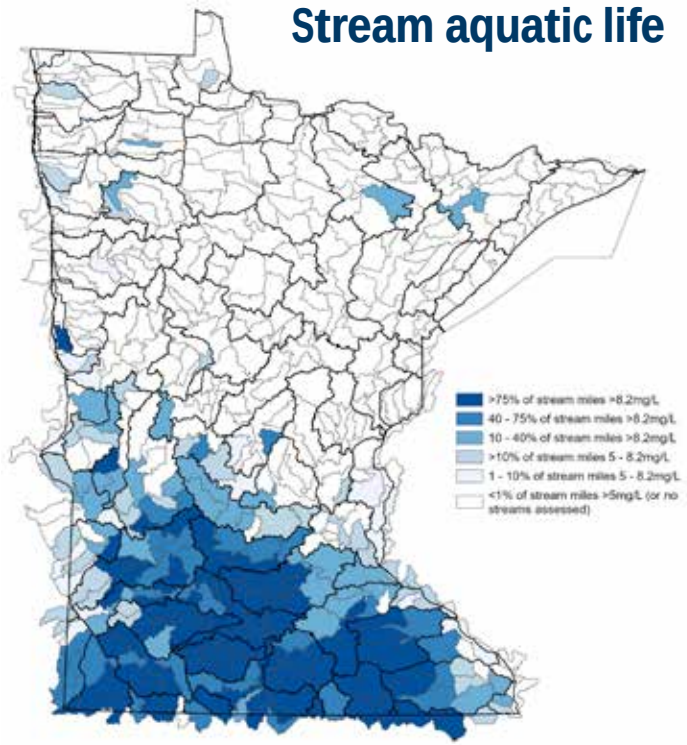
57% load reduction still needed

Chapters 2 and 3 – 2025 Minnesota NRS

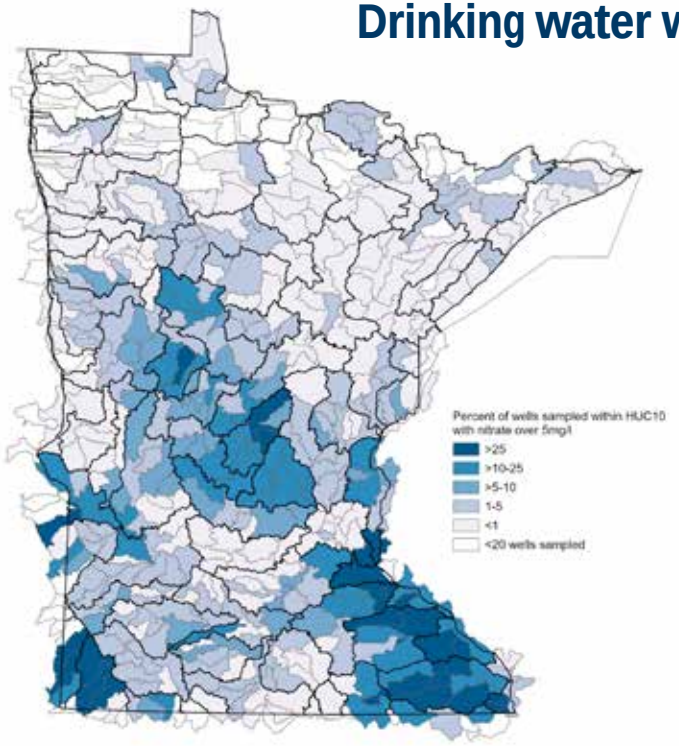
Remaining – Nitrate goals for Lake Winnipeg

Few in-state nitrate reduction needs

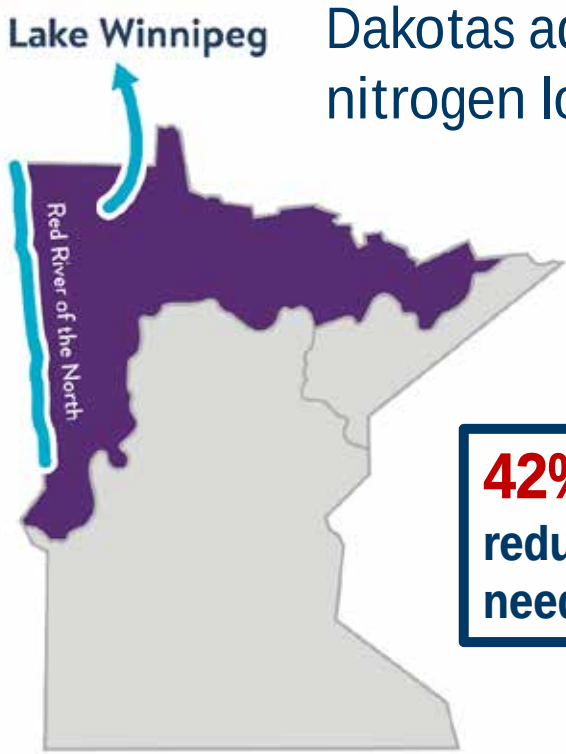
Stream aquatic life



Drinking water wells



Downstream total nitrogen reduction needs



Dakotas add 3/5 total nitrogen load

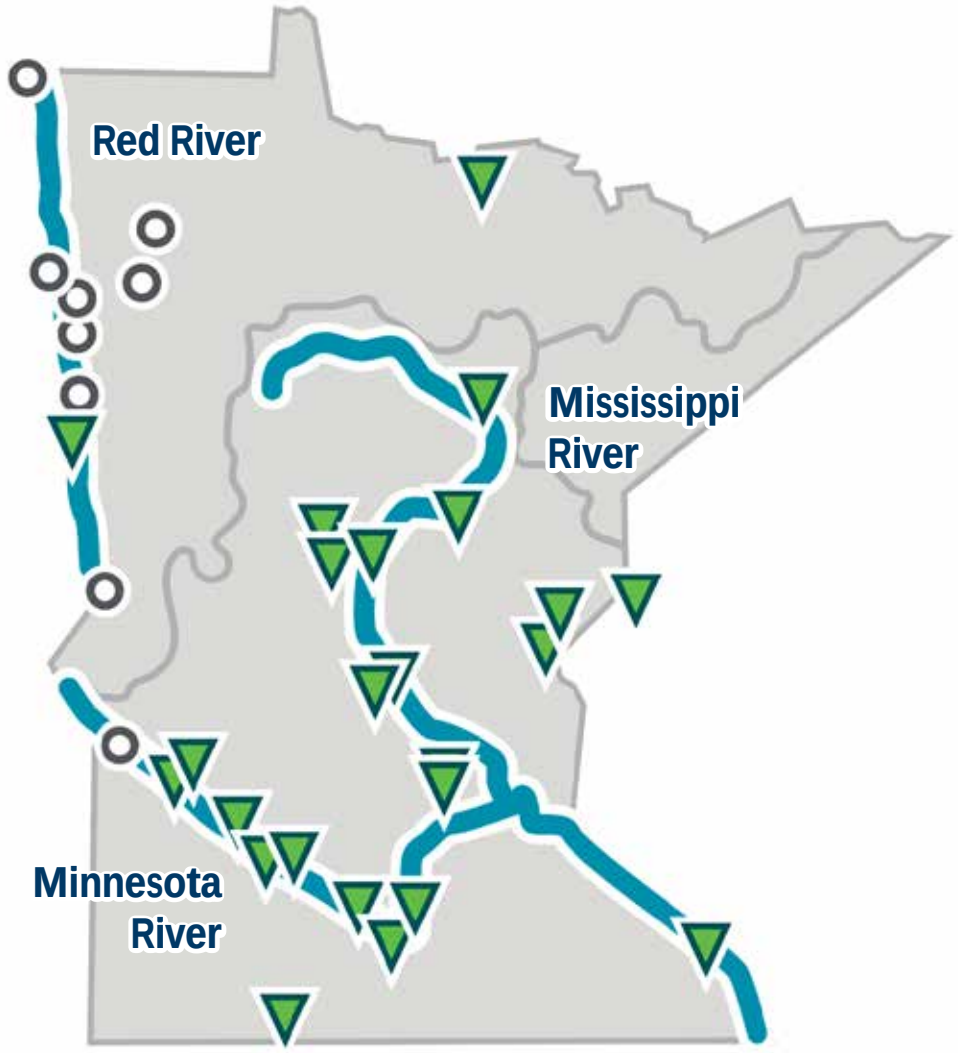
42% load reduction still needed

Chapters 2 and 3 – 2025 Minnesota NRS

Remaining – No nutrient increases for Great Lakes

Chapters 2 and 3 – 2025 Minnesota NRS

Statewide – Phosphorus reduced in Minnesota



Phosphorus concentration

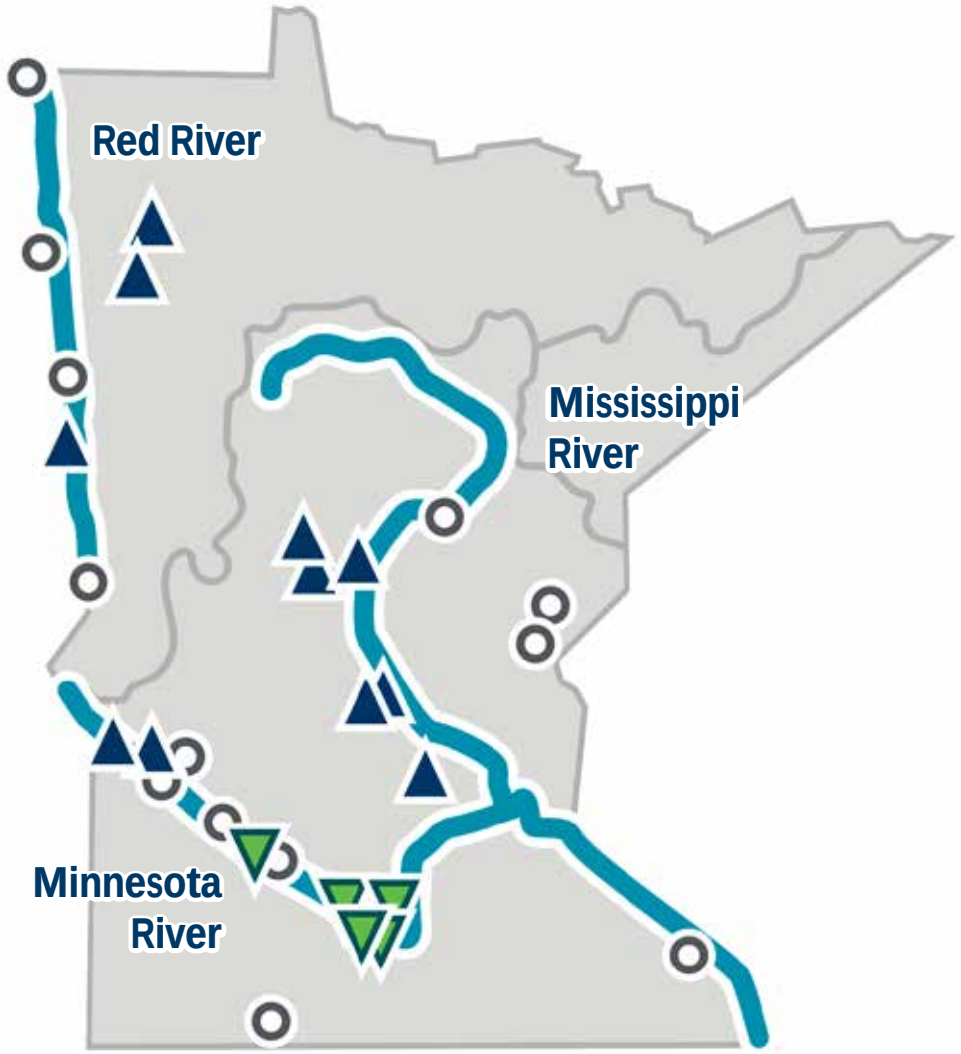
Streams and rivers

Flow corrected trends, 2003-2022

▼ Decreasing = 24

○ No trend detected = 12

Statewide mixed results – Nitrogen in Minnesota



Nitrate concentration

Streams and rivers

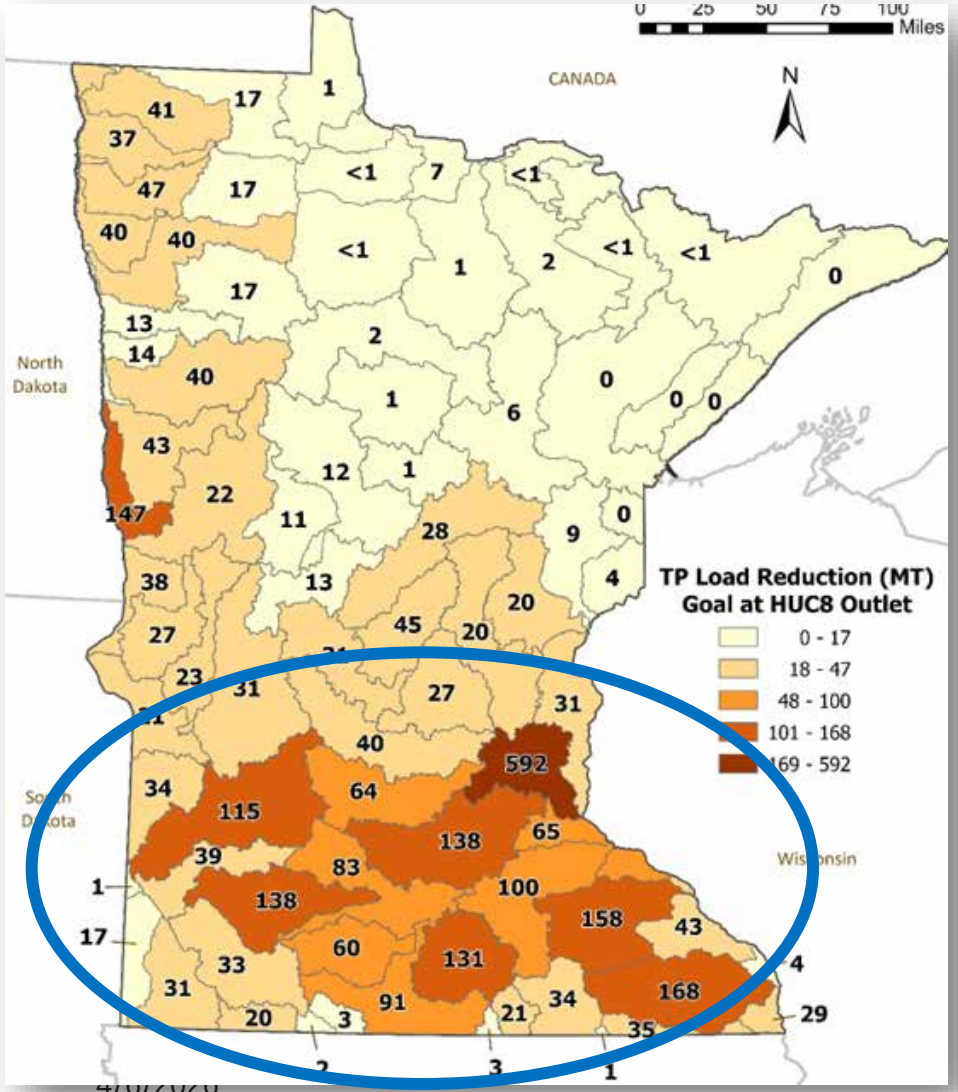
Flow corrected trends, 2003-2022

▲ Increasing = 11

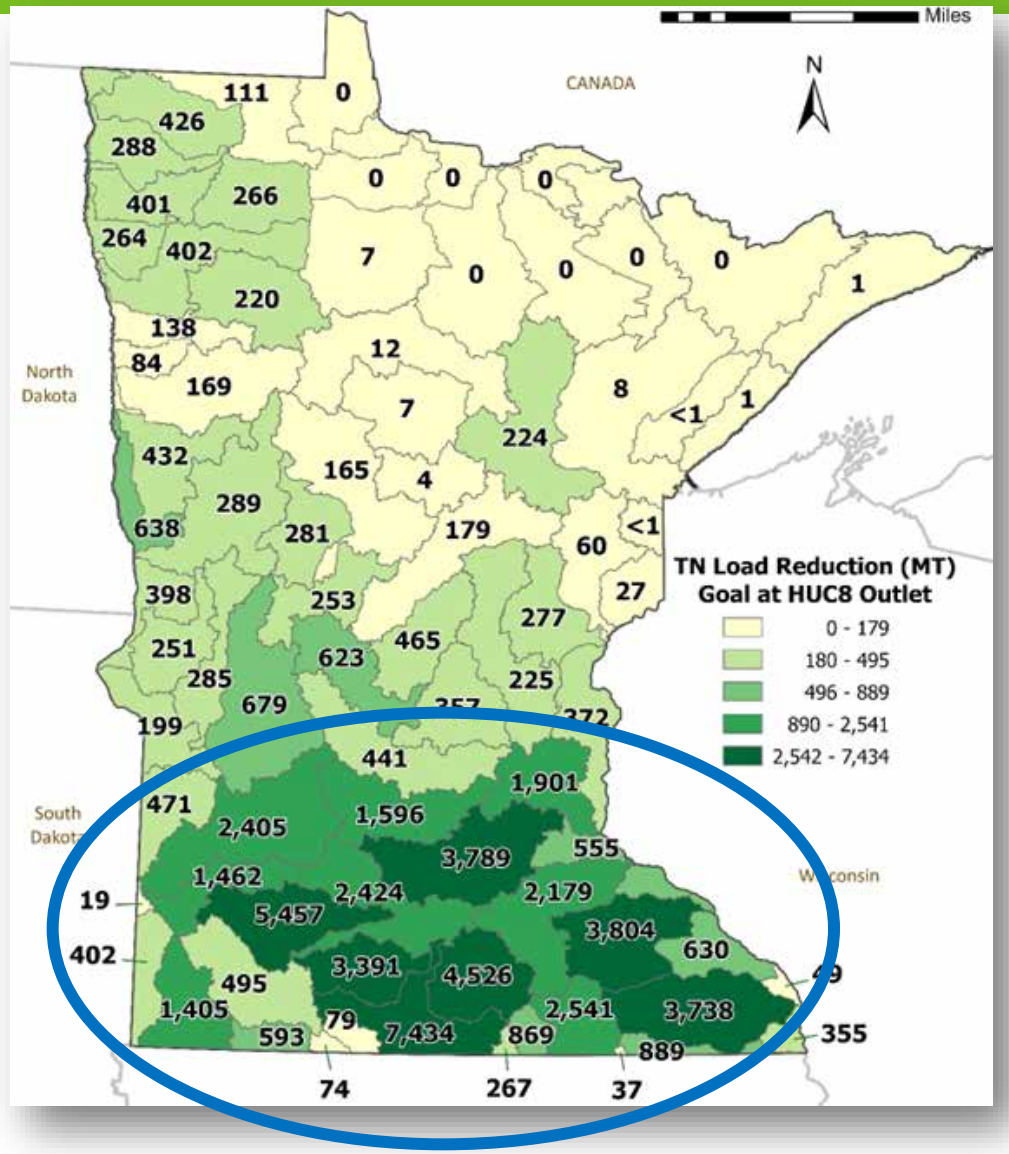
▼ Decreasing = 5

○ No trend detected = 15

Priority watersheds for downstream : major watershed outlet load reductions goals total P (left) and total N(right)



See MN NRS Chapter 2

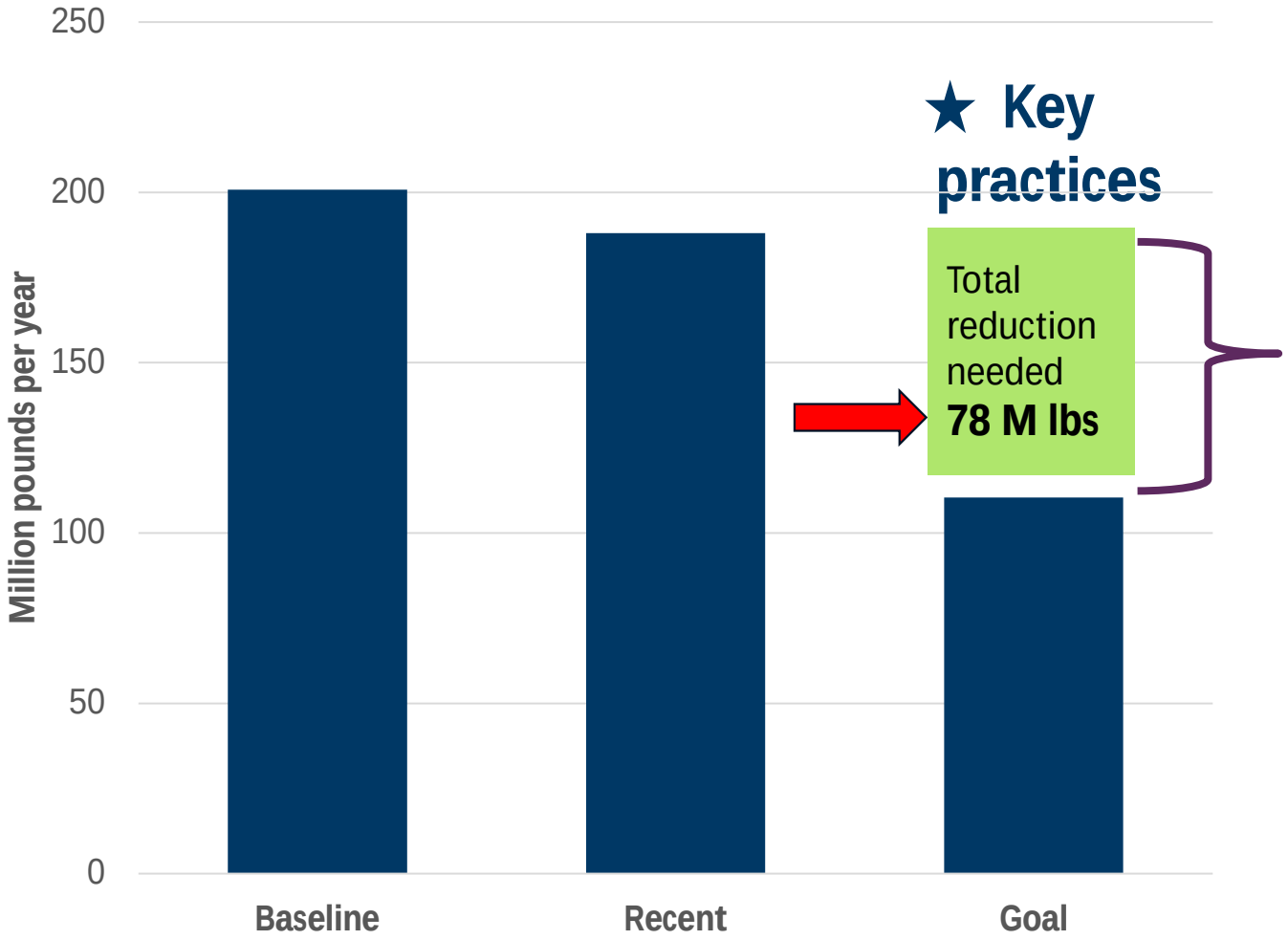


Next steps for the NRS roll out

Focus areas for NRS roll out

- Phase 2 of EPA Hypoxia Work Plan
  - Support scaling up adoption of ag practices
  - Fill in research gaps
  - Tools to support practitioners and farmers
  - Dashboard system to track progress by 2028
- Continuous living cover campaign
- Wastewater N strategy implementation
- Outreach and education statewide on the NRS
- Next 5 years: update overall NRS source assessment and reevaluate trends

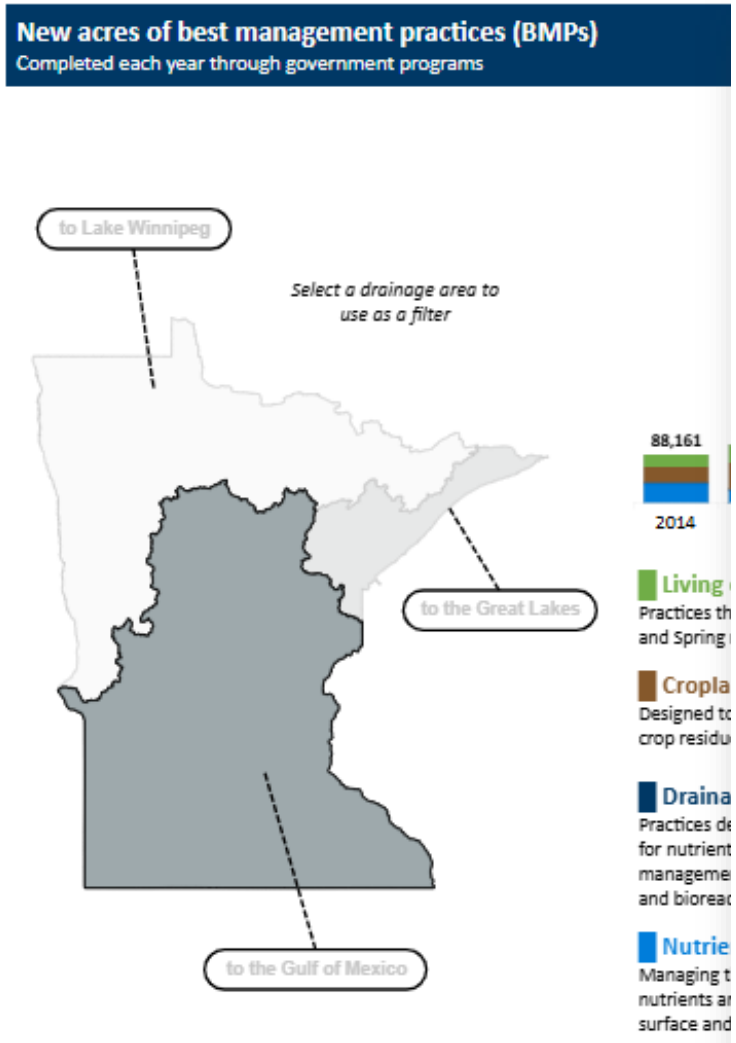
Nitrogen reduction scenario - practices for Mississippi River

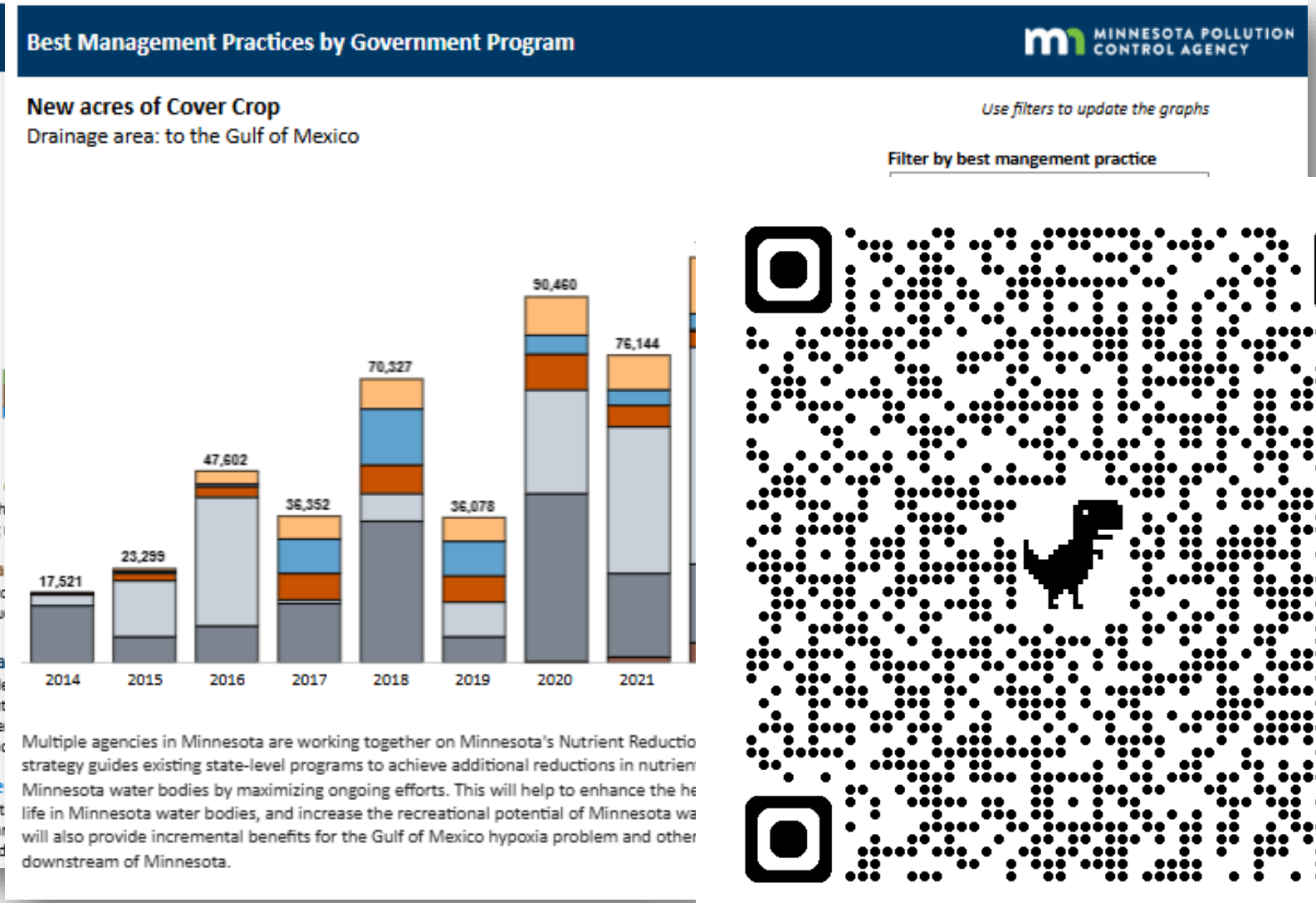


Practice type	Acres added (millions)	TN Load reduction (lbs/yr at state line)
Tile water management	3.0 M	13.8 M lbs ★
Fertilizer & manure mgmt.	2.8 M	4.4 M lbs
Continuous living cover	7.8 M	33.4 M lbs ★
Overland runoff controls	1.2 M	1.3 M lbs
Tillage with more residue	2.0 M	2.0 M lbs
Streambank/flood plains	TBD	7.0 M lbs
Urban wastewater N		11.0 M lbs ★
Other	TBD	5.0 M lbs
TOTAL	**17 M acres**	**78 million lbs TN**

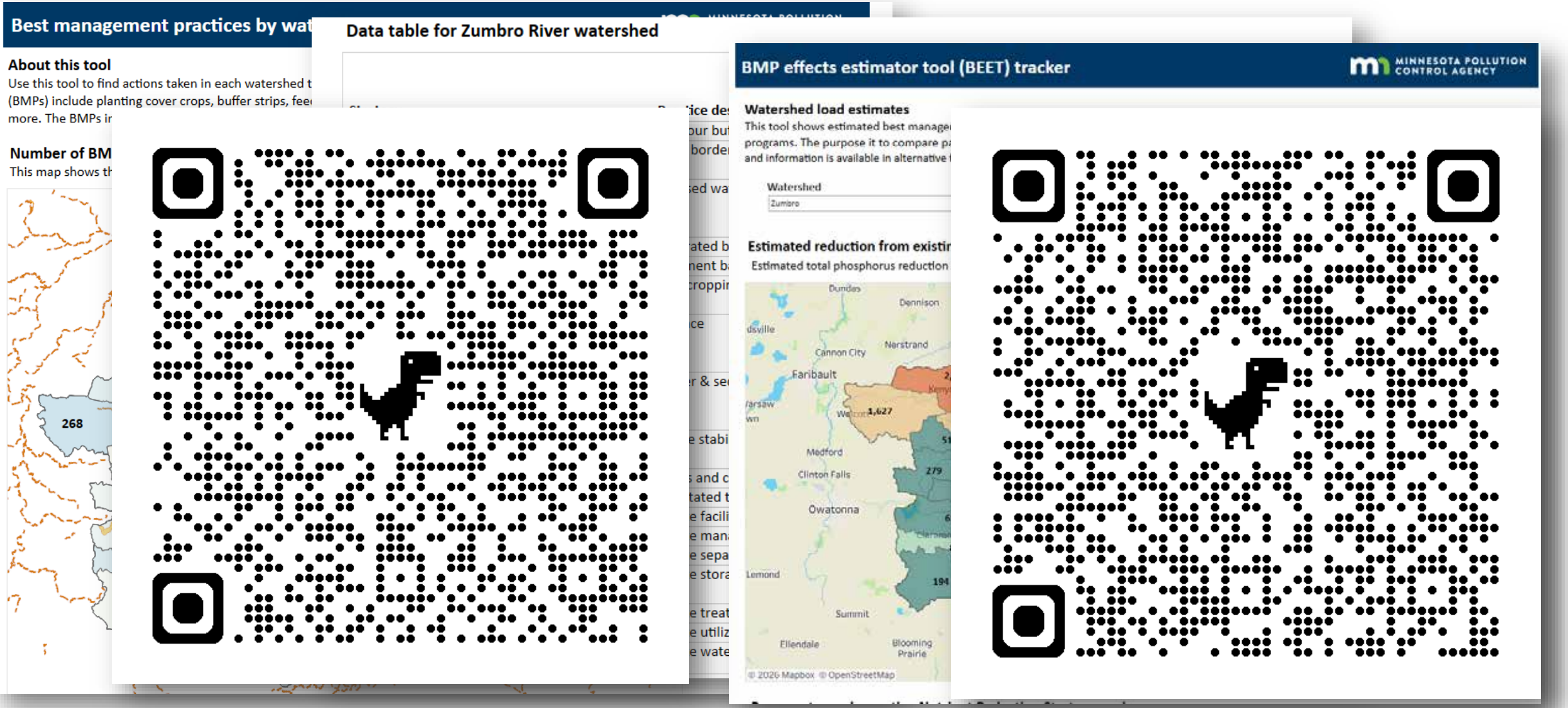
Chapters 4 and 5 – 2025 NRS update

Tracking practices long-term: State-wide





Tracking practices long-term: local by major watershed



Connections to Conservation Work

Practices to reduce nutrients

- Nutrient management and 4 Rs
  - Commercial fertilizer
  - Feedlots, pastures, and manure application
- Soil health and soil loss reduction
- Continuous living cover
- Drainage water management, wetlands, and water storage
- Stream bank and gully stabilization
- Forestry management, riparian vegetation management and buffers, and shoreland protection
- Urban stormwater

Landowner and technical assistance

- Work with landowners to prioritize practices that will have the greatest benefit for nutrient reduction.
- Aid or direct them where to get assistance for both conventional and cutting-edge nutrient reduction BMPs.
- Demonstrate practices and programs through outreach events (ex. field days).
- Work with industry via private and NGO sector to support nutrient work.

Including nutrients in local planning efforts

- Incorporate priority maps, areas with higher loads, or protection areas in the NRS that align with local priorities.
- Use load reduction needs to help guide local nutrient reduction goals.
- Use NRS as a citation for ag BMP research, nutrient source assessments, nutrient goals, core practices to reduce nutrients, and future needs.
- Link on-line dashboards to local plans and websites.

How you can stay involved

Nutrient Reduction Strategy Update

- Sign up for newsletter
  mnpca.info/4bKzmDP

- Check our web pages
  mnpca.info/nutrient-reduction

- Follow on social media

Thank you

MINNESOTA