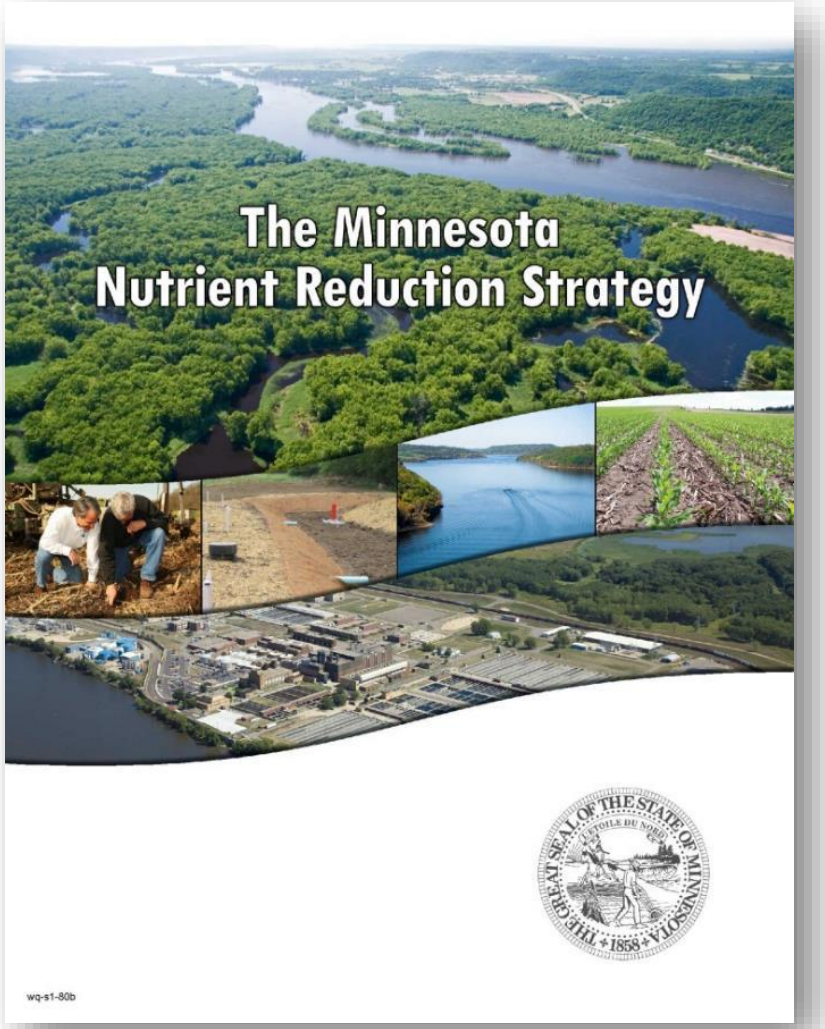
MINNESOTA POLLUTION CONTROL AGENCY

Minnesota's Nitrogen Reduction Strategy

ACWA Water Quality Standards Workshop
April 2024

Philip Monson

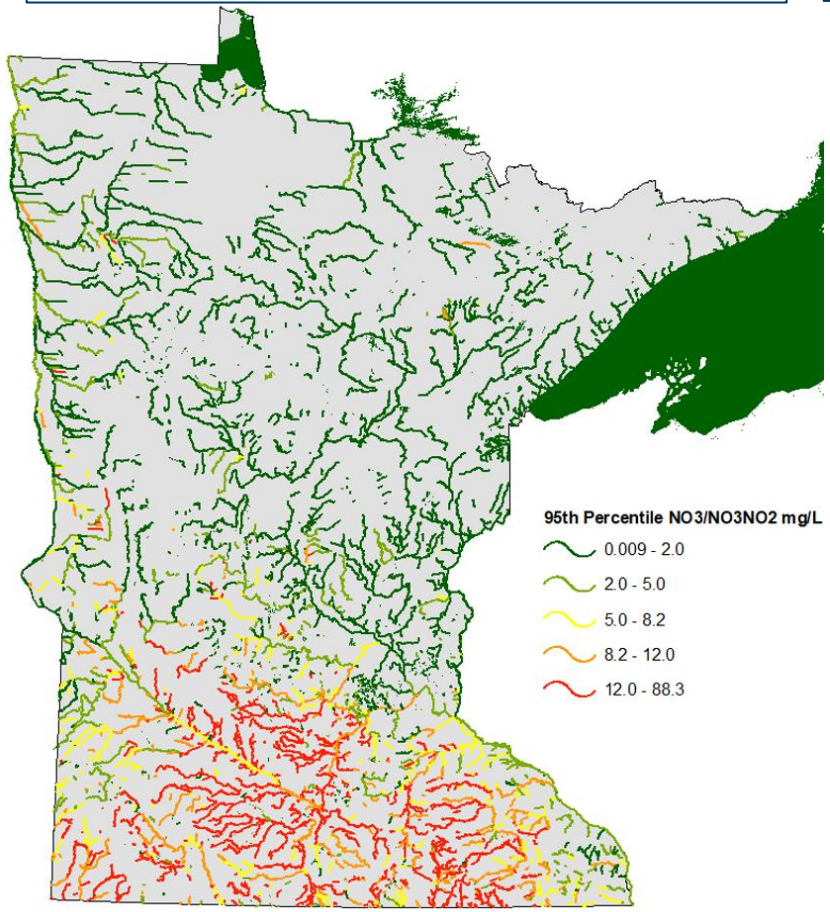
finalized in 2014 by 11 organizations
10-yr update underway



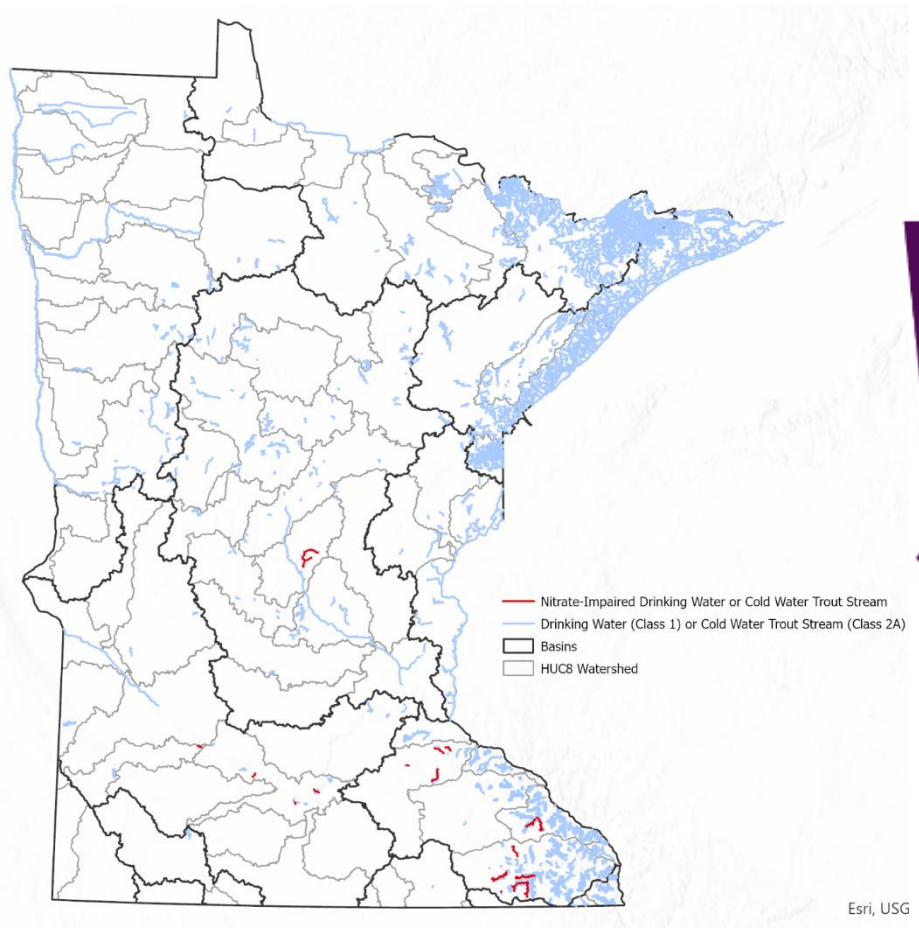
- Nutrient conditions in MN waters
- Causes and sources of nutrient pollution
- Goals for reducing nutrients
- Science-based solutions/practices
- Magnitude of change needed
- Specific strategies to promote/advance
- Ways to track progress toward goals

Drivers for nitrogen reduction in surface waters

High nitrate in Southern MN streams harming certain aquatic life



32 cold water stream reaches impaired for drinking water (nitrate-N >10 mg/l)



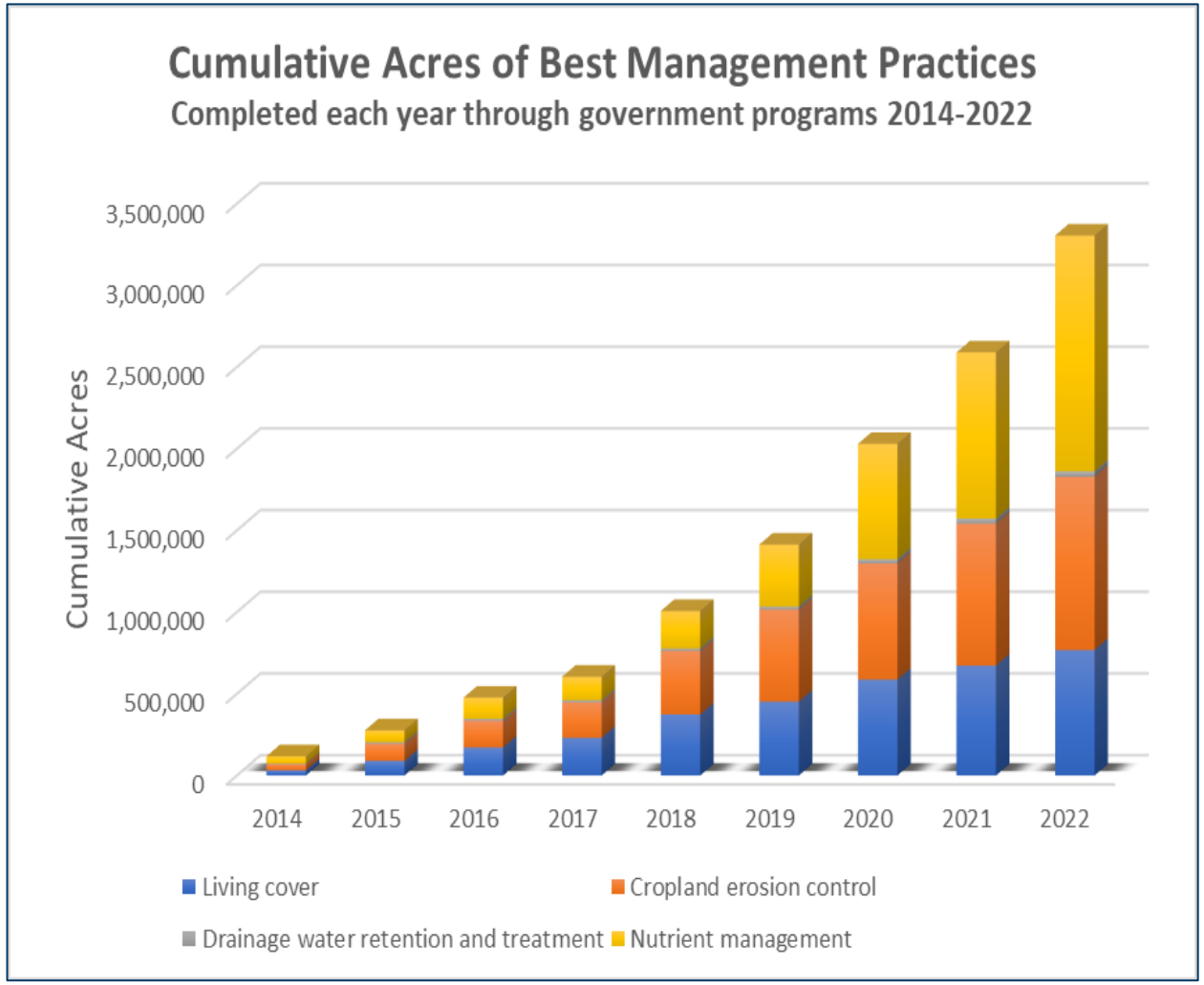
Minnesota exports nitrogen downstream – harming receiving waters

State-line nitrogen goals based on downstream water needs

	"final" goals (~2040)	Remaining reductions - Indications from monitoring
Mississippi River	**45%** Gulf Hypoxia Task Force (1980-96 baseline)	**33 - 45%** additional analysis underway
Red River & Lake Winnipeg	**50%** International Red River Watershed Bd (late 1990's baseline)	**30 – 50%** additional analysis underway
Lake Superior	**No net increase from 1970's**	

Both agriculture and wastewater are needed to do their part

- Some progress with agriculture documented
- MN Nutrient Reduction Strategy revision process (2025) looking at:
  - Technologies
  - Effectiveness
  - Cost
  - Implementation approaches



Government program assisted BMPs (does not include private adoption)

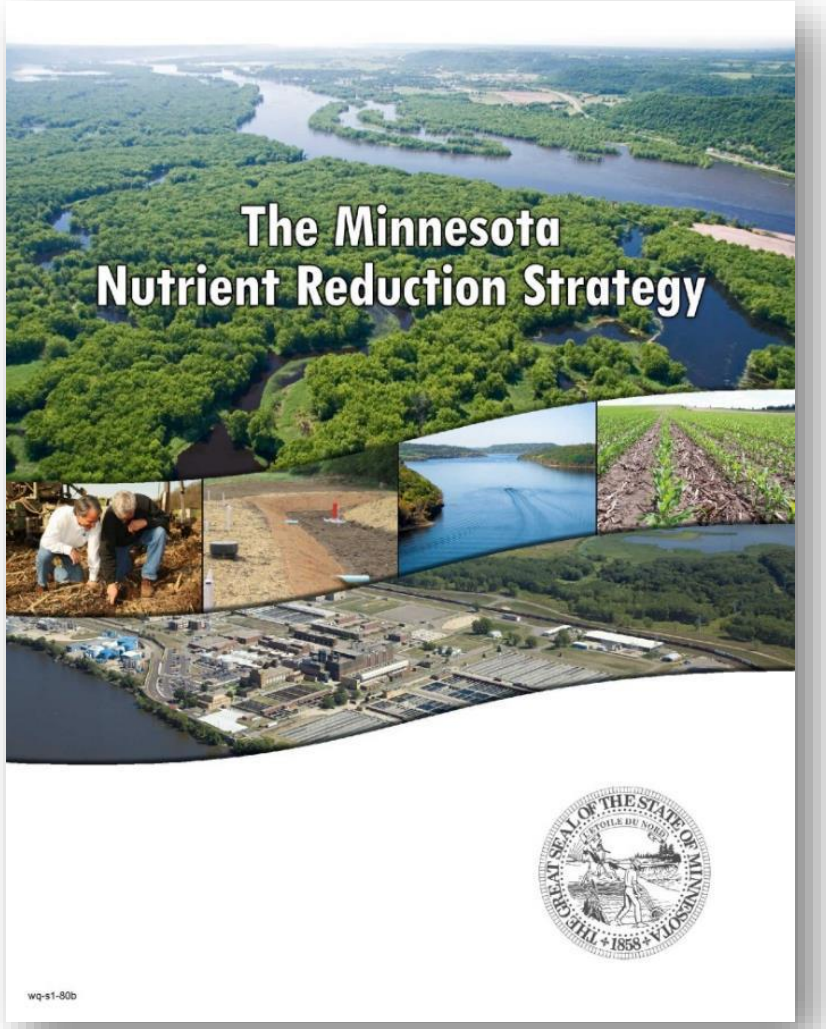
NRS connections to the MPCA wastewater nitrogen strategy

- Minnesota's 2014 Nutrient Reduction Strategy (NRS) identified *general steps* for wastewater N monitoring, management and reduction.

- MPCA's recently finalized wastewater nitrogen strategy considered NRS goals, but is a separate process from the NRS revision.

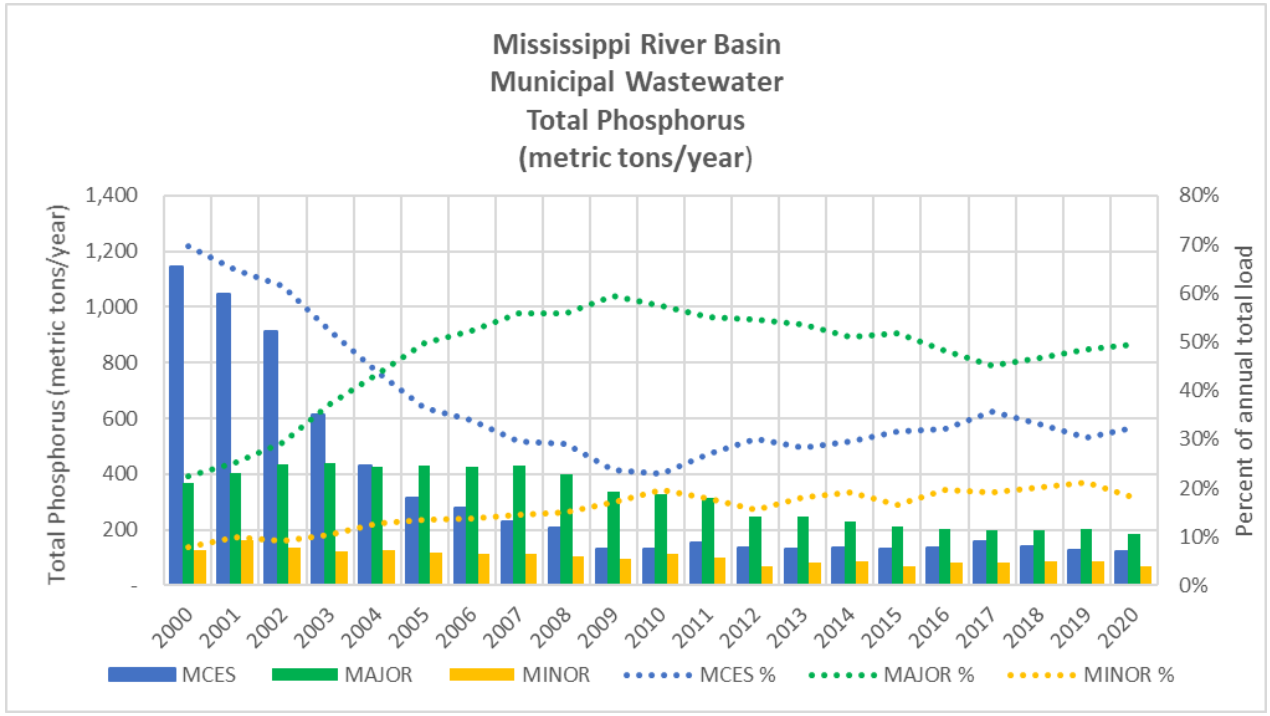
- The wastewater nitrogen strategy provides specific ways to achieve wastewater's part of addressing:

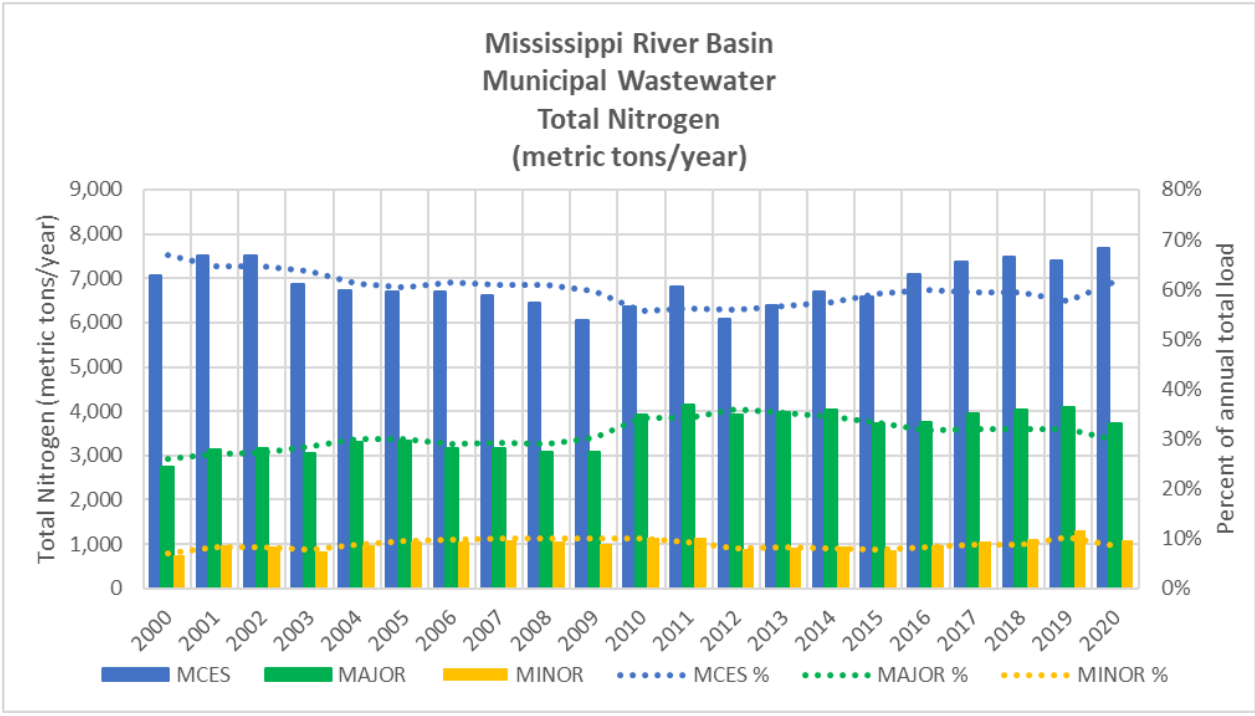
    a) Downstream nitrogen needs identified in the NRS;
    b) In-state aquatic life protection (WQS under development);
    c) Drinking water protection in cold water streams (TMDLs).



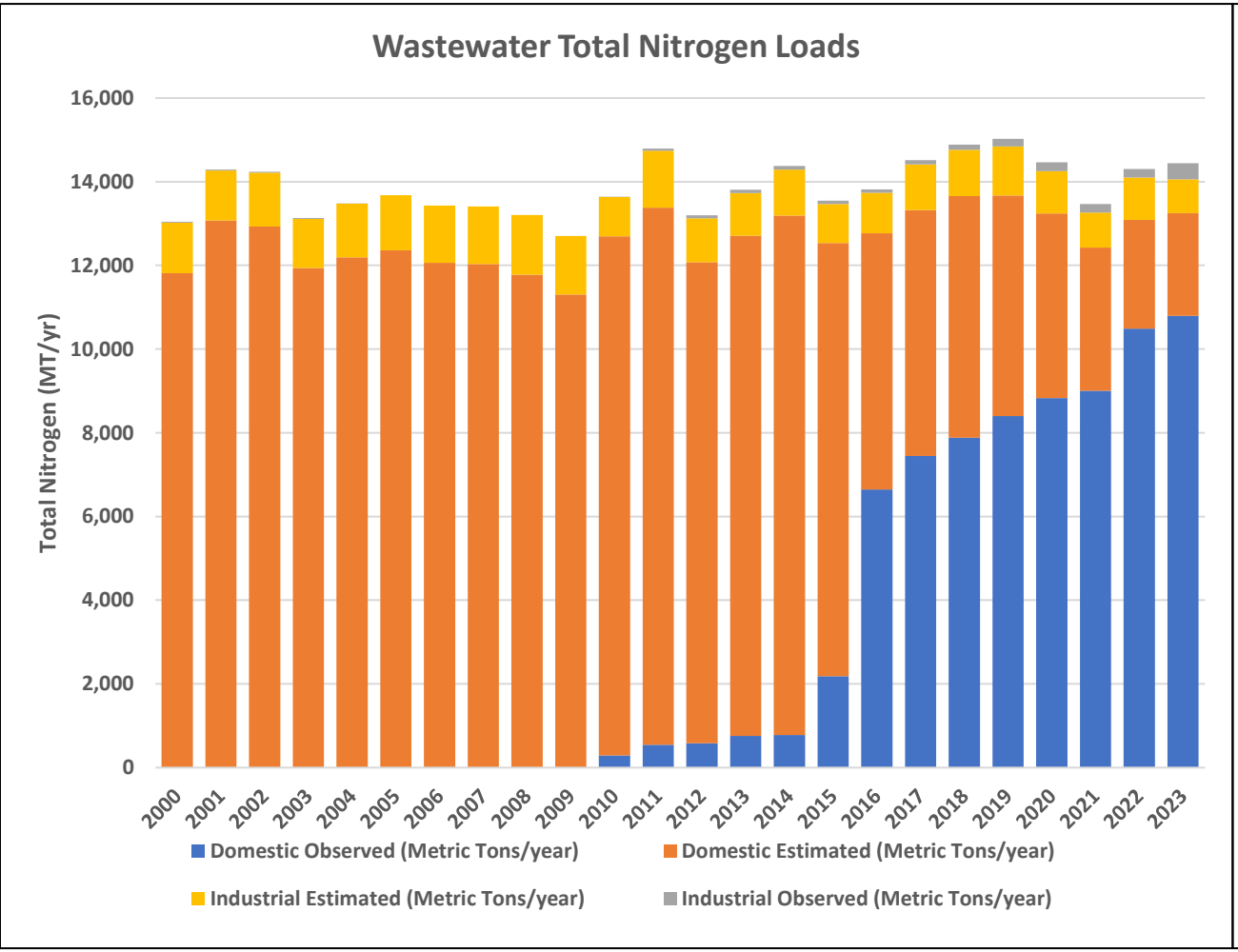
Recap of how we got here: Addition of phosphorus & nitrogen monitoring in wastewater permits

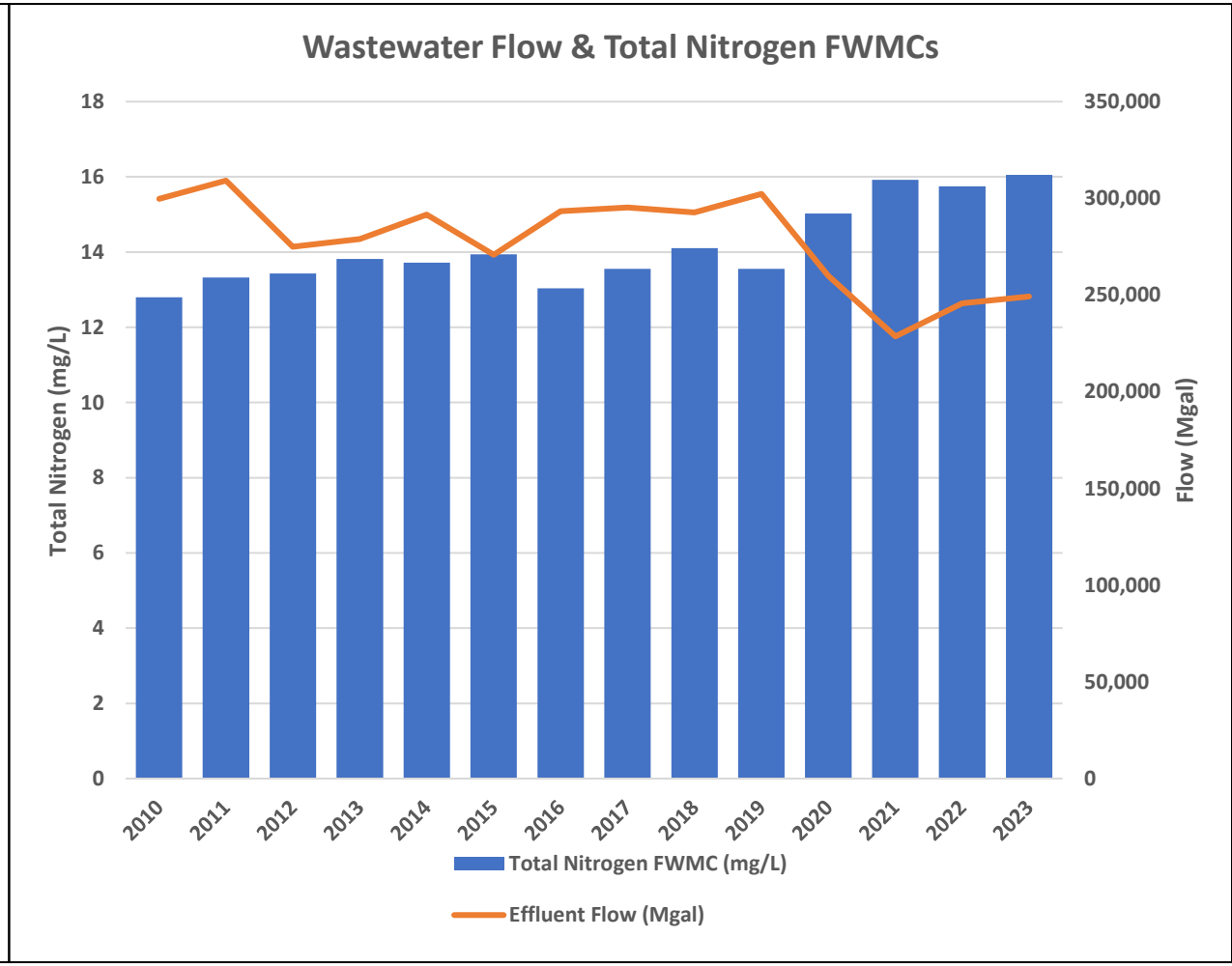
Mississippi River Basin – Wastewater TP & TN Loads





Nitrogen monitoring, loads and flow weighted mean concentrations





A brief overview of the Nitrate Water Quality Standard

Nitrate Water Quality Standard Overview

Minnesota waters

Aquatic life toxicity

- Draft WQS (revised 2022)

Drinking water in streams

Downstream waters

Gulf of Mexico - hypoxia

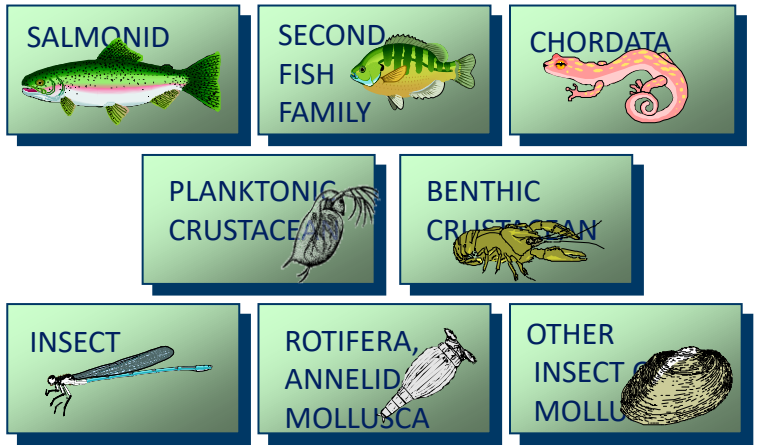
Lake Winnipeg – algae blooms

Iowa Rivers – drinking water

WQS Development Follows EPA Method

EPA Literature search complete;
Confirm test endpoints, methods, etc.

Assemble dataset of toxicity values



Calculation of Acute and Chronic Nitrate Aquatic Life Criteria

Final Acute Value
Final Chronic Value

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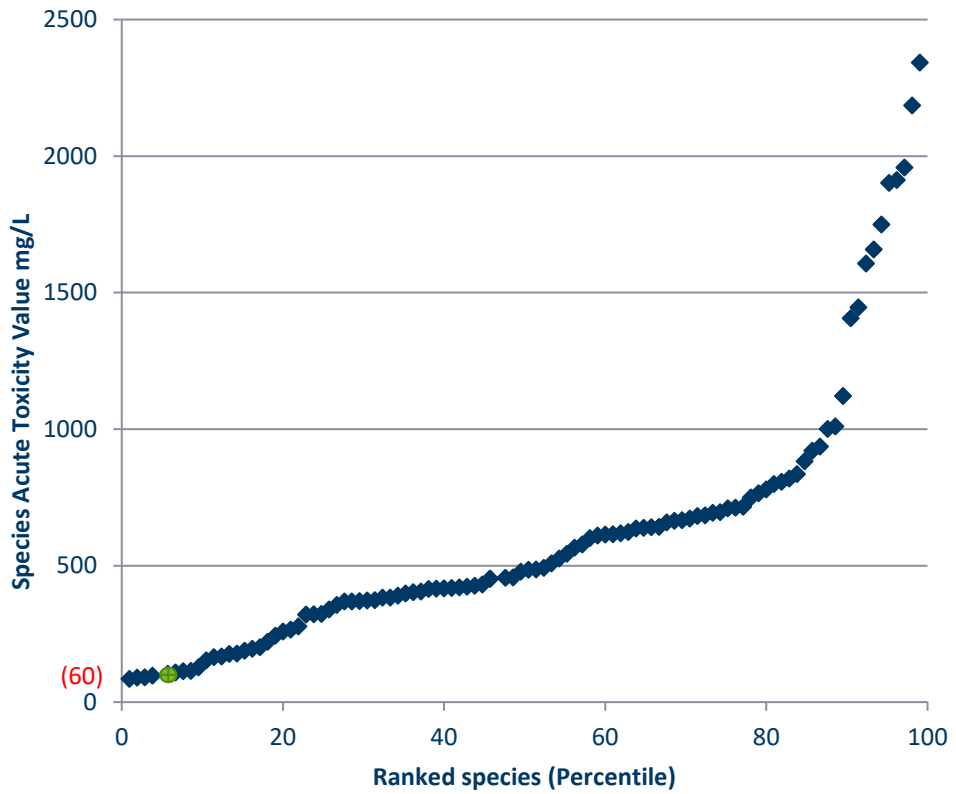
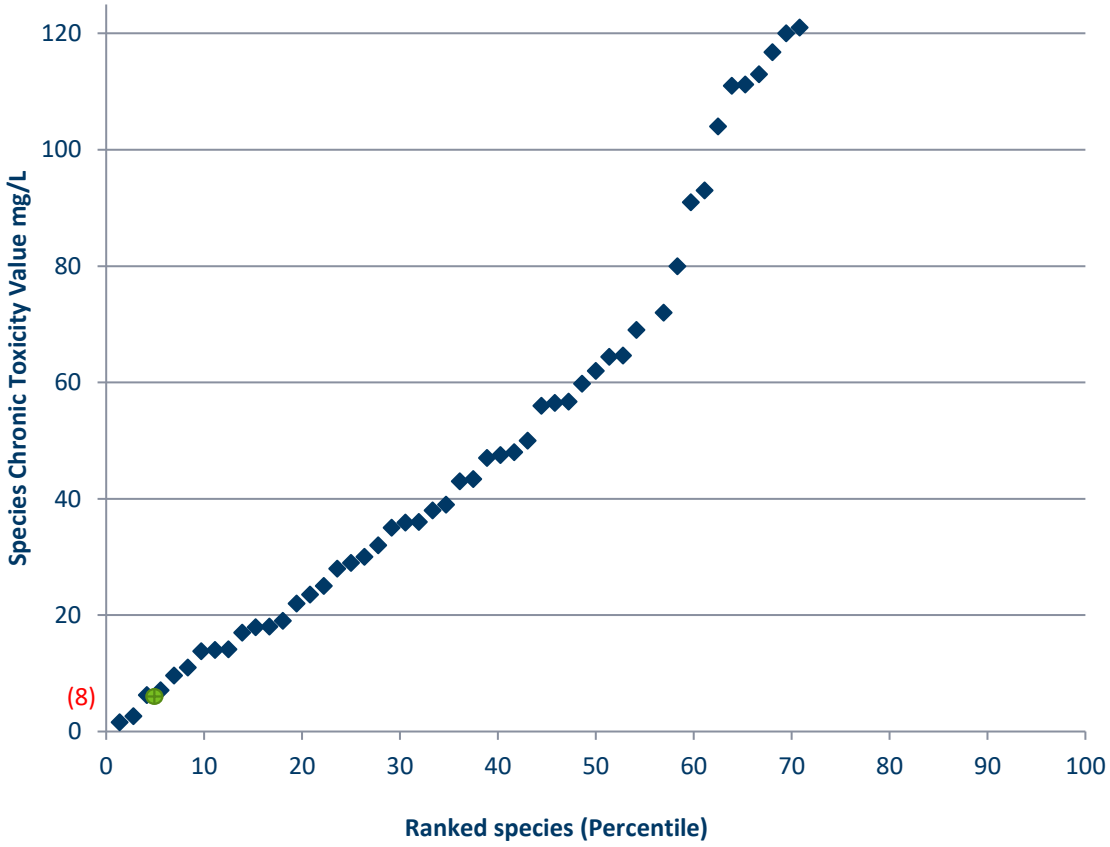
Ranked Acute and Chronic Values and Draft Numeric Criteria





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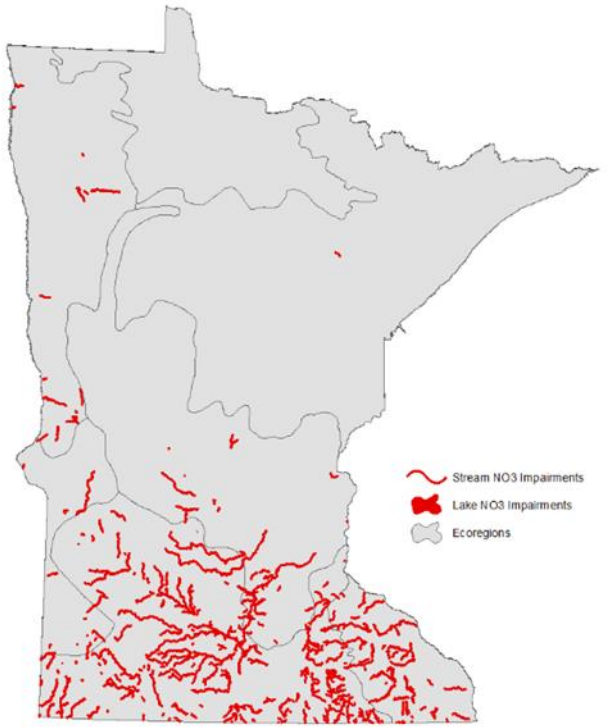
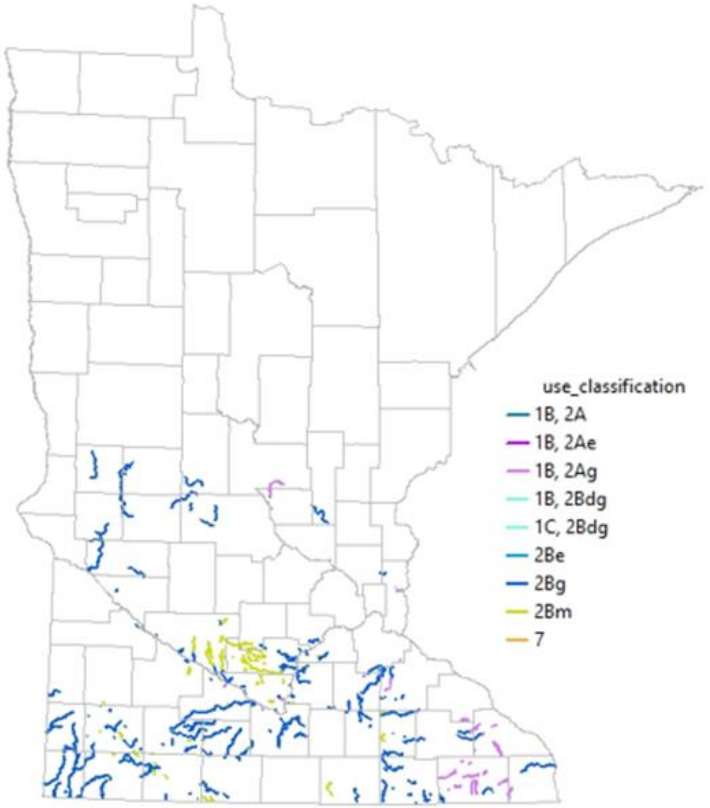
Do data show aquatic life is N-impacted?

Potential NO3-N Impairments based on Concentration



IBI Impairments Linked to Excess NO3-N



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Nitrate Rulemaking Restart

- Revise Draft TSD – 2025
- Request for Comments
- Peer Review (4 – 6 mo)
  - Also partner and stakeholder outreach
- RFC #2 or informal notice
- Follow by more partner and stakeholder outreach
- Public notice (1 - 1.5 y)
- Rule Hearings

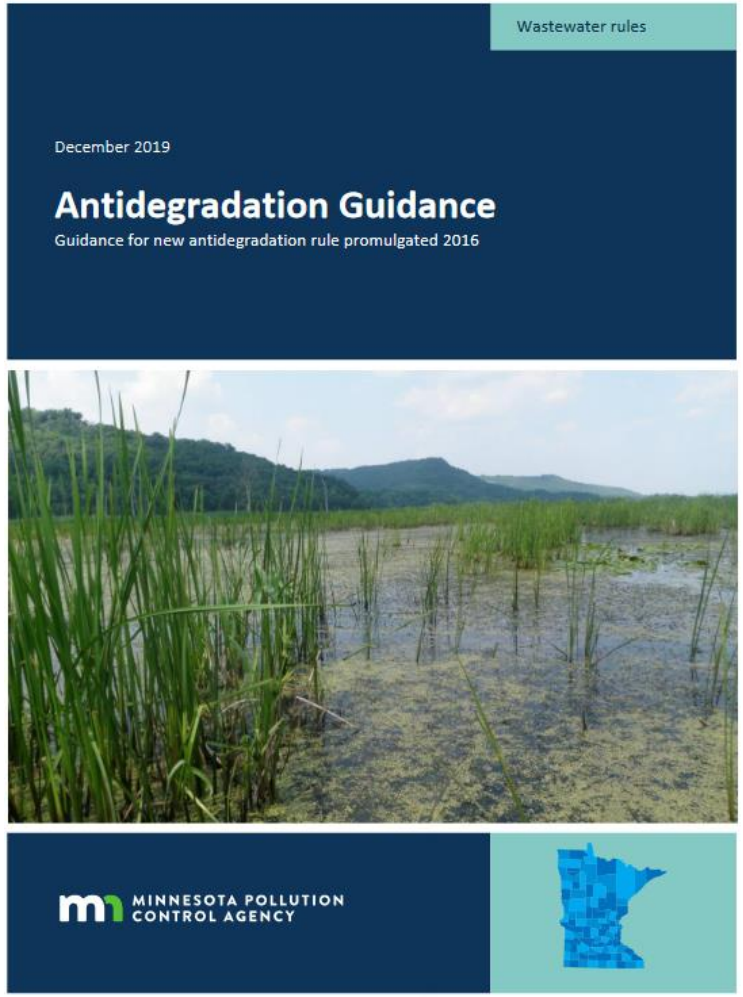
Moving forward to now: an overview of our current Wastewater Nitrogen Reduction Strategy

Phase 1: Nitrogen Guidance for new, expanding, & significantly upgraded facilities

- When – Starting April 1, 2024
- What – Before MN R. 7050 & 7053 rule changes:
  - New, expanded and significantly upgraded wastewater treatment facilities
  - The MPCA will work with project proposers to ensure that future nitrogen limits derived from draft WQS criteria and proposed SDR, are understood.
  - Require design considerations for new, expanded and significantly upgraded wastewater treatment facilities (WWTFs) to include nitrogen removal processes.
- Why – To promote early adoption of denitrification technology:
  - Maximize future benefits from impending investments in WWTF design and construction.
  - Expedite the ability of newly constructed, expanded and upgraded WWTFs to attain future nitrogen effluent limits

Phase 1: Nitrogen Guidance for new, expanding, & significantly upgraded facilities

- How – Work with project proposers to:
  - Ensure that WWTF designs prepared prior to the adoption of aquatic life toxicity NO_3-N WQSs and TN SDRs include consideration of the treatment units and hydraulic capacity necessary to achieve effluent denitrification.
  - Establish effluent limits where needed for protection drinking water sources and where biological stress to aquatic organisms exists as a result of high NO_3-N.
- What else – Antidegradation:
  - Antidegradation analyses for new and expanded WWTFs must consider nitrogen.
  - Least degrading prudent and feasible alternatives or loading offsets to avoid net increase in nitrate loading to downstream waters.



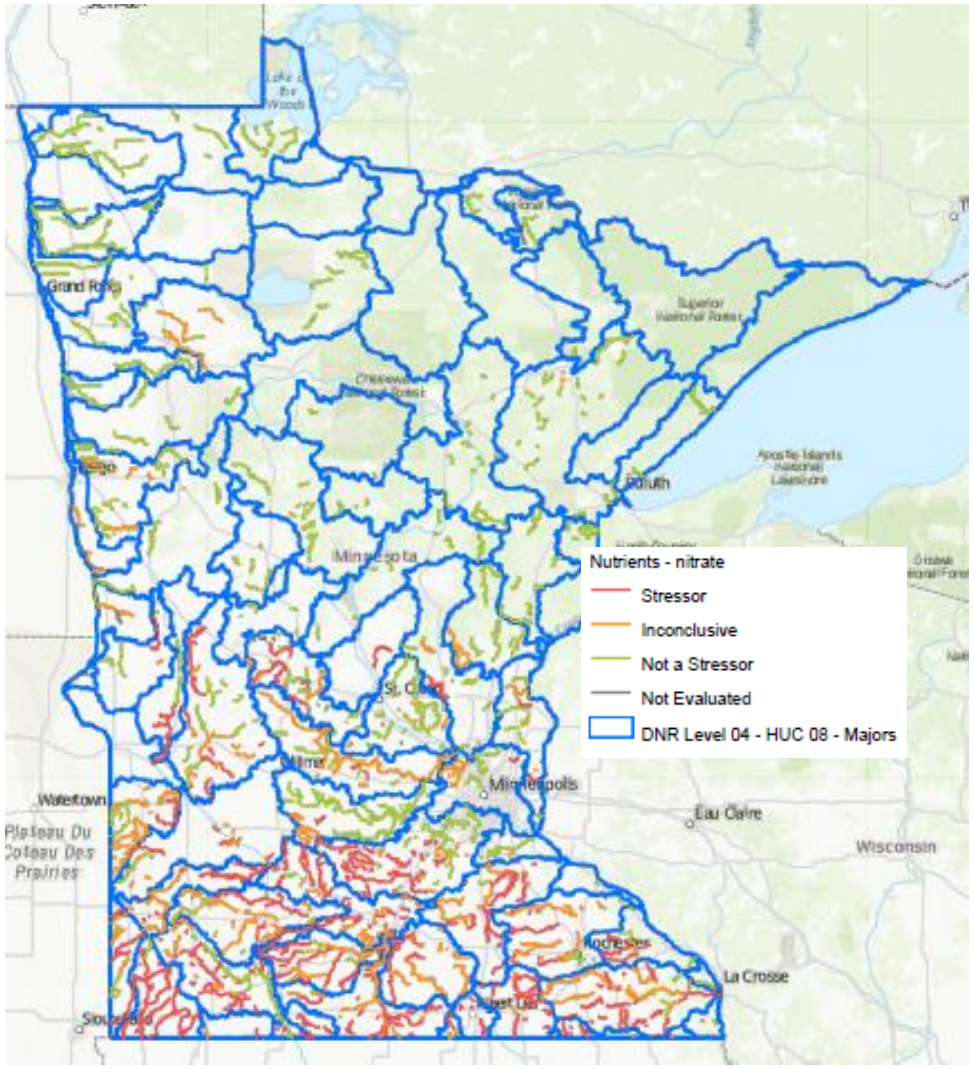
SDR & Nitrate WQS

- Phase I
  - Limits for nitrate if upstream of a drinking water source
  - NO_3-N causing biological stress to aquatic organisms
  - New, expanding, and significantly upgraded facilities must design for denitrification
- Phase II / Post-rulemaking
  - WQBELs based on RP for warm and cold water streams
  - SDRs

Nitrogen management plans

- Phase 1:
  - NMP development and implementation requirements for high concentration dischargers
  - Enhanced NMP development and implementation requirements for all dischargers upstream of IBI impaired water for which nitrate has been determined to be a stressor
    - Low concentration industrial dischargers only if TN > 5 mg/L
- Phase 2 & 3:
  - NMP update and implementation requirement for high concentration dischargers
  - NMP development and implementation requirement for low concentration dischargers
    - Low concentration industrial dischargers only if TN > 5 mg/L

IBI impaired waters – Nitrate stressor assessment



Additional Resources

Reducing nutrients in waters
www.pca.state.mn.us/air-water-land-climate/reducing-nutrients-in-waters

- Minnesota Nutrient Reduction Strategy (wq-s1-80)
- Minnesota Nutrient Reduction Strategy: Executive summary (wq-s1-80a)
- Nutrient Reduction Strategy: Two-page summary (wq-s1-80q)

MPCA's water quality standards work plan, 2021 - 2023
www.pca.state.mn.us/business-with-us/mpcas-water-quality-standards-work-plan-2021-2023

Thank you!

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