

Planning Guidebook

Using the Minnesota Nutrient Reduction Strategy in Water Planning

The Minnesota Board of Water and Soil Resources, in cooperation with the Minnesota Pollution Control Agency, developed this document to guide local, Tribal, and state government staff working with water plans in how to use data and tools from the Minnesota Nutrient Reduction Strategy (MN NRS) in planning.

Please note: Minnesota will update NRS data, products, and tools on an ongoing basis. Check the [Minnesota Nutrient Reduction Strategy website](#) for links to the latest web-based dashboards, estimators, GIS data, and more.

What is the NRS?

The NRS was first developed in 2014 to address excess nitrogen and phosphorus in Minnesota waters and Minnesota's contributions to excess nutrients downstream. The NRS was updated in 2025 to incorporate ten additional years of monitoring data, updated science, and emerging environmental concerns. The 2025 update also assessed progress made towards meeting the 2014 NRS nutrient reduction goals and introduced additional nutrient reduction goals for the state (Table 1).

Table 1: Total Phosphorus (TP) and Total Nitrogen (TN) river load goals and groundwater nitrate goals in the 2025 NRS.

Water Body	Nutrient	2025 NRS Goals
Lake Superior MN Tributaries	TP	No increase above 245 MT/yr average (combined MN tributaries)
	TN	No increase above 2,670 MT/yr average (combined MN tributaries)
Lake Winnipeg (Red River at Canada border)	TP	Reduce to 1,400 MT/yr average load (all states). ~50% reduction from late 1990s (1996–2000)
	TN	Reduce to 18,687 MT/yr average load (all states). ~53% reduction from late 1990s (1996–2000)
Mississippi River	TP	Achieve 45% TP reduction by 2040 (from 1980–1996 baseline)
	TN	Achieve 45% TN reduction by 2040 (from 1980–1996 baseline)
Groundwater (statewide)	Nitrate	Meet 1989 Groundwater Protection Act goals, and reduce groundwater nitrate baseflow into major rivers to enable achieving TN load reduction goals at state lines

Why Incorporate the NRS into Water Planning?

The NRS establishes statewide nutrient-reduction goals. Achieving them requires action at the local watershed level (Figure 1). The 2025 NRS informs and guides local government units in advancing these goals through local efforts.



Figure 1. Minnesota NRS connections at various scales.

How can the NRS be used in water planning?

The following sections describe common elements of watershed plans and how the NRS's rich array of data, information, and tools can be used to develop or amend plans. The data from the NRS will be updated on a continuous basis to reflect new water quality and monitoring data, as well as changes in land cover and conservation practice adoption.

Understanding Watershed Characteristics (Land and Water Resources Narrative)

Chapters 2 and 3 of the NRS include data about primary sources and pathways of nutrient loss. This information would be useful to include in the section of the plan that describes the watershed. Doing so lays the groundwork for subsequent sections that may identify nitrogen and/or phosphorus as a priority issue and possible actions to address nutrient issues. Pairing statewide trends described in the NRS with local observations and data from WRAPS Update reports and other sources to provide context for your watershed within the larger basin. Note that in some instances, nutrient load and concentration may be trending lower but still have relatively high reduction needs to meet local and NRS goals, while in some cases areas with lower nutrient may be trending higher. With that in mind, it is important to review the context of the nutrient trends in your watershed.

Stormy Watershed Example:

Stormy watershed drains to the Minnesota River, a tributary of the Mississippi River. The dominant nutrient sources are agricultural runoff, nitrate leaching from cropland, and streambank erosion for phosphorus. Other sources include wastewater and urban stormwater inputs (NRS Chapter 2). Stormy watershed's poorly drained soils and extensive tile

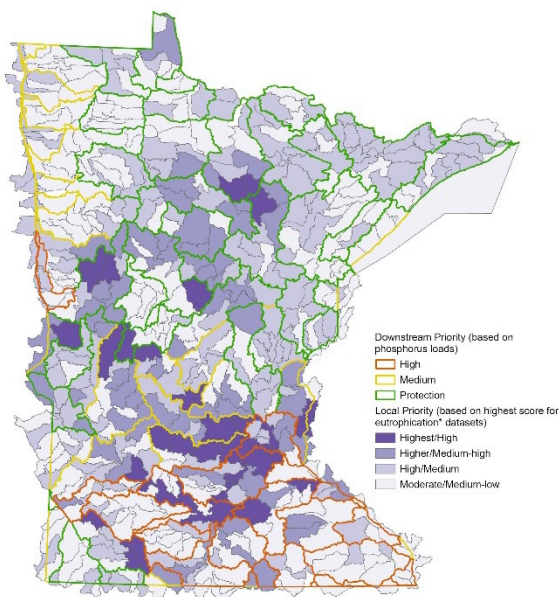
drainage mean nitrogen moves primarily through subsurface tile flow and groundwater, while phosphorus is delivered through surface runoff and streambank/channel erosion during high flows.

Statewide trend data (2003–2022) show phosphorus concentrations decreasing in most monitored streams but nitrate increasing in more streams than it is decreasing — a pattern consistent with a tile-drainage nitrogen pathway dominating in Stormy watershed (NRS Chapter 3).

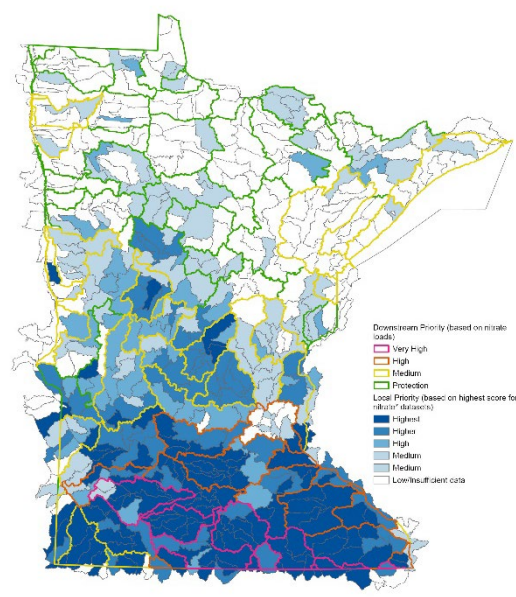
Identifying and Prioritizing Issues

The NRS can help planners identify the relative importance of their planning boundary's contribution to nutrient loading and the reductions needed. Chapter 2 of the NRS assesses Minnesota's progress on downstream nutrient reduction goals and identifies priority HUC-8 watersheds in which the largest amounts of nutrient reduction are needed to meet downstream goals.

Figures 3-12 and 3-26 show the ranking of watersheds for 'downstream priorities' (HUC-8 scale) as well as 'local priorities' (HUC-10 scale) for TP and TN respectively. These maps can help local decision makers determine whether TP or TN should be a priority issue in their plan for surface and groundwater resources.



NRS Figure 3-12 (page 93). Highest-category phosphorus priority HUC-10 subwatersheds, along with the HUC-8 priority watershed contributing TP loads downstream of Minnesota. HUC-10 subwatersheds are ranked by the highest category of the Nutrient-Impaired Lake, Lake Benefit:Cost Assessment, and River Phosphorus datasets.



NRS Figure 3-26 (page 113). Highest-category nitrate priority HUC-10 subwatersheds, along with the HUC-8 priority watersheds contributing TN loads downstream of Minnesota. HUC-10 subwatersheds are ranked by the highest category of the Aquatic Life Toxicity, MDA Township Testing, and MDH well water nitrate datasets.

Planners for watersheds that are depicted in the NRS as the highest priorities for phosphorus and/or nitrogen should identify the relevant nutrients as priorities in their plan. Pair NRS information with local trends and water-body specific priorities to refine your plan's priority issues and locations.

Stormy Watershed Example:

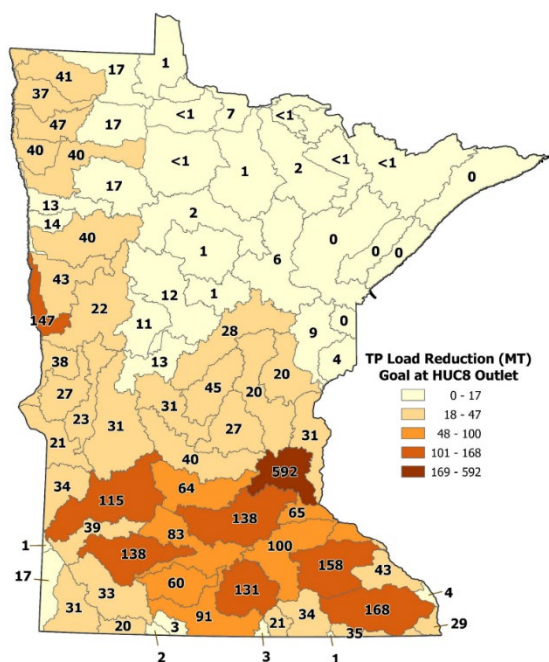
Stormy watershed issues were prioritized by how often they were mentioned in existing reports, the public survey, and committee meetings. “Excess nutrient delivery to surface waterbodies” ranked high as an issue from all sources. In addition, Stormy Watershed is identified in the NRS as a high priority for nitrogen and phosphorus load reduction to meet downstream Mississippi River goals (NRS Chapter 2). Therefore, this issue is a high priority in the plan. Both in-state and downstream nutrient reductions are needed to address resource concerns.

Setting Goals

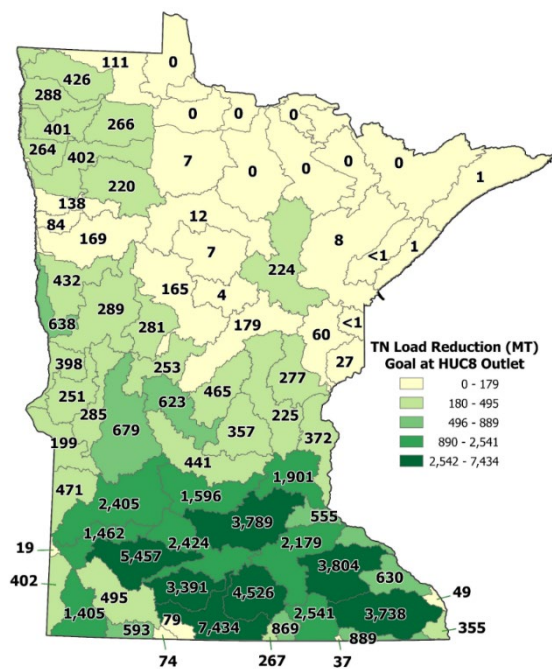
Many (although not all) watershed plans set goals for reducing phosphorus and/or nitrogen. While explicit numeric goals for these parameters are not required, when they do appear, they should be strongly connected to the NRS.

Long Term Goals (Desired Future Condition)

The NRS contains percent and numeric reduction targets for each of the state’s 80 major (HUC-8) watersheds. These NRS targets should be used as the desired future conditions in the plan. See Table 3 - Table 9 in Appendix 2-4, [Watershed nutrient loads to accomplish Minnesota’s Nutrient Reduction Strategy Goals](#).



NRS Appendix 2-4, Figure3 (page 9). Average annual HUC8 watershed TP load reductions (MT) at the watershed outlet to meet the final target loads at state lines.



NRS Appendix 2-4, Figure 1 (page 7). Average annual HUC8 watershed TN load reductions (MT) at the watershed outlet to meet the final target loads at state lines.

Stormy Watershed Example:

Nutrient Reduction Long-term Goals for Stormy River Watershed:

- Total Phosphorus: 91 metric tons/year load reduction (40%) at the watershed outlet (NRS Figure 2-3).
- Total Nitrogen: 6,803 metric tons/year load reduction (50%) at the watershed outlet (NRS Figure 2-3).

Contact your MPCA project manager when using NRS data in planning to ensure you are using the most appropriate (time and spatial scale) data sets.

Short Term (10-year) Goals

The BMP Effects Estimator Tool (BEET)

Planner can be a useful tool for determining existing pollution loads and the impact of new, planned, or future best management practice installation. To set short-term goals, follow these steps:

- 1) Look at how much has been accomplished in the past 10 years ([MPCA Healthier Watersheds](#)).
- 2) Determine your available staff and funding resources.
- 3) Set a 'stretch goal' based on what was done over the last 10 years plus an estimate of what could be done with more resources (don't set your goal based only on estimated current capacity – give yourself room for growth)
- 4) Set an implementation scenario based on the steps above (see below) and use the estimated results to set your short-term goal.

When HUC-8 watersheds and 1W1P Planning Boundaries do not align, consult with MPCA on how to translate watershed goals to planning boundaries. MPCA staff should check for updated/more detailed WRAPS information, and note whether goals contain a significant wastewater component (e.g., Lower Minnesota River)

- 1) If the planning boundary consists of multiple HUC-8 watersheds (e.g., Root River) use the sum of the HUC-8 goals
- 2) If there are only minor differences between the planning boundary and the HUC-8 boundary (e.g., Pomme de Terre River) use the HUC-8 goal.
- 3) If boundaries are dramatically different (e.g., Yellow Medicine), consider these options:
 - a) Pro-rate HUC-8 watershed goals according to the per- acre contribution of each HUC-8 watershed to the planning boundary.
 - b) Use information from a relevant TMDL study.
 - c) Use the basin goal

If the plan has short-term (10-year) numeric goals for reducing phosphorus or nitrogen, it should relate its nutrient reduction goals to the NRS watershed targets as a percentage that represents how much of the NRS goal the plan implementation will achieve.

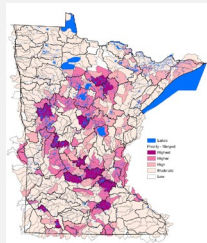
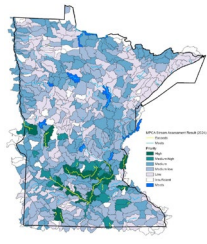
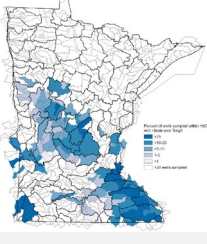
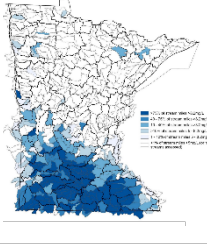
Stormy Watershed Example:

The Stormy watershed's 10-year plan goals for nutrients are summarized below:

Nutrient	Existing Load	10-year reduction goal	10-year goal <i>relative to existing load</i>	Long-term reduction <i>NRS goal</i>	10-year goal <i>relative to NRS goal</i>
Phosphorus (lbs/y)	500,000 (227 MT)	25,000 (11 MT)	5%	200,000 (91 MT)	13%
Nitrogen (lbs/y)	30,000,000 (13,607 MT)	1,500,000 (680 MT)	5%	15,000,000 (6,803 MT)	10%

Identifying Priority Areas

If nutrients are prioritized as an issue, the NRS can help identify which subwatersheds (HUC-10) should be the highest priorities for focusing nutrient reduction efforts. Chapter 3 contains an array of maps that could be helpful in various aspects of planning. Plans should reflect the priorities shown in the following figures in the NRS:

Figure, NRS p. #	Description	Use	Image
3-7, 84	Watershed priorities for reducing the phosphorus entering lakes, created from merging priority watersheds for impaired lake acreages and the LBCA (Lake Benefit:Cost Assessment) scores.	Determine priority lakes for restoration/protection in plans and/or identify priority subwatersheds for targeted P reduction.	
3-11, 90	Priority HUC-10 watersheds for phosphorus reductions to reduce river and stream eutrophication potential.	Determine priority rivers/streams for targeted P reduction.	
3-21, 106	Priority watersheds for groundwater nitrate based on the highest category rankings from MDH and the MDA Township Testing Program.	Identify priority subwatersheds for groundwater nitrate reduction efforts.	
3-24, 110	Priority watersheds for potential aquatic life toxicity concerns based on nitrate concentrations that exceed thresholds (95th percentile) in monitored stream miles.	Identify subwatersheds in which aquatic life concerns should be addressed in planning.	

As of fall 2026, MPCA is in the process of publishing the spatial data that corresponds to these maps in the State's MNGEO Commons.

The NRS prioritizes HUC-10 subwatersheds; this information should be further refined using HUC-12 scale data where available (see WRAPS, local data, and BEET planner).

Stormy Watershed Example:

The three subwatersheds (HUC-10) in the southeastern portion of Stormy watershed rank highest for nitrogen-reduction because they combine the highest tile-drainage density, the largest row-crop acreage on poorly drained soils and monitored nitrate concentrations above the state's drinking-water and aquatic-life thresholds. The lake-dominated subwatersheds (HUC-10) in the north are prioritized for phosphorus reduction given their impaired lakes. This subwatershed targeting directs limited implementation and grant dollars to the areas with the greatest resource concern and load-reduction potential.

Targeted Implementation

Chapters 4 and 5 of the NRS identify effective nutrient-reduction strategies. Table 5-3 outlines the potential benefits of various conservation practices, while the statewide implementation scenario shows the relative importance of strategies for reducing nitrogen and phosphorus.

Successful planners will combine this information with professional knowledge of the watershed's dominant nutrient sources and pathways, priority issues and areas, and conservation practice benefits to develop a targeted implementation schedule. The plan should describe how implementers will target high-value practices such as nutrient management/4Rs, continuous living cover, drainage water management, streambank stabilization, and urban stormwater management to address identified resource concerns and watershed conditions.

Use [The BMP Effects Estimator Tool \(BEET\) Planner](#) to experiment with different implementation scenarios to decide which combination of practices are the best fit for your watershed (landowner acceptance, cost-benefit, effectiveness, etc.).

Stormy Watershed Example:

In the three priority subwatersheds (HUC-10) where subsurface tile flow drives nitrogen loading, the implementation schedule emphasizes tile drainage water management, continuous living cover, and fertilizer/manure management — practices the NRS scenario identifies as offering the largest nitrogen reductions.

In the lake-dominated subwatersheds (HUC-10) prioritized for phosphorus reduction, the plan targets streambank stabilization, riparian buffers, and erosion control to address the surface-runoff and streambank-erosion phosphorus sources.

Implementation Programs

The NRS recognizes that understanding the human dimension of watershed work is critical to successful implementation. NRS chapters 4 and 5 discuss programmatic approaches to nutrient reduction in urban and rural areas. Sections 5.2, 5.3, and 5.4 discuss approaches to increase practice adoption and characteristics of successful programs. Chapters 4 and 6 describe state-level programs that can dovetail with or support local programs. Appendix 5-4 gives information about practice adoption trends. Finally, Appendix 7-1 describes how social science can help assess human dimensions of conservation work. Planners can refer to this information when writing the implementation programs section of the plan, especially when updating the section during a plan amendment.

Stormy Watershed Example:

The Stormy Watershed Partnership will build on existing initiatives to advance nutrient reduction strategies.

For nitrogen, the partnership will create an Agricultural Stewards Initiative that provides technical help and equipment rentals so farmers can explore nutrient management and soil health practices. The partnership will also promote drainage water management techniques through on-farm trials, and demonstration field days.

For the lake-dominated subwatersheds (HUC-10s) prioritized for phosphorus reduction, the partnership will pilot a Lake Stewards Initiative with the Round Lake Association. This neighbor-to-neighbor program uses peer education along with technical assistance and funding to highlight demonstration projects on the shoreline and in the watershed that promote watershed best management practices, stormwater management, and shoreline restoration projects.

Partners will seek financial assistance through the Board of Water and Soil Resources' (BWSR) watershed-based implementation funding (WBIF) and clean Water Fund grants, the NRCS Environmental Quality Incentives Program (EQIP) for cover crops and drainage water management, and the Reinvest in Minnesota (RIM) program for conservation easements and buffer establishment.