# LAKE TOPIC MEETING REPORT

## Introduction

The Kettle River & Upper St. Croix Watershed flows south from its headwaters in Carlton County to its confluence with the Snake River just south of St. Croix State Park. Although largely forested, the watershed is dotted with farmland and small cities including Moose Lake, Sandstone and Hinckley. This watershed is lucky to have abundant healthy natural resources including rivers, streams, lakes, wetlands, groundwater and forests.

The **Kettle River & Upper St. Croix One Watershed, One Plan** (1W1P) is a planning partnership between Pine SWCD, Pine County, Carlton SWCD, Carlton County and Kanabec SWCD. The goal of this partnership is to **prioritize** restoration and protection opportunities and **target** valuable resources. The result will be the development of a comprehensive watershed management plan with actions that make progress towards **measurable** goals.

The general 1W1P process is outlined in Figure 1. For the first step, which is to gather and prioritize opportunities/issues in the watershed, a series of five topic meetings will be held. The meeting topics include: 1) lakes, 2) forests, 3) rivers, streams & wetlands, 4) agriculture & groundwater and 5) stormwater.

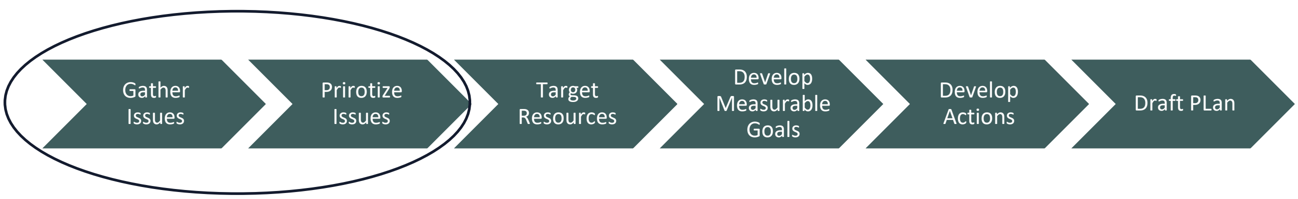


**Figure 1. The 1W1P process is divided into six main steps. The topic meetings are the first step in the process (circled).**

The 1W1P process is driven by local units of government, guided by an Advisory Committee made up of local stakeholders and state agencies. The decision-making body for the plan is a Policy Committee made up of elected officials from each County and SWCD.

To gather diverse viewpoints, topic experts were invited to attend the lake meeting in addition to the Kettle River & Upper St. Croix Watershed Advisory Committee. Topic experts included lake association, lakeshore owners, MN Department of Natural Resources Fisheries staff and lake conservation technicians.

## Kettle River & Upper St. Croix Watershed Lakes

There are 57 lakes of 10 acres or more in the Kettle River & Upper St. Croix watershed, hosting a variety of species including cisco (Hanging Horn and Little Hanging Horn), trout (Grindstone) muskie (Island) and wild rice (22 lakes according to the 1854 Treaty Authority). There are 13 lakes list by the MN Department Natural Resources (DNR) as being outstanding lakes of biological significance. This means the lake has a unique plant or animal species. According to the MN DNR, the lakes with the highest health scores include Grindstone, Greigs, Little Hanging Horn, Echo, Hanging Horn, Razor and Kettle lakes.

**Figure 2. Kettle Lake is a wild rice lake in the northern part of the planning area.**

A full list of lake related data is available in Table 2. Although many of the lakes in this watershed are healthy, a total of 13 lakes are listed as impaired by the Minnesota Pollution Control Agency (MPCA) due to high levels of nutrients. Too many nutrients, like phosphorous, can lead to algae blooms. These impaired lakes include Oak, Grindstone, Big Pine, Pine, Twentynine, Merwin, Eleven, Rock, Grace, McCormick, Fox, Elbow, Rhine. Some lakes are more sensitive to additions of nutrients, meaning that additions of nutrients could cause the lake to become impaired. A total of 10 lakes are listed by the MN DNR as having the highest sensitivity to additions of phosphorus. In addition, a total of nine lakes are listed as either nearly impaired or barely impaired by the MPCA. These lakes are very close to the nutrient standard. Finally, a total of five lake are infested with aquatic invasive species, including Bear, Sand, Sturgeon, an unnamed gravel pit and Little Hanging Horn Lake. They are all infested with Eurasian Water Milfoil.

## Kettle River & Upper St. Croix Watershed's Lake Issues

To illustrate the diversity of viewpoints, at the beginning of the lake meeting, we asked the experts and Advisory Committee members to tell us that comes to mind when they think about the Kettle River & Upper St. Croix watershed's lakes. The responses were assembled to create a word cloud (figure x)


**Figure 3. Word cloud depicting the diversity of responses to the question, "when you think of the Kettle River & Upper St. Croix Watershed's lakes, what comes to mind?"**

To help us understand what issues/opportunities surround lakes in the Kettle River & Upper St. Croix watershed, issues listed in previous plans, reports, state agency comment letters and public input were gathered and compiled into common themes, becoming the basis of creating the priority lake issues for the Kettle River & Upper St. Croix Watershed (see References for sources).

Gather issues described in existing plans, state agency comment letters and public kickoff meeting feedback

Compile common themes within all sources

Brainstorm issues at the topic meeting, edit and combine with issues gathered from existing sources

Topic meeting participants prioritize issues by selecting their top two highest priority themes for the Kettle River & Upper St. Croix Watershed

Topic meeting participants discuss possible actions and measures to address priority issues

**Figure 4. Issue statement development process**

A diverse group of lake experts plus the Kettle River & Upper St. Croix Advisory Committee gathered to brainstorm issues for lakes in the watershed. The brainstormed list was either grouped with the compiled themes or new themes were created. The group then agreed on a final list of four topic themes (table 1). In addition, two issues were tabled until the stream meetings. They include concerns with stream connectivity affecting spawning habitat for lake fish and the impoundment in Hinckley.

**Figure 5. Photos from the Lake Topic Meeting held on August 15, 2022.**

**Table 1. Lake issue statements developed at the Lake Topic Meeting.**

| # | Draft Issue Statement | References |
|---|---|---|
| 1 | Protection of lakes that provide critical habitat for rare and sensitive species (cisco, trout, wild rice, etc.) is needed to improve water quality, maintain biodiversity, and support native fish, wildlife, and plant communities. | Carlton and Pine Water Plans, MPCA, BWSR & DNR Letters, Landscape Stewardship Plan, Kickoff Meeting, Topic Meeting |
| 2 | Invasive species are a threat to lakes, and healthy lakes with thriving native plant communities can limit invasive species growth. | Carlton & Pine Water Plans, DNR Letter, Kickoff Meeting, Topic Meeting |
| 3 | Nutrients from aging or poorly maintained septic systems/holding tanks, shoreline erosion, lake bottom sediments/aquatic plants (internal phosphorous), wake boats, and upstream watershed sources can impact lake health and water quality. | Pine & Carlton Water Plans, Public Kickoff, MPCA Letter, Rapid Watershed Assessment NRCS, Kickoff Meeting, Topic Meeting |
| 4 | Wild rice is declining in some lakes and requires stable water quality and water levels. | Carlton Water Plan, MPCA Letter, Kickoff Meeting, Topic Meeting |
| 5 | Public recreation access is impacting the ability for residents, especially socially vulnerable populations, from enjoying lake recreation | Topic Meeting |
| 6 | High lake water levels caused by increased rain is impacting some lakes shorelines and property values. | Topic Meeting |

Each participant ranked their top two issues for lakes, and the top two priorities overall were:

- **Protection** of lakes that provide critical habitat for rare and sensitive species (cisco, trout, wild rice, etc.) is needed to improve water quality, maintain biodiversity, and support native fish, wildlife, and plant communities.
- **Nutrients** from aging or poorly maintained septic systems/holding tanks, shoreline erosion, lake bottom sediments/aquatic plants (internal phosphorous), wake boats, and upstream watershed sources can impact lake health and water quality.

The group discussed the possibility of lumping wild rice lakes with protection since the many of the same actions would address both issues. More discussion will follow in future meetings. In addition, it was recognized that AIS and public recreation access activities would not be eligible for Watershed Based Implementation Funding. However, they could still be included in the plan.

The group brainstormed a list of possible actions to address the priority issues along with ways success might be measured.

## Lake Actions/Measures

### Nutrients

- Develop additional septic system compliance measures / requirements on how often systems are inspected / guidelines at the county level / audit for inspection
    - # of systems inspected
    - Establishment of inspection guidelines
- Septic system / holding tank maintenance education
    - # of people reached
- Phosphorous monitoring of lakes
    - # of times monitored
    - Transparency trends tracked
- Diagnostic Monitoring to determine sources
    - Sites sampled
- Education & outreach of lakeshore owners
    - Outreach campaigns completed
- Private property stormwater management
    - Pounds of phosphorous
    - Projects completed
    - Impervious surfaces removed
- Reward installed best management practices
    - # projects installed
- Shoreline analysis (score your shore)
    - Lakes completed
- Install buffers on lakes
    - Linear feet restored
- Support, engage and build lake associations and/or lakeshore involvement
    - # of lake associations
    - # of people attending events
- Direct mailings to lakeshore owners
    - # of mailings
- Restore areas that were ditched
    - Linear feet restored
- Work with farmers with livestock to manage manure / nutrients
    - # best management practices installed
    - Pounds of phosphorous

### Protection

- Forest protection through conservation easements, Sustainable Forests Incentives Act, 2C land classification
    - Acres of forests protected

- Ordinances / zoning
    - # of ordinances enforced
    - # of review of ordinances
    - # of compliance checks
- Collaborate with counties and private landowners on timber harvests in lakesheds
    - # meetings held
- Collaborate with road authorities on projects in lakeshed, especially counties and townships
    - # meetings held
    - Review of 5-10 year plans
    - Identify priority culverts
- Restore & protect shoreline areas
    - Linear feet restored / protected
- Protecting water levels of wild rice lakes
    - # projects implemented
- Education of contractors
    - # of workshops held

## Public Recreation Access

- Adding Fishing piers on County, Township and State land (state land more difficult)
    - # of accesses created
- Education / outreach of public shoreline access that is already available
    - # of mailings
    - # of online tools created
    - # of maps created

## AIS

- Seasonal boat inspections
    - # lakes with inspections
- Education / outreach
    - # mailings
    - # of outreach campaigns
- Treat infestations
    - Acres of waters treated
- Plant survey for early detection of AIS
    - # of surveys

| HUC -10 Watershed | Lake Name | Aquatic Invasive Species | Shallow Lake? | Impairment Status (MPCA) | Nearly Barely Lake? (MPCA) | Mean TP (µg/L) (MPCA) | Lake of Phosphorus Sensitivity (DNR) | Secchi Trend (MPCA) | Lake of Biological Significance (DNR) | Lake Health Score (DNR) | Lake Benefit Cost Significance Class (DNR) | Unique Resources | MPCA Protection Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upper Kettle River | Kettle (09004900) | --- | Yes | --- | --- | 29 | High | Insufficient Data | Outstanding | 85 | High | Wild Rice (DNR & 1854) | Priority C |
| | Little Kettle | --- | --- | --- | --- | --- | --- | --- | Outstanding | --- | --- | Wild Rice (1854) | --- |
| | Merwin | --- | --- | Nutrients | --- | 39 | Impaired | Insufficient Data | --- | 70 | High | Wild Rice (1854) | --- |
| | Split Rock | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | Wild Rice (DNR & 1854) | --- |
| Moose River | Echo | --- | --- | --- | --- | 16 | Higher | Insufficient Data | Outstanding | 85 | High | --- | Priority B |
| | Coffee | --- | --- | | | 20 | Higher | Insufficient Data | | 70 | High | | Priority B |
| | Bob | --- | --- | --- | --- | 18 | Higher | Insufficient Data | --- | 75 | High | Wild Rice (DNR & 1854) | Priority C |
| | Bear | Yes | --- | --- | Yes | 26 | Highest | No Trend | --- | 70 | High | --- | Priority A |
| | Little Hanging Horn | Yes | --- | --- | --- | 17 | Highest | Improving | Outstanding | 85 | Higher | Cisco | Priority A |
| | Moose | --- | --- | --- | --- | 24 | Higher | Insufficient data | --- | 70 | High | Wild Rice (DNR & 1854) | Priority B |
| | Moosehead | --- | --- | --- | Yes | 36 | High | No Trend | Outstanding | 80 | High | Wild Rice (DNR & 1854) | Priority B |
| | Park | --- | Yes | --- | --- | 16 | Highest | No Trend | High | 80 | Higher | --- | Priority B |
| | Hanging Horn | --- | --- | --- | Yes | 29 | High | No Trend | Outstanding | 85 | High | Cisco | Priority C |
| | Sand | --- | --- | Fish IBI | --- | 19 | Highest | No Trend | --- | 70 | Higher | Wild Rice (1854) | Priority A |
| | Eddy | --- | --- | --- | Yes | 21 | High | No Change | --- | 70 | High | --- | Priority A |
| | Manoomini-zaaga'iganing | --- | --- | --- | --- | 18 | --- | --- | Outstanding | --- | --- | Wild Rice (DNR & 1854) | --- |
| | Twentynine | --- | --- | Nutrients | --- | 53 | Impaired | Insufficient data | --- | 70 | High | --- | Priority C |
| | Little North Sturgeon | --- | --- | --- | | | --- | --- | --- | --- | --- | Wild Rice (DNR & 1854) | --- |
| | Lords | --- | --- | --- | | | --- | --- | High | --- | --- | --- | --- |
| | Island | --- | --- | --- | Yes | 28 | Highest | No Change | Moderate | 75 | Higher | Muskie | Priority A |
| Willow River | Eleven (58006800) | --- | --- | Impaired | Yes | 25 | Highest | No Trend | --- | 70 | High | --- | Priority B |
| | Dago | --- | --- | --- | --- | 13 | Highest | Insufficient Data | --- | 80 | Higher | --- | Priority A |
| | Oak | --- | --- | Nutrients, Fish IBI | --- | 35 | Impaired | No Trend | --- | 70 | High | Wild Rice (1854) | Priority A |

| HUC -10 Watershed | Lake Name | Aquatic Invasive Species | Shallow Lake? | Impairment Status (MPCA) | Nearly Barely Lake? (MPCA) | Mean TP (µg/L) (MPCA) | Lake of Phosphorus Sensitivity (DNR) | Secchi Trend (MPCA) | Lake of Biological Significance (DNR) | Lake Health Score (DNR) | Lake Benefit Cost Significance Class (DNR) | Unique Resources | MPCA Protection Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sturgeon | Yes | --- | --- | --- | 13 | Highest | Improving | --- | 75 | Highest | Wild Rice (1854) | Priority A |
| | Passenger | --- | --- | --- | --- | 13 | Higher | Insufficient Data | --- | 75 | High | --- | Priority B |
| | Big Slough | --- | --- | --- | --- | | --- | --- | Moderate | --- | --- | --- | --- |
| | Turtle | --- | --- | --- | --- | | --- | --- | High | --- | --- | --- | --- |
| | Stanton | --- | Yes | --- | --- | 41 | High | Insufficient Data | --- | 70 | High | Wild Rice (DNR) | Priority C |
| | Willow | --- | --- | --- | --- | | --- | --- | --- | --- | --- | Wild Rice (DNR) | --- |
| Pine River | Bass (58013700) | --- | --- | --- | --- | 18 | Highest | Insufficient Data | Moderate | 70 | Highest | --- | --- |
| | Little Bass | --- | --- | --- | --- | 30 | High | Insufficient Data | --- | 65 | High | --- | Priority B |
| | Bass (58012800) | --- | Yes | --- | --- | 24 | High | Insufficient Data | Moderate | 75 | Higher | --- | --- |
| | Indian | --- | --- | --- | --- | 27 | High | Insufficient Data | --- | 70 | High | --- | Priority C |
| | Little Pine | --- | --- | --- | --- | 67 | High | Insufficient Data | --- | 70 | High | --- | Priority C |
| | Rhine | --- | Yes | Nutrients | --- | 62 | Impaired | No Trend | --- | 70 | High | --- | Priority A |
| | Fish | --- | --- | --- | --- | 69 | High | Insufficient Data | --- | 70 | High | --- | Priority C |
| | Fox | --- | Yes | Nutrients | --- | 52 | Impaired | --- | Outstanding | 80 | High | Wild Rice (DNR) | Priority C |
| | Upper Pine | --- | --- | --- | --- | 25 | Higher | No Trend | --- | 70 | High | --- | Priority C |
| | Eleven (33000100) | --- | Yes | Impaired | --- | 39 | Impaired | Insufficient Data | High | 70 | High | --- | Priority B |
| | Pine | --- | --- | Impaired | Yes | 34 | Impaired | No Trend | --- | 70 | High | Wild Rice (DNR) | --- |
| | Big Pine | --- | --- | Impaired | Yes | 28 | Impaired | No Change | --- | 70 | High | Wild Rice (DNR) | --- |
| Grindstone River | Grindstone | --- | --- | Nutrients | --- | 14 | Impaired | No trend | Outstanding | 85 | Higher | Trout Lake (DNR) | Priority B |
| | Miller | --- | --- | --- | ---- | 36 | Higher | Insufficient Data | | 70 | High | --- | Priority B |
| | Thirteen | --- | --- | | --- | --- | --- | --- | High | --- | --- | --- | --- |
| | Elbow | --- | --- | Nutrients | --- | 41 | Impaired | Insufficient Data | --- | 70 | High | --- | Priority B |
| | Five | --- | --- | --- | --- | 17 | Higher | Insufficient data | --- | 75 | High | --- | Priority C |
| Lower Kettle River | Second | --- | --- | --- | --- | 28 | Higher | Insufficient Data | Moderate | 75 | High | --- | Priority B |

| HUC -10 Watershed | Lake Name | Aquatic Invasive Species | Shallow Lake? | Impairment Status (MPCA) | Nearly Barely Lake? (MPCA) | Mean TP (µg/L) (MPCA) | Lake of Phosphorus Sensitivity (DNR) | Secchi Trend (MPCA) | Lake of Biological Significance (DNR) | Lake Health Score (DNR) | Lake Benefit Cost Significance Class (DNR) | Unique Resources | MPCA Protection Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cedar | --- | --- | --- | --- | 38 | Higher | Insufficient Data | --- | 70 | High | Wild Rice (DNR) | Priority B |
| | First | --- | --- | --- | --- | 39 | High | Insufficient Data | --- | 75 | High | --- | Priority B |
| | Long | --- | --- | --- | Yes | 27 | Higher | Improving | Moderate | 75 | High | --- | Priority B |
| | Mud | --- | --- | --- | --- | 80 | High | Insufficient Data | --- | 70 | High | --- | Priority C |
| | Clear | --- | --- | --- | --- | -- | --- | --- | Moderate | --- | --- | --- | |
| | McCormick | --- | --- | Nutrients | --- | 29 | Impaired | Insufficient Data | Moderate | 75 | High | Wild Rice (DNR) | Priority C |
| | Little Mud | --- | --- | --- | --- | 55 | High | Insufficient Data | --- | 70 | High | --- | Priority C |
| Sand Creek | Clayton | --- | Yes | --- | --- | 55 | High | --- | | 70 | High | --- | Priority C |
| | Wallace | --- | --- | --- | --- | 32 | High | --- | | 70 | High | --- | Priority C |
| Crooked Creek | Crooked | --- | --- | --- | --- | --- | --- | | Outstanding | --- | --- | Wild Rice (DNR) | --- |
| | Alma | --- | --- | --- | --- | --- | --- | | Moderate | --- | --- | | --- |
| | Tamarack | --- | --- | --- | --- | 15 | Higher | Improving | Moderate | 75 | High | | Priority C |
| | Greigs | --- | --- | --- | --- | 27 | Higher | Insufficient Data | Outstanding | 85 | High | | Priority B |
| | McGowan | --- | --- | --- | --- | 41 | High | Insufficient Data | --- | 70 | High | | Priority C |
| | Razor | --- | --- | --- | --- | 15 | Higher | Insufficient Data | High | 85 | High | | Priority C |
| | Lena | --- | --- | --- | --- | 32 | Highest | Insufficient Data | --- | 70 | High | | Priority A |
| Lower Tamarack | Grace | --- | Yes | Nutrients | --- | 70 | Impaired | | --- | 70 | High | --- | Priority C |
| | Hay Creek Flowage | --- | Yes | --- | --- | 75 | High | Insufficient Data | Outstanding | 80 | High | Wild Rice (DNR) | Priority C |
| | Little Tamarack | --- | --- | --- | --- | 26 | High | Insufficient Data | Moderate | 75 | High | --- | Priority C |
| | Rock | --- | Yes | --- | --- | 35 | Impaired | Insufficient Data | --- | 70 | High | --- | Priority B |
| | Stevens | --- | --- | --- | --- | 63 | High | Insufficient Data | --- | 70 | High | --- | Priority C |

# Lake Cost Benefit Assessment for the Kettle River/Upper St. Croix Watershed

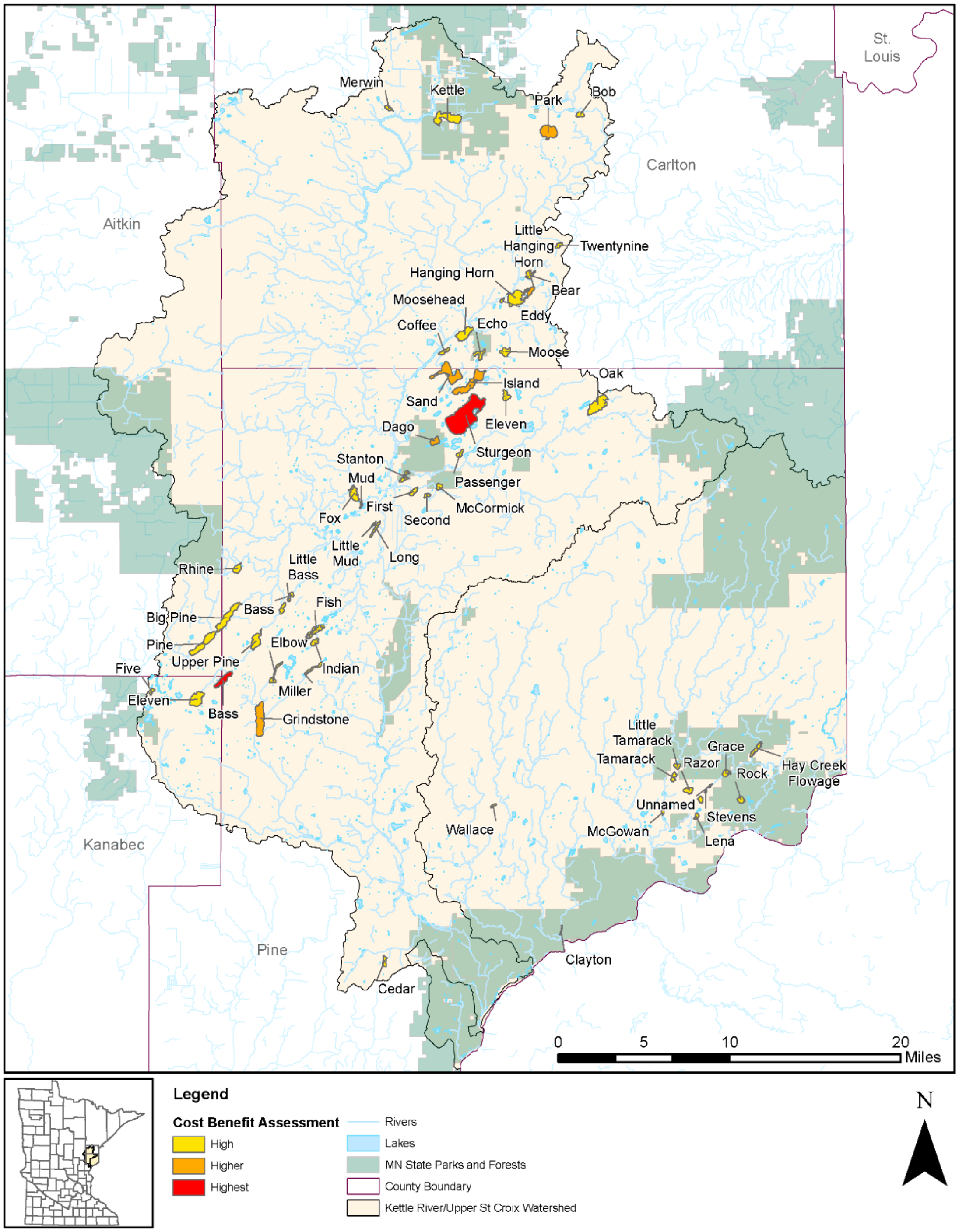


**Figure 6. MN DNR lake benefit cost assessment is a grouping of waterbodies based on the lake benefit:cost assessment priority score, which is a function of phosphorus sensitivity, lake size, and catchment disturbance. Classes relate to the state's priority of focusing on high-quality, high-value lakes that likely provide the greatest return on investment.**

Lake Hydrology Health Scores for the Kettle River/Upper St. Croix Watershed

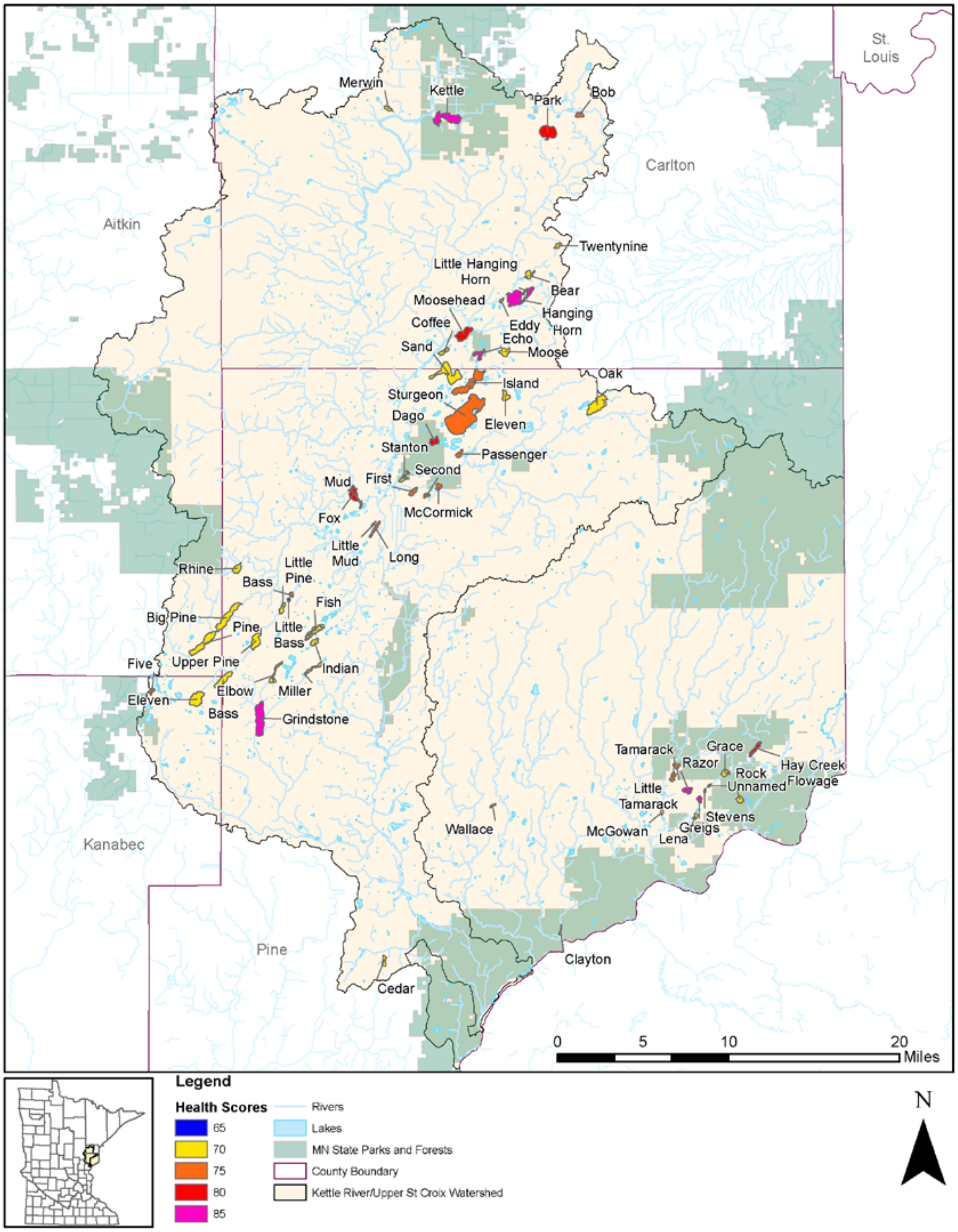


**Figure 7. The MN DNR Lake Health Score provides a generalized health assessment of a lake and its watershed. Lake Health Scores above 80 indicate good health and those below 70 indicate poor health.**

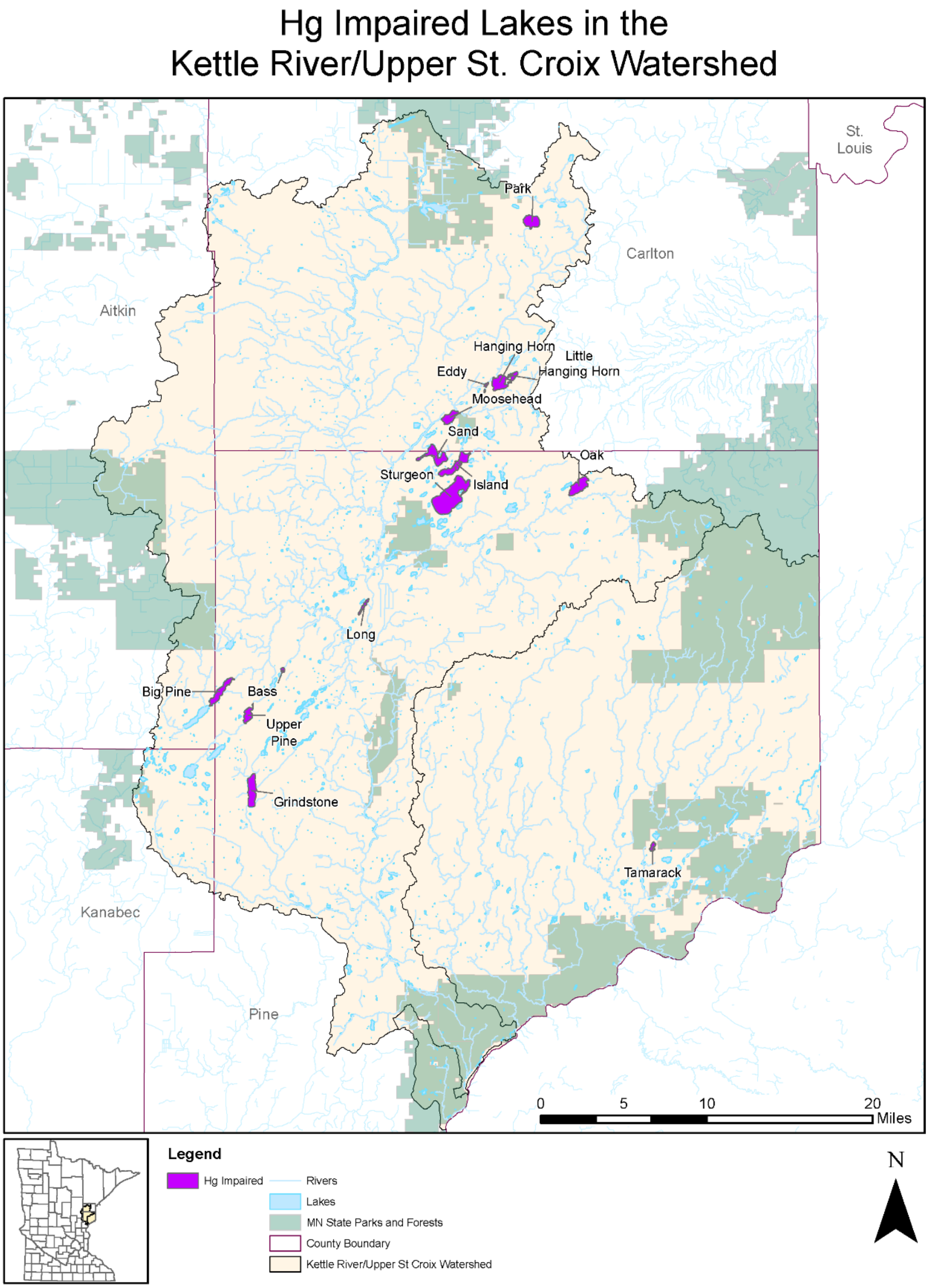


**Figure 8. The MPCA has listed lakes as impaired for mercury when fish tissues have elevated mercury levels.**

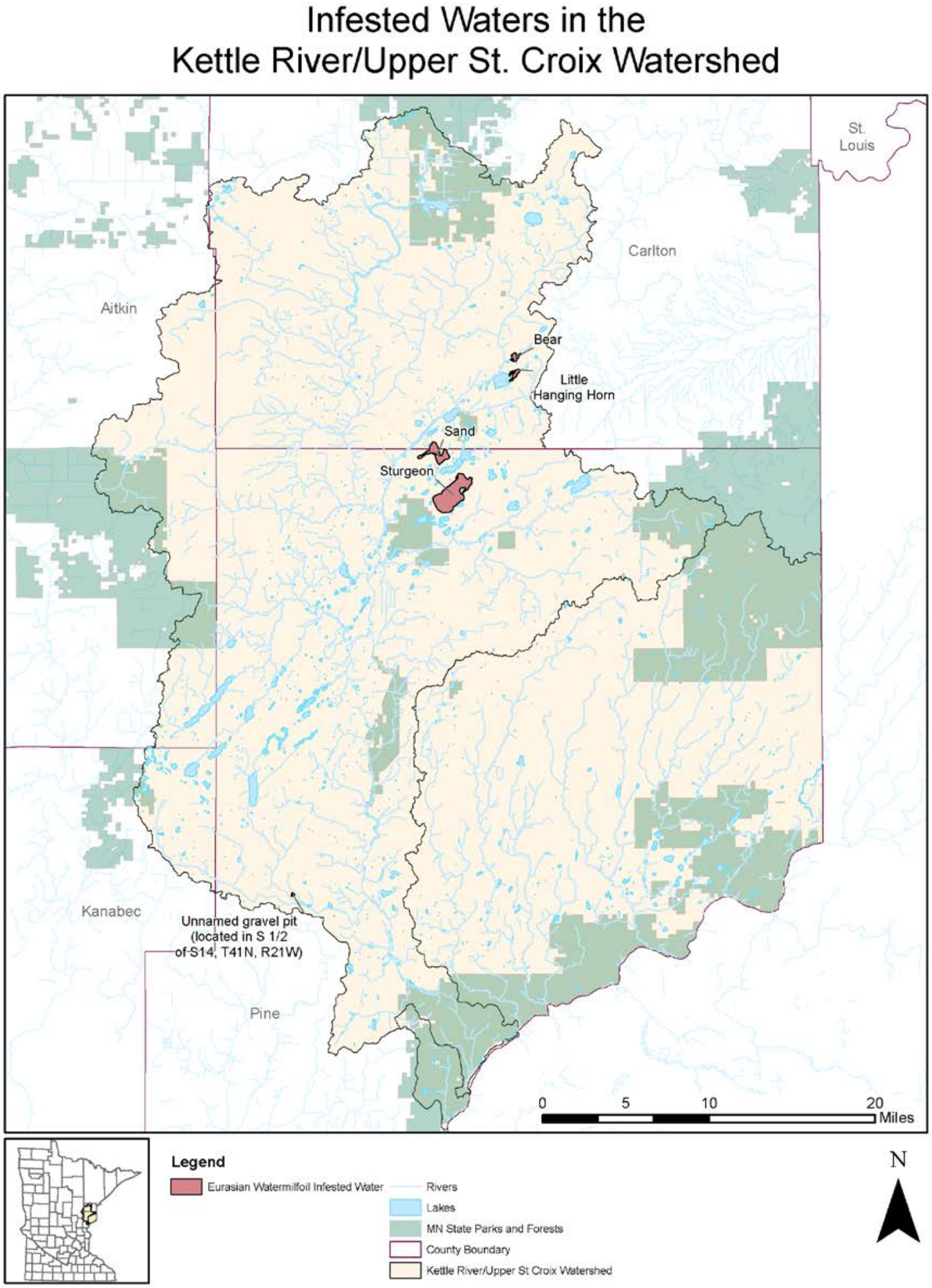


**Figure 9. A total of five lakes are designated by the MN DNR as having the aquatic invasive species Eurasian water milfoil.**

# Nutrient Impaired Lakes in the Kettle River/Upper St. Croix Watershed

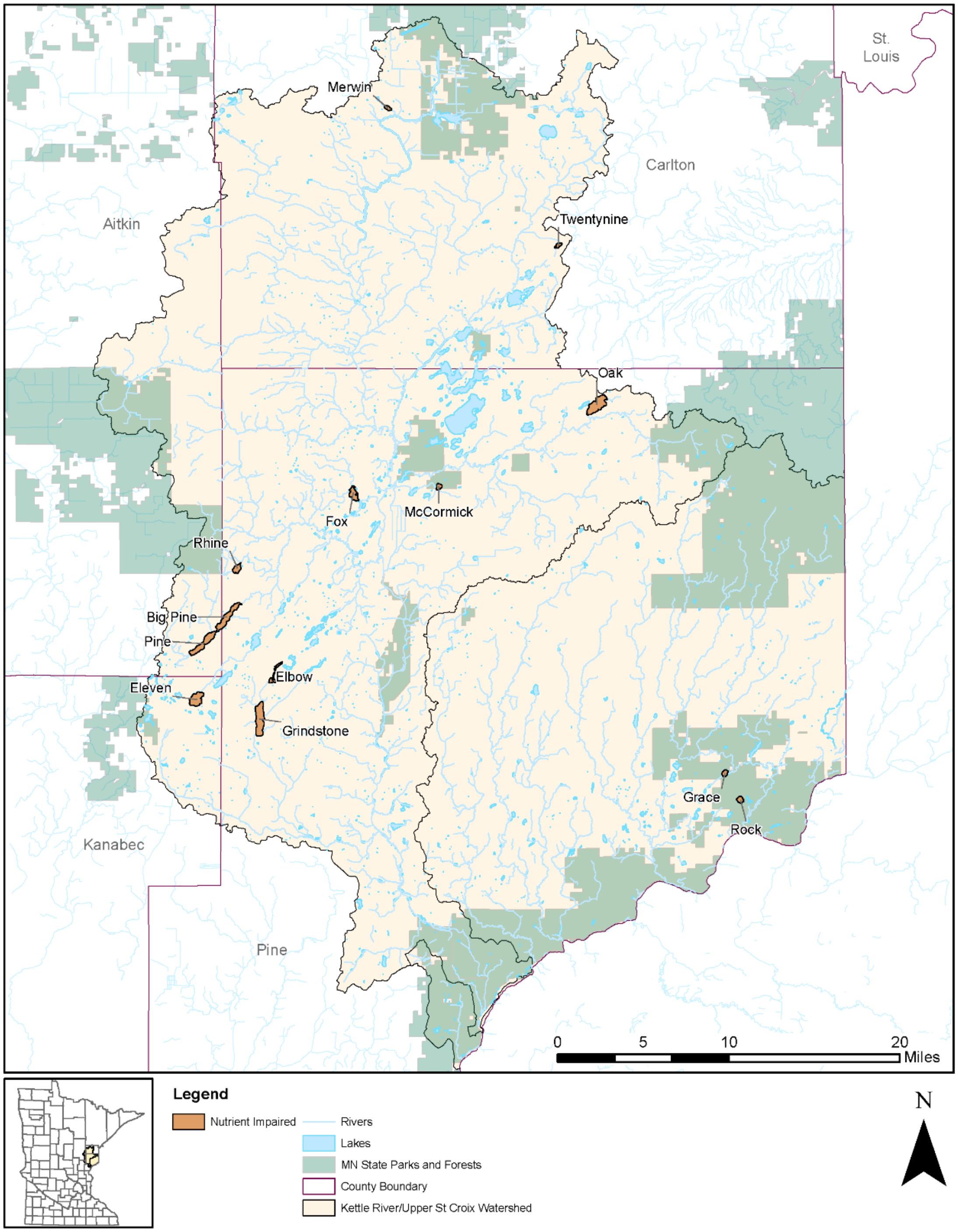


**Figure 10. A total of 13 lakes are listed as impaired by the MPCA for high levels of nutrients.**


**Figure 11. Phosphorus sensitivity was estimated for each lake by predicting how much water clarity would be reduced with additional phosphorus loading to the lake. The phosphorus sensitivity significance index, which is a function of phosphorus sensitivity, lake size, lake total phosphorus concentration, proximity to MPCA's phosphorus impairment thresholds, and watershed disturbance, was used to determine the lake's Priority Class.**

Wild Rice Lakes in the
Kettle River/Upper St. Croix Watershed

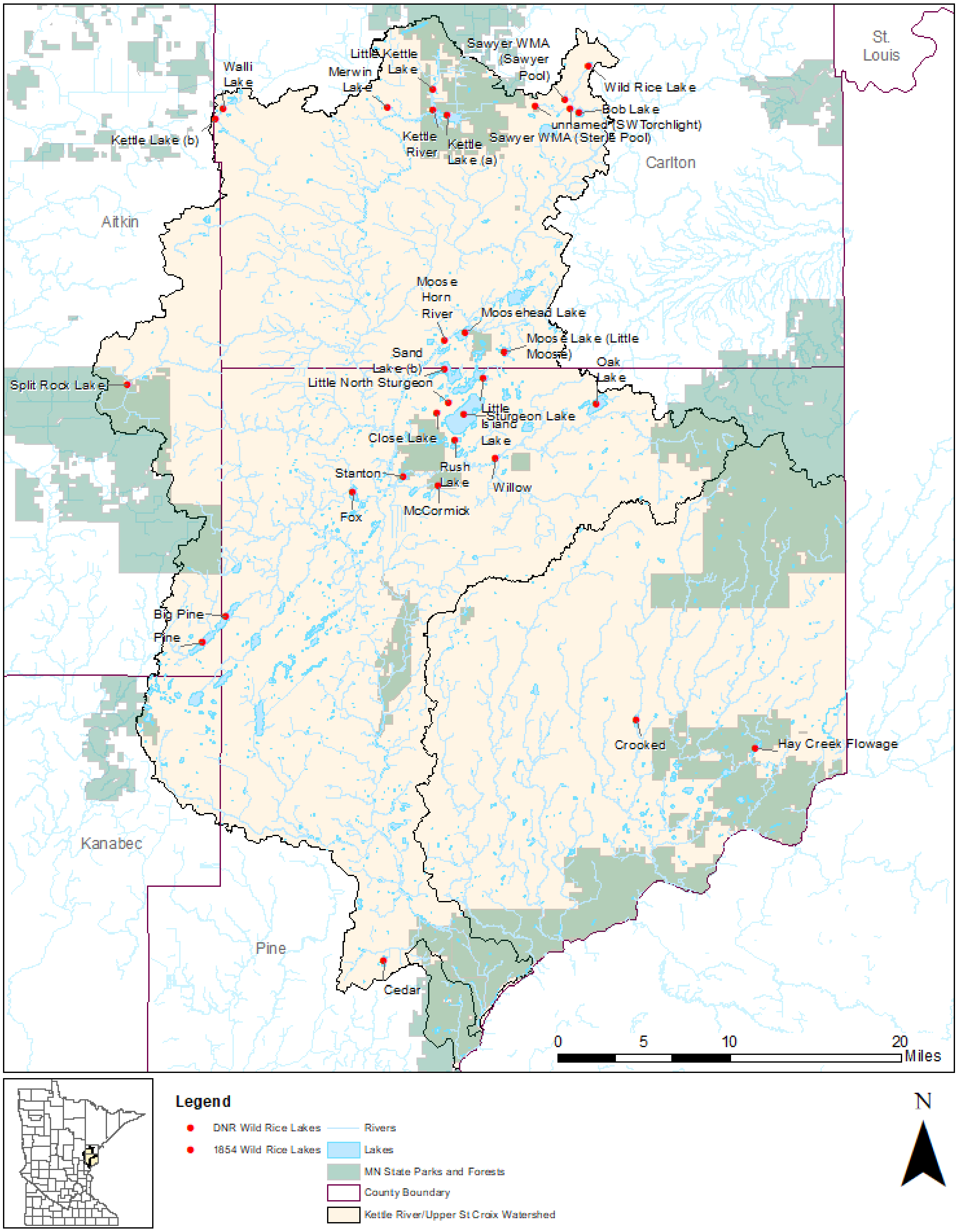


**Figure 12. Wild rice lakes are designated by both the MN DNR and the 1854 Treaty authority.**

# Environmental Justice in the Kettle River/Upper St. Croix Watershed

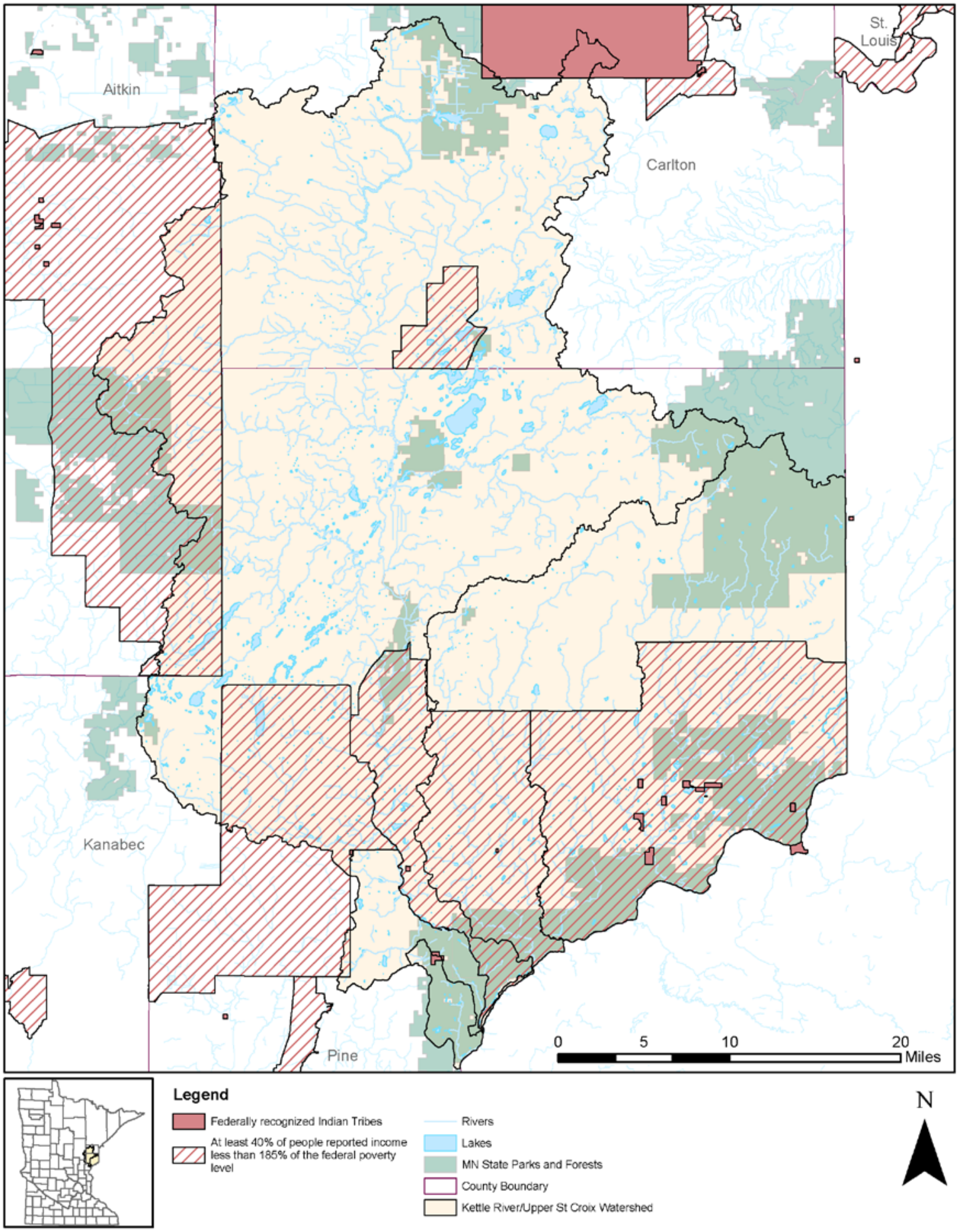


**Figure 13. The Environmental justice dataset was compiled by the MPCA to help make sure that pollution does not disproportionally impact any one group of people. This dataset shows locations of Indigenous and low-income communities.**

## References

WRAPS: 2021, Kettle River & Upper St. Croix River Watersheds Watershed Restoration and Protection Strategy Report

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