

MINNESOTA MILLE LACS LAKE MANAGEMENT PLAN

2022-2027





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Introduction

Purpose

The Minnesota Department of Natural Resources (DNR) produces plans for many of the resources it manages, including the state's ten largest lakes. Mille Lacs Lake is the state's second-largest lake. This plan guides the State of Minnesota's fisheries management on Mille Lacs Lake from 2022-2027. The plan's approach to fisheries management synthesizes ecological, economic, political and sociocultural information to determine actions (e.g., regulations, population monitoring) to achieve fish resource goals, within biological and legal bounds. Its goals, objectives and strategies also will guide effective and efficient allocation of staff and fiscal resources to protect and enhance the fish community. Finally, the plan describes how information is to be shared by the DNR and collected from interested stakeholders by the DNR. This ongoing engagement will guide future management planning.

Scope

Management plans focus on work within the DNR's authority, and when appropriate, consider cooperative management contexts. On Mille Lacs Lake, harvest of several species is shared between tribes signatory to the 1837 Treaty and the state, based on legal agreements. The State of Minnesota respects tribes' self-regulation and will continue to cooperatively manage the Mille Lacs fishery. This plan primarily directs the work of the DNR's Fish and Wildlife Division and complements planning by the 1837 Treaty Fisheries Technical Committee (FTC), the court stipulated venue for the DNR's cooperative management with 1837 Treaty bands. For species where the state and 1837 Treaty bands agree on a harvestable surplus (walleye, northern pike, yellow perch, cisco and burbot), this plan applies only to management of the state's share. The plan acknowledges the important work of tribal governments and the DNR's state, local, business, and nonprofit partners and stakeholders.



My first walleye.

Plan development

Public input

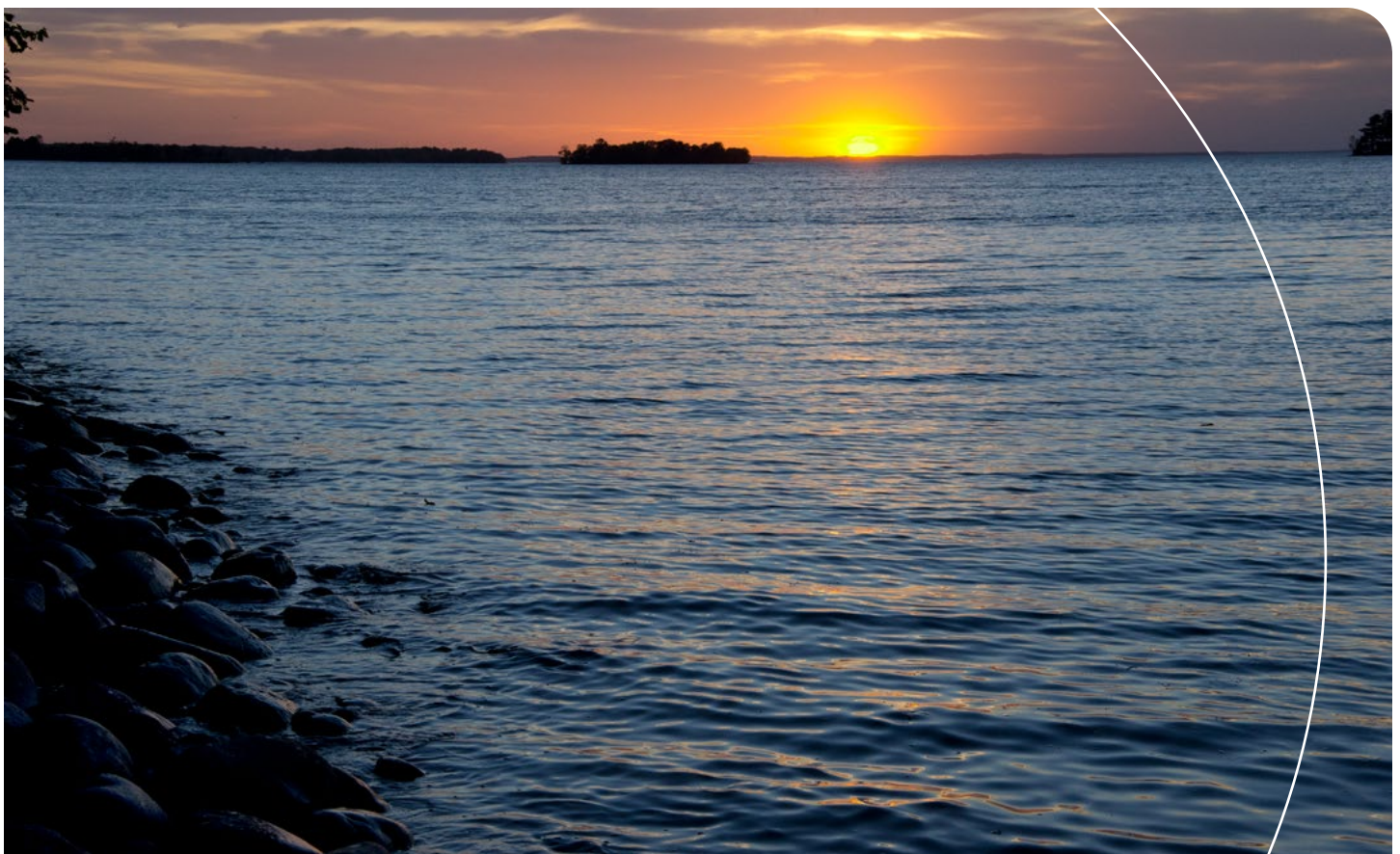
In 2019, the DNR used a variety of methods to gather front-end input from individuals and groups to inform this plan. Almost 1,300 individuals participated, including some organizational leaders representing their constituents, through an online survey, public meetings and other in-person opportunities. These options to provide public input, detailed in Appendix A, were advertised through the DNR website, social media and online newsletters; flyers and business cards; and local media. The DNR's Mille Lacs Fisheries Advisory Committee (MLFAC) advised on and reviewed plan content.

Public review

A draft of the plan was released for public review in spring 2021. Staff reviewed comments and evaluated where changes should be made resulting in this final plan. This process is described further in Appendix A.

Tribal coordination

The Mille Lacs Band of Ojibwe and Fond du Lac Band of Lake Superior Chippewa fisheries staff were consulted in-person by DNR fisheries staff during plan scoping. The FTC, including biologists from the Great Lakes Indian Fish and Wildlife Commission, reviewed elements of the plan concerning management objectives. The DNR consulted 1837 Treaty tribal partners on the draft plan in fall 2020 and incorporated their feedback prior to releasing the plan for public review. A final round of tribal review occurred in fall 2021 by staff and natural resources leadership from the Mille Lacs Band of Ojibwe; Fond du Lac Band of Lake Superior Chippewa; and Great Lakes Indian Fish and Wildlife Commission (GLIFWC), which represents bands in Minnesota, Wisconsin and Michigan that are parties to the 1837, 1842 and 1854 treaties with the United States.



Background and current conditions

This section summarizes background on the social, historical, biological and legal influences on Mille Lacs Lake management. A glossary is included in Appendix B.

Cultural history

The Mille Lacs Lake area is rich in natural resources, with a long history of different communities using these resources for socially, culturally and economically important reasons. The lake has undergone a variety of human and ecological changes since Euro-American settlement. Knowledge of these changes throughout history is important to understand current issues surrounding management of the lake.

The Mille Lacs Lake region has been home to indigenous communities for hundreds of years. Long before Europeans arrived, the Dakota and, shortly thereafter, the Ojibwe (Anishinaabe) lived here. Despite initial peace and cooperation between the Dakota and the Ojibwe, competition for resources led to decades of conflict that gradually displaced the Dakota from the region. In 1837, before Minnesota was a state, the Mille Lacs Band of Ojibwe and several other tribes signed a treaty that ceded lands, including Lake Mille Lacs, to the United States government and opened the area to Euro-American immigration and economic development. The tribes signed the Treaty of 1837 on the condition that they would still have the right to hunt, fish and gather in the ceded territory – rights that have been upheld by the U.S. Supreme Court. Exercising these rights remains important to the Ojibwe people as they pass these traditions onto future generations. In the late 1800s, many Ojibwe in Minnesota were moved by government forces to the White Earth reservation. But some, including the Non-Removable Mille Lacs Band of Ojibwe, resisted relocation and remained.

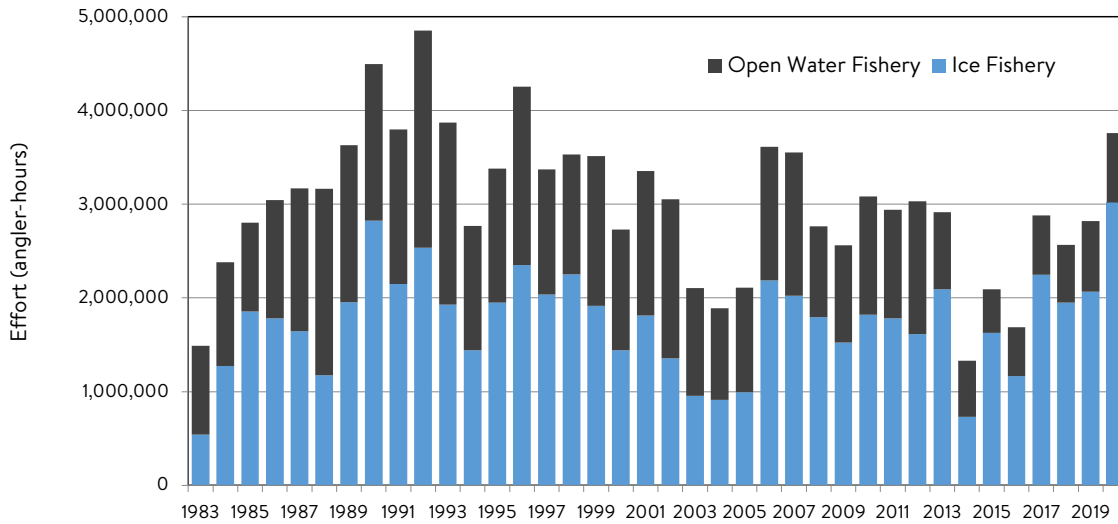
Utilization of the fish resources on Mille Lacs Lake evolved through time. Native Americans inhabiting the area used the resources for subsistence. With Euro-American colonization, commercial fisheries were established through the late 1800s. In 1895, the first regulations limiting harvest were enacted due to overharvest concerns. When railroads expanded to the area, access opened to sport anglers from Minneapolis and St. Paul and industry expanded to serve this clientele. The commercial fishery closed in the 1920s, at least partially due to competition with the developing sport fishery. Initially the sport fishery was very oriented to consumptive uses, but today much of the sport fishery is catch-and-release. Some anglers relocated to other waters when walleye harvest opportunities became limited on Mille Lacs Lake; however, many anglers have a strong tradition of fishing here and have continued to visit. A desire to harvest walleye on Mille Lacs Lake continues to exist among many anglers. Cultural differences continue to influence how the fishery is used and viewed.



Today, much of the sport fishery is catch-and-release.

Figure 1. Mille Lacs Lake angling pressure for the open water and ice fisheries, for all species

Winter pressure varies with ice conditions and fishing success and has increased steadily since 2014. Open water pressure has been relatively low since 2014.



Visitors and angler pressure

Mille Lacs Lake remains a popular recreational destination, largely due to its location within easy driving of the Minneapolis-St. Paul metropolitan area. Many anglers from around the state make multiple trips to the area each year, and 10% of Mille Lacs Lake anglers come from out-of-state. About one half of out-of-state anglers come from Wisconsin or Iowa, though the proportion of anglers coming from southern states, where bass fishing is very popular, has been increasing steadily.

Summer angling pressure peaked at 2.3 million angler hours in 1992 but has remained under 1 million hours since 2012, when more restrictive walleye regulations were introduced. Winter angling pressure peaked at 23.0 million angler hours in 2020 and has exceeded 2 million hours each winter since 2017-2018. The combination of summer and winter angling pressure consistently places Mille Lacs Lake as the first- or second-most heavily fished lake in Minnesota (Figure 1). Weather and ice conditions on Mille Lacs Lake and other popular fishing destinations can greatly influence winter angling pressure.

Stakeholder interests

In making management decisions about the Mille Lacs fishery, the DNR considers an array of stakeholder interests, including lakeshore property owners; other community members; area and statewide businesses; visitors; government agencies; and non-governmental organizations. The DNR uses multiple communication tools to reach these audiences (e.g., websites, press releases, e-newsletters, social media, brochures and signage). Historically, the DNR has also relied on advisory groups to provide public input on Mille Lacs Lake.

The DNR’s current advisory group is MLFAC, which was convened in 2015 following that season’s unplanned walleye fishing closure. MLFAC was formed to provide a forum for discussion and understanding of data and information related to the walleye fishery and to provide input on the state’s management options. The group comprises representatives from resorts, guides and other businesses; property owners; county government; representatives of DNR’s Walleye, Bass and Northern Pike-Muskellunge Working Groups; and other members of the public. MLFAC is similar in composition and function to advisory groups the DNR has established to inform its management of other Minnesota resources.

Current data collection

The DNR uses a variety of annual and intermittent sampling programs (see Appendix C) to monitor fish populations and the fishery and to guide management decisions. External reviews by university and federal agency institutions (see Appendix C) have found these sampling techniques to be sound, and the DNR has adopted improvements identified by these reviews. Additional surveys focus on monitoring water quality parameters, zebra mussels and zooplankton. Data collected through these programs shed light on the drivers of change in the lake.



Walleye in a gill net.



Northern pike sampled with a gill net.



DNR workers on an electrofishing boat.

Water clarity and productivity

Water clarity is related to a waterbody's productivity, with very clear water tending to be less productive. Fish species also tolerate water clarity differently, with walleye, for example, favoring Secchi depths of 6 to 6.5 feet (Lester et al. 2004, Hansen et al. 2019). Anecdotally, water on Mille Lacs was historically very clear, particularly before Euro-American colonization. With more permanent and seasonal residences and little attention to sewage management, glacial till soils allowed nutrients to seep into the lake. These nutrients supported growth of phytoplankton, which feed zooplankton and in turn the fish that walleye eat.

A 1944 report cited Secchi depths averaging 6.5 feet, although no reference was made to if this was more or less than in the past (Carlander 1944). Through the 1950s and 1960s, observations of blue-green algae blooms, thick enough for boats to leave tracks, were reported. A 1954 lake survey reported Secchi depths of 7 feet, and a 1981 report by the Mille Lacs Band of Ojibwe reported a mean Secchi depth of 7.2 feet (J. Persell and T. Ware, unpublished). This report called for reducing nutrient loading to improve water quality, primarily through improving sewage treatment around the lake. Water cleared through the latter half of the twentieth century, and from 1988 through 1994 Secchi depth averaged about 8.5 feet, and since 1995 almost 12 feet.

Modernized sewage treatment remains the likeliest explanation for this clearing trend. County ordinances require private sewage treatment facilities (septic systems) be brought to current standards when properties are sold. As non-compliant systems were rebuilt, fewer nutrients would have leached into surrounding surface waters, thereby reducing nutrient loading. Additionally, a centralized sewage treatment plant serving communities and rural homes on the west side of Mille Lacs Lake was completed in 2004.



Secchi disk, used to measure water clarity.

In summary, clearing water in Mille Lacs Lake is likely the result of reduced nutrient availability (Hansen et al. 2019), resulting in reduced phytoplankton abundance. These microscopic plants feed organisms higher up the food chain like yellow perch, a preferred prey of walleye, and northern pike. In addition, walleye effectively seek their prey in less clear conditions, compared to species such as northern pike and smallmouth bass that tend to do better in clearer waters.

Aquatic invasive species

Aquatic invasive species can also change fish productivity. When a species invades a lake, it first has a period of relatively slow population growth, before numbers dramatically increase to a population level often exceeding the water body’s carrying capacity. Invasive species abundance then drops and remains stable at a lower level. Zebra mussels and spiny water-fleas have both invaded Mille Lacs Lake, altering the zooplankton community structure and reducing zooplankton abundance (Figure 2). Zooplankton are an important food source for the juveniles of all fish species, including fish species (e.g., yellow perch, minnows and cisco) that serve as forage for predators, such as walleye.



DNR staff sampling zooplankton with a net.

Figure 2. Mille Lacs Lake zooplankton biomass by summer month

Zooplankton biomass, by month, in Mille Lacs Lake from 2006 to 2020. Zebra mussels were discovered in 2005, and spiny water-fleas in 2009.

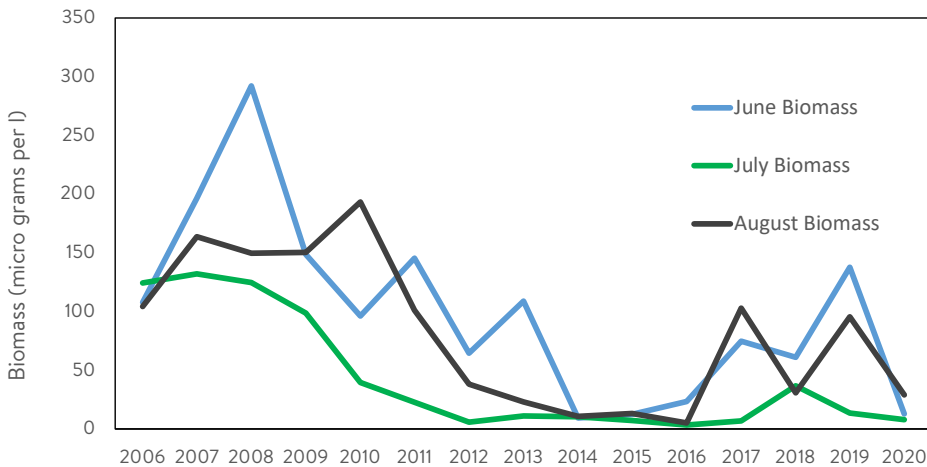
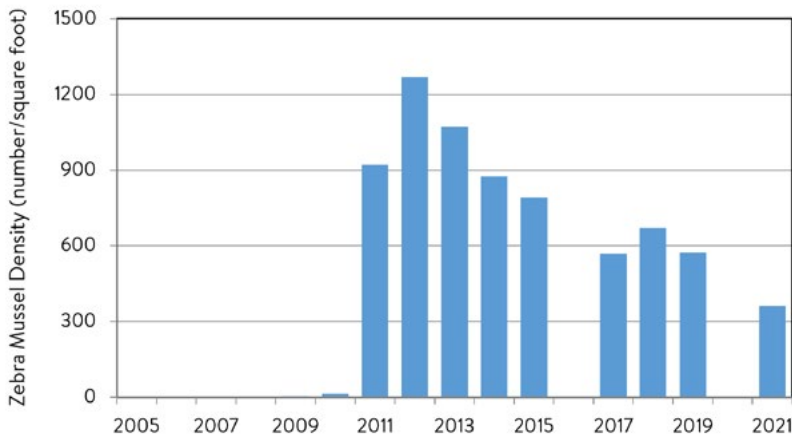


Figure 3. Mille Lacs Lake zebra mussel density

The population was first documented in 2005 and peaked in 2012. Surveys were not conducted in 2016 or 2020.



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Zebra mussels form colonies that cover hard surfaces.



Spiny Water Fleas are present in Mille Lacs.

- Zebra mussels were first detected in Mille Lacs Lake in 2005, peaked in 2012 and in recent years have stabilized at about one half of their highest level (Jensen 2020) (Figure 2). Zebra mussels filter feed on phytoplankton and expel wastes on the lake bottom, leaving less food for invertebrates and fish that feed on plankton in the water column, but creating more food for bottom-dwelling invertebrates that are preferred by smallmouth bass. Evidence from other lakes suggests that walleye and yellow perch decline after zebra mussel invasions, while smallmouth bass tend to increase (furthering their advantage in Mille Lacs Lake afforded by cleaner, clearer water discussed above).
- Spiny water-fleas invaded Mille Lacs Lake in 2009. They prey on and reduce overall zooplankton abundance, and have virtually eliminated some native zooplankton species. Some adult fish species feed on spiny water-fleas, but their long spiny tail makes it difficult for small fish to eat them.

The introduction of invasive species has disrupted the energy pathways that support walleye and yellow perch. As such, Mille Lacs Lake can no longer sustain the level of walleye and yellow perch harvest it did through the 1980s and early 1990s (Hansen et al. 2019). Conversely, smallmouth bass have expanded and now support a popular sport fishery.

In order to minimize the risk of additional invasions, invasive species inspectors frequently are stationed at high-use public boat access sites. These inspectors are funded by the state and counties, and have varying levels of enforcement authority. Additionally, some inspectors are equipped with portable cleaning stations to clean boats entering or exiting the water. To minimize risk of aquatic invasive species being transported by participants in fishing tournaments, boat inspections are required through the tournament permitting process.

Climate change and habitat alteration

Water temperature has been tracked systematically on Mille Lacs Lake since 2000, which yields too short a data series to use to describe climatic changes. However, water temperature is correlated with air temperature. Mean summer (June through September) monthly air temperature in Brainerd (25 miles west of the lake) since 1895 has increased by 1.5 degrees Fahrenheit in July and August and 2.6 degrees Fahrenheit in June (Figure 4).

Warming temperatures have also reduced the time that Mille Lacs Lake is covered by ice in a typical year. Data are not available for when the lake becomes fully ice covered, but ice-out now occurs on average eight days earlier than in 1950 (Figure 5).

The abundance of cisco and burbot, species that prefer colder water, has declined as water temperature has risen. Although harvest and

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Figure 4. Mean monthly air temperature recorded in Brainerd

Monthly temperature has increased over time, with June and September having the greatest increases.

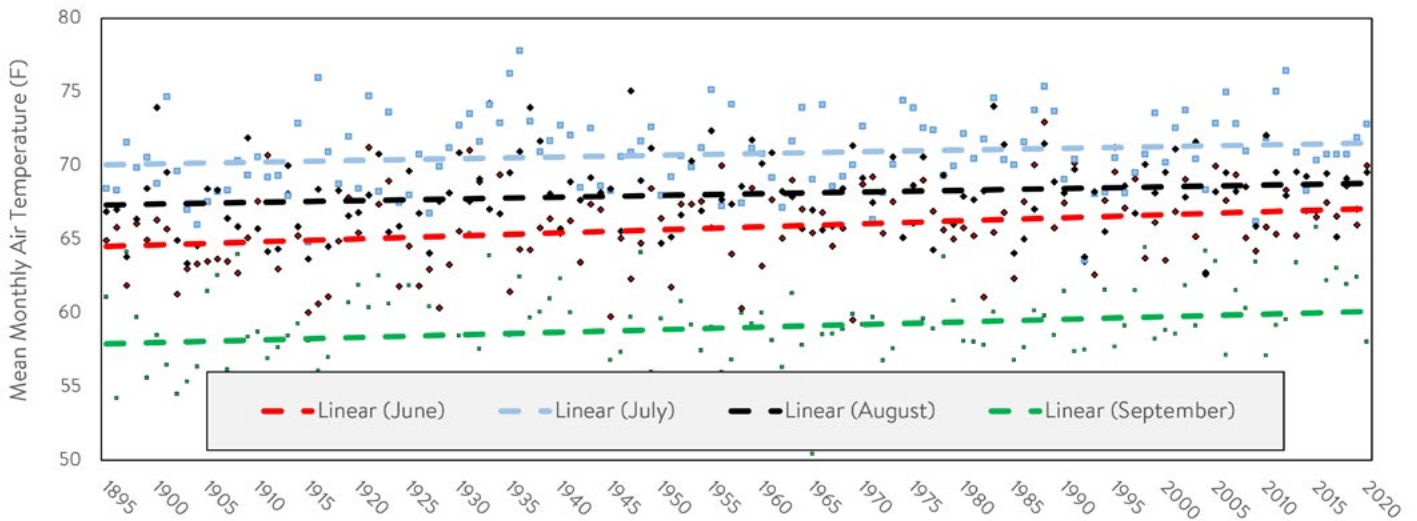
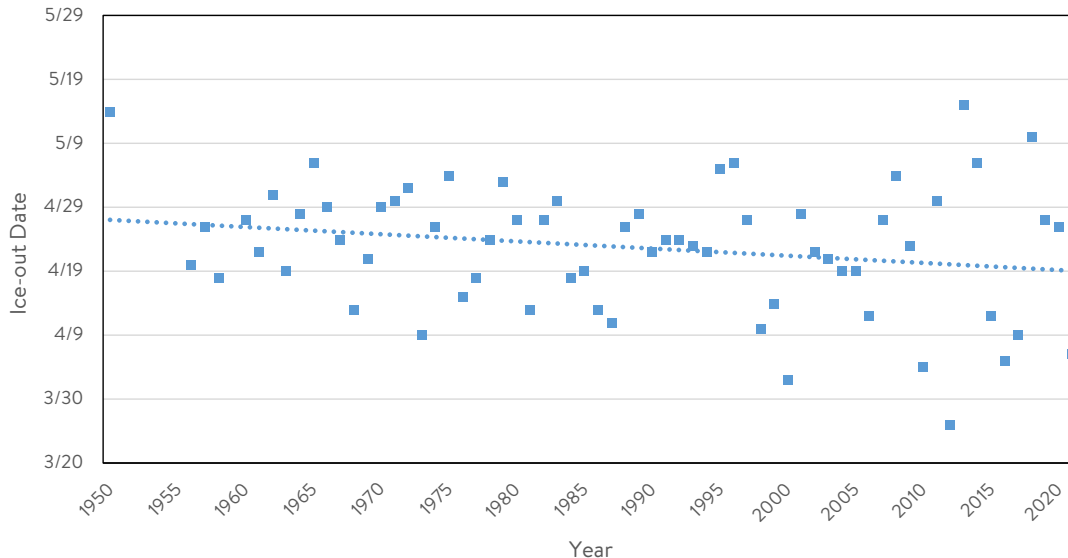


Figure 5. Annual ice-out date on Mille Lacs Lake

Ice-out now occurs an average of eight days earlier than in 1950.



predator populations also influence their abundance, the changing climate is creating less suitable conditions for these species. Federal agencies such as the National Oceanic and Atmospheric Administration (NOAA) monitor climate broadly, while the Minnesota Climatology Office focuses on the state's climate, and the DNR's Mille Lacs Area Fisheries Office monitors Mille Lacs Lake water temperature. These sources anticipate continuing warming trends that will affect lake conditions, favoring some species over others. Fall gill netting and other sampling programs monitor changes in the fish community. As these changes occur, management options are developed in collaboration with partners and stakeholders.

Shoreline alterations and aquatic plant removal can significantly alter fish habitat through direct destruction, or through erosion and sedimentation. Activities below the ordinary high water level require permits that consider fisheries impacts and are regulated by the U.S. Army Corps of Engineers,

the Minnesota DNR and other agencies. Work above the high water level is primarily regulated by county land services agencies. The Minnesota DNR's shoreline habitat program (mndnr.gov/shorelandmgmt) assists landowners with habitat restoration and improvement projects.

Climate change and watershed development can significantly affect aquatic life. The Midwest Glacial Lakes Partnership has a tool summarizing past changes and the potential for future changes in the condition of Midwest lakes (ifrshiny.seas.umich.edu/mglp). The tool classifies the Mille Lacs Lake watershed as one of low (8%) disturbance, defined as land that has been converted to urban or agricultural uses. However, the shoreline is classified as highly (39%) disturbed, with a recommendation for rehabilitating or mitigating disturbed areas. The lake is classified as having medium vulnerability to climate change impacts, with coldwater species (cisco and burbot) projected to persist through 2050.



Undeveloped shoreline on Mille Lacs Lake.

Cooperative management of treaty species

In the 1990s, eight Ojibwe Bands, signatories to the 1837 Treaty, sought to reaffirm their preexisting rights to hunt and fish in the territory they ceded to the U.S. The 1837 Treaty bands reestablished exercise of their treaty rights to fish for walleye in 1997. In 1999, the U.S. Supreme Court affirmed that members of the signatory bands to the 1837 Treaty retained their rights to hunt, fish and gather in the area of the ceded territory. A stipulated agreement incorporated into the court order includes five protocols that govern the working relationship between the bands and the state. These protocols are available at mndnr.gov/millelacslake, under “Court decisions & legal information.” The Minnesota DNR, the 1837 Treaty bands and GLIFWC work together as members of the 1837 Ceded Territory Fisheries Technical Committee (FTC), typically meeting quarterly. The FTC has responsibilities to coordinate fisheries surveys, sampling and research; recommend harvestable surplus levels; and discuss proposed state or band fisheries laws and regulations.

Walleye, yellow perch, northern pike, cisco and burbot are all treaty-managed species, and the protocols guide the process used to estimate harvestable surplus for these species, or the amount of fish that can be harvested without affecting a population’s long-term stability. The harvestable surplus is then distributed based on agreement between the state and bands. Harvestable surplus levels, along with a state and band share of the harvestable surplus, were first set for treaty managed species in 1998. Additional species could have harvestable surplus levels set if interest develops in harvesting those species.



Angler with a yellow perch.

- Yellow perch and northern pike have a harvestable surplus of 270,000 and 100,000 pounds respectively, shared equally between the state-licensed and band fisheries. These harvestable surplus levels are discussed annually at the FTC and could change with new information about those species.



Burbot caught while ice fishing.

- A harvestable surplus is not currently used for cisco and burbot, as interest in harvesting these species is generally low, though cisco harvests occasionally spike when the abundance of larger cisco makes them a desirable target for anglers. A harvestable surplus had been used in the past and could be implemented again if the need arises.

Photo courtesy Lake of the Woods Tourism

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Walleye is the most common species sought by anglers.

- The primary species of interest to anglers and tribal harvesters is walleye (Ojibwe harvesters). From 2017 through 2020, management was guided by the Consensus: Mille Lacs Fishery Harvest Plan, 2017-2020 (consensus agreement). The consensus agreement came about when the state exceeded its share of the harvestable surplus for walleye in 2016. The 1837 Treaty bands initiated the dispute resolution process outlined in the protocols. State and band fisheries managers arrived at consensus goals to restore the walleye population and to protect the 2013 walleye year class by setting harvestable surplus goals and strategies. Under the consensus agreement, 70% of the first 64,000 pounds went to the state-licensed fishery, and 30% to the band fishery. Above 64,000 pounds, the harvest level was shared equally. The state and bands monitored and regulated their fisheries to remain within their respective shares. The consensus agreement also described the process to follow if the bands or state exceed their respective share of the harvestable surplus. The consensus agreement expired at the end of the 2020 fishing season. With its expiration, division of the harvestable surplus between the state and tribal fisheries and how to address harvest overruns is discussed on an annual basis, based on the court-approved protocols.

Regulatory background of treaty species

Regulatory history

Mille Lacs Lake was under statewide walleye regulations until 1983, when public input led to the implementation of a night fishing ban intended to reduce harvest of large walleye and to spread harvest through the open water season. More restrictive walleye harvest limits began in the late 1990s, and since 2013 walleye fishing has been regulated even more restrictively, including two-inch harvest slots combined with possession limits of one walleye during some periods of the year, catch-and-release fishing only during other periods, and planned and unplanned walleye fishing closures. Recent regulations have been designed to limit harvest to remain within the state's share of the harvestable surplus. The history of regulation changes on Mille Lacs Lake from 1962 through 2019 is presented in Appendix D (history of fishing regulation changes) and Appendix E (history of night closures).

Hooking mortality

Regulations require anglers to release fish that they might otherwise harvest if given the choice. Some of these released fish die from the stress of being captured (termed post-release hooking mortality). Walleye killed through hooking mortality are counted toward the state's share of the harvestable surplus. Methods for estimating hooking mortality have been refined through two studies conducted on Mille Lacs Lake in 2007 and 2016. Hooking mortality has consistently made up the majority of the state's walleye take since 2015, due to angling being restricted to mostly catch and release with only limited walleye harvest opportunities.

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Regulatory process

Biological, social and legal considerations inform the state's annual process of setting walleye fishing regulations (Table 1). Potential regulations are modeled to estimate a range of possible harvest and kill values, based on historical fishery and environmental conditions. However, occasionally conditions can deviate from historical patterns, resulting in different levels of harvest than models predict.

Past input, primarily through MLFAC, has indicated that winter harvest is more important to state-licensed anglers than during the open-water season, so recent regulations have focused on prioritizing harvest during the winter. (As discussed below, public input for this plan showed a preference for May harvest, which will inform future regulation setting). MLFAC advised that winter anglers tend to be more harvest oriented than open-water anglers, and providing a harvest opportunity in the winter would have greater economic benefit (through

higher angler participation in the fishery) than harvest opportunity in the summer. Additionally, hooking mortality during the winter is lower than during the open-water season due to the low water temperature, meaning that additional winter angling pressure has less impact on the state's share of the harvestable surplus than would adding angling pressure during the open water season.

The fishing year starts on December 1, so the amount of open water harvest available is limited by winter harvest, since together they cannot exceed the state's share of the harvestable surplus for the fishing year. Winter regulations must be set in the fall, and have typically provided some harvest. Since the harvestable surplus is not established until the January meeting of the FTC, the impact of winter harvest on the state's share of the harvestable surplus is not known when winter regulations are set. Once the state's share is known, open-water regulations are set based on what remains of the state's share after accounting for winter harvest.



Ice fishing is popular on Mille Lacs lake.

Table 1. Annual regulatory process for walleye

Date	Regulatory process component
December 1	<ul style="list-style-type: none"> • Fishing year begins • Harvestable surplus is for the fishing year December 1-November 30
January	<ul style="list-style-type: none"> • DNR uses a model to estimate the walleye population in the lake, based on annual sampling of anglers (creel survey), annual fall gill net surveys, abundance of age-0 and age-1 walleye from annual fall electrofishing surveys, and periodic population estimates • FTC meets to discuss: <ul style="list-style-type: none"> › Walleye population status as indicated by DNR model as well as a separate model run by GLIFWC › Fishery goals for the walleye population • State and bands agree on a harvestable surplus level that meets shared desired outcomes • Harvestable surplus is divided between the state and tribal fisheries
February and March	<ul style="list-style-type: none"> • The state's share of the harvestable surplus is presented to MLFAC and initial input is sought on how to allocate harvest through the open-water season • A variety of open-water regulations are modeled and presented to MLFAC, based on: <ul style="list-style-type: none"> › Level of winter harvest › Harvestable surplus remaining after the winter season › Anticipated spring and summer angling catch rates (informed by historical trends, stock status, forage base, environmental factors)
December through mid-March	<ul style="list-style-type: none"> • Monitor angler activity and estimate angler effort, harvest and kill through hooking mortality during the winter season
Spring-early summer	<ul style="list-style-type: none"> • Periodic (approximately every five years) direct walleye population estimates
During open-water season	<ul style="list-style-type: none"> • Monitor angler effort and harvest to evaluate status relative to the state's share of the harvestable surplus • Adjust fishing regulations as needed
Fall	<ul style="list-style-type: none"> • Gill net index sampling measures relative abundance of walleye
Fall	<ul style="list-style-type: none"> • The state sets winter fishing regulations based on the size structure of the population and anticipated harvest rates

Tribal self-regulation

A significant finding of the 1999 Supreme Court ruling affirming treaty rights is that the state may not regulate band members as long as the bands can effectively self-regulate, with regulations for band member fishing adequate to meet conservation, public health and public safety needs. Specifically, the state cannot regulate the time, place nor manner of the exercise of retained treaty rights, meaning the state cannot dictate when, where or how band members choose to fish. Until the series of court cases reaffirming treaty rights, the state previously interpreted that it had the ability to regulate band member harvest under state regulations.

Strategic issues

This section summarizes the current strategic issues that frame the plan's goals, objectives and strategies.

Multiple interests

Mille Lacs Lake stakeholders have diverse values, including recreational, economic opportunity (e.g., guides, resorts, launches, support industries), cultural and historical values, environmental protection and community relations. The DNR incorporates these values into its management actions, and the agency works separately through government-to-government relations to incorporate tribal perspectives and treaty obligations into decision-making.

Systems change

As described previously, Mille Lacs Lake has experienced significant ecological changes since the mid-1990s, including increased water clarity, reduced nutrient availability and aquatic invasive species invasions. Due to these changes, walleye and yellow perch production is lower than it was prior to 1995, while smallmouth bass and northern pike production is higher. These changes will affect harvest of species like walleye. Harvest levels on Mille Lacs Lake have at times exceeded modeled safe harvest amounts (Hansen et al. 2019), resulting in lower abundance the following year. The DNR's approach to management of fish resources in Mille Lacs Lake takes social, cultural and economic needs into consideration, but these needs are ultimately constrained by biological limits. Continued climatic change and ongoing impacts by invasive species will influence management options in the future.



Natural shorelines create important riparian habitats.

Goals, objectives and strategies

The goals in this plan are long-term, outcome-oriented purpose statements, complementing the DNR's treaty management. Public and other stakeholder input was instrumental in formulating these goals.

- Goal 1 – Serve a diversity of lake interests
- Goal 2 – Provide a predictable management process
- Goal 3 – Maintain healthy, self-sustaining fish populations that support recreation and harvest

Below each of the goals, this plan lists objectives and strategies:

- Objectives are activities or outputs that support plan goals that can be tracked to determine progress through the life of the plan.
- Strategies are specific, actionable statements describing how the DNR will achieve its goals and objectives. Harvest regulations are the primary strategies involved in management of the fishery.

Goal 1 – Serve a diversity of lake interests

Objective 1A. Improve tribal coordination

The DNR fulfills treaty obligations as stipulated by protocols stemming from Mille Lacs Band of Chippewa Indians vs. State of Minnesota (1996): “The State has a trust responsibility and authority to manage natural resources for the benefit of all current and future users consistent with the treaty harvest rights of the Bands.”



Mille Lacs has recreational value for more than just anglers.

Minnesota also has a policy of government to government relationships between the state and tribal nations. Minnesota Statutes 10.65 (government-to-government relationship with tribal governments) affirms that the state and Minnesota's tribal nations significantly benefit from working together, learning from one another and partnering when possible. Similarly, the state collaborates with Wisconsin bands party to the 1837 Treaty through the Great Lakes Indian Fish and Wildlife Commission. Therefore, to supplement Fisheries Technical Committee coordination, the DNR will proactively engage with tribal governments and members on fisheries management issues.

Strategies:

- Annually, the DNR commissioner will communicate regarding Mille Lacs Lake fisheries issues individually with all 1837 bands in Minnesota, and with GLIFWC in its role as a representative of the Wisconsin bands, to ensure open exchange. If a tribal government prefers, the DNR's fisheries section manager, regional director or regional fisheries manager can be responsible for this communication.

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- Annually, the DNR’s regional fisheries manager and area supervisor will offer to attend, and if desired, present at, a tribal community meeting with band members, for each 1837 band in Minnesota.
- 1837 band members will receive notice of the opportunity to apply for the fisheries advisory group (currently MLFAC), as a community-level effort to supplement government-to-government coordination, and encourage tribal staff-level involvement at meetings.

Objective 1B. Improve communication and public engagement processes

Exchange between the DNR and stakeholders leads to improved mutual understanding, greater public involvement in natural resources stewardship and ultimately higher-quality agency decisions. The DNR uses a variety of methods to involve the public, ranging from one-way communication efforts that inform, to basic involvement where the DNR shares information and takes input, to full public consultation and collaboration on complex decisions.

The DNR will work to strengthen and expand upon its public communication and engagement practices – including developing newsletters, news releases, web content updates, brochures and signage – and informal and formal coordination with members of the public. In addition, the DNR will expand efforts to engage with more Minnesotans and out-of-state visitors, through improved public education and involvement and expanded partnerships and social science efforts.

Strategies:

- Develop statewide educational and interpretive materials (online and print) for use by DNR’s Mille Lacs Lake staff, to explain the history of the lake’s fishery, state and tribal cooperative management of the lake, current ecological and social trends, and how these issues influence current management.
- Expand public communication practices to keep stakeholders informed about public engagement opportunities, fisheries monitoring and research findings, and season regulation setting.
- Strengthen local partnerships to support formal and informal education and interpretation for residents and visitors to learn about and engage in Mille Lacs Lake fisheries management. In addition to working with state parks and others DNR programs, consider partnerships with:
 - › Local government bodies – school districts, cities, libraries, etc.
 - › 4-H, scouts and other youth development organizations
 - › University Extension
 - › Watershed and other nongovernmental organization conservation groups
 - › Resorts, launch companies, local sport shops and bait shops
- Implement improved online tools to involve the public in DNR’s work, incorporate local knowledge of the lake, and better understand public interests.
- Annually, prior to walleye season opener, hold a public open house on Mille Lacs Lake fisheries issues that presents information on the state of the fishery, allows for both dialogue and a public comment opportunity, and involves partner agencies and organizations.
- Continue a fishery advisory group (currently MLFAC), and appropriately inform the public of the group’s work.
- Conduct a statewide representative human dimensions survey, to better understand all Minnesotans’ fishing and related recreational values and incorporate them into decision-making.

Goal 2 – Provide a predictable management process

Objective 2A. Improve communication and understanding of regulatory options

Effective long-term management relies on a sound process that incorporates biological and fishery data to assess fish population status and to evaluate the implications among regulatory options. Detailed information has been shared with MLFAC, but it has not been documented consistently, or formatted in a manner that makes it easy to share with the public. Efforts under Objective 1B to improve public engagement will also support improving stakeholders' involvement and their understanding of goals and impacts of regulation options. The DNR will develop new approaches for engaging with the public so that diverse stakeholders can articulate their values and preferences, to inform the DNR's regulation setting.

Strategies:

- Develop and post online plain language versions of explanatory materials covering various management topics (e.g., creel survey, hooking mortality).
- Improve the public's understanding of Mille Lacs Lake management in the context of similar lake systems in Minnesota and elsewhere, through continuing to involve internal and external fisheries science and policy subject matter experts and sharing technical and non-technical information.
- Improve the DNR's communication of its long-term fish community and fishery objectives (see Goal 3) with our FTC partners, and adapt this information and make it available through public channels.
- In general, leverage public engagement strategies under Objective 1B to support improved stakeholder understanding of goals and implications for regulation options.



Fisheries crew lifting a survey gill net.

Objective 2B. Develop and present to the public regulation options in a more consistent, predictable and timely manner

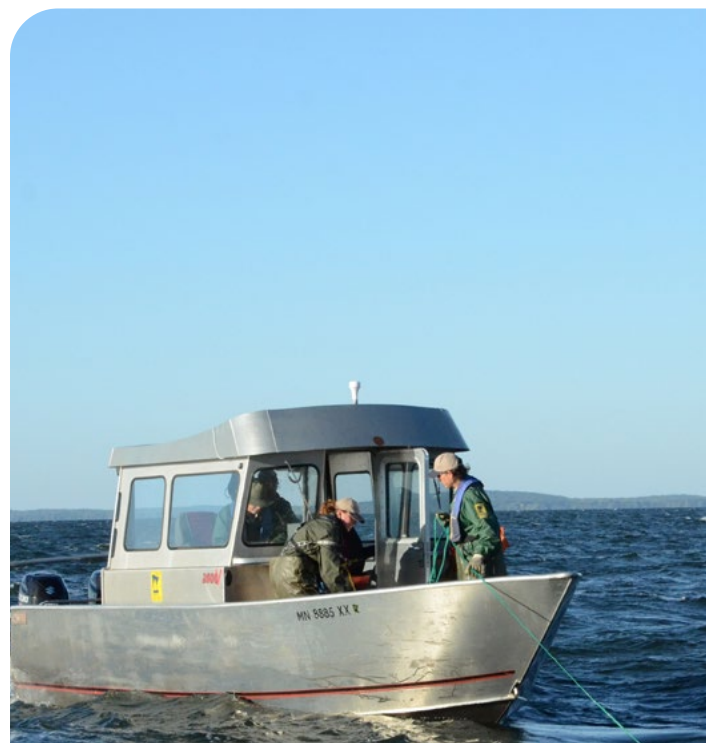
In recent years, walleye regulation options have been limited, due to a relatively low harvestable surplus and the resulting low state share of the harvestable surplus. MLFAC and other stakeholders, notably resort operators, have called for more regulation options, with greater consistency and predictability in how regulations are developed.

- **Limited options:** The overall harvestable surplus and state/tribal shares are determined annually, based on the walleye population status. The higher the state's share, the more regulation options are available. For the duration of this plan, catch and release angling for walleye will likely be in place for much of the open water season, in order to minimize the risk of an unplanned fishing closure, and thereby maintain angling opportunity.
- **Consistency and predictability:** The DNR models potential regulations to estimate harvest and the risk of exceeding the state's share of the harvestable surplus, which would result in an unplanned walleye fishing closure. There is more risk of exceeding the state's share with higher angler pressure, catch rates and water temperature (which increases hooking mortality), and these variables are difficult to predict accurately. If the state unexpectedly nears its share of the harvestable surplus, an unplanned walleye closure is likely. The state can work with stakeholders to determine an acceptable level of risk of an unplanned closure, to make selecting a regulation more consistent and predictable. More variability in the winter harvest and the harvestable surplus, combined with efforts to maximize winter harvest opportunity in the state fishery, makes it more difficult to achieve consistent and predictable regulations, particularly in the open-water fishery.

- **Timing:** The FTC uses walleye population conditions (e.g., abundance of walleye from surveys, forecasted recruitment of future year classes, desired future walleye abundance) to determine a harvestable surplus. Standardizing how these conditions are interpreted would accelerate the determination of a harvestable surplus. Defining a consistent risk level for exceeding the state fishery share of the harvestable surplus, triggering an unplanned closure, could also accelerate the process of determining a regulation.

Strategies:

- Explore opportunities to consult with MLFAC on an earlier schedule for each season's regulations, including on options when they exist, and make available to the public the process and rationale used to determine regulations.
- Consult with the public, including MLFAC, to identify preferences for balancing fishing and harvest opportunity with risk of an unplanned closure.
- Work with the FTC to update the process that informs setting a harvestable surplus.



Fall gill net survey on Mille Lacs Lake.

Goal 3 – Maintain healthy, self-sustaining fish populations that support recreation and harvest

Objective 3A. For walleye, maximize angling opportunity, and when population status allows, provide harvest opportunity while maintaining high quality size structure and high catch rates

Walleye are the most challenging species to plan for on Mille Lacs, as it is the species most targeted by both 1837 Treaty tribes and state anglers. Generally, it is advantageous to spread harvest across age and size groups, while avoiding immature and old, large individuals (SPOF 12 1984, Gwinn et al 2015). The DNR takes into account the size of fish being harvested by 1837 treaty bands in determining harvest regulations for state anglers, along with relative abundance of various sizes of fish. With more restrictive regulations in recent years, the majority of the state’s take of walleye is due to hooking mortality, which spreads kill across a broad size range of fish.

Much of the public input received on the plan (described in the plan introduction and detailed in Appendix A) focused on how the walleye fishery should be managed. Stakeholders were most interested in managing the state walleye



Fishing and tourism are important for the communities surrounding Mille Lacs.

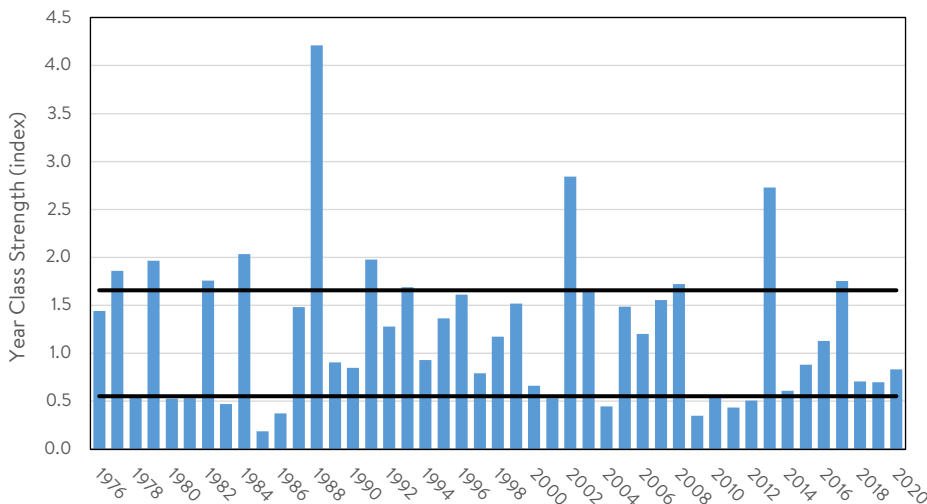
fishery to maintain angling opportunity (no unplanned closures), and secondarily to allow some opportunity for harvest. While past input from MLFAC has generally supported allocating harvest to the winter season, comments received on this plan demonstrated more support for spring harvest.

When the harvestable surplus is relatively low, the state’s fishing regulations must be very restrictive, and will be limited to catch-and-release fishing only.

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Figure 6. Walleye year class strength index

Walleye year class strength index is shown in the graph from 1976 to 2019, with horizontal bars for the 25th and 75th percentile. Very strong year classes were present in 1988, 2002 and 2013. Weak year classes were produced in years when the bars did not reach the lower horizontal line. Strong year classes have become less frequent since 2009.



Planned closures during warm water (high hooking mortality) periods will be considered if maintaining a fall (cooler water period) angling opportunity is a high priority for stakeholders. Fall fishing has been closed in years when the state reaches its share of the harvestable surplus prior to the end of the season. When the harvestable surplus is higher, regulations may include harvest opportunity, expanding the time period harvest is available, or expanding the harvest slot.

When the state's share of the harvestable surplus can support some harvest, the decision of when to allow that harvest involves tradeoffs. Early season harvest increases the chance that high harvest (including hooking mortality) requires an unplanned closure later in the open water season to stay within the state's share. Offering harvest later in the season may mean harvesting less of the state's share if fishing effort or success is low earlier in the season, but reduces the risk of an unplanned closure.

Potential walleye regulations are evaluated based on modeling that uses past fishery and environmental conditions to estimate a range of pounds of walleye killed through the open water season. Unexpected conditions (e.g., unusually high catch rates, angler pressure, water temperature) increase the likelihood of an unplanned closure. To meet the goals of maximizing angling opportunity and minimizing unplanned closures, the DNR will set conservative regulations.

Strategies:

- Through the FTC, use modeling to determine the walleye population level and harvestable surplus.
- Use modeling to evaluate the effect of specific harvest options.
- Consult with stakeholders to select a regulation that best meets fishery goals while minimizing the chance of an unplanned fishing closure.
- Set regulations conservatively early in the fishing year, and assign some portion of harvest opportunity later in the season. This will allow

transitioning to a more conservative regulation if an unplanned closure seems likely based on higher than expected hooking mortality during the catch-and-release part of the season.

- Monitor harvest, and close the walleye fishery if harvest is projected to exceed the state's share of the harvestable surplus.
- Limit walleye focused angling tournaments to cool water periods in May, June, September and October.
- Continue annual sampling programs.

Objective 3B. For smallmouth bass, maintain harvest opportunity while maintaining a high quality/trophy size structure with high catch rates

Current smallmouth bass regulations allow for some harvest of smaller fish but protect larger fish with potential to grow to "trophy" size (20-inches or greater). There is currently minimal interest in harvesting smallmouth bass, with approximately 98% of legal-to-harvest fish voluntarily released. However, past harvest levels have been higher. Despite the popularity of fishing for smallmouth bass, there was very little input regarding smallmouth bass management during this plan's public input process.

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Smallmouth bass sampled on Mille Lacs.

The Mille Lacs Smallmouth Alliance (MLSA) provided input on smallmouth bass management, expressing interest in maintaining the trophy component of the population by reducing the possession limit and expanding the protected slot (from 17 to 21-inches to 15 to 21-inches). Because most angled bass are voluntarily released, lowering the bottom end of the protected slot would do little to maintain trophy size structure. However, this change would reduce opportunity for the few anglers that choose to harvest smallmouth bass to eat. The current level of harvest on smallmouth bass is not limiting the abundance of bass greater than 17 inches. However, individuals greater than 21 inches may benefit from additional protection.

These large individuals are rare, as relatively few smallmouth bass have the genetic ability to grow to this size.

MLFAC provided input that the protected slot allows anglers to harvest rare, truly large smallmouth bass, but that these trophy fish have greater value in being recaptured than in being harvested. Therefore, the DNR plans to replace the 17 to 21-inch protected slot with a 17-inch maximum size limit. If annual monitoring shows harvest is limiting trophy fish abundance, the DNR will consider more restrictive regulations.

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Figure 7. Smallmouth bass abundance

Abundance is measured using fall gill net surveys. Abundance has increased since 1983.

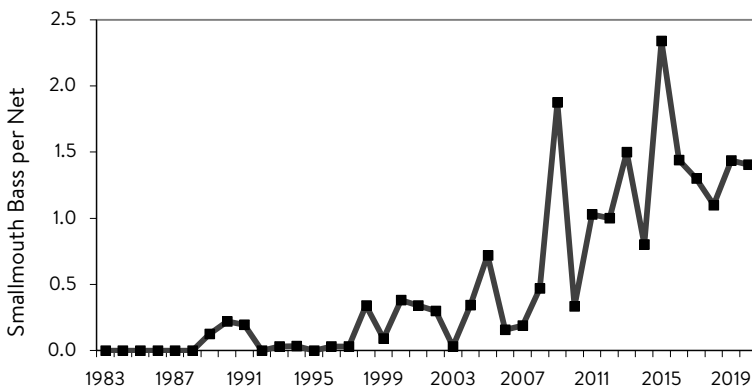
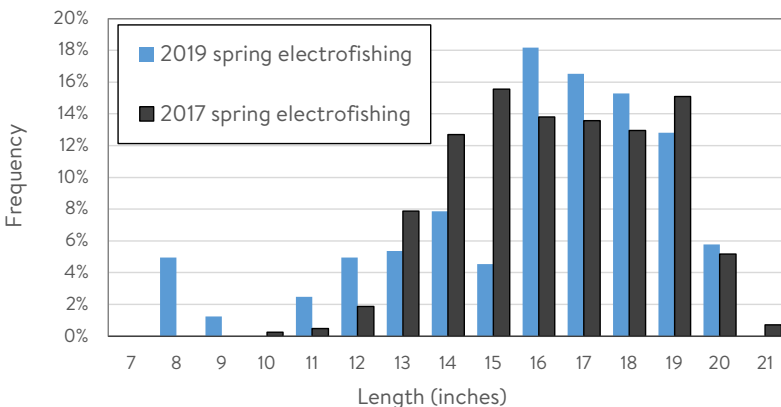


Figure 8. Smallmouth bass length frequency distribution

Frequency is based on 2017 and 2019 spring electrofishing samples. Individuals over 16 inches are abundant.



Smallmouth bass will be managed with the goal that approximately 6% of fish in the electrofishing survey sample are 20-inches or longer (based on a three-year running average) and some individuals sampled are at least 21-inches in length.

Strategies:

- Create regulations for the following:
 - › Open season following statewide regulations, with spring and fall catch-and-release seasons.
 - › 17-inch maximum size limit.
 - › Three bass in possession.
 - › No bass tournaments permitted during the spawning period of June 1-21.
- Annually sample smallmouth bass to monitor size structure.

Objective 3C. For muskellunge, maintain a high-quality, trophy size structure

Although muskellunge are native to the Mississippi River watershed, no muskellunge were found in the earliest fisheries surveys on Mille Lacs Lake, from 1941 through 1943 (Carlander 1944) and in 1954 (Maloney 1955). While muskellunge may have strayed into the lake on occasion, there was no significant population of muskellunge in Mille Lacs Lake prior to the first stocking effort in 1969.



Muskies attract anglers to Mille Lacs.

From 1969 through 1978, 2,283 Shoepack strain muskellunge were stocked. It is unlikely that this low level of stocking led to a significant fishery. In 1984, stocking resumed to take advantage of an abundant cisco population, and to possibly create a fishery that would redistribute fishing pressure from other lakes with naturally reproducing muskellunge. The goal was to produce a high-quality, low-density muskellunge population. From 1984 through 1993, between 1,912 and 10,015 (average of 4,896) fall fingerlings were stocked annually (except in 1988, when none were stocked). From 1984 through 1987, Wisconsin strain were stocked, but since 1989 Leech Lake strain have been stocked exclusively. Beginning in 1993, stocking was reduced to a maintenance level of approximately 3,000 fall fingerlings every other year. Exceptions were no stocking from 2000 through 2003 due to low abundance of cisco, and in 2020, when only 1,010 fall yearlings were stocked. The 2020 alteration to the stocking plan was due to egg-take restrictions caused by the COVID-19 pandemic that resulted in no fingerlings being available.

Genetic analysis has shown some natural reproduction in Mille Lacs Lake. It is estimated that a minimum of 30% of the adult population is due to natural reproduction. The combination of stocking and natural reproduction continues to produce a low density, high quality, muskellunge population.

Since muskellunge stocking was initiated in 1984, several factors have changed in Mille Lacs Lake. As discussed above, overall productivity has been reduced, energy pathways have been altered, and warming climate has reduced the suitability of the lake for cisco, the primary forage species for adult muskellunge. Cisco abundance in recent years is similar to during the 2000 to 2003 era, when no muskellunge were stocked due to low cisco abundance.

Mille Lacs Lake supports a trophy muskellunge population (50-inches long or greater). Current statewide regulations that include a minimum size limit of 54 inches, combined with very little

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interest in harvest, as shown in the creel survey, are adequate to protect the trophy aspects of this population. However, numerous comments were received on the draft plan indicating that anglers targeting muskellunge have experienced a reduction in catch rate since the early 2000s, and creel survey data support this. This is not unique to Mille Lacs, as most mature populations have a lower overall abundance comprised mainly of larger fish. Comments suggested that additional stocking (i.e., to pre-1993 levels) would increase abundance and improve angling catch rates. With the low abundance of cisco, increasing stocking rates should be considered with caution. However, there may be options to modify current stocking strategy to improve survival of stocked fingerlings. This could include stocking yearling fish, which are larger and less susceptible to predation by adult northern pike and muskellunge.

Strategies:

- Maintain current statewide regulations:
 - › Statewide open season.
 - › Minimum size of 54-inches.
 - › One muskellunge in possession.
- Continue to stock muskellunge at the current rate (3,000 fall fingerlings every other year).
 - › Investigate stocking options that could improve the survival of fish to adulthood. The evaluation may include bioenergetics and other techniques to assess potential impacts to forage species such as cisco and yellow perch.
 - › Evaluate success of stocking efforts by tagging stocked fish or through other methods of identification.



Mille Lacs Lake supports a trophy northern pike population.

Objective 3D. For northern pike, maintain harvest opportunity while maintaining a high quality/trophy size structure

The DNR received significant input on northern pike. Many anglers were dissatisfied with the winter regulation of harvesting two pike less than 30-inches long before one longer than 30-inches could be harvested. Public input showed support for maintaining the trophy size structure of the northern pike population in Mille Lacs Lake, with little support for harvesting a trophy fish. However, there was support for the opportunity to harvest smaller northern pike. The DNR considered three regulation options:

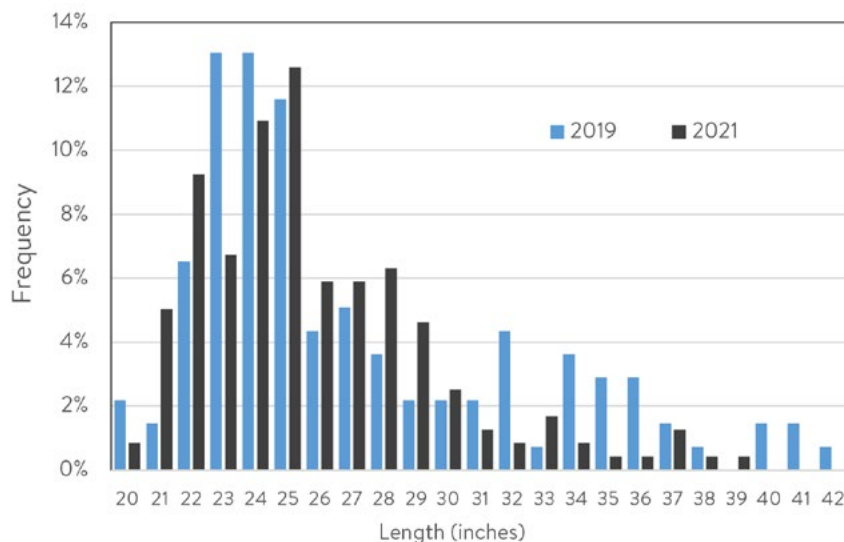
- 30-40 inch protected slot limit for all anglers (hook-and-line and darkhouse).
- 30-40 inch protected slot limit for hook-and-line, and one-fish-over-26-inch limit for darkhouse anglers.
- 30-inch maximum size limit for all anglers.

Public input demonstrated general support for the 30-40 inch protected slot limit, that was used in the open-water period. However, following consultation with MLFAC and the Minnesota Darkhouse and Angling Association, the 30-inch maximum size limit was selected to allow harvest

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Figure 9. Northern pike length frequency distribution

Frequency is based on 2019 and 2021 spring trap net survey samples. Fish over 42 inches were sampled in 2019, and over 39 inches in 2021.



of smaller fish and protect the high-quality size structure of the population. Additionally, it balances the needs of spear fishers and hook-and-line anglers.

The DNR will continue to assess management goals for northern pike size structure. Intermittent spring sampling from the mid-1990s to 2013 showed few northern pike longer than 40 inches. In 2019, northern pike longer than 40-inches rose to 4%. Since spring spawning run sampling was conducted only intermittently, and the percentage of trophy-size fish can be highly influenced by the recruitment of a single strong year class, it is difficult to determine realistic size structure management goals at this point. The DNR expects spring spawning run sampling will be effective in capturing fish longer than 40 inches, but it will take several years of data to develop an understanding of the relative abundance of this size of fish in Mille Lacs based on these data.

Strategies:

- Create regulations for the following:
 - › Continue current open season (generally fishing opening day through March 31 of the following year) regulation through the period covered by this plan.
 - › 30-inch maximum.
 - › Three northern pike in possession.
- Continue to monitor size structure through annual spring sampling using trap nets.

Objective 3E. For yellow perch, focus research efforts to determine what is limiting abundance

The DNR received significant public input on yellow perch, including concerns about low population. This perceived decline in abundance is also reflected in sampling data. The cause of the decline in abundance is not clear, but may include natural fluctuations, predation by walleye, impacts of zebra mussel and spiny water-flea, and angler harvest. Creel survey data over the past decade document low angler harvest, but this has not increased yellow perch abundance.

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Yellow perch are an important sport fish, and early life stages of yellow perch are the most important prey for walleye. Forage abundance, primarily yellow perch, is correlated with survival of age-0 and age-1 walleye. Higher forage abundance reduces predation on young walleye, increasing their survival rate. When age-0 yellow perch are abundant, age-0 walleye grow more quickly, are larger going into the winter and have a greater chance of surviving through the winter.

The DNR will undertake a multi-year project to develop sampling methods, monitor abundance of age-0 and age-1 yellow perch through the summer, and attempt to identify factors limiting abundance.

Strategies:

Review available data and literature to identify information needs concerning low yellow perch abundance.

- Develop a study design to address the most relevant information needs.
- Maintain current angling regulations at statewide regulations:
 - › 20 yellow perch daily, 40 in possession.
 - › Continuous open season.
 - › Harvest reductions will be reexamined if there is indication harvest is limiting yellow perch abundance.

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Figure 10. Yellow perch harvest through the open water and ice fisheries

Harvest has been minimal in recent years.

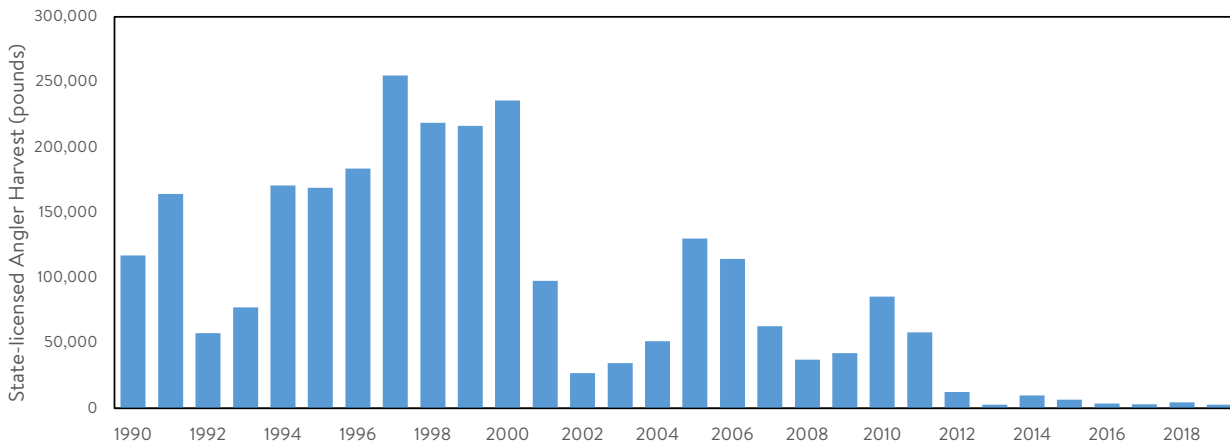
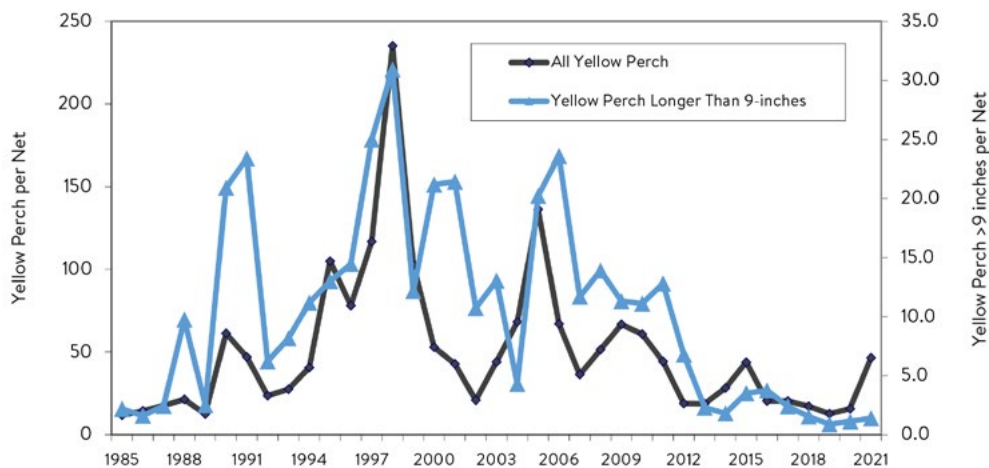


Figure 11. Yellow perch abundance

Abundance is based on fall gill net surveys. The population has been highly variable and in long-term decline since the late 1990s. Increased abundance in 2021 is due to the 2020 year class recruiting to the sampling gear. Fish from the 2020 year class averaged about 6-inches long.



Objective 3F. Protect cold water species

Burbot and cisco are typically found in lakes with a consistent refuge of cold water in summer, which Mille Lacs Lake does not have due to its relatively shallow depth that allows frequent mixing of bottom and surface waters. These species likely were more abundant in the past, but warming summers and longer ice-free periods have contributed to their decline.

Burbot declined dramatically through the 1980s and 1990s, and have been sampled only rarely since 2000. Harvest has been stable and averaging only 270 burbot per year by state anglers since 2011. Declines are likely due to environmental conditions rather than harvest. However, it is prudent to protect the remaining individuals to allow this species the best chance to persist. Virtually no anglers target burbot, but they are caught incidentally while fishing for other species, and were sometimes harvested prior to the closure of harvest in 2021.

Cisco abundance has also declined, but to a lesser degree than burbot. Cisco continue to produce year classes approximately every four to six years, a cycle that may be related to their biology and is seen in other lakes. When they are abundant, small cisco are important prey for walleye. Larger cisco are important prey for large walleye, northern pike and muskellunge, and the presence of large cisco is well correlated with a high quality size structure of these predator species.

The impact of harvest on cisco is not well understood. Harvest has ranged from less than 1,000 pounds per year from 2005 through 2007, to almost 55,000 pounds in 2010. The highest harvest estimate was over 73,000 pounds in 1995. The impact of harvest on the cisco population will be examined through literature review, additional modeling and possibly experiments with different regulations.

In 2021, the bag limit was reduced from 10 to five to reduce harvest of this species.



Cisco

Strategies:

- Protect remaining burbot from harvest by keeping the possession limit at zero.
- Review data and literature to add understanding to cisco biology in Mille Lacs Lake.
- Maintain the cisco bag limit of five that was enacted in 2021.

Performance measures

The DNR will track and report publicly its progress implementing all strategies in the plan. In addition, the following key measures will track progress toward key strategies.

Table 2. Key performance measures

Goal	Objective	Measure
Goal 1. Serve a diversity of lake interests	<i>Objective 1A. Improve tribal coordination</i>	<ul style="list-style-type: none"> • Tribal meetings offered annually, in addition to FTC meetings
	Objective 1B. Improve communication and public engagement processes	<ul style="list-style-type: none"> • Public meeting held annually • Advisory group (currently MLFAC) maintained • Human dimensions survey conducted during the plan's duration • Improve content on Mille Lacs webpage and track usage
Goal 2. Provide a predictable management process	Objective 2A. Improve communication and understanding of regulatory options	<ul style="list-style-type: none"> • Improve the Mille Lacs webpage and track usage • Track attendance at annual public meetings
	Objective 2B. Develop and present to the public regulation options in a more consistent, predictable and timely manner	<ul style="list-style-type: none"> • Regulation communication template produced and used annually
Goal 3. Maintain healthy, self-sustaining fish populations that support recreation and harvest	Objective 3A. For walleye, maximize angling opportunity, and when population status allows, provide harvest opportunity while maintaining high quality size structure and high catch rates	<ul style="list-style-type: none"> • No unplanned closures
	Objective 3B. For smallmouth bass, maintain harvest opportunity while maintaining a high quality/trophy size structure with high catch rates	<ul style="list-style-type: none"> • Three-year average of 6% sampled in spring electrofishing longer than 20-inches
	Objective 3C. For muskellunge, maintain a high-quality, trophy size structure	<ul style="list-style-type: none"> • Report produced evaluating stocking options

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Goal	Objective	Measure
Goal 3. Maintain healthy... continued	Objective 3D. For northern pike, maintain harvest opportunity while maintaining a high quality/trophy size structure	<ul style="list-style-type: none"> • Three year average of: <ul style="list-style-type: none"> › 30% of females > 30 inches › 10% of females > 35 inches › 1% of females > 40 inches
	Objective 3E. For yellow perch, focus research efforts to determine what is limiting abundance	<ul style="list-style-type: none"> • Report produced to better understand causes of reduced abundance
	Objective 3F. Protect cold water species	<ul style="list-style-type: none"> • Report produced to better understand cisco biology in Mille Lacs



Mille Lacs Lake shoreline.

Appendices

Appendix A – Input and review methods

Public input (2019)

To inform this plan, the DNR requested input to identify the interests of various stakeholders of the fishery. In total, almost 1,300 individuals provided input, including some organizational leaders representing their constituents. Opportunities to provide input on the plan were communicated in a variety of ways, including the DNR website, social media and GovDelivery newsletters; flyers and business cards; and local media. A summary of input methods is below, and a full results report is available on the DNR's website.

- **Creel survey:** Through the annual creel survey, anglers had the opportunity to answer additional questions to inform management planning. Two sets of questions were developed, one for walleye anglers, and the second for northern pike anglers. Prior to the closure of the walleye harvest season at the end of May 2019, surveys focused on gathering perspectives only on walleye management from these potentially more harvest-oriented anglers. After the walleye harvest closure, the walleye and northern pike questions were alternated between interviews.
- **Public meetings:** Three meetings were held to provide stakeholders background on the planning process and issues the plan would address, an opportunity to ask questions and discuss their perspectives, and options to provide input. Meetings were in Brainerd, the closest urban area; Mille Lacs-Kathio State Park, local to the lake; and Indian Mounds Regional Park, in St. Paul, to accommodate metro residents who might fish or own property on the lake. Each meeting started with a presentation from DNR, followed by small-group discussions. Staff assigned to each group took notes and answered questions.
- **Online survey:** A survey was developed to gather input on preferences for Mille Lacs Lake management. This survey was open from July 11 through August 1, 2019. Through the DNR website, press releases, flyers and business cards, social media, e-newsletters and tribal community announcements, individuals with an interest in the management of Mille Lacs Lake were encouraged to participate and provide input.
- **Tailored outreach:** DNR staff attended events throughout the state to talk to community members about the plan. Staff attended the Hmong Freedom Festival in St. Paul, Aitkin and Crow Wing County Fairs, and Minnesota State Fair; met with representatives of the Mille Lacs Smallmouth Alliance and Minnesota Darkhouse Association; and held a number of informal conversations in the community, at businesses and the Garrison Fisheries Office. Finally, as management goals were developed, they were presented to the Walleye, Bass and Northern Pike-Muskellunge Work Groups for comment.



Garrison, Minnesota.

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Draft plan public review (2021)

A draft of the management plan was released for a 30-day public review period in March 2021. During that period, the DNR held an open house to present the plan and take questions and comments, published an online questionnaire, and received comments via phone and email. Comments are summarized below. Full reports from the open house and questionnaire are available on the DNR's website.

Comments that resulted in plan changes or additions:

- Expand information in the plan about the breadth of stakeholder interests.
- Explain in more detail state/tribal cooperative management and treaty issues.
- Explain in more detail how regulations are set.
- Add detail on topics including water clarity, climate change, invasive species, watershed development, forage species, and increased water temperatures, and resulting management strategies.
- Improve the muskellunge section by addressing low population density, low stocking rates, and dissatisfaction with muskellunge angling.

Comments that were outside the scope of the plan or did not result in changes:

- Include additional detail about surveys and assessments, and resulting management changes.
 - › Beyond the scope of the plan. The results of annual surveys can be found on the DNR web site under LakeFinder.
- Address perceived impacts of tribal netting.
 - › The plan adequately addresses that the DNR cannot restrict tribal fishing rights. Studies of walleye fry abundance on Mille Lacs have found higher fry densities than other large walleye lakes in Minnesota, indicating that tribal netting is not restricting walleye spawning success.

- Include opportunities to harvest more large walleye.
 - › Regulations allow harvest of walleye longer than 28-inches. Harvest must remain within the state's share of the harvestable surplus. The abundance of "large" walleye (longer than 25-inches) peaked around 2006. "Large" walleye are currently at about one third of their peak abundance.
- Consider barbless hooks and live bait restrictions combined with catch and release regulations.
 - › Research has found barbless hooks to be only marginally effective at reducing walleye hooking mortality compared to barbed hooks. Bait restrictions are in place during closures to minimize incidental catch of walleye, and are more effective than barbless requirements. However, stakeholders have not generally supported bait restrictions during seasons when walleye may be targeted.
- Make smallmouth bass catch and release only.
 - › Creel surveys show that harvest of smaller bass is low, and does not meaningfully reduce the number of bass growing into the protected size range.
- Close the lake to northern pike spearing.
 - › DNR response: There would have to be demonstrated negative consequences to the management goal due to spearing. Spearing pressure has moderated after an initial surge when the lake was first opened to spearing, and spear fishers must follow the same regulations as anglers.
- Address lack of confidence in hooking mortality methods.
 - › Two hooking mortality studies have been conducted on Mille Lacs Lake, both using fishing methods commonly employed by Mille Lacs Lake anglers. Results from the two studies were similar, with the most significant factor influencing hooking mortality being water temperature.

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- Do not use closures as a management tool or only use them during periods of high water temperatures.
 - › Closures are used to keep harvest of the state fishery within its share of the harvestable surplus. Planned closures are generally targeted to periods with high water temperature, typically in July, and coupled with bans on using live bait, in order to minimize walleye by-catch and hooking mortality. Unplanned closures, however, have occurred late in the open-water season when harvest has reached or exceeded, the state share of the harvestable surplus. Exceeding the state share of the harvestable surplus would be contrary to our obligations and commitments to tribal governments and could result in legal action.

Tribal coordination (2019-2021)

- **Plan input:** DNR staff met with fisheries and planning staff from the Mille Lacs and Fond du Lac bands in 2019. Tribal staff shared DNR’s online survey link with band-member anglers, and shared tribal staff and member perspectives on lake management.
- **Draft plan review:** DNR staff again met with tribal staff and leaders in 2020 to review a draft of the management plan. Representatives from the Mille Lacs and Fond du Lac bands and GLIFWC provided feedback on the draft, notably suggestions to include information on climate impacts to cold-water species, bait species harvest, smallmouth bass regulations and competition with walleye, northern pike regulations, yellow perch abundance, AIS and water quality, climate and habitat trends, and muskellunge stocking. The DNR addressed some of these suggestions in the version of the plan released for public review in early 2021. Mille Lacs tribal leadership also provided suggested language for the cultural history section that was incorporated into the final plan.
- **Final plan review:** DNR staff emailed and called Mille Lacs, Fond du Lac, and GLIFWC staff and natural resources leadership in fall 2021. Tribal staff and leadership provided comments on the final draft of the plan, and the DNR incorporated suggestions in this final version of the plan, as applicable.

Appendix B – Glossary

- **Abundance:** The quantity of fish in a population. Abundance is usually expressed as a catch rate from standardized assessment gear when actual population size is unknown.
- **AIS:** see Aquatic invasive species.
- **Age-0:** A fish that has not reached its first birthday (January 1), also called young-of-year (YOY).
- **Angler catch rate:** The number of fish caught by anglers per hour of fishing. Catch rates can be based on fish that are harvested or released, and is expressed as fish/angler hour.
- **Angler-hour:** One hour of fishing by a single angler. For example, if two people in a boat each fished for three hours, they expended 6 angler hours. Angler-hours are the units used to describe pressure.
- **Aquatic invasive species:** A species of plant or animal that is not native to a body of water. Aquatic invasive species can also include pathogens.
- **Benthic:** Plants or animals that live on the bottom of a water body. Contrast to planktonic.
- **Biomass:** The aggregate weight of a given group of organisms (e.g., pounds in a system).
- **Carrying capacity:** The average maximum number, or weight, of an organism that an environment can sustain.
- **Catch per Unit Effort (CPUE, catch rate):** The number of fish caught per unit of effort spent fishing. For anglers it is expressed as fish/angler hour (e.g., 0.25 walleye per angler hour). For sampling nets this would be the number of fish caught per net (e.g., 13.7 walleye per gill net lift). In standardized assessments changes in CPUE correlate to changes in abundance.
- **Condition factor:** A relationship between fish length and weight, which measures the relative plumpness of a fish, similar to the Body Mass Index (BMI) for humans. On Mille Lacs Lake, condition factor is often expressed as the percent deviation from what a fish of standard weight (based on its length) would be expected to weigh.
- **Control rules/harvest control rules:** Agreed upon guidelines that determine how much fishing can take place (the harvestable surplus), based on indicators of the fish population's status.
- **Creel survey:** A survey used to estimate fish harvest and kill, angler catch rates and pressure. Annual ice and open-water creel surveys are conducted on Mille Lacs Lake. Creel surveys used on Mille Lacs Lake count and interview anglers returning to access sites.
- **Detritus:** Nonliving material.
- **Electrofishing:** The use of electricity to capture fish. Fish are temporarily stunned, dip netted, and held in a livewell. Electrofishing is limited in its effectiveness by depth, size of the fish within the shock field, and conductivity of the water. This gear is used to sample age-0 walleye and adult smallmouth bass. Age-0 walleye sampling is conducted in early September. Results provide an index of reproductive success and survival to the fall. Smallmouth bass are sampled to assess the size structure of the population.
- **Exploitation:** Removal of fish from a population. Often expressed as exploitation rate, which is the percentage of fish, by number or biomass, that is, or can be, removed.
- **Fishery:** Any activity involving the capture of fish. It can be defined in terms of the people involved, fish species pursued, method of fishing, purpose of fishing or area in which the fish are pursued. A lake can support multiple fisheries. Mille Lacs Lake supports subsistence gillnet and spear fisheries, as well as recreational fisheries for walleye, northern pike, smallmouth bass, and yellow perch. More broadly, Mille Lacs Lake supports state (sport/recreational) and tribal (subsistence/cultural) fisheries.
- **Fishing pressure:** see Pressure.

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- **Fingerling:** A generic term used to describe small fish. Muskellunge are stocked in Mille Lacs Lake as fall fingerlings, meaning the size they attain at the end of their first summer.
- **Food web:** The manner in which energy (in terms of food) moves through organisms.
- **Fry:** The larval stage of fish. Walleye are typically referred to as fry until they absorb their yolk sack and start to feed.
- **Gill net:** A net that forms a vertical wall in the water. Meshes are made of multi-filament or monofilament threads suspended in the water column between a float line and lead line. Gill nets are an entanglement gear where fish of the correct size pass partway into the mesh, become entangled, and are unable to escape. Individuals that are too small will pass through the mesh, while individuals that are too large cannot enter the mesh, and will “bounce off”. Gill nets can be used for a variety of assessments, including population estimates and index sampling. The fall gill net survey is an index survey using experimental nets that are comprised of five different mesh sizes, allowing a broad size range of fish to be sampled. This survey has been completed annually during the last two weeks of September since 1983. Gillnets are the most effective gear for assessing walleye and yellow perch populations; however, information on other species is also collected.
- **Growth rate:** The increase in size per unit of time, usually length (inches/year). Change in growth rate can indicate change in the abundance of a species or change in lake productivity. Change in growth rate can be monitored through length at age across a period of years, for example, the average length of age-3 walleye from the gill net sample, from 1983 to 2019.
- **Harvest:** Fish that are caught and taken home by anglers.
- **Harvestable surplus:** The number of individuals or pounds that can be harvested from a fish population without affecting the long-term stability of that population.
- **Hooking mortality:** The portion of fish that die, due to the stress of being captured by angling gear, after they are released. The rate of hooking mortality varies by water temperature, with higher temperatures experiencing a higher rate of hooking mortality. Fish that die due to hooking mortality are included in the state’s share of the harvestable surplus. The rate of hooking mortality used to determine total walleye kill on Mille Lacs Lake was developed through experiments conducted on the lake.
- **Index sampling:** Sampling to determine a relative value or quantity. Since conducting a direct population estimate on a large lake is very expensive, catch rates (e.g., gillnet catch rates) are used to index the relative abundance of the population. That is, a change in the relative abundance (catch rate) is assumed to be proportional to a change in the actual abundance of the population.
- **Juvenile:** Fish are not sexually mature (i.e., have not spawned yet).
- **Kill:** Fish that are caught and taken home, as well as those that are released, but are estimated to have died from hooking mortality.
- **Littoral Area:** The area of the lake where water depth is less than 15 feet. This is a surrogate measure of lake productivity; this is where vegetation, insects, and small fish (prey) are most abundant in lakes.
- **Median:** The value at which half of the observations in a data set are greater, and half of the observations are lower.
- **Mille Lacs Fisheries Advisory Committee (MLFAC):** The public advisory group that was formed to represent a broad range of interests around the Mille Lacs Lake fishery. MLFAC provides input on management options being considered by the DNR.

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- **Mortality:** The rate at which fish die. Can also be expressed as a percentage of the fish that were in the population at the beginning of a time period. Mortality is typically divided into natural mortality (e.g., disease or being eaten by a predator) and fishing mortality (removed by harvest or hooking mortality).
- **Population:** All individuals of the same species within a defined geographic location (e.g., a lake) at a given time.
- **Pressure:** Total number of angler-hours spent fishing over a specified time period (e.g., during the last winter creel survey, pressure was over 2 million angler-hours).
- **Otolith:** Bony inner ear structures of fish formed from layers of calcium carbonate that are used for balance and orientation. These structures are removed from sampled fish and used to determine age.
- **Oxytetracycline (OTC):** An antibiotic chemical that is absorbed by bone, and fluoresces when exposed to certain wavelengths of light. Walleye fry have been marked with OTC for specific experimental purposes. Otoliths can be examined for absorption of OTC, which would indicate if that fish was stocked. OTC-marked fish have been used on Mille Lacs Lake to estimate the number of wild walleye fry produced in a given year.
- **Planktonic/plankton:** Referring to plants (phytoplankton) or animals (zooplankton) that are suspended, or primarily move through, the water column, rather than residing on the bottom. Zooplankton are planktonic animals, while phytoplankton are planktonic plants. Contrast to benthic.
- **Population dynamics:** The interactions of recruitment, growth, and mortality that determine the abundance, age structure, and sizes of individuals in a population. Because recruitment, growth, and mortality are constantly occurring, populations are constantly changing.
- **Population estimate:** An estimate of the actual number of fish in a population. On Mille Lacs Lake population estimates are generated in two different ways. Periodically, a direct population estimate is made through a mark-recapture experiment. Since direct population estimates are very expensive, a statistical catch-at-age (SCAA) model is used between direct population estimates. The periodic direct population estimates are incorporated into the SCAA model.
- **Population structure:** The distribution of sizes, ages or sexes in a population resulting from the processes of recruitment, growth, natural mortality, and selective removal (fishing).
- **Production:** The amount of total biomass, or fish, that can be produced in a body of water, typically expressed in weight.
- **Protocol:** A series of mutually agreed upon rules dictating how entities interact or an agreement that modifies or supplants a treaty. Both definitions are used in interactions between the State of Minnesota and the 1837 treaty bands.
- **Pseudofeces:** Indigestible material that is taken into an animal, but is expelled prior to passage through the digestive tract. Pseudofeces are produced as a by-product of filter feeding by zebra mussels.
- **Recruitment:** The number of fish surviving to a defined size or age. Commonly defined recruitment to size- or age-classes are when they first become vulnerable to the predominant fishing gear (e.g., the size at which they can be caught in a gill net or the size at which anglers begin to harvest them).
- **Secchi depth:** A measure of water clarity using a Secchi disk. Secchi depth is measured by lowering a Secchi disk into the water and observing when it is no longer visible. It is an indication of how deep light can penetrate into the water.

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- **Secchi disk:** A 20 centimeter (8-inch) diameter disk that is divided into quadrants, with the quadrants painted alternately black and white.
- **Seining:** A method of sampling small fish in near-shore areas. Historically, shoreline seining was conducted in Mille Lacs Lake to sample age-0 game fish and forage species at several sites around the lake. Seining was discontinued in the early 2000s.
- **Selectivity:** The ability of a gear to catch a certain size or species of fish relative to its ability to catch other sizes or species. For example, gill nets are more selective for 17-inch walleye than they are for 11-inch walleye, so catching more 17-inch fish does not necessarily mean they are more abundant in the population than 11-inch fish. Selectivity also refers to angler harvest, where angler preference, and regulations, determine what species and sizes are kept.
- **Share of the harvestable surplus:** The portion of the harvestable surplus that is assigned to the state or 1837 Treaty fisheries, respectively.
- **Spawning Stock Biomass (SSB):** The aggregate weight of the mature portion of a population usually expressed in pounds or pounds per gill net lift. Mature female walleye SSB is most often used as a predictor of total egg and fry production (reproductive potential). On Mille Lacs Lake, total SSB goals (total of male and female) have been used to determine the state's share of the harvestable surplus of walleye that can be killed in a year.
- **Stable/stability:** A population that is neither increasing nor decreasing over the long term. It does not mean the population is the same every year, just that there are no long-term trends in abundance.
- **Standardized sampling:** Sampling conducted in a rigidly prescribed manner that defines gear, methods of operation, timing, and location. Standardized sampling means replicating as closely as possible all sampling variables so that results are comparable over time.
- **Statistical-Catch-at-Age (SCAA) Model:** A population model that estimates number and biomass of fish by age and sex. On Mille Lacs Lake, inputs to the model include age and sex specific tribal kill and gill net survey data, sex-specific growth, maturity, angling selectivity, population estimates, and age-specific natural mortality.
- **Stipulation:** An agreement between two parties in a court proceeding. The stipulation defines issues that both parties agree to, and becomes part of the court record.
- **Trawl:** A funnel-shaped net that is towed through the water by a boat. Trawling is used primarily to sample small fish in deeper water than shoreline seining can sample. Older, larger fish are occasionally caught, but most are able to evade the trawl and avoid capture.
- **Treaty:** Agreements negotiated between the United States and sovereign tribal nations in the 1700 and 1800s that remain in effect. In some treaties, tribes ceded their lands in return for various goods, services or cash payments. Others referenced preexisting rights retained by tribes such as hunting, fishing and gathering on ceded lands. Still others defined reservations as permanent tribal homelands, either on remnants of tribal ancestral lands or in new areas where tribes were forced to relocate.
- **Year class:** A group of fish produced in a particular year (e.g., all the walleye hatched in 2018 comprise the 2018 year class).
- **Year class strength:** The relative abundance of a year class. An index value can be calculated by sampling an individual year class multiple times over consecutive years. Strong and weak year classes are relative terms based on the abundance of a year class relative to the abundance of others in the same lake. In general, strong year classes are defined as having a year class strength value greater than the 75th percentile, and weak year classes have a year class strength value lower than the 25th percentile.
- **YOY:** See Age-0.

Appendix C – Mille Lacs Lake sampling programs

To monitor individual fish populations and the overall fishery, annual and intermittent sampling programs are utilized. Suggested survey programs and methods are outlined in the DNR's Large Lake Sampling Guide (Wingate and Schupp 1985). The sampling guide suggests that refinements to programs and methods be made as needs arise and more is learned about the strengths and weaknesses of sampling techniques.

Annual Programs

- **Open-water and ice fishery creel surveys:** Annual monitoring ensures that harvest is within allocation, and to identify trends in harvest, pressure, and catch rates. Mille Lacs Lake's sport fisheries are monitored through non-uniform probability, access-based creel surveys (Pollock *et al* 1994). These surveys yield estimated angler pressure, estimated number and pounds of fish harvested, and estimated length distribution of fish that were harvested, released, and died from hooking mortality.
- **Young-of-year (YOY) walleye sampling:** The purpose of this survey is to monitor abundance of age-0 walleye, which is an indicator of reproductive success. Age-0 walleye are sampled using electrofishing at discrete areas of the lake, to monitor relative abundance, age, and size of age-0 and age-1 walleye.
- **Forage assessment:** Monitoring abundance of forage species gives insight into past and future angling success rates, and walleye recruitment. Small mesh vertical gill nets are used to sample forage species in the lake. Primary target species are age-0 and age-1 yellow perch, cisco, and spot-tail shiner. Relative abundance of these species is monitored. Additionally, the relative abundance of incidentally captured age-0 walleye is compared to results from age-0 walleye sampling and assessed for similarity in trends.
- **Fall gill net survey:** This program targets walleye, yellow perch, cisco and northern pike using standard experimental gill nets. Metrics monitored from these populations include age distribution, year class strength, growth rate, and rate of sexual maturity. Changes in these metrics relate to how fish populations compensate for changes in density (Gangl and Pereira 2003). Additionally, condition factor, the relative plumpness of a fish, is monitored. Condition factor is correlated with angler catch rates, and can be used to provide insight into future angling catch rate or to explain past catch rates. The survey has been expanded beyond the original 32 near-shore netting locations to include 20 off-shore sites. Nets set in northern pike habitat have also been added to provide a larger sample of northern pike, using larger mesh sizes than the experimental nets.
- **Zooplankton sampling:** Zooplankton sampling monitors the abundance and species composition of the zooplankton community. Both of these metrics offer insight into changes in the productivity of the lake. Zebra mussel veliger abundance is also monitored through this program.
- **Water quality sampling:** Water is sampled and analyzed for a variety of chemical parameters and clarity (Secchi depth). The sampled parameters primarily relate to productivity.
- **Adult zebra mussel sampling:** Adult zebra mussels are sampled at standard stations around the lake in order to monitor trends in abundance.
- **Walleye Population Model:** A Statistical Catch at Age (SCAA) model is used to combine multiple types of data into a unified framework to estimate age and sex specific abundances and exploitation over time. The model uses data collected by the state creel, tribal census, fall electrofishing survey, and fall gillnetting survey. The state's SCAA model has been reviewed externally and found to be sound.

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- **Smallmouth bass and northern pike:** Both of these species are managed to provide a high quality, trophy fishing experience. These assessments are designed to monitor the size structure of these fish populations.

Both the creel survey and population assessments have been reviewed externally by subject matter experts and found to be reasonable and sound. The creel survey design was formally reviewed by Dr. James R. Bence, Quantitative Fisheries Center, Michigan State University, and informally by Dr. Chris Vandergoot, Great Lakes Science Center – USGS, Sandusky, Ohio. A review of walleye sampling techniques was undertaken by Dr. James R. Bence, Quantitative Fisheries Center, Michigan State University and Dr. Terrance Quinn, Juneau Center-School of Fisheries and Ocean Sciences, University of Alaska-Fairbanks. This review identified several areas where sampling could be improved, and these suggestions have been adopted.

Intermittent Programs

Several sampling programs are conducted on a periodic or as-needed basis.

- **Walleye population estimate:** A direct walleye population estimate, using mark-recapture methodology, is conducted periodically in order to corroborate the trends in the gillnet survey and model derived abundance estimates. Population estimates were made in 2002, 2003, 2004, 2008, 2013, 2014, and 2018. This assessment is now scheduled to be conducted on a five-year rotation, with the next scheduled in 2023.
- **Muskellunge assessment:** Muskellunge are managed to provide a high quality, trophy fishing experience. This assessment is designed to monitor the size structure of the muskellunge populations.

Appendix D – History of fishing regulation changes

“Bass” refers to largemouth and smallmouth bass. HSL is harvest slot limit, PSL is protected slot limit. Closed indicates a species cannot be targeted and possession limit is zero. Missing years indicate no regulation change from previous years, though open and close dates are statewide.

Year	Date	Species	Limit	Comments
1962		Northern Pike	0	No harvest
1963		Northern Pike	3	Statewide regulations
1983		Northern Pike	3	Spearing closure
1985		Walleye	6	One over 20-inches
1994	05/14/1994 – 02/19/1995	Northern Pike	3	One over 30-inches
1997	05/10/1997 – 05/10/1997	Walleye	6	15-inch minimum, one over 20-inches
1998	05/09/1998 – 02/14/1999	Northern Pike	3	26-36 inch PSL, one over 36-inches
1999	05/15/1999 – 02/20/2000	Walleye	6	14-20 inch HSL, one over 26-inches
2000	05/13/2000 – 02/18/2001	Walleye	6	14-18 inch HSL, one over 28-inches
	05/27/2000 – 09/10/2000	Smallmouth Bass	1	21-inch minimum
	09/11/2000 – 02/18/2001	Smallmouth Bass	0	Catch-and-release
2001	05/12/2001 – 06/04/2001	Walleye	6	16-20 inch HSL, one over 30-inches
	06/05/2001 – 11/30/2001	Walleye	6	16-18 inch HSL, one over 28-inches
	12/01/2001 – 02/17/2002	Walleye	6	14-18 inch HSL, one over 28-inches
2002	05/11/2002 – 02/16/2003	Walleye	4	14-16 inch HSL, one over 28-inches
	05/11/2002 – 02/16/2003	Northern Pike	3	24-36 inch PSL, one over 36-inches
2003	05/10/2003 – 02/15/2004	Walleye	4	17-28 inch PSL, one over 28-inches
	Continuous	Cisco	10	Closed to sport gill netting
2004	05/15/2004 – 07/15/2004	Walleye	4	20-28 inch PSL, one over 28-inches
	07/16/2004 – 11/30/2004	Walleye	4	22-28 inch PSL, one over 28-inches
	12/01/2004 – 02/20/2005	Walleye	4	20-28 inch PSL, one over 28-inches
2007	05/12/2007 – 07/08/2007	Walleye	4	20-28 inch PSL, one over 28-inches
	06/02/2007 – 02/24/2008	Muskellunge	1	48-inch minimum length
	07/09/2007 – 11/30/2007	Walleye	4	14-16 inch HSL, one over 28-inches
	12/01/2007 – 02/24/2008	Walleye	4	20-28 inch PSL, one over 28-inches
2008	05/10/2008 – 02/22/2009	Walleye	4	18-28 inch PSL, one over 28-inches
2010	05/15/2010 – 07/14/2010	Walleye	4	18-28 inch PSL, one over 28-inches
	07/15/2010 – 11/30/2010	Walleye	4	20-28 inch PSL, one over 28-inches

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Year	Date	Species	Limit	Comments
2011	05/14/2011 – 02/26/2012	Northern Pike	3	27-40 inch PSL, one over 40-inches
2012	05/12/2012 – 02/24/2013	Walleye	4	17-28 inch PSL, one over 28-inches
2013	05/11/2013 – 02/23/2014	Walleye	2	18-20 inch HSL, one over 28-inches
	05/11/2013 – 02/23/2014	Northern Pike	3	33-40 inch PSL, one over 40-inches
	05/25/2013 – 09/08/2013	Smallmouth Bass	6	17-20 inch PSL, one over 20-inches
	09/09/2013 – 02/23/2014	Smallmouth Bass	0	Catch-and-release
2014	05/10/2014 – 02/22/2015	Walleye	2	18-20 inch HSL, one over 28-inches
	05/10/2014 – 02/22/2015	Bass	6	One over 18-inches
	05/10/2014 – 03/30/2015	Northern Pike	10	One over 30-inches Spearing ban lifted
2015	12/01/2014 – 02/22/2015	Walleye	2	18-20 inch HSL, one over 28-inches
	12/01/2014 – 03/31/2015	Northern Pike	10	One over 30-inches
	12/01/2014 – 11/30/2015	Bass	6	One over 18-inches
	05/09/2015 – 08/02/2015	Walleye	1	19-21 inch HSL
	08/03/2015 – 11/30/2015	Walleye	NA	Closed
	05/09/2015 – 11/30/2015	Northern Pike	10	One over 30-inches, two smaller than 30-inches must be harvested before one over 30-inches can be harvested
2016	12/01/2015 – 02/28/2016	Walleye	1	18-20 inch HSL or one over 28-inches
	12/01/2015 – 03/31/2016	Northern Pike	5	One over 30-inches, two smaller than 30-inches must be harvested before one over 30-inches can be harvested
	12/01/2015 – 02/28/2016	Bass	6	One over 18-inches
	05/14/2016 – 09/05/2016	Walleye	0	Catch-and-release
	09/06/2016 – 11/30/2016	Walleye	NA	Closed
	05/14/2016 – 05/29/2016	Bass	0	Catch-and-release
	05/30/2016 – 02/26/2017	Bass	4	One over 18-inches
	2017	12/01/2016 – 02/26/2017	Walleye	1
12/01/2016 – 03/31/2017		Northern Pike	5	One over 30-inches, two smaller than 30-inches must be harvested before one over 30-inches can be harvested
05/13/2017 – 07/06/2017		Walleye	0	Catch-and-release
07/07/2017 – 08/10/2017		Walleye	NA	Closed
08/11/2017 – 09/04/2017		Walleye	0	Catch-and-release

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Year	Date	Species	Limit	Comments
	09/05/2017 – 11/30/2017	Walleye	NA	Closed
	05/13/2017 – 05/27/2017	Bass	0	Catch-and-release
	05/28/2017 – 02/25/2018	Bass	3	17-21 inch PSL, one over 21-inches
2018	12/01/2017 – 02/25/2018	Walleye	1	20-22 inch HSL or one over 28-inches
	12/01/2017 – 03/31/2018	Northern Pike	5	One over 30-inches, two smaller than 30-inches must be harvested before one over 30-inches can be harvested
	05/12/2018 – 11/30/2018	Walleye	0	Catch-and-release
	05/12/2018 – 05/26/2018	Bass	0	Catch-and-release
	05/27/2018 – 02/24/2019	Bass	3	17-21 inch PSL, one over 21-inches
	12/01/2018	Smallmouth Bass	NA	Closed per Commissioner's Order. This may have been an error, with the actual intent to allow catch-and-release fishing.
	05/12/2018 – 11/30/2018	Northern Pike	5	30-40 inch PSL, one over 40-inches
2019	12/01/2018 – 02/24/2019	Walleye	1	21-23 inch HSL, one over 28-inches
	05/11/2019 – 05/31/2019	Walleye	1	21-23 inch HSL, one over 28-inches
	06/01/2019 – 09/05/2019	Walleye	0	Catch-and-release
	09/06/2019 – 11/30/2019	Walleye	NA	Closed, unplanned closure
	05/11/2019 – 05/24/2019	Bass	0	Catch-and-release
	05/25/2019 – 09/08/2019	Bass	3	17-21 inch PSL, one over 21-inches
	12/01/2018 – 03/31/2019	Northern Pike	5	One over 30-inches, two smaller than 30-inches must be harvested before one over 30-inches can be harvested
	05/11/2019 – 11/30/2019	Northern Pike	5	30-40 inch PSL, one over 40-inches
	09/09/2019 – 02/28/2020	Smallmouth Bass	0	Catch-and-release
2020	12/01/2019 – 02/23/2020	Walleye	1	21-23 inch HSL, one over 28-inches
	05/09/2020 – 06/30/2020	Walleye	0	Catch-and-release
	07/01/2020 – 07/31/2020	Walleye	NA	Closed, planned closure
	08/01/2020 – 11/30/2020	Walleye	0	Catch-and-release
	05/09/2020 – 05/22/2020	Bass	0	Catch-and-release
	05/23/2020 – 09/12/2020	Bass	3	17-inch MSL
	09/13/2020 – 02/28/2021	Smallmouth Bass	0	Catch-and-release
	05/09/2020 – 03/31/2021	Northern Pike	3	30-inch MSL, permanent change
	12/01/2020 – 11/30/2021	Burbot	0	Permanent regulation change

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Year	Date	Species	Limit	Comments
2021	12/01/2020 – 02/28/2021	Walleye	1	21-23 inch HSL, one over 28-inches
	05/15/2021 – 05/31/2021	Walleye	1	21-23 inch HSL, one over 28-inches
	06/01/2021 – 06/30/2021	Walleye	0	Catch-and-release
	07/01/2021 – 07/15/2021	Walleye	NA	Closed, planned closure
	07/16/2021 – 09/15/2021	Walleye	0	Catch-and-release
	09/16/2021 – 11/30/2021	Walleye	1	21-23 inch HSL, one over 28-inches
	05/15/2021 – 05/28/2021	Bass	0	Catch-and-release
	05/29/2021 – 09/12/2021	Bass	3	17-inch MSL
	09/13/2021 – 02/27/2022	Smallmouth Bass	0	Catch-and-release
	12/01/2021 – 11/30/2022	Cisco	5	Permanent regulation change

Appendix E – History of night closures

Year	Comments
1983	<p>From Monday following the general fishing opener, until Monday four weeks after the opener, no fishing from 10:00 pm until 6:00 am the following morning. You may not be on the water if in the possession of any fishing gear.</p> <p>Statute, at request of citizens, to limit harvest of large walleye.</p>
2016	<p>Night fishing ban of 1983 extended through last day of November. Except during open season for muskellunge, anglers can target (and possess) muskellunge using baits and lures longer than 8-inches (from front of eye to the end of the trailing hook), and non-game species can be targeted with bow fishing gear, though no angling gear may be possessed while bow fishing. If not bow fishing, fishing gear may be possessed after 10:00 pm.</p> <p>DNR rule, to limit harvest of walleye.</p>
2017	<p>Night fishing ban of 1983 extended through last day of November. Except during open season for muskellunge, anglers can target (and possess) muskellunge and northern pike using baits and lures longer than 8-inches (from front of eye to the end of the trailing hook), and non-game species can be targeted with bow fishing gear, no angling gear may be possessed while bow fishing. Fishing gear may be possessed after 10:00 pm.</p> <p>DNR rule, to limit harvest of walleye.</p>
2021	<p>Night fishing ban of 2017 was relaxed to midnight from September 16 through last day of November.</p>

Appendix F – References

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