NA-01570-01

Minnesota Department of Natural Resources

LAKE MANAGEMENT PLAN

DEPARTMENT OF NATURAL RESOURCES

Region	Area	D.O.W. Number	County	D.O.W. Lake Name	Acreage
NE	**Grand Marais**	**16-0239**	**Cook**	**Poplar**	**764.0**

Ecological Class: 3 Alternate Class: Littoral Acres: 290 Maximum Depth (ft): 73

Long Range Goal: Increase walleye abundance. Support walleye and northern pike fisheries providing average catch rates for anglers. Maintain a lake whitefish population capable of supporting a sport netting harvest. Maintain a smallmouth bass fishery providing some larger fish for anglers, with average catch rates.

Operational Plan:

1) Continue stocking 580 lb medium-sized Pike River-strain walleye fingerlings (fgl) in every odd-numbered year (11,600 fgl @ 20 fgl/lb, per stocking) OR beginning in 2023 stock 300,000 Pike River-strain walleye fry in two consecutive years of every three. This would be base-level stocking. See stocking narrative for discussion of these alternatives. Only one will be included in the final version of this plan.
2) Conduct standard surveys, duplicating all 2009 gill net sets (10 GSH, 6 GDE,), and including 12 3/4-in and 12 1/4-in-mesh trap net sets, in late July 2024, 2028, and 2032.
3) Continue to allow sport whitefish netting annually.
4) Revise this plan by March 2034.

Mid Range Objective: Attain and maintain a minimum walleye catch of 1.25 fish/gill net set, with some fish over 20 inches present. Maintain a northern pike population with a minimum gill net catch of 0.6 fish/net. Maintain a lake whitefish population with a minimum gill net catch of 0.75 fish/net. Provide some smallmouth bass over 14 inches in length in the angling catch or lake survey catches.

Potential Plan:

1) Conduct a traditional roving creel survey in May-September 2032 in conjunction with creel surveys of other lakes in the immediate area. Cost - $15,000/lake surveyed.
2) Implement a 17-26-in protected-slot size limit (PSL) for walleye, coupled with a bag limit of three fish (one over 26 in), in March 2024. Implementation would depend on demonstrated public support for such a proposal. See regulation narrative for more information. Cost - $2,000.

Primary Species Management	Secondary Species Management	**Additional jurisdictions:**
Walleye*	**Northern Pike, Smallmouth Bass, Lake Whitefish**	

Area Supervisor's Signature Steven E. Persons	Date
Regional Supervisor's Signature	Date

1854 Ceded Territory
Superior National Forest

Prepared by: Steven E. Persons
Date of initial lake management plan: 5/26/1987
Dates of previous revisions: 4/20/1992, 5/31/1994, 12/18/2000, 4/13/2004, 1/31/2011

* Actively managed species

See following pages for information on various surveys, past management, social considerations, present limiting factors, survey needs, land acquisition needed, habitat development and protection, commercial fisheries, stocking plans, other management tools, and evaluation plans.

USFS District: Gunflint

Date sent from DNR Area Fisheries to USFS District Ranger:

Date sent from DNR Regional Fisheries to USFS Forest Supervisor:

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NARRATIVE

Ecological Class: 3

Various surveys Poplar Lake lies within the Lake Superior North watershed, discharging to Lake Superior via Poplar Creek to the North Brule River, then to the Brule River. Early lake survey data were collected in 1935 and 1938. The temperature-oxygen profile was found to be fair for lake trout, with water temperature and dissolved oxygen of 49° F and 5.2 ppm at 33 ft, and 44° F and 3.6 ppm at 66 ft. Walleye, northern pike, white sucker, and yellow perch were collected in 100 ft gill nets and seine hauls in 1938. An initial lake survey was completed by the MNDNR in August 1948. That survey found temperature-oxygen conditions suitable for lake trout (water temperature < 55 F, dissolved oxygen > 5 ppm) to a depth of a little under 55 feet. A Secchi transparency of 10.5 feet was measured, and water color was described as brown. Poplar was described as a softwater lake of low fertility. “Tullibee”, white sucker, northern pike, yellow perch, and walleye were collected in graduated-mesh gill nets or 0.75-in-mesh trap nets. Lake trout and burbot were reported to have been present, but were not taken in sampling gear. Walleye taken were described as slow-growing and “seriously stunted.”

Additional population assessments or standard surveys were done in 1955 (resurvey), 1959, 1963, 1969, 1971, 1972, 1977-1979, 1980 (resurvey), 1982, 1984, 1986-1988, 1991 (resurvey), 1993, 1995, 1997, 1999, 2003, 2006 (resurvey), 2009, 2012, and 2016. Most surveys and assessments have been done between mid July and late August, with the exception of the 1981 and 1978 assessments, done in early September. Most have used a mix of standard graduated-mesh gill nets (GN, GSH, or GDE) and 0.75-in-mesh trap nets (TN), and many have included the use of 0.25-in-mesh trap nets (TQU). A targeted survey using only shallow gill net sets (GSH) and 0.75-in-mesh trap nets was done in 2020 to assess the walleye population. Special assessments, using only 1/4-in-mesh trap nets and targeting young-of-year (YOY) walleye and yellow perch, were done in 1972-1979, 1981-1987, 2007, and 2008. Since 1993, gill net sets have been stratified on the basis of depth, with shallow sets above the thermocline and deep sets (GDE) below the thermocline; however, most (if not all) assessments done prior to that time also sampled a mix of depths, with all sets (deep or shallow) recorded as standard gill net sets (GN). Unless otherwise noted, references to gill net catches in this narrative will be for the combination of deep and shallow sets. The number of GDE sets was increased after 1995 to better sample lake trout, and was reduced in 2009 after lake trout stocking had been discontinued.

Fish species collected in Poplar Lake since 1938 (with the year first collected) include: walleye (1938), northern pike (1938), white sucker (1938), yellow perch (1938), northern cisco (1948), lake whitefish (1955), smallmouth bass (1955), burbot (1955), green sunfish (1972), black crappie (1974), pumpkinseed sunfish (1976), unidentified minnows (1981), central mudminnow (1982), blacknose shiner (1982), black bullhead (1983), bluegill (1980), spottail shiner (1985), brook stickleback (1993), Iowa darter (1993), lake trout (1997), largemouth bass (1999), hybrid sunfish (2006), and common shiner (2012). No black bullhead have been collected since 1983, no northern cisco have been observed since the 1950's, and lake trout were last collected in 2003.

Management emphasis in Poplar Lake has long been on the walleye fishery, but improving the fishery has been a goal that has eluded managers. The 1948 survey reported that the walleye population was "seriously stunted", and recommended that the lake should not be heavily stocked due to the limited forage base. The 1955 survey found good natural walleye reproduction, and recommended that stocking be discontinued. Walleye growth was slow; age-3 walleye collected in 1955 averaged 8.9 in at last annulus formation. The 1959 assessment also concluded that walleye natural reproduction was good, even though the three strongest year classes collected that year had all been supplemented by stocking and there were no strong unstocked year classes. The 1963 survey, which followed seven years with no walleye stocking, found that walleye abundance had declined dramatically. Walleye stocking was resumed and increased after 1963.

Walleye gill net catches in the period following the resumption of regular walleye stocking (after 1967) peaked in 1977 at

7.7 fish/net, and then declined (with some fluctuations) until reaching a low of 0.06 fish/net in 1997 (Table 1). Since 1991 the walleye catch has fluctuated between 0.06 and 1.0 fish/gill net. The walleye catch in the 2016 assessment was 0.56 fish/gill net. Walleye collected in 2016 ranged in length from 7.6 to 27.6 inches. Ten of the 13 walleye collected (all gears) were from year classes that had been supplemented by stocking (fingerling). Although sample sizes were small, growth rates for young walleye collected in 2016 appeared to have been slow. Across all year classes, fish reached a mean length of 10.8 inches at age-3 annulus formation, compared to an area mean of 11.7 inches in Class 3 lakes. The walleye catch in the 2020 targeted survey was similarly low (Table 5). One 31.6-inch fish was sampled, but the rest were under 18 inches in length. Years in which fingerlings had been stocked (but not necessarily stocked fish) accounted for 88% of the total walleye catch in 2020.

There is some evidence to suggest that heavy walleye stocking in Poplar Lake resulted in reduced walleye abundance. From 1977 to 1988, the cumulative number of age 2-6 walleye stocked prior to assessments increased steadily. During this time, the walleye catch in assessments declined dramatically. After 1988, the cumulative number of age 2-6 walleye stocked prior to assessments declined; however, walleye catches remained low, with the walleye population showing no sign of recovering naturally.

Stocking walleye fry has succeeded in producing higher number of juvenile fish in the years such stocking has been done. Catches of YOY walleye in 1/4-in-mesh trap nets have been very low in years when no fry have been stocked, and much higher in years with fry stocking (Table 3). Only one YOY walleye has been taken in 1/4-in-mesh trap nets in any year (stocked or unstocked) since 1987.

Smallmouth bass were first collected in the 1955 survey. Assessment catches have never been high, ranging from zero to 1.3 fish/gill net (Table 1). There has been no clear trend in smallmouth abundance, at least as indicated by gill net catches. Growth of age-2 smallmouth bass collected in 1991 was slow, with fish averaging 4.6 in at last annulus formation, compared to the Cook County mean of 5.3 in; however, smallmouth bass collected in 1993 exhibited faster growth, with age-4 fish averaging 11.0 in at last annulus formation. Only one smallmouth bass (a 13-in fish) was taken in the 2003 assessment, and the 2009 assessment also yielded a catch of just one fish (14.1 inches). Despite low smallmouth bass catches in standard assessment gear, catches of YOY smallmouth bass in 1/4-in-mesh trap nets have often been high (Table 3). Catches in 2007, 2008, and 2016 exceeded the third quartile (2.00 YOY/set) for local Class 3 lakes.

Black crappie were first collected in 1977, but have never been abundant (Tables 2 and 4). Frequently assessments have failed to collect any black crappie. In the 1991 assessment several fish were collected, all ages 2 and 3, and two black crappie (ages 4 and 6) were collected in 1993. Several YOY black crappie were taken in 1/4-in-mesh trap nets in 1999 and 2008 (Table 3).

Northern pike gill net catches have generally been below 2.0 fish/gill net since 1969; the catch in 2016 was 0.67 fish/gill net. There has been no clear trend in northern pike abundance or average size (Table 1). Northern pike collected in 2016 ranged from 15.8 to 24.0 in. Northern pike over 25 in have been rare in surveys of this lake.

Yellow perch abundance has generally been low, with catches in most assessments under 2 fish/gill net. Since 1987 yellow perch gill net catches have not exceeded 1.0 fish/set (Table 1). Four yellow perch were taken in 18 gill net sets in 2016 and none were collected in 12 shallow gill net sets in 2020. Yellow perch taken in surveys of this lake have typically been small. Production of YOY yellow perch has been variable since 1970, with 1/4-in trap net catches ranging from zero to over 200 YOY/net, compared to a local median of 24 YOY/net in Class 3 lakes (Table 3). There has been no clear trend in YOY production since 1972.

Lake whitefish were first collected in 1955. Since then, the gill net catch for that species has ranged from 0.1 to 1.2

fish/net, with the higher catches in the latest assessments (Table 2). The catch in 2016 was 1.11 fish/gill net, with fish taken in gill nets ranging in length from 8.9 to 18.1 inches.

Lake trout were first collected in Poplar Lake in 1997, after the species was reintroduced in 1996. The 1997 catch consisted entirely of fish from a 1997 yearling stocking. Lake trout were also collected in the 1999 and 2003 assessments. In 1999, fish stocked in 1997 and 1999 contributed to the catch (one fish from the 1997 stocking); however, only fish stocked as yearlings in the spring of 2003 were taken in the 2003 catch. Although lake trout stocking continued through 2005, no lake trout were taken in any subsequent surveys. Long-term survival of lake trout was apparently very low. Stocking failed to produce a population that would attract attention from anglers.

A creel survey was conducted from May through September 1983. Fishing pressure was estimated at 5,209 angler-h (6.9 angler-h/acre). Walleye harvest rate, harvest, and yield were estimated at 0.29 fish/angler-h, 1,490 fish, and 0.9 lb/acre, respectively. Smallmouth bass harvest rate, harvest, and yield were estimated at 0.10 fish/angler-h, 495 fish, and 1.1 lb/acre, respectively. An estimated 370 northern pike (0.6 lb/acre) were also harvested. Mean lengths at harvest for walleye, smallmouth bass, and northern pike were 11.0, 13.3, and 15.4 in, respectively. The 1983 creel survey was done at a time when assessment results indicated walleye were relatively abundant (5.33 fish/gill net set in 1982). By 1984 the assessment catch had dropped to 1.00 fish/gill net set, and it never recovered.

In 2013 members of the Poplar Lake Area Association (PLAA) conducted a volunteer-based creel survey during June-September. Survey forms developed by the Grand Marais Fisheries office were provided to resorts and residents, and were available in a drop box at the public access. Responses covered 81 fishing trips on Poplar Lake, with a total of 422.5 angler-hours of effort. Reported harvest rates for walleye, northern pike, smallmouth bass, black crappie, and yellow perch were 0.298, 0.021, 0.083, 0.007, and zero, respectively. One angling group accounted for 40% of reported effort and 72% of reported walleye harvest.

A traditional roving creel survey was done in May through mid September 2016. Estimated fishing pressure on Poplar Lake was 4,161 angler-h (5.5 angler-h/acre). Estimates for walleye harvest rate, harvest, and yield were 0.021 fish/angler-h, 86 fish, and 0.11 lb/acre, respectively, with an estimated walleye catch rate (harvest plus release) of 0.049 fish/angler-h. Estimated catch rates for northern pike and smallmouth bass were 0.155 and 0.221 fish/angler-h, respectively. A few lake whitefish, sunfish (unidentified), and yellow perch were also reported caught by anglers; none reporting catching any black crappie. About 49% of parties interviewed reported targeting walleye, either alone or in combination with another species, and the estimated walleye catch rate for those parties was 0.062 fish/angler-h. Ten percent of parties interviewed reported targeting northern pike and 26% reported targeting smallmouth bass; catch rates for the species targeted by those groups were 0.313 and 0.326 fish/angler-h, respectively.

Past management Lake trout were apparently native to this lake, but disappeared after walleye were introduced. Lake trout fry or fingerlings were stocked between 1926 and 1940, in 1964, and in 1967, with no success. The 1991 survey and the 1993 assessment found temperature-oxygen conditions suitable for lake trout. As a result the 1994 lake management plan (LMP) recommended reintroducing lake trout, by stocking 7,300 fin-clipped yearlings every odd year starting in 1995. No lake trout could be obtained for the 1995 stocking, but fish were stocked at the planned rate in 1996, 1997, 1999, 2003, and 2005. Lake trout stocking was discontinued after 2005.

Rainbow trout fingerlings were stocked in the early 1940's and again in the 1960's, apparently with little success. To provide a summer fishery, in light of very low walleye abundance, the 1994 LMP recommended stocking rainbow trout yearlings. Yearlings were stocked in 1994, 1995, 1996, 1997, and 1998 (about 5,000/stocking). Although there were some reports of anglers catching rainbow trout, none were ever taken in assessment nets, and there did not appear to be much interest in the fishery. Rainbow trout stocking was discontinued after 1998.

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Walleye fry were stocked regularly from 1926 (initial introduction) through 1954. Fry were stocked again in 1963, and regularly from 1970 through 1987. Fry stocking quotas from 1970 to 1978 ranged from 200,000 to 500,000. Quotas from 1979 to 1987 ranged from 800,000 to 2,000,000, with fry stocking alternating with fingerling stocking over most of that period. No walleye fry were stocked from 1988 through 2000. Fry stocking resumed in 2001 and fry were again stocked in 2006 and 2007. No fry were stocked after 2007.

Walleye fingerlings were stocked in 1955, 1967, 1968, and regularly from 1977 through 1992. The number of fingerlings stocked ranged from 656 in 1978 to 27,797 in 1967. From 1988 through 1994, the stocking quota was set at 0.5 lb/littoral acre (150 lb), two of every three years, with "blanks" scheduled for 1990 and 1993. No walleye fingerlings were stocked from 1993 through 2002. Fingerling stocking resumed in 2003, with fingerlings stocked again in 2008, and in every odd-numbered year beginning in 2011.

Through the 1980's and 1990's, walleye catches declined to a very low level, despite regular, and sometimes heavy, stocking. The 1994 LMP recommended that walleye stocking be discontinued immediately, on the assumption that heavy stocking may have overwhelmed the lake's forage base, resulting in poor survival of stocked and naturally-produced walleye. It was hoped that in the absence of stocking, the walleye population would rebound naturally. By 1999, there was no evidence to suggest any recovery had occurred. Walleye and yellow perch gill net catches remained low (Table 1).

The 2000 LMP recommended that walleye stocking be resumed, using fry at a relatively low rate (for this lake historically), and following up with fingerlings only if fry stocking failed to produce a good year class. No stocking was to be done in the two years following any fingerling stocking, or any successful fry stocking, to avoid suppression effects. Following those recommendations, 300,000 walleye fry were stocked in 2001. Assessments required to assess that stocking were not done, and on the assumption that it had failed (and because no fry had been stocked in 2002), walleye fingerlings were stocked in 2003. Fry stockings in 2006 and 2007 failed, and were followed by a fingerling stocking in 2008. No fry were stocked in 2009 or 2010.

Walleye stocking plans were again reviewed as part of the 2011 LMP revision. The walleye stocking regime established in the 2000 LMP (and continued in the 2004 revision) was complex. It required assessment effort in stocked years that had become hard to find funding for. Under that scheme, assuming no contribution from natural reproduction, good year classes could have been produced no more frequently than once every three years, and then only if fry stocking succeeded. If fry stockings were not successful (a more likely outcome), fingerling stocking capable of producing modest year classes would have occurred only once every five years (assuming fingerling stocking was always successful).

To simplify the walleye stocking strategy, and to provide more reliable year class production, The 2011 LMP recommended stocking 580 lb (2.0 lb/littoral acre) of medium-sized Pike River-strain walleye fingerlings (fgl) in every odd-numbered year, beginning in 2011 (11,600 fgl @ 20 fgl/lb, per stocking). Stocking at that rate and frequency was done as planned in 2011-2021, although a production shortfall resulted in only 400 lb being stocked in 2021.

Adult yellow perch were stocked in 1980 (7,598), 1981 (3,213), and 1985 (36,459) to enhance the forage base. There were no discernible short or long range increases in yellow perch abundance as a result of those stockings.

Northern cisco were introduced in the early 1930's. The introduction failed to establish a self-sustained population, although northern cisco were apparently present in the lake into the 1950's.

A rainbow smelt introduction in Poplar Lake was considered in the early 1980's; however, an examination of migration barriers in the watershed led to the conclusion that such an introduction would affect too many lakes.

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Chemical rehabilitation of Poplar Lake was also considered in the early 1980's; however, the project would have required the reclamation of over a dozen lakes, most in the BWCAW, and was considered prohibitively expensive (over $250,000 at the time). During this time various schemes to fertilize or lime Poplar Lake to improve fish production were also considered and discarded as too expensive, or too unlikely to succeed.

Class "C" permits for whitefish removal were issued in 1955, 1978, and 1979, and at various times since. The lake has also been open to sport whitefish netting since 1981. Several local anglers participate in the sport netting fishery; total harvest is unknown.

A rock and rubble walleye spawning reef was constructed at the mouth of the Skipper Creek inlet in 1982. When last observed, this reef was silted in. Several brush piles were placed in shallow areas by volunteer crews in 1983 in an effort to boost production of YOY yellow perch by providing spawning substrate and refuge areas.

Management goals for Poplar Lake have varied considerably in detail, but the basic goal since the 1980's has been to somehow improve the walleye fishery in the lake. The long range goal in the initial LMP (1987) was 'to improve the fishery...', although no specific targets were set. In the 1992 LMP revision, a long range goal was set at 3.0 walleye/gill net, with some fish over 20 in. This goal was seen as over-optimistic for a natural population in this lake, and was revised downward to 0.5 fish/gill net when walleye stocking was discontinued in the 1994 LMP revision. Emphasis was changed in 1994 to management for a restored lake trout population and a stocked rainbow trout fishery. In the 2000 LMP revision, restoration of the lake trout population remained important, but the long range goal for the walleye population was increased to 3.0 fish/gill net (the median catch for Class 3 lakes). There was some evidence in the assessment record to suggest that the higher goal could be attained with a program of infrequent stocking of relatively small numbers of walleye fry. Good short-term survival of stocked walleye fry had been demonstrated by catches observed in 1/4-in-mesh trap nets. It seemed that for such an important area lake, where most anglers continued to target walleye, it would be inappropriate to settle for the kind of population represented by a gill net catch of 0.5 fish/net.

In the 2011 LMP revision, the walleye goal established in the 2000 revision, and continued in the 2004 revision, was retained, but the stocking regime designed to meet that goal was revised. Northern pike continued as the secondary management species, as much for their importance to the fish community as for their importance to anglers. The goal for northern pike was to maintain a natural population within the normal range of abundance for the lake class; the catch goal was set at about the first quartile for Class 3 lakes. No effort was planned to preserve or enhance the smallmouth bass population or fishery in this lake, other than enforcement of existing statewide regulations.

In this LMP revision the walleye catch goal (now an objective) has been revised downward to a more realistic 1.25 fish/gill net set, about the first quartile value for Class 3 lakes. Meeting that objective consistently would mean walleye numbers in Poplar Lake would be in the normal, or average, range for Class 3 lakes, and would constitute an improvement in walleye catches compared to those typically seen since 1990. The northern pike catch objective has again been set at about the first quartile for the lake class. The lake whitefish objective has been set at a level that seems reasonable and attainable in this lake, historically. We do not have a means of accurately measuring smallmouth bass abundance in Poplar Lake, but meeting the size objective would mean the fishery provided some high-quality angling experiences.

Social considerations Poplar Lake is located near the edge of the BWCAW, but lies completely outside it. The lake is about 30 miles from Grand Marais, and is one of the most heavily developed lakes in the area. The 1991 survey counted five resorts and 91 private homes or cabins. In 1993 the USFS constructed a large public access in the extreme west end of the lake. Parking is available for 20 (or more) vehicles. Poplar Lake is a popular entry point for the BWCAW, and much of the boat traffic on any given day in the summer consists of groups of canoes crossing the lake to various BWCAW portage trails.

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Resort owners and anglers have been concerned about the poor walleye fishery on Poplar Lake for years. The lake supports the largest group of resorts in the area, and as such deserves a high management priority, particularly with the construction of the new public access. Most of the anglers on Poplar Lake target walleye, and have continued to do so despite the poor fishing the lake has provided. There has been little call for trophy management on this lake. It appears that most of the resort owners and anglers would settle for increased numbers of walleye of any size.

There have been occasional requests, from anglers and one resort owner, that the DNR stock splake in Poplar lake. These requests have been driven in part by the success of a single splake stocking in nearby Birch Lake in the early 1980's.

Public input Four major resorts on Poplar Lake were contacted by phone on 27 May 1994, and were asked to provide input on future management of the lake. Two resorts reported that walleye fishing in 1993 was very poor, one reported that the fishing was down from the previous year, but was not bad, and the last reported good guided fishing, although not as good as the previous year. All four resorts favored an attempt to re-introduce lake trout, and favored stocking of rainbow trout to provide a summer fishery. Two felt that walleye stocking had failed and should be discontinued, and all four were willing to see walleye stocking discontinued if lake trout and rainbow trout were stocked.

In 1999, DNR Fisheries again asked for public comment, to be used in a revision of the LMP. At a meeting of the Mid-trail Property Owner's Association on 24 July 1999 there appeared to be general approval of attempts to reintroduce lake trout. When participants were told that no rainbow trout had been stocked in the lake in 1999, and no further stocking was planned, there was no comment. There was a request that experimental regulations be considered to improve the walleye fishery. At an open house conducted in Grand Marais on 28 August 1999 covering proposed LMP revisions on several lakes (including Poplar), no comments were received concerning Poplar Lake's management.

A draft of the 2004 plan revision was made available for public review in February and March of 2004. No comments were received.

In November 2010 comments on the management of this and many other lakes in the Grand Marais area were solicited in a news release. In addition, management suggestions were received during a meeting of the Poplar Lake Association in September 2010. Stocking suggestions included stocking crappie to provide better fishing for kids, stocking northern pike or muskellunge, a resumption of rainbow trout stocking (in higher numbers), support for increased walleye fingerling stocking, and stocking yellow perch or other forage fish to improve walleye growth. One respondent suggesting closing the lake to fishing while it was being stocked, but otherwise support for regulations appeared to have been minimal. A local guide felt a walleye regulation on Poplar Lake would be "crazy" because the lake wasn't fished much, and wasn't very productive (yielding a couple fish per angler, usually). The Poplar Lake Association agreed to poll their members and neighbors to see whether there would be any support for regulations, and to collect suggestions (results of that polling are not available). The association expressed interest in helping place brush piles or cribs to aid yellow perch production, or in helping build a better walleye spawning area. None of those responding appeared to have been interested in smallmouth bass management; the guide felt they were an invasive species, and should be treated as such.

During the 2016 creel survey, parties interviewed were asked about regulation options on Poplar Lake. Support for walleye or smallmouth bass regulation changes appeared to have been fairly evenly split, with narrow majorities responding "no" for each species when asked if they would support changes. Among those that did support changes on Poplar Lake, and provided suggestions for change for walleye or smallmouth bass regulations, most suggested stricter size restrictions (unspecified slot limits), while two suggested reduced bag limits (for walleye).

Public input on the management of Poplar Lake was again solicited in a new release issued in the fall of 2021. Two respondents expressed interest in management of the lake, but provided no comments or suggestions. Another

expressed general support for smallmouth bass regulations on lakes in the area, but made no comments specific to Poplar Lake.

Climate change Climate change will bring increased air temperatures, with larger increases in the winter months (MDH 2014). As a result the duration of winter ice will be shorter. Winterkills may be less frequent. In Minnesota as a whole episodes of extreme heat are likely to be more frequent and severe (Wadsworth 2009; MDH 2014). Waters will be exposed to higher temperatures, for longer periods, which will warm them and increase losses to evaporation. Lakes will stratify earlier, and stay stratified longer. Hypolimnetic waters will be subjected to longer periods of oxygen depletion during stratified periods, reducing habitat availability for coldwater species. Surface waters will warm more quickly, reach higher temperatures, and stay warmer longer into the fall, improving conditions for warm-water fish species. Poplar Lake will not benefit from a reduction in winterkill frequency, since it has not been at any risk of winterkill in the past. Although it may lose some hypolimnetic habitat, it should be capable of supporting its coldwater fish community for some time yet. Warmwater species like walleye, black crappie, and smallmouth bass would likely benefit from warming of the lake's surface waters.

In Northeastern Minnesota annual precipitation has been increasing. That will likely continue; however, most of the increase will come in the winter and spring (Wadsworth 2009). Short term summer droughts may become more frequent, while moderate-to-severe long term droughts may be less frequent (MDH 2014; Wadsworth 2009). Summer droughts may increase the frequency of intense fires, which, when coupled with severe storm events could result in increased sediment and nutrient loads in lakes. The combination of longer open-water seasons, higher losses to evaporation due to higher air temperatures, and reduced summer precipitation, will result in reduced lake water levels, at least in mid-late summer periods. Low summer precipitation could reduce inputs to lakes from wetlands, reducing dissolved organic carbon (DOC) in lakes (bog stain), and increasing water clarity (Gunn et al. 2004). Increased water clarity may drive thermoclines deeper in stratified lakes, reducing (or in extreme cases eliminating) hypolimnetic habitat. Modeling done on Ontario lakes supporting walleye found that sustainable yields for walleye dropped when water clarity (Secchi depth) exceeded 6.6 ft (Lester et al 2004). Secchi depths have long exceeded 6.6 ft in Poplar Lake. Waters of the lake are bog-stained, and so may see clarity increase further if reductions in DOC occur. Prune Lake may be an important source of bog-stained waters flowing into Poplar Lake; waters in Prune are perhaps the area's most deeply stained.

Cisco and lake whitefish populations may be lost in small lakes that currently have limited thermal habitat. Cisco populations will likely be lost in lakes where water temperature at a dissolved oxygen concentration of 3.0 ppm (TDO3) exceeds 17^{o} C (62.6^{o} F) in the late summer (Jiang et al. 2012). Poplar Lake has provided a relatively large amount of thermal habitat for cisco and whitefish; on 25 July 2016, Poplar Lake had a TDO3 of 7.2^{o} C (44.9^{o} F). Lake whitefish may be more likely than cisco to experience reduced growth rates as lakes warm (Hasnain et al. 2010).

In lakes supporting warm- and cool-water fish communities smallmouth bass may benefit more than walleye, northern pike, and yellow perch from warming waters, since lake waters will be approaching preferred temperatures for smallmouth bass as they begin to exceed preferred temperatures for the latter three species (Hasnain et al. 2010). Rapid warming in the spring may reduce the frequency at which walleye, yellow perch, and northern pike eggs are able to develop in optimum temperatures, reducing recruitment. Modeling of Wisconsin walleye lakes indicated warming of those lakes would result in a loss of walleye recruitment in up to 75% of lakes, while increasing largemouth bass recruitment in up to 60% of lakes (Hansen et al 2016). Black crappie and bluegill will likely benefit from warming of lakes in this area.

Present limiting factors In this lake, and several other area lakes, lake trout disappeared shortly after walleye were introduced and became abundant. Temperature-oxygen conditions remain suitable for lake trout in Poplar Lake. On 4 August 2003, conditions suitable for lake trout (temperature < 55 F, dissolved oxygen > 5 ppm) were found at depths of 23 to at least 50 ft (the deepest tested). On 25 July 2016 those conditions prevailed at depths of about 28 to 43 ft. In the reintroduction attempt made in the 1990s short-term survival of stocked lake trout yearlings was fairly good. Reasons for

their poor long-term survival were unclear. Angler harvest can probably be ruled out, since there have been no reports of lake trout being taken by anglers in this lake. There is virtually no winter fishery, and few summer anglers use methods likely to take lake trout. Resident lake trout have done well in other area lakes in the face of competition from lake whitefish and predation from moderate numbers of warmwater game fish. Unfortunately, attempts to reintroduce lake trout in lakes with similar fish communities, after lake trout have been extirpated, have usually failed.

Walleye reproduction appears to have been very poor. The period of no stocking from 1956 through 1962 was followed by a very low walleye gill net catch in 1963. Assessments have consistently shown that the strongest year classes were stocked, and YOY assessments have shown very low catches of YOY walleye in years when no fry were stocked. Walleye spawning habitat was described as fair in the 1991 survey, consisting of rubble and gravel shoreline areas, the outlet area, and Skipper Creek. Spawning habitat was described at fair to good by the 2006 survey crew. It is possible that numbers of adult walleye in the lake have fallen to the point where good natural reproduction could not occur regardless of the quality or quantity of spawning habitat available.

Increased stocking of fry and fingerlings from 1977 to 1988 failed to establish a walleye population meeting the long range goal set in the 1992 lake management plan (3.0 fish/gill net). Stocking of smaller numbers of walleye fingerlings in 1988-1992 also failed to meet that goal. A lack of forage (see below), and resulting slow growth of juveniles, may have been one factor limiting survival of stocked walleye. In addition, walleye fingerlings stocked in the 1980's and 1990's were generally small. The target size for fingerlings (30/lb) was attained or exceeded in only about half the stockings; in the other stockings, fingerlings ranged from 50 to 112 fish/lb. Small fingerlings are more vulnerable to predation when stocked, and the poor forage means they remain vulnerable for a longer period. Over-winter survival can also be poor for smaller fingerlings. The 1993 assessment failed to collect any fish from the 1992 stocking (rate 71.1 fgl/lb) or the 1986 stocking (rate 93.9 fgl/lb). Since 2011 walleye fingerlings stocked in Poplar Lake have been produced by private growers, who must meet contracted size targets for those fish. Stocking has met quotas in every year but 2021, and fish stocked have been within our target size range.

Relatively high angler harvest may also have contributed to the apparent collapse of the Poplar Lake walleye population in the early 1980's. Poplar Lake is a relatively unproductive lake that, because of its accessibility, level of development, and resort population, can at times be relatively heavily fished. High variability in walleye catches prior to 1984, and a decline in mean weight between 1955 and 1982, may have indicated that excessive harvest was occurring. Based on MEI, potential yield for Poplar Lake can be estimated at 2.87 lb/acre, and the partitioned potential annual yield for walleye can be estimated at 0.92 lb/acre. The walleye yield estimate from the 1983 summer creel survey was 0.9 lb/acre, close to the partitioned potential yield, and perhaps a conservative estimate at that (since night harvest is often missed in creel surveys).

The forage base is limited. Yellow perch abundance has never been high, and the yellow perch YOY that are produced must be shared by northern pike, walleye, smallmouth bass, and black crappie. No other major forage species are present. Fisheries managers in the 1940's and 1950's warned against over-stocking this lake and over-stressing the limited forage base.

The presence of northern pike, walleye, and smallmouth bass would preclude any attempt to stock splake (or any other trout) fingerlings in this lake. Losses to predation would likely be unacceptably high. When rainbow trout were stocked in the 1990's, large yearlings were used to limit predation.

Assessments in 1995, 1997, and 1999 failed to collect any of the rainbow trout stocked in 1994-1998; however, that did not necessarily mean that survival of those fish was poor. The stocking quota of 5,000 fish was relatively low for a lake of this size, and may not have produced a population dense enough to be reliably sampled by the netting effort used in those assessments. One local guide reported he had some success fishing for rainbow trout in Poplar Lake during the period

they were stocked. Assessments were done some time after each stocking, and any harvest that occurred would have further reduced the chances of observing stocked fish. Our ability to stock higher numbers of trout yearlings in Poplar Lake is limited by production capacity in the State's hatcheries (already strained), the high cost to transport those fish here, and our lack of large fish transports; those we have are almost completely committed already during the busy spring stocking season.

Commercial fishery There has been some commercial harvest of lake whitefish from Poplar Lake. Records in Grand Marais indicate whitefish were harvested under Class C permits in 1955 (1,930 lb), 1978 (660 lb), 1979 (1,670 lb), 1980 (58 lb), and 1981 (2,500 lb). The harvest in 1980 also included white sucker (1,416 lb) and burbot (72 lb), with another 435 lb of white sucker were taken in 1981.

Land acquisition No acquisition is needed.

Habitat development and protection There is little in the assessment history of this lake to suggest that past habitat projects in the lake (brush piles and the Skipper Creek spawning area) were successful. It seems unlikely that spawning habitat is limiting walleye or yellow perch populations. No new habitat improvement projects will be proposed in this plan; however, improvement projects proposed, funded, and completed by other parties could be supported if they are deemed unlikely to adversely affect the lake, are not diverting funding from more worthwhile projects, and are done to a scale that offers some chance for success.

Other management tools Other than stocking and regulations (see below), no other management tools are proposed at this time.

Stocking plans Stocking so far has failed to increase walleye abundance, but it does seem likely that without stocking the walleye population (and fishery) might crash completely. Walleye are important to anglers fishing this lake, and to the lake's resorts, who use the presence of the walleye fishery to attract business. Maintaining that opportunity may be all we can expect from the current stocking program, in the absence of any other management efforts. The WAESTOCK stocking analysis tool indicated that although no recent year classes have been very strong, on the whole stocked year classes have been slightly stronger than unstocked year classes (Figures 1 and 2). Recent fry stocking appears to have produced slightly stronger year classes than fingerling stocking (or recent natural reproduction), but the number of fry-stocked year classes has been low (4) and the difference minimal, so those results may be misleading. Low levels of walleye fry stocking did appear to support higher walleye numbers in Poplar Lake in the 1970s.

We are considering two walleye stocking options in Poplar Lake. The first would be to continue stocking 580 lb (2.0 lb/littoral acre) of medium-sized Pike River-strain walleye fingerlings (fgl) in every odd-numbered year (11,600 fgl @ 20 fgl/lb, per stocking). Experience since 2011 suggests this strategy will support walleye numbers at roughly current levels (gill net catches typically under 1.0 fish/net. The other option would be to return to walleye fry stocking, stocking 300,000 Pike River-strain fry in two years of every three, beginning in 2023. This option provides a better chance that an occasional strong year class will be produced, and is a far less expensive option for maintaining the fishery. Although in the past fry stocking seemed to have been effective, recent experience suggests this option might also do little more than maintain the status quo. Under either option forage for walleye will be limited; we should expect that growth will be slow, since stocked fish will be subsisting mainly on an invertebrate diet. Under either option some protection from harvest (regulations) would be needed to rebuild a robust adult broodstock in this lake.

Lake trout stocking should not be resumed. Regular yearling stocking failed to produce a significant lake trout population, or a lake trout fishery of any kind. Rainbow trout stocking should also not be resumed. Stocking rainbow trout yearlings in low numbers failed to produce a fishery. Stocking yearlings at the rates used in other stream trout lakes in the area would require over 20,000 yearlings annually. Costs of that level of stocking would not be sustainable, particularly when

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stocking of other trout lakes across the area is being reduced due to a lack of adequate funding.

Poplar Lake supports an adequate northern pike population that does not require supplementary stocking. Muskellunge should not be introduced, since this is a relatively unproductive lake that could probably not support another major warmwater predator. Crappie are already present in Poplar Lake, and the population has probably been producing as many fish as conditions in the lake allow. Crappie compete with walleye and yellow perch for invertebrate forage, and may prey directly on both species. Stocking them in the large numbers required to support a significant fishery could have an adverse effect on the already-struggling walleye population. Finally, stocking yellow perch in high numbers on a regular basis, as a sort of feeding program for walleye and northern pike, would be prohibitively expensive even if we had a reliable local source for those fish. Past stocking (even the 36,000 fish stocked in 1985) failed to increase yellow perch abundance, suggesting that even higher numbers would be required. Many lakes in this area have sustained good walleye populations with low numbers of yellow perch, where walleye have done well on invertebrate forage.

Regulations; It is very difficult to craft effective regulations for a lake without information on current fishing pressure and harvest. Our only traditional creel survey data for Poplar Lake come from widely separated surveys done in 1983 and 2016, and those surveys showed very different fisheries. In many cases, fishing pressure is driven by angler success - anglers will fish where there have been reports of good fishing. However, because Poplar Lake supports several resorts and many private homes and cabins, it probably supports at least moderate fishing pressure regardless of the success experienced by anglers. That seemed to have been the case in 2016. Although walleye harvest has likely been low in Poplar Lake (given poor angling reports and low assessment catches since 1984, and results of the 2016 creel survey), it is nevertheless possible that persistent fishing pressure has been enough to suppress the population's recovery. Results of the voluntary survey done in 2013 suggested that at times some anglers have experienced enough success on Poplar Lake to drive a significant walleye harvest. Experience in Red Lake in Minnesota suggests that a strict harvest restriction (coupled with stocking, in that case) could help bring about a recovery, even in a fishery where the underlying population has crashed and harvest seems low. Stocking alone has not been enough to restore a walleye fishery on Poplar Lake; harvest restrictions may also be needed.

With only minimal creel survey data available to craft a custom regulation, one of the three standard "toolbox" walleye regulations would normally be proposed for Poplar Lake. The three toolbox regulation possibilities are: reduce the bag limit to three fish, implement a 17-in minimum size limit, or implement a 17-26-in protected slot limit (PSL). The bag limit reduction, by itself, would be the least likely to succeed. In 2016 we found no parties where any angler had harvested more than two walleye, so a three-fish limit would not have reduced harvest at all. The 17-in minimum size limit is intended for systems where stocked walleye experience relatively fast growth. Growth has been much slower in Poplar Lake; it would likely take six years for walleye to grow beyond the 17-inch size, based on growth rates seen in 2016. In the 2016 creel survey, no walleye larger than 17 inches were observed in the harvest. Larger fish may have been harvested and not seen by or reported to the clerk, and a few larger fish were released that might have been harvested under different regulations, but in 2016, at least, a 17-inch minimum size limit would have almost eliminated walleye harvest in Poplar Lake. Finally, the 17-26-inch protected slot limit is intended to help improve the quality of a fishery, usually in a situation where it is supported by natural reproduction. In Poplar Lake, little interest has been expressed in creating a high-quality fishery; however, the protected slot might shelter mature walleye broodstock in this lake, helping improve natural reproduction. The willingness of anglers to harvest smaller walleye, and the many years it would take for walleye to grow into the protected slot, suggests that few would survive to reach protected-slot sizes; however, implementation of a three-fish bag limit might improve those odds slightly, particularly when a somewhat stronger year class is recruiting to the fishery.

Pending further public input, in this LMP revision we propose implementation of a 17-26-in protected-slot size limit (PSL) for walleye, coupled with a bag limit of three fish (one over 26 in), in March 2024. That proposal may be modified or dropped based on public input, which would be sought as this plan is completed, and through posting and an input

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meeting in the summer and fall of 2023.

Survey needs and evaluation plans To continue evaluating walleye management efforts, complete standard surveys, duplicating all 2009 gill net sets (10 GSH, 6 GDE,) and including 12 3/4-in and 12 1/4-in-mesh trap net sets, in late July 2024, 2028, and 2032. Surveys should use 2009 gill net sets to maintain the slight shift in sampling effort back towards shallow waters begun in 2009. Survey data will be used to determine whether current stocking strategy results in an increase in walleye abundance, and to monitor any changes in walleye growth or forage availability. A creel survey should be done in May-September 2032 to update angler use data for this important fishery and to determine whether stocking, plus restrictions on harvest, have resulted in improvements in the walleye fishery.

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Table 1. Number of fish per set, and mean weight (pounds/fish) for Northern Pike, Yellow Perch, Walleye, and Smallmouth Bass taken in graduated-mesh gill net sets (deep and shallow combined) in surveys of Poplar Lake, Cook County, Minnesota, 1948-2016. Number of deep gill net sets in parentheses.

Survey	No.	Northern Pike		Yellow Perch		Walleye		Smallmouth Bass	
Date	Sets	Number	Weight	Number	Weight	Number	Weight	Number	Weight
8/5/48	23	0.26	1.00	1.91	0.12	4.00	0.34		
8/31/55	15	0.47	0.79	0.93	0.21	7.00	0.75	0.07	
8/24/59	15	0.33	0.75	0.80	0.39	7.47	1.06	1.33	1.46
7/22/63	10	0.20		1.30		0.80		0.20	
8/20/69	7			1.14	0.13	3.29	0.65		
7/29/71	9	1.67	1.25	0.44	0.33	3.89	1.09		
7/28/77	9	1.22	1.47	6.11	0.10	7.67	0.81	0.22	
9/8/78	9	0.89	1.38	0.22		0.22		0.11	
8/9/79	8	2.38	1.33	0.13		3.00	0.72	0.25	
7/19/80	9	0.56	1.64	0.78	0.13	1.67	0.51		
9/3/81	6	0.67	1.10	4.17	0.24	5.00	0.61		
7/16/82	6	1.83	1.55	1.83	0.12	5.33	0.66		
8/8/84	12	1.00	1.06	1.42	0.17	1.00	0.65	0.75	0.83
8/1/86	12	1.00	2.13	1.75	0.15	1.17	0.69	0.08	
8/7/87	12	1.33	0.81	0.42	0.15	1.25	0.66	0.25	1.12
8/12/88	12	0.33	1.13	0.08		0.83	0.85	0.17	
8/16/91	12	0.67	1.19	0.92	0.20	0.50	0.50		
7/12/93	12 (4)	0.33	1.27	0.42	0.23	0.67	0.93	0.17	
7/31/95	16 (4)	1.25	2.15	0.42	0.26	0.58	1.28	0.33	1.16
7/28/97	16 (8)	0.75	2.70	0.13		0.06			
7/26/99	16 (9)	1.00	1.69	0.38	0.08	0.50	0.49	0.06	
8/4/03	16 (8)	0.63	1.03	0.06		1.00	0.70	0.06	
7/24/06	16 (8)	0.56	1.26	0.44	0.11	0.56	1.31	0.13	
8/3/09	16 (6)	1.06	1.34	0.69	0.11	0.69	1.12	0.06	
7/9/12	16 (5)	1.00	1.23	0.13		0.31	1.00		
7/25/16	18 (8)	0.67	1.47	0.22	0.13	0.56	1.46	0.06	
Class 3									
Medians		1.33	3.23	1.19	0.15	3.00	1.44	0.67	0.87
1st Q		0.56	2.10	0.39	0.10	1.17	0.96	0.31	0.56
3rd Q		2.38	4.95	3.69	0.23	5.18	1.96	1.36	1.50

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Table 2. Number of fish per set, and mean weight (pounds/fish) for Lake Whitefish, Burbot, Black Crappie, and White Sucker taken in graduated-mesh gill net sets (deep and shallow combined) in surveys of Poplar Lake, Cook County, Minnesota, 1948-2016. Number of deep gill net sets in parentheses.

Survey	No.	Lake Whitefish		Burbot		Black Crappie		White Sucker	
Date	Sets	Number	Weight	Number	Weight	Number	Weight	Number	Weight
8/5/48	23							1.70	1.94
8/31/55	15	0.27	0.90	0.13				1.93	2.31
8/24/59	15	0.07		0.20				1.53	2.71
7/22/63	10			0.20				1.80	
8/20/69	7	0.14		0.14				0.57	2.75
7/29/71	9	0.56	2.56	0.33	2.57			5.22	2.89
7/28/77	9	0.89	1.98	0.11		0.11		4.44	2.09
9/8/78	9	0.89	1.94	0.89	1.04			0.56	2.56
8/9/79	8	0.38	1.83	0.38	0.40			2.50	2.78
7/19/80	9	0.33	0.73	0.11				1.00	2.23
9/3/81	6			0.17		0.17		3.17	2.18
7/16/82	6	1.17	1.36					3.33	2.65
8/8/84	12	1.08	0.71	0.17				2.58	2.47
8/1/86	12	0.50	1.92	0.25	0.57	0.08		2.08	2.31
8/7/87	12	0.92	1.43	0.25	1.33			1.17	2.45
8/12/88	12	1.17	1.25	0.42	0.88			1.25	1.59
8/16/91	12	0.83	1.93	0.67	1.06			1.00	1.83
7/12/93	12 (4)	1.58	1.08	0.08				1.42	2.35
7/31/95	16 (4)	0.67	1.32	0.17				1.08	2.19
7/28/97	16 (8)	0.63	1.60	1.00	0.66			0.81	2.35
7/26/99	16 (9)	1.44	1.10	0.38	0.97	0.06		1.56	2.19
8/4/03	16 (8)	1.00	1.45	0.50	1.11			1.63	2.31
7/24/06	16 (8)	0.31	1.12	0.63	1.21			1.06	2.81
8/3/09	16 (6)	1.38	1.33			0.13		2.38	2.06
7/9/12	16 (5)	2.06	0.84	0.69	1.23	0.13		2.06	2.00
7/25/16	18 (8)	1.11	1.13	0.33	0.67			0.89	2.12
Class 3									
Medians		7.42	1.54	0.42	1.00	0.33	0.20	2.38	1.85
1st Q		1.58	1.02	0.20	0.64	0.13	0.14	0.83	1.07
3rd Q		15.54	2.11	1.00	1.50	1.06	0.63	5.31	2.54

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Table 3. Catch (fish/set) of young-of-year (YOY) Walleye, Yellow Perch, Smallmouth Bass, Black Crappie, and Northern Pike in 0.25-in-mesh trap nets, with the number of sets used and the number of Walleye fry stocked in each assessment year in Poplar lake, Cook County, Minnesota, 1972-2016.

Survey Date	No. Sets	No. of Walleye Fry Stocked	Catch (number of YOY/set)				
			Walleye	Yellow Perch	Smallmouth Bass	Black Crappie	Northern Pike
8/8/72	6		0.17	15.67	0.83		
8/2/73	6	500,000	25.00	49.83	4.00		
7/30/74	6		0.17	16.50	0.50	0.50	
7/31/75	6	200,000	2.17	75.50	0.50	8.33	0.33
7/29/76	6	300,000	0.67	30.33	1.33	13.67	0.17
7/28/77	6	200,000		9.33	0.33	0.33	
7/26/78	12	500,000	2.08	26.08	0.50	0.50	0.08
8/8/79	12	800,000	0.83	32.75	0.58	1.25	
7/15/80	18			22.17	0.67	0.56	0.11
7/9/81	12	2,000,000	4.50	25.42	0.08		
7/15/82	13		0.15	21.23			
7/27/83	12	1,500,000	12.92	6.58	7.00		0.08
8/7/84	18			47.33	1.00		0.06
7/31/85	16	1,000,000	1.75	22.63	0.81		0.06
8/1/86	18		0.17	270.56	13.61	0.89	
8/4/87	23	800,000	1.22	42.57	1.83		
7/12/93	8						
7/31/95	12			46.42	5.92	0.17	
7/28/97	12			83.42	1.08	0.08	0.17
7/26/99	12			44.67	2.00	2.92	0.17
7/24/06	16	300,000		6.25		0.63	0.19
7/16/07	16	300,000		0.13	3.94		
8/4/08	16			47.94	8.31	1.81	
6/11/12	12				N/A	N/A	
7/25/16	12		0.08	24.25	4.00	5.67	0.08
Class 3 Medians*			0.91	22.40	0.78	0.63	0.14
1st Q			0.17	4.19	0.50	0.42	0.08
3rd Q			2.25	47.64	2.00	2.36	0.18

* Grand Marais area data, 1969-2014

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Table 4. Number of fish per set, and mean weight (pounds/fish) for Black Crappie, Yellow Perch, Walleye, and Smallmouth Bass taken in 0.75-inch-mesh trap nets in surveys of Poplar Lake, Cook County, Minnesota, 1971-2020.

Survey	No.	Black Crappie		Yellow Perch		Walleye		Smallmouth Bass	
Date	Sets	Number	Weight	Number	Weight	Number	Weight	Number	Weight
7/29/71	12					0.33	1.35		
8/8/72	6					1.17	0.90		
9/3/81	7	0.14		0.14		0.29		0.14	
8/8/84	12					0.33		0.17	
8/12/88	20			0.15	0.13	0.80	0.64	0.20	0.17
8/16/91	20	0.55	0.63	0.30	0.13	0.50	0.79	0.20	0.25
7/12/93	12	0.17		0.17		0.08		0.17	
7/31/95	12	0.08		0.08		0.92	0.82		
7/24/06	16	0.81	0.27	0.19	0.33	0.50	0.72	0.13	
7/9/12	12	0.75	0.14	0.08		0.50	0.67	0.17	
7/25/16	12	0.08		0.08		0.17		0.25	1.91
7/6/20	12	0.25	0.43	0.17		0.58	0.71	0.25	0.69
Class 3									
Medians		0.20	0.69	0.74	0.20	0.31	0.82	0.61	0.29
1st Q		0.13	0.35	0.37	0.13	0.20	0.50	0.14	0.16
3rd Q		0.44	1.13	1.25	0.40	0.79	1.46	1.26	0.41

Region	Area F218	D.O.W. Number	County	D.O.W. Lake Name	Acreage
NE	**Grand Marais**	**16-0239**	**Cook**	**Poplar**	**764.0**

Table 5. Number of fish per set, and mean weight (pounds/fish) for Northern Pike and Walleye taken in shallow gill net sets (GSH), and Lake Whitefish and Burbot taken in deep gill net sets (GDE), in surveys of Poplar Lake, Cook County, Minnesota, 1993-2020.

Survey Date	No. GSH Sets	No. GDE Sets	Shallow Gill Net Sets: Northern Pike Number	Northern Pike Weight	Walleye Number	Walleye Weight	Deep Gill Net Sets: Lake Whitefish Number	Lake Whitefish Weight	Burbot Number	Burbot Weight
7/12/93	8	4	0.50	1.30	0.88	0.90	2.00	1.02	0.25	
7/31/95	8	4	1.88	2.15	0.88	1.28	0.25		0.25	
7/28/97	8	8	1.50	2.70	0.13		0.13		2.00	0.66
7/26/99	7	9	1.86	1.61	1.14	0.49	1.56	1.28	0.67	0.97
8/4/03	8	8	1.25	1.03	1.75	0.75	1.13	1.45	0.50	0.89
7/24/06	8	8	1.13	1.26	0.75	1.23	0.38	0.63	1.25	1.21
8/3/09	10	6	1.50	1.33	1.00	1.10	2.67	1.25	0.33	
7/9/12	11	5	1.45	1.23	0.27	1.00	3.40	1.17	1.80	1.30
7/25/16	10	8	1.20	1.47	1.00	1.46	1.75	1.21	0.38	0.91
7/6/20	12	0	0.92	1.48	0.83	2.29	N/A		N/A	
Local Medians[1]			1.16	2.72	1.67	1.33	2.00	1.25	N/A	N/A
1st Q			0.56	1.50	0.84	1.08	1.25	1.02		
3rd Q			1.50	3.63	2.35	1.72	3.40	1.45		
N			26		28		13			

[1] Grand Marais area data for 53 surveys of Class 3 lakes, 1993-2019. N equals the number of surveys where the species was caught.

Region	Area F218	D.O.W. Number	County	D.O.W. Lake Name	Acreage
NE	**Grand Marais**	**16-0239**	**Cook**	**Poplar**	**764.0**

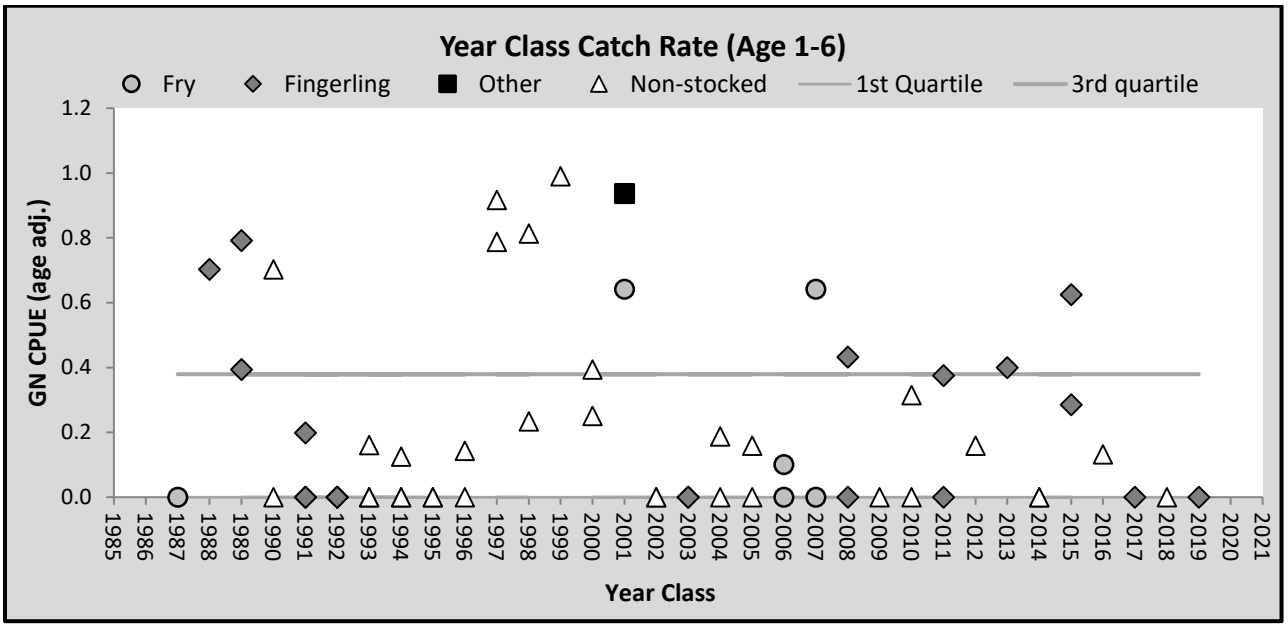

Figure 1. Year-class specific catches for stocked and unstocked year classes using the WAESTOCK age 1-6 dataset. Gill net catches have been age-corrected to reflect regional age-specific differences in gill net catchability. Other means a mix of stocked sizes.

Region	Area F218	D.O.W. Number	County	D.O.W. Lake Name	Acreage
NE	**Grand Marais**	**16-0239**	**Cook**	**Poplar**	**764.0**

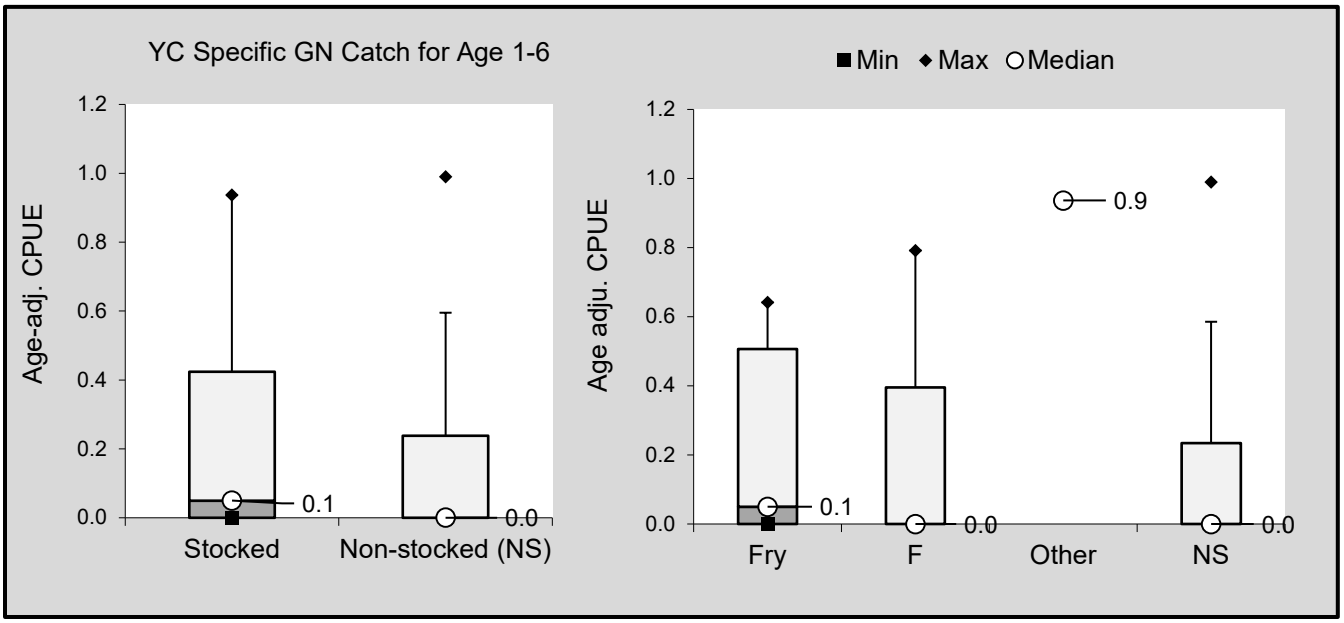

Figure 2. Box plots of year-class specific catches for stocked and unstocked year classes using the WAESTOCK age 1-6 dataset. Gill net catches have been age-corrected to reflect regional age-specific differences in gill net catchability. F means fingerling stocking only, fry means fry stocking only, other means a mix of stocking sizes, and NS means not stocked.