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Completion Report

Winter Creel Survey Report for Leech Lake 2019-2020

by

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Walker Area Fisheries Office

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Winter Creel Survey
Leech Lake
2019-2020

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ABSTRACT

A non-uniform access-based creel survey using clusters of sampling stations was conducted on Leech Lake from December 28th, 2019 through March 17th, 2020. Access landing rates were used to estimate fishing pressure. A total of 629 angling parties were interviewed of these, 451 were day-trip angling parties, 172 sleeperhouse angling parties, and 6 darkhouse spearing parties. The estimated total angling pressure was 220,203 angler-hours. This was a decline from the 2015-2016 estimate (568,340 angler-hours; Stevens 2016), and was the lowest since the 2005-2006 winter season. Angling pressure from day-trip anglers was 54,465 angler-hours, 165,698 angler-hours for sleeperhouse anglers, and 39 angler-hours for darkhouse spearers. An estimated 74,278 fish (0.67 fish/acre) were caught, of which 23,449 were harvested (31.6% of total catch). Most of the total catch and harvest (number of fish) was comprised of Yellow Perch (80% and 76%, respectively). An estimated 3,365 Walleye (4,657 pounds) were harvested during 2019-2020 at a rate of 0.015 Walleye/hour across all anglers. The estimated total number and pounds of Walleye harvested in 2019-2020 was the second lowest observed during the winter season since 2005. An estimated 254 Northern Pike were harvested during the 2019-2020 season down considerably from 2015-2016 (6,483 fish) and was the lowest ever recorded during a winter creel survey on the lake. The 2019-2020 ice conditions were very poor for much of December, January and into February which certainly impacted the amount of pressure and catch rates during the winter creel survey.

INTRODUCTION

In 1983, the Minnesota Department of Natural Resources (MNDNR) increased its commitment to managing Leech Lake and other large lakes by establishing the Large Lake Monitoring Program (LLP). For Leech Lake, this program includes annual collection, analysis, and reporting of fish population data for monitoring long-term population trends, the development of management recommendations, and public input (Wingate and Schupp 1984).

In conjunction with annual fish surveys, angler use and harvest information is collected using creel surveys. Open water and winter surveys are currently scheduled every four years and are used to estimate catch, harvest, and pressure statistics for the recreational fishery with the next survey scheduled for the open water season of 2020. Yield estimates are compared to safe harvest targets prescribed in Special Publication No. 151 (MDNR 1997) and management objectives outlined in the Leech Lake Management Plan. If yield estimates routinely exceed established safe target harvest levels and are not within management plan objectives adjustments to harvest regulations would be considered to create a more balanced population.

While Leech Lake is well known among anglers as an exceptional multi-species fishery, most anglers target and harvest Walleye *Sander vitreus*. During the 1998-99 open water seasons, anglers averaged 1.2 million angler hours and harvested 174,000 pounds of Walleye per year (Sledge, 1999, 2000). However, several consecutive years without a large Walleye year class caused declines in overall abundance and an unbalanced population size structure; this in turn produced low levels of angler effort and harvest during the 2004-2005 open water seasons (Rivers 2005, 2006). These changes to the Walleye fishery, as well as changes in the Yellow Perch population, coincided with high Walleye and Yellow Perch harvest in the late 1990's, expanding populations of double-crested cormorants during the early 2000's, and expanding aquatic invasive species such as Rusty Crayfish *Oroconetes rusticus* and Eurasian Watermilfoil *Myriophyllum spicatum*. Management action implemented in 2005 led to increases in Walleye abundance in the late-2000s and increased angler success thereafter (Schultz 2010a). These increases in Walleye abundance led to management goals being met and resulted in the 18"-26" protected slot limit (PSL) being relaxed to 20"-26", effective fishing opener 2014. A creel survey was scheduled in 2014 and winter 2015-2016 to monitor how the relaxed PSL affected Walleye harvest. The PSL was removed in 2019 and an unscheduled 2019 summer and 2019-20 winter survey were added.

STUDY AREA

Leech Lake (DOW # 11-0203; Lake Class 26, Schupp 1992) is located in northern Cass County, Minnesota and is within the Chippewa National Forest and the Leech Lake Indian Reservation. The lake is the third-largest entirely within State boundaries and has nearly 112,000 surface acres. In its original state, Leech Lake covered about 106,000 acres. A dam constructed on the Leech River in 1884 raised the lake level approximately two feet and increased the surface area to the present state (Wilcox 1979).

Leech Lake is located in three glacial zones and has an irregular shape with many large and small bays (Figure 1). Leech Lake varies considerably from a morphological perspective.

Some large bays, such as Steamboat and Boy, display highly eutrophic water characteristics whereas other large bays, such as Walker and Kabekona, have properties more similar to oligotrophic lakes. The main portion of the lake, like most large Minnesota Walleye lakes, is windswept and mesotrophic. Previous estimates of shoreline miles have varied, but using remote sensing technology, the estimate is 201 miles. Approximately 23 percent of the shoreline consists of a gravel-rubble-boulder mixture, nearly all of which is used by spawning Walleye (Wilcox 1979).

The diversity of the Leech Lake shoreline and substrate, as well as its extensive littoral zone, provides excellent spawning and nursery habitats for a number of species, including Percids and Esocids which dominate the fish community. Walleye, Northern Pike *Esox lucius* and Muskellunge *E. masquinongy* are the principal predators and are located throughout the lake. Although most fish species are found in every portion of the lake, the largest Walleye and Muskellunge concentrations exist in the mesotrophic areas. Northern Pike are most common in vegetated eutrophic bays. Yellow Perch *Perca flavescens* are abundant throughout the lake and are likely the primary forage for most predators. Tullibee (Cisco) *Coregonus artedi* and Lake Whitefish *C. clupeaformis* are an important forage base for larger predators (Engstrom-Heg et al. 1986) and are typically found in the mesotrophic and oligotrophic areas. Juvenile Tullibee (Cisco) also comprise larger proportions of predator diets when large year classes are present. Other species present in the lake include: White Sucker *Catostomus commersoni*, Burbot *Lota lota*, Rock Bass *Ambloplites ruspestris*, Bowfin *Amia calva*, Shorthead Redhorse *Moxostoma macrolepidotum*, Bullheads *Ameiurus spp.*, Pumpkinseed *Lepomis gibbosus*, Bluegill *L. macrochirus*, Largemouth Bass *Micropterus salmoides*, Smallmouth Bass *M. dolomieui*, and Black Crappie *Pomoxis nigromaculatus*.

Previous summer and winter creel surveys completed on Leech Lake include Schupp (1972), Gustafson (1985, 1986), Haukos (1992, 1993), Sledge (1999, 2000), Rivers (2005, 2006), Schultz (2009, 2010a, 2010b), Vondra and Schultz (2011), Ward and Schultz (2012), Stevens and Ward (2015a), and Stevens and Ward (2015b), Stevens (2016) and Pedersen (2020). Historically, winter creel surveys were infrequently completed on Leech Lake during the normal creel cycle because winter angling pressure and harvest was relatively light compared to summer estimates. Winter surveys have been added to periodically assess large-scale changes to the winter fishery.

METHODS

A non-uniform access-based creel survey using clusters of sampling stations was conducted on Leech Lake from December 28th, 2019 through March 17th, 2020. Similar to winter creel surveys on several other large lakes in Minnesota, access landing rates were used to estimate fishing pressure (Schultz and Vondra 2011).

Creel Strata

Sampling and data organization were stratified by day type (weekday or weekend/holiday), lake basin (western bays or main lake), period (Month), and angler type (day-trip angler, sleeperhouse angler, darkhouse spearer). Observed holidays included New Year's Day (January 1st), Martin Luther King Jr. Day (January 20th), and Presidents Day (February 17th).

Statistics were calculated using the Creel Application Software (CAS) program developed by South Dakota Department of Game, Fish, and Parks (Soupir and Brown 2002). Statistics were calculated for each sampling period on a lake-wide basis.

Estimation of Angling Pressure and Catch Statistics

Angling pressure was estimated using the number of completed trips observed. Instantaneous counts were calculated by multiplying the number of completed trips per access site by the average daily trip length and then dividing by the assigned access site probability to produce an instantaneous count of the number of angler parties fishing during the respective time block (P. Radomski, MN DNR, personal communication). Instantaneous counts were then input into CAS to produce fishing pressure estimates.

To obtain angler interviews, the lake was divided into 7 clusters with each cluster containing one to three sampling stations (Figure 1). These stations included resorts, marinas, and public accesses. Sampling days were randomly selected for each clerk. Initial non-uniform access probabilities were developed based on the frequency of interviews obtained at each location during the 2010-11 and 2014-2015 creel survey. After January 31st, probabilities were based on the frequency of interviews obtained at each location during the current (2019-2020) creel survey. Changes to access probabilities were also made as ice access and travel conditions changed throughout the season. For scheduling, sampling clusters were randomly selected for each clerk based upon access probabilities. Sampling times were randomly selected with equal probability. A sampling day was divided into two periods of equal length. The sampling day was 13 hours (08:00-21:00) for the entire creel. Clerk schedules were developed each month and revisited every two weeks in order to address any changes to angler behavior based on accessibility.

On a scheduled sampling day each clerk sampled one cluster, visiting assigned stations in 2 hour blocks. Clerks collected information on catch, harvest, effort, and angler demographics/preferences. During interviews, clerks identified and measured as many harvested fish as time allowed and remaining harvested fish were enumerated. Species, number, and length of released fish were obtained through angler recollection. Bluegill and Pumpkinseed Sunfish were pooled as Sunfish for analysis. Individual weights for Walleye, Yellow Perch, and Northern Pike were estimated using length-weight regression formulas from the September, 2019 gillnetting survey. Fish weight for all other species was estimated using length-weight regression formulas from long-term gillnet data collected from 1983-2007.

In order to estimate pressure, catch rates, harvest rates, total harvest, total catch, fish population statistics, and angler demographic/preferences, Creel Analysis Software (CAS) (Soupir and Brown 2002) was used. Targeting angler catch rates in previous creel surveys (2008-2011) were incorrectly summarized by CAS due to a programming error. This statistic has been corrected for 2008-2019 creel surveys and the methods for this correction are documented in Stevens and Ward (2015a).

RESULTS

Angling Pressure

A total of 629 angling parties were interviewed from December 9th, 2019 through March 17th, 2020 (Table 1). Of these, 451 were day-trip angling parties, 172 sleeperhouse angling parties, and 6 darkhouse spearing parties. The estimated total angling pressure was 220,203 angler-hours (Table 2, Figure 2). This was a decline from the 2015-2016 estimate (568,340 angler-hours; Stevens 2016), and was the lowest since the 2005-2006 winter season. Angling pressure from day-trip anglers was 54,465 angler-hours, 165,698 angler-hours for sleeperhouse anglers, and 39 angler-hours for darkhouse spearers (Table 1).

Pressure from sleeperhouse anglers continues to be the largest contributor to the overall increase in pressure on Leech Lake. The increased popularity of wheeled fish houses facilitating overnight fishing trips has greatly changed the Leech Lake winter fishery. Sleeperhouse angler pressure was minimal prior to the 2010-2011 creel (75,760 angler hours; Vondra and Schultz 2010). However this increased to 297,792 hours in 2014-2015. In 2015-2016 Leech Lake ice conditions were poor for all of December, and fishing did not start until January, despite that, pressure was still the second highest on record. For the 2019-2020 season ice formed early in December but mild temperatures and heavy snow in December and early January created very difficult travel conditions with considerable amounts of slush on the ice through the latter part of December, January and into February. On ice travel conditions improved towards the end of February. In 2019-2020 the sleeperhouse pressure was less than half (165,698 hours) of the 2015-2016 (373,556) levels (Table 2). In 2014-2015 the average sleeperhouse trip length was 24.0 hours, it was 31.4 hours during the 2015-2016 survey and 33.61 hours in 2019-2020 (Table 1).

The number of angler trips was the lowest observed since angler trips were first tracked beginning with the 2004-2005 season. Day trip angler trips (12,398 trips) was the lowest ever recorded. The number of sleeperhouse trips had increased dramatically from the 2010-2011 (2,237 trips) season into the 2015-2016 season (11,897 trips) but fell to 4,930 in 2019-2020. The number of darkhouse spearer trips was dramatically down with only 6 trips estimated in 2019-2020 compared to 6,449 in the 2015-2016 season (Table 2).

During the 2019-2020 winter season the number of anglers that traveled less than 50 miles (35.7%) was up slightly than the lowest level observed (33.4%) in 2015-2016 (Table 3). For the season, 51.7% percent of angling parties were within the travel distance of a day-trip (<100 miles), 41.0% were from “metro” anglers (100-249 miles), while 7.3% of angling parties interviewed were “destination” anglers, or those traveling >250 miles to fish Leech Lake. Extrapolating these rates to total fishing effort, pressure from local anglers was 113,857 angler hours, metro angler pressure was 90,291 angler hours, and destination angler pressure was 16,055 angler hours (Tables 14 and 15).

During previous summer and winter creel surveys on Leech Lake socioeconomic factors have been thought to contribute to the amount of fishing pressure from metro and destination anglers (Stevens and Ward 2015a; Stevens and Ward 2015b). Particularly fuel prices have been thought to be a barrier to these anglers. During the 2015-2016 winter season fuel prices

dropped to the lowest price ($1.45 USD; Figure 3) since 2004. Despite this metro angler pressure declined slightly and destination angler pressure was similar to 2014-2015 (Table 14 and 15) in 2015-2016. In 2019-2020 season fuel prices were still lower but winter pressure was the lowest level since 2005.

Most anglers interviewed were Minnesota residents (90.0%; Table 4) and most angling parties targeted Walleye (56.1%) or Yellow Perch (31.1%) (Table 5, Figure 4). In 2015-2016 anglers were asked to rate how satisfied they were their fishing experience on a scale of 1-5, the average angler response was 3.08, with most responses fairly equally distributed (Table 16) During the 2019-2020 season the question was modified and anglers were asked how they would rate their fishing success instead of their fishing experience on a scale of 1 to 5 with 5 being high and 1 being low. Responses were skewed to either end of the scale with 43.2% of anglers reporting low angler success and 18.9% reporting high success (Table 16). Anglers were also asked questions relating to their feelings about changes to statewide Walleye bag and possession limits based on two different scripts (Table 16). Each clerk was assigned a specific script. The first script (Script A) was "On a scale of 1 to 5, how much would you support or oppose changing the statewide walleye bag limit from 6 fish to 4, but keeping the possession limit at 6? 1 is strongly oppose and 5 is strongly support. The second script (B) was "On a scale of 1 to 5, how much would you support or oppose changing the statewide Walleye bag limit from 6 fish to 4, 1 is strongly oppose and 5 is strongly support?" Of those responding to script A, 38% strongly supported the proposal and 9.1% strongly opposed it while 69.8% of people strongly supported the script B while 9.1% strongly opposed the proposal (Table 16)

Catch and Harvest

An estimated 74,278 fish (0.67 fish/acre) were caught in Leech Lake during the 2019-2020 winter creel season (Table 6), of which 23,449 were harvested (31.6% of total catch). Most of the total catch and harvest (number of fish) was comprised of Yellow Perch (80% and 76%, respectively). Historically the highest stratum-specific estimate of total catch and harvest occurs during March when most anglers are targeting Yellow Perch. Eighty percent of perch caught during the winter season were caught in March and Yellow Perch still were the primary species caught and harvested during the entire season (Table 6).

The Leech Lake winter fishery 2019 total yield was estimated to be 12,130 pounds (0.11 pounds/acre; Table 7) this was much lower than the 2015-2016 estimate (0.54 pounds/acre; Stevens 2016). Most of the total harvest (pounds of fish) was comprised of Walleye (38.4%). During 2019-2020, the season total day-trip angler catch and harvest rates across all anglers were 1.1471 and 0.3853 fish/hour, respectively (Table 8), compared to respective rates from 2015-2016 of 1.244 and 0.309 fish/hour. The sleeperhouse angler catch and harvest rates across all anglers for the season were 0.0705 and 0.0147 fish/hour, respectively (Table 8), compared to respective rates from 2015-16 of 0.168 and 0.051 fish/hour. Daytime catch rates of anglers and targeting anglers were all below historic averages for all species except for Burbot (Table 13).

Walleye- The majority of angling parties targeted Walleye (56.1%; Table 5). An estimated 3,365 Walleye (4,657 pounds) were harvested during 2019-2020 at a rate of 0.015 Walleye/hour across all anglers (Table 2). An additional 4,424 Walleye were released (Table

6). The estimated total number and pounds of Walleye harvested in 2019-2020 was the second lowest observed during the winter season since 2005 (Table 2).

Breaking it down by specific angler groups, the catch and harvest rates of Walleye by all day-trip anglers were 0.1143 fish/hour and 0.0407 fish/hour, respectively (Table 8). Overall catch and harvest rates for day-trip targeting anglers were 0.1235 fish/hour and 0.0679 fish/hour, respectively (Table 9). The catch and harvest rates of Walleye by all sleeperhouse anglers were 0.0238 fish/hour and 0.0080 fish/hour, respectively (Table 8). Season total catch and harvest rates for sleeperhouse targeting anglers were 0.0209 fish/hour and 0.0080 fish/hour, respectively (Table 9) and just over 4% of anglers targeting Walleye harvested their possession limit (Table 11).

Creel clerks measured 96 Walleye and anglers reported lengths on 164 additional fish. The average harvested Walleye across the entire season was 14.8 inches and 1.4 pounds (Table 7). Lengths of Walleye caught ranged from 4-28 inches (Table 12, Figure 5). The majority of harvested fish were 12.0"-19.9". Anglers harvested 74% of fish caught in this size range. Eighteen percent of all Walleye less than 13.0" caught by anglers were harvested. Harvest of Walleye drops of dramatically over 20". Walleye that were 19 inches were harvested 77% of the time compared to only 35% of Walleye that were 20". Twenty nine percent of the released fish were over 20" and 11% of the harvested fish were over 20" Twenty one percent of the total catch was over 20" (Table 12 and Figure 5). Based on length, most harvested Walleye appear to be from the 2015 and 2016 year classes.

Northern Pike- An estimated 254 Northern Pike were harvested during the 2019-2020 season down considerably from 2015-2016 (6,483 fish) and was the lowest ever recorded during a winter creel survey on the lake. There were an estimated 751 pounds of Northern Pike harvested which is also a historical low and well below the average (3,385 pounds) (Table 2). The harvest rate was 0.001 fish/hour across all anglers (Table 2). Only 1.3% of parties interviewed during the winter creel survey targeted Northern Pike, compared to 5% during the summer 2019 and the 2015-2016 winter creel (Table 5, Figure 6) (Stevens 2016, Pedersen 2020). Of all the interviewed parties during the season only 6 parties were darkhouse spearers.

The catch and harvest rates of Northern Pike by all day-trip anglers were 0.0176 fish/hour and 0.0020 fish/hour, respectively (Table 8). Season total catch and harvest rates for day-trip targeting anglers were 0.0462 fish/hour and 0.092 fish/hour, respectively (Table 9). The catch and harvest rates of Northern Pike by all sleeperhouse anglers were 0.0068 fish/hour and 0.0009 fish/hour, respectively (Table 8). Catch and harvest rates for sleeperhouse targeting anglers were 0.0317 fish/hour and 0.0317 fish/hour, respectively (Table 9) and encounter and harvest rates for targeting darkhouse spearers were 0.1038 fish/hour and 0.1038 fish/hour, respectively (Table 9). There were 0% of all angling parties or parties specifically targeting Northern Pike that harvested their daily limit (Tables 10 and 11).

Harvested Northern Pike averaged 23.7 inches and 3.0 pounds (Table 7). Lengths of Northern Pike caught ranged from 10 to 36 inches (Table 12, Figure 6). The percentage of Northern Pike harvested less than 22.0", 22-26", and greater than 26.0" was 29%, 33%, and 39%, respectively (Table 12). Darkhouse spearers harvested only 7 total Northern Pike with 3 of

those being in the protected slot. An estimated 33% of the harvested fish were within the protected slot with 13% of those taken legally by darkhouse spearers under provisions of the regulation.

Yellow Perch- An estimated 17,854 Yellow Perch (3,800 pounds) were harvested at a rate of 0.603 fish/hour across all anglers (Table 2). Thirty one percent of angling parties interviewed during the creel survey targeted Yellow Perch, as compared to 7% during the summer (Table 5, Figure 4).

The catch and harvest rates of Yellow Perch by all day-trip anglers were 1.0093 fish/hour and 0.3147 fish/hour, respectively (Table 8). For the season catch and harvest rates for day-trip targeting anglers were 1.19170 fish/hour and 0.5933 fish/hour, respectively (Table 9). The catch and harvest rates of Yellow Perch by all sleeperhouse anglers were 0.0269 fish/hour and 0.0042 fish/hour, respectively (Table 8). Catch and harvest rates for sleeperhouse targeting anglers were 0.2357 fish/hour and 0.0277 fish/hour, respectively (Table 9). Overall, 2.7% of anglers targeting Yellow Perch harvested their daily limit (Table 11).

Catch and harvest was highest during March (Table 6). Eighty two percent of the total winter Yellow Perch harvest occurred during March. Anglers reported catching Yellow Perch that ranged in length from less than 3 inches to 15 inches (Table 2, Figure 7). The average size of harvested fish was 6.9 inches and 0.2 pounds (Table 7). The percentage of Yellow Perch that anglers elected to harvest for perch less than 8", 8-10", and greater than 10" was 1%, 38%, and 61%, respectively (Table 12).

Burbot- An estimated 403 Burbot (991 pounds) were harvested at a rate of .0112 fish/hour across all day-trip anglers (Table 2). The catch and harvest rates of Burbot by all day-trip anglers were 0.0112 fish/hour and 0.0032 fish/hour, respectively (Table 8). Season total catch and harvest rates for day-trip targeting anglers were 0.2107 fish/hour and 0.0790 fish/hour, respectively (Table 9). The catch and harvest rates of Burbot by all sleeperhouse anglers were 0.0121 fish/hour and 0.0014 fish/hour, respectively (Table 8). Catch and harvest rates for sleeperhouse targeting anglers were 0.0389 fish/hour and 0.0254 fish/hour, respectively (Table 9). Anglers reported catching Burbot that ranged in length from 8 to 36 inches (Table 12). The average size of harvested fish was 21.1 inches and 2.5 pounds (Table 7).

Bluegill/Pumpkinseed (sunfish) - An estimated 317 sunfish (155 pounds; Bluegill and Pumpkinseed combined) were harvested at a rate of .0014 fish/hour across all anglers (Table 2). The catch and harvest rates of Sunfish by all day-trip anglers were 0.0112 fish/hour and 0.0058 fish/hour, respectively (Table 8). Overall catch and harvest rates for day-trip targeting anglers were 5.5728 fish/hour and 3.7152 fish/hour, respectively (Table 9).

March was the only month in the survey in which Sunfish were caught (Table 6). In the 2015-2016 winter survey 77% of the total Sunfish harvest occurred during March. Anglers reported catching Sunfish that ranged in length from 5 to 10 inches (Table 12). The average size of harvested fish was 7.9 inches and 0.5 pounds (Table 7). One hundred percent of the Sunfish less than 8" were released and 100% of the Sunfish that were 8" or larger were harvested (Table 12).

Cisco/Whitefish- An estimated 1,247 Cisco/Whitefish (1,774 pounds) were harvested at a rate of 0.0057 fish/hour across all anglers (Table 2). The catch and harvest rates of Cisco/Whitefish by all day-trip anglers was 0.0276 fish/hour and 0.0219 fish/hour, respectively (Table 8). For the season catch and harvest rates for day-trip targeting anglers were 0.1930 fish/hour and 0.1705 fish/hour, respectively (Table 9). Anglers reported catching Cisco/Whitefish that ranged in length from 8 to 20 inches (Table 12).

Additional Species – There were a number of other species reported caught by anglers in low numbers including one Black Crappie, two Muskellunge, one Largemouth Bass, eight Rock Bass and five Smallmouth Bass.

DISCUSSION

The 2019-2020 ice conditions were very poor for much of December, January and into February. While the lake capped over with ice in early December, warming temperatures prevented the ice from becoming safe for travel. Heavy snow in late December and early January on a minimal ice layer led to a deep layer of slush across the majority of the lake making lake access very difficult. Resorts on the main lake were able to open some roads, but they quickly deteriorated and they were forced to close them for most of the month of January. By mid-February the snow layer had compacted and frozen which slowly led to improved access through the end of February and into March.

The winter pressure reflects this difficulty in travel with the lowest level since 2005-2006 winter season. As expected with very low winter pressure, harvest of most gamefish species would also be low. Harvest numbers of all species in the survey were below historical averages and harvest of a number of species such as Northern Pike and Sunfish were the lowest on record. Not surprising catch and harvest rates were also low. With the limited travel, anglers were not able to access preferred spots nor were they able to easily move around to search for fish. Climate and associated winter weather patterns during the season may have a larger contributing effect on winter angler effort than socioeconomic factors.

Due to the recent expansion of the winter fishery, winter surveys are necessary to gauge the amount of total harvest and pressure that occurs for the entire year. It will be interesting to evaluate how the lake and predator-prey relationships react to such a dramatic decrease in winter harvest and if those fish that were not harvested survive the winter and are available to summer anglers in 2020. Due to weather-dependent travel and thus highly variable nature of winter fisheries, alternative methods for indexing pressure should be considered during years when winter creels are not scheduled.

LITERATURE CITED

EIA (Energy Information Administration). 2020. http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_smn_w.htm. Accessed 20 March 2020.

Engstrom-Heg, R., R. T. Colesante, and G. A. Stillings. 1986. Prey selection by three esocid species and a hybrid esocid. Special Publication 15:189-194. American Fisheries Society, Bethesda, MD.

Gangl, R. S. and D. L. Pereira. 2003. Biological performance indicators for evaluating exploitation of Minnesota's large-lake Walleye fisheries. North American Journal of Fisheries Management 23:1303-1311.

Gustafson, S. P. 1985. 1984 Leech Lake Creel Survey. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 4, St. Paul.

Gustafson, S. P. 1986. 1985 Leech Lake Creel Survey. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 4, St. Paul.

Haukos, N. A. 1992. 1991 Summer Creel Survey and 1991-1992 Winter Creel Survey for Leech Lake. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 2, Job 239.

Haukos, N. A. 1993. 1992 Summer Creel Survey and 1992 Winter Cisco Survey for Leech Lake. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 2, Job 239.

Pedersen, C.A. 2020. Summer creel survey report for Leech Lake, 2019. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 4, Job.

Rivers, P. 2005. Leech Lake Summer and Winter Creel Surveys, May 15 to September 30, 2004. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 4, Job 678.

Rivers, P. 2006. Leech Lake Summer and Winter Creel Surveys, May 15 to September 30, 2005. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 4, Job 714.

Schultz, D. 2009. Summer creel survey report for Leech Lake, 2008. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 4, Job 830.

Schultz, D. 2010a. Large lake sampling program assessment report for Leech Lake, 2009. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, F-29-R-29, Study 2.

Schultz, D. 2010b. Summer creel survey report for Leech Lake, 2009. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 4, Job 835.

Schultz, D. and B. A. Vondra. 2011. Winter Creel Survey Report for Leech Lake 2010-2011. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 4, Job 855.

Schupp, D. H. 1972. The Walleye fishery of Leech Lake, Minnesota. Minnesota Department of Natural Resources, Section of Fisheries, Investigational Report 317, St. Paul.

Schupp, D. H. 1992. An ecological classification of Minnesota lakes with associated fish communities. Minnesota Department of Natural Resources, Section of Fisheries, Investigational Report 417, St. Paul, MN.

Sledge, T. J. 1999. Leech Lake Creel Survey, May 9 to September 30, 1998. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 4, Job 451.

Sledge, T. J. 2000. Leech Lake Creel Survey, May 14 to September 30, 1999. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 4, Job 479.

Soupir, C. A. and M. L. Brown. 2002. Comprehensive evaluation and modification of the South Dakota angler creel program. Federal Aid to Sportfish Restoration Project F-15-R, Study 1575.

Stevens, T.M. 2016. Winter Creel Survey for Leech Lake, 2015-2016. Minnesota Department of Natural Resources, Section of Fisheries, Study 4, Job 982.

Stevens, T. M. and M.C. Ward. 2015a. Summer creel survey for Leech Lake, 2014. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 4, Job 934

Stevens, T. M. and M.C. Ward. 2015b. Winter creel survey for Leech Lake, 2014-2015. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 4, Job 935

Vondra, B. A., and D. W. Schultz. 2011. Summer creel survey report for Leech Lake, 2010. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 4, Job 854.

Ward, M. C. and D.W. Schultz. 2012. Summer creel survey for Leech Lake, 2011. Minnesota Department of Natural Resources, Section of Fisheries, Completion Report, Study 4, Job 860

Wilcox, D. E. 1979. The effect of various water level regimes on fish production in the Leech Lake reservoir, Cass County, Minnesota. Minnesota Department of Natural Resources, Section of Fisheries, St. Paul, MN.

Wingate, P. J., and D. H. Schupp. 1984. Large lake sampling guide. Minnesota Department of Natural Resources, Section of Fisheries, Special Publication 140, St. Paul.

TABLES

Table 1. Creel survey sampling summary and angling pressure estimates by stratum for Leech Lake, Minnesota, December 9th, 2019 – March 17th, 2020. Standard errors appear in parentheses.

	Stratum				
	December	January	February	March	Season
			Sampling Summary (Number)		
Dates	December 9-31	January 1-31	February 1-29	March 1-17	Dec 9-Mar 17
Days in stratum	22	31	25	13	91
N Weekdays sampled	13	20	17	12	62
N Wknd/Hol sampled	5	8	9	5	27
			Day-Trip Angling Parties		
N Interviews	72	72	152	155	451
Mean anglers/party	2.55 (1.18)	1.86 (0.4)	2.37 (0.5)	2.16 (0.56)	2.21 (0.32)
Mean trip length (h)	4.50 (2.36)	3.81 (0.68)	4.85 (1.02)	4.48 (1.14)	4.39 (0.64)
Total angler hours	12,397 (8,292)	6,896 (2,775)	18,808 (4,971)	16,364 (7,385)	54,465 (12,478)
Total angler trips	2,755 (1,843)	1,810 (728)	3,878 (1,025)	3,653 (1,648)	12,398 (2,841)
			Sleeperhouse Angling Paties		
N Interviews	50	17	105	0	172
Mean anglers/party	3.45 (2.16)	1.89 -	2.55 (0.76)	- -	2.54 (0.7)
Mean trip length (h)	32.67 (20.47)	29.36 (4.38)	38.87 (8.22)	- -	33.61 (6.43)
Total angler hours	73,912 (82,997)	7,736 (5,385)	84,050 (55,530)	- -	165,698 (100,005)
Total angler trips	2,262 (2,540)	263 (183)	2,162 (1,429)	- -	4,930 (2,976)
			Darkhouse Spearing Parties		
N Interviews	2	2	2	0	6
Mean anglers/party	2.00 -	1.50 -	2.00 -	- -	1.81 (0.)
Mean trip length (h)	5.17 (2.57)	8.13 -	5.71 -	- -	6.46 (0.65)
Total angler hours	39 (51)	- -	- -	- -	39 (51)
Total angler trips	6 (8)	- -	- -	- -	6 (8)

Table 2. Estimated total angling pressure and total harvest statistics for the winter creel season on Leech Lake, Minnesota, 1965-2020.

	Year											
	1965-1966	1984-1985	1990-1991	1991-1992	1992*	2004-2005	2005-2006	2010-2011	2014-2015	2015-2016	2019-20	1965-2020 Mean
						Angling Pressure						
Start Date		8-Dec	6-Dec	4-Dec	24-Feb	28-Dec	27-Dec	15-Dec	3-Dec	28-Dec	9-Dec	
End Date		15-Feb	15-Feb	15-Feb	10-Apr	31-Mar	31-Mar	15-Mar	24-Mar	17-Mar	17-Mar	
Day-Trip Angler hours	8,418	22,279	55,889	81,829	19,788	114,932	68,441	271,794	343,977	159,506	54,465	109,211
Sleeperhouse hours	-	-	-	-	-	-	-	75,760	297,792	373,556	165,698	228,202
Darkouse hours	50,675	17,948	17,948	18,366	No est.	No est.	No est.	15,547a	6,033	35,278	39	20,898
Total Angler Hours	59,093	40,227	73,837	100,195	19,788	114,932	68,441	347,554	647,802	568,340	220,203	107,639
Day-Trip Angler trips						27,964	19,896	62,625	76,270	35,764	12,398	39,153
Sleeperhouse trips	-	-	-	-	-	-	-	2,237	12,387	11,897	4,930	7,863
Darkhouse trips	-	-	-	-	-	No est.	No est.	3,048	1,592	6,449	6	2,774
Total Angler Trips	-	-	-	-	-	27,964	19,896	67,911	90,249	54,110	17,335	46,244
						Number of Harvested Fish						
Northern pike	5,179	2,602	3,664	4,405	-	1,011	997	3,013[a]	5,873	6,483	254	3,385
Burbot	55	231	1,330	957	-	446	845	491	1,237	851	403	685
Sunfish	-	-	-	2,295	-	1,608	422	824	3,346	2,101	317	1,559
Yellow Perch	10,298	27,720	20,454	81,017	-	20,536	47,676	224,963	175,997	55,156	17,854	68,167
Walleye	246	1,388	4,010	6,420	-	2,555	315 [1]	8,294 [1]	22,001 [2]	11,093 [2]	3,365 [3]	2,924
Cisco/Whitefish	1,034	57	1,760	2,090	46,225	300	119	8,801	4,827	1,350	1,247	6,165
						Pounds of Harvested Fish						
Northern pike	20,004	-	6,540	12,479	-	3,323	3,846	8,253[a]	17,092	17,766	751	10,225
Burbot	-	-	4,602	4,698	-	1,078	2,442	1,670	4,032	2,091	993	2,701
Sunfish	-	-	-	1,120	-	510	155	430	1,764	1,208	155	763
Yellow Perch	5,149	-	9,247	27,150	-	7,734	18,784	95,701	85,195	24,322	3,808	30,788
Walleye	301	-	5,023	7,672	-	2,820	318	9,664	26,674	12,105	4,667	7,694
Cisco/Whitefish	725	-	2,166	2,575	48,912	387	180	11,175	7,732	2,409	1,774	7,804

* Specifically focused on cisco/whitefish fishery

1Walleye protected by 18-26" protected slot limit

2Walleye protected by 20-26" protected slot limit

3 Walleye limit - 4 total in possesion with only 1 over 20" allowed

a Darkhouse spearer effort and and northern pile harvest during Feb 1 - Feb 28 was approximated based on average daily observations, by day type, during the Dec 15 - Jan 31 stratum

Table 2 continued. Estimated total angling pressure and total harvest statistics for the winter creel season on Leech Lake, Minnesota, 1965-2020.

	Year											
	1965-1966	1984-1985	1990-1991	1991-1992	1992*	2004-2005	2005-2006	2010-2011	2014-2015	2015-2016	2019-2020	1965-2020 Mean
						Harvest per Angler Hour (all anglers)						
Northern pike	0.0360	0.0720	0.1100	0.0440	-	0.0088	0.0146	0.0060	0.0091	0.0102	0.0012	0.0312
Burbot	0.0060	0.0100	0.0160	0.0180	-	0.0039	0.0123	0.0037	0.0019	0.0023	0.0018	0.0076
Sunfish	-	-	-	0.0290	-	0.0140	0.0062	0.0043	0.0052	0.0082	0.0014	0.0098
Yellow Perch	1.0450	1.2440	0.5950	1.0310	-	0.1787	0.6966	0.6430	0.2717	0.2409	0.0811	0.6027
Walleye	0.0290	0.0620	0.1170	0.0700	-	0.0222	0.0046	0.0320	0.0340	0.0407	0.0153	0.0427
Cisco/Whitefish	0.7200	0.0020	0.0500	0.0210	2.3360	0.0018	0.0018	0.0150	0.0075	0.0064	0.0057	0.2879
						Harvest per Angler Hour (targeting anglers)						
Northern pike	-	-	-	-	-	0.0655	0.0413	0.2137	0.0900	0.0259	0.0656	0.0837
Burbot	-	-	-	-	-	0.0160	0.0609	0.0000	0.0287	0.0877	0.1186	0.0520
Sunfish	-	-	-	-	-	1.7734	0.3656	1.1200	2.3770	0.7573	2.3883	1.4636
Yellow Perch	-	-	-	-	-	0.6070	1.0402	1.7675	0.6031	0.5554	0.7647	0.8896
Walleye	-	-	-	-	-	0.0429	0.0188	0.1187	0.0673	0.0448	0.1430	0.0726
Cisco/Whitefish	-	-	-	-	-	1.5000	0.0000	9.0620	0.4244	0.1112	0.3164	1.9023

Table 3. Hometown distances of anglers fishing Leech Lake, Minnesota relative to Walker, MN, December 9th, 2019 – March 17th, 2020.

Fishing Season	2004-2005	2005-2006	2010-2011	2014-2015	2015-2016	2019-2020
Angler Hours	114,932	68,442	347,554	647,802	373,556	220,203
Distance (miles)						
0-49	39.8%	52.7%	44.4%	45.5%	33.4%	35.7%
50-99	5.9%	6.4%	7.8%	9.7%	9.0%	16.1%
100-149	17.3%	17.1%	15.3%	19.6%	22.6%	20.5%
150-199	17.3%	17.1%	18.8%	15.8%	21.0%	16.9%
200-249	2.4%	3.1%	4.5%	4.6%	6.1%	3.7%
250-299	2.4%	3.1%	2.1%	1.3%	2.0%	0.8%
300-349	15.1%	5.6%	1.1%	0.9%	0.7%	0.7%
350-399	3.7%	3.7%	2.2%	0.6%	1.5%	1.4%
400-449	4.0%	4.0%	0.4%	0.2%	0.5%	0.6%
450-499	0.0%	4.3%	0.8%	0.8%	1.3%	1.6%
500-5,000	0.0%	8.2%	2.6%	1.0%	1.9%	2.1%

Table 4. State of residence of anglers fishing Leech Lake, Minnesota, December 9th, 2019 – March 17th, 2020.

State of Residence	N	Percent
Illinois	18	1.2
Indiana	6	0.4
Iowa	19	1.3
Minnesota	1,346	90.0
Nebraska	9	0.6
North Dakota	29	1.9
South Dakota	1	0.1
Wisconsin	40	2.7
Other	27	1.8
Total	1,495	100.0

Table 5. Frequencies (%) of species targeted by parties during each stratum for Leech Lake, Minnesota, December 9th, 2019 – March 17th, 2020.

	Targeted Species							
Stratum	Walleye	Northern pike	Yellow perch	Cisco/Whitefish	Sunfish	Burbot	Any/Other	Total (%.)
December	80.3	1.3	15.0	0.0	0.0	0.0	3.3	100.0
January	76.6	3.7	14.9	1.1	0.0	0.0	3.7	100.0
February	70.1	1.2	11.5	10.5	0.0	4.0	2.8	100.0
March	0.0	0.0	88.4	8.6	0.0	3.0	0.0	100.0
Season	56.1	1.3	31.1	6.8	0.0	2.5	2.3	100.0

Table 6. Catch and harvest estimates by stratum for day-trip anglers during the winter creel survey on Leech Lake, Minnesota, 2019-2020. Standard errors are in parentheses.

Number Caught (Day-Trip Anglers)

Species	December	January	February	March	Season
Northern Pike	474 (351)	148 (88)	111 (42)	223 (124)	957 (385)
Burbot	56 (58)	87 (69)	468 (294)	- -	612 (308)
Sunfish spp.	- -	- -	- -	479 (504)	479 (504)
Yellow Perch	4,084 (3,327)	2,668 (1,520)	4,303 (2,087)	43,919 (19,742)	54,974 (20,186)
Walleye	1,874 (1,233)	761 (350)	957 (473)	246 (126)	3,839 (1,372)
Cisco/Whitefish	31 (22)	133 (86)	875 (555)	464 (384)	1,503 (681)
Overall	6,532 (4,645)	3,838 (1,793)	6,754 (2,595)	45,354 (20,520)	62,478 (21,274)

Number Harvested (Day-Trip Anglers)

Species	December	January	February	March	Season
Northern Pike	93 (79)	13 (16)	- -	- -	107 (81)
Burbot	- -	10 (11)	165 (146)	- -	175 (146)
Sunfish spp.	- -	- -	- -	317 (330)	317 (330)
Yellow Perch	1,186 (1,367)	438 (293)	1,376 (879)	14,142 (6,077)	17,142 (6,298)
Walleye	1,207 (786)	439 (208)	396 (217)	- -	2,042 (841)
Cisco/Whitefish	12 (12)	30 (34)	819 (527)	332 (298)	1,194 (607)
Overall	2,499 (1,905)	930 (424)	2,755 (1,228)	14,799 (6,435)	20,984 (6,835)

Number Released (Day-Trip Anglers)

Species	December	January	February	March	Season
Northern Pike	381 (303)	134 (80)	111 (42)	223 (124)	850 (340)
Burbot	56 (58)	77 (68)	304 (188)	- -	437 (208)
Sunfish spp.	- -	- -	- -	162 (174)	162 (174)
Yellow Perch	2,898 (2,071)	2,230 (1,249)	2,928 (1,365)	29,777 (13,826)	37,832 (14,102)
Walleye	667 (470)	322 (158)	561 (294)	246 (126)	1,797 (590)
Cisco/Whitefish	19 (19)	103 (76)	56 (40)	131 (93)	309 (128)
Overall	4,033 (2,807)	2,907 (1,429)	3,999 (1,588)	30,556 (14,216)	41,494 (14,647)

Table 6 continued. Catch and harvest estimates by stratum for sleeperhouse anglers during the winter creel survey on Leech Lake, Minnesota, 2019-2020. Standard errors are in parentheses.

Number Caught (Sleeperhouse Anglers)

Species	December	January	February	March	Season
Northern Pike	616 (683)	131 (101)	383 (215)	- -	1,130 (723)
Burbot	1,529 (1,975)	9 (11)	465 (275)	- -	2,003 (1,994)
Sunfish spp.	- -	- -	- -	- -	- -
Yellow Perch	636 (744)	2,551 (1,962)	1,265 (841)	- -	4,453 (2,260)
Walleye	2,223 (1,582)	389 (324)	1,338 (1,071)	- -	3,951 (1,938)
Cisco/Whitefish	- -	- -	79 (46)	- -	79 (46)
Overall	5,043 (4,971)	3,080 (2,152)	3,556 (2,269)	- -	11,679 (5,873)

Number Harvested (Sleeperhouse Anglers)

Species	December	January	February	March	Season
Northern Pike	77 (82)	9 (11)	59 (55)	- -	145 (99)
Burbot	- -	5 (7)	224 (140)	- -	229 (140)
Sunfish spp.	- -	- -	- -	- -	- -
Yellow Perch	38 (61)	374 (291)	280 (257)	- -	691 (393)
Walleye	520 (409)	134 (100)	670 (498)	- -	1,323 (652)
Cisco/Whitefish	- -	- -	54 (34)	- -	54 (34)
Overall	634 (516)	521 (366)	1,287 (910)	- -	2,442 (1,108)

Number Released (Sleeperhouse Anglers)

Species	December	January	February	March	Season
Northern Pike	539 (602)	121 (96)	324 (181)	- -	985 (636)
Burbot	1,529 (1,975)	5 (6)	241 (148)	- -	1,774 (1,981)
Sunfish spp.	- -	- -	- -	- -	- -
Yellow Perch	599 (737)	2,177 (1,755)	985 (669)	- -	3,761 (2,018)
Walleye	1,704 (1,198)	255 (234)	669 (586)	- -	2,627 (1,354)
Cisco/Whitefish	- -	- -	25 (22)	- -	25 (22)
Overall	4,409 (4,499)	2,558 (1,883)	2,269 (1,398)	- -	9,236 (5,074)

Table 6 continued. Catch and harvest estimates by stratum for darkhouse spearers during the winter creel survey on Leech Lake, Minnesota, 2019-2020. Darkhouse spearer catch reflects number of fish encountered. Standard errors are in parentheses.

Number Caught (Darkhouse Spearers)

Species	December	January	February	March	Season
Northern Pike	2 (2)	- -	- -	- -	2 (2)
Burbot	- -	- -	- -	- -	- -
Sunfish spp.	- -	- -	- -	- -	- -
Yellow Perch	119 (103)	- -	- -	- -	119 (103)
Walleye	- -	- -	- -	- -	- -
Cisco/Whitefish	- -	- -	- -	- -	- -
Overall	121 (104)	- -	- -	- -	121 (104)

Number Harvested (Darkhouse Spearers)

Species	December	January	February	March	Season
Northern Pike	2 (2)	- -	- -	- -	2 (2)
Burbot	- -	- -	- -	- -	- -
Sunfish spp.	- -	- -	- -	- -	- -
Yellow Perch	21 (17)	- -	- -	- -	21 (17)
Walleye	- -	- -	- -	- -	- -
Cisco/Whitefish	- -	- -	- -	- -	- -
Overall	23 (19)	- -	- -	- -	23 (19)

Number Released (Darkhouse Spearers)

Species	December	January	February	March	Season
Northern Pike	- -	- -	- -	- -	- -
Burbot	- -	- -	- -	- -	- -
Sunfish spp.	- -	- -	- -	- -	- -
Yellow Perch	99 (85)	- -	- -	- -	99 (85)
Walleye	- -	- -	- -	- -	- -
Cisco/Whitefish	- -	- -	- -	- -	- -
Overall	99 (85)	- -	- -	- -	99 (85)

Table 6 continued. Catch and harvest estimates by stratum for all anglers during the winter creel survey on Leech Lake, Minnesota, 2019-2020. All angler catch reflects number of fish encountered. Standard errors are in parentheses.

Number Caught (All Angler)

Species	December	January	February	March	Season
Northern Pike	1,092 (768)	278 (221)	495 (218)	223 (124)	2,088 (837)
Burbot	1,585 (1,976)	96 (69)	933 (389)	- -	2,614 (2,015)
Sunfish spp.	- -	- -	- -	479 (504)	479 (504)
Yellow Perch	4,840 (3,411)	5,219 (2,498)	5,569 (2,500)	43,919 (19,742)	59,546 (20,344)
Walleye	4,098 (2,454)	1,150 (464)	2,295 (1,329)	246 (126)	7,790 (2,832)
Cisco/Whitefish	31 (22)	120 (79)	919 (567)	464 (384)	1,582 (695)
Overall	11,696 (7,412)	6,917 (2,774)	10,310 (4,123)	45,354 (20,520)	74,278 (22,376)

Number Harvested (All Anglers)

Species	December	January	February	March	Season
Northern Pike	172 (114)	23 (20)	59 (55)	- -	254 (128)
Burbot	- -	14 (13)	389 (202)	- -	403 (202)
Sunfish spp.	- -	- -	- -	317 (330)	317 (330)
Yellow Perch	1,244 (1,369)	812 (407)	1,656 (921)	14,142 (6,077)	17,854 (6,310)
Walleye	1,727 (1,661)	573 (239)	1,065 (593)	- -	3,365 (1,779)
Cisco/Whitefish	12 (12)	30 (34)	847 (528)	332 (298)	1,247 (616)
Overall	3,156 (2,563)	1,452 (351)	4,042 (1,608)	14,799 (6,435)	23,449 (7,119)

Number Released (All Anglers)

Species	December	January	February	March	Season
Northern Pike	920 (674)	256 (185)	435 (183)	223 (124)	1,834 (733)
Burbot	1,585 (1,976)	82 (68)	545 (224)	- -	2,211 (1,990)
Sunfish spp.	- -	- -	- -	162 (174)	162 (174)
Yellow Perch	3,596 (2,199)	4,407 (2,195)	3,913 (1,641)	29,777 (13,826)	41,693 (14,266)
Walleye	2,370 (1,166)	577 (264)	1,230 (792)	246 (126)	4,424 (1,439)
Cisco/Whitefish	19 (19)	90 (68)	72 (38)	131 (93)	334 (128)
Overall	8,541 (5,325)	5,465 (2,434)	6,268 (2,514)	30,556 (14,216)	50,829 (15,578)

Table 7. Yield estimates, mean weights, and mean weights of harvested fish by stratum for day-trip anglers during the winter creel survey on Leech Lake, Minnesota, December 9th, 2019 – March 17th, 2020. Standard errors are in parentheses.

Total Pounds Harvested (Day-Trip Anglers)

Species	December	January	February	March	Season
Northern Pike	262 (218)	44 (51)	- -	- -	306 (224)
Burbot	- -	17 -	318 (486)	- -	335 (486)
Sunfish spp.	- -	- -	- -	155 (360)	155 (360)
Yellow Perch	226 (353)	73 (68)	330 (394)	3,037 (1,875)	3,666 (1,950)
Walleye	1,606 (1,796)	428 (265)	285 (220)	- -	2,319 (1,829)
Cisco/Whitefish	12 (13)	25 -	1,283 (2,309)	374 (568)	1,694 (2,377)

Mean Weight (pounds) of Harvested Fish (Day-Trip Anglers)

Species	December	January	February	March	Season
Northern Pike	2.8 (3.4)	3.3 (5.5)	- -	- -	2.9 (3.1)
Burbot	- -	1.7 -	1.9 (3.7)	- -	1.9 (3.5)
Sunfish spp.	- -	- -	- -	0.5 (1.2)	0.5 (1.2)
Yellow Perch	0.2 (0.4)	0.2 (0.2)	0.2 (0.3)	0.2 (0.2)	0.2 (0.1)
Walleye	1.3 (1.8)	1.0 (0.8)	0.7 (0.7)	- -	1.1 (1.0)
Cisco/Whitefish	1.0 (1.4)	0.8 -	1.6 (3.1)	1.1 (2.0)	1.4 (2.2)

Mean Length (in) of Harvested Fish (Day-Trip Anglers)

Species	December	January	February	March	Season
Northern Pike	22.9 (26.3)	23.6 (40.3)	- -	- -	23.0 (23.6)
Burbot	- -	18.8 -	19.6 (41.2)	- -	19.5 (38.9)
Sunfish spp.	- -	- -	- -	7.9 (20.2)	7.9 (20.2)
Yellow Perch	7.0 (13.2)	6.7 (7.5)	7.2 (8.8)	6.9 (5.2)	6.9 (4.5)
Walleye	14.7 (20.1)	13.3 (10.5)	12.3 (15.0)	- -	14.0 (12.3)
Cisco/Whitefish	13.5 (18.9)	13.1 -	16.1 (30.5)	14.4 (25.6)	15.5 (22.1)

Table 7 continued. Yield estimates, mean weights, and mean weights of harvested fish by stratum for sleeperhouse anglers during the winter creel survey on Leech Lake, Minnesota, December 9th, 2019 – March 17th, 2020. Standard errors are in parentheses.

Total Pounds Harvested (Sleeperhouse Anglers)

Species	December	January	February	March	Season
Northern Pike	228 (269)	25 (23)	185 (194)	- -	437 (333)
Burbot	- -	13 -	643 (561)	- -	656 (561)
Sunfish spp.	- -	- -	- -	- -	- -
Yellow Perch	3 (5)	70 (109)	59 (113)	- -	132 (157)
Walleye	1,288 (1,949)	145 (100)	906 (1,166)	- -	2,339 (2,273)
Cisco/Whitefish	- -	- -	77 (162)	- -	77 (162)

Mean Weight (pounds) of Harvested Fish (Sleeperhouse Anglers)

Species	December	January	February	March	Season
Northern Pike	3.0 (4.7)	2.7 (5.0)	3.1 (4.4)	- -	3.0 (3.1)
Burbot	- -	3.0 -	2.9 (3.1)	- -	2.9 (3.1)
Sunfish spp.	- -	- -	- -	- -	- -
Yellow Perch	0.1 (0.2)	0.2 (0.3)	0.2 (0.4)	- -	0.2 (0.3)
Walleye	2.5 (4.3)	1.1 (1.1)	1.4 (2.1)	- -	1.8 (2.0)
Cisco/Whitefish	- -	- -	1.4 (3.2)	- -	1.4 (3.2)

Mean Length (in) of Harvested Fish (Sleeperhouse Anglers)

Species	December	January	February	March	Season
Northern Pike	23.8 (37.8)	23.5 (44.2)	24.6 (34.5)	- -	24.1 (24.6)
Burbot	- -	23.0 (38.5)	22.2 (24.7)	- -	22.2 (24.3)
Sunfish spp.	- -	- -	- -	- -	- -
Yellow Perch	5.0 (12.0)	7.2 (11.8)	6.8 (11.9)	- -	6.9 (8.0)
Walleye	18.3 (28.5)	13.9 (12.5)	14.7 (23.8)	- -	16.1 (16.4)
Cisco/Whitefish	- -	- -	15.4 (34.6)	- -	15.4 (34.6)

Table 7 continued. Yield estimates, mean weights, and mean weights of harvested fish by stratum for darkhouse spearers during the winter creel survey on Leech Lake, Minnesota, December 9th, 2019 – March 17th, 2020. Standard errors are in parentheses.

Total Pounds Harvested (Darkhouse Spearers)

Species	December	January	February	March	Season
Northern Pike	6 (6)	- -	- -	- -	6 (6)
Burbot	- -	- -	- -	- -	- -
Sunfish spp.	- -	- -	- -	- -	- -
Yellow Perch	2 (3)	- -	- -	- -	2 (3)
Walleye	- -	- -	- -	- -	- -
Cisco/Whitefish	- -	- -	- -	- -	- -

Mean Weight (pounds) of Harvested Fish (Darkhouse Spearers)

Species	December	January	February	March	Season
Northern Pike	3.4 -	- -	- -	- -	3.4 -
Burbot	- -	- -	- -	- -	- -
Sunfish spp.	- -	- -	- -	- -	- -
Yellow Perch	0.1 -	- -	- -	- -	0.1 -
Walleye	- -	- -	- -	- -	- -
Cisco/Whitefish	- -	- -	- -	- -	- -

Mean Length (in) of Harvested Fish (Darkhouse Spearers)

Species	December	January	February	March	Season
Northern Pike	25.3 -	- -	- -	- -	25.3 -
Burbot	- -	- -	- -	- -	- -
Sunfish spp.	- -	- -	- -	- -	- -
Yellow Perch	5.8 -	- -	- -	- -	5.8 -
Walleye	- -	- -	- -	- -	- -
Cisco/Whitefish	- -	- -	- -	- -	- -

Table 7 continued. Yield estimates, mean weights, and mean weights of harvested fish by season for all anglers during the winter creel survey on Leech Lake, Minnesota, December 9th, 2019 – March 17th, 2020. Standard errors are in parentheses.

Total Pounds Harvested (all anglers)

Species	December	January	February	March	Season
Northern Pike	496 (346)	68 (56)	185 (194)	- -	751 (401)
Burbot	- -	30 -	961 (743)	- -	993 (743)
Sunfish spp.	- -	- -	- -	155 (360)	155 (360)
Yellow Perch	231 (353)	143 (128)	389 (407)	3,037 (1,875)	3,808 (1,955)
Walleye	2,894 (1,673)	573 (283)	1,190 (1,204)	- -	4,667 (2,080)
Cisco/Whitefish	12 (13)	25 -	1,328 (2,309)	374 (568)	1,774 (2,383)
Total Pounds Harvested (all anglers)					12,148

Mean Weight (pounds) of Harvested Fish (all anglers)

Species	December	January	February	March	Season
Northern Pike	2.9 (2.8)	3.0 (3.8)	3.1 (4.4)	- -	3.0 (2.2)
Burbot	- -	2.1 -	2.5 (2.4)	- -	2.5 (2.3)
Sunfish spp.	- -	- -	- -	0.5 (1.2)	0.5 (1.2)
Yellow Perch	0.2 (0.4)	0.2 (0.2)	0.2 (0.3)	0.2 (0.2)	0.2 (0.1)
Walleye	1.7 (1.9)	1.0 (0.7)	1.1 (1.3)	- -	1.4 (1.0)
Cisco/Whitefish	1.0 (1.4)	0.8 -	1.6 (3.0)	1.1 (2.0)	1.4 (1.0)

Mean Length (in) of Harvested Fish (all anglers)

Species	December	January	February	March	Season
Northern Pike	23.3 (22.1)	23.6 (29.9)	24.6 (34.5)	- -	23.7 (17.2)
Burbot	- -	20.1 (19.1)	21.1 (22.6)	- -	21.1 (21.8)
Sunfish spp.	- -	- -	- -	7.9 (20.2)	7.9 (20.2)
Yellow Perch	6.9 (12.6)	6.9 (6.7)	7.1 (7.6)	6.9 (5.2)	6.9 (4.3)
Walleye	15.8 (19.0)	13.4 (8.7)	13.8 (16.6)	- -	14.8 (10.8)
Cisco/Whitefish	13.5 (18.9)	13.1 -	14.4 (25.6)	14.4 (25.6)	15.5 (21.2)

Table 8. Estimates of catch and harvest rates of selected species for all day-trip anglers by stratum during the winter season on Leech Lake, Minnesota, 2019-2020.

	Stratum				
Species	December	January	February	March	Season
			Catch per Angler Hour (Day-Trip Anglers)		
Northern Pike	0.0382 (0.0734)	0.0214 (0.0183)	0.0059 (0.0023)	0.0137 (0.0197)	0.0176 (0.0139)
Burbot	0.0045 (0.0054)	0.0126 (0.0117)	0.0249 ---		0.0112 ---
Sunfish spp.	- -			0.0293 ---	0.0088 (0.0075)
Yellow Perch	0.3294 (0.4799)	0.3869 (0.3360)	0.2288 (0.1248)	2.6839 (2.4006)	1.0093 (0.5533)
Walleye	0.1512 (0.2164)	0.1104 (0.0779)	0.0509 (0.0761)	0.0151 (0.0138)	0.0705 (0.0491)
Cisco/Whitefish	0.0025 (0.0025)	0.0174 (0.0224)	0.0465 (0.0212)	0.0283 (0.0343)	0.0276 (0.0143)
Overall	0.5269 (0.6467)	0.5565 (0.4062)	0.3591 (0.2038)	2.7716 (2.2626)	1.1471 (0.5654)
			Harvest per Angler Hour (Day-Trip Anglers)		
Northern Pike	0.0075 (0.0059)	0.0019 (0.0021)			0.0020 (0.0014)
Burbot	- -	0.0014 (0.0040)			0.0032 ---
Sunfish spp.	- -			0.0194 ---	0.0058 (0.0049)
Yellow Perch	0.0956 (0.0776)	0.0635 (0.0582)	0.0731 (0.0350)	0.8642 (0.7834)	0.3147 (0.1639)
Walleye	0.0974 (0.1301)	0.0636 (0.0437)	0.0210 (0.0366)		0.0375 (0.0272)
Cisco/Whitefish		0.0043 ---	0.0436 (0.0220)	0.0203 (0.0257)	0.0219 (0.0120)
Overall	0.2016 (0.2313)	0.1349 (0.0930)	0.1465 (0.0852)	0.9044 (0.7375)	0.3853 (0.1839)

Table 8 continued. Estimates of catch and harvest rates of selected species for all sleeperhouse anglers by stratum during the winter season on Leech Lake, Minnesota, 2019-2020.

	Stratum				
Species	December	January	February	March	Season
			Catch per Angler Hour (Sleeperhouse Anglers)		
Northern Pike	0.0083 (0.0132)	0.0169 (0.0243)	0.0046 (0.0056)		0.0068 (0.0065)
Burbot	0.0207 (0.0354)	0.0012 (0.0013)	0.0055 (0.0072)		0.0121 (0.0146)
Sunfish spp.	- -				
Yellow Perch	0.0086 (0.0140)	0.3298 (0.2574)	0.0151 (0.0214)		0.0269 (0.0236)
Walleye	0.0301 (0.0587)	0.0503 (0.0604)	0.0159 (0.0233)		0.0238 (0.0272)
Cisco/Whitefish			0.0005 (0.0009)		0.0005 (0.0009)
Overall	0.0682 (0.2004)	0.3981 (0.4478)	0.0423 (0.0529)		0.0705 (0.0988)
			Harvest per Angler Hour (Sleeperhouse Anglers)		
Northern Pike	0.0010 (0.0016)	0.0012 (0.0026)	0.0007 (0.0011)		0.0009 (0.0009)
Burbot	- -	0.0006 (0.0005)	0.0027 (0.0035)		0.0014 (0.0015)
Sunfish spp.	- -				
Yellow Perch	0.0005 (0.0010)	0.0483 (0.0364)	0.0033 (0.0064)		0.0042 (0.0045)
Walleye	0.0070 (0.0179)	0.0173 (0.0195)	0.0080 (0.0111)		0.0080 (0.0103)
Cisco/Whitefish			0.0003 (0.0004)		0.0003 (0.0004)
Overall	0.0086 (0.0231)	0.0674 (0.0770)	0.0153 (0.0208)		0.0147 (0.0176)

Table 8 continued. Estimates of catch (encounter rates of Northern Pike) and harvest rates of selected species for all darkhouse spearers by stratum during the winter season on Leech Lake, Minnesota, 2019-2020.

	Stratum				
Species	December	January	February	March	Season
			Catch per Angler Hour (Darkhouse Spearers)		
Northern Pike	0.0484 (0.0750)				0.0484 (0.0750)
Burbot	- -				
Sunfish spp.	- -				
Yellow Perch	3.0484 (5.4712)				3.0484 (5.4712)
Walleye	- -				
Cisco/Whitefish					
Overall	3.0968 (5.5470)				3.0968 (5.5470)
			Harvest per Angler Hour (Darkhouse Spearers)		
Northern Pike	0.0484 (0.0750)				0.0484 (0.0750)
Burbot	- -				
Sunfish spp.	- -				
Yellow Perch	0.5323 (0.8254)				0.5323 (0.8254)
Walleye	- -				
Cisco/Whitefish					
Overall	0.5806 (0.9004)				0.5908 (0.4932)

Table 9. Estimates of catch and harvest rates of selected species for day-trip targeting anglers by stratum during the winter season on Leech Lake, Minnesota, 2019-2020.

	Stratum				
Species	December	January	February	March	Season
			Catch per Angler Hour (Day-Trip Anglers)		
Northern Pike	0.0825 (0.0770)				0.0462 (0.0301)
Burbot	- -		0.4947 (0.1902)		0.2107 (0.1145)
Sunfish spp.	- -			5.5728	5.5728 ---
Yellow Perch	0.6118 (0.2598)	0.7272 (0.2616)	0.5669 (0.2760)		1.9170 (0.3442)
Walleye	0.1775 (0.0697)	0.1421 (0.0559)	0.0833 (0.0383)		0.1235 (0.0315)
Cisco/Whitefish			0.1395 (0.0674)		0.1930 (0.0832)
			Harvest per Angler Hour (Day-Trip Anglers)		
Northern Pike	0.0165 (0.0044)				0.0092 (0.0059)
Burbot	- -		0.1855 (0.1524)		0.0790 (0.0645)
Sunfish spp.	- -			3.7152	3.7152 ---
Yellow Perch	0.2105 (0.1373)	0.0974 (0.0518)	0.2107 (0.1234)	2.7889 (0.2781)	0.5933 (0.0989)
Walleye	0.1167 (0.0521)	0.0817 (0.0328)	0.0331 (0.0153)		0.0679 (0.0193)
Cisco/Whitefish			0.1331 (0.0645)	0.3640 (0.2258)	0.1705 (0.0699)

Table 9 continued. Estimates of catch and harvest rates of selected species for sleeperhouse targeting anglers by stratum during the winter season on Leech Lake, Minnesota, 2019-2020.

	Stratum				
Species	December	January	February	March	Season
			Catch per Angler Hour (Sleeperhouse Anglers)		
Northern Pike	- -		0.0445 (0.0511)		0.0317 (0.0333)
Burbot	- -		0.0389 (0.0128)		0.0389 (0.0128)
Sunfish spp.	- -				
Yellow Perch	0.0077 ---	0.9504 (0.1074)	0.0323 (0.0289)		0.2357 (0.1537)
Walleye	0.0282 (0.0117)	0.0264 (0.0167)	0.0169 (0.0070)		0.0209 (0.0053)
Cisco/Whitefish					
			Harvest per Angler Hour (Sleeperhouse Anglers)		
Northern Pike	- -		0.0445 (0.0511)		0.0317 (0.0333)
Burbot	- -		0.0254 (0.0099)		0.0254 (0.0099)
Sunfish spp.	- -				
Yellow Perch	0.0038 ---	0.0959 (0.0863)	0.0102 (0.0087)		0.0277 (0.0171)
Walleye	0.0066 (0.0020)	0.0085 (0.0058)	0.0086 (0.0024)		0.0080 (0.0018)
Cisco/Whitefish					

Table 9 continued. Estimates of catch (encounter rates for Northern Pike) and harvest rates of selected species for targeting darkhouse spearers by stratum during the winter season on Leech Lake, Minnesota, 2019-2020.

	Stratum				
Species	December	January	February	March	Season
			Catch per Angler Hour (Darkhouse Spearers)		
Northern Pike	0.0484 (0.0250)	0.0836 ---	0.1752 ---		0.1038 (0.0322)
Burbot	- -				
Sunfish spp.	- -				
Yellow Perch	4.0435 ---		0.1752		2.2410 (1.9980)
Walleye	- -				
Cisco/Whitefish					
			Harvest per Angler Hour (Darkhouse Spearers)		
Northern Pike	0.0484 (0.0250)	0.0836 ---			0.1038 (0.0322)
Burbot	- -				
Sunfish spp.	- -				
Yellow Perch	0.3976 ---				0.3976 (0.3545)
Walleye	- -				
Cisco/Whitefish					

Table 10. Percent of all parties who harvested a given number of fish by stratum from Leech Lake, Minnesota, December 9th, 2019 – March 17th, 2020.

Species/stratum		Number Harvested per Angler					
Northern Pike	N	0	0.1-0.9	1.0-1.9	2.0-2.9	3.0-9.9	10
December	124	93.5%	5.6%	0.8%	0.0%	0.0%	0.0%
January	91	94.5%	4.4%	1.1%	0.0%	0.0%	
February	259	97.7%	1.5%	0.4%	0.4%	0.0%	
March	155	100.0%	0.0%	0.0%	0.0%	0.0%	
Season	629	97.0%	2.4%	0.5%	0.2%	0.0%	
Yellow Perch	**N**	0	0.1-4.9	5.0-9.9	10.0-14.9	15.0-19.9	20
December	124	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
January	91	84.6%	11.0%	3.3%	1.1%	0.0%	0.0%
February	259	93.1%	4.6%	1.5%	0.4%	0.4%	0.0%
March	155	38.7%	26.5%	18.1%	11.0%	1.9%	3.9%
Season	629	78.4%	11.1%	5.9%	3.0%	0.6%	1.0%
Walleye	**N**	0	0.1-0.9	1.0-1.9	2.0-2.9	3.0-3.9	4
December	124	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
January	91	81.3%	3.3%	6.6%	4.4%	1.1%	3.3%
February	259	83.4%	7.7%	4.2%	2.3%	1.2%	1.2%
March	155	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Season	629	85.4%	5.9%	4.0%	1.9%	1.1%	1.7%

Northern pike: 10 fish in possession, 22"-26" Protected slot, 2 fish over 26 inches allowed in possession (statewide regulation).
Yellow perch: 20 fish daily, 40 in possession, no length limit (statewide regulation).
Walleye: 4 fish in possession, only 1 fish over 20 inches allowed in possession (special regulation).

Table 11. Percent of targeting parties who harvested a given number of fish by stratum from Leech Lake, Minnesota, December 9th, 2019 – March 17th, 2020.

Species/stratum		Number Harvested per Angler					
Northern Pike	N	0	0.1-0.9	1.0-1.9	2.0-2.9	3.0-9.9	10
December	3	33.3%	66.7%	0.0%	0.0%	0.0%	0.0%
January	3	33.3%	33.3%	33.3%	0.0%	0.0%	
February	7	57.1%	28.6%	0.0%	14.3%	0.0%	
March	0	0.0%	0.0%	0.0%	0.0%	0.0%	
Season	13	46.2%	38.5%	7.7%	7.7%	0.0%	
Yellow Perch	**N**	0	0.1-4.9	5.0-9.9	10.0-14.9	15.0-19.9	20
December	25	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
January	17	52.9%	29.4%	11.8%	5.9%	0.0%	0.0%
February	47	74.5%	14.9%	6.4%	2.1%	2.1%	0.0%
March	136	30.9%	29.4%	20.6%	12.5%	2.2%	4.4%
Season	225	45.8%	25.8%	15.6%	8.4%	1.8%	2.7%
Walleye	**N**	0	0.1-0.9	1.0-1.9	2.0-2.9	3.0-3.9	4
December	80	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
January	49	69.4%	2.0%	12.2%	8.2%	2.0%	6.1%
February	131	74.0%	13.7%	3.1%	4.6%	2.3%	2.3%
March	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Season	260	69.6%	12.3%	6.5%	4.6%	2.7%	4.2%

Northern pike: 10 fish in possession, 22"-26" Protected slot, 2 fish over 26 inches allowed in possession (statewide regulation).
Yellow perch: 20 fish daily, 40 in possession, no length limit (statewide regulation).
Walleye: 4 fish in possession, only 1 fish over 20 inches allowed in possession (special regulation).

Table 12. Observed length-frequency distribution of fish harvested and released for Leech Lake, Minnesota, December 9th, 2019 – March 17th, 2020.

Observered Number Harvested (H) and Released (R)						
	Northern Pike		Burbot		Sunfish	
TL (inches)	H	R	H	R	H	R
<4.00	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
4.00-4.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
5.00-5.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	5 (24%)
6.00-6.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	10 (48%)
7.00-7.99	- (0%)	(0%)	- (0%)	- (0%)	(0%)	6 (29%)
8.00-8.99	- (0%)	(0%)	- (0%)	2 (1%)	10 (24%)	(0%)
9.00-9.99	- (0%)	- (0%)	(0%)	- (0%)	21 (51%)	(0%)
10.00-10.99	- (0%)	1 (1%)	(0%)	- (0%)	10 (24%)	- (0%)
11.00-11.99	- (0%)	- (0%)	(0%)	- (0%)	- (0%)	- (0%)
12.00-12.99	- (0%)	2 (1%)	(0%)	3 (2%)	- (0%)	- (0%)
13.00-13.99	- (0%)	(0%)	(0%)	1 (1%)	- (0%)	- (0%)
14.00-14.99	- (0%)	(0%)	2 (5%)	3 (2%)	- (0%)	- (0%)
15.00-15.99	(0%)	1 (1%)	1 (3%)	6 (4%)	- (0%)	- (0%)
16.00-16.99	(0%)	2 (1%)	(0%)	6 (4%)	- (0%)	- (0%)
17.00-17.99	(0%)	(0%)	2 (5%)	2 (1%)	- (0%)	- (0%)
18.00-18.99	(0%)	5 (3%)	4 (10%)	19 (14%)	- (0%)	- (0%)
19.00-19.99	(0%)	3 (2%)	1 (3%)	10 (7%)	- (0%)	- (0%)
20.00-20.99	1 (4%)	20 (14%)	3 (8%)	23 (17%)	- (0%)	- (0%)
21.00-21.99	6 (25%)	2 (1%)	1 (3%)	9 (6%)	- (0%)	- (0%)
22.00-22.99	1 (4%)	9 (6%)	5 (13%)	12 (9%)	- (0%)	- (0%)
23.00-23.99	(0%)	8 (5%)	2 (5%)	6 (4%)	- (0%)	- (0%)
24.00-24.99	5 (21%)	36 (25%)	6 (15%)	15 (11%)	- (0%)	- (0%)
25.00-25.99	2 (8%)	12 (8%)	1 (3%)	5 (4%)	- (0%)	- (0%)
26.00-26.99	3 (13%)	23 (16%)	4 (10%)	3 (2%)	- (0%)	- (0%)
27.00-27.99	2 (8%)	7 (5%)	1 (3%)	(0%)	- (0%)	- (0%)
28.00-28.99	(0%)	4 (3%)	2 (5%)	6 (4%)	- (0%)	- (0%)
29.00-29.99	4 (17%)	(0%)	2 (5%)	2 (1%)	- (0%)	- (0%)
30.00-30.99	(0%)	6 (4%)	1 (3%)	4 (3%)	- (0%)	- (0%)
31.00-31.99	(0%)	(0%)	- (0%)	- (0%)	- (0%)	- (0%)
32.00-32.99	(0%)	2 (1%)	1 (3%)	- (0%)	- (0%)	- (0%)
33.00-33.99	(0%)	(0%)	- (0%)	- (0%)	- (0%)	- (0%)
34.00-34.99	(0%)	2 (1%)	- (0%)	1 (1%)	- (0%)	- (0%)
35.00-35.99	(0%)	(0%)	- (0%)	- (0%)	- (0%)	- (0%)
36.00-36.99	- (0%)	1 (1%)	- (0%)	1 (1%)	- (0%)	- (0%)
37.00-37.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
38.00-38.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
39.00-39.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
≥40.00	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
Total (N)	24 (100%)	146 (100%)	39 (100%)	139 (100%)	41 (100%)	21 (100%)

Table 12 continued. Observed length-frequency distribution of fish harvested and released for Leech Lake, Minnesota, December 9th, 2019 – March 17th, 2020.

Observed Number Harvested (H) and Released (R)						
	Yellow Perch		Walleye		Cisco/Whitefish	
TL (inches)	H	R	H	R	H	R
<4.00	- (0%)	286 (7%)	- (0%)	- (0%)	- (0%)	- (0%)
4.00-4.99	(0%)	1,114 (26%)	- (0%)	2 (1%)	- (0%)	- (0%)
5.00-5.99	(0%)	1,014 (23%)	- (0%)	(0%)	- (0%)	(0%)
6.00-6.99	3 (0%)	1,142 (26%)	- (0%)	2 (1%)	- (0%)	(0%)
7.00-7.99	21 (1%)	464 (11%)	(0%)	5 (1%)	- (0%)	(0%)
8.00-8.99	141 (8%)	235 (5%)	(0%)	10 (3%)	- (0%)	2 (6%)
9.00-9.99	499 (29%)	55 (1%)	(0%)	6 (2%)	(0%)	(0%)
10.00-10.99	355 (21%)	12 (0%)	3 (1%)	58 (17%)	1 (1%)	4 (11%)
11.00-11.99	451 (26%)	6 (0%)	9 (3%)	40 (12%)	3 (3%)	4 (11%)
12.00-12.99	132 (8%)	3 (0%)	31 (12%)	57 (17%)	1 (1%)	8 (23%)
13.00-13.99	75 (4%)	(0%)	51 (20%)	16 (5%)	4 (4%)	4 (11%)
14.00-14.99	28 (2%)	- (0%)	60 (23%)	21 (6%)	20 (18%)	8 (23%)
15.00-15.99	1 (0%)	- (0%)	27 (10%)	7 (2%)	20 (18%)	(0%)
16.00-16.99	- (0%)	- (0%)	18 (7%)	6 (2%)	28 (25%)	3 (9%)
17.00-17.99	- (0%)	- (0%)	13 (5%)	6 (2%)	18 (16%)	(0%)
18.00-18.99	- (0%)	- (0%)	9 (3%)	5 (1%)	7 (6%)	1 (3%)
19.00-19.99	- (0%)	- (0%)	10 (4%)	3 (1%)	6 (5%)	(0%)
20.00-20.99	- (0%)	- (0%)	6 (2%)	11 (3%)	3 (3%)	1 (3%)
21.00-21.99	- (0%)	- (0%)	4 (2%)	13 (4%)	(0%)	- (0%)
22.00-22.99	- (0%)	- (0%)	5 (2%)	14 (4%)	(0%)	- (0%)
23.00-23.99	- (0%)	- (0%)	2 (1%)	18 (5%)	(0%)	- (0%)
24.00-24.99	- (0%)	- (0%)	5 (2%)	10 (3%)	(0%)	- (0%)
25.00-25.99	- (0%)	- (0%)	2 (1%)	7 (2%)	- (0%)	- (0%)
26.00-26.99	- (0%)	- (0%)	3 (1%)	13 (4%)	- (0%)	- (0%)
27.00-27.99	- (0%)	- (0%)	1 (0%)	9 (3%)	- (0%)	- (0%)
28.00-28.99	- (0%)	- (0%)	1 (0%)	5 (1%)	- (0%)	- (0%)
29.00-29.99	- (0%)	- (0%)	- (0%)	(0%)	- (0%)	- (0%)
30.00-30.99	- (0%)	- (0%)	- (0%)	(0%)	- (0%)	- (0%)
31.00-31.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
32.00-32.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
33.00-33.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
34.00-34.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
35.00-35.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
36.00-36.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
37.00-37.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
38.00-38.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
39.00-39.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
40.00-40.99	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)	- (0%)
Total (N)	1,706 (100%)	4,331 (100%)	260 (100%)	344 (100%)	111 (100%)	35 (100%)

Table 13. Catch rates of selected species during winter creel on Leech Lake, Minnesota, 2004-2020.

	2004-2005	2005-2006[a]	2010-2011[a]	2014-2015[b]	2015-2016[b]	2019-2020[c]	2004-2020 Mean
				Catch per Angler Hour (all anglers)			
Northern pike	0.0128	0.0221	0.0082	0.0377	0.0271	0.0084	0.0194
Burbot	0.0050	0.0179	0.0060	0.0067	0.0064	0.0086	0.0084
Yellow Perch	0.7173	2.5589	2.5753	1.8548	1.0582	0.2944	1.5098
Walleye	0.0378	0.0125	0.0744	0.1398	0.1143	0.0298	0.0681
Cisco/Whitefish	0.0040	0.0022	0.0398	0.0156	0.0084	0.0072	0.0129
				Catch per Angler Hour (targeting anglers)			
Northern pike	0.0798	0.0493	0.0353	0.1607	0.0466	0.0530	0.0708
Burbot	0.0160	0.1195	0.5977	0.7904	0.1071	0.0639	0.2824
Yellow Perch	2.3132	4.0329	3.0585	2.4439	2.2964	1.3352	2.5800
Walleye	0.0781	0.0233	0.1299	0.1784	0.1132	0.0343	0.0929
Cisco/Whitefish	1.5000	-	3.3523	0.4244	0.1290	0.1725	1.1156

[a]18-26" Walleye protected slot limit

[b]20-26" Walleye protected slot limit

[c]Walleye: 4 fish in possession, only 1 fish over 20 inches allowed in possession (special regulation).

Table 14. Percentage of total angler effort by hometown distance category for winter creel on Leech Lake, Minnesota, 2004-2020.

Angler Group	Hometown Distance	2004-2005	2005-2006	2010-2011	2014-2015	2014-2015	2019-2020
Angling Pressure							
Local	0-99	52,524	40,449	181,562	358,151	240,976	113,857
Metro	100-249	42,410	25,529	134,225	258,864	282,465	90,291
Desination	>250	28,963	19,780	31,766	30,787	44,899	16,055

Table 15. Angler effort by hometown distance category for winter creel on Leech Lake, Minnesota, 2004-2020.

Angler Group	Hometown Distance	2004-2005	2005-2006	2010-2011	2014-2015	2014-2015	2019-2020
		Angling Pressure					
Local	0-99	46%	59%	52%	55%	42%	52%
Metro	100-249	37%	37%	39%	40%	50%	41%
Desination	>250	25%	29%	9%	5%	8%	7%

Table 16. Angler survey question responses for winter creel on Leech Lake, Minnesota, 2019-2020.

Q1. On a scale of 1-5, how would you rate your **fishing success** today? 1 is low and 5 is high.						
2019	N	1	2	3	4	5
December	101	44.6%	12.9%	15.8%	12.9%	13.9%
January	115	48.7%	8.7%	14.8%	13.9%	13.9%
February	335	48.7%	11.0%	10.7%	11.3%	18.2%
March	206	30.6%	12.1%	20.9%	11.2%	25.2%
Season	757	43.2%	11.2%	14.8%	11.9%	18.9%

Q1. On a scale of 1 to 5, with 5 being the highest, how satisfied were you with your **fishing experience** today?						
2016	N	1	2	3	4	5
December	0	0.0%	0.0%	0.0%	0.0%	0.0%
January	397	24.7%	13.9%	20.9%	21.7%	18.9%
February	408	22.5%	12.5%	21.6%	18.4%	25.0%
March	91	17.6%	11.0%	12.1%	22.0%	37.4%
Season	896	23.0%	12.9%	20.3%	20.2%	23.5%

Q2. Script A.On a scale of 1 to 5, how much would you support or oppose changing the statewide walleye bag limit from 6 fish to 4, but keeping the possession limit at 6? 1 is strongly oppose and 5 is strongly support.						
2019	**N**	1	2	3	4	5
December	62	6.5%	0.0%	35.5%	12.9%	45.2%
January	57	10.5%	3.5%	24.6%	24.6%	36.8%
February	145	8.3%	4.8%	24.8%	29.7%	32.4%
March	111	10.8%	8.1%	13.5%	24.3%	43.2%
Season	375	9.1%	4.8%	23.2%	24.5%	38.4%

Q2. Scripte B. On a scale of 1 to 5, how much would you support or oppose changing the statewide walleye bag limit from 6 fish to 4? 1 is strongly oppose and 5 is strongly support.						
2019	**N**	1	2	3	4	5
December	39	5.1%	0.0%	15.4%	17.9%	61.5%
January	57	7.0%	0.0%	17.5%	5.3%	70.2%
February	190	12.6%	0.0%	12.6%	6.8%	67.9%
March	95	16.8%	0.0%	6.3%	0.0%	76.8%
Season	381	12.1%	0.0%	12.1%	6.0%	69.8%

FIGURES

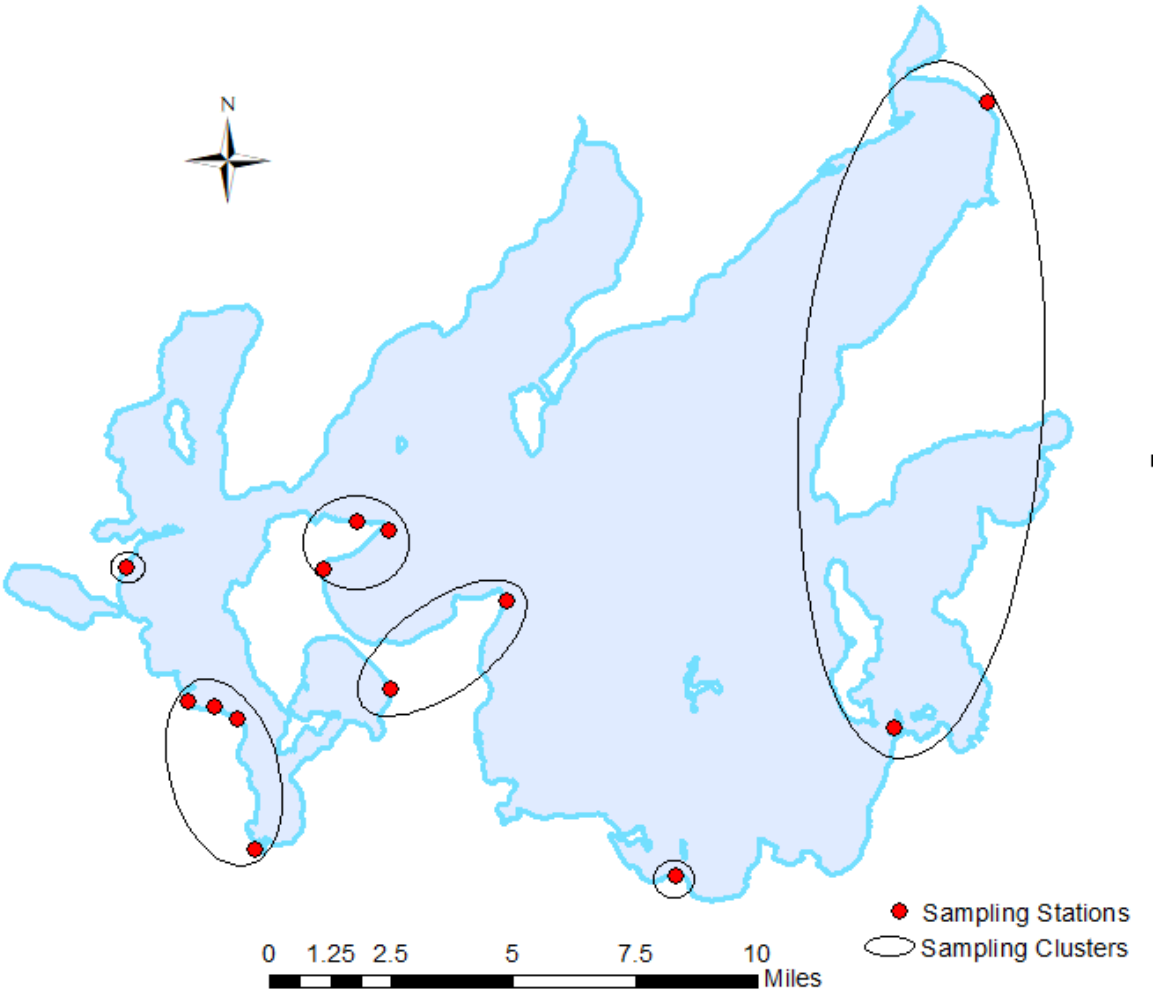

Figure 1.Winter creel survey sampling clusters (circles) and stations (dots) on Leech Lake, Minnesota.

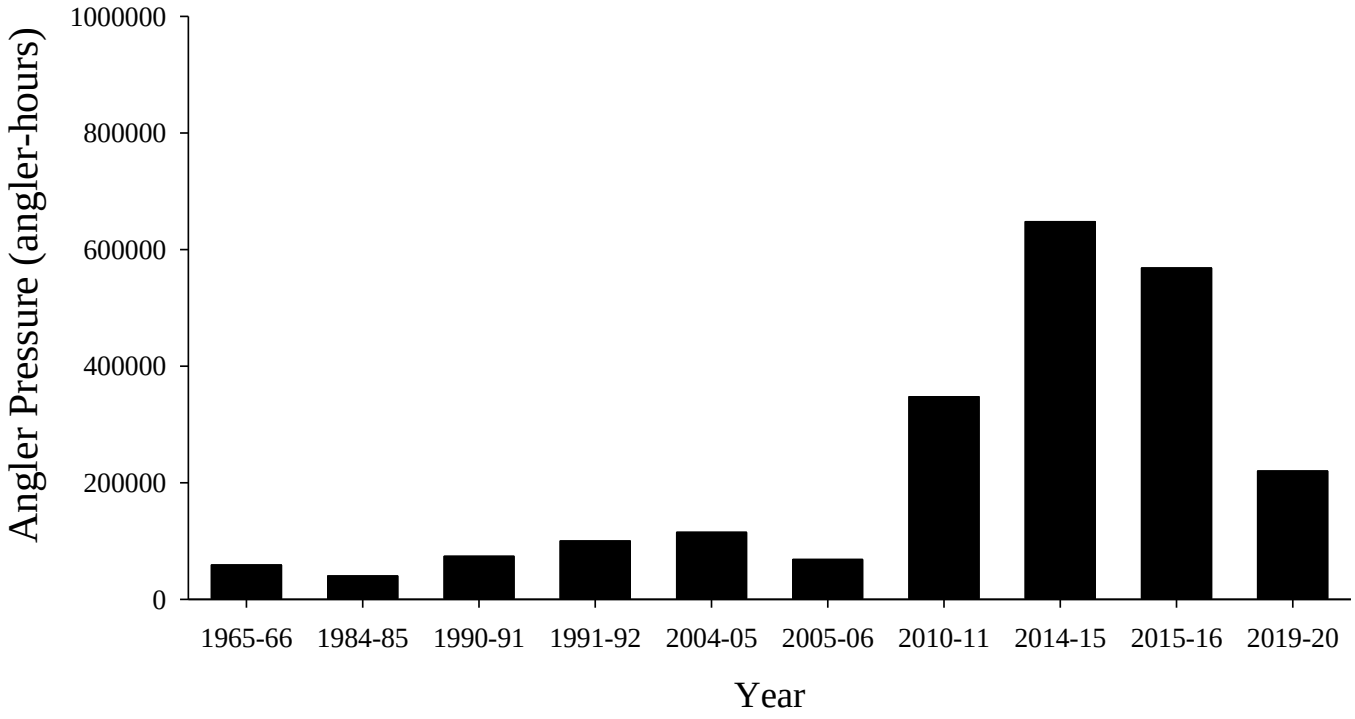

Figure 2. Total fishing pressure (angler-hours) by Leech Lake anglers in winter season, 1965-2020

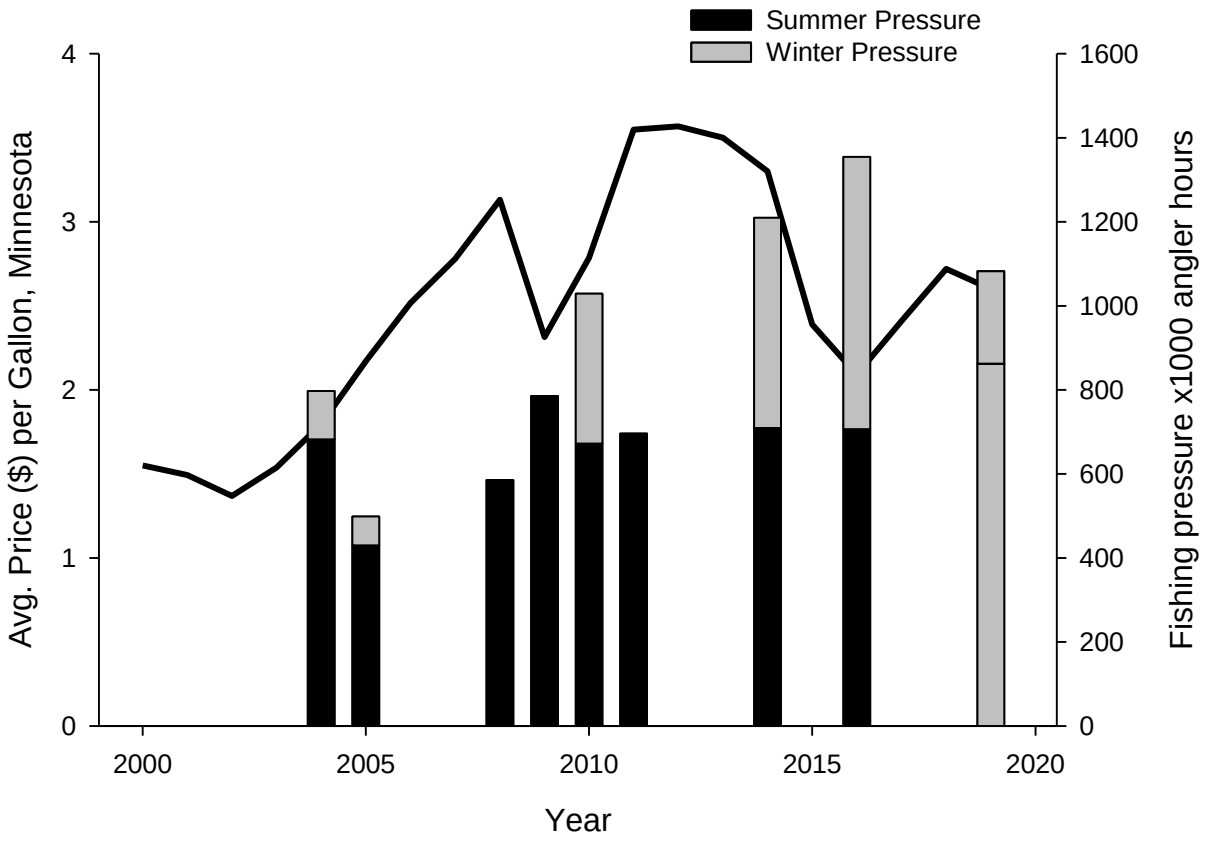

Figure 3. Average price ($) per gallon of regular gasoline in Minnesota, January 2001 – January 2020 (EIA 2020). The horizontal line depicts the 10-year average.

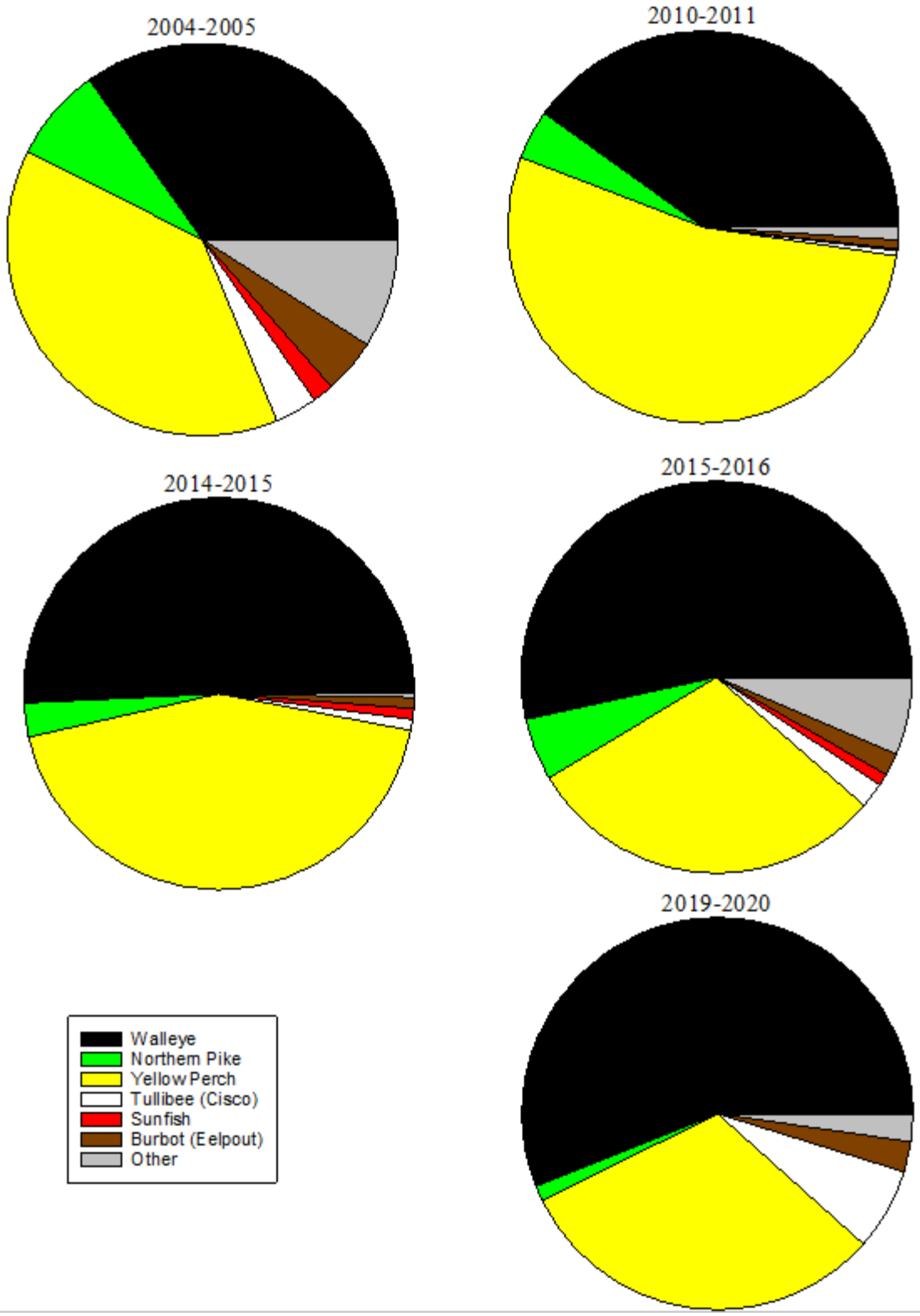

Figure 4. Mean distribution of species targeted by angling parties interviewed during winter creel surveys on Leech Lake, 2004-2020.

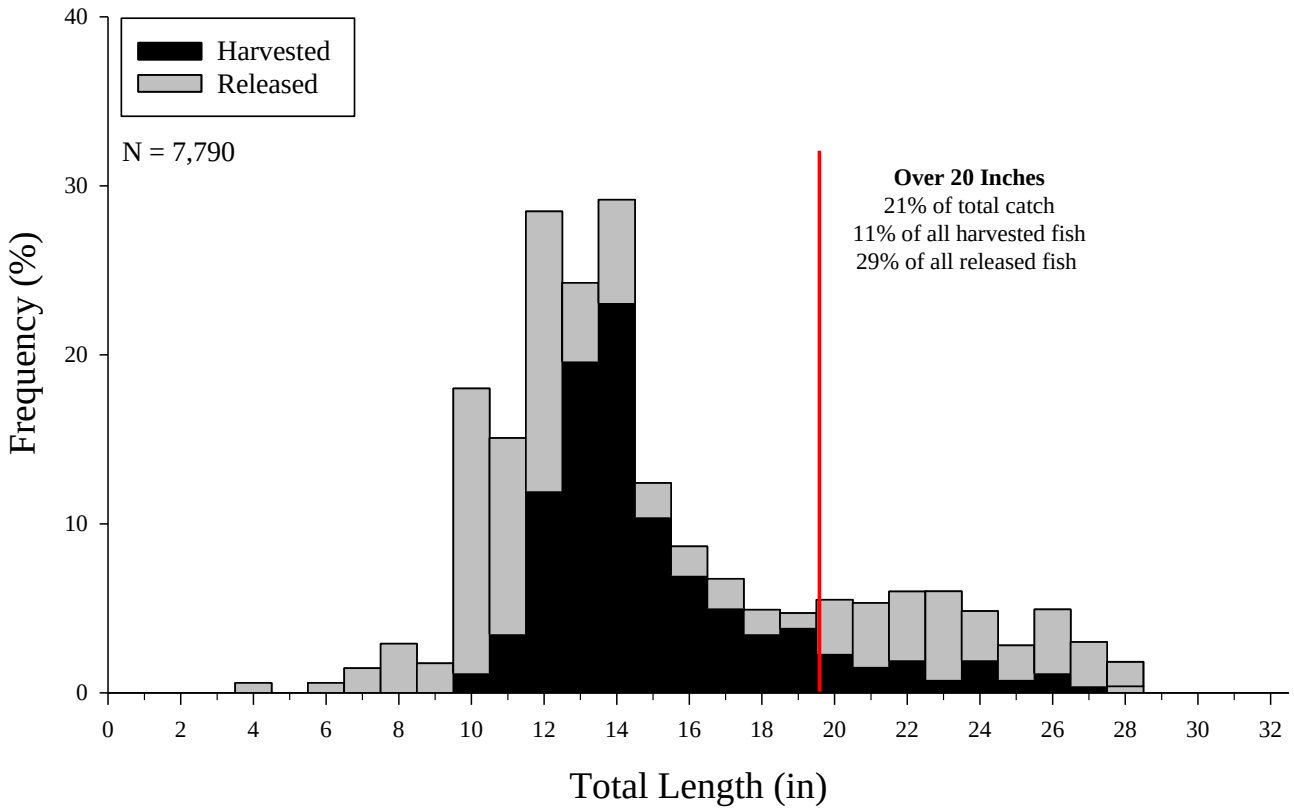

Figure 5. Length frequency distribution (% of observed catch) of harvested and released Walleye on Leech Lake, MN during the 2019-2020 winter creel. Red line denotes the 20 inch length bin. The Walleye regulation on Leech Lake during the winter season was a possession limit of 4, only one of which can be over 20 inches. Of the total catch 21% was over 20 inches, 29% of the released fish and 11% of the harvested fish were above 20 inches.

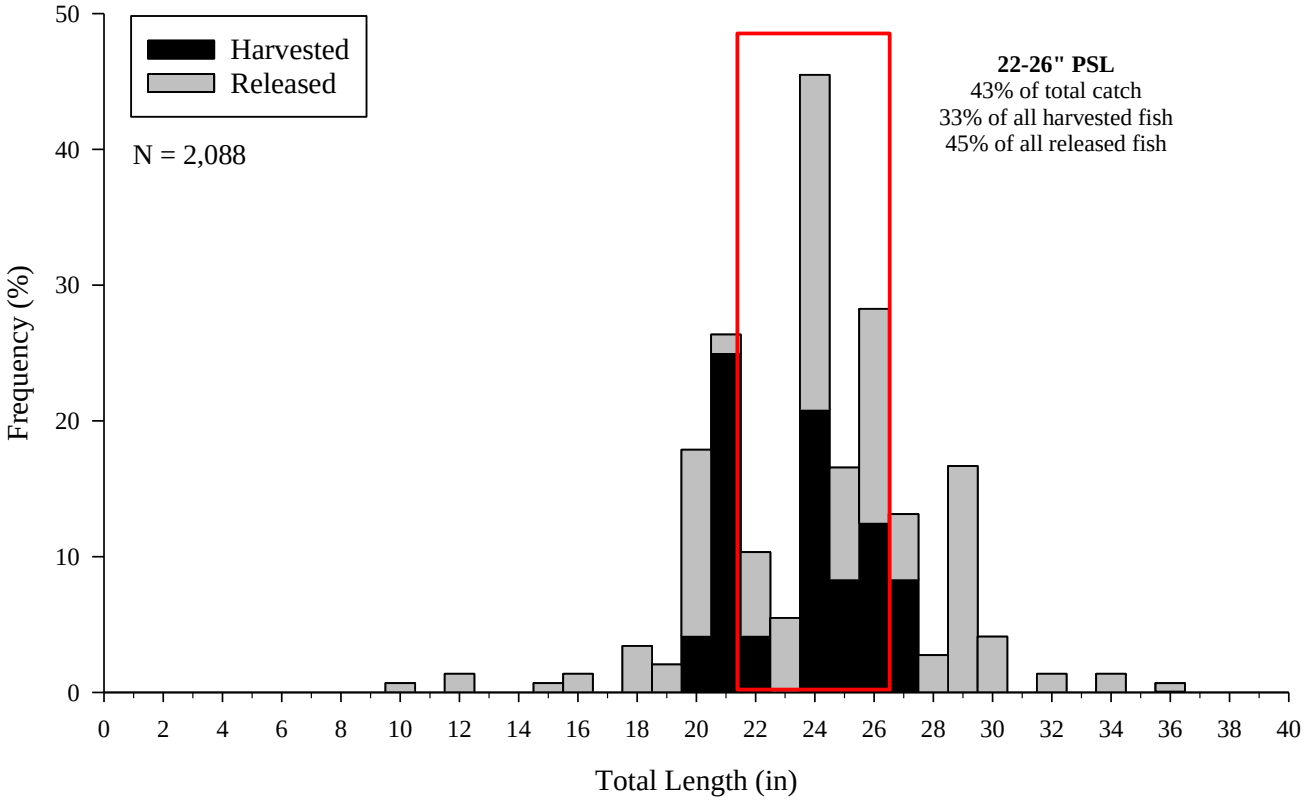

Figure 6. Length frequency distribution (% of observed catch) of harvested and released Northern Pike on Leech Lake, MN during 2019-2020 winter creel. The Northern Pike regulation is a bag limit of 10, with not more than two pike longer than 26 inches; and all from 22 to 26 inches must be released. Northern Pike taken by spearing follow the same rules except one pike may be between 22 and 26 inches or two larger than 26 inches. Of the total catch 43% was within the protected slot limit (PSL), 33% of the harvested fish and 45% of the released fish were within the PSL.

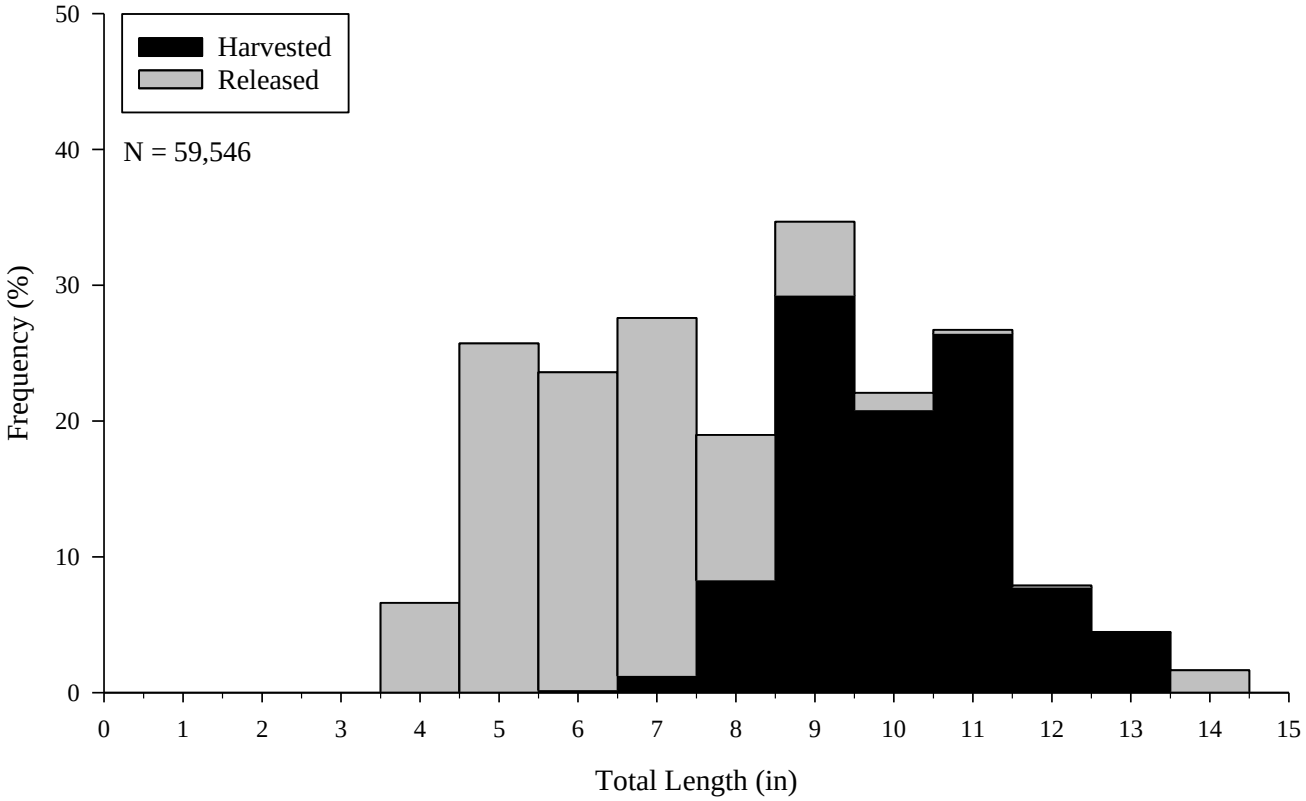

Figure 7. Length frequency distribution (% of observed catch) of harvested and released Yellow Perch on Leech Lake, MN during 2019-2020 winter creel.

Minnesota Department of Natural Resources
Section of Fisheries

Creel Survey Summary for Leech Lake, Minnesota

Fish Management Area: Walker

Year Surveyed: December 9th, 2019 – March 17th 2020

Angling Pressure	
Angler-hours	220,203
Angler-hours/acre	1.97
Anglers/party	Day-Trip-2.21; Sleeperhouse- 2.54; Darkhouse- 1.81
Mean Trip Length (h)	Day-Trip-4.39; Sleeperhouse- 33.61; Darkhouse- 6.46

	Catch (number)		Harvest (number)		Harvest (pounds)	
Species	Total N	N/acre	Total N	N/acre	Total lbs.	N/acre
Bowfin	-	-	-	-	-	-
Bullhead spp.	-	-	-	-	-	-
Northern Pike	2,088	0.02	254	0.00	750	0.01
Muskellunge	20	0.00		-		-
Burbot	2,614	0.02	403	0.00	993	0.01
Rock bass	83	0.00		-		-
Sunfish spp.	479	0.00	317	0.00	155	0.00
Smallmouth Bass	59	0.00		-		-
Largemouth bass	8	0.00		-		-
Black Crappie	8	0.00	8	0.00		-
Yellow Perch	59,546	0.53	17,854	0.16	3,808	0.03
Walleye	7,790	0.07	3,365	0.03	4,667	0.04
Cisco/Whitefish	1,582	0.01	1,247	0.01	1,774	0.02
		-		-		-
All species	74,278	0.67	23,449	0.21	12,147	0.11

	Catch Rate (fish/hour)		Harvest Rate (fish/hour)	
	Angler Type		Angler Type	
Species	Daytrip	Sleeper House	Daytrip	Sleeper House
Bowfin	-	-	-	-
Bullhead spp.	-	-	-	-
Northern Pike	0.0176	0.0068	0.0020	0.0009
Muskellunge	0.0004			
Burbot	0.0112	0.0121	0.0032	0.0014
Rock Bass	0.0009	0.0002	-	
Sunfish spp.	0.0088		0.0058	
Smallmouth Bass	0.0006	0.0002		
Largemouth Bass	0.0001			
Black Crappie	0.0001		0.0001	
Yellow Perch	1.0093	0.0269	0.3147	0.0042
Walleye	0.0705	0.0238	0.0375	0.0080
Cisco/Whitefish	0.0273	0.0003	0.0219	0.0002

Creel Survey Summary for Leech Lake, Minnesota

Length Frequency Summary for the estimated number of fish harvested (inch groups)

Species	0.0-4.9	5.0-8.9	9.0-12.9	13.0-16.9	17.0-20.9	21.0-24.9	25.0-29.9	≥30.0
Bowfin	-	-	-	-	-	-	-	-
Bullhead spp.								
Northern Pike					11	127	116	
Muskellunge								
Burbot				31	103	145	103	20
Rock Bass								
Sunfish spp.		77	240					
Smallmouth Bass								
Largemouth Bass								
Black Crappie				8				
Yellow Perch		1,727	15,039	1,088				
Walleye			557	2,019	492	207	91	
Cisco/Whitefish			56	809	382			

Comments:

Citation: Pedersen, C. A. 2020. Winter Creel Survey for Leech Lake, 2019-2020. Minnesota Department of Natural Resources, Section of Fisheries, Study 4, Job 1079.