

Minnesota
Study 4
Job 835
March 2010

**Minnesota Department of Natural Resources
Division of Fisheries and Wildlife**

Completion Report

**Summer Creel Survey Report
for
Leech Lake
2009**

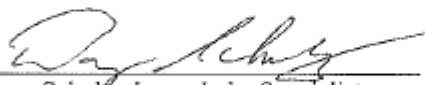
by

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Funded under Federal Aid by the Sport Fish Restoration Act, F-29-R(P)-29, Study 4, Job 835.

**Completion Report
Summer Creel Survey
Leech Lake
2009**

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TABLE OF CONTENTS

TABLE OF CONTENTS	3
INTRODUCTION	5
STUDY AREA	6
METHODS	6
CREEL STRATA	7
ESTIMATION OF ANGLING PRESSURE AND CATCH STATISTICS	7
RESULTS	8
ANGLING PRESSURE.....	8
CATCH AND HARVEST.....	9
DISCUSSION	11
LITERATURE CITED	13
TABLES	15
Table 1. Creel survey sampling summary and angling pressure estimates by stratum for Leech Lake, Minnesota, 9 May – 30 September, 2009. Standard errors appear in parentheses.....	16
Table 2. Estimated total angling pressure and total catch statistics for the summer open water creel season on Leech Lake, Minnesota, 1965-2009.....	17
Table 3. Hometown distances of anglers fishing Leech Lake, Minnesota relative to Walker, MN, 9 May – 30 September 2009.....	19
Table 4. State of residence of anglers fishing Leech Lake, Minnesota, 9 May – 30 September 2009.	19
Table 5. Frequencies (%) of species targeted by boat parties during each stratum for Leech Lake, Minnesota, 9-May – 30 September 2009.	20
Table 6. Catch and harvest estimates by stratum for the open water creel survey on Leech Lake, Minnesota, 2009. Standard errors are in parentheses.....	21
Table 7. Yield estimates and mean weights of harvested fish by stratum for Leech Lake, Minnesota, 9 May – 30 September 2009. Standard errors are in parentheses.....	23
Table 8. Estimates of catch and harvest rates of selected species for all anglers by stratum during the open water season on Leech Lake, Minnesota, 2009.	25
Table 9. Estimates of catch and harvest rates of selected species for targeting anglers by stratum during the open water season on Leech Lake, Minnesota, 2009.....	27

Table 10. Percent of all angling parties who harvested a given number of fish by stratum from Leech Lake, Minnesota, 9 May – 30 September 2009.....	29
Table 11. Percent of targeting angling parties who harvested a given number of fish by stratum from Leech Lake, Minnesota, 9 May – 30 September 2009.....	30
Table 12. Length-frequency distribution (%) of harvested and released fish for Leech Lake, Minnesota, 9 May – 30 September 2009.	31

FIGURES.....33

Figure 1. Creel survey sampling clusters (circles) and stations (dots) on Leech Lake, Minnesota.....	34
Figure 2. Weekly price (\$) per gallon of regular gasoline in Minnesota, February 2000 – January 2009 (EIA 2010). The horizontal line depicts the 10-year average.	35
Figure 3. Median distance (miles + 95% CI) traveled by Leech Lake anglers interviewed during summer creel surveys, 1998-2009.	36

APPENDIX.....37

Table A1. Creel survey sampling summary and angling pressure estimates by month and basin for Leech Lake, Minnesota, 9 May – 30 September, 2009. Standard errors appear in parentheses.....	38
Table A2. Catch and harvest estimates by month in the western bays basin (17,927 acres) of Leech Lake, 9 May – 30 September 2009.	39
Table A3. Catch and harvest estimates by month in the main lake basin (93,914 acres) of Leech Lake, 9 May – 30 September 2009.	40
Table A4. Monthly estimates of catch and harvest rates of all anglers in the western bays basin of Leech Lake, 9 May – 30 September 2009.....	41
Table A5. Monthly estimates of catch and harvest rates of all anglers in the main lake basin of Leech Lake, 9 May – 30 September 2009.....	42
Table A6. Monthly estimates of catch and harvest rates of targeting anglers in the western bays basin of Leech Lake, 9 May – 30 September 2009.....	43
Table A7. Monthly estimates of catch and harvest rates of targeting anglers in the main lake basin of Leech Lake, 9 May – 30 September 2009.	44

INTRODUCTION

In 1983, the Minnesota Department of Natural Resources increased its commitment to managing Leech Lake and other large walleye 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 outreach. (Wingate and Schupp 1984).

In conjunction with annual fish surveys, angler use and harvest information is collected using creel surveys typically conducted two consecutive years out of every six. On Leech Lake, survey results are used to estimate catch, harvest, and pressure statistics of the recreational fishery to document changes thereof. Yield estimates are compared to estimated target, or safe, harvest levels prescribed in Special Publication No. 151 (MDNR 1997). If yield estimates in a large lake routinely exceed established safe target harvest levels and the population exhibits signs of biological stress (Gangl and Pereira 2003) more restrictive regulations would be implemented to prevent a population collapse.

While Leech Lake is renown among anglers as an exceptional multi-species fishery, most anglers target and harvest walleye. During the 1998-99 open water seasons, anglers averaged 1.2 million angler hours and 174,000 pounds of harvested walleye per year (Sledge, 1999, 2000). However, several consecutive years without a large walleye year class caused declines in overall walleye abundance and an unbalanced population size structure; this in turn produced historically low levels of angler effort and walleye harvest during the 2004-2005 open water seasons (Rivers 2005, 2006). These changes to the walleye fishery, as well as stress responses in the yellow perch population, coincided with expanding populations of double-crested cormorants and invasive aquatic species such as rusty crayfish and Eurasian watermilfoil. As a result, an aggressive management plan was developed and implemented to improve fishing quality while benefiting the long-term sustainability of Leech Lake. Regarding the walleye population, management actions included protecting the spawning stock of adult walleye, increasing overall abundance of walleye in Leech Lake, improving the walleye population size structure, and establishing two good walleye year classes from 2005-2010. Strategies adopted to achieve these goals included a reduced bag and protected slot limit for walleye (PSL: 18-26" protected, four fish in possession, one longer than 26" allowed in possession) to reduce exploitation of walleye brood stock, double-crested cormorant control, and experimental stockings of marked walleye fry to evaluate walleye reproduction. The overall goal of this plan was to quickly improve the quality of walleye fishing on Leech Lake. In light of a substantial positive response of the walleye population to the implemented management actions (Schultz 2010), the MN DNR scheduled creel surveys in 2008 and 2009 preceding the normally scheduled surveys during 2010 and 2011 to further assess how improvements in the walleye population transcend to the recreational fishery.

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 approximately 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 congruent with oligotrophic lakes. The main portion of the lake, like most large Minnesota walleye lakes, is 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, in particular for 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 eutrophic bays supporting large areas of dense vegetation. Yellow perch *Perca flavescens* are abundant throughout the lake and are the primary forage for walleye and northern pike. Cisco *Coregonus artedii* and lake whitefish *C. clupeaformis* are an important forage base for muskellunge and trophy northern pike (Engstrom-Heg et al. 1986) and are typically found in the mesotrophic and oligotrophic areas. Other species present in the lake include: white sucker *Catostomus commersoni*, burbot *Lota lota*, rock bass *Ambloplites rupestris*, bowfin *Amia calva*, shorthead redhorse *Moxostoma macrolepidotum*, bullheads *Ameiurus spp.*, pumpkinseed *Lepomis gibbosus*, bluegill *L. macrochirus*, largemouth bass *Micropterus salmoides*, smallmouth bass *M. dolomieu*, and black crappie *Pomoxis nigromaculatus*.

METHODS

A non-uniform access-based creel survey using clusters of sampling stations was conducted on Leech Lake from 9 May through 30 September 2009; aerial boat counts were used for estimating fishing pressure (Rivers 2005).

Creel Strata

Sampling and data organization were stratified by day type (weekday and weekend/holiday), period (opening weekend and subsequent two-week intervals), and lake basin (western bays and main lake). Observed holidays included Memorial Day, Independence Day, and Labor Day. Statistics were calculated using the Creel Analysis 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 lakewide basis for better comparison with historical surveys and also monthly for determination of basin-specific estimates to compare against Rivers (2005, 2006). Post-release mortality of walleye, or hooking mortality (Reeves and Bruesewitz 2007), was determined during each two-week sampling period, with basins pooled, using the angler-reported length distribution of released walleye extrapolated to the total estimated number of released walleye and observed mean water temperature recorded daily by submerged temperature loggers.

Estimation of Angling Pressure and Catch Statistics

Angling pressure was estimated using aerial boat counts. Over the course of the creel season, flights were scheduled as three weekday flights per each week and one flight per each weekend/holiday days. Two additional weekend flights were also scheduled during the fishing opener (May 9 and 10) to increase the sample size for estimating pressure during the stratum. With the exception of the opening weekend, a minimum of 8 flights were scheduled within each stratum (Soupir et al. 2006). Flights canceled due to inclement weather were made up at the same time period during the first available day within the same strata (day type and creel period). In some cases flights were pre-flown based on the pending weather forecast to avoid losing sampling days, particularly towards the end of a sampling period.

For obtaining angler interviews, Leech Lake was divided into 14 clusters with each cluster containing two to four sampling stations (Figure 1). These stations included resorts, marinas, and public accesses. Two creel clerks were employed during this survey and each clerk was assigned to a separate group of clusters. Sampling days were randomly selected for each clerk except for the opening weekend (May 9 and 10) when both clerks were scheduled. The remaining survey schedule ensured that at least one clerk worked each day of the season. Non-uniform access probabilities were developed based on the frequency interviews were obtained at each location during the 2004 open water creel survey. Therefore, sampling clusters were randomly selected for each clerk based upon the probability of an angler completing a trip within a particular cluster. Sampling times were randomly selected with equal probability. A sampling day was divided into two non-overlapping periods of equal length, entirely covering daylight hours. The sampling day was 14 hours (0800-2200) from May through August and 12 hours (0800-2000) during September.

On a scheduled sampling day, each creel clerk sampled one cluster, visiting selected stations within the cluster. The clerks conducted as many interviews as possible,

collecting information on angler demographics, fishing effort, and catch. Clerks were given the latitude to deviate from the schedule and sample other stations within the assigned cluster more frequently if there was no or comparatively light angling pressure at an assigned station, or to move to the nearest available public landing if pressure within the assigned cluster was equally low. This was done to increase the number of angling parties interviewed by the clerk that day, and primarily occurred during May and September. During interviews, clerks identified and measured as many harvested fish as time allowed and remaining harvested fish were enumerated. Dorsal spines were removed from walleye for age estimation as described by Logsdon (2007). Species, number, and length of released fish were obtained through angler recollection. Bullhead species (brown, black, and yellow bullhead) were pooled because anglers were likely to misidentify these species. Similarly, bluegill and pumpkinseed sunfish were also pooled for analysis. Fish weight was estimated using length-weight regression formulas determined with historical gillnet data collected from 1983-2007.

To characterize walleye tournament catch, a creel clerk was assigned to interview tournament anglers for one hour of tournament weigh-in during each day of contest at either the beginning or the end of the clerk's scheduled work day. During interviews the clerk recorded party size, trip length, basin fished, and number and sizes of fish caught, but did not measure fish brought to the weigh-ins. To estimate tournament pressure, aerial boat counts were adjusted for tournament participants using the total number of participating boats reported to the Area office as required by the permit and the distribution of interviewed tournament participants among basins. No attempt was made to describe non-walleye tournaments independently during the analysis as the frequency and magnitude of these events was less than the walleye events.

RESULTS

Angling Pressure

A total of 1,973 Leech Lake angling parties were interviewed from 9 May through 30 September 2009 (Table 1). The estimated total angling pressure on Leech Lake during the summer fishing season was 794,708 angler-hours (Table 2; Schupp 1972; Gustafson 1985, 1986; Haukos 1992, 1993; Sledge 1999, 2000; Rivers 2005, 2006; Schultz 2009). This was approximately 200,000 angler-hours higher than the previous year (585,371 angler-hours; Schultz 2009) and is within the 1965-1999 range (697,267 – 1,290,339 angler-hours). Some of this can be contributed to an increased number of fishing tournaments held on Leech Lake during 2009. Three walleye events spanning a total of seven days of competition accounted for about 15,000 angler-hours of fishing pressure (Table 1). For comparison, walleye tournaments accounted for approximately 21,000 angler-hours on Mille Lacs Lake during 2009 (T. Jones, MN DNR, personal communication).

With the marked improvements in fishing quality, particularly for walleye, fishing effort has returned to the historical range (Table 2). Fuel prices were again above the 10-year

average (Figure 2) during the open water season and this could be influencing angler participation and travel patterns. Median distance traveled by anglers interviewed during the 2009 survey, as indexed using zip codes, was the lowest observed since zip code data was first collected in 1998 and less variable than other fishing seasons (Figure 3). Similarly, nearly 30% of anglers interviewed during 2009 traveled less than 50 miles to fish Leech Lake (Table 3). Most anglers interviewed were Minnesota residents (Table 4) and most angling parties targeted walleye (Table 5).

Catch and Harvest

An estimated 935,880 fish, or 8.39 fish/acre, were caught in Leech Lake during the 2009 summer creel season (Table 6), of which 277,046 were harvested (30% of total catch; 2.48 fish/acre). Most of the total catch and harvest was comprised of yellow perch (50% and 46%, respectively) and walleye (28% and 31%, respectively). The highest stratum-specific estimates of total catch (166,113 fish) and harvest (52,888 fish) occurred during May.

Total yield during the 2009 summer creel season was estimated to be 217,594 pounds of fish (1.95 lbs/acre; Table 7) and are similar to 2008 estimates (Schultz 2009). During 2009, the overall catch and harvest rates across all anglers were 1.201 and 0.356 fish/hour, respectively (Table 8), compared to respective average catch and harvest rates of 1.023 and 0.260 fish/hour across all anglers and species during 2004-2005 (Rivers 2005, 2006) and 1.368 and 0.477 fish/hour during 2008 (Schultz 2009). Basin-specific estimates of fishing effort, catch, and harvest are summarized in the appendix (Tables A1-A7).

Walleye

An estimated 85,902 walleye (96,762 pounds) were harvested during 2009 at a rate of 0.110 walleye/hour across all anglers (Table 2). An estimated 4,660 harvested walleye (10,334 pounds) were within the 18-26 inch protected slot limit (PSL), nearly double the 2008 estimate. Inclusion of post-release hooking mortality (9,947 walleye; 27,002 pounds) increased the total walleye kill to 95,849 fish (123,764 pounds).

The seasonal catch and harvest rates of walleye were 0.339 fish/hour and 0.110 fish/hour, respectively, across all anglers (Table 8). Seasonal walleye catch and harvest rates for anglers specifically targeting walleye were 0.987 fish/hour and 0.242 fish/hour, respectively (Table 9). The frequency of angling parties that harvested a limit of walleye was highest during May (Tables 10 and 11).

The average harvested walleye was 15.05 inches long and weighed approximately 1.13 pounds (Table 7). Lengths of walleye caught by anglers ranged from 5-30 inches (Table 12); creel clerks measured 2,295 harvested walleye and anglers reported lengths on another 6,656 released walleye. Based on length, most walleye harvested appear to be from the 2006 and 2007 year classes as the 2005 year class grew into the PSL.

Northern pike

An estimated 10,890 northern pike (33,588 pounds) were harvested at a rate of 0.014 fish/hour across all anglers during 2009 (Table 2), both of which are below the historical averages. This could be due in large part to the success anglers were experiencing with walleye fishing, as a mere 6% of angling parties interviewed during the creel survey specifically targeted northern pike, whereas 58% of angling parties targeted walleye (Table 5). Northern pike catch and harvest rates (fish/hour) were highest during July (Tables 8 and 9). Only one angling party harvested a limit of northern pike during 2009 and this occurred during May (Tables 10 and 11).

Harvested northern pike averaged 23.73 inches long and 3.08 pounds (Table 7). While lengths of northern pike caught by anglers ranged from 10 to 37 inches, pike 21 to 30 inches were more likely to be harvested (Table 12).

Yellow perch

An estimated 126,476 yellow perch (54,733 pounds) were harvested at a rate of 0.162 fish/hour across all anglers during 2009 (Table 2). While overall harvest remains below the long-term average, the harvest rate of targeting anglers was again above its respective average. Catch and harvest of yellow perch was highest during September (Tables 6 and 7) as were catch and harvest rates (Tables 8 and 9) and the frequencies of angling parties that harvested a limit of yellow perch (Tables 10 and 11).

Yellow perch caught by anglers ranged in length from less than <4 to 13 inches in length (Table 12). The average size of yellow perch harvested was 9.59 inches long and weighed 0.43 pounds (Table 7), and harvested yellow perch were usually 8.0 inches or longer.

Muskellunge

No muskellunge harvest was observed by creel clerks during 2009 (Table 2). Angler catch rates were 0.001 fish/hour across all anglers and 0.013 fish/hour for targeting anglers, or about half of the 2008 estimate (Schultz 2009). However, both statistics are within the historical range for the Leech Lake muskellunge fishery. A total of 19 muskellunge were reported released by interviewed angling parties, ranging in length from 22 to 50 inches.

Largemouth bass

Approximately 1,243 largemouth bass (2,141 pounds) were harvested at a rate of 0.002 fish/hour across all anglers during the 2009 summer season (Tables 2 and 7). Catch rates of anglers targeting largemouth bass were highest during September (Tables 8 and 9), whereas harvest was highest during June (Tables 6 and 7). Largemouth bass caught by anglers ranged in length from 7 to 22 inches, with most harvested fish measuring 12 to 17

inches (Table 12). The average size of a harvested largemouth bass was 14.13 inches long and weighed 1.72 pounds (Table 7).

Black crappie

An estimated 20,444 black crappie (13,127 pounds) (Tables 6 and 7) were harvested at a rate of 0.026 fish/hour across all anglers; all of these statistics are approximately double the 2008 estimates (Schultz 2009). Catch and harvest of black crappie was highest during May (Tables 6-9). Length of crappies caught by anglers ranged from 5 to 14 inches, and anglers tended to begin harvesting crappie 8.0 inches and longer (Table 12).

Bluegill/Pumpkinseed (sunfish)

An estimated 21,136 sunfish (9,909 pounds; bluegill and pumpkinseed combined) were harvested at a rate of 0.027 fish/hour across all anglers (Tables 6-9). Catch and harvest statistics were highest during July (Tables 8 and 9), likely when more effort was directed at these species. Lengths of sunfish caught ranged from 4 to 10 inches, with most harvested fish measuring 7 to 9 inches long (Table 12).

DISCUSSION

Management actions implemented in 2005 and continued to date have included reducing the resident double-crested cormorant population, protecting mature female walleye with an 18-26 inch protected slot limit, walleye stocking, and habitat protection. These actions, combined with conditions conducive for good walleye recruitment and reduced avian predatory pressures exerted on yellow perch, have increased the abundance and improved the population size structures of both species (Schultz 2010). Due to the exceptionally fast growth exhibited by the 2005-2007 year classes of walleye, improvements to the walleye population have quickly transcended to the recreational fishery. Similar patterns in above-average growth of yellow perch (Schultz 2010) also contributed to improved perch population size structure and overall fishing quality.

Catch and harvest rates of most species commonly sought during summer months were slightly lower than 2008 estimates (Schultz 2009), but remained above respective historical averages for anglers targeting a specific species in most instances. Total harvest estimates remain below the long-term average, but this seems more a function of fishing effort, not quality. Furthermore, length limits, such as protective slot limits, are intended to reduce or eliminate harvest on a particular size group of fish. The intentions of such a regulation can include improving the overall size structure of a population, protecting mature fish for more consistent natural reproduction, and/or to improve the overall quality of the fishing experience with higher overall catch rates and generally larger sizes of fish caught. For example, about 795,000 hours of angler effort caught nearly 264,000 walleyes during the 2009 summer season at an overall catch rate of 0.339 walleye/hour; this compares to nearly 1.2 million hours of angler effort catching about 230,000 walleyes at a rate of 0.162 walleye/hour and no special regulation in place

(Sledge 2000). While recent strong year classes produced during 2005-2007 have contributed to marked improvements in the walleye fishery, the role of the current protective slot limit cannot be discounted as 37% of the total walleye catch was comprised of fish that could have otherwise been harvested.

Recent changes in the national economy, in particular fuel prices, may have impacted fishing effort and ultimately total harvest during 2008 and 2009. Anecdotal conversations with other biologists suggested that fishing pressure again seemed down on other large walleye lakes (e.g. Winnibigoshish and Lake of the Woods) oriented in the northern tier of the state. With the record high fuel prices, the perception was that anglers who had to travel longer distances were less willing to make multiple fishing trips than during previous years. Future creel surveys and research efforts should consider characterizing and quantifying how these factors interact with trip travel distance to influence angler trip frequency, which in turn determines fishing effort and total harvest at local levels.

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TABLES

Table 1. Creel survey sampling summary and angling pressure estimates by stratum for Leech Lake, Minnesota, 9 May – 30 September, 2009. Standard errors appear in parentheses.

	Stratum				
	Opener	May	Jun-1	Jun-2	Jul-1
<i>Sampling Summary (Number)</i>					
Dates	May 9-10	May 12-31	Jun 1-15	Jun 16-30	Jul 1-15
Days in stratum	2	20	15	15	15
N Weekdays sampled	0	14	11	11	11
N Wknd/Hol sampled	2	7	4	4	4
N Interviews/refusals	103/0	352/0	292/0	158/2	158/0
<i>Boat Angler Trip Length & Party Size</i>					
Mean anglers/boat	2.53 (0.37)	2.21 (0.26)	2.20 (0.28)	2.38 (0.35)	2.57 (0.37)
Mean trip length (h)	4.42 (0.38)	4.38 (0.69)	4.76 (0.54)	4.25 (0.48)	3.29 (0.49)
<i>Walleye Tournament Angler Trip Length & Party Size</i>					
Mean anglers/boat	-	2.00 (0.41)	2.00 (0.23)	-	-
Mean trip length (h)	-	7.91 (1.62)	8.18 (0.92)	-	-
<i>Launch Angler Trip Length & Party Size</i>					
Mean anglers/boat	-	-	-	-	-
Mean trip length (h)	-	-	-	-	-
<i>Fishing Pressure</i>					
Total angler hours	36,229 (7,726)	121,993 (16,867)	113,343 (17,915)	73,133 (13,337)	80,119 (6,907)
	Stratum				
	Jul-2	Aug-1	Aug-2	Sep-1	Sep-2
<i>Sampling Summary (Number)</i>					
Dates	Jul 16-31	Aug 1-15	Aug 16-31	Sep 1-15	Sep 16-30
Days in stratum	16	15	16	15	15
N Weekdays sampled	12	10	11	10	11
N Wknd/Hol sampled	4	5	5	5	4
N Interviews/refusals	194/1	204/0	156/0	185/0	171/2
<i>Boat Angler Trip Length & Party Size</i>					
Mean anglers/boat	2.49 (0.44)	2.35 (0.20)	2.37 (0.34)	2.20 (0.22)	2.30 (0.35)
Mean trip length (h)	3.58 (0.53)	3.82 (0.43)	4.31 (0.98)	4.74 (0.60)	4.39 (0.71)
<i>Walleye Tournament Angler Trip Length & Party Size</i>					
Mean anglers/boat	-	-	-	-	-
Mean trip length (h)	-	-	-	-	-
<i>Launch Angler Trip Length & Party Size</i>					
Mean anglers/boat	-	6.00 (-)	5.00 (-)	-	-
Mean trip length (h)	-	4.33 (-)	4.47 (-)	-	-
<i>Fishing Pressure</i>					
Total angler hours	79,533 (10,700)	83,178 (5,154)	58,894 (6,938)	68,438 (5,200)	64,304 (4,872)

Table 2. Estimated total angling pressure and total catch statistics for the summer open water creel season on Leech Lake, Minnesota, 1965-2009.

	Year						
	1965	1966	1967	1984	1985	1991	1992
<i>Angling Pressure</i>							
Angler Trips	221,220	217,185	201,093	182,530	352,646	306,585	246,198
Angler Hours	858,960	862,346	785,905	697,267	1,290,339	1,195,683	935,553
-Walleye Tourn.							
-Total hours							
<i>Number of Harvested Fish</i>							
Northern pike	60,943	52,336	48,108	40,109	79,144	42,376	26,610
Muskellunge	139	151	236	20	372	81	32
Largemouth bass	-	-	-	1,023	1,166	1,024	1,466
Yellow perch	150,599	145,510	13,359	143,756	229,660	176,646	216,323
Walleye (Legal)	149,917	162,091	147,822	76,170	161,193	179,898	86,877
-Illegal ¹							
-Released ²							
-Total kill	149,917	162,091	147,822	76,170	161,193	179,898	86,877
<i>Pounds of Harvested Fish</i>							
Northern pike	155,800	138,666	125,081	73,609	148,562	96,655	65,526
Yellow perch	78,050	77,813	70,805	54,236	87,033	58,412	83,777
Walleye (Legal)	199,012	224,310	201,038	95,625	163,537	186,882	119,076
-Illegal ¹							
-Released ²							
-Total kill	199,012	224,310	201,038	95,625	163,537	186,882	119,076
<i>Harvest per Angler Hour (all anglers)</i>							
Northern pike	0.071	0.061	0.061	0.058	0.061	0.035	0.028
Muskellunge	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Largemouth bass	-	-	-	0.001	0.001	0.001	0.002
Yellow perch	0.175	0.169	0.170	0.206	0.178	0.148	0.231
Walleye	0.174	0.188	0.188	0.109	0.125	0.150	0.093
<i>Harvest per Angler Hour (targeting anglers)</i>							
Northern pike						0.159	0.110
Muskellunge						0.001	<0.001
Largemouth bass						0.013	0.079
Yellow perch						1.870	2.184
Walleye						0.242	0.162

^a18-26" protected slot limit

¹Walleye protected by length limit

²Estimated post-release hooking mortality (Reeves and Bruesewitz 2007)

Table 2 continued. Estimated total angling pressure and total catch statistics for the summer open water creel season on Leech Lake, Minnesota, 1965-2009.

	Year						1965-2009
	1998	1999	2004	2005 ^a	2008 ^a	2009 ^a	Mean
<i>Angling Pressure</i>							
Angler Trips	316,930	295,976	192,407	119,114	152,044	179,118	229,465
Angler Hours	1,274,985	1,193,941	682,346	430,003	585,371	779,163	891,339
-Walleye Tourn.						15,545	15,545
-Total hours						794,708	
<i>Number of Harvested Fish</i>							
Northern pike	50,255	47,749	23,638	13,967	16,908	10,890	39,464
Muskellunge	-	-	38	119	-	-	91
Largemouth bass	2,649	2,349	3,807	3,105	2,412	1,243	1,557
Yellow perch	391,367	439,768	51,355	84,783	136,096	126,476	177,361
Walleye	141,577	149,717	29,022	3,940	64,969	81,242	110,341
-Protected ¹				No est.	2,533	4,660	-
-Released ²			708	171	3,424	9,947	3,563
-Total kill	141,577	149,717	29,730	4,111	70,926	95,849	111,991
<i>Pounds of Harvested Fish</i>							
Northern pike	122,684	127,013	62,659	37,654	54,820	33,588	95,563
Yellow perch	113,444	150,666	21,175	34,485	59,149	54,733	72,598
Walleye	159,393	189,028	68,355	6,348	72,959	86,428	136,307
-Protected ¹				No est.	8,451	10,334	-
-Released ²			973	533	5,585	27,002	8,523
-Total kill	159,393	189,028	69,328	6,881	86,995	123,764	140,375
<i>Harvest per Angler Hour (all anglers)</i>							
Northern pike	0.044	0.045	0.035	0.033	0.029	0.014	0.044
Muskellunge	-	-	<0.001	<0.001	-	-	-
Largemouth bass	0.002	0.002	0.006	0.007	0.004	0.002	0.002
Yellow perch	0.347	0.408	0.075	0.197	0.233	0.162	0.208
Walleye	0.100	0.107	0.043	0.009	0.115	0.110	0.116
<i>Harvest per Angler Hour (targeting anglers)</i>							
Northern pike	0.128	0.122	0.082	0.074	0.339	0.197	0.151
Muskellunge	-	-	-	0.001	-	-	<0.001
Largemouth bass	0.040	0.009	0.054	0.070	0.237	0.059	0.070
Yellow perch	2.156	2.283	0.479	0.442	2.730	2.020	1.771
Walleye	0.184	0.227	0.054	0.019	0.459	0.242	0.199

^a18-26" protected slot limit

¹Walleye protected by length limit

²Estimated post-release hooking mortality (Reeves and Bruesewitz 2007)

Table 3. Hometown distances of anglers fishing Leech Lake, Minnesota relative to Walker, MN, 9 May – 30 September 2009.

Distance (miles)	N	Percent
0-49	1326	28.2
50-99	444	9.5
100-149	925	19.7
150-199	879	18.7
200-249	326	6.9
250-299	94	2.0
300-349	65	1.4
350-399	171	3.6
400-449	149	3.2
450-499	106	2.3
500-5,000	209	4.5
Total	4,694	100.0

Table 4. State of residence of anglers fishing Leech Lake, Minnesota, 9 May – 30 September 2009.

State of Residence	N	Percent
Minnesota	3,480	74.1
Illinois	168	3.6
Iowa	284	6.1
Wisconsin	120	2.6
Indiana	47	1.0
North Dakota	63	1.3
Nebraska	38	0.8
South Dakota	28	0.6
Other	466	9.9
Total	4,694	100.0

Table 5. Frequencies (%) of species targeted by boat parties during each stratum for Leech Lake, Minnesota, 9-May – 30 September 2009.

Stratum	Targeted Species								Total (N)
	Walleye	Northern pike	Yellow perch	Largemouth bass	Black crappie	Muskellunge	No particular spp.	Other	
Opener	80.5	3.3	12.2	0.0	3.3	0.0	0.8	0.0	213
May	82.2	2.4	5.1	1.9	5.3	0.0	1.9	1.3	345
Jun-1	87.0	2.2	5.1	0.6	1.3	0.9	1.9	0.9	391
Jun-2	70.7	5.5	7.2	3.3	0.6	3.9	3.3	5.5	242
Jul-1	58.2	16.3	3.8	1.6	1.1	6.0	8.2	4.9	248
Jul-2	63.1	11.3	1.8	1.8	2.3	9.5	6.8	3.6	259
Aug-1	59.9	8.7	8.7	3.7	0.8	13.2	1.7	3.3	369
Aug-2	60.6	8.6	7.4	2.3	4.6	10.3	4.6	1.7	193
Sep-1	42.7	5.7	18.9	3.5	6.2	16.3	5.3	1.3	167
Sep-2	51.2	7.7	28.0	2.9	3.4	3.9	1.0	1.9	174
Season	58.1	5.8	8.0	1.9	2.6	5.3	2.9	2.0	2601

Table 6. Catch and harvest estimates by stratum for the open water creel survey on Leech Lake, Minnesota, 2009. Standard errors are in parentheses.

Species	<i>Number Caught</i>				
	Opener	May	Jun-1	Jun-2	Jul-1
Bullhead spp.	-	-	-	-	241 (119)
Northern pike	2,390 (1,516)	8,003 (1,768)	8,725 (2,627)	3,974 (1,024)	8,128 (1,949)
Muskellunge	-	105 (78)	98 (106)	14 (14)	-
Burbot	-	395 (283)	147 (119)	55 (52)	174 (113)
Rock bass	-	2,446 (2,168)	8,494 (3,013)	12,136 (8,068)	3,838 (1,322)
Sunfish spp.	1,538 (1,506)	3,150 (2,604)	8,378 (4,424)	2,984 (1,062)	15,036 (8,666)
Smallmouth bass	-	-	-	55 (59)	146 (106)
Largemouth bass	81 (72)	1,493 (500)	785 (363)	1,738 (984)	1,157 (565)
Black crappie	3,021 (1,935)	15,513 (7,306)	1,821 (470)	109 (81)	297 (178)
Yellow perch	16,807 (5,175)	66,516 (14,558)	57,270 (15,247)	22,984 (7,759)	42,396 (12,565)
Walleye	17,270 (4,508)	68,450 (18,750)	65,771 (17,342)	27,891 (6,097)	19,307 (4,733)
Cisco	-	42 (30)	-	55 (52)	94 (87)
Overall	41,107 (9,776)	166,113 (33,111)	151,489 (34,089)	71,994 (18,954)	90,813 (16,896)

Species	<i>Number Harvested</i>				
	Opener	May	Jun-1	Jun-2	Jul-1
Bullhead spp.	-	-	-	-	80 (72)
Northern pike	331 (134)	1,220 (417)	999 (400)	578 (254)	1,798 (558)
Muskellunge	-	-	-	-	-
Burbot	-	103 (95)	-	-	-
Rock bass	-	847 (881)	1,594 (1,071)	2,980 (2,684)	322 (186)
Sunfish spp.	805 (788)	1,050 (868)	4,428 (2,350)	1,335 (528)	6,564 (4,038)
Smallmouth bass	-	-	-	-	-
Largemouth bass	-	42 (48)	327 (198)	365 (252)	94 (97)
Black crappie	1,923 (970)	7,873 (3,476)	1,788 (448)	55 (55)	188 (158)
Yellow perch	5,189 (1,498)	19,524 (4,880)	17,956 (5,351)	4,358 (1,861)	7,475 (3,365)
Walleye	8,782 (2,417)	22,229 (4,827)	14,853 (3,480)	7,424 (1,747)	5,645 (1,480)
Cisco	-	-	-	-	-
Overall	17,029 (3,702)	52,888 (10,109)	41,947 (9,320)	17,095 (5,881)	22,167 (5,691)

Table 6 continued. Catch and harvest estimates by stratum for the open water creel survey on Leech Lake, Minnesota, 2009. Standard errors are in parentheses.

Species	<i>Number Caught</i>					
	Jul-2	Aug-1	Aug-2	Sep-1	Sep-2	Season
Bullhead spp.	62 (-)	-	-	-	31 (31)	334 (123)
Northern pike	5,584 (1,259)	7,187 (1,225)	5,529 (1,452)	7,303 (1,304)	6,179 (1,690)	63,003 (5,189)
Muskellunge	62 (64)	209 (122)	67 (38)	104 (49)	65 (45)	724 (206)
Burbot	-	56 (52)	-	-	134 (95)	960 (348)
Rock bass	1,050 (343)	5,623 (3,122)	5,223 (2,762)	4,684 (2,145)	5,222 (2,940)	48,716 (10,552)
Sunfish spp.	4,030 (694)	1,663 (576)	2,026 (1,455)	2,290 (1,171)	2,736 (1,678)	43,832 (11,162)
Smallmouth bass	-	-	67 (41)	-	-	267 (128)
Largemouth bass	1,944 (1,473)	2,250 (613)	338 (147)	1,950 (1,048)	1,331 (802)	13,066 (2,446)
Black crappie	2,365 (73)	1,847 (1,419)	6,315 (6,136)	1,765 (1,202)	2,127 (1,186)	35,180 (9,995)
Yellow perch	21,906 (4,810)	44,292 (7,774)	19,035 (6,216)	73,249 (18,501)	101,269 (13,737)	465,724 (36,640)
Walleye	19,732 (4,476)	17,283 (3,685)	8,864 (1,875)	9,075 (2,314)	10,169 (2,179)	263,814 (27,919)
Cisco	-	-	-	-	-	190 (144)
Overall	56,735 (9,994)	80,411 (8,969)	47,504 (14,436)	100,420 (21,711)	129,294 (16,243)	935,880 (64,207)

Species	<i>Number Harvested</i>					
	Jul-2	Aug-1	Aug-2	Sep-1	Sep-2	Season
Bullhead spp.	-	-	-	-	-	80 (72)
Northern pike	1,505 (527)	1,038 (397)	750 (259)	1,123 (298)	1,546 (483)	10,890 (1,245)
Muskellunge	-	-	-	-	-	-
Burbot	-	-	-	-	36 (36)	139 (102)
Rock bass	234 (245)	2,482 (1,403)	278 (315)	835 (690)	1,127 (1,081)	10,699 (3,596)
Sunfish spp.	2,644 (386)	627 (146)	756 (587)	1,231 (732)	1,697 (1,055)	21,136 (5,467)
Smallmouth bass	-	-	36 (21)	-	-	36 (21)
Largemouth bass	110 (107)	111 (114)	86 (43)	-	108 (81)	1,243 (384)
Black crappie	1,835 (73)	994 (568)	2,835 (2,486)	1,303 (731)	1,650 (940)	20,444 (4,602)
Yellow perch	2,625 (740)	7,917 (2,388)	4,809 (2,378)	20,526 (5,939)	36,097 (5,571)	126,476 (12,153)
Walleye	7,893 (1,861)	7,289 (1,789)	4,006 (768)	4,079 (1,054)	3,702 (890)	85,902 (7,460)
Cisco	-	-	-	-	-	-
Overall	16,848 (4,505)	20,458 (3,533)	13,556 (4,637)	29,097 (6,751)	45,962 (6,361)	277,046 (20,249)

Table 7. Yield estimates and mean weights of harvested fish by stratum for Leech Lake, Minnesota, 9 May – 30 September 2009. Standard errors are in parentheses.

Species	Opener	May	Jun-1	Jun-2	Jul-1
<i>Total Pounds Harvested</i>					
Northern pike	1,047 (295)	3,740 (1,397)	3,610 (1,929)	1,786 (2,008)	4,860 (3,171)
Rock bass	-	577 (623)	1,046 (710)	1,978 (2,070)	197 (117)
Sunfish spp.	404 (-)	440 (-)	2,206 (1,590)	435 (162)	3,420 (1,965)
Largemouth bass	-	82 (225)	588 (-)	327 (209)	182 (190)
Black crappie	1,289 (359)	5,038 (2,643)	1,758 (529)	36 (37)	113 (-)
Yellow perch	2,696 (928)	9,719 (5,457)	7,096 (676)	1,735 (1,140)	2,918 (1,576)
Walleye	9,158 (2,149)	23,893 (9,762)	16,077 (3,605)	8,279 (3,451)	8,864 (3,739)
<i>Mean Weight (pounds) of Harvested Fish</i>					
Northern pike	3.16 (2.65)	3.06 (1.64)	3.61 (2.47)	3.09 (3.84)	2.70 (1.99)
Rock bass	-	0.68 (-)	0.66 (0.63)	0.66 (0.92)	0.61 (0.51)
Sunfish spp.	0.50 (-)	0.42 (-)	0.50 (0.45)	0.33 (0.23)	0.52 (0.44)
Largemouth bass	-	1.96 (5.82)	1.80 (-)	0.90 (0.93)	1.94 (2.84)
Black crappie	0.67 (0.46)	0.64 (-)	0.98 (0.38)	0.66 (-)	0.60 (-)
Yellow perch	0.52 (0.41)	0.50 (0.31)	0.40 (0.14)	0.40 (0.31)	0.39 (0.28)
Walleye	1.04 (0.82)	1.07 (0.50)	1.08 (0.39)	1.12 (0.54)	1.57 (0.82)
<i>Mean Length (in) of Harvested Fish</i>					
Northern pike	24.24 (21.05)	23.92 (12.56)	24.78 (19.27)	22.70 (21.36)	22.59 (14.68)
Rock bass	-	9.32 (-)	9.23 (8.87)	9.28 (12.34)	9.00 (7.75)
Sunfish spp.	8.18 (-)	7.75 (-)	8.20 (7.53)	7.18 (4.98)	8.35 (6.88)
Largemouth bass	-	15.17 (41.67)	14.61 (-)	11.50 (12)	14.85 (21.76)
Black crappie	10.27 (7)	10.23 (7.42)	11.42 (4)	10.25 (-)	10.10 (-)
Yellow perch	10.14 (7.79)	10.04 (6.21)	9.40 (3.28)	9.40 (7.30)	9.24 (7.17)
Walleye	14.87 (11.74)	14.89 (6.89)	14.79 (5.39)	15.17 (7.37)	16.17 (7.74)

Table 7 continued. Yield estimates and mean weights of harvested fish by stratum for Leech Lake, Minnesota, 9 May – 30 September 2009. Standard errors are in parentheses.

Species	Jul-2	Aug-1	Aug-2	Sep-1	Sep-2	Season
<i>Total Pounds Harvested</i>						
Northern pike	5,189 (3,288)	3,400 (2,310)	2,436 (602)	3,241 (1,003)	4,278 (2,286)	33,588 (6,526)
Rock bass	191 (-)	1,171 (970)	190 (223)	779 (788)	703 (822)	6,830 (2,735)
Sunfish spp.	1,126 (261)	311 (36)	415 (56)	539 (340)	858 (1,468)	9,909 (3,133)
Largemouth bass	365 (353)	216 (225)	212 (106)	-	169 (-)	2,141 (563)
Black crappie	1,009 (47)	832 (-)	1,469 (-)	836 (-)	747 (-)	13,127 (2,720)
Yellow perch	711 (382)	2,711 (981)	1,919 (1,027)	8,710 (4,333)	16,519 (7,225)	54,733 (10,393)
Walleye	8,655 (3,182)	8,356 (6,086)	4,584 (1,409)	4,782 (2,837)	4,114 (2,063)	96,762 (14,151)
<i>Mean Weight (pounds) of Harvested Fish</i>						
Northern pike	3.45 (2.58)	3.27 (2.62)	3.25 (1.45)	2.89 (1.37)	2.77 (1.73)	3.08 (0.72)
Rock bass	0.81 (-)	0.47 (0.47)	0.68 (1.11)	0.93 (1.22)	0.62 (0.94)	0.64 (0.33)
Sunfish spp.	0.43 (0.12)	0.50 (0.11)	0.55 (0.43)	0.44 (0.38)	0.51 (-)	0.46 (0.22)
Largemouth bass	3.30 (4.52)	1.94 (2.84)	2.47 (-)	-	1.58 (-)	1.72 (0.74)
Black crappie	0.55 (0.03)	0.84 (-)	0.52 (-)	0.64 (-)	0.45 (-)	0.64 (0.22)
Yellow perch	0.27 (0.17)	0.34 (0.17)	0.40 (0.30)	0.42 (0.25)	0.46 (0.22)	0.43 (0.10)
Walleye	1.10 (0.51)	1.15 (0.90)	1.14 (0.44)	1.17 (0.79)	1.11 (0.66)	1.13 (0.21)
<i>Mean Length (in) of Harvested Fish</i>						
Northern pike	24.35 (17.54)	24.45 (18.77)	24.41 (11.13)	23.54 (10.90)	23.25 (13.95)	23.73 (5.25)
Rock bass	10.00 (-)	8.20 (7.67)	9.32 (15.17)	10.45 (13.57)	9.16 (14)	9.11 (4.62)
Sunfish spp.	7.84 (2.15)	8.20 (1.87)	8.47 (6.68)	7.92 (6.90)	8.26 (-)	7.84 (4.49)
Largemouth bass	18.11 (24.75)	14.85 (22)	16.44 (-)	- 0.00	13.95 (-)	14.13 (5.95)
Black crappie	9.76 (0.61)	11.22 (-)	9.61 (-)	10.30 (-)	9.17 (-)	10.17 (3.50)
Yellow perch	8.12 (6.92)	8.89 (4.59)	9.34 (7.94)	9.51 (5.77)	9.81 (4.54)	9.59 (2.06)
Walleye	14.96 (6.62)	15.26 (11.57)	15.23 (6.15)	15.18 (10.66)	14.89 (9.43)	15.05 (2.83)

Table 8. Estimates of catch and harvest rates of selected species for all anglers by stratum during the open water season on Leech Lake, Minnesota, 2009.

Species	Stratum				
	Opener	May	Jun-1	Jun-2	Jul-1
<i>Catch per Angler Hour</i>					
Bullhead spp.	-	-	-	-	0.003 (0.001)
Northern pike	0.066 (0.044)	0.066 (0.019)	0.077 (0.035)	0.054 (0.029)	0.101 (0.030)
Muskellunge	-	0.001 (0.001)	0.001 (0.001)	<0.001 (<0.001)	-
Burbot	-	0.003 (0.002)	0.001 (0.001)	0.001 (0.001)	0.002 (0.001)
Rock bass	-	0.020 (0.018)	0.075 (0.033)	0.166 (0.119)	0.048 (0.021)
Sunfish spp.	0.042 (0.043)	0.026 (0.022)	0.074 (0.041)	0.041 (0.017)	0.188 (0.122)
Smallmouth bass	-	-	-	0.001 (0.001)	0.002 (0.001)
Largemouth bass	0.002 (0.002)	0.012 (0.004)	0.007 (0.004)	0.024 (0.008)	0.014 (0.009)
Black crappie	0.083 (0.056)	0.127 (0.062)	0.016 (0.005)	0.001 (0.001)	0.004 (0.002)
Yellow perch	0.464 (0.175)	0.545 (0.170)	0.505 (0.222)	0.314 (0.136)	0.529 (0.155)
Walleye	0.477 (0.161)	0.561 (0.204)	0.580 (0.211)	0.381 (0.187)	0.241 (0.063)
Cisco	-	<0.001 (<0.001)	-	0.001 (0.001)	0.001 (0.001)
Overall	1.135 (0.365)	1.362 (0.403)	1.337 (0.509)	0.984 (0.485)	1.133 (0.220)
<i>Harvest per Angler Hour</i>					
Bullhead spp.	-	-	-	-	0.001 (0.001)
Northern pike	0.009 (0.004)	0.010 (0.004)	0.009 (0.004)	0.008 (0.005)	0.022 (0.007)
Muskellunge	-	-	-	-	-
Burbot	-	<0.001 (<0.001)	-	-	-
Rock bass	-	0.007 (0.007)	0.014 (0.008)	0.041 (0.037)	0.004 (0.003)
Sunfish spp.	0.022 (0.022)	0.009 (0.007)	0.039 (0.022)	0.018 (0.009)	0.082 (0.056)
Smallmouth bass	-	-	-	-	-
Largemouth bass	-	<0.001 (<0.001)	0.003 (0.004)	0.005 (0.003)	0.001 (0.001)
Black crappie	0.053 (0.029)	0.065 (0.029)	0.016 (0.005)	0.001 (0.001)	0.002 (0.002)
Yellow perch	0.143 (0.052)	0.160 (0.050)	0.158 (0.070)	0.060 (0.028)	0.093 (0.042)
Walleye	0.242 (0.085)	0.182 (0.059)	0.131 (0.048)	0.102 (0.050)	0.070 (0.019)
Cisco	-	-	-	-	-
Overall	0.470 (0.144)	0.434 (0.122)	0.370 (0.136)	0.234 (0.124)	0.277 (0.072)

Table 8 continued. Estimates of catch and harvest rates of selected species for all anglers by stratum during the open water season on Leech Lake, Minnesota, 2009.

Species	Stratum					Season	
	Jul-2	Aug-1	Aug-2	Sep-1	Sep-2		
	<i>Catch per Angler Hour</i>						
Bullhead spp.	0.001	-	-	-	0.000 (<0.001)	<0.001 (<0.001)	
Northern pike	0.070 (0.021)	0.086 (0.017)	0.094 (0.026)	0.107 (0.024)	0.096 (0.030)	0.081 (0.009)	
Muskellunge	0.001 (0.001)	0.003 (0.001)	0.001 (<0.001)	0.002 (0.001)	0.001 (0.001)	0.001 (<0.001)	
Burbot	-	0.001 (0.001)	-	-	0.002 (0.001)	0.001 (<0.001)	
Rock bass	0.013 (0.005)	0.068 (0.039)	0.089 (0.041)	0.068 (0.033)	0.081 (0.039)	0.063 (0.014)	
Sunfish spp.	0.051 (0.011)	0.020 (0.007)	0.034 (0.025)	0.033 (0.020)	0.043 (0.026)	0.056 (0.014)	
Smallmouth bass	-	-	0.001 (0.001)	-	-	0.000 (<0.001)	
Largemouth bass	0.024 (0.017)	0.027 (0.008)	0.006 (0.003)	0.028 (0.016)	0.021 (0.013)	0.017 (0.003)	
Black crappie	0.030 (0.004)	0.022 (0.017)	0.107 (0.136)	0.026 (0.025)	0.033 (0.019)	0.045 (0.014)	
Yellow perch	0.275 (0.097)	0.533 (0.117)	0.323 (0.109)	1.070 (0.289)	1.575 (0.259)	0.598 (0.063)	
Walleye	0.248 (0.111)	0.208 (0.050)	0.151 (0.045)	0.133 (0.043)	0.158 (0.043)	0.339 (0.047)	
Cisco	-	-	-	-	-	<0.001 (<0.001)	
Overall	0.713 (0.233)	0.967 (0.173)	0.807 (0.240)	1.467 (0.356)	2.011 (0.320)	1.201 (0.123)	
	<i>Harvest per Angler Hour</i>						
Bullhead spp.	-	-	-	-	-	<0.001 (<0.001)	
Northern pike	0.019 (0.008)	0.012 (0.005)	0.013 (0.005)	0.016 (0.005)	0.024 (0.008)	0.014 (0.002)	
Muskellunge	-	-	-	-	-	-	
Burbot	-	-	-	-	0.001 (0.001)	<0.001 (<0.001)	
Rock bass	0.003 (0.003)	0.030 (0.018)	0.005 (0.005)	0.012 (0.010)	0.018 (0.015)	0.014 (0.005)	
Sunfish spp.	0.033 (0.006)	0.008 (0.002)	0.013 (0.010)	0.018 (0.011)	0.026 (0.016)	0.027 (0.007)	
Smallmouth bass	-	-	0.001 (<0.001)	-	-	<0.001 (<0.001)	
Largemouth bass	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	-	0.002 (0.001)	0.002 (<0.001)	
Black crappie	0.023 (0.003)	0.012 (0.007)	0.048 (0.067)	0.019 (0.015)	0.026 (0.015)	0.026 (0.007)	
Yellow perch	0.033 (0.015)	0.095 (0.029)	0.082 (0.040)	0.300 (0.091)	0.561 (0.100)	0.162 (0.019)	
Walleye	0.099 (0.046)	0.088 (0.023)	0.068 (0.021)	0.060 (0.020)	0.058 (0.016)	0.110 (0.014)	
Cisco	-	-	-	0.000	-	-	
Overall	0.212 (0.084)	0.246 (0.052)	0.230 (0.077)	0.425 (0.110)	0.715 (0.117)	0.356 (0.036)	

Table 9. Estimates of catch and harvest rates of selected species for targeting anglers by stratum during the open water season on Leech Lake, Minnesota, 2009.

Species	Stratum				
	Opener	May	Jun-1	Jun-2	Jul-1
<i>Catch per Angler Hour</i>					
Northern pike	1.928 (-)	0.174 (0.175)	0.187 (0.214)	0.288 (0.280)	0.474 (0.348)
Muskellunge	-	-	-	-	-
Rock bass	-	-	-	5.804	-
Sunfish spp.	-	1.364 (-)	9.549 (-)	2.306 (1.095)	5.475 (3.348)
Largemouth bass	-	0.476 (0.220)	0.222 (0.543)	0.731 (1.929)	1.286 (1.471)
Black crappie	3.974 (1.123)	6.390 (3.973)	1.028 (-)	-	0.571 (-)
Yellow perch	1.295 (0.831)	4.211 (2.815)	6.345 (4.786)	4.585 (2.518)	6.858 (5.528)
Walleye	0.826 (0.385)	1.324 (0.512)	1.501 (0.158)	0.892 (0.535)	1.062 (1.095)
Targeted any	-	1.159 (1.397)	1.732 (1.306)	0.582 (0.210)	5.127 (2.225)
<i>Harvest per Angler Hour</i>					
Northern pike	0.145 (-)	0.056 (0.116)	0.075 (0.107)	0.051 (0.060)	0.184 (0.128)
Muskellunge	-	-	-	-	-
Rock bass	-	-	-	2.657	-
Sunfish spp.	-	0.455 (0.000)	5.737 (-)	1.015 (0.429)	2.481 (1.957)
Largemouth bass	-	0.017 (0.252)	-	0.125 (0.309)	-
Black crappie	2.204 (0.881)	3.604 (1.856)	1.003 (-)	-	0.571 (-)
Yellow perch	0.367 (0.378)	1.415 (1.230)	2.727 (1.816)	1.503 (1.223)	1.806 (1.921)
Walleye	0.388 (0.195)	0.312 (0.174)	0.162 (0.047)	0.229 (0.243)	0.317 (0.322)
Targeted Any	-	0.199 (0.368)	0.876 (0.907)	0.166 (0.020)	0.970 (1.361)

Table 9 continued. Estimates of catch and harvest rates of selected species for targeting anglers by stratum during the open water season on Leech Lake, Minnesota, 2009.

Species	Stratum					Season
	Jul-2	Aug-1	Aug-2	Sep-1	Sep-2	
<i>Catch per Angler Hour</i>						
Northern pike	0.750 (1.304)	0.511 (0.536)	1.184 (0.826)	0.495 (0.361)	1.475 (1.104)	0.661 (0.245)
Muskellunge	0.010 (0.074)	0.027 (0.025)	0.009 (0.011)	0.010 (0.009)	0.033 (0.040)	0.013 (0.013)
Rock bass	-	2.507 (2.308)	8.444 (-)	-	4.364 (-)	3.715 (0.577)
Sunfish spp.	3.117 (2.160)	0.541 (0.446)	5.682 (-)	4.907 (-)	3.574 (-)	3.487 (0.582)
Largemouth bass	1.353 (1.344)	1.137 (0.467)	0.315 (0.095)	1.659 (2.010)	1.768 (0.681)	0.969 (0.426)
Black crappie	1.258 (-)	4.930 (-)	6.984 (2.466)	0.906 (1.132)	2.039 (0.310)	3.472 (0.833)
Yellow perch	0.823 (0.527)	6.046 (2.756)	6.005 (5.107)	7.771 (3.679)	9.580 (5.432)	5.892 (1.360)
Walleye	0.636 (0.372)	0.640 (0.405)	0.604 (0.607)	0.515 (0.318)	0.498 (0.323)	0.987 (0.162)
Targeted any	1.338 (0.479)	1.825 (2.625)	1.046 (0.440)	5.253 (3.851)	1.823 (2.140)	2.298 (0.690)
<i>Harvest per Angler Hour</i>						
Northern pike	0.278 (0.586)	0.167 (0.246)	0.168 (0.144)	0.117 (0.112)	0.659 (0.255)	0.197 (0.084)
Muskellunge	-	-	-	-	-	-
Rock bass	-	1.612 (0.954)	4.000 (-)	-	-	1.634 (0.239)
Sunfish spp.	2.109 (1.760)	0.226 (0.109)	2.273 (-)	3.569 (-)	2.298 (-)	1.801 (0.356)
Largemouth bass	0.030 (0.074)	-	0.174 (0.117)	-	0.143 (-)	0.059 (0.056)
Black crappie	1.094 (-)	2.026 (-)	3.551 (0.675)	0.818 (1.069)	1.490 (0.310)	2.008 (0.366)
Yellow perch	0.174 (0.306)	1.671 (1.318)	2.282 (1.943)	2.677 (1.828)	3.614 (2.187)	2.020 (0.551)
Walleye	0.230 (0.205)	0.260 (0.122)	0.272 (0.321)	0.243 (0.137)	0.170 (0.131)	0.242 (0.060)
Targeted Any	0.230 (0.208)	-	0.345 (0.256)	1.115 (1.844)	-	0.460 (0.314)

Table 10. Percent of all angling parties who harvested a given number of fish by stratum from Leech Lake, Minnesota, 9 May – 30 September 2009.

Species/stratum	N	Number Harvested per Angler					
		0	0.1-0.9	1.0-1.9	2.0-2.9	3	
Northern pike							
Opener	103	92%	7%	1%	0%	0%	
May	352	93%	6%	1%	0%	<1%	
Jun-1	292	96%	3%	0%	1%	0%	
Jun-2	158	93%	5%	2%	0%	0%	
Jul-1	158	89%	8%	3%	0%	0%	
Jul-2	194	91%	6%	2%	1%	0%	
Aug-1	204	94%	4%	1%	0%	0%	
Aug-2	156	90%	8%	1%	1%	0%	
Sep-1	185	90%	7%	3%	1%	0%	
Sep-2	171	85%	9%	5%	1%	0%	
Yellow perch							
	N	0	0.1-4.9	5.0-9.9	10.0-14.9	15.0-19.9	20
Opener	103	58%	37%	1%	0%	0%	4%
May	350	74%	22%	1%	0%	1%	2%
Jun-1	292	81%	15%	1%	1%	0%	2%
Jun-2	158	83%	15%	1%	0%	0%	1%
Jul-1	158	87%	11%	1%	0%	1%	0%
Jul-2	194	88%	12%	0%	0%	0%	0%
Aug-1	204	86%	11%	0%	0%	0%	2%
Aug-2	156	88%	9%	1%	0%	0%	2%
Sep-1	185	68%	21%	3%	1%	1%	8%
Sep-2	171	60%	23%	4%	3%	1%	9%
Walleye							
	N	0	0.1-0.9	1.0-1.9	2.0-2.9	3.0-3.9	4
Opener	103	28%	17%	25%	12%	10%	9%
May	352	56%	13%	12%	6%	5%	7%
Jun-1	292	69%	11%	9%	7%	2%	1%
Jun-2	158	63%	15%	13%	3%	1%	4%
Jul-1	158	73%	15%	8%	1%	1%	2%
Jul-2	194	68%	14%	13%	2%	1%	1%
Aug-1	204	68%	14%	11%	3%	3%	0%
Aug-2	156	71%	13%	11%	3%	0%	1%
Sep-1	185	73%	14%	8%	3%	2%	2%
Sep-2	171	74%	12%	9%	3%	0%	2%

Northern pike: 3 fish in possession, 1 fish over 30 inches allowed in possession (statewide regulation).

Yellow perch: 20 fish in possession, no length limit (statewide regulation).

Walleye: 4 fish in possession, 18-26 inch PSL, 1 fish over 26 inches allowed in possession (special regulation).

Table 11. Percent of targeting angling parties who harvested a given number of fish by stratum from Leech Lake, Minnesota, 9 May – 30 September 2009.

Species/stratum	N	Number Harvested per Angler					
		0	0.1-0.9	1.0-1.9	2.0-2.9	3	
Northern pike							
Opener	4	75%	0%	25%	0%	0%	
May	9	67%	22%	0%	0%	11%	
Jun-1	7	57%	29%	0%	14%	0%	
Jun-2	10	70%	20%	10%	0%	0%	
Jul-1	30	57%	30%	13%	0%	0%	
Jul-2	25	72%	12%	12%	4%	0%	
Aug-1	21	71%	19%	5%	5%	0%	
Aug-2	15	73%	20%	7%	0%	0%	
Sep-1	13	62%	23%	8%	8%	0%	
Sep-2	16	44%	31%	19%	6%	0%	
0							
Yellow perch							
Opener	15	40%	47%	7%	7%	0%	0%
May	18	11%	72%	0%	0%	6%	11%
Jun-1	16	6%	50%	13%	19%	13%	0%
Jun-2	13	54%	23%	15%	8%	0%	0%
Jul-1	7	43%	43%	0%	0%	0%	14%
Jul-2	4	75%	25%	0%	0%	0%	0%
Aug-1	21	48%	33%	14%	0%	0%	5%
Aug-2	13	31%	38%	23%	8%	0%	0%
Sep-1	43	21%	40%	23%	9%	2%	5%
Sep-2	58	10%	43%	22%	12%	9%	3%
0							
Walleye							
Opener	99	25%	17%	26%	12%	10%	9%
May	309	50%	15%	14%	7%	6%	8%
Jun-1	275	67%	12%	9%	8%	3%	1%
Jun-2	128	56%	17%	16%	4%	2%	5%
Jul-1	107	65%	19%	11%	1%	1%	3%
Jul-2	140	57%	19%	18%	3%	1%	1%
Aug-1	145	57%	19%	15%	5%	4%	1%
Aug-2	106	62%	16%	15%	5%	0%	2%
Sep-1	97	54%	23%	12%	5%	3%	3%
Sep-2	106	64%	15%	13%	5%	0%	3%

Northern pike: 3 fish in possession, 1 fish over 30 inches allowed in possession (statewide regulation).

Yellow perch: 20 fish in possession, no length limit (statewide regulation).

Walleye: 4 fish in possession, 18-26 inch PSL, 1 fish over 26 inches allowed in possession (special regulation).

Table 12. Length-frequency distribution (%) of harvested and released fish for Leech Lake, Minnesota, 9 May – 30 September 2009.

TL (inches)	Number Harvested (H) and Released (R)													
	Bullhead spp.		Northern pike		Muskellunge		Burbot		Rock bass		Smallmouth Bass		Largemouth bass	
	H	R	H	R	H	R	H	R	H	R	H	R	H	R
<4.00														
4.00-4.99									6	20				
5.00-5.99										139				
6.00-6.99									4	11				
7.00-7.99		1							41	307				5
8.00-8.99									27	21			1	
9.00-9.99									59	40				
10.00-10.99		1		1					81	266		1	1	15
11.00-11.99					1				6	1				1
12.00-12.99	1	1		24				1	1	80	1	3	6	74
13.00-13.99										1			1	1
14.00-14.99		1	1	49						5			3	37
15.00-15.99		1	5	142							1		6	88
16.00-16.99			3	14									4	4
17.00-17.99			8	229				1					2	49
18.00-18.99			6	9									1	8
19.00-19.99			10	68									1	10
20.00-20.99			25	250										12
21.00-21.99			15	18										
22.00-22.99			42	129		1		4						2
23.00-23.99			8	21										
24.00-24.99			40	147				4						
25.00-25.99			36	98		1		9						
26.00-26.99			11	1										
27.00-27.99			29	46				2						
28.00-28.99			6	1										
29.00-29.99			6	8										
30.00-30.99			10	30		1		1						
31.00-31.99			3	1										
32.00-32.99			2	17		1								
33.00-33.99				2										
34.00-34.99			1	4										
35.00-35.99				7			1							
36.00-36.99							1							
37.00-37.99			1	1			2							
38.00-38.99							3							
39.00-39.99														
40.00-40.99							2							
41.00-41.99							2							
42.00-42.99							1							
43.00-43.99														
44.00-44.99							1							
45.00-45.99														
46.00-46.99														
47.00-47.99							1							
48.00-48.99														
49.00-49.99														
≥50.00							1							
Total (N)	1	5	268	1,318	-	19	4	18	225	891	1	5	26	306

Table 12 continued. Length-frequency distribution (%) of harvested and released fish for Leech Lake, Minnesota, 9 May – 30 September 2009.

Number Harvested (H) and Released (R)														
TL (inches)	Black crappie		Bluegill		Sunfish spp.		Pumpkinseed		Yellow perch		Walleye ¹		Cisco/Whitefish	
	H	R	H	R	H	R	H	R	H	R	H	R	H	R
<4.00										21				
4.00-4.99				13		13				282				
5.00-5.99		37	7	273	7	313		40		922		16		
6.00-6.99		1	3	91	14	111	11	20	13	287		5		
7.00-7.99	17	203	208	97	227	97	19		77	305	1	71		
8.00-8.99	27	23	213		241	3	28	3	452	90	1	10		
9.00-9.99	192	156	47	16	54	16	7		1,006	237	1	97		
10.00-10.99	245	41		1		1			1,298	279	19	747		
11.00-11.99	48								148	6	38	96		
12.00-12.99	66	5							178	29	168	935		
13.00-13.99	15								1		183	33		
14.00-14.99	1	2									612	302		
15.00-15.99											768	525		1
16.00-16.99											216	54		
17.00-17.99											230	271		
18.00-18.99											15	194		
19.00-19.99											7	372		
20.00-20.99											9	855		2
21.00-21.99											1	67		
22.00-22.99											2	983		
23.00-23.99											2	63		
24.00-24.99											3	429		
25.00-25.99											3	391		
26.00-26.99											11	47		
27.00-27.99											3	68		
28.00-28.99											2	6		
29.00-29.99												11		
30.00-30.99												8		1
31.00-31.99														
32.00-32.99														
33.00-33.99														
34.00-34.99														
35.00-35.99														
≥ 36.00														
Total (N)	611	468	478	491	543	554	65	63	3,173	2,458	2,295	6,656	-	4

¹Bold font denotes walleye protected by length limit.

FIGURES

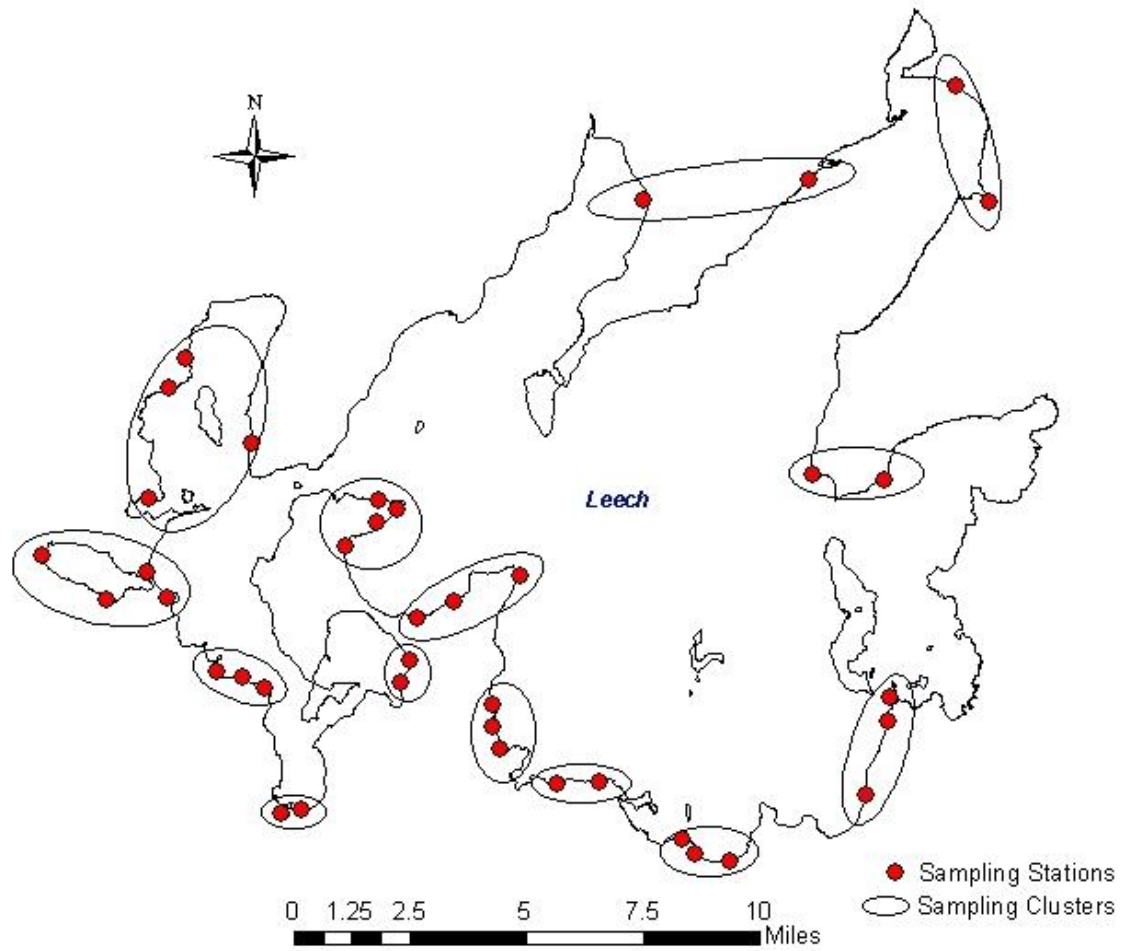


Figure 1. Creel survey sampling clusters (circles) and stations (dots) on Leech Lake, Minnesota.

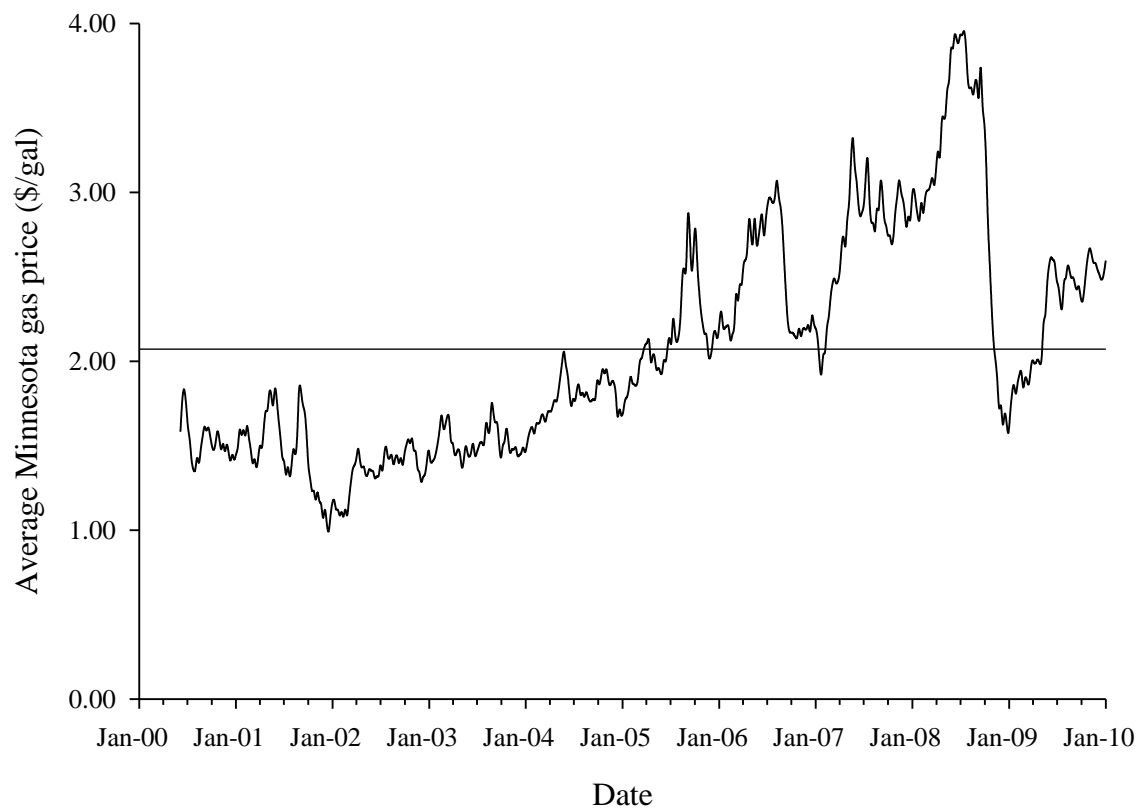


Figure 2. Weekly price (\$) per gallon of regular gasoline in Minnesota, February 2000 – January 2009 (EIA 2010). The horizontal line depicts the 10-year average.

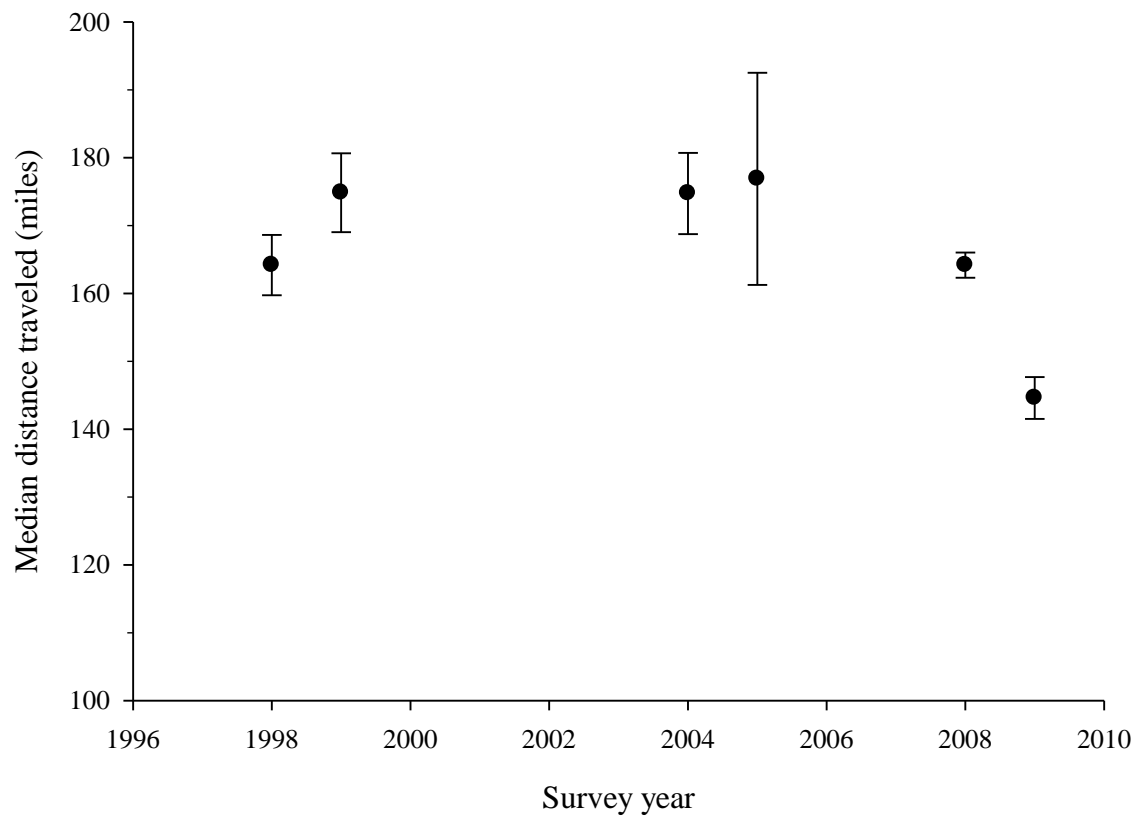


Figure 3. Median distance (miles \pm 95% CI) traveled by Leech Lake anglers interviewed during summer creel surveys, 1998-2009.

APPENDIX

Table A1. Creel survey sampling summary and angling pressure estimates by month and basin for Leech Lake, Minnesota, 9 May – 30 September, 2009. Standard errors appear in parentheses.

<i>Western Bays</i>	Stratum					
	May	June	July	August	September	Season
N Interviews/refusals	73/0	94/0	101/0	108/0	56/0	352/0
Mean anglers/boat	2.09 (0.22)	2.16 (0.59)	2.56 (-)	2.31 (-)	2.25 (-)	2.28 (0.13)
Mean trip length	3.96 (0.65)	4.70 (1.66)	3.15 (-)	3.68 (-)	4.15 (-)	3.92 (0.36)
Total angler hours	16,104 (2,504)	29,830 (3,001)	43,579 (4,661)	38,980 (3,181)	37,252 (2,564)	165,745 (7,328)
Total hours per acre	0.90 (0.14)	1.66 (0.17)	2.43 (0.26)	2.17 (0.18)	2.08 (0.14)	9.25 (0.41)
<i>Main Lake</i>						
N Interviews/refusals	382/0	356/2	161/1	155/0	112/2	854/5
Mean anglers/boat	2.30 (0.25)	2.35 (0.37)	2.50 (-)	2.44 (0.27)	2.25 (-)	2.37 (0.10)
Mean trip length	5.23 (0.69)	5.63 (1.11)	3.72 (-)	4.46 (0.92)	4.99 (-)	4.78 (0.36)
Total angler hours	142,118 (18,382)	156,646 (22,132)	116,072 (11,852)	103,091 (8,036)	95,490 (6,649)	613,418 (32,817)
Total hours per acre	1.51 (0.20)	1.67 (0.24)	1.24 (0.13)	1.10 (0.09)	1.02 (0.07)	6.53 (0.35)

Table A2. Catch and harvest estimates by month in the western bays basin (17,927 acres) of Leech Lake, 9 May – 30 September 2009.

Species	May	June	July	August	September	Season
	<i>Number Caught per Acre</i>					
Bullhead spp.	-	-	-	-	0.215 (0.037)	-
Northern pike	0.062 (0.022)	0.142 (0.063)	0.205 (0.052)	0.261 (0.064)	-	0.885 (0.113)
Muskellunge	-	0.001 (0.001)	-	0.001 (0.001)	0.002 (0.001)	0.004 (0.002)
Burbot	0.003 (<0.001)	-	0.005 (0.005)	-	0.004 (0.004)	0.012 (0.006)
Rock bass	0.016 (0.014)	0.257 (0.112)	0.085 (0.030)	0.362 (0.185)	0.439 (0.194)	0.159 (0.292)
Sunfish spp.	0.176 (0.145)	0.537 (0.253)	0.768 (0.411)	0.113 (0.033)	0.211 (0.101)	1.805 (0.515)
Smallmouth bass	-	-	-	-	-	-
Largemouth bass	0.048 (0.021)	0.075 (0.048)	0.126 (0.084)	0.078 (0.023)	0.057 (0.032)	0.384 (0.106)
Black crappie	0.881 (0.408)	0.102 (0.026)	0.144 (0.010)	0.045 (0.014)	0.050 (0.029)	1.221 (0.410)
Yellow perch	0.261 (0.084)	0.560 (0.181)	1.087 (0.315)	1.536 (0.393)	4.681 (0.792)	8.124 (0.959)
Walleye	0.179 (0.081)	0.481 (0.170)	0.372 (0.194)	0.329 (0.080)	0.192 (0.054)	1.552 (0.287)
Cisco	0.002 (0.002)	-	0.005 (0.005)	-	-	0.008 (0.005)
Overall	1.628 (0.578)	2.153 (0.607)	2.797 (0.657)	2.726 (0.433)	5.851 (0.966)	15.155 (1.502)
	<i>Number Harvested per Acre</i>					
Bullhead spp.	-	-	-	-	-	-
Northern pike	0.012 (0.006)	0.009 (0.004)	0.053 (0.029)	0.035 (0.015)	0.042 (0.010)	0.151 (0.036)
Muskellunge	-	-	-	-	-	-
Burbot	-	-	-	-	0.002 (0.002)	0.002 (0.002)
Rock bass	-	0.010 (0.010)	0.025 (0.017)	0.135 (0.078)	0.097 (0.071)	0.304 (0.111)
Sunfish spp.	0.059 (0.049)	0.003 (0.003)	0.379 (0.177)	0.040 (0.009)	0.119 (0.061)	0.867 (0.235)
Smallmouth bass	-	-	-	-	-	-
Largemouth bass	0.002 (0.003)	0.002 (0.001)	0.010 (0.008)	0.003 (<0.001)	0.006 (0.005)	0.040 (0.015)
Black crappie	0.450 (0.195)	0.100 (0.025)	0.113 (0.010)	0.035 (0.012)	0.038 (0.023)	0.737 (0.198)
Yellow perch	0.087 (0.039)	0.172 (0.055)	0.111 (0.065)	0.244 (0.127)	1.615 (0.302)	2.206 (0.345)
Walleye	0.047 (0.021)	0.147 (0.037)	0.111 (0.058)	0.144 (0.039)	0.086 (0.025)	0.476 (0.084)
Cisco	-	-	-	-	-	-
Overall	0.675 (0.185)	0.342 (0.094)	0.802 (0.284)	0.635 (0.185)	2.006 (0.362)	4.783 (0.558)

Table A3. Catch and harvest estimates by month in the main lake basin (93,914 acres) of Leech Lake, 9 May – 30 September 2009.

Species	May	June	July	August	September	Season
	<i>Number Caught per Acre</i>					
Bullhead spp.	-	-	0.003 (0.001)	-	-	0.004 (0.001)
Northern pike	0.099 (0.024)	0.108 (0.027)	0.107 (0.023)	0.086 (0.016)	0.102 (0.022)	0.502 (0.051)
Muskellunge	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.003 (0.001)	0.001 (0.001)	0.007 (0.002)
Burbot	0.004 (0.003)	0.002 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.008 (0.004)
Rock bass	0.023 (0.023)	0.171 (0.089)	0.036 (0.013)	0.046 (0.027)	0.022 (0.011)	0.297 (0.098)
Sunfish spp.	0.016 (0.016)	0.019 (0.003)	0.056 (0.049)	0.018 (0.015)	0.013 (0.010)	0.122 (0.055)
Smallmouth bass	-	0.001 (0.001)	0.002 (0.001)	0.001	-	0.003 (0.001)
Largemouth bass	0.008 (0.004)	0.013 (0.006)	0.009 (0.005)	0.013 (0.005)	0.024 (0.013)	0.066 (0.016)
Black crappie	0.029 (0.020)	0.001 (0.001)	0.001 (0.007)	0.078 (0.067)	0.032 (0.017)	0.142 (0.072)
Yellow perch	0.837 (0.164)	0.748 (0.179)	0.477 (0.130)	0.381 (0.075)	0.965 (0.193)	3.408 (0.344)
Walleye	0.879 (0.205)	0.906 (0.193)	0.345 (0.059)	0.216 (0.041)	0.168 (0.032)	2.513 (0.292)
Cisco	-	0.001 (0.001)	-	-	-	0.001 (0.001)
Overall	1.896 (0.351)	1.969 (0.399)	1.037 (0.167)	0.842 (0.161)	1.329 (0.222)	7.072 (0.621)
	<i>Number Harvested per Acre</i>					
Bullhead spp.	-	-	0.001 (0.001)	-	-	-
Northern pike	0.014 (0.004)	0.015 (0.005)	0.025 (0.006)	0.012 (0.004)	0.020 (0.006)	0.001 (0.001)
Muskellunge	-	-	-	-	-	0.087 (0.011)
Burbot	0.001 (0.001)	-	-	-	-	0.001 (0.001)
Rock bass	0.009 (0.009)	0.040 (0.030)	0.001 (0.001)	0.004 (0.003)	0.002 (0.001)	0.056 (0.032)
Sunfish spp.	0.009 (0.008)	0.010 (0.003)	0.026 (0.027)	0.007 (0.006)	0.009 (0.007)	0.060 (0.030)
Smallmouth bass	-	-	-	-	-	-
Largemouth bass	-	0.004 (0.003)	- 0.000	0.002 (0.001)	0.000	0.006 (0.003)
Black crappie	0.018 (0.010)	0.001 (0.001)	-	0.034 (0.027)	0.024 (0.012)	0.077 (0.031)
Yellow perch	0.246 (0.054)	0.209 (0.059)	0.086 (0.034)	0.089 (0.026)	0.295 (0.065)	0.926 (0.111)
Walleye	0.321 (0.057)	0.220 (0.041)	0.123 (0.023)	0.093 (0.019)	0.066 (0.014)	0.824 (0.078)
Cisco	-	-	-	-	-	-
Overall	0.619 (0.109)	0.498 (0.112)	0.262 (0.055)	0.241 (0.051)	0.416 (0.071)	2.037 (0.187)

Table A4. Monthly estimates of catch and harvest rates of all anglers in the western bays basin of Leech Lake, 9 May – 30 September 2009.

Species	May	June	July	August	September	Season
<i>Catch per Angler Hour</i>						
Bullhead spp.	-	-	-	-	-	-
Northern pike	0.069 (0.041)	0.085 (0.040)	0.084 (0.026)	0.120 (0.031)	0.104 (0.027)	0.096 (0.014)
Muskellunge	-	-	-	<0.001 (0.001)	0.001 (0.001)	<0.001 (-)
Burbot	0.003 (<0.001)	-	0.002 (0.002)	-	0.002 (0.002)	0.001 (0.001)
Rock bass	0.018 (0.016)	0.154 (0.071)	0.035 (0.015)	0.166 (0.078)	0.211 (0.063)	0.125 (0.029)
Sunfish spp.	0.196 (0.165)	0.323 (0.160)	0.316 (0.214)	0.052 (0.016)	0.102 (0.050)	0.195 (0.063)
Smallmouth bass	-	-	-	-	-	-
Largemouth bass	0.054 (0.028)	0.045 (0.000)	0.052 (0.034)	0.036 (0.010)	0.028 (0.016)	0.042 (0.009)
Black crappie	0.981 (0.496)	0.061 (0.017)	0.059 (0.008)	0.021 (0.007)	0.024 (0.013)	0.132 (0.045)
Yellow perch	0.290 (0.137)	0.337 (0.194)	0.447 (0.168)	0.706 (0.289)	2.253 (0.387)	0.879 (0.137)
Walleye	0.199 (0.175)	0.289 (0.144)	0.153 (0.083)	0.151 (0.042)	0.092 (0.030)	0.168 (0.038)
Cisco	0.003 (0.002)	-	0.002 (0.002)	-	-	0.001 (0.001)
Overall	1.812 (0.903)	1.294 (0.709)	1.151 (0.337)	1.254 (0.359)	2.816 (0.467)	1.639 (0.237)
<i>Harvest per Angler Hour</i>						
Bullhead spp.	-	-	-	-	-	-
Northern pike	0.013 (0.014)	0.006 (0.005)	0.022 (0.010)	0.016 (0.008)	0.020 (0.005)	0.016 (0.004)
Muskellunge	-	-	-	-	-	-
Burbot	-	-	-	-	0.001 (0.001)	-
Rock bass	-	0.028 (0.018)	0.010 (0.008)	0.062 (0.036)	0.047 (0.027)	0.033 (0.011)
Sunfish spp.	0.065 (0.055)	0.163 (0.088)	0.156 (0.094)	0.018 (0.005)	0.057 (0.029)	0.094 (0.029)
Smallmouth bass	-	-	-	-	-	-
Largemouth bass	0.003 (0.003)	0.011 (0.004)	0.004 (0.004)	0.001 (0.000)	0.003 (0.002)	0.004 (0.002)
Black crappie	0.501 (0.258)	0.060 (0.016)	0.046 (0.006)	0.016 (0.006)	0.019 (0.010)	0.080 (0.022)
Yellow perch	0.097 (0.026)	0.089 (0.052)	0.046 (0.029)	0.112 (0.065)	0.777 (0.158)	0.239 (0.041)
Walleye	0.052 (0.051)	0.053 (0.020)	0.046 (0.025)	0.066 (0.021)	0.041 (0.014)	0.052 (0.011)
Cisco	-	-	-	-	-	-
Overall	0.731 (0.316)	0.411 (0.177)	0.330 (0.121)	0.292 (0.098)	0.965 (0.186)	0.517 (0.073)

Table A5. Monthly estimates of catch and harvest rates of all anglers in the main lake basin of Leech Lake, 9 May – 30 September 2009.

Species	May	June	July	August	September	Season
<i>Catch per Angler Hour</i>						
Bullhead spp.	-	-	0.003 (0.001)	-	-	0.001 (-)
Northern pike	0.065 (-)	0.065 (0.027)	0.087 (0.024)	0.078 (0.016)	0.101 (0.025)	0.077 (0.011)
Muskellunge	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.002 (0.001)	0.001 (0.001)	0.001 0.000
Burbot	0.002 (0.002)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Rock bass	0.015 (0.015)	0.102 (0.058)	0.029 (0.013)	0.042 (0.024)	0.021 (0.012)	0.046 (0.015)
Sunfish spp.	0.011 (0.011)	0.011 (0.003)	0.046 (0.040)	0.016 (0.014)	0.013 (0.011)	0.019 (0.009)
Smallmouth bass	-	-	0.001 (0.001)	0.001 0.000	-	- 0.000
Largemouth bass	0.005 (0.002)	0.008 (0.004)	0.007 (0.004)	0.012 (0.005)	0.024 (0.013)	0.010 (0.003)
Black crappie	0.019 (0.013)	0.001 (0.001)	0.001 (0.001)	0.071 (0.073)	0.031 (0.022)	0.022 (0.012)
Yellow perch	0.553 (0.153)	0.448 (0.164)	0.386 (0.116)	0.347 (0.058)	0.949 (0.213)	0.522 (0.069)
Walleye	0.581 (0.180)	0.543 (0.179)	0.279 (0.085)	0.196 (0.046)	0.166 (0.042)	0.385 (0.060)
Cisco	-	-	- 0.000	-	-	- 0.000
Overall	1.253 (0.337)	1.180 (0.408)	0.839 (0.193)	0.767 (0.149)	1.307 (0.263)	1.083 (0.140)
<i>Harvest per Angler Hour</i>						
Bullhead spp.	-	-	0.001 (0.001)	-	-	- 0
Northern pike	0.009 0.000	0.009 (0.004)	0.020 (0.007)	0.011 (0.004)	0.020 (0.006)	0.013 (0.002)
Muskellunge	- 0.000	-	-	-	- 0.000	- 0.000
Burbot	0.001 0.000	-	-	-	- 0.000	-
Rock bass	0.006 (0.006)	0.024 (0.018)	0.001 (0.001)	0.003 (0.003)	0.002 (0.002)	0.009 (0.005)
Sunfish spp.	0.006 (0.006)	0.006 (0.002)	0.021 (0.022)	0.007 (0.006)	0.008 (0.007)	0.009 (0.005)
Smallmouth bass	-	-	- 0.000	-	-	-
Largemouth bass	- 0.000	0.002 (0.003)	- 0.000	0.001 (0.001)	- 0.000	0.001 (0.001)
Black crappie	0.012 (0.006)	- 0.000	- 0.000	0.031 (0.034)	0.024 (0.015)	0.012 (0.005)
Yellow perch	0.163 (0.045)	0.125 (0.049)	0.070 (0.030)	0.081 (0.022)	0.290 (0.068)	0.142 (0.021)
Walleye	0.212 (0.056)	0.132 (0.044)	0.100 (0.033)	0.085 (0.021)	0.065 (0.017)	0.126 (0.018)
Cisco	-	-	- 0.000	-	-	0.000 0.000
Overall	0.409 (0.103)	0.299 (0.106)	0.212 (0.061)	0.220 (0.048)	0.409 (0.081)	0.312 (0.040)

Table A6. Monthly estimates of catch and harvest rates of targeting anglers in the western bays basin of Leech Lake, 9 May – 30 September 2009.

Species	May	June	July	August	September	Season
<i>Catch per Angler Hour</i>						
Northern pike	-	-	0.719 (1.330)	0.730 (0.198)	0.957 (0.380)	0.575 (0.338)
Muskellunge	-	-	-	0.008 (0.014)	0.007 (0.008)	0.005 (0.005)
Rock bass	-	-	-	2.507 (2.308)	1.247 (-)	1.772 (0.962)
Sunfish spp.	2.727 (-)	5.900 (0.949)	5.855 (2.975)	0.521 (0.429)	3.574 (-)	3.938 (0.816)
Largemouth bass	0.317 (0.198)	0.677 (2.976)	1.329 (1.318)	0.605 (0.063)	1.503 2.570	0.831 (0.734)
Black crappie	10.437 (7.245)	1.406 (-)	1.771 (-)	1.329 (-)	2.537 (1.215)	3.469 (1.453)
Yellow perch	2.138 (1.352)	3.994 (0.939)	2.079 0.000	7.142 (5.311)	11.628 (5.762)	6.062 (1.915)
Walleye	1.088 (0.428)	1.149 (0.253)	0.840 0.997	0.605 (0.585)	0.452 (0.305)	0.881 (0.231)
Targeted any	0.940 (1.323)	1.405 (0.847)	3.495 (1.415)	0.911 (0.383)	4.860 (4.535)	2.317 (0.939)
<i>Harvest per Angler Hour</i>						
Northern pike	-	- 0.000	0.263 (0.583)	0.072 (0.086)	0.466 (0.066)	0.190 (0.144)
Muskellunge	-	-	-	-	-	-
Rock bass	-	-	-	1.612 (0.954)	-	0.672 (0.398)
Sunfish spp.	0.909 (-)	3.399 (0.372)	3.170 (1.948)	0.218 (0.105)	2.298 (-)	2.103 (0.517)
Largemouth bass	0.023 (0.336)	0.046 (0.064)	-	0.112 0.000	0.143	0.071 (0.068)
Black crappie	5.334 (3.364)	1.373 0.000	1.600 (-)	0.958	1.966 (1.215)	2.226 (0.702)
Yellow perch	0.206 (0.676)	1.243 (0.715)	0.145 0.000	1.839 (2.183)	4.319 (2.691)	1.825 (0.858)
Walleye	0.198 (0.202)	0.113 (0.070)	0.250 (0.328)	0.260 0.328	0.202 (0.140)	0.192 (0.093)
Targeted Any	0.049 (0.086)	0.609 (0.574)	0.786 (1.321)	0.300 (0.223)	1.050 (2.127)	0.570 (0.506)

Table A7. Monthly estimates of catch and harvest rates of targeting anglers in the main lake basin of Leech Lake, 9 May – 30 September 2009.

Species	May	June	July	August	September	Season
<i>Catch per Angler Hour</i>						
Northern pike	0.433 (0.267)	0.446 (0.333)	0.514 (0.396)	1.039 (0.916)	1.013 (1.097)	0.734 (0.350)
Muskellunge	-	-	0.010 (0.076)	0.028 (0.022)	0.035 (0.040)	0.020 (0.025)
Rock bass	-	5.804 (-)	-	8.444	-	6.629 (-)
Sunfish spp.	-	2.381 0.000	2.372 (3.090)	6.061 0.000	4.907	2.780 (0.773)
Largemouth bass	0.954 (0.649)	0.477 (0.569)	1.306 (1.488)	0.819 (0.458)	1.827 (1.256)	1.098 0.456
Black crappie	1.922 (0.439)	- (-)	- (-)	9.847 (2.865)	0.745 (0.488)	3.475 (0.867)
Yellow perch	5.147 4.181	6.937 (5.326)	5.894 (5.361)	4.907 (2.589)	5.724 (3.136)	5.745 (1.922)
Walleye	1.506 (0.870)	1.527 (0.268)	0.844 (0.526)	0.637 (0.438)	0.560 (0.335)	1.090 (0.228)
Targeted any	1.545 (3.509)	0.391 (-)	2.848 (1.697)	2.172 (3.126)	3.419 0.000	2.268 (0.985)
<i>Harvest per Angler Hour</i>						
Northern pike	0.098 0.177	0.114 (0.108)	0.202 (0.202)	0.239 (0.221)	0.310 (0.271)	0.203 (0.097)
Muskellunge	-	-	-	-	-	-
Rock bass	-	2.657 (-)	-	4.000	-	3.077 (-)
Sunfish spp.	-	0.952 0.000	0.966 (1.696)	2.424 0.000	3.569	1.327 0.424
Largemouth bass	- 0.000	0.111 (0.354)	0.025 (0.063)	0.068 0.121	-	0.048 (0.088)
Black crappie	1.630 (0.439)	- (-)	- (-)	4.550 (0.784)	0.597 (0.378)	1.804 (0.264)
Yellow perch	2.074 (1.813)	2.987 (2.070)	1.772 (1.869)	2.134 (0.940)	1.972 (0.940)	2.190 (0.710)
Walleye	0.434 (0.260)	0.247 (0.130)	0.294 (0.184)	0.271 (0.125)	0.211 (0.127)	0.290 (0.077)
Targeted Any	0.636 (1.445)	0.178 (-)	0.390 (0.190)	- 0.000	0.410 0.000	0.285 (0.131)



**Minnesota Department of Natural Resources
Section of Fisheries**



Creel Survey Summary for Leech Lake, Minnesota

Fish Management Area: Walker

Year Surveyed: 9 May - 30 September 2009

Angling Pressure

Angler-hours	794,708
Angler-hours/acre	7.12
Anglers/boat	2.36
Mean Trip Length (h)	4.19

Catch (number)

Harvest (number)

Harvest (pounds)

Species	Catch (number)		Harvest (number)		Harvest (pounds)	
	Total N	N/acre	Total N	N/acre	Total lbs.	lbs./acre
Bullhead spp.	334	0.003	80	0	-	-
Northern pike	63,003	0.565	10,890	0.098	33,588	0.301
Muskellunge	724	0.006	-	0.000	-	-
Burbot	960	0.009	139	0.001	504	0.005
Rock bass	48,716	0.437	10,699	0.096	6,830	0.061
Sunfish spp.	43,832	0.393	21,136	0.189	10,155	0.091
Smallmouth bass	267	0.002	36	0.000	-	-
Largemouth bass	13,066	0.117	1,243	0.011	2,141	0.019
Black crappie	35,180	0.315	20,444	0.183	13,127	0.118
Yellow perch	465,724	4.174	126,476	1.133	54,733	0.490
Walleye	263,814	2.364	85,902	0.770	96,762	0.867
Cisco	190	0.002	-	0.000	-	-
All species	935,880	8.387	277,046	2.483	217,841	1.952

Catch Rate (fish/hour)

Harvest Rate (fish/hour)

Species	Catch Rate (fish/hour)		Harvest Rate (fish/hour)	
	All	Targeting	All	Targeting
Bullhead spp.	<0.001	-	<0.001	-
Northern pike	0.081	0.661	0.014	0.197
Muskellunge	0.001	0.013	-	-
Burbot	0.001	-	<0.001	-
Rock bass	0.063	3.715	0.014	1.634
Sunfish spp.	0.056	3.487	0.027	1.801
Smallmouth bass	<0.001	-	<0.001	-
Largemouth bass	0.017	0.969	0.002	0.059
Black crappie	0.045	3.472	0.026	2.008
Yellow perch	0.598	5.892	0.162	2.020
Walleye	0.339	0.987	0.110	0.242
Cisco	-	-	<0.001	-
All/Targeted Any	1.201	2.298	0.356	0.460

Creel Survey Summary for Leech Lake, Minnesota

Length Frequency Summary for Harvested (measured) Fish (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
Bullhead spp.			1					
Northern pike				9	49	105	88	17
Muskellunge								
Burbot						4		
Rock bass	6	72	147					
Sunfish spp.		489	54					
Smallmouth bass			1					
Largemouth bass		1	7	14	4			
Black crappie		44	551	16				
Yellow perch		542	2630	1				
Walleye		2	226	1779	261	8	19	
Cisco								

Comments:

Citation: Schultz, D. W. 2010. Summer creel survey for Leech Lake, 2009. Minnesota Department of Natural Resources, Section of Fisheries, Study 4, Job 835.