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Completion Report

**Summer Creel Survey Report
for
Leech Lake
2008**

by

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Completion Report

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Leech Lake
2008**

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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 usually 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 are 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 2008a, 2008b), the MN DNR has 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 11 May through 30 September 2008. Historically Leech Lake creel surveys have used a non-uniform, access-based design to estimate angling pressure and to obtain catch and harvest information from completed-trip angler interviews at public accesses and private marinas and resorts around the lake. However, with a substantial reduction in the number of operating resorts (Rivers 2005, 2006), the

number of locations where creel clerks can obtain angler interviews and estimate fishing pressure has decreased. A comparison of the traditional access-based method of estimating pressure to whole-lake aerial boat counts found that the two methods produced similar results and aerial boat counts were recommended for estimating angling pressure during future surveys (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 respective observed length-frequency distribution 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 10 and 11) to increase the sample size for estimating pressure during that 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 five 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 10 and 11) 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. Stations within the cluster were randomly selected hourly based on station probabilities. 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.

RESULTS

Angling Pressure

A total of 1,206 Leech Lake angling parties were interviewed from 10 May through 30 September 2008 (Table 1). The estimated total angling pressure on Leech Lake during the summer fishing season was 585,371 angler hours (Table 2; Schupp 1972; Gustafson 1985, 1986; Haukos 1992, 1993; Sledge 1999, 2000; Rivers 2005, 2006). This was only slightly higher than the historical low of 556,175 angler hours (2004-2005 mean) and remains below the long-term average of 899,392 total hours of effort. Completed ice-out on Leech Lake did not occur until after the fishing opener, and this may have persuaded some anglers to fish elsewhere that weekend.

While fishing quality, particularly for walleye, was implicated as a cause of low pressure in 2004-2005, fishing quality has improved dramatically. Other factors, specifically record high fuel prices (Figure 2) and other economic effects, could be influencing angler participation and travel patterns. Median distance traveled by anglers interviewed during the 2008 survey, as indexed using zip codes, was the lowest observed since zip code data was first collected in 1998 and less variable than during previous fishing seasons (Figure 3). The majority of anglers interviewed during 2008 traveled less than 50 miles to fish Leech Lake (Table 3). Similarly, most anglers interviewed were Minnesota residents (Table 4) and most angling parties targeted walleye (Table 5).

Catch and Harvest

An estimated 800,892 fish, or 7.16 fish/acre, were caught in Leech Lake during the 2008 summer creel season (Table 6), of which 279,215 were harvested (35% of total catch; 2.50 fish/acre). Most of the total catch and harvest was comprised of yellow perch (56% and 49%, respectively) and walleye (20% and 24%, respectively). The highest stratum-specific estimates of total catch (170,195 fish) and harvest (49,748 fish) occurred during the last two weeks of September.

Total yield during the 2008 summer creel season was estimated to be 230,266 pounds of fish (2.06 lbs/acre; Table 7) and is considerably higher than the 145,191 pounds per summer estimated during the 2004-2005 surveys (Rivers 2005, 2006). The increases in catch and harvest were a result of increased fish abundance (Schultz 2008a, 2008b), which in turn led to improved fishing quality. During 2008, the overall catch and harvest rates across all anglers were 1.368 and 0.477 fish/hour, respectively (Table 8), compared to average catch and harvest rates of 1.023 and 0.260 fish/hour across all anglers and species during 2004-2005 (Rivers 2005, 2006). Basin-specific estimates of fishing effort, catch, and harvest are summarized in the appendix (Tables A1-A7).

Walleye

A total of 67,502 walleye (81,410 pounds) were harvested during 2008 at a rate of 0.115 walleye/hour across all anglers, the highest harvest rate observed since 1991 (Table 2). An estimated 2,533 harvested walleye (8,451 pounds) were within the 18-26 inch protected slot limit (PSL). Inclusion of post-release hooking mortality (3,424 walleye; 5,585 pounds) increased the total walleye kill to 70,926 fish (86,995 pounds). Assuming zero recaptures by anglers, approximately 95,300 walleye (135,900 pounds) were released, 48% of which were within the PSL (108,800 pounds). Furthermore, an estimated 10,700 harvestable walleye (15,200 pounds), defined as fish at least 13.0 inches long that were not protected by the PSL, were also released.

The seasonal catch and harvest rates of walleye were 0.278 fish/hour and 0.115 fish/hour, respectively, across all anglers (Table 8). Seasonal walleye catch and harvest rates for anglers specifically targeting walleye were 1.064 fish/hour and 0.459 fish/hour, respectively (Table 9). Catch and harvest rates of walleye were highest during the last two weeks of August. However, the frequency of angling parties that harvested a limit of walleye was highest during May (Tables 10 and 11).

The average harvested walleye was 15.26 inches long and weighed approximately 1.21 pounds for the entire season (Table 7). The average size of harvested walleye diminished slightly during the summer as the mode of the 2005 walleye year class grew into the protected slot limit and the mode of the 2006 year class grew to sizes anglers are more willing to harvest (Figure 4). Lengths of walleye caught by anglers ranged from 4-30 inches (Table 12); creel clerks measured 694 harvested walleye and anglers reported lengths on another 1,930 released walleye. Most walleye harvested were from the 2005 and 2006 year classes (Table 13).

Northern pike

A total of 16,908 northern pike (54,820 pounds) were harvested at a rate of 0.029 fish/hour across all anglers during 2008 (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 less than 10% of angling parties interviewed during the creel survey specifically targeted northern pike, whereas 56% of angling parties targeted walleye (Table 5). In terms of number and pounds of fish, northern pike catch and harvest was highest during July and August (Tables 6 and 7). Conversely, catch and harvest rates (fish/hour) were highest during the first two weeks of September (Tables 8 and 9). The frequency of angling parties that harvested a limit of northern pike was highest during the last two weeks of June and the last two weeks of August (Tables 10 and 11).

The average harvested northern pike was 24.34 inches long and weighed approximately 3.25 pounds; mean length of harvested northern pike ranged from 22.75 to 25.54 inches throughout the summer (Table 7). While lengths of northern pike caught by anglers ranged from 7 to 37 inches, pike 20 to 28 inches were more likely to be harvested (Table 12).

Yellow perch

A total of 136,096 yellow perch (59,149 pounds) were harvested at a rate of 0.233 fish/hour across all anglers during 2008. While total harvest was below the long-term average, the harvest rates across all anglers and targeting angler groups was above respective historical averages. Catch and harvest of yellow perch, by number and pounds, 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).

While yellow perch caught by anglers ranged in length from less than 4 inches to 13 inches in length (Table 12), the average size of yellow perch harvested was 9.65 inches long and weighed 0.44 pounds (Table 7). The yellow perch harvest was primarily comprised of perch 8.0 inches and longer.

Muskellunge

No muskellunge harvest was observed by creel clerks during 2008 (Table 2). Angler catch rates were less than 0.002 fish/hour across all anglers and 0.022 fish/hour for targeting anglers, but this is within the historical range for muskellunge. Anecdotal reports from local guides indicated that fishing was slower than previous years for most of the summer. However, conversations with other biologists and muskellunge anglers around the state suggested this was a statewide trend and not an anomaly specific to Leech Lake. A total of 24 muskellunge were reported released by interviewed angling parties, ranging in length from 19 to 47 inches.

Largemouth bass

Approximately 2,412 largemouth bass (4,465 pounds) were harvested at a rate of 0.004 fish/hour across all anglers during the 2008 summer season (Table 2). Catch statistics of largemouth bass were highest during May (Tables 8 and 9), whereas harvest was highest during July (Tables 6 and 7). Largemouth bass caught by anglers ranged in length from 5 to 22 inches, with most harvested fish measuring 12 to 17 inches (Table 12). The average size of a harvested largemouth bass was 14.51 inches long and weighed 1.85 pounds (Table 7).

Black crappie

An estimated 8,793 black crappie (7,862 pounds) (Tables 6 and 7) were harvested at a rate of 0.015 fish/hour across all anglers. Catch and harvest statistics of black crappie were highest during June (Tables 8 and 9). Length of crappies caught by anglers ranged from 5 to 12 inches; however, no crappie shorter than 8 inches were harvested.

Bluegill/Pumpkinseed (sunfish)

An estimated 30,992 sunfish (10,200 pounds; bluegill and pumpkinseed combined) were harvested at a rate of 0.053 fish/hour across all anglers (Tables 6 and 7). Catch and harvest statistics were highest during June and 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 8 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 in consecutive years and reduced avian predatory pressures exerted on yellow perch, have increased the abundance and improved the population size structures of both species (Schultz 2008b). 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 2008b) have 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 among the highest on record, particularly for those anglers targeting a given species during 2008. Harvest estimates remain below the long-term average, but this seems to be a function of fishing effort, not quality.

Recent changes in the national economy, in particular fuel prices, may have impacted fishing effort and ultimately total harvest during 2008. Anecdotal conversations with

other biologists suggested that fishing pressure was also 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, 10 May – 30 September, 2008. Standard errors appear in parentheses.

	Stratum				
	Opener	May	Jun-1	Jun-2	Jul-1
<i>Sampling Summary (Number)</i>					
Dates	May 10-11	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	10	11	10
N Wknd/Hol sampled	2	6	5	4	5
N Interviews/refusals	96/0	162/0	147/2	108/1	126/0
<i>Angling Pressure</i>					
Mean anglers/boat	2.37 (0.07)	2.45 (0.08)	2.6 (0.09)	2.45 (0.11)	2.63 (0.10)
Mean trip length (h)	5.03 (0.26)	4.63 (0.23)	3.83 (0.18)	3.30 (0.17)	3.83 (0.19)
Total angler hours	21,043 (6,139)	73,738 (10,431)	53,636 (8,627)	65,590 (5,446)	62,834 (10,468)

	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	11	12	10	11
N Wknd/Hol sampled	4	4	4	5	4
N Interviews/refusals	136/2	169/0	94/0	80/0	88/0
<i>Angling Pressure</i>					
Mean anglers/boat	2.58 (0.10)	2.58 (0.08)	2.59 (0.15)	2.20 (0.13)	2.36 (0.10)
Mean trip length (h)	3.16 (0.14)	3.26 (0.17)	2.99 (0.16)	4.81 (0.37)	3.64 (0.17)
Total angler hours	66,472 (8,104)	73,823 (10,571)	60,276 (7,682)	48,770 (7,370)	59,190 (9,118)

Table 2. Estimated total angling pressure and total catch statistics for the summer open water creel season on Leech Lake, Minnesota, 1965-2008.

	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
<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

¹Walleye protected by length limit

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

^a18-26" protected slot limit

Table 2 continued. Estimated total angling pressure and total catch statistics for the summer open water creel season on Leech Lake, Minnesota, 1965-2008.

	Year					1965-2008
	1998	1999	2004	2005 ^a	2008 ^a	Mean
<i>Angling Pressure</i>						
Angler Trips	316,930	295,976	192,407	119,114	152,044	233,661
Angler Hours	1,274,985	1,193,941	682,346	430,003	585,371	899,392
<i>Number of Harvested Fish</i>						
Northern pike	50,255	47,749	23,638	13,967	16,908	41,845
Muskellunge	-	-	38	119	-	99
Largemouth bass	2,649	2,349	3,807	3,105	2,412	1,583
Yellow perch	391,367	439,768	51,355	84,783	136,096	181,602
Walleye (Legal)	141,577	149,717	29,022	3,940	64,969	112,766
-Illegal ¹				No est.	2,533	-
-Released ²			708	171	3,424	1,434
-Total kill	141,577	149,717	29,730	4,111	70,926	113,336
<i>Pounds of Harvested Fish</i>						
Northern pike	122,684	127,013	62,659	37,654	54,820	100,727
Yellow perch	113,444	150,666	21,175	34,485	59,149	74,087
Walleye (Legal)	159,393	189,028	68,355	6,348	72,959	140,464
-Illegal ¹				No est.	8,451	-
-Released ²			973	533	5,585	2,364
-Total kill	159,393	189,028	69,328	6,881	86,995	141,759
<i>Harvest per Angler Hour (all anglers)</i>						
Northern pike	0.044	0.045	0.035	0.033	0.029	0.047
Muskellunge	-	-	<0.001	<0.001	-	-
Largemouth bass	0.002	0.002	0.006	0.007	0.004	0.002
Yellow perch	0.347	0.408	0.075	0.197	0.233	0.211
Walleye	0.100	0.107	0.043	0.009	0.115	0.117
<i>Harvest per Angler Hour (targeting anglers)</i>						
Northern pike	0.128	0.122	0.082	0.074	0.339	0.145
Muskellunge	-	-	-	0.001	-	<0.001
Largemouth bass	0.040	0.009	0.054	0.070	0.237	0.072
Yellow perch	2.156	2.283	0.479	0.442	2.730	1.735
Walleye	0.184	0.227	0.054	0.019	0.459	0.192

¹Walleye protected by length limit

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

^a18-26" protected slot limit

Table 3. Hometown distances of anglers fishing Leech Lake, Minnesota relative to Walker, MN, 10 May – 30 September 2008.

Distance (miles)	N	Percent
0-49	693	22.9
50-99	519	17.2
100-149	600	19.8
150-199	232	7.7
200-249	103	3.4
250-299	129	4.3
300-349	139	4.6
350-399	111	3.7
400-449	121	4.0
450-499	130	4.3
500-5,000	249	8.2
Total	3,026	100.0

Table 4. State of residence of anglers fishing Leech Lake, Minnesota, 10 May – 30 September 2008.

State of Residence	N	Percent
Minnesota	1,929	63.7
Illinois	194	6.4
Iowa	298	9.8
Wisconsin	105	3.5
Indiana	84	2.8
North Dakota	36	1.2
Nebraska	27	0.9
South Dakota	31	1.0
Other	322	10.6
Total	3,026	100.0

Table 5. Frequencies (%) of species targeted by boat parties during each stratum for Leech Lake, Minnesota, 10-May – 30 September 2008.

Stratum	Targeted Species								Total (N)
	Walleye	Northern pike	Yellow perch	Largemouth bass	Black crappie	Muskellunge	No particular spp.	Other	
Opener	72.3	0.5	23.9	0.0	2.3	0.0	0.0	0.9	213
May	76.5	3.2	12.2	1.4	2.3	0.0	2.0	2.3	345
Jun-1	54.2	11.8	17.4	3.1	3.3	2.8	3.8	3.6	391
Jun-2	61.2	9.1	11.2	3.7	0.0	2.5	0.4	12.0	242
Jul-1	52.4	8.1	6.5	4.0	2.4	5.6	6.5	14.5	248
Jul-2	45.6	10.8	5.8	1.9	0.0	7.3	15.1	13.5	259
Aug-1	45.5	15.4	8.7	3.3	0.5	5.4	7.0	14.1	369
Aug-2	53.4	10.9	6.2	0.5	2.6	8.3	13.0	5.2	193
Sep-1	39.5	4.8	20.4	0.0	0.0	21.0	12.0	2.4	167
Sep-2	59.8	5.2	27.0	0.0	0.0	2.9	2.9	2.3	174
Season	56.4	8.6	13.2	2.1	1.5	4.8	5.9	7.5	2601

Table 6. Catch and harvest estimates by stratum for the open water creel survey on Leech Lake, Minnesota, 2008. Standard errors are in parentheses.

<i>Number Caught</i>					
Species	Opener	May	Jun-1	Jun-2	Jul-1
Bullhead spp.	-	-	27 (-)	77 (-)	-
Northern pike	843 (284)	4,174 (1,057)	3,402 (770)	5,413 (939)	3,898 (1,120)
Muskellunge	-	44 (42)	99 (54)	-	327 (157)
Burbot	17 (14)	39 (43)	-	298 (188)	60 (63)
Rock bass	-	167 (39)	2,662 (1,125)	22,519 (6,555)	3,305 (990)
Sunfish spp.	-	1,241 (-)	4,789 (4,293)	15,912 (7,496)	10,636 (4,655)
Smallmouth bass	-	-	-	-	-
Largemouth bass	-	1,403 (1,378)	1,587 (340)	1,487 (916)	1,065 (570)
Black crappie	50 (63)	898 (475)	2,620 (57)	-	2,926 (-)
Yellow perch	6,824 (3,196)	37,738 (11,050)	25,867 (6,488)	27,273 (6,976)	21,891 (4,639)
Walleye	5,221 (1,540)	28,610 (5,267)	22,826 (4,965)	21,215 (4,994)	10,757 (2,608)
Cisco	-	-	-	-	48 (51)
Overall	12,954 (4,793)	74,314 (16,167)	63,880 (13,850)	94,194 (14,801)	54,914 11,018

<i>Number Harvested</i>					
Species	Opener	May	Jun-1	Jun-2	Jul-1
Bullhead spp.	-	-	-	-	-
Northern pike	231 (72)	1,356 (607)	1,349 (406)	2,156 (614)	1,055 (388)
Muskellunge	-	-	-	-	-
Burbot	-	39 (43)	-	-	-
Rock bass	-	-	192 (131)	5,421 (2,559)	623 (383)
Sunfish spp.	-	1,065 (-)	1,818 (1,184)	9,862 (4,988)	5,881 (2,691)
Smallmouth bass	-	-	-	-	-
Largemouth bass	-	-	365 (-)	460 (-)	259 (217)
Black crappie	50 (63)	828 (475)	2,464 (57)	-	2,044 (-)
Yellow perch	2,627 (1,392)	11,358 (4,010)	9,979 (3,021)	5,927 (1,782)	3,289 (1,517)
Walleye	1,245 (432)	12,874 (2,749)	8,839 (1,887)	7,249 (1,849)	4,172 (1,263)
Cisco	-	-	-	-	48 (51)
Overall	4,153 (1,892)	27,519 (6,189)	25,004 (5,617)	31,076 (6,817)	17,372 (4,664)

Table 6 continued. Catch and harvest estimates by stratum for the open water creel survey on Leech Lake, Minnesota, 2008. Standard errors are in parentheses.

Species	<i>Number Caught</i>					
	Jul-2	Aug-1	Aug-2	Sep-1	Sep-2	Season
Bullhead spp.	28 (18)	115 (-)	-	-	-	247 (18)
Northern pike	7,507 (1,524)	7,277 (1,951)	7,163 (1,734)	7,331 (1,875)	4,006 (1,012)	51,015 (4,195)
Muskellunge	218 (122)	-	100 (-)	265 (143)	64 (-)	1,117 (254)
Burbot	-	-	-	-	-	414 (203)
Rock bass	5,490 (757)	12,830 (6,089)	2,014 (759)	1,175 (23)	2,139 (1,109)	52,302 (9,202)
Sunfish spp.	14,510 (3,247)	9,367 (1,016)	4,529 (1,157)	1,963 (2,167)	-	62,945 (10,673)
Smallmouth bass	-	52 (-)	-	16 (20)	-	68 (20)
Largemouth bass	1,826 (694)	1,194 (169)	480 (142)	293 (299)	461 (160)	9,796 (1,955)
Black crappie	129 (75)	281 (56)	5,077 (2,269)	36 0	-	12,017 (2,322)
Yellow perch	38,141 (9,775)	38,225 (10,057)	23,469 (5,340)	88,378 (25,643)	140,311 (34,352)	448,117 (48,036)
Walleye	9,179 (2,033)	15,702 (4,725)	16,079 (4,163)	10,003 (1,637)	23,214 (4,703)	162,806 (12,454)
Cisco	-	-	-	-	-	48 (51)
Overall	77,027 (13,458)	85,043 (18,634)	58,912 (9,227)	109,460 (27,295)	170,195 (37,270)	800,892 (59,700)

Species	<i>Number Harvested</i>					
	Jul-2	Aug-1	Aug-2	Sep-1	Sep-2	Season
Bullhead spp.	-	-	-	-	-	- (-)
Northern pike	3,212 (830)	2,400 (629)	2,609 (753)	1,634 (636)	906 (322)	16,908 (1,796)
Muskellunge	-	-	-	-	-	- (-)
Burbot	-	-	-	-	-	39 (43)
Rock bass	1,072 (473)	7,671 (4,832)	628 (740)	32 (23)	786 (548)	16,426 -5579.63
Sunfish spp.	4,816 (2,182)	4,250 (756)	2,742 (643)	557 (592)	-	30,992 (6,294)
Smallmouth bass	-	-	-	-	-	- (-)
Largemouth bass	590 (347)	308 (112)	201 (-)	36 (49)	192 (-)	2,412 (427)
Black crappie	129 (75)	281 (56)	2,997 (1,418)	-	-	8,793 (1,501)
Yellow perch	8,142 (3,266)	9,956 (3,747)	5,893 (2,270)	38,914 (12,180)	40,012 (11,205)	136,096 (18,341)
Walleye	4,185 (967)	8,017 (2,696)	8,104 (2,399)	4,965 (1,000)	7,852 (1,747)	67,502 (5,859)
Cisco	-	-	-	-	-	48 (51)
Overall	22,146 (4,538)	32,882 (9,685)	23,176 (4,147)	46,139 (12,253)	49,748 (12,433)	279,215 (24,041)

Table 7. Yield estimates and mean weights of harvested fish by stratum for Leech Lake, Minnesota, 10 May – 30 September 2008. Standard errors are in parentheses.

Species	Opener	May	Jun-1	Jun-2	Jul-1
<i>Total Pounds Harvested</i>					
Northern pike	709 (448)	4,738 (3,466)	3,577 (1,751)	6,300 (315)	2,683 (1,513)
Rock bass	-	-	81 (86)	3,414 (1,906)	380 (616)
Sunfish spp.	-	350 (-)	598 (390)	3,246 (1,645)	1,936 (887)
Largemouth bass	-	-	681 (-)	883 (-)	483 (431)
Black crappie	49 (-)	615 (-)	2,544 (-)	-	1,370 (-)
Yellow perch	1,342 (794)	5,775 (3,760)	4,345 (2,238)	2,268 (432)	1,166 (1,229)
Walleye	2,201 (898)	16,388 (5,087)	8,510 (2,964)	8,314 (2,251)	6,077 (2,003)
All species	4,301 (2,140)	27,866 (12,314)	20,336 (7,429)	24,425 (6,549)	14,095 (6,679)
<i>Mean Weight (pounds) of Harvested Fish</i>					
Northern pike	3.07 (2.87)	3.49 (3.05)	2.65 (1.58)	2.92 (2.22)	2.54 (1.78)
Rock bass	-	-	0.42 (0.55)	0.63 (0.46)	0.61 (1.07)
Sunfish spp.	-	0.33 (-)	0.33 (0.31)	0.33 (0.24)	0.33 (0.22)
Largemouth bass	-	-	1.86 (-)	1.92 (-)	1.86 (2.28)
Black crappie	0.99 (-)	0.74 (-)	1.03 (-)	-	0.67 (-)
Yellow perch	0.51 (0.53)	0.51 (0.39)	0.44 (0.27)	0.38 (0.15)	0.35 (0.41)
Walleye	1.77 (1.46)	1.27 (0.50)	0.96 (0.42)	1.15 (0.46)	1.46 (0.66)
<i>Mean Length (in) of Harvested Fish</i>					
Northern pike	23.78 (21.55)	24.95 (21.34)	22.92 (13.90)	23.48 (17.99)	22.75 (16.19)
Rock bass	-	-	8.01 (11.52)	9.14 (6.79)	9.04 (16.51)
Sunfish spp.	-	7.24 (-)	7.24 (6.75)	7.24 (5.18)	7.24 (4.74)
Largemouth bass	-	-	14.56 (-)	14.65 (-)	14.56 (17.58)
Black crappie	11.84 (-)	10.66 (9.10)	11.99 (-)	-	10.38 (-)
Yellow perch	10.13 (10.52)	10.11 (7.63)	9.57 (5.33)	9.23 (3.46)	9.02 (10.81)
Walleye	17.15 (14.09)	15.43 (6.26)	14.32 (6.16)	14.84 (6.07)	16.59 (7.74)

Table 7 continued. Yield estimates and mean weights of harvested fish by stratum for Leech Lake, Minnesota, 10 May – 30 September 2008. Standard errors are in parentheses.

Species	Jul-2	Aug-1	Aug-2	Sep-1	Sep-2	Season
<i>Total Pounds Harvested</i>						
Northern pike	11,199 (3,584)	7,840 (1,448)	8,682 (6,879)	5,949 (3,482)	3,257 (1,522)	54,934 (9,715)
Rock bass	881 (259)	6,171 (4,111)	411 (490)	21 (16)	591 (-)	11,949 (4,607)
Sunfish spp.	1,585 (719)	1,399 (250)	903 (213)	183 (195)	-	10,200 (2,075)
Largemouth bass	1,237 (1,643)	636 (-)	120 (-)	67 (95)	359 (-)	4,465 (1,701)
Black crappie	96 (57)	147 (-)	3,042 (-)	-	-	7,862 (57)
Yellow perch	3,150 (3,171)	3,077 (1,239)	1,888 (142)	17,455 (3,742)	18,808 (8,372)	59,273 (10,825)
Walleye	4,413 (1,961)	8,452 (632)	9,262 (3,795)	8,226 (2,998)	9,738 (1,562)	81,582 (8,639)
All species	22,560 (11,393)	27,721 (7,680)	24,307 (11,519)	31,903 (10,528)	32,752 (11,457)	230,266 (37,619)
<i>Mean Weight (pounds) of Harvested Fish</i>						
Northern pike	3.49 (1.51)	3.27 (1.05)	3.33 (2.94)	3.64 (2.56)	3.59 (2.31)	3.25 (0.75)
Rock bass	0.82 (0.44)	0.80 (0.74)	0.65 (1.10)	0.65 (0.68)	0.75 (-)	0.73 (0.37)
Sunfish spp.	0.33 (0.23)	0.33 (0.09)	0.33 (0.12)	0.33 (0.49)	-	0.33 (0.10)
Largemouth bass	2.10 (3.15)	2.07 (-)	0.60 (-)	1.86 (3.67)	1.86 (-)	1.85 (0.80)
Black crappie	0.75 (0.62)	0.52 (-)	1.01 (-)	-	-	0.89 (0.15)
Yellow perch	0.39 (0.43)	0.31 (0.17)	0.32 (0.13)	0.45 (0.18)	0.47 (0.25)	0.44 (0.10)
Walleye	1.05 (0.54)	1.05 (0.37)	1.14 (0.62)	1.66 (0.69)	1.24 (0.39)	1.21 (0.18)
<i>Mean Length (in) of Harvested Fish</i>						
Northern pike	24.80 (10.58)	24.42 (7.70)	24.52 (20.27)	25.54 (18.41)	25.11 (16.68)	24.34 (5.44)
Rock bass	9.95 (5.42)	9.93 (9.01)	9.21 (15.44)	9.21 (9.56)	9.71 (-)	9.57 (4.83)
Sunfish spp.	7.24 (5.03)	7.24 (1.96)	7.24 (2.59)	7.24 (10.88)	-	7.24 (2.11)
Largemouth bass	15.31 (20.55)	15.47 (-)	10.20 (-)	14.56 (28.41)	14.56 (-)	14.51 (5.38)
Black crappie	10.70 (8.90)	9.61 (-)	11.93 (-)	-	-	11.37 (2.04)
Yellow perch	9.34 (9.84)	8.67 (4.76)	8.78 (3.69)	9.79 (3.81)	9.94 (5.30)	9.65 (2.18)
Walleye	14.77 (8.07)	14.81 (5.23)	15.11 (8.51)	16.65 (8.45)	15.44 (4.52)	15.26 (2.27)

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, 2008.

Species	Stratum				
	Opener	May	Jun-1	Jun-2	Jul-1
<i>Catch per Angler Hour</i>					
Bullhead spp.	-	-	0.001 (-)	0.001 (-)	-
Northern pike	0.040 (0.018)	0.057 (0.018)	0.063 (0.023)	0.083 (0.049)	0.062 (0.037)
Muskellunge	-	0.001 (0.001)	0.002 (0.001)	-	0.005 (0.003)
Burbot	0.001 (0.001)	0.001 (0.001)	-	0.005 (0.003)	0.001 (0.001)
Rock bass	-	0.002 (0.001)	0.050 (0.022)	0.343 (0.111)	0.053 (0.043)
Sunfish spp.	-	0.017 (-)	0.089 (0.082)	0.243 (0.118)	0.169 (0.164)
Smallmouth bass	-	-	-	-	-
Largemouth bass	-	0.019 (0.016)	0.030 (0.008)	0.023 (0.014)	0.017 (0.009)
Black crappie	0.002 (0.003)	0.012 (0.007)	0.049 (0.008)	-	0.047 (-)
Yellow perch	0.324 (0.251)	0.512 (0.162)	0.482 (0.173)	0.416 (0.111)	0.348 (0.157)
Walleye	0.248 (0.140)	0.388 (0.121)	0.426 (0.148)	0.323 (0.095)	0.171 (0.064)
Cisco	-	-	-	-	0.001 (0.001)
Overall	0.616 (0.408)	1.008 (0.290)	1.191 (0.388)	1.436 (0.344)	0.874 (0.356)
<i>Harvest per Angler Hour</i>					
Bullhead spp.	-	-	-	-	-
Northern pike	0.011 (0.005)	0.018 (0.009)	0.025 (0.012)	0.033 (0.028)	0.017 (0.009)
Muskellunge	-	-	-	-	-
Burbot	-	0.001 (0.001)	-	-	-
Rock bass	-	- 0.000	0.004 (0.002)	0.083 (0.042)	0.010 (0.014)
Sunfish spp.	-	0.014 (-)	0.034 (0.023)	0.150 (0.079)	0.094 (0.086)
Smallmouth bass	-	-	-	-	-
Largemouth bass	-	-	0.007 (0.001)	0.007 (0.001)	0.004 (0.004)
Black crappie	0.002 (0.003)	0.011 (0.007)	0.046 (0.008)	-	0.033 (-)
Yellow perch	0.125 (0.105)	0.154 (0.047)	0.186 (0.072)	0.090 (0.028)	0.052 (0.039)
Walleye	0.059 (0.037)	0.175 (0.051)	0.165 (0.065)	0.111 (0.034)	0.066 (0.024)
Cisco	-	-	-	-	0.001 (0.001)
Overall	0.197 (0.150)	0.373 (0.088)	0.466 (0.161)	0.474 (0.141)	0.277 (0.126)

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, 2008.

Species	Stratum					Season
	Jul-2	Aug-1	Aug-2	Sep-1	Sep-2	
	<i>Catch per Angler Hour</i>					
Bullhead spp.	0.000 (<0.001)	0.002 (-)	-	-	-	<0.001 (-)
Northern pike	0.113 (0.030)	0.099 (0.034)	0.119 (0.041)	0.150 (0.047)	0.068 (0.033)	0.087 (0.012)
Muskellunge	0.003 (0.002)	-	0.002 (<0.001)	0.005 (0.005)	0.001 (<0.001)	0.002 (0.001)
Burbot	-	-	-	-	-	0.001 (<0.001)
Rock bass	0.083 (0.016)	0.174 (0.087)	0.033 (0.017)	0.024 (0.004)	0.036 (0.020)	0.089 (0.017)
Sunfish spp.	0.218 (0.062)	0.127 (0.026)	0.075 (0.020)	0.040 (0.045)	-	0.108 (0.023)
Smallmouth bass	-	0.001 (-)	-	<0.001 (<0.001)	-	<0.001 (-)
Largemouth bass	0.028 (0.017)	0.016 (0.005)	0.008 (0.003)	0.006 (0.006)	0.008 (0.003)	0.017 (0.003)
Black crappie	0.002 (0.001)	0.004 (0.001)	0.084 (0.039)	0.001 (-)	-	0.021 (0.004)
Yellow perch	0.574 (0.263)	0.518 (0.187)	0.389 (0.119)	1.812 (0.655)	2.371 (1.089)	0.766 (0.111)
Walleye	0.138 (0.046)	0.213 (0.070)	0.267 (0.100)	0.205 (0.051)	0.392 (0.097)	0.278 (0.030)
Cisco	-	-	-	-	-	<0.001 (<0.001)
Overall	1.159 (0.342)	1.152 (0.342)	0.977 (0.246)	2.244 (0.783)	2.875 (1.124)	1.368 (0.152)
	<i>Harvest per Angler Hour</i>					
Bullhead spp.	-	-	-	-	-	-
Northern pike	0.048 (0.014)	0.033 (0.009)	0.043 (0.015)	0.034 (0.012)	0.015 (0.011)	0.029 (0.005)
Muskellunge	-	-	-	-	-	-
Burbot	-	-	-	-	-	0.000 (<0.001)
Rock bass	0.016 (0.007)	0.104 (0.067)	0.010 (0.012)	0.001 (0.001)	0.013 (0.010)	0.028 (0.010)
Sunfish spp.	0.073 (0.037)	0.058 (0.017)	0.046 (0.012)	0.011 (0.012)	-	0.053 (0.013)
Smallmouth bass	-	-	-	-	-	-
Largemouth bass	0.009 (0.006)	0.004 (0.002)	0.003 (<0.001)	0.001 (0.001)	0.003 (0.001)	0.004 (0.001)
Black crappie	0.002 (0.001)	0.004 (0.001)	0.050 (0.024)	-	-	0.015 (0.003)
Yellow perch	0.123 (0.079)	0.135 (0.053)	0.098 (0.040)	0.798 (0.296)	0.676 (0.294)	0.233 (0.037)
Walleye	0.063 (0.020)	0.109 (0.042)	0.135 (0.057)	0.102 (0.029)	0.133 (0.039)	0.115 (0.013)
Cisco	-	-	-	-	-	0.000 (<0.001)
Overall	0.333 (0.115)	0.445 (0.146)	0.385 (0.097)	0.946 (0.341)	0.841 (0.325)	0.477 (0.055)

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, 2008.

Species	Stratum				
	Opener	May	Jun-1	Jun-2	Jul-1
<i>Catch per Angler Hour</i>					
Northern pike	0.739 (-)	0.917 (0.347)	0.574 (0.343)	0.421 (0.727)	0.634 (0.517)
Muskellunge	-	-	0.020 (-)	-	0.080 (0.292)
Rock bass	-	-	0.546 (-)	-	-
Sunfish spp.	-	4.077 (-)	3.308 (5.670)	4.069 (2.061)	5.026 (0.330)
Largemouth bass	-	3.099 (7.467)	1.133 (0.061)	0.945 (0.882)	1.599 (0.054)
Black crappie	-	0.455 (0.725)	3.068 (0.052)	-	8.573
Yellow perch	1.391 (0.515)	3.752 (5.987)	3.685 (0.918)	1.840 (1.499)	4.209 (4.218)
Walleye	0.760 (0.518)	0.798 (0.439)	1.377 (1.620)	1.323 (1.172)	0.812 (0.733)
Targeted any	-	1.263 (-)	1.511 (0.473)	-	3.570 (0.536)
<i>Harvest per Angler Hour</i>					
Northern pike	0.369 (-)	0.172 (0.464)	0.201 (0.202)	0.241 (0.423)	0.275 (0.240)
Muskellunge	-	-	-	-	-
Rock bass	-	-	0.546 (-)	-	-
Sunfish spp.	-	3.846 (-)	0.808 (1.253)	2.826 (2.206)	2.923 (0.275)
Largemouth bass	-	-	0.519 (-)	0.366 (0.882)	-
Black crappie	-	0.399 (0.531)	2.945 (0.977)	-	6.467 (-)
Yellow perch	0.452 (0.343)	1.776 (3.044)	1.731 (0.704)	0.821 (0.799)	0.830 (1.931)
Walleye	0.112 (0.040)	0.445 (0.393)	0.363 (0.301)	0.426 (0.309)	0.295 (0.298)
Targeted Any	-	0.281 (-)	0.841 (0.613)	-	0.978 (0.312)

Table 9 continued. Estimates of catch and harvest rates of selected species for targeting anglers by stratum for Leech Lake, Minnesota, 10 May – 30 September 2008.

Species	Stratum					Season
	Jul-2	Aug-1	Aug-2	Sep-1	Sep-2	
	<i>Catch per Angler Hour</i>					
Northern pike	0.599 (0.437)	0.602 (0.441)	0.863 (0.920)	3.870 (0.127)	0.856 (0.433)	0.881 (0.185)
Muskellunge	0.034 (0.046)	-	-	0.019 (0.032)	-	0.022 (0.044)
Rock bass	-	11.698 (12.478)	-	-	-	8.910 (9.359)
Sunfish spp.	3.827 (3.126)	1.812 (5.533)	0.979 (0.119)	1.692 (-)	-	3.480 (1.229)
Largemouth bass	1.527 (0.893)	0.578 (0.116)	-	-	-	1.148 (0.353)
Black crappie	-	-	1.714 (-)	-	-	2.887 (0.197)
Yellow perch	8.275 (3.779)	6.313 (3.953)	1.910 (1.889)	14.587 (4.301)	13.291 (4.356)	6.881 (1.301)
Walleye	0.671 (0.316)	0.990 (0.596)	1.509 (0.871)	1.114 (1.274)	1.082 (0.941)	1.064 (0.298)
Targeted any	1.918 (0.946)	4.373 (4.052)	2.071 (0.302)	4.918 (1.983)	25.286 (-)	3.906 (0.590)
	<i>Harvest per Angler Hour</i>					
Northern pike	0.279 (0.346)	0.180 (0.252)	0.403 (0.437)	1.600 (-)	0.317 (0.495)	0.339 (0.123)
Muskellunge	-	-	-	-	-	-
Rock bass	-	8.031 (18.310)	-	-	-	6.159 (13.733)
Sunfish spp.	1.505 (1.892)	1.272 (5.351)	0.670 (0.367)	0.462 (-)	-	1.998 (0.746)
Largemouth bass	0.294 (0.595)	0.199 (0.178)	-	-	-	0.237 (0.146)
Black crappie	-	-	0.571 (-)	-	-	2.282 (0.292)
Yellow perch	2.937 (0.770)	2.870 (2.214)	1.060 (1.454)	6.783 (2.214)	4.208 (1.574)	2.730 (0.606)
Walleye	0.298 (0.175)	0.476 (0.350)	0.789 (0.299)	0.486 (0.530)	0.486 (0.472)	0.459 (0.122)
Targeted Any	0.386 (0.061)	0.851 (0.902)	0.931 (0.174)	1.905 (1.394)	8.743 (-)	1.274 (0.244)

Table 10. Percent of all angling parties who harvested a given number of fish by stratum from Leech Lake, Minnesota, 10 May – 30 September 2008.

Species/stratum	N	Number Harvested per Angler					
		0	0.1-0.9	1.0-1.9	2.0-2.9	3	
Northern pike							
Opener	96	90%	8%	1%	1%	0%	
May	162	87%	7%	6%	0%	1%	
Jun-1	147	84%	10%	5%	1%	0%	
Jun-2	108	85%	8%	6%	0%	1%	
Jul-1	126	89%	10%	2%	0%	0%	
Jul-2	136	81%	13%	7%	0%	0%	
Aug-1	169	89%	8%	4%	0%	0%	
Aug-2	95	83%	8%	4%	2%	1%	
Sep-1	80	91%	4%	4%	1%	0%	
Sep-2	88	91%	7%	1%	1%	0%	
Yellow perch							
	N	0	0.1-4.9	5.0-9.9	10.0-14.9	15.0-19.9	20
Opener	96	70%	26%	2%	0%	0%	2%
May	162	64%	30%	4%	0%	0%	2%
Jun-1	147	66%	31%	1%	1%	1%	1%
Jun-2	108	82%	18%	0%	0%	0%	0%
Jul-1	126	83%	15%	1%	0%	0%	1%
Jul-2	136	85%	13%	1%	0%	0%	1%
Aug-1	169	76%	20%	2%	0%	0%	2%
Aug-2	95	81%	16%	2%	0%	0%	1%
Sep-1	80	80%	13%	3%	4%	0%	1%
Sep-2	88	53%	17%	11%	7%	1%	10%
Walleye							
	N	0	0.1-0.9	1.0-1.9	2.0-2.9	3.0-3.9	4
Opener	96	66%	20%	13%	0%	2%	0%
May	162	50%	15%	15%	9%	3%	8%
Jun-1	147	54%	14%	17%	7%	4%	3%
Jun-2	108	74%	11%	6%	2%	3%	4%
Jul-1	126	79%	8%	9%	3%	0%	1%
Jul-2	136	80%	10%	6%	4%	0%	0%
Aug-1	169	76%	10%	9%	3%	1%	2%
Aug-2	95	62%	16%	12%	6%	2%	1%
Sep-1	80	71%	11%	11%	3%	1%	3%
Sep-2	88	66%	10%	16%	6%	0%	3%

Northern pike: 3 fish in possession, no length limit.

Yellow perch: 20 fish in possession, no length limit.

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

Table 11. Percent of targeting angling parties who harvested a given number of fish by stratum from Leech Lake, Minnesota, 10 May – 30 September 2008.

Species/stratum	N	Number Harvested per Angler					
		0	0.1-0.9	1.0-1.9	2.0-2.9	3	
Northern pike							
Opener	1	0%	0%	100%	0%	0%	
May	7	71%	0%	29%	0%	0%	
Jun-1	20	50%	25%	25%	0%	0%	
Jun-2	12	42%	8%	42%	0%	8%	
Jul-1	13	54%	38%	8%	0%	0%	
Jul-2	21	38%	38%	24%	0%	0%	
Aug-1	31	65%	23%	13%	0%	0%	
Aug-2	12	58%	17%	17%	0%	8%	
Sep-1	4	75%	0%	0%	25%	0%	
Sep-2	5	60%	20%	0%	20%	0%	
Yellow perch							
	N	0	0.1-4.9	5.0-9.9	10.0-14.9	15.0-19.9	20
Opener	29	31%	55%	7%	0%	0%	7%
May	24	0%	67%	17%	0%	0%	17%
Jun-1	28	14%	71%	4%	4%	4%	4%
Jun-2	10	30%	70%	0%	0%	0%	0%
Jul-1	9	44%	33%	11%	0%	0%	11%
Jul-2	8	38%	38%	13%	0%	0%	13%
Aug-1	17	24%	41%	18%	0%	0%	18%
Aug-2	8	38%	38%	13%	0%	0%	13%
Sep-1	12	17%	42%	8%	25%	0%	8%
Sep-2	36	11%	25%	25%	14%	0%	25%
Walleye							
	N	0	0.1-0.9	1.0-1.9	2.0-2.9	3.0-3.9	4
Opener	94	65%	20%	13%	0%	2%	0%
May	137	44%	17%	17%	9%	4%	9%
Jun-1	113	46%	15%	21%	8%	5%	4%
Jun-2	85	67%	14%	8%	2%	4%	5%
Jul-1	75	65%	13%	15%	5%	0%	1%
Jul-2	66	62%	18%	12%	8%	0%	0%
Aug-1	88	56%	17%	17%	6%	1%	3%
Aug-2	56	45%	21%	18%	11%	4%	2%
Sep-1	37	59%	8%	19%	5%	3%	5%
Sep-2	60	52%	13%	22%	8%	0%	5%

Northern pike: 3 fish in possession, no length limit.

Yellow perch: 20 fish in possession, no length limit.

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

Table 12. Length-frequency distribution (%) of harvested and released fish for Leech Lake, Minnesota, 10 May – 30 September 2008.

Percent Harvested (H) and Released (R)														
TL (inches)	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														
4.00-4.49														
5.00-5.49										14.0				1.4
6.00-6.49										3.3				
7.00-7.49				0.5						18.3	25.4			
8.00-8.49				0.2						18.3	0.8			2.1
9.00-9.49		75.0								46.7	19.6			2.1
10.00-10.49				0.2						8.3	29.5	50.0	9.5	9.0
11.00-11.49										8.3	3.3		4.8	4.2
12.00-12.99		25.0		2.2							4.1		23.8	7.6
13.00-13.99				0.2									4.8	1.4
14.00-14.99				2.5										18.1
15.00-15.99				4.4						0.2		50.0	23.8	30.6
16.00-16.99				0.8									14.3	2.1
17.00-17.99			0.5	8.4									14.3	15.3
18.00-18.99			0.5	3.5				16.7					4.8	1.4
19.00-19.99			2.1	10.7		4.2								0.7
20.00-20.99			10.1	12.8										2.8
21.00-21.99			9.0	4.4				16.7						
22.00-22.99			16.4	18.3				33.3						1.4
23.00-23.99			11.1	3.9										
24.00-24.99			11.1	8.9			100.0	16.7						
25.00-25.99			10.6	7.7		8.3								
26.00-26.99			9.5	0.7										
27.00-27.99			7.9	2.5		8.3								
28.00-28.99			6.9	0.2				16.7						
29.00-29.99			0.5	0.7		4.2								
30.00-30.99			2.6	4.0		4.2								
31.00-31.99			0.5			4.2								
32.00-32.99				0.8										
33.00-33.99														
34.00-34.99			0.5	0.3										
35.00-35.99				1.2		8.3								
36.00-36.99														
37.00-37.99				0.2		8.3								
38.00-38.99														
39.00-39.00														
40.00-40.99						4.2								
41.00-41.99						4.2								
42.00-42.99						8.3								
43.00-43.99														
44.00-44.99						4.2								
45.00-45.99						16.7								
46.00-46.99														
47.00-47.99						12.5								
48.00-48.99														
49.00-49.99														
≥50.00														
Total (N)	0	4	189	596	0	24	1	6	60	516	0	2	21	144

Table 12 continued. Length-frequency distribution (%) of harvested and released fish for Leech Lake, Minnesota, 10 May – 30 September 2008.

Percent Harvested (H) and Released (R)														
TL (inches)	Black crappie		Bluegill		Sunfish spp.		Pumpkinseed		Yellow perch		Walleye ¹		Cisco	
	H	R	H	R	H	R	H	R	H	R	H	R	H	R
<4.00										0.8				
4.00-4.49				18.3		34.4		22.2		5.6		0.4		
5.00-5.49		33.3	2.2	21.1		54.4	8.7	33.3	0.3	48.3		0.4		
6.00-6.49		25.0		1.6		7.3	26.1		0.7	8.8				
7.00-7.49		5.6	76.9	14.6	100.0	3.7	43.5	11.1	5.6	29.1		1.2		
8.00-8.49	4.9	36.1	20.9	24.0			21.7	11.1	12.5	0.6				
9.00-9.49	34.1			20.3		0.3			34.2	3.2	0.1	1.3		
10.00-10.49	14.6							22.2	35.4	2.9		9.3		
11.00-11.49	29.3								6.9	0.2	1.3	5.3		
12.00-12.99	17.1								4.2	0.7	19.3	22.5		
13.00-13.99									0.1		9.4	0.9		
14.00-14.99											8.1	2.6		
15.00-15.99											24.1	2.3		
16.00-16.99											17.1	0.1		
17.00-17.99											15.7	3.5	100.0	
18.00-18.99											0.6	4.3		
19.00-19.99											0.1	4.9		
20.00-20.99											1.0	10.1		
21.00-21.99											0.1	1.5		
22.00-22.99											0.9	13.2		
23.00-23.99											0.1	1.1		
24.00-24.99											0.3	5.8		
25.00-25.99											0.6	7.5		
26.00-26.99											0.9	0.7		
27.00-27.99											0.1	0.9		
28.00-28.99												0.1		
29.00-29.99												0.1		
30.00-30.99											0.1	0.1		
31.00-31.99														
32.00-32.99														
33.00-33.99														
34.00-34.99														
35.00-35.99														
≥ 36.00														
Total (N)	41	36	91	246	15	355	23	9	1,171	4,973	694	1,930	1	0

¹Bold font denotes walleye protected by length limit.

Table 13. Age distribution and mean length-at-catch of harvested walleye by month for Leech Lake, MN, 10 May – 30 September 2008. Standard errors of mean total lengths (TL; inches) are in parentheses.

Age	Year class	May		June		July		August		September	
		N	TL (in)	N	TL (in)	N	TL (in)	N	TL (in)	N	TL (in)
0	2008	0		0		0		0		0	
1	2007	0		0		0		0		1	11.9 (-)
2	2006	11	12.8 (0.30)	45	12.6 (0.09)	25	12.9 (0.22)	41	13.7 (0.16)	12	14.4 (0.39)
3	2005	59	16.3 (0.11)	52	15.7 (0.16)	35	15.8 (0.18)	22	16.4 (0.26)	14	16.2 (0.35)
4	2004	3	16.4 (0.82)	6	16.8 (0.46)	1	15.2 (-)	0		0	
5	2003	2	19.1 (1.06)	0		1	17.5 (-)	0		0	
6	2002	2	18.3 (0.30)	1	16.3 (-)	0		0		0	
7	2001	0		0		0		0		0	
8+	≤ 2000	4	24.6 (1.36)	0		0		0		0	
Total/mean		81	17.92	104	15.35	62	15.35	63	15.05	27	14.17

FIGURES

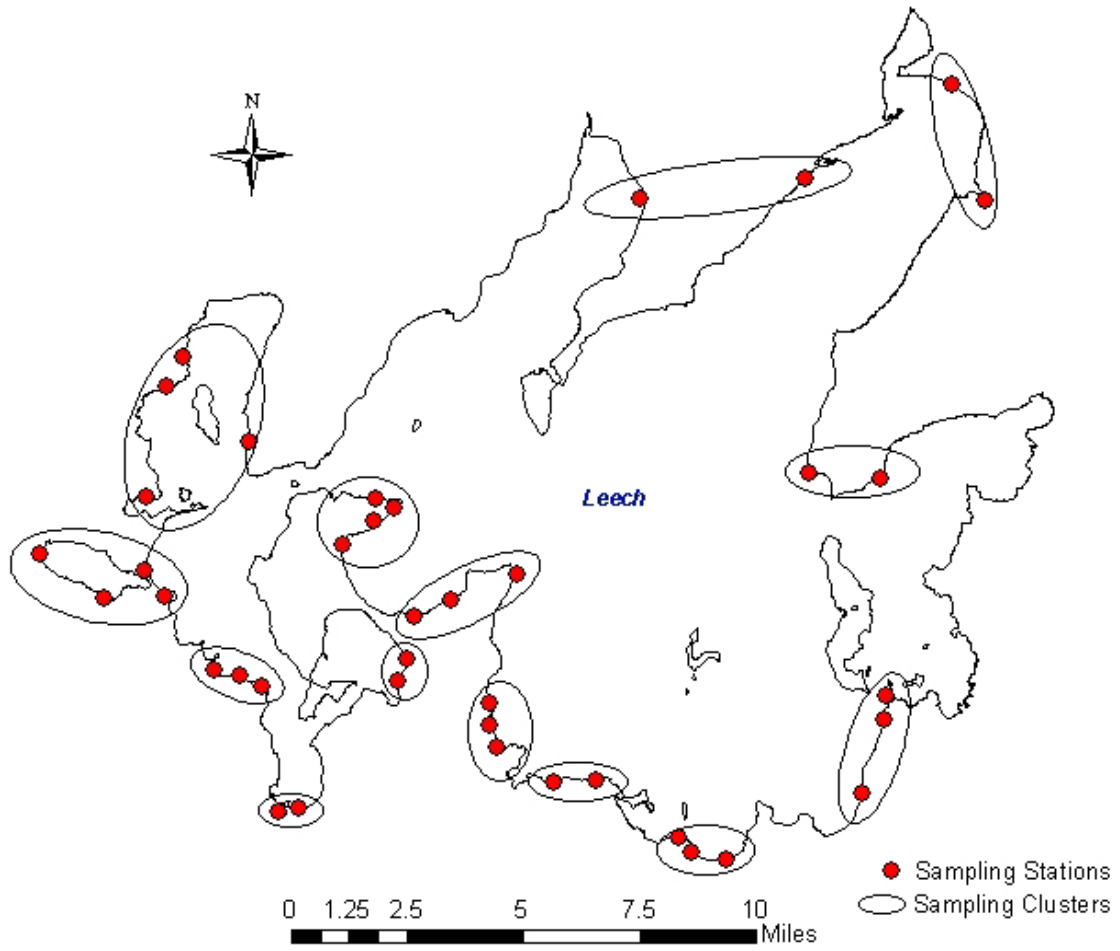


Figure 1. Creel survey sampling clusters (circles) and stations (dots) on Leech Lake, Minnesota.

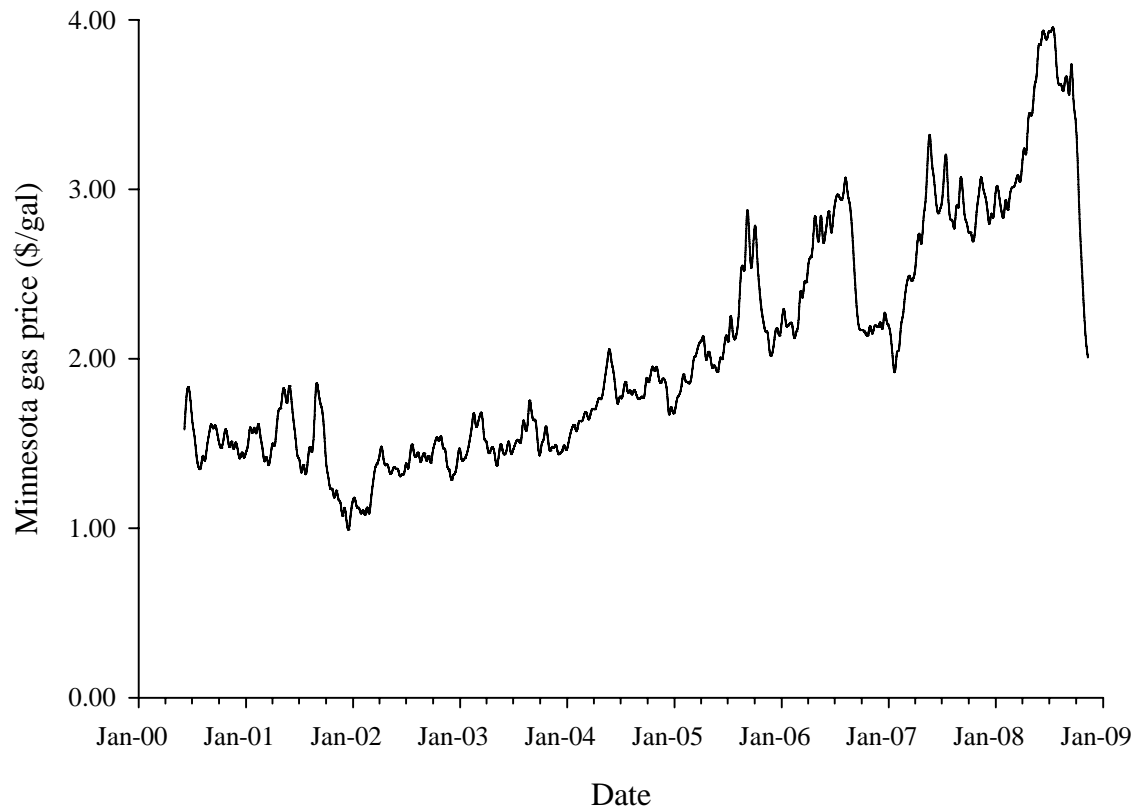


Figure 2. Weekly price (\$) per gallon of regular gasoline in Minnesota, February 2000 – November 2008 (EIA 2008).

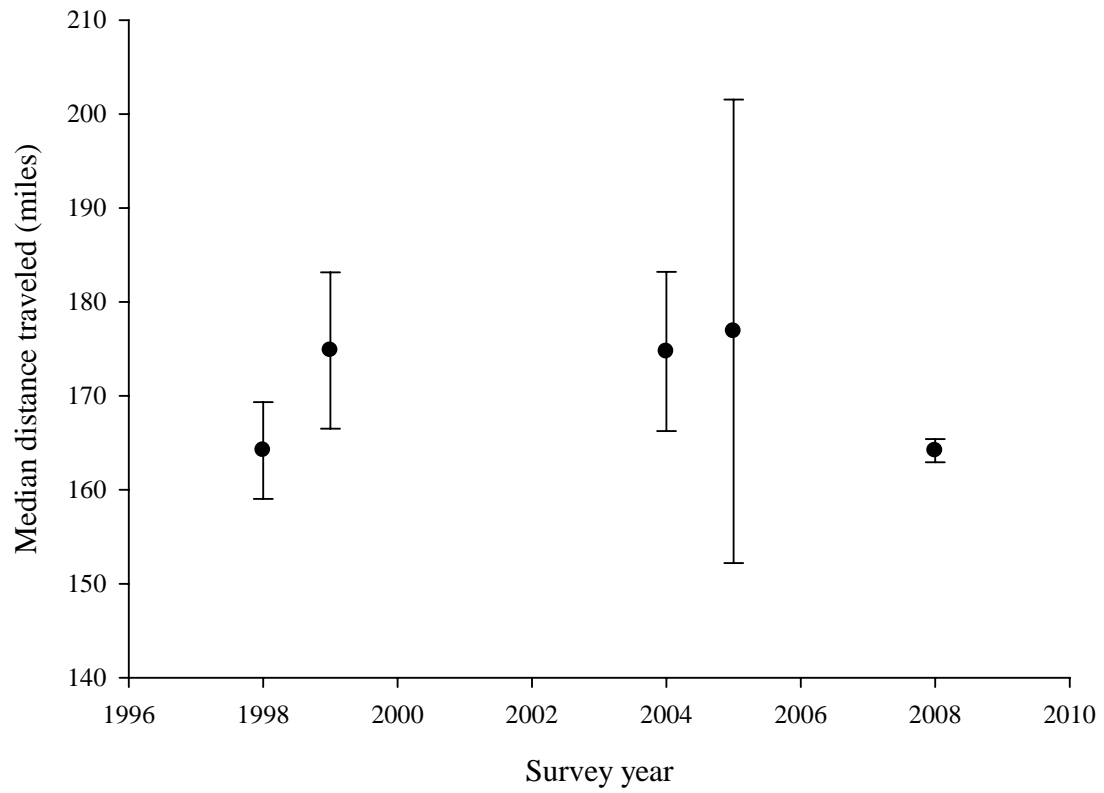


Figure 3. Median distance (miles \pm 95% CI) traveled by Leech Lake anglers interviewed during summer creel surveys, 1998-2008.

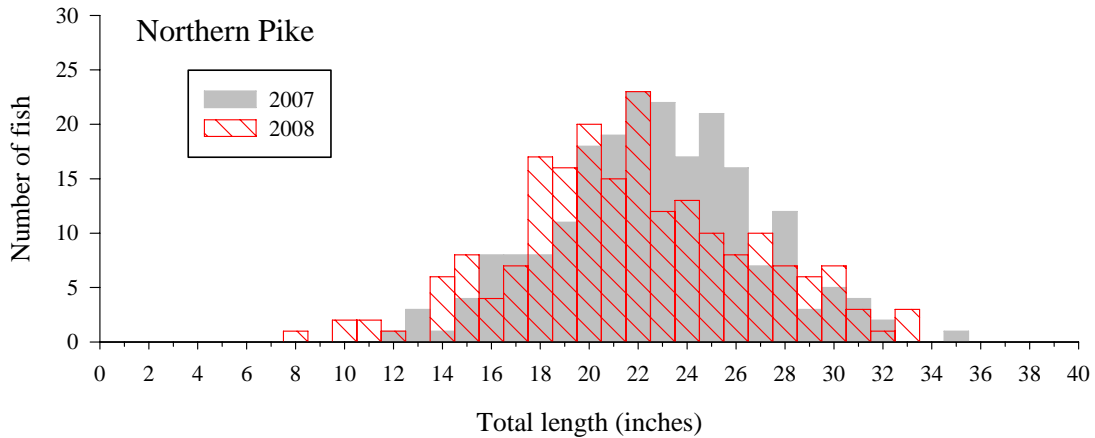
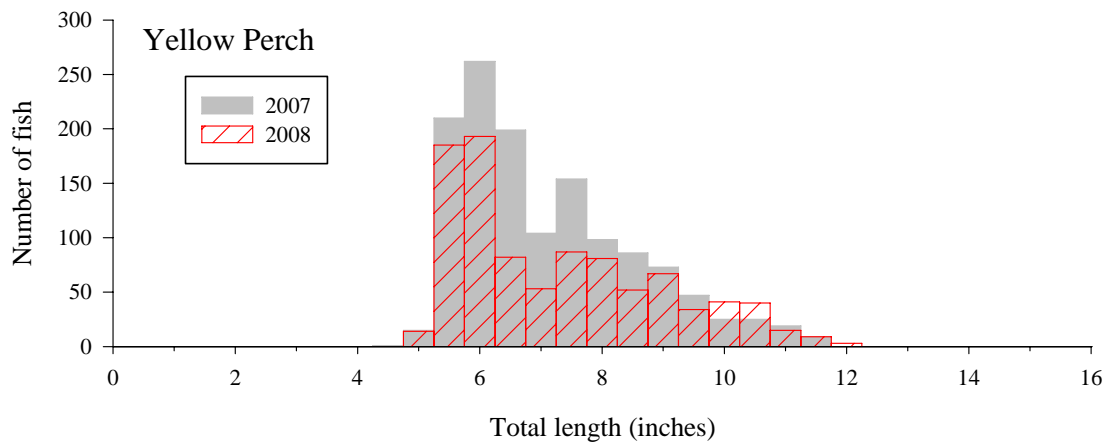
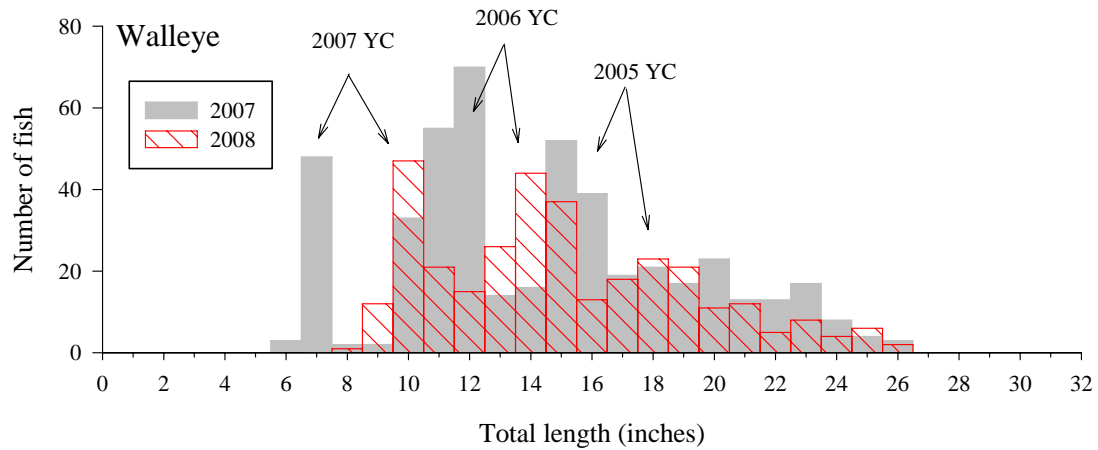


Figure 4. Length-frequency distributions of select species sampled in Leech Lake during the 2007 (shaded bars) and 2008 (hatched red bars) gillnet surveys. Peaks in the 2007 and 2008 distributions created by the 2005-2007 year classes of walleye are also highlighted (adapted from Schultz 2008a, 2008b).

APPENDIX

Table A1. Creel survey sampling summary and angling pressure estimates by month and basin for Leech Lake, Minnesota, 10 May – 30 September, 2008. Standard errors appear in parentheses.

	Stratum					
<i>Western Bays</i>	May	June	July	August	September	Season
N Interviews/refusals	30/0	57/0	101/0	108/0	56/0	352/0
Mean anglers/boat	2.40	2.56	2.63	2.69	2.23	2.51
Total angler hours (s.e.)	13,189 (2,664)	31,635 (3,660)	41,710 (6,181)	44,056 (7,089)	29,233 (2,941)	159,824 (10,131)
Total hours per acre	0.74 (0.15)	1.76 (0.20)	2.33 (0.27)	2.46 (0.40)	1.63 (0.16)	8.92 (0.57)
<i>Main Lake</i>						
N Interviews/refusals	228/0	198/3	161/2	155/0	112/0	854/5
Mean anglers/boat	2.47	2.48	2.59	2.48	2.33	2.47
Total angler hours (s.e.)	81,591 (11,807)	87,591 (9,523)	87,596 (12,329)	90,042 (10,978)	78,727 (11,350)	425,547 (25,128)
Total hours per acre	0.87 (0.13)	0.93 (0.10)	0.93 (0.13)	0.96 (0.12)	0.84 (0.12)	4.53 (0.27)

Table A2. Catch and harvest estimates by month in the western bays basin (17,927 acres) of Leech Lake, 10 May – 30 September 2008.

Species	May	June	July	August	September	Season
	<i>Number Caught per Acre</i>					
Bullhead spp.	-	-	0.002 (0.001)	-	-	0.002 (0.001)
Northern pike	0.029 (-)	0.127 (0.028)	0.178 (0.043)	0.289 (0.095)	0.147 (0.038)	0.770 (0.115)
Muskellunge	0.003 (0.002)	0.006 (0.003)	0.020 (0.008)	-	0.006 (0.002)	0.034 (0.009)
Burbot	-	0.005 (0.005)	-	-	-	0.005 (0.005)
Rock bass	0.007 (-)	0.930 (0.333)	0.298 (0.037)	0.719 (0.339)	0.057 (0.001)	2.011 (0.477)
Sunfish spp.	0.069 (-)	0.652 (0.376)	0.837 (0.222)	0.553 (0.079)	0.108 (0.121)	2.219 (0.460)
Smallmouth bass	-	-	-	0.003 (-)	0.001 (0.001)	0.004 (0.001)
Largemouth bass	-	0.049 (0.017)	0.063 (0.034)	0.051 (0.008)	0.012 (0.001)	0.175 (0.039)
Black crappie	0.038 (0.027)	0.067 (-)	0.080 (0.004)	0.253 (0.127)	-	0.438 (0.129)
Yellow perch	0.204 (0.055)	0.827 (0.327)	0.901 (0.167)	1.435 (0.478)	4.572 (0.983)	7.939 (1.154)
Walleye	0.189 (0.061)	0.726 (0.201)	0.392 (0.101)	0.463 (0.161)	0.433 (0.095)	2.203 (0.299)
Cisco	-	-	-	-	-	-
Overall	0.539 (0.157)	3.388 (0.634)	2.770 (0.522)	3.765 (0.906)	5.336 (1.007)	15.798 (1.592)
	<i>Number Harvested per Acre</i>					
Bullhead spp.	-	-	-	-	-	-
Northern pike	0.007 (-)	0.018 (0.011)	0.033 (0.014)	0.080 (0.021)	0.019 (0.006)	0.157 (0.028)
Muskellunge	-	-	-	-	-	-
Burbot	-	-	-	-	-	-
Rock bass	-	0.132 (0.103)	0.013 (0.009)	0.414 (0.272)	0.013 (0.001)	0.572 (0.291)
Sunfish spp.	0.059 (-)	0.235 (0.088)	0.368 (0.149)	0.301 (0.039)	0.029 (0.033)	0.992 (0.180)
Smallmouth bass	-	-	-	-	-	-
Largemouth bass	-	0.020 (-)	0.016 (0.012)	0.012 (0.002)	0.011 (-)	0.060 (0.012)
Black crappie	0.038 (0.027)	0.058 (-)	0.071 (0.004)	0.159 (0.079)	-	0.327 (0.084)
Yellow perch	0.081 (0.024)	0.181 (0.073)	0.066 (0.024)	0.483 (0.216)	1.434 (0.369)	2.244 (0.435)
Walleye	0.080 (0.023)	0.222 (0.080)	0.148 (0.040)	0.195 (0.093)	0.199 (0.046)	0.845 (0.139)
Cisco	-	-	-	-	-	-
Overall	0.267 (0.074)	0.867 (0.178)	0.715 (0.185)	1.644 (0.509)	1.704 (0.372)	5.197 (0.685)

Table A3. Catch and harvest estimates by month in the main lake basin (93,914 acres) of Leech Lake, 10 May – 30 September 2008.

Species	May	June	July	August	September	Season
<i>Number Caught per Acre</i>						
Bullhead spp.	-	0.0011 (-)	-	0.0012 (-)	-	0.0023 (-)
Northern pike	0.0478 (0.012)	0.0696 (0.012)	0.0876 (0.018)	0.0986 (0.021)	0.0926 (0.022)	0.3962 (0.039)
Muskellunge	-	-	0.0021 (0.002)	0.0011 (-)	0.0023 (0.002)	0.0054 (0.002)
Burbot	0.0006 (0.001)	0.0023 (0.002)	0.0006 (0.001)	-	-	0.0035 (0.002)
Rock bass	0.0004 (<0.001)	0.0907 (0.031)	0.0367 (0.011)	0.0208 (0.009)	0.0244 (0.012)	0.1730 (0.036)
Sunfish spp.	-	0.0960 (0.058)	0.1079 (0.043)	0.0425 (0.007)	0.0004 (<0.001)	0.2467 (0.072)
Smallmouth bass	-	-	-	-	-	-
Largemouth bass	0.0149 (0.015)	0.0233 (0.010)	0.0188 (0.007)	0.0081 (0.002)	0.0058 (0.004)	0.0710 (0.019)
Black crappie	0.0028 (0.001)	0.0151 (0.001)	0.0172 (-)	0.0089 (-)	0.0004 (-)	0.0443 (0.001)
Yellow perch	0.4356 (0.122)	0.4079 (0.080)	0.4672 (0.111)	0.3830 (0.080)	1.5624 (0.416)	3.2561 (0.462)
Walleye	0.3242 (0.057)	0.3304 (0.064)	0.1375 (0.029)	0.2500 (0.060)	0.2710 (0.050)	1.3130 (0.120)
Cisco	-	-	0.0005 (0.001)	-	-	0.0005 (0.001)
Overall	0.8263 (0.177)	1.0364 (0.179)	0.8762 (0.156)	0.8141 (0.138)	1.9592 (0.453)	5.5122 (0.558)
<i>Number Harvested per Acre</i>						
Bullhead spp.	-	-	-	-	-	-
Northern pike	0.0155 (0.007)	0.0338 (0.008)	0.0391 (0.009)	0.0381 (0.010)	0.0235 (0.008)	0.1500 (0.018)
Muskellunge	-	-	-	-	-	-
Burbot	0.0004 (0.001)	-	-	-	-	0.0004 (0.001)
Rock bass	-	0.0346 (0.019)	0.0156 (0.006)	0.0093 (0.004)	0.0063 (0.006)	0.0658 (0.021)
Sunfish spp.	-	0.0795 (0.052)	0.0437 (0.024)	0.0170 (0.008)	0.0004 (<0.001)	0.1406 (0.058)
Smallmouth bass	-	-	-	-	-	-
Largemouth bass	-	0.0049 (-)	0.0060 (0.004)	0.0030 (0.001)	0.0004 (0.001)	0.0143 (0.004)
Black crappie	0.0020 (0.001)	0.0151 (0.001)	0.0095 (-)	0.0046 (-)	-	0.0313 (0.001)
Yellow perch	0.1334 (0.045)	0.1348 (0.035)	0.1092 (0.038)	0.0766 (0.022)	0.5668 (0.162)	1.0207 (0.177)
Walleye	0.1350 (0.029)	0.1289 (0.024)	0.0607 (0.015)	0.1344 (0.034)	0.0984 (0.020)	0.5574 (0.057)
Cisco	-	-	0.0005 (0.001)	-	-	0.0005 (0.001)
Overall	0.2863 (0.067)	0.4316 (0.088)	0.2843 (0.060)	0.2831 (0.056)	0.6958 (0.172)	1.9811 (0.220)

Table A4. Monthly estimates of catch and harvest rates of all anglers in the western bays basin of Leech Lake, 10 May – 30 September 2008.

Species	May	June	July	August	September	Season
	<i>Catch per Angler Hour</i>					
Bullhead spp.	-	-	0.001 (-)	-	-	0.001 (-)
Northern pike	0.040 (-)	0.072 (0.022)	0.076 (0.024)	0.118 (0.051)	0.090 (0.027)	0.086 (0.016)
Muskellunge	0.003 (0.003)	0.003 (0.002)	0.008 (0.004)	-	0.004 (0.001)	0.004 (0.001)
Burbot	-	0.003 (0.003)	-	-	-	0.001 (0.001)
Rock bass	0.010 (-)	0.527 (0.200)	0.128 (0.031)	0.293 (0.147)	0.035 (0.004)	0.226 (0.056)
Sunfish spp.	0.094 (-)	0.370 (0.226)	0.360 (0.117)	0.225 (0.044)	0.066 (0.074)	0.249 (0.056)
Smallmouth bass	-	-	-	0.001 (-)	0.001 (0.001)	<0.001 (<0.001)
Largemouth bass	-	0.028 (0.010)	0.027 (0.015)	0.021 (0.005)	0.007 (0.001)	0.020 (0.005)
Black crappie	0.052 (0.038)	0.038 (-)	0.035 (0.004)	0.103 (0.054)	-	0.049 (0.015)
Yellow perch	0.277 (0.094)	0.469 (0.235)	0.387 (-)	0.584 (0.280)	2.804 (0.980)	0.891 (0.170)
Walleye	0.257 (0.095)	0.411 (0.113)	0.168 (0.058)	0.189 (0.069)	0.266 (0.065)	0.247 (0.037)
Cisco	-	-	-	-	-	-
Overall	0.733 (0.233)	1.920 (0.523)	1.191 (0.256)	1.532 (0.532)	3.272 (1.082)	0.259 (0.332)
	<i>Harvest per Angler Hour</i>					
Bullhead spp.	-	-	-	-	-	-
Northern pike	0.010 (-)	0.010 (0.008)	0.014 (0.006)	0.032 (0.007)	0.012 (0.004)	0.018 (0.003)
Muskellunge	-	-	-	-	-	-
Burbot	-	-	-	-	-	-
Rock bass	-	0.075 (0.059)	0.006 (0.004)	0.169 (0.115)	0.008 (0.001)	0.064 (0.033)
Sunfish spp.	0.081 (-)	0.133 (0.062)	0.158 (0.073)	0.123 (0.027)	0.018 (0.020)	0.111 (0.023)
Smallmouth bass	-	-	-	-	-	-
Largemouth bass	-	0.012 (0.001)	0.007 (0.005)	0.005 (0.002)	0.007 (0.001)	0.007 (0.002)
Black crappie	0.052 (0.038)	0.033 (-)	0.031 (0.004)	0.065 (0.034)	-	0.037 (0.010)
Yellow perch	0.111 (0.039)	0.103 (0.055)	0.028 (0.011)	0.196 (0.089)	0.879 (0.318)	0.252 (0.056)
Walleye	0.109 (0.038)	0.126 (0.044)	0.064 (0.025)	0.079 (0.043)	0.122 (0.031)	0.095 (0.018)
Cisco	-	-	-	-	-	-
Overall	0.363 (0.075)	0.491 (0.129)	0.307 (0.107)	0.669 (0.229)	1.045 (0.353)	0.094 (0.121)

Table A5. Monthly estimates of catch and harvest rates of all anglers in the main lake basin of Leech Lake, 10 May – 30 September 2008.

Species	May	June	July	August	September	Season
<i>Catch per Angler Hour</i>						
Bullhead spp.	-	0.001 (-)	-	0.001 (-)	-	0.001 (-)
Northern pike	0.055 (0.017)	0.075 (0.038)	0.094 (0.037)	0.103 (0.030)	0.110 (0.040)	0.087 (0.015)
Muskellunge	-	-	0.002 (0.002)	0.001 (-)	0.003 (0.002)	0.001 (0.001)
Burbot	0.001 (0.001)	0.003 (0.002)	0.001 (0.001)	-	-	0.001 (<0.001)
Rock bass	0.000 (0.001)	0.097 (0.038)	0.039 (0.027)	0.022 (0.012)	0.029 (0.015)	0.038 (0.010)
Sunfish spp.	-	0.103 (0.063)	0.116 (0.098)	0.044 (0.011)	0.001 (-)	0.055 (0.020)
Smallmouth bass	-	-	-	-	-	-
Largemouth bass	0.017 (0.015)	0.025 (0.011)	0.020 (0.012)	0.008 (0.003)	0.007 (0.004)	0.016 (0.004)
Black crappie	0.003 (0.001)	0.016 (0.002)	0.018 (-)	0.009 (-)	0.001 (-)	0.010 (0.001)
Yellow perch	0.501 (0.165)	0.437 (0.102)	0.501 (0.235)	0.399 (0.108)	1.864 (0.787)	0.719 (0.137)
Walleye	0.373 (0.115)	0.354 (0.104)	0.147 (0.050)	0.261 (0.082)	0.323 (0.076)	0.290 (0.039)
Cisco	-	-	0.001 (0.001)	-	-	0.001 (0.001)
Overall	0.951 (0.286)	1.111 (0.289)	0.939 (0.337)	0.849 (0.204)	2.337 (0.849)	0.181 (0.232)
<i>Harvest per Angler Hour</i>						
Bullhead spp.	-	-	-	-	-	-
Northern pike	0.018 (0.008)	0.036 (0.023)	0.042 (0.014)	0.040 (0.012)	0.028 (0.013)	0.033 (0.007)
Muskellunge	-	-	-	-	-	-
Burbot	0.001 (0.001)	-	-	-	-	-
Rock bass	-	0.037 (0.022)	0.017 (0.014)	0.010 (0.004)	0.008 (0.007)	0.015 (0.005)
Sunfish spp.	-	0.085 (0.056)	0.047 (0.046)	0.018 (0.009)	0.001 (-)	0.031 (0.014)
Smallmouth bass	-	-	-	-	-	-
Largemouth bass	-	0.005 (0.001)	0.006 (0.004)	0.003 (0.002)	0.001 (0.001)	0.003 (0.001)
Black crappie	0.002 (0.001)	0.016 (0.002)	0.010 (-)	0.005	-	0.007 (0.001)
Yellow perch	0.154 (0.051)	0.145 (0.041)	0.117 (0.070)	0.080 (0.026)	0.676 (0.261)	0.225 (0.047)
Walleye	0.155 (0.047)	0.138 (0.043)	0.065 (0.019)	0.140 (0.047)	0.117 (0.032)	0.123 (0.017)
Cisco	-	-	0.001 (0.001)	-	-	<0.001 (<0.001)
Overall	0.330 (0.091)	0.463 (0.136)	0.305 (0.116)	0.295 (0.075)	0.830 (0.293)	0.066 (0.085)

Table A6. Monthly estimates of catch and harvest rates of targeting anglers in the western bays basin of Leech Lake, 10 May – 30 September 2008.

Species	May	June	July	August	September	Season
<i>Catch per Angler Hour</i>						
Northern pike	1.000 (-)	0.477 (0.390)	0.582 (0.377)	0.731 (0.509)	0.326 (0.119)	0.614 (0.188)
Muskellunge	-	0.025 (-)	0.068 (0.282)	-	0.010 (0.015)	0.027 (0.084)
Rock bass	-	-	-	11.698 (12.478)	-	11.698 (12.478)
Sunfish spp.	5.300 (-)	5.242 (5.910)	7.062 (3.232)	1.567 (4.724)	1.692 (-)	4.750 (2.023)
Largemouth bass	-	1.230 (-)	2.504 (0.085)	0.406 (0.105)	-	1.287 (0.049)
Black crappie	0.340 (0.350)	2.359 (0.130)	10.667 (-)	-	-	2.599 (0.147)
Yellow perch	2.076 (-)	4.788 (-)	5.616 (5.100)	6.282 (3.704)	15.624 (5.002)	8.163 (2.099)
Walleye	0.654 (0.426)	1.670 (1.817)	0.888 (0.704)	1.514 (0.714)	1.192 (1.394)	1.185 (0.472)
Targeted any	-	2.379 (0.946)	1.209 (0.565)	3.702 (3.252)	6.022 (3.128)	2.783 (1.049)
<i>Harvest per Angler Hour</i>						
Northern pike	-	0.097 (0.224)	0.155 (0.097)	0.302 (0.380)	0.174 (-)	0.166 (0.119)
Muskellunge	-	-	-	-	-	-
Rock bass	-	-	-	8.031 (18.310)	-	8.031 (18.310)
Sunfish spp.	5.000 (-)	1.848 (1.663)	3.228 (1.959)	1.105 (4.832)	0.462 (-)	2.530 (1.146)
Largemouth bass	-	0.819 (-)	-	0.190 (0.172)	-	0.322 (0.068)
Black crappie	0.340 (0.350)	2.051 (2.442)	9.333 (-)	-	-	2.289 (0.483)
Yellow perch	1.946 (-)	2.000 (-)	0.275 (0.883)	3.097 (2.319)	6.073 (1.716)	3.008 (0.830)
Walleye	0.426 (0.425)	0.397 (0.331)	0.320 (0.259)	0.744 (0.228)	0.529 (0.524)	0.497 (0.161)
Targeted Any	-	1.396 (1.226)	0.192 (0.308)	0.842 (0.681)	1.517 (1.669)	0.769 (0.399)

Table A7. Monthly estimates of catch and harvest rates of targeting anglers in the main lake basin of Leech Lake, 10 May – 30 September 2008.

Species	May	June	July	August	September	Season
<i>Catch per Angler Hour</i>						
Northern pike	0.849 (0.536)	0.525 (0.632)	0.642 (0.526)	0.743 (0.908)	3.413 (0.454)	1.104 (0.301)
Muskellunge	-	-	0.044 (0.052)	-	0.016 (0.046)	0.017 (0.018)
Rock bass	-	0.546 (-)	-	-	-	0.546 (-)
Sunfish spp.	-	2.135 (1.209)	1.752 (0.260)	1.846 (8.701)	-	1.633 (0.661)
Largemouth bass	3.099 (7.467)	0.952 (0.562)	0.997 (0.576)	0.480 (0.153)	-	1.040 (0.624)
Black crappie	0.546 (2.152)	3.541 (-)	6.480 (-)	1.714 (-)	-	3.242 (0.400)
Yellow perch	3.932 (7.076)	2.211 (1.185)	7.226 (2.914)	1.747 (2.431)	12.254 (3.529)	5.829 (1.626)
Walleye	1.027 (0.827)	1.029 (0.835)	0.591 (0.338)	1.000 (0.914)	1.003 (0.751)	0.923 (0.339)
Targeted any	1.642 (-)	0.508 (-)	4.225 (0.950)	2.777 (2.499)	12.898 (1.407)	4.746 (0.668)
<i>Harvest per Angler Hour</i>						
Northern pike	0.300 (0.717)	0.326 (0.370)	0.379 (0.399)	0.288 (0.344)	1.342 (0.519)	0.483 (0.204)
Muskellunge	-	-	-	-	-	-
Rock bass	-	0.546 (-)	-	-	-	0.546 (-)
Sunfish spp.	-	1.786 (1.916)	1.154 (0.216)	1.244 (1.691)	-	1.225 (0.757)
Largemouth bass	-	0.232 (0.558)	0.190 (0.384)	0.082 (0.210)	-	0.171 (0.254)
Black crappie	0.364 (1.434)	3.541 (-)	3.600 (-)	0.571 (-)	-	2.273 (0.267)
Yellow perch	1.473 (3.598)	1.141 (0.810)	3.470 (1.584)	0.639 (0.774)	4.918 (2.106)	2.501 (0.868)
Walleye	0.417 (0.670)	0.392 (0.276)	0.273 (0.220)	0.546 (0.433)	0.444 (0.479)	0.414 (0.186)
Targeted Any	0.365 (-)	0.226 (-)	1.152 (0.024)	0.936 (0.621)	5.022 (1.288)	1.652 (0.305)



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



Creel Survey Summary for Leech Lake, Minnesota

Fish Management Area: Walker

Year Surveyed: 10 May - 30 September 2008

Angling Pressure

Angler-hours	585,371
Angler-hours/acre	5.25
Anglers/boat	2.48
Mean Trip Length (h)	3.84

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.	247	0.002	-	-	-	-
Northern pike	51,015	0.457	16,908	0.152	54,934	0.492
Muskellunge	1,117	0.010	-	0.000	-	-
Burbot	414	0.004	39	0.000	-	-
Rock bass	52,302	0.469	16,426	0.147	11,949	0.107
Sunfish spp.	62,945	0.564	30,992	0.278	10,200	0.091
Smallmouth bass	68	0.001	-	0.000	-	-
Largemouth bass	9,796	0.088	2,412	0.022	4,465	0.040
Black crappie	12,017	0.108	8,793	0.079	7,862	0.070
Yellow perch	448,117	4.016	136,096	1.220	59,273	0.531
Walleye	162,806	1.459	67,502	0.605	81,582	0.731
Cisco	48	0.000	48	0.000	-	-
All species	800,892	7.177	279,215	2.502	230,266	2.064

Catch Rate (fish/hour)

Harvest Rate (fish/hour)

Species	Angler Type		Angler Type	
	All	Targeting	All	Targeting
Bullhead spp.	<0.001	-	0.000	-
Northern pike	0.087	0.881	0.029	0.339
Muskellunge	0.002	0.022	0.000	-
Burbot	0.001	-	0.000	-
Rock bass	0.089	8.910	0.028	6.159
Sunfish spp.	0.108	3.480	0.053	1.998
Smallmouth bass	<0.001	-	0.000	-
Largemouth bass	0.017	1.148	0.004	0.237
Black crappie	0.021	2.887	0.015	2.282
Yellow perch	0.766	6.881	0.233	2.73
Walleye	0.278	1.064	0.115	0.459
Cisco	<0.001	-	0.000	-
All/Targeted Any	1.368	3.906	0.477	1.274

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.								
Northern pike					25	90	67	7
Muskellunge								
Burbot						1		
Rock bass		22	38					
Sunfish spp.		129						
Smallmouth bass								
Largemouth bass			8	9	4			
Black crappie		2	39					
Yellow perch		224	946	1				
Walleye			144	407	121	10	11	1
Cisco					1			

Comments:

Citation: Schultz, D. W. 2009. Summer creel survey for Leech Lake, 2008. Minnesota Department of Natural Resources, Section of Fisheries, Study 4, Job 830.