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Completion Report

**Summer Creel Survey Report
for
Leech Lake
2014**

by


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Walker Area Fisheries Office

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**Summer Creel Survey
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INTRODUCTION

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

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

While Leech Lake is well known among anglers as an exceptional multi-species fishery, most anglers target and harvest Walleye *Sander vitreus*. During the 1998-99 open water seasons, anglers averaged 1.2 million angler hours and harvested 174,000 pounds of Walleye per year (Sledge, 1999, 2000). However, several consecutive years without a large Walleye year class caused declines in overall abundance and an unbalanced population size structure; this in turn produced low levels of angler effort and harvest during the 2004-2005 open water seasons (Rivers 2005, 2006). These changes to the Walleye fishery, as well as changes in the Yellow Perch population, coincided with high Walleye and Yellow Perch harvest in the late 1990's, expanding populations of double-crested cormorants during the early 2000's, and expanding aquatic invasive species such as rusty crayfish and Eurasian water milfoil. Management action implemented in 2005 led to increases in Walleye abundance in the late-2000s and increased angler success thereafter (Schultz 2010a). These increases in Walleye abundance led to management goals being met and resulted in the 18"-26" protected slot limit (PSL) being relaxed to 20"-26", effective fishing opener 2014. In order to monitor how the relaxed PSL affected the Walleye population the MN DNR scheduled creel surveys in 2014 and winter 2015 preceding the normally scheduled surveys during 2016 and 2017.

STUDY AREA

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

Leech Lake is located in three glacial zones and has an irregular shape with many large and small bays (Figure 1). Leech Lake varies considerably from a morphological perspective. Some large bays, such as Steamboat and Boy, display highly eutrophic water characteristics whereas other large bays, such as Walker and Kabekona, have properties more similar to

oligotrophic lakes. The main portion of the lake, like most large Minnesota Walleye lakes, is windswept and mesotrophic. Previous estimates of shoreline miles have varied, but using remote sensing technology, the estimate is 201 miles. Approximately 23 percent of the shoreline consists of a gravel-rubble-boulder mixture, nearly all of which is used by spawning Walleye (Wilcox 1979).

The diversity of the Leech Lake shoreline and substrate, as well as its extensive littoral zone, provides excellent spawning and nursery habitats for a number of species, including Percids and Esocids which dominate the fish community. Walleye, Northern Pike *Esox lucius* and Muskellunge *E. masquinongy* are the principal predators and are located throughout the lake. Although most fish species are found in every portion of the lake, the largest Walleye and Muskellunge concentrations exist in the mesotrophic areas. Northern Pike are most common in vegetated eutrophic bays. Yellow Perch *Perca flavescens* are abundant throughout the lake and are likely the primary forage for most predators. Cisco *Coregonus artedii* and Lake Whitefish *C. clupeaformis* are an important forage base for larger predators (Engstrom-Heg et al. 1986) and are typically found in the mesotrophic and oligotrophic areas. Juvenile Cisco also comprise larger proportions of predator diets when large year classes are present. Other species present in the lake include: White Sucker *Catostomus commersoni*, Burbot *Lota lota*, Rock Bass *Ambloplites 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 10 May through 30 September 2014. Aerial boat counts were used for estimating fishing pressure (Rivers 2005).

Creel Strata

Sampling and data organization were stratified by day type (weekday or weekend/holiday), lake basin (western bays or main lake), and period. Opening weekend, the remainder of May, and June (June 1-15, June 16-30) were split into four periods; monthly periods were used thereafter to reduce total flight costs. Observed holidays included Memorial Day (May 26), Independence Day (July 4), and Labor Day (September 1). Statistics were calculated using the Creel Application Software (CAS) program developed by South Dakota Department of Game, Fish, and Parks (Soupir and Brown 2002). Statistics were calculated for each sampling period on a lake-wide and basin-specific basis. Post-release mortality of Walleye, or hooking mortality (Reeves and Bruesewitz 2007), was determined during each sampling period, by basin, using the angler-reported length distribution of released Walleye extrapolated to the total estimated number of released Walleye and mean water temperature recorded daily throughout the open water season by submerged loggers.

Estimation of Angling Pressure and Catch Statistics

Angling pressure was estimated using aerial boat counts. Flights were randomly scheduled throughout strata with a minimum of 8 flights scheduled within each stratum (Soupir et al. 2006). Two exceptions to this were opening weekend where an additional flight was scheduled each day. Also only 4-5 flights were flown on weekends/holidays in the two June periods due to fewer available weekend/holiday days. 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 when possible, particularly towards the end of a sampling period.

To obtain angler interviews, the lake was divided into 14 clusters with each cluster containing one to four sampling stations (Figure 1). These stations included resorts, marinas, and public accesses. Creel clerks were each assigned 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. Non-uniform access probabilities were developed based on the frequency of interviews obtained at each location during the 2008-2011 creel survey. Therefore, sampling clusters were randomly selected for each clerk based upon the probability of encountering an angler completing a trip within a particular cluster using previous surveys. 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 (08:00-22:00) from May through August and 12 hours (08:00-20:00) during September.

On a scheduled sampling day each clerk sampled one cluster, visiting all stations (minimum-1hr) within the cluster. Clerks visited stations in response to both maximizing the number of interviews and obtaining a representative sampling of anglers throughout the cluster. Clerks collected information on catch, harvest, effort, and angler demographics/preferences. During interviews, clerks identified and measured as many harvested fish as time allowed and remaining harvested fish were enumerated. Species, number, and length of released fish were obtained through angler recollection. 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 as Sunfish for analysis. Individual weights for Walleye, Yellow Perch, and Northern Pike were estimated using length-weight regression formulas from the September, 2014 gillnetting survey. Fish weight for all other species was estimated using length-weight regression formulas from long-term gillnet data collected from 1983-2007.

In order estimate pressure, catch rates, harvest rates, total harvest, total catch, fish population statistics, and angler demographic/preferences, Creel Analysis Software (CAS) (Soupir and Brown 2002) was used. Targeting angler catch rates in previous creel surveys (2008-2011) were incorrectly summarized by CAS due to a programming error. This statistic has been corrected for 2008-2014 creel surveys and the methods for this correction are documented in Appendix 2.

To estimate the total catch and harvest of Walleye by sex and maturity classes, sex and maturity were assigned to one inch length groups of the total catch and harvest length-frequency distributions and associated weights using the ratios observed in the September gill net survey during the same year. Previous creels surveys on Lake Mille Lacs have observed similar sex ratios between angler harvest and September gill netting (Jensen and Jones 2008). These totals were then summed by sex and maturity combinations. Confidence intervals (95%) of harvested SSB was calculated by applying the percentage of total harvest by weight that consisted of SSB to confidence intervals (95%) estimated by CAS for total catch by weight.

RESULTS

Angling Pressure

A total of 1,494 Leech Lake angling parties were interviewed from May 10th through September 30th, 2014 (Table 1). The estimated total angling pressure was 709,642 angler-hours (Table 2) (Figure 2). This was approximately 13,000 angler-hours higher than 2011 (696,536 angler-hours; Ward and Schultz 2012) and is slightly lower than the 1965-2014 mean of 854,495 angler-hours (Ward and Schultz 2012). Total effort was higher in the main lake (502,303 angler hours) than the western bays (207,339 angler hours). However on a per acre basis angler effort was over 2 times as high on the western bays (11.57 hours/acre) than the main lake (5.35 hours/acre). Two interviewed parties utilized a launch service in 2014; only two launch services remain on Leech Lake, and associated effort and harvest has been less than 1% of total effort and harvest (Schultz 2009; Schultz 2010b; Vondra and Schultz 2011). Interview data from launch service parties was pooled among boat angler data. In 2014, Walleye tournament events occurred on three days and accounted for 6,262 angler-hours of fishing pressure (Table 2), or less than 1% of total fishing effort.

With increases in angler catch and harvest of Walleye since 2005, fishing effort has returned to near the long-term range (Figure 2). Larger socioeconomic factors may still be influencing effort. While lower than the previous three years, fuel prices in 2014 continue to be above the 10-year average (Figure 3). Median distance traveled by anglers interviewed during the 2014 survey (140 miles), as indexed using zip codes, was the lowest observed since zip code data was first collected in 1998 (median range: 140-177 miles) (Figure 4). This continues the downward trend since 2005. Similar to the past four creel surveys, 24% of anglers interviewed traveled less than 50 miles (2008-2011 range 19%-28%) (Table 3). Overall, 35% percent of angling parties were within the travel distance of a day-trip (<100 miles), 44% were from “metro” anglers (100-249 miles), while 30% of was angling parties interviewed were from destination anglers (>250 miles) (Table 5). Extrapolating these rates to total fishing effort, local angler effort (254,724 angler hours) was the highest since 1998, metro angler effort was comparable to the 1998-2011 average, and destination angler effort was the lowest recorded since 1998 (Figure 5). Most anglers interviewed were Minnesota residents (78%; Table 4) and most angling parties targeted Walleye (74%; Table 6, Figure 6).

Catch and Harvest

An estimated 676,038 fish, or 6.06 fish/acre, were caught in Leech Lake during the 2014 summer creel season (Table 6), of which 219,535 were harvested (32.4% of total catch; 1.97 fish/acre). Most of the total catch and harvest (number of fish) was comprised of Yellow

Perch (60% and 51%, respectively) and Walleye (21% and 31%, respectively). The highest stratum-specific estimate of total catch (388,452 fish) and harvest (119,583) occurred during September and was comprised primarily of Yellow Perch.

Total yield was estimated to be 211,491 pounds (1.9 lbs/acre; Table 8) and was similar to 2011 (2.4 lbs/acre; Ward and Schultz 2012). Most of the total harvest (pounds of fish) was comprised of Yellow Perch (53%) and Walleye (33%, respectively). During 2014, the overall catch and harvest rates across all anglers were 0.953 and 0.309 fish/hour, respectively (Table 9), compared to respective rates from 2011 of 1.255 and 0.383. Basin-specific estimates of fishing effort, catch, and harvest are summarized in the appendix (Tables A1-A7).

Walleye- Most angling parties targeted Walleye (74%; Table 6). An estimated 68,894 Walleye (95,981 lbs) were harvested during 2014 at a rate of 0.097 Walleye/hour across all anglers (Table 2). An additional 68,834 Walleye were released (Table 13). No Walleye within the 20-26 inch protected slot limit (PSL) were observed being harvested. This was the first year that total compliance with the slot limit was observed by clerks. Post-release hooking mortality (1,806 Walleye; 5,406 pounds) increased the total Walleye kill to 70,700 fish (101,387 pounds, Figure 7). The estimated total number and pounds of Walleye killed in 2014 was the third and second highest respectively since the PSL has been in place, but well below the pre-regulation average (128,499 Walleye; 160,723 lbs), which is to be expected when a regulation is intended to certain segments of the population from harvest.

The overall catch and harvest rates of Walleye were 0.196 fish/hour and 0.097 fish/hour, respectively, across all anglers (Table 8). Overall catch and harvest rates for targeting anglers were 0.281 fish/hour and 0.134 fish/hour, respectively (Table 9, Figure 8). The overall targeting harvest rate was similar to harvest rates observed since 2005, but was well below the 2011-2015 harvest management objective (Figure 8). Overall, 3% of anglers targeting Walleye harvested their daily limit (Table 11, Table 12).

Creel clerks measured 2,071 Walleye and anglers reported lengths on 2,552 released Walleye. The average harvested Walleye across the entire season was 16.2 inches and 1.4 pounds (Table 8). Lengths of Walleye caught ranged from 5-30 inches (Table 13). The majority of harvested fish were 13.0"-16.9". Anglers harvested 90% of fish caught in this size range. Twelve percent of all Walleye less than 13.0" caught by anglers were harvested. Walleye that were previously protected by the 18-26" PSL (18"-19.9") accounted for 7% of the total catch, and of these 90% were harvested. Anglers harvested 29% of all Walleye caught that were longer than the PSL (≥ 26.0 "). Based on length, most harvested Walleye appear to be from the 2010 and 2011 year classes. Female Walleye from the 2007 and 2008 year classes were the youngest fish protected by the 20-26" PSL. However the majority of males up to age 8 (2006 year class and younger) were vulnerable to harvest.

An estimated 9,573 (22,637 lbs) mature female Walleye were harvested by anglers (Table 14). This was the highest in the past six creel surveys (2005-2014) and is the expected product of relaxed harvest restrictions in 2014. This resulted in a harvest of 0.20 lbs/acre of mature female biomass (Figure 14), 56% of which was comprised of 18"-19" females. Harvest of mature male Walleye was also the highest in the past five creel surveys, with an

approximately 44,307 pounds harvested. Immature fish made up 30% of the harvest by weight, with immature females accounting for 27% of total harvest by weight, and immature males accounting for 3% of harvest by weight. Thirty seven percent of all Walleye caught were in the PSL and released (Figure 10).

Northern Pike- An estimated 16,545 Northern Pike (44,884 pounds) were harvested at a rate of 0.023 fish/hour across all anglers (Table 2), both of which are below the long-term averages. This could be due in large part to the success anglers were experiencing with Walleye fishing, as only 7% of angling parties interviewed during the creel survey targeted Northern Pike.

The harvest rate of anglers targeting Northern Pike was 0.124 fish/hour (Figure 8). This was the highest targeted harvest rate since angler preference data was collected beginning in 1991. Northern Pike catch and harvest rates were highest during August (Table 9, Table 10). The estimated total number and pounds of Northern Pike harvested was within the range of the past five creel surveys (number range 10,890-16,908; pounds range 37,654-54,820) (Figure 7).

Harvested Northern Pike averaged 22.9 inches long and 2.7 pounds (Table 8). Lengths of Northern Pike caught ranged from 12 to 36 inches (Figure 11). The percent of fish harvested <21.0", 2.01-27.9", 2.08-33.9" and >34.0" was 33%, 60%, 6% and 0.4%, respectively (Table 13). Overall, 2% of anglers targeting Northern Pike caught their limit (Table 11, Table 12).

Yellow Perch- An estimated 112,230 Yellow Perch (51,325 pounds) were harvested at a rate of 0.158 fish/hour across all anglers (Table 2). Overall harvest and the harvest rate of targeting anglers both remained below long-term averages (Figure 8). Catch and harvest was highest during September (Table 7, Table 8) as were catch and harvest rates (Tables 9, Table 10). Overall, 3% of anglers targeting Yellow Perch harvested their limits (Tables 11, Table 12). The estimated total number and pounds of Yellow Perch harvested in 2014 was the second lowest since rehabilitation efforts were initiated in 2005 (number range 84,783-146,750; pounds range 34,485-64,516) (Figure 7).

Anglers reported catching Yellow Perch that ranged in length from 3 to 14 inches (Table 13, Figure 12.). The average size of harvested fish was 9.8 inches and 0.4 pounds (Table 8). The percent of fish harvested <8.0", 8.0-9.9", 10.0-11.9" and >1.02" was 9%, 37%, 48% and 0.3% (Table 13).

Muskellunge- No harvested Muskellunge were observed by creel clerks in 2014 (Table 2). Angler catch rates were 0.004 fish/hour for all anglers and 0.039 fish/hour for targeting anglers (Table 9, Table 10). Catch rates for targeting anglers in 2014 were the highest since 1991 (Figure 9). Catch rates by all anglers were highest in August and September. A total of 41 Muskellunge were reported released, ranging from 20 to 50 inches. The estimated total number harvested and released was 0 and 2,720, respectively (Table 13).

Largemouth Bass- An estimated 527 Largemouth Bass (1,135 pounds) were harvested at a rate of less than 0.001 fish/hour by all anglers in 2014 (Table 2, Table 9). The Largemouth Bass

targeting angler catch rate was 0.457 fish/hour. This was slightly above the 1991-2014 average since angler preference data was collected (Table 10, Figure 9). Largemouth Bass catch and harvest rates by all anglers were highest in July and August, respectively (Table 9, Table 10). Largemouth Bass ranged in length from 6 to 22 inches, with harvested fish measuring 12.0 to 18.9 inches (Table 13). The average size of harvested Largemouth Bass was 15.2 inches and 2.2 pounds (Table 8).

Black Crappie- An estimated 14,562 Black Crappie (13,133 pounds) (Table 7, Table 8) were harvested at a rate of 0.021 fish/hour across all anglers (Table 9). The number of Black Crappie harvested in 2014 was the second highest recorded, and the number of pounds harvested was the highest recorded. Catch and harvest of Black Crappie was highest during September (Table 9, Table 10). Length of crappies ranged from 5 to 17 inches. The percent of fish harvested <8.0", 8.0-9.9", 10.0-11.9" and >12.0" was 1%, 23%, 38% and 38% respectively (Table 13).

Bluegill/Pumpkinseed (sunfish) - An estimated 3,810 sunfish (2,513 pounds; Bluegill and Pumpkinseed combined) were harvested at a rate of 0.005 fish/hour across all anglers (Table 7, Table 8). Catch and harvest rates across all and targeting anglers were highest during early June (Table 9, Table 10). Lengths of sunfish caught ranged from 4 to 12 inches. The percent of fish harvested <6.0", 6.0-7.9", 8.0-9.9" and >10.0" was 0%, 29%, 56% and 15% respectively (Table 13).

Additional Species – An estimated 1,132 smallmouth bass were caught, with 149 being harvested (Table 7). Other species caught included rock bass (10,427) and bowfin (21). Although bullhead were observed in each of the past five creel surveys, the number caught has had a declining trend since 2005 and none were reported by anglers in 2014.

DISCUSSION

Catch and harvest rates of most gamefish species remained slightly lower than 2008-2009 estimates for the third creel survey in a row, but remained above respective long-term averages for anglers targeting a specific species in most instances. Total harvest remains below the long-term average, but this seems more a function of fishing effort, not fishing quality. Furthermore, length limits, such as protective slot limits (PSL), are intended to reduce or eliminate harvest of a particular size group of fish. The intentions of PSL's can include improving the overall size structure of a population, protecting mature fish for more consistent natural reproduction, and/or to improve the quality of fishing with higher catch rates and larger fish. For example, 709,642 hours of angler effort caught nearly 138,728 Walleyes during the 2014 summer season at an overall catch rate of 0.195 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 in 1999 (Sledge 2000). The 20-26" PSL protected 40% of the total Walleye caught by anglers from harvest; this statistic is anticipated to decline as growth has returned to historical rates and younger fish will be exposed to harvest opportunity for a longer duration. The 2007-2008 year classes are nearly fully recruited to the existing 20-26" PSL and continue to provide quality catch and release opportunities.

Prior to 2005 Leech Lake Walleye regulations were consistent with statewide regulations. Following a formal regulation review and public input process in 2004, an 18-26" protected slot limit (PSL), bag of 4, with one fish over 26" allowed in possession, was implemented in May 2005. The objective was to protect Walleye spawning stock and promote natural reproduction. A formal review of this regulation occurred in 2010 as part of the Leech Lake Management Planning Process, which resulted in strong support for the continuation of the regulation. As an outcome of this review, criteria were established for relaxing the protected slot under certain predetermined conditions. Exceedance of the spawner stock biomass objective range of 1.5 – 2.0 pounds/acre for two consecutive years would initiate consideration for relaxing the 18-26" PSL to a 20-26" PSL (bag limit unchanged). These criteria were met in 2012 and 2013 (Figure 13). Following a formal regulation review and public input process in 2013, a 20-26" protected slot limit (PSL), bag of 4, with one fish over 26" allowed in possession, was implemented in May 2014. Criteria now state that if estimates of mature female Walleye biomass fall below 1.50 pounds/acre for two consecutive years, the DNR will implement alternative regulations designed to increase spawner biomass to within management goals. Special summer and winter creel surveys were scheduled in 2014 to quantify regulation change effects (this report). Regularly scheduled creel surveys are planned for 2016 and 2017.

Anecdotally, winter pressure appears to be increasing and making up a larger portion of the total angling pressure on Leech Lake (Figure 2). The last winter creel survey conducted in 2010 saw the highest winter angling pressure estimates to date (357,404 angler hours) making up over a third of the total angling pressure for the 2010 fishing season (Schultz and Vondra 2011). In addition winter Yellow Perch catch and harvest rates can be equal to or exceed summer catch and harvest rates. The winter Yellow Perch fishery can be subject to large amounts of harvest which would be unaccounted for in summer creel surveys. Also species such as Burbot which are not sampled by standard sampling gears or generally caught by summer anglers are a primary species of some winter anglers. All future summer creel surveys should be combined with winter creel surveys to fully describe annual harvest, especially given the seasonal shift in fishing pressure that has been recently observed.

In light of rising flight costs the use of aerial pressure estimation is becoming increasingly expensive. Future creel surveys should investigate alternative methods for pressure estimation. In 2014 car counters were placed at all nine public accesses in order to estimate pressure from these accesses. Car counters should be used conjunction with all future summer creel surveys to further explore the potential for pressure estimation.

Like many of Minnesota's large lakes, Leech Lake is known as a destination fishery. High fuel prices and uncertainty about the national economy since the late 2000's are suspected drivers of reduced fishing trips and effort from destination (hometown >250 miles) type anglers. Historically these anglers made up approximately 40% of angler effort on Leech Lake. This declined to 17% in 2014. Reduced angler effort was attributed to low Walleye catch rates and limited fishing success during 2004-2005 (River 2005, 2006). However greater fishing success and higher fishing pressure by local anglers in 2014 no longer allow for this explanation. Local angler effort was the highest since zip code data was first collected in 1998. Although local angler effort decreased following the decline of the Walleye fishing in 2004-

2005, fishing pressure from local anglers has rebounded and increased. It appears that larger socioeconomic factors are depressing angler effort and future creel surveys and research efforts should consider motivations behind angler travel dynamics.

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TABLES

Table 1. Creel survey sampling summary and angling pressure estimates by stratum for Leech Lake, Minnesota, May 10th – September 30th, 2014. Standard errors appear in parentheses.

	Stratum				
	Opener	May	Jun-1	Jun-2	July
<i>Sampling Summary (Number)</i>					
Dates	May 10-11	May 12-31	Jun 1-15	Jun 16-30	Jul 1-31
Days in stratum	2	20	15	15	31
N Weekdays sampled	0	12	10	11	22
N Wknd/Hol sampled	2	6	5	4	9
N Interviews/refusals	169/1	364/0	173/0	131/0	199/0
<i>Boat Angler Trip Length & Party Size</i>					
Mean anglers/boat	2.54 (0.93)	2.38 (0.46)	2.39 (0.40)	2.49 (0.39)	2.33 (0.23)
Mean trip length (h)	5.25 (1.33)	4.77 (0.78)	4.51 (0.81)	3.98 (0.65)	4.08 (0.53)
<i>Walleye Tournament Angler Trip Length & Party Size</i>					
Mean anglers/boat	-	2.00 (-)	2.00 (-)	-	2.00 (0.50)
Mean trip length (h)	-	7.99 (-)	8.00 (-)	-	7.96 (1.99)
<i>Fishing Pressure</i>					
Total angler hours	49,321 (20,043)	120,023 (26,126)	99,448 (11,566)	57,904 (6,914)	122,870 (9,966)

	Stratum		
	August	September	Season
<i>Sampling Summary (Number)</i>			
Dates	Aug 1-31	Sept 1-30	May 10-Sept 30
Days in stratum	31	30	144
N Weekdays sampled	21	21	97
N Wknd/Hol sampled	10	9	47
N Interviews/refusals	228/0	230/0	1494/1
<i>Boat Angler Trip Length & Party Size</i>			
Mean anglers/boat	2.25 (0.25)	2.22 (0.30)	2.32 (0.13)
Mean trip length (h)	4.10 (0.44)	4.21 (0.67)	4.24 (0.25)
<i>Walleye Tournament Angler Trip Length & Party Size</i>			
Mean anglers/boat	-	-	
Mean trip length (h)	-	-	
<i>Fishing Pressure</i>			
Total angler hours	114,823 (9,262)	145,250 (14,052)	709,642 (40,602)

Table 2. Estimated total angling pressure and total harvest statistics for the summer open water creel season on Leech Lake, Minnesota, 1965-2014.

	Year							
	1965	1966	1967	1984	1985	1991	1992	1998
<i>Angling Pressure</i>								
Angler Trips	221,220	217,185	201,093	182,530	352,646	306,585	246,198	316,930
Angler Hours	858,960	862,346	785,905	697,267	1,290,339	1,195,683	935,553	1,274,985
-Walleye Tourn.								
-Total hours	858,960	862,346	785,905	697,267	1,290,339	1,195,683	935,553	1,274,985
<i>Number of Harvested Fish</i>								
Northern pike	60,943	52,336	48,108	40,109	79,144	42,376	26,610	50,255
Muskellunge	139	151	236	20	372	81	32	-
Largemouth Bass	-	-	-	1,023	1,166	1,024	1,466	2,649
Yellow Perch	150,599	145,510	13,359	143,756	229,660	176,646	216,323	391,367
Walleye (Legal)	149,917	162,091	147,822	76,170	161,193	179,898	86,877	141,577
-Illegal ¹								
-Released ²								
-Total kill	149,917	162,091	147,822	76,170	161,193	179,898	86,877	141,577
<i>Pounds of Harvested Fish</i>								
Northern pike	155,800	138,666	125,081	73,609	148,562	96,655	65,526	122,684
Yellow Perch	78,050	77,813	70,805	54,236	87,033	58,412	83,777	113,444
Walleye (Legal)	199,012	224,310	201,038	95,625	163,537	186,882	119,076	159,393
-Illegal ¹								
-Released ²								
-Total kill	199,012	224,310	201,038	95,625	163,537	186,882	119,076	159,393
<i>Harvest per Angler Hour (all anglers)</i>								
Northern pike	0.071	0.061	0.061	0.058	0.061	0.035	0.028	0.044
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	0.002
Yellow Perch	0.175	0.169	0.170	0.206	0.178	0.148	0.231	0.347
Walleye	0.174	0.188	0.188	0.109	0.125	0.150	0.093	0.100
<i>Harvest per Angler Hour (targeting anglers)</i>								
Northern pike						0.159	0.110	0.128
Muskellunge						0.001	<0.001	-
Largemouth Bass						0.013	0.079	0.040
Yellow Perch						1.870	2.184	2.156
Walleye						0.242	0.162	0.184

^a18-26" protected slot limit

^b20-26" 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 harvest statistics for the summer open water creel season on Leech Lake, Minnesota, 1965-2014.

	1999	2004	2005 ^a	2008 ^a	2009 ^a	2010 ^a	2011 ^a	2014 ^b	1965-2014 Mean
<i>Angling Pressure</i>									
Angler Trips	295,976	192,407	119,114	152,044	179,118	169,590	156,514	167,368	217,282
Angler Hours	1,193,941	682,346	430,003	585,371	779,163	658,009	696,536	709,642	852,253
-Walleye Toum.					15,545	14,056		6,262	
-Total hours	1,193,941	682,346	430,003	585,371	794,708	672,065	696,536	715,904	854,495
<i>Number of Harvested Fish</i>									
Northern pike	47,749	23,638	13,967	16,908	10,890	16,987	15,133	16,545	35,106
Muskellunge	-	38	119	-	-	-	116	-	82
Largemouth Bass	2,349	3,807	3,105	2,412	1,243	2,611	851	527	1,515
Yellow Perch	439,768	51,355	84,783	136,096	126,476	146,750	146,774	112,230	169,466
Walleye	149,717	29,022	3,940	64,969	81,242	60,300	54,967	68,894	101,162
-Protected ¹			No est.	2,533	4,660	628	756	-	1,715
-Released ²		708	171	3,424	9,947	1,975	3,004	1,806	3,005
-Total kill	149,717	29,730	4,111	70,926	95,849	62,903	58,727	70,700	103,013
<i>Pounds of Harvested Fish</i>									
Northern pike	127,013	62,659	37,654	54,820	33,588	49,015	44,490	44,884	86,294
Yellow Perch	150,666	21,175	34,485	59,149	54,733	64,516	64,275	51,325	70,243
Walleye	189,028	68,355	6,348	72,959	86,428	67,236	69,740	95,981	125,309
-Protected ¹			No est.	8,451	10,334	2,485	2,888	-	4,832
-Released ²		973	533	5,585	27,002	6,216	7,925	5,406	7,663
-Total kill	189,028	69,328	6,881	86,995	123,764	75,937	80,553	101,387	130,172
<i>Harvest per Angler Hour (all anglers)</i>									
Northern pike	0.045	0.035	0.033	0.029	0.014	0.025	0.022	0.023	0.040
Muskellunge	-	<0.001	<0.001	-	-	-	<0.001	-	<0.001
Largemouth Bass	0.002	0.006	0.007	0.004	0.002	0.004	0.001	0.001	0.002
Yellow Perch	0.408	0.075	0.197	0.233	0.162	0.218	0.228	0.158	0.206
Walleye	0.107	0.043	0.009	0.115	0.110	0.091	0.079	0.097	0.111
<i>Harvest per Angler Hour (targeting anglers)</i>									
Northern pike	0.122	0.082	0.074	0.118	0.077	0.114	0.080	0.124	0.108
Muskellunge	-	-	0.001	-	-	-	0.001	-	<0.001
Largemouth Bass	0.009	0.054	0.070	0.074	0.025	0.030	0.024	0.009	0.039
Yellow Perch	2.283	0.479	0.442	0.848	0.920	1.176	0.914	0.990	1.297
Walleye	0.227	0.054	0.019	0.158	0.146	0.122	0.129	0.135	0.143

^a18-26" protected slot limit

^b20-26" 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, May 10th – September 30th 2014.

Distance (miles)	N	Percent
0-49	910	23.9
50-99	454	11.9
100-149	847	22.3
150-199	696	18.3
200-249	229	6.0
250-299	123	3.2
300-349	128	3.4
350-399	104	2.7
400-449	85	2.2
450-499	56	1.5
500-5,000	168	4.4
Total	3,800	100.0

Table 4. State of residence of anglers fishing Leech Lake, Minnesota, May 10th – September 30th 2014.

State of Residence	N	Percent
Illinois	86	2.3
Indiana	55	1.4
Iowa	267	7.0
Minnesota	2,949	77.6
Nebraska	34	0.9
North Dakota	58	1.5
Other	207	5.4
South Dakota	22	0.6
Wisconsin	122	3.2
Total	3,800	100.0

Table 5. Fishing pressure on Leech Lake from 1998-2014 by hometown distances of anglers, sorted by angler group.

Angler Group	Hometown Distance	1998	1999	2004	2005	2008	2009	2010	2011	2014
<i>Angling Pressure</i>										
Local	0-99	229,022	188,996	100,790	59,774	234,734	293,744	180,952	217,319	254,724
Metro	100-249	562,988	525,762	316,648	196,699	180,880	352,961	312,554	337,820	330,917
Desination	>250	482,975	479,183	264,909	173,530	170,343	132,458	165,818	142,093	124,001

Table 6. Frequencies (%) of species targeted by boat parties during each stratum for Leech Lake, Minnesota, May 10th – September 30th 2014.

Stratum	Targeted Species								Total (N)
	Walleye	Northern Pike	Yellow Perch	Largemouth Bass	Black Crappie	Muskellunge	Sunfish spp.	Other	
Opener	95.6	0.9	2.4	0.0	0.0	0.0	1.1	0.0	455
May	90.2	1.5	5.0	0.4	1.6	0.0	1.2	0.0	919
Jun-1	84.4	3.9	0.0	2.8	3.0	2.8	1.8	1.4	433
Jun-2	81.0	9.5	3.7	0.9	0.6	3.4	0.9	0.0	326
July	62.2	11.3	2.8	7.3	0.8	10.9	3.4	1.4	505
August	56.5	19.5	4.2	2.7	2.0	14.1	0.5	0.5	595
September	44.9	7.7	34.9	3.0	3.9	5.0	0.5	0.0	561
Season	73.7	7.4	8.0	2.3	1.8	5.0	1.3	0.4	3,794

Table 7. Catch and harvest estimates by stratum for the open water creel survey on Leech Lake, Minnesota, 2014. Standard errors are in parentheses.

Species	<i>Number Caught</i>			
	Opener	May	Jun-1	Jun-2
Bowfin	--	21 (13)	--	--
Bullhead spp.	--	--	--	--
Northern Pike	2,290 (882)	6,002 (1,796)	8,691 (1,422)	6,059 (1,455)
Muskellunge	--	70 (29)	80 (55)	--
Burbot	--	--	--	--
Rock Bass	--	--	1,128 (420)	1,487 (605)
Sunfish spp.	--	1,007 (421)	4,374 (2,097)	254 -
Smallmouth Bass	--	56 (39)	64 -	260 (201)
Largemouth Bass	--	317 (262)	991 (324)	374 (222)
Black Crappie	--	1,834 (1,123)	1,664 (42)	494 (489)
Yellow Perch	3,009 (1,088)	14,390 (5,490)	7,836 (1,460)	7,515 (1,825)
Walleye	20,863 (7,081)	35,614 (8,188)	26,586 (4,243)	9,247 (1,511)
Cisco/Whitefish	--	--	--	--
Overall	26,162 (8,968)	59,310 (14,678)	51,414 (7,398)	25,690 (3,695)

Species	<i>Number Harvested</i>			
	Opener	May	Jun-1	Jun-2
Bowfin	--	--	--	--
Bullhead spp.	--	--	--	--
Northern Pike	239 (102)	689 (226)	1,556 (453)	1,544 (459)
Muskellunge	--	--	--	--
Burbot	--	--	--	--
Rock Bass	--	--	904 (415)	326 (267)
Sunfish spp.	--	965 (422)	1,981 (1,353)	141 -
Smallmouth Bass	--	--	64 -	--
Largemouth Bass	--	--	153 (104)	--
Black Crappie	--	659 (119)	590 (42)	454 (445)
Yellow Perch	1,592 (630)	5,802 (2,476)	2,055 (469)	2,310 (824)
Walleye	9,146 (3,077)	16,185 (4,010)	13,148 (2,227)	4,656 (1,005)
Cisco/Whitefish	--	--	--	--
Overall	10,976 (3,740)	24,300 (6,601)	20,451 (3,223)	9,431 (1,640)

Table 7 continued. Catch and harvest estimates by stratum for the open water creel survey on Leech Lake, Minnesota, 2014. Standard errors are in parentheses.

<i>Number Caught</i>				
Species	July	August	September	Season
Bowfin	--	--	--	21 (13)
Bullhead spp.	--	--	--	--
Northern Pike	15,467 (2,467)	18,663 (2,943)	18,077 4,480	75,338 (6,555)
Muskellunge	267 (123)	2,029 (581)	274 (165)	2,720 (619)
Burbot	--	--	--	--
Rock Bass	3,018 (1,002)	975 (384)	3,818 (1,415)	10,427 (1,922)
Sunfish spp.	797 (731)	295 (141)	329 (74)	7,056 (2,266)
Smallmouth Bass	150 -	383 (196)	220 (220)	1,132 (316)
Largemouth Bass	9,090 (2,874)	2,153 (907)	1,666 (404)	14,592 (3,077)
Black Crappie	75 (78)	3,819 (2,578)	12,182 (12,182)	20,069 (3,980)
Yellow Perch	23,535 (3,726)	18,994 (3,570)	330,767 (81,586)	405,956 (81,974)
Walleye	9,123 (1,358)	16,175 (2,809)	21,120 (4,876)	138,728 (13,076)
Cisco/Whitefish	--	--	--	--
Overall	61,522 (7,549)	63,487 (7,224)	388,452 (81,743)	676,038 (84,589)

<i>Number Harvested</i>				
Species	July	August	September	Season
Bowfin	--	--	--	--
Bullhead spp.	--	--	--	--
Northern Pike	3,236 791	5,101 (1,210)	4,181 1,180	16,647 (1,991)
Muskellunge	--	--	--	--
Burbot	--	--	--	--
Rock Bass	539 352	30 (33)	1,018 525	2,817 (803)
Sunfish spp.	418 (405)	85 -	220 71	3,810 (1,476)
Smallmouth Bass	--	85 (93)	--	149 (93)
Largemouth Bass	75 (76)	300 (184)	--	527 (225)
Black Crappie	75 (78)	3,819 2,578	8,965 1,730	14,562 (3,140)
Yellow Perch	4,715 (2,252)	2,803 1,194	92,954 (22,288)	112,128 (22,598)
Walleye	4,392 (750)	9,122 (1,809)	12,245 (2,771)	68,894 (6,560)
Cisco/Whitefish	--	--	--	--
Overall	13,449 (2,932)	21,344 (4,175)	119,583 (21,918)	219,535 (24,022)

Table 8. Yield estimates and mean weights of harvested fish by stratum for Leech Lake, Minnesota, May 10th – September 30th 2014. Standard errors are in parentheses.

Species	Opener	May	Jun-1	Jun-2
<i>Total Pounds Harvested</i>				
Northern Pike	846 (71)	2,007 (237)	4,163 (1,993)	3,701 (1,487)
Muskellunge	--	--	--	--
Rock Bass	--	--	1,264 (1,757)	204 (26)
Sunfish spp.	--	513 (251)	1,552 (5,597)	57 -
Largemouth Bass	--	--	488 (139)	--
Black Crappie	--	585 (93)	395 (43)	508 (84)
Yellow Perch	827 (981)	3,177 (2,606)	1,552 (1,046)	1,134 (837)
Walleye	14,035 (10,250)	23,562 (11,221)	17,858 (7,238)	5,854 (1,399)
Cisco/Whitefish	--	--	--	--
<i>Mean Weight (pounds) of Harvested Fish</i>				
Northern Pike	3.5 (1.6)	2.9 (1.1)	2.7 (1.5)	2.4 (1.3)
Muskellunge	--	--	--	--
Rock Bass	--	--	1.4 (2.1)	0.5 (0.5)
Sunfish spp.	--	0.5 (0.3)	0.8 (2.9)	0.4 -
Largemouth Bass	--	--	3.2 (2.4)	--
Black Crappie	--	0.9 (0.2)	0.7 (0.1)	0.7 (1.1)
Yellow Perch	0.5 (0.7)	0.5 (0.5)	0.8 (0.6)	0.6 (0.4)
Walleye	1.5 (1.4)	1.5 (0.8)	1.4 (0.6)	0.9 (0.4)
Cisco/Whitefish	--	--	--	--
<i>Mean Length (in) of Harvested Fish</i>				
Northern Pike	24.6 (10.8)	23.8 (9.3)	22.9 (13.9)	22.1 (13.4)
Muskellunge	--	--	--	--
Rock Bass	--	--	11.4 (14.8)	9.0 (7.5)
Sunfish spp.	--	8.4 (5.6)	9.4 (39.8)	7.7 -
Largemouth Bass	--	--	17.9 (13.2)	--
Black Crappie	--	11.3 (2.8)	10.3 (1.3)	12.2 (12.2)
Yellow Perch	10.2 (12.8)	10.4 (9.6)	11.4 (7.6)	10.0 (8.3)
Walleye	16.8 (15.2)	16.4 (8.7)	16.1 (7.7)	15.7 (5.4)
Cisco/Whitefish	--	--	--	--

Table 8 continued. Yield estimates and mean weights of harvested fish by stratum for Leech Lake, Minnesota, May 10th – September 30th. Standard errors are in parentheses.

Species	July	August	September	Season ¹
<i>Total Pounds Harvested</i>				
Northern Pike	8,382 (2,284)	13,523 (3,584)	12,261 (2,691)	44,884 (5,617)
Muskellunge	- -	- -	- -	- -
Rock Bass	431 -	28 (33)	594 (674)	2,520 (1,882)
Sunfish spp.	221 (242)	55 -	115 (53)	2,513 (5,608)
Largemouth Bass	155 (159)	492 (203)	- -	1,135 (293)
Black Crappie	69 (75)	5,343 -	6,233 (5,231)	13,133 (5,240)
Yellow Perch	2,038 (1,205)	899 (112)	41,699 (16,933)	51,325 (17,255)
Walleye	5,323 (1,196)	12,137 (3,605)	17,212 (6,226)	95,981 (18,398)
Cisco/Whitefish	- -	- -	- -	- -
<i>Mean Weight (pounds) of Harvested Fish</i>				
Northern Pike	2.6 (1.0)	2.7 (1)	2.9 (1.1)	2.7 (0.5)
Muskellunge	- -	- -	- -	- -
Rock Bass	0.8 -	0.9 -	0.6 (0.7)	0.9 (0.7)
Sunfish spp.	0.5 (0.8)	0.6 -	0.5 (0.3)	0.7 (1.5)
Largemouth Bass	2.1 -	1.6 (1)	- -	2.2 (1.1)
Black Crappie	0.9 -	1.4 (1)	0.7 (0.6)	0.9 (0.4)
Yellow Perch	0.4 (0.3)	0.3 (0)	0.4 (0.2)	0.5 (0.2)
Walleye	1.2 (0.4)	1.3 (0)	1.4 (0.6)	1.4 (0.3)
Cisco/Whitefish	- -	- -	- -	- -
<i>Mean Length (in) of Harvested Fish</i>				
Northern Pike	22.6 (8.4)	22.9 (8.7)	23.3 (9.3)	22.9 (4.3)
Muskellunge	- -	- -	- -	- -
Rock Bass	9.9 -	10.1 -	8.9 (11.6)	9.9 (6.5)
Sunfish spp.	8.4 (12.4)	8.8 -	8.4 (4.1)	8.9 (20.8)
Largemouth Bass	- -	13.8 (10.0)	- -	15.2 (7.6)
Black Crappie	- -	13.1 (8.8)	10.3 (6.1)	11.1 (4.3)
Yellow Perch	9.6 (7.0)	8.8 (3.9)	9.7 (4.6)	9.8 (3.9)
Walleye	15.5 (5.0)	16.0 (5.7)	16.2 (7.0)	16.2 (3.6)
Cisco/Whitefish	- -	- -	- -	- -

Table 9. Estimates of catch and harvest rates of selected species for all anglers by stratum during the open water season on Leech Lake, Minnesota, 2014.

Species	Stratum			
	Opener	May	Jun-1	Jun-2
<i>Catch per Angler Hour</i>				
Bowfin	--	<0.001 (<0.001)	--	--
Bullhead spp.	--	--	--	--
Northern Pike	0.0464 (0.0202)	0.0500 (0.0214)	0.0874 (0.0247)	0.1046 (0.0353)
Muskellunge	--	<0.001 (<0.001)	<0.001 (<0.001)	--
Burbot	--	--	--	--
Rock Bass	--	--	0.0113 (0.0042)	0.0257 (0.0109)
Sunfish spp.	--	0.0084 (0.0038)	0.0440 (0.1031)	0.0044 -
Smallmouth Bass	--	<0.001 (<0.001)	<0.001 -	0.0045 (0.0047)
Largemouth Bass	--	0.0026 (0.0021)	0.0100 (0.0066)	0.0065 (0.0039)
Black Crappie	--	0.0153 (0.0106)	0.0167 (0.0028)	0.0085 (0.0085)
Yellow Perch	0.0610 (0.0255)	0.1199 (0.0588)	0.0788 (0.0252)	0.1298 (0.0415)
Walleye	0.4230 (0.2343)	0.2967 (0.1109)	0.2673 (0.0777)	0.1597 (0.0450)
Cisco/Whitefish	--	--	--	--
Overall	0.5304 (0.2802)	0.4942 (0.1916)	0.5170 (0.1430)	0.4437 (0.1102)
<i>Harvest per Angler Hour</i>				
Bowfin	--	--	--	--
Bullhead spp.	--	--	--	--
Northern Pike	0.0049 (0.0014)	0.0057 (0.0029)	0.0156 (0.0052)	0.0267 (0.0137)
Muskellunge	--	--	--	--
Burbot	--	--	--	--
Rock Bass	--	--	0.0091 (0.0049)	0.0056 (0.0047)
Sunfish spp.	--	0.0080 (0.0038)	0.0199 (0.0571)	0.0024 -
Smallmouth Bass	--	--	<0.001 -	--
Largemouth Bass	--	--	0.0015 (0.0018)	--
Black Crappie	--	0.0055 (0.0028)	0.0059 (0.0014)	0.0078 (0.0077)
Yellow Perch	0.0323 (0.0115)	0.0483 (0.0244)	0.0207 (0.0059)	0.0399 (0.0140)
Walleye	0.1854 (0.1035)	0.1348 (0.0526)	0.1322 (0.0321)	0.0804 (0.0297)
Cisco/Whitefish	--	--	--	--
Overall	0.2225 (0.1167)	0.2025 (0.0796)	0.2056 (0.0507)	0.1629 (0.0539)

Table 9 continued. Estimates of catch and harvest rates of selected species for all anglers by stratum during the open water season on Leech Lake, Minnesota, 2014.

Species	Stratum			
	July	August	September	Season
<i>Catch per Angler Hour</i>				
Bowfin	--	--	--	<0.001 (<0.001)
Bullhead spp.	--	--	--	--
Northern Pike	0.1259 (0.0303)	0.1625 (0.0392)	0.1245 (0.0529)	0.1060 (0.0148)
Muskellunge	0.0022 (<0.001)	0.0177 (0.0076)	0.0019 (0.0012)	0.0038 (0.0010)
Burbot	--	--	--	--
Rock Bass	0.0246 (0.0166)	0.0085 (0.0038)	0.0263 (0.0111)	0.0147 (0.0035)
Sunfish spp.	0.0065 (0.0060)	0.0026 (0.0013)	0.0023 (<0.001)	0.0099 (0.0075)
Smallmouth Bass	0.0012 -	0.0033 (0.0017)	0.0015 (0.0011)	0.0016 (<0.001)
Largemouth Bass	0.0740 (0.0231)	0.0188 (0.0085)	0.0115 (0.0040)	0.0206 (0.0047)
Black Crappie	<0.001 (<0.001)	0.0333 (0.0226)	0.0839 (0.0201)	0.0283 (0.0059)
Yellow Perch	0.1915 (0.0422)	0.1654 (0.0349)	2.2772 (0.6267)	0.5722 (0.1221)
Walleye	0.0742 (0.0216)	0.1409 (0.0337)	0.1454 (0.0609)	0.1955 (0.0277)
Cisco/Whitefish	--	--	--	--
Overall	0.5007 (0.0934)	0.5529 (0.1115)	2.6744 (0.6759)	0.9526 (0.1407)
<i>Harvest per Angler Hour</i>				
Bowfin	--	--	--	--
Bullhead spp.	--	--	--	--
Northern Pike	0.0263 (0.0050)	0.0444 (0.0125)	0.0288 (0.0085)	0.0233 (0.0032)
Muskellunge	--	--	--	--
Burbot	--	--	--	--
Rock Bass	0.0044 (0.0017)	<0.001 (<0.001)	0.0070 (0.0043)	0.0040 (0.0012)
Sunfish spp.	0.0034 (0.0033)	<0.001 (<0.001)	0.0015 (<0.001)	0.0054 (0.0045)
Smallmouth Bass	--	<0.001 (<0.001)	--	<0.001 (<0.001)
Largemouth Bass	<0.001 (<0.001)	0.0026 (0.0017)	--	<0.001 (<0.001)
Black Crappie	<0.001 (<0.001)	0.0333 (0.0226)	0.0617 (0.0121)	0.0205 (0.0046)
Yellow Perch	0.0384 (0.0142)	0.0244 (0.0106)	0.6400 (0.1726)	0.1582 (0.0332)
Walleye	0.0357 (0.0116)	0.0794 (0.0210)	0.0843 (0.0331)	0.0971 (0.0137)
Cisco/Whitefish	--	--	--	--
Overall	0.1095 (0.0198)	0.1859 (0.0535)	0.8233 (0.1933)	0.3094 (0.0416)

Table 10. Estimates of catch and harvest rates of selected species for targeting anglers by stratum during the open water season on Leech Lake, Minnesota, 2014.

Species	Stratum			
	Opener	May	Jun-1	Jun-2
<i>Catch per Angler Hour</i>				
Northern pike	- -	0.1746 (0.0585)	0.3578 (0.1080)	0.2315 (0.0818)
Muskellunge	- -	- -	0.0249 (0.0282)	- -
Sunfish spp.	- -	0.1917 (0.1268)	2.1046 (0.8761)	0.9697 -
Largemouth Bass	- -	0.2202 (0.2666)	0.1757 (0.0495)	1.0105 (0.6861)
Black Crappie	- -	0.8235 (0.5260)	0.0136 (0.0108)	3.0000 -
Yellow Perch	0.1536 -	0.6964 (0.1700)	- -	0.9072 (0.3063)
Walleye	0.4271 (0.1101)	0.3010 (0.0260)	0.2887 (0.0233)	0.1846 (0.0349)
<i>Harvest per Angler Hour</i>				
Northern pike	- -	0.0476 (0.0308)	0.2981 (0.0927)	0.0267 (0.0216)
Muskellunge	- -	- -	- -	- -
Sunfish spp.	- -	0.1917 (0.1268)	1.0338 (0.6765)	0.4848 -
Largemouth Bass	- -	- -	0.0527 (0.0256)	- -
Black Crappie	- -	0.1520 (0.1660)	0.0136 (0.0108)	2.7273 -
Yellow Perch	0.0683 -	0.3910 (0.0955)	- -	0.3299 (0.2887)
Walleye	0.1887 0.0528	0.1419 (0.0183)	0.1411 (0.0193)	0.0887 (0.0255)

Table 10 continued. Estimates of catch and harvest rates of selected species for targeting anglers by stratum during the open water season on Leech Lake, Minnesota, 2014.

Species	Stratum			
	July	August	September	Season
<i>Catch per Angler Hour</i>				
Northern pike	0.3083 (0.0797)	0.4486 (0.0788)	0.3930 (0.1422)	0.3568 (0.0417)
Muskellunge	0.0146 (0.0057)	0.0649 (0.0239)	0.0346 (0.0164)	0.0393 (0.0099)
Sunfish spp.	0.2317 (0.2193)	0.1200 (0.1440)	0.0909 (0.0441)	0.6123 (0.2533)
Largemouth Bass	0.5914 (0.1668)	0.4540 (0.2718)	0.3797 (0.1448)	0.4567 (0.0953)
Black Crappie	- -	0.7007 (0.0212)	1.1928 (0.2119)	0.7521 (0.1898)
Yellow Perch	1.1626 (0.4360)	0.6392 (0.1895)	4.3938 (0.7157)	3.0333 (0.6826)
Walleye	0.1049 (0.0139)	0.2278 (0.0391)	0.2723 (0.0233)	0.2816 (0.0304)
<i>Harvest per Angler Hour</i>				
Northern pike	0.0949 (0.0398)	0.1522 (0.0347)	0.1254 (0.0513)	0.1241 (0.0212)
Muskellunge	- -	- -	- -	- -
Sunfish spp.	0.1158 (0.1227)	0.1200 (0.1440)	- -	0.3211 (0.1586)
Largemouth Bass	- -	0.0123 (0.0124)	- -	0.0091 (0.0053)
Black Crappie	- -	0.7007 (0.0212)	0.8566 (0.1567)	0.4807 (0.1449)
Yellow Perch	0.8473 (0.3383)	0.2062 (0.1576)	1.3566 (0.1809)	0.9903 (0.1774)
Walleye	0.0501 (0.0093)	0.1197 (0.0250)	0.1522 (0.0121)	0.1348 (0.0141)

Table 11. Percent of all angling parties who harvested a given number of fish by stratum from Leech Lake, Minnesota, May 10th – September 30th 2014.

Species/stratum	Number Harvested per Angler						
Northern Pike	N	0	0.1-0.9	1.0-1.9	2.0-2.9	3	
Opener	169	95%	5%	0%	0%	0%	
May	364	94%	4%	1%	0%	0%	
Jun-1	173	90%	7%	2%	1%	0%	
Jun-2	131	86%	10%	2%	1%	1%	
July	199	84%	12%	4%	1%	0%	
August	228	83%	8%	8%	0%	0%	
September	230	87%	9%	3%	0%	1%	
Season	1,494	89%	7%	3%	0%	0%	
Yellow Perch	N	0	0.1-4.9	5.0-9.9	10.0-14.9	15.0-19.9	20
Opener	169	80%	20%	0%	0%	0%	0%
May	364	86%	14%	0%	0%	0%	0%
Jun-1	173	91%	9%	0%	0%	0%	0%
Jun-2	131	89%	10%	1%	0%	0%	0%
July	199	93%	6%	1%	1%	0%	0%
August	228	92%	8%	0%	0%	0%	0%
September	230	59%	23%	8%	7%	1%	1%
Season	1,494	84%	13%	1%	1%	0%	0%
Walleye	N	0	0.1-0.9	1.0-1.9	2.0-2.9	3.0-3.9	4
Opener	169	33%	24%	21%	13%	5%	4%
May	364	50%	19%	14%	10%	3%	4%
Jun-1	173	59%	14%	16%	6%	3%	2%
Jun-2	131	71%	15%	10%	2%	1%	1%
July	199	83%	10%	6%	1%	1%	0%
August	228	75%	11%	6%	4%	4%	0%
September	230	71%	11%	11%	4%	0%	3%
Season	1,494	63%	15%	12%	6%	2%	2%

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

Yellow perch: 20 fish daily, 40 in possession, no length limit (statewide regulation).

Walleye: 4 fish in possession, 20-26 inch PSL, 1 fish over 26 inches allowed in possession (special regulation).

Table 12. Percent of targeting angling parties who harvested a given number of fish by stratum from Leech Lake, Minnesota, May 10th – September 30th 2014.

Species/stratum	Number Harvested per Angler						
	N	0	0.1-0.9	1.0-1.9	2.0-2.9	3	
Northern Pike							
Opener	2	100%	0%	0%	0%	0%	
May	7	71%	14%	14%	0%	0%	
Jun-1	7	29%	29%	43%	0%	0%	
Jun-2	8	75%	13%	13%	0%	0%	
July	22	55%	32%	14%	0%	0%	
August	46	52%	17%	26%	2%	2%	
September	17	59%	24%	12%	0%	6%	
Season	109	56%	21%	20%	1%	2%	
Yellow Perch							
Opener	3	33%	67%	0%	0%	0%	0%
May	16	44%	50%	0%	0%	6%	0%
Jun-1	0	-	-	-	-	-	-
Jun-2	4	50%	25%	25%	0%	0%	0%
July	6	33%	33%	17%	17%	0%	0%
August	9	67%	33%	0%	0%	0%	0%
September	79	15%	37%	20%	20%	4%	4%
Season	117	26%	38%	15%	15%	3%	3%
Walleye							
Opener	168	33%	24%	21%	13%	5%	4%
May	350	48%	20%	14%	11%	3%	4%
Jun-1	154	55%	15%	18%	6%	3%	3%
Jun-2	114	67%	18%	11%	3%	1%	1%
July	133	74%	14%	8%	2%	2%	0%
August	143	62%	17%	9%	6%	6%	1%
September	118	51%	16%	19%	8%	1%	5%
Season	1,180	53%	18%	15%	8%	3%	3%

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

Yellow perch: 20 fish daily, 40 in possession, no length limit (statewide regulation).

Walleye: 4 fish in possession, 20-26 inch PSL, 1 fish over 26 inches allowed in possession (special regulation).

Table 13. Observed length-frequency distribution of fish harvested and released for Leech Lake, Minnesota, May 10th – September 30th 2014.

Estimated Number Harvested (H) and Released (R)						
TL (inches)	Bowfin		Bullhead Spp.		Northern Pike	
	H	R	H	R	H	R
<4.00	-	-	-	-	-	-
4.00-4.99	-	-	-	-	-	-
5.00-5.99	-	-	-	-	-	-
6.00-6.99	-	-	-	-	-	-
7.00-7.99	-	-	-	-	-	-
8.00-8.99	-	-	-	-	-	-
9.00-9.99	-	-	-	-	-	-
10.00-10.99	-	-	-	-	-	-
11.00-11.99	-	-	-	-	-	-
12.00-12.99	-	-	-	-	-	42 (4%)
13.00-13.99	-	-	-	-	-	2 (0%)
14.00-14.99	-	-	-	-	1 (0%)	51 (4%)
15.00-15.99	-	-	-	-	2 (1%)	184 (16%)
16.00-16.99	-	-	-	-	1 (0%)	5 (0%)
17.00-17.99	-	-	-	-	9 (3%)	182 (16%)
18.00-18.99	-	-	-	-	3 (1%)	5 (0%)
19.00-19.99	-	-	-	-	16 (6%)	28 (2%)
20.00-20.99	-	-	-	-	60 (22%)	222 (19%)
21.00-21.99	-	-	-	-	18 (6%)	4 (0%)
22.00-22.99	-	-	-	-	47 (17%)	126 (11%)
23.00-23.99	-	-	-	-	17 (6%)	4 (0%)
24.00-24.99	-	1 (100%)	-	-	36 (13%)	122 (10%)
25.00-25.99	-	-	-	-	33 (12%)	90 (8%)
26.00-26.99	-	-	-	-	4 (1%)	2 (0%)
27.00-27.99	-	-	-	-	13 (5%)	39 (3%)
28.00-28.99	-	-	-	-	3 (1%)	- (0%)
29.00-29.99	-	-	-	-	5 (2%)	3 (0%)
30.00-30.99	-	-	-	-	5 (2%)	38 (3%)
31.00-31.99	-	-	-	-	1 (0%)	- (0%)
32.00-32.99	-	-	-	-	3 (1%)	9 (1%)
33.00-33.99	-	-	-	-	1 (0%)	1 (0%)
34.00-34.99	-	-	-	-	-	- (0%)
35.00-35.99	-	-	-	-	1 (0%)	6 (1%)
36.00-36.99	-	-	-	-	-	1 (0%)
37.00-37.99	-	-	-	-	-	-
38.00-38.99	-	-	-	-	-	-
39.00-39.99	-	-	-	-	-	-
40.00-40.99	-	-	-	-	-	-
41.00-41.99	-	-	-	-	-	-
42.00-42.99	-	-	-	-	-	-
43.00-43.99	-	-	-	-	-	-
44.00-44.99	-	-	-	-	-	-
45.00-45.99	-	-	-	-	-	-
46.00-46.99	-	-	-	-	-	-
47.00-47.99	-	-	-	-	-	-
48.00-48.99	-	-	-	-	-	-
49.00-49.99	-	-	-	-	-	-
≥50.00	-	-	-	-	-	-
Total (N)	-	1 (100%)	-	-	279 (100%)	1,166 (100%)

Table 13 continued. Observed length-frequency distribution of fish harvested and released for Leech Lake, Minnesota, May 10th – September 30th 2014.

Estimated Number Harvested (H) and Released (R)						
TL (inches)	Muskellunge		Burbot		Rock Bass	
	H	R	H	R	H	R
<4.00	-	-	-	-	-	-
4.00-4.99	-	-	-	-	-	-
5.00-5.99	-	-	-	-	-	5 (4%)
6.00-6.99	-	-	-	-	-	1 (1%)
7.00-7.99	-	-	-	-	9 (20%)	43 (38%)
8.00-8.99	-	-	-	-	2 (4%)	-
9.00-9.99	-	-	-	-	13 (28%)	26 (23%)
10.00-10.99	-	-	-	-	14 (30%)	32 (29%)
11.00-11.99	-	-	-	-	1 (2%)	- (0%)
12.00-12.99	-	-	-	-	3 (7%)	5 (4%)
13.00-13.99	-	-	-	-	-	-
14.00-14.99	-	-	-	-	2 (4%)	-
15.00-15.99	-	-	-	-	2 (4%)	-
16.00-16.99	-	-	-	-	-	-
17.00-17.99	-	-	-	-	-	-
18.00-18.99	-	-	-	-	-	-
19.00-19.99	-	-	-	-	-	-
20.00-20.99	-	1 (2%)	-	-	-	-
21.00-21.99	-	-	-	-	-	-
22.00-22.99	-	-	-	-	-	-
23.00-23.99	-	-	-	-	-	-
24.00-24.99	-	1 (2%)	-	-	-	-
25.00-25.99	-	2 (5%)	-	-	-	-
26.00-26.99	-	-	-	-	-	-
27.00-27.99	-	2 (5%)	-	-	-	-
28.00-28.99	-	-	-	-	-	-
29.00-29.99	-	-	-	-	-	-
30.00-30.99	-	3 (7%)	-	-	-	-
31.00-31.99	-	-	-	-	-	-
32.00-32.99	-	2 (5%)	-	-	-	-
33.00-33.99	-	-	-	-	-	-
34.00-34.99	-	-	-	-	-	-
35.00-35.99	-	2 (5%)	-	-	-	-
36.00-36.99	-	-	-	-	-	-
37.00-37.99	-	6 (15%)	-	-	-	-
38.00-38.99	-	-	-	-	-	-
39.00-39.99	-	-	-	-	-	-
40.00-40.99	-	7 (17%)	-	-	-	-
41.00-41.99	-	-	-	-	-	-
42.00-42.99	-	4 (10%)	-	-	-	-
43.00-43.99	-	-	-	-	-	-
44.00-44.99	-	2 (5%)	-	-	-	-
45.00-45.99	-	1 (2%)	-	-	-	-
46.00-46.99	-	-	-	-	-	-
47.00-47.99	-	5 (12%)	-	-	-	-
48.00-48.99	-	1 (2%)	-	-	-	-
49.00-49.99	-	1 (2%)	-	-	-	-
≥50.00	-	1 (2%)	-	-	-	-
Total (N)	-	41 (100%)	-	-	46 (100%)	112 (100%)

Table 13 continued. Observed length-frequency distribution of fish harvested and released for Leech Lake, Minnesota, May 10th – September 30th 2014.

Estimated Number Harvested (H) and Released (R)						
TL (inches)	Sunfish		Smallmouth Bass		Largemouth Bass	
	H	R	H	R	H	R
<4.00	-	-	-	-	-	-
4.00-4.99	-	1 (2%)	-	-	-	-
5.00-5.99	-	11 (17%)	-	-	-	-
6.00-6.99	-	-	-	-	-	-
7.00-7.99	23 (29%)	30 (48%)	-	1 (6%)	-	3 (1%)
8.00-8.99	20 (25%)	-	-	-	-	-
9.00-9.99	24 (30%)	6 (10%)	-	-	1 (9%)	3 (1%)
10.00-10.99	10 (13%)	13 (21%)	-	3 (19%)	-	24 (10%)
11.00-11.99	2 (3%)	-	-	-	-	-
12.00-12.99	-	2 (3%)	-	6 (38%)	3 (27%)	79 (33%)
13.00-13.99	-	-	-	-	-	6 (3%)
14.00-14.99	-	-	-	1 (6%)	1 (9%)	20 (8%)
15.00-15.99	-	-	-	1 (6%)	2 (18%)	52 (22%)
16.00-16.99	-	-	-	-	-	1 (0%)
17.00-17.99	-	-	1 (100%)	3 (19%)	3 (27%)	34 (14%)
18.00-18.99	-	-	-	-	1 (9%)	3 (1%)
19.00-19.99	-	-	-	1 (6%)	-	6 (3%)
20.00-20.99	-	-	-	-	-	5 (2%)
21.00-21.99	-	-	-	-	-	1 (0%)
22.00-22.99	-	-	-	-	-	1 (0%)
23.00-23.99	-	-	-	-	-	-
24.00-24.99	-	-	-	-	-	-
25.00-25.99	-	-	-	-	-	-
26.00-26.99	-	-	-	-	-	-
27.00-27.99	-	-	-	-	-	-
28.00-28.99	-	-	-	-	-	-
29.00-29.99	-	-	-	-	-	-
30.00-30.99	-	-	-	-	-	-
31.00-31.99	-	-	-	-	-	-
32.00-32.99	-	-	-	-	-	-
33.00-33.99	-	-	-	-	-	-
34.00-34.99	-	-	-	-	-	-
35.00-35.99	-	-	-	-	-	-
≥ 36.00	-	-	-	-	-	-
Total (N)	79 (100%)	63 (100%)	1 (100%)	16 (100%)	11 (100%)	238 (100%)

Table 13 continued. Observed length-frequency distribution of fish harvested and released for Leech Lake, Minnesota, May 10th – September 30th 2014.

Estimated Number Harvested (H) and Released (R)				
TL (inches)	Black Crappie		Yellow Perch	
	H	R	H	R
<4.00	- -	- -	- -	2 (0%)
4.00-4.99	- -	- -	2 (0%)	86 (2%)
5.00-5.99	- -	1 (1%)	6 (0%)	1,294 (37%)
6.00-6.99	- -	1 (1%)	- -	1 (0%)
7.00-7.99	2 (1%)	33 (41%)	152 (9%)	1,124 (32%)
8.00-8.99	12 (6%)	15 (19%)	117 (7%)	53 (2%)
9.00-9.99	35 (17%)	20 (25%)	509 (30%)	635 (18%)
10.00-10.99	73 (35%)	10 (13%)	789 (47%)	261 (7%)
11.00-11.99	5 (2%)	- -	29 (2%)	1 (0%)
12.00-12.99	45 (22%)	- -	79 (5%)	26 (1%)
13.00-13.99	5 (2%)	- -	- -	- -
14.00-14.99	15 (7%)	- -	5 (0%)	2 (0%)
15.00-15.99	13 (6%)	- -	- -	- -
16.00-16.99	- -	- -	- -	- -
17.00-17.99	1 (0%)	- -	- -	- -
18.00-18.99	- -	- -	- -	- -
19.00-19.99	- -	- -	- -	- -
20.00-20.99	- -	- -	- -	- -
21.00-21.99	- -	- -	- -	- -
22.00-22.99	- -	- -	- -	- -
23.00-23.99	- -	- -	- -	- -
24.00-24.99	- -	- -	- -	- -
25.00-25.99	- -	- -	- -	- -
26.00-26.99	- -	- -	- -	- -
27.00-27.99	- -	- -	- -	- -
28.00-28.99	- -	- -	- -	- -
29.00-29.99	- -	- -	- -	- -
30.00-30.99	- -	- -	- -	- -
31.00-31.99	- -	- -	- -	- -
32.00-32.99	- -	- -	- -	- -
33.00-33.99	- -	- -	- -	- -
34.00-34.99	- -	- -	- -	- -
35.00-35.99	- -	- -	- -	- -
≥ 36.00	- -	- -	- -	- -
Total (N)	206 (100%)	80 (100%)	1,688 (100%)	3,485 (100%)

Table 13 continued. Observed length-frequency distribution of fish harvested and released for Leech Lake, Minnesota, May 10th – September 30th 2014.

Estimated Number Harvested (H) and Released (R)				
TL (inches)	Walleye ¹		Cisco/ Whitefish	
	H	R	H	R
<4.00	- -	- -	- -	- -
4.00-4.99	- -	- -	- -	- -
5.00-5.99	- -	1 (0%)	- -	- -
6.00-6.99	- -	- -	- -	- -
7.00-7.99	- -	13 (1%)	- -	- -
8.00-8.99	1 (0%)	4 (0%)	- -	- -
9.00-9.99	2 (0%)	10 (0%)	- -	- -
10.00-10.99	1 (0%)	193 (8%)	- -	- -
11.00-11.99	5 (0%)	6 (0%)	- -	- -
12.00-12.99	52 (3%)	207 (8%)	- -	- -
13.00-13.99	51 (2%)	2 (0%)	- -	- -
14.00-14.99	242 (12%)	59 (2%)	- -	- -
15.00-15.99	648 (31%)	66 (3%)	- -	- -
16.00-16.99	127 (6%)	1 (0%)	- -	- -
17.00-17.99	606 (29%)	63 (2%)	- -	- -
18.00-18.99	68 (3%)	2 (0%)	- -	- -
19.00-19.99	242 (12%)	34 (1%)	- -	- -
20.00-20.99	- -	489 (19%)	- -	- -
21.00-21.99	- -	59 (2%)	- -	- -
22.00-22.99	- -	773 (30%)	- -	- -
23.00-23.99	- -	22 (1%)	- -	- -
24.00-24.99	- -	274 (11%)	- -	- -
25.00-25.99	- -	210 (8%)	- -	- -
26.00-26.99	12 (1%)	14 (1%)	- -	- -
27.00-27.99	13 (1%)	39 (2%)	- -	- -
28.00-28.99	- -	4 (0%)	- -	- -
29.00-29.99	- -	5 (0%)	- -	- -
30.00-30.99	1 (0%)	2 (0%)	- -	- -
31.00-31.99	- -	- -	- -	- -
32.00-32.99	- -	- -	- -	- -
33.00-33.99	- -	- -	- -	- -
34.00-34.99	- -	- -	- -	- -
35.00-35.99	- -	- -	- -	- -
≥ 36.00	- -	- -	- -	- -
Total (N)	2,071 (100%)	2,552 (100%)	- (0%)	- (0%)

¹Bold font denotes walleye protected by length limit.

Table 14. Estimated total Walleye harvest statistics for the summer open water creel season on Leech Lake, Minnesota, 1998-2014 sorted by sex and maturity.

	1998	1999	2004	2005	2008 ^a	2009 ^a	2010 ^a	2011 ^a	2014 ^b	1998-2014 Mean
<i>Number of Harvested Fish</i>										
Mature Female	17,443	35,161	11,770	1,125	3,042	3,410	2,049	2,731	9,573	9,589
Mature Male	54,569	40,213	13,984	2,349	11,730	18,412	19,577	24,615	32,178	24,181
Immature Female	50,426	59,313	4,880	1,739	34,824	57,147	25,611	20,056	23,122	30,791
Immature Male	19,138	15,030	1,769	464	17,906	6,934	13,691	7,566	4,021	9,613
Total	141,577	149,717	32,402	5,676	67,502	85,902	60,928	54,967	68,894	74,174
<i>Pounds of Harvested Fish</i>										
Mature Female	41,130	78,923	36,040	2,855	9,347	9,470	6,543	6,898	24,608	23,979
Mature Male	63,461	55,837	30,224	3,442	17,955	21,444	24,194	31,549	48,166	32,919
Immature Female	49,875	57,719	5,393	2,105	38,529	61,562	26,252	23,568	28,373	32,597
Immature Male	14,466	10,278	1,388	363	12,797	5,068	12,087	6,297	3,194	7,326
Total	168,931	202,756	73,045	8,765	78,628	97,543	69,076	68,312	104,341	96,822
<i>Pounds of Harvested Fish per Acre</i>										
Mature Female	0.37	0.71	0.32	0.03	0.08	0.08	0.06	0.06	0.22	0.21
Mature Male	0.57	0.50	0.27	0.03	0.16	0.19	0.22	0.28	0.43	0.29
Immature Female	0.45	0.52	0.05	0.02	0.34	0.55	0.23	0.21	0.25	0.29
Immature Male	0.13	0.09	0.01	0.00	0.11	0.05	0.11	0.06	0.03	0.07
Total	1.51	1.81	0.65	0.08	0.70	0.87	0.62	0.61	0.93	0.87

^a18-26" protected slot limit

^b20-26" protected slot limit

Table 14 continued. Estimated total Walleye harvest statistics for the summer open water creel season on Leech Lake, Minnesota, 1998-2014 sorted by sex and maturity.

	1998	1999	2004	2005	2008 ^a	2009 ^a	2010 ^a	2011 ^a	2014 ^b	1998-2014 Mean
<i>Number of Harvested Fish (18"-19.9")</i>										
Mature Female	3,344	10,018	2,781	155	37	266	121	27	5,828	2,509
Mature Male	2,102	2,585	6,054	179	138	340	101	59	4,484	1,782
Immature Female	1,010	-	117	36	137	218	47	17	-	176
Immature Male	-	-	-	-	-	-	-	-	-	-
Total	6,456	12,602	8,952	370	312	823	269	104	10,312	4,467
<i>Number of Released Fish</i>										
Mature Female	2,719	6,298	3,603	2,287	22,819	52,843	43,404	47,340	37,456	24,308
Mature Male	10,474	8,844	2,241	1,134	23,847	39,506	15,200	14,943	17,915	14,901
Immature Female	38,725	46,523	3,142	331	21,640	74,046	21,041	30,488	8,092	27,114
Immature Male	30,908	33,639	2,428	154	26,998	11,517	8,698	12,607	6,370	14,813
Total	82,825	95,304	11,414	3,906	95,304	177,912	88,343	105,378	69,834	81,136
<i>Number of Released Fish (20"-25.9")</i>										
Mature Female	1,398	3,510	3,057	2,180	20,475	48,054	41,619	44,979	35,459	22,303
Mature Male	117	774	1,327	1,067	22,521	30,019	8,740	11,221	15,521	10,145
Immature Female	17	-	31	115	3,072	11,579	8,406	9,387	-	3,623
Immature Male	-	-	-	-	-	-	-	-	-	-
Total	1,533	4,283	4,416	3,362	46,069	89,651	58,765	65,587	50,980	36,072

^a18-26" protected slot limit

^b20-26" protected slot limit

FIGURES

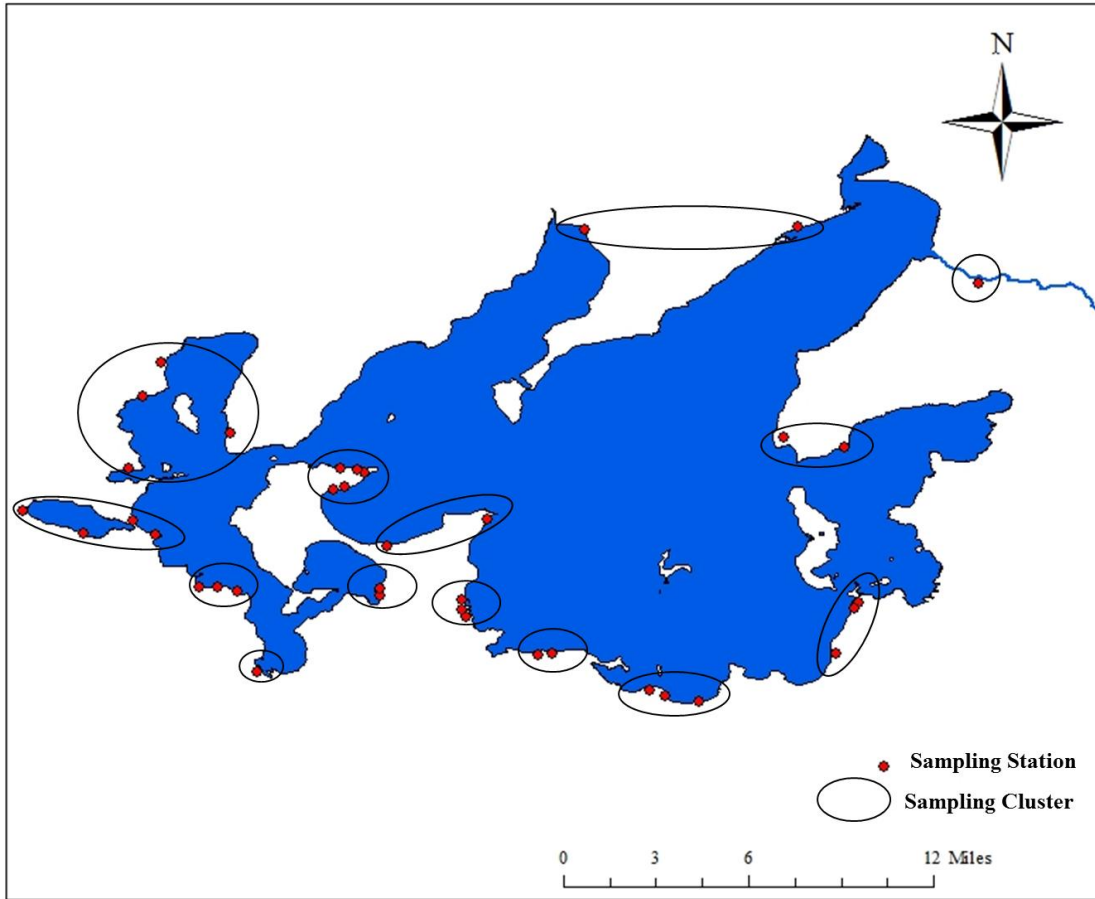


Figure 1. Creel survey sampling clusters (circles) and stations (dots) on Leech Lake, Minnesota.

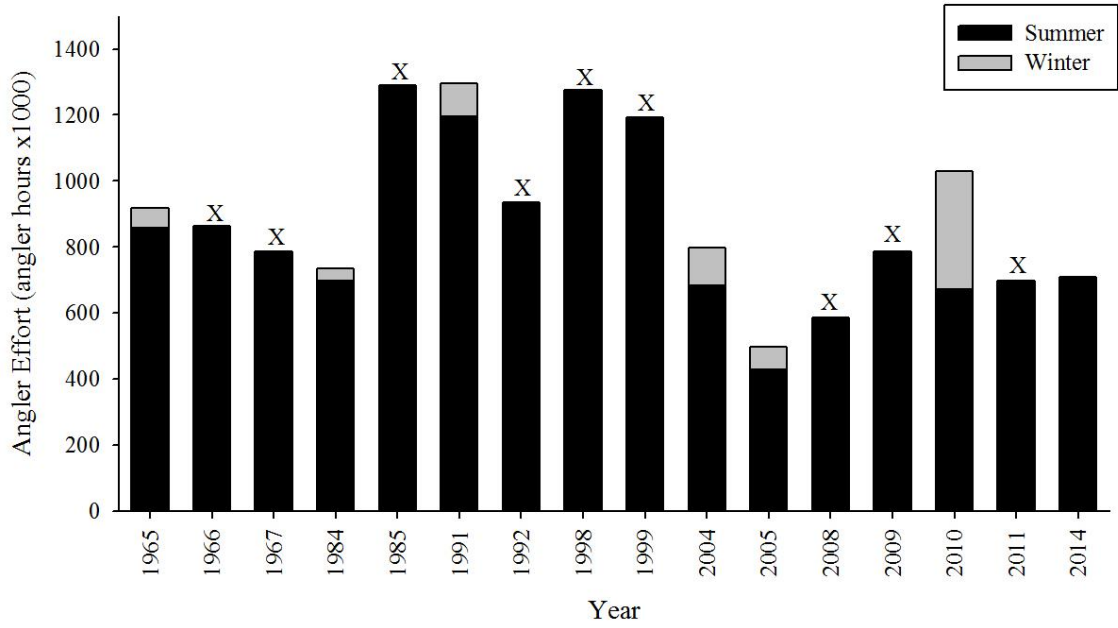


Figure 2. Total fishing pressure (angler-hours x 1,000) by Leech Lake anglers throughout the summer and winter seasons, 1965-2014 (X denotes year's winter surveys were not conducted in conjunction with summer survey).

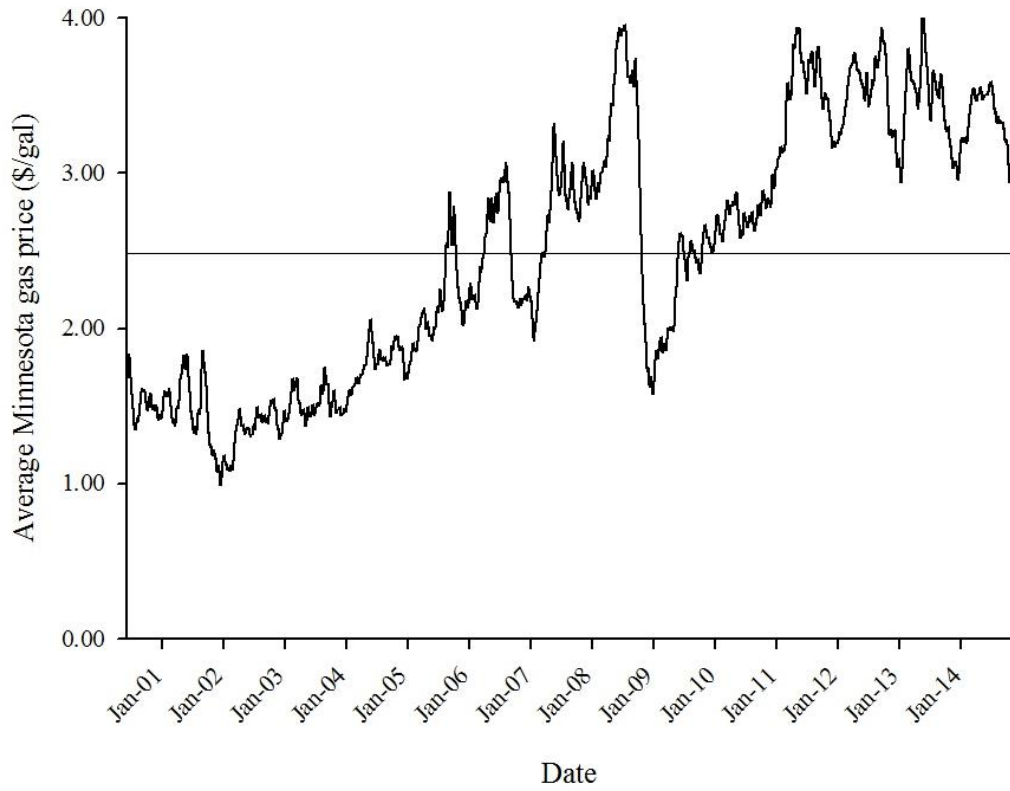


Figure 3. Weekly price (\$) per gallon of regular gasoline in Minnesota, June 2000 – January 2012 (EIA 2011). The horizontal line depicts the 10-year average.

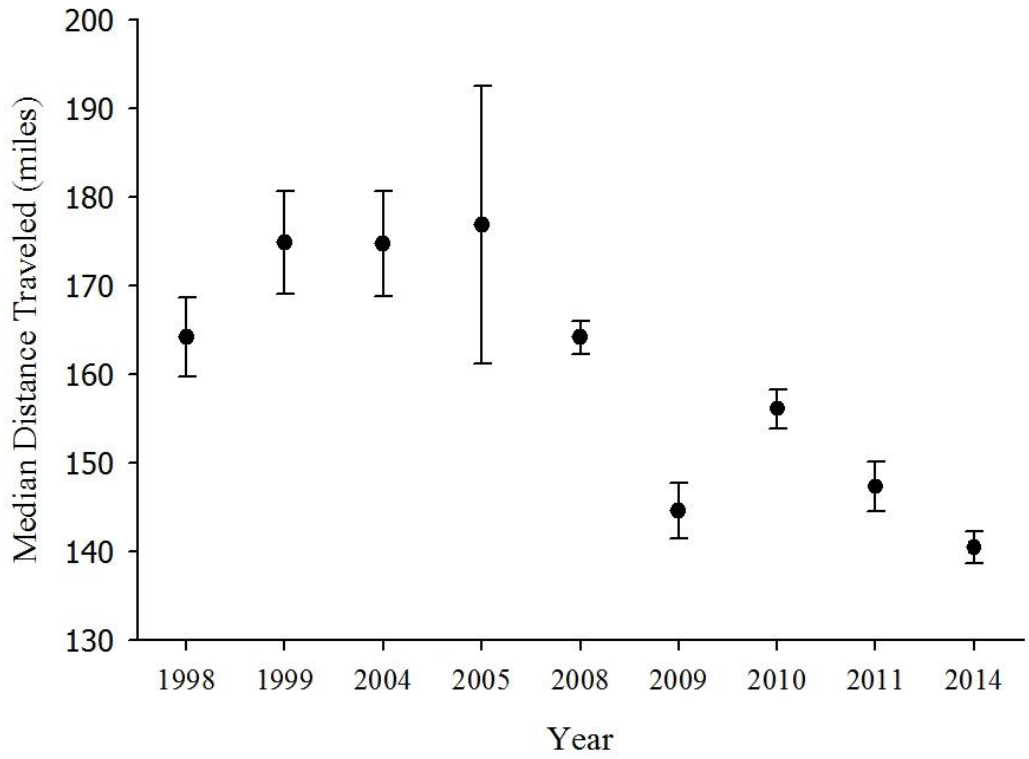


Figure 4. Median distance (miles \pm 95% CI) traveled by Leech Lake anglers interviewed during summer creel surveys, 1998-2014.

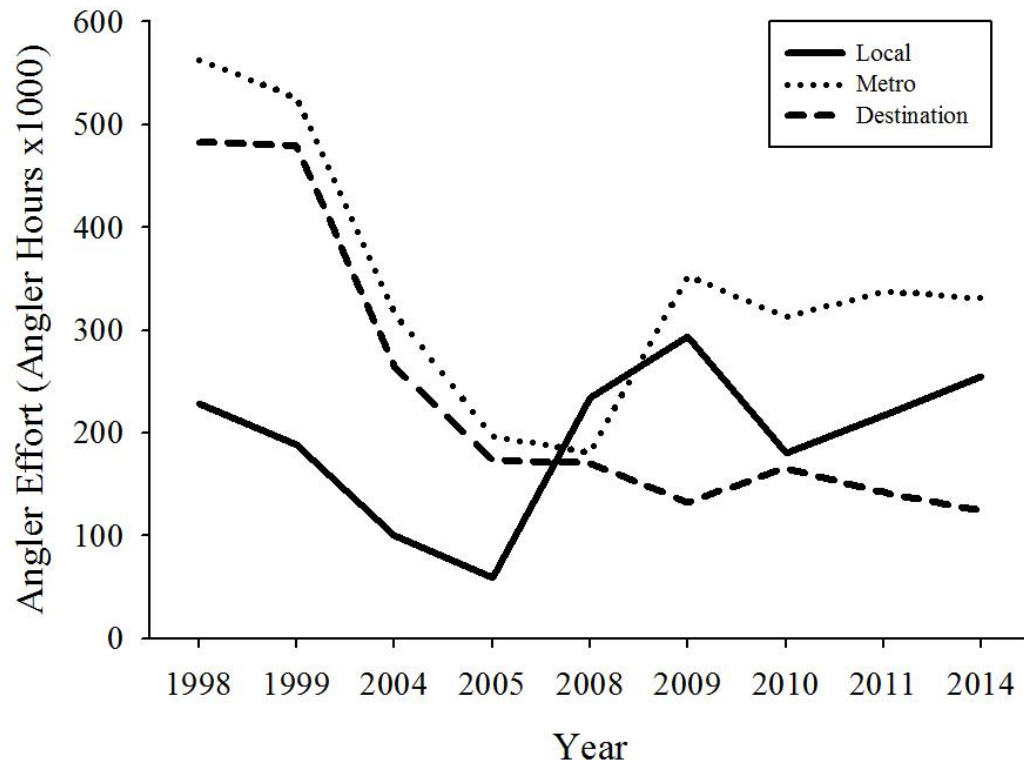


Figure 5. Fishing pressure on Leech Lake (1998-2014) by angler groups based on hometown distance (Local= 0-99 miles; Metro= 100-249 miles; Destination = 250+ miles)

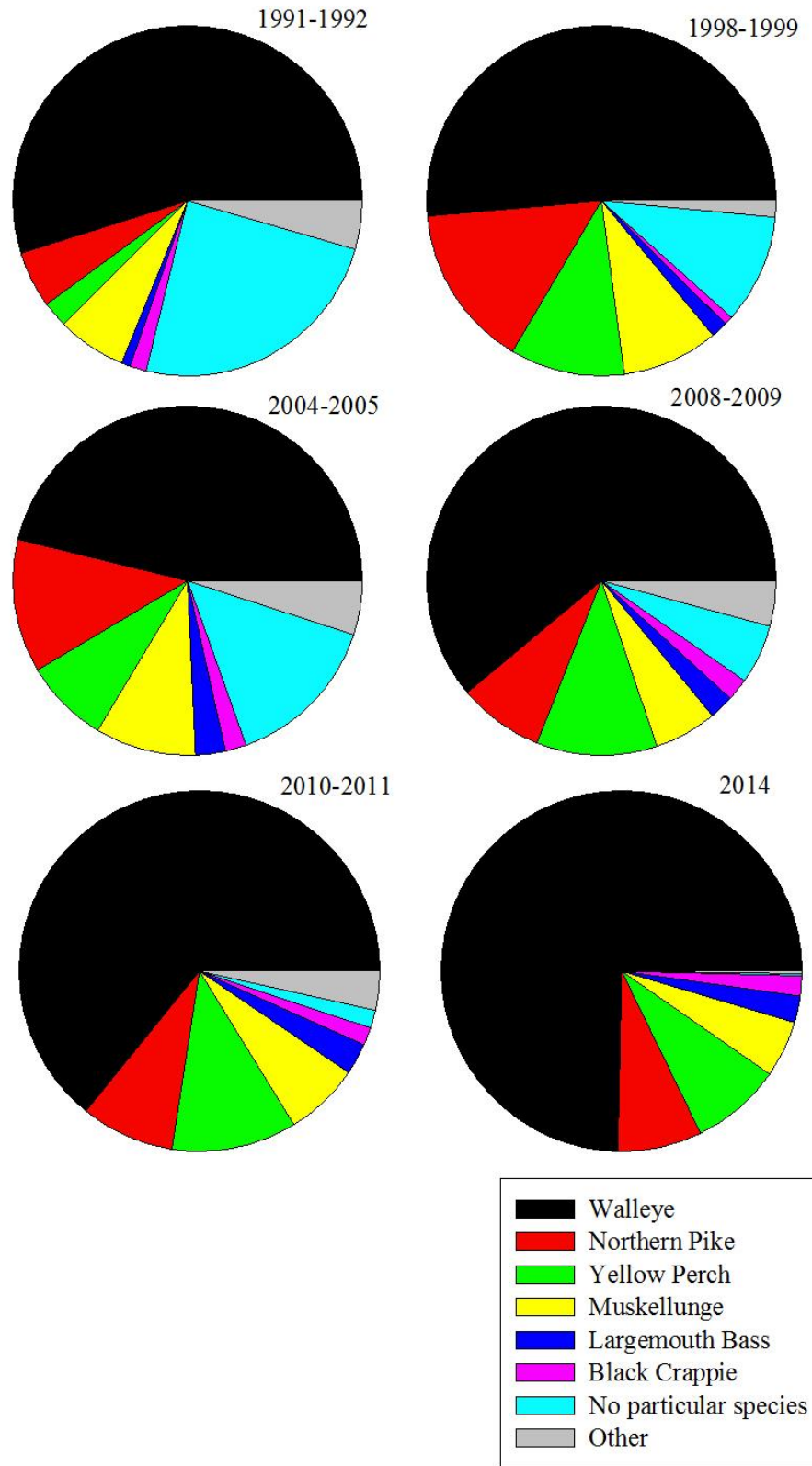


Figure 6. Mean distribution of species targeted by angling parties interviewed during summer creel surveys on Leech Lake, 1991-2014.

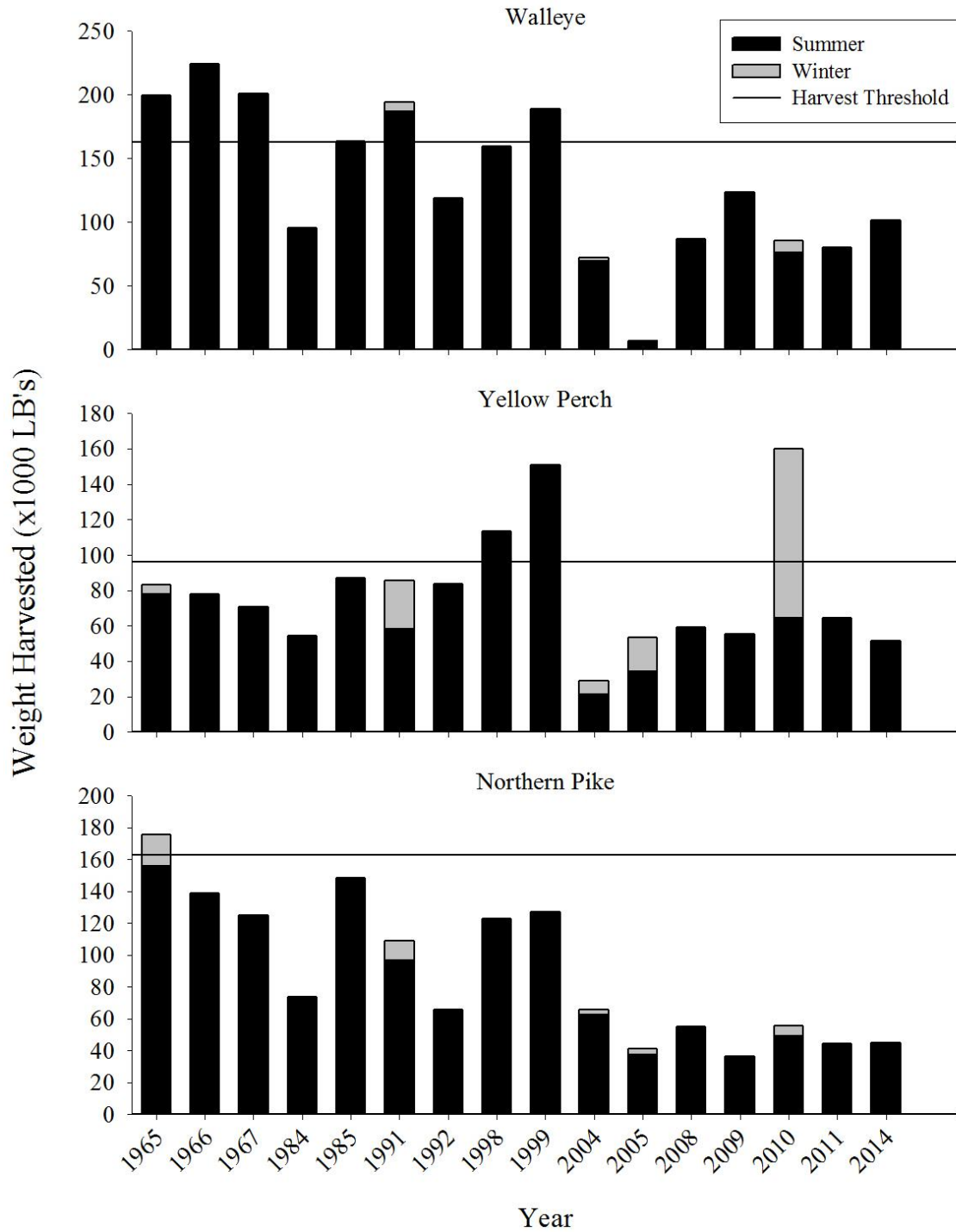


Figure 7. Total harvest (pounds x 1,000) of Walleye, Yellow Perch, and Northern Pike by Leech Lake anglers throughout the summer and winter seasons, 1965-2014. Horizontal lines represent the safe harvest threshold. Harvest above the threshold could be a precursor to population responses.

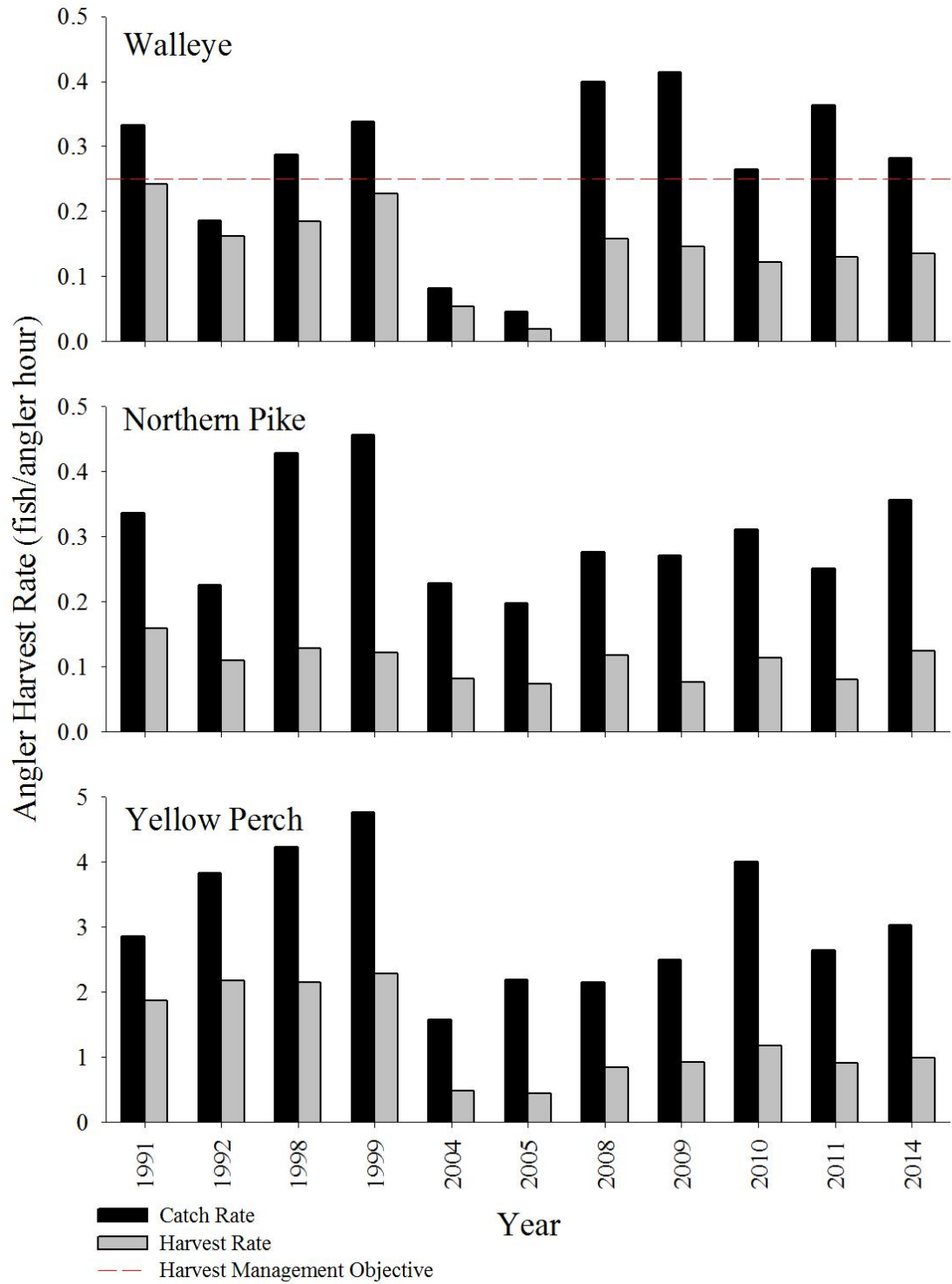


Figure 8. Walleye, Northern Pike, and Yellow Perch targeting angler catch and harvest rates by Leech Lake anglers targeting each species, 1991-2014. The dashed line represents the 2011-2015 management plan objective of a targeting harvest rate of 0.25 Walleye/hour or higher.

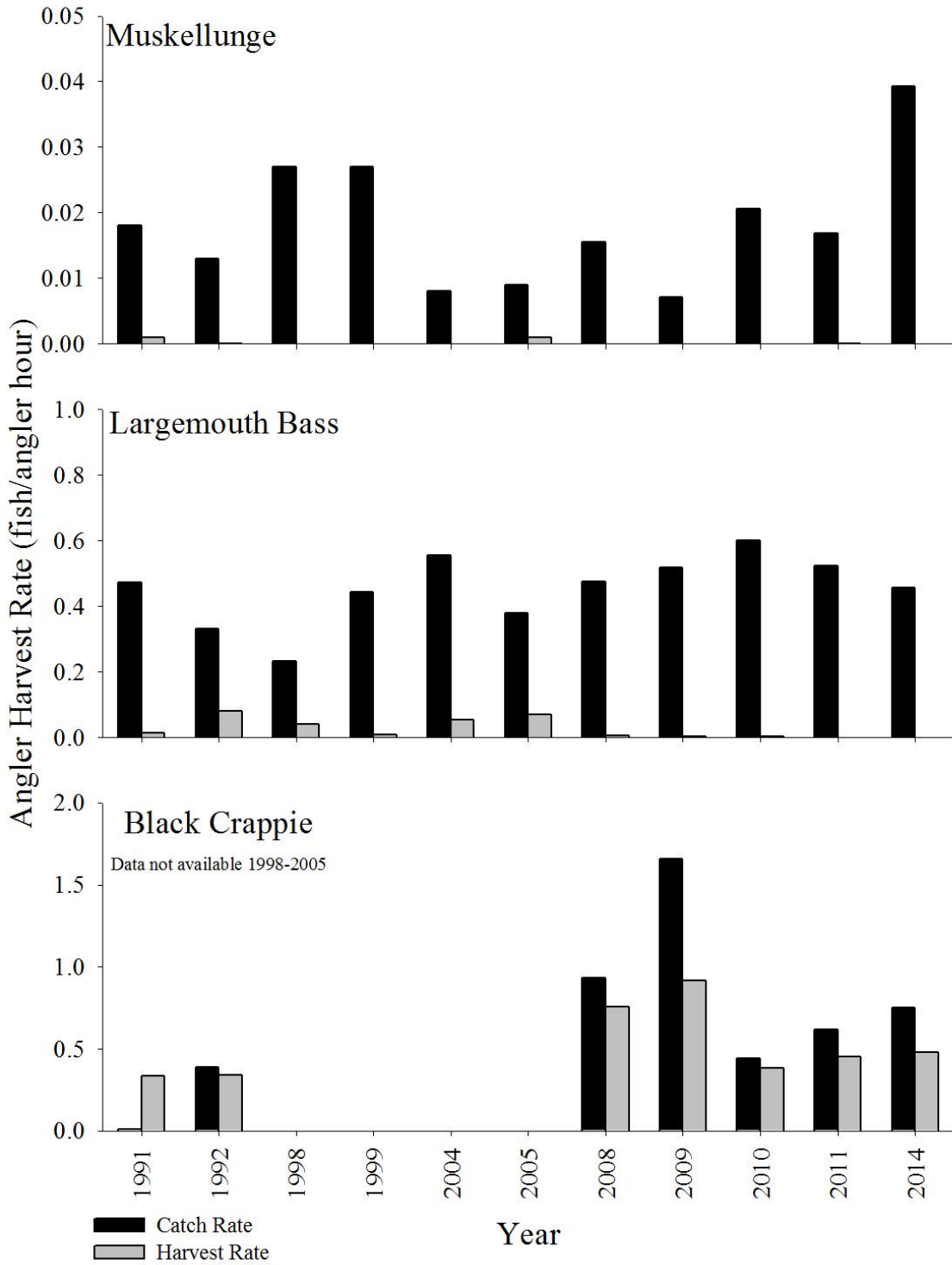


Figure 9. Muskellunge, Largemouth Bass, and Black Crappie targeting angler catch and harvest rates by Leech Lake anglers targeting each species, 1991-2014.

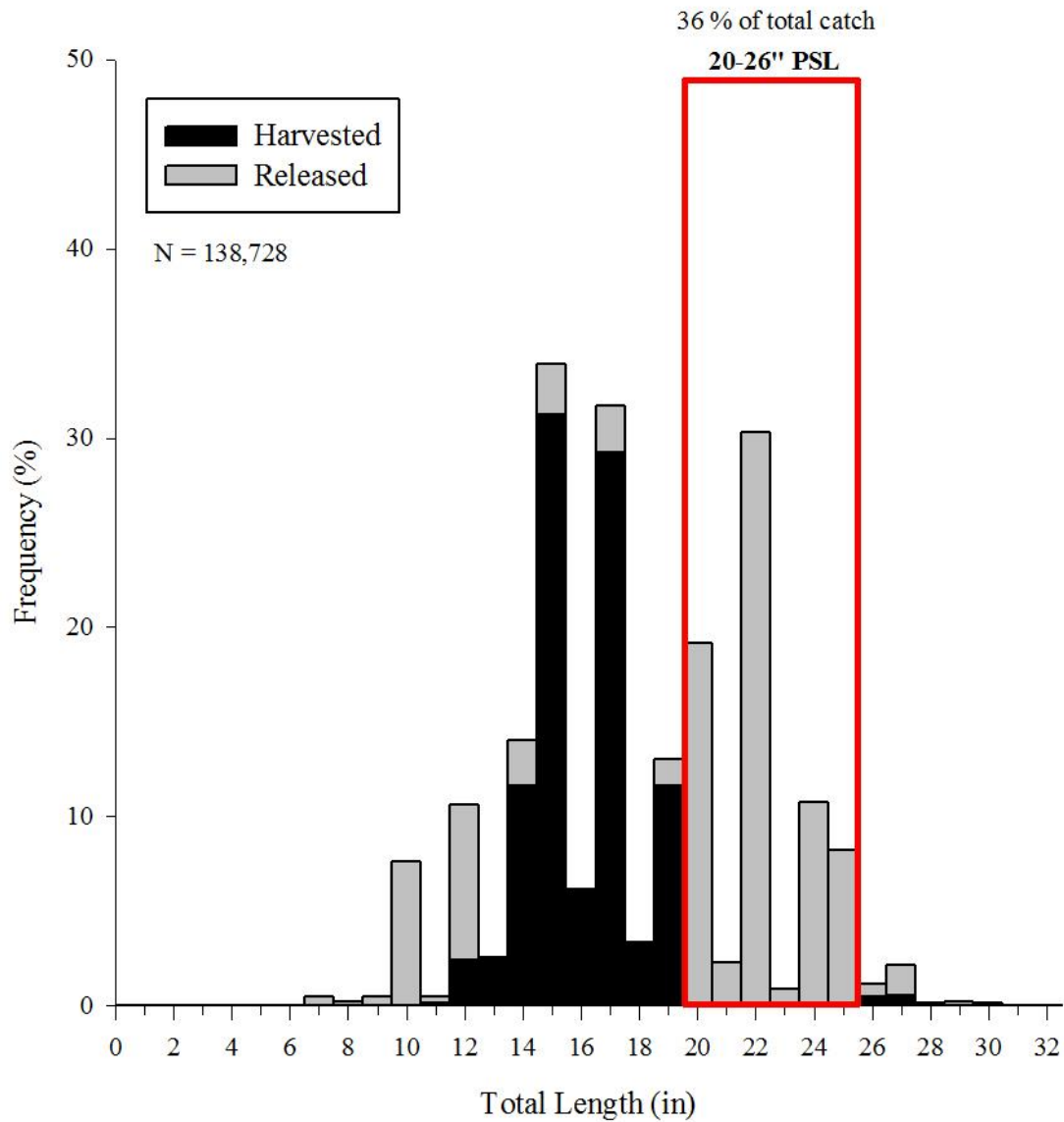


Figure 10. Length frequency distribution (% of observed catch) of harvested and released Walleye on Leech Lake, MN during 2014 summer creel. Red box indicates protected slot limit (20"-26").

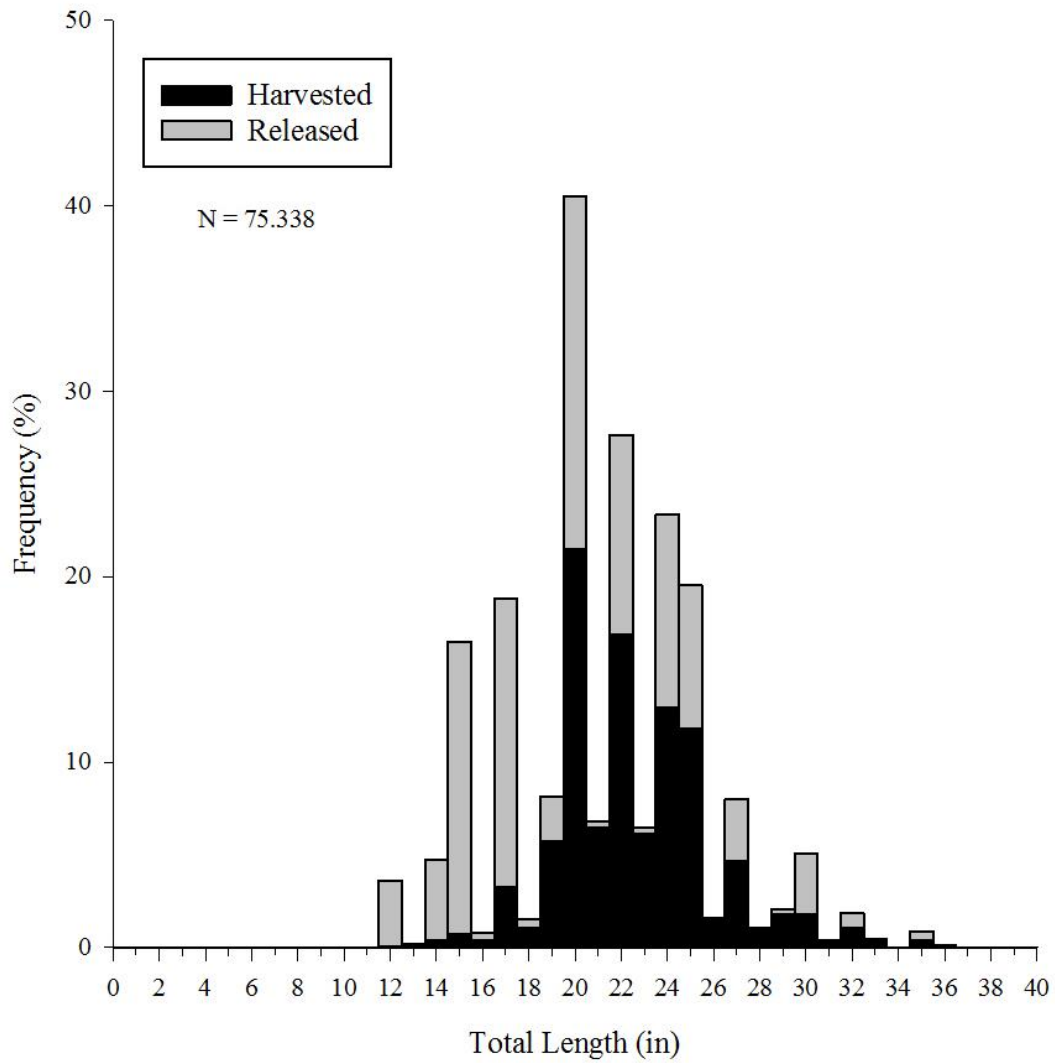


Figure 11. Length frequency distribution (% of observed catch) of harvested and released Northern Pike on Leech Lake, MN during 2014 summer creel.

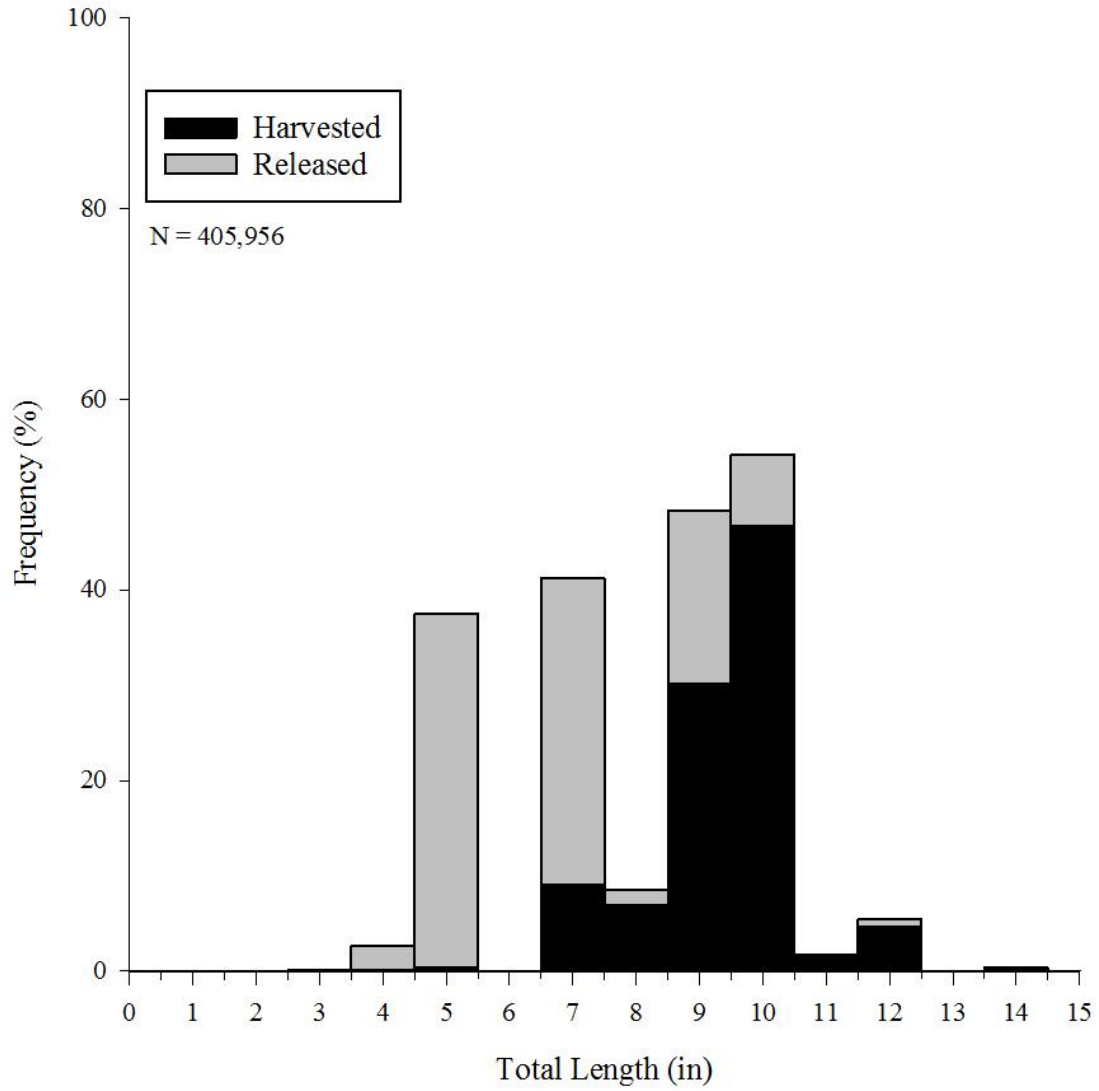


Figure 12. Length frequency distribution (% of observed catch) of harvested and released Yellow Perch on Leech Lake, MN during 2014 summer creel.

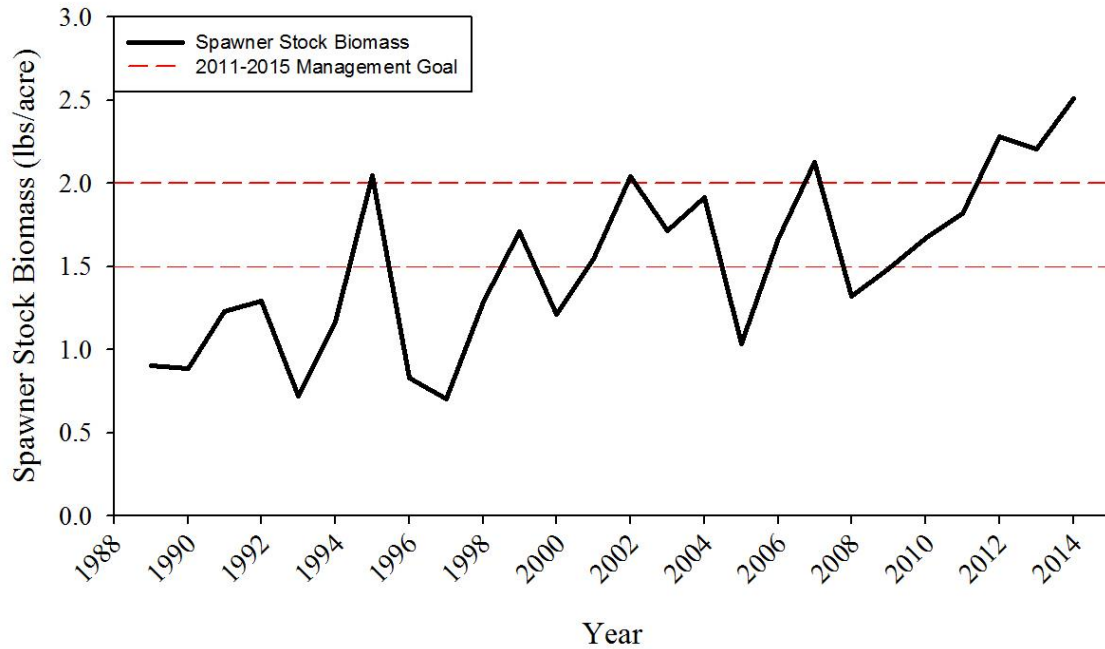


Figure 13. Estimated biomass (lbs/acre) of mature female Walleye in Leech Lake, 1989-2014. Horizontal lines depict the current management objective range of 1.5-2.0 lbs/acre (Ward and Schultz 2012).

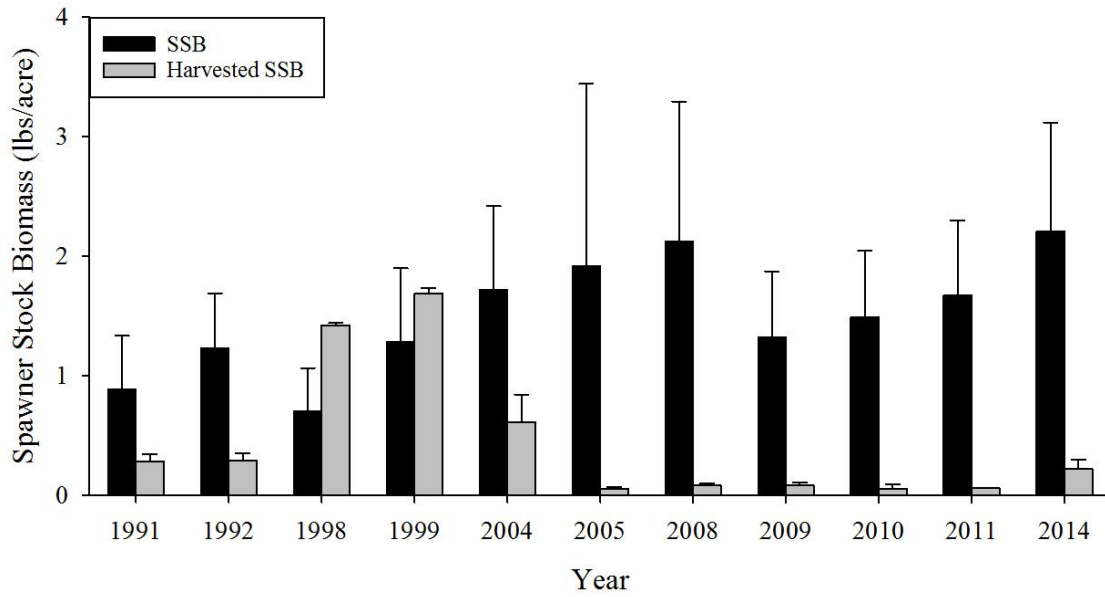


Figure 14. Estimated biomass and harvested biomass (lbs/acre) of mature female Walleye in Leech Lake, 1991-2014. Error bars are 95% confidence intervals.

APPENDICIES

Table A1. Creel survey sampling summary and angling pressure estimates by month and basin for Leech Lake, Minnesota, May 10th – September 30th 2014. Standard errors appear in parentheses.

<i>Western Bays</i>	Stratum					
	May	June	July	August	September	Season
N Interviews/refusals	53/0	101/0	76/0	133/0	96/0	459/0
Mean anglers/boat	2.30 (0.62)	2.52 (0.33)	2.40 (0.31)	2.43 (0.38)	2.23 (0.42)	2.41 (0.18)
Mean trip length	4.85 (1.33)	4.09 (0.60)	3.78 (0.71)	3.99 (0.57)	3.90 (0.84)	4.01 (0.33)
Total angler hours	33,905 (13,152)	37,255 (2,802)	51,016 (4,778)	48,385 (5,118)	41,414 (3,882)	207,339 (13,925)
Total hours per acre	1.89 (0.73)	2.08 (0.16)	2.85 (0.27)	2.70 (0.29)	2.31 (0.22)	11.57 (0.78)
<i>Main Lake</i>						
N Interviews/refusals	480/1	203/0	123/0	95/0	134/0	1035/1
Mean anglers/boat	2.30 (0.43)	2.38 (0.45)	2.25 (0.35)	2.07 (0.32)	2.21 (0.42)	2.24 (0.18)
Mean trip length	5.25 (0.89)	4.42 (0.88)	4.38 (0.80)	4.21 (0.67)	4.52 (1.03)	4.48 (0.39)
Total angler hours	164,252 (38,558)	122,401 (17,307)	71,855 (8,747)	66,438 (7,720)	103,837 (13,505)	502,303 (38,139)
Total hours per acre	1.75 (0.41)	1.30 (0.18)	0.77 (0.09)	0.71 (0.08)	1.11 (0.14)	5.35 (0.41)

Table A2. Catch and harvest estimates by month in the western bays basin (17,927 acres) of Leech Lake, May 10th – September 30th 2014.

Species	May	June	July	August	September	Season
<i>Number Caught per Acre</i>						
Bowfin	--	--	--	--	--	--
Bullhead spp.	--	--	--	--	--	--
Northern Pike	0.067 (0.035)	0.220 (0.063)	0.277 (0.056)	0.343 (0.080)	0.341 (0.178)	1.232 (0.213)
Muskellunge	--	0.002 (0.002)	0.008 (0.005)	0.011 (0.005)	0.002 (0.001)	0.022 (0.008)
Burbot	--	--	--	--	--	--
Rock Bass	--	0.052 (0.034)	0.079 (0.026)	0.031 (0.010)	0.049 (0.023)	0.209 (0.047)
Sunfish spp.	0.033 (0.030)	0.150 (0.062)	0.004 (0.005)	0.012 (0.008)	0.006 (0.001)	0.213 (0.057)
Smallmouth Bass	--	--	--	0.003 (0.003)	--	0.003 (0.003)
Largemouth Bass	0.006 (0.007)	0.034 (0.014)	0.214 (0.085)	0.064 (0.040)	0.048 (0.022)	0.366 (0.097)
Black Crappie	0.006 (0.007)	0.120 (0.027)	--	--	--	0.119 (0.028)
Yellow Perch	0.212 (0.109)	0.300 (0.064)	0.524 (0.109)	0.514 (0.113)	3.294 (0.633)	4.805 (0.661)
Walleye	0.615 (0.221)	0.417 (0.073)	0.340 (0.067)	0.510 (0.118)	0.231 (0.063)	1.984 (0.273)
Cisco/Whitefish	--	--	--	--	--	--
Overall	0.939 (0.373)	1.294 (0.200)	1.448 (0.273)	1.487 (0.215)	3.971 (0.595)	8.952 (0.785)
<i>Number Harvested per Acre</i>						
Bowfin	--	--	--	--	--	--
Bullhead spp.	--	--	--	--	--	--
Northern Pike	0.004 (0.002)	0.082 (0.034)	0.039 (0.017)	0.088 (0.030)	0.061 (0.032)	0.272 (0.056)
Muskellunge	--	--	--	--	--	--
Burbot	--	--	--	--	--	--
Rock Bass	--	0.012 (0.013)	0.013 (0.014)	0.002 (0.002)	0.029 (0.019)	0.057 (0.028)
Sunfish spp.	0.033 (0.030)	0.054 (0.029)	--	--	--	0.091 (0.037)
Smallmouth Bass	--	--	--	--	--	--
Largemouth Bass	--	0.002 (0.002)	--	0.008 (0.005)	--	0.010 (0.006)
Black Crappie	0.006 (0.007)	0.055 (0.025)	--	--	--	0.057 (0.025)
Yellow Perch	0.114 (0.080)	0.061 (0.027)	0.021 (0.009)	0.067 (0.049)	0.925 (0.194)	1.156 (0.211)
Walleye	0.289 (0.115)	0.162 (0.045)	0.180 (0.036)	0.238 (0.069)	0.108 (0.033)	0.899 (0.126)
Cisco/Whitefish	--	--	--	--	--	--
Overall	0.445 (0.193)	0.429 (0.083)	0.254 (0.055)	0.402 (0.096)	1.124 (0.212)	2.543 (0.292)

Table A3. Catch and harvest estimates by month in the main lake basin (93,914 acres) of Leech Lake, May 10th – September 30th 2014.

Species	May	June	July	August	September	Season ²
<i>Number Caught per Acre</i>						
Bowfin	<0.001 (<0.001)	- -	- -	- -	- -	<0.001 (<0.001)
Bullhead spp.	- -	- -	- -	- -	- -	- -
Northern Pike	0.093 (0.027)	0.117 (0.022)	0.112 (0.024)	0.133 (0.027)	0.127 (0.033)	0.566 (0.057)
Muskellunge	<0.001 (<0.001)	<0.001 (<0.001)	0.001 (<0.001)	0.020 (0.006)	0.003 (0.002)	0.025 (0.006)
Burbot	- -	- -	- -	- -	- -	- -
Rock Bass	- -	0.020 (0.006)	0.017 (0.009)	0.004 (0.004)	0.031 (0.014)	0.071 (0.018)
Sunfish spp.	0.005 (0.002)	0.020 (0.020)	0.008 (0.008)	0.001 -	0.002 (<0.001)	0.035 (0.022)
Smallmouth Bass	<0.001 (<0.001)	0.004 (0.003)	0.002 -	0.004 (0.002)	0.002 (0.001)	0.012 (0.003)
Largemouth Bass	0.003 (0.003)	0.008 (0.005)	0.056 (0.026)	0.011 (0.006)	0.009 (0.001)	0.086 (0.027)
Black Crappie	0.023 (0.013)	<0.001 (<0.001)	<0.001 (<0.001)	0.041 (0.027)	0.130 (0.030)	0.191 (0.042)
Yellow Perch	0.179 (0.082)	0.109 (0.029)	0.151 (0.034)	0.104 (0.031)	2.893 (0.860)	3.406 (0.864)
Walleye	0.590 (0.157)	0.301 (0.057)	0.032 (0.007)	0.075 (0.020)	0.181 (0.050)	1.098 (0.129)
Cisco/Whitefish	- -	- -	- -	- -	- -	- -
Overall	0.895 (0.232)	0.581 0.095	0.379 (0.061)	0.392 (0.065)	3.378 (0.863)	5.490 (0.888)
<i>Number Harvested per Acre</i>						
Bowfin	- -	- -	- -	- -	- -	- -
Bullhead spp.	- -	- -	- -	- -	- -	- -
Northern Pike	0.011 (0.003)	0.018 (0.005)	0.027 (0.008)	0.038 (0.012)	0.033 (0.011)	0.124 (0.018)
Muskellunge	- -	- -	- -	- -	- -	- -
Burbot	- -	- -	- -	- -	- -	- -
Rock Bass	- -	0.011 (0.006)	0.003 (0.003)	- -	0.005 (0.004)	0.019 (0.007)
Sunfish spp.	0.005 (0.002)	0.012 (0.013)	0.004 (0.004)	<0.001 -	0.002 (<0.001)	0.023 (0.014)
Smallmouth Bass	- -	<0.001 -	- -	<0.001 (<0.001)	- -	0.002 (<0.001)
Largemouth Bass	- -	0.001 (0.001)	<0.001 (<0.001)	0.002 (0.002)	- -	0.004 (0.002)
Black Crappie	0.008 (0.001)	0.001 (0.001)	<0.001 (<0.001)	0.041 (0.027)	0.095 (0.018)	0.144 (0.033)
Yellow Perch	0.074 (0.033)	0.036 (0.012)	0.046 (0.024)	0.017 (0.009)	0.813 (0.234)	0.974 (0.237)
Walleye	0.266 (0.071)	0.159 (0.031)	0.012 (0.004)	0.052 (0.014)	0.110 (0.029)	0.562 (0.066)
Cisco/Whitefish	- -	- -	- -	- -	- -	- -
Overall	0.364 (0.100)	0.240 (0.042)	0.095 (0.029)	0.151 (0.041)	1.059 (0.230)	1.852 (0.250)

Table A4. Monthly estimates of catch and harvest rates of all anglers in the western bays basin of Leech Lake, May 10th – September 30th 2014.

Species	May	June	July	August	September	Season
<i>Catch per Angler Hour</i>						
Bowfin	--	--	--	--	--	--
Bullhead spp.	--	--	--	--	--	--
Northern Pike	0.035 (0.026)	0.106 (0.041)	0.097 (0.037)	0.127 (0.057)	0.148 (0.075)	0.106 (0.023)
Muskellunge	--	<0.001 (<0.001)	0.003 (0.002)	0.004 (0.004)	<0.001 (<0.001)	0.002 (<0.001)
Burbot	--	--	--	--	--	--
Rock Bass	--	0.025 (0.016)	0.028 (0.019)	0.012 (0.006)	0.021 (0.010)	0.018 (0.006)
Sunfish spp.	0.017 (0.017)	0.072 (0.033)	0.002 (0.002)	0.004 (0.003)	0.003 (<0.001)	0.018 (0.005)
Smallmouth Bass	--	--	--	<0.001 (<0.001)	--	<0.001 (<0.001)
Largemouth Bass	0.003 (0.004)	0.016 (0.007)	0.075 (0.032)	0.024 (0.017)	0.021 (0.008)	0.032 (0.009)
Black Crappie	0.003 (0.004)	0.058 (0.028)	--	--	--	0.010 (0.003)
Yellow Perch	0.112 (0.072)	0.144 (0.052)	0.184 (0.091)	0.190 (0.047)	1.426 (0.344)	0.415 (0.072)
Walleye	0.325 (0.179)	0.201 (0.061)	0.120 (0.047)	0.189 (0.055)	0.100 (0.037)	0.172 (0.030)
Cisco/Whitefish	--	--	--	--	--	--
Overall	0.496 (0.288)	0.623 (0.143)	0.509 (0.185)	0.551 (0.131)	1.719 (0.355)	0.774 (0.108)
<i>Harvest per Angler Hour</i>						
Bowfin	--	--	--	--	--	--
Bullhead spp.	--	--	--	--	--	--
Northern Pike	0.002 (0.001)	0.039 0.020	0.014 (0.003)	0.033 (0.016)	0.026 (0.013)	0.024 (0.005)
Muskellunge	--	--	--	--	--	--
Burbot	--	--	--	--	--	--
Rock Bass	--	0.006 0.006	0.005 (0.005)	<0.001 (<0.001)	0.013 (0.008)	0.005 (0.002)
Sunfish spp.	0.017 (0.017)	0.026 0.016	--	--	--	0.008 (0.003)
Smallmouth Bass	--	--	--	--	--	--
Largemouth Bass	--	0.001 0.001	--	0.003 (0.002)	--	<0.001 (<0.001)
Black Crappie	0.003 (0.004)	0.027 0.020	--	--	--	0.005 (0.002)
Yellow Perch	0.060 (0.047)	0.029 0.016	0.007 -	0.025 (0.018)	0.401 (0.091)	0.100 (0.019)
Walleye	0.153 (0.087)	0.078 0.025	0.063 (0.017)	0.088 (0.031)	0.047 (0.019)	0.078 (0.013)
Cisco/Whitefish	--	--	--	--	--	--
Overall	0.235 (0.139)	0.206 0.050	0.089 (0.025)	0.149 (0.047)	0.487 (0.103)	0.220 (0.031)

Table A5. Monthly estimates of catch and harvest rates of all anglers in the main lake basin of Leech Lake, May 10th – September 30th 2014.

Species	May	June	July	August	September	Season
<i>Catch per Angler Hour</i>						
Bowfin	<0.001 (<0.001)	--	--	--	--	<0.001 (<0.001)
Bullhead spp.	--	--	--	--	--	--
Northern Pike	0.053 (0.021)	0.090 (0.028)	0.146 (0.045)	0.188 (0.052)	0.115 (0.065)	0.106 (0.019)
Muskellunge	<0.001 (<0.001)	<0.001 (<0.001)	0.002 (<0.001)	0.028 (0.013)	0.002 (0.002)	0.005 (0.001)
Burbot	--	--	--	--	--	--
Rock Bass	--	0.015 (0.009)	0.146 (0.045)	0.006 (0.005)	0.028 (0.015)	0.013 (0.004)
Sunfish spp.	0.003 (<0.001)	0.016 (0.015)	0.002 (<0.001)	0.001 -	0.002 (<0.001)	0.006 (0.009)
Smallmouth Bass	<0.001 (<0.001)	0.003 (0.003)	0.002 -	0.005 (0.003)	0.002 (0.002)	0.002 (<0.001)
Largemouth Bass	0.002 (0.002)	0.006 (0.008)	0.073 (0.032)	0.015 (0.009)	0.008 (0.004)	0.016 (0.005)
Black Crappie	0.013 (0.009)	<0.001 -	0.001 (0.001)	0.057 (0.039)	0.117 (0.030)	0.036 (0.008)
Yellow Perch	0.102 (0.057)	0.083 (0.033)	0.197 (0.030)	0.147 (0.049)	2.617 (0.882)	0.637 (0.171)
Walleye	0.337 (0.146)	0.231 (0.079)	0.042 (0.019)	0.106 (0.040)	0.164 (0.087)	0.205 (0.038)
Cisco/Whitefish	--	--	--	--	--	--
Overall	0.512 (0.210)	0.446 (0.147)	0.495 (0.092)	0.554 (0.167)	3.055 (0.960)	1.026 (0.196)
<i>Harvest per Angler Hour</i>						
Bowfin	--	--	--	--	--	--
Bullhead spp.	--	--	--	--	--	--
Northern Pike	0.007 (0.002)	0.014 (0.005)	0.035 (0.009)	0.053 (0.018)	0.030 (0.011)	0.023 (0.004)
Muskellunge	--	--	--	--	--	--
Burbot	--	--	--	--	--	--
Rock Bass	--	0.009 (0.007)	0.004 -	--	0.005 (0.005)	0.004 (0.001)
Sunfish spp.	0.003 (<0.001)	0.010 (0.010)	0.006 (0.006)	0.001 -	0.002 (<0.001)	0.004 (0.006)
Smallmouth Bass	--	<0.001 (<0.001)	--	0.001 (0.001)	--	<0.001 (<0.001)
Largemouth Bass	--	<0.001 (0.002)	0.001 (0.001)	0.002 (0.002)	--	<0.001 (<0.001)
Black Crappie	0.005 (0.002)	<0.001 -	0.001 (0.001)	0.057 (0.039)	0.086 (0.018)	0.027 (0.007)
Yellow Perch	0.042 (0.023)	0.028 (0.011)	0.060 (0.021)	0.024 (0.013)	0.735 (0.244)	0.182 (0.047)
Walleye	0.152 (0.067)	0.122 (0.039)	0.016 (0.012)	0.073 (0.028)	0.099 (0.048)	0.105 (0.019)
Cisco/Whitefish	--	--	--	--	--	--
Overall	0.208 (0.089)	0.184 (0.061)	0.124 (0.027)	0.213 (0.089)	0.958 (0.278)	0.346 (0.059)

Table A6. Monthly estimates of catch and harvest rates of targeting anglers in the western bays basin of Leech Lake, May 10th – September 30th 2014.

Species	May	June	July	August	September	Season
<i>Catch per Angler Hour</i>						
Northern Pike	- -	0.956 (0.656)	0.892 (0.177)	1.280 (0.223)	0.883 (0.279)	0.919 (0.127)
Muskellunge	- -	0.029 (0.026)	0.070 (0.058)	0.060 (0.053)	0.008 (0.007)	0.044 (0.022)
Rock bass	- -	- -	- -	- -	1.967 -	0.571 -
Sunfish spp.	0.516 (0.169)	2.214 (0.137)	0.082 (0.091)	- -	0.146 (0.114)	0.549 (0.045)
Largemouth Bass	- -	0.844 (0.184)	0.825 (0.250)	0.676 (0.346)	0.791 (0.146)	0.802 (0.118)
Black Crappie	- -	1.008 (1.260)	- -	- -	- -	2.129 -
Yellow Perch	- -	3.000 -	0.308 -	2.052 (0.600)	6.685 (0.657)	3.233 (0.288)
Walleye	0.809 (0.145)	0.641 (0.110)	0.404 (0.075)	0.686 (0.151)	0.483 (0.118)	0.586 (0.058)
<i>Harvest per Angler Hour</i>						
Northern Pike	- -	0.528 (0.230)	0.249 (0.182)	0.411 (0.133)	0.230 (0.163)	0.311 (0.081)
Muskellunge	- -	- -	- -	- -	- -	- -
Rock bass	- -	- -	- -	- -	1.967 (1.403)	0.571 (0.407)
Sunfish spp.	0.516 (0.326)	0.450 (0.260)	- -	- -	- -	0.198 (0.086)
Largemouth Bass	- -	0.156 (0.233)	- -	0.035 (0.078)	- -	0.048 (0.061)
Black Crappie	- -	0.916 (0.553)	- -	- -	- -	1.935 (0.829)
Yellow Perch	- -	- -	0.308 (0.555)	0.603 (0.320)	2.042 (0.270)	0.923 (0.188)
Walleye	0.381 (0.106)	0.249 (0.062)	0.214 (0.066)	0.322 (0.068)	0.226 (0.087)	0.264 (0.034)

Table A7. Monthly estimates of catch and harvest rates of targeting anglers in the main lake basin of Leech Lake, May 10th – September 30th 2014.

Species	May	June	July	August	September	Season
<i>Catch per Angler Hour</i>						
Northern Pike	0.276 (0.073)	1.033 (0.122)	1.236 (0.100)	1.094 (0.300)	1.134 (0.790)	1.005 (0.203)
Muskellunge	- -	- -	0.021 (0.014)	0.171 (0.042)	0.168 (0.111)	0.074 (0.017)
Rock bass	- -	- -	3.273 -	- -	- -	- -
Sunfish spp.	- -	9.231 -	- -	0.300 -	- -	2.892 -
Largemouth Bass	0.440 (0.533)	0.838 -	1.487 (0.423)	0.600 -	0.194 (0.120)	0.771 (0.137)
Black Crappie	4.698 (0.482)	0.035 (0.024)	- -	1.519 (0.082)	2.751 (0.248)	1.832 (0.104)
Yellow Perch	0.815 (0.238)	1.558 -	3.222 (1.041)	0.135 -	12.539 (2.575)	5.121 (0.848)
Walleye	0.763 (0.093)	0.603 (0.069)	0.139 (0.026)	0.397 (0.095)	0.609 (0.117)	0.464 (0.037)
<i>Harvest per Angler Hour</i>						
Northern Pike	0.130 (0.164)	0.135 (0.138)	0.183 (0.100)	0.399 (0.154)	0.390 (0.302)	0.268 (0.088)
Muskellunge	- -	- -	- -	- -	- -	- -
Rock bass	- -	- -	1.818 (1.348)	- -	- -	- -
Sunfish spp.	- -	6.154 (2.481)	- -	0.300 (0.548)	- -	1.828 (0.684)
Largemouth Bass	- -	0.114 (0.163)	- -	- -	- -	0.016 (0.023)
Black Crappie	2.038 (1.116)	0.035 (0.090)	- -	1.519 (0.503)	2.057 (0.551)	1.221 (0.257)
Yellow Perch	0.453 (0.101)	0.543 (0.285)	2.333 (0.683)	0.135 (0.367)	3.800 (0.302)	1.924 (0.194)
Walleye	0.344 (0.035)	0.318 (0.042)	0.054 (0.027)	0.280 (0.079)	0.362 (0.074)	0.259 (0.026)



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



Creel Survey Summary for Leech Lake, Minnesota

Fish Management Area: Walker

Year Surveyed: May 10th – September 30th 2014

Angling Pressure

Angler-hours	696,536
Angler-hours/acre	6.24
Anglers/boat	2.32
Mean Trip Length (h)	4.24

Catch (number)

Harvest (number)

Harvest (pounds)

Species	Catch (number)		Harvest (number)		Harvest (pounds)	
	Total N	N/acre		N/acre	Total lbs.	lbs./acre
Bowfin	21	0.00	-	-	-	-
Bullhead spp.	-	-	-	-	-	-
Northern Pike	75,248	0.67	16,545	0.15	44,884	0.40
Muskellunge	2,720	0.02	-	-	-	-
Burbot	-	-	-	-	-	-
Rock bass	10,427	0.09	2,817	0.03	2,520	0.02
Sunfish spp.	7,056	0.06	3,810	0.03	2,513	0.02
Smallmouth Bass	1,132	0.01	149	0.00	-	-
Largemouth bass	14,592	0.13	527	0.00	1,135	0.01
Black Crappie	20,069	0.18	14,562	0.13	13,133	0.12
Yellow Perch	406,046	3.64	112,230	1.01	51,325	0.46
Walleye	138,728	1.24	68,894	0.62	95,981	0.86
Cisco/Whitefish	-	-	-	-	-	-
All species	676,038	6.06	219,535	1.97	211,491	1.90

Catch Rate (fish/hour)

Harvest Rate (fish/hour)

Species	Catch Rate (fish/hour)		Harvest Rate (fish/hour)	
	Angler Type		Angler Type	
	All	Targeting	All	Targeting
Bowfin	<0.001	-	-	-
Bullhead spp.	-	-	-	-
Northern Pike	0.106	0.357	0.023	0.124
Muskellunge	0.004	0.039	-	-
Burbot	-	-	-	-
Rock Bass	0.015	0.492	0.004	0.492
Sunfish spp.	0.010	0.612	0.005	0.321
Smallmouth Bass	0.002	-	<0.001	-
Largemouth Bass	0.021	0.457	<0.001	0.009
Black Crappie	0.028	0.752	0.021	0.481
Yellow Perch	0.572	3.033	0.158	0.990
Walleye	0.195	0.282	0.097	0.135
Cisco/Whitefish	-	-	-	-

Creel Survey Summary for Leech Lake, Minnesota

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

Species	0.0-4.9	5.0-8.9	9.0-12.9	13.0-16.9	17.0-20.9	21.0-24.9	25.0-29.9	≥30.0
Bowfin	-	-	-	-	-	-	-	-
Bullhead spp.	-	-	-	-	-	-	-	-
Northern Pike	-	-	-	237	5,218	6,998	3,439	652
Muskellunge	-	-	-	-	-	-	-	-
Burbot	-	-	-	-	-	-	-	-
Rock Bass	-	674	1,898	245	-	-	-	-
Sunfish spp.	-	2,074	1,736	-	-	-	-	-
Smallmouth Bas	-	-	-	-	149	-	-	-
Largemouth Bas	-	61	553	123	246	-	-	-
Black Crappie	-	990	11,169	2,333	71	-	-	-
Yellow Perch	133	18,284	93,481	332	-	-	-	-
Walleye	-	33	1,996	35,528	30,472	-	832	33
Cisco/Whitefish	-	-	-	-	-	-	-	-

Comments:

Citation: Stevens, T.C., M. C. Ward and D.W. Schultz. 2014. Summer creel survey for Leech Lake, 2014. Minnesota Department of Natural Resources, Section of Fisheries, Study 4, Job 934.

APPENDIX 2. METHOD FOR CORRECTION OF CATCH AND HARVEST RATES OF TARGETING ANGLERS IN CAS.

Using standard analyses in CAS, targeting catch/harvest rates may be summed across work period, day type, zone, and type of fishing instead of averaging. In order to avoid targeting rates being summed across strata, which inflates targeting catch rates relative to other creel surveys completed by MN DNR, the data need to be pooled into a singular stratum.

1. Create two copy databases to be used solely for calculating targeting rates (one for seasonal; one for work period strata).
2. Open the CAS database in Microsoft Access.
3. Using the Access database with the interview table change these fields
 - a. Day Type Code- all interviews should be DayType = 1
 - b. Work Period- if calculating catch rates for entire season all interviews should be Work Period = 1; if calculating catch rates for each work period make no change.
 - c. Zone- all interviews should be Zone = 1
 - d. Type of Fish- all interviews should be 1 if calculating rates across all angler types, otherwise make no change.
4. Within CAS, make the following changes using the code editor only if calculating catch/harvest rates for entire season:
 - a. Station-Work Period- change work period to Work Period = 1, set dates to encompass entire creel season. Delete all other work periods.
 - b. Analysis Specific Codes- Work Shift Probability- Delete all work shift codes for all work periods except work period 1.
 - c. Analysis Specific Codes- Work Period Days and Hours- Change number of days for rows 1-3 so that they encompass the number of weekend/holiday days, week days, and all days during the creel season. Delete all other rows.