

Current Status of the Leech Lake Fishery and Related Studies
Minnesota Department of Natural Resources
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Report Preparation Cost

Pursuant to Minnesota Statutes, Section 3.197, the incremental costs of preparing this report were less than \$500, involving about two days of staff time to compile the information in this format. All of the information and analyses included in this report had previously been prepared for other management and public involvement purposes.

Authority

Minnesota Session Laws 2007, Chapter 131, Article 1, Section 90 requires by January 15, 2008, the commissioner of natural resources must report to the chairs of the house of representatives and senate committees having jurisdiction over environment and natural resource policy on the status of the Leech Lake fishery. This report fulfills that requirement.

Background

Downturns in the Leech Lake walleye fishery in the early 2000's prompted the development and implementation of an aggressive 5-year action plan to improve walleye fishing. This plan was developed in consultation with the local business community and local anglers. The goals of this plan were to protect and maintain the existing spawning stock, to increase overall walleye abundance, to improve the population size structure, and to establish two good walleye year classes from 2005-2010. Strategies adopted to achieve these goals included implementation of a protected slot limit to reduce harvest of walleye brood stock (sexually mature fish), double-crested cormorant control, evaluation of potential effects of rusty crayfish predation on walleye eggs, and experimental stockings of marked walleye fry to quantify walleye reproduction in Leech Lake and make comparisons with other natural walleye lakes.

Status of the Fishery

Based on the 2007 fish population assessment, all management goals delineated in the five-year management plan for Leech Lake have been met or exceeded.

Biomass of mature female walleyes was 2.13 pounds/acre, well above the goal of 1.25-1.75 pounds/acre (Figure 1). The gillnet catch rate of 13.1 walleyes/net was the second highest on record and nearly double the 1983-2007 average of 7.5 fish/net (Figure 2). Both the 2005 and 2006 year classes of walleye are large in number and have exhibited fast growth thus far. Observed median lengths of these two year classes were approximately 15 and 12 inches total length (TL), respectively, and walleyes from 6 to 26 inches TL in length were present in the gillnet sample (Figure 3). This is similar to the length-frequency distributions of walleye populations in other large natural walleye lakes. The age-frequency distribution of the Leech Lake walleye population has also improved. The number of age-8 and older fish caught in gillnets has increased from 1 fish in 2001 to 54 fish in 2007, indicating that the 18-26" protected slot is having a positive effect on the population.

The 2005 and 2006 year classes of walleye are very strong and are already contributing to the sport fishery. Trawling catch rates for 2007 (32 young-of-year (YOY) walleye/hour) initially suggested that the 2007 year class might not be large in number (Figure 4). However, this year class has been growing fast and a substantial number of YOY (53 fish) were caught in fall gillnets. Therefore, high survival of these fish could result in a year class of average strength. The catch rate of YOY walleyes in fall electrofishing samples was 27 fish/hour. Respectively, YOY walleye catch rates of the 2005 and 2006 year classes were 60 and 35 fish/hour. The proportion of marked (stocked) YOY walleyes in a pooled sample of 378 fish collected using all gears was 22.8%. The estimated walleye hatch rate for Leech Lake in 2007 was 0.54%; this is the highest since stockings began in 2005. Leech Lake has exhibited walleye hatch rates very similar to those observed in Red Lake, a lake characterized by excellent natural walleye production and with no known exotic species (Table 1).

The catch rate of yellow perch in gillnets was 36.8 fish/lift and is well above the 1983-2007 average of 21.7 fish/net (Figure 2). This is due to the large number of yellow perch produced in recent years that are now recruiting to the nets. Yellow perch from 5 to 11 inches TL were caught in gillnets; approximately 6% of yellow perch were 10 inches or longer and this proportion is anticipated to increase in coming years as younger perch continue to grow and reach harvestable sizes (Figure 5). Catch rates of YOY yellow perch in trawl hauls was relatively high (Figure 4), indicating that adequate forage should be available for maintaining walleye growth into early 2008.

Table 1. Walleye stocking and natural reproduction summaries for Red Lake, 1999-2003 and Leech Lake, 2005-2007. Spawner stock biomass (SSB) is the estimated amount of mature females in the lake from fall gillnet surveys that will be available for reproduction the following spring.

Lake	Year	SSB (lbs/A)	Eggs**	Hatch Rate (%)	Fry per littoral acre*		
					Wild	Stocked	Total
Red	1999	0.17	1,131,450,000	0.60	86	521	607
	2001	1.31	8,823,425,000	0.16	174	400	574
	2003	0.76	5,121,400,000	0.02	11	414	425
	Mean			0.26	90	445	535
Leech	2005	1.91	5,352,600,000	0.22	203	130	334
	2006	1.04	2,896,975,000	0.12	61	380	440
	2007	1.67	4,678,933,604	0.54	432	129	561
	Mean			0.29	232	213	445

*57,994 littoral acres

**Estimated as 25,000 eggs per pound of mature female

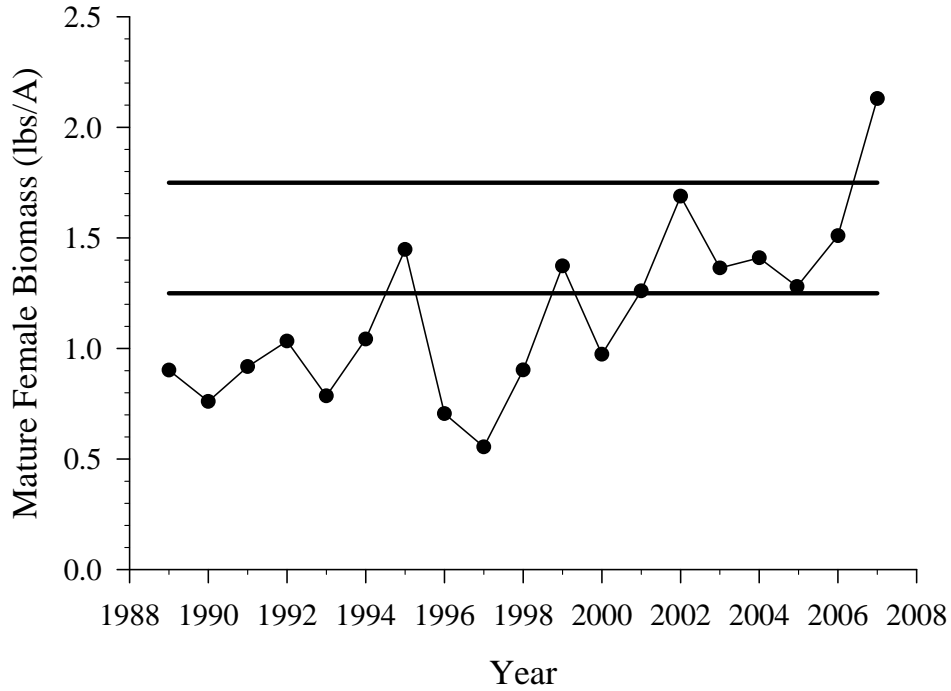


Figure 1. Biomass (lbs./A) of mature females in Leech Lake, 1989-2007 estimated from fall gillnet sets. Horizontal lines depict the 2005-2010 management goal window of 1.25-1.75 lbs./A.

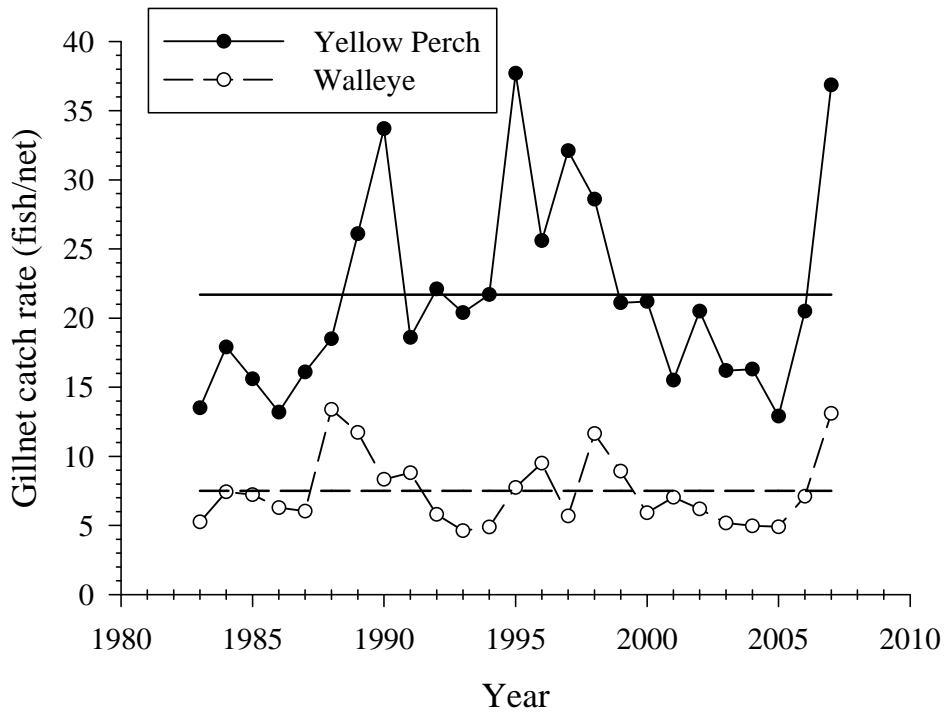


Figure 2. Gillnet catch rates (fish/net) of walleyes and yellow perch in Leech Lake, 1983-2007. Horizontal lines represent the respective means for each species.

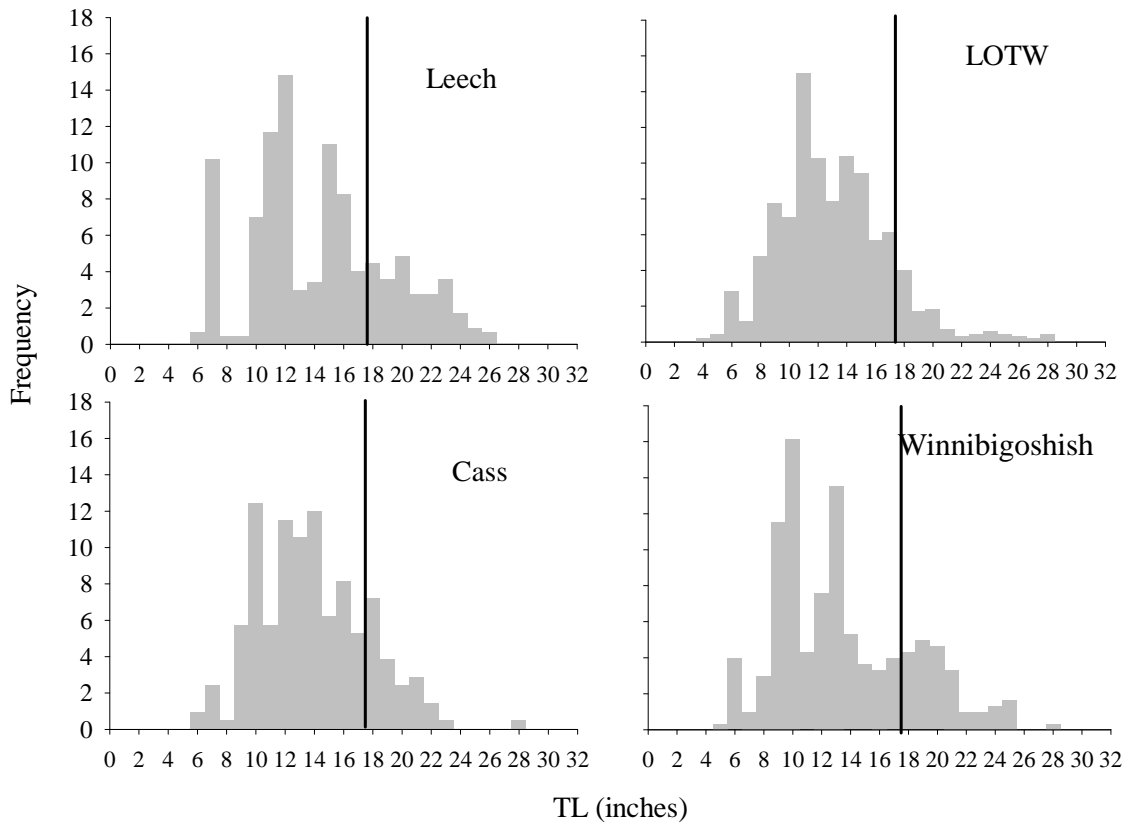


Figure 3. Frequency (percent of total catch) distribution in one-inch length groups (total length; TL) of walleyes captured in gillnets in Leech, Lake of the Woods, Cass, and Winnibigoshish lakes, 2007. Vertical black lines denote the 18-inch length group.

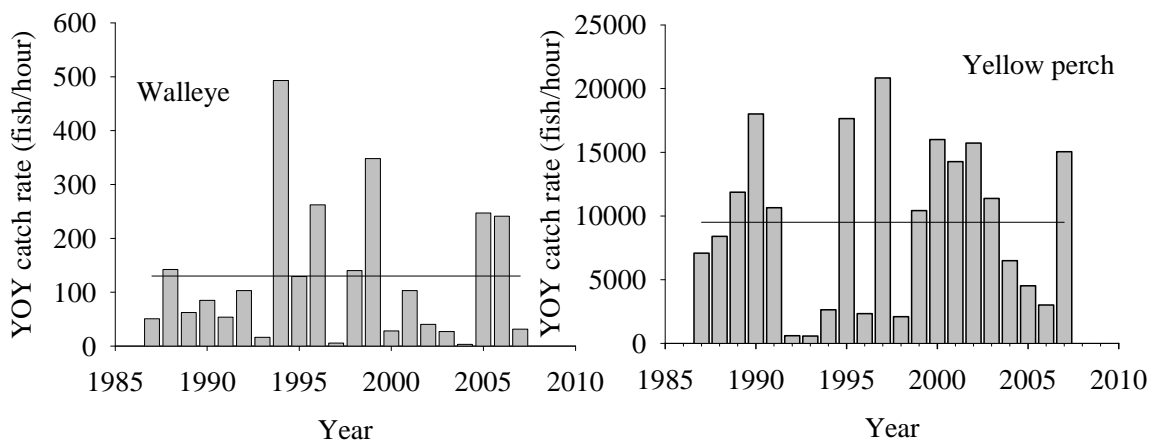


Figure 4. Trawl catch rates (fish/hour) of young-of-year (YOY) walleye and yellow perch in Leech Lake, 1987-2007 and their respective means (lines).

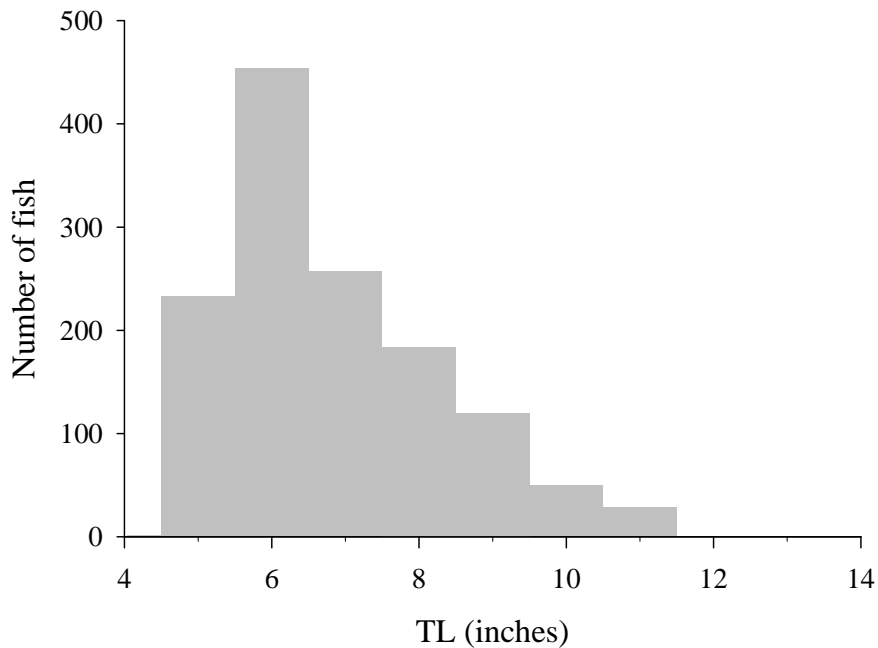


Figure 5. Frequency (number of fish) distribution in one-inch length groups of yellow perch sampled with experimental gillnets in Leech Lake, 2007.

Double-Crested Cormorant Control and Diet Study

Under the direction of the Leech Lake Band of Ojibwe, in cooperation with the U.S. Department of Agriculture Wildlife Services and the Minnesota Department of Natural Resources, double-crested cormorant control efforts on Leech Lake were initiated in 2005. Approximately 9,000 birds have been removed from Leech Lake (2,993 birds in 2005; 3,303 birds in 2006; and, 2,784 birds in 2007) since control efforts were initiated in 2005. Population control efforts have reduced the number of nesting pairs to near the preliminary management goal of 500 nesting pairs (563 nests in 2007). This represents nearly a 75% reduction in the population of nesting cormorants on Leech Lake. Fewer migrating cormorants were observed on Leech Lake during the spring and fall of 2007. Lethal control efforts will continue in 2008 in an effort to maintain the population goal of 500 nesting pairs.

Adult birds were collected during 2004-2007 and regurgitated samples from juvenile birds were collected during 2005-2007 for diet analysis. Double-crested cormorants are advantageous predators, meaning they feed primarily on the most abundant, easiest to catch food item. Approximately 90% of cormorant diets on Leech Lake during 2005-2006 have been comprised of either yellow perch, shiners, or trout-perch (a smaller, minnow-type species), with yellow perch being the predominant food item. Preliminary analysis of 2007 diets indicate similar results. While walleye generally comprised less than 1% of cormorant diets by number (slightly higher by weight) the true foraging impacts on the fishery, and in turn the number of birds Leech Lake can support without impacting angling quality, needs to be evaluated with the aid of fish consumption modeling. Such models are

being developed by the University of Minnesota and should be available for use by August 2008. Results of this work will be used to manage the Leech Lake double-crested cormorant population in the future.

Rusty Crayfish Research

Laboratory and field trials evaluating the potential effects of rusty crayfish predation on walleye eggs in Leech Lake were completed during spring 2007 in the first year of a two-year study being conducted by researchers at Bemidji State University. Preliminary findings suggest rusty crayfish and native crayfish consumed walleye eggs at similar rates in both field and laboratory trials. Walleye egg hatch rates on Leech Lake are comparable to that observed on Red Lake suggesting that crayfish predation on walleye eggs is not impacting the walleye population on Leech Lake. Laboratory and field experiments will be repeated during spring 2008 and a final report will be available June 30, 2008.

Stocking

Walleye fry marked with oxytetracycline, an antibiotic that leaves a fluorescent mark on bony structures that allows biologists to identify their origin (stocked or wild) were stocked into Leech Lake at rates of 7.5, 22.0, and 7.5 million fry in 2005, 2006, and 2007, respectively. Age-0 walleyes were collected throughout the summer and early fall of each year. The proportions of age-0 walleyes having stocking origins were 39% in 2005, 86% in 2006, and 23% in 2007. The estimated mean hatch rate for wild eggs from 2005-2007 on Leech Lake was 0.29%. Estimated hatch rates from Red Lake using similar methods was 0.26% from 1999 – 2003. Based on comparisons with Red Lake which is considered an excellent naturally reproducing walleye lake, evidence suggests there is not a reproductive problem with the Leech Lake walleye population and further supports Leech Lake is capable as functioning as a self-sustaining fishery.

As per previous agreement the DNR will stock 20 million marked walleye fry in spring 2008. Barring a major change in the status of the fishery, no stocking will occur in 2009.

Summary

Walleye and yellow perch populations in Leech Lake have rebounded dramatically in recent years and an upturn in sport angling success has followed. All fish population goals established in the 2005-2010 Leech Lake Action Plan have been met or exceeded. Cormorant population control measures have been successful in reducing predation on walleye and their primary forage species, yellow perch. While walleye stocking has contributed to the increase in walleye abundance it is unclear to what degree stocked fish may have replaced wild fry in the lake. Estimated hatch rates of wild walleye eggs are similar to other natural reproducing walleye fisheries in Minnesota. This is a significant finding as it lends credence to managing Leech Lake as a healthy natural sustaining walleye fishery.

Many of the investigations initiated on Leech Lake (e.g. marked fry evaluation, experimental regulation evaluation, cormorant diet study, rusty crayfish research) in recent years will be drawing to conclusion in 2008. The DNR intends to assimilate all of this information and initiate a process to develop an updated management plan for Leech Lake

in early 2009. This will be an interactive process that involves all of the interested constituent groups from the local community and the broader angling public.

Maintaining a vibrant and healthy Leech Lake fishery is a very high priority for the DNR. Additional staff time has been redirected to Leech Lake to help provide additional monitoring and evaluation of the fishery. In addition to completing the studies described in this report DNR Fisheries staff will conduct an open water creel survey. This survey will document fishing pressure, harvest and catch rates of walleye and other important sport fish.