

*Ontario Ministry of Natural Resources  
Kawartha Lakes Fisheries Assessment Unit  
Update 2004-2*

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**Rice Lake 2003 Fall Walleye Index Netting Survey**

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**Background**

The Kawartha Lakes Fisheries Assessment Unit (KLFAU) periodically conducts fisheries surveys on Rice Lake. These surveys are part of the Ministry of Natural Resources (MNR) science plan for long term monitoring of selected type lakes. Rice Lake has been part of this long term plan and standard surveys have been conducted intermittently over the past 25 years. Such long term monitoring of selected lakes is a necessary approach to develop an understanding of the dynamics in aquatic systems, which ultimately supports better resource management.

MNR has recently developed a provincial standard Fall Walleye Index Netting (FWIN) survey for assessing walleye populations. This survey relies on a strict protocol to ensure that results are comparable across years or between lakes. The purpose of these surveys is to provide an assessment of the walleye population by measuring the relative abundance and key biological characteristics of the population. FWIN was first conducted on Rice Lake in 1999. The 2003 survey was conducted as part of the KLFAU rotating assessment program.

**Methods**

Rice Lake is a 10,015 ha lake in the Kawartha Lakes system. Rice Lake is considered eutrophic because of high levels of phosphorous (0.029 mg/l) and TDS (182 mg/l). The mean depth is 2.6 m, maximum depth is 7.9 m, and the early summer secchi disk depth is 2.5 m.

Details of the FWIN protocol are described by Morgan (1998). The FWIN sample gear is a multi-mesh gill net with 11.9 m (25 ft) of each mesh size (25, 38, 51, 64, 76, 102, 127, and 156 mm). Each net was set for approximately 24 hr. A sample site was a grid of 0.25 minutes of

latitude and longitude. These sites were selected randomly from the portion of the lake that was 2- 15 m deep. The FWIN sample protocol specifies that a survey on a lake >10,000 ha uses 36 sets, however, only 18 sets were made in the 2003 survey to limit the number of fish killed.

The FWIN survey began on October 14 and ended on October 24. Surface water temperatures were within the range of 13 to 8. Catches were enumerated by species for each mesh size. Detailed biological data were collected from the fish including size (total length), sex, maturity, age structures, and mature ovaries to determine fecundity. Otoliths were used for age interpretations.

Catch-per-unit-effort (CUE) was calculated as the geometric mean of the number of fish (log catch+1 transformation) per net lift. Statistical error (RSE) was expressed as the standard error relative to the mean CUE. The target precision was 20% RSE for the survey.

**Results**

Sixteen species were captured in the FWIN survey (Table 1). Yellow perch dominated the catch, accounting for 72% of the total catch. A total of 224 walleye were caught at a rate of 9.91 per net lift. The target precision was attained for both walleye and yellow perch.

The walleye per net ranged from a low of 1 fish per net to a high of 34 fish per net. Walleye catches were highest in the general area where the Otonabee River enters Rice Lake, east of Cow Island (78°15' W) and west of Curtis Point (78°09' W). Walleye catches were moderate at sites west of this area and low at sites to the east. Walleye abundance was not significantly related to depth or temperature.

Table 1. Species catch (number and percent) and catch rate (geometric mean catch/net and relative standard error, RSE) in Rice Lake 2003 FWIN survey.

Species	Catch		CUE (N/net)	RSE (%)
	(N)	(%)		
Walleye	224	11.3	9.91	6.9
Yellow Perch	1430	72.0	65.50	3.7
Muskellunge	4	0.2	0.15	55.9
W. Sucker	15	0.8	0.55	30.2
Carp	8	0.4	0.32	35.6
Golden Shiner	2	0.1	0.08	68.6
Spottail Shiner	127	6.4	3.90	16.1
Br. Bullhead	40	2.0	0.50	55.6
Troutperch	14	0.7	0.45	36.3
Rock Bass	1	<0.1	0.04	100.0
Pumpkinseed	26	1.3	0.75	32.1
Bluegill	37	1.9	0.97	31.1
S.mouth Bass	16	0.8	0.49	37.9
L.mouth Bass	10	0.5	0.41	29.2
Bl. Crappie	30	1.5	1.07	23.1
Logperch	3	0.2	0.10	70.5

The size distribution of walleye ranged from 17 cm to 65 cm (Fig.1). A greater number of males were caught than females. The age composition of walleye included fish from age-0 to age-14 (Table 2). Most of the walleye caught were age-2 fish (30%) from the 2001 year class and age-6 fish from the 1997 year class. Females were larger than males for age-5 and older fish.

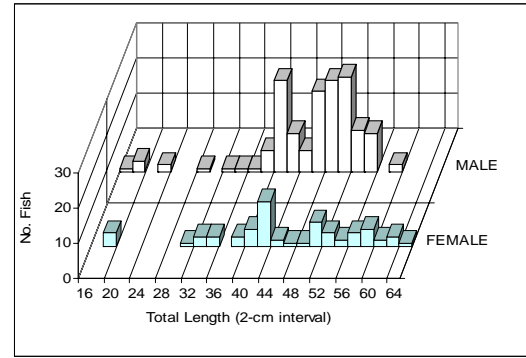


Figure 1. Size distribution of male and female walleye in the Rice Lake 2003 FWIN survey.

All males >38 cm were mature. Ninety-eight percent of the males were mature at age-2 and would spawn as 3-yr old fish (Table 2). Females >47 cm were mature except for one immature female at 50 cm. All of the age-5 females were mature and would spawn as 6-yr old fish.

Most of the walleye stomachs contained food (N=149). Fish were present as prey in all but one stomach. Most of the prey fish (N=275) could be identified as yellow perch (73%), centrarchids (24%), cyprinids (2%), and ictalurids (1%). Walleye <35 cm tended to eat leptomids and cyprinids while larger walleye ate yellow perch.

Table 2. Walleye age composition (sample number, percent) of sexes combined, for male and female; number, mean total length (mm), mean weight (g), and percent maturing (percent) for Rice Lake 2003 FWIN survey.

Age	Male							Female			
	Number (N)	Comp (%)	No. (N)	TLEN (mm)	RWT (g)	Mature (%)	No. (N)	TLEN (mm)	RWT (g)	Mature (%)	
0	10	4.5	6	200	74	0	4	191	61	0	
1	10	4.5	3	320	289	0	7	335	362	0	
2	68	30.4	45	414	713	98	23	422	735	0	
3	0	0.0	0	--	--	--	0	--	--	--	
4	4	1.8	3	457	946	100	1	500	1171	0	
5	12	5.4	8	473	1084	100	4	516	1492	100	
6	58	25.9	43	490	1176	100	15	551	1719	100	
7	10	4.5	6	503	1340	100	4	553	1801	100	
8	26	11.6	23	505	1306	100	3	610	2438	100	
9	4	1.8	4	535	1550	100	0	--	--	--	
10	14	6.3	11	531	1535	100	3	626	2568	100	
11	1	0.4	1	523	1496	100	0	--	--	--	
12	4	1.8	4	504	1278	100	0	--	--	--	
13	2	0.9	2	529	1477	100	0	--	--	--	
14	1	0.4	1	520	1633	100	0	--	--	--	
All	224		160				64				

## Discussion

The walleye catch rate in 2003 (9.9) was significantly lower than in 1999 (26.6). The difference was largely due to the low numbers of small walleye (<35 cm). Large walleye (>45 cm) were not lower than in 1999 (Fig. 2). The catch rate of walleye in Rice Lake was still higher than most other lakes that have been surveyed using FWIN in southern Ontario. Morgan et. al. (2003) reported a mean catch rate of 2.8 walleye per net for southern Ontario lakes.

The age distribution in the 2003 catch indicated only the 2001 year class was present in any appreciable number since 1997. The relative abundance of year classes in recent FWIN and trap net surveys indicates a pattern of alternating year classes in the 1990s (Fig. 3). Although the survey design was considerably different among these surveys, the year class proportion was similar. The 2001 year class CUE was only 30% of the value for the 1997 year class. Along with the decline in abundance, size at age has increased significantly for age-2 walleye and for males age-4 and older (Fig. 4).

The catch rate of yellow perch on Rice Lake increased from 49.6 in 1999 to 65.5 in 2003. Yellow perch CUE was higher on Rice Lake than on any other Kawartha lake surveyed. Small yellow perch (<14 cm) were more than 10 times higher than the average catch rate on the other lakes. Large yellow perch (>20 cm) however were lower than the median catch rate.

The Rice Lake fish community has changed in recent years. Black crappie have increased significantly since their invasion of Rice Lake in the mid 1990s which may have a negative affect on walleye. Catch rates of other species in 2003 FWIN survey were similar to 1999 except for an increase in the number of shiners in 2003.

### References:

Morgan, G. E. 1998. Manual of Instructions: Fall Walleye Index Netting Surveys. Ontario Ministry of Natural Resources.

Morgan, G.E., M.D. Malette, R.S. Kushneriuk, S.E. Mann, 2003. Regional summaries of walleye life history characteristics based on Fall Walleye Index Netting (FWIN) program , 1993 to 2001. Diagnostics and Sampling Standards Working Group, Percid Community Synthesis.

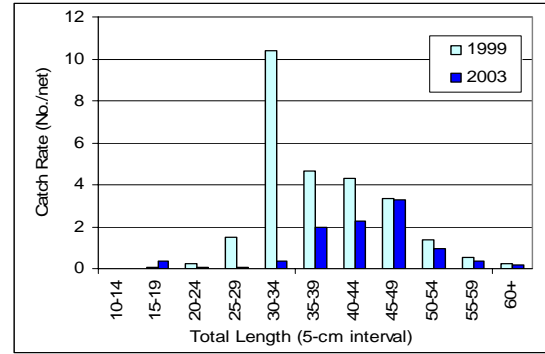


Figure 2. Walleye catch rate by 5-cm size interval for Rice Lake FWIN surveys in 1999 and 2003.

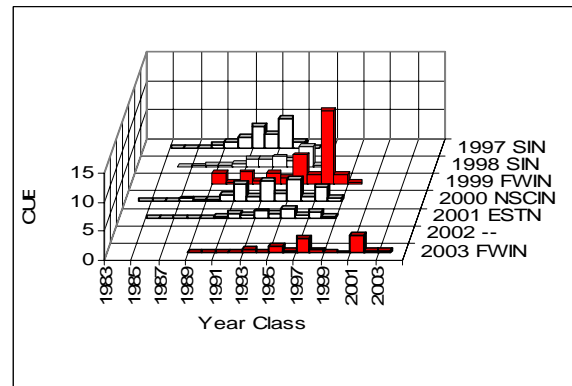


Figure 3. Walleye catch rate by year class for recent Rice Lake surveys. (SIN=spring index netting -TN, FWIN= fall walleye index netting, NSCIN= nearshore community index netting-TN, ESTN= end-of-spring trap netting).

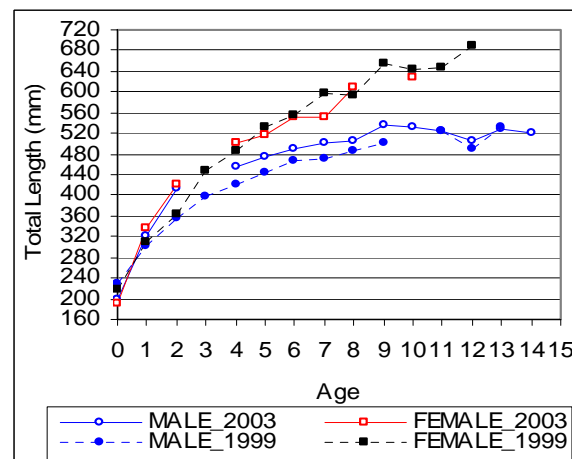


Figure 4. Length at age for walleye sampled in 1999 and 2003 Rice Lake FWIN survey