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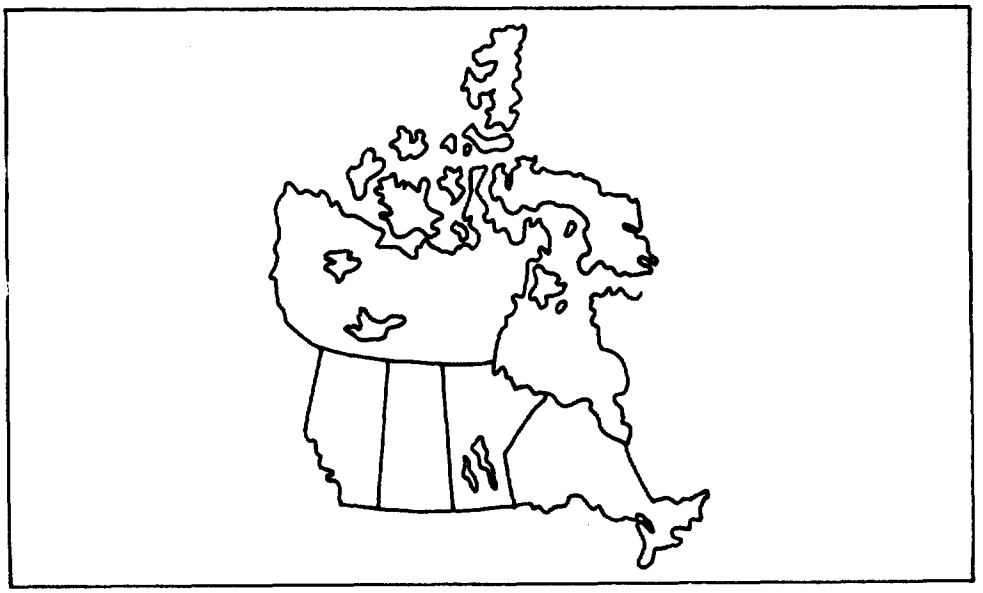
Data on the Biology of Lake Whitefish and Lake Trout from Kaminuriak Lake, District of Keewatin, NWT

By
W.A. Bond

Data Report Series No. CEN/D-75-4

Resource Management Branch
Central Region



DEPARTMENT OF THE ENVIRONMENT
FISHERIES AND MARINE SERVICE

FISHERIES OPERATIONS DIRECTORATE
CENTRAL REGION

DATA REPORT SERIES No. CEN/D-75-4

DATA ON THE BIOLOGY OF LAKE WHITEFISH AND LAKE TROUT FROM KAMINURIAK LAKE, DISTRICT OF KEEWATIN, NWT

BY

W. A. BOND

FISHERY MANAGEMENT DIVISION
RESOURCE MANAGEMENT BRANCH
WINNIPEG, MANITOBA

1975

ACKNOWLEDGEMENTS

Biological sampling was carried out in 1972 by Mr. P. Meikle and in 1973 by Fishery Officer E. Ralf. Age determinations from whitefish scales were performed by Mr. G. Carder and Mrs. C. Read. Lake trout otoliths were aged by Mrs. J. Favell. Mrs. C. Read also assisted in compiling the data and was responsible for drawing most of the figures in the text.

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INTRODUCTION

Commercial fishing has developed as an industry in the District of Keewatin only within the last decade. To date, the great distances involved and the high cost of transportation have limited exploitation to coastal waters [for anadromous Arctic char, *Salvelinus alpinus* (Linnaeus)] and a few of the larger inland lakes.

Although these inland lakes are known to possess large stocks of whitefish, *Coregonus clupeaformis* (Mitchill) and lake trout, *Salvelinus namaycush* (Walbaum), little is known of the biology of specific populations and the question of how they will respond to commercial exploitation remains unanswered.

Because of the uncertainties involved, the policy of Fisheries and Marine Service regarding the opening of new lakes to commercial fishing, is one of moderation. As a general rule it is expected that fish stocks will be assessed prior to the commencement of exploitation and that the catch will be monitored regularly after a fishery has been established.

On the basis of a joint survey done in 1967, by the Department of Fisheries and the Department of Indian Affairs and Northern Development, it was decided that Kaminuriak Lake was capable of supporting a commercial fishery for whitefish and lake trout and a combined quota of 131,000 pounds (59,545 kg) of trout and whitefish was assigned to the lake. Such a fishery was then established and operated for the first time during the summer of 1972.

In order to obtain baseline information on the biology of the whitefish and lake trout populations in the initial stages of commercial exploitation, the Kaminuriak Lake commercial landings were sampled during August, 1972 and again in August, 1973. The data collected are summarized in this report.

DESCRIPTION OF THE STUDY AREA AND THE FISHERY

Kaminuriak Lake (62°55'N; 95°40'W) is situated in the barren lands 115 miles (184 km) west of Rankin Inlet in the District of Keewatin, NWT (Fig. 1). With a surface area of 212 mi^2 (550 km^2), it is the largest lake in the Ferguson River system. The lake is more than 50 miles (80 km) long and is continuous with Parker and Victory Lakes at its north and south ends respectively (Fig. 2). The shoreline is extremely irregular with long, narrow bays extending from the main body of the lake. The Ferguson River enters on the west side of Kaminuriak Lake and the lake drains south-eastward through Victory Lake and the Ferguson River into Hudson Bay (Fig. 2).

The dominant fish species in the lake are the lake whitefish and lake trout. Other species which have been reported include: ciscoes, *Coregonus sp.*; longnose suckers, *Catostomus catostomus* (Forster); grayling, *Thymallus arcticus* (Pallas); Arctic char, *Salvelinus alpinus* (Linnaeus) and burbot, *Lota lota* (Linnaeus).

In 1972, the commercial fishery was conducted by 8 fishermen while 10 men took part in 1973. The fishermen worked in pairs from 22 foot canoes powered by outboard motors. Each canoe was equipped with 10 gill nets, each 100 yards long. All nets were 5½" (13.9 cm) stretched measure, 22 meshes deep, and constructed of 210/6 nylon twine.

In 1972, fishing began on July 31 and for the first two weeks the fishermen directed their activities to the mouth of the Ferguson River in the vicinity of the fish plant (Fig. 2). Nets were set on the bottom in water less than 10 feet (3 m) deep. From mid-August on, the effort was extended further from the plant into the main lake. Here too, the fishermen continued to fish the shallow water along the shore. The nets were lifted every 24 hours and the fish returned to the plant for dressing. They were then packed in ice and transported by air to the cannery in Rankin Inlet. The same general pattern was seen in 1973 (E. Ralf Pers. comm.). Fishing ceased on September 19 in 1972 and on September 20 in 1973.

The 1972 fishery produced 33,566 pounds (15,257 kg) of whitefish and 31,837 pounds (14,471 kg) of lake trout (round weight). In 1973, the total commercial production from the lake was 23,793 pounds (10,815 kg) of whitefish and 35,235 pounds (16,016 kg) of lake trout.

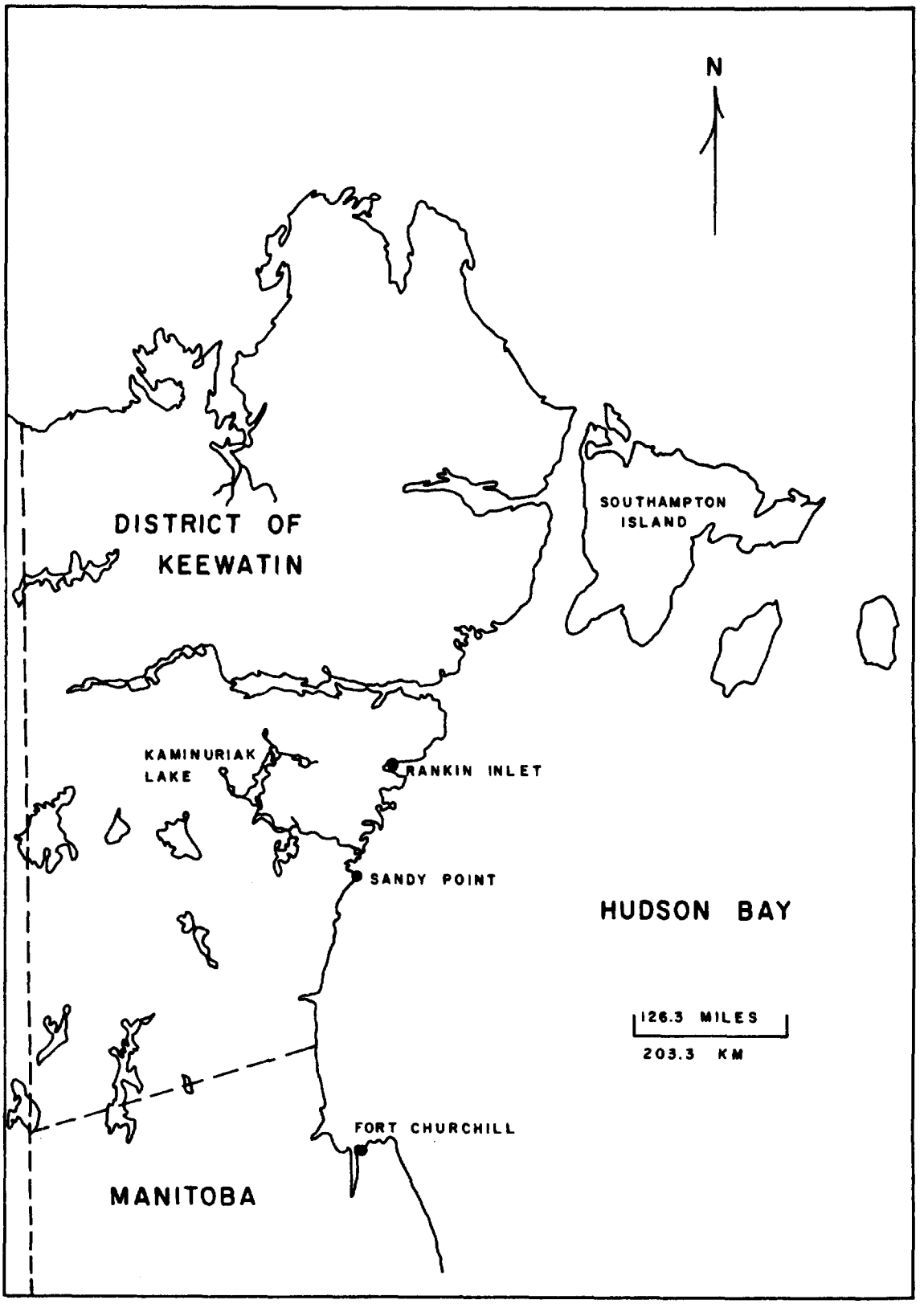

Fig. 1. Map of the District of Keewatin showing location of Kaminuriak Lake.

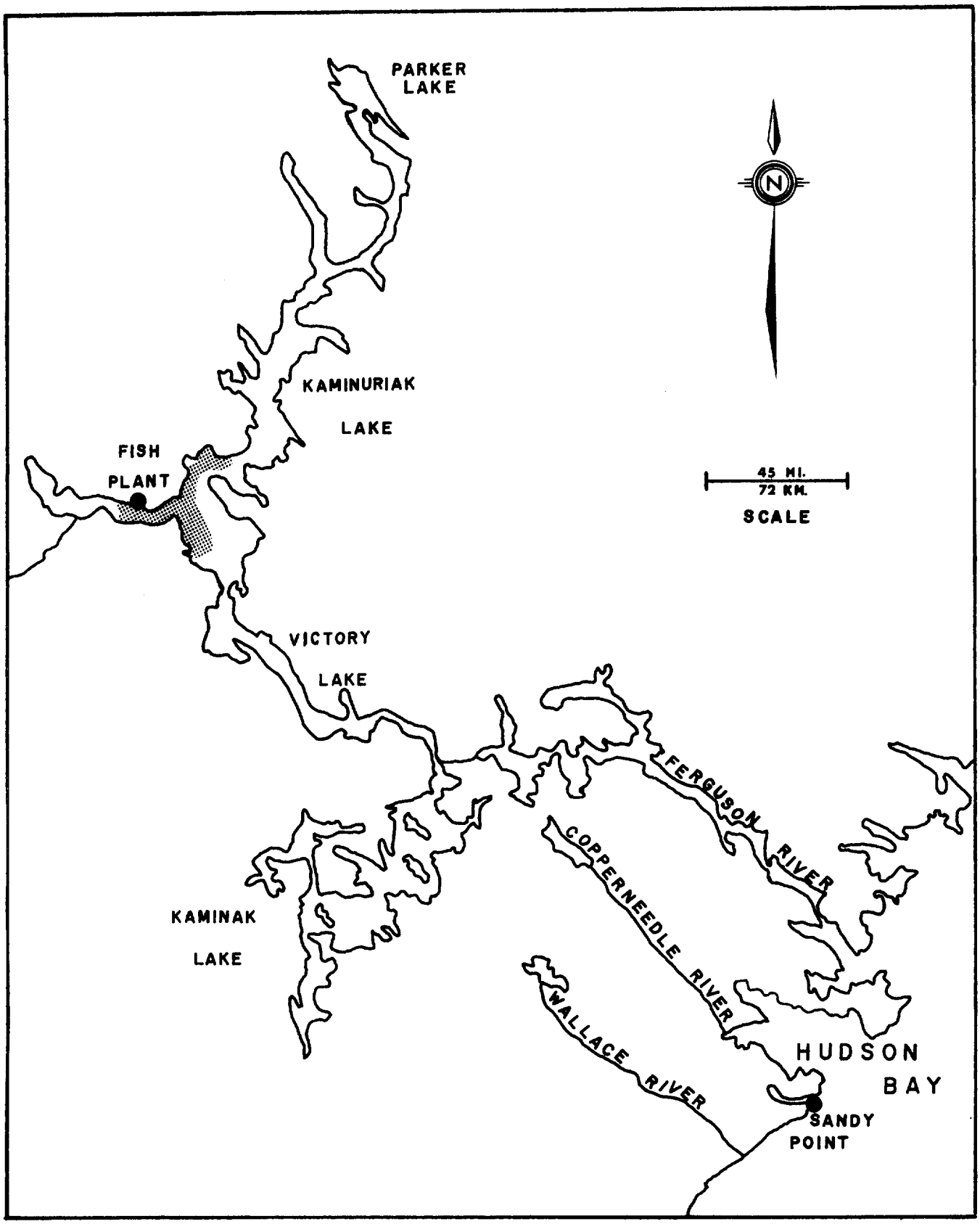

Fig. 2. Map of Kaminuriak Lake showing location of fish plant and area most commonly exploited by the fishery in 1972-73.

The estimated catch per unit of effort during 1972 was 22 pounds (10.0 kg) of whitefish and 21 pounds (9.5 kg) of lake trout per net per 24 hours. In 1973 the catch per unit of effort was 21 pounds (9.5 kg) of whitefish and 33 pounds (15.0 kg) of trout per net per 24 hours.

MATERIALS AND METHODS

Fish were usually brought to the plant before dressing, thus it was possible to sample the commercial landings in round form. All fish were measured (fork length ± 1.0 mm) and weighed (± 25 g). Sex was determined by examination of the gonads. In 1972, whitefish and lake trout were assessed as to their state of sexual maturity. A mature fish was one that was expected to spawn that year. In 1973, fish were recorded only as male or female. For purposes of age determination, scale samples were removed from whitefish while otoliths were taken from lake trout and stored dry. In 1972 the sampling period was from August 9 to August 17. During 1973, sampling occurred between August 23 and September 7.

Age determinations for whitefish were made by counting annuli on the scales. Three or four scales from each fish were placed between two glass slides and the year marks counted on the image produced by a microprojector. Trout otoliths were ground by hand on a carborundum and cleared using a 3:1 mixture of benzyl benzoate and methyl salicylate. Growth zones were counted using a dissecting microscope and reflected light against a black background.

Length-weight relationships for whitefish and lake trout were described by the power equation.

$$\log_{10}W = a + b\ (\log_{10}L)$$

where: W = weight in grams
L = fork length in millimeters
a = Y-intercept
b = slope of the regression line

Condition (K) factors, often used to describe the relative plumpness of fish, were calculated from the formula $K = W \times 10^5/L^3$.

Because of the relatively small number of fish involved, the 1972 and 1973 data were combined to provide a larger sample.

Data were analyzed using a programmable calculator (Hewlett-Packard Model 9810-A).

RESULTS

During 1972 and 1973 biological data were collected from 222 lake whitefish (111 each year) and 363 lake trout (284 in 1972) captured by the commercial fishery. Summaries of these data have been arranged in tabular form in the Appendices. In the following sections the age and growth characteristics of the whitefish and lake trout populations are described and compared with similar data from other areas.

WHITEFISH

Length-Frequency Distribution: The percentage length-frequency distribution for the combined 1972 and 1973 whitefish sample is shown in Figure 3. Whitefish ranged from 490 to 667 mm in fork length with an overall sample mean of 590 mm. Of the total sample, 46% exceeded 600 mm. Female whitefish had a mean fork length of 604 mm (range: 490-667 mm) while males were smaller, having a mean length of 576 mm (range: 490-660 mm). There was little difference in length, however, between males and females of the same scale age.

It is interesting to note that the length range of the sample is relatively short (177 mm). This seems to be a common feature of the whitefish samples taken by gill nets from many northern lakes eg. Keller Lake (Johnson 1972) and Lac la Martre (Bond MS 1973).

By contrast, studies in other lakes have shown a given mesh size to capture a much broader length range of fish. Whitefish captured in 5½" gill nets from Great Slave Lake in the 1940's prior to the establishment of the commercial fishery had fork lengths from 325 to 600 mm (Rawson 1951). In the past few years, whitefish from 5½" commercial gill nets on Great Slave Lake have ranged from about 300 mm to about 600 mm (Bond and Turnbull MS 1973; Bond MS 1974).

Although the Kaminuriak Lake sample is small and although there is no guarantee that it was selected in an entirely random fashion, it seems strange that no whitefish shorter than 490 mm were recorded. Surely the 5½" gill nets employed in the fishery must be capable of capturing much smaller fish. It is tempting to postulate that when Kaminuriak Lake is tested with small mesh gill nets it will be found that a larger percentage of the whitefish biomass exists in the form of large fish with small fish being poorly represented. Such a condition would be consistent with

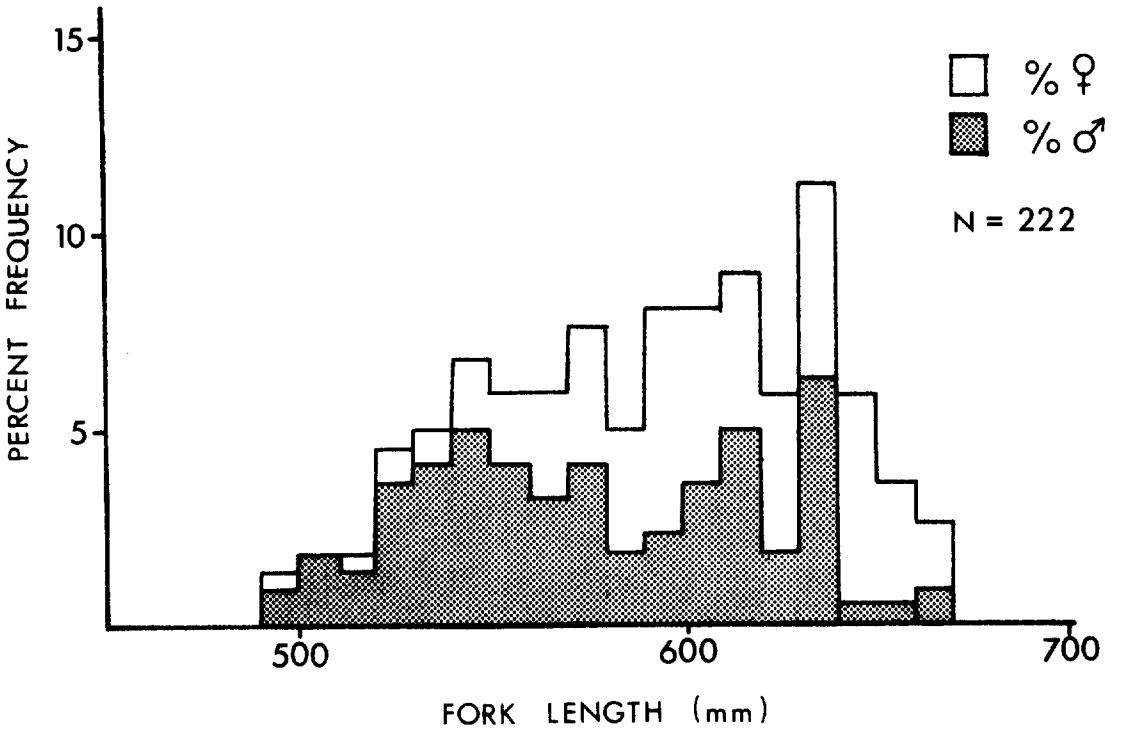

Fig. 3. Length-frequency distribution for whitefish from the commercial landings in 1972-73.

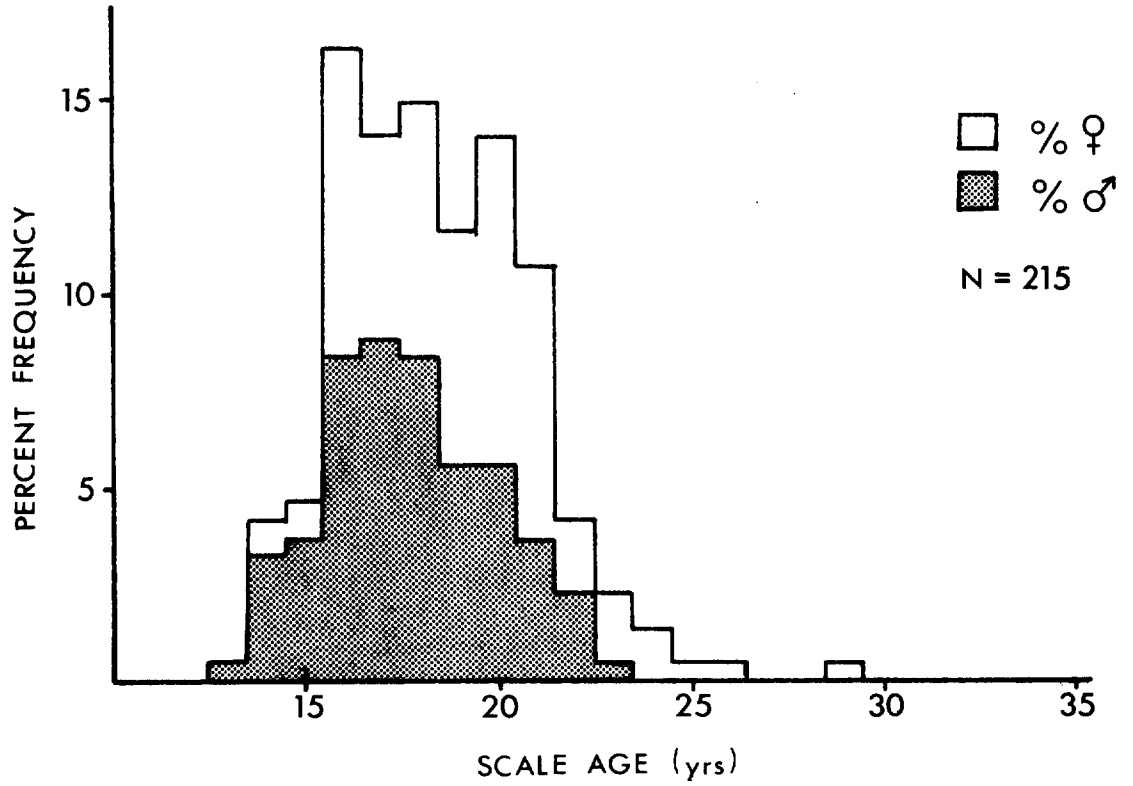

Fig. 4. Age-frequency distribution for whitefish from the commercial landings in 1972-73.

that found in many other unexploited northern lakes, eg. Keller, Beaverlodge and Redrock Lakes (Johnson 1973) and Lac la Martre (Bond MS 1973).

Age and Growth: Scale ages were determined for 215 whitefish and the percentage age-frequency distribution is seen in Figure 4. Scale ages ranged from 13 years to 29 years with a mean age of 18.3 years. The mean age of females was slightly greater than that of males.

Growth curves (Figures 5 and 6) for Kaminuriak whitefish were plotted using the data in Table 1. For purposes of comparison growth curves from several other unexploited whitefish populations have also been included in these figures. The curves in figure 5 have all been plotted as fork length in mm at scale age. Since, in some cases, the original data were not given in this form it was necessary to convert them. I have plotted converted data as presented by Healey (1975) who describes his method of conversion.

In figures 5 and 6 it should be noted that the Kaminuriak curves represent only the top part of the growth curves because of the lack of young fish in the sample. It should also be noted that between the ages represented in our sample there seems to be little correlation between age and length. Although the mean length tends to increase with age, there is a large degree of overlap between age classes to the extent that a fish with a fork length of 570 mm might be any age from 14 to 22 years. Nevertheless, these curves seem to indicate that the growth rate for Kaminuriak Lake whitefish is intermediate between those reported from MacEwan Lake (Kennedy 1963) and those from Munising Bay, Lake Superior (Edsall 1960). The latter two lakes represent the fastest and slowest growth rates respectively reported in the literature for unexploited whitefish populations and according to Healey (1975) these rates may be considered biological maxima and minima for this species.

It is known that when whitefish populations are exploited, they often respond with, among other things, an increase in growth rate. Healey hypothesizes that the difference between the growth rate observed for an unexploited population and the maximal rate may provide one indication of the fishery potential of a fish stock in that it represents the potential of the fish to respond to exploitation by compensatory growth.

The growth rate of Kaminuriak whitefish, on the basis of the available data, appears to be moderately high. Certainly it is higher than that shown in Figure 5 for Great Slave Lake in its

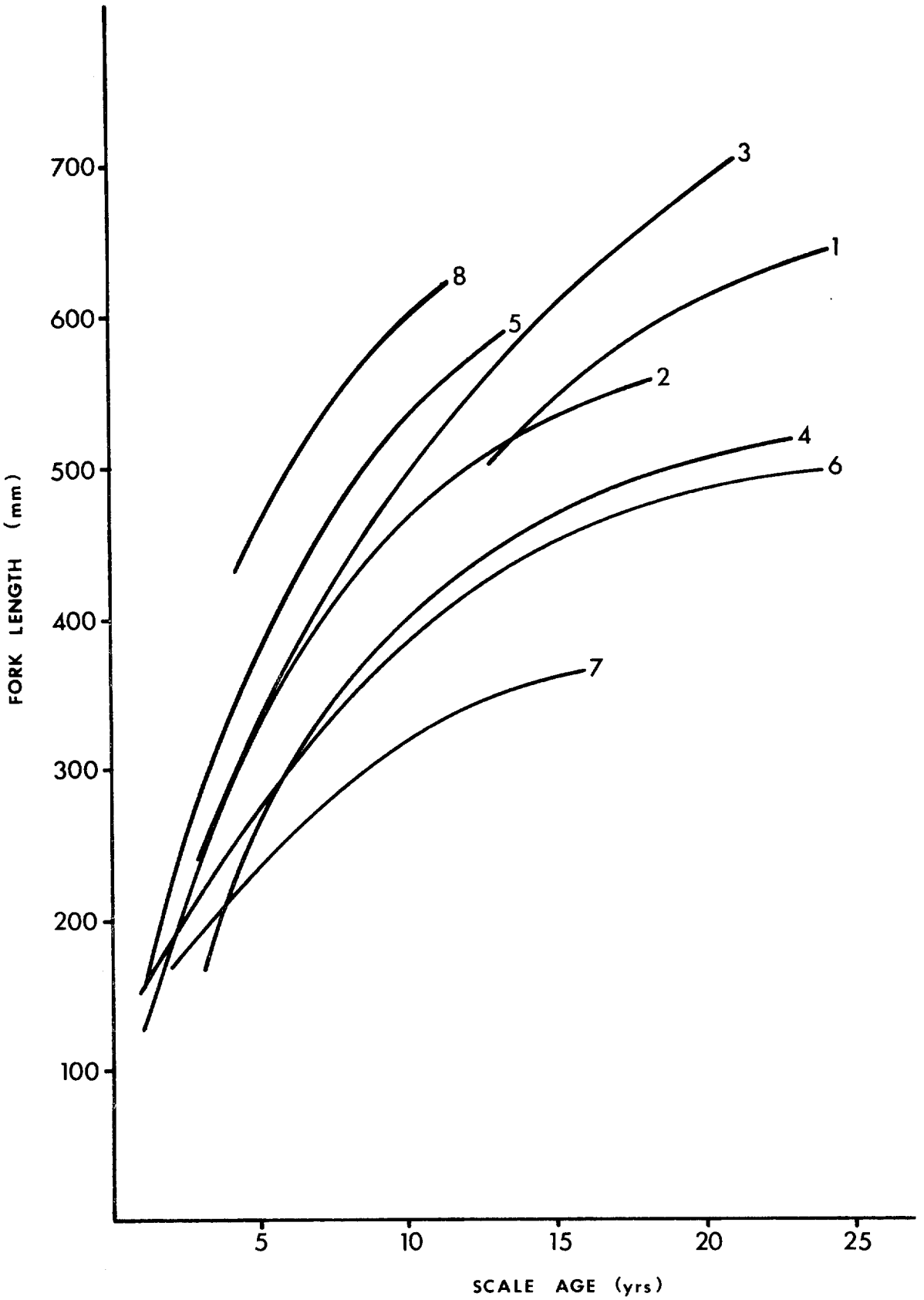

Fig. 5. Growth in length for whitefish from Kaminuriak Lake and from several other lakes. 1 - Kaminuriak Lake (present study; 2 - Hottah Lake (Wong and Whillans MS 1973); 3 - Great Bear Lake (Kennedy 1949); 4 - Great Slave Lake (Kennedy 1953); 5 - Lac la Martre (Bond MS 1973); 6 - Shakespear Island Lake (Hart 1931); 7 - Lake Superior (Edsall 1960); 8 - MacEwan Lake (Kennedy 1963).

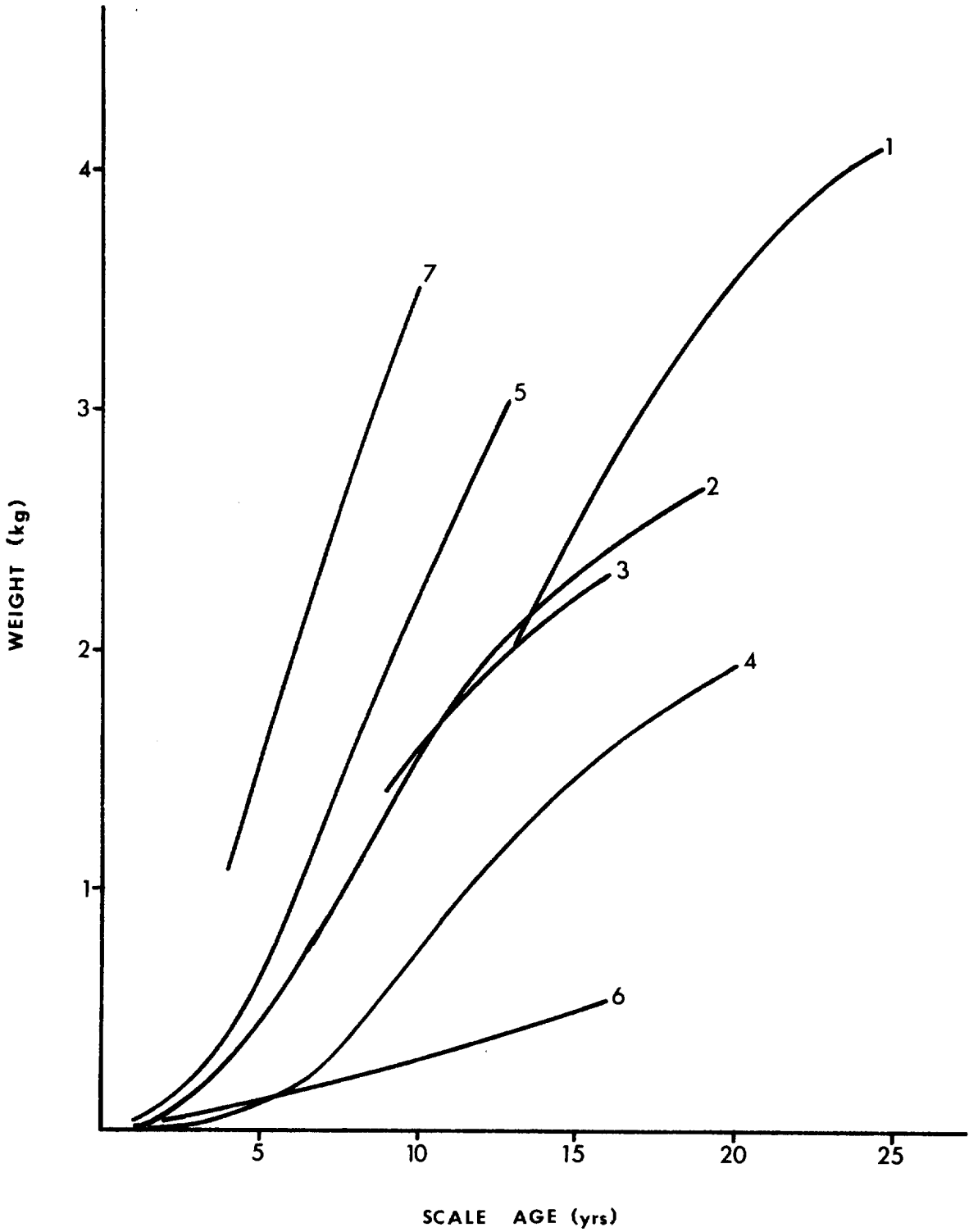

Fig. 6. Growth in weight for whitefish from Kaminuriak Lake and from several other lakes. 1 - Kaminuriak Lake (present study); 2 - Hottah Lake (Wong and Whillans MS 1973); 3 - Nueltin Lake (Kennedy 1963); 4 - Great Slave Lake (Kennedy 1953); 5 - Lac la Martre (Bond MS 1973); 6 - Lake Superior (Edsall 1960); 7 - MacEwan Lake (Kennedy 1963).

Table 1. Length-weight relationships for whitefish from Kaminuriak Lake compared with those from other lakes of northwestern Canada [$\log_{10}W = a + b (\log_{10}L)$].

Lake	Sex	N	Y-intercept a	Slope b	S_b	95% C.I. of b
Kaminuriak L. (Present Study)	Male	112	-5.5982	3.2872	0.1215	3.0491-3.5253
	Female	110	-4.5339	2.9052	0.1815	2.5495-3.2609
	Combined	222	-5.1571	3.1284	0.1515	2.8315-3.4253
Great Slave Lake (Bond MS 1975, In prep.)	Combined[1]	501	-5.0030	3.0651	0.0240	3.0181-3.1121
	Combined[2]	541	-5.1504	3.1233	0.0278	3.0688-3.1778
	Combined[3]	509	-5.2218	3.1538	0.0309	3.0932-3.2144
Hottah Lake (Wong and Whillans MS 1973)	Male	540	-5.7168	3.33	-	-
	Female	438	-5.6082	3.29	-	-
	Combined	1040	-5.8507	3.37	-	-
Lake Winnipeg (Kennedy 1954)	Combined	-	-4.651	2.96	-	-

[1]Sample taken near Hay River, July 9 - August 7, 1974.
[2]Sample taken near Moraine Bay, June 29 - July 3, 1974.
[3]Sample taken near Moraine Bay, August 7 - August 9, 1974.

unexploited condition (Kennedy 1953). On the other hand the mortality rate (0.54) is low by Healey's standard. This combination, according to Healey could indicate a situation with "limited fishery potential" where harvesting should be light, with large mesh nets and care taken to assure that the brood stock is not reduced too much.

Length-Weight Relationship: The mathematical relationship between length and weight for Kaminuriak Lake whitefish can be described by the equation:

$$\log_{10}W = -5.1571 + 3.1284 \log_{10}L$$

Separate equations were calculated for male and female whitefish. However, F tests showed that there was no significant difference in slope or elevation between the two lines. Table 1 compares length-weight relationships for whitefish populations from several different lakes in northwestern Canada.

Sex Ratio, Mortality and Maturity: The ratio of males to females for the total sample was 1.02 males to 1.00 female. This ratio varied among the age groups and tended to increase in favour of females as age increased, indicating that females live longer than males.

The total annual mortality rate as determined by Ricker's (1958) method was 0.54 based on ages 21-26 inclusive.

It is not possible from the data, to define the age at which whitefish first achieve sexual maturity in Kaminuriak Lake. The youngest fish sampled was age 13 and in 1972, virtually all fish sampled were considered to be sexually mature, i.e., they were expected to spawn that year.

LAKE TROUT

Length-Frequency Distribution: The percentage length-frequency distribution for lake trout is shown in Fig. 7. These fish had a mean fork length of 603 mm, ranging from 224 to 1005 mm. This mean length from a 5½" gill net is not exceptionally long when compared with Keller Lake (617), Namaycush Lake (701) and Beaverlodge Lake (805)(Johnson 1973). Rawson (1951) reported a mean length of 670 mm for Great Slave Lake lake trout captured in 5½" gill nets.

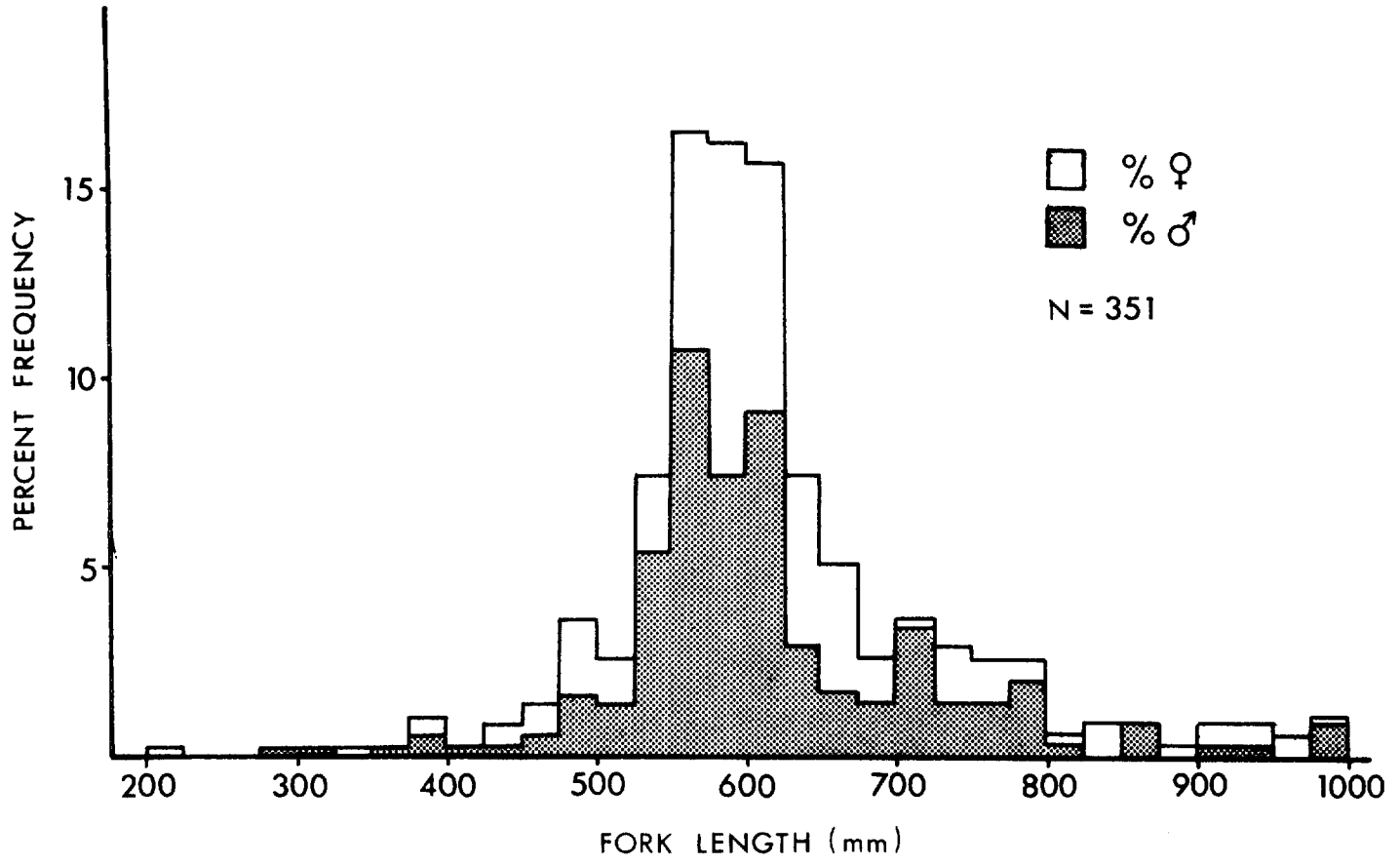

Fig. 7. Length-frequency distribution for lake trout from the commercial landings in 1972-73.

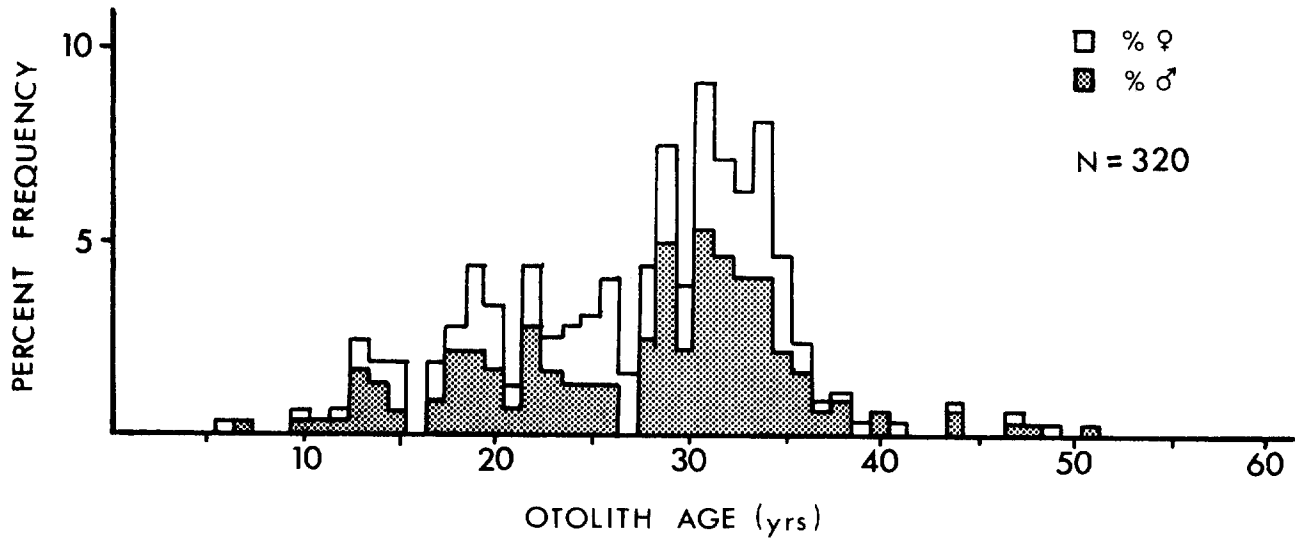

Fig. 8. Age-frequency distribution for lake trout from the commercial landings in 1972-73.

Unlike the situation described previously for whitefish, the lake trout represented a large range of fork lengths and the length-frequency distribution was characterized by a single high mode with 73% of the sample lying between 475 and 675 mm.

Age and Growth: The ages of 332 lake trout were determined from otoliths. The mean age for the total sample was 27.4 years with a range of from 6 years to 62 years (Fig. 8).

Using the data in Table A-3, growth curves (Figs. 9 and 10) were plotted for Kaminuriak Lake lake trout and compared with growth curves reported for lake trout from other lakes in the NWT and from Mistassini Lake in Quebec. Mistassini Lake was included since otolith ages were utilized for age determination rather than scales as is the case in most lake trout studies.

The growth rate for Kaminuriak trout appears to be slow, relative to the other lakes shown in Figures 9 and 10. It should be noted, however, that the line for Hottah Lake (Fig. 9) is not strictly comparable to the others since scales, rather than otoliths were used for age determination. Dubois and Lagueux (1968) have shown that, in the case of Mistassini Lake, the use of scales grossly underestimates the age of the fish beyond age 6 if, indeed, the otolith age represents the true age. This would have the effect of greatly overestimating the growth rate of the population.

Length-Weight Relationship: The mathematical relationship between length and weight for Kaminuriak Lake lake trout can be described by the equation:

$$\log_{10}W = -5.4478 + 3.1883 \log_{10}L$$

Performance of F tests indicated no significant difference in slope or elevation between the separate lines for males and females. In Table 2, length-weight equations for lake trout for some other lakes in northwestern Canada are compared with those determined from trout from Kaminuriak Lake.

Sex Ratio, Mortality and Maturity: The overall sex ratio was 1.25 males to every female. Maturity estimates, provided from the 1972 sample, indicate that the youngest mature male was age 13 and that 32 out of 38 males (84%) between the ages of 14 and 27 years were sexually mature. The youngest mature female was 19 years old. Of 26 female trout between age 19 and 24 years, only 6 (23%) were considered to be mature. Out of 33 females between the ages of 25 and 30 years, 22 (67%) were mature. And of 39 females between 31 and 35 years of age, 26 (67%) were sexually mature. In Kaminuriak Lake, then, male lake trout appear to spawn at an earlier age and more frequently than do the females.

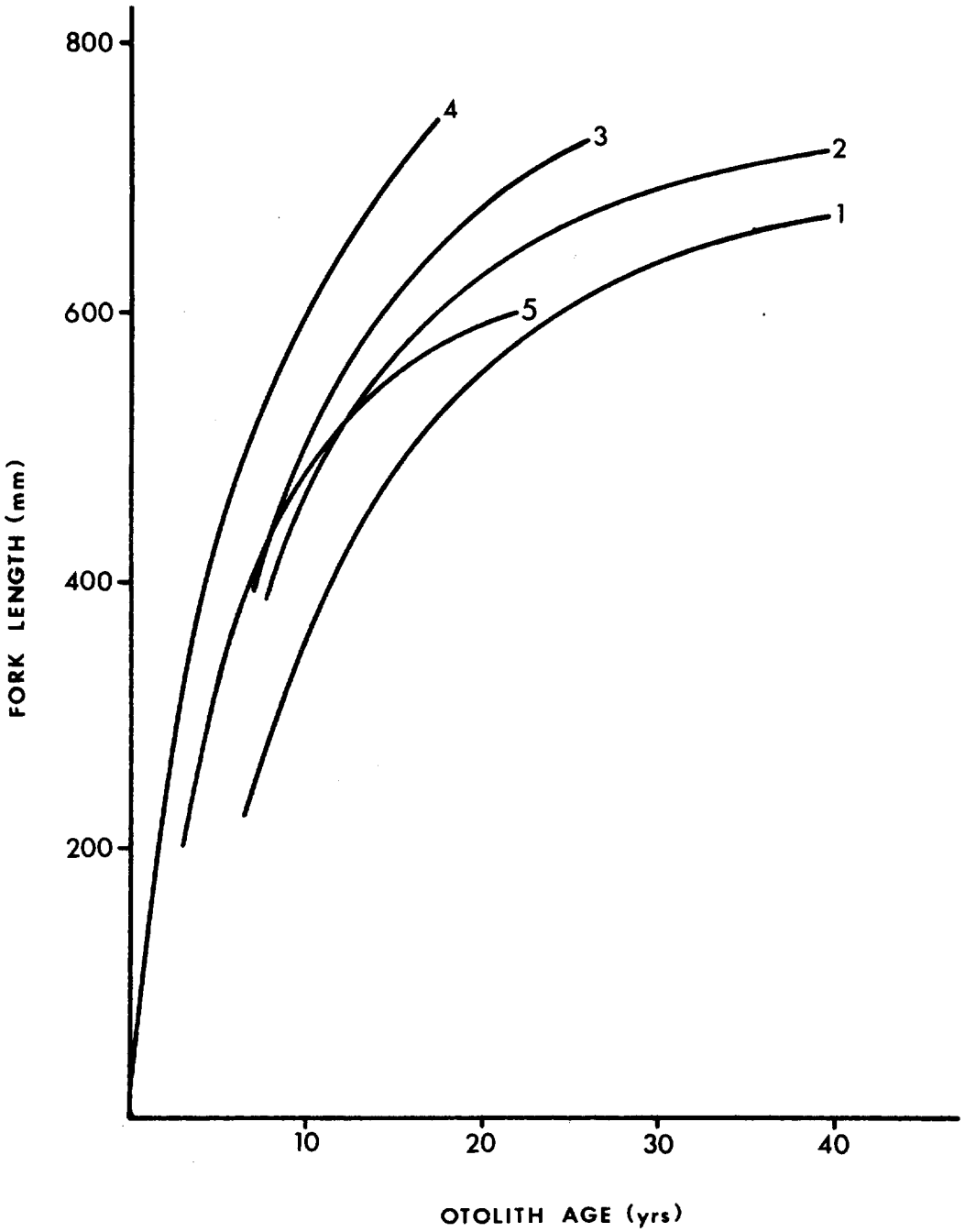

Fig. 9. Growth in length for lake trout from Kaminuriak Lake and from several other lakes. 1 - Kaminuriak Lake (present study); 2 - Great Bear Lake (Falk et al. MS 1974); 3 - Great Slave Lake (Falk et al. MS 1974); 4 - Hottah Lake (Wong and Whillans MS 1973); 5 - Mistassini Lake (Dubois and Lagueux 1968).

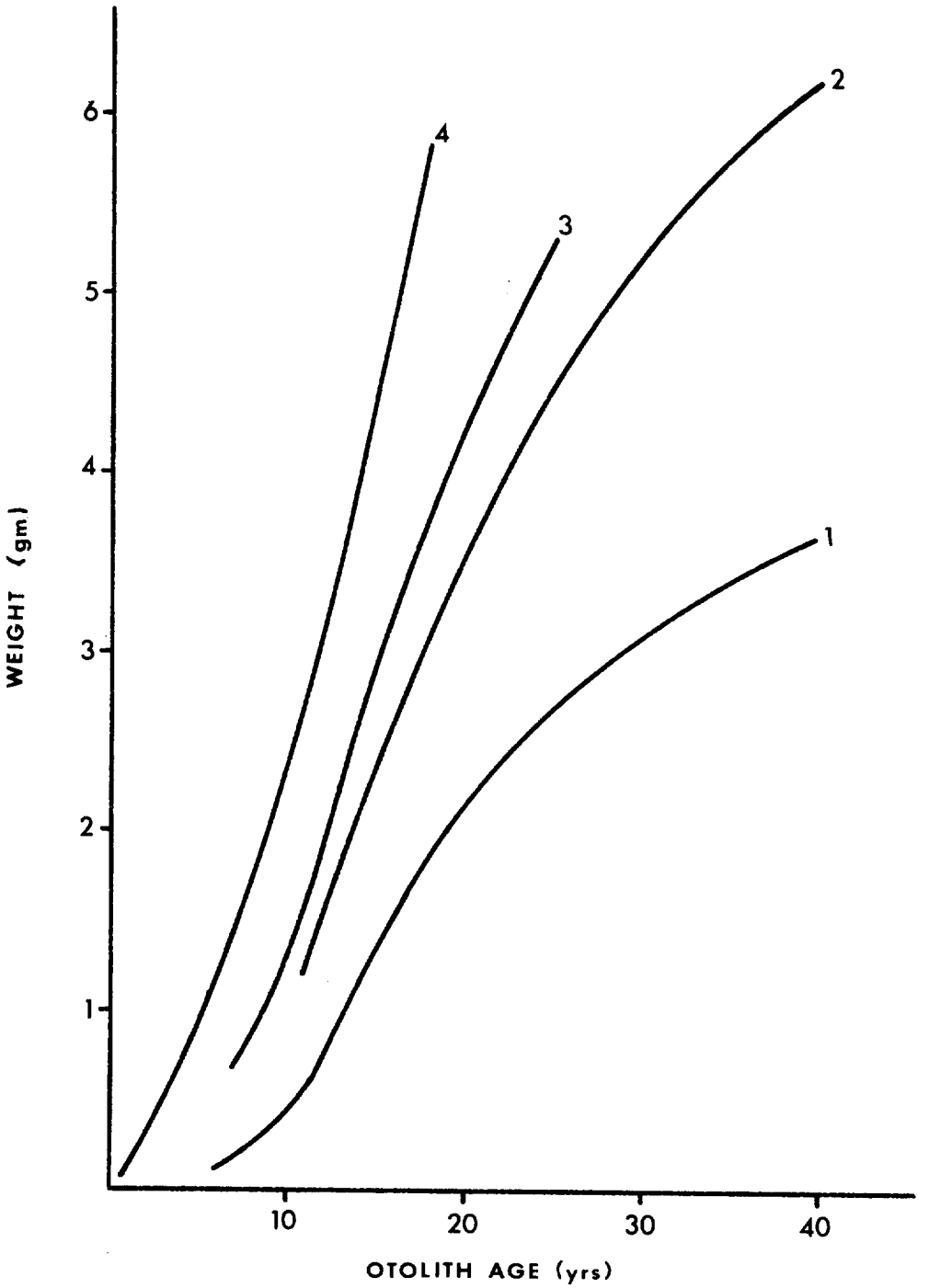

Fig. 10. Growth in weight for lake trout from Kaminuriak Lake and from several other lakes. 1 - Kaminuriak Lake (present study); 2 - Great Bear Lake (Falk et al. MS 1974); 3 - Great Slave Lake (Falk et al. MS 1974); 4 - Hottah Lake (Wong and Whillans MS 1973).

When a catch curve was plotted of otolith ages versus the logarithm of the frequency in each age class, a very irregular plot was obtained which made it difficult to estimate the annual mortality rate. To overcome this problem, I smoothed the descending limbs of the catch curve by plotting a moving mean (the average of two successive age classes). The total annual mortality rate calculated on this basis, using Ricker's (1958) method was 0.41 using ages 34-42 inclusive.

Table 2. Length-weight relationships for lake trout from Kaminuriak Lake compared with those from other lakes of northwestern Canada [$\log_{10}W = a + b\ (\log_{10}L)$].

Lake	Sex	N	Y-intercept a	Slope b	S_b	95% C.I. of b
Kaminuriak Lake (Present Study)	Male	194	-5.4525	3.1902	0.0373	3.1171-3.2633
	Female	158	-5.4425	3.1860	0.0475	3.0929-3.2791
	Combined	352	-5.4478	3.1883	0.0424	3.1052-3.2714
Great Bear Lake (Falk et al., MS 1974)	Male	935	-4.3474	2.785	0.0752	2.638 -2.932
	Female	777	-4.1506	2.720	0.0728	2.577 -2.863
	Combined	1712	-4.2487	2.752	0.0736	2.608 -2.896
Great Slave Lake (Falk et al., MS 1974)	Male	579	-6.3492	3.413	0.0781	3.260 -3.566
	Female	629	-6.2765	3.492	0.0749	3.345 -3.637
	Combined	1208	-6.3070	3.448	0.0756	3.300 -3.596
Hottah Lake (Wong and Whillans MS 1973)	Male	259	-4.9727	3.01	-	-
	Female	210	-5.0726	3.05	-	-
	Combined	544	-5.1960	3.09	-	-
Namaycush Lake (Johnson 1973)	Combined	-	-1.3878	2.6133	-	-
Keller Lake (Johnson 1973)	Combined	-	-1.7288	2.8921	-	-

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Table A-1. Mean length, mean weight, condition factor and sex ratio by age for whitefish from Kaminuriak Lake, 1972-1973.

Age	No.	Fork Length (mm)			Weight (g)			Condition Factor	No. Males	No. Females	M/F Ratio
		Mean	Range	S.E.	Mean	Range	S.E.				
13	1	505	-	-	2000	-	-	1.55	1	-	-
14	9	535	495-605	10.0	2294	1500-3500	182.3	1.50	7	2	3.50
15	10	556	500-635	14.8	2635	1750-3950	223.3	1.54	8	2	4.00
16	35	556	490-635	5.9	2691	1800-4250	103.0	1.57	18	17	1.06
17	30	563	515-610	4.8	2809	2000-4250	108.3	1.57	19	11	1.73
18	32	577	520-630	4.6	3105	2200-4500	102.9	1.61	18	14	1.29
19	25	613	550-655	5.5	3766	2750-5250	120.1	1.64	12	13	0.92
20	30	625	560-655	3.6	3894	2750-4625	88.3	1.60	12	18	0.67
21	23	622	530-665	6.9	3891	2450-5250	129.8	1.62	8	15	0.53
22	9	628	575-660	8.6	4442	3925-5200	158.9	1.79	5	4	1.25
23	5	639	595-667	14.5	3800	3400-4225	169.0	1.46	1	4	0.25
24	3	636	619-648	8.6	4041	3950-4175	68.2	1.57	-	3	-
25	1	604	-	-	3900	-	-	1.77	-	1	-
26	1	648	-	-	4500	-	-	1.65	-	1	-
27	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-
29	1	661	-	-	4000	-	-	-	-	1	-
Total	215		490-667	-	-	1500-5250	-	-	109	106	1.03
Mean	-	590	-	-	3306	-	-	1.61	-	-	-

Table A-2. Mean weight, condition factor and sex ratio by length interval for whitefish from Kaminuriak Lake, 1972-1973.

Length Interval (mm)	No.	Class Mark	Weight (g)			Condition Factor	No. Males	No. Females	M/F Ratio
			Mean	Range	S.E.				
490-499	3	495	1767	1500-2000	145.3	1.49	2	1	0.50
500-509	4	505	2013	1750-2500	171.2	1.59	4	-	-
510-519	4	515	2125	2000-2250	72.2	1.56	3	1	3.00
520-529	10	525	2200	2000-2400	48.3	1.54	8	2	4.00
530-539	11	535	2277	2000-2500	51.6	1.51	9	2	4.50
540-549	15	545	2407	2000-2800	57.9	1.50	11	4	2.75
550-559	13	555	2560	2400-2900	54.3	1.51	9	4	2.25
560-569	13	565	2775	2500-3000	33.1	1.56	7	6	1.17
570-579	17	575	3059	2750-4750	116.9	1.62	9	8	1.12
580-589	11	585	3364	3075-4000	109.2	1.70	4	7	0.59
590-599	18	595	3432	2500-4000	84.2	1.64	5	13	0.38
600-609	18	605	3672	3275-4250	67.7	1.67	8	10	0.80
610-619	20	615	3700	2800-4500	103.5	1.60	11	9	1.22
620-629	13	625	3919	3600-4800	116.4	1.62	4	9	0.44
630-639	25	635	4225	3125-5200	101.8	1.66	14	11	1.27
640-649	13	645	4027	3325-5250	138.8	1.51	1	12	0.08
650-659	8	655	4388	3925-5000	138.6	1.57	1	7	0.14
660-669	6	665	4104	3400-4600	175.9	1.41	2	4	0.50
Total	222	-	-	1500-5250	-	-	112	110	1.02
Mean	-	-	3306	-	-	1.61	-	-	-

Table A-3. Mean length, mean weight, condition factor and sex ratio by age for lake trout from Kaminuriak Lake, 1972-1973.

Age	No.	Fork Length (mm)			Weight (g)			Condition Factor	No. Males	No. Females	No. Unspec.	M/F Ratio
		Mean	Range	S.E.	Mean	Range	S.E.					
6	1	224	-	-	100	-	-	0.89	-	1	-	-
7	2	285	272-298	13.0	250	225-275	25.0	1.08	1	-	1	1.00
8	3	283	270-303	10.0	218	180-250	20.5	0.96	-	-	3	-
9	1	272	-	-	185	-	-	0.92	-	-	1	-
10	2	325	310-340	15.0	338	300-375	37.5	0.98	1	1	-	1.00
11	1	372	-	-	500	-	-	0.97	1	-	-	-
12	2	389	382-395	6.5	575	575-575	-	0.98	1	1	-	1.00
13	10	432	378-485	11.6	880	575-1200	69.8	1.09	5	3	2	1.67
14	7	478	425-525	12.3	1,264	925-1800	114.1	1.15	4	2	1	2.00
15	7	500	475-564	11.5	1,429	1100-1950	108.2	1.14	2	4	1	0.50
16	-	-	-	-	-	-	-	-	-	-	-	-
17	6	539	500-585	11.4	1,846	1475-2375	126.1	1.18	3	3	-	1.00
18	9	546	512-593	9.1	1,964	1575-2300	87.4	1.21	7	2	-	3.50
19	14	545	490-601	9.5	1,743	1250-2450	145.0	1.08	7	7	-	1.00
20	11	557	455-745	21.9	2,080	950-4750	288.8	1.21	5	6	-	0.83
21	5	556	489-603	20.8	2,125	1300-2650	227.5	1.23	2	2	1	1.00
22	14	584	540-630	7.9	2,386	2000-2850	67.4	1.20	9	5	-	1.80
23	8	617	560-779	26.3	2,822	1650-6425	552.4	1.20	5	3	-	1.67
24	9	582	511-690	16.9	2,278	1525-3750	211.2	1.15	4	5	-	0.80
25	10	600	519-670	14.2	2,495	1450-3200	155.8	1.16	4	6	-	0.67
26	13	627	570-720	14.2	2,885	2200-4100	187.3	1.17	4	9	-	0.44
27	5	593	534-680	26.7	2,635	1775-3825	360.6	1.26	-	5	-	-
28	15	625	554-728	15.5	3,118	2000-5000	275.6	1.27	8	6	1	-
29	24	619	505-762	13.6	3,005	1450-5750	212.0	1.27	16	8	-	2.00
30	12	610	546-762	19.4	2,788	1700-5550	350.9	1.23	7	5	-	1.40
31	29	623	537-740	11.3	3,049	1975-4900	166.8	1.26	17	12	-	1.42
32	23	629	540-743	14.4	3,046	1750-5375	249.9	1.22	15	8	-	1.88

Table A-3. (Cont'd)

Age	No.	Fork Length (mm)			Weight (g)			Condition Factor	No. Males	No. Females	No. Unspec.	M/F Ratio
		Mean	Range	S.E.	Mean	Range	S.E.					
33	20	660	564-788	21.1	3,743	2275-6150	404.9	1.30	13	7	-	1.86
34	26	653	555-927	20.3	3,716	2150-10550	440.8	1.33	13	13	-	1.00
35	15	621	550-848	23.9	3,205	2000-7750	467.8	1.34	7	8	-	0.88
36	8	661	560-875	37.4	3,850	2150-8075	699.8	1.33	5	3	-	1.67
37	3	667	577-720	45.4	3,667	2275-4800	740.3	1.23	2	1	-	2.00
38	4	668	605-799	45.3	3,794	2375-6425	901.0	1.27	3	1	-	3.00
39	1	935	-	-	11,375	-	-	-	-	1	-	-
40	2	737	601-873	136.0	4,775	2200-7350	2575.0	1.19	2	-	-	-
41	2	765	620-962	145.0	6,900	2200-11800	4700.0	1.54	-	1	-	-
42	-	-	-	-	-	-	-	-	-	-	-	-
43	-	-	-	-	-	-	-	-	-	-	-	-
44	3	867	785-914	41.3	8,900	5950-12250	1829.6	1.36	2	1	-	2.00
45	-	-	-	-	-	-	-	-	-	-	-	-
46	-	-	-	-	-	-	-	-	-	-	-	-
47	2	975	962-988	13.0	12,950	11800-14100	1150.0	1.40	1	1	-	1.00
48	1	938	-	-	12,050	-	-	-	1	-	-	-
49	1	993	-	-	9,900	-	-	1.01	-	1	-	-
50	-	-	-	-	-	-	-	-	-	-	-	-
51	1	988	-	-	13,650	-	-	1.42	1	-	-	-
62	1	1005	-	-	-	-	-	-	-	-	1	-
Total	332	-	224-1005	-	-	100-14100	-	-	178	142	12	1.25
Mean	-	603	-	-	2,923	-	-	1.23	-	-	-	-

Table A-4. Mean weight, condition factor and sex ratio by length interval for lake trout from Kaminuriak Lake, 1972-1973.

Length Interval (mm)	No	Class Mark	Weight (g) Mean	Range	S.E.	Condition Factor	No. Males	No. Females	No. Unspec.	M/F Ratio
200-224	1	212	100	-	-	0.89	-	1	-	-
225-249	-	237	-	-	-	-	-	-	-	-
250-274	3	262	197	180-225	14.2	0.98	-	-	3	-
275-299	2	287	250	225-275	25.0	1.05	1	-	1	-
300-324	2	312	275	250-300	25.0	0.96	1	-	1	-
325-349	1	337	375	-	-	0.95	-	1	-	-
350-374	1	362	500	-	-	0.97	1	-	-	-
375-399	4	387	594	575-650	18.8	1.03	2	2	-	1.00
400-424	2	412	688	675-700	12.5	1.03	1	-	1	-
425-449	3	437	917	875-950	22.0	1.14	1	2	-	0.50
450-474	6	462	1,042	925-1200	45.9	1.06	2	3	1	0.67
475-499	14	487	1,327	1100-1600	38.2	1.15	6	7	1	0.86
500-524	10	512	1,522	1350-1800	46.5	1.15	5	4	1	1.25
525-549	26	537	1,868	1600-2300	30.9	1.21	19	7	-	2.71
550-574	58	562	2,199	1650-2800	28.0	1.23	38	20	-	1.90
575-599	58	587	2,401	2000-3000	27.5	1.20	26	31	1	0.84
600-624	56	612	2,633	2200-3050	30.0	1.16	32	23	1	1.39
625-649	26	637	3,055	2450-3800	56.0	1.18	10	16	-	0.63
650-674	18	662	3,398	3000-3750	72.1	1.16	6	12	-	0.50
675-699	9	687	3,981	3500-4750	150.7	1.26	5	4	-	1.25
700-724	13	712	4,408	3800-5000	127.1	1.22	12	1	-	12.00
725-749	10	737	4,735	3925-5400	137.5	1.19	5	5	-	1.00
750-774	9	762	5,117	3925-5950	243.6	1.16	5	4	-	1.25
775-799	9	787	6,069	5600-6600	117.9	1.25	7	2	-	3.50
800-824	2	812	7,675	7600-7750	75.0	1.39	1	1	-	1.00
825-849	3	837	7,533	7250-8050	258.7	1.28	-	3	-	-

Table A-4. (Cont'd)

Length Interval (mm)	No.	Class Mark	Weight (g) Mean	Weight (g) Range	Weight (g) S.E.	Condition Factor	No. Males	No. Females	No. Unspec.	M/F Ratio
850-874	3	862	8,716	7350-10450	913.5	1.34	3	3	-	-
875-899	1	887	8,075	-	-	1.21	-	1	-	-
900-924	3	912	10,783	8500-12250	1157.0	1.44	1	2	-	0.50
925-949	3	937	11,325	10550-12050	433.7	1.39	1	2	-	0.50
950-974	2	962	11,275	10750-11800	525.0	1.26	-	2	-	-
975-999	4	987	13,275	9900-15450	1188.2	1.38	3	1	-	3.00
1000-1024	1	1012	-	-	-	-	-	-	1	-
TOTAL	363	-	-	575-15450	-	-	194	157	12	1.24
MEAN	-	-	3,060	-	-	1.20	-	-	-	-

Printed in Canada by the
Department of Supply and Services
Printing Operations
for exclusive distribution by
Environment Canada
Fisheries and Marine Service
Freshwater Institute
Winnipeg, Manitoba
Canada