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FISHERIES RESEARCH BOARD OF CANADA

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INTRODUCTION

Certain uninformed people who live near Great Slave Lake have in recent years reported that the lake is being overfished. It therefore behooves me to review some of the information on which I base my opinion that the lake has definitely not been fished excessively. Because of a desire to restrict this manuscript to a reasonable size, only part of the information at hand is presented here. However, none has been suppressed which would invalidate the conclusions drawn from the information that is used. I would be only too glad to go over all the data with any interested person at any time. Nobody who has examined this data with me (and they include Drs. W. E. Ricker, L. Butler, and D. S. Rawson) has suggested that the data show anything but an absence of any signs of depletion.

MATERIAL AND METHODS

The important feature of the Great Slave Lake study has been the personal contacts between Fisheries Research Board personnel and the fishermen. The field parties live with the fishermen, know them by name, talk to them as friends. A determined (and generally successful) effort is made to screen out applicants who are likely to make a bad impression on fishermen. It has been our practice to keep all information confidential and to assure the fishermen that it is kept confidential. The average fisherman would probably not supply accurate information

if he were not certain that it was kept confidential because (1) if fish are running heavily in his nets and if other fishermen knew about it, they would set their nets close to his which would reduce his catch and (2) in the case where some of his activities are illegal he would increase the likelihood of being prosecuted. Mr. H. V. Dempsey agrees with this policy by which we keep knowledge of illegal activities confidential, because divulging information to the Fisheries Officers would result in the successful prosecution of few, if any culprits, while a source of information essential to the proper assessment of the effects of the fishery would be closed to us forever. It takes about two years for a fisherman to gain complete confidence in our integrity in this respect. Many never become confident enough to report their illegal activities to us. There are other ways of assessing the extent of such activities, and we use all of them. If, as rarely happens, a fisherman appears to habitually supply doubtful information in other respects, it is disregarded when the data are analysed.

In the summer fishery an attempt is made to interview fishermen every time that they land fish. At Hay River there are not enough investigators to enable all to be interviewed regularly, so only the maximum that can be interviewed regularly are interviewed at all. At Gros Cap <u>all</u> the fishermen are interviewed regularly. Fishermen are asked for the location of their nets, the amount of gear fished, an estimate of the amount of

fish discarded (including both commercial fish and rough fish) and the length of time that the nets were fishing. The amount of fish caught is determined from the buyers' records. In the winter fishery much the same information is gathered but it is impossible to interview more than about 2 per cent of the fishermen daily, so selected fishermen are asked to keep written records of their activities which are collected at regular intervals. Because observations on the winter fishery are necessarily scanty, they are of little value in assessing the probability of over-fishing.

Samples of fish are "borrowed" from the commercial catch as landed, and the weight of each individual fish is recorded. An attempt is made to take a sample of 500 fish each half month from each of thirteen subdivisions into which we have arbitrarily divided the lake for the purposes of this study. All obvious precautions are taken to make the samples completely representative of the commercial catch for any particular time and place.

Seven places have been designated as "scale collection stations". Representative samples of commercial fish taken in the immediate vicinity of these scale collection stations are "borrowed" and from each fish a few scales are taken just dorsal to the lateral line, between it and the dorsal fin. They are placed in a scale envelope on which are recorded the necessary data regarding the fish. Later an image of the scale magnified

about 60 times is projected on a white screen. The number of annuli counted in the projected image is regarded as equivalent to the age of the fish in years.

Some fish were tagged at various places in 1946 and 1947. The tag consisted of two thin plastic discs, one-half inch in diameter connected by a pin through the base of the dorsal fin. No reward was paid for tags returned by the fishermen.

GENERAL HISTORY OF THE FISHERY

In the summer of 1944 under the Fisheries Research Board of Canada, Dr. D. S. Rawson began a three year scientific study (later extended by one year) of Great Slave Lake to determine its potential capacity to support a commercial fishery in addition to the then existing domestic fishery. The results of Dr. Rawson's study were so promising that McInnes Products Corporation Limited became interested and were allowed to begin the first fishing on the lake on July 29, 1945. A few scientific observations were taken at that time and I began a detailed scientific study of the summer fishery in June, 1946 and a partial study of the winter fishery in January, 1949 as directed by the Fisheries Research Board.

The base of operations for this fishery was an excellent harbour near a point of land called Gros Cap, and this name is now generally applied to the McInnes fish camp. Fish are brought to the camp in the fishing boats, and they are then weighed and

sold to McInnes Products Corp. which generally freezes them in either the dressed state or after filleting them. The frozen fish are transported by reefer barges up the Slave and Athabaska Rivers to the railhead at Waterways, Alberta. Some unfrozen fish have been shipped out by air freight but this has apparently not been a profitable operation.

On the basis of the long-term yield per unit water area in the Great Lakes and of the "official" area of Great Slave Lake (later found to be too small by 10 per cent) Dr. Rawson estimated that the annual fish crop from Great Slave Lake could be at least 5 million pounds. His observations on the habits of people living near the lake indicated that the existing domestic fishery was taking less than 1.5 million pounds annually so that a commercial fishery could take at least 3.5 million pounds annually. Therefore, the fisheries regulations pertinent to Great Slave Lake specified that the maximum catch should be three and one-half million pounds dressed weight of lake trout, plus whitefish, plus inconnu, which is equivalent to about 4.2 million pounds round weight.

In September, 1948 an all-weather road was completed linking the settlement of Hay River which is on the south shore of the lake with the railway at Grimshaw, Alberta. This made possible a greater rate of exploitation. The question of the maximum annual production permitted was therefore reviewed. It was found that up until the end of 1948 most of the fish produced

had been taken from less than one-quarter of the lake, without any apparent adverse effect on the fish populations in that part. I, therefore, recommeded that a greater annual production of commercial fish be allowed, with the new maximum tentatively set at 9 million pounds dressed weight of commercial fish. To be certain that the fish were not all caught in one part of the lake I also recommended that the lake be subdivided for administrative purposes (not the same subdivisions as used for statistical purposes) and that a quota of fish be assigned to each subdivision. To further protect the domestic fishery I recommended that the waters near all the settlements should be closed to commercial fishing. These recommendations were accepted and the regulations were amended accordingly. I concurred with the suggestion that inconnu be no longer regarded as commercial fish as it appeared likely that less of them would be caught by commercial fishermen under that condition.

A substantial fishery based on Hay River grew up in addition to the one based at Gros Cap. Several fish companies began to buy fish at Hay River and shipped them dressed and unfrozen over the new road to the railhead. A winter fishery almost as great as the two summer fisheries combined also developed, based almost entirely at Hay River.

Table I summarizes the course of the fishery. In the summer of 1949 the fishery at Hay River began operating on a large scale which more than doubled the summer fishing effort.

The catch also was more than doubled. The total catch for 1949 is greater than the total permitted partly because that part of the quota not caught in the summer of 1948 was "carried over" to the winter of 1948-49. This practice is no longer permitted.

The fishing effort exerted in the winter fishery of 1949-50 was roughly 120,000 equivalent net-nights. Therefore, the total fishing effort exerted during that year (the greatest to date) was approximately 170,000 equivalent net-nights. Annual fishing effort exerted on Lake Erie is at least 100 times as great, in spite of which Lake Erie is far from being "fished out".

On Great Slave Lake there has been only one form of illegal fishing that has been of any importance, namely the leaving of nets in the water for more than 30 consecutive hours. In the summer of 1950 about 30 per cent of all the fishing effort was illegal in this respect. In the same season about 4 per cent of the fishing effort involved more than the legal amount of gear per fisherman, about 2 per cent involved fishing in closed areas, and as far as we know no nets with illegal mesh were fished. Compared with fishermen on some lakes, those on Great Slave have been exceptionally law-abiding.

TAGGING

In 1946, 78 lake trout and 34 whitefish were tagged and released in the vicinity of Gros Cap. In 1947, 474 lake

trout, 320 whitefish and 6 inconnu were tagged and released at various places in Great Slave Lake.

As Table II shows, the whitefish moved very little, and all were recovered within the statistical subdivision of the lake into which they had been released. The trout moved around slightly more, but the majority of them were also recovered within the statistical subdivision into which they had been released.

It is therefore obvious that the commercial fish from one part of the lake must be regarded as distinct from those in another part of the lake. It is quite possible to have local depletion without having general depletion.

AVAILABILITY

The catch per unit of effort, known as availability, shown in the last column of Table I, although it gives the correct general impression that there has been no drastic change, is slightly misleading in that the grounds exploited have not been always the same. Up until the end of 1948 the Gros Cap fishermen were continually discovering grounds where the fishing was better, which of course increased the overall availability. When fishing started at Hay River the lower availability in that vicinity decreased the overall availability. In 1950 when the more productive area IA was closed which forced the fishermen to fish in the hitherto unexploited, and less productive area IB,

the overall availability dropped still more. That the low availability in IB is not the result of a general decrease in availability is suggested by (1) a few nets set illegally in 1A produced the same catch per net as was observed in 1949 and (2) rough field observations near Hay River during the winter 1950-51 indicated no decrease in availability compared with previous winters. However, to guard against any possibility that there has been local overfishing near Hay River I recently recommended certain changes in the local quota and in the manner of subdividing that part of the lake.

It is worthwhile studying the changes in the availability of lake trout and whitefish combined in the three statistical subdivisions known as areas G, H, and K, which are the three nearest to Gros Cap, and which have borne the brunt of the fishing to date. The availabilities are shown in Table III. The amount by which availability can fluctuate within a given year should be noted, since it indicates that a change in availability cannot always be interpreted as a change in the abundance of fish (remember that the tagging returns show that fish move very little).

In each area the availability was lower in 1949 and 1950 than in the preceding years. This could be interpreted as indicating a decline in abundance. However, it does not seem to be the correct interpretation since the availability remained more or less unchanged until the end of 1948, and changed only

after fishing in those areas became sporadic. The correct interpretation seems to be that in 1949 and 1950 not enough fishing was done to find where the fish were most concentrated in those years. It may seem incredible that fishermen would go further afield for fish when there was good fishing nearer the fishing station on areas G, H, and K. However, remarks of fishermen to us showed that early in 1948 for some reason they got the idea that these grounds were "fished out" particularly area G, although as Table III shows there was no basis in fact for this idea. In any case they acted on their convictions and went elsewhere.

It should be noted that in each of the three areas shown in Table III, overall availability was greater in 1950 than in 1949. Of the nine areas fished in both years five showed an increase in availability from 1949 to 1950 and four showed a decrease.

It is self-evident that any fishing, no matter how limited, must produce a decrease in the number of fish present, which in turn must tend to decrease availability. However, the abundance of fish at a particular place is not the only thing which determines availability. I interpret the available data to mean that in Great Slave Lake any tendency for a decrease in availability as the result of fish is completely obscured by those fluctuations in availability that are caused by other factors.

AVERAGE SIZE

If the number of fish of catchable size in a lake has been reduced then obviously a larger proportion of the catch will be made up of those fish which have just become large enough to be taken by the gear, and this will automatically reduce the average size taken. Therefore, a study of the decline in average size of commercial fish should furnish a clue to the extent to which a fish population has decreased in abundance. Tables IV to IX show the average size of fish on those grounds for which data are available for at least four years.

To interpret these tables it is important to realize that in summer the older (hence larger) whitefish and lake trout tend to be found in a slightly deeper water than are the younger fish, presumably because temperature preferences change with age. So it is obvious how average size of the fish taken can change during a fishing season since the depth at which colder water is found varies, as does the depth at which fishermen set their nets. Part of the erratic variation shown by the tables is the result of inadequate samples.

Although fluctuations in average size do tend to obscure the situation slightly, a comparison between years of the average sizes at any particular time of the year shows no apparent general tendency for the average size of commercial fish to decrease. The cases where an apparent decrease has

occurred are more or less balanced by the cases where there has been an apparent increase.

GROWTH RATE

In numerous cases, intensive fishing has been shown to have increased the rate of growth of fish in the populations that were exploited, presumably by reducing competition. It seems likely that any fishery which appreciably reduces the number of commercial fish present would increase the average rate of growth i.e. cause fish of a certain age to be larger than fish were formerly at that age.

Tables X and XI show the average weights of lake trout and of whitefish respectively at specific ages for all the cases where data are available for making comparison between samples taken in two or more years. It is quite evident that there has been no appreciable increase in rate of growth among the whitefish. Among the lake trout the situation is complicated because the samples are small in view of the fact that some lake trout are more than three times as big as others of the same age. Such as the data are, however, they show that the growth rate of lake trout has not increased noticeably.

MORTALITY RATE

Suppose that when the ages of a representative sample of whitefish are determined the sample is found to consist of 1

nine-year-old, 30 ten-year-olds, 50 eleven-year-olds, 90 twelve-year-olds, 100 thirteen-year-olds, 50 fourteen-year-olds, 25 fifteen-year-olds, 12 sixteen-year-olds, 6 seventeen-year-olds, and a few older fish (this is typical of Great Slave Lake commercial whitefish). It is evident that most nine-year-olds are too small to be caught, that ten-year-olds are more liable to capture and so on. A fish evidently must be at least a thirteen-year-old to be fully vulnerable to capture. The decrease in numbers of fish more than 13 years old is apparently the result of a mortality rate which eliminates 50 per cent of the surviving fish each year. The fact that the gear may become less effective as the fish increase in girth perhaps accounts for part of this increase, but it is presumably a small part since whitefish increase relatively slowly in size at these ages. Perhaps maximum girth in a large whitefish is unimportant because the fish is tapered, so that there is always some part of the anterior end which will go through the mesh of a gill-net.

The same arguments hold for lake trout. It should be remembered that a large proportion of lake trout are caught by their mouth parts, which makes their capture independent of mesh size. Dr. W. E. Ricker in "Methods of estimating vital statistics of fish populations" has reviewed and elaborated the discussion on the determination of mortality rates from this type of data. He suggests that "catch curves" (i.e. curves whose absiccae are ages and whose ordinates are number of fish)

be plotted. A series of such curves for lake trout and for whitefish are shown in Figure I. The scale collection station and year which each curve represents is indicated. Note that only cases where five or more fish were of a particular age are shown. In some instances this results in the right limb of the curve disappearing below the base line to reapppear as a small peak further to the right. The curve "I, 1948" is based on a sample that was not entirely randomly chosen, and it should not have been included. Dr. Ricker shows that the slope of the right limb of such a curve represents the mortality rate among the fish population sampled. He further shows that if there has been an increase in mortality rate the right limb of the catch curve should show a decrease in slope at a point which is a distance to the right of the highest point by an amount which represents the number of years since the factor causing the increase in mortality began to act.

The right limb of the catch curves in Figure I might be expected to increase in slope slightly towards the right if there is a tendency for efficiency of capture to lessen in the case of larger fish. However, it is unlikely that any such increase would be enough to obscure the pronounced decrease in slope that would be expected to accompany the greater mortality rate that would necessarily accompany the removal of an appreciable proportion of the catchable fish.

The curves in Figure I give no indication that there

has been a noticeable increase in mortality rate of either lake trout or whitefish. (The curve "VII, 1949" may represent a change in mortality rate, but if so it would be unrelated to the fishery since the change, if any, occurred two years before fishing began in that vicinity.) The mortality rate in 1950 is seen to be approximately the same as it was before commercial fishing began. Fishing has not resulted in commercial fish dying faster than they would have died from "natural causes" if left alone.

AVERAGE AGE

It is evident that if growth rate increases, or if mortality rate increases, then the average age of fish in a representative sample from the catch must decrease. Table XII shows the average ages calculated from all the available data. There is no indication of decrease in average age of either lake trout or whitefish since fishing began. The apparent increase in the age of whitefish probably is the result of fishing a little deeper each year (as our records show). This must mean that the average size of whitefish in the catch has also increased - though not by much because of the slow growth rate - but if so it cannot be demonstrated from the data available. The apparent increase cannot be attributed to a progressive change in scale reading interpretation since the whitefish scales were read in the order 1948, 1947, 1946, 1949.

As far as the data go, then, they can be interpreted as supplying further evidence that the rate of growth has not increased and that mortality rate has not increased since commercial fishing began.

DISCUSSION

When a fish population is exploited for the first time there must inevitably be as a result, a decrease in availability, a decrease in the size and age of fish caught, an increase in mortality rate and probably an increase in growth rate. The precise amount of change in these directions that is to be interpreted as representing overfishing is not obvious at present (although the scientific study on Great Slave Lake is expected to greatly increase our knowledge of this subject). Where there has been no clear-cut decline in availability, no apparent decrease in average size or age, and no obvious increase in either growth rate or mortality rate it is quite evident that the fish population in question is far from being overfished.

It is instructive to compare the Great Slave Lake fishery with one where the fish population is generally considered to be depleted. A good example is the halibut fishery off the West coast of Canada (Area 2) just prior to 1931 when most of the regulations to correct the situation were introduced. In this fishery all the conditions prevailed which are generally associated with the term "depletion". On the other hand the

depletion can be considered as "moderate" since (1) it was still profitable to catch halibut, in fact the industry was expanding (2) the situation was corrected by a moderate reduction in annual production.

The following is a comparison between certain pertinent characteristics of the two fisheries:

The Halibut Fishery	The Great Slave Lake Fishery
Total annual catch decreased in spite of increased fishing effort.	Total annual catch increased when fishing effort increased.
Overall catch per unit of effort less than 16 per cent (probably much less) of the original catch per unit.	Overall catch per unit of effort 83 per cent of the original catch per unit.
About 40 per cent of the stock of commercial fish caught each year.	A negligible fraction of the stock of commercial fish caught each year (no change in mortality rate).
Fish caught much smaller and younger than in the original condition.	No apparent decrease in average size or average age.
"Relatively few survive beyond age 12, the average age of maturity for females."	A major part of the spawn deposited by females younger than those usually captured by the gear used (calculated knowing age at maturity, egg count at each age, and age composition of the catch).

SUMMARY

1. The amount of commercial fishing gear used on Great Slave Lake is comparatively insignificant.

2. Fish tend to remain in one place.

3. There has been no clear-cut decrease in catch per unit of effort since commercial fishing began.

4. There has been no obvious decrease in the average size of fish caught since commercial fishing began.

5. There has been no obvious increase in rate of growth since commercial fishing began.

6. There has been no obvious increase in mortality rate since commercial fishing began.

7. Lack of obvious changes in these respects indicates that fishing has been far from excessive.

8. The characteristics of the Great Slave Lake fishery are decidedly different from those of depleted fishery.

Table I. A summary of the extent of fishing activities by the commercial fishery on Great Slave Lake 1945-1950. Reasonably accurate estimates of availability and fishing effort can be made for the summer fishery only. From 1945 to 1948 (inclusive) commercial fish meant lake trout, whitefish and inconnu. In 1949 and 1950 it meant lake trout and whitefish only. Omitting inconnu decreases availability by about 4 units. December is regarded as part of the following year.

Year	Catch of commercial fish in thousands of pounds round weight			Summer fishing effort in equivalent net-nights ✱		Availability i.e. catch per unit effort in summer
	Max. legal	Actual Winter	Actual Summer	Estimated total	Recorded and used to find availability	
1945	4,200	0	1,549	-	-	-
1946	4,200	0	2,753	26,000	25,357	106
1947	4,200	272	2,370	21,000	19,854	112
1948	4,200	1,396	2,293	20,000	19,838	116
1949	9,000	4,705	5,337	48,000	38,410	106
1950	9,000	3,912	4,306	49,000	34,784	88

✱ A fishing effort of X net-nights is the effort that X nets which are lifted daily would exert in one night to give the same catch. Fishing effort expressed in equivalent net-nights is adjusted for the fact that doubling the time between lifts does not double the amount of fish taken per lift.

Table II. A summary of the amount of movement shown by commercial fish that were tagged, released alive, and later recovered from Great Slave Lake. Fish released into closed areas are excluded.

Fishing season after released in which fish was recaptured	Average time at large -days-	Average distance travelled -miles-	Relation of statistical area in which recovered to statistical area in which released		
			same	adjoining	not adjoining
Trout					
First	15	2	33	2	0
Second	354	23	17	9	3
Third	663	26	14	8	1
Fourth	1,089	38	1	2	1
Whitefish					
First	15	1	25	0	0
Second	360	8	10	0	0
Third	634	17	2	0	0
Fourth	-	-	0	0	0

Table III. The catch per unif of effort of combined lake trout and whitefish from the three most heavily fished statistical subdivisions ✱ of Great Slave Lake to the fishermen who were interviewed during the designated summer season.

	June 16-30	July 1-15	July 16-31	Aug. 1-15	Aug. 16-31	Sept. 1-15	Sept. 16-31	Total Summer
Area G								
1945	-	-	-	105	-	-	-	105
1946	91	82	97	78	92	135	-	91
1947	-	88	79	87	91	94	105	87
1948	69	64	141	112	147	92	-	98
1949	69	57	45	43	60	53	-	58
1950	-	-	47✱✱	83✱✱	63✱✱	86✱✱	-	68
Area H								
1945	-	-	-	88	-	-	-	88
1946	60	81	71	71	72	67	-	71
1947	-	74	54	58	72	68	80✱✱	67
1948	65	64	72	132	75	58	-	76
1949	41✱✱	48✱✱	268✱✱	-	69✱✱	50✱✱	-	58
1950	70✱✱	84✱✱	32✱✱	56✱✱	95✱✱	69	-	63
Area K								
1945	-	-	-	77	-	-	-	77
1946	51✱✱	95	86	71	63	130	-	87
1947	-	112	77	91	86	98	90✱✱	89
1948	104	96	111	121	101	94	-	103
1949	77	98	81	100✱✱	86	89	-	90
1950	75✱✱	127	77	100	111	80✱✱	-	95

✱ These three areas, which include 18 per cent of the total water area of the lake produced almost 100 per cent of the total catch in 1945, 71 per cent in 1946, 50 per cent in 1947, 31 per cent in 1948, 4 per cent in 1949, and 3 per cent in 1950.

✱✱ Value based on less than 200 units of effort.

Table IV. The average size of lake trout and of whitefish in pounds round weight and its standard error in samples taken at random from the fish that were landed by Great Slave Lake commercial fishermen from Area E during various summer seasons. The number of fish in each sample is shown in brackets.

Year	June 16-30	July 1-15	July 16-31	Aug. 1-15	Aug. 16-31	Sept. 1-15
Lake trout						
1946	-	12.6±0.7 (106)	11.8±0.8 (73)	-	-	-
1947	-	13.3±1.8 (21)	10.5±0.3 (303)	-	-	-
1948	-	10.9±0.4 (165)	12.2±0.2 (366)	-	-	-
1949	8.2±0.3 (217)	10.3±0.2 (592)	14.7±0.4 (334)	9.2±0.3 (325)	-	-
1950	9.2±0.6 (150)	10.3±0.4 (253)	12.±0.7 (143)	9.3±0.1 (167)	8.6±0.3 (249)	11.6±0.7 (80)
Whitefish						
1946	-	-	2.8±0.05 (73)	-	-	-
1947	-	2.9±0.09 (41)	2.8±0.03 (477)	-	-	-
1948	-	2.8±0.05 (150)	3.0±0.03 (308)	-	-	-
1949	-	3.0±0.02 (646)	2.8±0.02 (715)	2.9±0.02 (333)	2.7±0.03 (697)	-
1950	2.8±0.05 (100)	2.9±0.03 (439)	3.0±0.03 (400)	3.1±0.04 (442)	3.0±0.05 (370)	2.5±0.03 (294)

Table V. The average size of lake trout and of whitefish in pounds round weight and its standard error in samples taken at random from the fish that were landed by Great Slave Lake commercial fishermen from Area F during various summer seasons. The number of fish in each sample is shown in brackets.

Year	July 1-15	July 16-31	Aug. 1-15	Aug. 16-31	Sept. 1-15
Lake trout					
1947	10.9±0.7 (67)	12.2±1.1 (44)	12.5±0.6 (115)	7.4±0.4 (97)	-
1948	9.3±0.5 (136)	9.1±0.3 (261)	-	5.6±0.2 (110)	4.9±0.1 (84)
1949	10.0±0.6 (118)	8.1±0.5 (209)	-	-	-
1950	6.1±0.3 (37)	-	-	6.2±0.1 (214)	-
Whitefish					
1947	2.8±0.09 (48)	2.6±0.08 (21)	2.8±0.03 (267)	-	3.1±0.07 (131)
1948	2.8±0.05 (170)	2.9±0.03 (252)	-	-	3.3±0.09 (88)
1949	2.9±0.03 (255)	3.0±0.02 (683)	-	-	-
1950	2.7±0.03 (266)	4.1±0.10 (91)	2.5±0.04 (74)	2.7±0.03 (246)	2.6±0.02 (505)

Table VI. The average size of lake trout and of whitefish in pounds round weight and its standard error in samples taken at random from the fish that were landed by Great Slave Lake commercial fishermen from Area G during various summer seasons. The number of fish in each sample is shown in brackets.

Year	June 16-30	July 1-15	July 16-31	Aug. 1-15	Aug. 16-31	Sept. 1-15
Lake trout						
1945	-	-	-	7.8±0.6 (48)	-	-
1946	-	7.7±0.4 (147)	-	-	5.4±0.1 (167)	-
1947	-	9.5±0.3 (427)	9.9±0.3 (319)	8.1±0.2 (193)	6.4±0.2 (217)	5.0±0.1 (249)
1948	11.7±0.6 (92)	10.4±0.6 (79)	-	7.5±0.4 (104)	-	5.1±0.03 (172)
1949	-	-	-	-	8.6±0.6 (115)	5.4±0.1 (383)
1950	6.5±0.4 (19)	-	-	8.6±0.7 (93)	-	4.3±0.2 (90)
Whitefish						
1945	-	-	-	2.9±0.06 (74)	-	-
1946	-	2.6±0.02 (367)	-	-	3.0±0.04 (435)	-
1947	-	3.0±0.03 (418)	2.6±0.02 (804)	2.7±0.03 (322)	2.7±0.03 (173)	2.7±0.04 (381)
1948	-	2.7±0.02 (370)	-	2.7±0.03 (160)	2.7±0.03 (255)	3.0±0.04 (262)
1949	-	-	2.9±0.02 (517)	-	-	-
1950	-	-	-	2.6±0.03 (186)	-	-

Table VII. The average size of lake trout and of whitefish in pounds round weight and its standard error in samples taken at random from the fish that were landed by Great Slave Lake commercial fishermen from Area H during various summer seasons. The number of fish in each sample is shown in brackets.

Year	June 16-30	July 1-15	July 16-31	Aug. 1-15	Aug. 16-31	Sept. 1-15
Lake trout						
1946	-	-	-	-	8.5±0.2 (366)	-
1947	-	8.7±0.3 (263)	8.5±0.4 (111)	7.4±0.2 (292)	8.3±0.4 (94)	7.9±0.3 (243)
1948	9.0±0.5 (91)	9.6±0.3 (262)	8.8±0.4 (112)	8.2±0.3 (93)	8.9±0.3 (248)	7.0±0.5 (32)
1949	-	-	-	-	-	-
1950	-	-	6.9±0.2 (250)	6.8±0.4 (59)	7.2±0.3 (218)	6.8±0.2 (165)
Whitefish						
1945	-	-	-	3.3±0.07 (61)	-	-
1946	-	-	-	-	3.1±0.04 (414)	-
1947	-	3.0±0.04 (331)	2.9±0.08 (82)	2.9±0.06 (249)	3.1±0.05 (197)	3.4±0.10 (172)
1948	-	2.8±0.06 (101)	3.1±0.08 (103)	3.1±0.08 (116)	3.2±0.07 (250)	-
1949	-	-	-	-	-	-
1950	-	-	3.0±0.06 (235)	3.1±0.07 (173)	3.0±0.08 (275)	3.1±0.06 (212)

Table VIII. The average size of lake trout and of whitefish in pounds round weight and its standard error in samples taken at random from the fish that were landed by Great Slave Lake commercial fishermen from Area K during various summer seasons. The number of fish in each sample is shown in brackets.

Year	June 16-30	July 1-15	July 16-31	Aug. 1-15	Aug. 16-31	Sept. 1-15
Lake trout						
1945	-	-	-	8.1±0.8 (24)	-	-
1946	-	-	-	-	8.7±0.4 (145)	-
1947	-	10.6±0.4 (157)	10.2±0.4 (175)	10.9±0.7 (88)	-	-
1948	8.6±0.8 (67)	11.6±0.4 (243)	7.9±0.4 (91)	7.8±0.2 (269)	7.5±0.2 (180)	7.4±0.4 (135)
1949	-	6.0±0.2 (67)	-	-	-	-
1950	12.8±0.1 (37)	15.7±0.6 (164)	8.9±0.4 (99)	9.4±0.4 (54)	8.3±0.3 (154)	6.7±0.2 (149)
Whitefish						
1947	-	3.1±0.04 (321)	3.4±0.08 (181)	3.4±0.04 (268)	3.0±0.05 (117)	-
1948	3.4±0.08 (73)	3.5±0.04 (199)	4.2±0.11 (131)	3.6±0.07 (264)	5.0±0.13 (126)	3.1±0.05 (263)
1949	-	3.7±0.03 (518)	4.1±0.11 (128)	-	-	-
1950	-	3.7±0.04 (394)	3.3±0.03 (443)	3.6±0.09 (96)	-	2.9±0.13 (42)

Table IX. The average size of lake trout and of whitefish in pounds round weight and its standard error in samples taken at random from the fish that were landed by Great Slave Lake commercial fishermen from Area M during various summer seasons. The number of fish in each sample is shown in brackets.

Year	July 1-15	July 16-31	Aug. 1-15	Aug. 16-31	Sept. 1-15
Lake trout					
1947	-	8.7±0.6 (71)	-	8.0±0.2 (403)	7.6±0.2 (344)
1948	9.9±0.4 (153)	7.6±0.5 (76)	9.0±0.3 (301)	8.5±0.3 (267)	7.3±0.2 (252)
1949	-	-	5.8±0.2 (48)	8.7±0.3 (293)	8.4±0.2 (377)
1950	-	8.0±0.3 (159)	8.0±0.2 (256)	8.4±0.4 (285)	7.9±0.2 (207)
Whitefish					
1947	3.2±0.07 (100)	3.4±0.09 (145)	-	-	-
1948	-	2.9±0.06 (65)	3.9±0.08 (300)	4.0±0.09 (227)	4.3±0.13 (156)
1949	-	-	-	4.1±0.05 (446)	-
1950	-	3.3±0.06 (119)	3.8±0.06 (438)	4.2±0.06 (443)	4.3±0.06 (501)

Table X. Average weights in pounds at specific ages of lake trout in samples taken at random from the fish landed by Great Slave Lake commercial fishermen from the vicinity of the designated scale collection stations during the specified years. Only averages based on at least 10 fish are shown.

Age	Scale Collection Station							
	III			IV			VII	
	1946	1947	1949	1946	1947	1949	1947	1949
7+	-	-	3.7	-	-	3.7	-	-
8+	-	-	5.0	4.8	-	4.1	-	-
9+	5.6	-	5.8	5.6	4.9	4.8	-	-
10+	6.7	-	7.2	6.5	5.5	5.6	6.1	4.2
11+	7.0	-	8.9	7.1	6.6	6.7	6.3	5.4
12+	9.0	5.4	10.0	-	6.2	7.3	6.6	6.0
13+	9.0	7.3	12.0	-	7.2	11.9	7.9	6.7
14+	12.4	-	14.6	-	6.3	-	7.5	7.8
15+	14.8	11.7	14.0	-	9.8	15.0	8.0	8.5
16+	18.8	-	18.5	-	-	-	9.8	9.8
17+	19.0	-	-	-	-	-	-	10.6
18+	-	-	-	-	-	-	-	13.0

Table XI. Average weights in pounds at specific ages of whitefish in samples taken at random from the fish that were landed by Great Slave Lake fishermen from the vicinity of the designated scale collection stations during the specified years. Only averages based on at least 10 fish are shown.

Age	Scale Collection Station											
	III				IV				V		VII	
	1946	1947	1948	1949	1946	1947	1948	1949	1947	1948	1947	1949
9+	-	-	-	-	1.9	2.2	2.1	-	-	-	-	-
10+	2.2	-	2.4	-	2.2	2.3	2.3	2.4	2.4	-	-	-
11+	2.6	2.5	2.6	2.7	2.6	2.5	2.5	2.6	2.6	-	2.6	3.2
12+	3.0	2.9	2.7	2.8	2.9	2.9	2.9	2.7	2.9	3.0	2.9	3.2
13+	3.3	-	3.1	2.9	3.2	3.2	3.2	2.9	3.3	3.4	3.3	3.4
14+	-	-	3.1	3.1	-	3.5	-	3.2	3.7	-	3.8	3.8
15+	-	-	-	3.4	-	-	-	3.2	4.1	-	-	4.3
16+	-	-	-	3.6	-	-	-	3.4	4.2	-	-	4.7
17+	-	-	-	3.7	-	-	-	-	-	-	-	4.9
18+	-	-	-	-	-	-	-	-	-	-	-	5.5
19+	-	-	-	-	-	-	-	-	-	-	-	6.1

Table XII. Average ages of commercial fish in samples taken at random from the fish that were landed by Great Slave Lake fishermen from the vicinity of the designated scale collection stations during the specified years. The number in the samples are shown in brackets.

Year	Scale Collection Station						
	I	II	III	IV	V	VI	VII
Lake trout							
1946	-	-	13.5 (166)	10.2 (134)	-	-	-
1947	-	-	13.5 (66)	12.8 (275)	13.4 (363)	-	13.4 (289)
1949	15.2 (253)	-	11.5 (489)	10.0 (484)	13.6 (189)	13.3 (562)	14.2 (477)
Whitefish							
1946	-	-	11.8 (96)	11.2 (354)	-	-	-
1947	-	-	12.1 (60)	11.6 (418)	12.5 (412)	-	12.6 (93)
1948	-	-	12.3 (119)	11.6 (302)	13.0 (68)	-	-
1949	13.6 (732)	12.3 (472)	14.0 (507)	12.8 (516)	-	14.8 (531)	14.9 (502)