Catch and Winter Food of Lake Trout in certain Algonquin Park Lakes[1]

By N. V. Martin
Ontario Department of Lands and Forests, Toronto

ABSTRACT

Winter catches of lake trout in the sports fishery exceeded those taken at other times of the year in some Algonquin Park lakes. The size of the fish caught was generally smaller because of the different type of gear used in winter. The winter fishing also exploited a high percentage of the immature stock.

The winter diet was less varied than at other seasons and there was a high percentage of empty stomachs. Bottom feeding was negligible in most lakes, but, in some, insect larvae were taken more frequently than at any other time of the year. Plankton feeding was at a low level in winter even in those lakes which have predominantly plankton-feeding populations in summer. In these same lakes the absence of thermal barriers permitted trout to feed more frequently on fish in winter and also on a greater variety of fish species. Populations feeding on fish in summer continued to do so in winter. As the winter progressed, there was a decline in the frequency of plankton in the stomachs and an increase in fish and bottom fauna.

INTRODUCTION

Our knowledge of the life history of the lake trout *Salvelinus namaycush namaycush* is still imperfect and indeed is almost a complete void for that part of the year when ice covers our lakes. Studies aimed at filling this gap in our information have been carried on by the Research Division of the Ontario Department of Lands and Forests in the Algonquin Park area. Two features of these studies will be discussed—the catch statistics of the ice fishing and the winter food of the lake trout—and these will be compared with summer conditions.

THE WINTER FISHERY

The winter sports fishery for lake trout has become increasingly popular in late years in southern Algonquin Park. Because of the difficulties in reaching the lakes in the winter months most of the angling has been confined to about a dozen lakes within a mile of the highway which passes through the southern corner of the Park. An increasing part of the fishing in late years is being done by fishermen entering the Park from towns as far as 70 or 80 miles away. The local people of course have fished the area for many years but in general they fish a wider range of lakes, including some of the more inaccessible waters.

The fishing technique is similar to that employed elsewhere. Minnow-baited lines are attached to slender four-foot gads placed at a 45-degree angle over a hole about a foot in diameter. A strike is indicated by the violent bending of the tip of the pole.

[1]Received for publication April 20, 1953.

J. Fish. Res. Bd. Can., 11(1), 1954.
Printed in Canada

The availability of the lake trout in winter is generally higher than that at other times of the year, particularly in smaller lakes. This is due in part to the greater size range of trout available in the winter fishery. In large lakes like Lake Opeongo (13,400 acres), the catch is usually low, possibly because of difficulty in locating the fish.

Although there are no accurate catch data, rough estimates have been made for several of the lakes. In Brewer Lake (109 acres) the catch in the winter of 1950–51 was estimated to be 50 lake trout. In Canisbay Lake (350 acres) in the same year an estimated 800 lake trout were taken. Its catch in 1952–53 probably exceeded 1,000 lake trout. Costello Lake (96 acres) rewarded the angler with approximately 50 lake trout in 1952. All these catch figures far exceed the angling returns for the remainder of the year in these lakes.

In Figure 1 a comparison is made between the size composition of the angler's catch made by ice fishing and the composition of the catch taken by trolling at other seasons. The winter fishing, in three of the lakes at least, takes a much higher percentage of small lake trout. In Canisbay Lake 60 per cent of the lake trout in winter were 12 inches and under (fork length) while this group made up only 15 per cent of the summer catch. The average length of the winter fish was 11.9 inches, the summer 14.7 inches. In Lake Louisa this same size group of fish formed 50 per cent of the ice-fishing catch (average length 12.4 inches) and 10 per cent of the summer catch (average length 14.5 inches). In Brewer and Costello lakes there are insufficient trolling returns at a similar period to the winter collections for a comparison, but it is evident there is a high percentage of small fish, particularly in Costello Lake. In Lake Opeongo a somewhat different situation exists as the size of the fish taken through the ice is somewhat greater than that of those by trolling. Probably the fact that anglers on this lake use large hooks and minnows in the hope of catching large lake trout has some bearing on this situation.

Figure 1 also gives an indication of the proportion of mature and immature fish in the catch. Canisbay lake trout first mature at about 12 inches and Louisa at 11 inches, and both at age 5. It is evident then that the winter fishing exploits a high percentage of the immature stock in both these lakes. In Brewer and Costello lakes between half and two-thirds of the winter catch is made up of immature fish.

The difference in the ice-fishing and trolling catches is of course related to the differences in the gear used. The summer trolling, using heavy metal lines and large trolls or spinners, regulates the size of lake trout caught, so that in such lakes as Canisbay and Louisa, where the trout mature at a small size, the summer fishery leaves an appreciable part of the mature stock to spawn each fall. This situation will be changed because of winter fishing methods which take smaller fish and hence a greater proportion of the immature stock.

WINTER FOOD OF THE LAKE TROUT

A total of 442 lake trout stomachs was collected from a series of 18 Algonquin Park lakes, 20 by gill-netting, the remainder by the winter sports fishery. These data are summarized in Table I.

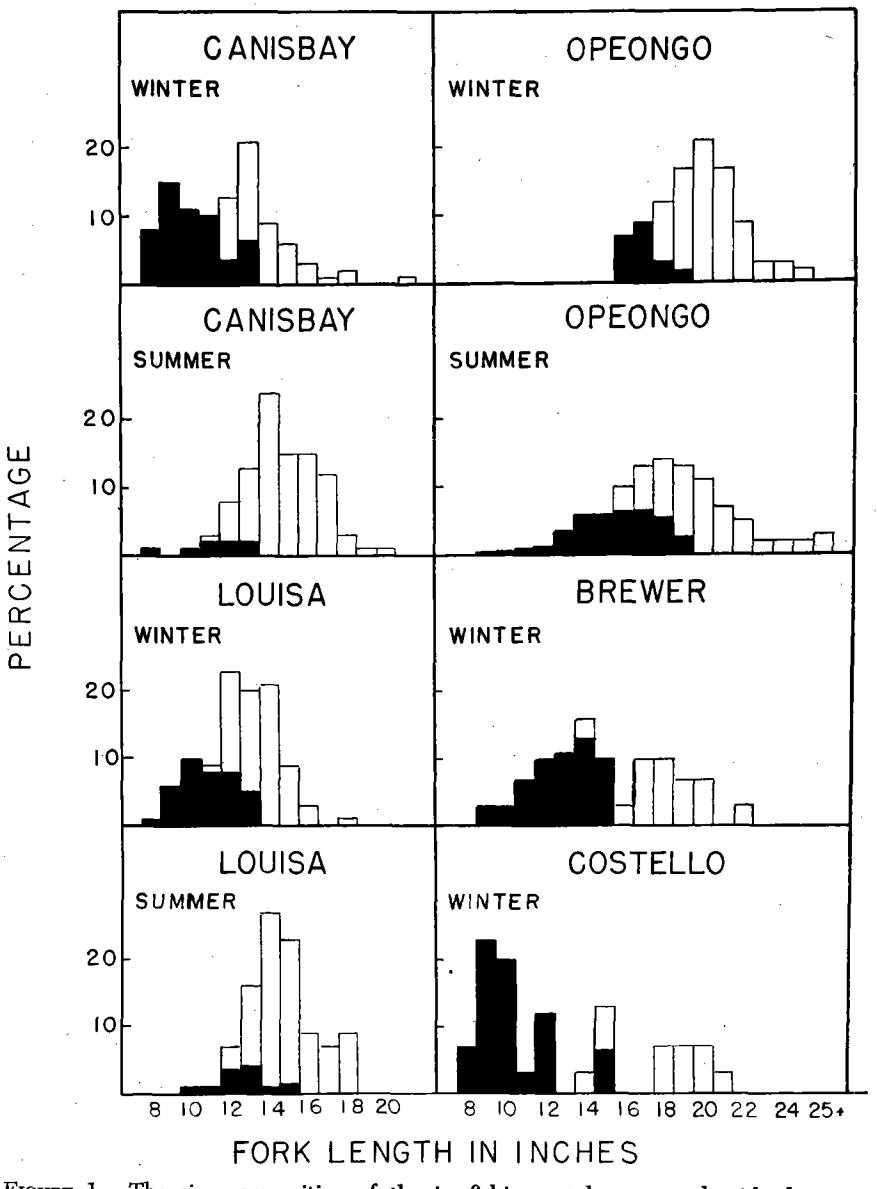

FIGURE 1. The size composition of the ice-fishing catch compared with that at other times of the year. The black areas represent the proportion of immature lake trout at each length.

In Table II the winter food is compared with that at other times of the year for those lakes where there are sufficient data. As the diet of the lake trout varies seasonally the data have been split into four major periods, spring (May and June), summer (July and August), fall (September and October) and winter.

TABLE I. Analysis of lake trout stomachs collected from certain Algonquin Park lakes in winters of 1948–52.

Lake	Number collected	Number containing food items indicated					
		Empty	Plankton	Insect larvae	Fish	Bait minnows	Crayfish
Boot	21	6	1	2	12	4	0
Booth	11	6	0	0	5	0	0
Brewer	33	17	0	0	16	10	0
Butt	8	8	0	0	0	2	0
Canisbay	77	15	33	17	22	11	0
Costello	38	22	9	0	8	13	0
Fraser	11	3	0	3	5	3	0
Hay	9	7	0	0	2	2	0
Joe	1	1	0	0	0	0	0
Kathlyn	1	0	0	0	1	1	0
Kearney	2	1	0	0	1	0	0
Lobster	5	2	0	0	2	3	0
Louisa	117	27	14	27	68	28	0
Opeongo	83	32	2	1	50	3	0
Shirley	5	0	0	0	4	0	1
Source	3	0	2	0	1	0	0
Sylvia	5	0	0	0	2	3	4
Two Rivers	12	6	0	0	6	2	0
Total	442	153	61	50	205	85	5

The winter diet differs from that at other times. Although it is much less varied because of the absence of surface feeding, there is also less variety in the bottom and pelagic feeding. In Brewer and Costello lakes the percentage of empty stomachs was at its highest, except for the fall months, and it was generally high in the other lakes. The data in Table I suggest that there was less feeding activity in winter.

Plankton feeding was generally at a low level in winter. In Lake Louisa, which has a predominantly plankton-feeding population in summer, only one trout in nine took plankton during the period of ice cover. Bottom feeding was almost negligible in three of the five lakes. In two lakes, Louisa and Canisbay, insect larvae occurred more frequently than at any other time of the year. Mayfly larvae were the chief components of the bottom organisms in the stomachs, as they were at other seasons. Crayfish were also taken on occasion.

The use of bait minnows in the ice-fishery made the analysis of the fish diet difficult, particularly when a lake was fished over a period of time. Where fish in trout stomachs have been definitely identified as bait minnows they have been indicated as such in the data presented. They have not been included in the fish percentages, and where they are the only food in the stomach the trout has been considered to be empty.

It is evident that in most of the lakes fish play an important part in the winter diet. This is particularly striking in the case of Lake Louisa where fish

TABLE II. Percentage frequency of occurrence of winter foods, compared with other times of the year.

Lake	Number examined	Empty	Plankton	Insect larvae	Fish	Surface
Louisa						
Spring	40	4	23	19	31	19
Summer	298	15	73	7	15	3
Fall	111	33	40	1	26	0
Winter	117	23	12	23	58	0
Canisbay						
Spring	18	22	61	11	22	6
Summer	134	13	54	11	35	1
Fall	0	—	—	—	—	—
Winter	77	19	43	22	29	0
Brewer						
Spring	84	10	40	11	49	4
Summer	103	12	39	4	65	0
Fall	63	22	60	2	24	0
Winter	33	52	0	0	48	0
Costello						
Spring	34	5	27	24	35	11
Summer	21	16	13	16	71	0
Fall	9	0	88	0	0	0
Winter	38	58	24	0	21	0
Opeongo						
Spring	266	34	4	7	70	6
Summer	345	44	0	0	56	0
Fall	42	55	0	0	43	0
Winter	83	38	3	1	61	0

were taken four times as often as in the summer. In Louisa in summer the trout feed largely on plankton, since minnows, the only forage fish, are in shallow water and largely unavailable to them. With the breakdown of thermal barriers in fall and winter, minnows are taken more frequently. The Lake Opeongo trout, which are predominantly fish feeders at other times of the year, are also strong fish feeders in winter. Only in Costello was there any drop in the number of fish-feeding trout in winter.

As might be expected there is a difference in the species composition of the forage fish in winter. The absence of temperature barriers permits lake trout to feed on species partly or entirely unavailable to the trout during thermal stratification. Perch occurred twice as frequently as whitefish in Opeongo trout in winter, whereas in summer the reverse is generally although not always true. Minnows were also taken on occasion at this time in this lake, whereas they were only rarely eaten in summer. Similarly there was a sixfold increase in minnows in the stomachs of Brewer Lake trout. Pumpkinseed were very rarely taken in winter although they were eaten in summer.

In Table III an attempt has been made to show that food habits may change during the winter. This seems rather surprising, since we generally assume that conditions under ice are rather static. However the changes are more a change in the frequency in which certain food elements occur than a change to other forms.

TABLE III. Percentage frequency of occurrence of food items in stomachs of lake trout in winter months.

Lake	Period	Number examined	Percentage containing food items indicated			
			Empty	Plankton	Insect larvae	Fish
Louisa	January 16, 17	24	21	38	13	42
	February 12	22	27	18	23	45
	March 10, 23	30	17	3	40	66
Canisbay	December 17	12	0	75	8	25
	January	10	20	80	0	10
	February 18	11	0	100	0	0
	March 28, 29	20	25	10	20	55
	April 6, 7	24	33	13	17	21
Opeongo	January	15	7	7	7	93
	February	30	53	3	0	43
	March	30	45	0	0	55
	April	6	0	0	0	100

There appears to be a general increase in the number of empty stomachs as the winter progresses. There are, however, definite trends in the abundance of plankton, fish and insect larvae in the stomachs. The frequency of occurrence of plankton in the stomachs decreases as the winter progresses. In Lake Louisa, where a year-round study of feeding habits has been carried out by Martin (1952), it is evident that the incidence of plankton in the stomachs is correlated with the classical plankton cycle. Peaks in the frequency of plankton in the stomachs occur in early June and late October and low points in late August and March. Data provided by Dr. Langford of the Ontario Fisheries Research Laboratory show that certain zooplankters in samples from these lakes, particularly copepods and cladocerans, decrease throughout the winter until in March and April they may be only a fifth as abundant as in October. Fish in the stomachs showed a steady increase in frequency of occurrence throughout the winter at least up until the end of March. The increased proportion of fish-feeding trout in late winter is probably associated with a decreasing abundance of plankton.

REFERENCE

MARTIN, N. V. 1952. A study of the lake trout, *Salvelinus namaycush*, in two Algonquin Park, Ontario, Lakes. *Trans. Am. Fish Soc.*, 81, 111–137.