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No. 200D

Title

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LAKES, N. B., CANADA.

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March 10, 1936.

THE DISTRIBUTION AND FOOD OF LANDLOCKED SALMON IN CHAMCOOK LAKES, N.B.

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Landlocked salmon (Salmo salar sebago) is the most attractive game fish in the region and occurs in the three lower lakes of the Chamcook chain where it was artificially introduced quite a long time ago from the United States. It thrives in Chamcook lake very well and has provided really good sport fishing and even, as it has been said, Americans came to Chamcook for collecting salmon eggs in order to introduce it again in certain Maine waters where the original stock of this fish had become depleted. However, during the last several years due to extensive fishing and limitation of spawning grounds the quantity of salmon in Chamcook lakes has gradually become smaller. In order to get some information with regard to this valuable species several problems were attacked by different investigators at the same time and the author was engaged in the study of feeding habits of this fish.

During the period since late fall of 1933, till late fall of 1935, as many as forty-five stomachs of adult salmon were examined from First and Second Chamcook lakes. The results of these stomach analyses are submitted in the following table. It has been found that the smelt play a most important role in the diet of this fish in First lake and that the stickleback is the principal food item for salmon in the Second lake. At the same time it has been assured that both smelt and stickleback are feeding almost entirely on planktonic crustaceans. The feeding habits of these species are summarized in another report.

As should be expected, landlocked salmon stop feeding some time before the spawning period and our examinations of alimentary tracts of spawning salmon show no traces of food.

The vertical and horizontal distribution of salmon in Chamcook is subject of considerable variation throughout the year and depends on temperature and the distribution of its food. During the hot weather when the water temperatures in Chamcook lake is quite high all the salmon seem to congregate into the deepest places. As an example of this the following case might be illustrated: On July 24th during the moderately calm weather the temperatures in Second Chamcook at surface, 1 m., 2 m., 3 m., 5 m. and 6 m., were 26.8, 24.1, 23.9, 23.4, 17.8 and 15.2°C respectively. In that time 15 salmon were caught in the deepest hole in one small gill net in a comparatively short time. During the other times when such an uneven (for this lake) distribution of temperatures was not observed only two fish were caught with the same gear set many times in the same and other places. On August 2, 1935, after strong northwest wind and complete circulation, the water temperature was 24.3°C all over the lake. A same net was set at the same spot without result. 1

In the First Chamcook where the depths are greater the salmon is distributed during the most part of the year all over the lake and although many trials have been made with gill nets during the summer and winter the catches always were very limited. As can be judged by stomach examination, the salmon in First Chamcook is a pelagic fish and follows the vertical migration of smelt, rising near surface at the evening at which time they can occasionally be caught by means of artificial fly. Therefore, it is hard to catch salmon in First Chamcook lake. During the spawning time salmon in this lake gather probably into two schools, one of

which run into the outlet from First lake near the railway bridge where they can be easily observed. In the fall of 1935 when due to the extremely dry season the outlet from the Second lake was practically dry a considerable number of spawning salmon were observed near the foot of First lake.

The writer was informed that before the dam was built at the foot of the lake many fish spawned in the outlet proper in the vicinity of the present sawmill. At the present time if salmon pass below the dam they have no chance to return into the lake again.

The following table represents the analyses of stomach contents of fish from the two lower lakes of the Chamcook chain:

<u>Date</u>	<u>Lake</u>	<u>Length</u>	<u>Sex</u>	<u>Stomach content</u>	<u>Remarks</u>
17-2-33	1	590/610	F	Empty	Spawning
"	1	560/575	F	"	"
"	1	600/620	M	"	"
"	1	630/650	M	"	"
2-1-34	1	670/690	F	4 smelts (60-100 mm.)	
2-2-34	1	365/395	F	1 smelt (100 mm.)	Remains of other smelt in intestine
12-2-34	1	311/320	F	2 smelts	
15-2-34	1	570/585	F	Empty	Fish was stripped for hatchery in the fall
16-2-34	1	360/365	F	5 smelts (60-90 mm.)	Remains of smelt in intestine
21-2-34	1	450/490	F	3 smelts	
5-3-34	1	350/380	F	Empty	
"	1	340/365	M	3 smelts	
10-3-34	1	345/370	M	Empty	

<u>Date</u>	<u>Lake</u>	<u>Length</u>	<u>Sex</u>	<u>Stomach content</u>
13-3-34	1	327/365	F	Remains of fish in the intestine
15-3-34	1	220/245	F	Phryganeidae (larva)one Water spiderone
"	1	300/330	M	4 smelts
26-3-34	1	225/234	M	6 smelts (60-70 mm.)
"	1	300/330	F	Remains of smelts in the intestine
1-3-34	1	580/600	F	Empty. Fish was stripped for hatchery in the fall
25-4-34	1	/570	F	About 10 smelts in stomach and intest.
19-6-35	1	470/500	F	4 smelts
13-8-35	1	445/475	F	6 smelts (well digested)
25-4-34	1	/570	F	About 10 smelts (digested) in stomach and intestine (17681) tag.
22-4-34	II	440/470	F	20 sticklebacks (30-45 mm.)
"	II	530/565	F	2 smelts, remains of other fish in intestine
24-7-35	II	240/254	F	16 sticklebacks, remains of other sticklebacks in intestine (digested)
"	II	398/427	F	29 sticklebacks, " " " " " " "
"	II	475/490	M	9 sticklebacks and 1 <u>Fundulus</u> , remains of other " in intestine (digested)
"	II	476/492	F	52 sticklebacks, remains of other " in intestine
"	II	475/490	F	15 " " " " " "
"	II	335/342	F	33 " , many digested in intestine
"	II	335/342	M	10 " , remains of other " in intestine
"	II	340/355	M	2 <u>Notropis cornutus</u> , several digested sticklebacks in intestine
"	II	341/354	M	5 sticklebacks and 2 <u>Notropis cornutus</u> several digested stick. in intestine
"	II	342/355	M	29 sticklebacks, many digested " in intestine.
"	II	335/344	M	33 " " " " " " "

29-9-35	II	240/250	F	5 sticklebacks, remains of some " in intestine
"	II	250/260	M	3 sticklebacks in stomach, also 4 digested in intestine

As show the stomach analyses of stickleback from Second Chamcook, this species is feeding principally on Diaptomus minutus, Diaphanosoma leuchtenbergianum, Daphnia pulex retrocurva, Daphnia longispina, Bosmina longirostris, Cyclops leuckarri, Epischura lacustris, etc.

As can be seen from the above table the chief items of the diet of older Chamcook salmon are smelt and sticklebacks but immature stages of certain aquatic insects are taken by younger fish. As no Notropis cornutus, Couesius plumbeus, Fundulus diaphanus or other minnows have been observed in the stomachs of adult salmon from First Chamcook lake we conclude that salmon in this lake keep principally in the open water. Therefore, the principal competitor of salmon in Chamcook chain is the lake trout, Cristivomer namaicush, the distribution of which, however, is strictly limited to the First Chamcook lake.

Cristivomer namaicush is a more rapacious fish than slamon and as shown by analyses of their stomachs this fish feeds principally on smelt. As many as twenty smelts have been found in the stomachs of large individuals of this species.