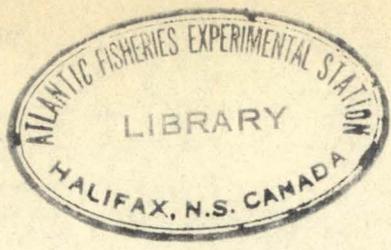


35177 ✓



BIOLOGICAL BOARD OF CANADA

MANUSCRIPT REPORTS OF THE BIOLOGICAL STATIONS

No. 201A

Title

INVESTIGATIONS ON SMELT IN CHAMCOOK LAKE, N.B., CANADA

1936

Author

A. D. Bajkov.

INVESTIGATION ON SMELT IN CHAMCOOK LAKE, NEW BRUNSWICK

by

A. D. Bajkov

Mar. 10, 1936.

Atlantic Biological Station

INVESTIGATION ON SMELT IN CHAMCOOK LAKE, NEW BRUNSWICK.

A. D. Bajkov
Mar. 10, 1936.

The landlocked smelt is a widely distributed little fish in the majority of deeper lakes in the Maritime Provinces. In each lake it is subject to considerable variation. The races of this fish have already been discussed in another report. The present paper deals only with one medium-sized race (120-150 mm.) widely distributed in First Chamcook lake. This race plays a very important role in the economy of this lake since it serves as the main food for two game fishes, namely, landlocked salmon (Salmo salar sebago) and lake trout (Cristivomer namaycush).

It is very difficult to estimate, even approximately, the relative abundance of this fish in Chamcook lake as it can be observed in quantity only during the spawning run which takes place early in spring when the lake is still covered by ice. The first school of smelt to be observed was seen through a hole in the ice, about 100 yards from the mouth of Inlet creek (outlet from the Second lake) at the upper end of First Chamcook, on the evening of February 28, 1934. About forty of them were caught by hook and line. The weather on the following day was mild and many more smelt were observed and caught through the ice. They disappear after two days when weather turned cold and come again only after ten days. A very large school approached the mouth of this creek on the evenings of March 14 and 15. The fish were nearly ripe at that time but no spawning fish were observed in the creek. The extensive runs to the mouth of the creek always took place during

the dark after sunset. During the day the most of them returned to the deeper water. Spawning takes place at night in the creek.

The eggs of smelt are very small and deposited by spawning fish on stones, gravel or aquatic vegetation usually in a strong current. The number of eggs is not the same in both ovaries. The left one is always about four times larger. The same asymmetry of sexual products occurs also in male fish.

The number of eggs in spawning smelt in Chamcook lake has been estimated as follows:

	Left ovary	Right ovary	Total
1 year old fish (90 mm.)	1372	275	1647
2 " " " (120 mm.)	2500	625	3125
3 " " " (142 mm.)	4883	1025	5908

Schools of smelt can be seen also in First Chamcook lake very late in the fall just before or during formation of ice. At that time they gather near shores and were observed in the lower end of the lake near railway bridge in 1934 and 1935. During the rest of the year the smelt in Chamcook lake can be found occasionally washed on the shore after storms.

The majority of our specimens were obtained from the stomachs of lake trout and landlocked salmon or taken during the spawning run.

With regard to the distribution of smelt in Second Chamcook lake (as well as in other lakes in this chain) nothing definitely can be said. As far as analyses of stomach contents of salmon show there are no smelt in Second Chamcook lake at least during the summer. It must be mentioned, however, that one salmon

caught on April 22, 1934, in the Second Chamcook contained in its stomach two smelt, but we must take into consideration the fact that at this time of the year salmon often pass freely from First to Second Chamcook lake. Since no smelt have been found in the stomachs of other fish examined from the Second lake and no dead smelt have been observed on the shores after storms, we suggest that smelt do not live in the Second lake. They can, of course, easily penetrate there by a very short creek (only about 150 metres in length) during the spawning run but probably immediately return to the deeper First lake.

The main bulk of Chamcook smelt spawns when two years old; the percent of yearlings and three-year-old fish is very small. Therefore, it is very possible that the average duration of life of Chamcook smelt is only two years.

As the spawning run of Chamcook smelt is not so extensive as the run of the middle-sized race of this fish in Lake Utopia, N.B., even if we take into consideration the relative areas of these two lakes, it may be concluded that smelt are not so abundant in Chamcook.

In connection with this an attempt has been made to transplant the middle-sized variety from Lake Utopia to Chamcook lake in order to increase the food supply for game fish.

Such an experiment was done on May 24, 1935, when about 200,000 naturally spawned smelt eggs were collected in Lake Utopia tributaries and a few thousand were artificially fertilized. All the eggs were quickly transported by canoe and automobile and placed into a southwestern tributary of First Chamcook. As the conditions of this new locality were apparently the same as on the

original spawning bed of this fish practically all eggs developed and hatched normally. The last weekly examination shows that on June 12th only an insignificant proportion (probably not more than it was when eggs were collected) were found dead on the aquatic moss. As the breeding season and morphological features of Utopia smelt are different from Chamcook fish it will be possible to distinct these varieties if the introduction is successful.

The feeding habits of Chamcook smelt were studied throughout the year. During the spawning time smelt do not feed at all. Examination of ninety specimens taken near the inlet to First Chamcook lake, March 19, 1934, i.e., just before the spawning, shows the following results:

53 stomachs	empty
19 stomachs	contained remains of fish (mostly small sticklebacks)
15 stomachs	contained small Ephemeridae and other insects larvae
8 stomachs	contained Chironomidae larvae

Smelt examined from the same locality during the first part of March, 1934, or about three weeks before the spawning, show that they feed more extensively and that the percent of empty stomachs is not so great. Their stomachs were contained both bottom and planktonic organisms.

The diet of all smelt obtained from stomachs of predacious fish, that is, smelt of the open lake, during summer and winter consist nearly always of planktonic crustaceans.

The following are selected examples of stomach contents of smelt found in the stomachs of landlocked salmon and lake trout from First Chamcook lake.

26-8-34. Size 100 mm. (depth 14 metres)

<u>Cyclops strenuus</u>	30%
<u>Leptodora kindtii</u>	3%
<u>Daphnia retrocurva</u>	10%
<u>Epischura lacustris</u>	20%
<u>Diaptomus minutus</u>	20%
<u>Bosmina longirostris</u>	2%
<u>Cyclops leuckarti</u>	<u>15%</u>

Total weight 50 mgm.

20-8-35. Size 60 mm. (depth 16 metres)

<u>Diaptomus minutus</u>	80%
<u>Epischura lacustris</u>	15%
<u>Daphnia and Bosmina</u>	<u>5%</u>

Total weight 48 mgm.

20-8-35. Size 70 mm. (depth 16 metres)

<u>Diaptomus minutus</u>	50%
<u>Epischura lacustris</u>	25%
<u>Cyclops</u> (two species)	23%
<u>Daphnia and Bosmina</u>	<u>2%</u>

Total weight 38 mgm.

20-8-35. Size 75 mm. (depth 16 metres)

<u>Diaptomus minutus</u>	50%
<u>Epischura lacustris</u>	25%
<u>Cyclops</u> (two species)	20%
<u>Daphnia and Bosmina</u>	<u>5%</u>

Total weight 48 mgm.

20-8-35. Size 80 mm. (depth 16 metres)

Leptodora kindtii 80%

Epischura lacustris 10%

Daphnia (two species) 10%

Total weight 53 mgm.

20-8-35. Size 90 mm. (depth 16 metres)

Stickleback one (27 mm.)

Diaptomus minutus and Daphnia (two spp.). . few

The average weight of planktonic crustaceans in smelt stomachs during the summer was estimated about 50 milligrams. During the winter Diaptomus minutus is the most common form,