

NOTES ON CERTAIN FEATURES OF THE LIFE HISTORY OF THE ALASKAN FRESHWATER SCULPIN

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Shortly after the publication of Doctor Gill's paper¹ on the habits of the freshwater Cottids of North America, there was received at the U. S. National Museum a small lot of Blobs collected at Loring, Alaska, by Mr. Fred Patching, superintendent of the Fortmann hatchery. These fish were interesting by reason of their stomach contents, a table of which is given on the last page of this article, and for the observations on their habits, an account of which is given in Mr. Patching's letter to Mr. E. L. Goldsborough, here copied in part:

"The Blob or Bullhead I consider very destructive to the Salmon eggs and in all probability to the fry in the earlier stages. I don't suppose they catch very many fuller grown Salmon, although the chances are that they manage to capture a few all the time, whenever they find them in schools or cornered up.

"I am sending you by express some specimens which may prove interesting; one showing the number of eggs a small Blob can eat and also the size of fry he can catch; the other showing that this fish is not particular when it is hungry, as it will eat even another of its kind. The two were washed ashore dead in just the position they are now. The eggs in the first mentioned specimen were probably some of the bait used in the trap (Silver ? Salmon eggs) and simply show the number a fish of that size can hold.

"Until we made traps I had no idea there were so many Bullheads in this stream [Helm Bay Stream]. One morning we caught 2,700 in three small traps, and in twenty-five days the total catch of Blobs was 31,000. If they only make way with one egg each a day the loss would soon be great.

"I have never kept any accurate account of the number of Blobs caught here nor made any careful examination of their stomachs, but have only observed enough to satisfy myself that they were enemies of the Salmon and should be destroyed whenever caught. I

¹"The Millers-thumb and its habits." Theodore Gill. Smithsonian Miscellaneous Collections, Volume 52, (Quarterly Issue, Volume 5, Part 1), pages 101-116.

supposed others knew this, and also the fact that the Trout is destructive to the Salmon, but last winter I found in the 'Pacific Fisherman' statements from authorities on the question that Trout are not destructive to Salmon fry, though I had been supposing all the time that everybody knew the greatest enemy the Salmon had was the Trout.

"Last season we captured fourteen marked Salmon and the year before two, sixteen in all, exactly one per cent of the number you marked. I have in consequence to lay aside my theory that Salmon take anywhere from twelve to twenty years to mature. On account of the marked fish caught at Yes Bay, my other theory that hatchery fish would return to the stream in which they were liberated, is likewise not substantiated. No one seems to know how many marked Salmon were caught, but one man told me they certainly took as many as twenty-five in one day; so, according to that, by far the larger portion of our hatch went to Yes Bay. One peculiar thing I notice about the return of marked fish is that at Yes Bay in 1906 they caught more than in 1907, whereas here in 1906 we captured only two, as against fourteen in 1907."

The two specimens of Blobs mentioned by Mr. Patching were a *Cottus asper* about 16 cm. ($6\frac{3}{8}$ inches) long and one about 11-12 cm. ($4\frac{1}{2}$ inches) long, which it had tried to swallow. The other specimen, also *Cottus asper*, had in its stomach thirty to forty eggs and a young Salmon about 8.5 cm. ($3\frac{1}{2}$ inches) long. The Blob was the same size as the larger one mentioned above.

Late in 1908 Mr. Patching sent to the U. S. National Museum another small collection from the same locality. This included a small Salamander, a Stickleback (*Gasterosteus aculeatus*), a Blenny (*Pholis ornatus*), and fourteen specimens of *Cottus asper*. The Blobs appeared so plump and well fed that an examination of their stomach contents was made. All of them showed evidence of having taken food a short time before being caught and in most cases this food, which consisted of young Salmon (*Oncorhynchus*) and Salmon eggs, was hardly digested. In one case two or three young Salmon in the stomach of a Blob were almost entirely digested, only the head and vertebræ remaining, and in two other cases there were a few scraps remaining from a previous meal. It is evident either that these Blobs must have gone a long time without eating or that their digestive processes must be very rapid; otherwise there would have been a greater diversity of conditions in regard to the amount of digestive action which had taken place. The latter supposition is the more probable one, for these fish came from a river filled with

young Salmon of the size of those they had eaten, and there is no reason to suppose that they would voluntarily wait until their stomachs were entirely empty unless from some special cause.

Blobs in general are bottom fish and prefer to remain hidden under stones, etc. It is just in similar places that young Salmon and Trout hide at certain hours of the day, usually when the sun is hottest; the Blobs can then get them with least difficulty. It is probable, therefore, that the stomach contents of each of these Blobs represents one day's feeding and that under proper conditions (when Salmon eggs or young Salmon are available) about the same amount would be eaten each day.

These fourteen Blobs had eaten thirty-nine Salmon and forty-six eggs, or an average of almost three Salmon and a little over three eggs for each fish. This is probably a good daily average for at least two months of each year, and if the Blobs are present in the river in such numbers as are indicated in Mr. Patching's letter, the consequent loss would be many thousand Salmon a year.

The greediness of some of the Blobs was certainly remarkable. One had eaten seven Salmon, five of which were about 5 cm. (2 inches) long and the other two about 7 cm. (nearly 3 inches) long. The last fish eaten was about 7 cm. long and had been swallowed tail first. As there was no room in the Blob's stomach for this one, only its tail was found there, while its head stretched up into the mouth of the Blob. The young Salmon eaten by the Blobs varied from about 5 centimeters (2 inches) to more than twice that length. One or two that were smaller seemed to be Trout (*Salmo* sp.). Nearly all the fish were in such condition that the genus to which they belong could be determined.

In all but one of the Blobs the presence of large numbers of Nematode parasites was noted. They were in the body cavity, either free or in cysts. Most of them were just leaving the cysts, but a few were entirely free. Two or three were found in the stomach or intestine and several more had penetrated the wall of the stomach. Others had started to burrow in the dorsal and ventral muscles and some were visible from the outside just under the skin of the belly. In their attempts to burrow to the outside they had penetrated all the visceral organs; one had even entered the head and seemed to be seeking an exit through the cranium. The cysts were found in the peritoneum, in the wall of the stomach, in the dorsal and ventral muscles and in the liver and kidney. None was found in the ovary or the testis. The males seemed to be less susceptible to the attacks of these worms than the females, but this may be due to the small

number (three) of males available for study. One of the females had eighty-two worms in the body cavity. The parasites were turned over to Dr. C. W. Stiles for identification, but were too immature for even generic diagnosis. A few of the larger cysts were heavily pigmented, but the most lacked pigment.

Table of food and parasites of Cottus asper from Loring, Alaska.

No.	Length.	Sex.	Worms.	Salmon.	Eggs.	Other food.
	<i>cm.</i>					
1.....	19.5	Female.	82	3	1	Sticks (dried seaweed).
2.....	17.5	...do...	14	2	13	
3.....	17.0	...do...	22	3	.....
4.....	16.5	Male...	9	2	1	Fish scraps.
5.....	14.0	Female.	6	1	.....
6.....	16.0	...do...	53	3	.....
7.....	17.0	Male...	9	4	.....
8.....	17.0	Female.	28	7	.....
9.....	16.5	...do...	15	2	.....	Fish scraps.
10.....	16.0	Male...	.....	1	.....
11.....	18.5	Female.	41	2	8	Fish scraps
12.....	17.0	...do...	21	5	.....
13.....	16.5	...do...	1	.....	23	
14.....	19.0	...do...	21	4	.....
Total.....			322	39	46	

There were eleven females and three males in the collection.