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REPORT ON MORTALITY OF SOCKEYE SALMON IN ENGLISH BAY, AUGUST 1939

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History.

The following communication was received by Messrs. J.P. Tully and J.L. McHugh on August 21, at the office of R.W. MacLeod, Fisheries Inspector, New Westminster, while they were investigating the complaint of sinking of fish nets off the Fraser River.

"Mr. Humphries of the London Fish Company reports that sockeye salmon in the vicinity of Point Grey are found swimming on top of the water and are being taken by the fishermen with gaffs. He says that the fish appear to be sick, although they look all right. I have discussed the matter today with Dr. Clemens and he suggests that Mr. Tully obtain samples of the water in the vicinity of Point Grey where the trouble has been found. He suggests that due to the intense hot weather there may be an excess of oxygen in the water.

"Mr. Humphries of the London Fish Company is retaining a sample of the fish at his plant."

"Major J.A. Motherwell"

No first hand information regarding the dead fish could be obtained on the river on Monday, August 21.

On communication with Mr. Humphries it was learned that two sockeye had been picked up in a dying condition in English bay and were being brought into the plant next day.

Observations

There was one male and one female fish of which the former was considerably the fresher. The exterior appearance was normal, as were the

viscera with the exception of the liver which was a light chocolate colour. The gills of both were a light buff colour, and those on the right side of the female were considerably damaged, probably due to some mechanical injury. This latter condition had been noticed on other fish by some of the fishermen.

Numerous parasitic copepods were reported present on the gills at the time of capture. Only one was found on the specimens examined, but these do not indicate an abnormal condition.

Small white worms were noticed on the gills by the fishermen and were present on the specimens. These were identified as digenic trematodes. The two fish examined were rather heavily infested, but it is not likely that death would result from this cause.

There were no gill-net marks and no conspicuous internal cysts. The air bladder was not distended but apparently was not ruptured. The flesh, particularly around the belly, was rather lighter in colour than usual.

The investigators were then taken to English bay in the Fisheries Patrol boat "Swantail II" where they made observations of the water and interviewed the fishermen who had brought in the fish.

The principal men were Dan Cameron, buyer for London Fish Company, and Tom Moore, fisherman, both of whom had seen the phenomenon and caught a fish.

The essence of the information from these men was:

The fish are first seen swimming slowly at the surface, growing steadily weaker until they finally roll on their side and die, float for a few minutes and then sink.

The condition is most noticeable around the south side of English bay, northward past Prospect point and toward Bowen island.

No one had noticed the colour of the gills before death, but within a

few minutes of death they had paled to a light buff colour.

These fish pale more rapidly than normal fish, particularly around the belly.

These men were then asked to spread the word amongst the fishermen to observe the gill colour before death on the next dying fish they saw and report to Major Motherwell.

The observations on the water were made as three points in English bay and consisted of temperature, chlorinity, oxygen content and pH, and a ten-minute plankton tow with a silk net. The locations were:

Station A - One mile magnetic south from Prospect point.

Station B - One mill offshore opposite the Jericho air base and the Yacht Club.

Station C - Midway in a line from Prospect point to the end of Point Grey.

The observations were:

Station	Depth	Time	Temperature °C	Cl°/oo	O_2 mg.A/1	% saturation	pH
A	Surface	15.50	19.5	8.35	0.643	122	8.42
	10 feet		16.5	9.31	0.715	137	6.83
B	Surface	17:40	19.6	8.35	0.681	117	8.72
	10 feet		16.5	12.20	0.738	139	8.51
C	Surface	19:10	18.3	9.38	0.712	134	8.69
	10 feet		16.5	12.42	0.778	146	7.86

There was very little difference in the amount of plankton between the three stations. Station C had slightly less than the others. The forms were chiefly filamentous, Skelotonema being dominant with lesser amounts of Thaloassiosira and Chaetoceros. Zoo-plankton was not numerous.

From the interviews with the fishermen it was evident that they confused the heavy bloom of algae with increased muddiness. It was possible to demonstrate by examination under a microscope that the apparent excess mud content was due to the algae.

General Conditions

Under the influence of westerly winds the surface waters tend to accumulate in English bay and off the entrance to Vancouver harbour. This condition, coupled with continued bright sunshine, has apparently permitted the intensive growth of the algae, which in turn is generating more oxygen by day than it is absorbing by night, giving rise to a high degree of supersaturation with dissolved oxygen in a limited area.

Diagnosis

It is known that a certain relationship between oxygen and carbon dioxide must exist in the water in order that fish respiration may proceed. From the high values found in the surface waters in English bay it appears that the gaseous balance has been disturbed and mortality has resulted.

That all species and all individuals of each species are not affected in the same manner is undoubtedly due to the fact that there are specific and individual variations in respect to physiological constitution.

It is natural that the fish should endeavour to stay below the zone of supersaturation, but in passing through shallow water where the condition of supersaturation exists to the bottom, it is possible that the fish become so weakened that even if they reach deeper water they are unable to sound below the supersaturated zone.

Remedy

It is the opinion of the investigators that the trouble will disappear as soon as the bloom of plants is over, which will probably occur on the period of south-easterly winfds accompanied by cloudy weather or rain.