FISHERIES RESEARCH BOARD

OF CANADA

MANUSCRIPT REPORTS OF THE BIOLOGICAL STATIONS

No. 305

Title

REPORT ON MORTALITY OF FISH AT SOOKE TRAPS - JULY, 1939

Author

W. A. Clemens

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HISTORY

On Monday, July 10, Mr. Goodrich of the Sooke Harbour Fishing and Packing Company brought to the Pacific Biological Station at Nanaimo three spring salmon which he reported having died in the traps in that area. Apparently in dying the fish merely became very slow in reaction, appeared near the top of the water, turned over, and succumbed with very little struggle. On Thursday, July 13, when the traps were again emptied, the mortality had assumed a much greater percentage. No evident clue as to the cause of death was offered and an investigation was desired. Accordingly Dr. Pritchard and Mr. Tully went to Sooke that same evening. Upon arrival consultations were held with Mr. Goodrich and Dr. Kask of the International Pacific Salmon Fisheries Commission.

BIOLOGICAL FINDINGS

The three spring salmon which were delivered to the Pacific Biological Station on July 10 revealed no evident cause of death. Two of the specimens were completely empty of food and no foreign organisms were discovered in the stomach or the intestines. The third, which was sent to Dr. D.C.B. Duff, Consulting Pathologist at the University of British Columbia, apparently contained herring. In all three cases, however, the gills were quite pale in colour, and the internal organs, especially the lower portion of the intestine, showed signs of hemmorhage.

On arrival at Sooke on Thursday, July 13, a number of gills and intestinal tracts from both spring and sockeye salmon were examined, and some dead herring were inspected. These also presented no clue except the paling of the gill filaments and slight hemmorrhages in the internal organs.

FIELD OBSERVATIONS

On Friday, July 14, a trip was made on the Fisheries Patrol Steamer

Malaspina along the northern shore of the Strait of Juan de Fuca from Victoria harbour to Sherringham point. Calls were made for inspection and collection of water samples at Beachey Head and Sherringham Point traps.

The final analysis of these samples is submitted in the accompanying table. It is pertinent to note that outside the traps at Sherringham in water of fourteen fathoms the percentage saturation of oxygen was 74.1 per cent, while at the surface it was 114.7 per cent. In the collecting portion of the trap, which was slightly over four fathoms deep, this percentage varied from 102.1 to 117.1 from four fathoms to the surface. At slack tide the surface sample gave a figure of 118.0 per cent.

The trap was closely observed for some hours through the period when slack tide occurred at which time the fish appeared to be succumbing. Dead fish were secured and immediately compared with those not seriously affected. In every case the internal hemorrhage and the blanching of the gills was noted.

There was an extremely heavy bloom of small organisms in the trap at this time which gave the water quite a murky appearance. Much of this was plant material which under the favourable conditions experienced recently, was apparently able to reproduce at a very high rate. These plants are producing oxygen at such a rate that, even in the strait where tidal movements are great, supersaturation is reached. High oxygen values even occur downstream from the trap lead after the water has passed through the wire and has been considerably agitated.

DIAGNOSIS

The presence of the leads to the trap cause the fish to be guided from the deeper water where the oxygen content is relatively low, into the collecting

pen where the depth is about twenty-five feet and the oxygen content is high. In the area of supersaturation conditions are apparently such that it is impossible for the fish to properly carry out the gaseous exchange necessary for respiration. 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 oxygen values found in the surface waters in the vicinity of Sooke and from the uniform symptoms among the affected individuals, it appears that the gaseous balance has been disturbed and mortalities have 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 not unreasonable on this diagnosis to find a few fish dead out side the traps. These are no doubt those which ranged in shallow water where the oxygen concentration was high. It appears from the decrease in the number of fish taken recently by the traps that most of the fish are staying in deep water of normal oxygen concentration and thus missing the nets.

REMEDY

It is the opinion of the investigators that the cause of the trouble will disappear as soon as the bloom of the plants is over. In the meantime the fish will die if remaining or retained in the surface waters. The fish dying in the traps are apparently quite edible since one of the investigators has eaten parts with no ill effects. Therefore the traps should be emptied sufficiently often to ensure the use of the fish while they are still in prime condition. It is possible that if the retaining portion of the trap were deepened to at least seven fathoms there might be sufficient room below the zone of supersaturation to ensure survival

during the retention period. In such a case all fish should be able to remain below the five fathom level.

DESCRIPTION		T°C	Cl°/oo	O_2 mg. At. /1.	O_2 satn. mg.At.	O_2 % satn.
1. Beechey Head Trap - 20 yd. East of trap - Tide flood (1 kt.) Time 11:20	9.90 - 10.9 9.88 - 11.1	9.9	17.06	0.465	0.582	79.9
2. Sherringham Point Trap - 20 yd. East of Trap - Tide flooding just before high water slack - 14 fathoms	9.42 - 9.7 9.40 - 9.9	9.4	17.46	0.441	0.595	74.1
3. Same as # 2 — 7 fathoms	10.10 - 10.2 10.08 - 10.3	10.1	17.23	0.470	0.582	80.9
4. Same as # 2 — Surface	10.80 - 10.7 10.78 - 10.8	10.8	17.03	0.654	0.570	114.7
5. Sherringham Point Trap - Collecting portion of trap - Tide nearly slack - Time 14:15 — 4 fathoms	10.47 - 10.8 10.44 - 10.8	10.5	17.13	0.582	0.570	102.1
6. Same as # 5 Time 14:25 - — 2 fathoms	10.77 - 11.1 10.75 - 11.1	10.8	17.08	0.663	0.570	116.3
7. Same as # 5 - Time 14:35 - Slack water - Surface	11.00 - 11.2 10.98 - 11.2	11.0	17.10	0.668	0.570	117.1
8. Same as # 5 - Time 15:00 - Slack water - Surface		11.0	17.09	0.673	0.570	118.0
9. Sherringham Point Trap - 20 yd. N.E. of heart - Tide starting to ebb. Time 15:05 - Surface		11.0	17.09	0.576	0.570	101.0