

FRESHWATER FISHERIES ADVISORY SERVICE



MARINE DEPARTMENT

INVESTIGATION REPORT

JOB NO. 92

ACCLIMATISATION SOCIETY DISTRICT: Southland

TITLE OF JOB: Bottom Fauna Sampling Mataura River February 1968.

OBJECTIVES: To assess the effects of pollution effluents on Bottom Fauna in this lower Mataura River and compare with previous visits.

INTRODUCTION

Bottom Fauna samples were collected from the Mataura River between 20th and 25th February, 1968. Sampling stations were the same as 1961-62 when nine stations were established between Otamita 10 miles above Gore and Gorge Road approx., 2 miles from the mouth.

METHODS

Five random samples were taken at each station using a standard square foot Surber sampler. A Metrohm meter was used for taking pH readings and a Galvanic Cell Oxygen Analyser for Temperature and Dissolved Oxygen readings. All samples were preserved in a 10% Formalin solution and analysed in the Christchurch laboratory.

FINDINGS

The physical features of the Mataura River study area are described in Job.26 and there has been little change since then. The three main pollution sources are still Gore, Mataura and Wyndam.

Below Gore the river becomes slightly discoloured from the discharge of waste materials. There is an increase in turbidity

until the water reaches Mataura where the bottom is completely blanketed in a thick grey-brown algal growth and visual penetration of the water is nearly impossible. Below Mataura the water is a brown-yellow colour and at certain times of day organic particles are observed to be floating in the river. These coincide with the release of effluents from the freezing works and paper mill.

Table 1 gives the total numbers and percentages of all the animals in 45 bottom fauna samples.

The average number for 5 samples at each station is shown in Table 2. The numbers in parenthesis represent the 1962 visit.

The fauna is composed mainly of:

	<u>Species</u>
Ephemeroptera	<u>Deleatidium</u>
Tricoptera	<u>Hydropsyche</u> and <u>Pycnocentria</u>
Coleoptera	<u>Elmidae</u>
Mollusca	<u>Potamopyrgus</u> spp.
Annelida	<u>Oligochaete</u> spp.

Tables 3, 3A and 3B give the extreme and total numbers of the dominant species at each station in the sampling area.

In Table 4 the range, average number and total number of animals in five samples at each station is shown.

Table 4A shows the pH, water temperature and dissolved oxygen readings taken during sampling at each station.

The high dissolved O² reading at Station 2 (25.19 ppm) was unusual and can only be explained by the instrument manufacturers note:

Erratic readings - coating of oil on membrane of oxygen probe.

Station 2 is just below Gore township where waste from a fellmongery enters the river. It is possible that a small amount of oil or detergent may have adhered to the probe.

Visual sightings of trout were made throughout the sampling area, even in the worse polluted areas.

DISCUSSION

As can be seen from Table 2 there are large fluctuations between stations in numbers of animals recorded. There are also marked changes between the 1962 and 1968 series of samples. Archichauliodes was found at stations 1, 2 and 3 in 1962. There were none present in any samples taken in 1968.

Tricoptera have increased in number since 1962 at all stations. At Station 2 by nearly 2 times and by nearly 27 times at Station 8. Numbers of Ephemeroptera had increased at Stations 1, 2 and 10 but a marked decrease is noted in the middle reaches. Numbers of Coleoptera had increased only at Station 1. There was an increase in the number of Diptera found at all stations.

Annelida form a large proportion of the fauna especially below Mataura. This was found to be so in 1962 by Bond and Cudby (Job No.26). Numbers of Annelida rose rapidly from Station 5 and dropped again towards Station 10. Numbers had increased at all stations except 1 and 5 by as much as 20 times.

The histogram (Fig.1) shows the percentage of pollution indicator organisms at each station. None of the more sensitive groups were completely absent at any station sampled.

Special screens have been installed in the freezing works at Mataura, but they must only be able to prevent certain organic waste from entering the river. Particles of refuse up to 6" in length were being released into the river at different times of the day.

CONCLUSIONS

There is evidence of pollution from Gore, Mataura and Wyndham. Mataura freezing-works and paper-mill being the worst offenders.

Trout are present in all the infected areas.

Bottom fauna samples show that the more sensitive groups are still present even in badly polluted areas.

RECOMMENDATIONS

Regular checks should be made on bottom fauna and trout populations in the study area.

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References: Technical Field Service
Investigation Report Job No.26

Bibliography: Hirsch A. 1958 Biological Evaluation of
Organic Pollution of New Zealand
Streams.
Pollution Advisory Council
Publication No.6

TABLE 1.MATAURA RIVER 1968

The total numbers and percentages of animals in 45 bottom fauna samples taken in the study area.

			<u>Numbers</u>	<u>Percentages</u>
Platyhelmia			1864	3.92
Annelida	Oligoch		19825	41.78
Mollusca	Potamopyrgus	4858		
	Physastra	40		
	Simlimnea	9		
	Planorbis	3		
	Sphaerium	52		
			4962	10.46
Crustacea	Ostracoda	21		
	Amphipoda	1321		
			1342	2.82
Ephemeroptera	Coloburiscus	1		
	Nesameletus	17		
	Deleatidium	3209		
			3227	6.8
Plecoptera	Stenoperla		1	
Trichoptera	Pycnocentria		1986	4.18
Sericostomatiidae	Olinga	43		
	Helicopsyche	2		
			45	.09
Leptoceridae	Hudsonema		1	
Hydropsychidae	Hydropsyche		7164	15.1
Rhyacophilidae	Hydrobiosis	456		
	Neurochorema	29		
			485	1.02
Hydroptilidae	Oxythita		256	.53
Coleoptera	Elmidae		2123	4.47
Diptera	Simuliidae	441		
	Chironomidae	3516		
	Tabanidae	137		
			4094	8.63
Miscellaneous			64	.13
Grand Total			47,439	99.93

TABLE 2

MATAURA RIVER

1962 AND 1968

AVERAGE NUMBERS OF BOTTOM FAUNA PER SQUARE FOOT

Species	<u>Station</u>									
	1	2	3	4	5	6	8	9	10	
Trichoptera	100.2 (38.5)	107.8 (17.6)	215.4 (14.4)	283.2 (13.4)	30 (15.5)	137 (7.9)	642 (13.7)	248.6 (13.4)	223.2 (15.7)	
Ephemeroptera	170.2 (114.5)	206.2 (102.2)	68 (102.0)	83.4 (103.2)	6.4 (109.0)	24.6 (112.6)	4.4 (51.1)	11 (52.7)	71.6 (36.9)	
Coleoptera	177 (143.6)	75.8 (109.7)	36 (42.4)	45.6 (75.3)	15.4 (96.7)	45.4 (108.1)	20.4 (32)	23.8 (45.4)	5.6 (32.3)	
Diptera	15.4 (7.8)	24.4 (6.7)	111.6 (22.3)	53.4 (14.6)	82.2 (9.4)	217.2 (3.4)	118.6 (13.8)	30.8 (3.7)	144.8 (1.1)	
Archichauliodes	0 (.3)	0 (.1)	0 (.5)	0 0	0 0	0 0	0 0	0 0	0 0	
Mollusca	3 (8.3)	108.2 (42.5)	35.4 (2)	12.8 (15.3)	19.2 (41.9)	159.6 (101.3)	129.4 (38.9)	474.6 (31.3)	50.4 (177.4)	
Annelida	.6 (4.1)	24.6 (10)	71.2 (6.5)	27 (12.1)	40.4 (146.6)	951.2 (46.2)	1867.4 (163.2)	863 (111.4)	119.4 (93.3)	
Total	466.4 (317.1)	547 (288.8)	537.6 (190.1)	505.4 (233.9)	193.6 (419.1)	1535 (379.5)	2782.2 (312.7)	1651.8 (257.9)	615 (356.7)	

Gore

Mataura

Wyndham

1962 Figures in parenthesis

EXTREME NUMBERS OF THE DOMINANT SPECIES FOR MAIN GROUPS

		<u>STATION 1</u>	5 Samples each station	
			<u>Range</u>	<u>Total</u>
Ephemeroptera	Deleatidium		71 - 318	844
Trichoptera	Pynocentria		1 - 117	230
	Hydropsyche		3 - 148	241
Coleoptera	Elmidae		121 - 230	869
Diptera	Simuliidae		1 - 32	33
<u>STATION 2</u>				
Platyhelminia			2 - 20	35
Annelida			10 - 58	122
Mollusca	Potamopyrgus		4 - 235	534
Ephemeroptera	Deleatidium		102 - 409	1031
Trichoptera	Pynocentria		2 - 33	66
	Hydropsyche		30 - 80	221
	Hydrobiosis		4 - 217	232
Coleoptera	Elmidae		6 - 251	379
Diptera	Chironomidae		1 - 51	78
<u>STATION 3</u>				
Platyhemina			6 - 66	151
Annelida			74 - 174	356
Mollusca	Potamopyrgus		6 - 131	167
Ephemeroptera	Deleatidium		46 - 97	340
Trichoptera	Pynocentria		2 - 50	85
	Hydropsyche		13 - 318	949
Coleoptera	Elmidae		10 - 93	180
Diptera	Chironomidae		25 - 316	482

TABLE 3ASTATION 4

		<u>Range</u>	<u>Total</u>
Platyhelminia		4 - 23	46
Annelida		10 - 83	135
Mollusca	Potamopyrgus	1 - 32	60
Crustacea	Amphipoda	1 - 93	178
Ephemeroptera	Deleatidium	56 - 109	413
Trichoptera	Pycnocentria	15 - 367	652
	Hydropsyche	7 - 366	691
Coleoptera	Elmidae	24 - 94	228
Diptera	Simuliidae	8 - 65	111
	Chironomidae	2 - 100	129

STATION 5

Annelida		1 - 161	202
Mollusca	Potamopyrgus	1 - 61	94
Ephemeroptera	Deleatidium	3 - 15	32
Trichoptera	Hydropsyche	3 - 25	93
Coleoptera	Elmidae	2 - 51	77
Diptera	Chironomidae	3 - 260	397

STATION 6

Platyhelminia		6 - 43	145
Annelida		407 - 2232	4741
Mollusca	Potamopyrgus	50 - 425	788
Ephemeroptera	Deleatidium	12 - 36	115
Trichoptera	Pycnocentria	10 - 20	80
	Hydropsyche	35 - 131	420
	Oxyethira	31 - 84	173
Coleoptera	Elmidae	11 - 134	227
Diptera	Chironomidae	18 - 477	1021

TABLE 3BSTATION 8

		<u>Range</u>	<u>Total</u>
Platyhelminia		26 - 381	870
Annelida		538 - 5236	9335
Mollusca	Potamopyrgus	31 - 223	622
Crustacea	Amphipoda	9 - 509	573
Ephemeroptera	Deleatidium	1 - 11	21
Trichoptera	Pycnocentria	13 - 116	336
	Hydropsyche	88 - 1646	2848
Coleoptera	Elmidae	3 - 49	102
Diptera	Chironomidae	3 - 405	559

STATION 9

Platyhelminia		91 - 234	601
Annelida		341 - 1420	4304
Mollusca	Potamopyrgus	51 - 783	2337
Crustacea	Amphipoda	43 - 121	411
Ephemeroptera	Deleatidium	1 - 35	55
Trichoptera	Pycnocentria	15 - 192	493
	Hydropsyche	6 - 423	704
Coleoptera	Elmidae	3 - 46	119
Diptera	Chironomidae	12 - 70	133

STATION 10

Annelida		60 - 187	597
Mollusca	Potamopyrgus	16 - 101	241
Crustacea	Amphipoda	3 - 54	121
Ephemeroptera	Deleatidium	30 - 108	358
Trichoptera	Hydropsyche	111 - 334	997
Coleoptera	Elmidae	2 - 15	28
Diptera	Chironomidae	29 - 399	707

TABLE 4

RANGE, AVERAGE NUMBER AND TOTAL NUMBER OF ANIMALS IN FIVE SAMPLES AT EACH STATION.

<u>Station</u>	<u>Range</u>	<u>Av.No.</u>	<u>Total No.</u>
1	268 - 735	467	2,335
2	216 - 1049	556.2	2,781
3	389 - 770	579.6	2,898
4	226 - 732	552.6	2,763
5	12 - 614	194.4	972
6	684 - 3080	1568.4	7,842
8	893 - 8603	3072	15,360
9	656 - 2696	1854.8	9,274
10	367 - 1123	642.8	3,214
		<u>Total</u>	<u>47,439</u>

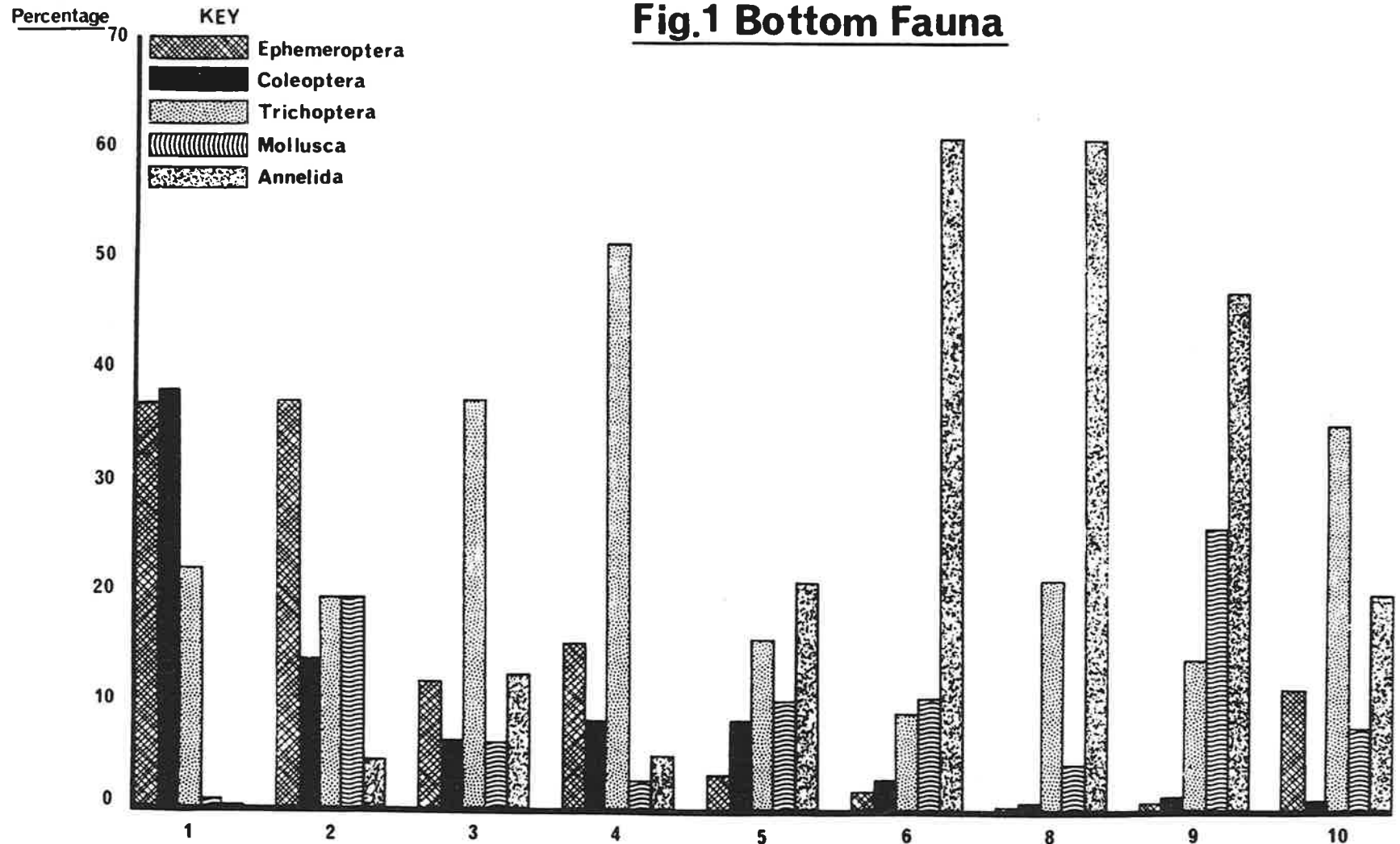
TABLE 4A

STATIONS

	1	2	3	4	5	6	8	9	10
<u>pH</u>	7.1	6.8	7.1	7.4	8.5	7.8	7.8	7.5	8.4
<u>Temp.C°</u>	18.75	20	23	19	19.5	21	21.75	17.75	20
<u>Dissolved O²</u>	9.63	25.19	10.29	9.27	6.55	5.87	6.67	5.0	4.02

MATAURA RIVER 1968

Fig.1 Bottom Fauna



Approx. Distance
Between Sampling
Stations (miles)

1-2
10-75m

2-3
3-25m

3-4
3-25m

4-5
0-50m

5-6
13-50m

6-8
13-50m

8-9
1-0 m

9-10
7-0 m

Sampling Stations