

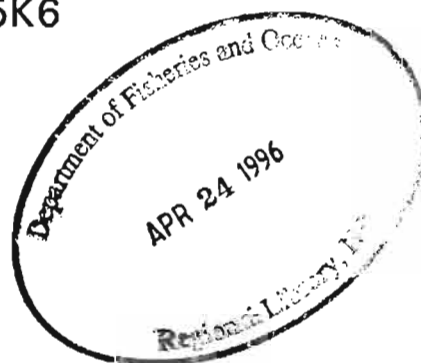


## **Summary of the 1994 Coho Salmon Smolt Trapping Operations on the Lachmach River and Antigonish Creek, British Columbia**

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1996



**Canadian Data Report of  
Fisheries and Aquatic Sciences 971**



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**ABSTRACT**

Baillie, S. J. 1995. Summary of the 1994 coho salmon smolt trapping operations on the Lachmach River and Antigonish Creek, British Columbia. Can. Data Rep. Fish. Aquat. Sci. 971: 37 p.

This report contains coho smolt (Oncorhynchus kisutch) enumeration, coded wire tagging and sampling data from Lachmach River and enumeration and sampling data from Antigonish Creek, both near Prince Rupert, B. C., for the period of April 18 to June 7, 1994. Enumeration and sampling data for outmigrant juvenile rainbow trout (O. mykiss), Dolly Varden char (Salvelinus malma), cutthroat trout (O. clarki), prickly sculpin (Cottus asper) and coastrange sculpin (C. aleoticus) are also presented.

For Lachmach River the total coho smolt outmigration was estimated to be 23,600. 6,816 were caught in rotary screw traps, of which 6,457 were coded wire tagged. The age structure of the coho smolts was 52% 1.0 and 48% 2.0. The total catch of other species was 4 coho fry, 5,107 pink salmon fry (O. gorbuscha), 572 rainbow trout, 23 cutthroat trout, 397 Dolly Varden char, 285 prickly sculpins, and 88 coastrange sculpins.

For Antigonish Creek the total enumeration of species caught in a fyke net was 73 coho smolts, 219 coho fry, 93 chinook fry (O. tshawytscha), 7 chum fry (O. keta), 12 cutthroat trout, 28 Dolly Varden char, 16 prickly sculpins, 8 coastrange sculpins, 27 lamprey (Lampetra, sp.), and 22 threespined stickleback (Gasterosteus aculeatus). Estimates were made for coho populations in the upper pond area (740, 95% range 484-1180, modified Schnabel method; 748-752, 95% range 504-1218, Bayesian method).

## RÉSUMÉ

Baillie, S. J. 1995. Summary of the 1994 coho salmon smolt trapping operations on the Lachmach River, British Columbia. Can. Data Rep. Fish. Aquat. Sci. 971: 37 p.

Ce rapport fait état des données recueillies lors de la campagne de recensement, de récupération d'étiquettes (étiquettes métalliques codées) et d'échantillonnage concernant les smolts de saumon coho (Oncorhynchus kisutch) de la rivière Lachmach, et celle concernant la rivière Antigonish Creek (toutes deux situées près de Prince Rupert (C.-B.)), pour la période comprise entre le 18 avril et le 7 juin 1994. Il fait aussi état des données recueillies lors de la campagne de recensement et d'échantillonnage des effectifs de truites arc-en-ciel juvéniles (O. mykiss), d'omble Dolly Varden (Salvelinus malma), de truite fardée (O. clarki), de chaboisseau « piquant » (Cottus asper) et de chaboisseau « côtier » (C. aleuticus) en migration catadrome.

Dans le cas de la rivière Lachmach, le nombre total de smolts de saumon coho en migration catadrome a été estimé à 23 600. De ce nombre, 6 816 ont été capturés dans des pièges à vis sans fin, et 6 457 portaient une étiquette métallique. Les cohortes d'un an représentaient 52 % et celles de 2 ans 48 % de l'effectif. Les chiffres de capture pour les autres espèces étaient de 4 saumons cohos à l'état d'alevin, 5 107 saumons roses (O. gorbuscha) à l'état d'alevin, et 572 truites arc-en-ciel, 23 truites fardées, 397 ombles Dolly Varden, 285 chaboisseaux « piquants » et 88 chaboisseaux « côtiers ».

Dans le cas de la rivière Antigonish Creek, le chiffre total des spécimens capturés (filet verveux) était de 73 saumons cohos à l'état de smolt, 219 saumons cohos à l'état d'alevin, 93 saumons quinnats (O. tshawytscha) à l'état d'alevin, 7 saumons keta (O. keta) à l'état d'alevin, et de 12 truites fardées, 28 ombles Dolly Varden, 16 chaboisseaux « piquants », 8 chaboisseaux « côtiers », 27 lamproies (Lampetra, sp.) et 22 épinoches à trois épines (Gasterosteus aculeatus). Des chiffres estimatifs ont été établis pour les populations de saumon coho dans l'étang supérieur (740, avec une probabilité de 95 % que l'effectif se situe entre 484 et 1180 individus, selon la méthode Schnabel modifiée; puis entre 748 et 752, et entre 504 et 1218 selon la méthode bayésienne.



## INTRODUCTION

The Lachmach River Project is one of the coho salmon research programs initiated in response to the Canada-United States Pacific Salmon Treaty. The program goals are to examine productivity and life history of coho salmon stocks in British Columbia. In 1986 Lachmach River was chosen as a representative north coast watershed suitable for investigations of coho salmon (Simpson, 1991). As part of the program, coded wire nose tagging of smolts and summer juvenile population studies began in 1987 and adult coho escapement, spawning distribution and age structure data has been collected since 1988. Algal and benthic community studies were initiated in 1993.

This report summarizes the data collected from the coho trapping and tagging operations on Lachmach River and the trapping operations on Antigonish Creek for the spring of 1994. This is the thirteenth data report in the Lachmach series. For further information see: Finnegan et al. (1990), Finnegan (1991), Lane and Finnegan (1991), Davies (1991a,b), Finnegan and Davies (1991), Davies et al. (1992), Lane and Baillie (1994), Lane et al. (1994a,b), Baillie (1994) and Taylor and Finnegan (1995). Reports on the fall sampling operations for 1993 and 1994 are in preparation.

Lachmach River is a small coastal stream approximately 8 km long, located 23 km east of Prince Rupert, British Columbia (Figures 1 and 2). It drains a steep mountainous catchment area of 41.3 km<sup>2</sup> of which the western slope was clearcut logged during the 1970's and early 1980's. There is limited estuarine development where the river reaches the sea at the head of Work Channel. The river is characterized by sections of low to moderate gradients, a series of small, passable falls in the 2 km to 3 km section and a series of riverine ponds in the upper 5 km of river. It supports populations of coho salmon (Oncorhynchus kisutch), pink salmon (O. gorbuscha), chum salmon (O. keta), steelhead trout and resident rainbow trout (O. mykiss), sea-run and resident cutthroat trout (O. clarki) and Dolly Varden char (Salvelinus malma). In recent years a small number of adult chinook salmon (O. tshawytscha) have been observed in the river. Other fish species present include threespine stickleback (Gasterosteus aculeatus), prickly sculpin (Cottus asper) and coastrange sculpin (C. aleuticus). Scientific and common names of fishes follow Gillespie (1993).

Since 1988 the coho smolt run has been divided into two size groups (<85 mm and >85 mm) and marked with unique coded wire tag codes. The marine survival rate and commercial fishery exploitation rate of Lachmach coho in previous years were generally lower for the smaller size group than the larger group (B. O. Finnegan, PBS, Nanaimo, unpub. data). In 1993, to investigate further, each size group was further divided into two groups to get finer resolution (50-74 mm, 75-85 mm, 86-114 mm, 115+ mm).

Antigonish Creek is a small (approx. 5 km in length) system that flows southwest into the Skeena River about 20 km east of Prince Rupert (Figure 2). The watershed consists of steep mountainous terrain, with a small floodplain area. The upper reaches are characterized by beaver ponds and elevated bogs. The mainstem consists of a moderate gradient below the ponds, followed by a tidal, sinuous lower reach. The work done this year was a repetition of the work done in 1988 (Finnegan, 1991).

## METHODS

### LACHMACH RIVER

In previous years, an aluminium fence was used to capture smolts. This fence was found to be difficult to keep clear of debris, and was laborious to install and remove. Also, moving adult steelhead trout past the fence was difficult and labourious. Since a complete capture of coho smolts was hard to obtain with the fence, it was replaced with two 5 foot rotary screw traps (E.G. Solutions, 1005 SE Park, Corvallis, OR 97333). This resulted in savings of time (installation and removal was accomplished in hours instead of days), of costs of overtime to continually clean fence panels during freshet events, and allowed the passage of steelhead trout.

The two traps were set up in a pool just below the tidal boundary, approximately 250 m upstream of the estuary (approximately 50 m above the fence site used in previous years). This is the same location used in 1993 (Baillie, 1994). The traps were each suspended from two steel cables, which were strung across the river and anchored on either side. One trap was placed in front of the other with a separation of 2 m, and offset to one side so that each trap entrance was in the area of fastest water flow. The two traps were operated continuously from April 18 to June 7.

The rotary traps were checked daily at 0800. All coho were counted and a maximum of 100 were randomly selected from the total pooled catch and measurements of length ( $\pm 1$  mm) and weight ( $\pm 0.1$  g) were recorded. Sub-samples of coho smolts were obtained by rapidly moving a small dipnet through the barrel of fish and transferring the fish into a bucket until 100 fish were removed (Davies et al., 1992).

All other coho were sorted into the 4 size categories (50-74 mm, 75-85 mm, 86-114 mm, and 115+ mm) and a coded wire tag and

adipose clip were applied to each fish. These size categories roughly represent small age 1.0 smolts, large age 1.0 smolts, small age 2.0 smolts, and large age 2.0 and age 3.0 smolts, respectively. Tagging was performed with a Mk. II Tagging Unit (Northwest Marine Technologies, Shaw Island, WA 98286) following procedures as described in Argue et al. (1979), except 2-phenoxyethanol was substituted for tricane methanesulfonate (MS-222). Short term tag retention was determined by holding up to 100 fish from each size group for 24 hours. Mortalities and the incidence of tag loss were recorded. All fish with lost tags were retagged before release. Coho that were less than 50 mm in length, or appeared to be moribund were released untagged.

Age composition of coho smolts was determined by taking scale samples from fish in each 5 mm size class, to a maximum of 25 samples per class. The age composition from each size class was then applied to the number of coho in that size range in the random samples from the rotary traps. By this method the age composition of the entire run was determined.

Daily catches of all other downstream migrating species of fish were identified, counted, and lengths ( $\pm 1$  mm) and weights ( $\pm 0.1$  g) were recorded.

Rotary trap efficiency tests were conducted on two occasions. On May 4, 223 coho (length range: 86+ mm) were marked with an upper caudal fin clip and released approximately 300 m upstream of the rotary traps. On May 19, 200 coho (length range: 52 @ 75-85 mm, 148 @ 86+ mm) were marked with a lower caudal fin clip and released in the same area.

#### ANTIGONISH CREEK

Baited minnow traps were set in the upper beaver ponds on 26 April and 1 May 1994. They were cleared, rebaited and reset after 24 hours, and cleared again after another 24 hours. All salmonids were measured and marked with a caudal fin clip.

A fyke trap and live box (Conlin and Tutty, 1979), similar to the one employed in 1988, was installed in the area of upper tidal influence near the mouth of Antigonish Creek on 20 April 1994. The trap did not cover the entire width of the creek but was fishing in the thalweg. This trap was fished continuously until 5 June 1994, and was checked and cleared every 2 or 3 days. All species were identified, measured for length ( $\pm 1$  mm) and weight ( $\pm 0.1$  g) and caudal clips were noted.

## RESULTS

### LACHMACH RIVER

#### Environmental Data

Environmental data collected at Lachmach River is shown in Table 1 and Figure 3. Total precipitation for the observation period of April 16 to June 8 was 363 mm. Peak periods of rainfall occurred on April 16-17 (68 mm), May 6-14 (111 mm) and May 24-28 (75 mm) (Table 1). Mean maximum air temperature was 18°C with a range of 6°C to 29°C. Mean minimum air temperature was 5°C with a range of -2°C to 9°C. Water temperature rose steadily through the study period, starting at 3°C and increasing to 11°C.

#### Coho Smolts

Total smolt interception from both rotary traps was 6,816. Table 2 shows the results of spring work from Lachmach River from 1987 to present. The number of interceptions differs from the total shown in Table 3 (daily coho enumeration) which includes the 97 coho that were recaptured in the trap efficiency test. 6,457 coho were coded wire tagged with four unique codes, with an estimated 6,389 retaining their tags (Table 4). Figure 4 depicts the daily enumeration of coho and other species.

Biological information from coho smolts is summarized by week in Table 5. Generally, the mean length and weight increased in the first three weeks of the run, and decreased over the next five weeks. The mean length was 90 mm (n=2304, SD=11.1), and the mean weight was 7.3 g (n=2204, SD=2.70).

Table 6 and Figure 5 shows the breakdown of ages of the samples that were used for age determination and includes the biological data obtained from these samples. Ages were obtained from 111 scale samples. There was considerable overlap in length range for each age group. To determine the age composition of the entire run, the aged fish were broken down into 5 mm length groups, and the proportion of age 1.0 and 2.0 fish for each group was applied to the breakdown of the length frequency sample taken from the traps (Table 7). The age composition was estimated to be 52% age 1.0 and 48% age 2.0. There were no age 3.0 coho in the sample.

Table 8 shows the recaptures of coho smolts which were caudal fin clipped and released above the traps to obtain trapping efficiency. 423 smolts were released above the traps, of which 97 (22.9%) were recaptured.

In previous years, fence efficiency tests were done with consistent results (Baillie, 1994). If the premise that the fence was fish-tight during these periods is accepted then these tests would be an estimate of recidivism (mortality/failure to continue migrating). The average rate of recapture, after discounting tests that were not complete due to fence integrity failure, was 79.4%. If this figure is applied to the release of fish to test the efficiency of the rotary screw traps, then the estimate of the RST efficiency is  $97 / (423 * 0.794)$ , or 28.9%, and the smolt migration estimate is  $6816 * (1 / 0.289)$ , or 23,500. If the premise is not accepted, then the smolt migration estimate would be  $6816 * (423/97)$ , or 29,700.

#### Other Species

Daily enumeration data of other species are presented in Table 9 and Figure 4. Biological information, summarized by week, for other species is presented in Table 10 (rainbow trout), Table 11 (cutthroat trout), Table 12 (Dolly Varden char), Table 13 (prickly sculpin) and Table 14 (coastrange sculpin). Figure 6 depicts the length frequency distribution of rainbow trout, cutthroat trout, Dolly Varden char, prickly and coastrange sculpins.

In addition, there were 4 coho fry caught between May 5 and May 17, and 5,107 pink salmon fry caught between April 18 and May 7.

#### ANTIGONISH CREEK

A total of 182 coho, 30 cutthroat trout, and 159 Dolly Varden char were marked with a caudal fin clip in the upper ponds (Tables 15, 16 and 17, respectively). Following the first release on 27 April, a total of 63 coho, 12 cutthroat trout, and 27 Dolly Varden char were captured in the fyke trap, with caudal fin clipped recaptures of 5 coho and 2 Dolly Varden char (Table 18). Table 19 lists the enumeration of other species caught in the fyke net.

Population estimates for coho of the upper pond area and the whole system can be calculated using several methods (Ricker, 1975) which are summarized below.

Population estimates and 95% confidence intervals (modified Schnabel method) for cutthroat trout and Dolly Varden char in the upper ponds are calculated to be 60 (24-149) and 235 (188-293), respectively. Bayesian estimates are 79 (35-462) and 225 (194-268), respectively.

Upper Ponds - Coho Smolts

Estimate Method	Estimate	95% confidence interval
Bayesian	748-752	504 - 1218
Schumacher	646	328 - 21,500
Schnabel	779	500 - 1290
modified Schnabel	740	484 - 1180

Table 20 summarizes the biological information gathered from fish sampled at the fyke net.

**ACKNOWLEDGEMENTS**

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Table 1. Environmental parameters measured at Lachmach River, spring 1994.

Date	Precipitation (mm)	Air Temperature (°C)		Water Temperature (°C)
		Maximum	Minimum	
16/04/94	34	-	-	3
17/04/94	34	6	0	3
18/04/94	0	15	-2	3
19/04/94	6	21	1	4
20/04/94	2	13	4	4
21/04/94	4	20	6	4
22/04/94	4	15	3	5
23/04/94	0	20	1	5
24/04/94	0	19	5	5
25/04/94	2	14	4	5
26/04/94	0	22	4	5
27/04/94	0	22	1	6
28/04/94	0	18	3	6
29/04/94	5	16	8	5
30/04/94	8	16	1	6
1/05/94	0	19	5	7
2/05/94	1	15	5	8
3/05/94	8	14	4	7
4/05/94	0	20	1	8
5/05/94	0	22	2	8
6/05/94	32	17	8	8
7/05/94	10	10	4	8
8/05/94	0	22	4	8
9/05/94	12	16	7	8
10/05/94	4	17	5	8
11/05/94	20	15	7	8
12/05/94	12	14	5	8
13/05/94	6	17	6	8
14/05/94	15	9	4	8
15/05/94	0	21	1	9
16/05/94	0	24	1	9
17/05/94	0	25	5	10
18/05/94	0	25	6	10
19/05/94	0	27	1	12
20/05/94	0	29	5	12
21/05/94	0	27	8	11
22/05/94	6	14	7	11
23/05/94	0	17	8	11
24/05/94	13	11	9	11
25/05/94	18	14	6	10
26/05/94	18	18	5	10

Table 1. (cont'd.)

Date	Precipitation (mm)	Air Temperature (°C)		Water Temperature (°C)
		Maximum	Minimum	
27/05/94	26	10	3	9
28/05/94	3	17	6	9
29/05/94	6	16	6	9.5
30/05/94	16	11	5	8.5
31/05/94	6	19	5	9
1/06/94	12	17	7	10
2/06/94	4	12	8	10
3/06/94	2	15	8	10
4/06/94	1	17	8	10
5/06/94	12	19	6	10
6/06/94	0	22	5	10
7/06/94	0	21	7	11
8/06/94	1	22	9	11

Table 2. Captures of coho smolts and other fish species from Lachmach River from 1987 to 1994.

Year	Coho Smolts		Other Species		
	Total	Coded Wire Tagged and Released	Rainbow Trout	Dolly Varden Char	Cutthroat Trout
1987 <sup>a</sup>	1,909	1,790	5	13	97
1988 <sup>b</sup>	9,983	9,192	103	351	175
1989	21,410	19,482	1,176	1,592	767
1990	25,860	24,639	1,189	1,964	1,387
1991	14,572	13,469	855	1,506	738
1992	21,282	20,362	1,472	1,299	798
1993	15,920	14,393	1,302	924	358
1994 <sup>c</sup>	6,816	6,457	572	397	23

<sup>a</sup> A wood fence used in 1987 was frequently inoperable and provided a poor enumeration of downstream migrant fish.

<sup>b</sup> The aluminum fence allowed undetected passage of fish, resulting in a lower than expected enumeration.

<sup>c</sup> Two rotary screw traps were used instead of an aluminum fence, resulting in a partial enumeration.

Table 3. Summary of daily enumeration of coho at Lachmach River, spring 1994.

Date	Coded Wire Tagged Coho Length Category (mm)				Untagged Coho	Morts	Totals
	50-74	75-85	86-114	115+			
18/04/94	2	2	4	0	0	5	13
19/04/94	6	8	10	0	0	0	24
20/04/94	3	8	17	0	1	0	29
21/04/94	7	6	15	0	1	0	29
22/04/94	7	11	11	0	0	0	29
23/04/94	5	5	8	1	1	0	20
24/04/94	7	7	12	0	0	0	26
25/04/94	1	0	4	0	0	0	5
26/04/94	2	2	7	1	0	1	13
27/04/94	3	5	17	0	0	0	25
28/04/94	6	2	22	1	0	0	31
29/04/94	12	16	57	1	0	0	86
30/04/94	11	36	127	7	1	0	182
1/05/94	7	32	71	6	0	1	117
2/05/94	5	8	0	0	55	0	68
3/05/94	7	6	0	0	52	1	66
4/05/94	4	21	0	0	115	0	140
5/05/94	6	32	209	9	0	2	237
6/05/94	8	75	351	10	3	4	425
7/05/94	36	243	1,359	24	16	45	1,719
8/05/94	40	202	454	13	3	1	713
9/05/94	16	78	246	2	0	1	343
10/05/94	9	58	175	5	2	1	248
11/05/94	18	122	281	0	1	1	422
12/05/94	34	150	525	9	12	12	742
13/05/94	21	87	176	2	2	1	289
14/05/94	11	90	125	3	0	1	230
15/05/94	8	31	49	5	0	0	93
16/05/94	4	12	26	1	2	0	45
17/05/94	5	0	0	0	57	0	62
18/05/94	3	0	0	0	70	0	73
19/05/94	6	15	0	0	73	1	95
20/05/94	3	31	67	0	1	0	63
21/05/94	3	13	33	0	0	0	45
22/05/94	0	9	11	0	0	0	20
23/05/94	0	3	6	0	0	0	9
24/05/94	0	3	4	0	1	0	8
25/05/94	3	14	33	0	4	0	54
26/05/94	0	4	9	0	1	0	14
27/05/94	0	11	22	0	1	0	34
28/05/94	0	2	4	0	0	0	6

Table 3. (cont'd.)

Date	Coded Wire Tagged Coho Length Category (mm)				Untagged Coho	Morts	Totals
	50-74	75-85	86-114	115+			
29/05/94	0	0	2	0	0	0	2
30/05/94	0	2	1	0	0	0	3
31/05/94	1	0	2	0	0	0	3
1/06/94	1	0	2	0	0	0	3
2/06/94	0	3	1	0	0	0	4
3/06/94	0	0	1	0	0	0	1
4/06/94	0	0	2	0	0	0	2
5/06/94	0	0	1	0	0	0	1
6/06/94	1	0	0	0	0	0	1
7/06/94	0	1	0	0	0	0	1
Totals <sup>a</sup>	332	1,466	4,559	100	475	78	6,913

<sup>a</sup> These figures include 97 coho that were recaptured in the efficiency test.

Table 4. Summary of coded wire tagged coho by code, tagged at Lachmach River, spring 1994.

Code	Date	Length Range (mm)	Total	Tag Retention	Tags at Large
08/29/16	18/4/94 - 6/6/94	50-74	332	0.980 (252) <sup>a</sup>	325
08/29/12	18/4/94 - 7/6/94	75-85	1,466	0.912 (940)	1,437
08/29/13	18/4/94 - 5/6/94	86-114	4,559	0.995 (1481)	4,536
08/29/17	23/4/94 - 16/5/94	115+	100	0.912 (91)	91
Totals			6,457		6,389

<sup>a</sup> Denotes the number used to estimate tag retention.

Table 5. Weekly summaries of biological sampling of coho smolts at Lachmach River, spring 1994.

Week	Fork Length (mm)			Weight (g)		
	N	Mean	SD	N	Mean	SD
18/4/94 - 24/4/94	166	84	10.9	166	6.3	2.53
25/4/94 - 1/5/94	360	91	11.7	360	7.7	2.85
2/5/94 - 8/5/94	632	93	11.0	532	8.2	2.91
9/5/94 - 15/5/94	595	89	10.2	595	6.8	2.39
16/5/94 - 22/5/94	404	91	11.4	404	7.4	2.64
23/5/94 - 29/5/94	127	89	8.8	127	6.9	1.87
30/5/94 - 5/6/94	18	84	8.5	18	5.9	1.59
6/6/94 - 7/6/94	2	74	7.0	2	4.4	1.30
Total	2304	90	11.1	2204	7.3	2.70

Table 6. Summary of lengths and weights by age for coho smolts at Lachmach River, spring 1994.

Age	N	Fork Length (mm)			Weight (g)		
		Range	Mean	SD	Range	Mean	SD
1.0	57	56-117	79	14.5	1.8-15.4	5.30	3.15
2.0	54	79-129	105	13.3	4.3-20.2	11.60	4.01

Table 7. Estimated age composition of coho smolt population of Lachmach River, spring 1994.  $\hat{p}$  is the estimated proportion of coho in the size classes that are age 1.0 or 2.0.

Range (mm)	Coho N	Age 1.0		Age 2.0	
		$\hat{p}$	$\hat{p} * N$	$\hat{p}$	$\hat{p} * N$
55 - 59	1	1.00	1	0	0
60 - 64	9	1.00	9	0	0
65 - 69	47	1.00	47	0	0
70 - 74	120	1.00	120	0	0
75 - 79	205	0.83	170	0.17	35
80 - 84	320	0.50	160	0.50	160
85 - 89	388	0.58	225	0.42	163
90 - 94	447	0.43	192	0.57	255
95 - 99	308	0.71	219	0.29	89
100 - 104	210	0.10	21	0.90	189
105 - 109	127	0.11	14	0.89	113
110 - 114	78	0.14	11	0.86	67
115 - 119	26	0.29	8	0.71	18
120 - 124	16	0	0	1.00	16
125 - 129	1	0	0	1.00	1
130 - 134	1	0	0	1.00	1
Total	2,304		1,197 (52%)		1,107 (48%)

Table 8. Rotary trap efficiency, Lachmach River, spring 1994.

Date	Release #1	Release #2	
	86+ mm	75-85 mm	86+ mm
4/5/94	<u>release date</u>		
5/5/94	21		
6/5/94	26		
7/5/94	4		
8/5/94	0		
9/5/94	0		
10/5/94	2		
11/5/94	1		
12/5/94	0		
13/5/94	0		
14/5/94	0		
15/5/94	0		
16/5/94	0		
17/5/94	0		
18/5/94	0		
19/5/94	0	<u>Release Date</u>	
20/5/94	0	13	26
21/5/94	0	0	4
Subtotal	<u>54</u>	<u>13</u>	<u>30</u>
Total	54	43	

Table 9. Daily enumeration of other species, Lachmach River, spring 1994.

Date	Rainbow Trout	Cutthroat Trout	Dolly Varden Char	Prickly Sculpin	Coastrange Sculpin
18/04/94	1	0	0	10	0
19/04/94	0	0	0	8	3
20/04/94	1	0	0	5	4
21/04/94	2	0	4	7	4
22/04/94	1	0	1	8	3
23/04/94	1	0	3	12	2
24/04/94	0	0	2	12	4
25/04/94	2	0	0	2	0
26/04/94	0	0	3	10	1
27/04/94	0	0	4	17	5
28/04/94	1	0	5	12	5
29/04/94	2	0	8	4	3
30/04/94	3	0	11	2	1
1/05/94	1	0	7	6	1
2/05/94	4	0	2	15	2
3/05/94	1	0	11	5	6
4/05/94	2	0	6	6	5
5/05/94	1	0	9	13	2
6/05/94	5	0	10	8	1
7/05/94	4	3	21	6	4
8/05/94	3	2	23	2	0
9/05/94	3	1	25	9	1
10/05/94	2	2	13	6	3
11/05/94	4	4	33	7	1
12/05/94	8	0	32	1	0
13/05/94	7	0	29	3	4
14/05/94	9	0	19	5	2
15/05/94	11	0	28	3	2
16/05/94	4	2	8	5	1
17/05/94	21	0	28	2	0
18/05/94	18	2	18	5	1
19/05/94	28	0	13	6	2
20/05/94	20	0	5	3	1
21/05/94	11	1	3	9	2
22/05/94	10	0	1	4	0
23/05/94	6	0	0	0	0
24/05/94	5	0	1	4	1
25/05/94	118	2	1	4	0
26/05/94	9	1	2	5	1
27/05/94	53	3	1	3	1
28/05/94	23	0	4	4	5
29/05/94	20	0	1	0	0

Table 9. (cont'd.)

Date	Rainbow Trout	Cutthroat Trout	Dolly Varden Char	Prickly Sculpin	Coastrange Sculpin
30/05/94	27	0	0	0	0
31/05/94	24	0	1	6	1
1/06/94	27	0	0	5	1
2/06/94	11	0	0	4	0
3/06/94	9	0	0	3	1
4/06/94	12	0	1	3	1
5/06/94	17	0	0	3	0
6/06/94	8	0	0	2	0
7/06/94	12	0	0	1	0
Total	572	23	397	285	88

Table 10. Weekly summary of rainbow trout, Lachmach River, spring 1994.

Week	Length (mm)			Weight (g)		
	N	Mean	S.D.	N	Mean	S.D.
18/4/94 - 24/4/94	6	129	14.6	6	21.2	8.11
25/4/94 - 1/5/94	9	118	24.3	9	19.8	11.0
2/5/94 - 8/5/94	20	124	27.5	17	20.6	11.9
9/5/94 - 15/5/94	36	156	28.9	36	36.6	14.8
16/5/94 - 22/5/94	112	138	33.3	112	26.6	15.4
23/5/94 - 29/5/94	234	145	23.3	234	27.9	10.5
30/5/94 - 5/6/94	127	134	28.3	127	23.7	13.4
6/6/94 - 7/6/94	20	102	13.4	19	11.4	4.1
Total	564	139	28.7	560	26.3	13.2

Table 11. Weekly summary of cutthroat trout, Lachmach River, spring 1994.

Week	Length (mm)			Weight (g)		
	N	Mean	S.D.	N	Mean	S.D.
18/4/94 - 24/4/94	0			0		
25/4/94 - 1/5/94	0			0		
2/5/94 - 8/5/94	5	106	23.5	3	18.3	4.9
9/5/94 - 15/5/94	7	107	30.8	7	15.1	12.8
16/5/94 - 22/5/94	5	96	7.7	5	9.2	2.0
23/5/94 - 29/5/94	6	101	11.9	6	10.3	2.8
30/5/94 - 5/6/94	0			0		
6/6/94 - 7/6/94	0			0		
Total	23	103	21.8	21	12.8	8.5

Table 12. Weekly summary of Dolly Varden char, Lachmach River, spring 1994.

Week	Length (mm)			Weight (g)		
	N	Mean	S.D.	N	Mean	S.D.
18/4/94 - 24/4/94	10	238	50.1	10	124.0	67.5
25/4/94 - 1/5/94	38	212	33.9	38	81.3	29.1
2/5/94 - 8/5/94	82	158	47.1	59	43.6	33.9
9/5/94 - 15/5/94	147	128	25.5	147	19.8	16.3
16/5/94 - 22/5/94	76	124	14.9	76	17.0	7.1
23/5/94 - 29/5/94	10	134	12.5	10	20.1	6.5
30/5/94 - 5/6/94	2	120	36.0	2	19.9	14.7
6/6/94 - 7/6/94	0			0		
Total	365	146	44.2	342	33.2	34.8

Table 13. Weekly summary of prickly sculpin, Lachmach River, spring 1994.

Week	Length (mm)			Weight (g)		
	N	Mean	S.D.	N	Mean	S.D.
18/4/94 - 24/4/94	62	111	17.5	62	20.5	12.7
25/4/94 - 1/5/94	53	108	14.4	50	20.6	10.3
2/5/94 - 8/5/94	55	99	18.3	53	15.3	11.6
9/5/94 - 15/5/94	33	99	14.4	33	12.6	5.1
16/5/94 - 22/5/94	34	96	18.8	34	12.3	6.9
23/5/94 - 29/5/94	20	93	20.7	20	10.7	6.3
30/5/94 - 5/6/94	24	88	27.3	23	10.0	10.2
6/6/94 - 7/6/94	3	89	12.6	3	7.9	2.9
Total	284	101	19.7	278	15.9	10.9

Table 14. Weekly summary of coastrange sculpin, Lachmach River, spring 1994.

Week	Length (mm)			Weight (g)		
	N	Mean	S.D.	N	Mean	S.D.
18/4/94 - 24/4/94	20	81	16.1	20	7.1	5.6
25/4/94 - 1/5/94	16	81	14.4	14	7.8	4.6
2/5/94 - 8/5/94	20	80	15.0	20	6.1	3.3
9/5/94 - 15/5/94	13	85	25.8	13	8.8	8.0
16/5/94 - 22/5/94	7	73	21.5	7	5.0	4.6
23/5/94 - 29/5/94	8	75	21.3	8	5.4	5.2
30/5/94 - 5/6/94	4	71	7.0	4	3.8	1.4
6/6/94 - 7/6/94	0			0		
Total	88	80	18.4	86	6.7	5.4

Table 15. Summary of coho captured and marked in the upper ponds, Antigonish Creek, spring 1994.

$C_t$  - Total catch for period t

$M_t$  - Number of additional marks applied for period t

$R_t$  - Number of recaptured marks during period t

Date	$C_t$	$M_t$	$R_t$	Mean (mm)	Range (mm)	S.D.
27/4/94	57	57	-	85	62 - 110	13.5
28/4/94	60	60	0	97	63 - 125	14.9
2/5/94	34	31	3	99	70 - 125	14.4
3/5/94	50	34	16	94	65 - 148	18.2
Total		182	19	93	62 - 148	16.2

Table 16. Summary of cutthroat trout captured and marked in the upper ponds, Antigonish Creek, spring 1994.

Date	$C_t$	$M_t$	$R_t$	Mean (mm)	Range (mm)	S.D.
27/4/94	23	23	-	96	59 - 149	21.7
28/4/94	1	1	0	139	-	-
2/5/94	0	0	0	-	-	-
3/5/94	9	6	3	95	61 - 137	27.7
Total		30	3	97	59 - 149	24.0

Table 17. Summary of Dolly Varden char captured and marked in the upper ponds, Antigonish Creek, spring 1994.

Date	$C_t$	$M_t$	$R_t$	Mean (mm)	Range (mm)	S.D.
27/4/94	78	78	-	112	80 - 158	20.7
28/4/94	40	40	0	117	90 - 189	23.5
2/5/94	38	13	25	154	92 - 204	33.3
3/5/94	78	28	50	104	81 - 175	22.2
Total		159	75	115	80 - 204	26.1

Table 18. Summary of enumeration of salmonids from Antigonish Creek, spring 1994.

() indicates number of caudal clips seen.

Date	Coho Smolts	Coho Fry	Chinook Fry	Chum Fry	Cutthroat Trout	Dolly Varden Char
21/4/94	0	0	0	1	0	1
22/4/94	3	0	0	0	0	0
23/4/94	2	0	0	2	0	0
24/4/94	1	0	0	1	0	0
25/4/94	2	0	0	0	0	0
26/4/94	2	0	0	0	0	0
28/4/94	0	0	0	0	0	2
1/5/94	2	0	0	0	0	1
4/5/94	2	1	0	0	0	5 (1)
6/5/94	8	24	0	0	1	3
8/5/94	12	7	0	0	2	2
11/5/94	7 (1)	4	4	0	3	5
14/5/94	7	49	18	0	0	0
17/5/94	10 (1)	34	4	0	5	8
21/5/94	10 (3)	22	0	0	0	1 (1)
24/5/94	1	2	1	0	0	0
26/5/94	1	0	2	0	1	0
28/5/94	0	2	0	0	0	0
30/5/94	3	18	8	0	0	0
1/6/94	0	24	30	2	0	0
2/6/94	0	14	16	1	0	0
4/6/94	0	13	7	0	0	0
5/6/94	0	5	3	0	0	0
Total after 27 Apr.	63 (5)	219	93	3	12	27 (2)
Total	73	219	93	7	12	28

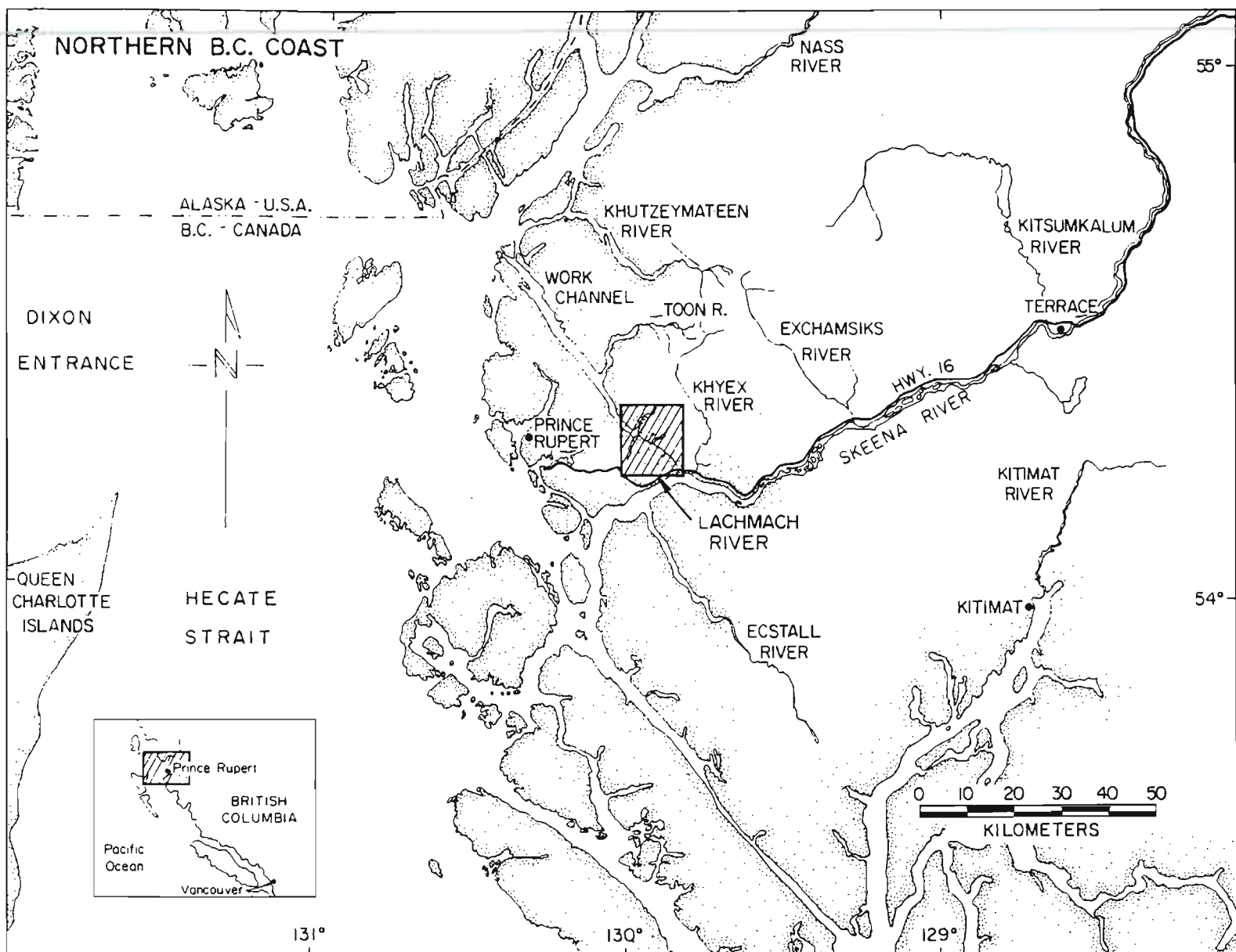
Table 19. Summary of enumeration of other species from Antigonish Creek, spring 1994.

Date	Prickly Sculpin	Coastrange Sculpin	Lamprey	Threespined Stickleback
21/4/94	0	0	0	1
22/4/94	0	0	0	0
23/4/94	0	0	0	0
24/4/94	0	0	0	0
25/4/94	0	0	0	0
26/4/94	0	0	0	0
28/4/94	0	0	0	0
1/5/94	0	0	0	0
4/5/94	0	0	0	0
6/5/94	2	1	0	2
8/5/94	1	3	3	0
11/5/94	3	1	3	1
14/5/94	0	0	4	2
17/5/94	1	1	0	4
21/5/94	2	0	0	2
24/5/94	0	1	4	0
26/5/94	0	0	0	1
28/5/94	2	1	1	0
30/5/94	0	0	2	1
1/6/94	0	0	3	3
2/6/94	4	0	4	2
4/6/94	1	0	0	2
5/6/94	0	0	3	1
Total	16	8	27	22

Table 20. Summary of lengths and weights of all species recorded at Antigonish Creek, spring 1994.

Species	Length (mm)				Weight (g)			
	N	Mean	Range	S.D.	N	Mean	Range	S.D.
coho smolts	73	97	56-151	25.4	48	11.0	1.1-29.0	7.41
coho fry	143	35	29-50	3.8	60	0.3	0.1-1.3	0.19
chinook fry	83	47	31-62	4.1	19	0.8	0.6-1.2	0.16
chum fry	7	43	40-46	2.3	0			
cutthroat trout	12	107	68-146	18.1	10	14.0	8.9-29.0	6.01
Dolly Varden char	28	124	82-245	44.5	23	26.0	5.3-134.0	32.0
prickly sculpin	16	69	37-104	21.1	8	7.4	3.7-15.0	3.27
coastrange sculpin	8	69	47-89	14.0	4	5.7	0.8-8.6	2.99
lamprey	9	156	123-177	19.0	3	7.2	6.4-7.8	0.59
threespined stickleback	17	57	38-74	10.1	10	1.9	0.3-4.5	1.19

Figure 1. Location of Work Channel and Lachmach River.





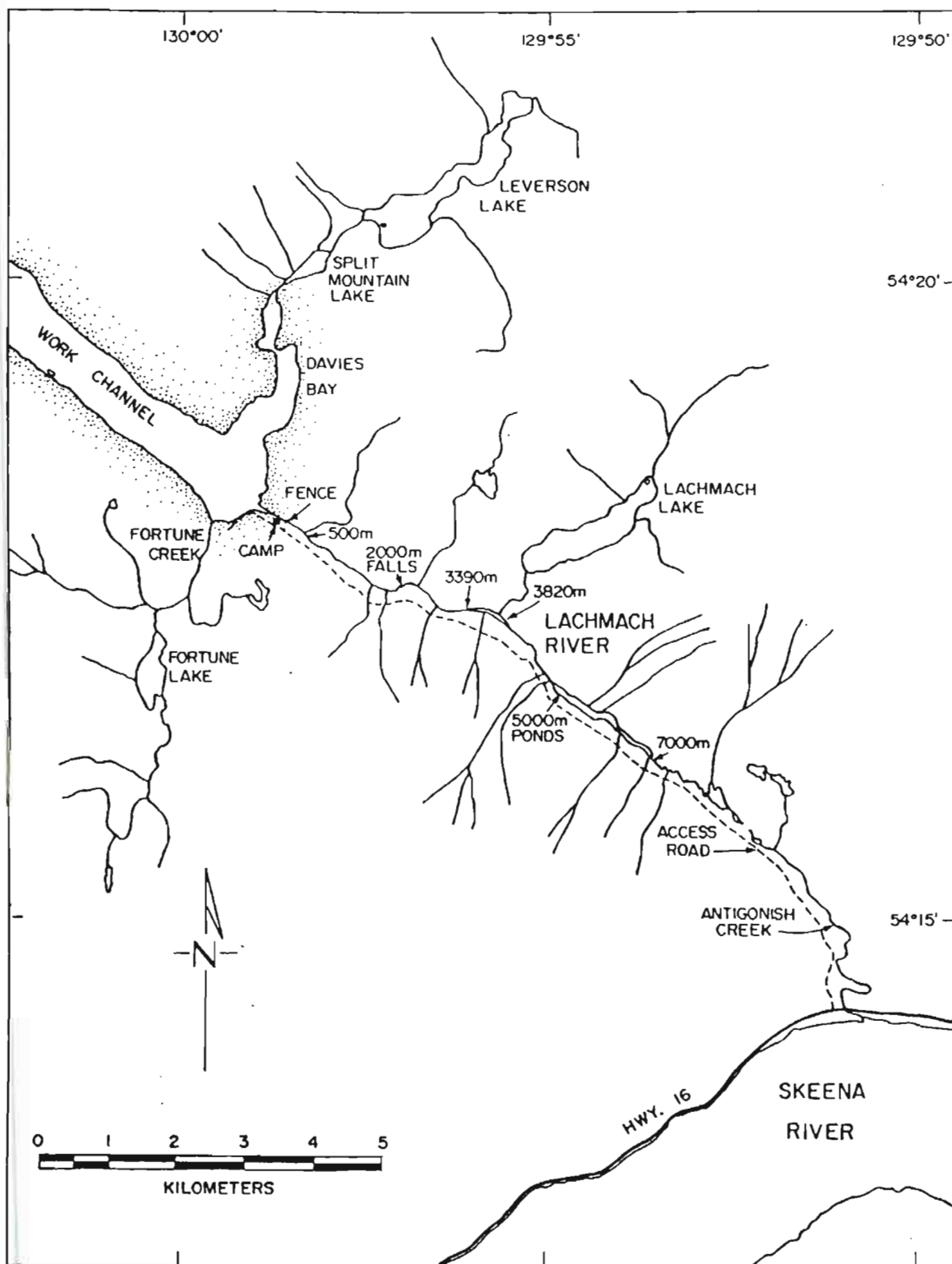


Figure 2. Map of Lachmach River and Antigonish Creek showing locations of study sites.



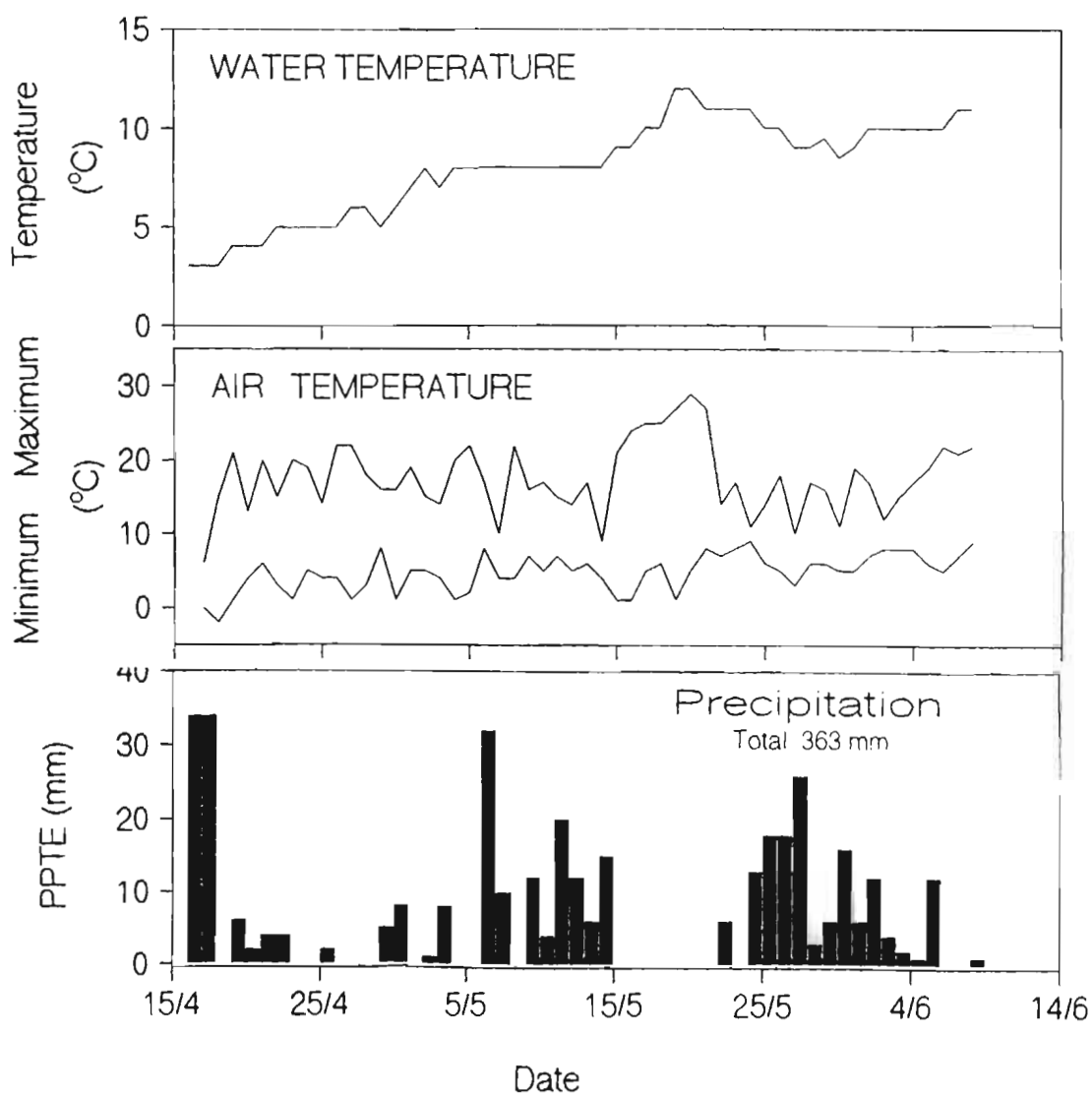


Figure 3. Environmental data recorded at the Lachmach River camp from 16 April to 8 May, 1994.



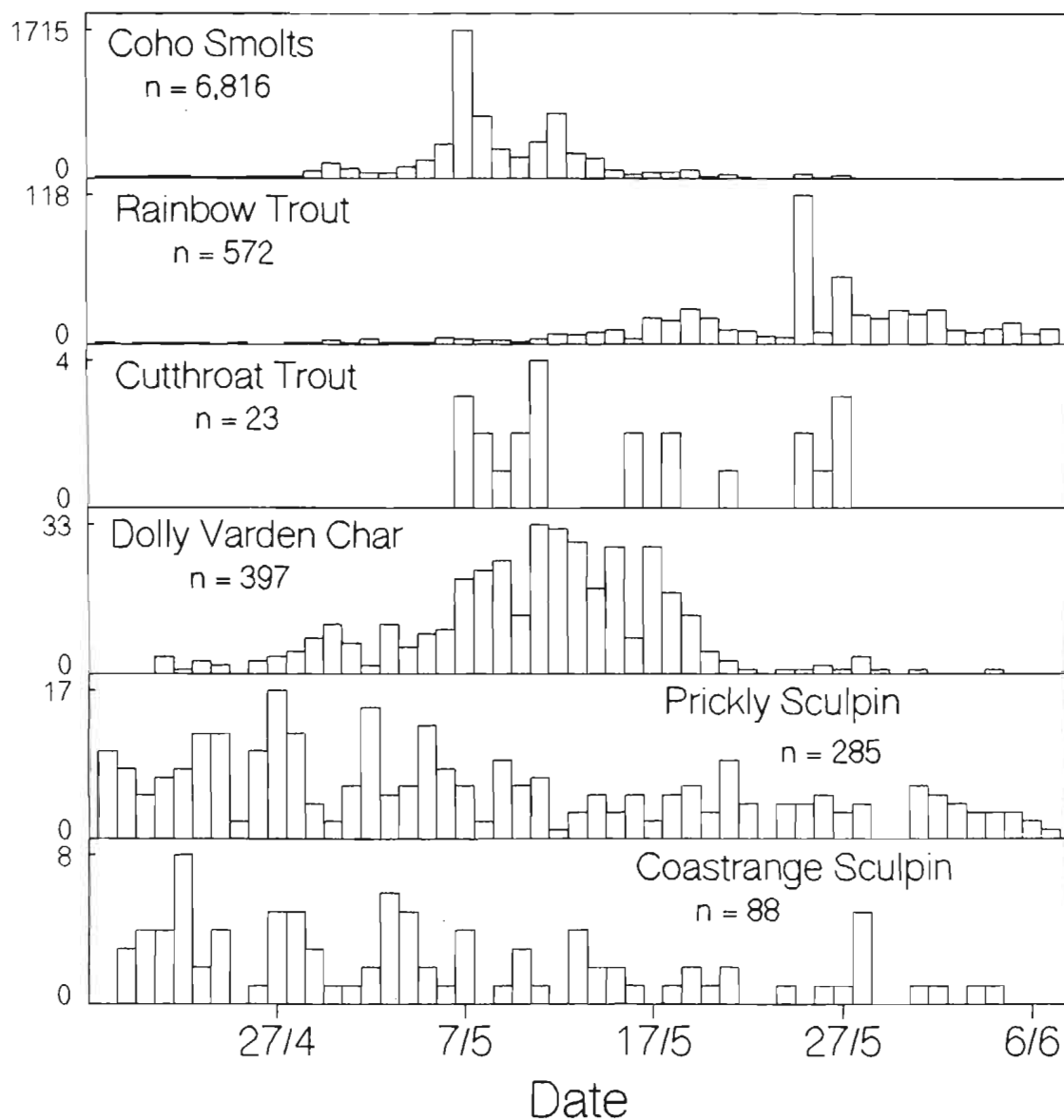


Figure 4. Daily captures of coho smolts, rainbow trout, Dolly Varden char and sculpin species trapped in the Lachmach River, spring 1994.

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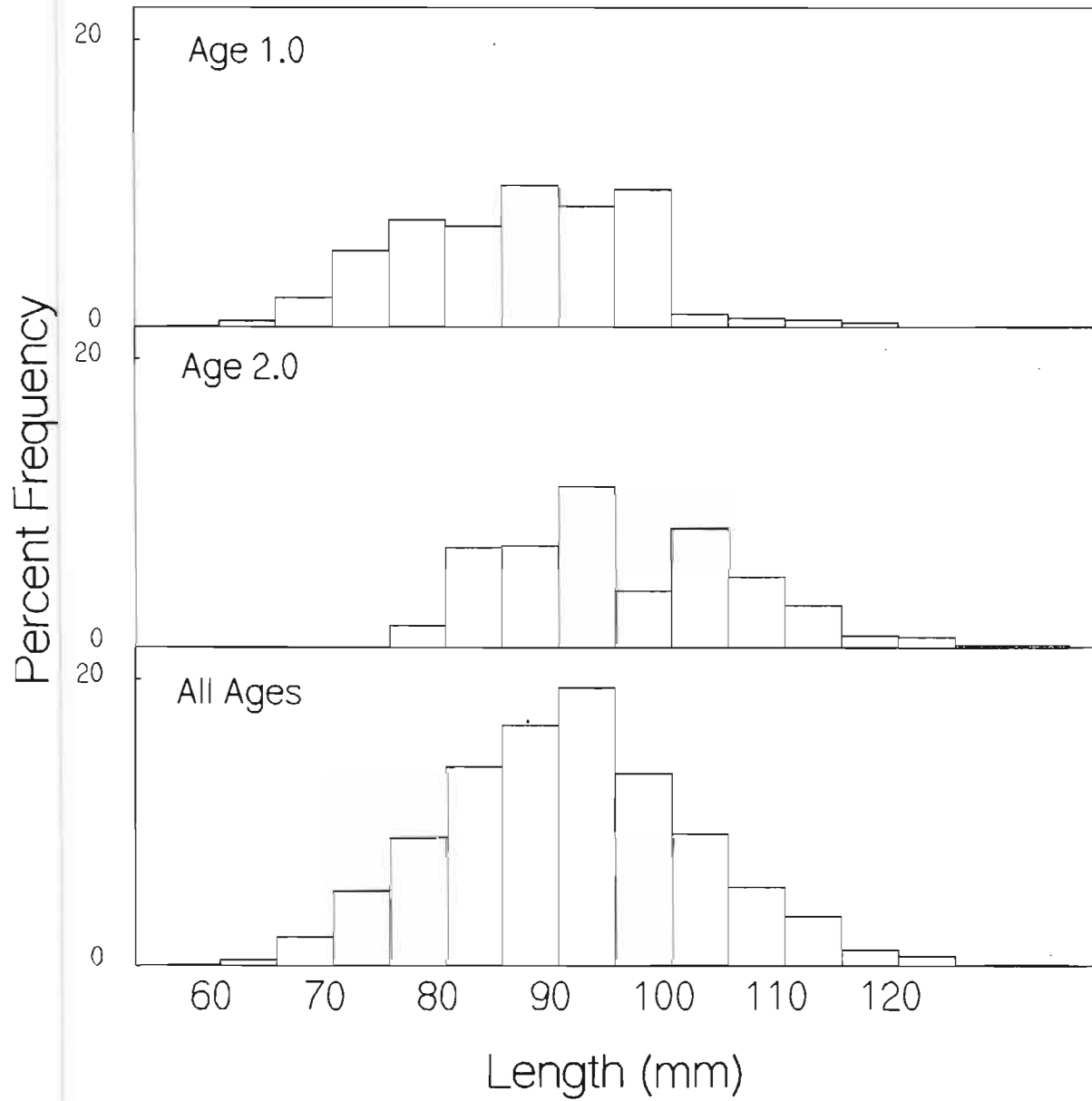


Figure 5. Length frequency distributions of coho smolts, combined and by age class, trapped in the Lachmach River, spring 1994.

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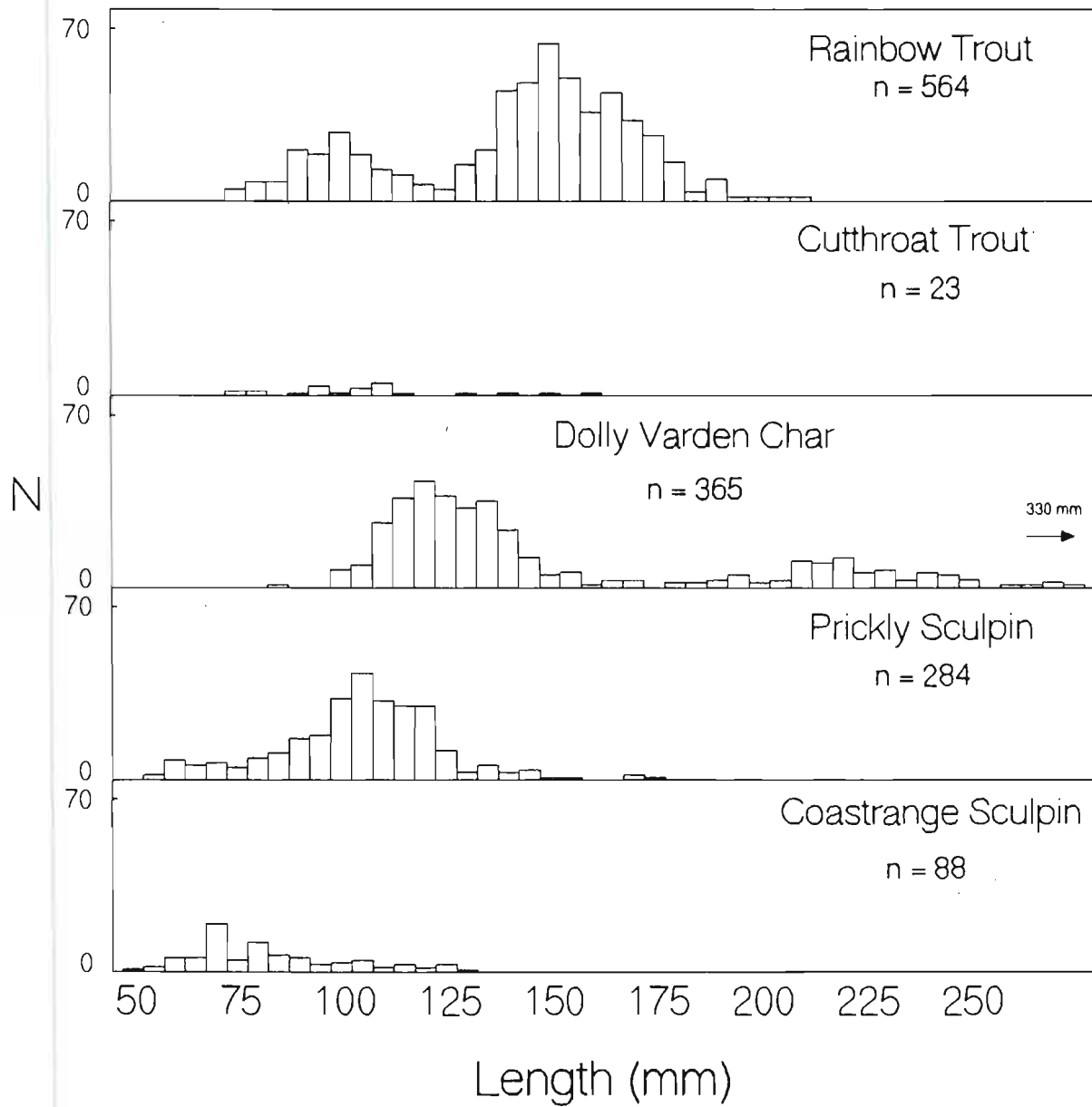


Figure 6. Length frequency distributions of rainbow and cutthroat trout, Dolly Varden char, prickly and coastrange sculpins trapped in the Lachmach River, spring 1994.

