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Summary of the 1992 Coho Salmon Smolt Trapping Operations on the Lachmach River, British Columbia

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ABSTRACT

Lane, J. and S. J. Baillie. 1994. Summary of the 1992 coho salmon smolt trapping operations on the Lachmach River, British Columbia. Can. Data. Rep. Fish. Aquat. Sci. 926: 35 p.

This report contains coho smolt (Oncorhynchus kisutch) enumeration, coded wire tagging and sampling data from the Lachmach River, British Columbia for the period of April 22 to June 25, 1992. 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. aleuticus) and adult steelhead trout (O. mykiss) are also presented. All fish were trapped using a smolt fence located near the mouth of the river. The total smolt outmigration was 21,282 of which 20,362 were coded wire tagged. Age structure of coho smolts was 25% 1.0, 73% 2.0 and 2% 3.0. The total outmigration of other species was 1,472 juvenile rainbow trout, 1,299 Dolly Varden char, 798 cottids, 14 cutthroat trout and 4 adult steelhead trout. Fourty adult steelhead trout were enumerated migrating upstream.

RÉSUMÉ

Lane, J. and S. J. Baillie. 1994. Summary of the 1992 coho salmon smolt trapping operations on the Lachmach River, British Columbia. Can. Data. Rep. Fish. Aquat. Sci. 926: 35 p.

Le présent rapport comporte des données sur le dénombrement, l'étiquetage par des micromarques codées et l'échantillonnage de saumon coho (Oncorhynchus kisutch) de la rivière Lachmach, en Colombie-Britannique, pendant la période du 22 avril au 25 juin 1992. On présente également des données sur le dénombrement et l'échantillonnage concernant des juvéniles de truite arc-en-ciel (O. mykiss), des Dolly Varden (Salvelinus malma), des truites fardées (O. clarki), des chabots piquants (Cottus asper) et des chabots côtiers (C. aleuticus) et des truites arc-en-ciel anadromes adultes (O. mykiss) qui effectuent tous des migrations vers le large. Tous les poissons ont été capturés au moyen d'une barrière à smolts placée à proximité de l'embouchure de la rivière. Le nombre total de smolt en dévalaison était de 21 282 dont 20 362 ont reçu une micromarque codée. La structure par âge des smolts de coho était la suivante : 25% d'âge 1.0, 73% d'âge 2.0 et 2% d'âge 3.0. Le nombre total de poissons d'autres espèces qui ont effectué des migrations s'établissait comme suit : 1 472 juvéniles de truite arc-en-ciel, 1 292 Dolly Varden, 798 cottidés, 14 truites fardées et 4 truites arc-en-ciel anadromes adultes. On a dénombré quarante truites arc-en-ciel anadromes en montaison.

INTRODUCTION

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^2 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).

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 smolt fence trapping and tagging operations on the Lachmach River for the spring of 1992. This is the tenth 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), and Davies et al. (1992). Reports on the adult coho salmon sampling operations at Lachmach River for 1990 and 1991 are in preparation.

METHODS

A welded aluminum smolt fence, as described by Finnegan (1991) was in operation from April 22 to June 25. Cleaning and minor repairs to the fence were done as required and periodic snorkel inspections were conducted to check for fence integrity and to inspect the fyke net lead-ins for damage and debris accumulation.

The fence trap boxes were checked daily between 0800 and 0930. Coho were counted and 10%, to a maximum of 100 coho smolts, were selected and sampled for length (+/- 1 mm), weight (+/- 0.05 g) and the presence of fin or maxillary clip marks. Coho examined for daily length and weight samples were chosen by dip netting fish from holding buckets that contained fish from all the traps. Scale smears for age determinations were taken from up to 25 fish per 5 mm size ranges from 55 to 145 mm. A further 113 coho smolts were sampled for age determination by removal of scales, otoliths and pectoral fins. Fin samples were frozen and otoliths were stored in a 50% glycerine solution with a 0.3% addition of thymol as an antifungal and antibacterial agent.

Prior to the application of coded wire nose tags, all coho smolts were checked for the presence of fin or maxillary clip marks and graded into large (>=86 mm) or small (<=85 mm) size categories. A length from every fish with a fin or maxillary clip mark was recorded. Tagging was performed with a Mk. II Tagging Unit (Northwest Marine Technologies, Shaw Island WA) following procedures as described in Argue et al. (1979), except 2-phenoxyethanol was substituted for tricane methanesulfonate (MS 222). Each size group received separate tag codes as follows:

Large:
1. April 22 to May 11 - 08/08/03
2. May 11 to May 25 - 08/01/26
3. May 25 to June 6 - 08/01/28

Small:
1. April 22 to June 25 - 08/08/02

Coho that were less than 55 mm, or appeared to be injured or moribund were released untagged.

Short term tag retention was determined daily from 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 being released.

Fence trapping efficiency was estimated from the recaptures of two separate releases of marked coho smolts. One hundred large and a combination of 50 large and 50 small coded wire

tagged smolts were released approximately 50 m upstream from the fence on April 25 and May 4 respectively. The April 25 and May 4 groups were marked with an upper and lower caudal fin clip respectively.

Daily catches of other downstream migrant fish were identified, counted and sampled for length and weight. Upstream migrating adult steelhead trout were caught in an upstream trap attached to the smolt fence. We tagged them with a numbered anchor tag (Floy FD-68B 2.54 cm, Seattle WA). Length and scale samples were collected when practical. Downstream migrating adult steelhead caught in the fence traps were examined for anchor tags. Untagged adult steelhead were sampled for length and scales and anchor tagged before being released downstream.

Daily records of river levels (low, moderate or high) and temperature and the weather measurements of precipitation, minimum and maximum air temperature, and % cloud cover were taken at the camp at 0800. These environmental data were recorded from April 13 to July 9.

RESULTS

FENCE

The fence was operated from April 22 until June 25. Fence integrity was maintained throughout this period except for brief occasions during large freshets on May 1, May 3 and June 1. The periods of lost fence integrity were between 6 and 18 hours. The fence was not checked on June 5, due to a crew change. Fence operations resumed on June 6.

ENVIRONMENTAL DATA

Total precipitation from April 13 to July 9 was 377 mm, of which 60% was recorded between April 29 and May 11. A 24 hour maximum rainfall of 52 mm was recorded on May 2 (Figure 3). The mean maximum daily air temperature was 14.5°C, with a range of 4.5°C to 22.5°C. The mean minimum daily air temperature was 5.3°C, with a range of -3.0°C to 12.0°C. Daily water temperatures increased gradually during the study period, with a mean of 8.1°C and minimum and maximum values of 5.0°C and 12.0°C respectively.

COHO SMOLTS

Total smolt outmigration from April 22 to June 25 was 21,282. A complete enumeration of the run was not possible due to hydrological conditions. Several fence panels were removed during extreme freshet conditions. The recapture at the fence of coded wire tagged smolts that were released downstream prior to the freshets suggest some degree of upstream migration occurred during this period. It is probable that a number of coho smolts passed downstream through the fence during this time period. Comparisons with smolt migration of previous years (Davies et al. 1992) are presented in Table 2. The daily combined outmigration for large and small smolts is illustrated in Figure 4. The lower quartile of migration was May 2, the median May 10 and the upper quartile May 19. Of the total smolt production, 18,567 (87%) were classified as large (Table 3) and 2,715 (13%) classified as small (Table 4).

Of the small smolts captured, 2,515 were coded wire tagged (tag code 08/08/02), 95 were released untagged and 105 were mortalities (Table 4). Short term tag retention (24 hours) for small smolts was 96.8%, therefore, the estimated number of tagged small smolts is 2,435 (Table 5). The number of large smolts coded wire tagged was 17,847, 173 were released untagged and 547 were mortalities (Table 3). Tag retention for large smolts was 96.6%, 99.7% and 100 % for tag codes 08/08/03, 08/01/26 and 08/01/28 respectively. The estimated number of tagged large smolts is 17,486 (Table 5).

The length-frequency distribution for all smolts is illustrated in Figure 5. Biological information summaries for all smolts by week are presented in Table 6. The mean length of outmigrants was 96 mm (n=3490, SD=12.0) and the mean weight 8.70 g (n=3050, SD=3.05). Mean lengths and weights decreased through the migration with the largest decrease occuring after the fifth week. Biological information by age class is presented in Table 7. Ages were obtained from 377 scale samples and 113 combination samples of fins, otoliths and scales. The total age composition was obtained by weighting each 5 mm size class by the age composition in the class. 25% were estimated as age 1.0, 73% as age 2.0 and 2% as age 3.0. The age class lengths overlapped considerably (Table 7, Figure 5).

A summary of the number of smolts captured with fin clip marks and the history of mark applications is presented in Table 8. Recaptures of marks from previous years (Davies 1991, Davies et al. 1992) are also presented. Left maxillary clips were applied in 1989 only to coho that were age 1.0 or older. In 1990 there were 13 outmigrant smolts with this mark and 6 in 1991. The 12 coho smolts identified with this mark in 1992 would have to be four year old smolts which is unlikely. The obvious

conclusion is that these fish were originally marked with a combination of a left maxillary and a ventral fin clip, with the ventral fin regrowing. Table 9 summarizes the mean lengths of coho with different fin marks.

Table 10 shows the recaptures of smolts which were caudal clipped and released above the fence to obtain fence trapping efficiency. Trapping efficiency was 79% for the April 25 releases and 80 and 74% for large and small smolts respectively for the May 4 releases. These are the minimum estimates because they do not account for mortality after release or fish that do not migrate back downstream after release.

OTHER SPECIES

Daily captures of juvenile rainbow trout, Dolly Varden char, cutthroat trout, prickly sculpin, coastrange sculpin, and adult steelhead trout are presented in Table 11. Daily captures of juvenile rainbow trout, Dolly Varden char, and cottids are illustrated in Figure 4. Migration timing data are presented in Table 12. Counts of adult steelhead were not sufficient to provide an estimate of run timing.

Biological information by week for other juvenile salmonid species are presented in Tables 13 and 14. Biological information for prickly and coastrange sculpins are presented in Tables 15 and 16. Mean lengths and weights generally decreased through the sample period for juvenile salmonids and remained level for cottids. Length-frequency distributions for juvenile rainbow trout, Dolly Varden char and cottids are illustrated in Figure 6.

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Table 1. Environmental data collected at Lachmach River, spring 1992.

Date	Precipitation (mm)	Air Temperature (°C)		Water Temperature (°C)
		Maximum	Minimum	
Apr 13	-	13.5	5	7
Apr 14	-	12	8	7
Apr 15	-	17	6	6
Apr 16	-	14	7	6
Apr 17	-	17	7	7
Apr 18	-	7	3	6
Apr 19	-	16	3	7
Apr 20	-	16	6	5
Apr 21	-	13	3	6
Apr 22	-	14	1	6
Apr 23	-	18	2	6
Apr 24	-	16	1	7
Apr 25	-	17	2	7.5
Apr 26	-	15	5	7
Apr 27	6	15	5	7
Apr 28	-	12	4	7.5
Apr 29	5	9.5	4	7.5
Apr 30	9	8	1.5	7
May 1	30	4.5	2	6
May 2	52	13	4	5.5
May 3	29	11	5.5	6.5
May 4	8	9.5	7	7
May 5	19	9.5	8	6
May 6	3	16	2	6
May 7	0	13	1	7
May 8	10	9	5	7
May 9	20	8	3	6.5
May 10	20	8	3	7
May 11	17	13	4.5	7
May 12	2	13	3	7
May 13	0	13	5	8

Table 1. (cont'd.)

Date	Precipitation	Air Temperature		Water
		Maximum	Minimum	(°C)
May 14	0	13	4	8
May 15	0	20	1	8
May 16	0	11	3	8.5
May 17	0	11	2	7.5
May 18	0	11	0	6.5
May 19	0	16	-3	6
May 20	0	19	-2	6.5
May 21	0	22.5	-1	7.5
May 22	0	18	3	9
May 23	0	22	2	9.5
May 24	4	15	11	11
May 25	13	17	11	10
May 26	7	12	10	10
May 27	8	16	10	10
May 28	14	21	9	10
May 29	2	13	11	9
May 30	18	14	8	10
May 31	31	19	10	10
June 1	10	14	8	9
June 2	2	13	9	9
June 3	0	17	3	9
June 4	0	20	4	9
June 5	-	-	2	9
June 6	0	19	5	11
June 7	5	18	9	10.5
June 8	5	14	11	10
June 9	0	14.5	7.5	10
June 10	1	18	8	11
June 11	0	18	10	10.5
June 12	0	21	11	13.5
June 13	15	16	12	11.5
June 14	0	14	11	12
June 15	0.5	14	11	11.5

Table 1. (cont'd.)

Date	Precipitation	Air Temperature		Water (°C)
		Maximum	Minimum	
June 16	0	16.5	-	-
June 17	6.5	14	-	11
June 18	2.5	21.5	-	10.5
June 19	24	15	10	12
June 20	2	16	14	12
June 21	4	15	11	12
June 22	5	19	11	12.5
June 23	0	17	12	12.5
June 24	0	21	7	14
June 25	0	23	7	13.5
June 26	0	25	8	14
June 27	0	27	7	14
June 28	0	24	11	15
June 29	1	26	12	15.5
June 30	0	26.5	11	16.5
July 1	0	31	12	16.5
July 2	2	28	13	16
July 3	0	25	13	16
July 4	0	29	12	17
July 5	0	26	12.5	16.5
July 6	0	27	11	16
July 7	0	18	12	15
July 8	0	22	12	15.5
July 9	0	23	14	15.5

Table 2. Captures of coho smolts and other fish species from the Lachmach River fence from 1987 to 1992.

year	Coho Smolts		Other Species		
	total	coded wire tagged and released	rainbow trout	Dolly Varden char	cottids
1987[a]	1,909	1,790	5	13	97
1988[b]	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

[a] - A wood fence used in 1987 was frequently inoperable and provided a poor enumeration of downstream migrant fish.

[b] - The aluminum fence allowed undetected passage of fish resulting in a lower than expected enumeration.

Table 3. Daily coded wire tagging summary for coho smolts >=86 mm, captured at the Lachmach River fence, spring 1992.

Date	Tagged Releases	Untagged Releases	Mortalities	Total
Apr 22	33	0	3	36
Apr 23	24	0	0	24
Apr 24	55	0	3	58
Apr 25	114	2	5	121
Apr 26	165	2	3	170
Apr 27	530	3	4	537
Apr 28	509	4	8	521
Apr 29	899	7	19	925
Apr 30	1308	6	17	1331
May 1	861	8	9	878
May 2	298	2	138	438
May 3	461	24	134	619
May 4	464	4	17	485

Table 3. (cont'd.)

Date	Tagged Releases	Untagged Releases	Mortalities	Total
May 5	844	3	16	863
May 6	502	1	7	510
May 7	479	7	1	487
May 8	190	3	4	197
May 9	595	5	3	603
May 10	1416	6	51	1473
May 11	1517	7	7	1531
May 12	176	1	2	179
May 13	295	2	1	298
May 14	141	1	3	145
May 15	479	9	4	492
May 16	388	0	1	389
May 17	592	0	3	595
May 18	546	3	2	551
May 19	265	3	2	270
May 20	379	7	1	387
May 21	149	4	0	153
May 22	524	3	2	529
May 23	219	2	2	223
May 24	367	6	9	382
May 25	745	16	17	778
May 26	823	7	40	870
May 27	136	5	4	145
May 28	72	1	1	74
May 29	185	5	4	194
May 30	53	0	0	53
May 31	36	2	0	38
June 1	4	0	0	4
June 2	2	0	0	2
June 3	5	0	0	5
June 4	2	0	0	2
June 6	0	2	0	2
June 7 - 25	0	0	0	0
Totals	17,847	173	547	18,567

Table 4. Daily coded wire tagging summary for coho smolts <= 85 mm captured at the Lachmach River fence, spring 1992.

Date	Tagged Releases	Untagged Releases	Mortalities	Total
Apr 22	17	1	1	19
Apr 23	6	0	0	6
Apr 24	10	0	0	10
Apr 25	9	0	1	10
Apr 26	6	0	2	8
Apr 27	62	1	1	64
Apr 28	57	2	2	61
Apr 29	67	0	2	69
Apr 30	77	0	0	77
May 1	98	1	8	107
May 2	33	1	18	52
May 3	49	9	20	78
May 4	162	5	3	170
May 5	89	7	12	108
May 6	90	0	0	90
May 7	61	3	0	64
May 8	37	3	1	41
May 9	61	1	3	65
May 10	139	10	1	150
May 11	126	3	4	133
May 12	30	0	2	32
May 13	26	0	4	30
May 14	19	0	2	21
May 15	49	4	0	53
May 16	39	1	4	44
May 17	59	1	0	60
May 18	47	0	0	47
May 19	38	1	1	40

Table 4. (cont'd.)

Date	Tagged Releases	Untagged Releases	Mortalities	Total
May 20	24	0	0	24
May 21	24	0	0	24
May 22	28	0	0	28
May 23	35	1	0	36
May 24	82	3	1	86
May 25	147	14	0	161
May 26	130	2	7	139
May 27	68	0	1	69
May 28	26	1	0	27
May 29	48	4	2	54
May 30	27	1	0	28
May 31	23	3	0	26
June 1	1	1	0	2
June 2	3	2	0	5
June 3	20	0	0	20
June 4	3	0	0	3
June 6	16	0	0	16
June 7	22	0	0	22
June 8	59	0	0	59
June 9	11	0	0	11
June 10	3	0	0	3
June 11	3	1	0	8
June 12	2	3	0	5
June 13	58	3	2	63
June 14	23	0	0	23
June 15	15	0	0	15
June 16	1	0	0	1
June 17	3	0	0	3
June 18	3	0	0	3

Table 4. (cont'd.)

Date	Tagged Released	Untagged Released	Mortalities	Total
June 19	22	0	0	22
June 20	9	0	0	9
June 21	7	0	0	7
June 22	0	0	0	0
June 23	1	1	0	2
June 24	1	0	0	1
June 25	0	1	0	1
Totals	2515	95	105	2715

Table 5. Summary of tagged coho releases from the Lachmach River, spring 1992.

Size	Tag Code	Tagging Date	Total Tagged and Released	% Tag Retention	Estimated Tags at Large
Large	08/08/03	Apr 22 - May 11	10,441	96.6	10,086
	08/01/26	May 11 - May 25	5,452	100.0	5,452
	08/01/28	May 25 - June 4	1,954	99.7	1,948
	All		17,847		17,486
Small	08/08/02	Apr.22 - June 25	2,515	96.8	2,435

Table 6. Weekly summaries of biological sampling of coho smolts tagged at the Lachmach River fence, spring 1992.

Week	Fork Length (mm)			Weight (g)		
	N	Mean	SD	N	Mean	SD
April 22 - 28	553	99	11.4	552	8.95	2.89
April 29 - 5	600	99	12.3	498	9.15	3.20
May 6 - 12	701	97	11.9	701	8.50	2.94
May 13 - 19	629	99	11.3	625	8.80	2.77
May 20 - 26	507	99	12.8	507	8.70	3.06
May 27 - 2	200	92	17.7	125	8.00	3.77
June 3 - 9	114	74	8.6	0		
June 10 - 16	113	73	5.6	0		
June 17 -25	48	73	6.4	42	3.80	0.99
Totals	3490	96	12.0	3050	8.70	3.05

Table 7. Summary of length and weight by age for coho smolts trapped at the Lachmach River fence, spring 1992.

Age	Fork Length (mm)				Weight (g)			
	N	Range	Mean	SD	N	Range	Mean	SD
1.0	162	57-124	74	11.9	113	1.90-16.40	4.25	2.17
2.0	313	75-139	105	13.0	231	4.00-24.35	10.80	3.90
3.0	15	101-139	117	10.3	13	8.95-22.05	14.10	3.94

Table 8. Summary of fin clipped coho smolts captured at the Lachmach River fence, spring 1992.

() denote totals for the years 1989 to 1992.

Mark Type	Release Site	Release Dates and Number		Recaptures N
Adipose	Fence	Spring 89-92[a]		9 (35)
Adipose/CWT	Fence	Spring 89-92[b]		14 (44)
Left Maxillary	Fence	June-July 89	109 (109)	12[c] (19)
Right Ventral/ Left Maxillary	500 m[d]	June-Sept 89 Aug 90 June 91	136 27 47 (210)	27 (73)
Left Ventral/ Right Maxillary	2000 m	June-Aug 89 Aug 90 June 91	224 63 216 (503)	9 (36)
Left Ventral/ Left Maxillary	2600 m	Sept 89 Aug 90 July 91	322 42 49 (413)	14 (31)
Left Ventral	3820 m 3390 m	Sept 89 June 91 Aug 90 July 91	696 107 400 106 (1309)	80 (196)
Right Ventral/ Right Maxillary	4500 m	Sept 89 Aug 90 June 91	356 200 79 (635)	46 (98)
Right Ventral	5000 m	Aug 89 Aug 90 June 91	897 19 198 (1114)	320 (455)

Table 8. (cont'd.)

Right Maxillary	7000 m	Sept 89 Aug 90 June 91	286 114 38 (438)	33 (57)
Right Ventral/ Left Ventral				3[e] (3)

[a] - It is not known the year these fish were adipose clipped.
[b] - Includes fish recaptured shortly after tagging and fish recaptured from the previous years tagging efforts.
[c] - See text under 'Results', p. 4.
[d] - Numbers indicate distance in meters upstream from fence.
[e] - There were no RVLV marks officially applied. These fish were incorrectly marked.

Table 9. Mean fork lengths (mm) for fin clipped coho smolts captured at the Lachmach River fence, spring 1992.

Mark	N	Mean	SD
Adipose	9	101	8.34
Adipose + CWT	14	106	12.01
Left Maxillary	12	101	11.02
Left Ventral	80	96	15.18
Left Ventral/ Left Maxillary	14	90	8.71
Left Ventral/ Right Maxillary	9	101	10.41
Right Maxillary	33	98	18.88
Right Ventral	318	109	11.31
Right Ventral/ Left Maxillary	31	99	12.09
Right Ventral/ Left Ventral	3	97	15.04
Right Ventral/ Right Maxillary	41	95	9.63

Table 10. Daily recaptures of marked coho smolts at the Lachmach River fence used to estimate the fence capture efficiency for coho smolts, spring 1992.

() denotes captures that were mortalities

Date	Upper Caudal	Lower Caudal	
	Large	Large	Small
Apr.25	release date		
Apr.26	15		
Apr.27	21		
Apr.28	8		
Apr.29	12		
Apr.30	12		
May 1	8		
May 2	0		
May 3	3		
May 4	0	release date	
May 5	0	9 (1)	17 (3)
May 6	0	8 (3)	0
May 7	0	6	3
May 8	0	1	0
May 9	0	4	1
May 10	0	10	12
May 11	0	2	1
May 12	0	0	0
May 13	0	1	0
May 14	0	0	0
May 15	0	1	0
May 16 - 19	0	0	0
May 20	0	1	0
May 21 - 29	0	0	0
May 30	0	1	0
Total	79	40	37

Table 11. Daily captures of other fish species from the Lachmach River fence, spring 1992.

Date	Rainbow Trout	Dolly Varden Char	Cutt. Trout	Adult Steelhead		Prickly Sculpin	Coast. Sculpin
				Up	Down		
Apr 22	4	8	0	0	0	9	0
Apr 23	2	12	0	0	0	7	2
Apr 24	6	22	1	0	0	4	7
Apr 25	5	21	0	1	0	19	4
Apr 26	17	28	0	3	0	21	4
Apr 27	18	31	0	1	0	27	7
Apr 28	9	25	0	1	0	28	6
Apr 29	9	27	0	1	0	6	2
Apr 30	11	15	0	2	0	9	1
May 1	15	46	0	3	1	16	6
May 2	9	11	0	0	0	10	0
May 3	3	23	0	0	0	7	0
May 4	21	39	0	1	0	22	3
May 5	35	76	0	0	0	27	4
May 6	7	29	0	0	0	18	3
May 7	16	25	0	1	0	16	2
May 8	6	13	1	1	0	22	6
May 9	44	48	0	0	0	15	0
May 10	71	96	0	1	0	9	2
May 11	24	102	0	2	0	15	1
May 12	5	10	0	1	0	4	2
May 13	14	20	0	1	0	17	7
May 14	5	11	0	3	0	20	5
May 15	27	27	1	2	0	5	3
May 16	40	40	0	1	0	11	1

Table 11. (cont'd.)

Date	Rainbow Trout	Dolly Varden Char	Cutt. Trout	Adult Steelhead		Prickly Sculpin	Coast. Sculpin
				Up	Down		
May 17	33	41	0	0	0	1	1
May 18	29	19	0	0	0	1	1
May 19	13	19	0	0	0	0	0
May 20	38	24	0	4	0	1	0
May 21	13	12	0	3	0	0	0
May 22	34	16	0	1	0	3	1
May 23	66	17	0	3	0	2	1
May 24	75	85	0	0	0	11	7
May 25	115	57	1	0	0	19	7
May 26	149	43	0	0	0	11	4
May 27	24	14	0	1	0	10	3
May 28	20	10	0	0	0	3	1
May 29	139	105	0	0	2	4	3
May 30	28	8	0	0	0	13	1
May 31	14	5	0	0	1	10	5
June 1	3	1	0	0	0	12	0
June 2	2	0	0	0	0	5	0
June 3	8	1	0	0	0	6	3
June 4	5	3	0	0	0	18	0
June 6	22	1	1	1	0	6	0
June 7	8	0	7	1	0	1	1
June 8	56	2	0	0	0	3	12
June 9	17	3	0	0	0	5	3
June 10	4	1	0	0	0	1	2
June 11	4	0	0	0	0	2	2
June 12	9	0	0	0	0	9	7
June 13	25	1	1	0	0	6	5
June 14	22	1	1	0	0	7	1

Table 11. (cont'd.)

Date	Rainbow Trout	Dolly Varden Char	Cutt. Trout	Adult Steelhead		Prickly Sculpin	Coast. Sculpin
				Up	Down		
June 15	15	1	0	0	0	5	1
June 16	0	0	0	0	0	4	2
June 17	3	1	0	0	0	0	0
June 18	2	1	0	0	0	0	0
June 19	25	2	0	0	0	7	7
June 20	11	0	0	0	0	22	18
June 21	9	0	0	0	0	11	3
June 22	7	0	0	0	0	14	4
June 23	2	0	0	0	0	6	0
June 24	0	0	0	0	0	5	1
June 25	0	0	0	0	0	2	3
Totals	1472	1299	14	40	4	610	188

Table 12. Migration timing in quartiles for outmigrant juvenile rainbow trout, Dolly Varden char and cottids from the Lachmach River, spring 1992.

Quartile	Rainbow Trout	Dolly Varden Char	Cottids
Lower	May 15	May 5	May 3
Median	May 25	May 11	May 14
Upper	May 29	May 24	June 4

Table 13. Weekly summaries of fork lengths (mm) for other salmonid species trapped at the Lachmach River fence, spring 1992.

Week	Rainbow Trout			Cutthroat Trout			Dolly Varden Char		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Apr 22 - 28	44	140	32.1	1	136	-	116	183	56.3
Apr 29 - May 5	54	143	27.1	0	-	-	125	137	35.4
May 6 - 12	97	153	27.5	1	125	-	141	126	19.3
May 13 - 19	124	148	30.9	1	134	-	146	129	6.4
May 20 - 26	126	142	50.6	1	132	-	77	129	18.9
May 27 - June 2	116	133	43.1	0	-	-	63	135	23.5
June 3 - 9	116	101	23.5	8	107	11.7	10	118	52.3
June 10 - 16	79	96	17.6	2	143	3.5	4	113	14.5
June 17 - 25	59	94	17.9	0	-	-	4	98	3.7
Totals	842	130	39.7	14	119	17.3	713	139	37.5

Table 14. Weekly summaries of weights (g) for other salmonid species trapped at the Lachmach River fence, spring 1992.

Week	Rainbow Trout			Cutthroat Trout			Dolly Varden Char		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Apr 22 - 28	44	27.20	14.86	1	21.50	-	113	54.45	36.55
April 29 - May 5	54	27.65	14.19	0	-	-	67	24.25	20.98
May 6 - 12	97	31.75	14.91	1	15.50	-	140	16.95	10.63
May 13 - 19	112	29.60	15.70	1	21.40	-	128	18.05	7.50
May 20 - 26	126	27.30	19.17	1	19.65	-	77	17.85	8.67
May 27 - June 2	96	24.70	20.85	0		-	63	21.05	12.15
June 3 - 9	0	-	-	0	-	-	0	-	-
June 10 - 16	0	-	-	0	-	-	0	-	-
June 17 - 25	54	8.45	3.81	0	-	-	4	9.20	3.68
Totals	583	26.30	17.52	4	19.55	2.82	584	25.80	23.94

Table 15. Weekly summaries of lengths (mm) for cottids trapped at the Lachmach River fence, spring 1992.

	prickly sculpin			coastrange sculpin		
Week	N	Mean	SD	N	Mean	SD
Apr 22 - 28	97	114	17.17	23	102	19.52
Apr 29 - May 5	54	105	20.91	11	101	12.96
May 6 - 12	90	110	16.38	14	84	18.56
May 13 - 19	55	107	18.19	17	87	21.50
May 20 - 26	26	104	20.92	13	93	16.40
May 27 - June 2	56	106	21.12	13	85	28.86
June 3 - 9	39	109	25.82	13	92	19.60
June 10 - 16	34	101	21.47	20	104	19.84
June 17 - 25	67	101	25.28	36	92	21.35
Totals	528	107	20.77	170	93	21.03

Table 16. Weekly summaries of weights (g) for cottids trapped at the Lachmach River fence, spring 1992.

	prickly sculpin			coastrange sculpin		
Week	N	Mean	SD	N	Mean	SD
Apr 22 - 28	82	20.55	11.73	22	13.10	6.60
Apr 29 - May 5	39	16.80	16.11	9	12.75	5.65
May 6 - 12	79	17.55	8.56	12	7.00	4.14
May 13 - 19	1	28.15	-	0	-	-
May 20 - 26	14	19.55	10.86	9	10.05	4.54
May 27 - June 2	7	18.05	9.87	3	22.85	25.32
June 3 - 9	0	-	-	0	-	-
June 10 - 16	0	-	-	0	-	-
June 17 - 25	67	13.80	14.80	34	9.60	8.47
Totals	289	17.55	12.52	89	10.90	8.25

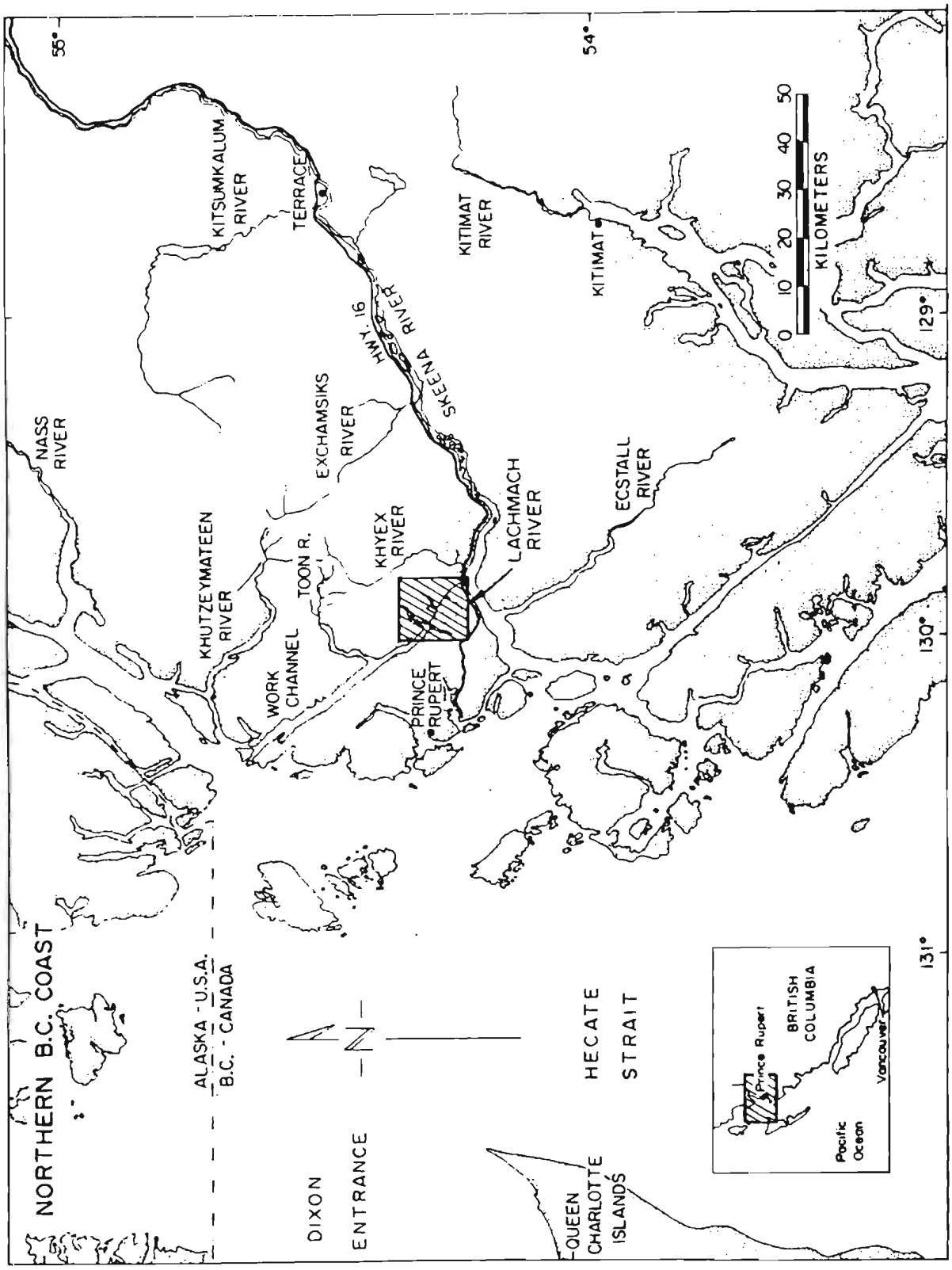

Figure 1. Locations of the Work Channel and Lachmach River areas.

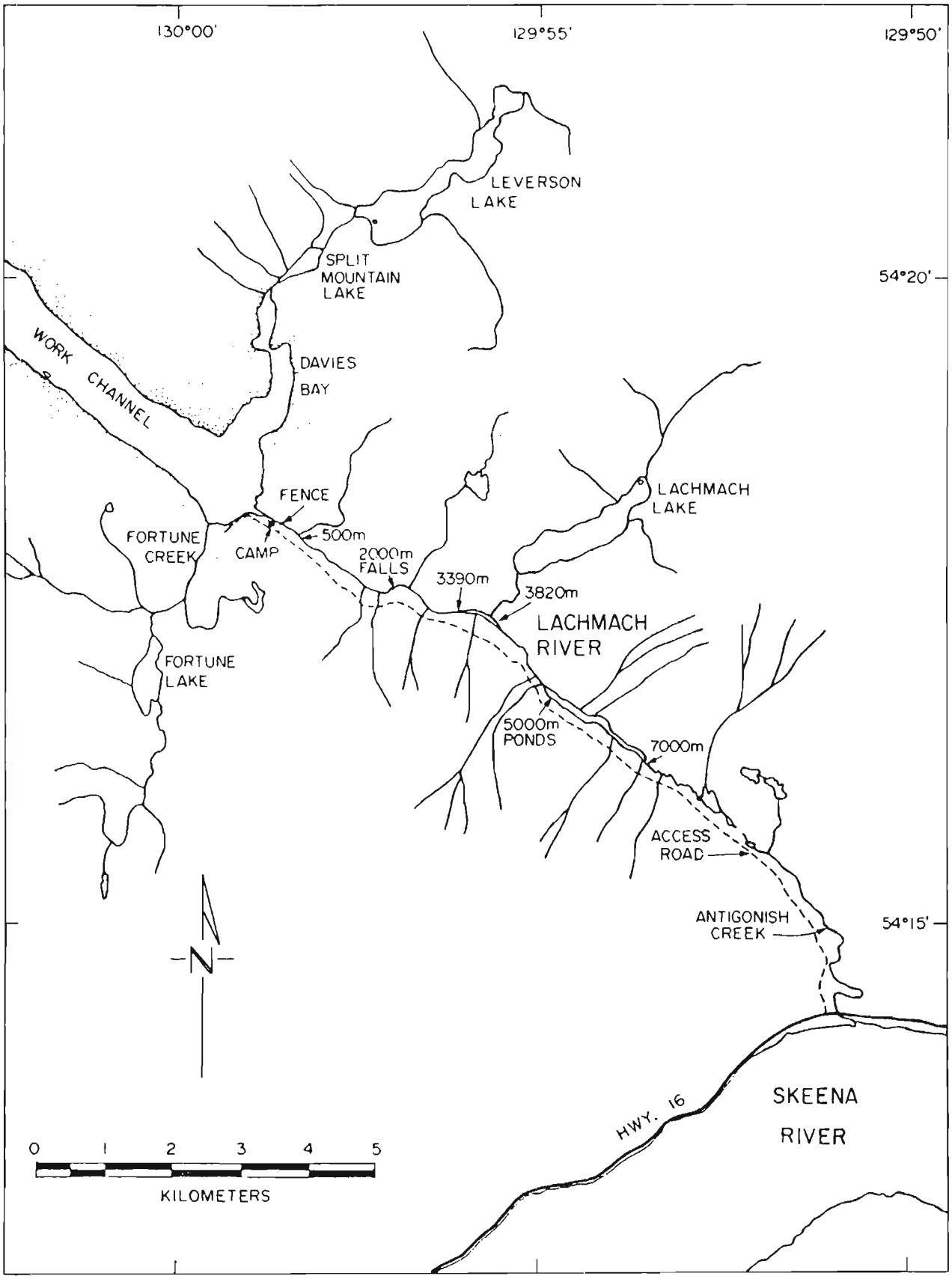

Figure 2. Map of the Lachmach River area showing locations of study sites and adjacent systems.

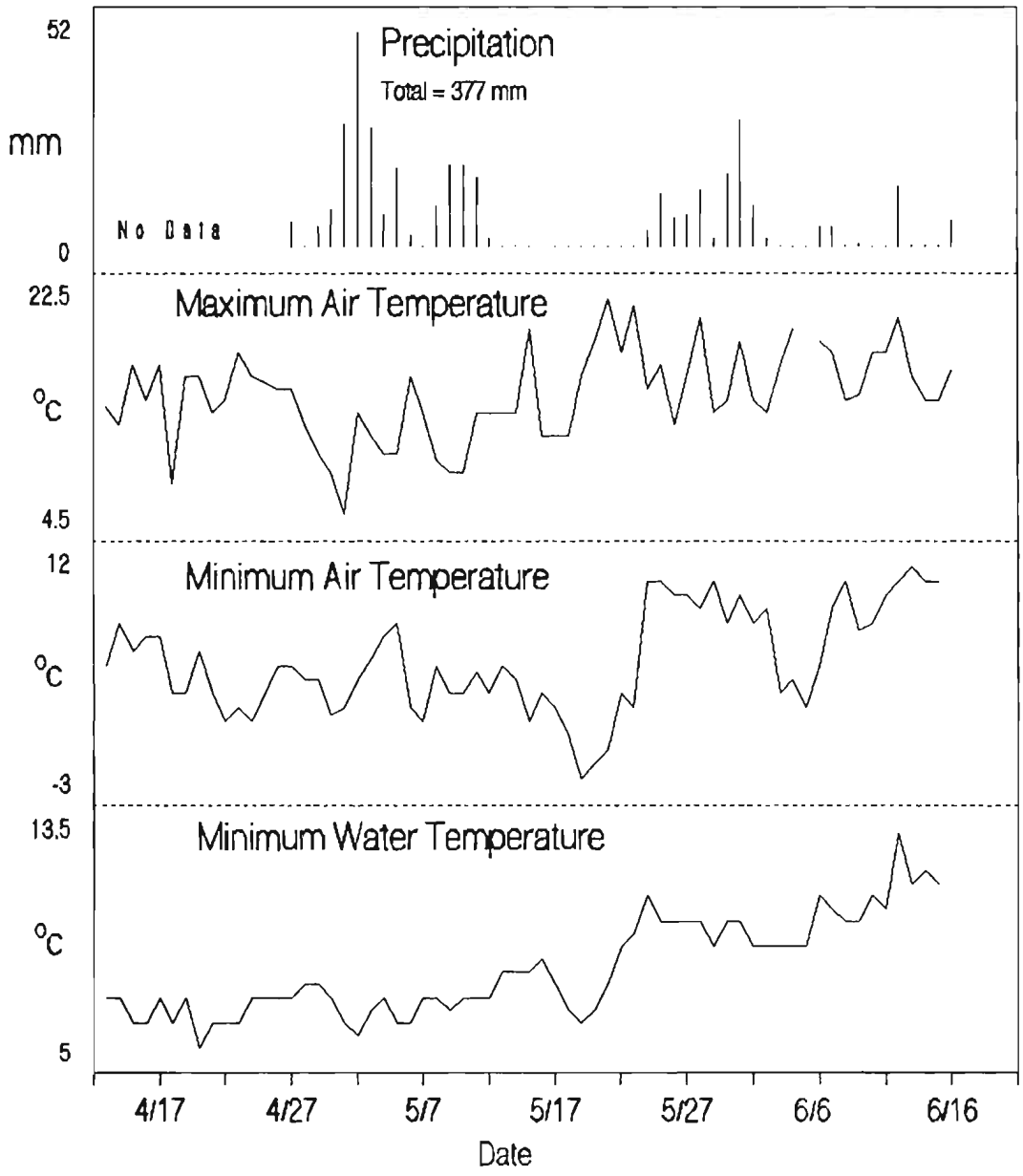

Figure 3. Environmental parameters recorded at the Lachmach River fence from April 12 to June 25, 1992.

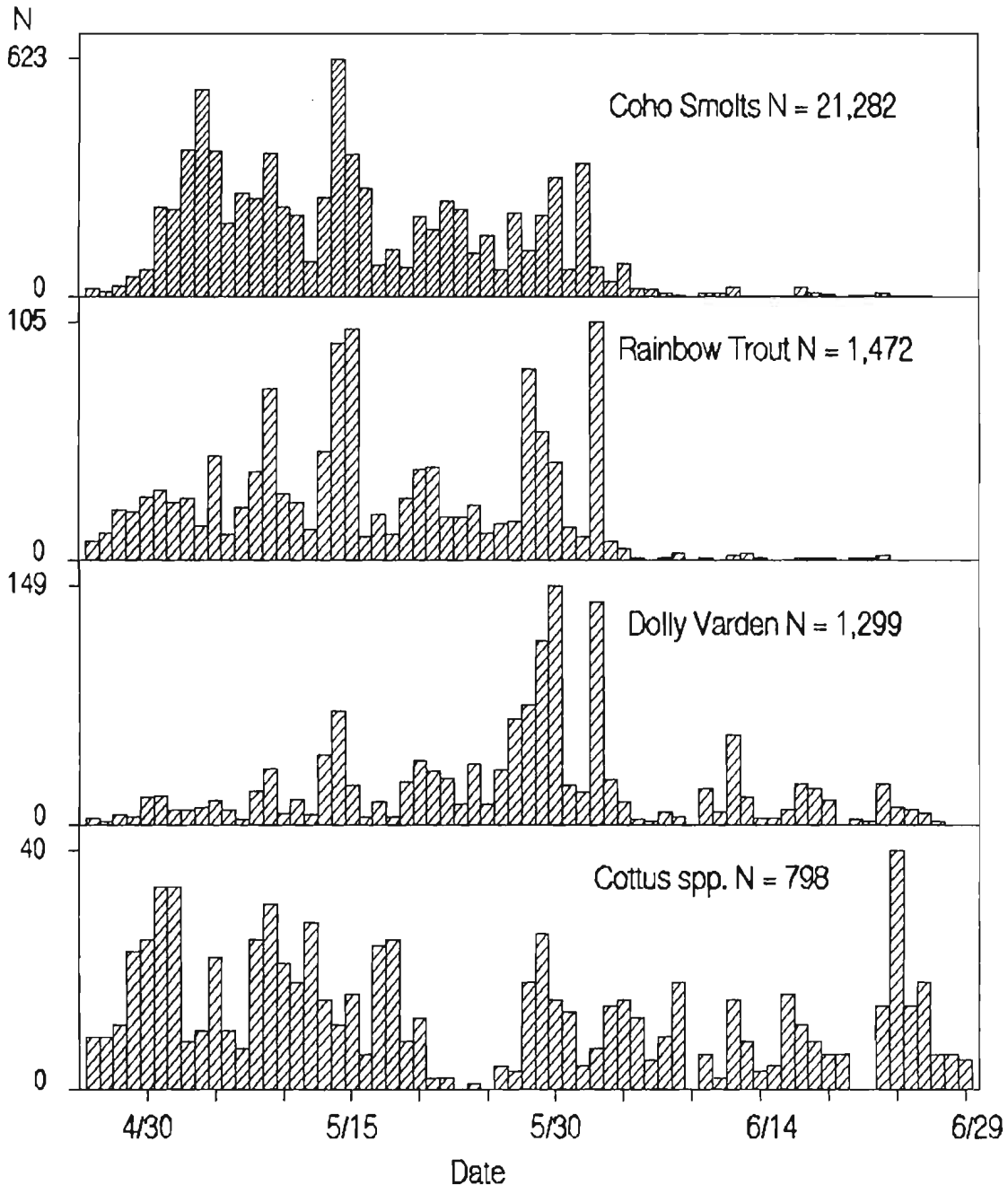

Figure 4. Daily captures of coho smolts, juvenile rainbow trout, Dolly Varden char and cottid species trapped at the Lachmach River fence, spring 1992.

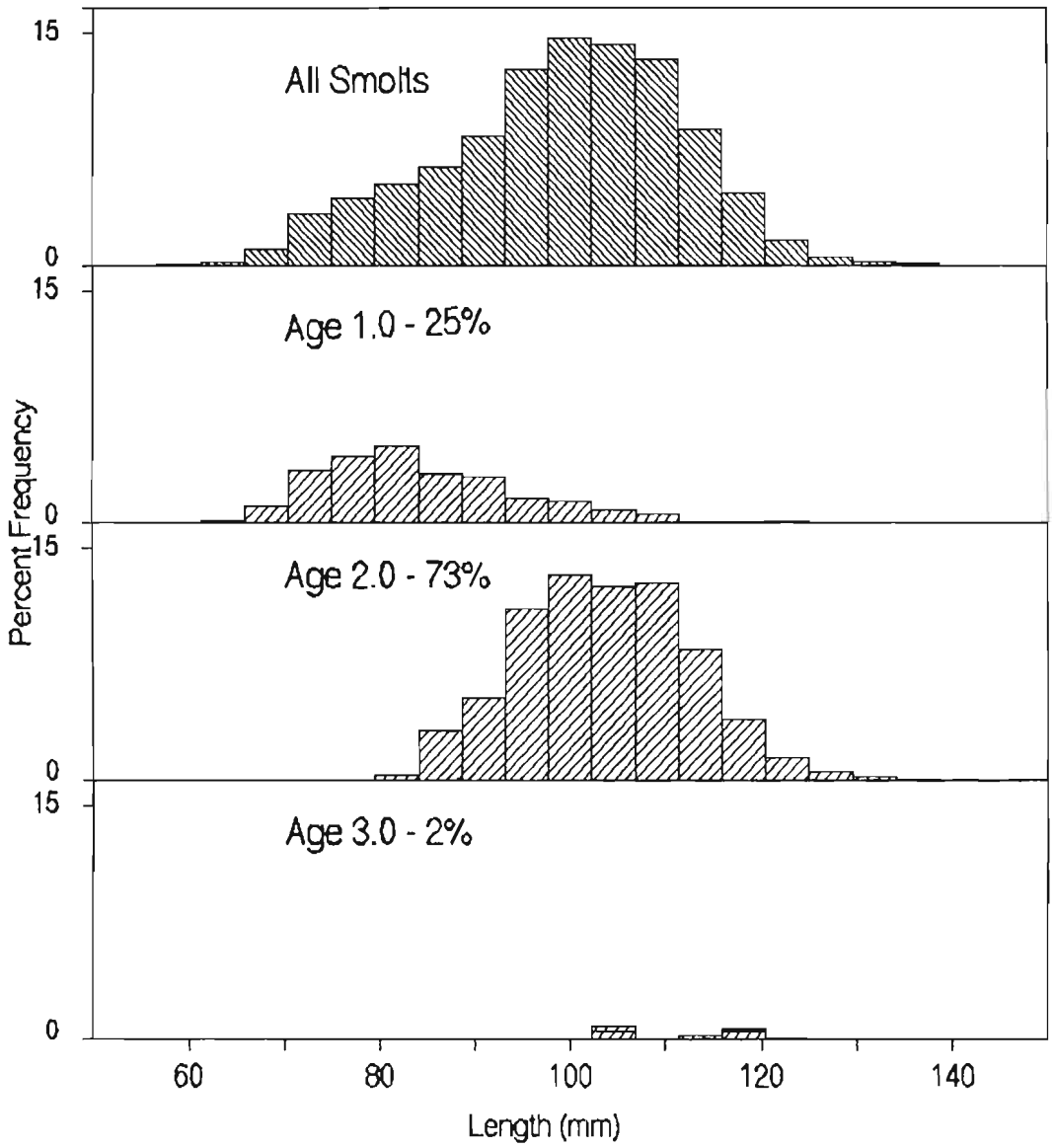

Figure 5. Length-frequency distributions of coho smolts, combined and by age class, for coho smolts trapped at the Lachmach River fence, spring 1992.

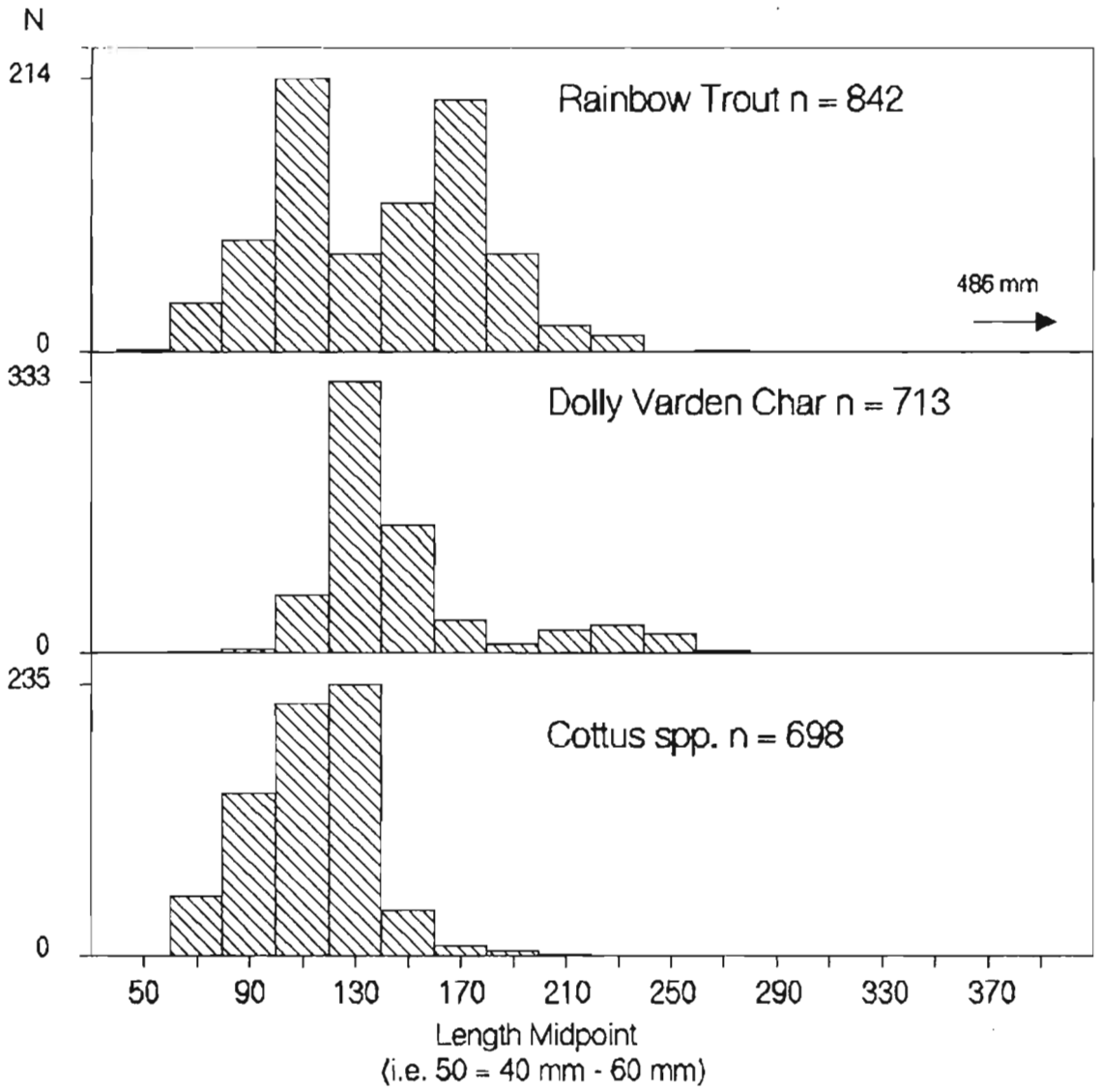

Figure 6. Length-frequency distributions for juvenile rainbow trout, Dolly Varden char and cottid species trapped at the Lachmach River fence, spring 1992. A rainbow trout of 486 mm is not shown.