

SK 85

Lachmach River Steelhead
Investigations,
April 22 - June 23 1992.

J.R.C. Lough

B.C Environment
Recreational Fisheries Branch
Smithers, B.C.

Skeena Fisheries Report #SK85

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Acknowledgements

The data collection efforts of Department of Fisheries and Ocean's Barry Finnegan and the staff of J.A. Taylor and Associates were greatly appreciated. Variable water conditions and equipment problems that often plague fence projects tested the patience of these hard workers. Ministry of Environment, Fisheries Branch staff Ron Tetreau and Mark Beere also contributed to the field studies and their help and input were appreciated. Thanks also goes out to Colin Spence and Bruce Ward who gave valuable input to what data should be collected and how.

Introduction

The Lachmach River is a small coastal stream located at the head of Work Channel 23 km east of the community of Prince Rupert (Fig. 1).

In conjunction with the Department of Fisheries and Oceans and contractor J.A. Taylor and Associates, the B.C. Fisheries Branch participated in a steelhead stock monitoring project, the objective of the project was to collect baseline data on steelhead adult and smolt populations to facilitate improved management of north coast winter steelhead.

Methods

Both adult and juvenile salmonids were captured using a permanent aluminum fence located about 400 metres upstream of the Lachmach estuary (Fig. 2). A Department of Fisheries and Oceans data report (Finnegan 1991), gives a detailed description of the Lachmach fence and its daily operation.

All of the fence installation and most of the tagging and data collection was completed by D.F.O. and the contractor, John Taylor and Associates.

i) Adults

Adult data collection commenced with the fence installation on April 22. The smolt fence, originally designed to only capture emigrating juveniles, was modified to include with an upstream trap to allow for the capture of immigrating adult steelhead (Fig. 3). Emigrating kelts were not expected to move into the smolt traps during fence operation. Consequently, kelts congregated upstream of the fence and passed downstream only during high water fence openings or after fence operations ended. A few kelts were captured by angling upstream of the fence.

Scale samples and fork lengths were taken on all adult steelhead captured. To estimate population size, mark recapture techniques were employed. Anchor tags were applied to all captured fish and a opercular punch was applied to assess tag loss among recaptured fish. All emigrating kelts captured were enumerated and checked for a tag and operculum punch. Any untagged fish were sampled and tagged at that time. Scales were placed in scale envelopes and later pressed on acetates for life history interpretation.

ii) Juveniles

Steelhead smolt sampling also commenced on April 22. An effort was made to capture all emigrating steelhead smolts and to sample approximately 10% of the run for lengths, weights and scales. Ten to fifteen scale and fork length samples were collected for each 5mm length interval. This was repeated over three, 25 day, sampling periods (April, May 1-24, May 25-June 20). A sub-sample of weights was to also be taken twice a week.

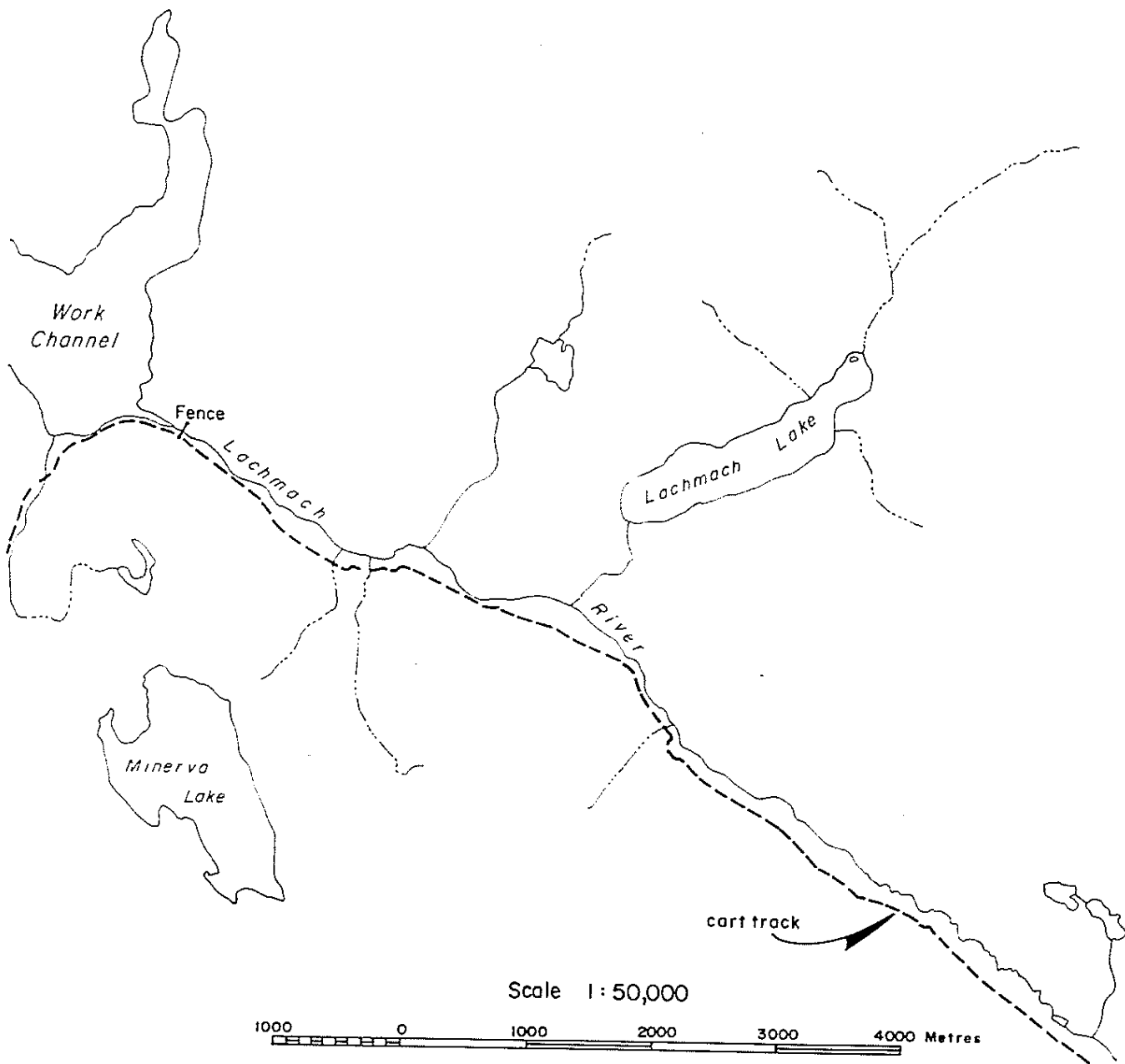
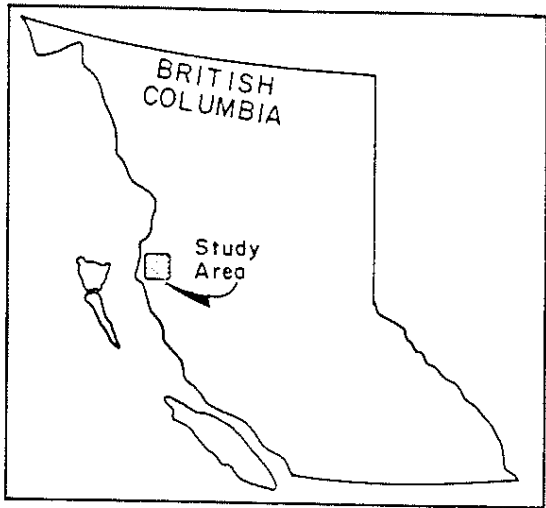


Figure 1. Lachmach River watershed.

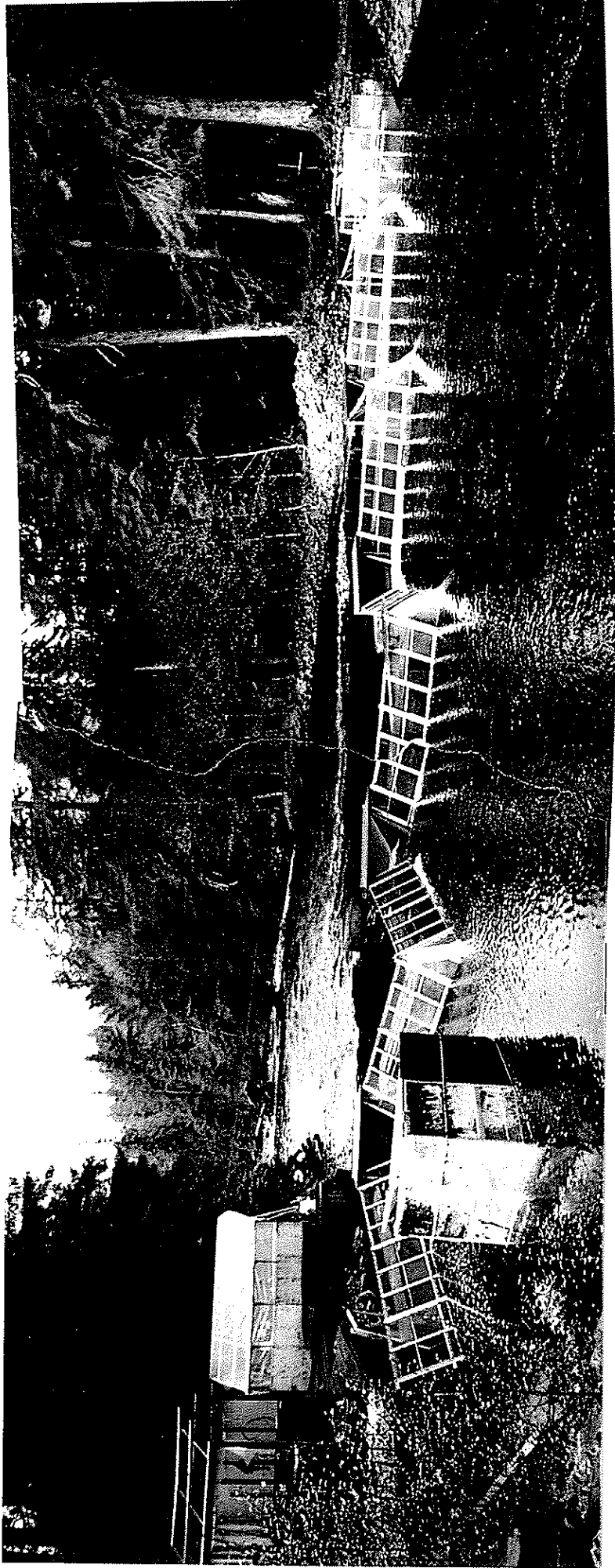


Figure 2. Lachmach River Fence.

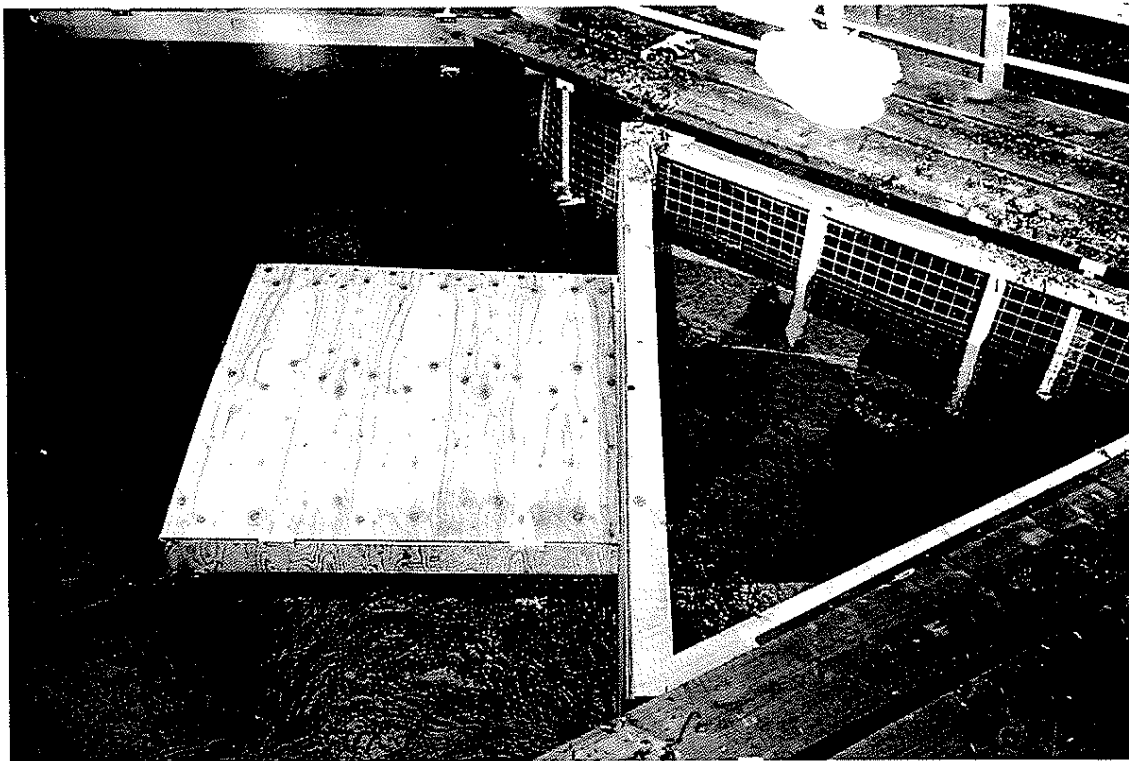


Figure 3. Modified upstream adult steelhead trap on the Lachmach R.

Dolly Varden and cutthroat trout were enumerated and measured for lengths.

Results

The 1992 fence operation on the Lachmach River commenced April 22 and ended June 26. This was slightly later than usual due to some equipment and fence installation problems. On three occasions (May 1st, 3rd and 31st) the fence was opened due to high waters which threatened to breach and damage the fence.

i) Adults

A total of 52 adult steelhead were captured between the April 25 and June 2. Eleven of these were tagged by angling in areas above and below the fence during two short periods on May 6th and May 27th. The remaining 41 were sampled and tagged at the main fence. Of these 52 fish, four kelts were recaptured by angling upstream of the fence (Appendix 1). There did not appear to be any major peaks in the run timing of adult steelhead while the fence was in operation (Fig.4).

Steelhead captured by angling on May 6 and May 27 revealed that many passed the fence undetected. Up to and including May 6th, 16 steelhead had been tagged and released at the fence, but only one of six fish captured by angling upstream of the fence on May 6th had tags. Similarly by May 27th, 45 steelhead had been tagged at the fence, but angling on the 27th revealed that only three of eight fish caught were previously tagged. The untagged steelhead likely immigrated prior to the April 25th fence installation or during fence openings on May 1st and 3rd.

Sex was identified for 50 adult steelhead, 36 were female and 14 were male. The average length of the female steelhead was 76.9 cm ranging from 61 to 90.8 cm. The average male length was 70.7 cm, ranging from 61 to 80 cm (Fig 5).

Scales were analyzed for 32 adult steelhead. Seven of the samples (21.8%) had regenerated freshwater annuli and were unsuitable for aging. The most common total age was 3.3 (31.3%), followed by 3.2 (21.9%), 3.2S1 (18.8%), 4.2 (3.1%) and 4.3 (3.1%). Ocean life history interpretation revealed that 16 (50%) and nine (28.1%) had spent three and two years respectively at sea, while and seven (21.9%) were repeat spawners (Fig. 6).

i) Juveniles

Between April 22 and June 23, 1128 juvenile steelhead were captured in the downstream trap. Of these, 42 were sampled for scales and 569 were sampled for length and weights. Smolt emigration occurred throughout the entire sampling period. There did appear to be a marked increase in downstream migration numbers with the increased stream flows between May 25th and May 29th (Fig. 7).

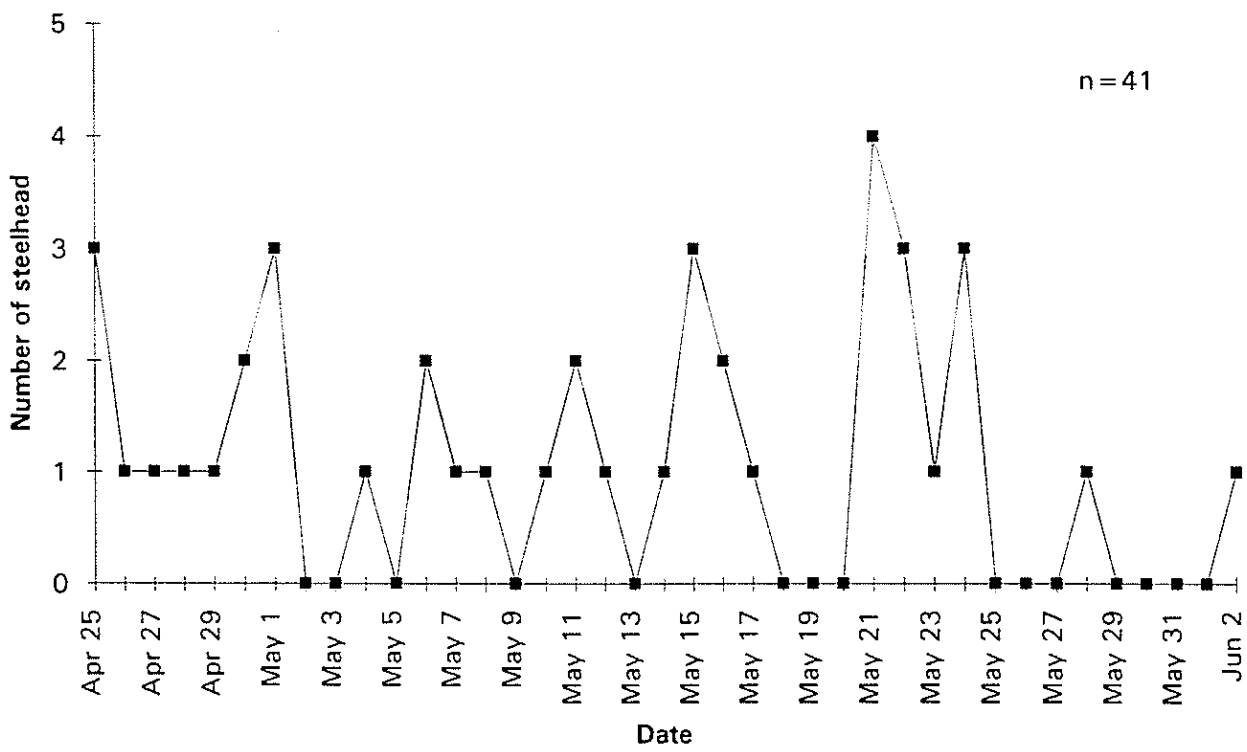


Figure 4. Migration timing of adult steelhead in the Lachmach River April 25 - June 2, 1992.

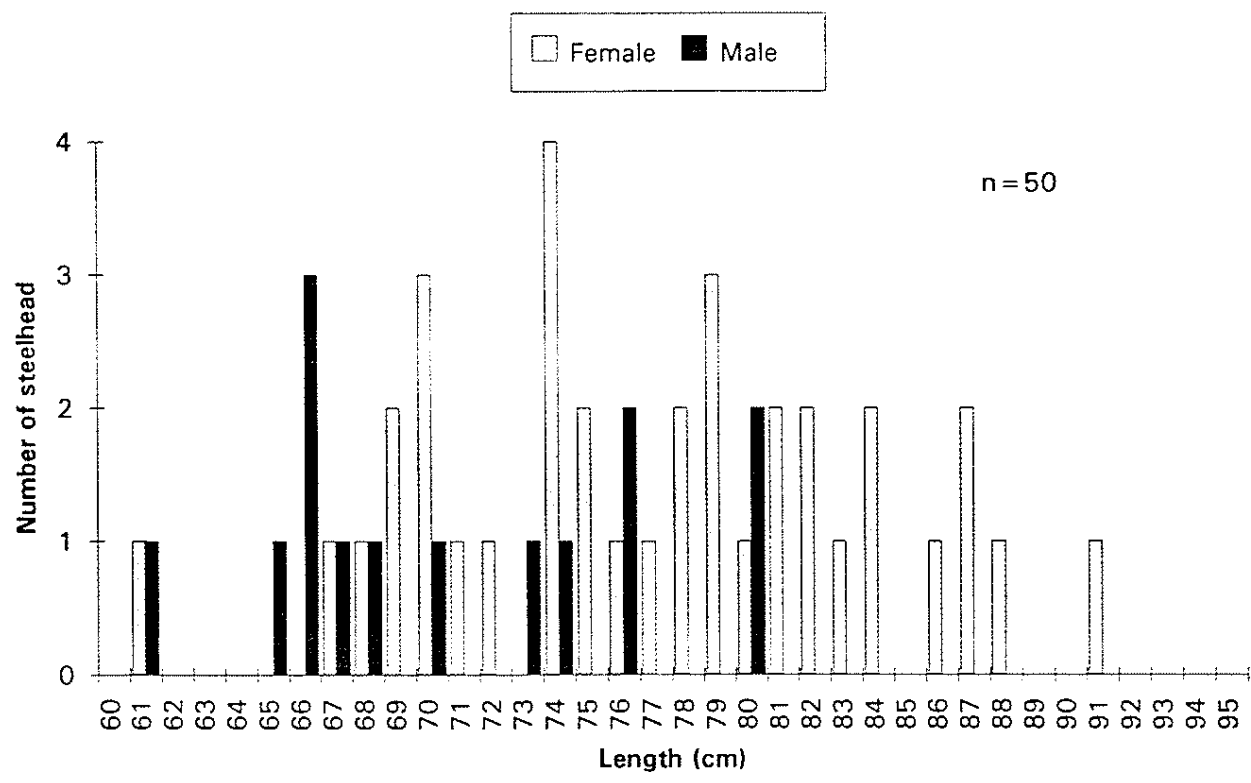


Figure 5. Length frequency of adult steelhead in the Lachmach River, April 25 - June 2, 1992.

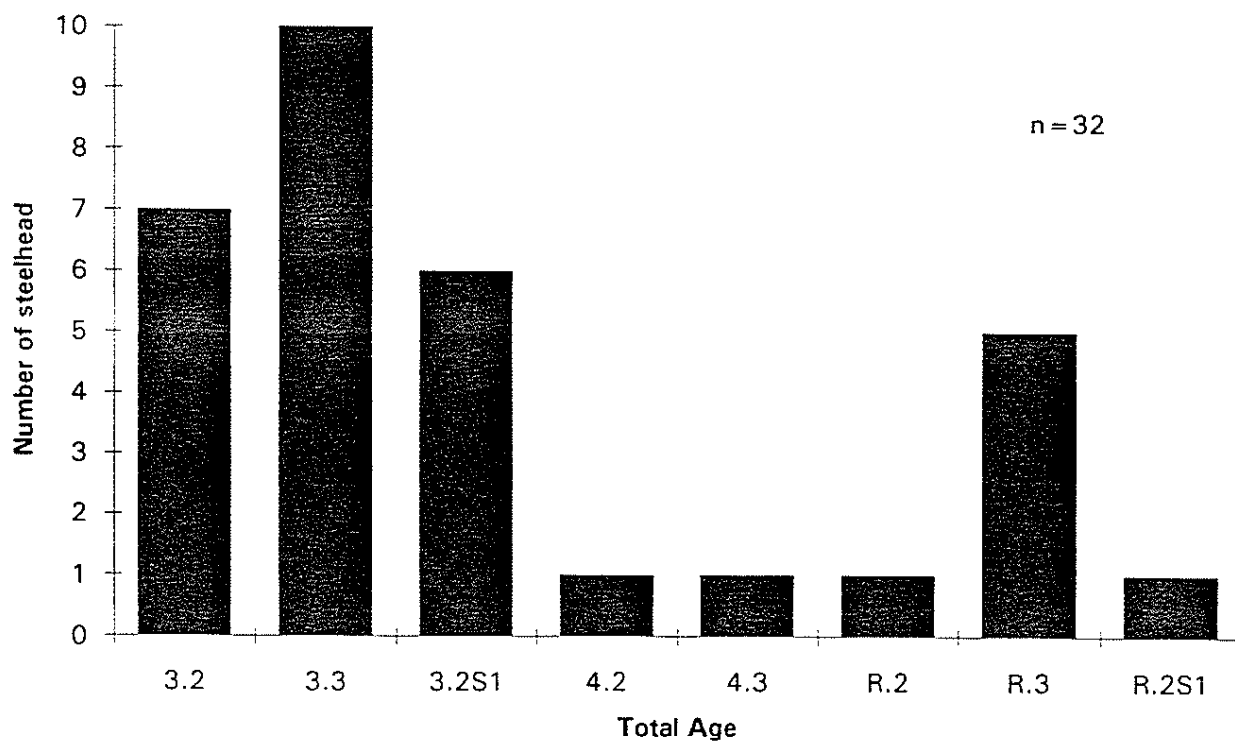


Figure 6. Age composition of adult steelhead from the Lachmach River April 25 - June 2, 1992.

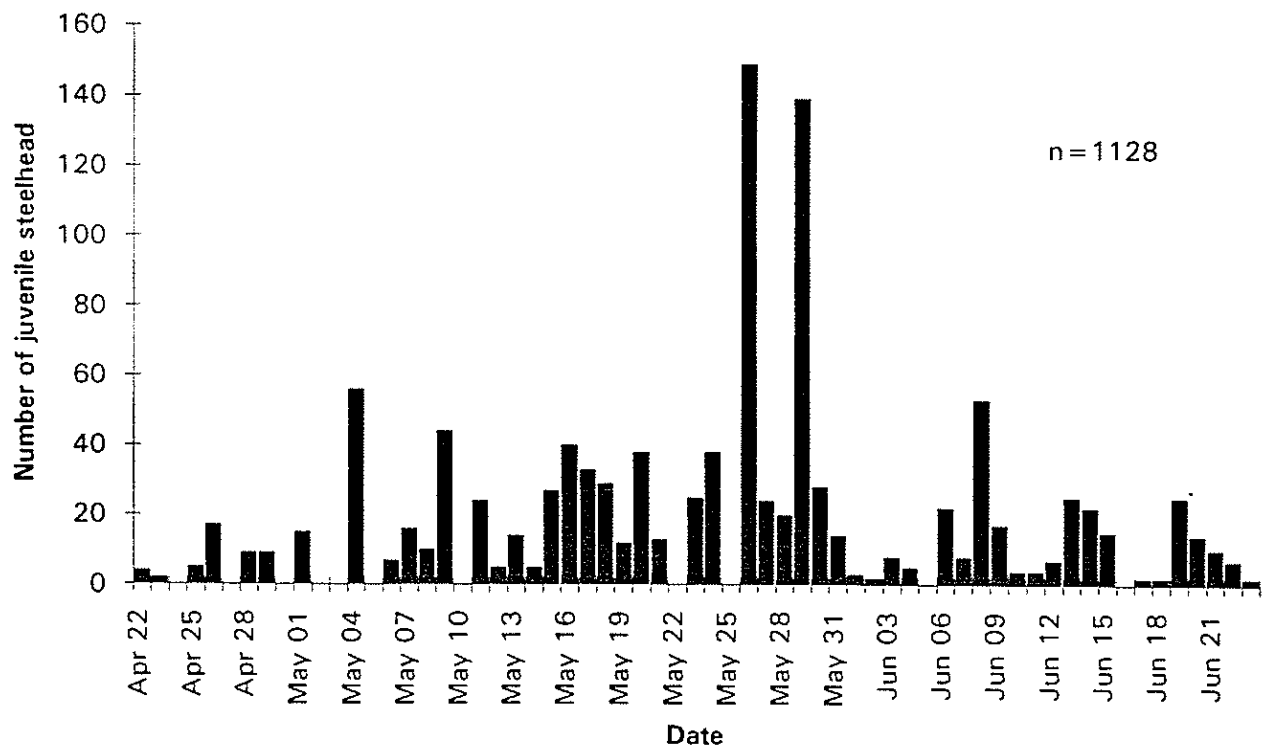


Figure 7. Emigration timing of Lachmach River juvenile steelhead April 22 - June 23, 1992.

Fresh water ageing of 42 steelhead juveniles revealed that 18 (42.9%) were three years of age, 20 (47.6%) were two years of age, and four (9.5%) were one year of age when trapped moving downstream at the fence. Freshwater life history was also revealed from adult scale readings. Of 32 adult scale samples, seven (21.9%) were regenerated and could not be read, 23 (71.9%) spent three years in fresh water, and two (6.3%) spent four years of their life in fresh water prior to migrating to the ocean.

One interesting feature of the juvenile scale sampling was that age two and three year old smolts were the most predominate age classes. In contrast, adult scale samples revealed that Lachmach steelhead predominantly spent three or four years in the fresh water as juveniles before moving to the ocean. It appears that the small sample of juvenile scales did not reflect the total smolt emigration. The one and two year old juveniles captured at the trap were in all likelihood parr exhibiting normal instream migration as apposed to emigrating as one or two year old smolts. The age three juveniles were the emigrating smolts which supports adult scale readings.

Age\length and age\weight relationships could not be determined from the juvenile scale sampling. Regardless, length samples of 815 juveniles revealed a bimodal distribution of lengths. Juveniles under 120 mm would represent age one and two year old parr and fish over 120 mm delineate age three and four year old smolts (Fig 8).

Although the sample size was small, tag loss on adult steelhead appeared to be insignificant. None of the seven steelhead caught upstream of the trap without tags had an opercular punch, indicating a tag was applied but later fell out.

Recommendations

Steelhead most likely passed unenumerated prior to the fence installation on April 25th and during fence openings on May 1st, 3rd and 31st. Nothing could be done to lengthen the fishing period of the fence this year. The fence was installed as soon as possible but equipment problems made the starting date slightly later than usual.

One way to improve the data collection would be to lengthen the consulting contract and start fence installations earlier. The high water and fence openings are a common occurrence on fence operations and are impossible to prevent without endangering the fence structure or compromising safety.

A major problem with the existing fence is its inability to recapture kelts on their downstream migration. This greatly diminishes the ability of estimating population size.

In late spring the steelhead kelts hold in large numbers just above the fence and will not move through the "V" traps. Eventually the panels are opened to allow downstream passage of the kelts but it does not allow for a count of the tagged or untagged fish. Therefore, enumeration of the entire spawning population was not possible for the 1992 run. To improve the fence operation for future years a downstream adult trap should be constructed to accurately count

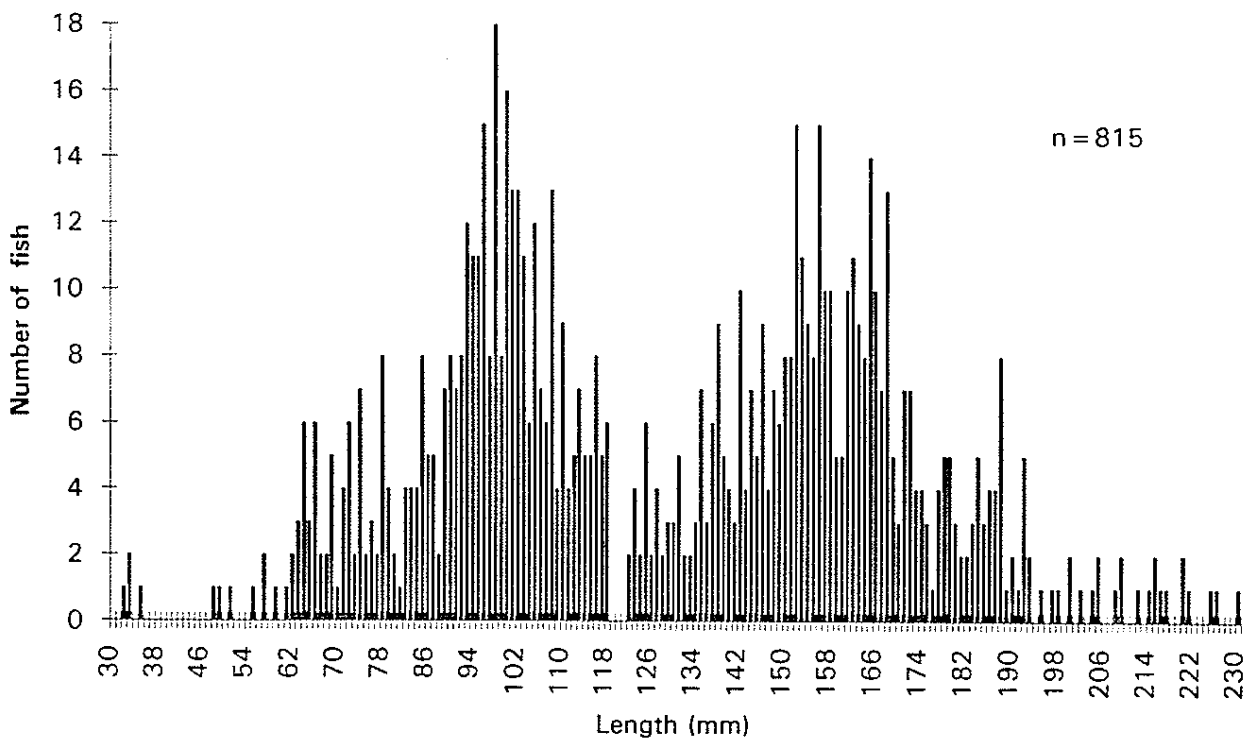


Figure 8. Length frequency of juvenile steelhead sampled at the Lachmach fence April 22 - June 23, 1992.

emigrating adult steelhead. If this cannot be facilitated, seining operations upstream of the fence could be attempted to move and count holding kelts.

Juvenile scale samples generally did not correspond to length and weight sampling thus not allowing for age/length or age/weight relationship analysis. Future juvenile scale sampling should have fish lengths and sampling dates noted on the slides. In addition a larger sample of scales would give more accurate information on the dominate smolting age.

Continuation of the Lachmach steelhead investigations is desirable to gather and compare stock trends for North Coast steelhead streams. With the generous offer from the Department of Fisheries and Oceans to continue to collect the vast majority of the data, it is imperative to seize the opportunity to continue gathering this potentially long term data string.

References

Finnegan, B. 1991. Summary of 1988 coho salmon smolt trapping operations on the Lachmach River and Antigonish Creek, British Columbia. Can. Data Rep. Fish. Aquat. Sci. No. 844.

APPENDIX 1. Summary of steelhead tagged in the Lachmach River, April 25-June 2, 1992.

Appendix 1. Summary of tagging and recaptures of steelhead on the Lachmach River, 1992

Tag #	Date	Sex	Length	Location	Comments	Recap Date	Location	Comments
2412	Apr 25	F	70.7	Fence				
2418	Apr 25	F	69.8	Fence				
2419	Apr 25	F	67.4	Fence				
2422	Apr 26	F	74.5	Fence		May 06	U/S Trap	Kelt - Caught by F&W angling
2423	Apr 27	M	76.4	Fence				
2424	Apr 28	F	70.3	Fence				
2426	Apr 29	M	73.3	Fence				
2427	Apr 30	F	74.2	Fence				
2428	Apr 30	M	66.1	Fence				
2429	May 01	F		In D/S Trap	Kelt			
2432	May 01	F	70.4	Fence				
2433	May 01	M	80	Fence				
2435	May 01	?	74.5	Fence				
3924	May 04	F	90.8	Fence				
3923	May 06	F	73.5	Fence				
3922	May 06	F	84	Fence		May 27	U/S Fence	Kelt - caught by F&W angling
3921	May 06	M	68	D/S Fence	Angling			
3920	May 06	F	78	U/S Fence	Angling			
3919	May 06	F	74	U/S Fence	Angling	May 27	U/S Fence	Kelt - caught by F&W angling
3918	May 06	M	66	D/S Fence	Angling			
3917	May 06	M	66	D/S Fence	Angling			
3916	May 06	F	81	D/S Fence	Angling			
3915	May 07	F	78.1	Fence				
3914	May 08	F	68.5	Fence				
3774	May 10	F	83.5	Fence				
3775	May 11	F	86.9	Fence				
3772	May 11	F	86.9	Fence				
3771	May 12	F	61	Fence				
3770	May 14	?	92.5	Fence				
3769	May 15	F	76.5	Fence				
3768	May 15	F	88	Fence		May 27	U/S Fence	Kelt - caught by F&W angling
3767	May 15	F	80	Fence				
3766	May 16	F	82.3	Fence				
3765	May 16	F	80.7	Fence				
3764	May 17	F	68.5	Fence				
3763	May 21	F	75.3	Fence				
3762	May 21	M	80	Fence				
3635	May 21	F	75.5	Fence				
3636	May 21	M	76.4	Fence				
3637	May 22	M	67.4	Fence				
3638	May 22	F	68	Fence				
3639	May 22	F	71.5	Fence				
3640	May 23	M	64.5	Fence				
NA	May 24	F	83.2	Fence	Not Tagged			
3641	May 24	M	70	Fence				
3642	May 24	F	78.8	Fence				
3643	May 27	M	74	U/S Fence	Spawned			
3644	May 27	M	61	U/S Fence	Spawned			
3645	May 27	F	79	U/S Fence	Kelt			
3646	May 27	F	74	U/S Fence	Kelt			
3647	May 27	F	86	U/S Fence	Kelt			
3648	May 28	F	79	Fence				
3649	Jun 02	?		Fence				
Total Tagged - 52		Ave. Length 75.4 cm		Total Recaptured - 4				