

LM 289

LIFE HISTORY OF STEELHEAD TROUT (SALMO GAIRDNERI)  
IN THE SOUTH ALOUETTE RIVER --- BASED ON NINE  
YEARS OF ANGLER'S CATCHES

By

Alan Caverly- Second Year Fish, Wildlife and  
Recreation Student; BCIT FORESTRY TECHNOLOGY

Submitted to:

Dan Williamson, Region 2 Fish and Wildlife  
Branch, Burnaby, B.C.

Apr. 27, 1977.

100-0267-060

TABLE OF CONTENTS

Acknowledgements .....Pg. 1  
List of figures .....Pg. 2  
List of tables .....Pg. 3  
Abstract .....Pg. 4  
Introduction .....Pg. 6  
Materials and Methods .....Pg. 8  
Results .....Pg. 13  
Discussion .....Pg. 22  
Recommendations .....Pg. 25  
List of References ..... Pg. 26  
Appendix ..... Pg. 27

ACKNOWLEDGEMENTS

C.W. Chestnut helped by his encouragement and supplying reference material. Dr. Chestnut also put me in touch with Kanji Tsmura at UBC Fisheries Research. I wish to thank Kanji and Angelo Fachin for the instruction and use of the scale press and 3M "500" Printer Reader. Finally, thanks to Bobbi Musgrove for her patience and time in typing this report.

LIST OF FIGURES

- FIG. 1 MAP OF SOUTH ALOUETTE RIVER ..... Pg. 7
- FIG. 2 PHOTOMICROGRAPH OF A STEELHEAD ..... Pg. 10  
SCALE WITH GROWTH ZONES MARKED
- FIG. 3 PHOTOMICROGRAPH OF A STEELHEAD  
SCALE WITH AGE DESIGNATION AND  
SPAWNING CHECK ..... Pg. 12
- FIG. 4 FLOW RATES OF SOUTH ALOUETTE RIVER ..... Pg. 24

LIST OF TABLES

TABLE I	AGE CLASS STRUCTURE OF STEELHEAD IN THE SOUTH ALOUETTE RIVER.....Pg. 15
TABLE II	FRESHWATER AGES OF STEELHEAD IN THE SOUTH ALOUETTE RIVER.....Pg. 16
TABLE III	SALTWATER AGES OF STEELHEAD IN THE SOUTH ALOUETTE RIVER .....Pg. 17
TABLE IV	AGE GROUPS OF REPEAT SPAWNING STEELHEAD IN THE SOUTH ALOUETTE RIVER.....Pg. 18
TABLE V	SEX RATIO OF STEELHEAD IN THE SOUTH ALOUETTE RIVER.....Pg. 19
TABLE VI	TIMING OF THE RUN - BASED ON FISH CAUGHT BY ANGLERS MONTHLY.....Pg. 20
TABLE VII	TIMING OF THE RUN - BASED ON FISH CAUGHT BY ANGLER'S WEEKLY ON THE SOUTH ALOUETTE RIVER.....Pg. 21

ABSTRACT

In September, 1976 this project was chosen to complete the requirements of the Projects course at BCIT and a request by the Fish and Wildlife Branch. The Fish and Wildlife Branch had scale samples stored in their Region 2 Office that were taken from South Alouette River steelhead between 1950 and 1959. The report they requested was to include the age class structure, sex ratio and timing of the run for steelhead in the South Alouette.

During the fall of 1976 I carried out a library research project on scale analysis techniques and steelhead life history to provide background for the raw data report on the South Alouette River steelhead. In January of 1977 I began to prepare the rough data for this project.

The scale envelopes provided information on the sex ratio of these steelhead caught and timing of the run based on catch dates. The sex ratio of females to males was 1.1:1. The peak period of angler catches of steelhead was between January fifteenth and February seventh. The remaining information on age class structure of the South Alouette River steelhead population was obtained through scale analysis.

To facilitate scale reading many of the scale samples had already been mounted on a sheet of cellulose acetate. A plastic impression of the scale makes a permanent record that is easily filed and easily used in various scale reading devices. The scales that had not yet been mounted on plastic were prepared for mounting and then taken to UBC. At UBC

ABSTRACT CONT'D

these scales were mounted in cellulose acetate. All of the scale samples were photographed and printed on 8" by 14" paper. This made scale reading much easier and eliminated the need for magnification devices to observe the growth zones.

Of all the scale samples 102 were readable and therefore useful for age interpretation. Of these scales 5 were steelhead that had been caught on their second spawning migration. The most common single age group among steelhead spawning for the first time was 2.1+ followed by fish in the age group 2.2+.

This report can be a useful guide to the life history characteristics of South Alouette River steelhead. It should be remembered though, the report describes only the characteristics of steelhead caught by anglers and should not be taken as an accurate representation of the entire steelhead population in the river. The small sample size may also have affected the results.

## INTRODUCTION

The South Alouette River originates at the west end of Alouette Lake and drains into the Pitt River, a tributary of the Fraser (Fig. 1). The Upper River runs down a shallow valley through big pools and stretches strewn with large boulders. The middle section of the river passes in a channel through flat terrain. Much of this area has an unstable gravel bottom. Lower sections of the river lie in meadow land and the stream bottom is composed of sand and mud. The river is subject to high variations in water flow and temperature. The highest flows and coldest temperatures are between October and February, Steelhead season. (Hartman '68).

The South Alouette River supports a run of winter Steelhead, one of B.C.'s most popular game fish. It's population of Steelhead has diminished over the years, mainly due to the actions of man. The importance of this great gamefish and it's increasing scarcity makes this fact very disappointing. The Fish and Wildlife Branch decided that some knowledge of the steelhead population in the South Alouette river was desperately needed. They began collection scale samples from Steelhead caught by angler's that could be used in scale analysis to determine age class structure, sex ratio and the timing of the run. This was the objective of this project, to read the scales and interpret the data to meet the three objectives of the Fish and Wildlife Branch,



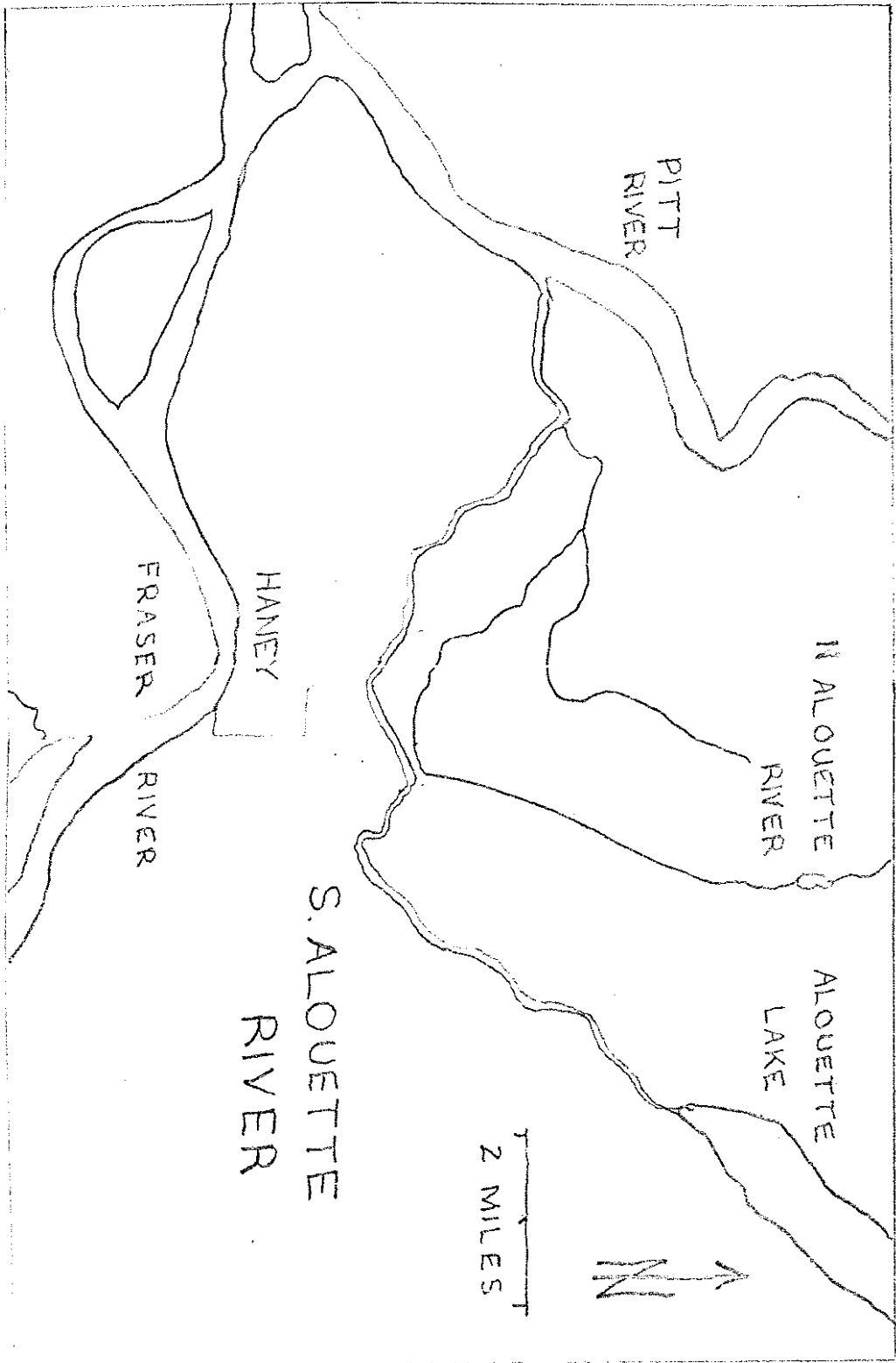


Fig.1 Map of South Alouette River.

## MATERIALS AND METHODS

During the years between 1950 and 1959 the Fish and Wildlife Branch, then called the Game Commission distributed scale sample envelopes for Steelhead to various sporting goods stores. The scale envelopes were labelled with various headings for the angler to fill in information about their Steelhead catch. This information included the date, location, fish species, sex, weight and length. There was also a space labelled remarks.

When an angler had caught a Steelhead in the South Alouette River he was requested to take ten or more scales from just behind the dorsal fin, high up on the side of the fish. The envelope was then sealed and mailed to the Game Commission.

The scale samples were obtained from the Region 2 Fish and Wildlife branch office. The information on the scale envelopes was used to determine the sex ratio of the South Alouette Steelhead. Additionally, the date of catch was used to obtain a rough idea as to the timing of the run. This assumes that more Steelhead are caught by anglers during the peak migration time of adult Steelhead into the river. The rest of the information used to reach the objectives of this report was obtained through scale reading.

Many of the scale samples from the Region Two Office had already been mounted in sheets of cellulose acetate to make a plastic impression of the scale. Each remaining scale sample that had not been pressed was removed from the envelope and soaked in water containing a small amount of detergent to separate the scales.

MATERIALS AND METHODS CONT'D

Two scales which appear to be undamaged were examined under a microscope to determine if they were not regenerated and therefore usable for scale reading. These scales were placed on gummed paper, the paper was placed on a sheet of cellulose acetate. The plastic card was placed in a heated hydrolic press for 15 minutes to make a permanent impression of the scale on plastic.

When all the scales had been mounted in plastic they were ready for photographing. They were photographed with a 3M "500" READER-PRINTER. The plastic scale impressions were placed between two glass plates and aligned beneath the lens. The scale image appeared on a large screen and rotating the lens brought it into proper focus. The exposure was set at 2 or 3 and then the print button was pressed. In a few seconds a blow up of the scale was printed on eight by fourteen inch paper.

The age determination was broken into two sections, fresh water growth and saltwater growth. The freshwater growth zone was represented by the nuclear area near the center of the scale where the concentric growth rings or circuli were narrowly spaced (Fig. 2). Each winter of freshwater growth resulted in narrowly spaced broken circuli followed by widely spaced circuli. This was counted as one year of growth. The transition to saltwater growth was visible as a section of widely spaced unbroken circuli immediately following the freshwater growth zone. The winter period of saltwater growth was again visible as a zone of narrowly spaced circuli, followed by a zone of widely spaced circuli. Each winter of saltwater growth was counted as one year.

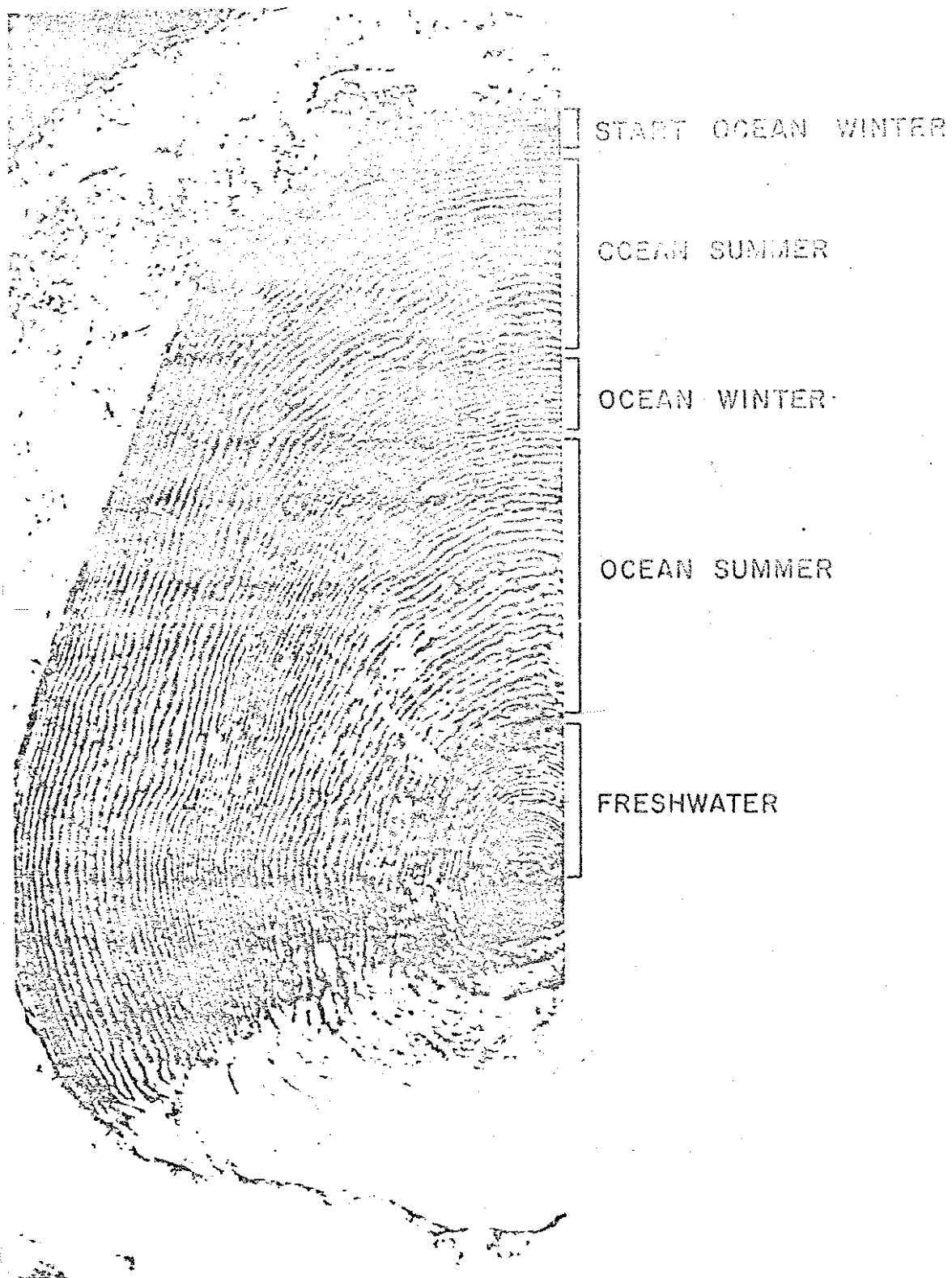


Fig. 2. Photomicrograph of a steelhead scale with the ocean and freshwater growth zones marked.

MATERIALS AND METHODS CONT'D

To understand the system used in this report to code the steelhead's life history information it is necessary to understand some aspects of steelhead growth. Steelhead spawn in late winter or early spring. The young steelhead emerge from the gravel in the late spring of that same year. They spend their first months or years in freshwater and then migrate to the sea in the spring or early summer. They spend one or more years in the ocean and return to the rivers during fall or winter to spawn. Some of these steelhead return to sea and come back to spawn a second time.

The code for aging steelhead is a result of their life history and age breakdown. For example, a fish that was designated as 2.1+ is a four year old steelhead that spent two winters (2.) in freshwater before moving out to sea. In the ocean it spent one additional winter (.1) before entering its home river to spawn in its second winter of ocean residence (+). The + sign indicates a part of one year in saltwater; therefore the steelhead was in its fourth year when caught.

If a steelhead has an age designation of 2.1S+ it would indicate that the steelhead had spent two winters in the stream (2.), one full year in the sea (.1) and then spawned for the first time in its fourth year (S). The steelhead migrated back to the sea after spawning, returning to spawn a second time the following winter (+). In this case the fish would be in its fifth year and the S would represent the fourth year.

The S designation that represents a spawning check would appear as a break in the circuli patterns left by reabsorption of the scale edges. The break would be followed by several wide-



Fig. 3. Photomicrograph of a steelhead scale with the annuli and a spawning check marked and with an age designation of 2+.2S+. See text for explanation.

RESULTS

In total 102 scales were used for age interpretation, five of these were repeat spawners and for three of the scales the sex was unknown.

(i) TOTAL AGE (TABLE I)

The ages of the 97 steelhead, not including repeat spawners was most often made up of fish spending two or three years in freshwater and one or two years in saltwater. The single most common age group was 2.1+ (44.3%). The next most common age group was 2.2+ (32%), followed by 3.1+ (13.4%).

(ii) FRESHWATER AGE (TABLE II)

Of 95 scale samples 76 fish (80%) had spent two winters in freshwater, 17 fish (18%) had spent three winters in freshwater and only 4 fish (4.2%) spent one year in freshwater.

(iii) OCEAN AGE (TABLE 3)

Of 95 scale samples 57 (60%) had returned to their home river in the second ocean winter (.1+). A further 35 fish (36.8%) had returned during their third ocean winter (.2+). Only 3 fish (3.2%) returned during their first ocean winter (.+).

(iv) REPEAT SPAWNERS (TABLE IV)

Of the 102 total readable scale samples 5 fish (4.9%) had returned to the South Alouette to spawn a second time. Of the fish four were females and one was a male. The four females had spent two years in freshwater as juveniles. Three had spent 2 winters in saltwater before spawning for the first time, one had spent only one winter in saltwater before spawning.

The one male repeat spawner had three years of freshwater growth and one year of saltwater growth before spawning for the first time.

RESULTS CONT'D

(v) SEX RATIO (TABLE V)

The total number of scale envelopes that had the sex of the steelhead filled in was 138. Of these fish 72 were females and 66 were males giving a female to male sex ratio of 1.1:1.

(vi) TIMING OF THE RUN (TABLE VI)

The total number of scale envelopes that contained information of catch dates for steelhead was 136. Of these, 19 fish (14%) were caught in December. A further 69 fish (50.7%) were caught in January and 33 fish (24.3%) were caught in February. Only 10 fish (7.4%) were caught during March.

The peak months were broken down into weekly segments. During January 69 fish were caught, 7 of these (10.2%) were caught between January first and seventh. A further 8 fish (11.6%) were caught between the eighth and fourteenth. 20 fish (29%) were caught in the week of the fifteenth to twenty first. The largest number of fish, 31, (44.9%) was caught in the week of the twenty-second to thirty first.

In February, 34 fish were caught, 13 of these (38.2%) were caught between the first and seventh, 9 fish (26.5%) were caught between the eighth and fourteenth, 7 fish (20.6%) between the fifteenth and twenty first and 5 fish (14.7%) between the twenty second and twenty eighth.

The peak period was between January fifteenth and February seventh. During this period, 64 fish (47.1%) of 136 steelhead were caught.



TABLE I AGE CLASS STRUCTURE OF STEELHEAD  
CAUGHT IN THE SOUTH ALOUETTE RIVER

YEAR	SEX	TOTAL AGE GROUP								Total
		1.1+	1.2+	1.3+	2.+	2.1+	2.2+	3.1+	3.2+	
1950-51	M	-	-	-	-	-	1	-	-	
	F	2	1	-	-	-	4	-	-	
	Total	2	1	-	-	-	5	-	-	
1951-52	M	-	-	-	-	2	-	-	-	
	F	-	-	-	-	1	-	-	-	
	Total	-	-	-	-	3	-	-	-	
1952-53	M	1	-	-	-	3	1	1	-	
	F	-	-	-	-	2	-	-	-	
	Total	1	-	-	-	5	1	1	-	
1953-54	M	-	-	-	-	2	-	-	-	
	F	-	-	-	-	1	1	-	-	
	Total	-	-	-	-	3	1	-	-	
1954-55	M	-	-	-	-	1	-	-	-	
	F	-	-	-	-	1	1	-	-	
	Total	-	-	-	-	2	1	-	(1?)	
1955-56	M	-	-	-	-	-	3	-	-	
	F	-	-	-	-	1	-	-	-	
	Total	-	-	-	(1?)	1	3	-	-	
1956-57	M	-	-	-	-	2	1	-	-	
	F	-	-	-	-	-	4	-	-	
	Total	-	-	-	-	2	5	-	-	
1957-58	M	-	-	-	-	12	2	7	-	
	F	-	-	-	1	12	10	4	2	
	Total	-	-	-	1	24	12	11	2	
1958-59	M	-	-	-	-	-	2	-	2	
	F	-	-	-	-	2	1	-	-	
	Total	-	-	-	-	2	3	-	2	
TOTAL	M	1	-	-	-	22	10	8	2	43
	F	2	1	-	1	20	21	4	2	51
	Total	3	1	-	2	43	31	13	4	97
	%	3.1%	1%	-	2.1%	44.2%	32%	13.4%	4.1%	

TABLE II. FRESHWATER AGES OF STEELHEAD IN THE SOUTH ALOUETTE RIVER.

FRESHWATER AGE GROUP					
YEAR	SEX	1.	2.	3.	TOTAL
1950-51	M	-	1	-	1
	F	3	4	-	7
	Total	3	5	-	8
1951-52	M	-	2	-	2
	F	-	1	-	1
	Total	-	3	-	3
1952-53	M	1	4	1	6
	F	-	2	-	2
	Total	1	6	1	8
1953-54	M	-	2	-	2
	F	-	2	-	2
	Total	-	4	-	4
1954-55	M	-	1	-	1
	F	-	2	-	2
	Total	-	3	(1?)	4
1955-56	M	-	3	-	3
	F	-	1	-	1
	Total	-	6 (2?)	-	6
1956-57	M	-	3	-	3
	F	-	4	-	4
	Total	-	7	-	7
1957-58	M	-	14	7	21
	F	-	23	6	29
	Total	-	37	13	50
1958-59	M	-	2	2	4
	F	-	3	-	3
	Total	-	5	2	7
TOTAL	M	1	32	10	43
	F	3	42	6	51
	Total	4	76	17	97
	%	4.1%	78.4%	17.5%	

TABLE III. SALTWATER AGES OF STEELHEAD  
IN THE SOUTH ALOUETTE RIVER.

YEAR	SEX	SALTWATER AGE GROUP			TOTAL
		.+	.1+	.2+	
1950-51	M	-	-	1	
	F	1	2	4	
	Total	2(1?)	2	5	
1951-52	M	-	2	-	
	F	-	1	-	
	Total	-	3	-	
1952-53	M	-	5	1	
	F	-	2	-	
	Total	-	7	1	
1953-54	M	-	2	-	
	F	-	1	1	
	Total	-	3	1	
1954-55	M	-	1	-	
	F	-	1	1	
	Total	-	3(1?)	1	
1955-56	M	-	-	3	
	F	-	1	-	
	Total	-	2(1?)	3	
1956-57	M	-	2	1	
	F	-	-	4	
	Total	-	2	5	
1957-58	M	-	19	2	
	F	-	16	12	
	Total	-	35	14	
1958-59	M	-	-	4	
	F	-	2	1	
	Total	-	2	5	
TOTAL	M	-	31	12	43
	F	1	26	23	50
	Total	2	57	35	94
	%	2.1%	58.8%	36.1%	

TABLE IV. AGE GROUPS OF REPEAT SPAWNING  
STEELHEAD IN THE SOUTH ALOUETTE RIVER.

AGE GROUP					
YEAR	SEX	2.1S+	2.2S+	3.1S+	TOTAL
1950-51	M	-	-	-	
	F	1	-	-	
1953-54	M	-	-	-	
	F	-	1	-	
1954-55	M	-	-	-	
	F	-	1	-	
1956-57	M	-	-	-	
	F	-	1	-	
1957-58	M	-	-	1	
	F	-	-	-	
TOTAL	M	-	-	1	1
	F	1	3	-	4
	Total	1	3	1	5

- Repeat spawners made up 4.9% of the total sample size ( 102 ).

TABLE V. SEX RATIO OF STEELHEAD IN THE SOUTH ALOUETTE RIVER.

SEX			
YEAR	Male	Female	SEX RATIO $\frac{\text{Female}}{\text{Male}}$
1949-50	—	1	—
1950-51	4	8	2:1
1951-52	3	1	.3:1
1952-53	9	5	.6:1
1953-54	3	4	1.3:1
1954-55	2	4	2:1
1955-56	2	2	1:1
1956-57	4	5	1.3:1
1957-58	32	37	1.2:1
1958-59	7	5	.7:1
Totals	66	72	1.1:1

TABLE VI. TIMING OF THE RUN \* BASED ON FISH CAUGHT BY ANGLERS MONTHLY.

Year	Month						Total
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	
1950-51		1	5	4	2		
1951-52		1	2	1			
1952-53			4	9		1	
1953-54		6	1				
1954-55			5	1	1		
1955-56			1	2	4		
1956-57		4	3		2		
1957-58		8	45	14		1	
1958-59	3	1	3	3	1		
TOTAL	3	19	69	33	10	2	136
%	2.2%	19.6%	50.7%	24.3%	7.4%	1.5%	

YEAR	MONTH																							
	DEC.			JAN.			FEB.			MAR.														
	1-7	8-14	15-21	22-31	1-7	8-14	15-21	22-31	1-7	8-14	15-21	22-28												
1950-51	-	-	1	-	2	2	-	1	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	
1951-52	-	-	-	-	-	1	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1952-53	-	-	-	-	1	1	-	2	7	-	2	-	-	-	-	-	-	-	-	-	-	-	-	
1953-54	1	2	1	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1954-55	-	-	-	-	2	3	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	
1955-56	-	-	-	-	-	-	-	1	-	-	1	-	-	-	1	1	-	-	2	-	2	-	-	
1956-57	1	-	1	3	2	-	1	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	
1957-58	-	-	3	4	-	2	19	24	2	6	1	5	-	-	-	-	-	-	-	-	-	-	-	
1958-59	-	-	-	1	-	1	-	1	1	2	-	-	-	-	-	-	-	1	-	-	-	-	-	
TOTALS	2	2	6	10	7	8	20	31	13	9	7	5	5	5	3									

TABLE VII TIMING OF THE RUN - BASED ON FISH  
 CAUGHT BY ANGLER'S WEEKLY ON  
 THE SOUTH ALOUETTE RIVER

## DISCUSSION

The information in this report cannot be regarded as an accurate representation of the life history of steelhead in the South Alouette River. The report is a good representation of a sample of the population based on angler's catches, making it useful for comparison to other rivers sampled the same way.

Some of the information is definitely biased by angler catch such as the sex ratio. Nearly all steelhead sport fisheries appear to catch more females than males (Narver and Withler '74). Nevertheless in a California stream where all fish were trapped and examined as they migrated upstream, the sex ratio was essentially 1:1 (Narver and Withler '74).

The life history study determined that of 95 scales readable for freshwater age 4.2% spent one year in freshwater, 80% spent two winters in freshwater, and 18% spent three years in freshwater. In another study of the South Alouette 8.4% of the adult steelhead spent one year in freshwater, 65.7% had spent two years in freshwater and 25.1% had spent three years in the stream (Withler '65). An average of the two studies would probably be the next accurate. Withler also stated that channelization and flow control on the South Alouette have been in effect for many years. There seems to be stronger natural selection against two and three year fish during warm summer months. (Withler '65).

The most dominant age group in the South Alouette was 2.1+. This can be compared with other winter steelhead streams such as the Nansimo which is also dominately 2.1+ (Narver and Withler '74). The Chilliwack also was predominantly two year freshwater fish although most Lower Mainland streams have 3 year freshwater fish (Narver and Withler '74).



DISCUSSION CONT'D

The timing of the run in the South Alouette determined the peak period to be between January fifteenth and February seventh. During this time 64 steelhead were caught. This was actually only a peak for angler catches and not steelhead migration. Comparing the catch peak periods to flow charts points out an interesting fact. The peak of catch coincides with high winter flows, which influence steelhead migration. (Fig.4)

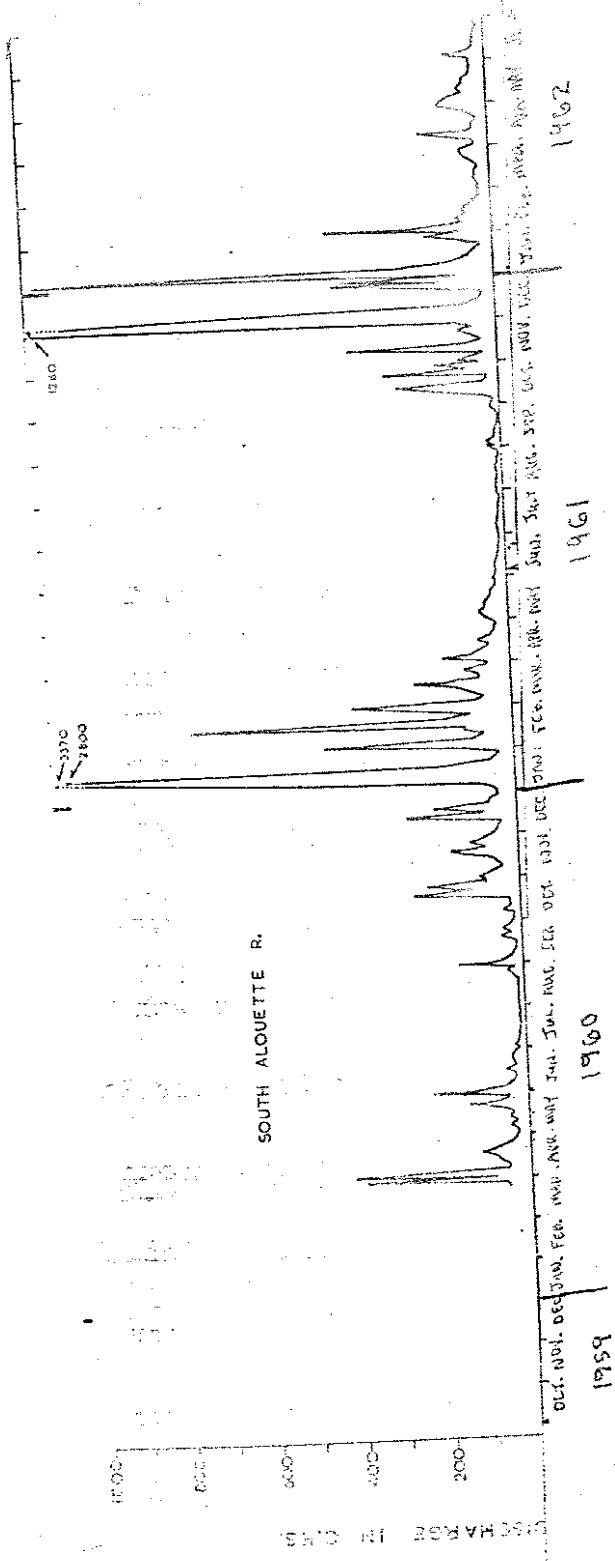


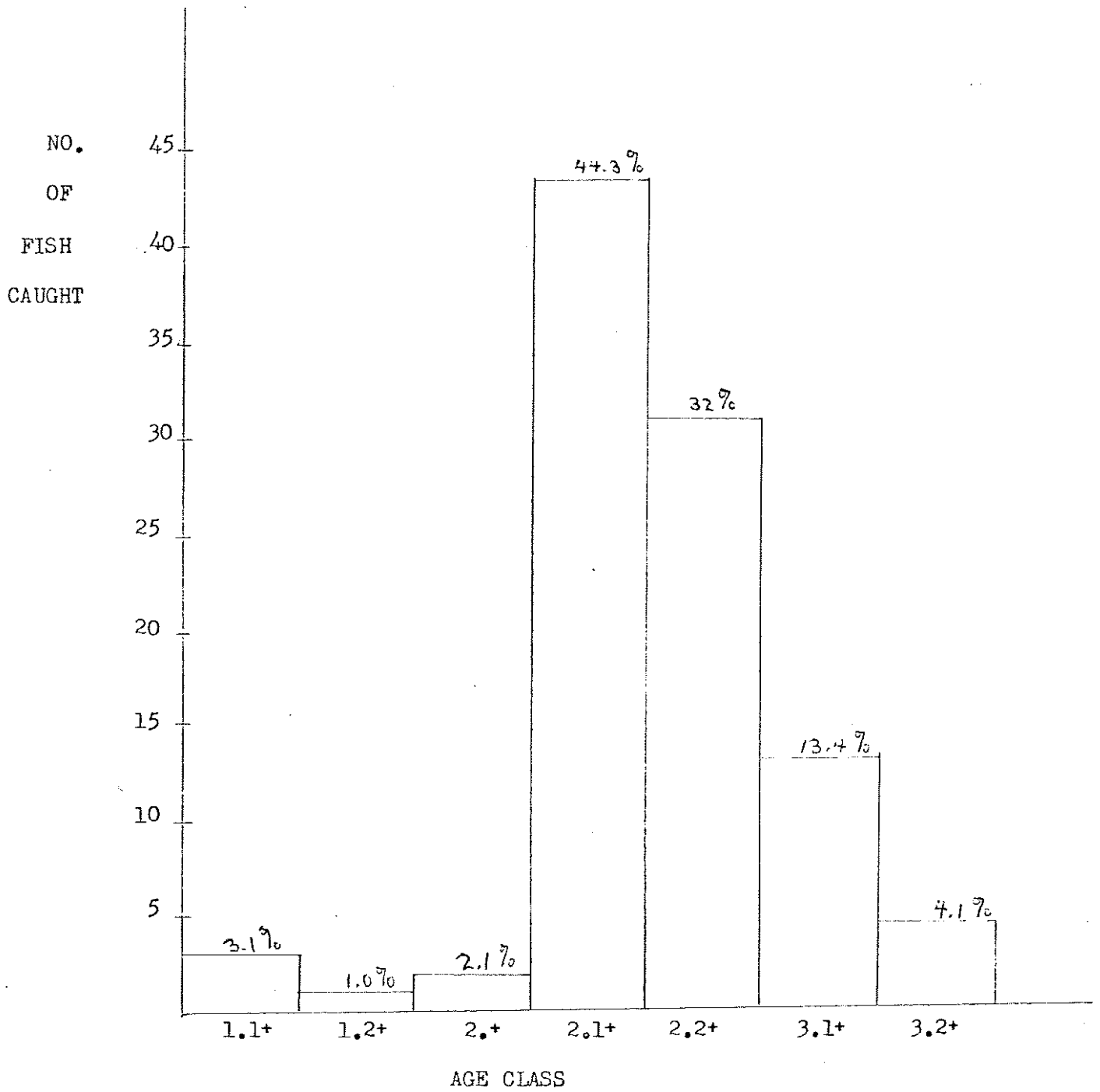
Fig.4 Flow rates of the South Alouette River

RECOMMENDATIONS

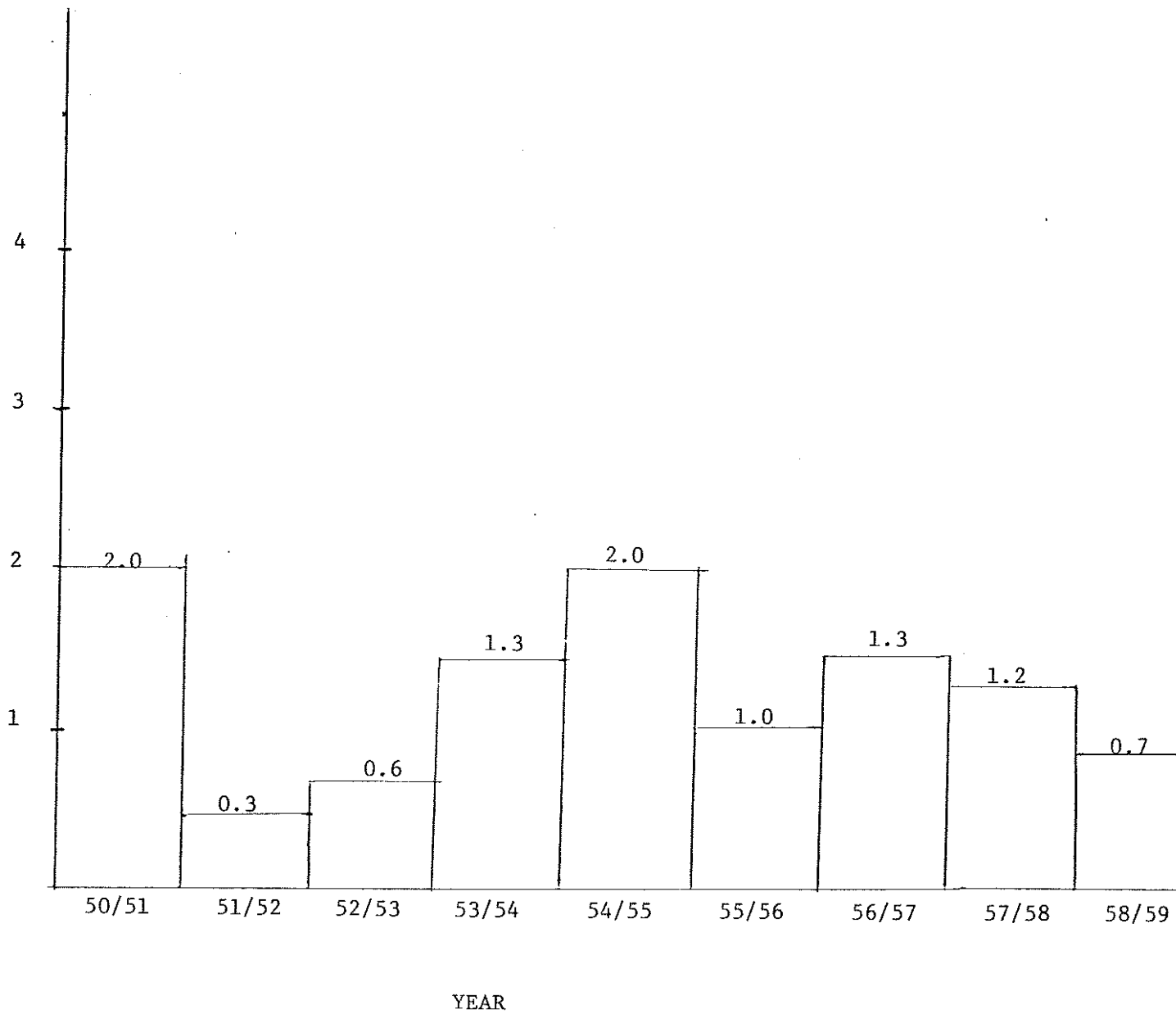
1. The data in this report should not be assumed to be completely accurate but should provide a few clues to the life history characteristics of South Alouette River steelhead.
2. The scale samples used to determine the age class structure of the South Alouette River Steelhead should be read by two other individuals and the results averaged with those in this report.
3. The collection of steelhead scales from the South Alouette should be resumed and scale analysis carried out when ever possible.
4. Efforts should be undertaken to increase low summer flows in the South Alouette and reduce high water temperatures at that time of year.
5. If scale collection is resumed, more effort should be made to distribute scale envelopes amongst the most successful anglers. For example, envelopes could be mailed to anglers reporting high catches of fish from the South Alouette on the yearly questionnaire.
6. Data relating to stream flows and temperatures during the years the scale sampling was carried out should be compared to the timing of the run in this report. Possible correlations may exist.

LIST OF REFERENCES

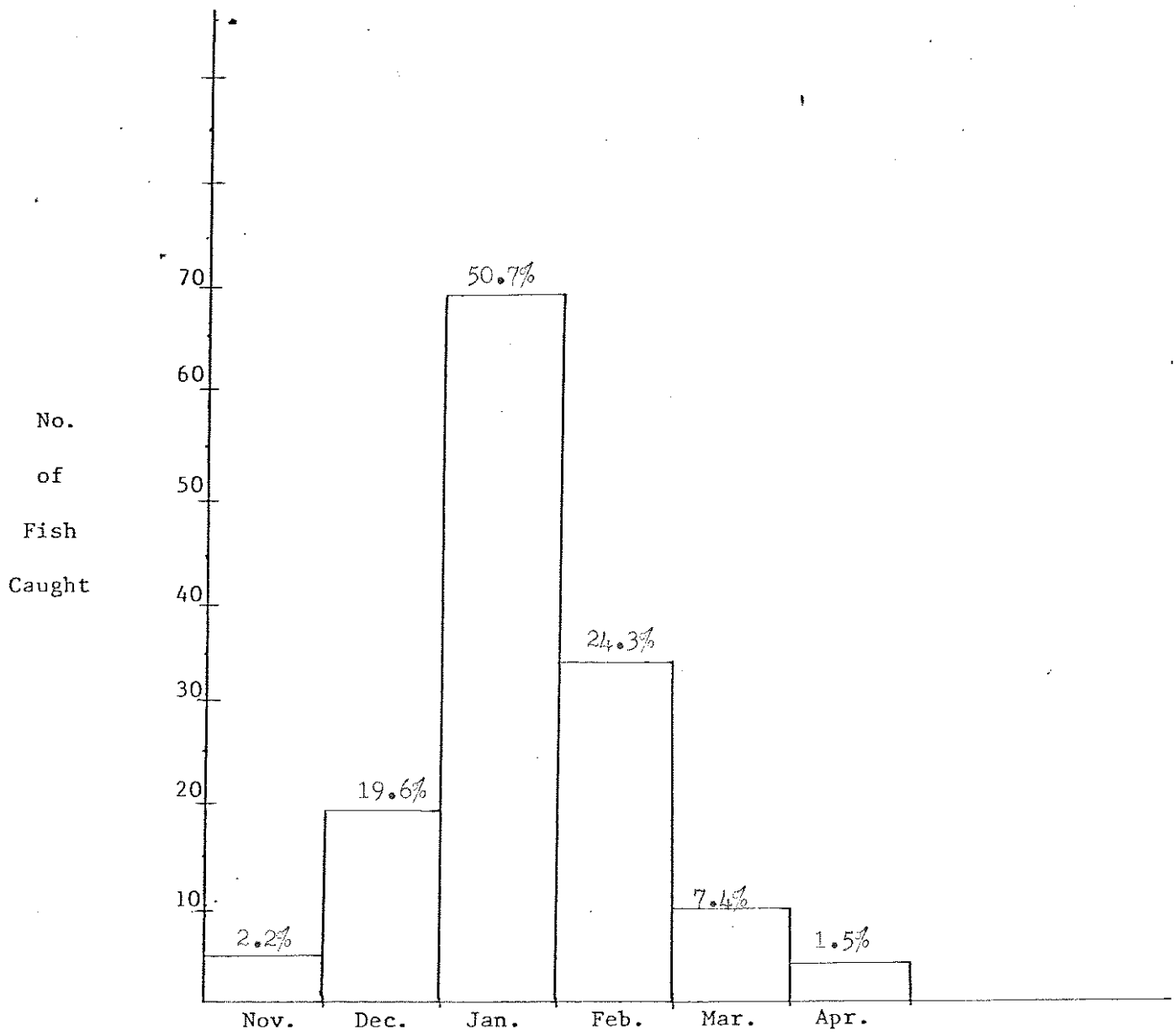
1. HARTMAN G.F. 'GROWTH RATE AND DISTRIBUTION OF  
SOME FISHES IN THE CHILLIWACK,  
SOUTH ALOUETTE, AND SALMON RIVERS'  
  
Mgt. Pub. No. 11 of the B.C. Fish and Wildlife Branch 1968
  
2. DAVID W. NARVER AND F.C. WITHLER 'STEELHEAD OF THE NANAIMO RIVER  
ASPECTS OF THEIR BIOLOGY AND  
THE FISHERY FROM 3 YEARS OF  
ANGLER'S CATCHES'  
  
Fisheries and Marine Service Pacific Biological Station,  
Nanaimo, B.C. Circular No. 99 Dec. 1974.
  
3. WITHLER, I.L. 1965 'VARIABILITY IN LIFE HISTORY CHARACTERISTICS  
OF STEELHEAD TROUT (SALMO GAIRDNERI) ALONG  
THE PACIFIC COAST OF NORTH AMERICA'  
  
Journal Fish Res. Bd. Canada, 23 (3):365-393



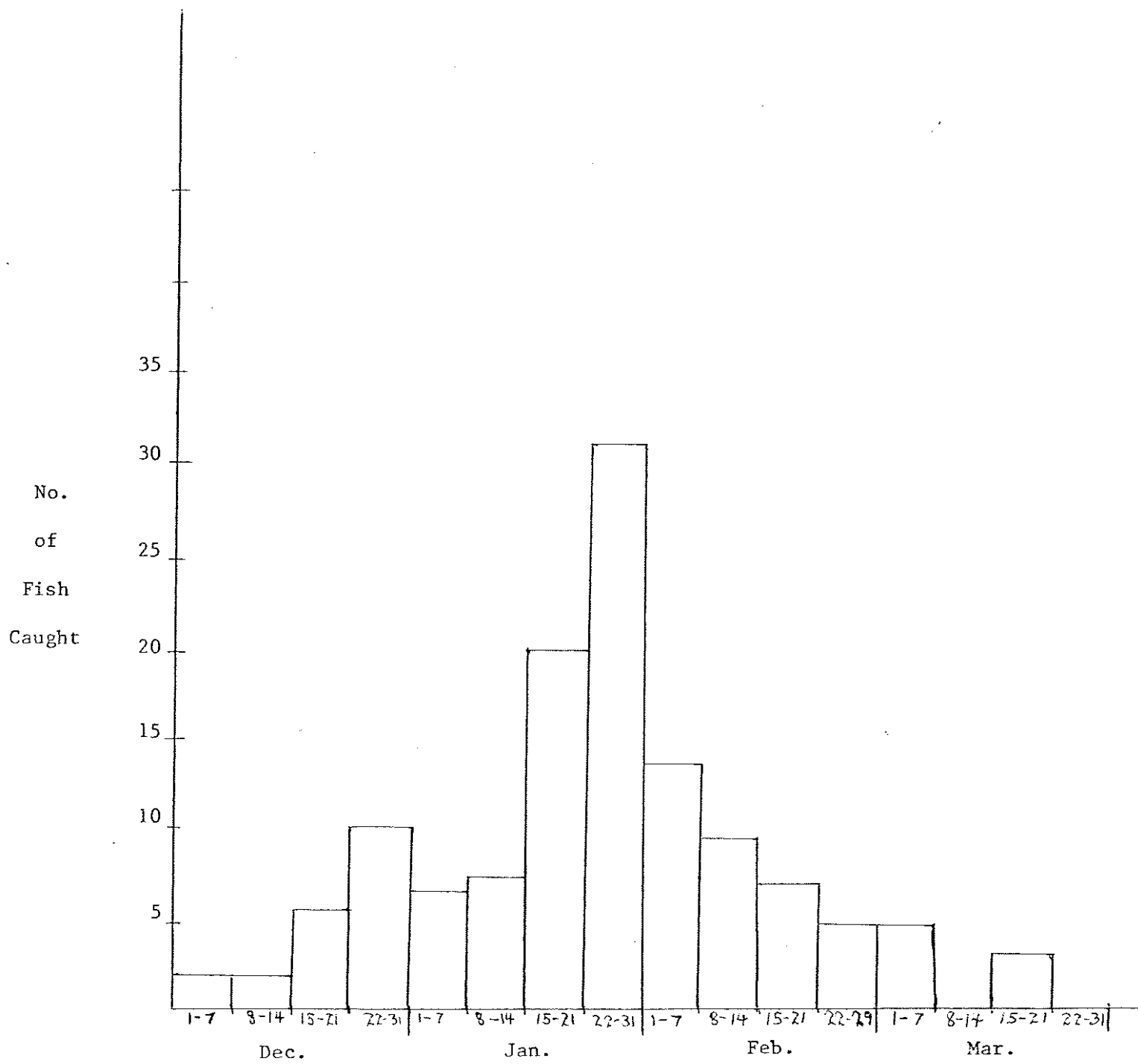
Appendix I. AGE CLASS STRUCTURE OF STEELHEAD CAUGHT  
IN THE SOUTH ALOUETTE RIVER.



APPENDIX III. Sex Ratio of Steelhead Caught By Anglers  
In The South Alouette River



APPENDIX IV. Timing of the Run - Based on Angler Catch Per Month  
In The South Alouette River



APPENDIX V. Timing of the Run - Based on Angler Catch Per Week on the South Alouette River



Appendix VII. ADULT SCALE SAMPLE RECORD SHEET

LOCATION: SOUTH ALOUETTE RIVER, HANCOY P.C.

INTERPRETER: ALAN CAJETA

SPECIES: STEELHEAD (*Salmo gairdneri*)

DATE: MAY 1977

REPORT NO.: II

LIFE HISTORY OF STEELHEAD TROUT (*Salmo gairdneri*)  
IN THE SOUTH ALOUETTE RIVER - BASED ON 9 YEARS OF ANGLER'S CATCHES cm. cm.

DATE			SCALE			in.	lbs.	TOTAL	FRESH	FRESH	MAG	SALT	SALT	TOTAL
DAY	MO.	YR.	ENVELOPE	BOOK	SEX	LENGTH	WEIGHT	AGE	AGE	RADIUS		AGE	RADIUS	RADIUS
17	12	50	1	NA	M	30.0	10.5	2.1+	2.	2.7	48x	.1+	8.1	13.5
04	01	51	2	NA	M	29.5	7.5	2.1+	2.	2.4	"	.1+	8.7	15.0
05			3	"	F	31.0	12.2	2.15+	2.	3.3	"	.15+	10.6	15.0
13	1		4	"	F	33.5	13.8	R.2+	R.	-	"	.2+	-	-
14			5	"	F	32.0	14.2	2.2+	2.	2.3	"	.2+	7.7	14.0
30			6	"	F	31.25	11.75	2.2+	2.	2.0	"	.2+	9.0	16.8
01	02		7	"	F	33.25	15.2	1.2+	1.	2.8	"	.2+	10.5	16.8
03			8	"	M	34.5	16.0	2.15+	2.	2.8	"	.15+	7.4	17.2
19			9	"	F	32.0	12.8	R.2+	R.	-	"	.2+	-	-
20			10	"	F	28.0	7.6	1.1+	1.	2.5	"	.1+	9.4	12.5
04	03		11	"	M	37.0	16.5	R.2+	R.	-	"	.2+	-	-
18			12	"	F	-	12.0	2.2+	2.	3.5	"	.2+	15.0	20.5
29	01	52	13	"	M	-	22.5	2.1+	2.	3.3	"	.1+	14.4	8.0
29			14	"	M	34.25	13.0	3.2+	3.	3.0	"	.	9.0	20.5
06	02		15	"	M	32.5	11.5	2.1+	2.	1.5	"	.1+	10.5	18.3
13	12		16	"	F	27.0	10.0	2.1+	2.	3.0	"	.1+	10.3	14.2
03	01	53	17	"	M	28.0	8.0	R.1+	R.	-	"	.1+	-	-
7			18	"	M	28.0	9.0	1.1+	1.	2.7	"	.1+	12.2	17.0
25			19	"	F	34.5	14.5	2.25+	2.	2.2	"	.25+	10.0	22.5
30			20	"	M	27.5	7.8	2.1+	2.	2.0	"	.1+	8.0	13.0
04	02		21	"	M	30.5	8.75	3.1+	3.	3.5	"	.1+	13.6	21.5
04			22	"	F	25.5	7.0	2.1+	2.	2.7	"	.1+	13.0	18.5
04			23	"	M	27.5	6.75	2.1+	2.	3.0	"	.1+	11.5	14.5
06			24	"	M	29.0	7.5	R.1+	R.	-	"	.1+	-	-
07			25	"	F	27.0	6.7	2.1+	2.	3.2	"	.1+	10.5	13.5

ADULT SCALE SAMPLE RECORD SHEET

LOCATION: SOUTH ALBUQUERQUE RIVER, HADEY, B.C.  
 SPECIES: STEELHEAD (*Salmo gairdneri*)  
 REPORT NO.: II

INTERPRETER: ALAN CAVERLY  
 DATE: MAY 1977

DATE			SCALE	SCALE		in.	lbs.	TOTAL	FRESH	FRESH	MAG	SALT	SALT	TOTAL
DAY	MO.	YR.	ENVELOPE	BOOK	SEX	LENGTH	WEIGHT	AGE	AGE	RADIUS		AGE	RADIUS	RADIUS
18	02	53	26	NA	M	29.0	7.0	2.1+	2.	4.0	48x	.1+	15.5	21.0
18			27	"	M	37.0	12.0	2.2+	2.	2.8	"	.2+	13.2	24.0
10	04		28	"	F	27.5	7.0	R.1+	R.	—	"	.1+	—	—
05	12		29	"	M	27.0	8.0	2.1+	2.	2.4	"	.1+	12.0	15.3
13			30	"	M	25.0	8.0	2.1+	2.	2.5	"	.1+	10.5	13.0
13			31	"	M	26.5	6.75	R.1+	R.	—	"	.1+	—	—
18			32	"	F	33.0	12.0	2.2+	2.	3.0	"	.2+	11.2	19.0
23			33	"	F	33.5	13.5	2.25+	2.	3.0	"	.25+	12.5	22.5
26			34	"	F	24.5	6.0	2.1+	2.	2.5	"	.1+	9.7	13.5
	01	54	35	"	F	26.5	7.0	R.1+		3.2	"	.1+	14.5	19.5
01	01	55	36	"	—	—	14.0	3.15+	3.	4.0	"	.15+	13.0	19.8
02			37	"	F	32.5	11.5	2.25+	2.	3.0	"	.25+	12.0	21.5
08			38	"	F	32.0	14.0	2.2	2.	3.2	"	.2+	12.0	21.2
08			39	"	M	36.0	18.0	2.2+	2.	3.2	"	.2+	13.2	22.8
08			40	"	F	32.0	14.0	R	—	—	—	—	—	—
20	02		41	"	F	33.0	14.1	2.2+	2.	2.4	"	.2+	9.9	16.2
17	03		42	2-2 #1	M	28.5	6.75	2.1+	2.	—	"	.1+	—	—
22	01	56	43	NA	M	33.0	12.7	2.2+	2.	3.6	"	.2+	10.5	17.0
09	02		44	"	—	—	4.0	2.+	2.	3.1	"	.+	—	9.3
19			45	"	F	24.0	9.0	2.1+	2.	3.6	"	.1+	12.1	16.6
02	03		46	"	M	33.0	14.5	2.2+	2.	2.6	"	.2+	10.0	18.0
3			47	"	F	28.0	7.5	2.1+	2.	2.5	"	.1+	11.0	15.0
16			48	"	—	—	8.0	R.1+	R.	—	"	.1+	—	—
16			49	"	—	—	5.0	2.1+	2.	3.1	"	.1+	10.0	13.0
02	12		50	2-1 #5.6	F	—	5.0	—	—	—	"	—	—	—

ADULT SCALE SAMPLE RECORD SHEET

LOCATION: SOUTH ALouETTE RIVER, HANCOCK, B.C.  
 SPECIES: STEELHEAD (*Salmo gairdneri*)  
 REPORT NO.: 11

INTERPRETER: ALAN CANNON  
 DATE: MAY 1977

DATE			SCALE	SCALE		in.	lbs.	TOTAL	FRESH	FRESH	MAG	SALT	SALT	TOTAL
DAY	MO.	YR.	ENVELOPE	BOOK	SEX	LENGTH	WEIGHT	AGE	AGE	RADIUS		AGE	RADIUS	RADIUS
16	12	56	51	NA	F	29.0	9.5	2.2+	2.	2.8	48x	.2+	10.5	18.2
22			52	"	F	32.0	12.0	2.25+	2.	3.5	"	.2+	11.7	21.6
23			53	"	M	32.0	11.5	2.2+	2.	2.9	"	.2+	10.5	21.0
06	01	57	54	2-1 2,3,4	M	-	4.1	2.1+	2.	3.4	"	.1+	12.	2.6
06			55	NA	F	-	11.0	2.2+	2.	3.0	"	.2+	10.7	1.5
19			56	"	M	24.75	6.0	2.1+	2.	-	"	.1+	-	-
02	03!		57	2-1 1,2	M	18.0	2.0	R.+	R.	-	"	.+	-	-
03			58	NA	F	-	11.0	2.2+	2.	-	"	.2+	-	-
-	12		59	"	M	26.0	8.0	3.1+	3.	3.0	"	.1+	10.0	10.0
18			60	"	F	32.0	10.0	2.2+	2.	2.5	"	.2+	10.0	17.0
21			61	"	M	27.0	6.5	3.1+	3.	2.6	"	.1+	8.6	11.5
21			62	"	M	24.5	5.5	2.1+	2.	2.8	"	.1+	12.2	15.0
23			63	"	M	30.5	11.0	2.2+	2.	2.1	"	.2+	7.5	15.0
26			64	"	F	30.0	11.5	R.2+	R.	-	"	.2+	-	-
28			65	"	F	-	10.0	2.2+	2.	2.2	"	.2+	7.8	15.5
29			66	1-3 1,2	M	25.0	6.0	R.1+	R.	-	"	.1+	-	-
11	01	58	67	NA	M	-	6.0	R.1+	R.	-	"	.1+	-	-
12			68	"	F	27.0	6.5	2.1+	2.	3.2	"	.1+	12.0	15.2
			69	1-1 1,2	F	27.0	7.75	R.2+	R.	-	"	.2+	-	-
15			70	NA	M	26.0	5.5	2.1+	2.	2.7	"	.1+	11.0	14.0
15			71	"	F	21.5	10.5	2.2+	2.	2.8	"	.2+	8.0	14.0
16			72	1-1 1,2,3	F	-	10.0	2.2+	2.	3.2	"	.2+	13.0	20.8
18			73	NA	F	29.0	8.0	3.2+	3.	3.0	"	.1+	10.2	16.5
8			74	"	M	26.0	5.25	2.2+	2.	2.5	"	.1+	10.0	12.6
18			75	"	F	30.0	9.5	2.2+	2.	4.0	"	.2+	11.0	18.1
18			76	1-2 1,2	M	26.0	7.0	3.1+	3.	3.0	"	.1+	13.0	16.0

ADULT SCALE SAMPLE RECORD SHEET

LOCATION: SOUTH ALBUQUERQUE RIVER, PAPER, N.M.

INTERPRETER: ALAN CAJERLA

SPECIES: STEELHEAD (*Salmo gairdneri*)

DATE: May 1977

REPORT NO.: #

DATE			SCALE			in.	lbs.	TOTAL	FRESH	FRESH	MAG	SALT	SALT	TOTAL
DAY	MO.	YR.	ENVELOPE	BOOK	SEX	LENGTH	WEIGHT	AGE	AGE	RADIUS		AGE	RADIUS	RADIUS
18	01	58	77	NA	M	26.0	6.0	2.1+	2.	3.0	48x	.1+	11.5	14.0
18			78	"	M	23.25	4.0	3.1+	3.	2.1	"	.1+	7.5	9.0
19			79	"	M	26.5	6.5	3.-	2.	2.8	"	.1+	11.0	14.2
19			80	"	F	29.0	11.0	2.2+	2.	2.7	"	.2+	9.7	17.5
19			81	H-1 #7.8	F	29.0	11.0	2.2+	2.	2.8	"	.2+	10.5	19.1
19			82	NA	F	24.0	5.0	2.2+	2.	2.5	"	.2+	10.2	17.1
19			83	"	M	33.5	11.0	R.2+	R.	-	"	.2+	-	-
19			84	"	F	29.5	9.25	3.2+	3.	2.6	"	.2+	9.4	16.5
19			85	"	M	27.0	6.5	3.1+	3.	5.0	"	.1+	13.5	16.0
19			86	"	F	31.0	9.75	3.1+	3.	2.4	"	.1+	5.4	15.6
19			87	"	M	31.0	10.0	3.15+	3.	3.5	"	.15+	12.0	15.0
20			88	"	M	21.0	5.0	R.1+	R.	-	"	.1+	-	-
20			89	"	F	24.0	5.1	2.1+	2.	2.7	"	.1+	11.6	14.2
20			90	"	F	30.0	9.25	2.2+	2.	3.2	"	.2+	9.5	16.5
22			91	"	F	29.5	9.0	2.2+	2.	2.8	"	.2+	10.5	19.0
22			92	"	F	24.0	5.5	3.1+	3.	3.0	"	.1+	11.3	14.8
24			93	"	F	24.5	4.5	2.1+	2.	3.0	"	.1+	12.0	15.0
25			94	"	M	25.0	6.0	2.1+	2.	3.0	"	.1+	9.5	11.6
25			95	H-1	F	24.5	5.25				"			
25			96	NA	F	30.0	10.0	3.2+	3.	2.6	"	.2+	10.7	17.5
25			97	"	F	23.5	6.0	2.1+	2.	2.5	"	.1+	12.3	14.5
26			98	"	M	14.0	2.25	R	R	-	"	-	-	-
26			99	H-1 #9.0	M	-	6.0	R.1+	R.	-	"	.1+	-	-
26			100	"	F	29.0	9.0	2.2+	2.	2.7	"	.2+	12.5	16.0
26			101	NA	F	25.0	5.5	3.1+	3.	2.6	"	.1+	11.0	15.5
26			102	"	M	24.0	6.0	2.1+	2.	2.5	"	.1+	10.0	12.5
26			103	"	M	27.5	7.5	R.2+	R.	-	"	.2+	-	-
26			104	H-2 #5.6	F	29.0	9.0	2.1+	2.	2.5	"	.1+	7.0	15.6

ADULT SCALE SAMPLE RECORD SHEET

LOCATION: South Alouette River, Prince Rupert

INTERPRETER: ALAN CAVERLY

SPECIES: Steelhead (Salmo gairdneri)

DATE: Mar 1977

REPORT NO.: 1

DATE			SCALE	SCALE		in.	lbs.	TOTAL	FRESH	FRESH	MAG	SALT	SALT	TOTAL
DAY	MO.	YR.	ENVELOPE	BOOK	SEX	LENGTH	WEIGHT	AGE	AGE	RADIUS		AGE	RADIUS	RADIUS
26	01	58	105	NA	M	28.0	8.5	3.2+	3.	3.5	48x	.2+	10.6	17.1
26			106	"	F	24.0	7.75	2.1+	2.	2.5	"	.1+	10.1	12.9
27			107	1-3 #3.1	M	23.5	5.0	2.1+	2.	2.5	"	.1+	10.5	13.7
27			108	"	M	24.0	4.5	2.1+	2.	2.3	"	.1+	8.3	10.0
28			109	"	M	24.0	5.0	2.1+	2.	2.7	"	.1+	13.0	14.5
28			110	"	M	25.0	6.0	R.1+	R.	—	"	.1+	—	—
29			111	"	F	30.0	10.5							
31			112	1-2 #2.8	M	26.0	6.75	3.1+	3.	3.0	"	.1+	10.5	14.0
02	02		113	NA	F	27.0	6.0	2.1+	2.	3.0	"	.1+	9.3	12.3
03			114	"	F	25.0	6.0	2.1+	2.	2.1	"	.1+	10.1	11.0
			115											
08			116	"	F	26.0	8.5	2.1+	2.	3.0	"	.1+	12.0	15.5
10			117	"	M	26.0	7.5	2.1+	2.	2.1	"	.1+	12.0	13.0
13			118	"	F	25.0	5.5	2.1+	2.	3.1	"	.1+	9.9	12.0
14			119	"	F	26.0	7.25	R	R					
14			120	"	F	26.5	10.6	R.2+	R.	—	"	.2+	—	—
20			121	"	M	33.0	12.5	R.2+	R.	—	"	.2+	—	—
23			122	"	F	32.0	10.0	2.2+	2.	3.0	"	.2+	11.0	19.3
23			123	"	M	31.0	10.0	R.2+	R.	—	"	.2+	—	—
23			124a	"	F	29.5	9.5	2.2+	2.	2.6	"	.2+	10.8	17.0
26			124b	1-1 #5.0	F	30.0	9.0	R.2+	R.	—	"	.2+	—	—
27			125	1-3 #5.6	M	26.5	6.0	R.1+	R.	—	"	.1+	—	—
21	04		126	1-2 #3.4	M	24.0	4.4	2.1+	2.	2.1	"	.1+	9.5	12.6
21	11		127	NA	M	32.0	11.0	3.2+	3.	3.1	"	.2+	12.0	16.7
22			128	"	M	24.5	5.0	R.1+	R.	—	"	.1+	—	—
22			129	"	M	25.0	6.0	R.1+	R.	—	"	.1+	—	—
20	12		130	1-4 #7.8	M	35.0	13.7	2.2+	2.	2.7	"	.2+	12.7	19.2

ADULT SCALE SAMPLE RECORD SHEET

LOCATION: South ALBUQUERQUE RIVER, HATCH, N.M.

INTERPRETER: A. J. CROOK

SPECIES: STEELHEAD (Salmo gairdneri)

DATE: May 1977

REPORT NO.: 11

DATE			SCALE	SCALE		in.	lbs.	TOTAL	FRESH	FRESH	MAG	SALT	SALT	TOTAL
DAY	MO.	YR.	ENVELOPE	BOOK	SEX	LENGTH	WEIGHT	AGE	AGE	RADIUS		AGE	RADIUS	RADIUS
11	01	59	131	1-4 9.75	F	32.0	12.5	R	R	-	48x		-	-
14			132	1-4 3.4	F	28.0	8.0	2.1+	2.	3.1	"	.1+	11.8	15.5
17			133	1-4 5.6	M	27.0	6.5	3.1+	3.1+	5.0	"	.1+	10.0	14.1
24			134	NA	F	27.0	6.0	2.1+	2.	2.7	"	.1+	12.7	17.0
01	02		135	"	M	33.0	13.75	3.2+	3.	2.7	"	.2+	9.5	17.0
05			136	"	M	32.5	14.2	2.2+	2.	3.3	"	.2+	12.0	18.2
08			137	"	F	31.5	13.0	2.2+	2.	3.0	"	.2+	10.6	17.2
07	03	59	138	1-4 1.2	F	26.5	5.5	R.1+	R.	-	"	.1+	-	-

SUBJECT: Use of Master Reference Report

The scale sample master record sheets contain all the raw data obtained from scale envelopes and scale samples that have been discussed in reports on Lower Mainland streams. All the samples are arranged chronologically by day whenever possible. Scale samples are stored in the file cabinet for scales at the Region II office. Photomicrographs are in the watershed file, numbered by scale envelope no.

Different formats are used for adult scale samples and juvenile samples. Copies of both are in the scale file. Copies of the adult record sheets are also in the report appendix for each watershed.

Description of Record Sheet Format and Terminology

(i) Adult Samples: Record sheets also included in report appendix

At the top of the record sheet is the following:

Location: River, nearby town

Species: Common name (latin name)

Report No. Roman numeral and report title

Interpreter: Name of person(s) reading scales

Date: Date the scales are read (month/year)

- The rest of the sheet is scale envelope and sample information

- All radii measurements are in centimeters on the dorsal-ventral axis.

Date: Date of sampling

Day Mo. Yr.

Scale Envelope: This number corresponds to the number at the upper right hand corner of the scale envelope

Scale Book: Book number - page number (NA - not applicable) # square no.

Sex: Self-explanatory

Length: Length of fish in inches

Weight: Weight of fish in pounds

Total Age: Freshwater winters. Saltwater winters; This would also include second or third spawnings.

Freshwater age: Number of winters in freshwater

Freshwater Radius: The radius of the freshwater growth zone, measured from the focus to the outer freshwater annulus.

Mag: The magnification used for all scale radii measurements

Saltwater Age: Number of winters of saltwater growth; includes repeat spawning

Saltwater Radius: Measured from the focus to the outer ring of the first saltwater annulus.

Total Radius: Measured from the focus to the outer scale edge.