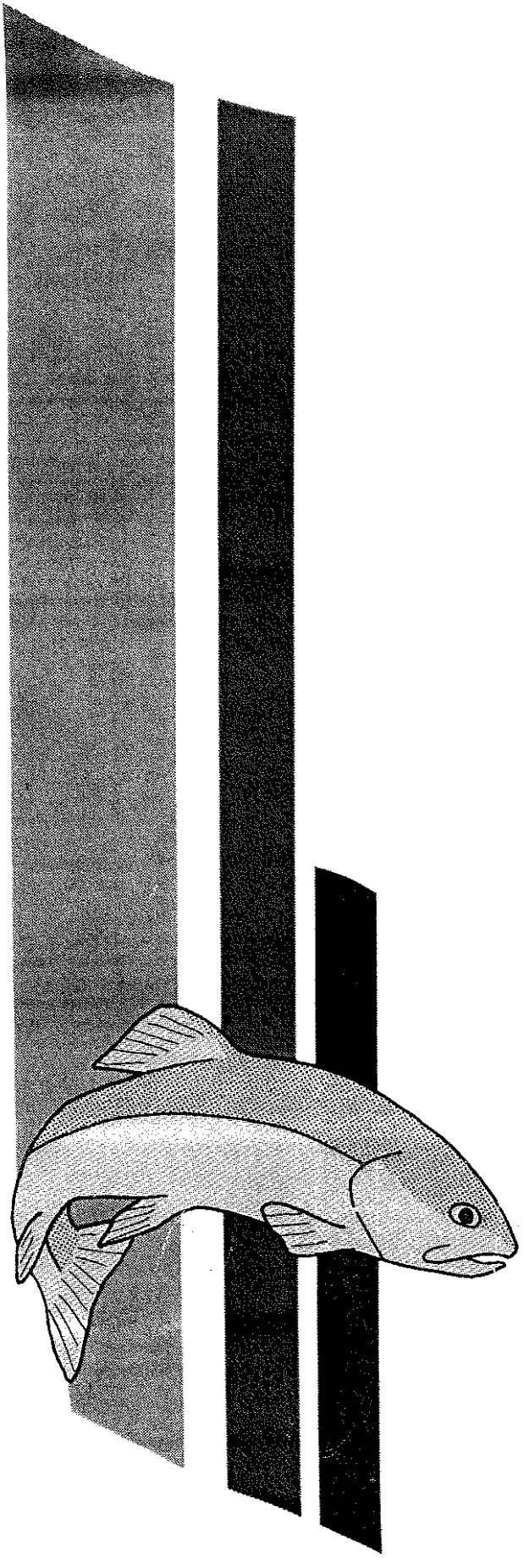

Skeena Fisheries

Pallant Creek Steelhead 1984-85

by

A.D. de Leeuw

B.C. Ministry of Environment
Fisheries Branch
Smithers, B.C.

Fisheries Progress Report No. SK-52

December 1985

PALLANT CREEK STEELHEAD

1984-85

by

A.D. de Leeuw

British Columbia Ministry of Environment
Fish and Wildlife Branch
Smithers, B.C.

Fisheries Progress Report No. SK-52
December, 1985

TABLE OF CONTENTS

ABSTRACT

de Leeuw, A.D. 1985. Pallant Creek steelhead: 1984-85.

During the 1984-85 winter season, a steelhead tagging study was undertaken on Pallant Creek, Queen Charlotte Islands. One hundred and twenty-five fish were angled, of which 123 were tagged. Seven (6.3%) were subsequently recaptured. The abundance of steelhead was calculated using multiple-sample techniques and estimates were 739, 821 and 892 fish. Confidence limits were wide and ranged from 401 to 2,523 fish. The greatest number of steelhead were taken in the middle sections of the river and average number of days between recapture was 35, and ranging from 1 to 107 days. The dominant age group was 3.3 (28%), followed by 3.1S1 (20%), 4.2 (10%), 3.2 (12%), 4.3 (8%) and 3.1, 4.1S1 and 3.1SS1 with 4% each. Repeat spawners comprised 24% of the sampled population. The sports fishery and results are discussed relative to other Charlotte streams.

INTRODUCTION

Although steelhead trout contribute substantially to the non-tidal sports fishery of the Queen Charlotte Islands, no long-term monitoring of life history or population abundance was carried out on these Islands for this species prior to 1981. During the 1981-82 winter season, a steelhead tagging study was undertaken at Pallant Creek (Fig. 1), repeated in 1983-84 and again in 1984-85. This report covers the 1984-85 season. It is hoped the work will continue annually, establishing Pallant Creek as an adult steelhead index stream for the Queen Charlotte Islands. The continued commitment of the Queen Charlotte Island Chapter of the British Columbia Steelhead Society and the Pallant Creek hatchery staff to this project, combined with the small size and accessibility of the stream, make Pallant Creek a favourable location for this type of long term study.

Like the previous years, the objectives of the 1984-85 Pallant Creek steelhead tagging study were to:

1. Describe steelhead run timing and movement
2. Describe life history characteristics
3. Estimate population size

A description of the study area can be found in previous Pallant Creek reports (de Leeuw, 1985a, 1985b).

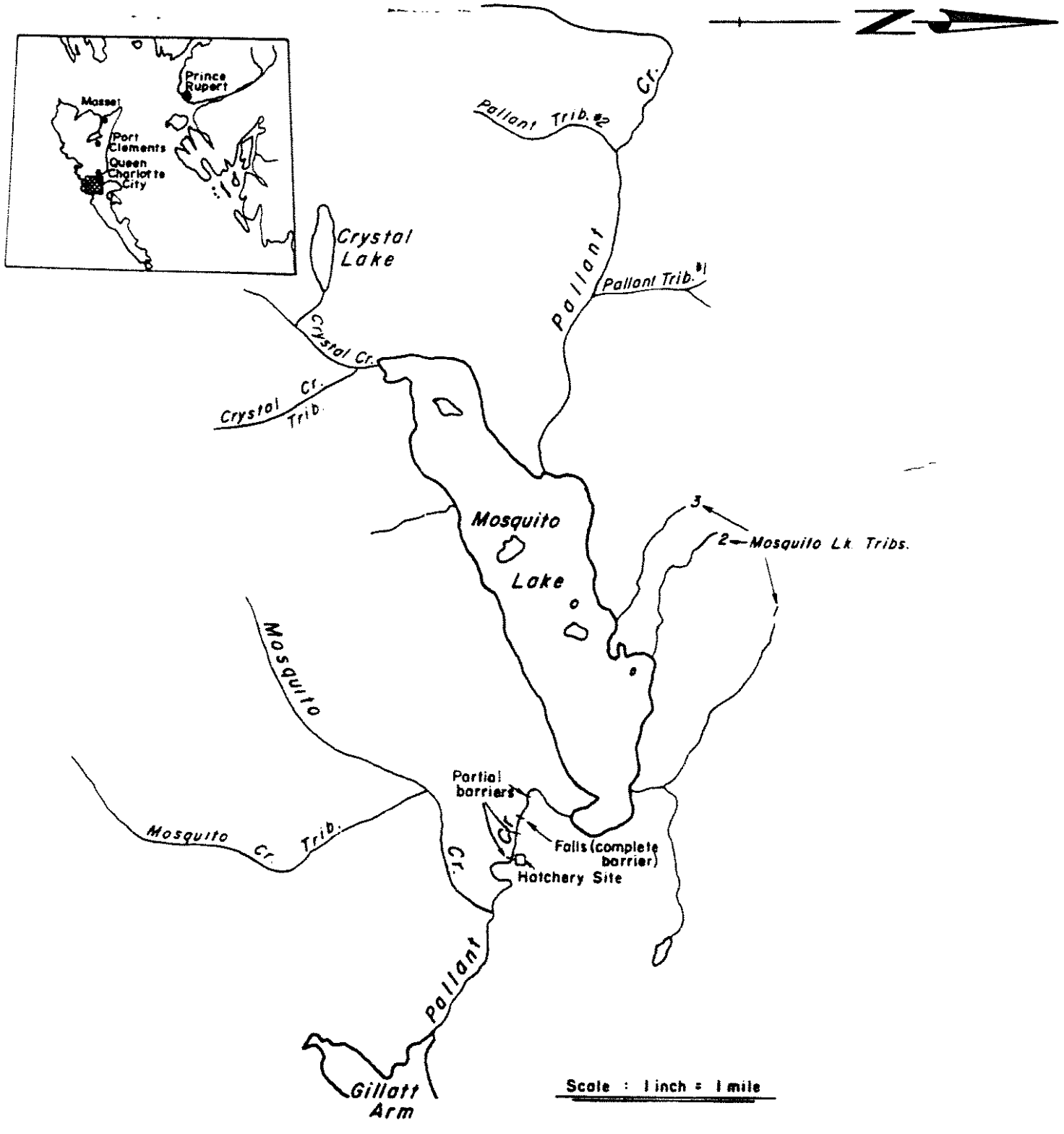

Fig. 1 PALLANT CREEK AND MOSQUITO LAKE SYSTEM

THE FISHERY

According to steelhead angler questionnaire results, effort in terms of both angler days and number of anglers has increased over the past 14 years (Table 1). Over the past 5 or 6 years however, effort has stabilized somewhat. The large catches of the 1980-81 to 1984-85 seasons possibly reflect better than average steelhead runs during those seasons, as well as an increased steelhead harvest questionnaire response by successful anglers. Over-estimation as a result of primarily successful anglers returning their questionnaires is a distinct possibility for the Pallant. A 4 to 63% positive bias has been observed in the B.C. steelhead questionnaire catch estimates when these estimates are compared to on-site creek census results (Billings, 1982). Nonetheless, on a relative basis, angler success or catch/day has consistently been better for the Pallant than it has been for the Charlottes as a whole.

Table 1. Pallant Creek steelhead harvest analysis[1], 1970-71-1984-85

Season	Days Fished	No. of Anglers	Kept	Released	Kept/ Day	Catch/ Day	Charlottes Catch/Day
70-71	8	4	8	20	1.00	3.50	.36
71-72	10	3	21	25	2.00	4.60	.52
72-73	89	12	45	86	.50	1.47	.31
73-74	26	3	26	34	1.00	2.22	.33
74-75	10	3	7	0	.67	.67	.27
75-76	73	30	23	40	.32	.86	.47
76-77	107	46	47	20	.45	.65	.37
77-78	74	30	48	92	.64	1.86	.48
78-79	177	42	35	26	.21	.38	.41
79-80	236	50	36	86	.16	.53	.48
80-81	382	53	59	709	.16	1.96	.79
81-82	227	66	41	190	.22	1.05	.93
82-83	293	50	17	511	.06	1.80	1.23
83-84	235	37	39	330	.17	1.57	.57
84-85	359	58	66	620	.18	1.92	1.32
Mean:	154	32	35	186	.51	1.67	.59

1 Steelhead Harvest Analysis. B.C. Fish and Wildlife Branch annual reports.

METHODS

In this study year, the river was partitioned into seven zones in an attempt to more accurately describe steelhead movement (Fig. 2). Adult steelhead were angled and tagged with orange, numbered anchor (spaghetti) tags. Weights were generally estimated while fork lengths were measured. Gender, date of capture, tag number and colour as well as zone of capture were recorded. After the removal of a few scales, fish were released at the capture site.

Scales were viewed using a dissecting microscope, and the two best examples from the sample were cleaned and mounted on gummed cards. Impressions of the scales were made on acetate cards by applying heat

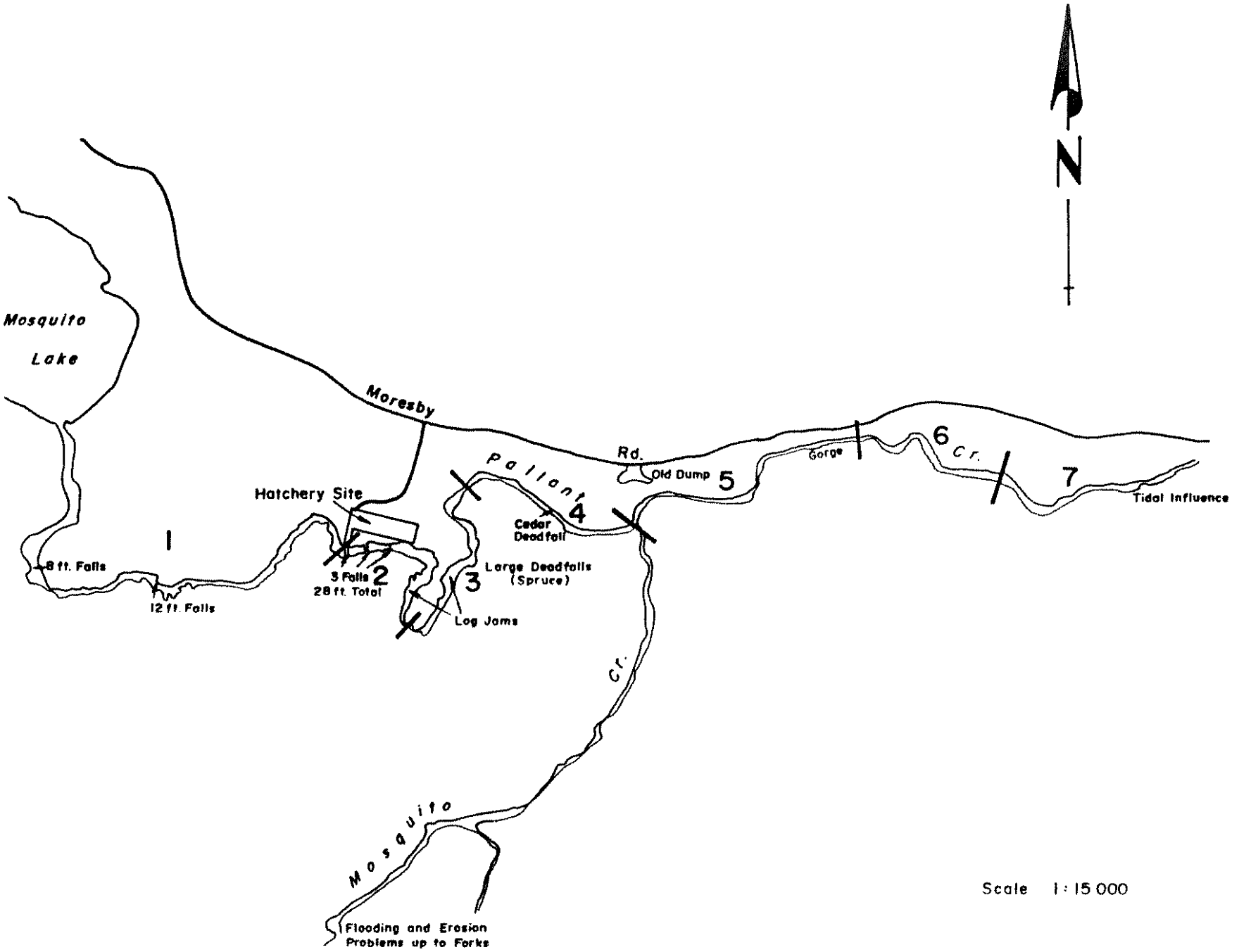

Fig. 2 Pallant Creek Angling Zones During The 1984-85 Steelhead Tagging Study

and pressure. A Leitz Prado projector was then used to examine each scale for freshwater and ocean age determination (Narver and Withler, 1984).

Population size was determined using the Schnabel, Schumacher and Schabel-Chapman adjusted multiple census techniques (Ricker, 1958). The formulae were:

Schnabel: $$N = \frac{\text{sum } (Ct\ Mt)}{R}$$

Schumacher: $$N = \frac{1}{\bar{N}} = \frac{\text{sum } (Mt\ Rt)}{\text{sum } (Ct \cdot Mt^2)}$$

Schnabel, Chapman revised: $$N = \frac{\text{sum } (Ct\ Mt)}{R+1}$$

where:
- t = 5-day time period
- Ct = total catch during time t
- Mt = total fish tagged and released during time t
- M = sum of Mt
- Rt = total recapture during time t
- R = sum of Rt

RESULTS

One hundred and twenty-five steelhead were angled from December through May on Pallant Creek during the 1984-85 winter steelheading season. Of these, 123 were tagged and 9 (7.3%) were recaptured.

SPATIAL AND TEMPORAL DISTRIBUTION

Almost half of all fish tagged were taken from Zones 2 and 4 or the mid-section of the river. No fish were angled from the uppermost area (Zone 1), located immediately below the impassable barrier (Table 2). The largest catches occurred during March and April (Table 3), and sex ratio favoured females slightly (52%) over males. Sex was not recorded for three fish.

Table 3. Number of steelhead captured during the 1984-85 tagging study on Pallant Creek. Catch grouped by 10-day periods.

Date	Males	Females	Not recorded	Total
12/1-10	0	0		0
12/11-20	1	2		3
12/21-30	1	0		1
01/1-10	1	0		1
01/11-20	1	4		5
01/21-30	2	2	3	7
02/1-10	1	3		4
02/11-20	2	1		3
02/21-30	7	10		17
03/1-10	3	1		4
03/11-20	11	9		20
03/21-30	10	8		18
04/1-10	17	24		41
04/11-20	0	0		0
04/21-30	0	0		0
05/1-10	0	1		1
Total	57 (45.6%)	65 (52%)	3 (2.4%)	125

Of the nine recaptures, two were originally tagged during the 1983-84 season. Date and location of original and repeat capture were recorded for only five recaptured fish. One of these had migrated downstream. The other four were recaptured within the same area (Table 4). Stream residency during the study season varied considerably and ranged from 3 to 107 days, with an average of approximately 37 days (Table 4).

Table 4. Movement and residency of recaptured steelhead in Pallant Creek, 1984-85.

Tag # (Orange)	Original Capture Zone	Original Capture Date	Original Capture Condition	Recapture Zone	Recapture Date	Recapture Condition	Days
03115	4	Feb 21/85	Bright	4	Feb 25/85	Bright	3
06935	-			3	Mar 3/85	Dark	-
03599	2	Mar 1/85	Coloured	2	Mar 24/85	Dark	23
03591	7	Feb 25/85	Bright	7	Mar 25/85	Spawning	28
03108	3	Jan 17/85	Bright	-	Mar 31/85	Kelt	73
03140	3	Dec 18/84	Coloured	3	Apr 4/85	Dark	107
02856	-	Apr 3/85	Coloured	6	Apr 4/85	Coloured	1
02703	-	Dec 14/83	Bright	4	Apr 8/85	Kelt	-
02755	4	Mar 18/85	Coloured	5	Apr 9/85	Kelt	22

AGE AND SIZE

Of the 125 fish angled, only 38 sets of scales were collected, of which 37 were readable.

The dominant age group was three years of fresh water and three years of ocean growth (3.3), and comprised 28% of all scales examined where both fresh water and ocean growth were readable. The next most common ages were 3.1S1 (20%), 4.2 (16%) and 3.2 (12%) (Table 5).

Sixty-eight percent of those steelhead sampled had spent 3 years in Pallant Creek prior to ocean migration. The remaining 32% had 4 years of stream growth (Table 6).

Prior to their first spawning, Pallant Creek steelhead had spent from 1 to 3 years in the marine environment. Two and 3 years of ocean growth (.2 and .3) accounted for 38% each of the total, while 1 year of marine residency was present in only 9 or 24% of those sampled (Table 7).

Table 5. Steelhead trout age groups from Pallant Creek, 1984-85, n = 25.

Age groups	Males	Females	Total	% of Total
3.1	0	1	1	4.0
3.2	1	2	3	12.0
3.3	4	3	7	28.0
4.2	0	4	4	16.0
4.3	1	1	2	8.0
3.1S1	3	2	5	20.0
3.1SS1	0	1	1	4.0
4.1S1	0	2	2	8.0
Total	9	16	25	
R.2	2	4	6	
R.3	1	4	5	
R.2S1	1	0	1	

R = Central area of scale is resorbed, fresh water age is not determinable.

Table 6. Number and percentage of male and female Pallant Creek steelhead of different fresh water ages, 1984-85, n = 25.

Fresh water age	Males	Females	Total	% of Total
3	8	9	17	68
4	1	7	8	32
	9	16	25	100

Table 7. Number and percentage of male and female Pallant Creek steelhead of different ocean ages, 1984-85, n = 37.

Ocean age	Males	Females	Total	% of Total
.1	3	6	9	24
.2	4	10	14	38
.3	6	8	14	38
Total	13	24	37	100

Twenty-four percent of all steelhead sampled had spawned previously (Table 8). The largest majority of these pre-spawners (78%) had spent only 1 year in the ocean prior to their first spawning (Table 8). Sex ratio of previous spawners favoured females only slightly. One fish was on its third spawning migration.

Table 8. Numbers and percentage of repeat spawning Pallant Creek steelhead of different ocean age groups, n = 9.

Ocean age	Males	Females	Total
.1S1	3	4	7
.2S1	1	0	1
.1SS1	0	1	1
Total	4	5	9

The average fork length of steelhead where both length and age were determined was 68.7 cm. Lengths of all fish measured ranged from 50.8 cm to 91.4 cm and averaged 69.2 cm. The largest fish were three-year ocean males which averaged 73.7 cm. Very little difference in fork length was noted between 2 and 3 year ocean fish.

Table 9. Fork lengths (cm) of male and female Pallant Creek steelhead of different ocean ages, 1984-85.

Ocean age	Males n	Males x	Males Range	Females n	Females x	Females Range	Total n	Total x	Total Range
.2	3	66.7	61.0-78.7	2	64.8	61.0-6806	5	66.1	61.0-78.7
.3	2	73.7	66.0-81.3	4	71.1	68.6-73.7	6	72.0	66.0-81.3
Total	5	69.6	61.0-81.3	6	68.9	61.0-73.7	11	69.3	61.0-81.3

POPULATION ESTIMATION

The three multiple capture estimators calculated 821,739 and 892 steelhead in Pallant Creek during the 1984-85 season. The low number of recaptures are likely responsible for the wide confidence limits.

Table 10. Pallant Creek steelhead population estimates during the 1984-85 winter season.

Method (Ricker, 1958)	Estimate	95% Confidence Limits	
		Poisson distribution	Normal distribution
N Schnable	821	432 - 1847	490 - 2523
N Schumacher	892	717 - 1179	
N Chapman	739	401 - 1572	470 - 1728
Average	817		

DISCUSSION

The increased catches in zones 2 and 4 are likely the result of better access and fishability in these areas. Area 3 is less fishable since numerous log jams are located in the stream. Magnitude of steelhead catches on other Charlotte streams are also largely a function of fishability and access (de Leeuw, 1983). The temporal distribution of the catch in December through to April with peaks in late March and early April is also typical of many Charlotte steelhead streams. On the Copper and Yakoun Rivers, as well as during previous years on the Pallant, adult steelhead migrations took place during this time (Chudyk, 1982; de Leeuw, 1983, 1985). Peaks in the catch, presumably

a reflection of peaks in run timing, can be variable. On the Yakoun, for instance, greatest catches occurred in December rather than March. No doubt steelhead have developed specific migration strategies to optimize production potentials on an individual stream basis.

The range in time duration between recaptures is possibly the result of adult steelhead leaving Pallant Creek and then re-entering at a later date. On southern Vancouver Island, radio-tagged steelhead migrated into and then out of a small coastal stream, depending on stream flows (Witt, et.al., 1980). If fish remained in the stream throughout this time, one would expect perhaps a greater recapture rate. A short adult stream residency is also possible. In this scenario, mature steelhead enter Pallant Creek, spawn and leave all in a matter of weeks, or even days. More research work is needed in this aspect of steelhead ecology.

The dominance of three year freshwater followed by three years of ocean growth in the 1984-85 Pallant Creek steelhead catch is typical of other Charlotte streams and for the Pallant in previous years. The degree of this dominance however is variable, and changes from year to year within streams and is also different between streams. On the Pallant, for instance, during the 1981-82, 1983-84 and 1984-85 seasons, the 3.3 age group comprised 50%, 47.1% and 28% respectively of the total sample examined (de Leeuw, 1985a, 1985b). On the Copper and Yakoun Rivers, this age group represented 42.5% and 60.5% of the total catch (Chudyk, 1982; de Leeuw, 1983). In all the above cases, 3.3 was the dominant age group.

Although the number of years a juvenile steelhead spends in Pallant Creek prior to ocean migration varies from 2 to 4 years, 3 years generally comprises the bulk of the sample. Over the past 3 years of study, the number of steelhead with 3 years of freshwater growth has varied from 90% to 68%. During the 1983-84 season, 4 years of freshwater growth was not encountered, while in the 1984-85 sample, this age group accounted for 32% of the total. In this latter sample, no one year old steelhead smolts were recorded, while in the year previous, i.e. 1983-84, 17% of the sample were of this age group. These differences in length of stream residency as juveniles is possibly the result of changing growth rates caused by a number of factors such as stream flows and temperature as well as food availability.

Two and three years of ocean growth prior to first spawning accounts for about 40% each of the sample and is typical of the Pallant and other Charlotte streams.

The percentage of repeat spawners during the three years of study has varied considerably. During the 1981-82 season, it was 19%, while in the 1983-84 and 1984-85 seasons it was 9% and 24% respectively. No doubt variable post-spawning stream and marine survival rates combined with initial run size relative to subsequent study years influences the number of repeat spawners. Interestingly, on Pallant Creek the number of years an individual steelhead returns to spawn varies from 1 to 4. Sex ratio of multiple spawners favors females only marginally.

The average fork length of steelhead angled in the 1984-85 season was somewhat smaller than previous years. In the winter and spring of 1981-82 and 1983-84, the average lengths were 71.8 and 72.1 cm, while during the 1984-85 season 68.7 cm was the average.

Since only nine or 7.3% of the original captures were recaptured, the accuracy of the population estimates is questionable, and is reflected in the wide confidence intervals.

SUMMARY

1. During the 1984-85 steelhead season, 125 steelhead were angled from Pallant Creek. Of these, 123 were tagged, of which 7 to 6.3% were subsequently recaptured. Two steelhead tagged during the 1983-84 season were also recaptured in the 1984-85 study period.
2. The greatest number of steelhead were taken from 1.5 km to 3.0 km upstream of tide water. No fish were taken in the uppermost area.
3. The average number of days between recaptures was 35 and ranged from 1 to 107 days.
4. The dominant age group was 3.3 (28%), followed by 3.1S1 (20%), 4.2 (16%), 3.2 (12%), 4.3 (8%) and 3.1, 4.1S1 and 3.1SS1 with 4% each.
5. Average length of Pallant Creek steelhead during the 1984-85 study was 69.2 cm and ranged from 50.8 cm to 91.4 cm.
6. Using multiple sample techniques, the abundance of steelhead in Pallant Creek during the 1984-85 season was estimated. These estimates were: 739, 821 and 892 fish. Wide confidence limits, ranging from 401 to 2,523 fish are likely the result of few repeat captures.

ACKNOWLEDGEMENTS

Like the previous Pallant Creek steelhead studies, this project was largely the result of volunteer work by the Queen Charlotte Islands Chapter of the B.C. Steelhead Society with the assistance of the Pallant Creek Hatchery staff. Their help in this project was invaluable and is greatly appreciated. Organization of field-collected data was supervised by Tom Rutherford, Community Advisor of the Salmonid Enhancement Program. Interpretations of scales collected were accomplished by R. Tetreau and G. Schultze, and M. Lough calculated the population estimates.

The study was funded as a Public Participation Project by the Salmonid Enhancement Program.

REFERENCES

Billings, S.J. 1982. Steelhead havest analysis 1981-82, Fisheries Technical Circular No. 56. Fish and Wildlife Branch, Victoria, B.C., 26 pp.

Caw, G. 1978. An inventory of tributaries to the Copper and Pallant drainages, Moresby Island, Q.C.I. Stream Inventory Report. Fish and Wildlife Branch, Victoria, B.C., 78 pp.

Chudyk, W.E. 1982. Copper Creek (Q.C.I.) Steelhead Trout, a report on the effects of non-random release of kelts from a fence barrier on their incidental capture in an Indian net fishery, and some notes on population size and life history characteristics. Skeena Fisheries Report #81-1. Ministry of Environment, Smithers, B.C., 27 pp.

de Leeuw, A.D. 1983. Steelhead of the Yakoun River, some aspects of their life history, population size and the sport fishery, 1981-82. Skeena Fisheries Report #82-1. Ministry of Environment, Smithers, B.C., 23 pp.

de Leeuw, A.D. 1984. A Fisheries Management Strategy for the Pallant Creek Watershed, Queen Charlotte Islands. Skeena Fisheries Report #83-2. Ministry of Environment, Smithers, B.C., 31 pp.

de Leeuw, A.D. 1985a. Pallant Creek steelhead: some aspects of their life history, population size and sport fishery, 1981-82. Fisheries Progress Report No. SK-50. Ministry of Environment, Smithers, B.C.

de Leeuw, A.D. 1985b. Pallant Creek steelhead: 1983-84. Fisheries Progress Report No. SK-51. Ministry of Environment, Smithers, B.C.

Environment Canada, 1981. Historical stream flow summary, B.C.

Marshall, D.E., R.F. Brown, G.A. Buxton, V.D. Chanley and D.G. Demontier, 1978. Preliminary catalogue of salmon streams and spawning escapements of Statistical Area 2E (Queen Charlotte Islands). Fisheries and Marine Service Data Report #72. 346 pp.

Narver, D.W. and F.C. Withler, 1974. Steelhead of the Nanaimo River, aspects of their biology and the fishery from three years of anglers' catches. Fisheries and Marine Services, Nanaimo, B.C., Cir. No. 99, 25 pp.

Ricker, W.E. 1970. Handbook of computations for biological statistics of fish populations. Bulletin #119. Fisheries Research Brd., Canada.

Shepherd, B.C. 1978. Biological reconnaissance of Mathers and Pallant Creeks to December, 1977. Fisheries and Marine Service Manuscript, Rep. No. 1450.

Shepherd, B.C. 1982. Biological reconnaissance of Mathers and Pallant Creek, Queen Charlotte Islands, December 1977 to December 1978. Canadian Manuscript Report of Fisheries and Aquatic Sciences, No. 1648, 121 pp.

Steelhead Harvest Analysis. 1970-71 through to 1981-82, Fish and Wildlife Branch, Victoria, B.C.

Witt, A.N., R.A. Hunter and E.A. Harding, 1980. A radio telemetry study of the migratory behaviour of winter run steelhead trout (Salmo gairdneri) in Goldstream River, British Columbia. Ministry of Environment, Victoria, B.C., Draft Technical Report, 10 pp.

APPENDICES

I. Original steelhead captures from Pallant Creek, 1984-85 winter season.

II. Steelhead recaptures from Pallant Creek, 1984-85 winter season.

APPENDIX I. Original steelhead captures from Pallant Creek, 1984-85 winter season.

Fish No	Date	Sex	Length cm	Weight kg	Tag No. & Colour	Area	Remarks	Age
1	Dec 18/84	F	73.7	4.1	Orange03130	3	Bright	3.3
2	"	M	81.3	5.5	03140	3	Coloured,vigorous	3.3
3	Dec 20/84	F	50.8	2.3	03138	2	Coloured,spunky	
4	Jan 6/85	M	61.0	2.7	03137	2	A little coloured	
5	Jan 17/85	M	61.0	2.7	03106	2	A little coloured	
6	"	F	71.1	---	03109	3	Bright,large open wound on left side	4.1S1
7	"	F	63.5	---	03108	3	Bright	
8	"	M	78.7	---	03107	2	Dark,spawning	4.2
9	Jan 26/85	M	66.0	3.6	03110	2	Slight red streak, vigourous	3.3
10	Jan 28/85	M	81.3	5.0	03125	2	Slight red streak	
11	"	F	81.3	4.1	03124	3	Spawning	
12	"	U	76.2	4.1	03133	2	Bright	
13	"	U	61.0	2.7	03111	3	Bright	
14	"	U	71.1	3.6	03134	3	Spawner	
15	Jan 29/85	F	76.2	5.5	03120	4	Bright	
16	Feb 4/85	F	68.6	4.1	03136	2	Spawned out	
17	"	F	83.8	5.9	03119	2	Silver bright	
18	"	F	68.6	4.1	03112	2	Coloured,white nose	
19	Feb 7/85	M	66.0	3.2	03118	2	Coloured	
20	Feb 17/85	M	55.9	2.7	03113	4	Dark	
21	"	M	76.2	5.5	03116	4	Bit of red stripe	
22	"	F	86.4	6.8	03117	4	Bright	
23	Feb 21/85	F	66.0	3.2	03115	4	Bright	
24	"	F	76.2	4.5	03114	4	Bright	
25	"	F	71.1	3.6	---	4	Bright,some scars, LV infured	R.3
26	Feb 22/85	F	55.9	2.7	03622	4	Bright	
27	"	F	86.4	6.8	03618	4	Bright	
28	Feb 23/85	M	68.6	3.6	03623	4	Coloured,LP injured, hooked previously	
29	"	M	76.2	5.0	03584	4	Coloured	
30	"	M	76.2	4.5	03590	2	Coloured	
31	Feb 24/85	M	71.1	4.1	03586	6	Bright,vigourous	
32	"	M	76.2	5.5	03589	4	Bright,vigourous	
33	"	F	86.4	6.4	03587	4	Bright,vigourous	
34	Feb 23/85	F	55.9	2.3	03593	6	Bright,vigourous	
35	"	M	61.0	2.7	03594	7	Bright,fresh	
36	"	F	61.0	2.7	03595	7	Bright,fresh	
37	"	F	68.6	4.1	03596	7	Bright,fresh scar right side,Seal bi	
38	"	M	63.5	3.2	03598	7	Bright,fresh	
39	"	F	71.1	4.1	03591	7	Bright,real jumper	

APPENDIX I. continued. Original steelhead captures from Pallant Creek, 1984-85 winter season.

Fish No	Date	Sex	Length cm	Weight kg	Tag No. & Colour	Area	Remarks	Age
40	Mar 1/85	M	58.4	2.7	Orange03599	2	Coloured,scar L jaw	
41	"	M	66.0	3.6	03600	2	Coloured	
42	Mar 3/85	M	61.0	2.7	03597	2	Coloured	
43	"	F	71.1	4.3	03592	2	Bright,hard	
44	Mar 11/85	M	61.0	2.7	02753	2	Bright	
45	"	M	66.0	3.6	02774	3	Starting to colour	
46	Mar 13/85	M	71.1	4.1	02762	3	Coloured	
47	"	F	76.2	4.5	02763	3	Spawned out,good shape	
48	Mar 14/85	M	55.9	2.7	02766	4	A bit of colour	
49	"	M	66.0	3.6	02767	4	Bright,fresh	
50	"	F	63.5	3.2	02751	4	Bright,fresh,cut on vent	
51	"	F	63.5	3.2	02761	4	Bright,fresh	
52	"	M	71.1	4.1	02770	4	Bright,fresh	
53	Mar 17/85	F	63.5	3.2	02752	4	Bit of red stripe	
54	"	F	91.4	7.7	02772	4	Bright,fresh	
55	"	M	76.2	4.5	02765	2	Cark,spawning	
56	"	M	6.10	2.7	02754	2	Dark,Spawning,bad shape	
57	"	M	68.6	3.9	02801	4	Dark but lively	
58	"	M	78.7	5.2	02802	4	Bright,fresh	
59	Mar 18/85	M	71.1	4.1	02760	4	Little bit of colour	
60	"	F	58.6	3.6	02755	4	Little bit of colour	
61	Mar 20/85	F	68.6	3.2	02803	6	Bright,scar R side, hook in mouth	
62	"	F	68.6	3.2	02804	6	Bright,fresh	
63	"	M	63.5	2.7	02805	6	Bright,fresh	
64	Mar 21/85	M	66.0	3.6	02757	2	Spawning	
65	Mar 22/85	M	73.7	4.1	02806	6	Bright,energetic	
66	"	F	55.9	1.6	02776	6	Bright,fresh	
67	Mar 23/85	F	78.7	5.0	02777	2	Bright	
68	"	M	68.6	3.6	02756	2	Bright	
69	"	F	76.2	4.1	02771	3	Bright	
70	"	F	86.4	6.4	02764	3	Bright	
71	Mar 24/85	M	73.7	4.1	02807	4	Coloured	
72	"	F	81.3	4.5	02773	3	Spawned out,Ex. shape, good fight	
73	Mar 27/85	M	76.2	3.6	02808	4	Coloured	
74	"	F	63.5	2.7	02758	7	Bright	
75	"	M	73.7	4.1	02768	7	Bright	
76	Mar 26/85	M	6.10	3.2	02775	2	Coloured,milt running	
77	Mar 31/85	F	78.7	5.0	02853	-	Bright	3.1S1
78	"	M	73.7	4.5	02852	-	Dark	R.2S1

APPENDIX I. continued. Original steelhead captures from Pallant Creek, 1984-85 winter season.

Fish No	Date	Sex	Length cm	Weight kg	Tag No. & Colour	Area	Remarks	Age
79	Mar 31/85	M	61.0	3.2	Orange02851	-	Dark	
80	"	F	61.0	3.2	02647	-	Bright	R.2
81	"	M	55.9	2.3	02855	-	Dark	R.2
82	"	M	61.0	2.7	02854	-	Black	R.2
83	Apr 2/85	M	63.5	--	02759	6	Bright,lively	3.1S1
84	"	F	68.6	--	02778	6	Bright,lively	4.2
85	Apr 3/85	M	--	3.2	02856	-	Some colour	3.2
86	"	M	--	2.7	02857	-	Dark	3.1S1
87	"	M	--	3.2	02859	-	Some colour	
88	"	F	--	2.7	02860	-	Silver	3.2
89	"	M	--	3.6	02862	-	Dark	3.3
90	"	F	--	4.1	02863	-	Bright	3.1S1
91	"	F	--	3.6	02864	-	Silver	R.3
92	"	F	--	3.6	02865	-	Silver	4.1S1
93	Apr 4/85	M	--	3.6	02780	2	Dark	
94	"	M	--	4.5	02781	2	Some colour	4.3
95	"	M	--	4.1	02782	2	Some colour	
96	"	F	--	3.2	02791	-	Silver	R.2
97	"	M	--	3.6	02793	-	Silver	3.3
98	"	F	--	2.3	02769	-	Silver	3.2
99	"	M	--	4.1	02792	-	Silver	
100	Apr 7/85	F	61.0	3.6	02794	6	Bright,fresh	
101	"	M	68.6	4.1	02795	6	Slightly coloured	
102	Apr 8/85	M	66.0	3.6	02809	2	Dark	
103	"	F	--	4.1	02785	4	Bright	4.3
104	"	F	--	1.4	02786	4	Bright	R.2
105	"	F	--	4.5	02787	4	Bright	R.3
106	"	F	--	3.6	02886	6	Fresh run	3.3
107	"	F	--	2.3	02890	6	Fresh fish	R.2
108	"	F	--	2.7	02899	7	Bright	4.2
109	"	F	--	1.8	02900	7	Kelt	3.1S
110	Apr 9/85	F	--	3.2	02788	6	Silver	
111	"	F	--	2.7	02789	6	Silver	
112	"	F	--	4.1	02790	6	Some colour,thin, maybe kelt	
113	"	F	--	2.7	03634	6	Silver	
114	"	F	--	2.7	02625	7	Silver	
115	"	F	--	6.4	03636	7	Bright,long skinny fish,maybe kelt	
116	"	F	--	2.7	03637	5	Silver	
117	"	M	--	4.1	03638	5	Some colour	
118	"	M	--	3.2	03639	4	Some colour	3.1S1
119	"	F	--	4.1	03640	4	Silver	3.1SS1

APPENDIX I. continued. Original steelhead captures from Pallant Creek, 1984-85 winter season.

Fish No	Date	Sex	Length cm	Weight kg	Tag No. & Colour	Area	Remarks	Age
120	Apr 9/85	F	--	3.2	Orange03641	4	Some colour,thin, maybe kelt	4.2
121	"	M	--	3.6	03642	4	Dark	R.3
122	"	M	--	2.3	03643	4	Coloured	
123	"	F	61.0	1.8	02796	6	Bright,fresh	
124	Jan 17/85	F	68.6	--	Killed--	-	---	3.3
125	"	F	71.1	--	Killed--	-	---	R.3
			69.2					

X = 69.2

APPENDIX II. Steelhead recaptures from Pallant Creek, 1984-85 winter season.

Fish No	Date	Sex	Length cm	Weight kg	Tag No. & Colour	Area	Remarks	Age
1	Feb 25/85	F	66.0	--	Orange03114	4	Bright	
2	Mar 03/85	-	71.1	--	06935	3	Very coloured, head eaten by parasites	
3	Mar 24/85	M	58.4	2.7	03599	2	Coloured,spawning	
4	Mar 25/85	F	71.1	3.6	03591	7	Bright but spawning	
5	Mar 31/85	F	63.5	2.7	03108	-	Kelt	
6	Apr 04/85	M	81.3	5.0	03140	3	Very dark,almost rotten	
7	Apr 04/85	M	--	2.7	02856	6	Some colour	
8	Apr 08/85	F	--	2.7	02703	4	Kelt	
9	Apr 09/85	F	--	3.6	02755	5	Kelt,still fairly bright	