PALLANT CREEK STEELHEAD

1990 - 91

by

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INTRODUCTION

As part of ongoing studies, the following report describes a steelhead tagging project carried out on Pallant Creek during the winter of 1990-91. Similar studies were conducted during the winters of 1981-82, 1983-84 and each successive winter thereafter (deLeeuw 1984; deLeeuw 1985a, 1985b, 1985c; deLeeuw 1989a, 1989b, 1989c, Tetreau and deLeeuw 1991). This project is aimed at documenting long term steelhead population changes and establishing Pallant Creek as a steelhead index stream for the Queen Charlotte Islands. Continued commitment by the British Columbia Steelhead Society (Queen Charlotte Island Chapter) and the Department of Fisheries and Oceans, (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 study.

As in previous years, the objectives of the 1990-91 Pallant Creek steelhead tagging study were to:

1. describe steelhead run timing and movement;
2. describe life history characteristics; and
3. estimate population size.

A description of the study area can be found in previous reports on this project (de Leeuw 1985a, 1985b, 1985c).

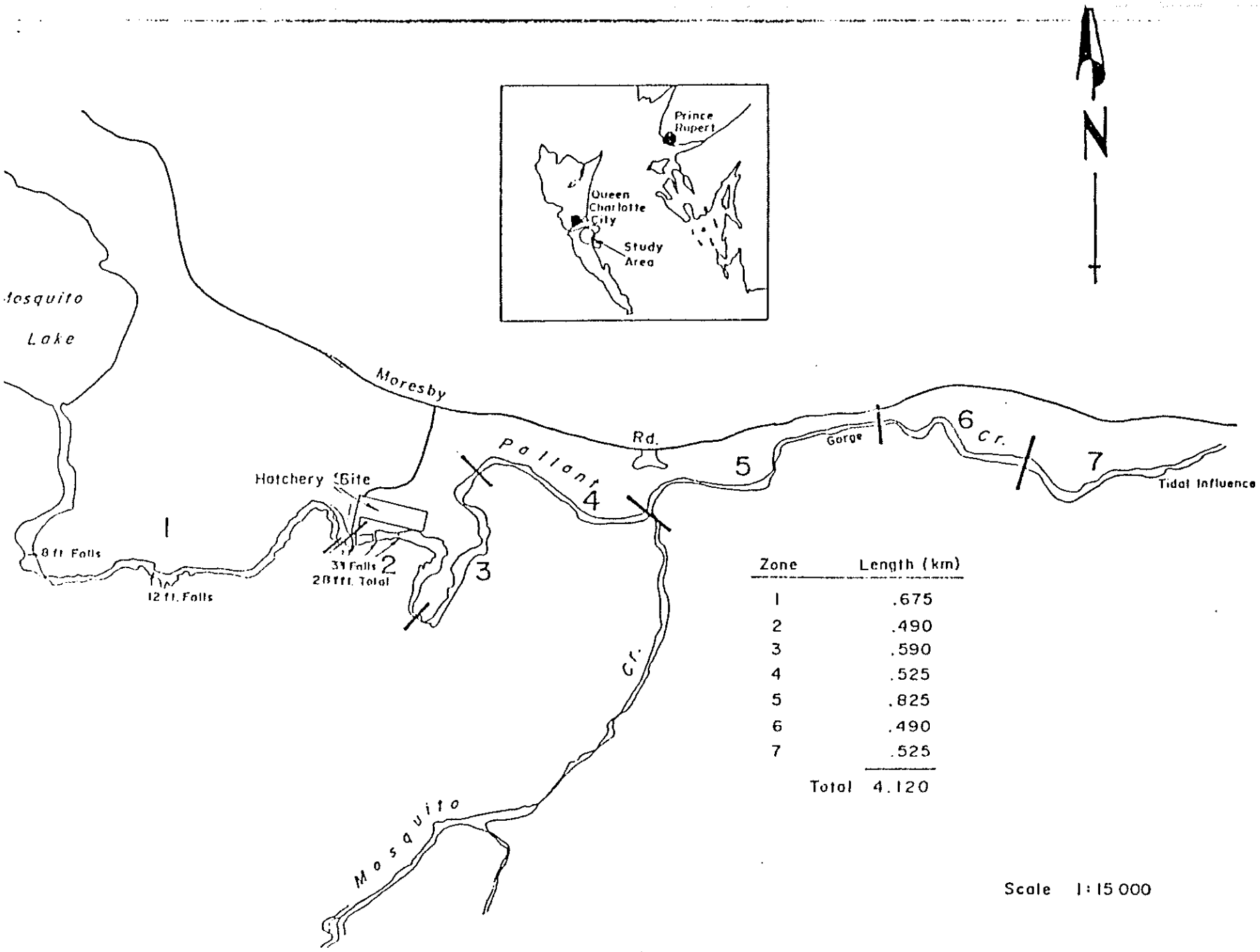
THE FISHERY

Steelhead fishing effort on Pallant Creek as reported annually in the Steelhead Harvest Analysis (MELP, data on file) has been quite variable, with 1990-91 showing the second highest angler day total on record (Table 1). The general increase in angler use during the last decade was likely the result of participation by hatchery staff and B.C. Steelhead Society members involved in the steelhead tagging program. A dramatic increase in angler days was evident in the 1990-91 season as compared with the previous year, although the actual number of anglers dropped notably. The total catch increased nearly four times as compared to 1989-90 while the catch per day declined slightly. Catch per day for other Charlotte streams declined somewhat from the previous year.

METHODS

The river was partitioned into seven zones (Fig. 1). Adult steelhead were angled on conventional gear and tagged with white, pink or yellow, numbered, anchor (7.6 cm spaghetti) tags. Fork length, sex, date of capture, tag number and colour as well as zone of capture were recorded. After the removal of a few scales between the dorsal fin and lateral line, fish were released at the capture site. In-stream migration distances of recaptured fish were estimated by calculating the distance between the mid points of original and recapture zones.

Scales were viewed using a dissecting microscope. 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 (85 to 95°C) and pressure (100 ft lbs) for 60 seconds. A Leitz Prado



Zone	Length (km)
1	.675
2	.490
3	.590
4	.525
5	.825
6	.490
7	.525
Total	4.120

Scale 1:15 000

Fig 1 Pallant Creek Angling Zones During The 1990-91 Steelhead Tagging Study

Table 1. Pallant Creek steelhead harvest analysis[1] 1970-71 to 1990-91.

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	0.36
71-72	10	3	21	25	2.00	4.60	0.52
72-73	89	12	45	86	0.50	1.47	0.31
73-74	26	3	26	34	1.00	2.22	0.33
74-75	10	3	7	0	0.67	0.67	0.27
75-76	73	30	23	40	0.32	0.86	0.47
76-77	107	46	47	20	0.45	0.65	0.37
77-78	74	30	48	92	0.64	1.86	0.48
78-79	177	42	35	26	0.21	0.38	0.41
79-80	236	50	36	86	0.16	0.53	0.48
80-81	382	53	59	709	0.16	1.96	0.79
81-82	227	66	41	190	0.22	1.05	0.93
82-83	293	50	17	511	0.06	1.80	1.23
83-84	235	37	39	330	0.17	1.57	0.57
84-85	359	58	66	620	0.18	1.92	1.32
85-86	137	41	14	185	0.10	1.44	1.65
86-87	219	70	17	350	0.10	1.65	1.51
87-88	507	64	36	1026	0.07	2.07	1.28
88-89	348	68	12	535	0.05	1.58	1.41
89-90	129	61	15	95	0.11	0.85	1.14
90-91	478	39	17	375	0.04	0.82	0.79
Mean	196	40	30	255	0.39	1.59	0.79

[1] Steelhead Harvest Analysis B.C. Fisheries Branch annual reports.

projector was then used to examine each scale for freshwater and ocean age (Narver and Withler 1974).

Population size was determined using the Schnabel, Schumacher and Schnabel-Chapman adjusted multiple census techniques (Ricker, 1975). The formulae were:

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

Schumacher: $$\frac{1}{N} = \frac{\Sigma (Mt\ Rt)}{\Sigma (Ct\ Mt^2)}$$

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

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 AND DISCUSSION

During the 1990-91 study period, 112 steelhead were tagged in Pallant Creek. Of these, 21 were recaptured once, and four were recaptured twice and two fish were recaptured three times for a total of 27 recaptures (24.1%). An additional four fish from previous tagging studies were also recaptured. One of these was a return from 70 fish tagged in 1986-87. Another was a return from 87 tags disbursed in 1988-89, while the remaining two were a result of 82 tags from 1989-90. Doug Turvey of Pallant Creek Hatchery (pers. comm.) noted that the higher number of tagged fish was due to an decrease in "non-tagging" fishermen, and one enthusiastic fisherman

on staff who spent all of his free time fishing and tagging.

SPATIAL AND TEMPORAL DISTRIBUTION

The largest portion of the steelhead catch in the present study occurred in Zones 2 (25.9%) and 3 (42.0%) (Table 2). In combination, these zones have contributed over half of the catch during all study years. The fact that these two zones are closest to the hatchery (Fig. 1) where access is readily available is likely the most significant factor controlling catch distribution.

As in other years steelhead were tagged from mid December to mid May, with the majority of the catch occurring after mid January (Table 3). Although the larger component of the Pallant Creek steelhead run enters in the latter part of the season, peaks in run timing have been variable from year to year.

Time between the original capture and recapture varied from zero (i.e. fish recaptured on day of capture) to 65 days (Table 4). Eleven (40.7%) of the 27 recaptures occurred within 20 days of first capture and only two fish were captured on the same day. The remaining 12 fish averaged 36 days between captures with a range of 21 to 65 days. The overall average time between captures of all recaptured fish was 24.5 days.

There were slightly higher numbers of males captured (53.8%) than females (46.2%) during the study. Males also dominated the recaptures (66.7%). Of the 12 long time residents (i.e. longer than 20 days between recaptures), nine were males. The two longest residents were a female

Table 2. Pallant Creek steelhead tagged during the 1984-85 to 1990-91 winter seasons by zone.

Zone	Steelhead tagged 1984-85 n (%)	1985-86 n (%)	1986-87 n (%)	1987-88 n (%)	1988-89 n (%)	1989-90 n (%)	1990-91 n (%)	Total n (%)
1	0(0)	1(1)	3(2)	9(6)	0(0)	--	4(4)	17(2)
2	27(22)	16(11)	40(24)	46(34)	44(51)	34(42)	29(26)	236(27)
3	13(11)	29(20)	50(29)	49(25)	22(25)	39(48)	47(42)	249(28)
4	34(28)	13(9)	32(19)	18(11)	1(1)	3(4)	5(4)	106(12)
5	2(1)	14(10)	26(15)	19(12)	11(13)	2(2)	6(5)	80(9)
6	17(14)	60(42)	18(11)	18(11)	9(10)	2(2)	12(11)	136(16)
7	11(9)	10(7)	1(1)	1(1)	0(0)	--	9(8)	32(4)
Not recorded	19(15)	0	0	0	0	2(2)	0	21(2)
Total	123(100)	143(100)	170(100)	160(100)	87(100)	82(100)	112(100)	877(100)

Table 3. Number of steelhead tagged during the 1984-85 to 1990-91 winter seasons grouped in 10 day periods.

Date (mm/dd)	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	Total
10/01-10	0	0	0	0	0	0	0	0
11-20	0	0	0	3	0	0	0	3
21-30	0	0	0	0	0	0	0	0
11/01-10	0	0	0	0	0	0	0	0
11-20	0	0	2	0	0	0	0	2
21-30	0	0	0	5	4	0	0	9
12/01-10	0	0	12	1	4	0	0	17
11-20	3	10	16	15	6	2	0	52
21-30	1	13	6	10	3	2	9	44
01/01-10	1	13	14	8	4	3	1	44
11-20	3	4	6	13	2	9	11	48
21-30	7	4	24	16	4	9	13	77
02/01-10	4	4	11	10	2	5	1	37
11-20	3	7	8	21	4	8	8	59
21-28	17	6	8	8	10	8	5	62
03/01-10	4	18	9	16	11	1	5	64
11-20	20	23	12	9	6	0	8	78
21-30	18	26	6	7	15	4	4	80
04/01-10	41	7	3	7	10	16	19	103
11-20	0	7	22	10	2	5	9	55
21-30	0	1	8	0	0	5	3	17
05/01-10	1	0	3	0	0	5	13	22
11-20	0	0	0	1	0	0	3	4
Total	123	143	170	160	87	82	112	877

Table 4. Movement and residency of recaptured steelhead in Pallant Creek, 1990-91.

No.	Sex	Original Capture Zone	Original Capture Date	First Recapture Zone	First Recapture Date	Second Recapture Zone	Second Recapture Date	Third Recapture Zone	Third Recapture Date	Total Days (1st Recapture)
W 2924	M	2	Dec. 22	2	Dec. 31	2	Jan. 25	2	Mar. 15	(9)34
W 2962	M	2	Dec. 23	2	Jan. 13					21
W 2976	M	3	Jan. 15	3	Jan. 15	3	Jan. 19	3	Mar. 19	4
W 2973	F	2	Jan. 12	2	Jan. 22					10
W 2963	M	2	Dec. 23	2	Jan. 23					31
W 2928	M	2	Jan. 11	2	Jan. 25					14
W 2984	M	3	Jan. 19	3	Jan. 25	3	Mar. 22			(6)62
W 2967	M	3	Dec. 23	3	Jan. 26					34
W 2983	F	3	Jan. 19	3	Jan. 28					9
W 2925	M	6	Dec. 31	3	Jan. 31					31
Y 1576	F	3	Feb. 3	3	Feb. 3					0
W 2971	M	2	Jan. 9	2	Feb. 13					35
P 0013	F	2	Feb. 11	2	Feb. 28					17
W 2974	F	6	Jan. 14	2	Mar. 3					48
P 0005	M	3	Feb. 28	3	Mar. 4					4
W 2968	F	2	Dec. 31	2	Mar. 6					65
P 0019	M	3	Feb. 23	3	Mar. 9					14
Y 1579	M	2	Mar. 3	2	Mar. 12					9
Y 1578	M	2	Mar. 2	2	Mar. 15	2	Mar. 26			(12)23
P 0018	M	3	Feb. 23	2	Mar. 23					28
P 0021	F	3	Mar. 4	3	Mar. 26					22

at 65 days and a male at 62 days.

Steelhead tagged early in the season had a considerably better chance of being recaptured than late arriving fish (Table 5). Recaptures of early tagged (December and January) fish were distributed throughout the season while all late fish were recaptured within the months of original capture (April) or not recaptured at all. The pattern demonstrated in 1990-91 has also persisted throughout most other years of study on this system (Table 6).

Of particular interest was the recapture of a female steelhead tagged during the 1986-87 season (Table 7). The fish was originally tagged on January 14, 1987, recaptured March 28, 1989 as a kelt and finally caught on February 12, 1991 prior to spawning. Although scales were not available to permit aging this fish, the successive year pattern of repeat spawning common to this and other coastal winter-run streams suggests it would have been in its fifth spawning migration in 1991. It grew 7.6 cm between 1987 and 1989, but there was no difference in length between 1989 and 1991. Another female originally tagged on March 1, 1989 was recaptured on March 2, 1991 and had grown 11.4 cm.

AGE AND SIZE

Only 25 sets of readable scales were collected from the 112 tagged fish. The most prevalent age class in this small sample was three years of fresh water followed by three years of ocean growth (3.3) which made up 40% of the readable sample (Table 8).

Table 5. Pallant Creek steelhead original capture and recapture dates grouped by months within the 1990-91 winter season.

Original Capture		Recapture						
Date	Total	Dec. n(%)	Jan. n(%)	Feb. n(%)	Mar. n(%)	Apr. n(%)	May n(%)	Total n(%)
Dec.	9	1(11)	5(55)	0	2(22)	0	0	8(89)
Jan.	25	0	6(24)	1(4)	3(12)	0	0	10(40)
Feb.	14	0	0	2(14)	3(21)	0	0	5(35)
Mar.	16	0	0	0	4(25)	0	0	4(25)
Apr.	32	0	0	0	0	0	0	0(0)
May	16	0	0	0	0	0	0	0(0)

Table 6. Monthly numbers and percentages of Pallant Creek steelhead recaptured during their original year of tagging, 1984-85 to 1990-91.

	84-85	85-86	86-87	87-88	88-89	89-90	90-91
Month	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Oct.	0	0	0	1 (14)	0	0	0
Nov.	0	0	2 (100)	0	2 (50)	0	0
Dec.	0	14 (61)	21 (62)	16 (62)	7 (50)	7 (100)	8 (89)
Jan.	0	9 (43)	12 (27)	10 (27)	5 (50)	16 (89)	10 (40)
Feb.	1 (4)	4 (24)	5 (19)	4 (36)	2 (13)	3 (14)	5 (35)
Mar.	4 (9)	14 (21)	3 (11)	0	5 (16)	0	4 (25)
Apr.	4 (10)	0	2 (6)	0	0	1 (4)	0
May	0	0	0	1 (100)	0	27 (33)	0

Table 7. Pallant Creek steelhead tagged in previous studies and recaptured in 1990-91.

		Tagged			Recaptured		
Tag #	Sex	Zone	Date	Length (cm)	Zone	Date	Length (cm)
WL 2892	F	3	Jan 24/90	76.2	3	Mar 15/91	76.2
					2	Mar 23/91	76.2
WL 2862	F	2	Jan 27/90	78.7	2	Feb 12/91	78.7
OR 1808	F	4	Jan 14/87	76.2	3	Feb 12/91	83.8
Y 1533	F	2	Mar 1/89	69.9	2	Mar 2/91	81.3

Freshwater age 3 fish made up 89.5% of the sample. The remaining 10.5% migrated to the ocean after four years of stream residency (Table 9). Three years of fresh water growth prior to ocean migration is typical of Queen Charlotte Island steelhead (Chudyk 1982: de Leeuw and Whately 1983; de Leeuw 1986).

The dominant ocean age of maiden fish was .3 (81.3%) followed by .2 (18.7%) (Table 10). Of the 27 fish sampled, 9 (33.3%) had spawned previously and of these one was in its third spawning migration (Table 8). The highest composition of multiple spawners of any study year to date was observed in 1990-91. The percentage of repeat spawners making up the population has varied considerably from year to year. However, this likely reflects the strength of the maiden fish return relative to the size of the run which produced the associated repeat spawners. It is less likely that changes in the proportion of repeat spawners indicate annual variation in the survival of adults after spawning.

The average fork length of steelhead tagged and measured during this study was 73.5 cm and ranged from 66.0 cm to 97.1 cm (Table 11). Like the earlier Pallant Creek studies, steelhead size was linked to ocean age. After two years of ocean growth, Pallant Creek steelhead averaged 67.3 cm, while fish with an additional year in saltwater were more than 10 cm longer At the end of three years of ocean growth, males were larger than females on average.

Table 8. Number and percent male and female steelhead of different total age groups Pallant Creek, 1990-91 (N = 18).

Age Group	Males	Females	♂ + ♀	% of Total
3.2	1	1	2	11.1
3.3	5	5	10	55.5
3.1S1	2	1	3	16.6
3.2S1	1	0	1	5.6
4.1SS1	0	1	1	5.6
4.2SS	0	1	1 /18	5.6

Table 9. Number and percent male and female Pallant Creek steelhead of different freshwater ages, 1990-91 (N = 19).

Freshwater Age	Males	Females	♂ + ♀	% of Total
3	10	7	17	89.5
4	0	2	2	10.5
Total	10	9	19	100.0

Table 10. Number and percent male and female Pallant Creek steelhead of different ocean ages, 1990-91 (N = 16).

Ocean Age	Males	Females	♂ + ♀	% of Total
.2	2	1	3	18.7
.3	7	6	13	81.3
Total	9	7	16	100.0

Table 11. Fork lengths (cm) of male and female Pallant Creek steelhead of different ocean ages, 1990-91.

Ocean	Males			Females			Total		
Age	N	$\bar{x}$	Range	N	$\bar{x}$	Range	N	$\bar{x}$	Range
.2	2	67.3	66.0 - 68.6	0			2	67.3	66.0 - 6
.3	7	83.1	78.1 - 97.1	6	76.3	68.6 - 81.3	13	79.7	68.6 - 9

POPULATION ESTIMATE

The three multiple capture estimates calculated populations of 295, 283 and 503 adult steelhead in Pallant Creek during 1990-91 (Table 12). These estimates are only valid if the following conditions are met:

1. marked fish suffer the same mortality as the unmarked;
2. marked fish are as vulnerable to capture as the unmarked ones;
3. marked fish do not lose their mark;
4. marked fish mix randomly with the unmarked ones such that the distribution of fishing effort (in subsequent sampling) is proportional to the number of fish present in different

parts of the body of water;

5. all marks are recognized and reported on recovery;

6. there is only a negligible amount of recruitment to the catchable population during the time the recoveries are being made (Ricker 1975).

Since there were fresh fish entering and kelts leaving the study area, validity of the population estimates is questionable. For example, only four of the 64 fish tagged during March, April and May were recaptured, suggesting that these fish had a short riverine residence time and were not as vulnerable to capture. Although these data may not provide an accurate estimate of actual population size, they nonetheless provide a useful index of trends in stock size.

Table 12. Pallant Creek steelhead population estimates during the 1990-91 winter season.

		95% Confidence Limits	
Method	Estimate	Poisson distribution	Normal Distribution
Schnabel	295	199 - 460	209 - 500
Chapman	283	192 - 437	204 - 461
Schumacher	503	301 -1523	
Mean	360		

SUMMARY

1. One hundred and sixteen steelhead were captured in Pallant Creek from December 22, 1990 to May 14, 1991. Of these, 112 were tagged and an additional four were recaptures from other years' tagging.

2. The majority of fish were taken in January, February and April in the two zones below the hatchery. Eighty-five percent of all recaptures occurred in the zone of original capture while both upstream and downstream migrations were noted amongst the remainder. Eleven of the 27 recaptures were taken within 20 days of their original tagging date. The total days between original and repeat capture ranged from zero to 65. The average number of days between original and repeat capture was 24.5. Two fish were captured twice on the same day.

3. A higher percentage of males (53.8%) than females (46.2%) was observed in the sample.

4. Scale samples were interpreted from only 25 fish, of which nine (33.3%) were multiple spawners. Only 18 scales were used to calculate the age classes as seven sets of scales were regenerated. The dominant age class was 3.3 (55.5%) followed by 3.1S1 (16.6%), 3.2 (11.1%), 3.2S1 (5.6%), 4.1SS1 (5.6%) and 4.2SS (5.6%).

5. The overall average fork length of Pallant Creek steelhead during the 1989-90 study was 76.0 cm and ranged from 66.0 to 97.1 cm. Where both fork length and ocean age were

determined, males with two or three years of marine growth averaged 67.3 cm and 83.1 cm respectively while females averaged 76.3 cm after three years of marine growth. There were no scales sampled from females with two years of marine growth.

6. Estimates of the 1990-91 Pallant Creek steelhead population were 295 (Schnabel), 283 (Chapman) and 503 (Schumacher).

ACKNOWLEDGEMENTS

This project, like the previous Pallant Creek steelhead studies was largely the result of volunteer work by the Pallant Creek Hatchery staff and members of the Queen Charlotte Islands Chapter of the B.C. Steelhead Society. Their assistance in this project was invaluable and greatly appreciated. Data collection was supervised by Doug Turvey (Pallant Creek Hatchery). Mark Beere calculated the population estimates, and Colin Spence and Bob Hooton provided editorial assistance. The manuscript was typed by Marilyn Barnard.

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APPENDICES

APPENDIX I

FALLANT CREEK STEELHEAD TAGGING DATA

YEAR: 1990/91

NUMBER	DATE	TAG NUMBER	COLOR	SEX	LENGTH (INCHES)	LENGTH (M.M.)	WEIGHT (APPROX)	LOCATION	COMMENTS	ANGL
1	DEC22/90	2924	WHITE	M	36.75	933		2	RED STRIPE, STRONG	DT
2	DEC23/90	2962	WHITE	M	31.00	787		2	SOME COLOR, STRONG	SL
3	DEC23/90	2963	WHITE	M	31.50	800		2	RED STRIPE, SCRAPE LEFT SIDE	SL
4	DEC23/90	2964	WHITE	F	28.50	724		3	SILVER BRIGHT	SL
5	DEC23/90	2965	WHITE	F	33.50	851		3	BRIGHT, STRONG	SL
6	DEC23/90	2966	WHITE	M	28.00	711		3	BRIGHT	SL
7	DEC23/90	2967	WHITE	M	29.00	737		3	SILVER BRIGHT	SL
8	DEC31/90	2968	WHITE	F	31.50	800		2	BRIGHT	SL
9	DEC31/90	2925	WHITE	M	34.75	883		6	SILVER BRIGHT	DT
10	JAN09/91	2971	WHITE	M	32.00	813		2	BRIGHT	MB
11	JAN11/91	2927	WHITE	M	32.50	826		2	COLORED	DT
12	JAN11/91	2928	WHITE	M	32.00	813		2	COLORED	DT
13	JAN12/91	2973	WHITE	F	28.00	711		2	SILVER, RED STRIPE	MB
14	JAN14/91	2972	WHITE	F	?????	0		3	SILVER BRIGHT	AW
15	JAN14/91	2974	WHITE	F	32.00	813		6	SILVER BRIGHT, SCARRED LEFT	MB
16	JAN15/91	2975	WHITE	M	29.50	749		3	COLORED	MB
17	JAN15/91	2976	WHITE	M	22.00	559		3	SILVER, RED STRIPE	MB
18	JAN18/91	2969	WHITE	M	30.00	762		3	SILVER BRIGHT, STRONG++	SL
19	JAN19/91	2970	WHITE	M	29.00	737		3	BRIGHT, SCARRED LEFT SIDE	SL
20	JAN19/91	2983	WHITE	M	27.50	699		3	BRIGHT	SL
21	JAN19/91	2984	WHITE	M	27.00	686		3	SOME COLOR	SL
22	JAN21/91	2977	WHITE	F	27.00	686		6	SILVER BRIGHT	MB
23	JAN23/91	2926	WHITE	F	29.00	737		2	SOME COLOR	DT
24	JAN24/91	2985	WHITE	M	32.00	813		3	LITTLE COLOR, SCARS RGHT SIDE	SL
25	JAN25/91	1574	YELLOW	M	32.00	813		2	SOME COLOR, STRONG	DT
26	JAN26/91	2978	WHITE	F	27.00	686		2	SILVER BRIGHT	MB
27	JAN26/91	2979	WHITE	M	28.00	711		3	SILVER BRIGHT, SUPER STRONG	MB
28	JAN28/91	2980	WHITE	M	31.00	787		3	FULL COLOR	MB
29	JAN28/91	2986	WHITE	F	29.00	737		3	RED STRIPE, STUBBORN	SL
30	JAN28/91	2981	WHITE	M	30.00	762		1	COLORED, SCAR ON HEAD	MB
31	JAN28/91	2982	WHITE	M	29.00	737		1	COLORED	MB
32	JAN28/91	0011	PINK	M	29.50	749		1	COLORED, SCARS HEAD, JUMPER	MB
33	JAN29/91	0012	PINK	M	31.50	800		3	SILVER, LIGHT STRIPE, TAILWALKER	MB
34	JAN30/91	1575	YELLOW	M	32.50	826		2	SEMI-BRIGHT, SPAWNED??	DT
35	FEB03/91	1576	YELLOW	F	29.75	756		3	BRIGHT, RED STRIPE, STRONG	DT
36	FEB11/91	0013	PINK	F	31.00	787		2	COLORED, SCAR BEHIND DORSAL	MB
37	FEB12/91	0014	PINK	M	30.00	762		6	BRIGHT WITH STRIPE	MB
38	FEB12/91	0015	PINK	F	20.50	521		1	BRIGHT, SOME COLOR, RAINBOW??	MB
39	FEB13/91	0016	PINK	M	32.50	826		3	SEMI-BRIGHT, STRONG	MB
40	FEB15/91	0001	PINK	F	32.50	826		3	SOME COLOR, STRONG	SL
41	FEB16/91	0002	PINK	M	29.50	749		6	STRONG, BRIGHT	SL
42	FEB16/91	0017	PINK	F	37.00	940		3	SILVER, RED STRIPE, IMMENSE POWER	MB
43	FEB20/91	0023	PINK	M	38.25	972		3	COLORED, SCAR RGHT GILL COVER	SL
44	FEB23/91	0018	PINK	M	27.50	699		3	SEMI-BRIGHT	MB
45	FEB23/91	0019	PINK	M	24.00	610		3	SILVER BRIGHT, SCRAPPY	MB
46	FEB28/91	0004	PINK	M	28.50	724		2	SOME COLOR, SCARRED RGHT SIDE HEAD	SL
47	FEB28/91	0005	PINK	M	30.75	781		3	SEMI-BRIGHT, FEEBLE FIGHT, SCARS RGHT	SL
48	FEB28/91	0006	PINK	F	30.00	762		3	FAIRLY BRIGHT	SL
49	MAR02/91	1577	YELLOW	M	33.25	845		2	COLORED, STRONG	DT
50	MAR03/91	1578	YELLOW	M	34.50	876		2	COLORED	DT
					1483.00	37668				

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PALLANT CREEK STEELHEAD TAGGING DATA

YEAR: 1990/91

NUMBER	DATE	TAG NUMBER	COLOR	SEX	LENGTH (INCHES)	LENGTH (M.M.)	WEIGHT (APPROX)	LOCATION	COMMENTS
51	MAR23/91	1579	YELLOW	M	36.00	914		2	COLORED, HEAD SHAKING LOG
52	MAR24/91	0033	PINK	M	36.50	927		2	FULL COLOR, STRONG
53	MAR04/91	0021	PINK	F	26.00	660		3	SILVER BRIGHT, VERY SCRAPPY
54	MAR11/91	0027	PINK	F	32.00	813		3	LITTLE COLOR, CRISS CROSS SCARS BOTH
55	MAR12/91	1580	YELLOW	F	31.50	800		2	SEMI-BRIGHT, STRONG, SOFT BELLY
56	MAR12/91	0032	PINK	F	29.50	749		4	SILVER BRIGHT, STRONG
57	MAR15/91	0023	PINK	M	31.25	794		3	COLORED, SPAWNED??
58	MAR16/91	0034	PINK	M	32.75	832		3	FULL COLOR, FIRE ENGINE
59	MAR17/91	1552	YELLOW	M	27.00	686		6	SILVER BRIGHT, SCRAPPY
60	MAR18/91	0025	PINK	F	30.00	762		2	SEMI-BRIGHT, LOTS OF AIR TIME
61	MAR18/91	0027	PINK	F	25.50	648		6	SILVER BRIGHT, SCRAPPY
62	MAR21/91	0028	PINK	M	26.00	660		6	SILVER, SLIGHT STRIPE, STRONG
63	MAR28/91	0029	PINK	F	32.50	826		6	SILVER BRIGHT, SEA LICE
64	MAR30/91	1581	YELLOW	F	26.00	660		3	KELT, COLORED
65	MAR30/91	1582	YELLOW	M	34.00	864		3	COLORED, STRONG
66	APR01/91	0030	PINK	F	30.00	762		4	BRIGHT, HEALED SCARS ON BACK
67	APR01/91	0031	PINK	F	21.00	533		5	BRIGHT, SCRAPPY, SMALL
68	APR02/91	0032	PINK	M	33.25	845		6	SILVER, PINK STRIPE, VERY STRONG
69	APR02/91	0033	PINK	M	32.00	813		3	SILVER BRIGHT, RED STRIPE
70	APR02/91	0034	PINK	F	30.00	762		3	SILVER BRIGHT, RED STRIPE
71	APR02/91	0038	PINK	F	32.50	826		3	BRIGHT, HEALED SCARS ON BACK
72	APR02/91	0039	PINK	F	33.00	838		5	BRIGHT, FRESH SCARS ON BACK AND SIDE
73	APR04/91	0040	PINK	F	29.00	737		5	BRIGHT, HEALED SCAR BEHIND DORSAL
74	APR05/91	0041	PINK	M	34.00	864		6	FULL COLOR, SCARS RGHT SIDE
75	APR05/91	0042	PINK	M	27.00	686		6	SILVER BRIGHT STRONG
76	APR05/91	0003	PINK	F	30.00	762		3	SILVER BRIGHT
77	APR05/91	0043	PINK	F	25.00	635		3	SOME COLOR, SKY WALKER, SCARS TAIL
78	APR07/91	1583	YELLOW	M	32.25	819		2	COLORED
79	APR07/91	1584	YELLOW	M	35.25	895		2	COLORED, RATTY
80	APR09/91	0043	PINK	F	31.25	794		2	SILVER WITH PINK STRIPE
81	APR09/91	0044	PINK	M	32.50	826		3	FULL COLOR, STRONG
82	APR10/91	0045	PINK	F	30.25	768		3	SILVER WITH PINK, EX. SHAPE
83	APR10/91	0046	PINK	M	25.25	641		2	FULL COLOR, RED
84	APR10/91	0047	PINK	M	29.00	737		2	FULL COLOR, STRONG, AIR TIME
85	APR12/91	0048	PINK	F	29.00	737		4	SILVER WITH RED, STRONG
86	APR12/91	0049	PINK	F	30.50	775		4	RATTY, FULL COLOR, SPAWNING??
87	APR12/91	0050	PINK	M	26.50	673		4	FULL COLOR, HEALED SCARS
88	APR13/91	0056	PINK	M	26.50	673		5	KELT, FULL COLOR
89	APR13/91	0057	PINK	F	30.00	762		3	BRIGHT, SOFT BELLY
90	APR13/91	0058	PINK	M	24.50	622		3	COLORED, FRESH SCAR RGHT SIDE, SCRAPPY
91	APR16/91	0060	PINK	M	33.75	857		3	FULL COLOR, RED
92	APR18/91	1585	YELLOW	M	36.00	914		2	RATBAG, HOOK IN LIP, FRY IN MOUTH
93	APR18/91	1586	YELLOW	M	25.25	641		2	COLORED, GOOD SHAPE
94	APR27/91	0010	PINK	M	26.00	660		3	DARK, SOFT, NO FIGHT, HEALED SCAR
95	APR27/91	0052	PINK	M	31.00	787		3	COLORED STRONG, GOOD SHAPE
96	APR30/91	0061	PINK	F	26.00	660		7	SILVER BRIGHT, OPEN SCAR ON NOSE
97	MAY06/91	0062	PINK	F	31.00	787		7	SILVER WITH STRIPE
98	MAY06/91	0063	PINK	F	27.00	686		7	SILVER BRIGHT, SCRAPPY
99	MAY06/91	0064	PINK	M	33.00	838		7	SILVER WITH STRIPE
100	MAY06/91	0065	PINK	M	32.00	813		7	SILVER, RAINBOW COLOR
					1497.00	38024			

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PALLANT CREEK STEELHEAD TAGGING DATA

YEAR: 1990/91

NUMBER	DATE	TAG NUMBER	COLOR	SEX	LENGTH (INCHES)	LENGTH (M.M.)	WEIGHT (APPROX)	LOCATION	COMMENTS	ANGL
101	MAY06/91	0066	PINK	F	32.00	813		7	KELT, BRIGHT, HEALED SCAR RGHT SIDE	
102	MAY06/91	0067	PINK	F	30.00	762		7	BRIGHT, RAINBOW, AIRTIME	
103	MAY06/91	0068	PINK	F	28.00	711		7	BRIGHT, SOFT BELLY, MORE AIRTIME	
104	MAY06/91	0069	PINK	M	26.00	660		5	COLORED, WIMPY	
105	MAY06/91	0070	PINK	F	32.00	813		5	BRIGHT, RED STRIPE, HOOK IN MOUTH	
106	MAY07/91	0071	PINK	F	31.00	787		2	VERY DARK	
107	MAY07/91	0072	PINK	F	29.00	737		2	DARK, REDDISH	
108	MAY07/91	0073	PINK	F	30.00	762		3	BRIGHT WITH COLOR, STRONG	
109	MAY07/91	0074	PINK	F	28.00	711		3	BRIGHT, FULL OF EGGS, SOFT	
110	MAY13/91	0075	PINK	M	25.00	635		7	FULL COLOR, RATTY	
111	MAY14/91	0092	PINK	M	25.00	635		3	FULL COLOR	
112	MAY14/91	0093	PINK	F	32.50	826		3	BRIGHT, WIDE, SOFT, HEALED SCAR ON BELL	
					348.50	8852				
			PAGE 2		1497.00	38024				
			PAGE 1		1483.00	37668				
					3328.50	84544				
			MEAN:		29.99	761.66				

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PALLANT CREEK STEELHEAD TAGGING DATA

APPENDIX II

YEAR:1990/91 **********RECAPTURES**********

NUMBER	RECAPTURE DATE	TAG NUMBER	COLOR	SEX	LENGTH (INCHES)	LENGTH (M.M.)	LOCATION RECAPTURE	DATE TAGGED	LOCATION TAGGED	COMMENTS	ANGLER RECAP.	ANGLER TAG
OY 1	DEC20/90	2892	WHITE	F	30.00	762	3	JAN24/90	3	SILVER BRIGHT	SL	MM
2	DEC31/90	2924	WHITE	M	36.75	933	2	DEC22/90	2	RED STRIPE	SL	DT
3	JAN13/91	2962	WHITE	M	31.00	787	2	DEC23/90	2	COLORED	DT	SL
4	JAN15/91	2976	WHITE	M	22.00	559	3	JAN15/91	3	SILVER BRIGHT	MB	MB
* 5	JAN19/91	2976	WHITE	M	22.00	559	3	JAN15/91	3	BRIGHT	DT	MB
6	JAN22/91	2973	WHITE	F	28.00	711	2	JAN12/91	2	SILVER, RED STRIPE	MB	MB
7	JAN23/91	2963	WHITE	M	31.50	800	2	DEC23/90	2	COLORED	DT	SL
8	JAN25/91	2928	WHITE	M	32.00	813	2	JAN11/91	2	COLORED	DT	DT
* 9	JAN25/91	2924	WHITE	M	36.75	933	2	DEC22/90	2	COLORED	DT	DT
10	JAN25/91	2984	WHITE	M	26.00	660	3	JAN19/91	3	SILVER, RED STRIPE	MB	SL
11	JAN26/91	2967	WHITE	M	29.00	737	3	DEC23/90	3	RED STRIPE, FIESTY, DAMAGED TAIL	SL	SL
12	JAN28/91	2983	WHITE	F	28.00	711	3	JAN19/91	3	BRIGHT, RED STRIPE	MB	SL
13	JAN31/91	2925	WHITE	M	34.75	883	3	DEC31/90	6	COLORED, STRONG	SL	DT
14	FEB03/91	1576	YELLOW	F	29.75	756	3	FEB03/91	3	TIRED, TAGGED 20 MINUTES AGO	DT	DT
OY 15	FEB12/91	2862	WHITE	F	31.00	787	2	JAN27/90	2	SPAWNED OUT	MB	DT
OY 16	FEB12/91	1808	ORANGE	F	33.00	838	3	JAN14/87	4	SILVER, HEALED BELLY SCAR	AW	MD
17	FEB13/91	2971	WHITE	M	32.00	813	2	JAN09/91	2	FULL COLOR, AIRTIME, STRONG	MB	MB
18	FEB28/91	0013	PINK	F	31.00	787	2	FEB11/91	2	FULL COLOR, STRONG	SL	MB
OY 19	MAR02/91	1533	YELLOW	F	32.00	813	2	MAR01/89	2	BRIGHT, STRONG	DT	DT
20	MAR03/91	2974	WHITE	F	32.00	813	2	JAN14/91	6	SEMI-BRIGHT	DT	MB
21	MAR04/91	0005	PINK	M	30.50	775	3	FEB28/91	3	SILVER, RED STRIPE	MB	SL
22	MAR06/91	2968	WHITE	F	31.50	800	2	DEC31/90	2	SEMI-BRIGHT	DT	SL
23	MAR09/91	0019	PINK	M	24.00	610	3	FEB23/91	3	BRIGHT, SLIGHT STRIPE	MB	MB
24	MAR12/91	1579	YELLOW	M	36.00	914	2	MAR03/91	2	COLORED	DT	DT
25	MAR15/91	1578	YELLOW	M	34.50	876	2	MAR03/91	2	COLORED, SPAWNED	DT	DT
** 26	MAR15/91	2924	WHITE	M	36.75	933	2	DEC22/90	2	COLORED, SPAWNED	DT	DT
27	MAR15/91	2892	WHITE	F	30.00	762	3	JAN24/90	3	COLORED	BB	MM
** 28	MAR19/91	2976	WHITE	M	22.50	572	2	JAN15/91	3	COLORED	DT	MB
* 29	MAR22/91	2984	WHITE	M	26.50	673	3	JAN19/91	3	FULL COLOR	AW	SL
30	MAR23/91	2892	WHITE	F	30.00	762	2	JAN24/90	3	KELT, GOOD SHAPE, COLORED	DT	MM
31	MAR23/91	0018	PINK	M	27.50	699	2	FEB23/91	3	COLORED	DT	MB
* 32	MAR26/91	1578	YELLOW	M	34.50	876	2	MAR03/91	2	FULL COLOR	MB	DT
33	MAR26/91	0021	PINK	F	26.00	660	3	MAR04/91	3	BRIGHT, SLIGHT STRIPE	MB	MB