

PORTLAND CANAL JUVENILE CHUM
SALMON CODED WIRE TAGGING

Final Report for the Period 1 July 1987 to 30 June 1988

By

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TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES	ii
LIST OF FIGURES	iii
ABSTRACT	iv
INTRODUCTION	1
OBJECTIVES	1
METHODS	1
RESULTS	5
Summary of Fyke Net Catches	5
Summary of Coded Wire Tagging	5
Analysis of Length Weight Data	5
CONCLUSIONS	9

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LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Summary of the Fish Creek fyke net catches 11 March to 17 May 1988	6
2. Summary of coded wire tagging of Fish Creek juvenile chum salmon 11 March to 18 May 1988	9
3. Fish Creek juvenile chum fry mean lengths and weights by week, 1988	10

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Map of the Salmon River drainage showing the Fish Creek tributary	2
2. Map of Fish Creek showing the fyke net and tagging site	3

ABSTRACT

Annex IV, Chapter 2 of the Pacific Salmon Treaty identifies specific concerns by both Alaska and Canada for chum salmon (*Oncorhynchus keta*) originating in Portland Canal tributaries. In an effort to learn more about the interception rates, harvest rates, migratory timing and migration routes of these fish a coded wire tagging study was initiated on Fish Creek near Hyder Alaska in 1988. A total of 145,870 wild juvenile chum salmon fry were coded wire tagged with half-length tags from 11 March to 16 May 1988. The fry were captured in two fyke nets attached to aluminum holding boxes. The first adult returns from this tagging project are expected in 1990.

INTRODUCTION

The chum salmon (*Oncorhynchus keta*) stocks of southern Southeast Alaska and northern British Columbia have been designated as stocks of special concern to the U.S./Canada Pacific Salmon Treaty. Annex IV, Chapter 2 of the Pacific Salmon Treaty identifies specific concerns by both Alaska and Canada for chum salmon originating in Portland Canal tributaries. These chum salmon stocks contribute to the fisheries of both countries and the effective management of these fisheries requires knowledge of the interception rates, harvest rates, migratory timing and migratory routes.

In an effort to determine these parameters for Portland Canal chum salmon stocks a juvenile coded wire tagging project was initiated on Fish Creek a tributary of the Salmon River near Hyder Alaska (Fig. 1). This report covers the first year of this project.

OBJECTIVES

1. Identify the migratory timing and migration routes of Fish Creek chum salmon by the use of coded wire tagging methodology.
2. Estimate the total rate of exploitation of Fish Creek chum salmon by the gillnet and purse seine fisheries in Alaska and the net and troll fisheries of British Columbia.
3. Obtain size, age, sex composition, stream life and migratory timing of the Fish Creek chum salmon escapement.
4. Obtain an estimate of the survival rate of Fish Creek chum salmon.
5. Identify problems in the coded wire tagging of wild juvenile chum salmon fry (tag loss, tagging mortality and straying of tagged fish).

METHODS

A site on Fish Creek approximately 2.4 km upstream from its confluence with the Salmon River was chosen as the capture and tagging site as it was easily accessible by road and was below the major spawning areas (Fig. 2). Out-migrant chum fry were captured in two fyke nets attached to 1.5 m X 0.9 m X 0.45 m aluminum holding boxes. The fyke nets were 0.45 m by 0.9 m and were placed to fish a column of water 0.9 m wide. The nets were spaced 4.0 m apart and placed in the middle of the stream. From 10 March to 15 April 1.0 m high leads of plastic netting (3.2 mm mesh) were placed from the fyke nets to the stream banks effectively funneling all out-migrant fry into the two nets. The leads were removed due to high water on 15 April and were not replaced as the two nets continued to capture a sufficient number of fry for tagging.

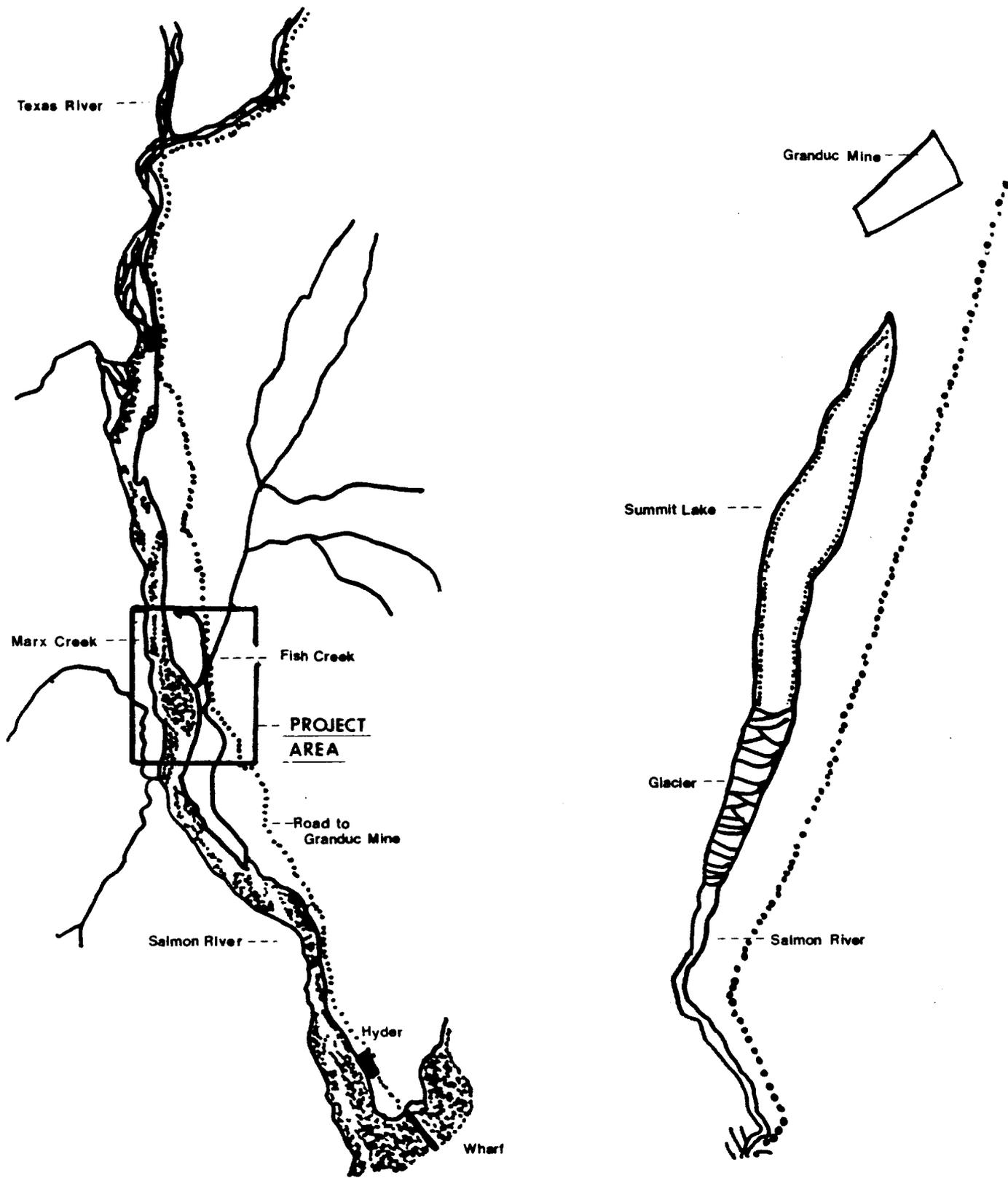


Figure 1. Map of the Salmon River drainage showing the Fish Creek tributary.

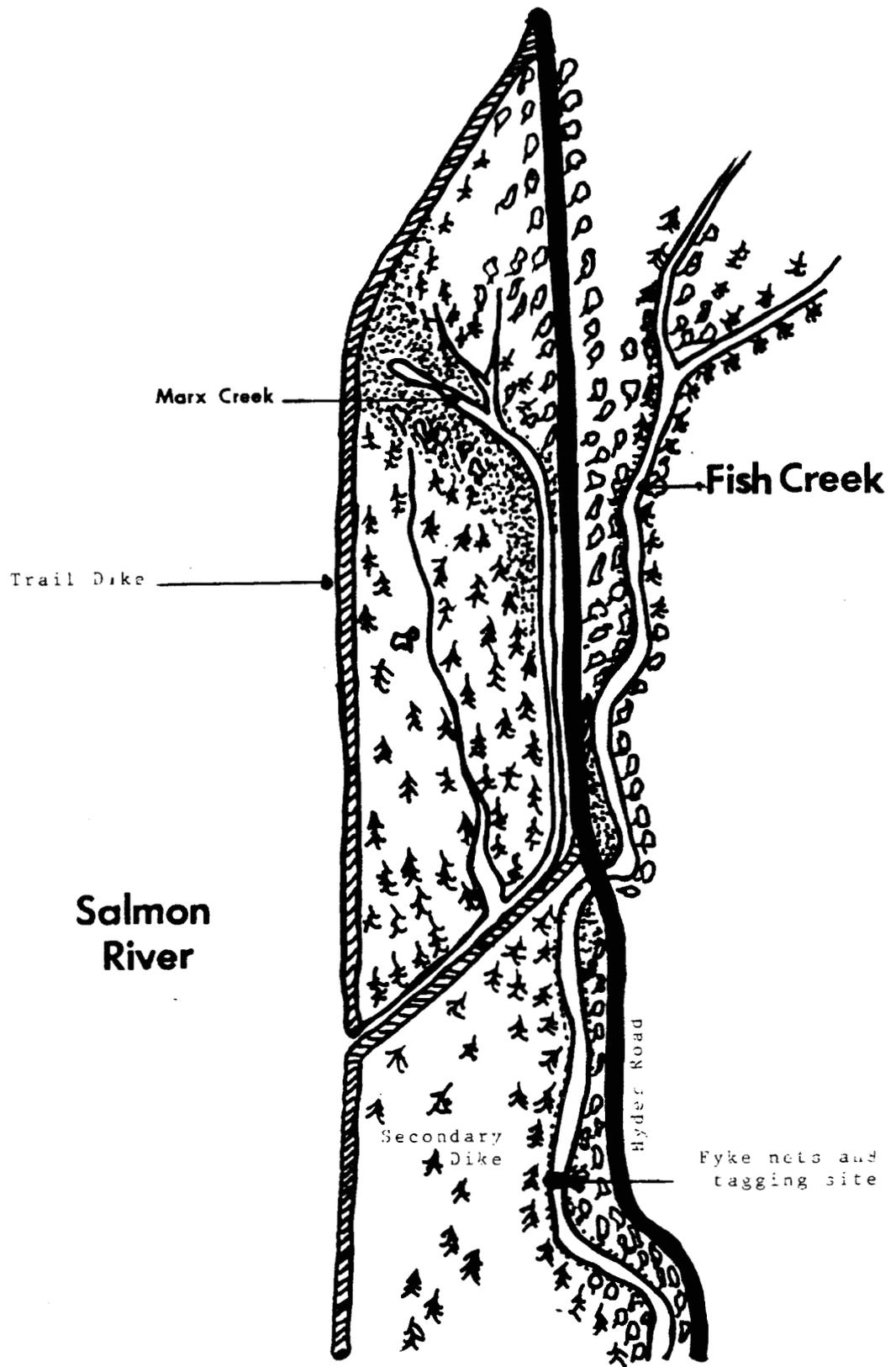


Figure 2. Map of Fish Creek showing the fyke net and tagging site.

The enumeration of the fyke net catches was accomplished by two different methods. From 10 March to 8 April fry estimates were made by the volumetric method. A subsample of known volume was enumerated for species composition and the total volume of fish captured was then expanded to estimate the total number of chum and pink salmon fry. After 8 April the daily catches increased significantly and the fry estimation method was changed to the gravimetric method with a subsample of known weight enumerated for species composition. A total of 5,000 to 8,000 fry were held each night for coded wire tagging the following day.

The coded wire tagging operations were conducted in a 70.2 m tagging trailer which was parked next to Fish Creek at the fyke net site. The trailer was equipped with a 105 L anesthetic tank, tagging table and laboratory area. The trailer was wired for 110 volt AC current which was supplied by a 1400 watt gasoline generator.

The chum fry were anesthetized with MS-222 (tricaine methanesulfonate) at a concentration of 40 mg/L. Since MS-222 lowers the pH of the water the solution was buffered with sodium carbonate (Na_2CO_3) back to the pH of Fish Creek water (7.0). To reduce stress, non-iodized salt was added to the solution at a concentration of 0.5 % to replace salts lost due to handling and to stimulate mucus flow. An effort was made to insure that the fry were not left in the anesthetic solution for more than five minutes.

The adipose fins of the chum fry were removed with surgical grade micro-scissors before being passed on to the tagging machine operator. Only fry that had completely absorbed their yolk sacs were selected for tagging. All pink and coho salmon fry and chum with visible yolk sacs were released back into Fish Creek.

The tagging equipment consisted of a Northwest Marine Technology¹. Mark IV tag injector, quality control device and power supply. All chum fry were tagged with half length coded wire tags.

The quality control device was set up so that fry with tags were routed from the tagging trailer through a 63.5 mm diameter hose and out to a holding pen in Fish Creek. If the quality control device did not detect a tag the device routed the fry into a bucket. These fry were then passed through the device again and if they did not register a tag the second time they were returned to the tagging machine operator and re-tagged.

At the end of the tagging day the tagged chum fry were held in holding pens and released during the late evening hours. Tagged fish mortalities were recorded at the time of release. Tag retention samples were also conducted at this time. A random sample of 200 fry was passed through the quality control device and the number of fry without tags were recorded. Tag retention percentages and tagged fish mortalities were then used to calculate the total number of tags released.

¹ Mention of trade names does not constitute endorsement by ADF&G.

A total of 50 chum fry were sampled for length and weight each week. The fry were measured to the nearest 0.1 mm and weighed to the nearest 0.01 g.

RESULTS

Summary of Fyke Net Catches

The numbers of fry captured in the fyke nets are summarized in Table 1. The decision was made to only attempt exact estimates of out-migrant fry every other night using either the volumetric or gravimetric method. On the other nights the nets were fished only long enough to capture a sufficient number of chum fry for tagging the next day. During the study period the nets were fished for a total of 419.75 hours and captured a total of 1,786,245 chum salmon fry and 89,414 pink salmon fry.

The nightly out-migration did not commence until after dark, between 1700 and 1800 hours. Peak fry movement was between 2100 and 2300 with an occasional smaller peak between 0200 and 0400 hours. The out-migration usually ceased by 0600 hours.

Since chum fry were captured the first night the nets were set in Fish Creek (10 March) it was obvious that the out-migration had been underway for a number of days. It is difficult to determine a peak period of out-migration as the plastic mesh wings, which were funneling all of the fry into the nets, were removed on 15 April due to high streamflows.

Catches increased steadily through March and appeared to peak during the period 4 April to 13 April. Catch rates declined during mid May and the nets were removed on 17 May.

Summary of Coded Wire Tagging

Tagging at Fish Creek commenced on 11 March 1988. A summary of the tagging is presented in Table 2. The number of fish tagged per day and the tag retention rates were low during the first days of tagging as the crew was not experienced with the half length tagging of such small fish. As the crew gained experience tag retention rates climbed to an overall retention rate of 94 %. In order to spread the tagging over the complete duration of the out-migration a goal of 3,000 tags per day was set. The original tagging goal for this project was 100,000 tags released. By mid April it was obvious that the crew was capable of reaching our goal by the end of April and an additional 50,000 tags were ordered. The crew continued to tag until 18 May. The total number of tags released for the season was 145,870. The first adult returns from this tagging are expected in 1990 as age 3 fish.

Analysis of Length Weight Data

The mean lengths and weights by week are summarized in Table 3. The mean lengths and weights showed no significant variations throughout the duration

Table 1. Summary of the Fish Creek Fyke Net Catches 11 March to 17 May, 1988.

DATE	CHUM FRY		PINK FRY		FYKE NET FISHING PERIOD			ENUMERATION METHOD
	DAILY	CUMULATIVE	DAILY	CUMULATIVE	START TIME	STOP TIME	TOTAL HOURS	
3/11 ¹	5,000	5,000	50	50	1700	1945	2.75	VISUAL ESTIMATE
3/12	5,000	10,000	25	75	1645	2000	3.25	VISUAL ESTIMATE
3/13	10,000	20,000	50	175	1700	2000	3.00	VISUAL ESTIMATE
3/14	19,629	39,629	875	1,050	1615	0600	13.75	VOLUMETRIC
3/15	5,000	45,629	300	1,350	1615	2015	4.00	VISUAL ESTIMATE
3/16	27,059	72,688	709	2,059	1630	0100	8.50	VOLUMETRIC
3/17	8,000	80,688	300	2,359	1630	2000	3.50	VISUAL ESTIMATE
3/18	34,844	115,532	629	2,988	1600	0100	9.00	VOLUMETRIC
3/19	NETS WERE NOT SET		-	-	-	-	-	
3/20	6,000	121,532	300	3,288	1600	1930	3.50	VISUAL ESTIMATE
3/21	24,658	156,190	913	4,201	1615	0100	8.75	VOLUMETRIC
3/22	2,000	159,190	150	4,351	1845	2015	1.50	VISUAL ESTIMATE
3/23	42,286	201,476	2,643	6,994	1600	0115	9.25	VOLUMETRIC
3/24	5,000	206,476	250	7,244	1600	2000	4.00	VISUAL ESTIMATE
3/25	38,340	244,816	1,464	8,708	1545	0115	9.50	VOLUMETRIC
3/26	NETS WERE NOT SET		-	-	-	-	-	
3/27	2,500	247,316	500	9,208	2000	2200	2.00	VISUAL ESTIMATE
3/28	62,157	309,473	10,153	19,361	1600	0500	15.00	VOLUMETRIC
3/29	5,000	314,473	500	19,861	1600	2030	4.50	VISUAL ESTIMATE
3/30	23,849	338,322	601	20,462	0100	0500	4.00	VOLUMETRIC
3/31	5,000	343,322	500	20,962	1615	2000	3.75	VISUAL ESTIMATE
4/01	75,182	419,504	6,292	27,255	1600	0500	13.00	VOLUMETRIC

¹ Plastic mesh leads were in place funneling all fry into the two fyke nets.

Table 1. (Continued)

DATE	CHUM FRY		PINK FRY		FYKE NET FISHING PERIOD			ENUMERATION METHOD
	DAILY	CUMULATIVE	DAILY	CUMULATIVE	START TIME	STOP TIME	TOTAL HOURS	
4/02	NETS WERE NOT SET		-	-	-	-	-	
4/03	5,000	424,504	500	27,755	1630	2000	3.50	VISUAL ESTIMATE
4/04	134,192	558,696	9,054	36,819	1600	0600	14.00	VOLUMETRIC
4/05	5,000	563,696	500	37,319	1600	2030	4.50	VISUAL ESTIMATE
4/06	125,204	688,900	7,752	45,071	1500	2400	8.00	VOLUMETRIC
4/07	5,000	704,900	500	45,571	1600	2100	5.00	VISUAL ESTIMATE
4/08	173,698	878,598	11,081	56,652	1600	0600	14.00	GRAVIMETRIC
4/09	NETS WERE NOT SET		-	-	-	-	-	
4/10	5,000	883,598	500	57,152	2100	2130	0.50	VISUAL ESTIMATE
4/11	164,183	1,047,781	10,288	67,440	1600	0600	14.00	GRAVIMETRIC
4/12	4,000	1,051,781	400	67,840	1600	2100	5.00	VISUAL ESTIMATE
4/13	114,765	1,166,547	7,327	75,167	1600	2400	8.00	GRAVIMETRIC
4/14	5,000	1,172,547	600	75,767	1600	2100	5.00	VISUAL ESTIMATE
4/15 ^a	18,621	1,191,168	588	76,355	1500	0600	14.00	GRAVIMETRIC
4/16	NETS WERE NOT FISHED		-	-	-	-	-	
4/17	8,000	1,199,168	480	76,835	2100	2145	0.75	VISUAL ESTIMATE
4/18	49,370	1,248,538	2,077	78,912	1600	0600	14.00	GRAVIMETRIC
4/19	9,000	1,257,538	160	79,072	1600	2145	5.75	VISUAL ESTIMATE
4/20	37,198	1,293,736	764	79,836	1600	2400	8.00	GRAVIMETRIC
4/21	8,000	1,301,736	160	79,996	1600	2145	5.75	VISUAL ESTIMATE
4/22	57,837	1,359,573	1,270	81,266	1600	0600	14.00	GRAVIMETRIC
4/23	NETS WERE NOT FISHED		-	-	-	-	-	

^a Plastic mesh leads were removed due to high water and were not replaced.

Table 1. (Continued)

DATE	CHUM FRY		PINK FRY		FYKE NET FISHING PERIOD			ENUMERATION METHOD
	DAILY	CUMULATIVE	DAILY	CUMULATIVE	START TIME	STOP TIME	TOTAL HOURS	
4/24	5,000	1,364,573	200	81,466	1600	2200	6.00	VISUAL ESTIMATE
4/25	52,735	1,417,308	1,084	82,550	1600	0600	14.00	GRAVIMETRIC
4/26	5,000	1,422,308	200	82,750	1600	2200	6.00	VISUAL ESTIMATE
4/27	36,000	1,458,510	2,312	85,062	1600	0200	10.00	GRAVIMETRIC
4/28	5,000	1,463,510	200	85,262	1600	2200	6.00	VISUAL ESTIMATE
4/29	26,661	1,490,171	824	86,086	1800	0600	12.00	GRAVIMETRIC
4/30	NETS WERE NOT FISHED		-	-	-	-	-	
5/01	5,000	1,495,171	200	86,286	1700	2200	5.00	VISUAL ESTIMATE
5/02	66,908	1,562,079	577	86,963	1800	0600	12.00	GRAVIMETRIC
5/03	5,000	1,567,079	200	87,163	1600	2200	6.00	VISUAL ESTIMATE
5/04	75,523	1,642,602	1,543	88,706	1600	0100	9.00	GRAVIMETRIC
4/05	5,000	1,647,602	100	88,806	1600	2300	7.00	VISUAL ESTIMATE
5/06	40,160	1,687,762	408	89,214	1800	0600	12.00	GRAVIMETRIC
5/07	NETS WERE NOT FISHED		-	-	-	-	-	
5/08	8,000	1,695,762	100	89,314	2130	2300	1.50	VISUAL ESTIMATE
5/09	15,266	1,711,028	0	89,314	1800	0600	12.00	GRAVIMETRIC
5/10	9,000	1,719,028	100	89,414	2130	2230	1.00	VISUAL ESTIMATE
5/11	12,328	1,731,356	0	89,414	2100	0100	4.00	GRAVIMETRIC
5/12	5,000	1,736,356	0	89,414	2130	2300	1.50	VISUAL ESTIMATE
5/13	10,793	1,747,129	0	89,414	2000	0100	5.00	GRAVIMETRIC
5/14	NETS WERE NOT FISHED		-	-	-	-	-	
5/15	7,000	1,754,129	0	89,414	2130	2300	1.50	VISUAL ESTIMATE
5/16	27,116	1,781,245	0	89,414	1500	0600	14.00	GRAVIMETRIC
5/17	5,000	1,786,245	0	89,414	1500	2000	4.00	VISUAL ESTIMATE
Total		1,786,245		89,414			419.75	

Table 2. Summary of the Coded Wire Tagging of Fish Creek Juvenile Chum Salmon 11 March to 18 May 1988.

DATES	NUMBER TAGGED	CODE
3/11-3/17	9,563	3B-4-1
3/17-3/22	10,862	3B-4-2
3/23-3/28	11,469	3B-4-3
3/28-4/04	11,751	3B-4-4
4/04-4/07	11,975	3B-4-5
4/07-4/13	11,816	3B-3-3
4/14-4/19	11,762	3B-3-4
4/19-4/22	11,978	3B-3-5
4/22-4/27	11,398	3B-3-6
4/27-5/04	10,436	3B-3-7
5/04-5/09	8,951	4-1-1-4-1
5/10-5/12	8,768	4-1-1-4-2
5/12-5/16	8,680	4-1-1-3-13
5/16-5/18	6,461	4-1-1-3-14
TOTAL	145,870	

Table 3. Fish Creek Juvenile Chum Fry mean lengths and weights by week, 1988.

WEE	MEAN LENGTH (mm)	MEAN WEIGHT (g)	SAMPLE SIZE
3/13-3/19	39.0	0.37	150
3/20-3/26	39.1	0.40	100
3/27-4/02	39.4	0.40	100
4/03-4/09	39.6	0.41	75
4/10-4/16	40.0	NO WEIGHTS	50
4/17-4/23	38.8	0.39	100
4/24-4/30	39.8	0.40	100
5/01-5/07	38.8	0.39	100
5/08-5/14	38.8	0.38	100
5/15-5/21	38.7	0.37	50
Total	39.2	0.39	925

of the out-migration. Weekly mean lengths and weights ranged from 38.7 mm to 40.0 mm and 0.37 g to 0.41 g, respectively. The overall mean lengths and weights of Fish Creek chum fry were 39.2 mm and 0.39 g, respectively.

CONCLUSIONS

This was the first year of a proposed six year study designed to determine the interception rates, harvest rates, migratory timing and migration routes of Portland Canal chum salmon stocks by the use of coded wire tagging methodology. The tagging of over 145,000 wild juvenile chum fry on Fish Creek far exceeded our expectations for the first year of this study.

The two fyke nets and aluminum holding boxes proved to be a more than acceptable method for capturing a sufficient number of chum fry for tagging. No mortality problems were encountered during the study period.

There was some apprehension at the onset of this project in relation to our ability to coded wire tag, with half-length tags, chum fry that would average only 38-40 mm in length. As our crew gained more experience with the tagging equipment and with handling the smaller fish these fears were quickly put to rest. By mid-season our crew was capable of tagging 5,000 fry a day with tag retention rates in excess of 94 %. Prerequisites for a successful tagging project such as this included custom made head molds for proper tag placement, surgical grade fin clipping microscissors and a properly prepared anesthetic solution. Paying close attention to tag placement and the anesthetic bath kept our tagging mortalities down to less than 0.2 %. Due to the success of this project it is recommended that the tagging goal of 100,000 be increased to 200,000 for 1989.

Adult chum salmon from this 1988 tagging effort should enter the U.S. and Canadian fisheries and return to Fish Creek to spawn starting in 1990. The first adults will be age 3 fish, with 4 and 5 year old fish returning in 1991 and 1992, respectively. Tag recoveries from the fisheries of both countries and from Fish Creek should provide much needed information for the effective management of the Portland Canal chum salmon stocks.
