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Owikeno Lake (Rivers Inlet, Statistical Area 9)

Fall Sockeye Salmon Escapement Survey

1990

by

S.K. Bachen, B.P. Spilsted and R.D. Goruk

Department of Fisheries and Oceans

Fisheries Branch

Prince Rupert, B.C.

V8J 1G8.

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ABSTRACT

Spilsted, B.P., S.K. Bachen and R.D. Goruk, 1991. Owikeno Lake (Rivers Inlet, Statistical Area 9) fall sockeye salmon escapement survey 1990. Can. Data Rep. Fish. Aquat. Sci. 833. iii + 23 p.

Rivers Inlet sockeye salmon stocks spawn in the Owikeno Lake system (Canada Department of Fisheries and Oceans, Statistical Area 9). Tributaries of Owikeno Lake are surveyed annually to enumerate sockeye escapement. In 1990 a total of 586,500 sockeye escaped to the Owikeno Lake system. Five representatives of the commercial fishing industry accompanied department staff during the industry tour. This report summarizes the 1990 fall enumeration survey. The operation of the Genesee Camp and required repairs are also outlined.

RÉSUMÉ

Spilsted, B.P., S.K. Bachen and R.D. Goruk, 1991. Owikeno Lake (Rivers Inlet, Statistical Area 9) fall sockeye salmon escapement survey 1990. Can. Data Rep. Fish. Aquat. Sci. 833. iii + 23 p.

Les stocks de saumon rouge de l'inlet Rivers fraient dans le bassin du lac Owikeno (zone statistique 9 du ministère des Pêches et des Océans du Canada). Chaque année, on dénombre les saumons rouges qui atteignent les tributaires du lac Owikeno. En 1990, l'échappée totale dans le bassin de ce lac était de 586,000 saumons rouges. Cinq représentants de l'industrie de la pêche commerciale ont accompagné des employés du ministère lors d'une visite des installations. Ce rapport présente dans les grandes lignes la campagne de dénombrement de l'automne 1990. Les opérations du camp Genesee et les réparations qu'il faudra y apporter sont également brièvement décrites.

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INTRODUCTION

Owikeno Lake (Statistical Area 9) is the largest sockeye salmon (*Oncorhynchus nerka*) producing system in the Central Coast. Sockeye returns to Owikeno Lake support commercial fisheries held in the lower reaches of Rivers Inlet.

Sockeye salmon are enumerated in spawning streams of Owikeno Lake annually from September to October. Full descriptions of the watersheds have been documented by Thomson, Bachen & Goruk, 1988, Winther, Bachen & Goruk, 1989, and Winther, Bachen & Goruk, 1990.

METHODS & RESULTS

Machmell Camp was opened from September 5 to October 23, 1990. Water and propane systems were connected and repaired. Water had to be pumped from the lake in 1990 because the small creek previously used for water was dry.

River systems were surveyed approximately every ten days, weather and water conditions permitting. Escapements for sockeye streams appear in Table 1. Systems were usually walked or boated to a regular site where the survey was terminated. These sites exist where obstacles prevent fish from continuing up the river or where crews cannot proceed. Table 2 documents the usual distance surveyed in each system and the distance surveyed in 1990. Table 3 lists the daily record of sockeye escapement surveys in 1990. Most of the streams exhibited low escapements in 1990. Exceptions and enumeration difficulties are noted below.

The sampling program continued in 1990 to collect hypural length, sex and otoliths from 100 fish from streams surveyed in Owikeno Lake. In 1990, samples were only collected from the Ashlulm, Inziana, Neechanz, Sheemahant and Washwash Rivers as it was difficult to collect carcasses in the other systems. A successful sampling of 100 fish were obtained from the Ashlulm, Inziana, Neechanz and Washwash Rivers, while 74 fish were sampled from the Sheemahant River. Female carcasses sampled from above noted rivers were sampled for egg retention. Data collected for the Ashlulm, Inziana, Neechanz, Sheemahant and Washwash Rivers appear in Appendices 1, 2, 3, 4, and 5 respectively. Ageing data obtained from otolith samples is also presented and is summarized in Appendix 6.

Gillnet drift sets described below were made with a 15 m (50 ft) length of gillnet 3 m (10 ft) deep. Dimensions of the beach seine used were 60 m (200 ft) long and 6 m (20 ft) deep. Both nets were set from a 5.5 m (18 ft) aluminum river boat with 100 hp jet outboard motor.

GENESEE CREEK.

Genesee creek received a low escapement of only 2,500 sockeye in 1990. High water is required to allow the fish to escape bear predation. Low water conditions prevailed during all of September which caused a significant number of pre-spawn mortalities from bear predation. Rain in late October allowed some fish holding in the lake to move into the creek and spawn successfully.

INZIANA RIVER.

Total sockeye escapement to the Inziana River was 32,000. Spawning sockeye were observed from late August to mid October. Water conditions improved from silty in August and early September to slightly turbid in October.

Blocking the Inziana breakthrough in 1988 was effective in diverting the water back to the main spawning beds in the lower portion of the river. However, the river is continuing to cut into a section of the upper dyke at the site of the old breakthrough and further repairs may have to be done in 1991.

MACHMELL RIVER.

The Machmell River was surveyed twice in 1990; once by helicopter and once by walking the lower end during the industry tour. The system was very silty and extensively channelized at the confluence of the Machmell and the Neechanz. Jet boats could not pass this area. Conditions were poor in the mainstem of the river during the helicopter survey, the Machmell has channeled into Clear creek significantly reducing fish visibility. No fish were observed either in the creek or at its confluence with the Machmell River due to very poor visibility of the water, but fish were observed to be present in side channels. Escapement to the Machmell River was 20,000 sockeye.

NEECHANZ RIVER.

Sockeye escapement to the Neechanz River was 25,000. Counting conditions were fair in September and excellent in late October.

SHEEMAHANT RIVER.

The Sheemahant River had an escapement of 300,000 sockeye. Water conditions were fairly stable in 1990 with constant poor or fair visibility due to silt and normal or slightly below normal water levels. The amount of redds dried up or left visible in the shallows during fluctuating water conditions usually provides an indication of abundance of

spawners. No dried redds were observed on the first inspection of Sept. 8, but this may have been the result of the stable water levels. Good showings of fish and redds were evident of subsequent visits.

Three beach seine sets were made September 8 in three locations below the logging bridge. Total catch was 125 male, 116 female and 1 jack sockeye, 22 coho, 8 pink and 2 dolly varden trout. Three sets in September 27 caught 307 male, 310 female, 8 jack sockeye, 39 coho and 7 dolly varden trout in the same areas.

During the industry inspection on October 15, 4 beach seine sets were made for a total of 84 male and 54 female sockeye, 37 coho and 2 dolly varden. Site #1 is just below the bridge and resulted in a catch of 4 male and 4 female sockeye. Site #2 (500 yds. above normal location) yielded a catch of 14 male and 10 female sockeye and 20 coho. Site #3 caught 49 male and 27 female sockeye, 7 coho and 2 dolly varden trout. Site #4 caught 17 male and 13 female sockeye and 10 coho.

WANNOCK RIVER.

Sockeye escapement to the Wannock River was estimated to be 100,000. The Wannock River was extremely difficult to enumerate throughout the season. Silty conditions prevailed through the year with below normal water level evident during the industry inspection on October 19. Two seine sets were made at the "top end" site during the Industry Tour for a total catch of 1,631 sockeye and 1 coho. Seining was somewhat difficult because the below normal water level caused the seine to become snagged on debris on the bottom during each of the sets. The seine, on each occasion, had to be lifted over debris. One beach seine set was made at the "spring hole" for chinook with Percy Walkus of the Owekeeno Band. The catch included 20 male (19 tagged), 16 female (15 tagged) and 31 jack chinook (6 tagged) as well as 35 sockeye, 36 coho and 187 chum. Chinook escapement to the Wannock River for 1990 was set at 3,500.

WASHWASH RIVER.

The Washwash River had a low escapement of only 35,000 sockeye in 1990. Spawning sockeye were observed from late August to late October. Schools of fish holding off the mouth of the river at the end of October presumably spawned in November. Coho were observed among the schools of sockeye at the mouth. One live chinook was observed in the Washwash in early September.

Permanent repairs are still required to stabilize the Washwash River. The temporary dikes built in 1988 were not washed out in 1990 and no additional breakthroughs to the Tzeo

River were observed.

INDUSTRY TOUR

The industry tour occurred from October 12 to 21, 1990. The tour was originally scheduled to begin on October 9th, but was delayed to the 12th due to high water conditions. All of the systems were surveyed except for the Dallery River and upper section of the Amback. Five industry representatives, seven fisheries personnel and one guest attended the fall inspection:

Industry representatives:

Name	Representing	Dates attended
		October
Dave Pashley	B.C. Packers, Bella Coola	12-21
Jim Cameron	UFAWU	12-21
Art Monk	B.C.P., Rivers Inlet	12-21
Sandy Souter	Canadian Fishing Co.	12-21
Tom Vosburg	UFAWU	12-21

Fisheries representatives:

Name	Title	
S.K. Bachen	Technician	01-23
R.D. Goruk	Biologist	12-23
B. Spilsted	Biologist	12-21
D. Radford	Biologist	18-21
G. Savard	Assist. Dist. Sup.	18-21
G. Rahier	Fishery Officer	12-21
A. Gibson	A/Director, Fish. Br.	13-20

Other representatives:

Name	Title	
C. Walters	Prof. U.B.C.	19-21

OWIKENO LAKE MACHMELL CAMP 1990

The Machmell Camp was subject to many changes this year. Facilities Management Division supplied funding to initiate the repairs and renewals identified in the 1989 Department of Public Works Canada report.

These repairs and renewals started in July. Department of Fisheries and Oceans personnel drifted cross timbers and top decking on a 30' x 60' log float. A 20' x 40' metal warehouse/generator building was then constructed on top of the finished float. In September, the generators and other materials were moved from the old generator float into the new building. An electrician was brought into camp to wire the new building to meet electrical code requirements and to bring the rest of the camp wiring up to code. The Provincial Electrical Inspector approved all the work, except the

overhead wire from the generators to the hookup outside the main building. This section of wire will have to be replaced in the 1991 season.

Major repair was also made to the accommodation float. There were 14 cedar logs rolled under the float to lift the low side. The logs levelled the float and raised it approximately 2 feet.

Most of the repairs identified in the Department of Public Works Canada report, inspection date 89-08-03, have been done. There is, however, still work to be done in order to have hot water tanks, oil heaters, propane fridges, lines and tanks as well as diesel fuel tanks and lines for the heaters and generators fixed up to meet the appropriate safety codes.

In the 1991 season, the "Palace residence" will need extensive work. The roof must be repaired first. The ceiling tiles will have to be replaced and new insulation placed in the attic. The present floor tiles will also have to be replaced with linoleum, as they are lifting and broken. The exterior needs to be painted as it has weathered noticeably in the past 2 years. At the same time, measures should be taken to protect the building from damage by small animals such as martens and various kinds of rodents.

In the 1991 season, a containment system will have to be built for the two 2,250 liter (500 gallon) gas storage tanks and one 2,250 liter (500 gallon) diesel tank. The only company in the area that is able to supply fuel will not fill them until they are brought up to proper environmental standards. These tanks are needed in order to carry out field responsibilities.

REFERENCES

- Thomson, B.L., S.K. Bachen and R.D. Goruk. 1988. An historical overview of the Owikeno Lake (Rivers Inlet Statistical Area 9) fall sockeye salmon escapement surveys, 1971-1987. Can. Data Rep. Fish. Aquat. Sci. 711. iii + 69 p. + Appendices.
- Winther, I., S.K. Bachen and R.D. Goruk. 1989. Owikeno Lake (Rivers Inlet, Statistical Area 9) fall sockeye salmon escapement survey 1988. Can. Data Rep. Fish. Aquat. Sci. 754. iii + 11 p.
- Winther, I., S.K. Bachen and R.D. Goruk. 1990. Owikeno Lake (Rivers Inlet, Statistical Area 9) fall sockeye salmon escapement survey 1989. Can. Data Rep. Fish. Aquat. Sci. 794. iii + 13 p.

TABLE 1. 1990 Escapement data for Owikeno Lake systems.

SYSTEM	1990 ESCAPEMENT
AMBACK	30,000
ASHLULM	13,000
DALLERY	10,000
GENESEE	2,500
INZIANA	32,000
MACHMELL	20,000
NEECHANZ	25,000
OWIKENO LAKE SPAWNERS	5,000
SHEEMAHANT	300,000
TZEO	14,000
WANNOCK	100,000
WASHWASH	35,000
TOTAL:	586,500

TABLE 2. Distance to survey termination sites from the mouths of streams and distances surveyed during the 1990 Industry Tour.

SYSTEM		NORMAL DISTANCE SURVEYED (km)	DISTANCE SURVEYED DURING THE 1990 INDUSTRY TOUR (km)	MAXIMUM DISTANCE SURVEYED IN 1990 (km)
AMBACK	**	3.0	3.0	3.0
ASHLULM	**	3.5	3.5	3.5
DALLERY		3.8	0	3.8
GENESEE		1.3	1.3	1.3
INZIANA		1.6	1.6	1.6
MACHMELL	*	*	0	0
NEECHANZ		4.0	4.0	4.0
SHEEMAHANT		6.0	12.0 ***	12.0
TZEO		4.5	1.0	4.5
WASHWASH		2.5	2.5	2.5

* Machmell usually not surveyed.

** Survey distances preliminary, further measurement required.

*** Usually only survey to logging bridge.

TABLE 3. OWIKENO LAKE 1990 - DAILY RECORD OF SOCKEYE ESCAPEMENT SURVEYS.

DATE	STREAM	EST. NO. SOCKEYE			METHOD	WATER			COMMENTS
		LIVE	DEAD	%NEW		COND.	VIS.	LEVEL	
SEP 26	AMBACK				HLCPTR	CLEAR	GOOD	VERY LOW	LARGE BODY OF FISH OBSERVED OFF MOUTH.
OCT 21	AMBACK				WALK	CLEAR	POOR	ABOVE NORM	EST. 4,000 SX IN STREAM. INDUSTRY. TFY 30,000.
SEP 08	ASHLULUM	2400	275	20	WALK	SILT	GOOD	NORMAL	MOST FISH LOCATED IN LOWER REACHES. EST. 3,000 - 3,500 TOT. SX IN STREAM.
SEP 18	ASHLULUM	2300	300	70	WALK	SILT	FAIR	NORMAL	EST. 2,500 TOTAL SX IN STREAM.
SEP 26	ASHLULUM	2500		100	HLCPTR	TEA	GOOD	BELOW NORM	EST. 3,000 TOTAL SX IN STREAM, FISH MAINLY IN LOWER REACHES.
OCT. 19	ASHLULUM				WALK	TEA	FAIR	NORMAL	EST. 4,000 TOTAL SX IN STREAM. TFY 13,000.
SEP 09	DALLERY	1300	75	20	WALK	CLEAR	GOOD	NORMAL	EST. 2,000 TOTAL SX IN STREAM.
SEP 19	DALLERY	2160	380	70	WALK	CLEAR	GOOD	BELOW NORM	EST. 2,300 TOTAL SX IN STREAM.
SEP 26	DALLERY	2500	200	80	HLCPTR	CLEAR	EXCEL	BELOW NORM	EST. 2,500 TOTAL SX IN STREAM. TFY 10,000.
SEP 12	GENESEE	40			WALK	CLEAR	GOOD	NORMAL	
SEP 21	GENESEE	50	0	100	WALK	CLEAR	EXLNT	BELOW NORM	SX IN LOWER POOLS, NO SPANNING OBSERVED AT THIS TIME.
OCT 20	GENESEE				WALK	CLEAR	EXLNT	NORMAL	EST. 1,500 SX IN STREAM. TFY 2,500.
SEP 07	INZIANA	4800	200	5	WALK	SILT	FAIR	NORMAL	SX DISTRIBUTED THROUGHOUT STREAM, EST. 7,000 IN STRM. MOSTLY ON REDDS.
SEP 17	INZIANA	10050	1100	35	WALK	SILT	FAIR	NORMAL	SX DISTRIBUTED THROUGHOUT STREAM, EST. 12,000 IN STRM. NUM. DBL. SPANNING.
SEP 26	INZIANA	15000		50	HLCPTR	SILT	GOOD	NORMAL	SX DISTRIBUTED THROUGHOUT, LARGE NUMBER (NO EST.) OF CARCASSES.
OCT 15	INZIANA				WALK	TURBID	GOOD	NORMAL	EST. 1500 TOT. SX IN STREAM. TFY 32,000.
SEP 26	MACHMELL				HLCPTR	SILT	NIL	NORMAL	HEAVY SILT. NIL VIS. FOR COUNTING FISH. FISH PRESENT IN SIDE CHANNEL.
OCT 20	MACHMELL	450			WALK	SILT	FAIR	NORMAL	SX OBSERVED IN ALL SIDE CHANNELS. TFY 20,000.

TABLE 3 cont. ONIKENO LAKE 1990 - DAILY RECORD OF SOCKEYE ESCAPEMENT SURVEYS.

DATE	STREAM	EST. NO. SOCKEYE		METHOD	WATER			COMMENTS
		LIVE	DEAD		COND.	VIS.	LEVEL	
SEP 12	MARBLE	680		WALK	GOOD	NORMAL		
SEP 16	MARBLE	1170		WALK	FAIR	NORMAL		
SEP 08	NEECHANZ			FLOAT	POOR	NORMAL		2 BEACH SEINE SETS:#1:24M 15F 1J, #2:33M 22F 1J. GOOD SHOWING THROUGH.
SEP 12	NEECHANZ	4500	225	WALK	FAIR	NORMAL		SX ON REDDS THROUGHOUT STREAM. EST. 7,000 TOTAL IN STREAM.
SEP 16	NEECHANZ	5750	250	WALK	FAIR	NORMAL		MANY NEW FISH IN LOWER REACHES, EST. 8,000 TOTAL IN STREAM.
SEP 26	NEECHANZ	10000		HLCPTR	GOOD	BELOW NORM		THE COUNT OF 10,000 INCLUDES MARBLE CR. ASSESSMENT.
OCT 17	NEECHANZ			WALK	FAIR	NORMAL		EST. 1,500 IN STREAM. TFY 25,000.
SEP 08	SHEEMAHANT		100	FLOAT	FAIR	NORMAL		3 SN SETS:#1 23M,31F,1J, #2 30M,26F,0J, #3 72M,59F,0J.
SEP 26	SHEEMAHANT			HLCPTR	FAIR	NORMAL		GOOD SHOWING OF SX THROUGHOUT.
SEP 27	SHEEMAHANT			FLOAT	FAIR	NORMAL		3 SN SETS:#1 94M,80F,0J #2 112M,104F,5J, #3 101M 126F,3J.
OCT 15	SHEEMAHANT			FLOAT	POOR	BELOW NORM		4 SN SETS:#1=4M,4F, #2=14M,10F, #3=49M,27F, #4=17M,13F. TFY 300,000
SEP 12	TZEO	900	60	WALK	POOR	NORMAL		CHECKED BETWEEN BREAKTHROUGHS, EST. 2,000+ IN STREAM.
SEP 20	TZEO	1300	10	WALK	POOR	BELOW NORM		ONLY CHECKED LOWER RIFFLE. EST. 6,500 IN STREAM.
SEP 26	TZEO	10000		HLCPTR	POOR	BELOW NORM		5,000 ABOVE BREAKTHROUGH, 5,000 BELOW. LARGE NUM. OF CARCASSES. TFY 14,000
SEP 17	SHMHT FLATS	250	1	FLOAT	GOOD	NORMAL		WATER LEVEL DROPPING.
SEP 26	SHMHT FLATS			HLCPTR	GOOD	NORMAL		LARGE SCHOOLS OBSERVED, 4,000 - 5,000 SX IN FRONT OF CABIN.
OCT 18	SHMHT FLATS			FLOAT	POOR	NORMAL		EST. 1,500 SX IN STREAM, INDUSTRY, TFY 5,000.
OCT 19	WANNOCK			FLOAT	POOR	BELOW NORM		3 SEINE SETS FOR 1666 SX, 37 CO, 187 CM, 67 CK, INDUSTRY, TFY 100,000

TABLE 3 cont. ONWIKENO LAKE 1990 - DAILY RECORD OF SOCKEYE ESCAPEMENT SURVEYS.

DATE	STREAM	EST. NO. SOCKEYE			METHOD	WATER			COMMENTS
		LIVE	DEAD	%NEW		COND.	VIS.	LEVEL	
SEP 07	WASHWASH	2800	125	10	WALK	TEA	GOOD	NORMAL	FISH THROUGHOUT, BREAKTHROUGH NOT WALKED. ESTIMATE 3,000 IN STREAM.
SEP 12	WASHWASH	6800	250	60	WALK	TEA	GOOD	NORMAL	FISH THROUGHOUT, EST. 7,000 IN STREAM. EST. APPROX. 2,000 OFF MOUTH.
SEP 20	WASHWASH	7200	425	60	WALK	CLEAR	GOOD	NORMAL	DID NOT CHECK BREAKTHROUGH. ESTIMATE 8,000 IN STREAM.
SEP 26	WASHWASH	8000			HLCPTR	CLEAR	GOOD	BELOW NORM	1,500 THROUGH THE BREAKTHROUGH. EST. TOTAL IN STREAM SAME AS LAST COUNT.
OCT 16	WASHWASH			75	WALK	CLEAR	GOOD	NORMAL	COUNTED THROUGHOUT TO FALLS. EST. 15,000 IN STREAM. TFY 35,000.
SEP 07	SUNDAY/WISK	150		50	FLOAT	CLEAR	GOOD	NORMAL	BEACH SPANNERS AT MOUTH OF WHISKEY CR.
SEP 17	SUNDAY/WISK	350	2		FLOAT	CLEAR	GOOD	NORMAL	
SEP 26	SUNDAY/WISK				HLCPTR	CLEAR	GOOD	NORMAL	EST. 2,000 OBSERVED.
SEP 07	3RD NARROWS	200	0	50	FLOAT	CLEAR	GOOD	NORMAL	BEACH SPANNERS IN LAKE GRAVEL.
SEP 17	3RD NARROWS	80		60	FLOAT	TEA	GOOD	NORMAL	
SEP 26	3RD NARROWS				HLCPTR		GOOD	NORMAL	GOOD SHOWING OF JUMPERS OBSERVED.

ABBREVIATIONS: BT = BOAT, CHIN = CHINOOK, COND = CONDITION, DRFT = DRIFT, EXT = EXTREMELY, EXLNT = EXCELLENT, F = FEMALE, GN = GILLNET,
HLCPTR = HELICOPTER, M = MALE, NORM = NORMAL, PK = PINK, SHMHT = SHEEMAHANT, SN = BEACH SEINE, SX = SOCKEYE, TFY = TOTAL FOR YEAR,
TTD = TOTAL TO DATE, VIS = VISIBILITY, WISK = WHISKEY

APPENDIX 1. 1990 Ashlulm River sockeye samples.

#	Sex	Hypural Length (mm)	Nose/Fork Length (mm)	(Box # 80190) Otolith Age	Egg Retention	Date
1	F	525	648	52	24	18-09-90
2	M	496	624	52		18-09-90
3	M	450	599	42		18-09-90
4	M	502	687	S2	RES	18-09-90
5	F	511	617	52	0	18-09-90
6	M	560	732	52		18-09-90
7	M	531	706	52		18-09-90
8	F	491	598	52	3	18-09-90
9	F	520	642	52	23	18-09-90
10	M	409	516	42		18-09-90
11	M	544	711	41		18-09-90
12	M	517	686	41		18-09-90
13	F	504	599	52	36	18-09-90
14	F	505	612	41	0	18-09-90
15	F	554	664	52	178	18-09-90
16	M	431	564	42		18-09-90
17	F	486	576	52	2	18-09-90
18	F	428	639	41	314	18-09-90
19	F	500	602	52	0	18-09-90
20	F	544	647	41	0	18-09-90
21	M	479	612	42		18-09-90
22	M	500	655	52		18-09-90
23	M	534	692	52		18-09-90
24	M	442	578	42		18-09-90
25	M	517	686	52		18-09-90
26	M	534	682	52		18-09-90
27	M	522	693	OP	RES	18-09-90
28	M	533	700	P		18-09-90
29	M	508	664	52		18-09-90
30	M	536	704	52		18-09-90
31	M	418	550	S2	RES	18-09-90
32	M	424	558	S2	RES	18-09-90
33	M	538	697	52		18-09-90
34	F	496	595	52	0	18-09-90
35	F	546	660	52	1	18-09-90
36	F	494	589	41	0	18-09-90
37	M	417	550	42		18-09-90
38	M	510	678	52		18-09-90
39	M	520	696	41		18-09-90
40	M	438	569	42		18-09-90
41	M	530	700	41		18-09-90
42	M	437	565	42		18-09-90
43	F	511	635	52	0	18-09-90
44	F	496	595	52	0	18-09-90
45	F	500	606	52	0	18-09-90
46	F	530	654	52	3	18-09-90
47	M	526	680	52		18-09-90
48	M	545	708	52		18-09-90
49	M	538	700	52		18-09-90
50	M	476	650	41		18-09-90

APPENDIX 1 cont. 1990 Ashlum River sockeye samples.

#	Sex	Hypural Length (mm)	Nose/Fork Length (mm)	(Box # 80189) Otolith Age	Egg Retention	Date
1	M	448	704	41		23-09-90
2	M	382	487	42		23-09-90
3	M	537	709	52		23-09-90
4	M	459	600	42		23-09-90
5	F	498	600	52	4	23-09-90
6	F	520	632	41	362	23-09-90
7	M	500	627	S2	RES	23-09-90
8	M	457	609	52		23-09-90
9	F	487	611	52	0	23-09-90
10	M	477	607	42		23-09-90
11	M	523	680	41		23-09-90
12	M	518	710	52		23-09-90
13	F	508	618	52	0	23-09-90
14	F	500	616	52	0	23-09-90
15	F	541	660	52	431	23-09-90
16	F	516	626	41	63	23-09-90
17	F	482	587	52	4	23-09-90
18	F	548	670	41	152	23-09-90
19	F	507	612	52	2	23-09-90
20	M	504	638	41		23-09-90
21	M	512	672	52		23-09-90
22	M	525	705	52		23-09-90
23	M	530	681	52		23-09-90
24	M	542	712	52		23-09-90
25	M	452	602	42		23-09-90
26	M	480	626	S2	RES	23-09-90
27	M	521	690	41		23-09-90
28	F	494	612	52	0	23-09-90
29	M	521	690	52		23-09-90
30	M	524	700	52		23-09-90
31	M	531	690	52		23-09-90
32	M	402	508	S2	RES	23-09-90
33	M	522	687	S2	RES	23-09-90
34	M	576	752	41		23-09-90
35	M	560	730	52		23-09-90
36	M	511	691	41		23-09-90
37	M	532	681	41		23-09-90
38	M	497	650	52		23-09-90
39	M	536	728	52		23-09-90
40	M	502	651	52		23-09-90
41	M	510	679	52		23-09-90
42	M	458	593	42		23-09-90
43	M	521	692	41		23-09-90
44	M	509	662	52		23-09-90
45	F	492	614	41	*pre-spn. mort.	23-09-90
46	F	500	615	52	277	23-09-90
47	F	523	642	41	1	23-09-90
48	F	505	600	41	22	23-09-90
49	F	504	620	41	34	23-09-90
50	F	503	611	OP	0	23-09-90

*All eggs developed and water hard.

APPENDIX 2. 1990 Inziana River sockeye samples.

#	Sex	Hypural Length (mm)	Nose/Fork Length (mm)	(Box # 80155) Otolith Age	Egg Retention	Date
1	M	480	655	52		10-09-90
2	M	500	665	52		10-09-90
3	M	510	670	52		10-09-90
4	M	535	695	52		10-09-90
5	M	505	670	52		10-09-90
6	M	530	670	52		10-09-90
7	F	475	600	52	17	10-09-90
8	M	560	745	52		10-09-90
9	M	530	710	52		10-09-90
10	M	505	655	52		10-09-90
11	M	510	690	52		10-09-90
12	M	510	685	52		10-09-90
13	M	500	650	52		10-09-90
14	F	500	610	52	7	10-09-90
15	F	510	645	52	12	10-09-90
16	M	460	603	42		10-09-90
17	F	456	559	52	3	10-09-90
18	F	545	657	52		10-09-90
19	M	519	694	52		10-09-90
20	M	512	657	52		10-09-90
21	M	493	647	52		10-09-90
22	M	464	633	52		10-09-90
23	F	512	619	52	4	10-09-90
24	M	400	497	42		10-09-90
25	M	525	677	52		10-09-90
26	M	521	638	52		10-09-90
27	M	531	685	52		10-09-90
28	F	490	600	52	0	10-09-90
29	F	480	599	P	0	10-09-90
30	M	500	655	52		10-09-90
31	M	465	603	42		10-09-90
32	F	516	649	52	1	10-09-90
33	F	522	655	52	33	10-09-90
34	M	470	634	52		10-09-90
35	M	511	665	52		10-09-90
36	M	462	610	42		10-09-90
37	M	539	711	41		10-09-90
38	M	522	715	52		10-09-90
39	M	516	671	52		10-09-90
40	M	509	679	52		10-09-90
41	F	507	632	41	22	10-09-90
42	M	537	707	52		10-09-90
43	M	540	705	52		10-09-90
44	M	465	620	OP		10-09-90
45	F	471	595	52	3	10-09-90
46	M	450	627	42		10-09-90
47	F	500	634	52	5	10-09-90
48	F	474	595	52	0	10-09-90
49	M	449	605	42		10-09-90
50	M	498	660	52		10-09-90

APPENDIX 2 cont. 1990 Inziana River sockeye samples.

#	Sex	Hypural Length (mm)	Nose/Fork Length (mm)	(Box # 80156) Otolith Age	Egg Retention	Date
1	F	505	615	52	24	10-09-90
2	F	487	595	52	5	10-09-90
3	M	516	675	52		10-09-90
4	M	523	700	52		10-09-90
5	F	505	630	52	1	10-09-90
6	M	500	671	52		10-09-90
7	F	522	664	52	6	10-09-90
8	M	298	392	32		10-09-90
9	M	454	607	53		10-09-90
10	M	487	638	52		10-09-90
11	M	510	659	52		10-09-90
12	M	535	710	52		10-09-90
13	F	500	627	52	63	10-09-90
14	F	497	612	52	1	10-09-90
15	M	497	670	52		10-09-90
16	M	535	725	41		10-09-90
17	M	525	694	S2	RES	10-09-90
18	F	491	630	52	0	10-09-90
19	F	502	635	52	0	10-09-90
20	F	510	640	52	3	10-09-90
21	M	510	659	52		10-09-90
22	F	492	613	52	5	10-09-90
23	F	420	520	42	0	10-09-90
24	F	511	626	52	325	10-09-90
25	F	490	606	52	5	10-09-90
26	M	483	656	42		10-09-90
27	F	482	611	P	2	10-09-90
28	M	512	666	52		10-09-90
29	M	507	670	52		10-09-90
30	F	509	637	52	7	10-09-90
31	M	501	653	52		10-09-90
32	M	460	614	42		10-09-90
33	M	511	691	52		10-09-90
34	F	500	612	52	2	10-09-90
35	M	507	672	52		10-09-90
36	M	381	490	42		10-09-90
37	F	434	522	42	1	10-09-90
38	F	493	604	52	4	10-09-90
39	M	530	699	52		10-09-90
40	M	481	641	52		10-09-90
41	M	508	676	41		10-09-90
42	M	412	532	42		10-09-90
43	M	461	619	42		10-09-90
44	M	513	691	52		10-09-90
45	M	500	672	52		10-09-90
46	M	527	694	52		10-09-90
47	M	446	559	42		10-09-90
48	M	526	700	52		10-09-90
49	M	521	685	P		10-09-90
50	M	397	485			10-09-90

APPENDIX 3. 1990 Neechanz River sockeye samples.

#	Sex	Hypural Length (mm)	Nose/Fork Length (mm)	(Box # 80153) Otolith Age	Egg Retention	Date
1	F	491	624	52	80	11-09-90
2	F	493	620	52	133	11-09-90
3	M	506	681	32		11-09-90
4	F	463	586	52	1000+	11-09-90
5	F	515	644	52	4	11-09-90
6	F	499	637	52	62	11-09-90
7	F	499	607	52	7	11-09-90
8	M	286	372	52		11-09-90
9	F	487	582	52	1	11-09-90
10	M	451	581	52		11-09-90
11	F	512	600	52	18	11-09-90
12	F	483	566	52	2	11-09-90
13	F	513	603	52	11	11-09-90
14	M	536	697	52		11-09-90
15	M	514	662	41		11-09-90
16	M	550	706	52		11-09-90
17	F	504	604	52	127	11-09-90
18	F	500	602	52	99	11-09-90
19	F	498	599	52	235	11-09-90
20	F	517	618	52	400	11-09-90
21	M	442	583	52	RES	11-09-90
22	M	512	672	52		11-09-90
23	F	484	578	52	1	11-09-90
24	M	530	695	52		11-09-90
25	M	511	660	52		11-09-90
26	M	446	687	41		11-09-90
27	F	510	595	52	8	11-09-90
28	F	514	605	52	0	11-09-90
29	M	495	680	52		11-09-90
30	F	467	555	41	0	11-09-90
31	F	484	576	52	2	11-09-90
32	M	467	604	52		11-09-90
33	F	472	570	52	219	11-09-90
34	F	489	585	52	363	11-09-90
35	F	541	634	52	37	11-09-90
36	F	525	631	52	1	11-09-90
37	F	511	603	52	5	11-09-90
38	M	502	663	52		11-09-90
39	M	374	465	42		11-09-90
40	M	410	527	53		11-09-90
41	M	368	471	42		11-09-90
42	M	520	677	52		11-09-90
43	M	531	680	52		11-09-90
44	F	512	598	52	(50% spawned)	11-09-90
45	F	466	545	52	10	11-09-90
46	F	490	596	52	2	11-09-90
47	F	490	594	52	11	11-09-90
48	F	483	586	52	5	11-09-90
49	F	535	606	52	(70% spawned)	11-09-90
50	F	482	573	52	37	11-09-90

APPENDIX 3 cont. 1990 Neechanz River sockeye samples.

#	Sex	Hypural Length (mm)	Nose/Fork Length (mm)	(Box # 80160) Otolith Age	Egg Retention	Date
1	M	487	636	52		11-09-90
2	M	519	654	52		11-09-90
3	F	504	606	52	0	11-09-90
4	M	520	662	52		11-09-90
5	M	534	685	52		11-09-90
6	M	485	637	MF		11-09-90
7	M	505	668	52		11-09-90
8	F	505	591	52	2	11-09-90
9	F	478	567	52	3	11-09-90
10	F	522	619	52	7	11-09-90
11	M	543	694	52		11-09-90
12	F	494	610	52	0	11-09-90
13	M	535	697	52		11-09-90
14	M	538	706	52		11-09-90
15	F	480	570	52	63	11-09-90
16	M	540	694	52		11-09-90
17	M	532	692	52		11-09-90
18	F	507	612	52	0	11-09-90
19	F	492	600	52	0	11-09-90
20	M	515	681	52		11-09-90
21	F	509	611	52	0	11-09-90
22	M	526	673	52		11-09-90
23	M	504	653	52		11-09-90
24	M	465	602	52		11-09-90
25	M	542	727	52		11-09-90
26	F	481	600	52	0	11-09-90
27	M	522	696	52		11-09-90
28	F	500	613	52	290	11-09-90
29	F	491	593	52	30	11-09-90
30	M	506	654	52		11-09-90
31	M	490	635	52		11-09-90
32	M	515	684	52		11-09-90
33	M	485	626	52		11-09-90
34	F	484	599	52	22	11-09-90
35	M	530	706	52		11-09-90
36	F	510	615	52	14	11-09-90
37	F	515	636	52	0	11-09-90
38	M	500	665	52		11-09-90
39	F	512	607	52	34	11-09-90
40	M	559	713	52		11-09-90
41	F	529	627	52	132	11-09-90
42	F	513	619	52	19	11-09-90
43	M	534	693	52		11-09-90
44	M	502	678	52		11-09-90
45	M	500	646	52		11-09-90
46	M	380	473	42		11-09-90
47	M	540	698	52		11-09-90
48	M	507	653	52		11-09-90
49	M	499	660	52		11-09-90
50	M	522	664	52		11-09-90

APPENDIX 4. 1990 Sheemahant River sockeye samples.

#	Sex	Hypural Length (mm)	Nose/Fork Length (mm)	(Box # 80194) Otolith Age	Egg Retention	Date
1	M	512	690	52		28-09-90
2	F	518	620	52	0	28-09-90
3	F	495	540	52	27	28-09-90
4	F	505	600	52	16	28-09-90
5	F	511	609	52	1	28-09-90
6	F	516	619	52	42	28-09-90
7	F	496	603	52	0	28-09-90
8	M	495	671	52		28-09-90
9	M	512	670	52		28-09-90
10	M	410	530	42		28-09-90
11	M	440	550	S2	RES	28-09-90
12	M	545	710	52		28-09-90
13	F	520	640	52	4	28-09-90
14	F	520	630	52	43	28-09-90
15	M	510	670	52		28-09-90
16	M	490	655	P	RES	28-09-90
17	M	520	685	S2	RES	28-09-90
18	M	525	675	52		28-09-90
19	M	520	660	52		28-09-90
20	M	525	700	52		28-09-90
21	M	530	710	52		28-09-90
22	F	500	600	52	3	28-09-90
23	M	535	695	52		28-09-90
24	M	540	695	52		28-09-90
25	M	465	590	52		28-09-90
26	F	512	614	52	1	28-09-90
27	M	501	595	52		28-09-90
28	M	504	692	41		28-09-90
29	F	487	593	52	17	28-09-90
30	M	480	632	S2	RES	28-09-90
31	M	515	670	52		28-09-90
32	F	456	552	52	7	28-09-90
33	M	384	499	42		28-09-90
34	F	508	606	52	3	28-09-90
35	M	522	699	52		28-09-90
36	F	483	590	52	27	28-09-90
37	M	495	675	52		28-09-90
38	F	501	611	52	4	28-09-90
39	M	540	70	52		28-09-90
40	F	494	610	52	1	28-09-90
41	M	522	699	52		28-09-90
42	F	507	600	52	12	28-09-90
43	M	496	599	52		28-09-90
44	M	520	694	52		28-09-90
45	F	503	605	52	9	28-09-90
46	F	487	599	52	212	28-09-90
47	F	505	603	52	112	28-09-90
48	M	444	592	42		28-09-90
49	M	437	563	42		28-09-90
50	M	519	680	52		28-09-90

APPENDIX 4 cont. 1990 Sheemahant River sockeye samples.

#	Sex	Hypural Length (mm)	Nose/Fork Length (mm)	(Box # 80196) Otolith Age	Egg Retention	Date
1	M	497	644	52		28-09-90
2	F	510	608	52	0	28-09-90
3	M	509	650	52		28-09-90
4	M	533	709	52		28-09-90
5	F	496	604	52	6	28-09-90
6	F	472	550	52	0	28-09-90
7	M	512	673	52		28-09-90
8	M	511	651	52		28-09-90
9	F	473	577	52	3	28-09-90
10	M	576	684	52		28-09-90
11	M	514	692	52		28-09-90
12	M	536	703	52		28-09-90
13	M	516	673	52		28-09-90
14	M	437	574	42		28-09-90
15	M	493	649	52		28-09-90
16	F	477	584	52	1	28-09-90
17	F	474	596	52	34	28-09-90
18	M	536	710	52		28-09-90
19	F	482	570	52	2	28-09-90
20	F	499	582	52	6	28-09-90
21	F	462	560	52	1	28-09-90
22	F	462	570	52	138	28-09-90
23	M	486	652	52		28-09-90
24	M	569	750	52		28-09-90

APPENDIX 5. 1990 Washwash River sockeye samples.

#	Sex	Hypural Length (mm)	Nose/Fork Length (mm)	(Box # 80157) Otolith Age	Egg Retention	Date
1	F	483	585	52	0	10-09-90
2	M	529	684	41		10-09-90
3	M	486	645	52		10-09-90
4	F	485	580	52	0	10-09-90
5	M	532	657	52		10-09-90
6	M	521	668	52		10-09-90
7	M	553	665	52		10-09-90
8	M	533	688	52		10-09-90
9	F	503	598	52	445	10-09-90
10	M	518	645	52		10-09-90
11	F	480	570	52	2	10-09-90
12	F	495	590	52	6	10-09-90
13	F	509	610	52	5	10-09-90
14	M	537	672	52		10-09-90
15	M	523	674	41		10-09-90
16	M	513	695	52		10-09-90
17	M	505	660	52		10-09-90
18	M	480	640	41		10-09-90
19	F	487	595	52	5	10-09-90
20	F	498	616	41	2	10-09-90
21	M	537	700	52		10-09-90
22	F	486	607	52	22	10-09-90
23	M	530	704	52		10-09-90
24	M	481	674	52		10-09-90
25	M	482	632	52		10-09-90
26	F	486	617	52	1	10-09-90
27	M	491	686	52		10-09-90
28	M	480	645	42		10-09-90
29	M	527	698	52		10-09-90
30	M	273	356	32		10-09-90
31	M	542	705	41		10-09-90
32	F	497	616	41	0	10-09-90
33	M	483	664	41		10-09-90
34	M	504	674	52		10-09-90
35	M	454	617	42		10-09-90
36	M	492	664	41		10-09-90
37	M	538	688	41		10-09-90
38	F	350	445	41	24	10-09-90
39	M	510	655	52		10-09-90
40	M	549	689	52		10-09-90
41	M	450	559	52		10-09-90
42	M	540	670	41		10-09-90
43	F	453	540	52	1	10-09-90
44	F	523	619	52	0	10-09-90
45	M	544	703	52		10-09-90
46	F	480	562	52	13	10-09-90
47	M	490	623	52		10-09-90
48	F	478	570	OP	0	10-09-90
49	F	447	537	52	1	10-09-90
50	M	512	661	52		10-09-90

APPENDIX 5 cont. 1990 Washwash River sockeye samples.

#	Sex	Hypural Length (mm)	Nose/Fork Length (mm)	(Box # 80161) Otolith Age	Egg Retention	Date
1	M	472	603	42		10-09-90
2	M	522	654	52		10-09-90
3	F	525	625	52	0	10-09-90
4	F	530	630	52	2	10-09-90
5	F	509	623	52	2	10-09-90
6	M	519	658	52		10-09-90
7	M	490	628	52		10-09-90
8	M	524	679	41		10-09-90
9	M	544	688	52		10-09-90
10	M	405	500	42		10-09-90
11	F	508	600	52	46	10-09-90
12	F	494	594	52	9	10-09-90
13	M	533	690	52		10-09-90
14	M	506	671	52		10-09-90
15	F	484	572	41	0	10-09-90
16	F	508	614	52	350	10-09-90
17	F	490	580	52	4	10-09-90
18	F	541	652	52	127	10-09-90
19	M	528	681	52		10-09-90
20	M	509	650	OP		10-09-90
21	M	522	706	52		10-09-90
22	M	528	667	52		10-09-90
23	M	525	684	52		10-09-90
24	M	531	682	52		10-09-90
25	F	473	576	52	0	10-09-90
26	F	531	624	52	0	10-09-90
27	F	463	576	41	2	10-09-90
28	F	532	624	52	3	10-09-90
29	F	475	600	52	0	10-09-90
30	F	496	612	52	0	10-09-90
31	F	502	623	52	1	10-09-90
32	F	485	573	52	0	10-09-90
33	M	530	664	52		10-09-90
34	M	518	690	52		10-09-90
35	M	525	698	52		10-09-90
36	M	546	702	41		10-09-90
37	F	498	596	52	0	10-09-90
38	F	490	580	52	2	10-09-90
39	F	526	608	52	0	10-09-90
40	F	500	596	41	0	10-09-90
41	F	460	526	52	0	10-09-90
42	M	518	690	41		10-09-90
43	F	514	608	41	0	10-09-90
44	M	542	711	52		10-09-90
45	M	500	640	52		10-09-90
46	M	560	730	52		10-09-90
47	M	561	731	52		10-09-90
48	M	545	720	52		10-09-90
49	F	472	580	52	200	10-09-90
50	F	510	604	52	0	10-09-90

APPENDIX 6. Summary of otolith age/length data for Owikeno streams.

Age class/sex	Hypural Length (mm)	Nose/Fork Length (mm)	Sample Size
<u>Ashlulm River:</u>			
41 (F)	507	626	11
41 (M)	517	690	13
42 (F)			0
42 (M)	441	572	13
52 (F)	508	618	23
52 (M)	523	686	30
4's (F)	507	626	11
4's (M)	479	631	26
ALL 4's	487	630	37
5's (F)	508	618	23
5's (M)	523	686	30
ALL 5's	516	657	53
<u>Inziana River:</u>			
32 (F)			0
32 (M)	298	392	1
41 (F)	507	632	1
41 (M)	527	704	3
42 (F)	427	521	2
42 (M)	444	585	12
52 (F)	499	621	27
52 (M)	511	675	47
53 (F)			0
53 (M)	454	607	1
3's (F)			0
3's (M)	298	392	1
ALL 3's	298	392	1
4's (F)	454	558	3
4's (M)	461	608	15
ALL 4's	460	600	18
5's (F)	499	621	27
5's (M)	510	673	48
ALL 5's	506	654	75

APPENDIX 6 cont. Summary of otolith age/length data for Owikeno streams.

Age class/sex	Hypural Length (mm)	Nose/Fork Length (mm)	Sample Size
<u>Neechanz River:</u>			
32 (F)			0
32 (M)	506	681	1
41 (F)	467	555	1
41 (M)	480	675	2
42 (F)			0
42 (M)	374	470	3
52 (F)	500	602	47
52 (M)	510	664	42
53 (F)			0
53 (M)	410	527	1
3's (F)			0
3's (M)	506	681	1
ALL 3's	506	681	1
4's (F)	467	555	1
4's (M)	416	552	5
ALL 4's	425	552	6
5's (F)	500	602	47
5's (M)	507	661	43
ALL 5's	504	630	90

Sheemahant River:

41 (F)			0
41 (M)	504	692	1
42 (F)			0
42 (M)	422	552	5
52 (F)	495	596	29
52 (M)	519	658	34
4's (F)			0
4's (M)	436	575	6
ALL 4's	436	575	6
5's (F)	495	596	29
5's (M)	519	658	34
ALL 5's	508	629	63

APPENDIX 6 cont. Summary of otolith age/length data for Owikeno streams.

Age class/sex	Hypural Length (mm)	Nose/Fork Length (mm)	Sample Size
<u>Washwash River:</u>			
32 (F)			0
32 (M)	273	356	1
41 (F)	472	576	7
41 (M)	520	678	11
42 (F)			0
42 (M)	453	591	4
52 (F)	496	596	34
52 (M)	520	674	41
3's (F)			0
3's (M)	273	356	1
ALL 3's	273	356	1
4's (F)	472	576	7
4's (M)	502	655	15
ALL 4's	492	630	22
5's (F)	496	596	34
5's (M)	520	674	41
ALL 5's	509	639	75

Summary of all age/length data for 1990 sampling program:

32 (F)			0
32 (M)	359	476	3
41 (F)	493	605	20
41 (M)	516	686	30
42 (F)	427	521	2
42 (M)	435	567	37
52 (F)	499	605	160
52 (M)	516	671	194
53 (F)			0
53 (M)	432	567	2
3's (F)			0
3's (M)	359	476	3
ALL 3's	359	476	3
4's (F)	487	598	22
4's (M)	471	620	67
ALL 4's	475	615	89
5's (F)	499	605	160
5's (M)	515	670	196
ALL 5's	508	641	356