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Owikeno Lake (Rivers Inlet, Statistical Area 9)

Fall Sockeye Salmon Escapement

Survey 1989

by

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ABSTRACT

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.

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 1989 a total of 375,175 sockeye escaped to the Owikeno lake system. Three representatives of the commercial fishing industry accompanied department staff during the industry tour. This report summarizes the 1989 fall enumeration survey. Operation of the Genesee camp and required repairs are outlined.

RESUME

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.

Les saumons rouges qui reviennent de l'inlet Rivers frayent dans le reséau du lac Owikeno (zone statistique 9, Peches et Oceans Canada). On fait chaque anée un releve des tributaires du lac Owikeno pour faire le dénombrement lors des echappees de saumons rouges. En 1989, 375,175 saumons rouges se sont dirigés vers le reseau du lac Owikeno. Trois représentants du secteur de la pèche commerciale ont accompagne les employes du Ministere lors des evaluations. Le present rapport donne un résumé des releves effectues a l'automne de 1989. Il décrit egalement le fonctionnement du camp Genesee et les reparations qui doi ent etre apportées.

INTRODUCTION

Owikeno Lake (Statistical Area 9) is the largest sockeye salmon (Onchorhynchus 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).

METHODS & RESULTS

Machmell Camp was opened from September 5 to October 22, 1989. Water and propane systems were connected and repaired. Water had to be pumped from the lake in 1989 because the small creek previously used for water was dry.

Weather and water levels taken at Machmell Camp, Owikeno Lake appear in Table 1.

River systems were surveyed approximately every ten days, weather and water conditions permitting. Escapements for sockeye streams appear in Table 2. 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 3 documents the usual distance surveyed in each system and the distance surveyed in 1989. Table 4 lists the daily record of sockeye escapement surveys in 1989. Most of the streams exhibited low escapements in 1989. Exceptions and enumeration difficulties are noted below.

Sampling strategy was to collect hypural length, sex and otoliths from 100 fish in each of the ten streams surveyed in Owikeno Lake. The first 100 dead fish found on the stream were to be sampled. Samples were only collected from the Washwash, Asklulm and Inziana Rivers because dead fish were difficult to collect in the other systems. None of the samples were complete; 99 fish were sampled from the Asklulm River, 50 fish were sampled from the Inziana River and another 54 fish were sampled from the Washwash River. Eggs retained in the dead females sampled from the Inziana River were counted. Only 4 of the fish collected for the Washwash sample were from dead fish, the rest were from a fecundity sample seined from the mouth of the river. Data collected for the Washwash, Asklulm and Inziana Rivers appear in Appendices 1, 2 and 3 respectively. Ageing data was not available at the time of publication.

Female sockeye from the Washwash River were sampled for fecundity. Fifty fish were seined from the mouth of the river and sampled for hypural length, and number of eggs. Scales and otoliths were collected for ageing. Qualitative notes were made on the size of the eggs. If all of the eggs were

loose the fish was considered ripe. Ageing data was not available at the time of publication. Data collected appears in Appendix 1.

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

Genesee creek had an extremely low escapement of only 100 sockeye in 1989. High water is required to allow the fish to escape bear predation and low water conditions prevailed during all of September and most of October. Although 400 sockeye were counted in the stream September 20, all were eaten by bears. Rain in late October may have allowed some fish holding in the lake to move into the creek and spawn successfully.

INZIANA

Total sockeye escapement to the Inziana River was 15,000 in 1989. Spawning sockeye were observed from late August to mid October. Water conditions improved from silty in August and early September to clear in October.

Blocking the Inziana break through in 1988 was effective in diverting the water back to the main spawning beds in the lower portion of the river. The dike survived floods in the spring and fall of 1989.

MACHMELL

The Machmell was only surveyed once in 1989 by helicopter. The system was very silty and extensively channelized at the confluence of the Machmell and the Neechanz. Jet boats could not pass this area. Although conditions were poor in the mainstem of the river during the helicopter survey, Clear creek was in good condition. No fish were observed either in the creek or at its confluence with the Machmell River. No redds were observed and there was very little bird or bear activity on the river. Escapement to the Machmell River was 5000 sockeye.

NEECHANZ

Sockeye escapement to the Neechanz River was 18,000 fish in 1989. Counting conditions were fair in September and excellent in late October.

SHEEMAHANT

The Sheemahant River had an escapement of 125,000 sockeye. Water conditions were very stable in 1989 with

constant poor visibility due to silt and normal or slightly below normal water levels. This presented difficulties in obtaining an escapement estimates. The amount of redds dried up or left visible in the shallows during fluctuating water conditions usually provides and indication of abundance. Very few fish were observed in the shallows.

Three seine sets were made September 12 in three locations below the logging bridge. Total catch was 140 male, 81 female and 1 jack sockeye, and 17 coho. Three sets in the same areas on October 1 caught 111 male and 118 female sockeye, 52 coho and 2 dolly varden.

During the industry tour 4 gillnet drift sets were made above the logging bridge for a catch of 27 male and 14 female sockeye, 1 coho and 5 cutthroat trout. Two seine sets were made below the logging bridge for 65 male, 41 female and 1 jack sockeye, 23 coho and 4 cutthroat trout. A third set was attempted but caught on a snag. The net had to be cut free.

WANNOCK

Sockeye escapement to the Wannock River was 125,000. The Wannock River was extremely difficult to enumerate in 1989. Silty conditions prevailed through the year with full flood conditions during the Industry Tour. Three seine sets were made above Smokehouse Island during the Industry Tour for a total catch of 478 sockeye and 1 coho. Seining was not very effective because the extreme high water held much of the net off the bottom. The seine snagged on debris during two of the sets. The seine had to be lifted over debris for one set and a tree had to be pulled from the net during the other. Most of the fish in the net were lost before they could be counted but assuming no snags, the catch was estimated at 1200 to 1500 fish for all three sets. Normal seining operations for chinook in the Spring Hole could take place in 1989. Percy Walkus of the Owekeeno Band was seining for chinook brood stock for the hatchery. Eight chinook were caught and tagged. The remaining 42 tags were given to Percy to tag fish that were released from the brood stock pens. Chinook escapement to the Wannock River was 3000.

WASHWASH

The Washwash River had a very low escapement of only 13,000 sockeye in 1989. 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. Two live chinook were observed in the Washwash early in September.

Permanent repairs are still required to stabilize the Washwash River. The temporary dikes built in 1988 were not washed out in 1989 and no additional break throughs to the Tzeo were observed.

INDUSTRY TOUR

The industry tour occurred from October 10 to 20, 1989. All of the systems were surveyed except for the Dallery River. Three industry representatives and five fisheries personnel attended:

Industry representatives:

Name	Representing	Dates attended October
Dave Pashley	B.C. Packers, Bella Coola	11-20
Jim Cameron	UFAWU	10-20
Art Monk	B.C.P., Rivers Inlet	10-20

Fisheries representatives:

Name	Title	
S.K. Bachen	Technician	10-22
R.D. Goruk	Biologist	10-22
T. Perry	Operations Manager	19-22
G. Rahier	Fishery Officer	10-18
I. Winther	Biologist	10-22

CAMP REPAIR REQUIREMENTS

Repairs to the residence float and the generator float described in 1989 (Winther, Bachen & Goruk, 1990) still have to be completed. The Department of Public Works (DPW) inspected the Machmell Camp and identified a total of $81,000 in repairs required to bring the camp up to health and safety standards. Repairs were described in stages, $8000 of critical repairs to be completed in 1989-90, $46,000 of essential repairs to be completed 1990-91 and an additional $27,000 of essential repairs to be completed before 1993.

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.

TABLE 1. Owikeno Lake 1989 daily weather and lake levels.

DATE	RIVER LEVEL (FT) AM	PM	WEATHER	
SEPT 10			AM-sunny, hot	PM-calm, clear, hot
SEPT 11			AM-sunny, clear	PM-light breeze
SEPT 12			AM-clear, windy	PM-clear, windy
SEPT 13	9.60	9.60	AM-sunny, hot	PM-clear, windy
SEPT 14	9.60	9.50	AM-sunny, hot	PM-high cloud, windy
SEPT 15	9.50	9.40	AM-cloudy, windy	PM-
SEPT 16	9.25	9.10	AM-cloudy, rain	PM-
SEPT 17	8.95	8.90	AM-clear, calm	PM-clear, calm
SEPT 18	8.70	8.65	AM-cloudy, rain	PM-rain, windy
SEPT 19	8.50	8.45	AM-cloud	PM-cloud, showers
SEPT 20	8.40	8.35	AM-fog	PM-sunny, hot
SEPT 21	8.35	8.35	AM-sunny, clear	PM-sunny
SEPT 22	8.40	8.45	AM-sunny, hot	PM-sunny, hot, windy
SEPT 23	8.55	8.60	AM-sunny, hot	PM-high cloud
SEPT 24	8.60	8.65	AM-clear	PM-sunny, hot
SEPT 25	8.70	8.75	AM-clear	PM-overcast
SEPT 26	8.80	8.85	AM-overcast, showers	PM-sunny periods
SEPT 27	8.90	8.90	AM-sunny, hot	PM-clear, windy
SEPT 28	8.90	8.90	AM-sunny, hot	PM-clear, windy
SEPT 29	8.90	8.80	AM-rain	PM-rain
SEPT 30	8.80	8.70	AM-sunny, hot	PM-sunny, hot
OCT 01	8.70	8.60	AM-sunny, hot	PM-sunny, hot
OCT 02	8.60	8.50	AM-clear, cool	PM-sunny, hot
OCT 03	8.45	8.40	AM-cloudy	PM-clear, warm
OCT 04	8.30	8.30	AM-rain	PM-rain
OCT 05	8.40	8.40	AM-cloudy, cool	PM-clear, warm
OCT 06	8.40	8.40	AM-clear, cool	PM-clear, warm
OCT 07	8.40	8.40	AM-cloudy	PM-cloudy
OCT 08	8.40	8.40		
OCT 09	8.70	8.80		
OCT 10	9.25			
OCT 11	9.50			
OCT 12	9.70			
OCT 13	9.50			
OCT 17	8.60	10.00		
OCT 18	11.5			

Table 2: 1989 Escapements for Owikeno Lake systems

System	1989 Escapement
AMBACK	50,000
ASHLULM	12,000
DALLERY	2,500
GENESEE	100
INZIANA	15,000
MACHMELL	5,000
NEECHANZ	18,000
OWIKENO LAKE SPAWNERS	6,075
SHEEMAHANT	125,000
TZEO	3,500
WANNOCK	125,000
WASHWASH	13,000
Total	375,175

Table 3: Distances to survey termination sites from the mouths of streams and distances surveyed during the 1989 industry tour.

System	Normal Distance Surveyed (km)	Distance surveyed during the 1989 tour (km)	Max. distance surveyed in 1989 (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 - need to be measured
!! usually only survey to logging bridge

TABLE 4: OWIKENO LAKE 1988- DAILY RECORD OF SOCKEYE ESCAPEMENT SURVEYS

DATE	STREAM	EST. NO. SOCKEYE			METHOD	WATER			COMMENTS
		LIVE	DEAD	%NEW		COND.	VIS.	LEVEL	
OCT 02	AMBACK				FLOAT			EXT LOW	LARGE BODY OF FISH HOLDING IN FRONT OF RIVER
OCT 16	AMBACK	10000	200	90	WALK	CLEAR	EXLNT	NORMAL	VERY LARGE SCHOOLS OF FISH IN FRONT OF RIVER, 1 GRIZZLY, INDUSTRY TOUR TFY 50,000
AUG 24	ASHLULM	300		100	WALK	CLEAR	GOOD	NORMAL	WALKED LOWER BAR ONLY
SEP 08	ASHLULM	800		40	WALK	SILT	GOOD	NORMAL	600 LIVE/50 DEAD PINK, 50 LIVE/5 DEAD CHUM, 3 LIVE/1 DEAD CHIN
SEP 18	ASHLULM	800	250	0	WALK	CLEAR	EXLNT	BELOW NORM	400 LIVE/200 DEAD PK, 20 DEAD CHUM, 1 CHIN
SEP 30	ASHLULM	1000			HLCPTR	CLEAR	POOR	EXT LOW	FISH THROUGHOUT, 1 BEAR
OCT 15	ASHLULM	6500	120	80	WALK	CLEAR	EXLNT	NORMAL	MOST IN LOWER RIVER, INDUSTRY, TFY 12000
SEP 09	DALLERY	200		80	WALK	CLEAR	EXLNT	NORMAL	3 COHO, 1800 PINK, 25 CHUM, 12 CHIN, 1 BLACK, 1 GRIZZLY
SEP 24	DALLERY	750		30	WALK	CLEAR	EXLNT	BELOW NORM	10 COHO, 400 PINK, 4 CHIN, 2 GRIZZLIES, TFY 2500
SEP 20	GENESEE	400	6	100	WALK	CLEAR	EXLNT	BELOW NORM	FISH HOLDING IN FRONT OF RIVER
SEP 30	GENESEE	0			HLCPTR	CLEAR	FAIR	EXT LOW	FISH HOLDING IN FRONT OF RIVER
OCT 15	GENESEE	6	>100	100	WALK	CLEAR	EXLNT	BELOW NORM	ALL FISH EATEN BY BEARS, INDUSTRY, TFY 100
AUG 24	INZIANA	2500		100	WALK	SILT	POOR	NORMAL	
AUG 30	INZIANA	5000			HLCPTR	SILT	FAIR	NORMAL	
SEP 07	INZIANA	5000	35	50	WALK	SILT	POOR	NORMAL	
SEP 16	INZIANA	5000			WALK	TURBID	FAIR	BELOW NORM	THROUGHOUT TO CASCADES, 40 PINK, 1 GRIZZLY
SEP 30	INZIANA	2500			HLCPR		FAIR	NORMAL	MIXED SCHOOLS OF SX & COHO FROM MOUTH TO CABIN - 4-5000
OCT 14	INZIANA	350			FLOAT	CLEAR	EXLNT	NORMAL	INDUSTRY, TFY 15000
SEP 30	MACHMELL				HLCPTR	SILT	POOR	NORMAL	NO FISH, NO BIRD OR BEAR ACTIVITY, TFY 5000
SEP 20	MARBLE	150		50	WALK	CLEAR	EXLNT	NORMAL	FROM LOGGING BRIDGE DOWN
SEP 10	NEECHANZ	1000		100	FLOAT	SILT	POOR	BELOW NORM	DID NOT CHECK LOOP OR MARBLE CREEK
SEP 12	NEECHANZ				FLOAT	SILT	FAIR	BELOW NORM	SEINED 31 SX, 1 COHO FROM LOWER POOL
SEP 20	NEECHANZ	6000		80	FLOAT	SILT	FAIR	BELOW NORM	FISH THROUGHOUT, 11 GRIZZLY
SEP 30	NEECHANZ	3000		80	HLCPTR	TEA	FAIR	BELOW NORM	
OCT 05	NEECHANZ	3000		20	FLOAT	TURBID	FAIR	NORMAL	5 GRIZZLY
OCT 06	NEECHANZ				FLOAT	TURBID	FAIR	NORMAL	2 SEINE SETS FOR 45 COHO, 55 SX
OCT 15	NEECHANZ	3000		50	FLOAT	CLEAR	EXLNT	BELOW NORM	1 SEINE SET FOR 10 SX, 47 COHO, TFY 18000

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TABLE 4: OWIKENO LAKE 1988- DAILY RECORD OF SOCKEYE ESCAPEMENT SURVEYS

DATE	STREAM	EST. NO. SOCKEYE			METHOD	WATER			COMMENTS
		LIVE	DEAD	%NEW		COND.	VIS.	LEVEL	
SEP 12	SHEEMAHANT			95	FLOAT	SILT	NIL	NORMAL	3 SEINE SETS FOR 222 SX, 17 COHO
SEP 21	SHEEMAHANT				FLOAT	SILT	POOR	BELOW NORM	REDDS IN THE SHALLOWS, 1 GRIZZLY
SEP 29	SHEEMAHANT				HLCPTR	SILT	POOR	NORMAL	LOTS OF REDDS, 8 GRIZZLY
OCT 01	SHEEMAHANT			90	FLOAT	SILT	POOR	BELOW NORM	3 SEINE SETS FOR 231 SX, 52 COHO
OCT 12	SHEEMAHANT			95	FLOAT	SILT	NIL	NORMAL	4 GN DRIFTS FOR 40 SX, 1 COHO, 5 TROUT, 2 SEINE SETS FOR 117 SX, 23 COHO, 4 TROUT, INDUSTRY, TFY 125000
SEP 16	TZEO	300			WALK	SILT	GOOD	BELOW NORM	MOST FISH BELOW 2ND BREAKTHROUGH, 2 GRIZZLY
SEP 27	TZEO	300			WALK	SILT	POOR	NORMAL	
OCT 13	TZEO	1500			FLOAT	TEA	FAIR	NORMAL	INDUSTRY, TFY 3500
SEP 16	SHMHT FLATS	0			FLOAT	CLEAR	GOOD	NORMAL	
SEP 21	SHMHT FLATS	2000		100	FLOAT	CLEAR	EXLNT	BELOW NORM	FISH THROUGHOUT, ALL NEW
SEP 27	SHMHT FLATS	3500		40	FLOAT	CLEAR	EXLNT	NORMAL	
SEP 29	SHMHT FLATS	6500		100	FLOAT	CLEAR	EXLNT	BELOW NORM	FISH FROM CABIN TO WHISKY CREEK, 3 SCHOOLS SX, 3 OF COHO=1000
OCT 14	SHMHT FLATS	1200	50		FLOAT	CLEAR	GOOD	BELOW NORM	SCHOOLS ON SEP 29 JUST PASSING FISH, INDUSTRY, TFY 3250
OCT 18	WANNOCK				FLOAT	SILT	POOR	FLOOD	3 SEINE SETS FOR 478 SX, 1 COHO, INDUSTRY, TFY 125000
AUG 30	WASHWASH	1000			HLCPTR	CLEAR	GOOD	NORMAL	ONLY FLEW UPPER PORTION OF RIVER
SEP 07	WASHWASH	1600	50		WALK	CLEAR	EXLNT	NORMAL	200 PINK, 6 CHUM, 2 CHIN
SEP 17	WASHWASH	1200			WALK	CLEAR	EXLNT	BELOW NORM	1 GRIZZLY
SEP 25	WASHWASH	1350		10	WALK	CLEAR	EXLNT	NORMAL	1 GRIZZLY
SEP 30	WASHWASH	1200			HLCPTR	CLEAR	GOOD	NORMAL	2-3000 HOLDING AT THE MOUTH OF THE RIVER
OCT 01	WASHWASH				FLOAT	CLEAR		NORMAL	2 SEINE SETS AT RIVER MOUTH FOR 187 SX, 3 COHO
OCT 07	WASHWASH				FLOAT	CLEAR		NORMAL	1 SEINE SET AT RIVER MOUTH FOR 211 SX (80 FEMALES 50% RIPE)
OCT 13	WASHWASH	5000	100	50	WALK	CLEAR	EXLNT	NORMAL	100 BEAR KILLS, 2 GRIZZLY, INDUSTRY, TFY 13000
SEP 10	SUNDAY/WISK	6		100	FLOAT	CLEAR	GOOD	NORMAL	NO FISH AT SUNDAY
SEP 21	SUNDAY/WISK	200	1	80	FLOAT	CLEAR	EXLNT	BELOW NORM	NO FISH AT SUNDAY
SEP 27	SUNDAY/WISK	550		90	FLOAT	CLEAR	GOOD	NORMAL	SUNDAY 100, 100% NEW, WISKEY 450, 50% NEW
OCT 14	SUNDAY/WISK	250			FLOAT	CLEAR	FAIR	NORMAL	SUNDAY 25, WISKEY 225, INDUSTRY, TFY SUNDAY 125, TFY WISKEY 700
SEP 16	3RD NARROWS	100		80	FLOAT	TEA	GOOD	NORMAL	

- CONTINUED

TABLE 4: OWIKENO LAKE 1988- DAILY RECORD OF SOCKEYE ESCAPEMENT SURVEYS

DATE	STREAM	EST. NO. SOCKEYE			METHOD	WATER			COMMENTS
		LIVE	DEAD	%NEW		COND.	VIS.	LEVEL	
SEP 21	3RD NARROWS	200	1	80	FLOAT	CLEAR	EXLNT	BELOW NORM	
SEP 27	3RD NARROWS	400	10	50	FLOAT	CLEAR	GOOD	NORMAL	
OCT 01	3RD NARROWS				FLOAT	TEA	FAIR	BELOW NORMA	1 SEINE SET FOR 79 SX, 23 COHO
OCT 14	3RD NARROWS	125			FLOAT	TEA	FAIR	NORMAL	ALL FISH OLD, INDUSTRY, TFY 2000

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: Washwash River sockeye fecundity samples.
October 1, 1989, Otolith box # 80144.

Scale #	Otolith #	Sex	Length (cm)	Fecundity	Notes
	1	M	34.9		dead pitch
	2	M	38.4		dead pitch
	3	F	39.3		dead pitch
	4	M	44.8		dead pitch
1	5	F	48.1	5793	ripe, very small eggs
2	6	F	47.8	6213	large skeins
3	7	F	44.1	3903	
4	8	F	51.8	4713	
5	9	F	41.1	3481	ripe
6	10	F	48.0	4803	
7	11	F	50.4	5761	small eggs
8	12	F	41.2	3447	
9	13	F	42.0	3158	ripe, very small eggs
10	14	F	41.4	3423	
11	15	F	49.3	4882	
12	16	F	49.2	3621	ripe
13	17	F	48.5	4700	ripe, large eggs
14	18	F	46.5	4549	
15	19	F	50.2	5148	
16	20	F	46.6	4189	large eggs
17	21	F	53.1	5474	ripe
18	22	F	49.8	5226	ripe
19	23	F	51.8	6006	
20	24	F	53.2	5402	large eggs
21	25	F	50.5	3243	
22	26	F	43.1	6530	large skeins
23	27	F	52.6	3741	ripe
24	28	F	48.6	4750	ripe
25	29	F	54.7	5609	
26	30	F	49.8	5182	ripe
27	31	F	48.8	5123	
28	32	F	49.1	5037	large eggs
29	33	F	50.2	4076	ripe
30	34	F	41.9	2869	
31	35	F	45.9	3949	
32	36	F	50.0	5375	
33	37	F	50.3	5858	
34	38	F	50.2	5610	
35	39	F	49.9	5328	
36	40	F	40.7	3582	
37	41	F	39.8	3005	
38	42	F	47.0	3396	
39	43	F	51.5	3569	
40	44	F	44.3	3308	
41	45	F	49.4	4385	
42	46	F	42.0	3165	
43	47	F	50.0	6079	
44	48	F	52.5	6212	
45	49	F	45.2	3268	
46	50	F	45.0	4791	
47		F	44.8	3686	
48		F	41.8	3000	
49		F	50.0	4235	
50		F	51.8	5458	

Appendix 2: 1989 Asklulm River sockey

Otolith Box #	#	Sex	Length (cm)	Date
80146	1	F	40.8	18-9-89
80146	2	F	54.5	18-9-89
80146	3	M	38.6	18-9-89
80146	4	F	44.1	18-9-89
80146	5	F	51.3	18-9-89
80146	6	M	53.7	18-9-89
80146	7	F	41.6	18-9-89
80146	8	F	51.4	18-9-89
80146	9	M	53.3	18-9-89
80146	10	M	46.1	18-9-89
80146	11	M	38.7	18-9-89
80146	12	F	52.1	18-9-89
80146	13	F	44.4	18-9-89
80146	14	M	39.0	18-9-89
80146	15	M	38.8	18-9-89
80146	16	F	45.8	18-9-89
80146	17	M	45.6	18-9-89
80146	18	M	50.4	18-9-89
80146	19	F	41.0	18-9-89
80146	20	M	37.5	18-9-89
80146	21	F	51.1	18-9-89
80146	22	M	37.8	18-9-89
80146	23	M	43.5	18-9-89
80146	24	M	43.7	18-9-89
80146	25	M	40.9	18-9-89
80146	26	F	47.4	18-9-89
80146	27	F	41.4	18-9-89
80146	28	M	38.1	18-9-89
80146	29	F	45.7	18-9-89
80146	30	F	43.3	18-9-89
80146	31	M	40.9	18-9-89
80146	32	M	40.0	18-9-89
80146	33	M	38.8	18-9-89
80146	34	M	37.2	18-9-89
80146	35	F	44.5	18-9-89
80146	36	M	36.1	18-9-89
80146	37	M	39.2	18-9-89
80146	38	M	36.8	18-9-89
80146	39	M	39.5	18-9-89
80146	40	M	38.8	18-9-89
80146	41	F	51.2	18-9-89
80146	42	M	54.4	18-9-89
80146	43	M	39.4	18-9-89
80146	44	M	39.6	18-9-89
80146	45	M	38.2	18-9-89
80146	46	M	38.8	18-9-89
80146	47	F	53.9	18-9-89
80146	48	M	47.7	18-9-89
80146	49	M	55.4	18-9-89
80147	1	M	37.0	18-9-89
80147	2	M	42.8	18-9-89

Appendix 2: 1989 Asklulm River sockey

Otolith Box #	#	Sex	Length (cm)	Date
80147	3	M	37.9	18-9-89
80147	4	M	38.0	18-9-89
80147	5	M	46.2	18-9-89
80147	6	F	50.9	18-9-89
80147	7	M	53.6	18-9-89
80147	8	F	50.2	18-9-89
80147	9	F	49.5	18-9-89
80147	10	M	53.3	18-9-89
80147	11	M	41.3	18-9-89
80147	12	M	48.0	18-9-89
80147	13	M	40.5	18-9-89
80147	14	F	40.5	18-9-89
80147	15	M	40.4	18-9-89
80147	16	F	51.8	18-9-89
80147	17	M	38.9	18-9-89
80147	18	M	36.6	18-9-89
80147	19	M	40.5	18-9-89
80147	20	F	45.0	18-9-89
80147	21	M	41.5	18-9-89
80147	22	M	37.5	18-9-89
80147	23	F	43.3	18-9-89
80147	24	F	52.4	18-9-89
80147	25	M	36.8	18-9-89
80147	26	M	36.7	18-9-89
80147	27	M	37.0	18-9-89
80147	28	F	43.3	18-9-89
80147	29	M	41.4	22-9-89
80147	30	F	50.2	22-9-89
80147	31	M	37.7	22-9-89
80147	32	M	36.4	22-9-89
80147	33	M	39.2	22-9-89
80147	34	M	40.9	22-9-89
80147	35	F	41.3	22-9-89
80147	36	F	42.4	22-9-89
80147	37	M	47.8	22-9-89
80147	38	M	40.5	22-9-89
80147	39	F	51.4	22-9-89
80147	40	M	49.4	22-9-89
80147	41	M	50.4	22-9-89
80147	42	F	42.8	22-9-89
80147	43	M	38.4	22-9-89
80147	44	F	45.9	22-9-89
80147	45	F	42.8	22-9-89
80147	46	M	38.0	22-9-89
80147	47	F	54.3	22-9-89
80147	48	F	45.4	22-9-89
80147	49	M	35.7	22-9-89
80147	50	M	40.2	22-9-89

Appendix 3: 1989 Inziana River sockeye samples.

Otolith Box #	#	Sex	Length (cm)	Egg Retention	Date
80142	1	F	51.1	5	19-9-89
80142	2	F	48.2	22	19-9-89
80142	3	M	39.8		19-9-89
80142	4	M	53.0		19-9-89
80142	5	M	47.1		19-9-89
80142	6	F	45.7	6	19-9-89
80142	7	F	46.4	29	19-9-89
80142	8	F	50.1	4	19-9-89
80142	9	M	52.7		19-9-89
80142	10	M	41.4		19-9-89
80142	11	M	40.3		19-9-89
80142	12	F	49.6	19	19-9-89
80142	13	F	50.4	8	19-9-89
80142	14	M	38.4		19-9-89
80142	15	M	36.1		19-9-89
80142	16	M	54.3		19-9-89
80142	17	F	50.0	1	19-9-89
80142	18	M	29.5		19-9-89
80142	19	M	45.0		19-9-89
80142	20	F	50.0	51	19-9-89
80142	21	M	37.4		19-9-89
80142	22	F	52.4	2	19-9-89
80142	23	F	45.1	52	19-9-89
80142	24	M	39.3		19-9-89
80142	25	F	44.9	103	19-9-89
80142	26	F	40.3	255	19-9-89
80142	27	M	40.5		19-9-89
80142	28	F	50.9	6	19-9-89
80142	29	F	48.2	28	21-9-89
80142	30	F	42.4	3	21-9-89
80142	31	M	35.9		21-9-89
80142	32	M	44.2		21-9-89
80142	33	M	38.6		21-9-89
80142	34	M	49.9		21-9-89
80142	35	F	50.8	27	21-9-89
80142	36	F	47.5	4	21-9-89
80142	37	F	55.8	19	21-9-89
80142	38	F	46.3	158	21-9-89
80142	39	M	39.5		21-9-89
80142	40	M	29.5		21-9-89
80142	41	F	47.7	122	21-9-89
80142	42	M	35.7		23-9-89
80142	43	M	49.7		23-9-89
80142	44	M	54.9		23-9-89
80142	45	M	38.0		23-9-89
80142	46	F	48.7	2	23-9-89
80142	47	F	47.7	0	23-9-89
80142	48	F	52.2	0	23-9-89
80142	49	F	49.0	54	23-9-89
80142	50	M	28.4		23-9-89