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Alaska Department of Fish & Game
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ABSTRACT

King Salmon River, located near the head of Seymour Canal on Admiralty Island approximately 15 miles south of Juneau, Alaska, was selected as the chinook salmon, *Oncorhynchus tshawytscha*, brood stock of choice for Snettisham Hatchery in 1983. To develop this stock as a brood source, egg collections took place at King Salmon River from 1979-1992. From 1983 to 1992 a portable tripod weir was used to capture and enumerate chinook salmon entering the system. In addition chum salmon, *O. keta*, and pink salmon, *O. gorbuscha*, escaping into the system when the weir was operated, were enumerated each year.

A yearly average of 230 (range 117-311) adult chinook salmon escaped to the King Salmon River during 1983-92. The number of chinook salmon removed annually for brood stock development during this period averaged 17 (range 7-31) of each sex. The age composition of chinook salmon collected for brood stock development (based on scale pattern analysis using the European age designation) was 1.5%, 0.4; 9.8%, 1.3; 83.2%, 1.4; and 5.3%, 1.5; for females and 0.7%, 1.1%; 0.7%, 0.3; 26.6%, 1.2; 36.0%, 1.3; 35.3%, 1.4; and 0.7% 1.5 for males. An average of 12,417 (range 2,489-28,533) chum salmon and 31,553 (range 177-76,187) pink salmon escaped to the system during the same period.

Beginning in 1984, eggs were collected at Snettisham Hatchery from King Salmon River brood chinook salmon returning to that facility. From 1984 through 1991, excluding 1986 and 1987, and average of 5 females and 3 males per year were spawned at Snettisham Hatchery.

Returns of King Salmon River stock chinook salmon released at Snettisham Hatchery were poor; the cumulative survival (brood years 1979-88) was 0.29%. Because of this the brood stock development portion of the King Salmon River chinook salmon project was transferred to the National Marine Fisheries (NMFS) Little Port Walter Salmon Research Station (LPW) in 1988. King Salmon River brood eggs collected from King Salmon River (1988-92) and Snettisham Hatchery (1989-91) were transported to LPW for an accelerated brood stock

development program.

Analysis of length at each age and sex of King Salmon River stock fish returning to Snettisham and King Salmon River showed that the size of fish returning to Snettisham was significantly smaller than at King Salmon River.

Key Words: Chinook salmon, *Oncorhynchus tshawytscha*, brood stock development, weir, egg collection, age composition, length.

INTRODUCTION

King Salmon River (ADF&G stream number 111-17-10) is located near the head of Seymour Canal on Admiralty Island approximately 15 miles south of Juneau, Alaska (Figure 1). The entire drainage is within the USFS Admiralty Island National Monument. This river supports one of only two documented island spawning runs of chinook salmon (*Oncorhynchus tshawytscha*) in southeast Alaska. King Salmon River chinook salmon were selected as the brood stock of choice for Snettisham Hatchery in 1983 (Holland *et al.*, 1983). Factors in this selection were the proximity of the system to Snettisham, which is located at the head of Port Snettisham approximately 40 miles south of Juneau and 15 miles east of King Salmon River and the desire to diversify hatchery brood stocks in southeast Alaska (McGee *et al.*, 1988). Egg collections were done at King Salmon River from 1979 through 1992, excluding 1980. Additionally, eggs were collected for Crystal Lake Hatchery in 1975 and 1976. Eggs collected in 1975 were incubated at Auke Creek Hatchery when weather prevented transport to Crystal Lake Hatchery; progeny from these eggs were not released, (Kissner, 1984). Progeny from eggs collected in 1976 were released from Crystal Lake Hatchery but no returns were documented.

Before 1983, a helicopter was used to support day trips to the spawning areas and adults were captured directly from the redds. Success of early attempts was limited because of poor weather conditions, difficulty of brood stock collection, use of partially spawned fish, short duration of trips, and uncertainty of escapement counts used to set egg-collection limits. The egg-collection limits were based on a sliding scale (Table 1) developed by FRED, Sport Fish, and Commercial Fish Division personnel.

When this stock was designated as the preferred chinook salmon stock for Snettisham Hatchery, emphasis was placed on improving egg-collection quality and quantity. To facilitate this, a timber tripod weir was constructed and installed before the 1983 chinook salmon run occurred. The weir provided accurate escapement counts for chinook,

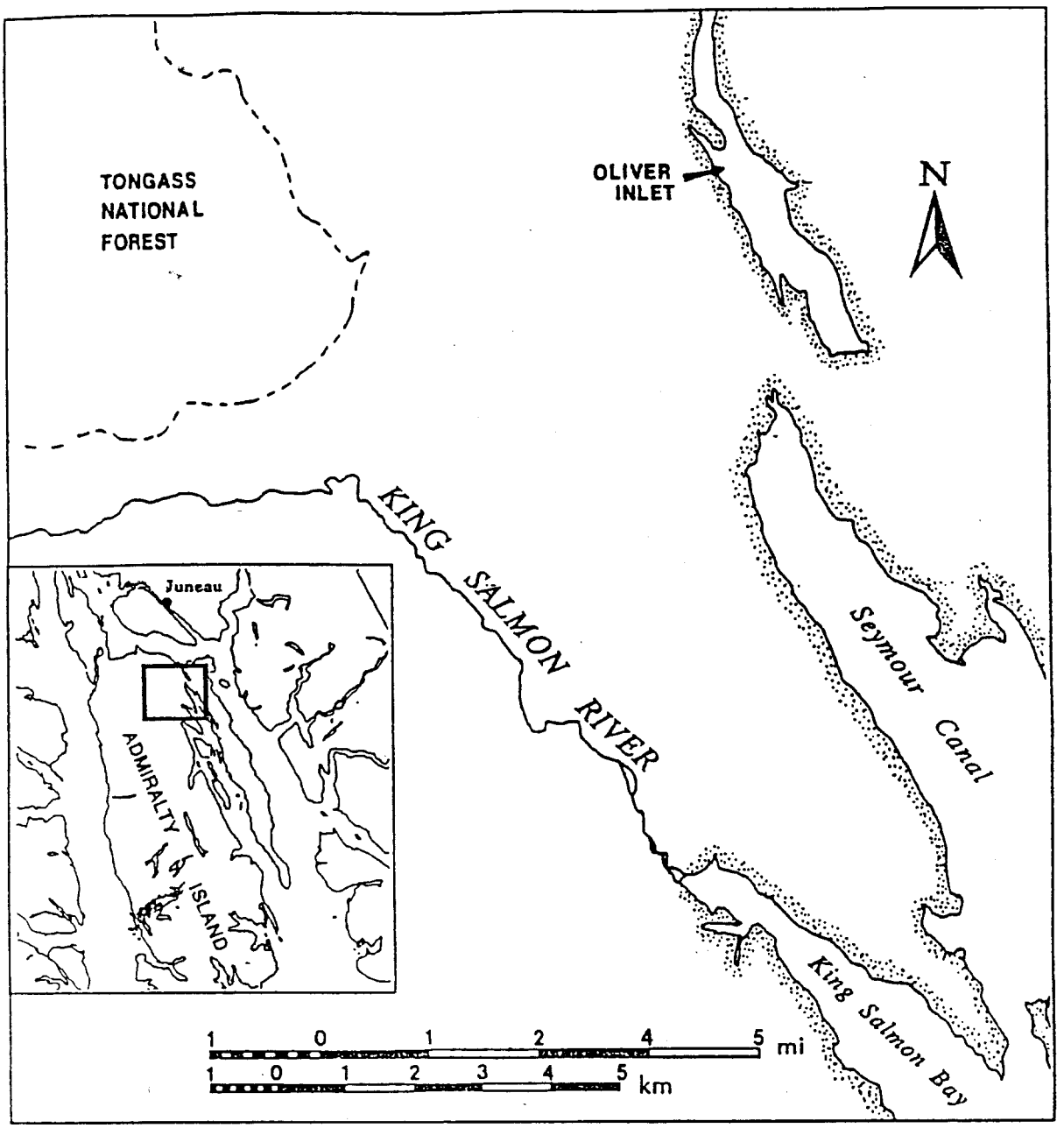

Figure 1. King Salmon River drainage, Admiralty Island, Southeast Alaska (from Pahlke 1992).

Table 1. King Salmon River (111-17-10) chinook salmon egg removal schedule.

MEG (minimum escapement goal) = 75

DEG (desired escapement goal) = 250

Escapement[a]	Hatchery May Take
Less than 75 fish	0 fish
First 75 fish	10 fish; 5 females
Next 100 fish	14 fish; 7 females
Next 100 fish	20 fish; 10 females
Remainder (over 275)	50%; half females

[a] Adults as determined by fish weir or aerial survey.

chum (*O. keta*), and pink (*O. gorbuscha*) salmon. The counts allowed for maximal chinook salmon egg collection while still complying with the sliding egg-collection schedule. In addition, the adults could be collected in pre-spawning condition which provides for maximal numbers and quality of eggs.

During the period 1979 through 1987 eggs collected at King Salmon weir were used to develop a chinook salmon brood stock at Snettisham Hatchery. Progeny from all King Salmon River brood eggs were tagged with coded wire to provide information on migration patterns, survival rates, and fishery contributions by these fish. The first returns of King Salmon River brood chinook salmon to Snettisham Hatchery arrived in 1984. However, return numbers of the King Salmon River stock to the sport and commercial fisheries and Snettisham Hatchery rack did not meet expectations and by 1988 it was apparent that timely brood stock development of this stock at Snettisham Hatchery was not possible. A co-operative agreement was reached with the National Marine Fisheries Service (NMFS) in 1988 to do the remainder of the King Salmon River brood stock development at the NMFS Little Port Walter Hatchery (LPW) on south Baranof Island. With one exception, from 1988 through 1992 King Salmon River brood chinook salmon eggs were transferred to LPW; the exception were the King Salmon River brood eggs collected at Snettisham Hatchery in 1988.

The King Salmon River weir was operated for 10 years, 1983 through 1992. During that time the project goals were to enumerate chinook, chum, and pink salmon, collect chinook salmon for egg collection according to the sliding egg-collection schedule, provide a comparison of aerial and weir counts, collect age and length data on chinook and chum salmon, and collect pathology and genetic samples from chinook salmon. The final wild egg collection occurred in July of 1992. In November of that year the wooden structures, tripods, tent platform, and other miscellaneous items were burned. In accordance with USFS policy, the remainder of the metal weir materials were removed in May of 1993.

MATERIALS AND METHODS

Weir Operation and Adult Enumeration

A 45-m timber tripod, aluminum channel, and galvanized steel conduit picket weir was constructed and installed on the system in 1983 and used through 1992 (Bertoni, 1983) The site chosen for installation was 200m upstream of mean high water elevation. The support camp consisting of a single 4.3-m by 4.9-m tent platform was constructed on the west bank adjacent to the weir. A 2.4-m by 2.4-m trap was built into the weir to capture immigrant adult salmon. The weir was dismantled and stored on site at the end of each operating season.

The weir was installed each year on, or about 29 June and maintained by at least two personnel for the duration of the season. The weir was removed each year on or about 30 July. Support flights from Juneau were done by helicopter, or by float plane landing in King Salmon Bay approximately 0.8 - 2.4 km from camp.

A small picket weir was also installed in a side branch of the main river about 200m west of the main weir site in 1984 through 1987. This weir was placed in response to concern that fish may have been passing upstream using this channel. The side channel branches off the main channel about 500m upstream from the weir site and feeds back about 100m downstream of the weir site. The side channel was monitored periodically for presence of fish during 1984 through 1987. As no fish were seen in this portion of the channel it was not weired in subsequent years.

Salmon migrating upstream were captured in the trap on the main weir. Counts through the weir were generally made during daylight hours. An opening in the weir face allowed fish to move into the trap. Fish were periodically removed from the trap and daily counts, by species, were kept. In the case of chinook salmon, each fish passed was categorized by sex and age status (either an adult or jack [age 1.2 or less] based on size). Although chinook

salmon were either released upstream or held in cages for use as brood stock, other species were released upstream; occasionally immigrant salmon were minimally impeded when age and size data were collected from chinook and chum salmon at the weir. The frequency of trap attendance depended on how rapidly the fish were moving upstream. Generally, four or five times per working day was sufficient to keep fish moving without congestion in the trap. As the run increased the trap was cleared more frequently. When no brood stock was to be collected, the fish were allowed to move upstream out of the trap by simply pulling two or more vertical pickets. Fish were also periodically passed upstream by pulling pickets on the weir away from the trap.

A daily record of stream height and temperature was taken at 0900. Stream height was measured in inches on a permanent stadia rod and temperatures were taken with a hand-held thermometer to the nearest degree Celsius.

Brood Stock Collection and Eggs Collected

Sport Fish Division personnel monitored King Salmon River chinook escapements consistently since the 1960's. With the other fishery divisions, they developed an egg-collection schedule for the system. The scale was based on minimal escapement goals and desired escapement goals for adult chinook salmon. Brood stock was available in increasing numbers after the minimal escapement goal was reached. The greatest proportion of immigrating chinook salmon that could be used as brood stock was 50% of the fish in excess of the desired escapement goal.

Timing of brood stock collection was determined by the status of escapement and run strength. Both females and males were collected in groups of one to ten as allowed by the schedule. Fish collected were representative of the escapement in that neither females or males were selected for by size, condition of ripeness, or physical condition. Frequent downstream foot surveys provided estimates of the number of individuals expected to move upstream, such estimates were used to project the total escapement. This allowed for

collection of brood stock in a manner representative of the entire run as opposed to being biased toward the later fish. Fish were held in 1-m x 1-m x 2.4-m plastic-coated wire-mesh holding pens. Pens were kept in slow moving shaded water 30m upstream from the weir.

Chinook salmon eggs were collected on-site from brood stock collected at the weir and held for ripening. Females were sorted before the egg collection, and those determined to be ripe were held separately. Handling of females was minimized by predicting time of ripeness based on historical spawning time. Previous surveys had shown that spawning activity began with fair regularity in the system (Kissner, 1984).

Procedures for egg collections followed guidelines established in the Fish Culture Manual (FRED staff, 1983). Females were checked for ripeness by hand and sorted. Ripe fish were killed by a blow to the head, bled at the gills, and hung head down on a bleeding rack suspended over the river. While females were bleeding a corresponding number of males (one for each female in most cases) were arbitrarily chosen from a holding pen and killed in the same manner.

For the years 1983-91 milt from each male was collected in an individual paper cup and kept cool. Females were then spawned individually into plastic wash pans. Eggs from each female were fertilized with the milt from a mixture of from two to four males. The mixture was gently stirred to uniformity before and after adding enough river water to cover the eggs. After 30 seconds the eggs were rinsed of blood and excess milt, and then poured into muslin lined aluminum transport baskets sitting in slowly moving river water. Great care was taken to avoid contamination of the eggs and milt with water prior to fertilization. Breakage of eggs at each step was minimized to avoid low fertilization rates that could be caused by excess yolk material (Wilcox and Stoss, 1983).

After water hardening in river water for a minimum of 60 minutes, the egg baskets were transferred to 24-liter IGLOO™ coolers. Crushed ice was placed below and above the eggs which were insulated from the ice by several layers of muslin. The coolers were transported

directly from the weir site to Snettisham Hatchery for incubation. In 1991 this process was similar with the exception that the coolers were transported by helicopter directly to Juneau and then by float plane to LPW.

In 1992 eggs from each female were collected into separate 2- gallon Ziplock™ bags. Milt was collected into 16-oz WhirlPak™ bags, pure oxygen was added, and the bags were sealed. The gametes were then placed into 24-liter IGLOO™ coolers on a layer of foam rubber under which had been placed a layer of crushed ice. A layer of foam rubber was placed on top of the gametes and an additional layer of crushed ice was placed on top of the foam. The coolers were transported to Juneau via helicopter and then to LPW via floatplane. Fertilization and water hardening followed standard procedures at LPW.

Aerial to Weir Count Comparisons

During the period 1975 through 1992 helicopter surveys were used to determine chinook salmon escapements into King Salmon River. In years of weir operation, aerial counts were compared to weir counts as an indication of aerial count accuracy.

Sampling and Analysis

Sampling of chinook and chum salmon occurred for a number of reasons. Age and length data were sought as baseline information for brood stock development and as part of coast-wide salmon studies. Pathology tissue samples were collected for a disease history of the stock and to screen brood stock for potential pathogens. Tissues were collected for genetic studies. Recoveries of chinook salmon tagged with coded wire provided opportunities for further analysis.

Length and Scales:

Scales and lengths from all chinook salmon brood stock carcasses and holding mortalities

were sampled. Lengths and scales were also taken from a subsample of chinook passed upstream in 1983, and in 1992, when all chinook salmon that passed through the weir were sampled. For each year of weir operation length and scales were taken from a portion of chum salmon that passed through the weir. Mid-eye to fork of tail lengths were taken with a flexible tape that was accurate to 1mm. Three or four scales per chinook salmon and one per chum salmon were collected from the left side of the fish from the area three rows above the lateral line, between the posterior margin of the dorsal fin and the anterior margin of the anal fin. Scales, sex, and length data were given to Region I stock biology section of the Commercial Fisheries Division. Age, length, and sex frequency determinations were made from the data.

Statistical tests for differences in length at time of return to Snettisham Hatchery and King Salmon River were done on the University of Alaska-Fairbanks mainframe computer using SAS General Linear Models Procedure and Tukey's Studentized Range Test.

The model was:

$$L_{ij}=\mu+S_i+e_{ij}$$

where: L_{ij}=length at return, μ=common mean, S_i= the effect of the *ith* stock (King Salmon River wild or Snettisham Hatchery), and e_{ij}= uncontrolled environmental error. This test was run for males of ages 1.2, 1.3, and 1.4, and for females ages 1.3 and 1.4.

Pathology Sampling:

Pathology samples were collected from each fish used as brood stock and stored on ice in WhirlPak™ bags. Samples consisted of a 1-cm section of kidney and in some cases a small piece of hind gut. In some years, ovarian fluid samples were collected from each female used as brood stock. Additional samples of hatchery cultured fry and/or smolts were collected periodically through time when there were concerns regarding the health of rearing juveniles.

Samples were sent to the FRED Division pathology laboratory in Juneau or Anchorage for analysis. The kidney samples were assayed for *Renibacterium salmoninarum* (the causative agent of bacterial kidney disease, BKD) and other bacteria, and the ovarian fluid samples were assayed for the viral particle that causes Infectious Hematopoietic Necrosis (IHN).

Genetic Sampling:

Genetic samples were collected from brood stock carcasses and consisted of an eyeball and small sections of heart, liver, and skeletal muscle. Samples were collected in WhirlPak™ bags and stored on ice. Samples collected in 1983 through 1990 were given to the NMFS Auke Bay Laboratory genetics section for starch-gel electrophoresis analysis. Samples collected in 1991 and 1992 were given to the FRED Division Genetics Laboratory in Anchorage.

Analysis of Returns:

King Salmon River stock chinook salmon released from Snettisham Hatchery had a very high tagged to untagged ratio and 100% of those released from LPW were tagged with coded wire. Returns of these fish have been sampled in commercial and sport fisheries using standard methods. The King Salmon River stock returning to Snettisham Hatchery was sampled by hatchery personnel and was documented by tag recoveries at the rack.

RESULTS

Weir Operation and Adult Enumeration

The weir operated effectively during the 10-year period. There were no cases when the weir was breached by high water. There has been no suggestion that any chinook or chum salmon have passed by or through the weir without being counted. Chinook salmon began moving into the trap on or around 30 June and increased in number until about 13 July. Subsequent

counts were low but fairly steady until the weir was removed on or about 29 July. There was very little variation in the run timing over time. Estimates of total escapement of chinook, chum, and pink salmon for each year of weir operation are presented in Table 2. Yearly counts are considered estimates because they include a downstream count at the end of weir operations. Chinook salmon escapement, divided into females, males, and jacks, is shown in Figure 2. Daily counts by species, and for chinook salmon, by sex and age, are presented by year in Appendix Tables 1-10.

Brood Stock and Egg Collection

Eggs collected at King Salmon River during 1979 through 1987 were incubated, and the fry reared, and released at Snettisham Hatchery. The first returns of King Salmon River brood chinook salmon to Snettisham Hatchery arrived in 1984. Egg collections from these fish and subsequent King Salmon River chinook salmon returning to Snettisham Hatchery through 1990 took place in conjunction with the wild egg collections. Progeny from these eggs were tagged with coded wire to provide information on migration patterns and fishery contributions by these fish.

Eggs collected at King Salmon River in 1988 through 1990 were incubated to the eyed stage at Snettisham Hatchery and then transported to LPW for final incubation, rearing and release. Eggs collected at King Salmon River in 1991 and 1992 were sent directly to LPW, with no incubation at Snettisham Hatchery. Eggs collected from King Salmon River brood chinook salmon returning to Snettisham Hatchery during the period 1984 through 1988 were incubated, reared, and released at Snettisham Hatchery. Eggs from King Salmon River brood chinook salmon returning to Snettisham during the period 1989 through 1991 were either incubated to the eyed stage at Snettisham (1989 and 1990) or sent directly to LPW (1991) for incubation, rearing, and release. All of the progeny from these eggs were or will be tagged with coded wire to allow for stock separation at LPW (LPW also has returns of Unuk and Chickamin River chinook salmon).

Table 2. Total estimated escapement of adult chinook, chum, and pink salmon to the King Salmon River, 1983-92.

Year	Chinook	Chum	Pink
1983	282	2,489	76,187
1984	311	15,189	22,069
1985	204	28,533	61,595
1986	281	22,353	10,239
1987	227	21,228	71,924
1988	243	11,352[a]	177[a]
1989	278	7,072	39,540
1990	208	6,008	3,320
1991	154	4,626	18,272
1992	117	5,340	12,211

[a] Weir count only, does not include a down stream survey.

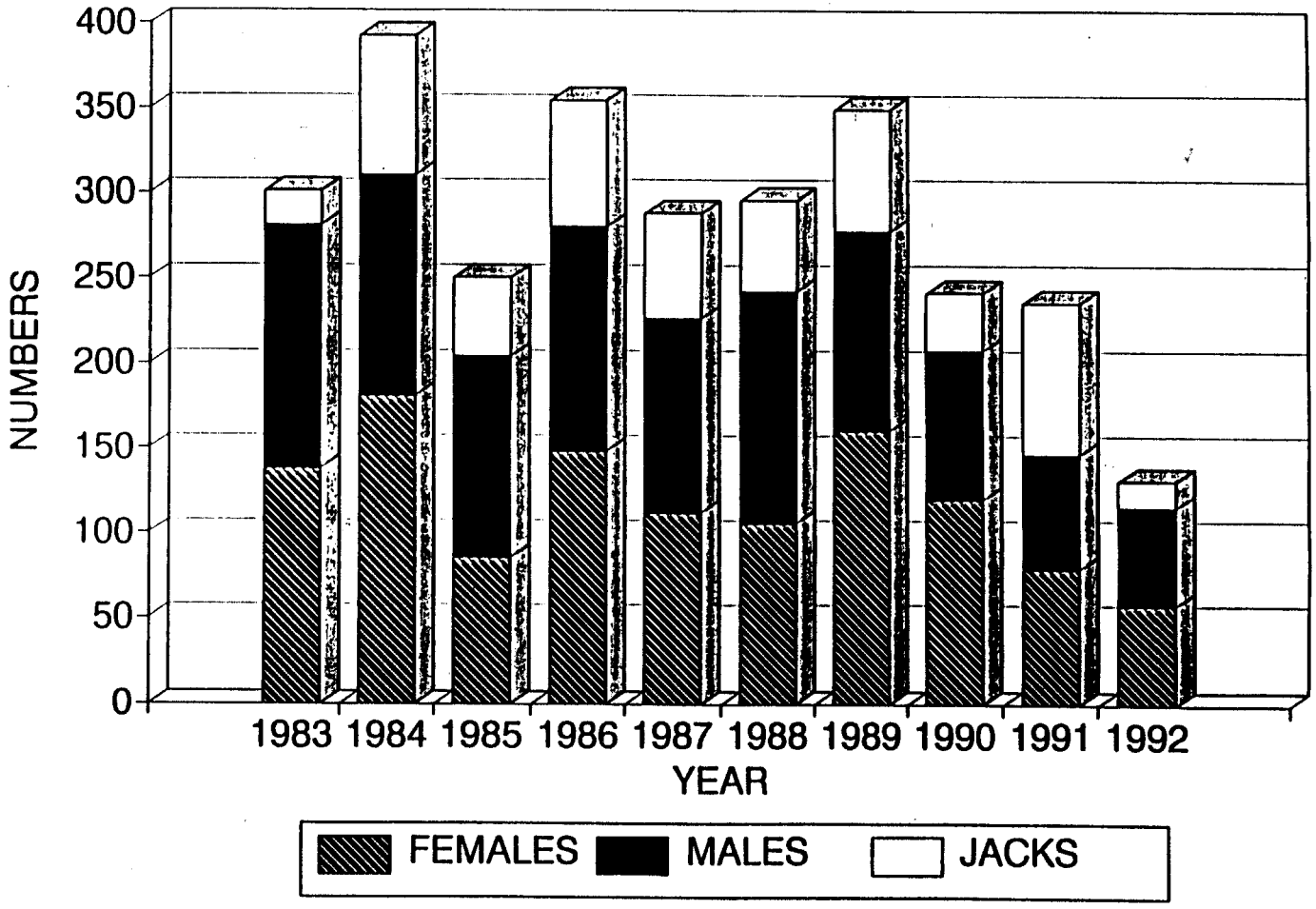

Figure 2. King Salmon River chinook salmon weir counts for females, males, and jacks, 1983–92.

Table 3 presents the number of chinook salmon that were collected for brood stock, the holding mortalities, the number of eggs collected, and the average fecundity during King Salmon River egg collections. Table 4 presents similar information for eggs collected at Snettisham Hatchery from chinook salmon of King Salmon River stock that returned to the hatchery.

During the 10-year operational cycle of the King Salmon River weir, eggs were collected during the period 22 July through 7 August. Timing at the hatchery was later with a period from 7 through 22 August.

Aerial to Weir Count Comparisons

Figure 3 shows peak chinook salmon survey counts for aerial and foot surveys during 1971 to 1992 and weir counts during 1983 to 1992. In every year of operation, weir counts exceeded the foot or aerial survey counts. For this comparison weir counts do not include fish used for brood stock. For detailed information refer to Pahlke (1992).

Sampling and Analysis

In all years of operation of the weir, age and size data were collected from brood fish. Other age and length data were collected as requested and available. Tissue samples for disease and genetic analysis were collected as requested by department principal scientists or other agencies. Analysis of returning adults has been possible through the recovery of coded wire tags in common property fisheries and at terminal return sites.

Length and Scales:

Age determination of sampled fish was not always possible due to the condition of scales collected, consequently sample sizes for length at age and age-class distribution may be less than the total number sampled. The length for each age, and age-class distribution of King

Table 3. Total number of chinook salmon used for brood stock, number of holding mortalities, number of eggs collected, and average fecundity of fish spawned at King Salmon River, 1979 - 1992.

Brood	Brood Stock		Mortalities		Eggs	
Year	Females	Males	Females	Males	Collected	Fecundity
1979	7	10	0	0	35,300	5,043
1981	5	5	1	0	20,000	4,000
1982	17	13	0	0	83,400	4,906
1983	23	18	2	7	135,791	5,904
1984	31	28	1	15	188,951	6,095
1985	15	17	1	0	90,077	6,005
1986	23	21	0	7	131,908	5,735
1987	18	16	1	2	111,000	6,167
1988	19	18	0	0	116,411	6,127
1989	17	13	4	6	106,000	6,235
1990	10	10	5	9	72,062	7,206
1991	10	10	0	0	60,000[a]	6,000
1992	7	7	1	3	40,348	5,764
TOTAL	202	186	16	49	1,191,248	

a All of these eggs died soon after arriving at Little Port Walter.

Table 4. Total number of chinook salmon used for brood stock, total escapement, number of eggs collected, and average fecundity of King Salmon River stock spawned at Snettisham Hatchery, 1984 - 1992.

Brood Year	Brood Stock		Total Escapement		Eggs Collected	FECUNDITY
	Females	Males	Females	Males		
1984	1	2	1	8	4,962	4,962
1985	6	3	11	11	32,136	5,356
1986	N/A[a]	N/A[a]	1	3	N/A[a]	-
1987	N/A[a]	N/A[a]	0	5	0	-
1988	9	7	17	22	54,809	6,090
1989	2	1	4	16	10,406	5,203
1990	17	9	35	37	110,093	6,476
1991	3	2	3	15	12,824	4,275
1992	0	0	0	2	0	0
TOTAL	38	24	72	119	225,230	

[a] King Salmon River chinook salmon returns to Snettisham rack were mixed with other brood stocks and not differentiated at spawning time.

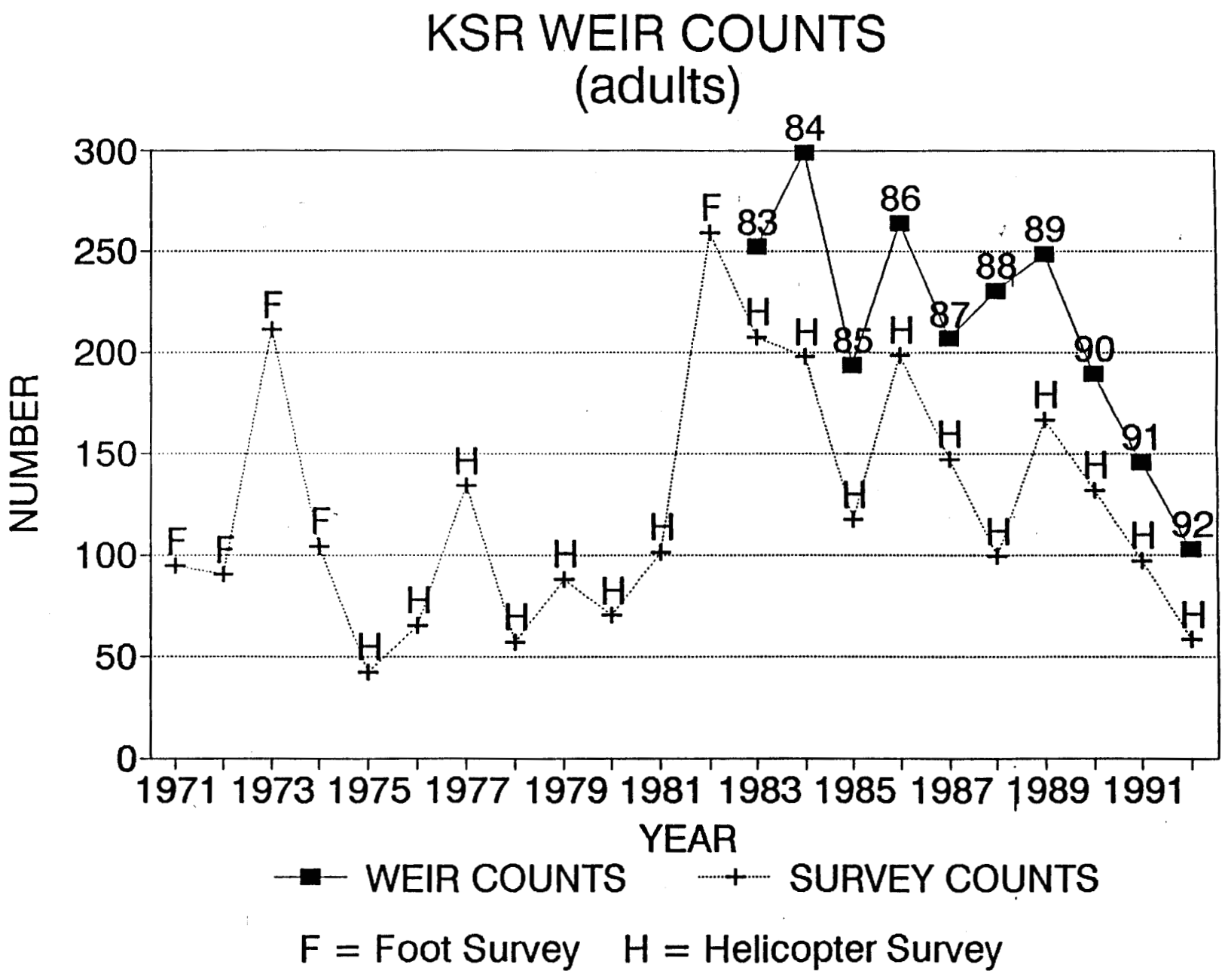

Figure 3. Comparison of weir and foot or helicopter surveys counts at King Salmon River, 1971 - 1992.

Salmon River chinook salmon sampled in 1983 is representative of the total return for that year (Tables 5 and 6). Age and length data for brood stock are not available for 1983, as they can not be separated from return data; or for 1992, when the data was lost. The length for each age and the age-class distribution of chinook salmon collected for brood stock development at King Salmon River during 8 years (1984-91) of weir operation are shown in Tables 7 and 8. Data in Tables 7 and 8 includes holding mortalities as well as fish spawned for brood stock development. The length for each age and the age composition of King Salmon River brood chinook salmon sampled at Snettisham Hatchery from 1984 to 1990 is shown in Tables 9 and 10.

Male King Salmon River brood chinook salmon in age classes 1.2, 1.3, and 1.4 returning to Snettisham Hatchery were significantly shorter than fish of the same sex and age class returning to King Salmon River; similar results were obtained for female chinook salmon of age class 1.4, (Table 11). Sample sizes for other age classes were not large enough to detect significant differences in length. Although not statistically tested, it also appears that females returning to Snettisham were of an older age, (96.1% $\geq$ age-1.4 vs 87.6% $\geq$ age-1.4 at King Salmon River).

Chum salmon age and length data collected during weir operations were analyzed by ADF&G Commercial Fisheries Division and will not be discussed in this report. Results are available from the Stock Biology Section.

Pathology Sampling:

The results of pathology analysis carried out on tissue samples collected from King Salmon River chinook salmon during the period 1979-92 are presented in Table 12. In general King Salmon River chinook salmon had a very low incidence of BKD and no incidence of IHNV or Viral Hemorrhagic Septicemia Virus (VHSV) in tested adults used as brood stock or as rearing juveniles at Snettisham Hatchery.

Table 5. Average length at each age for 1983 chinook salmon escaping to King Salmon River.

Brood Year	Sex[a]	Sample Size	AGE 0.2	1.2	0.4	1.3	0.5	1.4	1.5
1983	F	46	590[b]	639[b]	805	785	830	850	905
	M	42	590	603	830	738		883	899
	B	88	590	610	817	742	830	858	904

[a] F = female, M = male, B= both sexes combined.

[b] Fish may have been improperly sexed.

Table 6. Age composition for 1983 chinook salmon escapement to King Salmon River.

Brood Year	Sex[a]	Sample Size	Percent At Age 0.2	1.2	0.4	1.3	0.5	1.4	1.5
1983	F	46	2.2[b]	4.3[b]	4.3	4.3	2.2	67.4	15.2
	M	42	2.4	21.4	4.8	42.9		26.2	2.4
	B	88	2.3	12.5	4.5	22.7	1.1	47.7	9.1

[a] F = female, M = male, B= both sexes combined.

[b] Fish may have been improperly sexed.

Table 7. Average length at age of chinook salmon collected for brood stock development at King Salmon River, 1984-1991.

Brood		Sample	Length at Age						
Year	Sex[a]	Size	1.1	0.3	1.2	0.4	1.3	1.4	1.5
1984	F	24					793	869	890
	M	37			630		766	939	
	B	61			630		769	894	890
1985	F	13					797	888	
	M	17			566		788	913	
	B	30			566		790	890	
1986	F	23					840	882	
	M	25			579		693	853	
	B	48			579		738	875	
1987	F	12					805	912	
	M	16	455		643		768	908	
	B	28	455		643		722	911	
1988	F	16						885	970
	M	13		795	640		847	895	
	B	29		795	640		847	888	970
1989	F	17				875	880	894	930
	M	18			585		831	903	
	B	35			585	875	847	899	930
1990	F	17[b]					990	885	
	M	9[b]			565		775	847	975
	B	26[b]			565		775	875	975
1991	F	9						894	
	M	4					1000	903	
	B	13					1000	896	
AVERAGE	F	131				875	843	890	925
	M	139	455		606		781	902	
	B	270	455		606	875	812	896	925

[a] F = female, M = male, B= both sexes combined.
[b] Includes carcasses sampled above the weir.

Table 8. Age composition of chinook salmon collected for brood stock development at King Salmon River, 1984 -1991.

Brood	Females				Males					
Year	0.4	1.3	1.4	1.5	1.1	0.3	1.2	1.3	1.4	1.5
1984	0	1	21	2	0	0	15	10	12	0
1985	0	4	9	0	0	0	4	12	1	0
1986	0	4	19	0	0	0	10	9	6	0
1987	0	1	11	0	1	0	3	9	3	0
1988	0	0	15	1	0	1	2	2	8	0
1989	2	3	8	4	0	0	2	6	10	1
1990	0	0	17	0	0	0	1	1	6	0
1991	0	0	9	0	0	0	0	1	3	0
TOTAL	2	13	109	7	1	1	37	50	49	1
PERCENT	1.5%	9.9%	83.2%	5.3%	0.7%	0.7%	26.6%	36.0%	35.3%	0.7%

Table 9. Length at each age of King Salmon River chinook stock returning to Snettisham Hatchery, 1984 - 1991.

Brood Year	Sex[a]	Sample Size	Age 1.1	1.2	1.3	1.4	1.5
1984	F	1			794		
	M	8			732		
	B	9			739		
1985	F	11				848	
	M	10				813	
	B	21				832	
1986	F	1					880
	M	3	350	575			
	B	4	350	575			880
1987	F	0					
	M	5	365	551			
	B	5	365	551			
1988	F	17			785	824	
	M	22		541	716	793	
	B	39		541	726	814	
1989	F	4				802	900
	M	16		580	707	745	
	B	20		580	707	773	900
1990	F	18				876	
	M	28	430	559	763	858	975
	B	46	430	559	763	867	975
1991	F	1				725	
	M	12		531	731		
	B	13		531	731	725	
AVERAGE	F	53			789	846	893
	M	104	370	517	726	802	975
	B	157	370	517	747	826	937

[a] F = female, M = male, B= both sexes combined.

Table 10. Age composition of King Salmon River chinook salmon returning to Snettisham Hatchery, 1984 - 1991.

Brood	Females			Males			
Year	1.3	1.4	1.5	1.1	1.2	1.3	1.4
1984	1	0	0	0	0	8	0
1985	0	11	0	0	0	0	10
1986	0	0	1	1	2	0	0
1987	0	0	0	1	2	2	0
1988	1	16	0	0	8	6	8
1989	0	2	2	0	5	9	2
1990	0	18	0	1	7	4	15
1991	0	1	0	0	8	4	0
TOTAL	2	48	2	4	32	33	35
PERCENT	3.8%	92.3%	3.8%	3.8%	30.8%	31.7%	33.6%

Table 11. Comparison of average lengths (mid-eye to fork of tail, mm), by sex and age class, for King Salmon River brood chinook salmon at Snettisham Hatchery and King Salmon River.

AGE Sex	Class	N	Snettisham Hatchery	N	King Salmon River
MALES	1.1	3	382	1	455
	1.2	35	555[a]	38	606[a]
	1.3	33	717[b]	61	781[b]
	1.4	40	833[c]	46	902[c]
FEMALES	1.3	2	789	13	843
	1.4	65	857[d]	104	890[d]
	1.5	3	893	7	925

[a] Vary significantly ($P > 0.0001$).

[b] Vary significantly ($P > 0.0006$).

[c] Vary significantly ($P > 0.0001$).

[d] Vary significantly ($P > 0.0001$).

Table 12. Pathology analysis of King Salmon River brood chinook salmon for the period 1979-92 (from FRED Division Pathology Laboratory).

Sample Source	Sample Date	Sample Life Stage	Results
King Salmon River	10/78	adults	0/12 BKD positive
King Salmon River	8/79	adults	0/21 BKD positive
King Salmon River	7/79	adults	0/5 BKD positive
Snettisham Hatchery	6/80	fry	2/6 presumptive amoeba
Snettisham Hatchery	5/81	pre-smolt	11/30 BKD positive
Snettisham Hatchery	4/82	fry	0/2 pools IHNV positive
King Salmon River	7-8/83	adults	0/29 BKD positive
Snettisham Hatchery	3/83	fingerling	0/10 BKD and *A. salmonicida* positive
King Salmon River	10/84	adults	0/53 BKD positive
Snettisham Hatchery	9/84	juveniles	1/10 Poikilocytosis positive 4/10 nuclear segmentation positive
Snettisham Hatchery	4/85	smolt	1/60 BKD positive
Snettisham Hatchery	4/85	fry	0/68 BKD positive
Snettisham Hatchery	6/85	fry	Water quality problems
Snettisham Hatchery	8/85	adult	2/9 BKD positive
King Salmon River	7-8/85	adult	0/33 BKD positive
King Salmon River	7-8/86	adult	0/44 BKD positive
Snettisham Hatchery	8/86	adult	0/43 BKD positive
Snettisham Hatchery	9/86	adult	0/20 BKD positive
King Salmon River	8/87	adult	0/33 BKD positive
Little Port Walter	5/88	adult	5/5 BKD positive
Snettisham Hatchery	6/88	fry	*Trichodina* infection possible poor water quality
King Salmon River	7/89	adult	0/31 BKD positive by FAT 9/31 BKD positive by ELISA
Snettisham Hatchery	8/89	adult	1/105 BKD positive
King Salmon River	7/91	adult	2/20 BKD positive; 0/20 IHNV positive
Little Port Walter	7/91	fingerling	gas bubble disease
King Salmon River	7/92	adult	0/7 IHNV positive; 0/7 VHSV[a] positive 1/14 BKD positive

[a] Viral Hemorrhagic Septicemia Virus

Genetic Sampling:

The results of starch-gel electrophoretic analysis carried out on tissue samples collected in early years from King Salmon River chinook salmon are presented in Gharrett *et al.*, 1987. The authors found the King Salmon River chinook salmon, and most other southeast Alaskan chinook salmon, to be intermediate genetically, as characterized at 28 protein coding loci, between western Alaska and non-Alaskan chinook salmon populations to the south. More recently collected samples have not been analyzed.

Analysis of Returns:

For a summary of King Salmon River brood chinook salmon released from Snettisham and Little Port Walter refer to Table 13. Survival of King Salmon River stock chinook salmon released at Snettisham Hatchery have been poor. Chinook salmon smolts of this brood had an average overall smolt-to-adult survival of 0.29% (for brood years 1979 through 1988; Table 14). Exploitation rates of King Salmon River chinook salmon released from Snettisham Hatchery were 54.8% and 33.3% for commercial and sport fisheries respectively; they were 88.1% overall. Over 82% of the total harvest of Snettisham/King Salmon River chinook salmon occurred in Districts 110 and 111 (Table 15) and less than 1% has occurred in "outside waters".

DISCUSSION

Operations at King Salmon River were motivated by the desire to build a chinook salmon brood of this stock for Snettisham Hatchery. This goal was not accomplished. The failure was due to poor survivals of the chinook salmon smolts released from Snettisham Hatchery and the high harvest rates on returning adults. It is unlikely that the low survivals are a result of the stock because Andrew Creek stock smolts released from the hatchery have also done poorly. Of note, is the significantly greater survival of hatchery smolts when they are released off site (Josephson and Kelley). It is possible that chinook salmon released from the

Table 13. Summary of release of King Salmon River brood chinook salmon from Snettisham and Little Port Walter (LPW) Hatcheries.

Brood Year	Release Site	Release Date	Release Size (g)	Tag Code	Tags Released	Total Release
76	BLIND SLOUGH[a]	06/01/77	20.4	040102	2,798	3,099
79	SNETTISHAM	05/01/81	12.1	042049	23,569	26,746[b]
81	SNETTISHAM	05/31/83	8.3	042059	7,471	7,471
82	SNETTISHAM	06/10/84	14.9	042363	63,739	65,240
83	SNETTISHAM	06/10/85	12.9	040163	9,010	10,078
83	SNETTISHAM	06/10/85	12.9	040263	9,450	10,570
83	SNETTISHAM	06/10/85	12.9	040363	9,655	10,800
83	SNETTISHAM	06/10/85	12.9	040463	10,020	11,208
83	SNETTISHAM	06/10/85	12.9	040563	9,458	10,579
83	SNETTISHAM	06/10/85	12.9	040663	9,970	11,152
83	SNETTISHAM	06/10/85	12.9	040763	9,423	10,540
83	SNETTISHAM	06/10/85	12.9	040863	9,897	11,071
83	SNETTISHAM	06/10/85	12.9	040963	9,608	10,747
83	SNETTISHAM	06/10/85	12.9	041063	6,653	7,442
				TOTAL	93,144	104,187
84	SNETTISHAM	06/18/86	9.7	041317	3,140	3,712
84	SNETTISHAM	06/18/86	9.7	045163	8,806	10,409
84	SNETTISHAM	06/18/86	9.7	045363	17,945	21,212
84	SNETTISHAM	06/18/86	9.7	045463	17,580	20,780
84	SNETTISHAM	06/18/86	9.7	045563	17,894	21,151
84	SNETTISHAM	06/18/86	9.7	045663	17,748	20,979
84	SNETTISHAM	06/18/86	9.7	045763	17,863	21,115
84	SNETTISHAM	06/18/86	9.7	045863	17,713	23,553[c]
				TOTAL	118,689	142,911

- continued -

[a] Released from Crystal Lake Hatchery.

[b] Includes approximately 500 unmarked fish.

[c] Includes approximately 2,600 unmarked fish.

Table 13 (cont). Summary of release of King Salmon River brood chinook salmon from Snettisham and Little Port Walter (LPW) Hatcheries.

Brood Year	Release Site	Release Date	Release Size (g)	Tag Code	Tags Released	Total Release
85	SNETTISHAM	06/07/87	7.1	043563	25,140	32,000
85	SNETTISHAM	06/07/87	7.1	043663	25,066	32,000
85	SNETTISHAM	06/07/87	7.1	044763	8,511	11,000
85	SNETTISHAM	06/07/87	7.1	044863	8,246	11,000
				TOTAL	66,963	86,000[d]
86	SNETTISHAM	06/03/88	10.7	042963	24,196	30,862
86	SNETTISHAM	06/03/88	10.7	043963	24,564	31,332
86	SNETTISHAM	06/03/88	10.7	044963	6,450	8,227
				TOTAL	55,210	70,421
87	SNETTISHAM	05/31/89	11.8	043763	29,291	31,161
87	SNETTISHAM	05/31/89	11.8	043863	29,803	31,705
87	SNETTISHAM	05/31/89	11.8	045063	8,590	9,138
				TOTAL	67,684	72,004
88	LPW	05/15/90	21.9	030116	12,424	12,486
88	LPW	05/15/90	17.7	030119	12,293	12,480
88	LPW	05/15/90	19.2	030121	12,363	12,476
88	LPW	05/15/90	19.6	030122	12,359	12,484
88	LPW	05/15/90	18.5	030125	12,431	12,493
88	LPW	05/15/90	34.3	030216	11,789	11,813
88	LPW	05/15/90	31.5	030217	11,574	11,703
88	LPW	05/15/90	18.5	031947	3,458	3,458
				TOTAL	88,691	89,393
88	SNETTISHAM	06/02/91	12.6	042563	19,034	19,724

- continued -

[d] Includes approximately 1,700 unmarked fish.

Table 13 (cont). Summary of release of King Salmon River brood chinook salmon from Snettisham and Little Port Walter (LPW) Hatcheries.

Brood Year	Release Site	Release Date	Release Size (g)	Tag Code	Tags Released	Total Release
89	LPW	05/15/91	23.2	030218	12,840	12,892
89	LPW	05/15/91	20.3	030219	12,340	12,515
89	LPW	05/15/91	24.1	030220	12,478	12,541
89	LPW	05/15/91	21.9	030221	12,629	12,680
89	LPW	05/15/91	48.3	030222	4,802	4,826
89	LPW	05/15/91	63.3	030223	4,350	4,421
89	LPW	05/15/91	47.1	030224	4,740	4,778
89	LPW	05/15/91	21.1	030225	7,701	7,779
89	LPW	05/15/91	21.0	030226	7,998	7,998
89	LPW	05/15/91	42.7	032052	3,773	3,773
				TOTAL	83,651	84,203
90	LPW	05/18/92	14.9	030227	16,093	17,193
90	LPW	05/18/92	14.9	030228	16,581	17,236
90	LPW	05/18/92	14.8	030229	15,771	17,388
90	LPW	05/18/92	21.2	030230	8,449	8,621
90	LPW	05/18/92	22.3	030231	9,062	9,313
90	LPW	05/18/92	20.9	030232	9,113	9,414
90	LPW	05/18/93	14.8	031618	24,763	25,555
				TOTAL	99,832	104,720
91	LPW	05/18/93	22.9	032333	4,136	4,308

Table 14. Retrun and percent survival by brood year for King Salmon River brood chinook salmon released at Snettisham Hatchery, 1981-90.

BROOD YEAR	TOTAL RELEASE	RETURN YEAR	RETURN AGE	HATCHERY ESCAPEMENT	GILLNET	SEINE	SUMMER TROLL	WINTER TROLL	SPORT	TOTAL	PERCENT SURVIVAL
1979	26,746	1982	1.1	2	0	7	0	0	2	11	0.04%
		1983	1.2	19	9	0	2	0	2	32	0.12%
		1984	1.3	9	21	0	49	0	79	158	0.59%
		1985	1.4	21	27	0	19	23	6	96	0.36%
		1986	1.5	1	4	0	0	0	0	5	0.02%
			Total	52	61	7	70	23	89	302	1.13%
1981	7,471	1984	1.1	0	0	0	0	0	0	0	0.00%
		1985	1.2	0	0	0	0	0	0	0	0.00%
		1986	1.3	0	0	0	2	0	0	2	0.02%
		1987	1.4	0	2	0	0	0	0	2	0.03%
		1988	1.5	0	0	0	0	0	0	0	0.00%
			Total	0	2	0	2	0	0	4	0.05%
1982	65,240	1985	1.1	1	0	3	0	0	0	4	0.01%
		1986	1.2	2	64	0	0	0	29	95	0.15%
		1987	1.3	20	65	4	39	0	159	286	0.44%
		1988	1.4	24	46	0	19	32	46	166	0.25%
		1989	1.5	2	0	0	0	2	0	4	0.01%
			Total	49	174	7	58	34	234	556	0.85%
1983	104,187	1986	1.1	1	0	0	0	0	1	2	0.00%
		1987	1.2	4	14	0	0	0	18	36	0.03%
		1988	1.3	8	15	0	7	0	45	75	0.07%
		1989	1.4	4	1	0	0	0	1	6	0.01%
		1990	1.5	1	0	0	0	0	0	1	0.00%
			Total	18	30	0	7	0	65	121	0.12%
1984	142,911	1987	1.1	1	0	5	0	0	1	7	0.00%
		1988	1.2	8	19	0	0	0	14	41	0.03%
		1989	1.3	11	42	0	91	11	41	196	0.14%
		1990	1.4	33	13	0	18	57	9	130	0.09%
		1991	1.5	1	2	0	6	10	0	19	0.01%
			Total	54	76	5	115	78	65	392	0.27%
1985	86,000	1988	1.1	0	0	0	0	0	0	0	0.00%
		1989	1.2	5	3	0	0	0	6	15	0.02%
		1990	1.3	4	6	0	20	3	18	51	0.06%
		1991	1.4	1	0	0	2	7	0	10	0.01%
		1992	1.5	0	0	0	0	0	0	0	0.00%
			Total	10	9	0	22	10	25	76	0.09%
1986	70,421	1989	1.1	0	0	0	0	0	0	0	0.00%
		1990	1.2	7	3	0	0	0	22	32	0.05%
		1991	1.3	4	0	8	36	2	1	51	0.07%
		1992	1.4	1	2	0	4	7	1	16	0.02%
		1993	1.5					0		0	0.00%
			Total	12	5	8	40	9	25	99	0.14%
1987	72,004	1990	1.1	2	3	0	0	0	0	5	0.01%
		1991	1.2	9	9	16	0	0	1	35	0.05%
		1992	1.3	1	23	0	21	6	78	129	0.18%
		1993	1.4					20		20	0.03%
		1994	1.5							0	0.00%
			Total	12	36	16	21	26	79	190	0.26%
1988	19,724	1991	1.1	0	0	0	0	0	0	0	0.00%
		1992	1.2	0	0	5	0	0	0	5	0.02%
		1993	1.3					0		0	0.00%
		1994	1.4							0	0.00%
		1995	1.5							0	0.00%
			Total	0	0	5	0	0	0	5	0.02%
GRAND TOTALS	594,704			207	394	47	335	180	581	1,744	0.29%
PERCENT OF TOTAL RETURN				11.9%	22.6%	2.7%	19.2%	10.3%	33.3%		

EXPLOITATION RATES	COMMERCIAL	SPORT	TOTAL
	54.8%	33.3%	88.1%

Table 15. Contribution of King Salmon River brood chinook salmon released at Snettisham Hatchery by return year, gear and district, 1982-92.

RETURN YEAR	GEAR	DISTRICT 103	109	109/110	109/112	110	110/111	111	112	112/114	113	113/114	114	115	TOTAL
1982	WINTER TROLL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TROLL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GILLNET	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SEINE	0	0	0	0	3	0	0	4	0	0	0	0	0	7
	SPORT	0	0	0	0	0	0	2	0	0	0	0	0	0	2
	TOTAL	0	0	0	0	3	0	2	4	0	0	0	0	0	9
1983	WINTER TROLL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TROLL	0	0	0	0	0	0	0	2	0	0	0	0	0	2
	GILLNET	0	0	0	0	0	0	9	0	0	0	0	0	0	9
	SEINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SPORT	0	0	0	0	0	0	2	0	0	0	0	0	0	2
	TOTAL	0	0	0	0	0	0	11	2	0	0	0	0	0	13
1984	WINTER TROLL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TROLL	0	4	1	0	14	4	0	8	0	0	0	14	2	49
	GILLNET	0	0	0	0	0	0	7	0	0	0	0	0	14	21
	SEINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SPORT	0	0	0	0	0	0	79	0	0	0	0	0	0	79
	TOTAL	0	4	1	0	14	4	86	8	0	0	0	14	16	149
1985	WINTER TROLL	0	3	0	0	21	0	0	0	0	0	0	0	0	23
	TROLL	0	3	0	0	0	0	13	3	0	0	0	0	0	19
	GILLNET	0	0	0	0	0	0	27	0	0	0	0	0	0	27
	SEINE	0	0	0	0	3	0	0	0	0	0	0	0	0	3
	SPORT	0	0	0	0	0	0	5	0	1	0	0	0	0	6
	TOTAL	0	5	0	0	24	0	45	3	1	0	0	0	0	78
1986	WINTER TROLL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TROLL	0	0	0	0	2	0	0	0	0	0	0	0	0	2
	GILLNET	0	0	0	0	0	0	51	0	0	0	0	0	17	68
	SEINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SPORT	0	0	0	0	0	0	30	0	0	0	0	0	0	30
	TOTAL	0	0	0	0	2	0	81	0	0	0	0	0	17	100
1987	WINTER TROLL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TROLL	0	0	0	0	22	0	5	2	0	0	0	9	0	39
	GILLNET	0	0	0	0	0	0	58	0	0	0	0	0	23	81
	SEINE	0	3	0	0	5	0	1	0	0	0	0	0	0	8
	SPORT	0	0	0	0	0	0	178	0	0	0	0	0	0	178
	TOTAL	0	3	0	0	27	0	242	2	0	0	0	9	23	307
1988	WINTER TROLL	0	0	0	0	25	0	2	2	0	0	0	3	0	32
	TROLL	0	5	0	0	10	5	3	0	0	0	0	3	0	26
	GILLNET	0	0	0	0	0	0	76	0	0	0	0	0	3	79
	SEINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SPORT	0	0	0	0	0	0	105	0	0	0	0	0	0	105
	TOTAL	0	5	0	0	35	5	187	2	0	0	0	5	3	242

(continued)

Table 15 (cont). Contribution of King Salmon River brood chinook salmon released at Snettisham Hatchery by return year, gear and district, 1982-92.

RETURN YEAR	GEAR	DISTRICT 103	109	109/110	109/112	110	110/111	111	112	112/114	113	113/114	114	115	TOTAL
1989	WINTER TROLL	0	0	2	0	8	0	2	0	0	0	0	0	0	13
	TROLL	0	5	17	0	20	24	19	2	0	4	0	0	0	91
	GILLNET	0	0	0	0	0	0	40	0	0	0	0	0	7	46
	SEINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SPORT	0	0	0	0	0	0	48	0	0	0	0	0	0	48
	TOTAL	0	5	19	0	28	24	110	2	0	4	0	0	7	198
1990	WINTER TROLL	0	13	10	0	25	9	3	0	0	0	0	0	0	60
	TROLL	15	5	0	0	16	2	0	0	0	0	0	0	0	38
	GILLNET	0	0	0	0	0	0	21	0	0	0	0	0	3	25
	SEINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SPORT	0	0	0	0	0	0	49	0	0	0	0	0	0	49
	TOTAL	15	18	10	0	41	11	74	0	0	0	0	0	3	173
1991	WINTER TROLL	0	2	2	0	13	0	2	0	0	0	0	0	0	19
	TROLL	0	7	0	0	24	2	0	3	0	0	4	4	0	44
	GILLNET	0	0	0	0	0	0	8	0	0	0	0	0	3	12
	SEINE	0	0	0	0	17	0	0	7	0	0	0	0	0	24
	SPORT	0	0	0	0	0	0	2	0	0	0	0	0	0	2
	TOTAL	0	9	2	0	54	2	12	10	0	0	4	4	3	101
1992	WINTER TROLL	0	2	0	2	9	0	0	0	0	0	0	0	0	13
	TROLL	0	0	3	0	17	2	2	2	0	0	0	0	0	25
	GILLNET	0	0	0	0	0	0	20	0	0	0	0	0	6	26
	SEINE	0	0	0	0	3	0	0	2	0	0	0	0	0	5
	SPORT	0	0	0	0	0	0	72	0	0	0	0	0	7	79
	TOTAL	0	2	3	2	28	2	93	4	0	0	0	0	13	148
TOTAL	WINTER TROLL	0	20	14	2	101	9	9	2	0	0	0	3	0	160
	TROLL	15	29	22	0	125	39	43	23	0	4	4	30	2	335
	GILLNET	0	0	0	0	0	0	318	0	0	0	0	0	76	394
	SEINE	0	3	0	0	31	0	1	13	0	0	0	0	0	47
	SPORT	0	0	0	0	0	0	572	0	1	0	0	0	7	581
	GRAND TOTAL	15	52	36	2	257	48	942	38	1	4	4	32	86	1,517
PERCENT OF TOTAL RETURN CAPTURED IN DISTRICT		1.0%	3.4%	2.4%	0.1%	16.9%	3.1%	62.1%	2.5%	0.1%	0.3%	0.3%	2.1%	5.7%	

hatchery encounter heavy predation or unfavorable early rearing conditions in Port Snettisham when compared with those experienced by smolts released off site.

The difference in the length of King Salmon River chinook returning to the river and to Snettisham Hatchery is of interest and could have implications to the survival phenomenon. Determination of factors that contribute to a speculative lack of fitness would seem to be site and rearing strategy related. The smaller size of Snettisham chinook is presumably related to smaller smolt size and the lack of rearing in marine pens for two or more weeks. Both of these deficiencies may reduce fitness. The smaller size of adults is also of concern because of the current state fishing regulations that prohibit retention of chinook shorter than 28" in marine troll and recreational fisheries. Production of Snettisham chinook salmon has primarily been intended for those fisheries.

Analysis of the return information of King Salmon River chinook salmon by districts indicates that a very high percentage of these fish are captured by inside fisheries. In particular, the troll contributions by district show that King Salmon River chinook salmon may spend much of the ocean phase of their life cycle in inside waters. This behavior provides a greater harvest rate by recreational fishermen in the Juneau area. This is an important consideration for the planned use of this stock for Juneau area chinook salmon enhancement projects.

Snettisham Hatchery no longer has an on-site release program for chinook salmon. Chinook salmon incubated at this facility in the future will be released from sites in the Juneau area. In addition, King Salmon River brood chinook salmon are proposed for release from Douglas Island Pink and Chum Salmon Incorporated's Gastineau Hatchery and from Armstrong Keta's Port Armstrong Hatchery as brood stock development being conducted at Little Port Walter Hatchery is complete.

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REFERENCES

Bertoni, S. Alaskan style weir. Draft manuscript. Alaska Department of Fish and Game, Division of Fisheries Rehabilitation Enhancement and Development.

FRED Staff. 1983. Fish Culture Manual. Alaska Department of Fish and Game, Division of Fisheries Rehabilitation Enhancement and Development.

Gharrett, A.J., S.M. Shirley, and G.R. Tromble. 1987. Genetic relationships among populations of Alaskan chinook salmon (*Oncorhynchus tshawytscha*). Can. J. Fish. Aquat. Sci. 44:765-774.

Holland, J., B. Bachen, G. Freitag, P. Kissner, and A. Wertheimer. 1983. Chinook Salmon Plan For Southeast Alaska. Alaska State Document.

Josephson, R. and M. Kelley. 1993. Production summary tables in Snettisham Annual Management Plan. Alaska Department of Fish and Game, FRED Division, Douglas, Alaska.

Kissner, P. 1984. A study of chinook salmon in southeast Alaska. Alaska Department of Fish and Game. Annual Report 1983-84, Project F-9-16, 25(AFS-41).

McGee, S., B. Bachen, G. Freitag, K. Leon, D. Mecum, A. Wertheimer. 1988. 1988 Annex: Chinook Salmon Plan for Southeast Alaska. Alaska State Document.

Pahlke, Keith, A. 1992. Escapements of chinook salmon in southeast Alaska and transboundary rivers in 1991. Alaska Department of Fish and Game, Division of Sport Fish. Fishery Data Series No. 92-32.

Wilcox, K. and S. Stoss. 1983. Prevention of infertility due to broken eggs. INFL Memo No. 58. Government of Canada, Department of Fisheries and Oceans.

Appendix Table 1. Daily weir count, King Salmon River, 1983.

	CHINOOK				CHUM		PINK	
DATE	FEMALE	MALE	CUM.	JACKS	CHUM	CUM.	PINK	CUM.
27-Jun	1	0	1	0	1	1	0	0
28-Jun	0	0	1	0	1	2	2	2
29-Jun	0	0	1	0	2	4	0	2
30-Jun	0	0	1	0	2	6	0	2
01-Jul	0	1	2	0	4	10	0	2
02-Jul	0	0	2	0	1	11	0	2
03-Jul	0	0	2	0	1	12	0	2
04-Jul	0	0	2	0	6	18	1	3
05-Jul	0	0	2	0	5	23	18	21
06-Jul	5	2	9	0	8	31	33	54
07-Jul	3	7	19	0	10	41	129	183
08-Jul	10	16	45	0	17	58	1,027	1,210
09-Jul	34	28	107	0	41	99	375	1,585
10-Jul	12	6	125	2	206	305	6,081	7,666
11-Jul	4	1	130	1	60	365	1,369	9,035
12-Jul	5	5	140	1	33	398	1,426	10,461
13-Jul	5	4	149	0	14	412	563	11,024
14-Jul	4	1	154	0	78	490	789	11,813
15-Jul	3	6	163	1	86	576	9,728	21,541
16-Jul	2	3	168	0	73	649	3,173	24,714
17-Jul	5	3	176	3	117	766	2,858	27,572
18-Jul	1	6	183	1	67	833	931	28,503
19-Jul	14	17	214	4	731	1,564	12,718	41,221
20-Jul	3	8	225	0	176	1,740	2,983	44,204
21-Jul	0	4	229	1	76	1,816	955	45,159
22-Jul	5	2	236	3	320	2,136	3,993	49,152
23-Jul	2	2	240	0	24	2,160	195	49,347
24-Jul	2	4	246	2	49	2,209	2,702	52,049
25-Jul	1	1	248	1	25	2,234	626	52,675
26-Jul	2	2	252	0	55	2,289	512	53,187
27-Jul	15	15	282	0	200	2,489	23,000	76,187
TOTAL	138	144	282	20		2,489		76,187

Counts on 27 July reflect downstream surveys.

Appendix Table 2. Daily weir count, King Salmon River, 1984.

	CHINOOK				CHUM		PINK	
DATE	FEMALE	MALE	CUM.	JACKS	CHUM	CUM.	PINK	CUM.
30-Jun	0	0	0	0	0	0	0	0
01-Jul	0	1	1	1	49	49	0	0
02-Jul	7	7	15	0	11	60	0	0
03-Jul	3	5	23	0	17	77	0	0
04-Jul	7	2	32	0	43	120	0	0
05-Jul	7	8	47	4	15	135	0	0
06-Jul	11	8	66	4	101	236	0	0
07-Jul	4	6	76	3	45	281	0	0
08-Jul	14	11	101	8	95	376	2	2
09-Jul	16	14	131	10	303	679	2	4
10-Jul	10	8	149	2	841	1,520	33	37
11-Jul	14	7	170	2	403	1,923	87	124
12-Jul	21	12	203	4	570	2,493	23	147
13-Jul	3	4	210	1	377	2,870	2	149
14-Jul	4	4	218	3	393	3,263	22	171
15-Jul	8	1	227	3	624	3,887	89	260
16-Jul	1	3	231	4	909	4,796	77	337
17-Jul	2	1	234	4	613	5,409	127	464
18-Jul	2	0	236	0	393	5,802	94	558
19-Jul	6	3	245	1	517	6,319	169	727
20-Jul	12	4	261	5	469	6,788	69	796
21-Jul	1	2	264	5	403	7,191	21	817
22-Jul	4	0	268	1	580	7,771	41	858
23-Jul	5	1	274	0	1,129	8,900	90	948
24-Jul	4	2	280	1	582	9,482	263	1,211
25-Jul	2	1	283	5	886	10,368	642	1,853
26-Jul	2	2	287	2	789	11,157	820	2,673
27-Jul	1	3	291	3	990	12,147	4,678	7,351
28-Jul	1	2	294	1	1,008	13,155	4,315	11,666
29-Jul	1	0	295	3	302	13,457	1,700	13,366
30-Jul	2	1	298	2	1,700	15,157	8,600	21,966
31-Jul	6	7	311	0	32	15,189	103	22,069
TOTAL	181	130	311	82		15,189		22,069

Counts on 31 July reflect downstream surveys.

Appendix Table 3. Daily weir count, King Salmon River, 1985.

	KING				CHUM		PINK	
DATE	FEMALE	MALE	CUM.	JACKS	CHUM	CUM.	PINK	CUM.
01-Jul	0	0	0	0	0	0	0	0
02-Jul	0	0	0	0	0	0	0	0
03-Jul	1	0	1	0	30	30	0	0
04-Jul	0	0	1	1	23	53	0	0
05-Jul	2	1	4	1	30	83	0	0
06-Jul	2	2	8	2	40	123	0	0
07-Jul	0	0	8	1	41	164	1	1
08-Jul	0	2	10	1	100	264	2	3
09-Jul	1	1	12	1	92	356	0	3
10-Jul	1	2	15	2	437	793	0	3
11-Jul	5	5	25	1	952	1,745	0	3
12-Jul	0	2	27	5	230	1,975	0	3
13-Jul	0	12	39	0	783	2,758	9	12
14-Jul	0	8	47	3	1,057	3,815	30	42
15-Jul	4	5	56	1	889	4,704	8	50
16-Jul	16	15	87	5	1,699	6,403	78	128
17-Jul	7	8	102	1	898	7,301	54	182
18-Jul	7	16	125	5	3,189	10,490	449	631
19-Jul	16	15	156	8	3,117	13,607	902	1,533
20-Jul	4	7	167	2	3,438	17,045	5,818	7,351
21-Jul	4	2	173	0	1,520	18,565	2,730	10,081
22-Jul	2	5	180	0	951	19,516	3,026	13,107
23-Jul	0	0	180	0	2,036	21,552	14,916	28,023
24-Jul	1	2	183	0	323	21,875	4,143	32,166
25-Jul	1	1	185	2	761	22,636	4,854	37,020
26-Jul	0	0	185	1	594	23,230	1,292	38,312
27-Jul	6	1	192	0	1,508	24,738	1,868	40,180
28-Jul	0	2	194	2	1,295	26,033	1,415	41,595
29-Jul	5	5	204	2	2,500	28,533	20,000	61,595
TOTAL	85	119	204	47		28,533		61,595

Counts on 29 July reflect downstream surveys.

Appendix Table 4. Daily weir count, King Salmon River, 1986.

DATE	KING FEMALE	KING MALE	KING CUM.	JACKS	CHUM CHUM	CHUM CUM.	PINK PINK	PINK CUM.
30-Jun	1	1	2	0	0	0	0	0
01-Jul	0	0	2	0	12	12	0	0
02-Jul	0	0	2	0	12	24	0	0
03-Jul	2	0	4	0	4	28	0	0
04-Jul	1	1	6	1	11	39	0	0
05-Jul	0	1	7	0	17	56	0	0
06-Jul	5	4	16	2	114	170	0	0
07-Jul	4	3	23	1	282	452	0	0
08-Jul	1	2	26	6	43	495	1	1
09-Jul	4	1	31	8	131	626	0	1
10-Jul	20	10	61	4	612	1,238	3	4
11-Jul	13	19	93	4	276	1,514	1	5
12-Jul	8	5	106	2	49	1,563	1	6
13-Jul	6	9	121	2	991	2,554	13	19
14-Jul	6	3	130	1	373	2,927	1	20
15-Jul	2	4	136	0	1,242	4,169	16	36
16-Jul	15	5	156	7	1,946	6,115	58	94
17-Jul	1	7	164	2	353	6,468	6	100
18-Jul	4	5	173	1	725	7,193	22	122
19-Jul	4	5	182	9	1,206	8,399	393	515
20-Jul	5	5	192	3	1,151	9,550	427	942
21-Jul	3	2	197	1	734	10,284	95	1,037
22-Jul	11	8	216	2	4,211	14,495	714	1,751
23-Jul	9	8	233	6	2,216	16,711	725	2,476
24-Jul	5	8	246	6	1,915	18,626	811	3,287
25-Jul	3	4	253	1	294	18,920	213	3,500
26-Jul	3	3	259	2	734	19,654	257	3,757
27-Jul	1	1	261	1	240	19,894	206	3,963
28-Jul	2	1	264	0	161	20,055	125	4,088
29-Jul	0	0	264	0	113	20,168	59	4,147
30-Jul	0	0	264	0	185	20,353	92	4,239
31-Jul	9	8	281	2	2,000	22,353	6,000	10,239
TOTAL	148	133	281	74		22,353		10,239

Counts on 31 July reflect downstream surveys.

Appendix Table 5. Daily weir count, King Salmon River, 1987.

	KING				CHUM		PINK	
DATE	FEMALE	MALE	CUM.	JACKS	CHUM	CUM.	PINK	CUM.
30-Jun	1	0	1	0	3	3	0	0
01-Jul	0	1	2	3	14	17	2	2
02-Jul	0	0	2	2	13	30	2	4
03-Jul	1	1	4	2	14	44	7	11
04-Jul	0	1	5	1	5	49	3	14
05-Jul	2	2	9	1	55	104	0	14
06-Jul	0	1	10	1	50	154	0	14
07-Jul	3	3	16	3	65	219	10	24
08-Jul	1	1	18	0	105	324	26	50
09-Jul	4	5	27	4	197	521	43	93
10-Jul	3	3	33	3	148	669	46	139
11-Jul	6	3	42	1	276	945	141	280
12-Jul	17	11	70	6	767	1,712	389	669
13-Jul	12	12	94	2	1,664	3,376	2,273	2,942
14-Jul	0	2	96	0	287	3,663	438	3,380
15-Jul	7	5	108	1	1,688	5,351	4,014	7,394
16-Jul	9	12	129	2	437	5,788	1,660	9,054
17-Jul	6	2	137	6	375	6,163	1,336	10,390
18-Jul	2	1	140	2	321	6,484	383	10,773
19-Jul	7	8	155	6	1,201	7,685	1,083	11,856
20-Jul	4	5	164	2	825	8,510	700	12,556
21-Jul	2	4	170	4	654	9,164	426	12,982
22-Jul	1	2	173	3	682	9,846	335	13,317
23-Jul	2	2	177	2	1,317	11,163	1,294	14,611
24-Jul	5	4	186	2	1,063	12,226	2,563	17,174
25-Jul	4	6	196	1	2,221	14,447	11,082	28,256
26-Jul	0	2	198	0	2,754	17,201	15,330	43,586
27-Jul	0	0	198	1	592	17,793	2,265	45,851
28-Jul	3	6	207	1	1,435	19,228	11,073	56,924
29-Jul	10	10	227	0	2,000	21,228	15,000	71,924
TOTALS	112	115	227	62		21,228		71,924

Counts on 29 July reflect downstream surveys.

Appendix Table 6. Daily weir count, King Salmon River, 1988.

DATE	KING FEMALE	KING MALE	KING CUM.	JACKS	CHUM CHUM	CHUM CUM.	PINK PINK	PINK CUM.
30-Jun	0	0	0	0	1	1	0	0
01-Jul	1	1	2	7	35	36	3	3
02-Jul	2	3	7	3	28	64	0	3
03-Jul	2	5	14	1	191	255	5	8
04-Jul	3	7	24	2	71	326	0	8
05-Jul	4	2	30	0	125	451	3	11
06-Jul	3	5	38	3	222	673	1	12
07-Jul	1	3	42	3	142	815	0	12
08-Jul	2	4	48	3	102	917	0	12
09-Jul	5	2	55	3	308	1,225	0	12
10-Jul	1	3	59	0	709	1,934	4	16
11-Jul	5	9	73	1	545	2,479	4	20
12-Jul	10	21	104	8	1,216	3,695	10	30
13-Jul	7	7	118	4	379	4,074	2	32
14-Jul	3	5	126	0	688	4,762	5	37
15-Jul	9	8	143	0	656	5,418	3	40
16-Jul	16	12	171	1	2,325	7,743	20	60
17-Jul	1	6	178	1	602	8,345	8	68
18-Jul	4	3	185	2	323	8,668	8	76
19-Jul	2	2	189	1	299	8,967	2	78
20-Jul	4	1	194	1	811	9,778	3	81
21-Jul	3	7	204	1	248	10,026	0	81
22-Jul	2	3	209	1	195	10,221	8	89
23-Jul	4	2	215	2	161	10,382	7	96
24-Jul	3	3	221	2	142	10,524	3	99
25-Jul	0	0	221	1	309	10,833	12	111
26-Jul	2	2	225	2	225	11,058	16	127
27-Jul	1	3	229	0	155	11,213	7	134
28-Jul	0	2	231	1	139	11,352	43	177
29-Jul	6	6	243	0	0	11,352	0	177
TOTALS	106	137	243	54		11,352		177

Counts on 29 July reflect downstream surveys for chinook salmon only.

Appendix Table 7. Daily weir count, King Salmon River, 1989.

	KING				CHUM		PINK	
DATE	FEMALE	MALE	CUM.	JACKS	CHUM	CUM.	PINK	CUM.
01-Jul	0	1	1	0	30	30	0	0
02-Jul	2	2	5	1	32	62	8	8
03-Jul	3	8	16	4	23	85	1	9
04-Jul	8	9	33	6	31	116	1	10
05-Jul	7	5	45	8	23	139	0	10
06-Jul	4	5	54	12	7	146	0	10
07-Jul	3	1	58	1	114	260	0	10
08-Jul	8	5	71	0	214	474	0	10
09-Jul	11	1	83	7	297	771	22	32
10-Jul	7	1	91	8	1,000	1,771	2,009	2,041
11-Jul	7	2	100	1	52	1,823	76	2,117
12-Jul	3	1	104	4	249	2,072	247	2,364
13-Jul	6	11	121	2	469	2,541	1,831	4,195
14-Jul	31	24	176	7	864	3,405	1,100	5,295
15-Jul	3	2	181	0	390	3,795	1,164	6,459
16-Jul	9	1	191	2	712	4,507	3,684	10,143
17-Jul	2	2	195	0	392	4,899	818	10,961
18-Jul	12	0	207	2	477	5,376	6,367	17,328
19-Jul	0	0	207	1	499	5,875	2,212	19,540
20-Jul	1	1	209	0	207	6,082	580	20,120
21-Jul	2	0	211	1	173	6,255	380	20,500
22-Jul	0	1	212	0	71	6,326	31	20,531
23-Jul	3	5	220	0	124	6,450	956	21,487
24-Jul	0	3	223	1	84	6,534	1,010	22,497
25-Jul	1	3	227	2	51	6,585	10	22,507
26-Jul	4	5	236	1	142	6,727	872	23,379
27-Jul	5	1	242	0	138	6,865	2,990	26,369
28-Jul	3	4	249	1	77	6,942	2,171	28,540
29-Jul	15	14	278		130	7,072	11,000	39,540
TOTALS	160	118	278	72		7,072		39,540

Counts on 29 July reflect downstream surveys.

Appendix Table 8. Daily weir count, King Salmon River, 1990.

	KING				CHUM		PINK	
DATE	FEMALE	MALE	CUM.	JACKS	CHUM	CUM.	PINK	CUM.
01-Jul	1	1	2	1	2	2	0	0
02-Jul	0	0	2	1	76	78	0	0
03-Jul	0	2	4	4	48	126	1	1
04-Jul	1	0	5	1	46	172	4	5
05-Jul	3	2	10	1	28	200	4	9
06-Jul	6	4	20	3	107	307	1	10
07-Jul	10	8	38	4	116	423	3	13
08-Jul	8	5	51	0	1,649	2,072	25	38
09-Jul	4	2	57	0	284	2,356	5	43
10-Jul	5	3	65	0	311	2,667	24	67
11-Jul	2	1	68	0	68	2,735	1	68
12-Jul	0	0	68	0	189	2,924	3	71
13-Jul	4	4	76	1	20	2,944	1	72
14-Jul	4	2	82	0	39	2,983	0	72
15-Jul	6	2	90	0	1,225	4,208	36	108
16-Jul	10	5	105	0	111	4,319	4	112
17-Jul	2	1	108	0	34	4,353	2	114
18-Jul	7	7	122	2	166	4,519	9	123
19-Jul	8	1	131	1	52	4,571	2	125
20-Jul	5	1	137	2	182	4,753	11	136
21-Jul	14	6	157	5	141	4,894	15	151
22-Jul	4	7	168	3	46	4,940	5	156
23-Jul	3	4	175	0	232	5,172	13	169
24-Jul	6	1	182	3	56	5,228	4	173
25-Jul	0	2	184	0	28	5,256	0	173
26-Jul	1	5	190	1	147	5,403	6	179
27-Jul	0	4	194	2	55	5,458	6	185
28-Jul	3	1	198	0	116	5,574	11	196
29-Jul	0	2	200	0	14	5,588	6	202
30-Jul	3	5	208	0	420	6,008	3,118	3,320
TOTALS	117	83	208	35		6,008		3,320

Counts on 30 July reflect downstream surveys.

Appendix Table 9. Daily weir count, King Salmon River, 1991.

DATE	KING FEMALE	KING MALE	KING CUM.	JACKS	CHUM	CHUM CUM.	PINK	PINK CUM.
29-Jun	0	0	0	0	6	6	0	0
30-Jun	0	1	1	0	3	9	0	0
01-Jul	0	1	2	4	5	14	0	0
02-Jul	1	0	3	1	11	25	0	0
03-Jul	1	1	5	0	14	39	1	1
04-Jul	2	1	8	0	5	44	1	2
05-Jul	1	3	12	1	6	50	0	2
06-Jul	1	1	14	0	8	58	0	2
07-Jul	1	0	15	1	15	73	1	3
08-Jul	2	3	20	3	12	85	0	3
09-Jul	5	6	31	7	26	111	0	3
10-Jul	5	3	39	6	22	133	0	3
11-Jul	2	5	46	4	138	271	4	7
12-Jul	2	1	49	1	215	486	4	11
13-Jul	3	0	52	1	467	953	38	49
14-Jul	6	2	60	0	440	1393	189	238
15-Jul	13	5	78	25	118	1511	54	292
16-Jul	2	6	86	8	468	1979	1,481	1773
17-Jul	3	2	91	3	115	2094	201	1974
18-Jul	1	5	97	2	74	2168	31	2005
19-Jul	8	4	109	3	62	2230	21	2026
20-Jul	2	2	113	0	209	2439	390	2416
21-Jul	4	0	117	0	109	2548	75	2491
22-Jul	4	2	123	3	1,219	3767	1,391	3882
23-Jul	3	4	130	2	179	3946	66	3948
24-Jul	4	4	138	12	31	3977	24	3972
25-Jul	2	5	145	2	509	4486	288	4260
26-Jul	1	0	146	1	20	4506	12	4272
27-Jul	4	4	154	0	130	4636	14,000	18272
TOTALS	83	71	154	90		4,636		18,272

Counts on 27 July reflect downstream surveys.

Appendix Table 10. Daily weir count, King Salmon River, 1992.

	KING				CHUM		PINK	
DATE	FEMALE	MALE	CUM.	JACKS	CHUM	CUM.	PINK	CUM.
29-Jun	0	0	0	0	0	0	0	0
30-Jun	0	0	0	0	0	0	0	0
01-Jul	0	0	0	0	0	0	0	0
02-Jul	1	1	2	2	6	6	0	0
03-Jul	1	0	3	0	14	20	1	1
04-Jul	0	0	3	0	15	35	1	2
05-Jul	1	0	4	0	11	46	0	2
06-Jul	1	0	5	0	11	57	2	4
07-Jul	0	0	5	0	6	63	1	5
08-Jul	0	0	5	0	0	63	0	5
09-Jul	0	0	5	0	23	86	0	5
10-Jul	2	0	7	1	43	129	0	5
11-Jul	0	0	7	1	192	321	0	5
12-Jul	1	0	8	0	90	411	2	7
13-Jul	2	0	10	0	139	550	3	10
14-Jul	1	1	12	0	194	744	6	16
15-Jul	2	5	19	1	49	793	2	18
16-Jul	1	0	20	0	120	913	4	22
17-Jul	1	0	21	0	28	941	2	24
18-Jul	5	3	29	2	133	1,074	1	25
19-Jul	3	2	34	1	58	1,132	0	25
20-Jul	1	1	36	0	71	1,203	1	26
21-Jul	0	1	37	0	61	1,264	1	27
22-Jul	0	1	38	0	235	1,499	34	61
23-Jul	2	0	40	2	427	1,926	2	63
24-Jul	2	5	47	0	158	2,084	6	69
25-Jul	3	8	58	1	1,265	3,349	42	111
26-Jul	1	4	63	5	827	4,176	28	139
27-Jul	1	0	64	0	272	4,448	11	150
28-Jul	1	0	65	0	31	4,479	4	154
29-Jul	0	0	65	0	4	4,483	4	158
30-Jul	0	0	117	0	857	5,340	12,053	12,211
TOTALS	59	58	117	16		5,340		12,211

Total chinook escapement of 117 reflects peak count combiningdownstream survey and fish passed through weir. This down stream survey occured on July 24 when 70 chinook were counted and 47 had passed through the weir. Counts for pink and chum salmon on 30 July reflect downstream survey on that day.