

SOCKEYE SALMON *ONCORHYNCHUS NERKA* SMOLT INVESTIGATIONS AT
RED, AKALURA, AND UPPER STATION LAKES CONDUCTED
IN RESPONSE TO THE 1989 M/V EXXON VALDEZ OIL SPILL, 1990-1992

by

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INTRODUCTION

Due to contamination from the 24 March 1989 M/V EXXON VALDEZ oil spill most of the Kodiak Management Area was closed to commercial salmon fishing. As a consequence, escapement surpluses occurred. In the Red Lake system the sockeye escapement was 768,000, more than twice the management goal of 200,000 to 300,000. At Akalura the escapement was 116,000, surpassing the 40,000 to 60,000 goal. However, not all systems were overescaped. For example, nearby Upper Station had an estimated 286,000 escapement, which is reasonably close to the 200,000 to 275,000 goal.

There is concern that the 1989 escapements into Red and Akalura Lakes may produce returns that will not meet future escapement requirements. Kyle et al. (1988) found that large sockeye escapements into Frazer Lake can cause increased fry loadings with subsequent reductions in rearing fry growth caused by decreased size and abundance of zooplankton. Kyle et al. (1988) further reports that poor growth among fry can lower their overwinter survival and correspondingly, limit smolt production. Excessive 1981 and 1982 escapements into Frazer Lake produced returns that limited fishing opportunity and did not meet escapement objectives in subsequent years (Barrett 1989).

To assess the impact of the Red Lake and Akalura sockeye escapement surpluses, a smolt monitoring program began in 1990 and continued through 1992 at each of these locations with the Upper Station system serving as a control (Figure 1). In the assessment, outmigrating sockeye smolt population numbers, age, length, and weight characteristics were quantified.

METHODS

Study Site Selection

Study sites were selected that were at least 1 km downstream from the lake outlet, in a riffle, and where stream depth was ≥ 0.3 m and water velocity ≥ 0.3 m/sec. Actual site locations were approximately 1.6, 5.6, and 1.2 km from the outlets of Red, Akalura, and Upper Station lakes, respectively.

Red Lake

In 1990 from 13 May through 30 June, a single Canadian fan trap was positioned midstream with the trap opening perpendicular to stream flow. Attached to the trap opening were perforated aluminum plate leads (4.75 mm diameter holes) 2.5 m in length, 1 m in width, and angled to about 30 degrees left and right of the opening. A live box, 2 m in length, 1 m in width, and 0.8 m high with perforated plate side and end panels was affixed to the trap exit. The live box when not being attended was covered with plywood to discourage avian predators. In 1991 from 6

May through 7 July, two Canadian fan traps were employed; site location was identical to 1990 with the second trap positioned parallel to the first and about 6 m off to one side. Leads attached to the opening of each trap were about 2 m in length and angled away from the trap opening on both sides at about 30 degrees. The addition of a second trap during 1991 was an attempt to increase catchability of sockeye smolt at this site. In 1992 from 4 May through 29 June, the same traps and leads were used, but unlike the previous year the traps were moved upstream and fished next to each other, again to increase smolt catchability. In addition to the two smolt traps, a 24 m weir located approximately 45 m downstream from the traps was operated from 30 May to 26 June. Weir construction was of cast aluminum pipe framing and welded 25 mm outside diameter electrical conduit spaced at 40 mm intervals into 2 m high by 1 m wide panels. The upstream side of the weir was covered with 13 mm diamond shaped mesh plastic vexar cloth rising about 0.5 m above the water level and anchored to the substrate with 5 cm diameter sections of galvanized pipe and sandbags. The weir was fitted with a Canadian fan trap and attached live box to pass smolt.

In addition to smolt operations at Red Lake, an adult salmon counting weir was operated at the lake outlet during 1991 and 1992 to determine the percentage of the Ayakulik River sockeye escapement entering Red Lake. The weir used was of an aluminum panel design. Total sockeye escapement into the Ayakulik system which includes Red Lake was counted through a weir located at the mouth of the Ayakulik River, 0.75 km upstream from the Pacific Ocean. The weir at this location has been operated since the late 1970's. Operational dates in 1991 were from 25 May through 29 August and during 1992 from 22 May through 28 August.

Akalura and Upper Station

A single Canadian fan trap was operated at both Akalura and Upper Station positioned near the tail of a riffle in about 0.5 m and 0.8 m depths, respectively. Smolt monitoring occurred at Akalura from 13 May through 27 June in 1990, 8 May through 1 July in 1991, and 1 May through 29 June in 1992. At Upper Station the dates were: 13 May through 28 July in 1990; 11 May through 5 August in 1991; and 4 May through 9 August in 1992. While leads were not used on the Akalura trap, the Upper Station trap was fitted on each side with a 1.2 m long lead of perforated plate angled 30 degrees from the trap opening. Live boxes for both traps were about 2 m in length and 1 m in width and depth. Adult salmon counting weirs similar to the one at Red Lake were operated on the Akalura and Upper Station systems during 1990-1992.

Smolt Enumeration

At each site, smolt trap live boxes were inspected about every 0.5 h beginning at 2130 h and continuing until 0530 h, daily. Light sources used were battery powered headlamps and gas lanterns. Direct light was deflected from upstream areas using metal and wood shields. Species identification of the trap catches were determined by visual examination of external characteristics (McConnell and Snyder 1972; Trautman 1973). When catches were less than 100 fish per 0.5 h, live box inspections were reduced to about once every hour.

Two methods of enumeration were employed dependant on the volume of outmigrants. The first was directly counting the catch by species using a dip net and tally counters. The second, a catch-weight method was implemented when smolt capture exceeded the field crew's capacity to directly count. In this procedure, the catch was transferred by dip net to a small mesh netted basket suspended over the creek from a hanging scale. A wet weight was obtained to the nearest 0.1 kg for each dip net of fish, and the process was continued until the live box was emptied. About every tenth dip net of fish was sampled to determine species count by weight. This entailed transferring a dip net load of fish to a 18.7 L plastic water filled bucket, counting the contents by species while spilling the catch into another water filled bucket and then obtaining a wet weight of the sampled catch using the netted basket with the hanging scale.

Cumulative smolt counts per day spanned a noon to noon time frame and were assigned to the calendared day of the noon to midnight period.

Age, Weight, and Length Sampling

In 1990 at each site, a 240 sockeye smolt age (Thompson 1987), length, and weight (AWL) sample was collected weekly from a single day's catch about mid week. When the trap catch on the sampling day was not sufficient to complete the sample, sampling extended into the next day but not beyond. To insure that the sampled smolt were representative of the catch, the live box contents were stirred immediately preceding any removal. The smolt were held in a separate live box until sampling. At sampling, the smolt were anesthetized with MS-222 (Tricain Methanesulfonate), measured to the nearest 1 mm from tip-of-snout to fork-of-tail, and weighed to the nearest 0.1 gram using a dial-a-gram triple beam balance. Sampling for age information was conducted by removing 5-10 scales per fish from the preferred area (INPFC 1963) and mounting the scales on microscope slides at five fish per slide. After sampling all smolt were revived and released downstream at each site.

All sockeye scales collected had ages assigned based upon freshwater circuli pattern interpretation using a microfiche reader with 42x and 48x lenses. All age data were recorded in European notation (Koo 1962). During 1991 and 1992, AWL sampling design was changed so that a maximum of 70 smolt per day were sampled six days a week. This change allowed for quantifying shifts in age composition of the smolt outmigration on less than a weekly basis (James Hasbrouk, Alaska Department of Fish & Game, Sport Fish Div. Anchorage, personal communication).

Trap Catch Efficiency Trials

Trap efficiency was determined weekly at each site subject to smolt availability. For each test, about 500 trap caught smolt, collected over a maximum of two days, were dyed and released about 1 km upstream of the index trap(s) at a site where stream velocity was relatively low (≤ 0.5 m/sec). Several steps occurred in the process. The 500 smolt sample was collected,

depending on smolt availability, over a one to three day period from the trap(s) and placed into a holding box until upstream transport. The smolt were then backpacked to the upstream release site in groups of 150 to 200 smolt in 18.7 L water filled buckets equipped with battery powered aerators. At the release site the smolt were counted, then placed into a perforated aluminum plated live box anchored to the stream substrate. Smolt were then held for about 30 minutes. In a separate 113.5 L plastic tub, a solution of 1.9 g of Bismark Brown Y dye to 57 L water was prepared (Ward and Verhoeven 1963; Lawler and Fitz-Earle 1968). The dye solution was aerated continuously with battery powered aerators and oxygenated in 1991 and 1992 using a portable oxygen tank. The smolt were then placed into the dye solution for 30 minutes with the dye tub covered to minimize stress. Afterwards, the marked smolt were returned to the instream live box and held for one hour. Smolt were counted again, then placed in 18.9 L water filled buckets and released proportionately across the stream channel over an hour period. Only smolt judged to be behaving normally were released.

Marked fish recoveries in the smolt traps were recorded over three successive nights. Except in instances where dyed fish were released over two successive days, smolt traps were monitored for marked fish recoveries over a minimum of four consecutive nights. Marked fish recoveries were recorded separately from unmarked fish captures to prevent inflated catch reporting. The percentage of marked smolt captured in the trap(s) was the estimated trap smolt catch efficiency.

In 1992 at the Red Lake outlet, a smolt weir was operated daily from 30 May through 26 June, 40 m downstream of the index traps for the purpose of estimating the true catch efficiency of the index traps and determining whether the smolt population numbers derived from the index traps were biased. During this period, all outmigrating smolt were individually counted through the weir or estimated using the catch-weight method described earlier. During 3 and 12 June, algae from the lake clogged the weir precluding operation. Index trap catch efficiency was obtained for the days when the weir was successfully operated by dividing the daily index trap catch by the daily weir count.

Climate Data

Climatological data, consisting of air and water temperatures (degrees Celsius), cloud cover (%), stream depth (1 cm), and wind velocity (mph) and direction, were recorded daily at the smolt sites normally at 1800 hours.

DATA ANALYSIS

For obtaining smolt numbers from data collected from the catch weight method (when employed) the following relationship was used:

$$\hat{c} = \frac{ac}{b},$$

where a is the grand smolt weight total less basket weight; b is subsample weight of smolt less basket weight; and c is actual counts of smolt from subsampled baskets.

In deriving trap efficiency from the mark-recapture and trap-weir catch data the formula is:

$$\hat{e} = \frac{d_i}{D_i}$$

where d_i is the number of marked fish recaptured on successive nights after release and D_i is the number of marked fish released on day i. We assumed that the weir smolt counts represent the true population by day in addition to some minor process error. Since mark-recapture trap efficiencies were derived on a weekly basis, chi-square tests ($\alpha=.05$) were employed to examine for homogeneity between events for each year and system (Zar 1984). All tests within all years and systems were significant ($p<.01$). Therefore, we employed linear interpolation between weekly trap efficiency values to obtain daily estimates. Rawson (1984) reported statistical models for treating sockeye smolt mark-recapture data derived on a daily basis with population estimates generated by:

$$\hat{N}_i = n_i \left[\frac{D_i}{d_i} + \frac{(D_i - d_i)}{d^2} \right] = \frac{n_i}{d_i} \left[D_i + D_i - \frac{d_i}{d_i} \right] = n_i \frac{D_i}{d_i} \left[1 + D_i - \frac{d_i}{D_i} d_i \right];$$

with variance

$$\text{Var} [\hat{N}_i] = n_i (n_i + d_i) D_i (D_i - d_i) / d_i^3.$$

The overall annual smolt outmigration for a particular system was estimated by:

$$\hat{N} = \sum_{i=1}^k \hat{N}_i;$$

with the overall variance estimated by

$$\text{Var} [\hat{N}] = \sum_{i=1}^k \text{Var} [\hat{N}_i] .$$

For these equations:

- i) N_i = Total population of smolt outmigrating on day i;
- ii) n_i = Number of marked fish captured in traps during day i;
- iii) N = Total smolt population outmigrating over k days.

The $(1-\alpha)$ confidence intervals for the smolt population estimates were derived assuming a normal distribution (Rawson 1984).

RESULTS

The 1990 through 1992 daily sockeye smolt trap catch numbers and trap efficiency estimates for Red Lake, Akalura, and Upper Station are reported (Appendix A). Daily smolt population estimates by system and year are presented in Appendix B. The estimated daily numbers of smolt emigrating from these lakes by age and year are listed in Appendix C. Annual smolt numbers by age assigned to brood year (parent escapement year) are given in Table 1 and illustrated in Figures 2-4.

The sockeye smolt length, weight, and condition factor by age, system, and year are located in Appendix D. Average length, weight, and condition factor for age 0., 1., and 2. smolt by brood year are shown in Figures 5-8.

The test results of the daily Red Lake smolt population numbers derived from the smolt weir and index traps are depicted in Table 2 and Figure 9.

The daily weir counts of sockeye escapement for 1991 and 1992 at Red Lake and for 1989 through 1992 at Ayakulik River are in Appendix E. A comparison of the 1991 and 1992 annual sockeye escapements for the two locations is provided in Figure 10.

The climatological data for the three systems by year are in Appendix F.

DISCUSSION

Red Lake sockeye smolt numbers from the 1988 and 1989 brood years are critically low at 0.4 million and 1.5 million smolt, respectively (Table 1). Assuming 20% survival from smolt to adult (Koenings and Burkett 1987), the 1988 brood year will produce a return of 80,000 adults and the 1989 brood year, 300,000 adults. Most of the return from the 1988 brood year should occur in 1993 and 1994, and the 1989 brood year return should be mainly in 1994 and 1995. The weakest run should occur in 1994. Most of the 1988 brood year smolt emigrated at age 1., the adults are expected to return at age-1.2 (1992) and -1.3 (1993). A majority of the 1989 brood year smolt left as age 2. fish. The adults from this outmigration will return as age-2.2 (1994) and age-2.3 (1995) fish. It is likely that the desired escapement goal of 300,000 fish may not be reached in 1994 even with a fishery closure in the terminal area. Red Lake smolt length and weight data indicate that the age 1. smolt from the 1989 brood year experienced a decreased growth rate as compared to 1988 and 1990 brood year smolt. However, age 2. 1989 brood year smolt experienced improved growth (Figure 5).

Akalura sockeye smolt numbers from the 1989 brood year are about one half the level from the 1988 brood year. A 20% smolt to adult survival of the estimated 192,000 smolt from the 1989 brood year, equates to approximately 38,000 adults, a level below the minimum Akalura sockeye escapement goal of 40,000. The poor smolt production from the 1989 brood year may cause a major escapement deficit in 1994 and 1995, especially if there is not a robust number of age 2. smolt emigrating in 1993 from the 1990 brood year. Akalura age 1. and age 2. smolt length and weight data indicate no major difference in growth characteristics between brood years (Figure 6).

The smolt population numbers generated from the index traps appear to be reasonable estimates. In a 26 day evaluation at Red Lake, a total of 1,314,373 smolt were counted through the weir and 1,210,554 fish were estimated using the index trap method for a difference of about 8% (Table 2 and Figure 9).

Not all the sockeye salmon escapement that are counted through the Ayakulik River weir enter Red Lake. Based on two years of weir counts, about 79% of the escapement reaches the lake (Figure 10). Some of the difference is due to brown bear predation, sport fish harvest, and a segment of the escapement which spawns in the upper Ayakulik River and Bare Lake.

For each of the study years, there were two identifiable smolt outmigrations from the Upper Station system. The first was in May and June of age 1., 2., and 3. smolt, and the second was in mid to late July of age 0. smolt (Appendix C.7-C.9). While three years of smolt population estimates were obtained from Upper Station, the only essentially complete brood year is 1989. For that year an estimated 5.5 million age 0. and 0.6 million age 1. and 2. smolt outmigrated (Table 1 and Figure 4). Assuming 20% survival to adult of the age 1. and 2. smolt and 10% survival of the age 0. smolt (Koenings and Burkett 1987), the 1989 brood year return should be about 670,000 for a return per spawner ratio of 2.3:1. A return of this magnitude will provide for desired escapement and a commercial fishery.

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Table 1. Sockeye smolt population estimates by brood year and age class for Red Lake, Akalura, and Upper Station, 1990-1992.

Year	Escapement	Number of Smolt by Age Class				Total	95% CI	
		0.	1.	2.	3.		Lower	Upper
Red Lake								
1986	318,135	a	a	a	6,427			
1987	261,913	a	a	493,026	38,184	531,210	294,277	768,143
1988	291,774	a	240,500	119,849	25,794	386,143	232,243	540,043
1989	768,101	0	105,467	1,365,082	b	1,470,549	1,145,584	1,795,514
1990	371,282	0	29,484	b	b			
1991	374,859	0	b	b	b			
Akalura								
1986	9,800	a	a	a	0			
1987	6,116	a	a	408,331	1,251	409,582	273,835	544,078
1988	38,618	a	66,460	299,591	8,315	374,366	281,153	467,579
1989	116,029	0	9,086	182,963	a	192,049	152,427	231,671
1990	47,181	0	1,921	b	b			
1991	44,189	0	b	b	b			
Upper Station								
1986	466,385	a	a	a	58,682			
1987	232,195	a	a	1,591,424	15,389	1,606,813	863,715	2,349,911
1988	306,560	a	241,181	245,673	1,444	488,298	256,907	745,205
1989	286,288	5,511,473	224,621	362,990	b	6,099,084	3,435,884	8,762,286
1990	254,446	1,959,423	80,238	b	b	2,039,661	1,059,251	3,020,071
1991	292,886	1,950,244	b	b	b			

^a Smolt outmigration not monitored.

^b Smolt of this age class have not outmigrated.

Table 2. Comparison of the daily weir and trap population estimates for sockeye salmon smolt from Red Lake, 30 May through 26 June, 1992.

Operational			Population Estimates		Absolute ^a Error
Date	Time	Hours	Weir	Trap	
30-May	2100-0430	8.5	54,161	38,392	15,769
31-May	1900-0530	10.5	102,359	144,961	42,602
01-June	1930-0515	10.0	192,884	162,592	30,292
02-June	1920-0437	8.9	7,524	6,014	1,510
04-June	2300-0430	5.5	75,583	43,310	32,273
05-June	2215-0430	6.3	52,947	38,070	14,877
06-June	2245-0430	5.6	41,852	37,525	4,327
07-June	2230-0435	6.1	30,693	47,001	16,308
08-June	2230-0440	6.2	41,151	53,403	12,252
09-June	2230-0530	7.0	164,620	43,361	121,259
10-June	2250-0455	6.0	160,275	158,091	2,184
11-June	2228-0442	6.2	129,936	164,900	34,964
13-June	2215-0440	6.4	45,293	30,110	15,183
14-June	2315-0417	5.0	7,030	11,303	4,273
15-June	2320-0441	5.3	70,171	57,520	12,651
16-June	2300-0440	5.7	47,115	28,641	18,474
17-June	2245-0500	6.2	29,253	33,529	4,276
18-June	2330-0446	5.3	11,825	26,219	14,394
19-June	2350-0500	5.1	5,446	10,786	5,340
20-June	2302-0500	5.9	1,546	3,233	1,687
21-June	2245-0500	6.3	9,327	12,841	3,514
22-June	2230-0500	6.5	4,158	6,675	2,517
23-June	2315-0500	5.7	3,575	4,527	952
24-June	2257-0504	6.1	9,043	12,650	3,607
25-June	2300-0500	6.0	9,602	18,038	8,436
26-June	2300-0500	6.0	6,644	16,862	10,218
Total			1,314,373	1,210,554	103,819 ^b

^a Represented as weir minus trap population estimates.

^b Total weir minus trap population estimates.

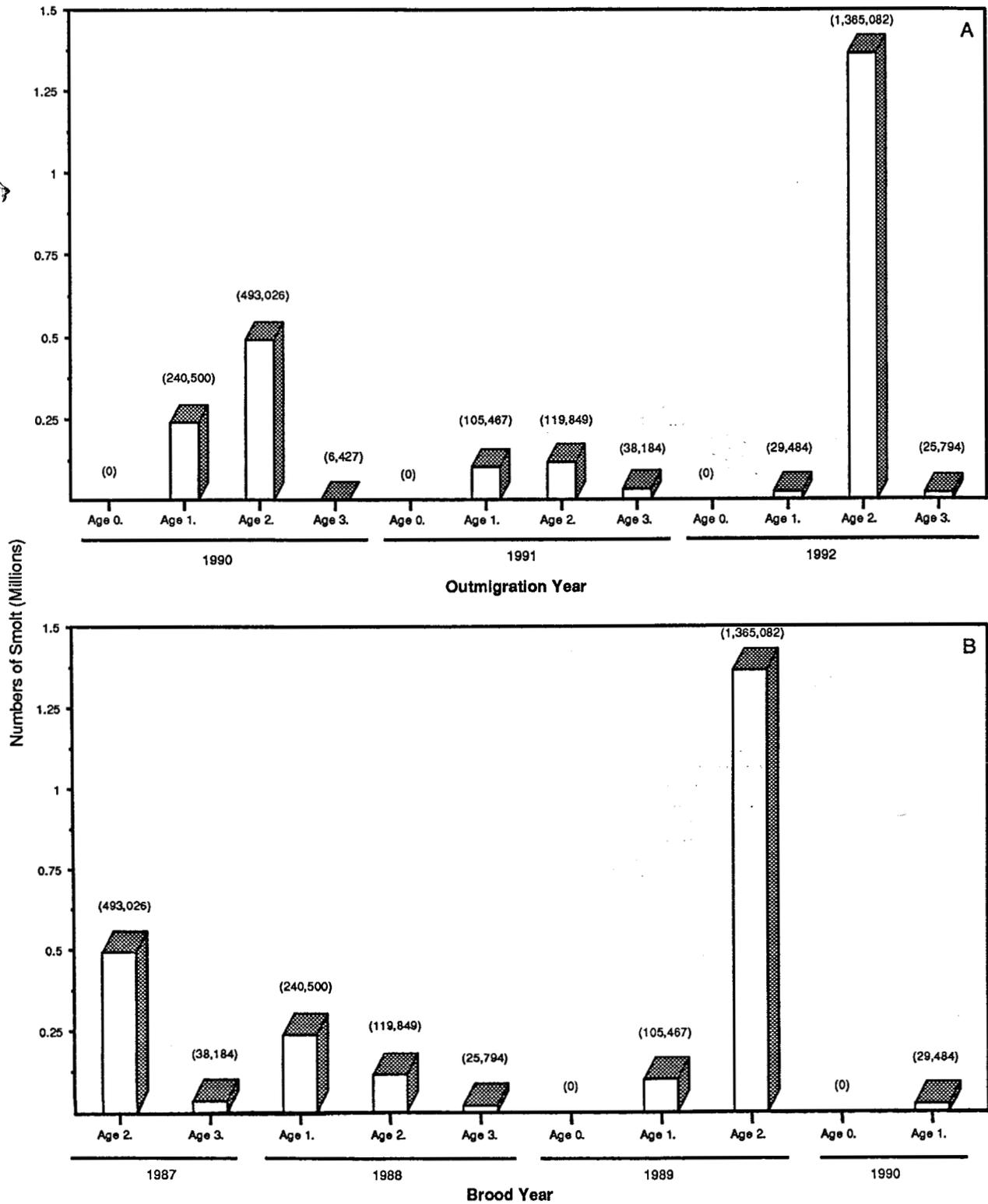


Figure 2. Red Lake sockeye salmon smolt numbers (A) by age class and outmigration year; (B) by age class and brood year.

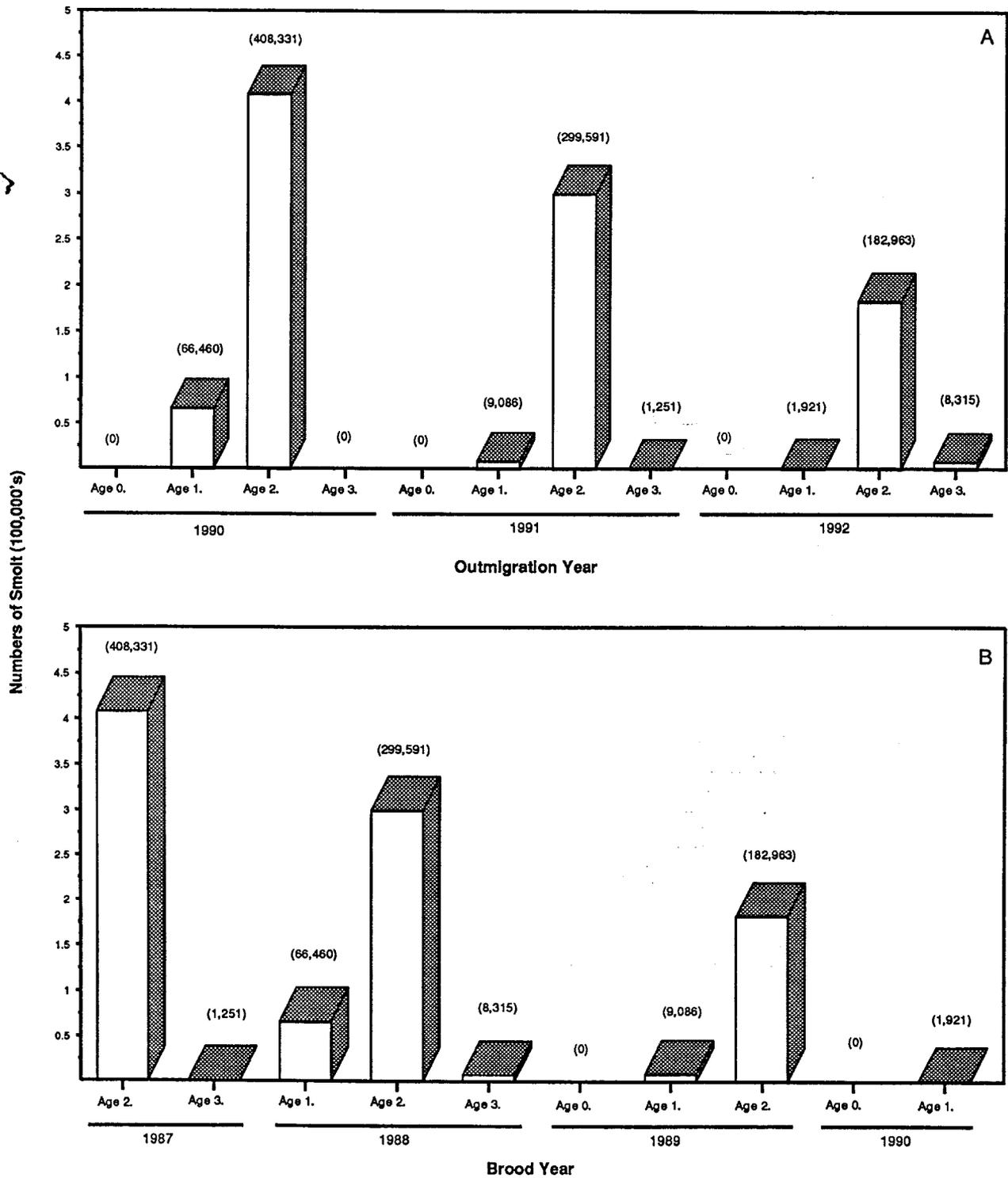


Figure 3. Akalura Lake sockeye salmon smolt numbers (A) by age class and outmigration year; (B) by age class and brood year.

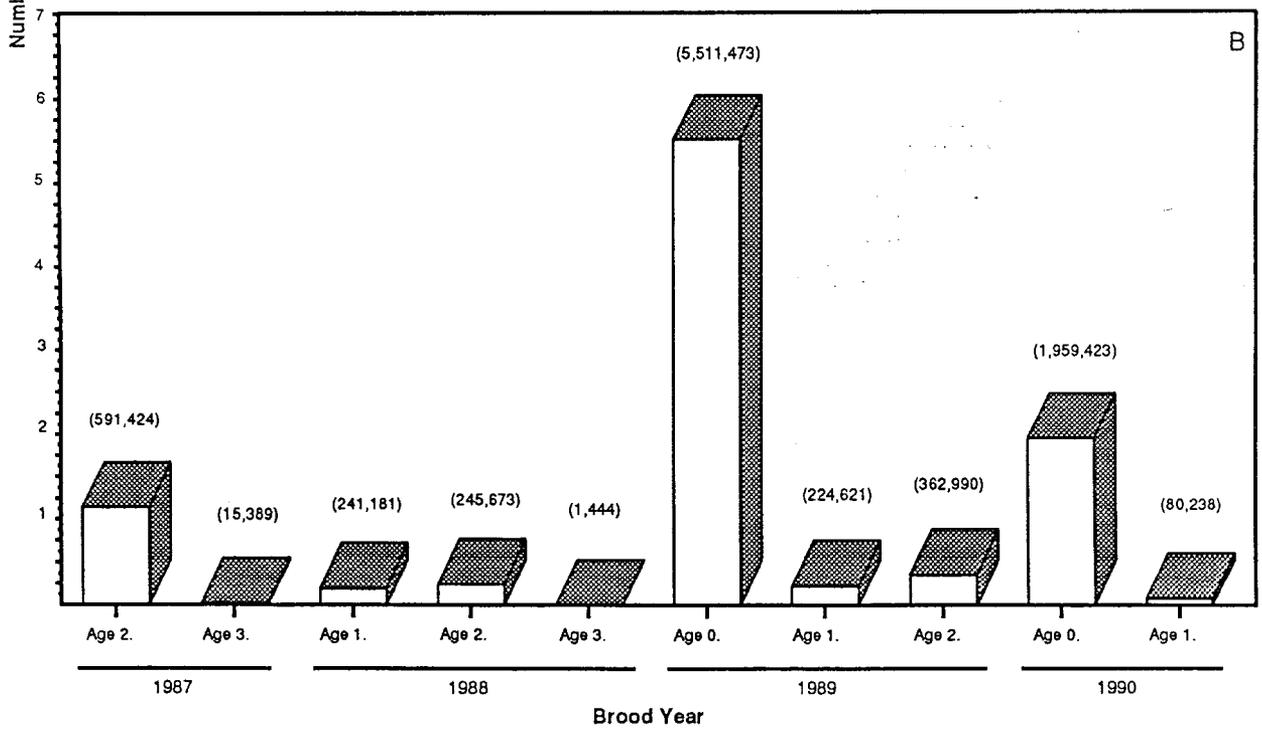
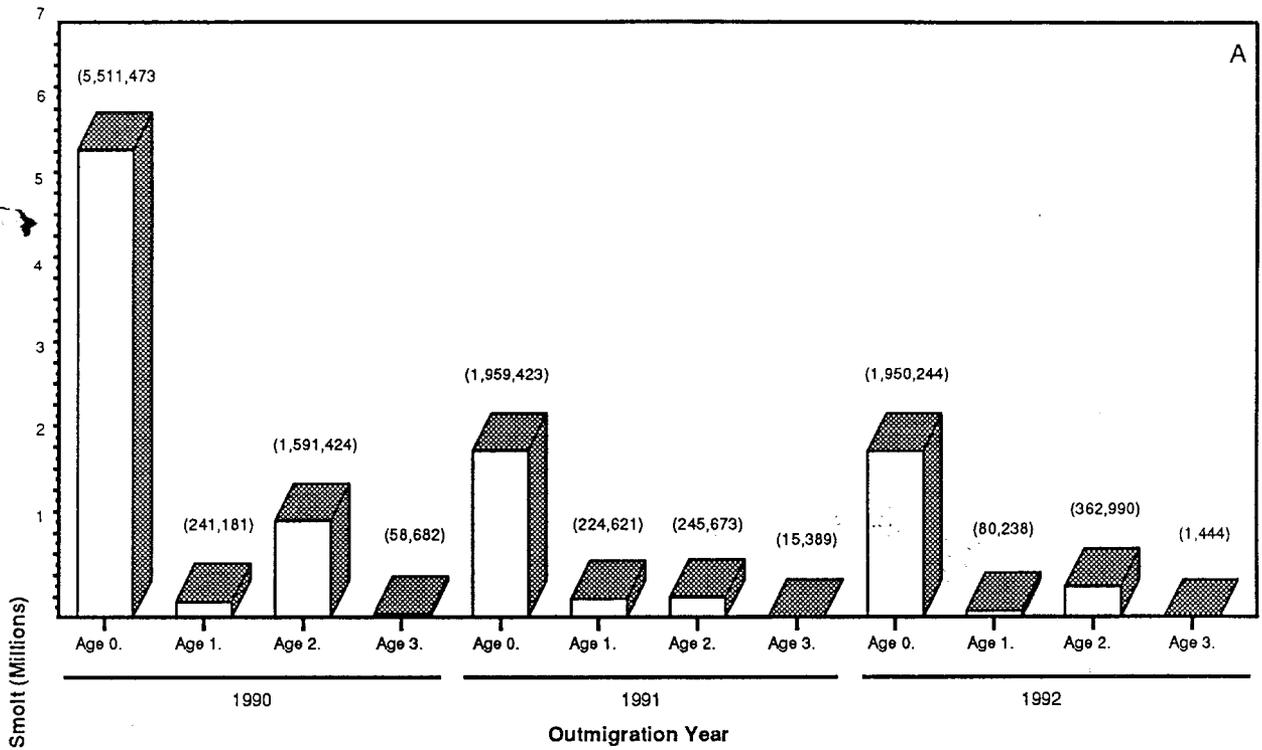


Figure 4. Upper Station sockeye salmon smolt numbers (A) by age class and outmigration year; (B) by age class and brood year.

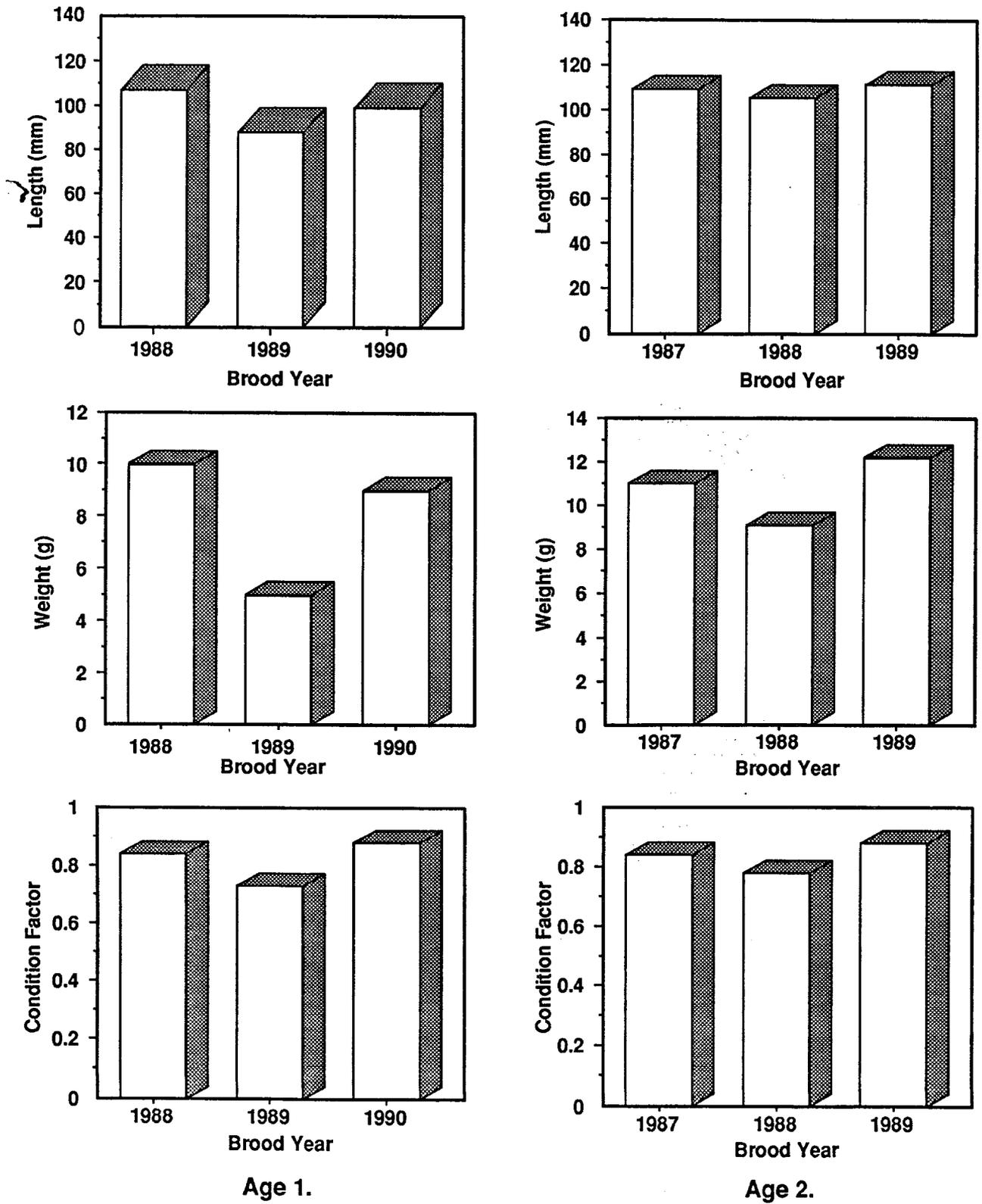
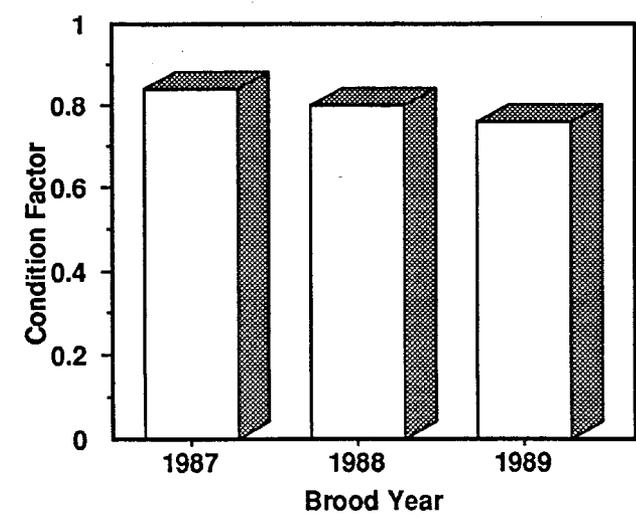
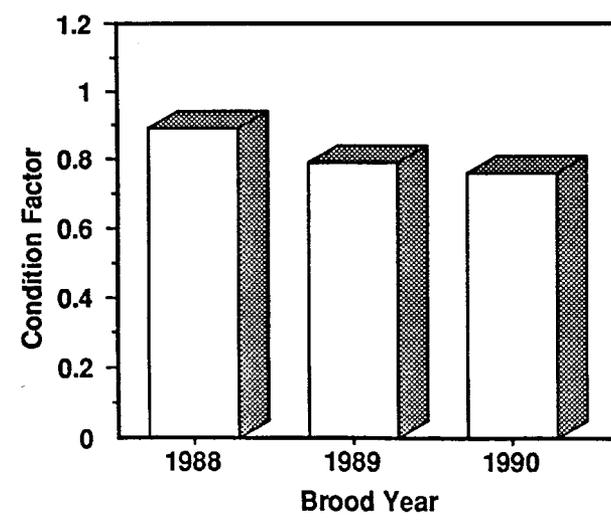
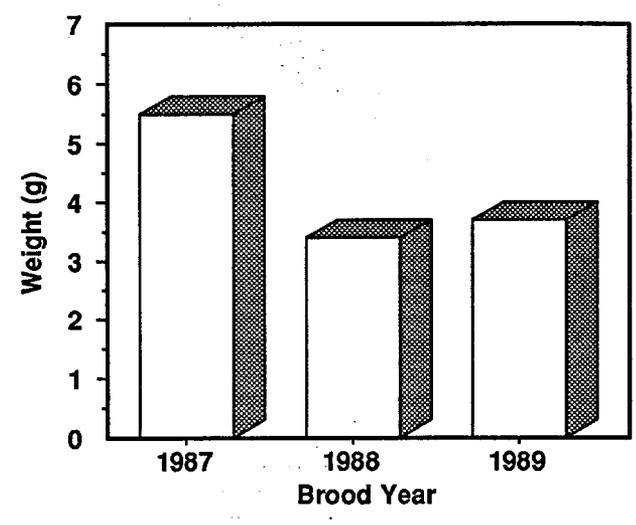
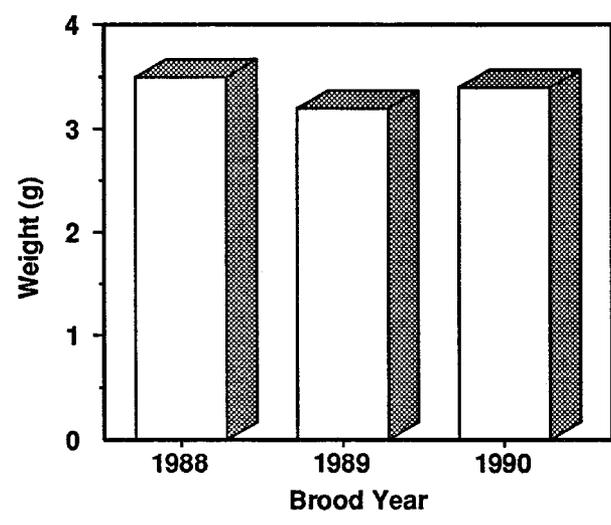
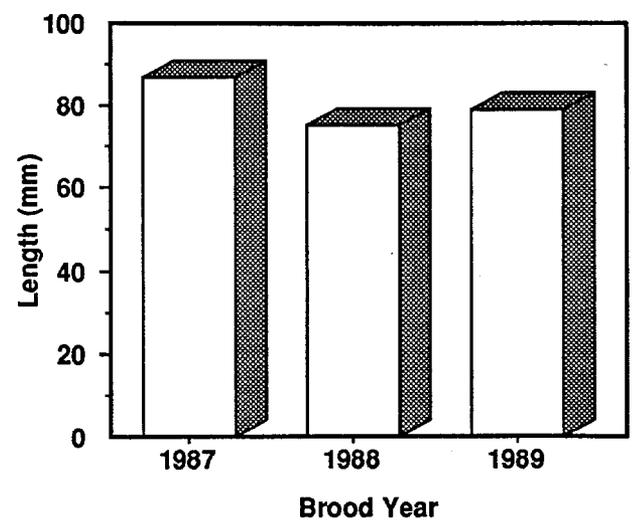
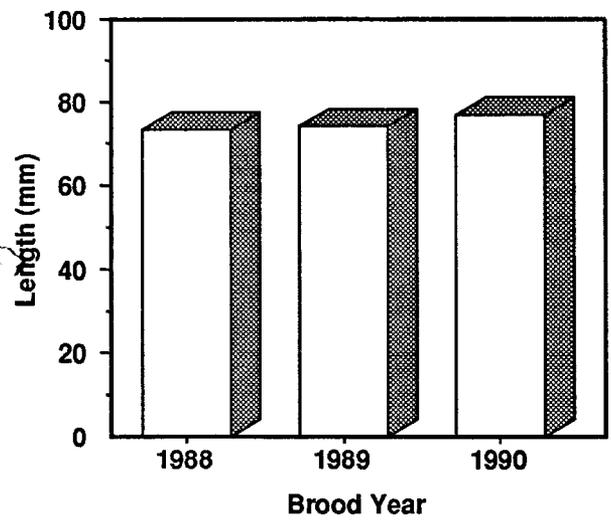


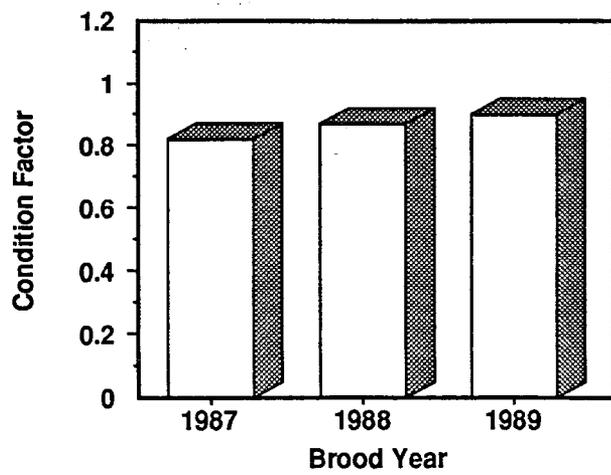
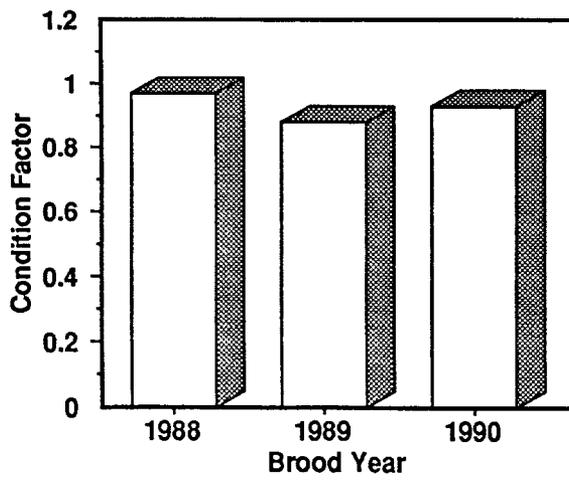
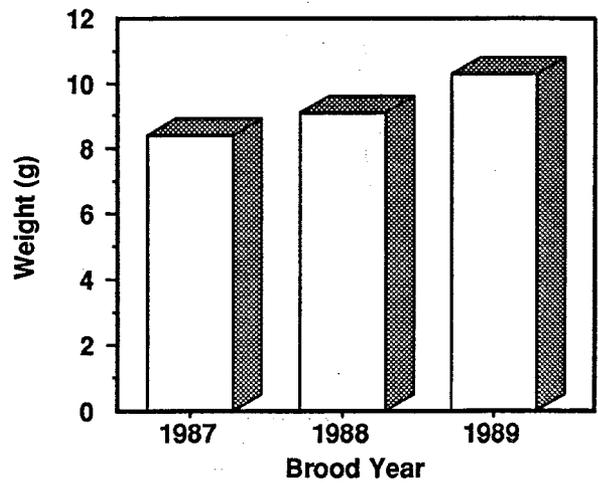
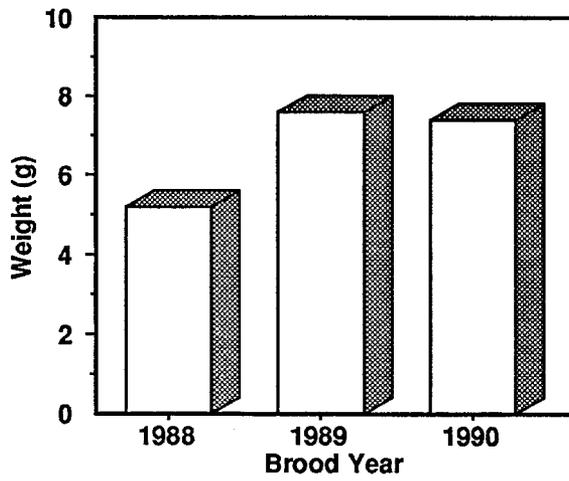
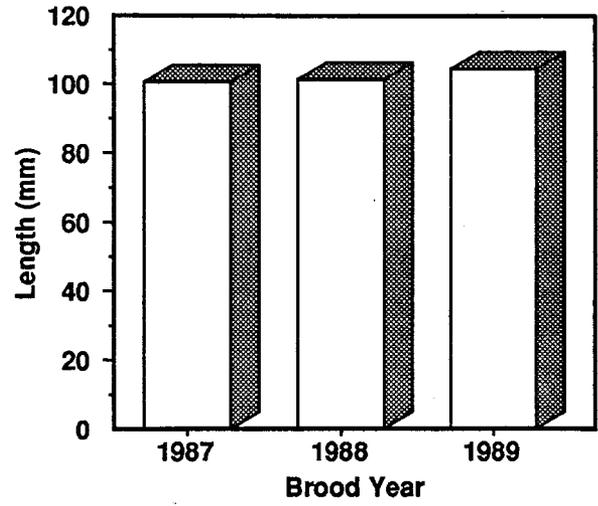
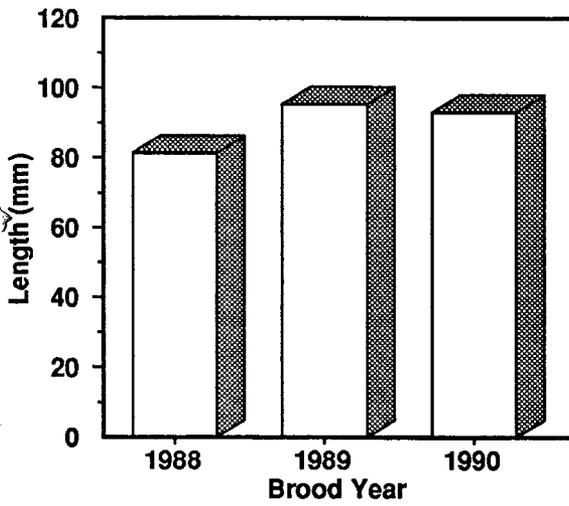
Figure 5. Mean length, weight, and condition factor of age 1. and age 2. sockeye salmon smolt by brood year, Red Lake.



Age 1.

Age 2.

Figure 6. Mean length, weight, and condition factor of age 1. and age 2. sockeye salmon smolt by brood year, Akalura Lake.



Age 1.

Age 2.

Figure 7. Mean length, weight, and condition factor of age 1. and age 2. sockeye salmon smolt by brood year, Upper Station.

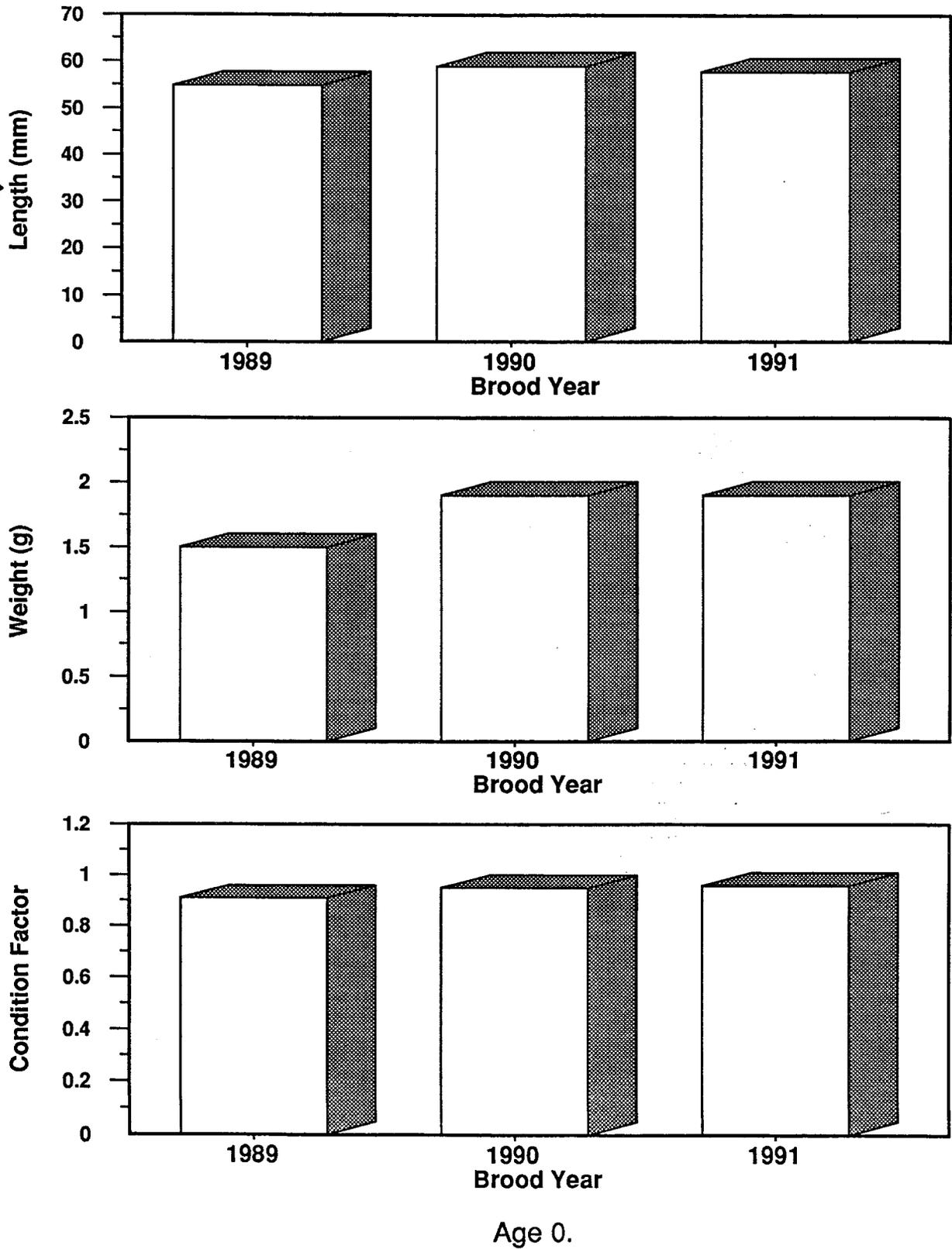


Figure 8. Mean length, weight, and condition factor of age 0. sockeye salmon smolt by brood year, Upper Station.

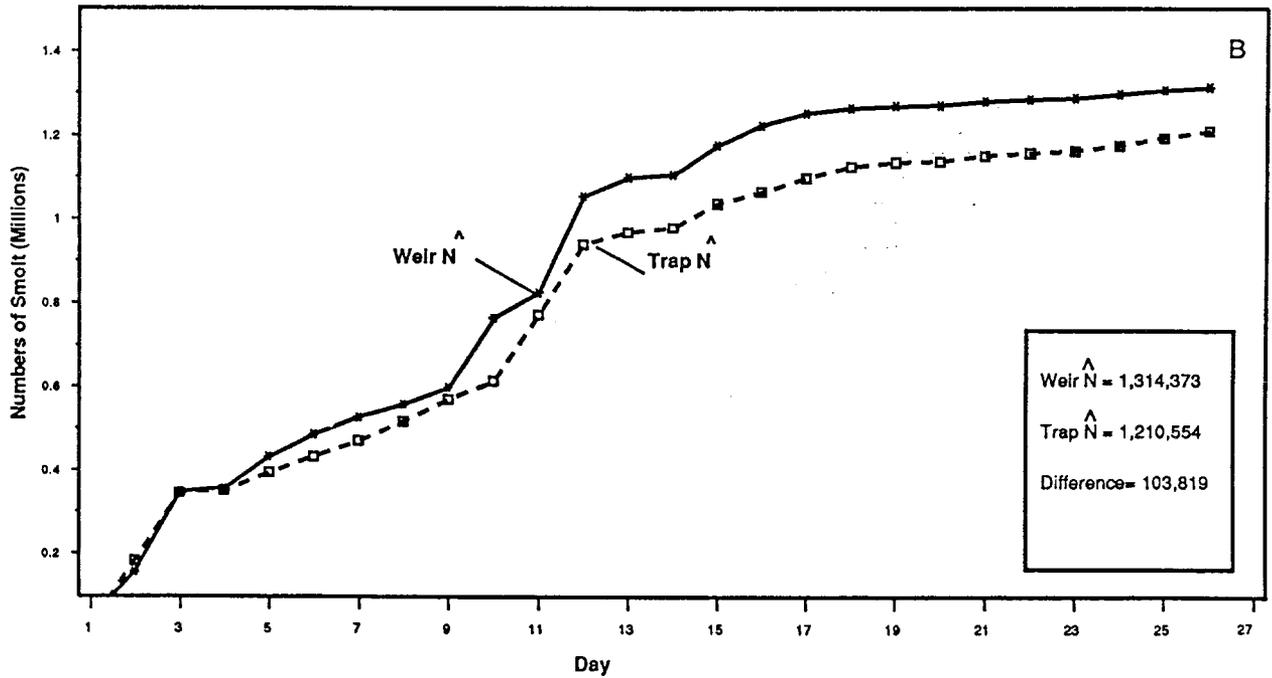
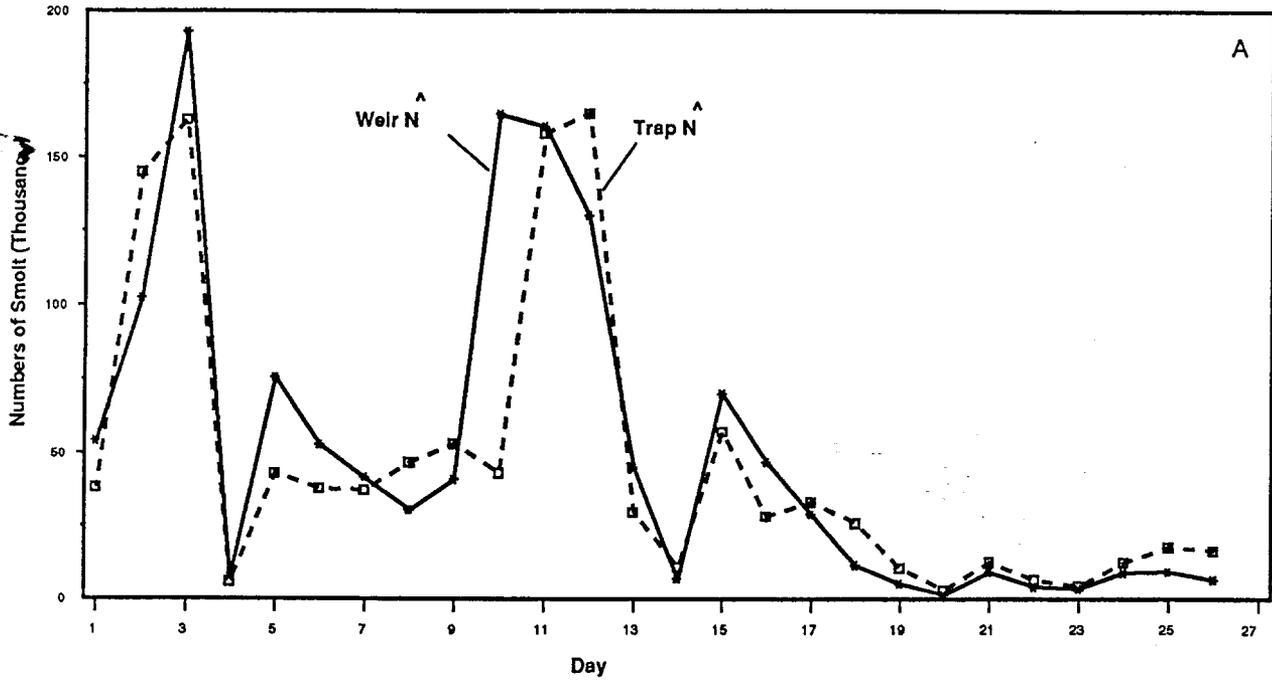


Figure 9. (A) Sockeye salmon smolt weir and trap population estimates by day; (B) cumulative weir and trap sockeye smolt population estimates by day, 1992.

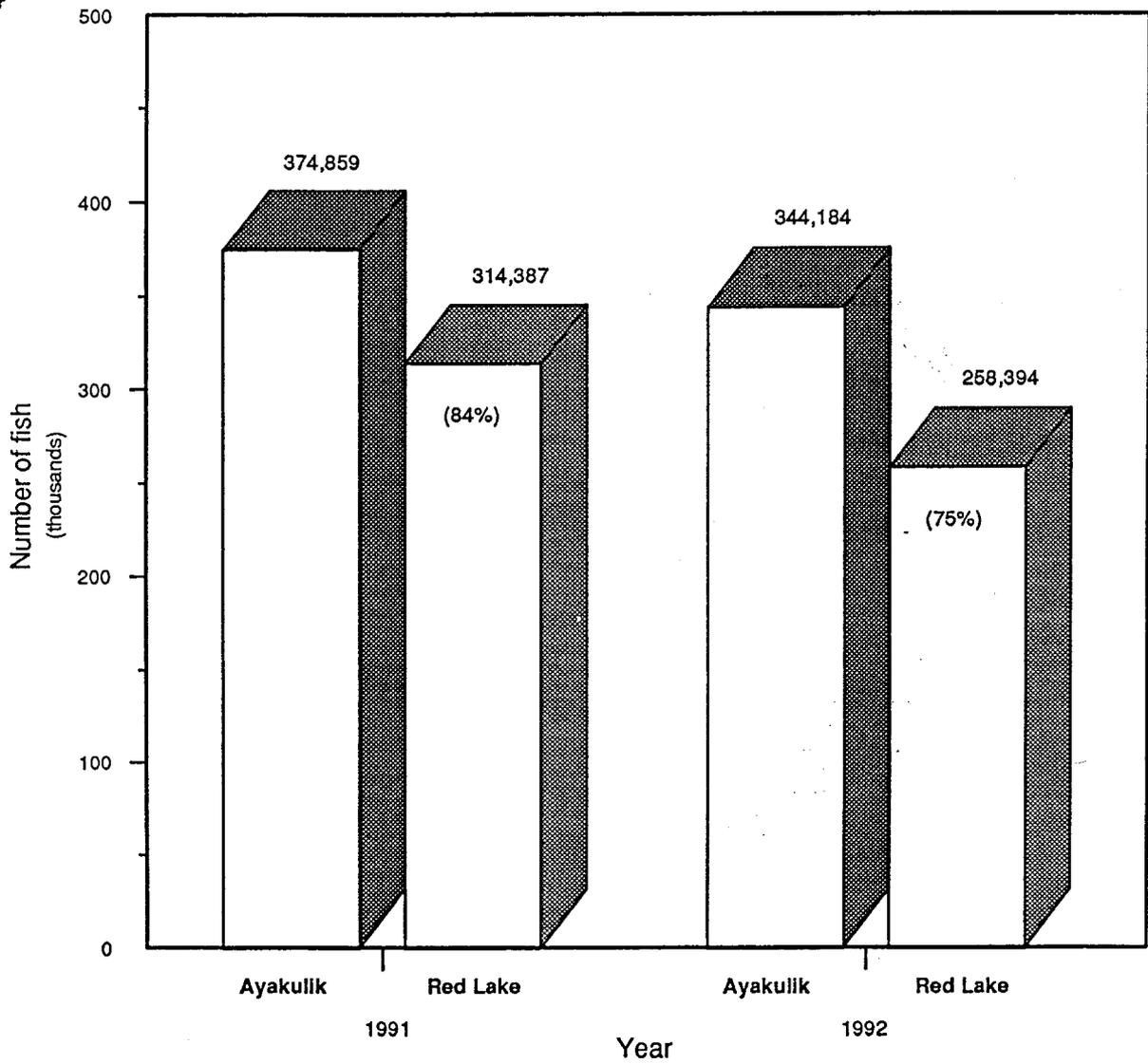


Figure 10. Comparison of the total cumulative sockeye salmon escapement count through the Ayakulik and Red Lake weirs, 1991 and 1992.

APPENDIX

Appendix A.1.

Daily sockeye salmon smolt catch and trap efficiency estimates, Red Lake, 1990.

Date ^a	Trap Catch		Trap Efficiency Test			Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Daily ^b	Cum.	Daily				
			Marked Released	Examined For Marks	Marked Recoveries		
04-May							
05-May							
06-May							
07-May							
08-May							
09-May							
10-May							
11-May							
12-May							
13-May							
14-May	114	114	0	0			
15-May	147	261	0	0			
16-May	111	372	0	0			
17-May	47	419	0	0			
18-May	7	426	0	0			
19-May	18	444	0	0			
20-May	10	454	0	0			
21-May	3	457	0	0			
22-May	108	565	0	0			
23-May	640	1,205	0	0			
24-May	58	1,263	0	0			
25-May	15	1,278	0	0			
26-May	93	1,371	0	0			
27-May	33	1,404	0	0			
28-May	40	1,444	37	0			
29-May	276	1,720	267	278	2		
30-May	713	2,433	196	717	4	14	2.8%
31-May	44	2,477	0	50	6		
01-Jun	188	2,665	0	190	2		
02-Jun	49	2,714	0	49	0		
03-Jun	237	2,951	0	237	0		
04-Jun	135	3,086	0	0			
05-Jun	67	3,153	0	0			
06-Jun	190	3,343	182	0			
07-Jun	209	3,552	134	211	2		
08-Jun	237	3,789	240	243	6	10	1.8%
09-Jun	178	3,967	0	180	2		
10-Jun	45	4,012	0	45	0		
11-Jun	146	4,158	0	146	0		
12-Jun	658	4,816	0	658	0		
13-Jun	400	5,216	375	400	0	24	6.4%
14-Jun	570	5,786	0	589	19		
15-Jun	3,274	9,060	0	3,278	4		
16-Jun	4,815	13,875	0	4,816	1		
17-Jun	5,029	18,904	0	0			
18-Jun	1,484	20,388	450	1,505	21	25	5.6%
19-Jun	2,173	22,561	0	2,177	4		
20-Jun	179	22,740	0	179	0		
21-Jun	370	23,110	0	370	0		
22-Jun	1,224	24,334	0	1,224	0		
23-Jun	2,294	26,628	313	2,314	20	23	7.3%
24-Jun	1,592	28,220	0	1,595	3		
25-Jun	377	28,597	0	377	0		
26-Jun	496	29,093	0	496	0		
27-Jun	467	29,560	456	467	0	9	2.0%
28-Jun	607	30,167	0	616	9		

-Continued-

Appendix A.1. (page 2 of 2)

Date ^a	Trap Catch		Trap Efficiency Test			Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Daily ^b	Cum.	Daily				
			Marked Released	Examined For Marks	Marked Recoveries		
29-Jun	472	30,639	0	472	0		
30-Jun	623	31,262	0	623	0		
01-Jul		31,262					
02-Jul		31,262					
03-Jul		31,262					
04-Jul		31,262					

- a Each date listed covers a 24-hour period extending from noon to noon and identifies the date of the first noon of the 24-hour period.
- b Number of fish caught does not include mark recoveries from trap efficiency tests.
- c Represents the estimated sum of marked recoveries for the particular dye test period.
- d Determined from the cumulative number of marked and recovered fish by test period.

Appendix A.2. Daily sockeye salmon smolt catch and trap efficiency estimates, trap # 1, Red Lake, 1991.

Date ^a	Trap Efficiency Test						
	Trap Catch		Daily			Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Daily ^b	Cum.	Marked Released	Examined For Marks	Marked Recoveries		
06-May	0	0		0	0		
07-May		0					
08-May		0					
09-May		0					
10-May	6	6	0	6	0		
11-May	17	23	0	17	0		
12-May	7	30	0	7	0		
13-May	21	51	0	21	0		
14-May	19	70	0	19	0		
15-May	0	70	0	0	0		
16-May	15	85	0	15	0		
17-May	4	89	0	4	0		
18-May	3	92	0	3	0		
19-May	0	92	0	0	0		
20-May	5	97	0	5	0		
21-May	18	115	0	18	0		
22-May	93	208	0	93	0		
23-May	157	365	0	157	0		
24-May	106	471	255	123	17	20	6.2
25-May	946	1,417	66	947	1		
26-May	1393	2,810	0	1394	1		
27-May	351	3,161	0	352	1		
28-May	8	3,169	0	8	0		
29-May	34	3,203	0	34	0		
30-May	186	3,389	0	186	0		
31-May	101	3,490	0	101	0		
01-Jun	92	3,582	66	96	4	6	5.3
02-Jun	293	3,875	48	294	1		
03-Jun	152	4,027	0	153	1		
04-Jun	114	4,141	0	114	0		
05-Jun	739	4,880	0	739	0		
06-Jun	735	5,615	524	749	14	17	3.2
07-Jun	147	5,762	0	150	3		
08-Jun	116	5,878	0	116	0		
09-Jun	151	6,029	0	151	0		
10-Jun	556	6,585	0	556	0		
11-Jun	286	6,871	0	286	0		
12-Jun	416	7,287	540	429	13	23	4.3
13-Jun	543	7,830	0	550	7		
14-Jun	95	7,925	0	98	3		
15-Jun	186	8,111	0	186	0		
16-Jun	828	8,939	0	828	0		
17-Jun	767	9,706	0	767	0		
18-Jun	736	10,442	0	736	0		
19-Jun	285	10,727	629	304	19	24	3.8
20-Jun	130	10,857	0	135	5		
21-Jun	253	11,110	0	253	0		
22-Jun	824	11,934	0	824	0		
23-Jun	263	12,197	0	263	0		
24-Jun	270	12,467	0	270	0		
25-Jun	291	12,758	0	291	0		
26-Jun	174	12,932	513	218	44	44	8.6
27-Jun	153	13,085	0	153	0		
28-Jun	274	13,359	0	274	0		
29-Jun	242	13,601	0	242	0		
30-Jun	526	14,127	0	526	0		

-Continued-

Date ^a	Trap Catch		Trap Efficiency Test			Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Daily ^b	Cum.	Daily				
			Marked Released	Examined For Marks	Marked Recoveries		
01-Jul	670	14,797	0	670	0		
02-Jul	39	14,836	0	39	0		
03-Jul	146	14,982	0	146	0		
04-Jul	81	15,063	0	81	0		
05-Jul	77	15,140	0	77	0		
06-Jul	22	15,162	0	22	0		
07-Jul	17	15,179	0	17	0		

- ^a Each date listed covers a 24-hour period extending from noon to noon and identifies the date of the first noon of the 24-hour period.
- ^b Numbers of fish caught does not include mark recoveries from trap efficiency tests.
- ^c Represents the sum of marked recoveries for the particular dye test period.
- ^d Determined from the cumulative number of marked and recovered fish by test period.

Appendix A.3. Daily sockeye salmon smolt catch and trap efficiency estimates, trap # 2, Red Lake, 1991.

Date ^a	Trap Catch		Trap Efficiency Test				Recovery Rate % ^d
	Daily ^b	Cum.	Daily		Est. Total Recoveries for Dye Test Period ^c		
			Marked Released	Examined For Marks		Marked Recoveries	
06-May							
07-May							
08-May							
09-May							
10-May	0	0	0	0	0		
11-May	0	0	0	0	0		
12-May	1	1	0	1	0		
13-May	7	8	0	7	0		
14-May	6	14	0	6	0		
15-May	0	14	0	0	0		
16-May	1	15	0	1	0		
17-May	6	21	0	6	0		
18-May	1	22	0	1	0		
19-May	1	23	0	1	0		
20-May	1	24	0	1	0		
21-May	12	36	0	12	0		
22-May	61	97	0	61	0		
23-May	202	299	0	202	0		
24-May	49	348	255	63	14	19	5.9
25-May	383	731	66	387	4		
26-May	328	1,059	0	329	1		
27-May	116	1,175	0	116	0		
28-May	13	1,188	0	13	0		
29-May	14	1,202	0	14	0		
30-May	27	1,229	0	27	0		
31-May	15	1,244	0	15	0		
01-Jun	13	1,257	66	18	5	6	5.3
02-Jun	204	1,461	48	205	1		
03-Jun	55	1,516	0	55	0		
04-Jun	27	1,543	0	27	0		
05-Jun	214	1,757	0	214	0		
06-Jun	586	2,343	524	593	7	14	2.7
07-Jun	189	2,532	0	195	6		
08-Jun	130	2,662	0	131	1		
09-Jun	189	2,851	0	189	0		
10-Jun	179	3,030	0	179	0		
11-Jun	262	3,292	0	262	0		
12-Jun	368	3,660	540	386	18	25	4.6
13-Jun	303	3,963	0	307	4		
14-Jun	59	4,022	0	62	3		
15-Jun	155	4,177	0	155	0		
16-Jun	349	4,526	0	349	0		
17-Jun	550	5,076	0	550	0		
18-Jun	207	5,283	0	207	0		
19-Jun	59	5,342	629	72	13	13	2.1
20-Jun	175	5,517	0	175	0		
21-Jun	198	5,715	0	198	0		
22-Jun	573	6,288	0	573	0		
23-Jun	56	6,344	0	56	0		
24-Jun	61	6,405	0	61	0		
25-Jun	223	6,628	0	223	0		
26-Jun	84	6,712	513	108	24	27	5.3
27-Jun	98	6,810	0	100	2		
28-Jun	146	6,956	0	146	0		
29-Jun	94	7,050	0	94	0		
30-Jun	116	7,166	0	116	0		

-Continued-

Date ^a	Trap Catch		Trap Efficiency Test				
	Daily ^b	Cum.	Daily			Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
			Marked Released	Examined For Marks	Marked Recoveries		
01-Jul	151	7,317	0	151	0		
02-Jul	23	7,340	0	23	0		
03-Jul	33	7,373	0	33	0		
04-Jul	12	7,385	0	12	0		
05-Jul	19	7,404	0	19	0		
06-Jul	16	7,420	0	17	1		
07-Jul	17	7,437	0	17	0		

- ^a Each date listed covers a 24-hour period extending from noon to noon and identifies the date of the first noon of the 24-hour period.
- ^b Numbers of fish caught does not include mark recoveries from trap efficiency tests.
- ^c Represents the sum of marked recoveries for the particular dye test period.
- ^d Determined from the cumulative number of marked and recovered fish by test period.

Appendix A.4.

Daily sockeye salmon smolt catch and trap efficiency estimates, traps # 1 and #2 combined, Red Lake, 1991.

Date ^a	Trap Efficiency Test						
	Trap Catch		Daily			Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Daily ^b	Cum. Released	Marked Released	Examined For Marks	Marked Recoveries		
06-May	0	0		0	0		
07-May	0	0		0	0		
08-May	0			0	0		
09-May	0			0	0		
10-May	6	6	0	6	0		
11-May	17	23	0	17	0		
12-May	8	31	0	8	0		
13-May	28	59	0	28	0		
14-May	25	84	0	25	0		
15-May	0	84	0	0	0		
16-May	16	100	0	16	0		
17-May	10	110	0	10	0		
18-May	4	114	0	4	0		
19-May	1	115	0	1	0		
20-May	6	121	0	6	0		
21-May	30	151	0	30	0		
22-May	154	305	0	154	0		
23-May	359	664	0	359	0		
24-May	155	819	255	186	31	39	12.1
25-May	1,329	2,148	66	1334	5		
26-May	1,721	3,869	0	1723	2		
27-May	467	4,336	0	468	1		
28-May	21	4,357	0	21	0		
29-May	48	4,405	0	48	0		
30-May	213	4,618	0	213	0		
31-May	116	4,734	0	116	0		
01-Jun	105	4,839	66	114	9	12	10.5
02-Jun	497	5,336	48	499	2		
03-Jun	207	5,543	0	208	1		
04-Jun	141	5,684	0	141	0		
05-Jun	953	6,637	0	953	0		
06-Jun	1,321	7,958	524	1342	21	31	5.9
07-Jun	336	8,294	0	345	9		
08-Jun	246	8,540	0	247	1		
09-Jun	340	8,880	0	340	0		
10-Jun	735	9,615	0	735	0		
11-Jun	548	10,163	0	548	0		
12-Jun	784	10,947	540	815	31	48	8.9
13-Jun	846	11,793	0	857	11		
14-Jun	154	11,947	0	160	6		
15-Jun	341	12,288	0	341	0		
16-Jun	1,177	13,465	0	1177	0		
17-Jun	1,317	14,782	0	1317	0		
18-Jun	943	15,725	0	943	0		
19-Jun	344	16,069	629	376	32	37	5.9
20-Jun	305	16,374	0	310	5		
21-Jun	451	16,825	0	451	0		
22-Jun	1,397	18,222	0	1397	0		
23-Jun	319	18,541	0	319	0		
24-Jun	331	18,872	0	331	0		
25-Jun	514	19,386	0	514	0		
26-Jun	258	19,644	513	326	68	71	13.8
27-Jun	251	19,895	0	253	2		
28-Jun	420	20,315	0	420	0		
29-Jun	336	20,651	0	336	0		
30-Jun	642	21,293	0	642	0		

-Continued-

Date ^a	Trap Efficiency Test						
	Trap Catch		Daily			Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Daily ^b	Cum.	Marked Released	Examined For Marks	Marked Recoveries		
01-Jul	821	22,114	0	821	0		
02-Jul	62	22,176	0	62	0		
03-Jul	179	22,355	0	179	0		
04-Jul	93	22,448	0	93	0		
05-Jul	96	22,544	0	96	0		
06-Jul	38	22,582	0	39	1		
07-Jul	34	22,616	0	34	0		

- a Each date listed covers a 24-hour period extending from noon to noon and identifies the date of the first noon of the 24-hour period.
- b Numbers of fish caught does not include mark recoveries from trap efficiency tests.
- c Represents the sum of marked recoveries for the particular dye test period.
- d Determined from the cumulative number of marked and recovered fish by test period.

Appendix A.5.

Daily sockeye salmon smolt catch and trap efficiency estimates, Red Lake, 1992.

Date ^a	Trap						Trap Efficiency Test				
	No. 1		No. 2		Combined		Daily			Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Daily ^b	Cum.	Daily	Cum.	Daily	Cum.	Marked (Dyed)	Examined For Marks	Marked Recoveries		
04-May	0	0	0	0	0	0	0	0	0		
05-May	0	0	0	0	0	0	0	0	0		
06-May	0	0	0	0	0	0	0	0	0		
07-May	1	1	0	0	1	1	0	0	0		
08-May	0	1	1	1	1	2	0	0	0		
09-May	0	1	1	2	1	3	0	0	0		
10-May	1	2	3	5	4	7	0	0	0		
11-May	1	3	0	5	1	8	0	0	0		
12-May	1	4	1	6	2	10	0	0	0		
13-May	0	4	1	7	1	11	0	0	0		
14-May	1	5	1	8	2	13	0	0	0		
15-May	1	6	2	10	3	16	0	0	0		
16-May	1	7	1	11	2	18	0	0	0		
17-May	0	7	7	18	7	25	0	0	0		
18-May	1	8	8	26	9	34	0	0	0		
19-May	39	47	66	92	105	139	0	0	0		
20-May	17	64	48	140	65	204	0	0	0		
21-May	9	73	65	205	74	278	0	0	0		
22-May	44	117	116	321	160	438	0	0	0		
23-May	608	725	600	921	1,208	1,646	229	1,228	20	32	14.0%
24-May	103	828	237	1,158	340	1,986	0	348	8		
25-May	726	1,554	1,888	3,046	2,614	4,600	0	2,618	4		
26-May	1,261	2,815	3,334	6,380	4,595	9,195	654	4,661	66	92	14.1%
27-May	1,070	3,885	3,560	9,940	4,630	13,825	0	4,643	13		
28-May	1,192	5,077	2,603	12,543	3,795	17,620	0	3,808	13		
29-May	216	5,293	479	13,022	695	18,315	0	0	0		
30-May	1,645	6,938	4,103	17,125	5,748	24,063	0	0	0		
31-May					21,959	46,022	0	0	0		
01-Jun					25,108	71,130	0	0	0		
02-Jun	459		478		937	72,067	474	981	56	75	15.8%
03-Jun	917		1,337		2,254	74,321	0	2,261	7		
04-Jun	2,768		3,652		6,420	80,741	0	6,432	12		
05-Jun	2,143		3,340		5,483	86,224	0	0	0		
06-Jun					5,215	91,439	0	0	0		
07-Jun	2,589		3,745		6,334	97,773	0	0	0		
08-Jun					6,972	104,745	0	0	0		

-Continued-

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Date ^a	Trap						Trap Efficiency Test				
	No. 1		No. 2		Combined		Daily			Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Daily ^b	Cum.	Daily	Cum.	Daily	Cum.	Marked (Dyed)	Examined For Marks	Marked Recoveries		
09-Jun	2582		2,885		5,467	110,212	474	5,498	32	61	12.9%
10-Jun					20,563	130,775	0	17,425	15		
11-Jun					21,795	152,570	0	21,809	14 ^e		
12-Jun	3,012		4,226		7,238	159,808	0	0			
13-Jun	1,559		2,604		4,163	163,971	0	0			
14-Jun	686		910		1,596	165,567	0	0			
15-Jun	2233		6,001		8,234	173,801	0	0			
16-Jun	1,436		2,664		4,100	177,901	525	4,160	60	76	14.5%
17-Jun	1,306		3,161		4,467	182,368	0	4,481	14		
18-Jun	1,423		1,810		3,233	185,601	0	3,235	2		
19-Jun	553		670		1,223	186,824	0	0			
20-Jun	100		237		337	187,161	0	0			
21-Jun	601		610		1,211	188,372	0	0			
22-Jun	95		467		562	188,934	0	0			
23-Jun	78		253		331	189,265	555	356	25	42	7.6%
24-Jun	222		703		925	190,190	0	941	16		
25-Jun	572		747		1,319	191,509	0	1,320	1		
26-Jun	718		515		1,233	192,742	0	0			
27-Jun	205		138		343	193,085	0	0			
28-Jun	40		60		100	193,185	0	0			
29-Jun	12		57		69	193,254	0	0			

- ^a Each date listed covers a 24-hour period extending from noon to noon and identifies the date of the first noon of the 24-hour period.
- ^b Number of fish caught does not include mark recoveries from trap efficiency tests.
- ^c Represents the estimated sum of marked recoveries for the particular dye test period.
- ^d Determined from the cumulative number of marked and recovered fish by test period.
- ^e Adjusted to include examination of all fish.

Appendix A.6. Daily sockeye salmon smolt trap catch numbers and trap efficiency estimates, Akalura, 1990.

Date ^a	Trap Catch		Trap Efficiency Test				
	Daily ^b	Cum.	Daily			Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
			Marked Released	Examined For Marks	Marked Recoveries		
01-May							
02-May							
03-May							
04-May							
05-May							
06-May							
07-May							
08-May							
09-May							
10-May							
11-May							
12-May							
13-May	2,436	2,436					
14-May	5,956	8,392					
15-May	3,501	11,893	450	3,498	25	35	7.8%
16-May	5,793	17,686		5,802	9		
17-May	2,858	20,544		2,859	1		
18-May	3,726	24,270					
19-May	2,767	27,037					
20-May	1,291	28,328					
21-May	116	28,444					
22-May	149	28,593					
23-May	13	28,606					
24-May	49	28,655					
25-May	104	28,759					
26-May	285	29,044	100	285	1	7	7.0%
27-May	255	29,299		259	4		
28-May	362	29,661		363	1		
29-May	401	30,062		402	1		
30-May	488	30,550	410	497	9	32	7.8%
31-May	447	30,997		470	23		
01-Jun	648	31,645		648	0		
02-Jun	576	32,221					
03-Jun	363	32,584					
04-Jun	830	33,414					
05-Jun	290	33,704	450	290	12	29	6.4%
06-Jun	317	34,021			10		
07-Jun	229	34,250			7		
08-Jun	181	34,431					
09-Jun	63	34,494					
10-Jun	65	34,559					
11-Jun	111	34,670					
12-Jun	118	34,788					
13-Jun	105	34,893					
14-Jun	219	35,112					
15-Jun	211	35,323					
16-Jun	145	35,468	450	186	41	51	11.3%
17-Jun	125	35,593		135	10		
18-Jun	107	35,700		107	0		
19-Jun	112	35,812					
20-Jun	178	35,990					
21-Jun	78	36,068					
22-Jun	36	36,104					
23-Jun	60	36,164					
24-Jun	29	36,193					

-Continued-

Date ^a	Trap Efficiency Test						
	Trap Catch		Daily			Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Daily ^b	Cum.	Marked Released	Examined For Marks	Marked Recoveries		
25-Jun	32	36,225					
26-Jun	16	36,241					
27-Jun							
28-Jun							
29-Jun							

- ^a Each date listed covers a 24-hour period extending from noon to noon and identifies the date of the first noon of the 24-hour period.
- ^b Number of fish caught does not include mark recoveries from trap efficiency tests.
- ^c Represents the estimated sum of marked recoveries for the particular dye test period.
- ^d Determined from the cumulative number of marked and recovered fish by test period.

Appendix A.7.

Daily sockeye salmon smolt catch and trap efficiency estimates, Akalura, 1991.

Date ^a	Trap Catch		Trap Efficiency Test			Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Daily ^b	Cum.	Marked Released	Examined For Marks	Marked Recoveries		
08-May	665	665	0	0	0		
09-May	795	1,460	0	0	0		
10-May	0	1,460	0	0	0		
11-May	0	1,460	0	0	0		
12-May	2,384	3,844	0	0	0		
13-May	1,548	5,392	0	0	0		
14-May	11,099	16,491	0	0	0		
15-May	7,022	23,513	483	7,022	44	73	15.1
16-May	6,140	29,653	0	6,140	22		
17-May	2,679	32,332	0	2,679	7		
18-May	2,951	35,283	0	2,951	0		
19-May	1,333	36,616	0	0	0		
20-May	509	37,125	487	509	17	49	10.1
21-May	141	37,266	0	141	23		
22-May	59	37,325	0	59	7		
23-May	46	37,371	0	46	2		
24-May	7	37,378	0	0	0		
25-May	6	37,384	0	0	0		
26-May	27	37,411	0	0	0		
27-May	16	37,427	0	0	0		
28-May	8	37,435	0	0	0		
29-May	13	37,448	0	0	0		
30-May	0	37,448	0	0	0		
31-May	10	37,458	0	0	0		
01-Jun	1	37,459	0	0	0		
02-Jun	1	37,460	0	0	0		
03-Jun	2	37,462	0	0	0		
04-Jun	2	37,464	0	0	0		
05-Jun	106	37,570	0	0	0		
06-Jun	4	37,574	0	0	0		
07-Jun	315	37,889	0	0	0		
08-Jun	64	37,953	0	0	0		
09-Jun	384	38,337	315	384	12	26	8.3
10-Jun	328	38,665	0	328	13		
11-Jun	10	38,675	0	10	1		
12-Jun	29	38,704	0	29	0		
13-Jun	0	38,704	0	0	0		
14-Jun	0	38,704	0	0	0		
15-Jun	48	38,752	0	0	0		
16-Jun	0	38,752	0	0	0		
17-Jun	42	38,794	0	0	0		
18-Jun	3	38,797	0	0	0		
19-Jun	0	38,797	0	0	0		
20-Jun	12	38,809	0	0	0		
21-Jun	5	38,814	0	0	0		
22-Jun	189	39,003	0	0	0		
23-Jun	19	39,022	0	0	0		
24-Jun	48	39,070	0	0	0		
25-Jun	0	39,070	0	0	0		
26-Jun	39	39,109	0	0	0		
27-Jun	4	39,113	0	0	0		
28-Jun	0	39,113	0	0	0		

-Continued-

Date ^a	Trap Efficiency Test						Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Trap Catch		Daily					
	Daily ^b	Cum.	Marked Released	Examined For Marks	Marked Recoveries			
29-Jun	24	39,137	0	0	0			
30-Jun	0	39,137	0	0	0			
01-Jul	6	39,143	0	0	0			

- ^a Each date listed covers a 24-hour period extending from noon to noon and identifies the date of the first noon of the 24-hour period.
- ^b Numbers of fish caught does not include mark recoveries from trap efficiency tests.
- ^c Represents the sum of marked recoveries for the particular dye test period.
- ^d Determined from the cumulative number of marked and recovered fish by test period.

Appendix A.8. Daily sockeye salmon smolt trap catch and trap efficiency estimates, Akalura, 1992.

Date ^a	Trap		Trap Efficiency Test				
	No. 1		Daily		Marked Recoveries	Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Daily ^b	Cum.	Marked Released	Examined For Marks			
01-May	6	6	0	0			
02-May	2	8	0	0			
03-May	0	8	0	0			
04-May	8	16	0	0			
05-May	33	49	0	0			
06-May	203	252	0	0			
07-May	1,647	1,899	0	0			
08-May	2,269	4,168	518	2,319	50	86	16.6%
09-May	4,335	8,503	0	4,370	35		
10-May	3,646	12,149	0	3,647	1		
11-May	1,726	13,875	0	1,726	0		
12-May	1,083	14,958	0	0			
13-May	3,297	18,255	0	0			
14-May	1,635	19,890	0	0			
15-May	3,865	23,755	519	3,924	59	90	17.3%
16-May	1,577	25,332	0	1,600	23		
17-May	981	26,313	0	983	2		
18-May	409	26,722	0	413	4		
19-May	234	26,956	0	236	2		
20-May	250	27,206	0	0			
21-May	79	27,285	0	0			
22-May	48	27,333	309	94	52	75	24.3%
23-May	46	27,379	0	63	17		
24-May	169	27,548	0	171	2		
25-May	525	28,073	0	527	2		
26-May	643	28,716	0	645	2		
27-May	302	29,018	0	0			
28-May	583	29,601	0	0			
29-May	174	29,775	525	218	47	64	12.2%
30-May	253	30,028	0	266	13		
31-May	325	30,353	0	328	3		
01-Jun	165	30,518	0	165	0		
02-Jun	356	30,874	0	357	1		
03-Jun	373	31,247	0	0			
04-Jun	232	31,479	0	0			
05-Jun	125	31,604	440	174	49	62	14.1%
06-Jun	55	31,659	0	67	12		
07-Jun	153	31,812	0	153	0		
08-Jun	93	31,905	0	94	1		
09-Jun	39	31,944	0	0			
10-Jun	16	31,960	0	0			
11-Jun	16	31,976	0	0			
12-Jun	11	31,987	0	0			
13-Jun	11	31,998	0	0			
14-Jun	9	32,007	0	0			
15-Jun	8	32,015	0	0			
16-Jun	3	32,018	0	0			
17-Jun	3	32,021	0	0			
18-Jun	0	32,021	0	0			
19-Jun	4	32,025	0	0			
20-Jun	1	32,026	0	0			
21-Jun	0	32,026	0	0			
22-Jun	1	32,027	0	0			
23-Jun	0	32,027	0	0			
24-Jun	0	32,027	0	0			
25-Jun	2	32,029	0	0			

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Date ^a	Trap		Trap Efficiency Test				
	No. 1		Daily			Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Daily ^b	Cum.	Marked Released	Examined For Marks	Marked Recoveries		
26-Jun	0	32,029	0	0			
27-Jun	0	32,029	0	0			
28-Jun	1	32,030	0	0			
29-Jun	0	32,030	0	0			

- a Each date listed covers a 24-hour period extending from noon to noon and identifies the date of the first noon of the 24-hour period.
- b Number of fish caught does not include mark recoveries from trap efficiency tests.
- c Represents the estimated sum of marked recoveries for the particular dye test period.
- d Determined from the cumulative number of marked and recovered fish by test period.

Appendix A.9.

Daily sockeye salmon smolt trap catch and trap efficiency estimates, Upper Station, 1990.

Date ^a	Trap Catch		Trap Efficiency Test				Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Daily ^b	Cum.	Daily					
			Marked Released	Examined For Marks	Marked Recoveries			
04-May	0	0	0	0				
05-May	0	0	0	0				
06-May	0	0	0	0				
07-May	0	0	0	0				
08-May	0	0	0	0				
09-May	0	0	0	0				
10-May	0	0	0	0				
11-May	0	0	0	0				
12-May	0	0	0	0				
13-May	0	0	0	0				
14-May	9	9	0	0				
15-May	9	18	0	0				
16-May	24	42	0	0				
17-May	41	83	0	0				
18-May	46	129	0	0				
19-May	37	166	0	0				
20-May	123	289	0	0				
21-May	121	410	0	0				
22-May	103	513	0	0				
23-May	175	688	0	0				
24-May	3,672	4,360	500 ^e	0		5	1.0%	
25-May	1,715	6,075	0	1,719	4			
26-May	1,173	7,248	0	1,173	0			
27-May	534	7,782	0	532	1			
28-May	451	8,233	0	451	0			
29-May	1,523	9,756	0	0				
30-May	2,220	11,976	493	2,261	41	52	10.5%	
31-May	4,090	16,066	0	4,101	11			
01-Jun	1,653	17,719	0	1,653	0			
02-Jun	200	17,919	0	200	0			
03-Jun	1,301	19,220	0	1,301	0			
04-Jun	914	20,134	0	914	0			
05-Jun	616	20,750	0	616	0			
06-Jun	253	21,003	0	253	0			
07-Jun	1,457	22,460	497	1,477	20	27	5.4%	
08-Jun	1,024	23,484	0	1,031	7			
09-Jun	3,128	26,612	0	3,128	0			
10-Jun	1,011	27,623	0	1,011	0			
11-Jun	1,216	28,839	496	1,234	18	21	4.2%	
12-Jun	2,467	31,306	0	2,470	3			
13-Jun	2,257	33,563	0	2,257	0			
14-Jun	985	34,548	0	884	0			
15-Jun	2,381	36,929	500	2,393	12	24	4.8%	
16-Jun	1,579	38,508	0	1,587	8			
17-Jun	1,293	39,801	0	1,295	2			
18-Jun	879	40,680	0	881	2			
19-Jun	1,820	42,500	0	1,820	0			
20-Jun	320	42,820	495	360	40	56	11.3%	
21-Jun	374	43,194	0	389	15			
22-Jun	377	43,571	0	377	0			
23-Jun	1,429	45,000	0	1,430	1			
24-Jun	542	45,542	0	542	0			
25-Jun	562	46,104	0	562	0			
26-Jun	223	46,327	315	230	7	14	4.4%	
27-Jun	328	46,655	0	333	5			
28-Jun	535	47,190	0	536	1			

-Continued-

Date ^a	Trap Efficiency Test						Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Trap Catch		Daily					
	Daily ^b	Cum.	Marked Released	Examined For Marks	Marked Recoveries			
29-Jun	347	47,537	0	348	1			
30-Jun	380	47,917	0	380	0			
01-Jul	243	48,160	0	243	0			
02-Jul	463	48,623	0	463	0			
03-Jul	163	48,786	0	163	0			
04-Jul	966	49,752	0	966	0			
05-Jul	851	50,603	0	851	0			
06-Jul	1,148	51,751	498	1,170	22	24	4.8%	
07-Jul	2,089	53,840	0	2,091	2			
08-Jul	6,463	60,303	0	6,463	0			
09-Jul	2,609	62,912	0	2,609	0			
10-Jul	3,960	66,872	0	3,960	0			
11-Jul	73,628	140,500	0	7,699	0			
12-Jul	10,732	151,232	493	10,752	20	20	4.1%	
13-Jul	44,210	195,442	0	5,661	0			
14-Jul	12,991	208,433	0	3,151	0			
15-Jul	9,374	217,807	0	9,374	0			
16-Jul	4,362	222,169	0	4,362	0			
17-Jul	8,669	230,838	0	1,782	0			
18-Jul	13,913	244,751	0	2,684	0			
19-Jul	3,127	247,878	0	3,127	0			
20-Jul	1,228	249,106	501	1,242	14	14	2.8%	
21-Jul	1,063	250,169	0	1,063	0			
22-Jul	1,404	251,573	0	1,404	0			
23-Jul	791	252,364	0	0	0			
24-Jul	275	252,639	0	0	0			
25-Jul	100	252,739	0	0	0			
26-Jul	224	252,963	0	0	0			
27-Jul	230	253,193	0	0	0			
28-Jul	142	253,335	0	0	0			
29-Jul		253,335						
30-Jul		253,335						
31-Jul		253,335						
01-Aug		253,335						
02-Aug		253,335						
03-Aug		253,335						
04-Aug		253,335						
05-Aug		253,335						
06-Aug		253,335						
07-Aug		253,335						
08-Aug		253,335						
09-Aug		253,335						

- ^a Each date listed covers a 24-hour period extending from noon to noon and identifies the date of the first noon of the 24-hour period.
- ^b Number of fish caught does not include mark recoveries from trap efficiency tests.
- ^c Represents the estimated sum of marked recoveries for the particular dye test period.
- ^d Determined from the cumulative number of marked and recovered fish by test period.
- ^e No leads were used on trap prior to 30 May.

Appendix A.10. Daily sockeye salmon smolt catch and trap efficiency estimates, Upper Station, 1991.

Date ^a	Trap Catch		Trap Efficiency Test			Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Daily ^b	Cum.	Daily				
			Marked Released	Examined For Marks	Marked Recoveries		
11-May	5	5	0	5	0		
12-May	1	6	0	1	0		
13-May	1	7	0	1	0		
14-May	1	8	0	1	0		
15-May	3	11	0	3	0		
16-May	0	11	0	0	0		
17-May	7	18	0	7	0		
18-May	0	18	0	0	0		
19-May	0	18	0	0	0		
20-May	0	18	0	0	0		
21-May	0	18	0	0	0		
22-May	1	19	0	1	0		
23-May	6	25	0	6	0		
24-May	34	59	0	34	0		
25-May	35	94	0	35	0		
26-May	72	166	0	72	0		
27-May	188	354	0	188	0		
28-May	52	406	0	52	0		
29-May	255	661	184	439	0		
30-May	192	853	190	382	6	25	6.7
31-May	58	911	0	58	11		
01-Jun	60	971	0	60	3		
02-Jun	234	1,205	0	234	5		
03-Jun	340	1,545	0	340	0		
04-Jun	246	1,791	500	746	0	34	6.8
05-Jun	127	1,918	0	127	23		
06-Jun	112	2,030	0	112	7		
07-Jun	246	2,276	0	246	2		
08-Jun	453	2,729	0	453	2		
09-Jun	145	2,874	0	145	0		
10-Jun	21	2,895	0	21	0		
11-Jun	214	3,109	0	214	0		
12-Jun	27	3,136	0	27	0		
13-Jun	76	3,212	0	76	0		
14-Jun	225	3,437	289	514	0	36	8.7
15-Jun	127	3,564	127	254	17		
16-Jun	11,356	14,920	0	11,356	16		
17-Jun	7,034	21,954	0	7,034	3		
18-Jun	4,659	26,613	0	4,659	0		
19-Jun	3,124	29,737	0	3,124	0		
20-Jun	86	29,823	0	86	0		
21-Jun	32	29,855	0	32	0		
22-Jun	477	30,332	0	477	0		
23-Jun	498	30,830	492	990	0	24	4.9
24-Jun	151	30,981	0	151	21		
25-Jun	68	31,049	0	68	2		
26-Jun	140	31,189	0	140	1		
27-Jun	594	31,783	0	594	0		
28-Jun	370	32,153	0	370	0		
29-Jun	144	32,297	0	144	0		
30-Jun	56	32,353	0	56	0		
01-Jul	32	32,385	0	32	0		

-Continued-

Trap Efficiency Test							
Date ^a	Trap Catch		Daily			Est. Total Recoveries for Dye Test Period ^c	Recovery Rate % ^d
	Daily ^b	Cum.	Marked Released	Examined For Marks	Marked Recoveries		
02-Jul	268	32,653	0	268	0		
03-Jul	95	32,748	0	95	0		
04-Jul	113	32,861	358	471	18	22	6.1
05-Jul	43	32,904	0	43	4		
06-Jul	120	33,024	0	120	0		
07-Jul	329	33,353	0	329	0		
08-Jul	1,683	35,036	0	1,683	0		
09-Jul	1,580	36,616	0	1,580	0		
10-Jul	8,281	44,897	495	8,776	16	16	3.2
11-Jul	6,637	51,534	0	6,637	0		
12-Jul	1,520	53,054	0	1,520	0		
13-Jul	3,474	56,528	0	3,474	0		
14-Jul	3,232	59,760	0	3,232	0		
15-Jul	674	60,434	0	674	0		
16-Jul	1,117	61,551	423	1,540	13	13	3.1
17-Jul	4,071	65,622	0	4,071	0		
18-Jul	4,354	69,976	0	4,354	0		
19-Jul	2,519	72,495	0	2,519	0		
20-Jul	1,767	74,262	0	1,767	0		
21-Jul	5,162	79,424	0	5,162	0		
22-Jul	955	80,379	0	955	0		
23-Jul	491	80,870	451	942	9	9	2.0
24-Jul	331	81,201	0	331	0		
25-Jul	401	81,602	0	401	0		
26-Jul	2,134	83,736	0	2,134	0		
27-Jul	722	84,458	0	722	0		
28-Jul	166	84,624	0	166	0		
29-Jul	129	84,753	0	129	0		
30-Jul	74	84,827	0	74	0		
31-Jul	232	85,059	0	232	0		
01-Aug	270	85,329	0	270	0		
02-Aug	158	85,487	499	657	15	15	3.0
03-Aug	166	85,653	0	166	0		
04-Aug	118	85,771	0	118	0		
05-Aug	281	86,052	0	281	0		

- ^a Each date listed covers a 24-hour period extending from noon to noon and identifies the date of the first noon of the 24-hour period.
- ^b Numbers of fish caught does not include mark recoveries from trap efficiency tests.
- ^c Represents the sum of marked recoveries for the particular dye test period.
- ^d Determined from the cumulative number of marked and recovered fish by test period.

Appendix A.11. Daily sockeye salmon smolt catch and trap efficiency estimates, Upper Station, 1992.

Date ^a	Trap		Trap Efficiency Test				Recovery Rate % ^d
	No. 1		Daily		Est. Total Recoveries for Dye Test Period ^c		
	Daily ^b	Cum.	Marked Released	Examined For Marks		Marked Recoveries	
04-May	0	0	0	0			
05-May	1	1	0	0			
06-May	0	1	0	0			
07-May	1	2	0	0			
08-May	0	2	0	0			
09-May	0	2	0	0			
10-May	0	2	0	0			
11-May	0	2	0	0			
12-May	0	2	0	0			
13-May	1	3	0	0			
14-May	1	4	0	0			
15-May	2	6	0	0			
16-May	20	26	0	0			
17-May	31	57	0	0			
18-May	43	100	0	0			
19-May	53	153	0	0			
20-May	331	484	53	331	0	1	1.9%
21-May	583	1,067	0	584	1		
22-May	427	1,494	0	427	0		
23-May	134	1,628	0	134	0		
24-May	317	1,945	376	329	12	13	3.5%
25-May	392	2,337	0	393	1		
26-May	1,331	3,668	0	1,331	0		
27-May	548	4,216	0	0			
28-May	771	4,987	0	0			
29-May	245	5,232	0	0			
30-May	582	5,814	0	0			
31-May	472	6,286	182*	498	26	30	16.5%
01-Jun	544	6,830	0	546	2		
02-Jun	1,741	8,571	0	1,743	2		
03-Jun	813	9,384	0	0			
04-Jun	550	9,934	556	576	26	37	6.7%
05-Jun	847	10,781	0	857	10		
06-Jun	123	10,904	0	124	1		
07-Jun	258	11,162	0	0			
08-Jun	756	11,918	0	0			
09-Jun	392	12,310	0	0			
10-Jun	164	12,474	0	0			
11-Jun	930	13,404	0	0			
12-Jun	512	13,916	0	0			
13-Jun	626	14,542	543	660	34	56	10.3%
14-Jun	132	14,674	0	154	22		
15-Jun	91	14,765	0	91	0		
16-Jun	1,057	15,822	0	0			
17-Jun	759	16,581	0	0			
18-Jun	208	16,789	0	0			
19-Jun	264	17,053	0	0			
20-Jun	64	17,117	0	0			
21-Jun	424	17,541	0	0			
22-Jun	237	17,778	462	272	35	47	10.2%
23-Jun	393	18,171	0	403	10		
24-Jun	292	18,463	0	294	2		
25-Jun	372	18,835	0	0			
26-Jun	283	19,118	0	0			
27-Jun	0	19,118	0	0			
28-Jun	0	19,118	0	0			

-Continued-

Date ^a	Trap		Trap Efficiency Test				Recovery Rate % ^d
	No. 1		Daily		Est. Total Recoveries for Dye Test Period ^c		
	Daily ^b	Cum.	Marked Released	Examined For Marks		Marked Recoveries	
29-Jun	0	19,118	0	0			
30-Jun	0	19,118	0	0			
01-Jul	761	19,879	0	0			
02-Jul	5,898	25,777	0	0			
03-Jul	1,921	27,698	557	1,937	16	17	3.1%
04-Jul	3,795	31,493	0	3,796	1		
05-Jul	3,273	34,766	0	3,273	0		
06-Jul	1,910	36,676	0	0			
07-Jul	3,168	39,844	0	0			
08-Jul	5,233	45,077	0	0			
09-Jul	4,474	49,551	0	0			
10-Jul	4,302	53,853	0	0			
11-Jul	2,446	56,299	0	0			
12-Jul	11,036	67,335	430	11,058	22	22	5.1%
13-Jul	1,166	68,501	0	1,166	0		
14-Jul	1,354	69,855	0	1,354	0		
15-Jul	1,380	71,235	0	0			
16-Jul	4,984	76,219	0	0			
17-Jul	2,388	78,607	0	0			
18-Jul	2,240	80,847	0	0			
19-Jul	19,196	100,043	583	19,275	79	79	13.6%
20-Jul	5,528	105,571	0	5,528	0		
21-Jul	4,440	110,011	0	4,440	0		
22-Jul	9,166	119,177	0	0			
23-Jul	6,749	125,926	0	0			
24-Jul	20,971	146,897	0	0			
25-Jul	8,125	155,022	0	0			
26-Jul	4,292	159,314	527	4,388	96	99	18.8%
27-Jul	3,066	162,380	0	3,069	3		
28-Jul	1,702	164,082	0	1,702	0		
29-Jul	2,313	166,395	0	0			
30-Jul	898	167,293	0	0			
31-Jul	1,585	168,878	0	0			
01-Aug	1,160	170,038	0	0			
02-Aug	1,193	171,231	503	1,291	98	98	19.5%
03-Aug	1,281	172,512	0	1,281	0		
04-Aug	291	172,803	0	0			
05-Aug	699	173,502	0	0			
06-Aug	473	173,975	0	0			
07-Aug	853	174,828	0	0			
08-Aug	935	175,763	0	0			
09-Aug	489	176,252	0	0			

- ^a Each date listed covers a 24-hour period extending from noon to noon and identifies the date of the first noon of the 24-hour period.
- ^b Number of fish caught does not include mark recoveries from trap efficiency tests.
- ^c Represents the estimated sum of marked recoveries for the particular dye test period.
- ^d Determined from the cumulative number of marked and recovered fish by test period.
- ^e High mortality during dye test due to absence of oxygen.

Appendix B.1. Estimated number of sockeye salmon smolt from Red Lake, by day, 1990.

Date	Population Estimate	95% Conf. Int.		Date	Population Estimate	95% Conf. Int.	
		Lower	Upper			Lower	Upper
14-May	4,354	2,126	6,582	22-Jun	18,002	12,038	23,966
15-May	5,615	2,777	8,452	23-Jun	32,759	20,310	45,208
16-May	4,240	2,067	6,412	24-Jun	27,883	16,176	39,589
17-May	1,795	808	2,783	25-Jun	8,737	4,525	12,950
18-May	267	44	491	26-Jun	16,488	7,342	25,634
19-May	687	245	1,130	27-Jun	26,238	10,786	41,691
20-May	382	96	668	28-Jun	34,610	14,274	54,946
21-May	115	17 ^a	246	29-Jun	26,519	10,903	42,135
22-May	4,125	2,008	6,242	30-Jun	35,003	14,438	55,568
23-May	24,444	12,511	36,377				
24-May	2,215	1,023	3,407				
25-May	573	188	958				
26-May	3,552	1,712	5,392		739,954	402,905	1,077,004
27-May	1,260	534	1,987				
28-May	1,528	671	2,385				
29-May	10,618	5,363	15,873				
30-May	28,470	14,365	42,574				
31-May	2,067	909	3,225				
01-Jun	8,193	3,898	12,488				
02-Jun	2,208	934	3,481				
03-Jun	11,180	5,152	17,208				
04-Jun	6,682	2,952	10,411				
05-Jun	3,488	1,434	5,542				
06-Jun	10,431	4,451	16,411				
07-Jun	12,252	5,102	19,402				
08-Jun	14,838	6,370	23,305				
09-Jun	7,105	3,638	10,571				
10-Jun	1,311	664	1,958				
11-Jun	3,371	2,025	4,717				
12-Jun	12,325	8,112	16,538				
13-Jun	6,494	4,003	8,984				
14-Jun	9,995	6,119	13,871				
15-Jun	56,135	34,614	77,657				
16-Jun	85,603	52,245	118,961				
17-Jun	90,680	55,111	126,249				
18-Jun	28,113	17,708	38,519				
19-Jun	38,281	24,543	52,018				
20-Jun	2,941	1,848	4,033				
21-Jun	5,782	3,757	7,808				

^aNumbers are negative values.

Appendix B.2.

Estimated number of sockeye salmon smolt from Red Lake, by day, 1991.

Date	Population Estimate	95% Conf. Int.		Date	Population Estimate	95% Conf. Int.	
		Lower	Upper			Lower	Upper
10-May	50	11	90	20-Jun	4,452	3,123	5,781
11-May	143	68	218	21-Jun	5,663	4,119	7,206
12-May	67	20	114	22-Jun	15,387	11,596	19,179
13-May	236	131	341	23-Jun	3,130	2,350	3,909
14-May	210	114	307	24-Jun	2,927	2,234	3,621
15-May	0	0	0	25-Jun	4,085	3,196	4,975
16-May	126	57	195	26-Jun	1,887	1,432	2,341
17-May	84	31	138	27-Jun	1,836	1,392	2,279
18-May	34	2	65	28-Jun	3,071	2,363	3,780
19-May	8	7 ^a	24	29-Jun	2,457	1,880	3,034
20-May	50	11	90	30-Jun	4,695	3,639	5,750
21-May	252	142	363	01-Jul	6,004	4,669	7,339
22-May	1,296	879	1,714	02-Jul	453	312	595
23-May	3,021	2,106	3,937	03-Jul	1,309	979	1,639
24-May	1,305	885	1,724	04-Jul	680	487	873
25-May	11,487	8,088	14,886	05-Jul	702	505	900
26-May	15,079	10,600	19,558	06-Jul	278	177	378
27-May	4,148	2,873	5,424	07-Jul	249	155	342
28-May	192	97	287				
29-May	444	267	621				
30-May	2,003	1,344	2,662		263,501	178,221	348,782
31-May	1,124	728	1,520				
01-Jun	1,072	508	1,635				
02-Jun	5,574	2,649	8,499				
03-Jun	2,575	1,145	4,005				
04-Jun	1,969	814	3,124				
05-Jun	15,159	6,046	24,271				
06-Jun	23,007	15,294	30,720				
07-Jun	5,487	3,640	7,333				
08-Jun	3,673	2,465	4,882				
09-Jun	4,677	3,220	6,133				
10-Jun	9,605	6,768	12,441				
11-Jun	6,662	4,744	8,580				
12-Jun	8,910	6,455	11,365				
13-Jun	10,285	7,362	13,207				
14-Jun	1,963	1,335	2,592				
15-Jun	4,570	3,164	5,977				
16-Jun	16,626	11,577	21,676				
17-Jun	19,666	13,540	25,791				
18-Jun	15,399	10,368	20,430				
19-Jun	5,997	4,073	7,921				

^aNumbers are negative values.

Appendix B.4. Estimated number of sockeye salmon smolt from Akalura Lake, by day, 1990.

Date	Population Estimate	95% Conf. Int.		Date	Population Estimate	95% Conf. Int.	
		Lower	Upper			Lower	Upper
07-May				18-Jun	961	664	1,257
08-May				19-Jun	1,005	697	1,314
09-May				20-Jun	1,598	1,138	2,058
10-May				21-Jun	700	471	929
11-May				22-Jun	323	196	451
12-May				23-Jun	539	353	725
13-May	32,145	22,109	42,181	24-Jun	260	150	370
14-May	78,595	54,160	103,030	25-Jun	287	170	405
15-May	46,199	31,806	60,591	26-Jun	144	69	218
16-May	75,338	52,083	98,593	27-Jun			
17-May	37,168	25,660	48,677	28-Jun			
18-May	47,765	33,102	62,429	29-Jun			
19-May	35,071	24,347	45,795				
20-May	16,136	11,199	21,072				
21-May	1,450	948	1,952				
22-May	1,842	1,224	2,460				
23-May	159	65	252				
24-May	591	357	825				
25-May	1,254	820	1,689				
26-May	4,612	1,668	7,557				
27-May	3,998	1,471	6,525				
28-May	5,504	2,078	8,930				
29-May	5,918	2,278	9,558				
30-May	6,433	4,285	8,580				
31-May	6,048	3,999	8,097				
01-Jun	9,161	6,025	12,298				
02-Jun	8,375	5,462	11,288				
03-Jun	5,432	3,491	7,373				
04-Jun	12,990	8,347	17,633				
05-Jun	4,645	2,984	6,307				
06-Jun	4,804	3,134	6,474				
07-Jun	3,231	2,124	4,338				
08-Jun	2,417	1,594	3,239				
09-Jun	787	488	1,086				
10-Jun	774	486	1,061				
11-Jun	1,248	831	1,666				
12-Jun	1,270	856	1,684				
13-Jun	1,071	723	1,419				
14-Jun	2,146	1,517	2,775				
15-Jun	1,973	1,404	2,542				
16-Jun	1,302	917	1,686				
17-Jun	1,122	784	1,460				
					474,790	318,734	630,846

Appendix B.6. Estimated number of sockeye salmon smolt from Akalura Lake, by day, 1992.

Date	Population Estimate	95% Conf. Int.		Date	Population Estimate	95% Conf. Int.	
		Lower	Upper			Lower	Upper
01-May	37	9	65	19-Jun	29	2	55
02-May	12	3 ^a	28	20-Jun	7	6 ^a	20
03-May	0	0	0	21-Jun	0	0	0
04-May	49	17	82	22-Jun	7	6 ^a	20
05-May	204	130	278	23-Jun	0	0	0
06-May	1,255	968	1,542	24-Jun	0	0	0
07-May	10,183	8,182	12,185	25-Jun	14	4 ^a	33
08-May	14,029	11,291	16,767	26-Jun	0	0	0
09-May	26,217	21,209	31,225	27-Jun	0	0	0
10-May	21,899	17,724	26,073	28-Jun	7	6 ^a	20
11-May	10,308	8,323	12,292	29-Jun	0	0	0
12-May	6,431	5,179	7,683	30-Jun	0	0	0
13-May	19,468	15,788	23,149	01-Jul	0	0	0
14-May	9,590	7,760	11,420				
15-May	22,562	18,310	26,813				
16-May	8,697	7,084	10,310		193,201	153,765	232,638
17-May	5,127	4,188	6,066				
18-May	2,031	1,646	2,416				
19-May	1,107	887	1,327				
20-May	1,129	911	1,347				
21-May	341	257	426				
22-May	199	137	262				
23-May	206	139	272				
24-May	822	615	1,029				
25-May	2,786	2,123	3,450				
26-May	3,753	2,821	4,685				
27-May	1,958	1,423	2,492				
28-May	4,281	3,077	5,484				
29-May	1,447	1,064	1,830				
30-May	2,052	1,537	2,566				
31-May	2,584	1,957	3,211				
01-Jun	1,286	952	1,621				
02-Jun	2,711	2,071	3,351				
03-Jun	2,776	2,130	3,421				
04-Jun	1,702	1,290	2,114				
05-Jun	898	649	1,148				
06-Jun	395	264	526				
07-Jun	1,100	803	1,396				
08-Jun	668	472	865				
09-Jun	280	178	383				
10-Jun	115	57	173				
11-Jun	115	57	173				
12-Jun	79	33	125				
13-Jun	79	33	125				
14-Jun	65	23	106				
15-Jun	58	19	96				
16-Jun	22	1 ^a	44				
17-Jun	22	1 ^a	44				
18-Jun	0	0	0				

^aNumbers are negative values.

Appendix B.7.

Estimated number of sockeye salmon smolt from Upper Station Lake, by day, 1990.

Date	Population Estimate	95% Conf. Int.		Date	Population Estimate	95% Conf. Int.	
		Lower	Upper			Lower	Upper
05-May	0	0	0	20-Jun	2,873	2,117	3,630
06-May	0	0	0	21-Jun	3,731	2,710	4,752
07-May	0	0	0	22-Jun	4,279	3,036	5,522
08-May	0	0	0	23-Jun	18,566	13,028	24,103
09-May	0	0	0	24-Jun	8,360	5,600	11,120
10-May	0	0	0	25-Jun	10,664	6,795	14,533
11-May	0	0	0	26-Jun	5,360	2,711	8,009
12-May	0	0	0	27-Jun	7,884	4,025	11,743
13-May	0	0	0	28-Jun	12,666	6,554	18,778
14-May	1,078	99	2,057	29-Jun	8,215	4,223	12,207
15-May	1,078	99	2,057	30-Jun	8,798	4,570	13,027
16-May	2,875	574	5,176	01-Jul	5,626	2,894	8,358
17-May	4,912	1,124	8,699	02-Jul	10,720	5,585	15,855
18-May	5,511	1,287	9,735	03-Jul	3,693	1,891	5,495
19-May	4,433	995	7,871	04-Jul	21,884	11,580	32,188
20-May	14,735	3,792	25,679	05-Jul	18,359	11,370	25,348
21-May	14,496	3,727	25,265	06-Jul	24,766	15,371	34,160
22-May	12,339	3,141	21,538	07-Jul	46,269	28,585	63,952
23-May	20,965	5,486	36,444	08-Jul	145,741	89,787	201,695
24-May	439,906	119,436	760,375	09-Jul	60,477	36,902	84,052
25-May	205,457	55,666	355,248	10-Jul	96,274	57,975	134,574
26-May	140,525	38,005	243,046	11-Jul	1,834,809	1,098,499	2,571,119
27-May	63,973	17,183	110,763	12-Jul	277,234	163,563	390,905
28-May	54,030	14,479	93,581	13-Jul	1,192,005	694,108	1,689,903
29-May	182,455	49,410	315,501	14-Jul	360,110	207,741	512,480
30-May	21,409	15,936	26,883	15-Jul	275,317	155,770	394,863
31-May	42,082	31,012	53,152	16-Jul	135,364	75,089	195,638
01-Jun	18,475	13,363	23,587	17-Jul	277,751	152,467	403,036
02-Jun	2,399	1,652	3,146	18-Jul	476,700	255,452	697,948
03-Jun	16,834	11,807	21,861	19-Jul	110,990	58,600	163,379
04-Jun	12,876	8,845	16,906	20-Jul	46,996	24,171	69,821
05-Jun	9,463	6,350	12,576	21-Jul	40,681	20,906	60,457
06-Jun	4,363	2,800	5,926	22-Jul	53,732	27,654	79,809
07-Jun	27,759	17,830	37,687	23-Jul	30,272	15,524	45,020
08-Jun	20,870	13,140	28,600	24-Jul	10,524	5,314	15,735
09-Jun	68,231	42,362	94,101	25-Jul	3,827	1,854	5,800
10-Jun	23,388	14,210	32,566	26-Jul	8,573	4,305	12,840
11-Jun	30,031	17,906	42,155	27-Jul	8,802	4,424	13,181
12-Jun	60,029	36,058	83,999	28-Jul	5,434	2,684	8,185
13-Jun	53,604	32,425	74,783				
14-Jun	22,847	13,860	31,833				
15-Jun	51,572	32,111	71,033				
16-Jun	26,682	17,695	35,670				
17-Jun	17,910	12,415	23,405				
18-Jun	10,316	7,376	13,255				
19-Jun	18,528	13,676	23,379				
					7,402,762	3,962,768	10,842,756

Appendix B.8.

Estimated number of sockeye salmon smolt from Upper Station Lake, by day, 1991.

Date	Population Estimate	95% Conf. Int.		Date	Population Estimate	95% Conf. Int.	
		Lower	Upper			Lower	Upper
05-May	0	0	0	21-Jun	564	287	842
06-May	0	0	0	22-Jun	9,190	5,563	12,817
07-May	0	0	0	23-Jun	10,614	6,535	14,692
08-May	0	0	0	24-Jun	3,137	1,882	4,391
09-May	0	0	0	25-Jun	1,389	791	1,987
10-May	0	0	0	26-Jun	2,790	1,687	3,894
11-May	78	8	147	27-Jun	11,650	7,354	15,946
12-May	16	13 ^a	44	28-Jun	7,087	4,468	9,706
13-May	16	13 ^a	44	29-Jun	2,665	1,644	3,686
14-May	16	13 ^a	44	30-Jun	1,017	584	1,451
15-May	47	5 ^a	98	01-Jul	571	300	841
16-May	0	0	0	02-Jul	4,694	3,004	6,384
17-May	109	24	193	03-Jul	1,635	1,000	2,270
18-May	0	0	0	04-Jul	1,917	1,104	2,731
19-May	0	0	0	05-Jul	806	409	1,203
20-May	0	0	0	06-Jul	2,400	1,319	3,482
21-May	0	0	0	07-Jul	7,551	4,104	10,998
22-May	16	13 ^a	44	08-Jul	42,733	22,748	62,719
23-May	93	16	170	09-Jul	46,736	23,422	70,051
24-May	528	274	781	10-Jul	271,688	148,079	395,296
25-May	543	284	803	11-Jul	217,751	118,658	316,843
26-May	1,117	644	1,591	12-Jul	49,869	27,083	72,655
27-May	2,917	1,784	4,051	13-Jul	113,977	62,052	165,902
28-May	807	448	1,165	14-Jul	113,005	56,610	169,401
29-May	3,957	2,443	5,471	15-Jul	23,566	11,716	35,416
30-May	2,980	1,823	4,136	16-Jul	39,055	19,491	58,620
31-May	900	507	1,293	17-Jul	151,054	73,842	228,266
01-Jun	931	527	1,336	18-Jul	168,938	81,014	256,862
02-Jun	3,536	2,340	4,731	19-Jul	105,444	48,825	162,063
03-Jun	5,137	3,435	6,839	20-Jul	76,999	34,959	119,039
04-Jun	3,717	2,464	4,969	21-Jul	247,780	107,619	387,941
05-Jun	1,862	1,208	2,517	22-Jul	48,005	20,262	75,748
06-Jun	1,619	1,045	2,193	23-Jul	27,284	11,225	43,343
07-Jun	3,455	2,327	4,583	24-Jul	17,333	7,305	27,361
08-Jun	6,189	4,254	8,124	25-Jul	20,073	8,680	31,465
09-Jun	1,928	1,285	2,571	26-Jul	101,235	45,508	156,962
10-Jun	276	138	413	27-Jul	32,875	14,977	50,773
11-Jun	2,737	1,870	3,603	28-Jul	6,932	3,187	10,676
12-Jun	337	183	490	29-Jul	5,149	2,388	7,911
13-Jun	924	598	1,251	30-Jul	2,853	1,293	4,413
14-Jun	2,704	1,874	3,534	31-Jul	8,579	4,199	12,960
15-Jun	1,505	986	2,024	01-Aug	9,563	4,963	14,162
16-Jun	142,697	97,875	187,519	02-Aug	5,596	2,855	8,337
17-Jun	92,883	62,952	122,815	03-Aug	5,879	3,005	8,753
18-Jun	65,922	43,920	87,925	04-Aug	4,179	2,102	6,256
19-Jun	47,434	31,027	63,841	05-Aug	9,952	5,171	14,734
20-Jun	1,414	836	1,992				

2,445,104 1,258,660 3,527,829

^aNumbers in negative values.

Appendix B.9.

Estimated number of sockeye salmon smolt from Upper Station Lake, by day, 1992.

Date	Population Estimate	95% Conf. Int.		Date	Population Estimate	95% Conf. Int.	
		Lower	Upper			Lower	Upper
05-May	105	41 ^a	251	23-Jun	4,211	2,988	5,434
06-May	0	0	0	24-Jun	3,355	2,332	4,378
07-May	105	41 ^a	251	25-Jun	4,595	3,165	6,024
08-May	0	0	0	26-Jun	3,823	2,567	5,079
09-May	0	0	0	27-Jun	5,571	3,695	7,448
10-May	0	0	0	28-Jun	7,771	5,043	10,499
11-May	0	0	0	29-Jun	10,368	6,569	14,168
12-May	0	0	0	30-Jun	13,855	8,475	19,236
13-May	105	41 ^a	251	01-Jul	18,135	10,671	25,599
14-May	105	41 ^a	251	02-Jul	168,323	94,099	242,548
15-May	210	42 ^a	462	03-Jul	66,530	36,940	96,121
16-May	2,100	9 ^a	4,209	04-Jul	120,919	69,175	172,662
17-May	3,255	14	6,496	05-Jul	98,117	57,233	139,001
18-May	4,515	39	8,991	06-Jul	52,460	31,392	73,527
19-May	5,565	60	11,070	07-Jul	82,535	50,244	114,827
20-May	34,755	645	68,865	08-Jul	129,663	80,154	179,172
21-May	46,721	1,128	92,314	09-Jul	105,684	66,195	145,173
22-May	27,406	942	53,871	10-Jul	94,785	60,494	129,077
23-May	7,129	316	13,943	11-Jul	51,644	33,286	70,002
24-May	10,506	5,171	15,841	12-Jul	225,007	137,119	312,895
25-May	10,996	5,799	16,194	13-Jul	19,141	12,320	25,961
26-May	34,448	18,927	49,968	14-Jul	18,601	12,523	24,679
27-May	13,164	7,369	18,959	15-Jul	16,254	11,329	21,178
28-May	17,279	9,933	24,625	16-Jul	50,883	36,690	65,077
29-May	5,146	2,963	7,328	17-Jul	21,742	16,000	27,485
30-May	11,732	6,953	16,510	18-Jul	18,368	13,774	22,963
31-May	8,973	5,397	12,548	19-Jul	143,212	114,107	172,317
01-Jun	9,785	5,992	13,577	20-Jul	39,087	31,338	46,837
02-Jun	29,588	18,577	40,598	21-Jul	29,699	23,980	35,418
03-Jun	13,147	8,328	17,966	22-Jul	58,552	47,624	69,480
04-Jun	8,473	5,815	11,131	23-Jul	40,998	33,550	48,445
05-Jun	12,171	8,519	15,823	24-Jul	122,286	100,700	143,872
06-Jun	1,672	1,120	2,224	25-Jul	45,248	37,444	53,052
07-Jun	3,336	2,333	4,340	26-Jul	23,035	18,932	27,137
08-Jun	9,299	6,703	11,896	27-Jul	16,355	13,439	19,270
09-Jun	4,588	3,303	5,873	28-Jul	9,033	7,407	10,659
10-Jun	1,834	1,293	2,376	29-Jul	12,214	10,039	14,390
11-Jun	9,961	7,378	12,544	30-Jul	4,714	3,850	5,578
12-Jun	5,261	3,894	6,627	31-Jul	8,278	6,799	9,758
13-Jun	6,167	4,596	7,739	01-Aug	6,029	4,943	7,115
14-Jun	1,300	922	1,679	02-Aug	6,174	5,042	7,305
15-Jun	897	618	1,175	03-Aug	6,629	5,417	7,841
16-Jun	10,413	7,805	13,022	04-Aug	1,506	1,199	1,813
17-Jun	7,477	5,586	9,369	05-Aug	3,617	2,937	4,298
18-Jun	2,084	1,470	2,697	06-Aug	2,448	1,974	2,922
19-Jun	2,645	1,881	3,408	07-Aug	4,414	3,593	5,235
20-Jun	641	417	866	08-Aug	4,838	3,942	5,735
21-Jun	4,247	3,057	5,438	09-Aug	2,530	2,042	3,019
22-Jun	2,374	1,683	3,065				

2,394,918 1,511,502 3,278,334

^aNumbers in negative values.

Appendix C.1.

Sockeye smolt numbers by age class and day from Red Lake, 1990.

Date	Population Estimate	Age Class			Date	Population Estimate	Age Class		
		1.0	2.0	3.0			1.0	2.0	3.0
05/14/90	4,354	11	4,193	151	06/23/90	32,759	23,009	9,750	0
05/15/90	5,615	14	5,407	194	06/24/90	27,883	19,584	8,299	0
05/16/90	4,240	10	4,083	147	06/25/90	8,737	6,137	2,600	0
05/17/90	1,795	4	1,729	62	06/26/90	16,488	9,548	6,940	0
05/18/90	267	1	257	9	06/27/90	26,238	15,194	11,044	0
05/19/90	687	2	662	24	06/28/90	34,610	20,042	14,568	0
05/20/90	382	1	368	13	06/29/90	26,519	15,357	11,162	0
05/21/90	115	0	111	4	06/30/90	35,003	20,270	14,733	0
05/22/90	4,125	10	3,972	143					
05/23/90	24,444	60	23,539	845					
05/24/90	2,215	5	2,133	77	Total	739,954	240,500	493,026	6,427
05/25/90	573	1	552	20					
05/26/90	3,552	9	3,420	123					
05/27/90	1,260	3	1,213	44					
05/28/90	1,528	4	1,471	53					
05/29/90	10,618	26	10,225	367					
05/30/90	28,470	216	27,893	360					
05/31/90	2,067	16	2,025	26					
06/01/90	8,193	62	8,027	104					
06/02/90	2,208	17	2,163	28					
06/03/90	11,180	85	10,954	142					
06/04/90	6,682	51	6,547	85					
06/05/90	3,488	26	3,417	44					
06/06/90	10,431	79	10,220	132					
06/07/90	12,252	93	12,004	155					
06/08/90	14,838	113	14,537	188					
06/09/90	7,105	1,066	5,942	97					
06/10/90	1,311	197	1,096	18					
06/11/90	3,371	506	2,819	46					
06/12/90	12,325	2,666	9,534	125					
06/13/90	6,494	1,405	5,023	66					
06/14/90	9,995	2,162	7,732	102					
06/15/90	56,135	12,141	43,422	571					
06/16/90	85,603	18,515	66,217	871					
06/17/90	90,680	19,613	70,144	923					
06/18/90	28,113	15,579	12,463	71					
06/19/90	38,281	21,419	16,862	0					
06/20/90	2,941	1,453	1,488	0					
06/21/90	5,782	3,401	2,381	0					
06/22/90	18,002	10,318	7,684	0					

Appendix C.2. Sockeye smolt numbers by age class and day from Red Lake, 1991.

Date	Population Estimate	Age Class			Date	Population Estimate	Age Class		
		1.0	2.0	3.0			1.0	2.0	3.0
05/10/91	50	0	17	33	06/19/91	5,997	4,455	1,542	0
05/11/91	143	0	48	95	06/20/91	4,452	3,307	1,145	0
05/12/91	67	0	22	45	06/21/91	5,663	4,514	1,149	0
05/13/91	236	0	79	157	06/22/91	15,387	13,603	1,561	223
05/14/91	210	0	70	140	06/23/91	3,130	2,817	268	45
05/15/91	0	0	0	0	06/24/91	2,927	2,634	293	0
05/16/91	126	0	42	84	06/25/91	4,085	3,677	409	0
05/17/91	84	0	28	56	06/26/91	1,887	1,723	164	0
05/18/91	34	0	11	23	06/27/91	1,836	1,783	53	0
05/19/91	8	0	3	5	06/28/91	3,071	2,764	307	0
05/20/91	50	0	17	33	06/29/91	2,457	2,141	316	0
05/21/91	252	0	84	168	06/30/91	4,695	4,559	136	0
05/22/91	1,296	0	432	864	07/01/91	6,004	5,404	600	0
05/23/91	3,021	0	1,051	1,970	07/02/91	453	416	37	0
05/24/91	1,305	0	480	825	07/03/91	1,309	1,216	94	0
05/25/91	11,487	0	5,744	5,744	07/04/91	680	631	49	0
05/26/91	15,079	0	8,777	6,302	07/05/91	702	652	50	0
05/27/91	4,148	0	1,885	2,263	07/06/91	278	269	9	0
05/28/91	192	0	117	75	07/07/91	249	218	31	0
05/29/91	444	0	287	157					
05/30/91	2,003	0	1,202	801					
05/31/91	1,124	0	674	450	Total	263,500	105,467	119,849	38,184
06/01/91	1,072	0	643	429					
05/30/91	2,003	0	1,202	801					
06/02/91	5,574	0	4,409	1,165					
06/03/91	2,575	37	1,839	699					
06/04/91	1,969	179	1,492	298					
06/05/91	15,159	1,378	11,484	2,297					
06/06/91	23,007	667	17,005	5,335					
06/07/91	5,487	166	4,240	1,081					
06/08/91	3,673	329	2,577	767					
06/09/91	4,677	535	3,207	935					
06/10/91	9,605	443	7,832	1,330					
06/11/91	6,662	307	5,432	922					
06/12/91	8,910	1,420	7,102	387					
06/13/91	10,285	4,261	5,583	441					
06/14/91	1,963	813	1,066	84					
06/15/91	4,570	1,747	2,621	202					
06/16/91	16,626	9,976	6,413	238					
06/17/91	19,666	14,821	4,275	570					
06/18/91	15,399	11,605	3,348	446					

Appendix C.3.

Sockeye smolt numbers by age class and day from Red Lake, 1992.

Date	Population Estimate	Age Class			Date	Population Estimate	Age Class		
		1	2	3			1	2	3
05/07/92	8	0	8	0	06/17/92	33,529	3,306	30,223	0
05/08/92	8	0	8	0	06/18/92	26,219	2,585	23,634	0
05/09/92	8	0	8	0	06/19/92	10,786	1,063	9,723	0
05/10/92	33	0	33	0	06/20/92	3,233	333	2,900	0
05/11/92	8	0	8	0	06/21/92	12,841	917	11,924	0
05/12/92	17	0	17	0	06/22/92	6,675	477	6,198	0
05/13/92	8	0	5	3	06/23/92	4,527	647	3,880	0
05/14/92	17	0	17	0	06/24/92	12,650	2,933	9,717	0
05/15/92	25	0	25	0	06/25/92	18,038	4,183	13,855	0
05/16/92	17	0	17	0	06/26/92	16,862	3,910	12,952	0
05/17/92	58	0	58	0	06/27/92	4,691	816	3,875	0
05/18/92	74	0	74	0	06/28/92	1,368	342	1,026	0
05/19/92	866	0	766	100	06/29/92	944	236	708	0
05/20/92	536	0	393	143					
05/21/92	611	0	448	163					
05/22/92	1,320	0	968	352	Total	1,420,360	29,484	1,365,082	25,794
05/23/92	9,967	153	8,280	1,533					
05/24/92	2,805	0	2,324	481					
05/25/92	19,531	0	16,183	3,348					
05/26/92	34,333	0	31,809	2,524					
05/27/92	32,793	482	30,382	1,929					
05/28/92	26,330	382	25,948	0					
05/29/92	4,740	0	4,740	0					
05/30/92	38,392	0	38,392	0					
05/31/92	144,961	0	138,470	6,491					
06/01/92	162,592	0	155,312	7,280					
06/02/92	6,014	191	5,823	0					
06/03/92	14,868	229	14,182	457					
06/04/92	43,310	0	43,310	0					
06/05/92	38,070	0	38,070	0					
06/06/92	37,525	0	37,174	351					
06/07/92	47,001	723	46,278	0					
06/08/92	53,403	822	52,581	0					
06/09/92	43,361	0	42,723	638					
06/10/92	158,091	0	158,091	0					
06/11/92	164,900	0	164,900	0					
06/12/92	53,822	0	53,822	0					
06/13/92	30,110	886	29,224	0					
06/14/92	11,303	359	10,944	0					
06/15/92	57,520	1,826	55,694	0					
06/16/92	28,641	1,685	26,956	0					

Appendix C.4. Sockeye smolt numbers by age class and day from Akalura Lake, 1990.

Date	Population Estimate	Age Class		Date	Population Estimate	Age Class	
		1.0	2.0			1.0	2.0
05/13/90	32,145	270	31,875	06/10/90	774	518	256
05/14/90	78,595	660	77,935	06/11/90	1,248	869	379
05/15/90	46,199	388	45,811	06/12/90	1,270	973	297
05/16/90	75,338	633	74,705	06/13/90	1,071	877	194
05/17/90	37,168	312	36,856	06/14/90	2,146	1,757	389
05/18/90	47,765	401	47,364	06/15/90	1,973	1,616	357
05/19/90	35,071	295	34,776	06/16/90	1,302	1,066	236
05/20/90	16,136	136	16,000	06/17/90	1,122	919	203
05/21/90	1,450	285	1,165	06/18/90	961	937	24
05/22/90	1,842	362	1,480	06/19/90	1,005	984	21
05/23/90	159	31	128	06/20/90	1,598	1,598	0
05/24/90	591	116	475	06/21/90	700	700	0
05/25/90	1,254	247	1,007	06/22/90	323	323	0
05/26/90	4,612	907	3,705	06/23/90	539	539	0
05/27/90	3,998	991	3,007	06/24/90	260	260	0
05/28/90	5,504	1,881	3,623	06/25/90	287	287	0
05/29/90	5,918	2,228	3,690	06/26/90	144	144	0
05/30/90	6,433	3,103	3,330				
05/31/90	6,048	3,528	2,520				
06/01/90	9,161	6,653	2,508	Total	474,791	66,460	408,331
06/02/90	8,375	6,082	2,293				
05/31/90	6,048	3,528	2,520				
06/03/90	5,432	3,273	2,159				
06/04/90	12,990	8,688	4,302				
06/05/90	4,645	3,107	1,538				
06/06/90	4,804	3,213	1,591				
06/07/90	3,231	2,161	1,070				
06/08/90	2,417	1,616	801				
06/09/90	787	526	261				

Appendix C.5. Sockeye smolt numbers by age class and day from Akalura Lake, 1991.

Date	Population Estimate	Age Class			Date	Population Estimate	Age Class		
		1.0	2.0	3.0			1.0	2.0	3.0
05/08/91	4,451	224	4,227	0	06/10/91	4,114	60	4,054	0
05/09/91	5,321	267	5,054	0	06/11/91	125	0	125	0
05/10/91	8,866	445	8,421	0	06/12/91	364	13	351	0
05/11/91	12,410	623	11,787	0	06/13/91	0	0	0	0
05/12/91	15,957	801	15,156	0	06/14/91	0	0	0	0
05/13/91	10,361	520	9,841	0	06/15/91	602	26	576	0
05/14/91	74,290	3,731	70,559	0	06/16/91	0	0	0	0
05/15/91	47,001	702	46,299	0	06/17/91	527	38	489	0
05/16/91	44,097	639	43,458	0	06/18/91	38	0	38	0
05/17/91	20,722	314	19,780	628	06/19/91	0	0	0	0
05/18/91	24,774	0	24,774	0	06/20/91	151	0	151	0
05/19/91	12,211	177	12,034	0	06/21/91	63	13	50	0
05/20/91	5,152	0	5,152	0	06/22/91	2,371	34	2,337	0
05/21/91	1,436	0	1,436	0	06/23/91	238	14	196	28
05/22/91	607	10	578	20	06/24/91	602	0	575	27
05/23/91	479	8	456	15	06/25/91	0	0	0	0
05/24/91	74	0	74	0	06/26/91	489	13	449	26
05/25/91	63	0	63	0	06/27/91	50	0	33	17
05/26/91	287	11	266	11	06/28/91	0	0	0	0
05/27/91	172	0	172	0	06/29/91	301	39	249	13
05/28/91	87	0	87	0	06/30/91	0	0	0	0
05/29/91	143	11	132	0	07/01/91	75	0	75	0
05/30/91	0	0	0	0					
05/31/91	112	0	101	11					
06/01/91	11	0	11	0					
06/02/91	11	0	11	0					
06/03/91	23	0	23	0					
06/04/91	23	12	12	0					
06/05/91	1,247	0	1,193	54					
06/06/91	48	0	48	0					
06/07/91	3,787	110	3,403	274					
06/08/91	779	23	700	56					
06/09/91	4,816	209	4,537	70					
					Total	309,928	9,086	299,591	1,251

Appendix C.7. Sockeye smolt numbers by age class and day from Upper Station Lake, 1990.

Date	Population Estimate	Age Class				Date	Population Estimate	Age Class			
		0.0	1.0	2.0	3.0			0.0	1.0	2.0	3.0
05/14/90	1,078	0	45	987	45	06/24/90	8,360	367	4,853	3,099	41
05/15/90	1,078	0	45	987	45	06/25/90	10,664	883	4,192	5,516	74
05/16/90	2,875	0	121	2,633	121	06/26/90	5,360	444	2,107	2,772	37
05/17/90	4,912	0	206	4,499	206	06/27/90	7,884	652	3,099	4,078	54
05/18/90	5,511	0	232	5,048	232	06/28/90	12,666	1,048	4,979	6,551	87
05/19/90	4,433	0	186	4,060	186	06/29/90	8,215	680	3,229	4,249	57
05/20/90	14,735	0	619	13,497	619	06/30/90	8,798	728	3,459	4,551	61
05/21/90	14,496	0	731	12,791	975	07/01/90	5,626	466	2,212	2,910	39
05/22/90	12,339	0	622	10,887	830	07/02/90	10,720	4,656	758	5,062	244
05/23/90	20,965	0	1,057	18,499	1,409	07/03/90	3,693	1,604	261	1,744	84
05/24/90	439,906	0	13,747	415,161	10,998	07/04/90	21,884	9,505	1,547	10,334	497
05/25/90	205,457	0	6,420	193,900	5,136	07/05/90	18,359	7,974	1,298	8,670	417
05/26/90	140,525	0	4,391	132,620	3,513	07/06/90	24,766	10,757	1,751	11,695	563
05/27/90	63,973	0	1,999	60,374	1,599	07/07/90	46,269	20,097	3,272	21,849	1,052
05/28/90	54,030	0	9,749	42,384	1,895	07/08/90	145,741	145,741	0	0	0
05/29/90	182,455	0	32,924	143,129	6,402	07/09/90	60,477	60,477	0	0	0
05/30/90	21,409	0	3,863	16,795	751	07/10/90	96,274	96,274	0	0	0
05/31/90	42,082	0	7,594	33,012	1,477	07/11/90	1,834,809	1,834,809	0	0	0
06/01/90	18,475	0	3,334	14,493	648	07/12/90	277,234	277,234	0	0	0
06/02/90	2,399	0	433	1,882	84	07/13/90	1,192,005	1,192,005	0	0	0
06/03/90	16,834	0	3,038	13,206	591	07/14/90	360,110	360,110	0	0	0
06/04/90	12,876	0	4,712	7,842	323	07/15/90	275,317	275,317	0	0	0
06/05/90	9,463	0	3,463	5,763	237	07/16/90	135,364	135,364	0	0	0
06/06/90	4,363	0	1,596	2,657	109	07/17/90	277,751	277,751	0	0	0
06/07/90	27,759	0	10,157	16,906	696	07/18/90	476,700	476,700	0	0	0
06/08/90	20,870	0	7,637	12,710	523	07/19/90	110,990	110,990	0	0	0
06/09/90	68,231	0	24,967	41,554	1,710	07/20/90	46,996	46,996	0	0	0
06/10/90	23,388	0	8,558	14,244	586	07/21/90	40,681	40,681	0	0	0
06/11/90	30,031	0	981	27,843	1,207	07/22/90	53,732	53,732	0	0	0
06/12/90	60,029	0	2,825	52,261	4,944	07/23/90	30,272	30,272	0	0	0
06/13/90	53,604	0	3,229	48,437	1,937	07/24/90	10,524	10,524	0	0	0
06/14/90	22,847	0	538	20,965	1,344	07/25/90	3,827	3,827	0	0	0
06/15/90	51,572	0	7,887	41,864	1,820	07/26/90	8,573	8,573	0	0	0
06/16/90	26,682	0	4,081	21,660	942	07/27/90	8,802	8,802	0	0	0
06/17/90	17,910	0	2,739	14,539	632	07/28/90	5,434	5,434	0	0	0
06/18/90	10,316	0	1,676	8,339	301						
06/19/90	18,528	0	10,721	7,691	117						
06/20/90	2,873	0	1,662	1,193	18						
06/21/90	3,731	0	2,159	1,549	23						
06/19/90	18,528	0	10,721	7,691	117						
06/22/90	4,279	0	2,476	1,776	27						
06/23/90	18,566	0	10,743	7,707	117						
						Total	7,402,762	5,511,473	241,181	1,591,424	58,682

Appendix C.8.

Sockeye smolt numbers by age class and day from Upper Station Lake, 1991.

Date	Population Estimate	Age Class				Date	Population Estimate	Age Class			
		0.0	1.0	2.0	3.0			0.0	1.0	2.0	3.0
05/11/91	78	0	31	47	0	06/25/91	1,389	0	785	544	60
05/12/91	16	0	16	0	0	06/26/91	2,790	0	1,764	1,026	0
05/13/91	16	0	16	0	0	06/27/91	11,650	0	5,967	5,683	0
05/14/91	16	0	16	0	0	06/28/91	7,087	0	4,337	2,644	106
05/15/91	47	0	47	0	0	06/29/91	2,665	0	1,631	994	40
05/16/91	0	0	0	0	0	06/30/91	1,017	0	622	379	15
05/17/91	109	0	93	0	16	07/01/91	571	0	339	232	0
05/18/91	0	0	0	0	0	07/02/91	4,694	0	2,787	1,907	0
05/19/91	0	0	0	0	0	07/03/91	1,635	0	971	664	0
05/20/91	0	0	0	0	0	07/04/91	1,917	29	1,345	515	29
05/21/91	0	0	0	0	0	07/05/91	806	302	363	141	0
05/22/91	16	0	16	0	0	07/06/91	2,400	1,113	696	591	0
05/23/91	93	0	0	93	0	07/07/91	7,551	6,796	431	324	0
05/24/91	528	0	31	497	0	07/08/91	42,733	39,528	2,137	1,068	0
05/25/91	543	0	0	496	47	07/09/91	46,736	43,620	1,558	1,558	0
05/26/91	1,117	0	160	910	48	07/10/91	271,688	271,688	0	0	0
05/27/91	2,917	0	0	2,494	423	07/11/91	217,751	217,751	0	0	0
05/28/91	807	0	132	560	115	07/12/91	49,869	47,732	2,137	0	0
05/29/91	3,957	0	746	2,925	287	07/13/91	113,977	107,464	6,513	0	0
05/30/91	2,980	0	561	2,203	216	07/14/91	113,005	113,005	0	0	0
05/31/91	900	0	183	656	61	07/15/91	23,566	23,566	0	0	0
06/01/91	931	0	310	572	49	07/16/91	39,055	37,939	1,116	0	0
06/02/91	3,536	0	1,127	2,255	154	07/17/91	151,054	151,054	0	0	0
06/03/91	5,137	0	1,489	3,574	74	07/18/91	168,938	166,525	0	2,413	0
06/04/91	3,717	0	1,077	2,586	54	07/19/91	105,444	105,444	0	0	0
06/05/91	1,862	0	540	1,214	108	07/20/91	76,999	76,999	0	0	0
06/06/91	1,619	0	548	976	95	07/21/91	247,780	244,240	3,540	0	0
06/07/91	3,455	0	1,678	1,579	197	07/22/91	48,005	47,319	686	0	0
06/08/91	6,189	0	3,448	2,741	0	07/23/91	27,284	27,284	0	0	0
06/09/91	1,928	0	1,028	900	0	07/24/91	17,333	17,333	0	0	0
06/10/91	276	0	121	155	0	07/25/91	20,073	20,073	0	0	0
06/11/91	2,737	0	992	1,587	159	07/26/91	101,235	101,235	0	0	0
06/12/91	337	0	122	195	20	07/27/91	32,875	32,875	0	0	0
06/13/91	924	0	335	536	54	07/28/91	6,932	6,833	99	0	0
06/14/91	2,704	0	980	1,568	157	07/29/91	5,149	5,075	74	0	0
06/15/91	1,505	0	545	872	87	07/30/91	2,853	2,853	0	0	0
06/16/91	142,697	0	64,110	74,451	4,136	07/31/91	8,579	8,579	0	0	0
06/17/91	92,883	0	42,088	46,442	4,354	08/01/91	9,563	9,563	0	0	0
06/18/91	65,922	0	27,206	35,577	3,139	08/02/91	5,596	5,596	0	0	0
06/19/91	47,434	0	23,717	23,717	0	08/03/91	5,879	5,879	0	0	0
06/20/91	1,414	0	586	759	69	08/04/91	4,179	4,179	0	0	0
06/21/91	564	0	245	294	25	08/05/91	9,952	9,952	0	0	0
06/22/91	9,190	0	3,996	4,795	400						
06/23/91	10,614	0	4,615	5,538	461						
06/24/91	3,137	0	1,773	1,228	136						
							2,445,106	1,959,424	224,621	245,673	15,389

Appendix C.9.

Sockeye smolt numbers by age class and day from Upper Station Lake, 1992.

Date	Population Estimate	Age Class				Date	Population Estimate	Age Class			
		0.0	1.0	2.0	3.0			0.0	1.0	2.0	3.0
05/05/92	105	0	0	105	0	06/24/92	3,355	97	2,188	1,070	0
05/06/92	0	0	0	0	0	06/25/92	4,595	525	2,626	1,444	0
05/07/92	105	0	0	105	0	06/26/92	3,823	437	2,185	1,202	0
05/08/92	0	0	0	0	0	06/27/92	5,571	637	3,183	1,751	0
05/09/92	0	0	0	0	0	06/28/92	7,771	888	4,441	2,442	0
05/10/92	0	0	0	0	0	06/29/92	10,368	1,185	5,925	3,259	0
05/11/92	0	0	0	0	0	06/30/92	13,855	1,583	7,917	4,354	0
05/12/92	0	0	0	0	0	07/01/92	18,135	17,099	259	777	0
05/13/92	105	0	105	0	0	07/02/92	168,323	168,323	0	0	0
05/14/92	105	0	105	0	0	07/03/92	66,530	66,530	0	0	0
05/15/92	210	0	0	210	0	07/04/92	120,919	120,919	0	0	0
05/16/92	2,100	0	105	1,785	210	07/05/92	98,117	96,715	1,402	0	0
05/17/92	3,255	0	0	3,255	0	07/06/92	52,460	52,460	0	0	0
05/18/92	4,515	0	0	4,200	315	07/07/92	82,535	80,177	2,358	0	0
05/19/92	5,565	0	0	5,177	388	07/08/92	129,663	129,663	0	0	0
05/20/92	34,755	0	0	34,755	0	07/09/92	105,684	105,684	0	0	0
05/21/92	46,721	0	0	46,721	0	07/10/92	94,785	94,785	0	0	0
05/22/92	27,406	0	1,566	25,448	392	07/11/92	51,644	51,644	0	0	0
05/23/92	7,129	0	204	6,925	0	07/12/92	225,007	225,007	0	0	0
05/24/92	10,506	0	300	10,206	0	07/13/92	19,141	19,141	0	0	0
05/25/92	10,996	0	1,100	9,896	0	07/14/92	18,601	18,601	0	0	0
05/26/92	34,448	0	2,496	31,952	0	07/15/92	16,254	16,254	0	0	0
05/27/92	13,164	0	1,908	11,256	0	07/16/92	50,883	50,883	0	0	0
05/28/92	17,279	0	3,209	14,070	0	07/17/92	21,742	21,742	0	0	0
05/29/92	5,146	0	515	4,631	0	07/18/92	18,368	18,368	0	0	0
05/30/92	11,732	0	838	10,894	0	07/19/92	143,212	143,212	0	0	0
05/31/92	8,973	0	1,154	7,819	0	07/20/92	39,087	39,087	0	0	0
06/01/92	9,785	0	1,538	8,247	0	07/21/92	29,699	29,699	0	0	0
06/02/92	29,588	0	6,432	23,156	0	07/22/92	58,552	58,552	0	0	0
06/03/92	13,147	0	2,858	10,289	0	07/23/92	40,998	40,998	0	0	0
06/04/92	8,473	0	1,210	7,142	121	07/24/92	122,286	122,286	0	0	0
06/05/92	12,171	0	695	11,476	0	07/25/92	45,248	45,248	0	0	0
06/06/92	1,672	0	96	1,576	0	07/26/92	23,035	23,035	0	0	0
06/07/92	3,336	0	435	2,901	0	07/27/92	16,355	16,355	0	0	0
06/08/92	9,299	0	930	8,369	0	07/28/92	9,033	9,033	0	0	0
06/09/92	4,588	0	532	4,056	0	07/29/92	12,214	12,214	0	0	0
06/10/92	1,834	0	341	1,493	0	07/30/92	4,714	4,714	0	0	0
06/11/92	9,961	0	2,561	7,400	0	07/31/92	8,278	8,278	0	0	0
06/12/92	5,261	0	1,353	3,908	0	08/01/92	6,029	6,029	0	0	0
06/13/92	6,167	0	1,251	4,916	0	08/02/92	6,174	6,174	0	0	0
06/14/92	1,300	0	390	891	19	08/03/92	6,629	6,629	0	0	0
06/15/92	897	0	234	663	0	08/04/92	1,506	1,506	0	0	0
06/16/92	10,413	0	2,566	7,847	0	08/05/92	3,617	3,617	0	0	0
06/17/92	7,477	0	3,525	3,952	0	08/06/92	2,448	2,448	0	0	0
06/18/92	2,084	0	997	1,087	0	08/07/92	4,414	4,414	0	0	0
06/19/92	2,645	0	1,265	1,380	0	08/08/92	4,838	4,838	0	0	0
06/20/92	641	0	307	334	0	08/09/92	2,530	2,530	0	0	0
06/21/92	4,247	0	1,395	2,852	0						
06/22/92	2,374	0	895	1,479	0						
06/23/92	4,211	0	2,346	1,865	0						
						Total	2,394,916	1,950,243	80,238	362,990	1,444

Appendix D.1.

Mean length, weight, and condition factor of Red Lake sockeye smolt samples and population by age and date, 1990.

Age	Week	Length			Samples Weight			Condition			Population			
		Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Population Size	Mean Length	Mean Weight	Mean Condition
1	5/16-5/30	1	83.0		1	3.0		1	0.52		379	83.0	3.0	0.52
1	5/31-6/06	33	102.5	0.8	33	9.0	0.0	33	0.84	0.00	336	102.5	9.0	0.84
1	6/07-6/13	38	103.3	0.7	38	9.0	0.0	38	0.82	0.00	6,044	103.3	9.0	0.82
1	6/14-6/20	129	107.5	0.4	129	11.0	0.0	129	0.89	0.00	90,882	107.5	11.0	0.89
1	6/21-6/30	141	107.5	0.3	140	10.0	0.0	140	0.80	0.00	142,860	107.5	10.0	0.80
	Totals	342	106.5	0.2	341	10.0	0.0	341	0.83	0.00	240,500	107.3	10.3	0.84
2	5/16-5/23	236	120.0	0.4	236	13.0	0.0	236	0.75	0.00	44,319	120.0	13.0	0.75
2	5/24-5/30	235	116.2	0.8	233	13.0	0.0	233	0.83	0.06	46,908	116.2	13.0	0.83
2	5/31-6/06	184	105.0	1.1	184	10.0	0.0	184	0.86	0.01	43,353	105.0	10.0	0.86
2	6/07-6/13	193	107.2	0.4	193	10.0	0.0	193	0.81	0.00	50,957	107.2	10.0	0.81
2	6/14-6/20	109	107.7	0.4	109	11.0	0.0	109	0.88	0.00	218,328	107.7	11.0	0.88
2	6/21-6/30	95	107.8	0.4	95	10.0	0.0	95	0.80	0.00	89,161	107.8	10.0	0.80
	Totals	1,052	111.8	0.3	1,050	11.0	0.0	1,050	0.79	0.00	493,026	109.3	11.0	0.84
3	5/16-5/23	10	123.9	1.3	10	15.0	0.1	10	0.79	0.00	1,591	123.9	15.0	0.79
3	5/24-5/30	3	105.7	3.7	3	10.0	0.1	3	0.85	0.01	1,043	105.7	10.0	0.85
3	5/31-6/06	3	111.3	4.9	3	11.0	0.1	3	0.80	0.00	560	111.3	11.0	0.80
3	6/07-6/13	3	117.0	3.2	3	14.0	0.1	3	0.87	0.00	695	117.0	14.0	0.87
3	6/14-6/20	1	116.0		1	14.0		1	0.90		2,538	116.0	14.0	0.90
	Totals	20	117.9	1.9	20	13.0	0.1	20	0.79	0.00	6,427	116.0	13.3	0.85

Appendix D.2.

Mean length, weight, and condition factor of Red Lake sockeye smolt samples and population by age and date, 1991.

Age	Week	Length			Samples Weight			Condition			Population			
		Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Population Size	Mean Length	Mean Weight	Mean Condition
1	5/31-6/06	17	88.9	3.5	17	5.5	0.7	17	0.78	0.02	2,261	88.9	5.5	0.78
1	6/07-6/13	106	86.4	0.5	106	4.7	0.1	106	0.73	0.01	7,462	86.4	4.7	0.73
1	6/14-6/20	322	87.1	0.3	322	4.8	0.0	322	0.73	0.00	46,724	87.1	4.8	0.73
1	6/21-6/27	380	88.7	0.2	380	5.1	0.0	380	0.73	0.00	30,750	88.7	5.1	0.73
1	6/28-7/04	282	89.2	0.2	282	5.1	0.0	282	0.72	0.00	17,131	89.2	5.1	0.72
1	7/05-7/11	28	88.8	0.8	28	5.1	0.2	28	0.73	0.01	1,139	88.8	5.1	0.73
	Totals	1,135	88.2	0.1	1,135	5.0	0.0	1,135	0.73	0.00	105,467	87.9	4.9	0.73
2	5/16-5/23	106	112.4	0.7	106	11.1	0.2	106	0.78	0.00	1,903	112.4	11.1	0.78
2	5/24-5/30	150	113.0	0.6	150	11.3	0.2	150	0.78	0.01	18,492	113.0	11.3	0.78
2	5/31-6/06	301	109.3	0.4	302	10.1	0.1	301	0.77	0.01	37,547	109.3	10.1	0.77
2	6/07-6/13	271	104.3	0.5	271	8.7	0.1	271	0.77	0.00	35,973	104.3	8.7	0.77
2	6/14-6/20	88	94.9	0.8	87	6.5	0.2	87	0.76	0.01	20,409	94.9	6.5	0.76
2	6/21-6/27	37	96.9	1.2	37	6.9	0.3	37	0.76	0.01	3,897	96.9	6.9	0.76
2	6/28-7/04	20	94.8	1.4	20	6.3	0.3	20	0.74	0.01	1,538	94.8	6.3	0.74
2	7/05-7/11	4	88.3	1.9	4	4.9	0.3	4	0.71	0.01	90	88.3	4.9	0.71
	Totals	977	106.7	0.3	977	9.5	0.1	976	0.78	0.00	119,849	105.4	9.1	0.78
3	5/16-5/23	168	114.5	0.4	167	11.7	0.1	167	0.78	0.00	3,674	114.5	11.7	0.78
3	5/24-5/30	114	113.4	0.7	114	11.6	0.2	114	0.80	0.01	16,166	113.4	11.6	0.80
3	5/31-6/06	85	111.3	0.7	86	10.9	0.2	85	0.79	0.01	10,672	111.3	10.9	0.79
3	6/07-6/13	35	109.3	0.8	35	9.9	0.2	35	0.76	0.01	5,864	109.3	9.9	0.76
3	6/14-6/20	4	107.0	2.3	4	9.0	0.7	4	0.73	0.02	1,540	107.0	9.0	0.73
3	6/21-6/27	1	103.0		1	8.3		1	0.76		268	103.0	8.3	0.76
	Totals	407	113.0	0.3	407	11.3	0.1	406	0.78	0.00	38,184	112.0	11.0	0.79

Appendix D.3.

Mean length, weight, and condition factor of Red Lake sockeye smolt samples and population by age and date, 1992.

Age	Week	Length			Samples Weight			Condition			Population			
		Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Population Size	Mean Length	Mean Weight	Mean Condition
1	5/17-5/23	1	87.0		1	6.4		1	0.97		153	87.0	6.4	0.97
1	5/24-5/30	2	97.5	17.5	2	8.4	4.2	2	0.91	0.01	864	97.5	8.4	0.91
1	5/31-6/06	3	100.0	5.7	3	8.8	1.6	3	0.88	0.06	420	100.0	8.8	0.88
1	6/07-6/13	3	96.0	5.8	3	8.3	1.5	3	0.94	0.01	2,430	96.0	8.3	0.94
1	6/14-6/20	20	98.8	2.0	20	8.2	0.5	20	0.85	0.01	11,156	98.8	8.2	0.85
1	6/21-6/27	43	100.0	1.0	43	8.9	0.4	43	0.89	0.02	13,883	100.0	8.9	0.89
1	6/28-7/04	13	100.8	2.7	13	9.4	1.0	13	0.92	0.02	578	100.8	9.4	0.92
	Totals	85	99.5	0.9	85	8.8	0.3	85	0.89	0.01	29,484	99.1	8.6	0.88
2	5/03-5/09	3	89.0	2.0	2	5.3	1.0	2	0.75	0.08	24	89.0	5.3	0.75
2	5/10-5/16	11	92.7	1.7	11	6.1	0.3	11	0.77	0.01	122	92.7	6.1	0.77
2	5/17-5/23	175	107.3	0.8	175	11.1	0.2	175	0.90	0.03	10,987	107.3	11.1	0.90
2	5/24-5/30	367	113.4	0.4	367	12.7	0.2	367	0.87	0.00	149,778	113.4	12.7	0.87
2	5/31-6/06	322	113.2	0.5	323	13.0	0.2	322	0.90	0.01	432,341	113.2	13.0	0.90
2	6/07-6/13	266	111.3	0.4	266	12.0	0.1	266	0.87	0.00	547,620	111.3	12.0	0.87
2	6/14-6/20	249	107.7	0.5	249	10.8	0.1	249	0.86	0.00	160,075	107.7	10.8	0.86
2	6/21-6/27	235	107.4	0.6	234	10.7	0.1	234	0.86	0.00	62,401	107.4	10.7	0.86
2	6/28-7/04	39	102.3	1.3	39	10.0	0.4	39	0.93	0.01	1,734	102.3	10.0	0.93
	Totals	1,667	110.2	0.2	1,666	11.8	0.1	1,665	0.88	0.00	1,365,082	111.5	12.2	0.88
3	5/10-5/16	1	119.0		1	12.4		1	0.74		3	119.0	12.4	0.74
3	5/17-5/23	34	120.1	1.5	34	15.5	0.5	34	0.89	0.02	2,292	120.1	15.5	0.89
3	5/24-5/30	21	117.2	1.9	21	13.9	0.7	21	0.86	0.02	8,283	117.2	13.9	0.86
3	5/31-6/06	6	127.0	10.7	6	19.2	5.3	6	0.94	0.02	14,579	127.0	19.2	0.94
3	6/07-6/13	1	112.0		1	11.5		1	0.82		638	112.0	11.5	0.82
	Totals	63	119.7	1.4	63	15.2	0.6	63	0.89	0.01	25,794	122.9	17.0	0.92

Appendix D.4.

Mean length, weight, and condition factor of Akalura sockeye smolt samples and population by age and date, 1990.

Age	Week	Length			Samples Weight			Condition			Population			
		Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Population Size	Mean Length	Mean Weight	Mean Condition
1	5/13-5/16	2	84.0	2.0	2	4.6	0.4	2	0.78	0.02	1,952	84.0	4.6	0.78
1	5/17-5/23	46	72.0	1.0	46	3.1	0.1	46	0.83	0.01	1,823	72.0	3.1	0.83
1	5/24-5/30	59	74.6	0.9	59	3.6	0.1	59	0.87	0.01	9,473	74.6	3.6	0.87
1	5/31-6/06	144	71.6	0.6	144	3.3	0.1	144	0.90	0.01	34,542	71.6	3.3	0.90
1	6/07-6/13	114	74.5	0.7	114	3.7	0.1	114	0.89	0.03	7,540	74.5	3.7	0.89
1	6/14-6/26	212	75.4	0.3	212	3.8	0.0	212	0.89	0.00	11,130	75.4	3.8	0.89
	Totals	577	73.9	0.3	577	3.6	0.0	577	0.87	0.01	66,460	73.4	3.5	0.89
2	5/13-5/16	236	87.1	0.2	236	5.3	0.0	236	0.80	0.00	230,325	87.1	5.3	0.80
2	5/17-5/23	191	83.4	0.4	192	4.7	0.1	191	0.81	0.00	235,306	83.4	4.7	0.81
2	5/24-5/30	179	85.3	0.4	179	5.3	0.1	179	0.85	0.00	204,735	85.3	5.3	0.85
2	5/31-6/06	95	86.5	0.7	95	5.6	0.1	95	0.87	0.01	193,700	86.5	5.6	0.87
2	6/07-6/13	42	91.7	0.9	42	6.9	0.2	42	0.89	0.01	134,996	91.7	6.9	0.89
2	6/14-6/26	5	90.4	3.1	5	6.6	0.7	5	0.89	0.02	99,305	90.4	6.6	0.89
	Totals	748	85.9	0.2	749	5.3	0.0	748	0.83	0.00	1,098,368	86.7	5.5	0.84

Appendix D.5.

Mean length, weight, and condition factor of Akalura sockeye smolt samples and population by age and date, 1991.

Age	Week	Length			Samples Weight			Condition			Population			
		Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Population Size	Mean Length	Mean Weight	Mean Condition
1	5/09-5/18	14	74.4	1.3	14	3.2	0.2	14	0.78	0.02	8,267	74.4	3.2	0.78
1	5/19-5/25	2	68.5	2.5	2	2.7	0.0	2	0.84	0.07	194	68.5	2.7	0.84
1	5/26-6/01	2	56.5	1.5	2	1.5	0.1	2	0.83	0.04	22	56.5	1.5	0.83
1	6/02-6/08	3	66.3	7.4	3	2.5	0.8	3	0.86	0.04	144	66.3	2.5	0.86
1	6/09-6/15	7	74.9	1.8	7	3.7	0.3	7	0.88	0.02	307	74.9	3.7	0.88
1	6/16-6/22	5	83.2	2.0	5	5.2	0.3	5	0.90	0.01	85	83.2	5.2	0.90
1	6/23-6/29	8	92.0	6.6	8	8	1.8	8	1.03	0.02	66	92.0	8.0	1.03
Totals		41	77.2	2.0	41	4.3	0.5	41	0.84	0.01	9,086	74.3	3.2	0.79
2	5/09-5/18	467	74.7	0.2	467	3.3	0.0	467	0.79	0	259,355	74.7	3.3	0.79
2	5/19-5/25	247	72.6	0.3	247	3.1	0.0	247	0.81	0	19,792	72.6	3.1	0.81
2	5/26-6/01	70	73.1	0.4	70	3.2	0.1	70	0.82	0.01	769	73.1	3.2	0.82
2	6/02-6/08	137	80.2	0.4	137	4.5	0.1	137	0.87	0.01	5,389	80.2	4.5	0.87
2	6/09-6/15	216	79.7	0.3	216	4.5	0.1	216	0.89	0	9,644	79.7	4.5	0.89
2	6/16-6/22	125	84.0	0.5	125	5.3	0.1	125	0.89	0	3,065	84.0	5.3	0.89
2	6/23-6/29	114	87.5	1.0	114	6.2	0.3	114	0.93	0.02	1,502	87.5	6.2	0.93
2	6/30-7/01	6	82.0	1.9	6	5.7	0.4	6	1.03	0.06	75	82.0	5.7	1.03
Totals		1382	77.5	0.2	1382	4	0.0	1382	0.83	0	299,591	75.0	3.4	0.80
3	5/17-5/18	2	88.0	4.0	2	5.2	0.8	2	0.76	0.01	628	88.0	5.2	0.76
3	5/19-5/25	3	88.7	5.8	3	5.3	1.2	3	0.76	0.06	35	88.7	5.3	0.76
3	5/26-6/01	2	83.5	9.5	2	5.2	2.0	2	0.89	0.07	22	83.5	5.2	0.89
3	6/02-6/08	8	84.4	1.3	8	5.1	0.2	8	0.85	0.02	385	84.4	5.1	0.85
3	6/09-6/15	1	125.0		1	16.9		1	0.87		70	125.0	16.9	0.87
3	6/23-6/29	6	121.8	3.9	6	16.8	0.9	6	0.93	0.05	112	121.8	16.8	0.93
Totals		22	97.3	4.0	22	8.9	1.2	22	0.85	0.02	1,251	91.9	6.9	0.81

Appendix D.6.

Mean length, weight, and condition factor of Akalura sockeye smolt samples and population by age and date, 1992.

Age	Week	Length			Samples Weight			Condition			Population			
		Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Population Size	Mean Length	Mean Weight	Mean Condition
0	5/31-6/06	1	59.0		1	1.5		1	0.73			59.0	1.5	0.73
	Totals	1	59.0		1	1.5		1	0.73			59.0	1.5	0.73
1	5/10-5/16	4	77.0	3.2	4	3.4	0.4	4	0.74	0.05	1,378	77.0	3.4	0.74
1	5/17-5/23	6	78.3	0.8	6	3.4	0.1	6	0.7	0.01	313	78.3	3.4	0.71
1	5/24-5/30	3	79.3	2.9	3	4.1	0.4	3	0.81	0.02	74	79.3	4.1	0.82
1	5/31-6/06	4	72.3	3.4	4	2.9	0.5	4	0.74	0.03	74	72.3	2.9	0.77
1	6/07-6/13	4	74.0	1.8	4	3.4	0.2	4	0.82	0.01	48	74.0	3.4	0.84
1	6/14-6/20	4	73.0	1.2	4	5.3	1.1	4	1.37	0.32	34	73.0	5.3	1.36
	Totals	25	75.7	1.0	25	3.7	0.3	25	0.85	0.07	1,921	77.0	3.4	0.76
2	4/26-5/02	7	91.7	5.8	0			0			49	91.7		
2	5/03-5/09	292	80.0	0.2	292	3.8	0.0	292	0.75	0.00	48,779	80.0	3.8	0.74
2	5/10-5/16	390	78.1	0.2	390	3.6	0.0	390	0.75	0.00	93,065	78.1	3.6	0.76
2	5/17-5/23	343	77.8	0.2	343	3.6	0.0	343	0.76	0.00	9,524	77.8	3.6	0.76
2	5/24-5/30	408	79.7	0.2	408	4.2	0.0	408	0.82	0.00	16,786	79.7	4.2	0.83
2	5/31-6/06	397	78.8	0.2	397	4.0	0.0	397	0.82	0.00	12,175	78.8	4.0	0.82
2	6/07-6/13	156	77.6	0.4	156	3.9	0.1	156	0.82	0.00	2,388	77.6	3.9	0.83
2	6/14-6/20	21	79.2	1.2	21	5.3	0.4	21	1.08	0.08	197	79.2	5.3	1.07
	Totals	2014	78.8	0.1	2,007	3.9	0.0	2,007	0.79	0.00	182,963	78.8	3.7	0.76
3	5/03-5/09	20	89.7	1.1	20	5.5	0.2	20	0.75	0.01	3,158	89.7	5.5	0.76
3	5/10-5/16	22	83.0	0.7	22	4.3	0.1	22	0.74	0.01	4,511	83.0	4.3	0.75
3	5/17-5/23	12	86.4	0.8	12	4.7	0.1	12	0.73	0.01	303	86.4	4.7	0.73
3	5/24-5/30	5	87.2	2.4	5	5.5	0.5	5	0.82	0.02	240	87.2	5.5	0.83
3	5/31-6/06	2	88.5	3.5	2	5.7	0.5	2	0.81	0.02	103	88.5	5.7	0.82
	Totals	61	86.4	0.6	61	4.9	0.1	61	0.75	0.01	8,315	85.9	4.8	0.76

Appendix D.7.

Mean length, weight, and condition factor of Upper Station sockeye smolt samples and population by age and date, 1990.

Age	Week	Length			Samples Weight			Condition			Population			
		Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Population Size	Mean Length	Mean Weight	Mean Condition
0	6/21-6/27	15	60.2	1.8	15	2.1	0.2	15	0.96	0.08	2,346	60.2	2.1	0.96
0	6/28-7/04	49	63.8	0.7	49	2.5	0.1	49	0.96	0.02	18,687	63.8	2.5	0.96
0	7/05-7/11	236	58.6	0.4	237	1.8	0.0	236	0.89	0.12	2,176,129	58.6	1.8	0.89
0	7/12-7/18	239	52.4	0.2	239	1.3	0.0	239	0.90	0.01	2,994,481	52.4	1.3	0.90
0	7/19-7/25	240	50.7	0.2	239	1.1	0.0	239	0.84	0.01	297,022	50.7	1.1	0.84
0	7/26-8/01	160	53.9	0.3	158	1.5	0.0	158	0.96	0.01	22,809	53.9	1.5	0.96
	Totals	939	54.5	0.2	937	1.5	0.0	936	0.93	0.03	5,511,473	54.8	1.5	0.91
1	5/16-5/23	11	76.5	2.3	11	4.1	0.4	11	0.92	0.02	3,865	76.5	4.1	0.92
1	5/24-5/30	39	77.2	0.9	39	4.1	0.2	39	0.89	0.01	25,330	77.2	4.1	0.89
1	5/31-6/06	56	80.3	0.9	55	4.5	0.1	55	0.87	0.01	24,169	80.3	4.5	0.87
1	6/07-6/13	32	85.8	1.2	32	6.0	0.2	32	0.95	0.03	58,354	85.8	6.0	0.95
1	6/14-6/20	39	84.4	1.0	39	5.7	0.2	39	0.95	0.01	29,304	84.4	5.7	0.95
1	6/21-6/27	127	81.2	0.6	127	4.7	0.1	127	0.88	0.01	29,629	81.2	4.7	0.88
1	6/28-7/07	21	82.6	2.3	21	5.4	0.4	21	0.96	0.02	22765.76	82.6	5.4	0.96
	Totals	325	81.4	0.4	324	4.9	0.1	324	0.91	0.01	193,416	81.4	5.2	0.97
2	5/16-5/23	214	103.2	0.4	213	8.9	0.1	213	0.81	0.00	73,889	103.2	8.9	0.81
2	5/24-5/30	195	101.6	0.5	195	8.4	0.1	195	0.80	0.00	554,072	101.6	8.4	0.80
2	5/31-6/06	176	99.6	0.5	176	8.1	0.1	176	0.82	0.01	78,854	99.6	8.1	0.82
2	6/07-6/13	514	100.5	0.3	514	8.6	0.1	514	0.85	0.00	213,955	100.5	8.6	0.85
2	6/14-6/20	194	97.0	0.5	194	7.8	0.1	194	0.85	0.00	116,250	97.0	7.8	0.85
2	6/21-6/27	87	90.7	1.3	87	6.5	0.3	87	0.87	0.01	26,497	90.7	6.5	0.87
2	6/28-7/04	158	98.8	0.5	158	8.7	0.1	158	0.90	0.01	35,401	98.8	8.7	0.90
2	7/05-7/11	1	104.0		1	9.4		1	0.84		42,214	104.0	9.4	0.84
	Totals	1,539	99.7	0.2	1,538	8.3	0.0	1,538	0.84	0.00	1,141,133	100.6	8.4	0.82
3	5/16-5/23	13	111.3	1.8	13	11.1	0.5	13	0.81	0.01	4,668	111.3	11.1	0.81
3	5/24-5/30	6	113.0	1.3	6	11.7	0.4	6	0.81	0.01	15,324	113.0	11.7	0.81
3	5/31-6/06	8	112.4	2.4	8	11.7	0.5	8	0.82	0.03	3,469	112.4	11.7	0.82
3	6/07-6/13	31	109.2	1.2	31	10.9	0.3	31	0.84	0.02	11,603	109.2	10.9	0.84
3	6/14-6/20	7	110.3	2.3	7	11.4	0.8	7	0.85	0.03	5,173	110.3	11.4	0.85
3	6/21-6/27	1	110.0		1	12.0		1	0.90		373	110.0	12.0	0.90
3	6/28-7/11	8	103.1	2.6	8	10.0	0.7	8	0.91	0.03	3,100	103.1	10.0	0.91
	Totals	74	109.7	0.8	74	11.1	0.2	74	0.84	0.01	43,711	110.7	11.3	0.83

Appendix D.8.

Mean length, weight, and condition factor of Upper Station sockeye smolt samples and population by age and date, 1991.

Age	Week	Length			Samples Weight			Condition			Population			
		Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Population Size	Mean Length	Mean Weight	Mean Condition
0	6/30-7/06	35	73.9	1.30	35	4.1	0.20	35	1.02	0.01	1,444	73.9	4.1	1.02
0	7/07-7/13	413	63.3	0.40	413	2.4	0.10	413	0.95	0.00	734,579	63.3	2.4	0.95
0	7/14-7/20	406	56.0	0.20	406	1.6	0.00	406	0.91	0.00	674,532	56.0	1.6	0.91
0	7/21-7/27	419	56.1	0.20	419	1.7	0.00	419	0.96	0.00	490,360	56.1	1.7	0.96
0	7/28-8/03	279	60.0	0.30	279	2.2	0.00	279	1.02	0.01	44,378	60.0	2.2	1.02
0	8/04-8/10	70	62.3	0.50	70	2.4	0.10	70	0.99	0.01	14,131	62.3	2.4	0.99
Totals		1,622	59.3	0.20	1,622	2.0	0.00	1,622	0.96	0.00	1,959,424	58.9	1.9	0.95
1	5/05-5/11	2	70.0	1.00	2	3.4		2	0.99	0.04	31	70.0	3.4	0.99
1	5/12-5/18	12	68.1	2.90	12	3.5	0.60	12	1.11	0.03	188	68.1	3.5	1.11
1	5/19-5/25	3	90.3	3.00	3	6.0	0.40	3	0.81	0.04	47	90.3	6.0	0.81
1	5/26-6/01	61	91.1	0.90	61	6.2	0.20	61	0.82	0.01	2,092	91.1	6.2	0.82
1	6/02-6/08	144	92.0	0.50	144	6.4	0.10	144	0.82	0.01	9,907	92.0	6.4	0.82
1	6/09-6/15	84	93.9	0.70	84	6.8	0.20	84	0.82	0.01	4,123	93.9	6.8	0.82
1	6/16-6/22	88	95.4	0.60	88	7.7	0.20	88	0.89	0.01	161,948	95.4	7.7	0.89
1	6/23-6/29	143	98.5	1.10	144	8.1	0.10	143	0.85	0.01	20,872	98.5	8.1	0.85
1	6/30-7/06	96	95.0	0.60	96	7.8	0.10	96	0.91	0.01	7,122	95.0	7.8	0.91
1	7/07-7/13	21	92.7	1.80	22	6.9	0.40	21	0.87	0.02	12,776	92.7	6.9	0.87
1	7/14-7/20	2	94.0	1.00	2	6.6	0.00	2	0.79	0.03	1,116	94.0	6.6	0.79
1	7/21-7/27	1	95.0		1	6.5		1	0.76		4,226	95.0	6.5	0.76
1	7/28-8/03	1	100.0		1	7.8		1	0.78		173	100.0	7.8	0.78
Totals		658	94.0	0.40	660	7.1	0.10	658	0.85	0.00	224,621	95.3	7.6	0.88
2	5/05-5/11	3	76.3	6.30	3	4.9	1.10	3	1.10	0.03	47	76.3	4.9	1.10
2	5/19-5/25	70	102.3	1.40	70	9.3	0.30	70	0.87	0.01	1,086	102.3	9.3	0.87
2	5/26-6/01	278	105.0	0.60	279	9.8	0.20	278	0.85	0.01	10,319	105.0	9.8	0.85
2	6/02-6/08	227	101.1	0.60	226	8.8	0.10	226	0.85	0.01	14,925	101.1	8.8	0.85
2	6/09-6/15	106	103.8	0.90	106	9.6	0.20	106	0.86	0.01	5,813	103.8	9.6	0.86
2	6/16-6/22	105	101.3	0.80	104	9.1	0.20	104	0.88	0.01	186,034	101.3	9.1	0.88
2	6/23-6/29	97	100.6	0.50	97	9.2	0.10	97	0.90	0.01	17,656	100.6	9.2	0.90
2	6/30-7/06	46	97.3	1.10	46	8.4	0.30	46	0.91	0.01	4,430	97.3	8.4	0.91
2	7/07-7/13	14	99.9	1.90	14	8.5	0.50	14	0.85	0.02	2,950	99.9	8.5	0.85
2	7/14-7/20	1	110.0		1	10.0		1	0.75		2,413	110.0	10.0	0.75
Totals		947	102.3	0.30	946	9.3	0.10	945	0.87	0.00	245,673	101.4	9.1	0.87
3	5/12-5/18	1	115.0		1	13.0		1	0.85		16	115.0	13.0	0.85
3	5/19-5/25	3	123.3	2.40	3	14.8	0.30	3	0.79	0.05	47	123.3	14.8	0.79
3	5/26-6/01	32	117.3	1.40	32	13.5	0.50	32	0.84	0.01	1,199	117.3	13.5	0.84
3	6/02-6/08	13	113.2	3.10	13	11.8	1.00	13	0.81	0.02	683	113.2	11.8	0.81
3	6/09-6/15	9	115.9	2.40	8	13.0	0.40	8	0.84	0.02	476	115.9	13.0	0.84
3	6/16-6/22	9	111.0	4.70	9	12.3	1.40	9	0.90	0.02	12,122	111.0	12.3	0.90
3	6/23-6/29	4	105.5	4.60	4	9.6	1.00	4	0.82	0.04	804	105.5	9.6	0.82
3	6/30-7/06	1	111.0		1	12.8		1	0.94		44	111.0	12.8	0.94
Totals		72	115.0	1.10	71	12.8	0.40	71	0.84	0.01	15,389	111.5	12.3	0.88

Appendix D.9.

Length, weight, and condition factor of Upper Station sockeye smolt samples and population by age and week, 1992.

Age	Week	Length			Samples Weight			Condition			Population			
		Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Sample Size	Mean	Standard Error	Population Size	Mean Length	Mean Weight	Mean Condition
0	6/21-6/27	10	61.4	2.9	10	2.6	0.3	10	1.12	0.05	1,696	61.4	2.6	1.12
0	6/28-7/04	206	59.7	0.3	206	2.1	0.0	206	0.99	0.01	376,527	59.7	2.1	0.99
0	7/05-7/11	487	57.7	0.2	487	1.9	0.0	487	0.99	0.01	611,128	57.7	1.9	0.99
0	7/12-7/18	420	57.0	0.2	420	1.7	0.0	420	0.92	0.01	369,996	57.0	1.7	0.92
0	7/19-7/25	420	56.8	0.2	420	1.7	0.0	420	0.93	0.01	479,082	56.8	1.7	0.93
0	7/26-8/09	270	57.3	0.2	270	1.7	0.0	270	0.90	0.01	111,814	57.3	1.7	0.90
	Totals	1,813	57.5	0.1	1,813	1.8	0.0	1,813	0.95	0.00	1,950,243	57.7	1.8	0.96
1	5/10-5/16	3	72.3	5.9	3	3.9	0.7	3	1.03	0.10	315	72.3	3.9	1.03
1	5/17-5/23	6	72.7	5.3	6	4.1	0.9	6	1.07	0.04	1,770	72.7	4.1	1.07
1	5/24-5/30	42	88.8	0.9	42	6.4	0.2	42	0.91	0.01	10,365	88.8	6.4	0.91
1	5/31-6/06	54	93.3	1.9	54	6.9	0.2	54	0.85	0.02	13,983	93.3	6.9	0.85
1	6/07-6/13	59	95.0	0.7	59	8.3	0.2	59	0.97	0.01	7,403	95.0	8.3	0.97
1	6/14-6/20	136	95.5	0.5	136	8.7	0.1	136	1.00	0.02	9,283	95.5	8.7	1.00
1	6/21-6/27	173	94.0	0.5	173	8.1	0.1	173	0.98	0.01	14,818	94.0	8.1	0.98
1	6/28-7/04	1	93.0		1	6.9		1	0.86		18,541	93.0	6.9	0.86
1	7/05-7/11	3	100.0	2.1	3	9.6	0.7	3	0.96	0.03	3,760	100.0	9.6	0.96
	Totals	477	93.7	0.4	477	7.9	0.1	477	0.96	0.01	80,238	93.0	7.4	0.93
2	5/03-5/09	2	113.5	3.5	2	12.1	1.3	2	0.83	0.01	210	113.5	12.1	0.83
2	5/10-5/16	19	109.6	1.9	19	12.5	0.5	19	0.95	0.03	1,995	109.6	12.5	0.95
2	5/17-5/23	344	108.6	0.4	344	11.4	0.1	344	0.89	0.00	126,481	108.6	11.4	0.89
2	5/24-5/30	306	102.8	0.5	306	9.6	0.1	306	0.88	0.01	92,906	102.8	9.6	0.88
2	5/31-6/06	364	102.8	0.5	364	9.5	0.1	364	0.87	0.01	69,705	102.8	9.5	0.87
2	6/07-6/13	359	102.2	0.3	359	10.2	0.1	359	0.96	0.01	33,043	102.2	10.2	0.96
2	6/14-6/20	279	101.1	0.4	279	10.2	0.1	279	0.99	0.01	16,156	101.1	10.2	0.99
2	6/21-6/27	165	99.1	0.6	165	9.4	0.2	165	0.97	0.01	11,662	99.1	9.4	0.97
2	6/28-7/04	3	101.7	6.7	3	10.0	1.7	3	0.95	0.03	10,832	101.7	10.0	0.95
	Totals	1,841	103.3	0.2	1,841	10.1	0.0	1,841	0.92	0.00	362,990	104.6	10.3	0.90
3	5/10-5/16	2	118.0	0.0	2	17.5	2.0	2	1.07	0.12	210	118.0	17.5	1.07
3	5/17-5/23	4	112.3	2.8	4	12.5	0.8	4	0.88	0.02	1,095	112.3	12.5	0.88
3	5/31-6/06	1	101.0		1	8.8		1	0.85		121	101.0	8.8	0.85
3	6/14-6/20	1	115.0		1	14.8		1	0.97		19	115.0	14.8	0.97
	Totals	8	112.6	2.3	8	13.6	1.2	8	0.95	0.04	1,444	112.2	12.9	0.92

Appendix E.1.

Daily sockeye salmon escapement counts through the Ayakulik and Red Lake weirs, 1989-1992.

Date	1989		1990		1991		1992		1992			
	Ayakulik daily	cum.	Ayakulik daily	cum.	Ayakulik daily	cum.	Red Lake daily	cum.	Ayakulik daily	cum.	Red Lake daily	cum.
22-May									1	1		
23-May									2	3		
24-May									22	25		
25-May					3	3			5	30		
26-May					7	10			5	35		
27-May			1,700	1,700	9	19			41	76		
28-May			810	2,510	106	125			22	98		
29-May			1,248	3,758	161	286			52	150		
30-May			831	4,589	121	407			242	392		
31-May	6	6	561	5,150	191	598			1,408	1,800		
01-Jun	86	92	2,440	7,590	202	800			634	2,434		
02-Jun	386	478	2,442	10,032	292	1,092			2,025	4,459		
03-Jun	289	767	10,748	20,780	54	1,146			2,303	6,762		
04-Jun	1,360	2,127	9,887	30,667	969	2,115			481	7,243		
05-Jun	1,158	3,285	12,102	42,769	11,045	13,160			971	8,214		
06-Jun	20,187	23,472	8,965	51,734	3,485	16,645			11,888	20,102	449	449
07-Jun	17,199	40,671	394	52,128	9,002	25,647			12,278	32,380	2,071	2,520
08-Jun	2,065	42,736	26,056	78,184	4,640	30,287	4,844	4,844	4,464	36,844	1,927	4,447
09-Jun	6,301	49,037	17,182	95,366	22,817	53,104	180	5,024	7,336	44,180	162	4,609
10-Jun	30,378	79,415	3,404	98,770	14,102	67,206	7,000	12,024	3,808	47,988	49	4,658
11-Jun	20,590	100,005	4,384	103,154	10,274	77,480	4,327	16,351	854	48,842	0	4,658
12-Jun	18,098	118,103	228	103,382	13,090	90,570	1,117	17,468	12,011	60,853	7,293	11,951
13-Jun	13,127	131,230	1,813	105,195	235	90,805	1,879	19,347	20,327	81,180	61	12,012
14-Jun	25,373	156,603	235	105,430	4,810	95,615	2,373	21,720	3,144	84,324	1,073	13,085
15-Jun	19,025	175,628	117	105,547	2,064	97,679	1,849	23,569	10,602	94,926	17,415	30,500
16-Jun	17,278	192,906	750	106,297	261	97,940	10,837	34,406	3,078	98,004	67	30,567
17-Jun	14,511	207,417	750	107,047	1,342	99,282	388	34,794	1,285	99,289	5,227	35,794
18-Jun	35,703	243,120	750	107,797	1,141	100,423	22,784	57,578	53	99,342	8,334	44,128
19-Jun	206	243,326	750	108,547	490	100,913	404	57,982	347	99,689	5,434	49,562
20-Jun	18,412	261,738	34	108,581	111	101,024	1,875	59,857	38	99,727	4,586	54,148
21-Jun	12,497	274,235	488	109,069	261	101,285	3,308	63,165	829	100,556	97	54,245
22-Jun	6,528	280,763	214	109,283	407	101,692	7,523	70,688	224	100,780	12	54,257
23-Jun	3,896	284,659	338	109,621	288	101,980	36	70,724	2,269	103,049	2,051	56,308
24-Jun	31,415	316,074	1,055	110,676	5,114	107,094	18	70,742	2,919	105,968	5,071	61,379
25-Jun	16,502	332,576	1,422	112,098	1,392	108,486	5,498	76,240	12	105,980	66	61,445
26-Jun	44,670	377,246	259	112,357	1,596	110,082	7,318	83,558	744	106,724	3,217	64,662
27-Jun	4,411	381,657	1,195	113,552	459	110,541	965	84,523	833	107,557	2,402	67,064
28-Jun	12,175	393,832	94	113,646	15,446	125,987	195	84,718	833	108,390	1,612	68,676
29-Jun	19,836	413,668	9,616	123,262	58,042	184,029	1,293	86,011	834	109,224	824	69,500

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Date	1989		1990		1991		1992		1992		1992	
	Ayakulik		Ayakulik		Ayakulik		Red Lake		Ayakulik		Red Lake	
	daily	cum.										
30-Jun	4,705	418,373	17,027	140,289	38,329	222,358	2,988	88,999	2,187	111,411	36	69,536
01-Jul	2,095	420,468	15,365	155,654	15,026	237,384	775	89,774	12,841	124,252	33	69,569
02-Jul	2,727	423,195	10,430	166,084	28,522	265,906	5,840	95,614	8,703	132,955	226	69,795
03-Jul	15,716	438,911	10,363	176,447	6,852	272,758	37,395	133,009	34,212	167,167	340	70,135
04-Jul	7,770	446,681	324	176,771	15,515	288,273	11,480	144,489	9,015	176,182	1,667	71,802
05-Jul	14,428	461,109	157	176,928	13,306	301,579	1,331	145,820	4,624	180,806	495	72,297
06-Jul	3,102	464,211	7,703	184,631	5,280	306,859	978	146,798	4,372	185,178	547	72,844
07-Jul	22,395	486,606	1,249	185,880	4,256	311,115	3,726	150,524	13,090	198,268	488	73,332
08-Jul	11,020	497,626	2,572	188,452	3,089	314,204	3,261	153,785	6,574	204,842	41,855	115,187
09-Jul	50	497,676	476	188,928	1,044	315,248	25,787	179,572	1,214	206,056	8,507	123,694
10-Jul	96	497,772	2,297	191,225	3,026	318,274	16,417	195,989	1,113	207,169	333	124,027
11-Jul	1,688	499,460	50	191,275	182	318,456	10,278	206,267	4,295	211,464	190	124,217
12-Jul	18,305	517,765	92	191,367	142	318,598	25,136	231,403	1,978	213,442	549	124,766
13-Jul	12,130	529,895	61	191,428	2,677	321,275	522	231,925	1,345	214,787	453	125,219
14-Jul	557	530,452	1,941	193,369	649	321,924	27	231,952	2,361	217,148	17,595	142,814
15-Jul	2,614	533,066	3,326	196,695	61	321,985	12	231,964	2,575	219,723	10,058	152,872
16-Jul	4,065	537,131	2,982	199,677	93	322,078	15	231,979	4,815	224,538	280	153,152
17-Jul	3,088	540,219	466	200,143	348	322,426	43	232,022	8,220	232,758	1,619	154,771
18-Jul	122	540,341	48	200,191	483	322,909	153	232,175	3,000	235,758	1,534	156,305
19-Jul	21,057	561,398	82	200,273	155	323,064	75	232,250	4,338	240,096	558	156,863
20-Jul	4,575	565,973	431	200,704	284	323,348	26	232,276	2,545	242,641	771	157,634
21-Jul	6,603	572,576	3,084	203,788	1,649	324,997	87	232,363	6,980	249,621	2,230	159,864
22-Jul	3,540	576,116	174	203,962	3,961	328,958	191	232,554	6,271	255,892	18,238	178,102
23-Jul	7,235	583,351	83	204,045	1,164	330,122	29,953	262,507	582	256,474	8,248	186,350
24-Jul	15,361	598,712	1,008	205,053	3,524	333,646	5,913	268,420	3,257	259,731	3,341	189,691
25-Jul	202	598,914	185	205,238	533	334,179	262	268,682	17,324	277,055	2,041	191,732
26-Jul	50,532	649,446	81	205,319	91	334,270	290	268,972	12,122	289,177	677	192,409
27-Jul	13,945	663,391	247	205,566	8,278	342,548	546	269,518	2,270	291,447	3,313	195,722
28-Jul	446	663,837	17,446	223,012	2,620	345,168	21	269,539	6,552	297,999	6,422	202,144
29-Jul	251	664,088	27,522	250,534	2,547	347,715	1,510	271,049	1,062	299,061	5,493	207,637
30-Jul	2,958	667,046	12,689	263,223	5,005	352,720	2,856	273,905	287	299,348	1,167	208,804
31-Jul	2,240	669,286	2,231	265,454	1,557	354,277	139	274,044	144	299,492	5,217	214,021
01-Aug	3,567	672,853	6,395	271,849	67	354,344	615	274,659	593	300,085	5,010	219,031
02-Aug	1,454	674,307	5,009	276,858	92	354,436	10	274,669	175	300,260	2,248	221,279
03-Aug	1,884	676,191	18,733	295,591	258	354,694	4,155	278,824	566	300,826	290	221,569
04-Aug	4,380	680,571	24,826	320,417	3,819	358,513	28	278,852	932	301,758	1,008	222,577
05-Aug	10,586	691,157	18,483	338,900	1,060	359,573	7	278,859	1,940	303,698	495	223,072
06-Aug	31,565	722,722	8,497	347,397	2,278	361,851	5	278,864	581	304,279	73	223,145

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Date	1989		1990		1991		1992					
	Ayakulik		Ayakulik		Ayakulik		Ayakulik					
	daily	cum.	daily	cum.	daily	cum.	daily	cum.				
07-Aug	6,553	729,275	6,450	353,847	3,023	364,874	5,877	284,741	701	304,980	4,004	227,149
08-Aug	6,601	735,876	4,932	358,779	321	365,195	5,636	290,377	951	305,931	4,455	231,604
09-Aug	4,460	740,336	1,463	360,242	249	365,444	361	290,738	3,904	309,835	113	231,717
10-Aug	1,373	741,709	2,697	362,939	961	366,405	4	290,742	4,409	314,244	94	231,811
11-Aug	2,881	744,590	453	363,392	1,970	368,375	5	290,747	1,855	316,099	456	232,267
12-Aug	3,136	747,726	554	363,946	2,709	371,084	1,160	291,907	1,176	317,275	697	232,964
13-Aug	2,508	750,234	541	364,487	1,275	372,359	4,767	296,674	749	318,024	739	233,703
14-Aug	5,451	755,685	458	364,945	2,500	374,859	2,916	299,590	2,851	320,875	1,926	235,629
15-Aug	2,941	758,626	105	365,050		374,859	1,143	300,733	1,480	322,355	69	235,698
16-Aug	384	759,010	719	365,769		374,859	340	301,073	1,892	324,247	206	235,904
17-Aug	1,619	760,629	306	366,075		374,859	90	301,163	1,977	326,224	119	236,023
18-Aug	1,731	762,360	309	366,384		374,859	744	301,907	2,573	328,797	1,466	237,489
19-Aug	793	763,153	514	366,898		374,859	409	302,316	1,869	330,666	1,628	239,117
20-Aug	776	763,929	843	367,741		374,859	5,452	307,768	3,018	333,684	630	239,747
21-Aug	584	764,513	217	367,958		374,859	2,500	310,268	2,000	335,684	1,553	241,300
22-Aug	502	765,015	454	368,412		374,859	369	310,637	2,000	337,684	724	242,024
23-Aug	30	765,045	581	368,993		374,859	193	310,830	1,500	339,184	3,305	245,329
24-Aug	1,205	766,250	268	369,261		374,859	291	311,121	1,500	340,684	1,407	246,736
25-Aug	400	766,650	223	369,484		374,859	1,475	312,596	1,000	341,684	6,822	253,558
26-Aug	400	767,050	258	369,742		374,859	145	312,741	1,000	342,684	3,435	256,993
27-Aug	284	767,334	310	370,052		374,859	1,345	314,086	1,000	343,684	1,401	258,394
28-Aug	199	767,533	96	370,148		374,859	96	314,182	500	344,184		258,394
29-Aug	189	767,722	67	370,215		374,859	205	314,387		344,184		258,394
30-Aug	78	767,800	95	370,310		374,859		314,387		344,184		258,394
31-Aug	301	768,101	312	370,622		374,859		314,387		344,184		258,394
01-Sep		768,101	63	370,685		374,859		314,387		344,184		258,394
02-Sep		768,101	92	370,777		374,859		314,387		344,184		258,394
03-Sep		768,101	120	370,897		374,859		314,387		344,184		258,394
04-Sep		768,101	109	371,006		374,859		314,387		344,184		258,394
05-Sep		768,101	86	371,092		374,859		314,387		344,184		258,394
06-Sep		768,101	56	371,148		374,859		314,387		344,184		258,394
07-Sep		768,101	84	371,232		374,859		314,387		344,184		258,394
08-Sep		768,101	50	371,282		374,859		314,387		344,184		258,394
09-Sep		768,101		371,282		374,859		314,387		344,184		258,394
10-Sep		768,101		371,282		374,859		314,387		344,184		258,394
Total	768,101		371,282		374,859		314,387		344,184		258,394	

Appendix F.1.

Daily climatological observations, water temperature, and water depth monitored at Red Lake field station, 1990.

DATE	TIME	TEMP (C)		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS
		AIR	WATER		DIRECTION	VEL. (mph)		
May 17	2200			100	SE	5-25		Continuous rain
18	2300	6.0	3.0	100	SE	5-10	91.0	Continuous rain
19	2000		6.0	90	NW	5-10	91.0	Sunny intervals, rain in morning
20	2000	6.5	4.0	75	SW	5-10	91.0	Ceiling 3500'
21	2000	4.0	5.0	75	NW	5-10	88.0	3500' broken
22	2000	7.0	4.0	100	NE	0-5	89.0	Light rain
23	2000	10.0	5.0	100	NE	0-5	88.0	Light rain earlier in day, calm overall
24	2000	10.0	5.0	100	NE	0-5	88.0	Light rain in morning, grey and calm most of day
25	2000	11.0	7.0	100	NE	0-5	85.0	No rain
26	2000	14.0	7.0	75	NW	0-5	84.0	Nice day overall
27	2000	13.0	6.0	100	SE	5-10	85.0	
28	2000	12.0	7.0	85	SE	0-5	85.0	
29	2000	12.0	7.0	80	SW	0-5	84.0	Nice day
30	2000	9.0	7.0	70	E	10-15	81.0	Clear and windy
31	2000	13.0	7.0	70	E	0-5	80.0	Some sun, little wind
June 1	2000	14	8	65	NE	5-20	76.0	Very windy, but sunny and nice
2	2000	14.0	8.0	75	NE	5-20	75.0	Switched to SW, late night fog
3	2000	15.0	8.0	10	SW	0-5	72.0	Nice day
4	2000	20.0	9.0	CAVU	SW	0-5	72.0	Super Nice
5	2100	16.0	8.0	CAVU	SW	0-5	71.0	Super Nice
6	1800	18.0	10.0	CAVU	SW	5-10	68.0	Super Nice
7	2030	13.0	8.0	CAVU	SW	5-15	67.0	Super Nice
8	1900	14.0	10.0	CAVU	SE	0-5	66.0	Super Nice
9	1930	9.0	10.0	85	NE	5-10	66.0	No more sun
10	2000	12.0	11.0	100	NE	0-5	66.0	No more sun
11	1930	15.0	11.0	75	SW	0-5	63.0	
12	2000	14.0	10.0	85	SW	0-5	63.0	Rainy
13	2000	12.0	10.0	100	SW	0-5	68.0	Rainy
14	2000	9.0	8.0	CAVU	SW	5-10	68.0	Sunny
15	2000	8.0	9.0	100	E	5-20	76.0	Rainy fog
16	2000	6.0	9.0	100	SE	0-20	84.0	Rainy fog
17	2000	9.0	10.0	100	SE	5-15	85.0	Drizzle fog
18	2000	11.0	10.0	95	SE	0-5	80.0	Drizzle at times
19	2100	10.0	11.0	90	SE	0-5	76.0	Better than the last six days
20	2000	16.0	10.0	50	NW	15-20	75.0	Bit of sun tonight, yea!
21	2000	12.0	9.0	75	NW	0-5	72.0	Sunny all day until 6:00pm
22	2000	13.0	9.0	85	NW	0-5	68.0	Cloudy, no rain, little wind
23	2000	14.0	10.0	CAVU	CALM	CALM	67.0	Nice day
24	2000	15.0	10.0	70	SW	0-2	67.0	Nice day
25	2200	14.0	10.0	100	CALM	-	66.0	Nice but cloudy day
26	2000	14.0	11.0	100	CALM	-	66.0	Overcast but looks like its clearing
27	2000	15.0	11.0	15	SW	5	66.0	A beautiful day for anything!
28	1945		11.0	10	SW	0-5	63.0	A beautiful day for anything!
29	2100	15.0	11.0	20	CALM	0	63.0	Nice day for bears
30	1930	16.0	12.0	80	NW	0-5	62.0	Nice sunny day until 1700 hrs

Appendix F.2.

Daily climatological observations, water temperature, and water depth monitored at Red Lake field station, 1991.

DATE	TIME	TEMP (C)		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS
		AIR	WATER		DIRECTION	VEL. (mph)		
May 6	1730	10.0	6.5	95	NE	10-15		Snow on ground in morning, cold night
7	1800			100	SE	25		RDF
8	1800			100	SE	25		RDF
9	1800			100	SE	30-40		RDF
10	1800	7.0	4.8	100	SE	5-10	33.0	Water level up 2"
11	1830	9.5	5.8	100	SE	5	34.0	Water up 1/2 inch
12	1830	7.0	5.5	95	NW	5-10	34.0	Nice day but cloudy about 1400
13	1830	9.8	6.8	100	SE	0-5	33.0	Glorious
14	1830	7.0	6.0	100	W	0-5	34.0	15-20 mph wind from W til 3:00 then gradually calmed down
15	1800	5.0	5.0	100	NW	15	35.0	
16	1800	8.0	5.5	75	SE	0-5	33.0	
17	1815	6.0	5.5	100	NE	5-15	32.0	
18	1800	7.0	5.0	98	N	5	32.0	
19	1800	8.5	6.5	98	SW	0-10	32.0	
20	1800	14.0	8.0	CAVU	SW	5-10	32.0	Nice day
21	1900	17.0	8.0	CAVU	SW	0-5	31.0	Best day yet
22	1800	16.5	8.0	5	W	5-10	29.0	Great day
23	1800	20.0	8.0	CAVU	SE	0-10	29.0	Better day
24	1945	15.0	8.0	0	E	5-10	28.0	Gorgeous day
25	1800	17.0	9.0	100	SW	0-5	28.0	Fog, low clouds
26	1815	17.0	8.5	100	SE	0-5	29.0	Drizzle all day
27	1800	7.0	7.5	100	E	5-10	29.0	Drizzle all day
28	1745	10.0	8.5	90	W	5-15	29.0	Cloudy occasional sun
29	1715	7.0	6.0	100	W	0-5	29.0	Cloudy all day
30	1830	7.5	6.5	100	SW	0-5	28.0	Cloudy all day
31	1800	8.0	7.0	100	W	5-10	28.0	Cloudy all day
June 1	1830	10.5	7.0	90	SW	0-5	27.0	All cloudy til 4:00
2	1800	8.0	8.0	100	SE	10	28.0	
3	1830	9.0	9.0	100	SE	5-15	24.0	
4	1800	8.0	7.5	100	E	0-5	27.0	Cloudy, some drizzle all day
5	1800	6.0	8.0	90	E	0-1	27.0	Rainy all day, occasional sun
6	1830	10.0	8.0	90	N	0-3	27.0	Cloudy day
7	1800	11.0	9.0	90	CALM		27.0	Decent day
8	1800	11.5	10.0	100	NE	10	24.0	Algal doom
9	1800	11.0	10.0	100	NE	10-15	27.0	Windy and algae
10	1830	18.0	9.0	5	SW	0-5	25.0	Great day
11	1900	13.0	10.0	0	SW	5	27.0	CAVU
12	1830	14.0	9.5	50	SW	5-10	26.0	Nice day, bit breezy
13	1800	16.0	12.0	0	SW	0-10	26.0	CAVU
14	1800	12.0	10.0	50	SW	10-15	26.0	Nice day
15	1800	11.5	9.0	100	W	0-5	25.0	Nice day, high thin overcast
16	1800	7.0	8.0	100	S	0-5	25.0	Rainy all day
17	1800	8.0	10.0	100	E	0-5	25.0	Cloudy mixed rain

-Continued-

DATE	TIME	TEMP (C)		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS	
		AIR	WATER		DIRECTION	VEL. (mph)			
	18	1800	10.0	10.0	100	SE	0-5	25.0	RDF
	19	1800	11.0	10.0	100	SE	10-15	25.0	Rain, drizzle, wind
	20	1800	9.0	10.0	100	SW	0-5	25.0	Fog, mist, rain
	21	1800	11.0	10.0	80	SW	5-10	25.0	Nice day
	22	1800	10.0	10.0	100	SSE	0-5	26.0	Nice day
	23	1800	12.0	10.0	100	SE	20-30	25.0	Windy, heinous algae
	24	1800	14.5	11.5	99	SE	0-5	26.0	Rained all morning and most of afternoon
	25	1800	15.0	12.0	100	NE	0-5	25.0	Algae extremely bad, bugs also
	26	1800	10.0	10.0	100	S	0-5	27.0	Algae extremely bad, bugs also
	27	1800	10.0	10.0	100	SW	0-5	27.0	Algae extremely bad, bugs also
	28	1800	15.5	15.5	100	SW	0-5	27.0	Not bad
	29	1800	16.0	11.0	100	SW	0-5	25.0	Mediocre day
	30	1800	16.0	12.0	30	SW	0-5	25.0	Nice day
July	1	1800	18.0	13.5	40	SW	5-10	25.0	Nice day
	2	1800	15.0	12.0	80	SW	5-10	25.0	Nice day
	3	1800	16.0	12.0	20	SW	0-5	25.0	Nice day
	4	1830	15.0	13.0	75	W	5-10	24.0	Nice day
	5	1800	15.0	14.0	100	ESE	5-10	24.0	Drizzle, humid
	6	1800	15.0	14.0	100	SW	0-2	24.0	Misty, fog
	7	1830	14.0	14.0	99	SE	0-5	24.0	No rain, thats something
	8	1830	16.0	14.0	50	SW	0-5	24.0	Nice day

Appendix F.3.

Daily climatological observations, water temperature, and water depth monitored at Red Lake field station, 1992.

DATE	TIME	TEMP (C)		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS
		AIR	WATER		DIRECTION	VEL. (mph)		
May 6	1806	7.0	6.0	90	SE	5	56.0	Measured stream gauge in cm.
7	1800	6.0	7.0	30	SW	8	56.0	
8	1800	5.0	7.0	30	NW	20	56.0	
9	1805	3.0	6.5	50	W	25	56.0	
10	1800	3.5	6.5	80	NW	20	55.0	
11	1815	9.0	7.0	5	SE	10	55.0	
12	1800	6.0	6.0	100	SE	10	55.0	
13	1800	7.0	8.0	5	W	20	56.0	
14	1800	6.5	6.0	100	SE	10	56.0	Drizzling
15	1800	3.0	8.0	0	NW	20	56.0	
16	1800	10.0	8.0	0	NW	20	56.0	
17	1800	11.0	8.0	5	N	5	56.0	
18	1800	11.0	8.0	5	W	15	56.0	
19	1800	16.0	9.5	0	W	5-10	57.0	
20	1800	19.0	10.0	0	S	5-10	58.0	
21	1800	12.0	9.0	0	W	5-10	58.0	
22	1800	14.0	11.5	5	W	5	57.0	
23	1800	15.0	9.0	5 Haze	S	10	58.0	
24	1800	15.5	14.0	30	N	20	58.0	
25	1800	12.0	8.5	100	N	20-25	58.0	
26	1800	13.0	7.5	100	N	15	58.0	
27	1800	14.0	9.0	90	SW	5	61.0	
28	1830	13.0	9.5	100	NONE	CALM	61.0	Drizzling rain
29	1900	11.0	10.0	100	W	5	61.0	
30	1800	12.0	9.0	95	NONE	CALM	71.0	Drizzling rain
31	1820	10.0	9.5	50	V	5	68.0	
June 1	1800	13.0	9.5	50	V	5-10	71.0	
2	1800	9.5	10.0	90	NE	10	68.0	
3	1800	12.0	10.5	100	N	15	61.0	Weir panels and leads pulled 1500 hours
3	1810	10.0	10.0	90	SE	5	68.0	Moved gauge because of influence of weir
4	1800	10.0	10.0	90	SE	5	68.0	
5	1800	11.5	10.0	95	SE	5	66.0	
6	1800	10.0	9.0	95	NE	5	66.0	
7	1800	12.0	10.0	60	N	10	63.0	
8	1800	12.0	11.5	15	W	15	63.0	
9	1800	14.0	9.0	10	W	10	61.0	
10	1800	13.0	9.5	100	SE	5	61.0	Drizzling
11	1800	13.0	10.0	100	SE	<5	61.0	Drizzling
12	1800	12.0	12.0	100	SE	25	61.0	Drizzling
13	1800	11.0	10.0	100	V	5	61.0	
14	1800	10.0	11.0	100	W	5	60.0	Drizzling
15	1800	9.0	10.0	80	SW	5	58.0	
16	1800	12.0	11.0	95	SE	5	58.0	Light rain

-Continued-

DATE	TIME	TEMP (C)		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS
		AIR	WATER		DIRECTION	VEL. (mph)		
17	1800	11.0	11.0	95	SE	10	56.0	
18	1800	10.0	12.0	75	SE	10	56.0	
19	1800	10.0	11.0	40	E	10	56.0	
20	1800	11.0	10.5	90	-	CALM	56.0	Rain
21	1800	11.0	13.0	40	SE	10	53.0	
22	1800	11.0	13.0	100	SE	5	53.0	
23	1800	11.0	12.0	100	SE	10	53.0	Rain
24	1800	10.0	13.0	75	SE	15	53.0	
25	1800	9.0	11.0	100	E	15-20	53.0	Rain
26	1800	12.0	12.0	100	SE	10-15	53.0	Fog, drizzle
27	1800	12.0	11.0	100	SE	10	53.0	Drizzle
28	1800	12.0	11.0	100	SE	5	61.0	Drizzle
29	1800	10.0	11.0	100	SW	10	63.0	
30	1800	14.0	11.0	80	SE	10	63.0	
July 1	1800	15.5	11.5	40	SE	0-5	63.0	
2	1800	13.0	11.5	80	SE	5	63.0	
3	1800	14.0	12.0	10	SW	5	58.0	Beautiful Day!!!
4	1800	12.0	12.0	100	SW	10	56.0	Drizzle
5	1800	10.0	12.0	100	SE	5	58.0	Drizzle
6	1800	11.0	11.5	100	S	5	58.0	Drizzle
7	1800	12.0	13.0	100	SE	5	58.0	
8	1800	15.0	14.0	95	SW	5	61.0	
9	1800	13.0	14.0	100	V	5	58.0	Rain
10	1800	13.0	13.0	100	V	10	58.0	
11	1800	12.0	13.0	90	V	10	58.0	
12	1800	12.0	13.00	80	NW	10	58.0	
13	1800	12.0	11.00	100	W	5	58.0	Rain
14	1800	13.0	12.00	100	SE	5	58.0	Rain, fog
15	1800	13.0	13.00	100	SE	5	61.0	Fog, drizzle
16	1800	14.0	13.00	100	SE	5	61.0	
17	1800	13.0	13.00	100	S	5	60.0	
18	1800	11.5	12.00	100	W	5	61.0	
19	1800	16.0	13.00	60	SW	5	56.0	SUN!
20	1800	15.0	12.00	100	SW	5	59.0	
21	1800	15.0	13.00	100	SW	5-10	58.8	
22	1800	11.5	13.50	100	-	-	63.0	Rain
23	1800	18.5	15.00	63	N	10	60.0	2000' broken
24	1800	22.0	16.00	7	N	10-15	58.0	5000' SKTD???
25	1800	17.0	14.50	100	NW	0-5	61.0	5000' solid
26	1800	15	13.00	100	-	-	62.0	1800' solid, fog
27	1800	13	13.00	100	S	10-15	59.0	2300' BRKN, mist
28	1800	16	15.00	60	SW	5-10	60.0	4000' BRKN
29	1800	16	14.00	80	N	5	59.0	3000' BRKN

-Continued-

DATE	TIME	TEMP (C)		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)		COMMENTS	
		AIR	WATER		DIRECTION	VEL. (mph)				
	30	1800	16	14.00	100	SW	5	61.0	1500'	solid, fog
	31	1800	14	15.50	100	W	0-5	60.0	1500'	SKTD???, 2500' BRKN
Aug	1	1800	13.5	14.50	100	W	0-5	61.0	15000'	solid, fog, rain
	2	1800	14	14.00	100	N	5-10	61.0	2400'	solid, rain
	3	1800	16.5	15.50	100	E	5-10	65.0	2000'	solid, a few rain showers
	4	1800	15	15.00	100	W	0-5	61.0	1000'	solid RDF
	5	1800	14	14.00	100	E	5-10	60.0	1500'	solid fog
	6	-	-	-	-	-	-	-	-	-
	7	1800	14.5	16.50	70	W	5	60.0	3000'	BRKN
	8	1800	19.5	15.00	0	W	5-10	58.0	CAVU	
	9	1800	16.5	14.50	100	SW	0-5	58.0	3000'	solid
	10	1800	13	14.50	65	S	15-20	56.0	3000'	scattered
	11	1800	12.5	14.50	100	-	-	60.0	1000'	solid RDF

Appendix F.4.

Daily climatological observations, water temperature, and water depth monitored at Akalura field station, 1990.

DATE	TIME	TEMP (C)		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS
		AIR	WATER		DIRECTION	VEL. (mph)		
May 14	1800			80	S	10	51.0	Cloudy all day, started to clear up around 4:30pm
15	1800			100	S	15	49.0	Wind gusting to 25
16	1825			100	SE	15	51.0	Wind gusting 25, drizzle all day long
17	1835			100	SE	15-20	53.0	Winds gusting 25, 500'100' ceiling, rainy all day
18	1800			100	NW	0-5	57.0	Rain & drizzle all day, 3000' ceiling, two planes made it in today
19	1820			90	N	5-10	57.0	Clouds clearing some, wind picking up, by 7:15 it's a steady 20mph
20	1808			100	NW	0-5	55.0	Ceiling lifting to 3000' wind dying down
21	1810	9.0	8.0	90	N-NW	10-15	54.0	Cool day, steady wind and cloud cover
22	1900	6.0	8.0	100	S-SE	5-10	53.0	Cool day, constant wind, light showers, 2500' ceiling
23	1800	8.0	8.0	100	SE	0-5	53.0	Cool, occasional drizzle and gusty periods, 3000' solid
24	1800	10.0	8.0	100	SW	5	53.0	3000' solid
25	1820	11.0	8.0	100	S	5	53.0	3500' solid all day, just a slight breeze all day
26	1800	9.0	10.0	99	S	5	52.0	Water was 27" with tide at 0700, 3000' broken
27	1815	11.0	9.0	100	N	5	55.0	1000' solid, wind changed from SE early to N later, gusting 20mph, steady rain
28	1906	11.0	10.0	99	SE	5	52.0	3000' broken, rainy and windy most of today, partial clearing this evening
29	1840	13.0	9.0	80	SE	5-10	51.0	5000 broken, 10 mile visibility, clearing in the evening
30	1930	11.0	8.0	80	SE	20	49.0	3000' broken, gusts to 30mph
31	1915	12.0	9.0	90	S	5	49.0	3000' broken, winds most of day 20mph
June 1								
2	1830	15.0	9.0	100	E	<5	47.0	3,000' broken, no wind, slight drizzle
3	1815	18.0	10.0	20	S	<5	47.0	Clear skies, nicest day so far!
4	2030	17.0	10.0	10	W	5-10	46.0	CAVU, warm day
5	1800	17.0	12.0	50	E	10	45.0	Clouding up from the east after 5:00pm, 5,000' broken
6	1900	17.0	13.0	5	W	5	44.0	CAVU, nice day
7	2130	14.0	12.0	<5	W	5	43.0	CAVU, winds W 10-15 in early evening, not as warm as yesterday
8	1815	15.0	14.0	<1	S	5-10	44.0	CAVU, winds picking up slightly in evening
9	1830	12.0	9.0	100	S	10	43.0	2500' solid, gusts 15-20, intermittant drizzle all day
10	1830	17.0	12.0	100	S	<5	43.0	Basically no wind, 2500' solid, intermittent drizzle all day
11	1930	16.0	13.0	70	S	5	43.0	2500' broken with lower fog patches, clearing to the south
12	1930	11.0	12.0	100	W	5	43.0	1000' solid, steady rain from mid-afternoon on
13	1815	11.0	11.0	100	SE	10	44.0	1000 solid, rained most of the day, winds up to 25mph earlier today
14	1830	13.0	13.0	25	W/NW	10-15	43.0	High clouds, cleared up this afternoon from 1000' solid and rain
15	1830	9.0	11.0	100	S	20	50.0	500' solid, steady rain all day
16	1815	9.0	10.0	100	S	20	53.0	500' solid, winds up to 35 and at least 20 all day, drizzle and rain, fog on ground
17	1900	11.0	9.0	100	SW	5	56.0	Zero/zero, drizzle, fog, higher winds to 25 most of day, heavy rain at times
18	1800	11.0	10.0	100	S	<5	56.0	1500' solid, lower fog, just a little drizzle mid-afternoon
19	1800	10.0	9.0	100	SE	5	55.0	2500' solid, lower fog patches, very light drizzle in the evening
20	1815	14.0	10.0	95	NW	20	53.0	Clearing later in day, gusts to 30
21	2200	11.0	10.0	80	W	5	53.0	3000' solid, slightly broken in SE, winds to 30mph earlier in the day
22	1915	14.0	11.0	95	W	<5	51.0	2500' mostly solid, clouds lower and darker to NW
23	1830	16.0	12.0	10	NW	5	51.0	High clouds, nice sunny day
24	1930	16.0	12.0	90	S	<5	49.0	Nice sunny morning, clouded up in early afternoon
25	1815	15.0	13.0	100	S	15	48.0	3500' slightly broken, wind just starting to pick up at 5:00pm
26	1800	14.0	13.0	100	Calm	-	46.0	3000' solid, calm all day, some light drizzle

Appendix F.5.

Daily climatological observations, water temperature, and water depth monitored at Akalura field station, 1991.

DATE	TIME	TEMP		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS
		AIR (C)	WATER (C)		DIRECTION	VEL. (mph)		
May 8	1800	3.0	5.0	100	SE	10-15	60.0	Alot of rain, water depth increasing.
9	1800	4.0	5.0	100	SE	15	63.0	
10	1800	5.0	6.0	95	SE	<5	72.0	Opened live box due to excess water flow at 0430.
11	1800	6.0	7.0	90	SE	5	70.0	Smolt trap stable, but has shifted slightly to one side.
12	1800	9.0	6.0	95	SE	5-10	67.0	Water level dropped, resumed fishing at 12:45pm
13	1800	10.0	6.0	90	S	<5	68.0	
14	1800	8.0	7.0	75	NE	5	61.0	
15	1800	8.0	7.0	90	NE	<5	58.0	
16	1800	7.0	7.0	50	NE	<5	57.0	
17	1800	7.0	7.0	100	SE	15-20	55.0	
18	1800	7.0	7.0	100	NE	5-10	55.0	Rain
19	1800	10.0	7.0	85	NE	5	55.0	
20	1800	14.0	8.0	0	NW	<5	48.0	
21	1800	13.0	9.0	0	NW	5	47.0	
22	1800	12.0	9.0	0	W	5	46.0	
23	1800	13.0	11.0	0	SW	5	43.0	
24	1800	13.0	11.0	0	NE	5-10	42.0	
25	1800	10.0	11.0	90	SW	10	42.0	
26	1900	8.0	8.0	100	SE	10-15	44.0	
27	1800	5.0	8.0	100	SW	15	44.0	
28	1800	6.0	8.0	100	SE	10	43.0	
29	1800	8.0	8.0	100	NW	10	43.0	
30	1800	8.0	8.0	100	NW	5	41.0	
31	1800	9.0	7.0	50	SW	15	41.0	
June 1	1800	6.0	8.0	75	NW	10	43.0	
2	1830	5.0	8.0	85	SE	15	43.0	
3	1800	4.0	7.0	100	SE	35-40	43.0	
4	1800	6.0	8.0	100	SW	5	42.0	
5	1830	8.0	7.0	50	SW	10	41.0	
6	1800	11.0	8.0	40	NE	10	41.0	
7	1545	10.0	8.0	40	NE	15-20	40.1	
8	1800	11.0	8.0	100	NE	5-10	38.0	
9	1830	12.0	8.0	90	NE	10	38.0	
10	1800	20.0	8.0	CAVU	W	5	37.0	
11	1830	22.0	9.0	CAVU	W	15	37.0	
12	1835	19.0	8.0	10	SW	15	37.0	Trap on bottom with low water, little flow
13	1815	23.0	8.0	CAVU	W	10	35.0	Used algae buildup to increase flow in trap
14	1800	18.0	9.0	50	NW	15-20	35.0	Water level too low to fish properly
15	1745	16.0	9.0	100	NW	5	50.0	Moved trap to different location
16	1800	7.0	8.0	100	SW	15	55.0	Rain all day so water level up 5.5cm
17	1750	6.0	8.0	100	SW	10	56.0	
18	1800	9.0	8.0	100	NE	15	57.0	Rained most of night
19	1800	10.0	9.0	100	E	10	57.0	Rain on and off all day

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DATE	TIME	TEMP		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS
		AIR (C)	WATER (C)		DIRECTION	VEL. (mph)		
20	1815	12.0	9.0	100	CALM	-	58.0	Rain on and off all day
21	1800	14.0	9.0	100	SE	10	57.0	Middle of day, sunny only
22	1750	12.0	10.0	100	SW	15	57.0	Rain/drizzle
23	1800	10.0	10.0	100	SE	15-20	56.0	Drizzle
24	1800	11.0	10.0	100	SE	20	60.0	Drizzle
25	1745	12.0	10.0	100	W	10	56.0	
26	1800	13.0	11.0	100	SE	5-10	56.0	Infrequent rain
27	1800	12.0	10.0	100	SE	0-5	57.0	Rain
28	1800	15.0	12.0	60	-	0	56.0	
29	1800	14.0	12.0	80	-	0	56.0	
30	1800	16.0	13.0	100	-	0	55.0	Blue sky most of day, got up to 72F
July 1	1800	19.0	13.0	0	-	0	55.0	The nicest blue sky day yet
2	1800	15.0	12.0	100	SW	5	55.0	Calm, 2000' solid

Appendix F.6.

Daily climatological observations, water temperature, and water depth monitored at Akalura field station, 1992.

DATE	TIME	TEMP (C)		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS
		AIR	WATER		DIRECTION	VEL. (mph)		
May 2	1800	9.0	-	0	SW	5	NR	Night time temp. to -6 C.; ice in creek at noon.
3	1900	4.0	7.0	0	SW	5	NR	
4	1800	6.0	7.0	100	N	10	NR	Night time low -8 C.; high overcast skies.
5	1815	6.0	8.5	100	W	5	NR	High overcast skies.
6	1800	6.0	7.0	100	SW	5-10	NR	Rain/drizzle throughout day; 1000 ft ceiling.
7	1700	5.0	8.0	10	SW	10-15	NR	
8	1830	9.0	8.0	10	W	15	NR	
9	1800	8.0	8.0	50	N	20-25	NR	
10	1830	6.5	7.5	100	NW	20+	25.0	Installed stream gauge; stream height hasn't changed from installation of smolt trap.
11								
12	1800	6.5	7.0	100	SW	10	28.0	Rain/drizzle since 0500.
13	1830	8.0	8.5	25	NW	15	28.0	
14	1800	7.0	8.0	100	S	5	29.0	Rain, drizzle, fog.
15	1800	8.0	9.0	20	N	20-25	29.0	
16	1800	8.5	9.0	0	N	15	28.0	
17	1830	9.0	9.5	100	SW	5	28.0	High overcast skies.
18	1800	14.0	10.0	0	W	5-10	28.0	
19	1800	13.5	11.0	0	SW	<5	29.0	
20	1800	12.0	12.0	0	SW	10	29.0	
21	1800	13.0	11.0	0	SW	10	30.0	
22	1820	14.0	13.0	0	SW	5-10	30.0	
23	1800	15.0	13.0	0	SW	10	29.0	
24	1800	13.0	11.0	50	NE	20	32.0	
25	1800	10.0	9.0	100	NE	10-15	33.0	Occasional drizzle in early a.m.
26	1700	9.5	9.0	100	SW	10	33.0	
27	1800	9.0	9.0	100	Calm	-	33.0	
28	1815	10.0	10.0	100	S	5	34.0	
29	1800	10.0	11.0	100	SW	10-15	34.0	Occasional drizzle.
30	1830	10.0	10.0	80	SW	15-20	35.0	Occasional rain.
31	1800	10.0	11.0	30	W	10	34.0	
June 1	1800	8.5	10.0	50	SW	5	33.0	
2	1800	9.0	11.0	100	S	10-15	33.0	
3	1800	9.0	11.0	100	NE	15	32.0	Occasional drizzle.
4	1900	8.0	10.0	100	S	10-15	33.0	Rain squalls in p.m.
5	1800	9.0	11.0	90	S	10	34.0	
6	1800	10.0	11.0	90	Calm	-	34.0	
7	1900	11.0	11.0	20	Calm	-	33.0	
8	1900	13.0	12.0	0	NE	10-15	32.0	
9	1730	17.0	13.0	0	SW	0-5	31.0	High haze; dead calm in evening.
10	1800	13.0	12.0	100	S	0-5	30.0	Light rain.
11	1800	13.0	11.0	100	SW	10	30.0	Light rain in evening.
12	1900	11.0	12.0	100	SW	25-30 Gusts	32.0	Light rain with heavy rain at times.

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DATE	TIME	TEMP (C)		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS
		AIR	WATER		DIRECTION	VEL. (mph)		
13	1830	14.0	11.0	99	SW	0-5	32.0	
14	1800	11.0	11.0	100	S	Calm	31.0	
15	1700	13.0	12.0	80	SW	10-15	30.0	Skies cleared off at 2000 hours.
16	1700	14.0	11.0	100	S	15-20	29.0	
17	1700	13.0	12.0	100	SW	5-10	28.0	
18	1630	12.0	10.0	80	SW	5-10	29.0	Squalls throughout day; BRKN.
19	1900	14.0	11.0	70	SW	10-15	28.0	
20	1700	13.0	12.0	80	Calm	Calm	28.0	BRKN; rain showers.
21	1800	12.0	11.0	100	SW	5-10	27.0	Gusts to 20mph.
22	1800	13.0	12.0	100	Calm	Calm	26.0	
23	1700	13.0	12.0	100	Calm	Calm	25.0	Rain showers.
24	1700	14.0	12.0	80	SW	0-5	25.0	Nice day.
25	1730	10.0	11.0	100	SW	15-25	25.0	Rain and strong gusts.

Appendix F.7.

Daily climatological observations, water temperature and water depth monitored at Upper Station field station, 1990.

DATE	TIME	TEMP (C)		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS
		AIR	WATER		DIRECTION	VEL. (mph)		
May	13	1800	9.0	8.0	90	E-SE	5-10	Wind gusts to 20mph
	14	2000	23.0	9.0	65	E-SE	5-10	Nice afternoon
	15	1930	22.0	10.0	90	E-SE	10-15	Wind gusts to 25mph
	16	1800	13.0	10.0	95	E-SE	10-15	Wind gusts to 20mph
	17	1800	10.0	10.5	100	E-SE	20-30	Wind gusts to 35mph
	18	1830	12.0	9.0	80	W	5-10	
	19	1800	21.0	9.0	95	NW	5-10	52.0
	20	1830	14.0	9.0	60	W-NW	5-10	53.0
	21	1830	13.0	9.0	25	W	5-15	53.0
	22	1830	12.0	9.0	95	S-SE	10-20	53.0
	23			9.0	95	S-SE	10-15	53.0
	24	2100	11.5	9.0	95	SE	20	53.0
	25	530	11.0	9.0	95	SE	10-15	52.0
	26	500	12.0	10.0	95	E-SE	5-15	52.0
	27	230	12.0	10.0	95	E-SE	10-30	55.0
	28	1400	13.0	10.0	95	SE	5-10	55.0
	29	1830	15.5	10.5	80	W	5	53.0
	30	1800	8.5	10.0	90	E-SE	5-10	53.0
	31	1800	10.5	10.0	95	E	5-15	53.0
June	1	1800	15.0	10.0	85	E	5-10	53.0
	2	1800	13.0	12.0	95	NE	5	53.0
	3	1800	15.0	12.0	10	W	5	53.0
	4	1800	17.0	14.0	20	NW	5	49.0
	5	1800	15.5	13.0	50	SW	5	48.0
	6	1800	20.0	14.0	5	W	5	48.0
	7	1800	14.5	14.0	5	W	5-10	43.0
	8	1800	15.0	16.0	5	SE	5	43.0
	9	1800	10.0	15.0	95	SE	15-20	46.0
	10	1800	13.0	14.0	95	SE	5	43.0
	11	1800	16.5	14.0	50	W	5	43.0
	12	1800	10.0	14.0	95	SE	5	43.0
	13	1800	8.0	14.0	100	SE	5-10	48.0
	14	1800	12.0	14.0	30	W	5-15	48.0
	15	1800	8.0	12.0	100	SE	5-15	51.0
	16	1800	7.0	12.0	100	SE	5-10	57.0
	17	1800	9.0	11.0	100	SE	5	57.0
	18	1800	10.0	11.0	95	E	5	58.0
	19	1800	8.0	11.0	95	E	15	58.0
	20	1800	13.0	12.0	85	NE	15	58.0
	21	1800	15.0	11.5	95	W	15	56.0
	22	1800	12.0	13.0	30	NW	15	56.0
	23	1800	11.0	13.0	60	NW	15	55.0
	24	1800	17.0	15.0	70	SE	15	56.0

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DATE	TIME	TEMP (C)		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS	
		AIR	WATER		DIRECTION	VEL. (mph)			
	25	1800	12.5	14.0	95	SE	15-20	56.0	A little rain around 2000
	26	1800	14.5	14.5	95	W	5	55.0	
	27	1800	17.0	15.0	<10	SW	5-10	53.0	CAVU
	28	1900	14.0	17.0	Scattered	W	5	52.0	CAVU
	29	1800	15.5	18.0	CAVU	SE	10-15	51.0	Zero/zero this morning
	30	1800	14.0	17.0	100	NE	5-10	52.0	
July	1	1800	16.0	15.0	100	NE	5	47.0	High winds (25-30) today
	2	1800	18.0	16.0	Scattered	SW	0-5	44.0	
	3	1800	13.0	11.0		SW	0-5	44.0	0/500 this morning
	4	1800	12.0	16.0	100	SE	15-20	43.0	
	5	1800	15.0	16.0	100	E	10	44.0	A little rain
	6	1800	12.0	15.0	100	W	5	44.0	
	7	1800	10.0	14.0	100	W	15	44.0	Rained a little when dark
	8	1800	12.0	13.5	90	E	10	46.0	
	9	1800	10.0	14.0	90	NE	20	44.0	
	10	1800	12.0	13.5	100	SW	5	44.0	Windy most the day around 20mph
	11	1800	15.0	14.0	100	SE	5	43.0	Pretty sunny most of the day, low winds, nice day
	12	1800	15.0	13.5	85	NE	10	41.0	
	13	1800	15.0	14.0	100	NE	20	42.0	Quite windy all day, a very little rain
	14	1800	18.0	14.0	100	SW	5	41.0	Calm day, a little sun came through around 1500
	15	1800	15.0	15.0	50	W	10	38.0	Trap will not work if water drops more, clear night
	16	1800	12.0	14.0	100	W	5	37.0	
	17	1800	16.0	16.0	CAVU	W	10	37.0	Very sunny day
	18	1800	17.0	16.0	CAVU	W	10	35.0	Got sunburnt, water flow not very good in trap, fog at night
	19	1800	17.0	18.0	CAVU	SW	5	34.0	
	20	1800	16.0	17.5	100	SE	5-10	34.0	Fewer smolt in hiding places in river
	21	1800	15.0	18.0	100	E	15-20	34.0	
	22	1800	14.0	18.0		SE	25-30	34.0	
	23	1800	14.0	15.0	100	NE	15-20	35.0	1/2 mile visibility, rain
	24								
	25	1800	12.0	15.0	100	SW	5	35.0	Rainy
	26	1800	11.0	14.0	100	NE	10	38.0	Rainy
	27	1800	10.0	14.0	100	NE	5-10	38.0	Rainy
	28	1800	12.0	14.0	100	NE	5-10	38.0	Rainy
	29	1800	11.0	15.0	100	E	5	38.0	No rain
	30	1800	11.0	14.0	100	SE	5-10	41.0	Intermittant rain
	31	1800	10.0	13.0	100	E	20-25	43.0	Rain

Appendix F.8.

Daily climatological observations, water temperature, and water depth monitored at Upper Station field station, 1991.

DATE	TIME	TEMP (C)		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS
		AIR	WATER		DIRECTION	VEL. (mph)		
May 11	1815	10.0	6.0	90	NE	10-15	86.0	Smolt trap in, stream velocity high, as well as water depth
12	1830	12.0	7.0	90	SE	10	84.0	Rain stopped, ceiling slightly broken
13	1800	11.0	7.0	70	NE	5	84.0	Vis 15, cloud cover starting to break
14	1830	16.0	8.0	60	SE	5	81.0	Stream still high, velocity 2m/sec
15	1800	16.0	8.0	50	NW	15	80.0	Stream vel 1.5m/sec
16	1800	17.0	8.0	30	SW	10-15	79.0	Stream vel 1.25m/sec
17	1800	15.0	8.0	100	E	40-45	84.0	Strong winds, 45-50 E, organics & debris in stream, vel 2-2.5m/sec
18	1900	12.0	8.0	80	E	5	81.0	Winds changing from east-west back to east, winds 5-10 east
19	1800	15.0	8.0	100	W	10	74.0	Winds still from the west
20	1700	14.0	8.0	0	SW	10	71.0	Clear skies, vis unlimited, stream depth going down, bright sunshine
21	1830	19.0	9.0	0	SW	10	68.0	Clear skies, vis unlimited, warm day 68F, sunshine
22	1800	18.0	10.0	0	SW	5	67.0	Clear skies, vis unlimited, stream depth normal
23	1830	23.0	12.0	0	SW	0-5	61.0	Clear skies, vis unlimited, stream depth normal
24	1830	20.0	12.0	0	SW	0-5	61.0	Clear skies, vis. unlimited, stream level down abit
25	1815	14.0	10.0	10	E	5	58.0	3000' broken vis 20
26	1800	11.0	10.0	100	NE	25-30	66.0	Strong winds, NE 25-30, water level up 3"+, vel 1.5+/m/sec at trap
27	1830	10.0	9.0	100	NE	25-30	61.0	Rain, winds, strong 25-30
28	1900	12.0	10.0	50	SW	15-20	58.0	Change of winds, skies broken, sunshine, moderate winds; SE
29	1800	10.0	10.0	100	SW	10	58.0	Cloudy skies, light winds, stream depth and flow about normal
30	1800	10.0	9.0	100	NW	15	58.0	Solid skies, winds picking up from NW
31	1800	11.0	9.0	75	NW	15	56.0	Broken 2200', windy all day 15-20
June 1	1925	14.0	9.0	CAVU	W	10-15	53.0	Nice day but a chilly wind
2	1800	13.0	9.0	20	SE	20-25	56.0	Winds changing to SE, bad moon a raising, some rain
3	1800	13.0	8.5	100	SE	25-30	63.0	Rain, strong winds from SE, stream level raising
4	1830	13.0	9.0	70	SE	5	58.0	Light rain at times, winds light at 5, stream level maintaining
5	1800	13.0	10.0	80	E	5	58.0	Stream/water level dropping some, winds light, vis. unlimited
6	1800	18.0	10.0	70	SW	5	58.0	Winds shifting to SW-5, rain deminished, stream flow steady
7	2200	15.0	10.0	80	NE	15-20	56.0	Winds picking up 25-30 NE, some sunshine
8	1800	14.0	10.0	100	NE	20-30	56.0	Strong winds from the NE, vis. 15-20
9	1800	19.0	10.0	90	-	-	48.0	No winds, overcast, stream flow a bit high and fast
10	1800	20.0	11.0	10	-	-	43.0	Stream flow and depth decreasing
11	1800	21.0	12.0	10	SW	10	56.0	Stream depth down to normal, moved trap outward into channel
12	1800	18.0	12.0	50	SW	5	56.0	Cloud cover increasing, winds almost calm, stream depth & flow normal
13	1800	18.0	14.0	100	CALM	0	56.0	100% cloud cover, no winds, stream flow & depth normal
14	1800	19.0	14.0	0	NW	10	51.0	CAVU, light winds; stream flow dropping to 20" at trap
15	1830	15.0	12.5	0	NW	0-5	48.0	Hazy all day, water dropping, waiting on fish
16	1800	16.0	12.0	100	SE	10-15	53.0	Winds; SE 10-15, rain, stream depth up maybe 1"
17	1830	15.0	11.5	100	SE	20	58.0	Rain, winds 15-20, stream depth up 2"+ vel at site 1.5m/sec
18	1800	15.0	12.0	100	SE	20-25	61.0	Rain, winds 15-20, stream depth up 2"+ vel at site 1.5m/sec
19	1830	14.0	12.0	100	E	20	66.0	Rain, Rain and more rain, strong winds, stream up/depth+vel
20	1800	16.0	12.0	100	E	10	62.0	Winds died down, E 5-10, stream flow & depth still high
21	1800	19.0	13.0	40	SW	5	61.0	Winds almost calm, sunshine, stream flow and depth decreasing
22	1930	14.0	13.0	100	SE	15-20	66.0	Some sunshine early, turning cloudy, winds increase, flow down
23	2100	12.0	9.0	90	E	35	71.0	Very windy with rain, water coming up

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DATE	TIME	TEMP (C)		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS	
		AIR	WATER		DIRECTION	VEL. (mph)			
	24	2000		12.0	90	E	15	57.0	Windy this morning, calming down at 2000, ceiling lifting and no rain
	25	1800	13.0	12.0	100	-	CALM	61.0	Rain has died and ceiling has dropped to 200'
	26	2100	11.0	12.0	100	-	CALM	66.0	No rain, fog and light drizzle
	27	2000	12.0	12.0	100	SW	5-10	57.0	500' solid, looks like more rain
	28	1800	12.0	12.0	80	W	10	56.0	A nice day, we even had some sun, bugs out tonight, 1800' solid
	29	1800	15.0	13.0	100	W	5-10	56.0	We saw the sun for a good part of the day, light breeze, 2000 solid
	30	1800	16.0	14.0	100	W	5	56.0	Sun is back out of clouds, 1000' solid to E
July	1	1800	22.0	15.0	10	NW	5-10	53.0	CAVU most of the day, 1900 SW 10 2000 solid
	2	1800	20.0	15.0	100	SW	5	53.0	Ceiling coming down but light winds and no rain are nice
	3	1800	23.0	15.0	CAVU	-	CALM	52.0	CAVU most of the afternoon, a fine day to be outside
	4	1800	15.0	15.0	100	-	-	51.0	Sunny most of the day
	5	1800	15.0	15.0	100	-	-	51.0	1000 light drizzle
	6	1800	15.0	15.0	100	CALM	CALM	51.0	Low fog all day with warm temps
	7	1800	15.0	16.0	100	CALM	CALM	48.0	1000 solid with some off and on drizzle
	8	1800	16.0	17.0	30	SW	5	46.0	
	9	1800	16.0	16.0	40	CALM	-	48.0	
	10	1800	15.0	16.0	25	CALM	-	48.0	
	11	1800	16.0	17.0	10	CALM	-	46.0	
	12	1800	16.0	17.0	20	CALM	-	46.0	
	13	2000	17.0	17.0	90	-	-	46.0	Nice day even with some clouds, warm and buggy but nice
	14	1800	15.0	17.0	100	SW	30-35	44.0	
	15	1800	16.0	15.0	90	W	15	47.0	
	16	1800	17.0	14.5	50	NW	10	43.0	
	17	1800	16.0	14.5	75	W	10	43.0	
	18	1800	16.0	15.0	90	NW	10	43.0	
	19	1900	15.0	16.0	30	W	15	42.0	Cloudy through morning, but nice by afternoon
	20	1800	18.0	16.0	70	NW	10-15	42.0	
	21	1800	18.0	17.0	80	NW	10	43.0	
	22	1800	22.0	17.0	60	SE	10	42.0	Sunny and nice all afternoon, clouds rolling in by evening
	23	1800	18.0	17.0	95	SE	5	42.0	
	24	1800	16.0	15.0	100	SE	10	43.0	Rain most of day
	25	1800	18.0	16.0	90	NE	10	42.0	Water level decreasing
	26	1800	19.0	17.5	10	NW	10-15	41.0	CAVU
	27	1800	15.5	16.5	70	NW	15-20	38.0	1800 live box resting on substrate, only adequate flow of water, will need to adjust if water decreases anymore
	28	1800	16.0	17.0	80	NW	15	38.0	
	29	1800	16.0	16.5	95	SW	10	38.0	
	30	1800	17.0	16.5	100	NW	10	39.0	
	31	1800	15.0	15.5	75	NW	30	37.0	
August	1	1800	17.0	15.0	60	NW	15-20	35.0	Low rainfall and high winds from NW cause for decrease in water level
	2	1800	16.0	14.5	75	NW	10	38.0	
	3	1800	15.5	15.0	40	NW	15	35.0	Lower water depth due to winds
	4	1800	16.0	15.0	75	NW	5	35.0	
	5	1800	16.0	15.0	60	NW	5	37.0	

Appendix F.9.

Daily climatological observations, water temperature, and water depth monitored at Upper Station field station, 1992.

DATE	TIME	TEMP		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS
		AIR (F)	WATER (C)		DIRECTION	VEL. (mph)		
May 5	1800	NR	NR	30	W	15	NR	Stream gauge not set up yet.
6	1800	NR	8	100	E	25	52.0	Set up stream gauge and thermo.
7	1800	55	8	40	W	>5	52.0	Nice change.
8	1800	50	7	5	NW	30	49.0	Howling wind all day.
9	1800	45	6	30	NW	35	49.0	High wind conditions all day, dropping water temp.
10	1800	48	7	60	W	30	49.0	High winds again, seemed to be slowing down around 10pm.
11	1800	45	7	30	SW	10	49.0	Winds decreasing and switching to south.
12	1800	45	7	100	SE	15	52.0	Drizzle, fog.
13	1800	52	9	0	W	10	49.0	CAVU, nice day.
14	1800	45	9	100	S	5	52.0	Drizzle, 1.5 mile vis.
15	1800	55	9	5	W	25	52.0	CAVU
16	1800	52	8	0	SW	10	52.0	CAVU
17	1800	53	9	0	SW	5-10	52.0	CAVU
18	1800	58	10	100 (Haze)	W	10	49.0	Clearing off around 10:30pm.
19	1800	62	11	0	SW	5	49.0	CAVU warmest water and air temp thus far.
20	1800	66	12	0	NW	5	52.0	Released dye test fish.
21	1800	66	12	0	NW	5	49.0	CAVU all day.
22	1800	62	13	0	NW	10	49.0	CAVU all day - quite a bit of algae in water.
23	1800	63	14	40	NW	10	49.0	Partly cloudy - high clouds.
24	1800	62	15	0	NE	20	49.0	Wind shifted today.
25	1800	55	14	100	N	20	49.0	Major weather change but no rain yet.
26	1800	52	14	100	E	10	49.0	A few light showers.
27	1800	54	14	70	E	20	52.0	Light rain overnight and tonight.
28	1800	50	14	100	E	5	49.0	Scattered showers all day.
29	1800	50	13	100	E	10	52.0	Light rain last night, cloudy today.
30	1800	54	12	90	E	5	55.0	Showers all day, clearing late afternoon.
31	1800	57	13	90	W	10	52.0	Clear in a.m., cloudy in late afternoon.
June 1	1800	54	14	15	S	10	52.0	Clearing off after cloudy morning.
2	1800	51	13	100	E	35	55.0	Water murky due to east wind.
3	1800	51	13	100	E	20	55.0	Water clearer, less wind/rain last night.
4	1800	46	12	100	E	25	55.0	Still windy with showers off and on.
5	1800	48	10	100	E	20	58.0	Showers and wind all day and night.
6	1800	52	12	100	W	5	58.0	Gradual clearing, showers till 3pm.
7	1800	58	11	20	W	10	58.0	CAVU much of the day.
8	1800	58	12	0	W	20	58.0	CAVU
9	1800	55	14	0	W	15	58.0	CAVU
10	1800	50	15	100	SE	5	58.0	Light rain.
11	1800	52	14	100	E	10	55.0	Cloudy with periodic mist.
12	1800	50	13	100	E	40	61.0	Wild wind and rain; water high and muddy.
13	1800	52	12	100	SE	5	58.0	Water not as cloudy.
14	1800	50	12	100	SE	10	58.0	Cloudy all day.
15	1800	51	12	10	S	0-5	61.0	Clear.
16	1800	50	13	100	SE	10-25	58.0	Intermittent rain.

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DATE	TIME	TEMP		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS
		AIR (f)	WATER (c)		DIRECTION	VEL. (MPH)		
17	1800	50	11	100	E	25	61.0	Cloudy and windy.
18	1800	52	13	60	SE	10	58.0	Partly cloudy with showers periodically.
19	1800	54	12	40	SE	15	58.0	Partly cloudy.
20	1800	54	13	70	NW	10	58.0	Partly cloudy and a few showers.
21	1800	54	14	90	SW	15	55.0	Partly cloudy.
22	1800	54	13	100	E	15	55.0	Showers.
23	1800	56	13	40	W	5	55.0	Partly cloudy.
24	1800	55	14	70	S	10	55.0	Cloudy.
25	1800	48	13	100	E	25	58.0	Rain and wind; water murky and fast.
26	1800	50	13	100	E	15	61.0	Mist all day.
27	1800	50	11	100	E	30	73.0	Heavy rain and wind all night; flood stage.
28	1800	50	11	100	E	20	79.0	Bank full stage water high and fast; light rain. Water gauge was knocked over at high water-new one placed nearby and used thereafter.
29	1800	52	12	90	S	10	79.0	River still high but no rain today.
30	1800	50	12	100	NW	5	79.0	No rain; lake and river still high.
July 1	1800	52	12	50	NW	5	79.0	Partly cloudy (moved trap).
2	1800	54	13	100	-	-	79.0	Cloudy.
3	1800	58	13	70	W	10	79.0	Partly cloudy.
4	1800	50	14	100	E	15	76.0	Light rain in afternoon.
5	1800	50	13	100	SE	10	73.0	Cloudy.
6	1800	50	14	100	W	10	73.0	Cloudy.
7	1800	50	13	100	E	10	70.0	Rain in afternoon and evening.
8	1800	55	13	50	SE	10	70.0	Sun breaking through.
9	1800	57	14	100	E	10	70.0	Cloudy yet again.
10	1800	55	14	100	-	Calm	70.0	Cloudy.
11	1800	57	14	60	W	10	67.0	Partly cloudy.
12	1800	57	14	60	W	10	67.0	Partly cloudy.
13	1800	55	14	100	W	10	67.0	Rain.
14	1800	52	14	100	W	10	67.0	Cloudy.
15	1800	54	15	100	-	-	64.0	Cloudy; rain earlier.
16	1800	55	15	100	-	-	64.0	Cloudy.
17	1800	54	15	100	W	5	64.0	Mist.
18	1800	50	15	100	N	5	64.0	Rain (again).
19	1800	56	15	80	N	5	64.0	Clear in a.m.; cloudy.
20	1800	54	15	100	E	15	61.0	Cloudy.
21	1800	55	15	100	E	10	61.0	Cloudy.
22	1800	55	15	100	E	10	61.0	Cloudy with showers.
23	1800	56	15	80	-	-	61.0	Mostly cloudy.
24	1800	72	16	10	E	10	61.0	Sunny.
25	1800	59	16	100	E	15	61.0	Cloudy.
26	1800	55	15	100	E	5	61.0	Cloudy.
27	1800	54	16	100	E	15	61.0	Showers.
28	1800	59	16	10	N	5	61.0	CAVU!
29	1800	58	16	40	W	15	61.0	Partly cloudy.

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DATE	TIME	TEMP		CLOUD COVER %	WIND		STREAM GAUGE (1 cm)	COMMENTS
		AIR (f)	WATER (c)		DIRECTION	VEL. (MPH)		
30	1800	59	16	100	W	10	61.0	Cloudy.
31	1800	55	16	100	S	5	61.0	Cloudy.
Aug 1	1800	55	16	100	-	-	61.0	Cloudy.
2	1800	55	15	100	E	20	61.0	Rain.
3	1800	57	16	100	E	15	61.0	Cloudy.
4	1800	57	15	100	SE	5	61.0	Cloudy.
5	1800	57	16	100	W	5	58.0	Cloudy.
6	1800	55	15	100	NW	10	61.0	Cloudy and showers.
7	1800	57	15	50	W	15	58.0	Partly cloudy!
8	1800	64	17	0	W	5	58.0	CAVU!!
9	1800	57	16	100	S	5	58.0	Cloudy.

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