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Juvenile Chinook Sampling Data, Slim Creek, British Columbia, 1993

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Canadian Data Report of Fisheries and Aquatic Sciences

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ABSTRACT

Taylor, G.C., J.A. Allan, and M.J. Bradford. 1994. Juvenile chinook sampling data, Slim Creek, British Columbia, 1993. Can. Data. Rep. Fish. Aquat. Sci. 942: 29p.

This report contains data from the first year of a detailed study of the freshwater population biology of chinook salmon from Slim Creek, B.C. The outmigration of juvenile chinook salmon was monitored with rotary auger traps. Catches of chinook fry and smolts with associated length and weight data are reported along with incidental fish catches. Results of trap efficiency tests performed throughout the sampling period are also presented. Diver surveys of selected reaches were performed on two occasions during the summer. Physical parameters of survey sites are documented along with the numbers of juvenile chinook observed. Data are also presented from some preliminary Fraser River beach seining and minnow trapping from Slim Creek.

RÉSUMÉ

Taylor, G.C., J.A. Allan, and M.J. Bradford. 1994. Juvenile chinook sampling data, Slim Creek, British Columbia, 1993. Can. Data. Rep. Fish. Aquat. Sci. 942: 29p.

Ce rapport présente les données de la première année d'une étude détaillée de la biologie des populations dulcicoles de saumon chinook du crique Slim, en Colombie-Britannique. La dévalaison des juvéniles a été surveillée au moyen de piéges à vis sans fin. On indique les prises d'alevins et de smolts de chinook, avec les données correspondantes de longeur et de poids, ainsi que les prises accidentelles. On présente aussi les résultats des tests d'efficacité des pièges faits pendant la période d'échantillonnage. À deux reprises pendant l'été, on a procédé à des plongées d'examen des tronçons choisis. Les paramètres physiques des sites de relevé sont fournis, avec le nombre de juvéniles de chinook observés. On présente en outre des données préliminaires de prises à la seine de plage dans le Fraser et au moyen de pièges à ménés dans le crique Slim.

INTRODUCTION

In the Fraser River watershed, the majority of chinook populations have the 'stream-type' life history where juveniles spend 1 or more years rearing in freshwater (Taylor 1990). However, little is known about the details of the freshwater life history and habitat use for these stocks. Such information is required by habitat managers, to make decisions about land-use practices and development proposals that could impact freshwater habitats. In addition, knowledge of the population dynamics will aid fisheries managers in setting escapement targets to optimize production from these stocks.

In 1993, under the auspices of the Fraser River Green Plan, a detailed investigation of the chinook population of Slim Creek, B.C. was initiated to address these knowledge gaps. This system was chosen because it is small enough to sample and work in, yet has a relatively large population of chinook spawners (1984-1991 mean 3769 spawners [N. Schubert, DFO, New Westminster, pers. comm.]). In the first year, the goals of the program were to estimate the numbers of chinook juveniles that outmigrated from the system in the spring and summer, and to make estimates of the number and distribution of chinook rearing in the Slim Creek watershed during the summer. Coupled with estimates of smolt production in 1994, these data will allow the determination of whether the majority of the 1992 brood reared for a year in Slim Creek, or moved downstream to the Fraser River mainstem.

In this data report, the methods of the 1993 fry and smolt enumeration program and rearing studies are given, along with a description of the study sites. Included are tables of catch and fish size data, trap calibration estimates, and observations of rearing chinook made by divers.

STUDY AREA

The Slim Creek watershed is located approximately 100 km east of Prince George, B.C. and has a total area of approximately 560 km^2 (Choromanski et al. 1993). It flows generally northward for 60 km from headwaters near Pinkerton Peak to the Fraser River (Figure 1). There are two small lakes in the system located 40-50 km upstream from the Fraser confluence.

PHYSICAL DESCRIPTION OF SLIM CREEK

We divided Slim Creek into 8 sections for sampling purposes, and the following is a general description of each section. Stream lengths and gradients were measured using topographic maps and a digitizing tablet. More quantitative descriptions of reaches used for

diver surveys along with variable and code descriptions can be found in Tables 1-3.

Section 1 runs from the Slim Creek confluence with the Fraser River to a point 11.3 km upstream. The flow in this section is gentle and slow but is continuous through deep pools, and some riffles. No rapids are present and the mean gradient is approximately 0.4%. Riparian vegetation is primarily deciduous on unstable silt banks. The substrate of mainly silt, however, some gravel is present in the upper areas of this section.

Section 2 extends 5.4 km from the top of Section 1 to about 2.5 km above the Highway 16 bridge. This section is the steepest section of Slim Creek (slope 0.8%) and is characterized by continuous riffles and some rapids. Riparian vegetation is mature coniferous forest and the substrate is cobble and small boulder.

Section 3 extends 24.5 km from the top of Section 2 to the Everett Creek confluence. This section consists of pools connected by riffles over a cobble substrate. The mean gradient is 0.4%.

Section 4 consists of the 10.9 km length of creek from the Everett Creek confluence up to Slim Lake. The upper reaches of this section are the main spawning area for chinook in this system (Fish Habitat Inventory and Information Program 1990). The section is similar to Section 3 with riffles connecting long pools over a cobble substrate but debris jams are more prevelant. Overhanging vegetation and backwaters are also abundant. The gradient over its length is approximately 0.6% though some sections attain slopes greater than 3%.

Section 5 is Slim Lake. Slim Lake is a small (length 9 km, area 44 ha), shallow lake, reaching a maximum depth of only 3-4 m. Almost all of the lake's area can be considered littoral zone (Rosberg et al. 1981). The lake bottom is primarily silt and the lake is thick with aquatic vegetation over most of its area.

Section 6 is the 2.3 km connecting stream between Tumuch and Slim Lakes. This section has a gradient generally less than 1% and begins in a deep glide before turning to riffles connecting small pools. The substrate is primarily gravel and sand with some small cobble present. Stream-side vegetation is abundant and mainly coniferous.

Section 7 is comprised of Tumuch Lake. The lake (length 11.3 km, area 145 ha) reaches a maximum depth of 60 metres and most of the shoreline is steep. However, the lake has extensive aquatic vegetation near the inflow and outlet creeks and up to 30% of the lake is littoral zone (Rosberg et al. 1981). The shoreline substrate is generally silt with coniferous riparian vegetation in most areas.

Section 8 is the upper creek extending from the confluence of Centennial Creek, 6.1 km to Tumuch Lake. This section is characterized by slow, placid flow with some deep glides over a sand, silt and pebble substrate and virtually no gradient. Overhanging riparian vegetation is abundant with willow (Salix spp.) being the dominant species.

METHODS

ROTARY AUGER TRAPPING

Rotary auger trapping to monitor juvenile chinook outmigration was performed over five different sampling periods during the spring, summer and fall of 1993. Sampling dates were: April 29 to June 7, June 30 to July 12, August 17 to August 26, October 17 to October 22 and November 16 to November 19. Dangerously high water levels between May 14 and May 17 threatened the operation of the traps and sampling was halted temporarily for this period. Apart from this 3 day interruption, the rotary traps performed well.

Two 5 foot diameter rotary auger traps (described in Duff et al. 1992) were initially installed in Section 2, approximately 14.7 km upstream from the mouth of Slim Creek, and 36.5 km downstream from the main spawning area (Figure 1). Both traps were suspended from a 13 mm steel cable as described in Taylor and Bradford (1993). The traps were positioned so that one trap (Trap 1) was fishing close to the right bank and the other (Trap 2) was just outside the area of maximum velocity closer to the right bank. As the water level dropped after freshet, the site became too shallow to operate the traps effectively and they were relocated on May 31 to a second site approximately 2 km upstream. The flow at the second site was deeper and more laminar at lower discharge and deep enough to allow continuous trap operation for the remainder of the year. This second site was accessible from Highway 16 via an old logging road. Again Trap 1 was positioned as close to the right bank as was functionally possible and moved accordingly as the creek level fluctuated. Trap 2 was positioned just outside the area of maximum velocity though closer to the left bank than at the previous site.

Traps were checked for fish at approximately 12 hour intervals for the first sampling period and once every 24 hours during the remaining sampling periods. At the time of trap inspection, all fish were enumerated to species and chinook juveniles were identified as fry or smolts based on fork length (Table 4, Figure 2). A subsample of chinook was anaesthetized in a bucket using a solution of 1 ml 2-phenoxy ethanol in 4 l of river water. These fish were measured to the nearest millimetre (Table 5) and revived in a bucket of fresh river water before being released back into the creek downstream of the trap site. Weights to the nearest hundredth of a gram were also recorded commencing on the second sampling trip (Table 6).

Mark and recapture experiments to estimate the efficiency of the rotary auger traps were performed at regular intervals during each of the sampling periods (Table 7). On selected days, all fry or smolts captured during the previous night's sampling were marked using a vital stain, Bismark brown. Approximately one gram of stain was added per 20 l of river water and the fish were held in this staining mixture for up to three hours. Oxygen levels in the water were maintained using a battery-operated aquarium pump. After staining was completed, the fish were held in large plastic buckets until late evening when they were released approximately 400 m upstream of the traps. The number of stained fish recaptured

over subsequent days was recorded.

Water temperature and stream depth were recorded at the trap site (Table 8, Figures 3 & 4) using a Unidata Starlogger data logger (Model 6004A). Water temperatures were also recorded just below Slim Lake in the main spawning area and at the Fraser River, 0.5 km upstream from the Hungary Creek confluence using ACR Systems Smartreader 1 temperature loggers (Table 8, Figure 3).

ADDITIONAL SAMPLING

To estimate abundance of juvenile chinook in the mainstem Fraser River, some preliminary sampling was performed by beach seining near the Hungary Creek confluence located approximately 30 km downstream from the Slim Creek confluence. Sampling was performed on four different dates in the summer and fall using a 30 m beach seine with wings 10 m (1 cm stretched mesh), bunt 10 m (0.6 cm stretched mesh), and depth 2 m. Sets were made off the stream bank on foot. The distance the net was taken offshore depended upon the slope of the shoreline but was usually about 15m. On three of the sampling dates, seining was initiated during the day while on the fourth date (October 21), sampling was performed at night. For each sampling, one set each was done above, within, and below the Hungary Creek confluence. All captured juvenile chinook were counted and then measured (fork length) and weighed (Table 9).

Preliminary sampling by minnow trapping was performed near the second Slim Creek trap site. On four occasions in summer and fall, three minnow traps were baited and placed near the rotary trap site. The traps were generally placed close to the shoreline amongst woody debris and retrieved the following day. All captured chinook were measured (fork length) and weighed (Table 10).

DIVER SURVEYS

To estimate the distribution and relative abundance of the rearing juvenile chinook population, diver surveys were conducted on two different occasions during July and August. In each of the eight sections, snorkel survey reaches were selected, usually at sites near to road access points. Each survey section was approximately 100-150 m in length and the number of reaches surveyed within a section varied due to stream accessibility. Two divers in wet suits and snorkel gear floated down opposite banks of each survey reach carefully counting all juvenile chinook observed. Rough estimates were also made of other species. The width of the area observed by each diver was approximately 5 m from the stream edge. Juvenile chinook were almost never observed in the center of the channel.

During the surveys, records were made of some physical parameters of the reaches. Channel widths were measured using a hip-chain, water velocities were recorded using a Marsh-McBirney current meter (model 201D) and water temperatures were measured using a

hand-held thermometer. In addition, the stream bank composition was visually estimated as a percentage of the overall length of the reach occupied by overhanging vegetation, woody debris or plain bank (Table 3).

During preliminary diver surveys in Tumuch Lake, no chinook juveniles were observed in the pelagic zone. Subsequent surveys were conducted in the littoral zone primarily close to the shoreline. In Slim Lake, however, some preliminary data on chinook abundance were obtained by surveying 1m wide transects at four locations through the center of the lake.

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Figure 4. Daily water depths at the Slim Creek trap site.

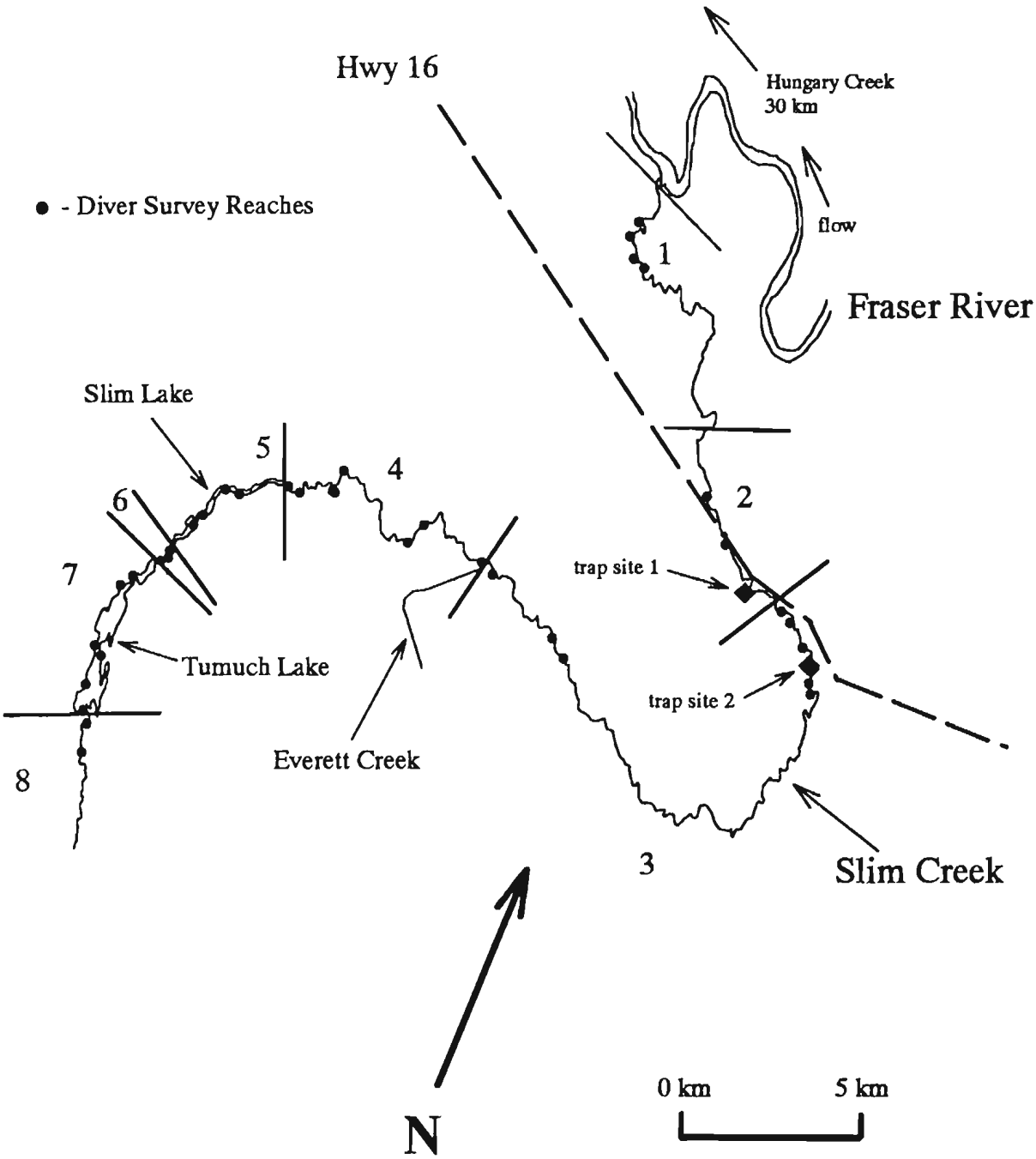

Figure 1. Rotary auger trap sites and diver survey reaches - Slim Creek 1993.

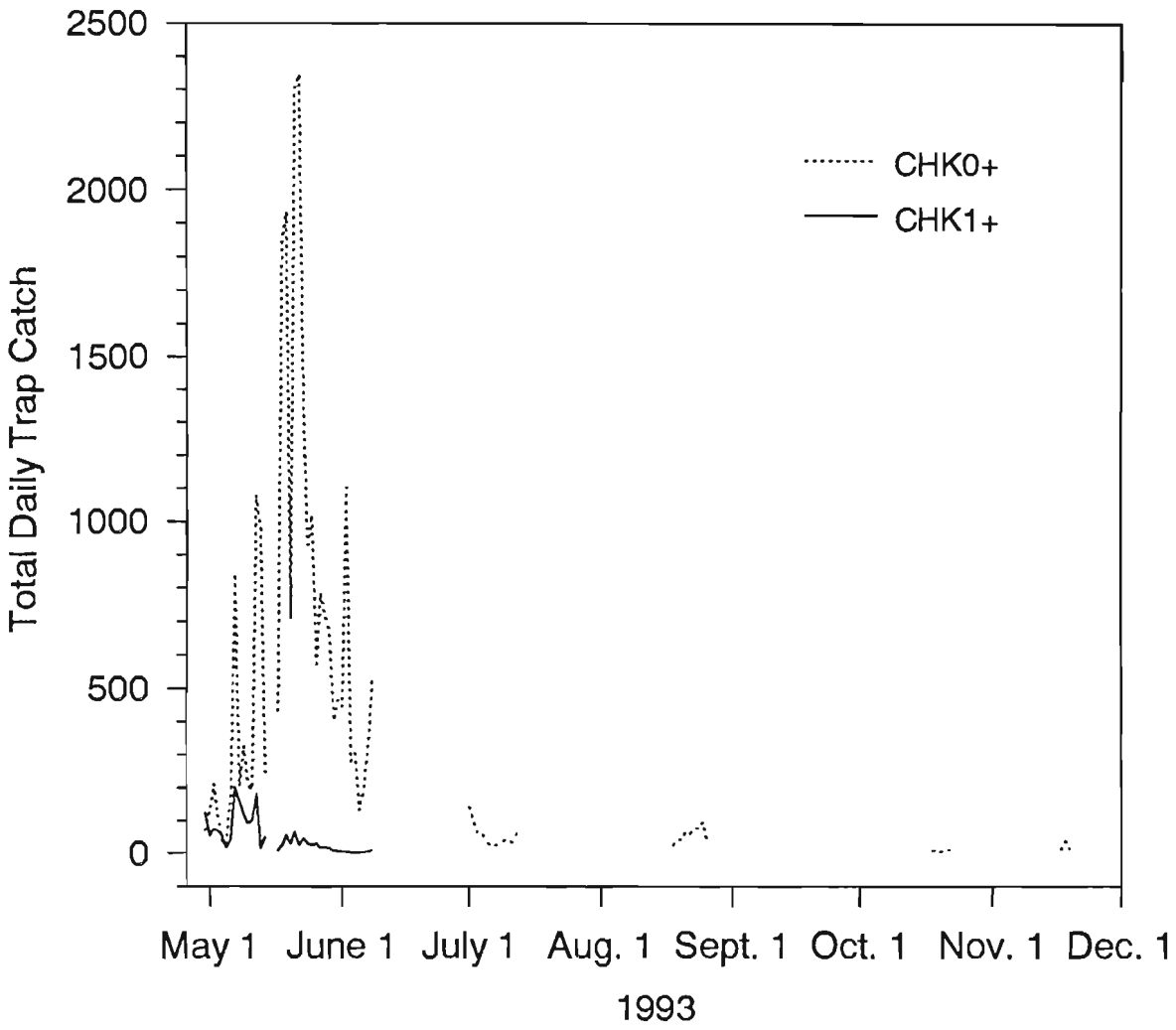

Figure 2. Total daily trap catch of juvenile chinook salmon - Slim Creek 1993, showing the catch of 0+ chinook fry and smolts (presumed 1+) summed over 24 hr periods for both traps.

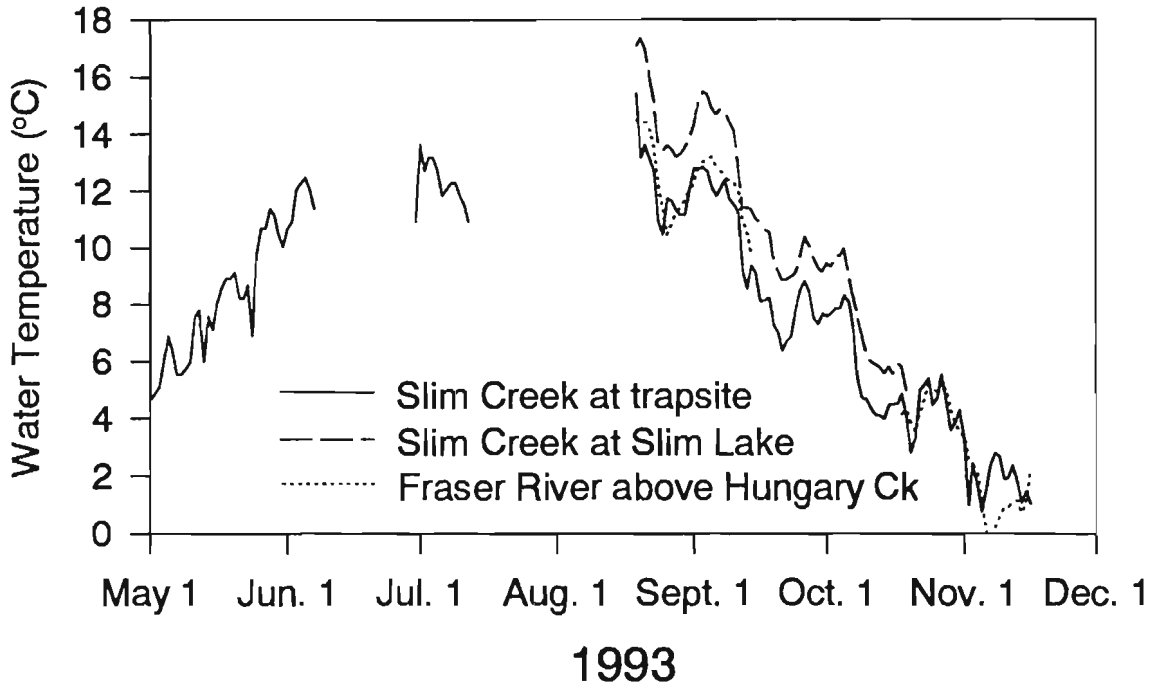

Figure 3. Daily mean water temperatures in Slim Creek and the Fraser River above Hungary Creek confluence.

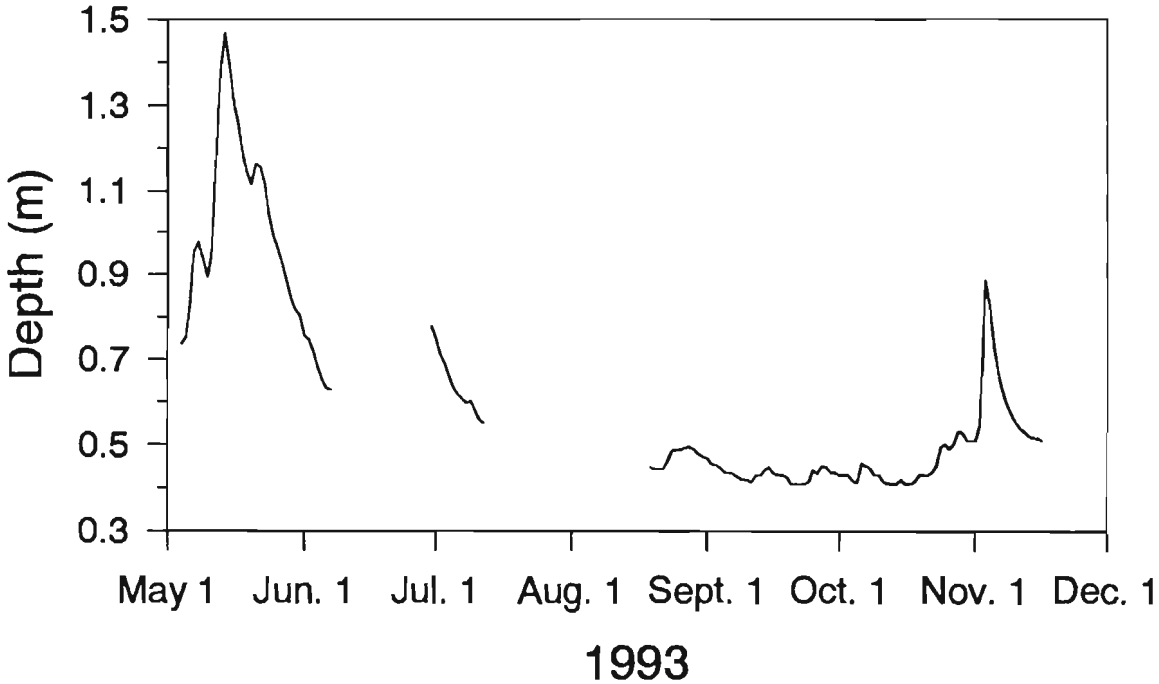

Figure 4. Daily mean water depths at the Slim Creek trap site.

Table 1. Description of the variables presented in the rotary auger trap and diver survey data from Slim Creek 1993.

VARIABLE	VARIABLE DESCRIPTION
DATE	Date survey or sample was taken (YYMMDD)
TIME	Time of survey or sample collection (PDT)
TRAP	Trap identification number (1 = Trap 1, 2 = Trap 2, 3 = Traps 1 & 2)
SEC	Section of river surveyed
RCH	Reach surveyed within a Section
LNTH	Length of reach (m)
WDTH	Average channel width of reach (m)
TEMP	Water temperature (°C)
VEL	Water velocity (m/s)
% BANK	Percent of shoreline in diver surveyed reach without vegetation
% OH VEG	Percent of shoreline in reach with overhanging vegetation
% WOODY	Percent of shoreline in reach with submerged or floating wood or log debris
JULIAN	Date in Julian days
X	Species present but not counted

Table 2. Scientific and common names and species codes of fishes collected from Slim Creek 1993.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	SPECIES CODE
SALMONIDAE		
Oncorhynchus mykiss	rainbow trout	RBT
O. tshawytscha	chinook salmon (fry)	CHK 0+
	chinook salmon (smolt)	CHK 1+
Prosopium williamsoni	rocky mountain whitefish	RMW
Salvelinus confluentus	bull trout	BT
CYPRINIDAE		
Rhynichthys cataractae	longnose dace	DAC
Rhynichthys falcatus	leopard dace	LDA
CATOSTOMIDAE	unidentified sucker	SUC
COTTIDAE	unidentified sculpin	SCU

Table 3. Diver Survey Data - Slim Creek 1993

DATE	TIME	SEC	RCH	LNTH (m)	WDTH (m)	TEMP (°C)	VEL (m/s)	% BANK	% OH VEG.	% WOODY	TOTAL NUMBER OF FISH OBSERVED CHKO+	RBT	BT	RMW	DAC	SCU	SUC	UNID	COMMENTS
930704	1253	1	1	260	.	11.0	.	.	.	.	14	35	.	3	.	.	.	.	
930704	1325	1	2	105	16	11.0	.	.	.	.	1	3	.	.	.	.	.	.	
930704	1340	2	1	100	.	.	0.00	.	.	.	0	.	.	2	.	.	.	1	Lakeshore
930704	1410	2	2	.	.	.	0.00	.	.	.	50	.	.	.	.	.	.	.	Lakeshore
930704	1500	2	3	100	.	.	0.00	.	.	.	0	.	.	.	.	.	.	5	Lakeshore
930704	1530	2	4	.	.	.	0.00	.	.	.	0	.	.	.	.	1	.	.	Lakeshore
930704	1600	2	5	.	.	.	0.00	.	.	.	0	.	.	.	1	.	.	.	Lakeshore
930704	1630	3	1	100	30	.	0.00	.	.	.	220	.	.	.	65	.	1	.	
930705	1150	3	2	190	15	.	0.70	.	.	.	169	.	1	15	2	.	.	.	
930705	1220	3	3	180	17	.	0.55	.	.	.	100	23	.	11	.	.	.	.	
930705	1250	3	4	120	18	.	0.68	.	.	.	0	.	2	20	25	1	.	.	
930706	1130	5	1	105	20	15.0	.	.	.	.	31	X	.	X	.	.	.	.	
930706	1400	6	6	.	.	.	.	.	.	.	344	.	.	.	.	.	.	.	
930707	930	5	2	135	16	15.5	0.95	.	.	.	116	10	.	10	.	.	.	.	
930707	1143	5	3	110	11	.	0.76	.	.	.	86	15	.	X	.	.	.	.	
930707	1315	5	4	110	11	.	1.48	.	.	.	111	5	.	2	1	.	.	.	
930707	1345	5	5	142	11	.	.	.	.	.	93	25	.	15	.	.	.	.	
930707	1415	5	6	100	18	.	.	.	.	.	48	.	.	.	.	.	.	.	
930708	1300	5	7	155	13	14.5	1.40	.	.	.	151	.	.	.	.	.	.	.	
930708	1330	5	8	.	.	.	1.40	.	.	.	120	X	.	X	.	.	.	.	
930708	1400	5	9	.	.	15.0	.	.	.	.	468	.	.	.	.	.	.	.	
930708	1430	6	1	150	.	14.0	.	.	.	.	223	.	.	.	.	.	.	.	
930708	1816	6	2	.	18	14.0	0.68	.	.	.	265	.	.	.	.	.	.	.	
930708	1845	6	3	.	.	.	.	.	.	.	171	.	.	.	.	.	.	.	
930709	1130	6	4	115	20	12.5	0.50	.	.	.	0	.	.	.	.	.	.	.	
930709	1200	6	5	180	.	.	.	.	.	.	24	.	.	.	.	.	.	.	
930709	1300	6	7	.	.	.	.	.	.	.	123	.	.	.	.	.	.	.	
930709	1330	6	8	.	.	.	.	.	.	.	38	.	.	.	.	.	.	.	
930709	1430	7	1	101	18	14.5	1.52	.	.	.	20	.	.	.	.	.	.	.	
930709	1445	7	2	95	.	.	.	.	.	.	24	.	.	.	.	.	.	.	
930710	1000	8	1	155	22	13.0	1.05	.	.	.	27	.	.	.	.	.	.	.	
930710	1030	8	2	172	27	.	1.09	.	.	.	60	1	.	1	.	.	.	.	
930710	1100	8	3	150	20	.	.	.	.	.	73	.	.	.	.	.	.	.	
930710	1130	8	4	107	26	.	.	.	.	.	16	.	.	.	.	.	.	.	

Table 3. Diver Survey Data - Slim Creek 1993

DATE	TIME	SEC	RCH	LNTH (m)	WDTH (m)	TEMP (°C)	VEL (m/s)	% BANK	% OH VEG.	% WOODY	TOTAL NUMBER OF FISH OBSERVED CHKO+	RBT	BT	RMW	DAC	SCU	SUC	UNID	COMMENTS
930819	1113	1	1	260	11.5	12.0	0.20	10	90	0	0	2	.	.	.	.	.	.	
930819	1130	1	2	105	16	12.0	0.20	70	30	0	0	.	.	.	.	.	.	.	
930819	1154	2	1	100	.	18.0	n/a	.	.	.	0	.	.	.	.	.	.	.	Lakeshore
930819	1245	2	2	.	.	18.0	n/a	.	.	.	0	.	.	.	.	.	.	3	Lakeshore
930819	1350	2	3	100	.	18.0	n/a	.	.	.	0	.	.	.	.	.	.	.	Lakeshore
930819	1420	2	4	.	.	18.0	n/a	.	.	.	0	.	.	.	.	.	.	.	Lakeshore
930819	1440	2	5	.	.	18.0	n/a	.	.	.	0	.	.	.	.	.	.	.	Lakeshore
930819	1500	3	1	100	30	16.0	.	0	50	50	41	3	.	2	.	.	.	.	
930820	1045	3	2	190	15	16.0	.	20	70	10	35	7	.	.	.	.	.	.	
930820	1115	3	3	180	17	16.0	.	55	25	20	70	14	.	.	.	.	.	.	
930820	1145	3	4	120	.	16.0	.	87.5	5	7.5	20	7	.	.	.	.	.	.	
930820	1300	4	1	60	.	19.0	.	0	100	0	7	.	.	.	.	.	.	.	Lake Center
930820	1330	4	2	70	.	19.0	.	0	100	0	1	.	.	.	.	.	.	.	Lake Center
930820	1400	4	3	55	.	19.0	.	0	100	0	1	.	.	.	.	.	.	.	Lake Center
930820	1430	4	4	69	.	19.0	.	0	100	0	0	.	.	.	.	.	.	.	Lake Center
930820	1520	5	1	105	.	19.0	0.59	40	30	30	37	20	.	.	.	.	.	.	
930820	1600	5	1.1	116	18	19.0	0.86	17.5	65	17.5	80	11	.	.	.	.	.	.	
930820	1630	5	2	135	.	19.5	.	15	40	45	79	29	1	.	.	.	.	.	
930820	1700	5	2.1	140	15	.	.	40	25	35	61	26	.	.	.	.	.	.	
930821	950	5	7	145	9	15.5	.	50	30	20	22	25	.	.	.	.	.	.	
930821	1030	5	8	250	9	15.5	.	75	20	5	8	6	.	.	.	.	.	.	
930821	1130	5	9	160	8	16.5	.	20	55	25	86	2	.	.	.	.	.	.	
930821	1200	6	1	155	15	.	.	62.5	17.5	20	52	2	1	.	.	.	.	.	
930821	1310	6	2	180	.	.	.	75	0	25	52	2	1	.	.	.	.	.	
930821	1330	6	3	150	10	.	.	85	7.5	7.5	7	.	.	.	.	.	.	.	
930823	1400	6	4	115	.	.	.	90	0	0	5	.	.	.	.	.	.	.	
930823	1430	6	5	180	.	.	.	65	0	35	48	.	.	.	.	.	.	.	
930823	1500	6	6	.	.	13.0	.	77.5	7.5	15	19	.	.	.	.	.		.	
930823	1530	6	7	.	.	.	.	55	20	25	102	.	.	.	.	.	.	.	
930823	1600	6	8	.	.	.	.	87.5	0	12.5	3	.	.	.	.	.	.	.	
930823	1630	7	1	101	.	.	.	100	0	0	5	.	.	.	.	.	.	.	
930823	1700	7	2	95	.	.	.	100	0	0	4	1	.	.	.	.	.	.	
930824	1230	8	1	155	.	11.5	.	65	0	35	33	.	.	.	.	.	.	.	
930824	1320	8	2	172	.	.	.	65	0	35	8	.	1	.	.	.	.	.	
930824	1400	8	3	150	.	.	.	70	0	30	128	.	.	.	.	.	.	.	
930824	1430	8	4	107	.	.	.	25	55	20	10	.	.	.	.	.	.	.	

Table 4. Catch Data From Rotary Auger Traps - Slim Creek 1993

DATE	TIME	TRAP	CHK0+	CHK1+	RBT	RMW	SUC	DAC	LDA	SCU	BT	UNID.	COMMENTS
930430	1000	1	34	84	.	.	1	.	.	1	.	.	
930430	1000	2	35	38	.	.	.	.	.	.	.	.	
930501	800	1	82	8	.	.	3	.	.	.	.	.	
930501	800	2	45	37	.	.	.	.	.	.	.	.	
930501	2000	1	3	4	.	.	.	.	.	.	.	.	
930501	2000	2	0	4	.	.	.	.	.	.	.	.	
930502	820	1	121	20	.	.	2	.	.	.	.	.	
930502	820	2	82	48	.	.	1	.	.	.	.	.	
930502	2005	1	4	3	.	.	.	.	.	.	.	.	
930502	2005	2	6	4	.	.	.	.	.	.	.	.	
930503	820	1	74	16	.	.	1	.	.	1	.	.	
930503	820	2	22	41	.	.	3	.	.	.	.	.	
930503	2010	1	8	4	.	.	.	.	.	.	.	.	
930503	2010	2	5	7	.	.	.	.	.	.	.	.	
930504	810	1	19	15	.	.	.	.	.	.	.	.	
930504	810	2	6	33	.	.	5	.	.	.	.	.	
930504	1955	1	4	3	.	.	.	.	.	.	.	.	
930504	1955	2	3	4	.	.	.	.	.	.	.	.	
930505	817	1	18	3	.	.	2	.	.	.	.	.	
930505	817	2	3	10	.	1	4	.	.	.	.	.	
930505	1907	1	2	2	.	.	.	.	.	.	.	.	
930505	1907	2	3	3	.	.	.	.	.	.	.	.	
930506	810	1	97	9	.	.	1	.	.	1	.	.	
930506	810	2	41	21	.	.	4	.	.	.	.	.	
930506	2015	1	43	0	.	.	.	.	.	.	.	.	
930506	2015	2	20	15	.	.	.	.	.	.	.	.	
930507	815	1	459	23	.	.	5	.	.	.	.	.	
930507	815	2	297	170	.	.	4	.	.	.	.	.	
930507	1810	1	62	3	.	.	.	.	.	.	.	.	
930507	1810	2	25	8	1	.	.	.	.	.	.	.	
930508	810	1	118	15	1	.	3	1	.	.	.	.	
930508	810	2	66	121	.	.	1	.	.	.	.	.	
930508	2005	1	14	7	.	.	.	.	.	.	.	.	
930508	2005	2	6	21	.	.	.	.	.	.	.	.	
930509	810	1	277	9	.	.	1	.	.	.	.	.	
930509	810	2	33	86	.	.	2	.	.	.	.	.	
930509	2040	1	14	3	.	.	.	.	.	.	.	.	
930509	2040	2	3	21	1	.	.	.	.	.	.	.	
930510	820	1	184	4	.	.	.	.	.	.	.	.	
930510	820	2	12	81	.	.	.	.	.	.	.	.	
930510	2025	1	12	2	.	.	1	.	.	.	.	.	
930510	2025	2	0	5	.	.	.	.	.	.	.	.	
930511	810	1	161	6	.	.	3	.	.	.	.	.	
930511	810	2	9	81	1	.	5	.	.	1	.	.	
930511	1814	1	23	2	.	.	1	.	.	.	.	.	
930511	1814	2	1	11	.	.	.	.	.	.	.	.	
930512	800	1	919	25	1	.	5	.	.	.	.	.	
930512	800	2	13	147	.	.	.	.	.	.	.	.	

Table 4. Catch Data From Rotary Auger Traps - Slim Creek 1993

DATE	TIME	TRAP	CHK0+	CHK1+	RBT	RMW	SUC	DAC	LDA	SCU	BT	UNID.	COMMENTS
930512	2020	1	112	3	3	1	.	.	.	.	.	.	
930512	2020	2	35	7	.	.	.	.	.	.	.	.	
930513	815	1	981	17	.	.	6	1	.	.	.	.	
930514	810	1	173	32	.	.	2	.	.	.	.	.	
930514	2030	1	56	18	1	.	.	.	.	.	.	.	
930515	815	1	.	.	.	.	.	.	.	.	.	.	
930515	1930	2	.	.	.	.	.	.	.	.	.	.	
930516	820	1	.	.	.	.	.	.	.	.	.	.	
930516	2000	2	.	.	.	.	.	.	.	.	.	.	
930517	810	1	.	.	.	.	.	.	.	.	.	.	
930517	2015	1	384	4	.	.	.	.	.	.	.	.	
930517	2015	2	49	5	.	.	.	.	.	.	.	.	
930518	805	1	1510	12	.	.	.	.	.	.	.	.	
930518	805	2	93	12	.	.	.	.	.	.	.	.	
930518	2010	1	82	2	.	.	3	.	.	.	.	.	
930518	2010	2	156	1	.	.	.	.	.	.	.	.	
930519	815	1	1198	9	.	.	10	.	.	.	.	.	
930519	815	2	392	36	.	.	6	.	.	.	.	.	
930519	1915	1	205	1	1	.	.	.	.	.	.	.	
930519	1915	2	139	10	.	.	.	.	.	.	.	.	
930520	810	1	522	5	.	.	.	.	.	.	.	.	
930520	810	2	41	18	.	.	.	.	.	.	.	.	
930520	1625	1	103	2	.	.	1	.	.	.	.	.	
930520	1625	2	42	4	.	.		.	.	.	.	.	
930521	830	1	1859	6	.	.	7	.	.	.	.	.	
930521	830	2	311	49	.	.	11	.	.	.	.	.	
930521	1830	1	89	1	.	.	.	.	.	.	.	.	
930521	1830	2	42	9	.	.	1	.	.	.	.	.	
930522	920	1	2051	3	.	.	5	.	.	.	.	.	
930522	920	2	189	22	1	.	5	.	.	.	.	.	
930522	1600	1	86	0	.	.	.	.	.	.	.	.	
930522	1600	2	19	2	.	.	.	.	.	.	.	.	
930523	900	1	928	3	.	.	5	.	.	.	.	.	
930523	900	2	295	33	1	.	12	.	.	.	1	.	
930523	2130	1	94	2	.	.	.	.	.	.	.	.	
930523	2130	2	38	8	.	.	.	.	.	.	.	.	
930524	945	1	664	3	.	.	7	.	.	.	.	.	
930524	945	2	127	22	.	.	6	.	.	.	.	.	
930524	2015	1	113	0	.	.	.	.	.	.	.	.	
930524	2015	2	14	6	.	.	1	.	.	.	.	.	
930525	810	1	654	2	.	.	10	.	.	.	.	.	
930525	810	2	177	18	.	.	13	.	.	.	.	.	
930525	2110	1	116	2	.	.	2	.	.	1	.	.	
930525	2110	2	72	5	.	.	.	.	.	1	.	.	
930526	845	1	352	1	.	.	5	.	.	.	.	.	
930526	845	2	91	24	1	.	10	.	.	.	1	.	
930526	2015	1	73	0	.	.	1	.	.	.	.	.	
930526	2015	2	57	5	.	.	.	.	.	.	.	.	

Table 4. Catch Data From Rotary Auger Traps - Slim Creek 1993

DATE	TIME	TRAP	CHK0+	CHK1+	RBT	RMW	SUC	DAC	LDA	SCU	BT	UNID.	COMMENTS
930527	820	1	398	1	1	.	1	.	.	.	.	.	
930527	820	2	291	9	.	.	6	.	.	.	.	.	
930527	1830	1	64	2	.	.	1	.	.	.	.	.	
930527	1830	2	33	4	.	.	1	.	.	.	.	.	
930528	815	1	494	0	.	.	5	.	.	.	.	.	
930528	815	2	161	16	.	.	5	.	.	.	.	.	
930528	2015	1	32	0	.	.	1	.	.	.	.	.	
930528	2015	2	26	3	.	.	1	.	.	.	.	.	
930529	815	1	431	1	.	.	1	.	.	.	.	.	
930529	815	2	174	7	.	.	6	.	.	.	.	.	
930529	2045	1	45	1	.	.	1	.	.	.	.	.	
930529	2045	2	22	8	.	.	.	.	.	.	.	.	
930530	815	1	297	0	1	.	3	.	.	.	.	.	
930530	815	2	25	6	1	.	4	.	.	.	.	.	
930530	2040	1	59	0	.	.	.	.	.	.	.	.	
930530	2040	2	22	2	.	.	2	.	.	.	.	.	
930531	820	1	234	1	.	.	5	.	.	.	.	.	
930531	820	2	232	6	1	.	2	.	.	.	.	.	
930601	830	1	339	2	.	.	.	.	.	.	.	.	
930601	830	2	46	1	.	.	.	.	.	.	.	.	
930601	2045	1	43	.	.	.	.	.	.	.	.	.	
930601	2045	2	17	2	.	.	.	.	.	.	.	.	
930602	830	1	553	.	.	.	1	.	.	.	.	.	
930602	830	2	495	3	.	.	.	.	.	.	.	.	
930602	2120	1	16	.	.	.	.	.	.	.	.	.	
930602	2120	2	38	2	.	.	.	.	.	.	.	.	
930603	815	1	86	.	.	.	3	.	.	.	.	.	
930603	815	2	169	3	.	.	.	.	.	.	.	.	
930603	2015	1	9	.	.	.	.	.	.	.	1	.	
930603	2015	2	15	1	.	.	.	.	.	.	.	.	
930604	820	1	75	.	.	.	.	.	.	.	.	.	
930604	820	2	206	.	.	.	.	.	.	.	.	.	
930604	2045	1	9	.	.	.	.	.	.	.	.	.	
930604	2045	2	13	.	.	.	.	.	.	.	.	.	
930605	820	1	56	.	.	.	.	.	.	.	.	.	
930605	820	2	39	4	.	.	2	.	.	.	.	.	
930605	2040	1	14	.	.	.	.	.	.	.	.	.	
930605	2040	2	22	.	.	.	.	.	.	.	.	.	
930606	808	1	69	.	.	.	.	.	.	.	.	.	
930606	808	2	73	3	.	.	3	.	1	.	.	.	
930606	2100	1	19	.	.	.	.	.	.	.	.	.	
930606	2100	2	33	.	.	.	.	.	.	.	.	.	
930607	900	1	169	1	.	.	.	.	.	1	.	.	
930607	900	2	120	2	.	.	1	.	.	.	.	.	
930607	1900	1	15	1	.	.	.	.	.	.	.	.	
930607	1900	2	16	1	.	.	.	.	.	.	.	.	
930608	800	1	354	1	.	.	.	.	.	.	.	.	
930608	800	2	171	8	1	2	1	.	.	.	.	.	

Table 4. Catch Data From Rotary Auger Traps - Slim Creek 1993

DATE	TIME	TRAP	CHK0+	CHK1+	RBT	RMW	SUC	DAC	LDA	SCU	BT	UNID.	COMMENTS
930630	1500	1	.	.	.	.	.	.	.	.	.	.	
930701	1900	1	29	.	.	3	.	.	.	.	.	.	
930701	1900	2	111	.	.	6	2	.	.	.	.	.	
930702	1842	1	70	.	.	10	.	.	1	.	.	.	
930702	1842	2	22	.	.	3	.	.	.	.	.	.	
930703	1752	1	19	.	.	.	.	.	.	1	.	.	
930703	1752	2	37	.	.	2	.	.	.	2	.	.	trap jammed
930704	1840	1	9	.	.	.	.	.	.	2	.	.	
930704	1840	2	47	.	.	.	2	.	.	.	.	.	
930705	1945	1	4	.	1	.	.	.	.	.	.	.	
930705	1945	2	33	.	.	.	1	1	1	.	.	.	
930706	1645	1	1	.	.	.	.	.	.	.	.	.	
930706	1645	2	19	.	.	3	.	.	1	.	.	.	
930708	2100	1	23	.	.	.	.	.	.	.	.	.	
930708	2100	2	7	.	.	5	.	.	.	.	.	.	trap jammed
930709	1100	1	26	.	.	.	.	.	.	.	.	.	
930709	1100	2	13	.	.	.	.	.	.	.	.	.	
930710	1640	1	28	.	.	5	.	.	5	.	.	2	
930710	1640	2	15	.	.	4	.	.	1	.	.	.	
930711	2030	1	30	.	.	9	.	.	.	.	.	.	
930711	2030	2	4	.	.	1	1	.	.	.	.	.	
930712	820	1	38	.	.	4	.	3	.	.	.	.	
930712	820	2	20	.	.	4	.	1	.	.	.	.	
930818	1415	1	21	.	.	.	.	.	3	.	.	.	
930818	1415	2	4	.	.	.	.	.	.	.	.	.	
930819	1700	1	36	.	.	.	.	.	2	.	.	.	
930819	1700	2	8	.	.	.	.	.	.	.	.	.	
930820	1019	1	31	.	.	1	.	1	2	.	.	.	
930820	1019	2	9	.	.	.	.	.	.	.	.	.	
930821	933	1	42	.	.	1	.	.	.	.	1	.	
930821	933	2	23	.	.	.	.	.	.	.	.	.	
930822	1300	1	44	.	.	.	.	.	1	.	.	.	
930822	1300	2	13	.	.	.	.	.	.	.	.	.	
930823	1350	1	71	.	.	.	.	.	.	.	.	.	
930823	1350	2	8	.	.	.	.	.	.	.	.	.	
930824	950	1	50	.	.	1	.	.	.	.	.	.	
930824	950	2	22	.	.	.	.	.	.	.	.	.	
930825	930	1	56	.	.	1	.	.	.	.	.	.	
930825	930	2	38	.	.	.	.	.	.	.	.	.	
930826	900	1	18	.	.	.	1	1	.	.	.	.	
930826	900	2	22	.	.	.	.	.	.	.	.	.	
931018	1216	1	5	.	.	.	.	.	.	.	.	.	
931018	1216	2	1	.	.	.	.	.	.	.	.	.	
931019	1000	1	9	.	.	.	.	.	.	.	1	.	
931019	1000	2	1	.	.	.	.	.	.	.	.	.	
931020	1100	1	2	.	.	.	.	.	.	.	.	.	
931020	1100	2	1	.	.	.	.	.	.	.	.	.	
931021	1500	1	6	.	.	.	.	.	.	.	.	.	

Table 4. Catch Data From Rotary Auger Traps - Slim Creek 1993

DATE	TIME	TRAP	CHK0+	CHK1+	RBT	RMW	SUC	DAC	LDA	SCU	BT	UNID.	COMMENTS
931021	1500	2	3	.	.	.	.	.	.	.	.	.	
931022	900	1	5	.	.	.	.	.	.	.	.	.	
931022	900	2	4	.	.	.	.	.	.	.	.	.	
931117	1245	1	7	.	.	.	.	.	.	.	.	.	
931117	1245	2	4	.	.	.	.	.	.	1	.	.	
931118	1150	1	17	.	.	.	.	.	.	.	.	.	
931118	1150	2	20	.	.	.	.	.	.	1	.	.	
931119	1030	1	5	.	.	.	.	.	.	.	.	.	
931119	1030	2	8	.	.	.	.	.	.	.	.	.	
TOTALS			25830	1813	19	67	250	9	18	14	5	2	

Table 5. Length Data From Juvenile Chinook Captured by Rotary Auger Traps - Slim Creek 1993

DATE	TIME	TRAP	SPEC	LENGTHS (mm)												
930501	800	1	CHK0+	38	38	38	37	38	37	38	37	40	36	.	.	.
930501	800	1	CHK1+	79	79	83	98	89	80	78	87	.	.	.	.	.
930501	800	2	CHK0+	33	37	38	38	36	37	39	36	38	38	.	.	.
930501	800	2	CHK1+	82	82	86	98	85	97	81	90	74	73	.	.	.
930501	2000	1	CHK0+	36	37	40	.	.	.	.	.	.	.	.	.	.
930501	2000	1	CHK1+	80	81	81	91	.	.	.	.	.	.	.	.	.
930501	2000	2	CHK1+	74	95	85	85	.	.	.	.	.	.	.	.	.
930502	820	1	CHK0+	35	37	36	32	34	36	33	35	39	34	.	.	.
930502	820	1	CHK1+	79	80	93	76	72	79	85	80	77	84	.	.	.
930502	820	2	CHK0+	35	37	37	36	37	37	37	36	38	38	.	.	.
930502	820	2	CHK1+	78	79	77	69	79	87	90	75	74	85	.	.	.
930502	2005	1	CHK0+	36	36	36	34	.	.	.	.	.	.	.	.	.
930502	2005	1	CHK1+	91	93	88	.	.	.	.	.	.	.	.	.	.
930502	2005	2	CHK0+	34	38	37	39	36	38	.	.	.	.	.	.	.
930502	2005	2	CHK1+	80	91	85	98	.	.	.	.	.	.	.	.	.
930503	820	1	CHK0+	34	37	39	37	34	38	37	38	38	38	.	.	.
930503	820	1	CHK1+	80	84	79	86	77	80	81	91	83	69	.	.	.
930503	820	2	CHK0+	39	39	37	38	38	37	36	36	38	36	.	.	.
930503	820	2	CHK1+	83	70	79	79	71	78	81	76	90	72	.	.	.
930503	2010	1	CHK0+	37	38	37	36	35	36	36	36	.	.	.	.	.
930503	2010	1	CHK1+	78	86	75	.	.	.	.	.	.	.	.	.	.
930503	2010	2	CHK0+	37	39	38	38	37	.	.	.	.	.	.	.	.
930503	2010	2	CHK1+	83	87	90	85	83	79	83	.	.	.	.	.	.
930504	810	1	CHK0+	38	34	37	38	33	37	35	37	34	36	.	.	.
930504	810	1	CHK1+	76	83	82	78	96	86	90	135	75	108	.	.	.
930504	810	2	CHK0+	39	34	39	38	.	.	.	.	.	.	.	.	.
930504	810	2	CHK1+	76	133	77	96	98	95	86	75	83	84	.	.	.
930504	1955	1	CHK0+	37	37	37	34	.	.	.	.	.	.	.	.	.
930504	1955	1	CHK1+	86	78	77	.	.	.	.	.	.	.	.	.	.
930504	1955	2	CHK0+	37	37	37	.	.	.	.	.	.	.	.	.	.
930504	1955	2	CHK1+	79	82	70	85	.	.	.	.	.	.	.	.	.
930505	817	1	CHK0+	36	37	36	36	36	36	37	33	38	39	.	.	.
930505	817	1	CHK1+	79	81	67	.	.	.	.	.	.	.	.	.	.
930505	817	2	CHK0+	37	36	35	.	.	.	.	.	.	.	.	.	.
930505	817	2	CHK1+	94	84	93	82	84	88	90	92	97	70	.	.	.
930505	1907	1	CHK0+	36	38	.	.	.	.	.	.	.	.	.	.	.
930505	1907	1	CHK1+	81	86	.	.	.	.	.	.	.	.	.	.	.
930505	1907	2	CHK0+	35	39	38	.	.	.	.	.	.	.	.	.	.
930505	1907	2	CHK1+	93	72	83	.	.	.	.	.	.	.	.	.	.
930506	810	1	CHK0+	39	35	37	35	34	37	38	36	37	39	.	.	.
930506	810	1	CHK1+	90	91	75	71	83	82	72	77	77	.	.	.	.
930506	810	2	CHK0+	36	39	37	36	32	38	37	33	37	35	.	.	.
930506	810	2	CHK1+	91	93	76	84	83	92	82	75	94	91	.	.	.
930506	2015	1	CHK0+	37	36	37	38	38	38	37	36	36	37	.	.	.
930506	2015	2	CHK0+	34	34	39	35	37	37	37	36	38	35	.	.	.
930506	2015	2	CHK1+	75	83	95	85	88	77	94	68	67	74	.	.	.
930507	815	1	CHK0+	36	37	37	37	37	35	37	39	37	37	.	.	.
930507	815	1	CHK1+	82	103	92	79	65	93	78	79	83	79	.	.	.

Table 5. Length Data From Juvenile Chinook Captured by Rotary Auger Traps - Slim Creek 1993

DATE	TIME	TRAP	SPEC	LENGTHS (mm)												
930507	815	2	CHK0+	38	37	36	36	35	37	39	36	35	38	.	.	.
930507	815	2	CHK1+	77	80	80	81	74	75	74	90	90	77	.	.	.
930507	1810	1	CHK0+	33	33	38	37	36	38	37	37	36	38	.	.	.
930507	1810	1	CHK1+	76	68	.	.	.	.	.	.	.	.	.	.	.
930507	1810	2	CHK0+	36	39	38	38	39	38	38	34	39	37	.	.	.
930507	1810	2	CHK1+	85	95	91	94	87	90	81	.	.	.	.	.	.
930508	810	1	CHK0+	39	34	35	36	35	35	37	39	36	38	.	.	.
930508	810	1	CHK1+	68	80	75	80	84	77	97	90	76	80	.	.	.
930508	810	2	CHK0+	38	38	36	39	35	37	38	38	39	37	.	.	.
930508	810	2	CHK1+	99	80	86	73	91	83	89	84	92	70	.	.	.
930508	2005	1	CHK0+	39	38	37	37	36	36	38	37	37	36	.	.	.
930508	2005	1	CHK1+	82	83	77	83	81	72	93	.	.	.	.	.	.
930508	2005	2	CHK0+	37	36	36	38	37	37	.	.	.	.	.	.	.
930508	2005	2	CHK1+	87	85	80	73	109	77	75	82	79	70	.	.	.
930509	810	1	CHK0+	36	38	37	37	36	38	37	39	37	35	.	.	.
930509	810	1	CHK1+	76	71	81	80	72	86	78	78	84	.	.	.	.
930509	810	2	CHK0+	38	36	37	35	36	36	36	37	.	.	.	.	.
930509	810	2	CHK1+	86	104	75	77	78	87	73	81	88	72	.	.	.
930509	2040	1	CHK0+	36	38	37	38	37	37	39	38	36	36	.	.	.
930509	2040	1	CHK1+	80	83	84	.	.	.	.	.	.	.	.	.	.
930509	2040	2	CHK0+	34	39	36	.	.	.	.	.	.	.	.	.	.
930509	2040	2	CHK1+	98	92	87	85	119	84	93	83	75	80	.	.	.
930510	820	1	CHK0+	37	36	35	36	36	34	36	37	35	36	.	.	.
930510	820	1	CHK1+	77	75	.	.	.	.	.	.	.	.	.	.	.
930510	820	2	CHK0+	37	37	35	37	40	35	36	38	39	36	.	.	.
930510	820	2	CHK1+	87	80	100	102	93	94	93	70	87	79	.	.	.
930511	810	1	CHK0+	36	34	37	37	34	36	35	38	37	34	.	.	.
930511	810	1	CHK1+	81	79	.	.	.	.	.	.	.	.	.	.	.
930511	810	2	CHK0+	36	37	35	38	37	34	.	.	.	.	.	.	.
930511	810	2	CHK1+	85	92	98	80	83	83	77	76	75	68	.	.	.
930512	800	1	CHK1+	85	110	80	82	90	83	85	89	81	85	.	.	.
930512	800	2	CHK1+	81	109	84	85	100	88	88	90	91	85	.	.	.
930513	815	1	CHK0+	35	40	37	39	35	36	37	38	36	38	.	.	.
930513	815	1	CHK1+	74	79	81	87	84	73	83	76	83	73	.	.	.
930514	810	1	CHK0+	37	37	42	35	36	36	36	.	.	.	.	.	.
930514	810	1	CHK1+	96	102	80	89	74	104	82	70	87	71	.	.	.
930518	805	1	CHK0+	37	37	36	38	38	33	37	37	39	37	.	.	.
930518	805	1	CHK1+	91	86	85	78	82	100	76	79	97	83	.	.	.
930518	805	2	CHK0+	37	37	37	38	38	38	38	39	39	.	.	.	.
930518	805	2	CHK1+	81	69	95	93	102	95	92	98	72	85	.	.	.
930519	815	1	CHK0+	39	38	36	36	36	37	37	37	38	35	.	.	.
930519	815	1	CHK1+	86	86	99	80	91	85	92	90	73	.	.	.	.
930519	815	2	CHK0+	39	39	39	37	36	36	38	38	38	36	.	.	.
930519	815	2	CHK1+	91	101	121	90	79	75	78	75	84	81	.	.	.
930520	810	1	CHK0+	36	36	37	39	43	36	37	38	35	.	.	.	.
930520	810	1	CHK1+	95	83	84	88	70	.	.	.	.	.	.	.	.
930520	810	2	CHK0+	36	36	41	34	34	38	37	38	41	32	.	.	.
930520	810	2	CHK1+	90	90	105	101	115	80	90	90	90	93	102	.	.

Table 5. Length Data From Juvenile Chinook Captured by Rotary Auger Traps - Slim Creek 1993

DATE	TIME	TRAP	SPEC	LENGTHS (mm)												
930521	830	2	CHK0+	38	44	38	41	37	38	36	38	36	37	.	.	.
930521	830	2	CHK1+	87	126	106	101	91	100	100	81	92	74	84	82	104
930521	830	2	CHK1+	82	75	77	.	.	.	.	.	.	.	.	.	.
930522	920	1	CHK0+	35	36	34	37	35	38	34	36	34	35	37	37	35
930522	920	2	CHK0+	31	39	37	37	36	36	35	36	32	31	.	.	.
930522	920	2	CHK1+	87	120	112	103	102	83	71	79	95	93	73	91	83
930523	900	2	CHK1+	92	125	117	86	91	91	113	98	61	86	80	92	107
930524	945	2	CHK0+	32	36	35	38	36	37	37	38	35	38	37	39	37
930524	945	2	CHK0+	37	37	38	36	35	35	33	.	.	.	.	.	.
930524	945	2	CHK1+	97	93	117	127	117	106	108	84	64	102	75	70	98
930524	945	2	CHK1+	78	108	.	.	.	.	.	.	.	.	.	.	.
930525	810	1	CHK0+	36	37	38	36	37	35	39	36	35	36	.	.	.
930525	810	2	CHK0+	45	37	38	34	36	35	37	34	40	35	.	.	.
930525	810	2	CHK1+	90	70	106	80	100	93	91	85	82	72	.	.	.
930526	845	1	CHK0+	37	37	37	39	37	38	40	38	37	35	.	.	.
930526	845	1	CHK1+	64	.	.	.	.	.	.	.	.	.	.	.	.
930526	845	2	CHK0+	39	38	35	37	41	39	36	35	35	36	.	.	.
930526	845	2	CHK1+	76	124	110	94	72	104	77	91	94	90	98	.	.
930527	820	1	CHK0+	36	38	38	35	37	39	39	37	34	38	.	.	.
930527	820	1	CHK1+	93	.	.	.	.	.	.	.	.	.	.	.	.
930527	820	2	CHK0+	34	35	38	35	40	36	38	35	35	36	.	.	.
930527	820	2	CHK1+	87	105	103	102	76	85	99	91	89	.	.	.	.
930528	815	1	CHK0+	34	33	37	36	35	36	35	37	35	32	.	.	.
930528	815	2	CHK0+	34	37	35	42	36	35	39	37	36	40	.	.	.
930528	815	2	CHK1+	91	90	109	80	82	96	94	88	100	79	.	.	.
930529	815	1	CHK0+	36	32	32	39	33	39	37	36	37	37	.	.	.
930529	815	1	CHK1+	82	.	.	.	.	.	.	.	.	.	.	.	.
930529	815	2	CHK0+	36	37	47	38	36	36	37	38	37	37	.	.	.
930529	815	2	CHK1+	76	117	76	94	108	97	82	89	.	.	.	.	.
930530	815	1	CHK0+	34	35	40	34	36	37	36	37	36	36	.	.	.
930530	815	2	CHK0+	34	35	34	36	39	39	38	34	38	37	.	.	.
930530	815	2	CHK1+	89	79	118	77	101	97	.	.	.	.	.	.	.
930531	820	1	CHK0+	31	36	35	34	34	35	37	36	35	38	.	.	.
930531	820	1	CHK1+	76	.	.	.	.	.	.	.	.	.	.	.	.
930531	820	2	CHK0+	37	37	37	37	38	38	36	37	39	35	.	.	.
930531	820	2	CHK1+	85	100	103	90	82	92	.	.	.	.	.	.	.
930601	830	1	CHK0+	40	39	37	37	35	36	41	36	38	39	.	.	.
930601	830	1	CHK1+	93	110	.	.	.	.	.	.	.	.	.	.	.
930601	830	2	CHK0+	35	37	38	39	40	40	49	35	35	37	.	.	.
930601	830	2	CHK1+	94	.	.	.	.	.	.	.	.	.	.	.	.
930602	830	1	CHK0+	32	35	38	36	41	37	43	36	38	37	.	.	.
930602	830	2	CHK0+	36	35	42	31	35	37	36	32	35	33	.	.	.
930602	830	2	CHK1+	93	122	91	.	.	.	.	.	.	.	.	.	.
930603	815	1	CHK0+	37	38	38	38	37	36	34	36	34	36	.	.	.
930603	815	2	CHK0+	31	33	32	34	42	37	34	35	35	35	.	.	.
930603	815	2	CHK1+	80	122	82	.	.	.	.	.	.	.	.	.	.
930604	820	1	CHK0+	42	38	31	35	35	34	34	34	33	34	.	.	.
930604	820	2	CHK0+	34	38	38	38	39	34	35	35	36	36	.	.	.

Table 5. Length Data From Juvenile Chinook Captured by Rotary Auger Traps - Slim Creek 1993

DATE	TIME	TRAP	SPEC	LENGTHS (mm)												
930605	820	1	CHK0+	41	45	38	38	37	39	38	37	33	41	.	.	.
930605	820	2	CHK0+	47	35	38	44	35	38	37	34	33	39	.	.	.
930605	820	2	CHK1+	101	87	98	92	.	.	.	.	.	.	.	.	.
930606	808	1	CHK0+	44	43	36	36	32	39	41	39	36	34	.	.	.
930606	808	2	CHK0+	37	40	38	42	37	39	42	42	43	35	.	.	.
930606	808	2	CHK1+	117	81	98	.	.	.	.	.	.	.	.	.	.
930607	900	1	CHK0+	39	33	40	35	44	45	38	38	36	38	.	.	.
930607	900	1	CHK1+	120	.	.	.	.	.	.	.	.	.	.	.	.
930607	900	2	CHK0+	38	40	37	37	38	41	41	43	39	36	.	.	.
930607	900	2	CHK1+	102	104	.	.	.	.	.	.	.	.	.	.	.
930608	800	1	CHK0+	32	37	49	37	49	34	39	46	36	35	.	.	.
930608	800	1	CHK1+	108	.	.	.	.	.	.	.	.	.	.	.	.
930608	800	2	CHK0+	38	37	39	51	45	49	39	44	38	40	.	.	.
930608	800	2	CHK1+	101	85	92	100	101	94	89	83	.	.	.	.	.
930701	1900	1	CHK0+	47	51	50	50	53	46	45	42	42	45	.	.	.
930701	1900	2	CHK0+	51	48	49	50	53	45	49	45	51	57	.	.	.
930702	1842	1	CHK0+	52	44	45	54	45	56	38	39	45	37	.	.	.
930702	1842	2	CHK0+	57	53	48	53	57	49	46	48	51	37	.	.	.
930703	1752	1	CHK0+	40	43	58	45	51	52	43	49	38	.	.	.	.
930703	1752	2	CHK0+	56	51	52	51	45	48	59	49	53	42	.	.	.
930704	1840	1	CHK0+	62	50	52	49	51	52	45	46	49	.	.	.	.
930704	1840	2	CHK0+	54	50	55	60	51	45	44	55	49	41	.	.	.
930708	2100	1	CHK0+	50	52	47	44	44	64	51	37	53	47	.	.	.
930708	2100	2	CHK0+	49	44	44	38	.	.	.	.	.	.	.	.	.
930712	820	1	CHK0+	52	48	49	60	44	58	45	49	50	43	.	.	.
930712	820	2	CHK0+	52	48	50	53	51	50	54	42	46	37	.	.	.
930819	1700	3	CHK0+	77	70	54	69	60	57	62	61	62	60	65	70	63
930819	1700	3	CHK0+	65	52	.	.	.	.	.	.	.	.	.	.	.
930821	933	1	CHK0+	74	61	73	55	61	52	56	57	74	54	51	56	63
930821	933	1	CHK0+	56	53	.	.	.	.	.	.	.	.	.	.	.
930821	933	2	CHK0+	96	60	60	79	56	62	58	53	57	62	58	52	65
930821	933	2	CHK0+	52	58	.	.	.	.	.	.	.	.	.	.	.
930823	1350	3	CHK0+	72	65	67	57	68	63	75	51	62	72	52	57	57
930823	1350	3	CHK0+	64	56	.	.	.	.	.	.	.	.	.	.	.
930825	930	1	CHK0+	59	67	58	52	66	52	60	59	61	50	62	61	.
930825	930	2	CHK0+	78	56	64	64	61	60	51	56	62	63	.	.	.
931018	1216	3	CHK0+	67	71	69	60	78	67	.	.	.	.	.	.	.
931019	1000	3	CHK0+	82	68	59	74	63	64	66	70	69	63	.	.	.
931020	1100	3	CHK0+	89	79	69	.	.	.	.	.	.	.	.	.	.
931021	1500	3	CHK0+	59	77	71	60	68	65	71	69	65	.	.	.	.
931022	900	3	CHK0+	69	73	73	62	72	74	64	76	65	.	.	.	.
931117	1245	1	CHK0+	66	71	81	70	67	67	74	.	.	.	.	.	.
931117	1245	2	CHK0+	68	56	68	82	.	.	.	.	.	.	.	.	.
931118	1150	1	CHK0+	70	77	65	69	67	80	81	63	63	71	.	.	.
931118	1150	2	CHK0+	75	74	79	68	78	81	70	73	69	68	.	.	.
931119	1030	1	CHK0+	68	67	63	65	75	.	.	.	.	.	.	.	.
931119	1030	2	CHK0+	88	76	64	73	71	63	71	68	.	.	.	.	.

Table 6. Weight Data From Juvenile Chinook Captured by Rotary Auger Traps - Slim Creek 1993

DATE	TIME	TRAP	SPEC	WEIGHTS (g)									
930701	1900	1	CHK0+	1.65	1.70	1.67	1.49	1.89	1.08	1.00	1.45	1.67	1.16
930701	1900	2	CHK0+	1.23	1.00	1.14	1.44	1.44	1.13	1.38	1.16	1.82	2.04
930702	1842	1	CHK0+	1.40	0.91	0.97	1.62	1.01	1.75	0.50	0.51	0.77	0.43
930702	1842	2	CHK0+	2.01	1.46	1.15	1.72	1.80	1.01	1.00	1.26	1.71	0.58
930703	1752	1	CHK0+	0.93	0.91	2.42	1.43	1.46	1.81	0.95	1.34	1.17	.
930703	1752	2	CHK0+	2.10	1.52	2.30	1.41	0.87	1.16	2.17	1.35	1.72	0.81
930704	1840	1	CHK0+	2.69	1.61	1.72	1.29	1.71	1.59	1.13	1.27	0.85	.
930704	1840	2	CHK0+	1.82	1.70	1.95	2.34	1.49	0.90	0.92	1.72	1.45	0.77
930708	2100	1	CHK0+	1.72	2.11	1.09	1.23	1.19	2.76	1.58	0.69	1.74	1.52
930708	2100	2	CHK0+	1.39	1.20	1.41	1.25	.	.	.	.	.	.
930712	820	1	CHK0+	1.40	1.30	1.30	2.30	1.00	2.00	0.90	1.20	1.30	0.80
930712	820	2	CHK0+	1.40	1.30	1.30	1.40	1.70	1.30	1.60	0.70	0.90	0.50
930819	1700	3	CHK0+	4.34	3.72	1.63	2.24	2.16	1.97	2.13	2.46	2.78	2.40
930819	1700	3	CHK0+	3.00	3.53	3.18	3.25	1.47	.	.	.	.	.
930821	933	1	CHK0+	4.20	2.40	4.30	1.80	2.20	1.50	1.80	2.00	.	.
930821	933	2	CHK0+	1.33	2.00	2.40	4.70	1.30	2.80	2.30	1.80	2.20	2.50
930821	933	2	CHK0+	2.30	1.60	3.20	1.90	1.90	.	.	.	.	.
930823	1350	3	CHK0+	3.90	3.00	2.90	2.00	3.20	2.70	4.60	1.20	2.80	3.40
930823	1350	3	CHK0+	1.40	2.00	1.90	2.60	1.90	.	.	.	.	.
931018	1216	3	CHK0+	3.06	5.16	3.59	2.30	4.75	3.26	.	.	.	.
931019	1000	3	CHK0+	5.23	3.63	2.29	4.83	3.21	2.93	3.02	3.79	3.81	2.69
931020	1100	3	CHK0+	7.16	5.15	3.35	.	.	.	.	.	.	.
931021	1500	3	CHK0+	2.39	4.13	3.78	2.25	3.35	3.14	3.65	3.27	2.61	.
931022	900	3	CHK0+	3.45	4.10	4.01	2.24	4.17	4.44	2.45	4.22	2.95	.
931117	1245	1	CHK0+	3.16	4.11	6.08	4.36	3.45	3.32	4.40	.	.	.
931117	1245	2	CHK0+	3.49	2.12	2.71	6.40	.	.	.	.	.	.
931118	1150	1	CHK0+	4.15	5.39	3.38	3.76	3.85	5.79	6.77	3.35	2.64	4.12
931118	1150	2	CHK0+	4.50	5.43	5.37	3.36	4.85	6.28	3.93	4.12	3.56	3.40
931119	1030	1	CHK0+	3.66	3.72	3.15	3.18	5.12	.	.	.	.	.
931119	1030	2	CHK0+	7.49	5.33	2.96	4.60	4.19	3.07	3.86	3.61	.	.

Table 7. Mark and Recapture Data From Rotary Auger Traps - Slim Creek 1993

RELEASE DATE	SPECIES	NO. OF FISH RELEASED	NO. OF FISH RECAPTURED TRAP 1	TRAP 2	TRAP EFFICIENCY
930501	CHK0+	113	4	0	3.54%
930503	CHK0+	88	3	0	3.41%
930501	CHK0+	113	4	0	3.54%
930503	CHK0+	88	3	0	3.41%
930506	CHK0+	138	4	0	2.90%
930508	CHK0+	186	3	0	1.61%
930510	CHK0+	194	1	1	1.03%
930512	CHK0+	700	0	0	0.00%
930519	CHK0+	800	8	0	1.00%
930521	CHK0+	1019	31	1	3.14%
930523	CHK0+	934	22	1	2.46%
930525	CHK0+	797	10	2	1.51%
930527	CHK0+	665	22	16	5.71%
930529	CHK0+	583	11	1	2.06%
930602	CHK0+	172	3	7	5.81%
930604	CHK0+	265	3	6	3.40%
930606	CHK0+	140	4	2	4.29%
930701	CHK0+	135	8	4	8.89%
930711	CHK0+	34	5	1	17.65%
930820	CHK0+	67	2	1	4.48%
930823	CHK0+	79	2	1	3.80%
930825	CHK0+	122	3	1	3.28%
931021	CHK0+	28	1	3	14.29%
931118	CHK0+	47	4	3	14.89%
930503	CHK1+	58	11	0	18.97%
930508	CHK1+	134	16	0	11.94%
930510	CHK1+	85	5	0	5.88%

Table 8. Daily Mean Depth and Temperatures - Slim Creek & Fraser River 1993.

DATE	JULIAN	SLIM DEPTH at trap site (m)	SLIM TEMP at trap site (°C)	SLIM TEMP below Slim Lake (°C)	FRASER TEMP above Hungary Cr. confluence (°C)
930501	122	.	4.64	.	.
930502	123	.	4.86	.	.
930503	124	.	5.09	.	.
930504	125	0.738	5.99	.	.
930505	126	0.753	6.89	.	.
930506	127	0.828	6.44	.	.
930507	128	0.954	5.54	.	.
930508	129	0.975	5.54	.	.
930509	130	0.936	5.76	.	.
930510	131	0.894	5.99	.	.
930511	132	0.942	7.56	.	.
930512	133	1.169	7.78	.	.
930513	134	1.379	5.99	.	.
930514	135	1.468	7.56	.	.
930515	136	1.391	7.11	.	.
930516	137	1.307	8.01	.	.
930517	138	1.263	8.53	.	.
930518	139	1.193	8.91	.	.
930519	140	1.145	8.91	.	.
930520	141	1.115	9.13	.	.
930521	142	1.163	8.23	.	.
930522	143	1.157	8.23	.	.
930523	144	1.115	8.68	.	.
930524	145	1.043	6.89	.	.
930525	146	0.990	9.80	.	.
930526	147	0.960	10.70	.	.
930527	148	0.924	10.70	.	.
930528	149	0.882	11.38	.	.
930529	150	0.846	11.15	.	.
930530	151	0.816	10.48	.	.
930531	152	0.804	10.03	.	.
930601	153	0.757	10.70	.	.
930602	154	0.748	10.93	.	.
930603	155	0.718	12.05	.	.
930604	156	0.685	12.27	.	.
930605	157	0.655	12.50	.	.
930606	158	0.633	12.05	.	.
930607	159	0.629	11.38	.	.
930608	160	0.619	9.58	.	.
930630	182	0.779	10.93	.	.
930701	183	0.751	13.62	.	.
930702	184	0.713	12.72	.	.
930703	185	0.690	13.17	.	.
930704	186	0.663	13.17	.	.
930705	187	0.635	12.72	.	.

Table 8. Daily Mean Depth and Temperatures - Slim Creek & Fraser River 1993.

DATE	JULIAN	SLIM DEPTH at trap site (m)	SLIM TEMP at trap site (°C)	SLIM TEMP below Slim Lake (°C)	FRASER TEMP above Hungary Cr. confluence (°C)
930706	188	0.619	11.82	.	.
930708	190	0.597	12.27	.	.
930709	191	0.602	12.27	.	.
930710	192	0.580	11.82	.	.
930711	193	0.558	11.50	.	.
930712	194	0.550	10.93	.	.
930818	231	0.448	14.52	.	.
930819	232	0.448	15.42	17.09	14.48
930820	233	0.445	13.17	17.36	14.39
930821	234	0.445	13.62	16.97	14.43
930822	235	0.445	13.17	16.03	14.20
930823	236	0.464	12.72	15.13	13.50
930824	237	0.486	10.93	13.57	12.24
930825	238	0.486	10.48	13.40	11.34
930826	239	0.489	11.73	13.60	10.46
930827	240	0.493	11.65	13.47	10.85
930828	241	0.495	11.32	13.22	11.26
930829	242	0.488	11.16	13.30	11.40
930830	243	0.478	11.15	13.54	11.76
930831	244	0.471	12.01	13.90	12.00
930901	245	0.469	12.79	14.33	12.29
930902	246	0.456	12.78	15.20	12.82
930903	247	0.454	12.84	15.49	13.04
930904	248	0.446	12.69	15.38	13.14
930905	249	0.436	12.13	14.93	13.20
930906	250	0.436	11.83	14.69	12.85
930907	251	0.433	12.06	14.86	12.72
930908	252	0.425	12.40	14.79	12.48
930909	253	0.418	11.72	14.43	12.35
930910	254	0.419	11.53	14.13	12.27
930911	255	0.415	11.24	12.94	12.05
930912	256	0.430	9.16	11.39	10.97
930913	257	0.430	8.55	11.41	10.51
930914	258	0.442	9.37	11.32	9.69
930915	259	0.447	9.11	11.02	9.91
930916	260	0.434	8.09	10.87	9.80
930917	261	0.430	8.14	10.63	9.63
930918	262	0.430	8.22	10.54	9.57
930919	263	0.425	7.26	9.54	8.84
930920	264	0.410	6.98	9.16	8.58
930921	265	0.410	6.38	8.83	8.34
930922	266	0.410	6.70	8.88	8.37
930923	267	0.410	6.87	8.98	8.45
930924	268	0.415	7.82	9.12	8.03
930925	269	0.441	8.49	9.68	7.49

Table 8. Daily Mean Depth and Temperatures - Slim Creek & Fraser River 1993.

DATE	JULIAN	SLIM DEPTH at trap site (m)	SLIM TEMP at trap site (°C)	SLIM TEMP below Slim Lake (°C)	FRASER TEMP above Hungary Cr. confluence (°C)
930926	270	0.434	8.79	10.37	9.08
930927	271	0.450	8.45	10.04	8.27
930928	272	0.449	7.50	9.60	5.55
930929	273	0.435	7.30	9.32	7.96
930930	274	0.436	7.66	9.13	7.40
931001	275	0.430	7.57	9.42	6.05
931002	276	0.430	7.65	9.34	7.09
931003	277	0.430	7.85	9.71	8.92
931004	278	0.417	7.85	9.69	9.09
931005	279	0.413	8.30	9.95	10.46
931006	280	0.457	8.10	9.09	7.02
931007	281	0.450	7.10	8.31	6.86
931008	282	0.446	5.44	7.49	5.14
931009	283	0.430	4.71	6.89	4.38
931010	284	0.430	4.68	6.25	4.35
931011	285	0.415	4.36	5.98	4.01
931012	286	0.412	4.11	5.90	3.75
931013	287	0.410	4.09	5.80	3.73
931014	288	0.410	3.98	5.58	3.62
931015	289	0.419	4.45	5.80	4.11
931016	290	0.410	4.49	5.56	4.15
931017	291	0.410	4.50	5.93	4.16
931018	292	0.415	4.84	5.79	4.14
931019	293	0.430	4.04	4.99	4.31
931020	294	0.430	2.81		3.86
931021	295	0.430	3.32		3.53
931022	296	0.436	4.98		4.21
931023	297	0.450	5.17		4.64
931024	298	0.496	5.37		5.19
931025	299	0.500	4.47		5.03
931026	300	0.490	4.70		4.92
931027	301	0.502	5.51		5.01
931028	302	0.530	4.57		5.02
931029	303	0.527	3.60		4.28
931030	304	0.510	3.83		3.87
931031	305	0.510	4.28		3.47
931101	306	0.510	3.27		3.42
931102	307	0.549	1.00		2.59
931103	308	0.885	2.43		2.37
931104	309	0.828	1.73		2.18
931105	310	0.732	0.77		1.11
931106	311	0.670	1.54		1.05
931107	312	0.631	2.40		1.98
931108	313	0.597	2.78		2.37
931109	314	0.573	2.67		2.26

Table 8. Daily Mean Depth and Temperatures - Slim Creek & Fraser River 1993.

DATE	JULIAN	SLIM DEPTH at trap site (m)	SLIM TEMP at trap site (°C)	SLIM TEMP below Slim Lake (°C)	FRASER TEMP above Hungary Cr. confluence (°C)
931110	315	0.553	1.89		0.93
931111	316	0.539	1.93		0.94
931112	317	0.530	2.36		1.08
931113	318	0.522	1.80		1.14
931114	319	0.515	1.05		0.71
931115	320	0.515	1.47		1.14
931116	321	0.510	1.03		2.21

Table 9. Fraser River beach seine data - Hungary Creek confluence 1993.

DATE	TIME	SET #	SITE		LENGTH		WEIGHT		TOTAL NUMBER OF FISH CAUGHT			
				CHIN 0+	mean	SE	mean	SE	RMWF	SCUL	SUCK	DACE
930710	1600	1	Below Hungary Ck.	59	48	2.8	1.59	0.31	10	1	.	.
930710	1600	2	Below Hungary Ck.	19	50	1.5	1.43	0.15	6	.	.	.
930710	1600	3	At Hungary Mouth	33	.	.	.	.	8	2		.
930710	1600	4	Above Hungary Ck.	16	.	.	.	.	1	.	3	.
930825	1230	1	Above Hungary Ck.	102	61	1.9	2.62	0.21	35	.	1	.
930825	1230	2	At Hungary Mouth	54	57	1.1	2.65	0.15	15	.	6	2
930825	1230	3	Below Hungary Ck.	78	59	1.9	2.22	0.19	14	12	2	30
931018	1420	1	Above Hungary Ck.	1	61	.	2.12	.	30	1	.	.
931018	1420	2	At Hungary Mouth	1	59	.	2.07	.	30	.	.	.
931018	1420	3	Below Hungary Ck.	0	.	.	.	.	30	.	.	.
931021	1900	1	Above Hungary Ck.	3	73	12.4	4.14	1.83	0	.	.	.
931021	1900	2	At Hungary Mouth	0	.	.	.	.	2	.	.	.
931021	1900	3	Below Hungary Ck.	6	62	2.5	2.52	0.29	30	.	.	.

Table 10. Minnow Trapping length & weight data - Slim Creek trap site 1993.

			LENGTH		WEIGHT	
DATE	TIME	n	mean	SE	mean	SE
930821	933	15	58	2.2	.	.
930823	1350	20	60	1.7	2.34	0.20
931020	1100	12	67	1.2	3.10	0.16
931119	1030	1	61	.	2.80	.