SIZE, DISTRIBUTION AND ABUNDANCE OF JUVENILE CHINOOK SALMON OF THE NECHAKO RIVER, 1996

NECHAKO FISHERIES CONSERVATION PROGRAM
Technical Report No. M96-3

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ABSTRACT

The size, distribution, and abundance of juvenile chinook salmon (*Oncorhynchus tshawytscha*) was measured in 1996 in the upper 100 km of the Nechako River as part of the eighth year of the Nechako Fisheries Conservation Program (NFCP).

Electrofishing surveys showed that the center of distribution of resident 0+ chinook moved upstream from May to June as the fish searched for rearing habitat. In the fall, resident 0+ chinook redistributed themselves evenly along the length of the upper river in preparation for overwintering.

Maximum density of electrofished 0+ chinook occurred in May and then decreased over June to November at a rate of 0.88 %/d for day catches and 1.45 %/d for night catches.

Maximum numbers of outmigrating 0+ chinook captured by rotary screw traps at Diamond Island also occurred in mid-May. Rotary screw trap catches of juvenile chinook decreased over May to July at a rate of 6.01 %/d for day catches. No loss rate could be calculated for night catches.

A total of 5,074 0+ chinook and 287 1+ chinook were captured by the rotary screw traps. Expansion of these numbers by the proportion of river volume sampled by the traps provided an index of downstream migration of 105,576 0+ chinook and 5,349 1+ chinook.

Comparison of seasonal trends in size-at-date, electrofishing catch-per-unit-effort and spatial distribution, and the index of outmigration showed that the population dynamics of 0+ chinook salmon in the upper Nechako River were similar in 1996 to the years 1991 to 1995. Comparison of the biological parameters over 1989 to 1996 showed that growth and spatial distribution of fry in 1996 was similar to previous years, but that timing of emergence and outmigration in 1996 was delayed by 1 to 2 weeks, which was attributed to lower-than-average spring and summer water temperatures.

INTRODUCTION

This report describes juvenile chinook salmon (*Oncorhynchus tshawytscha*) size, distribution and abundance in the upper 100 km of the Nechako River in 1996.

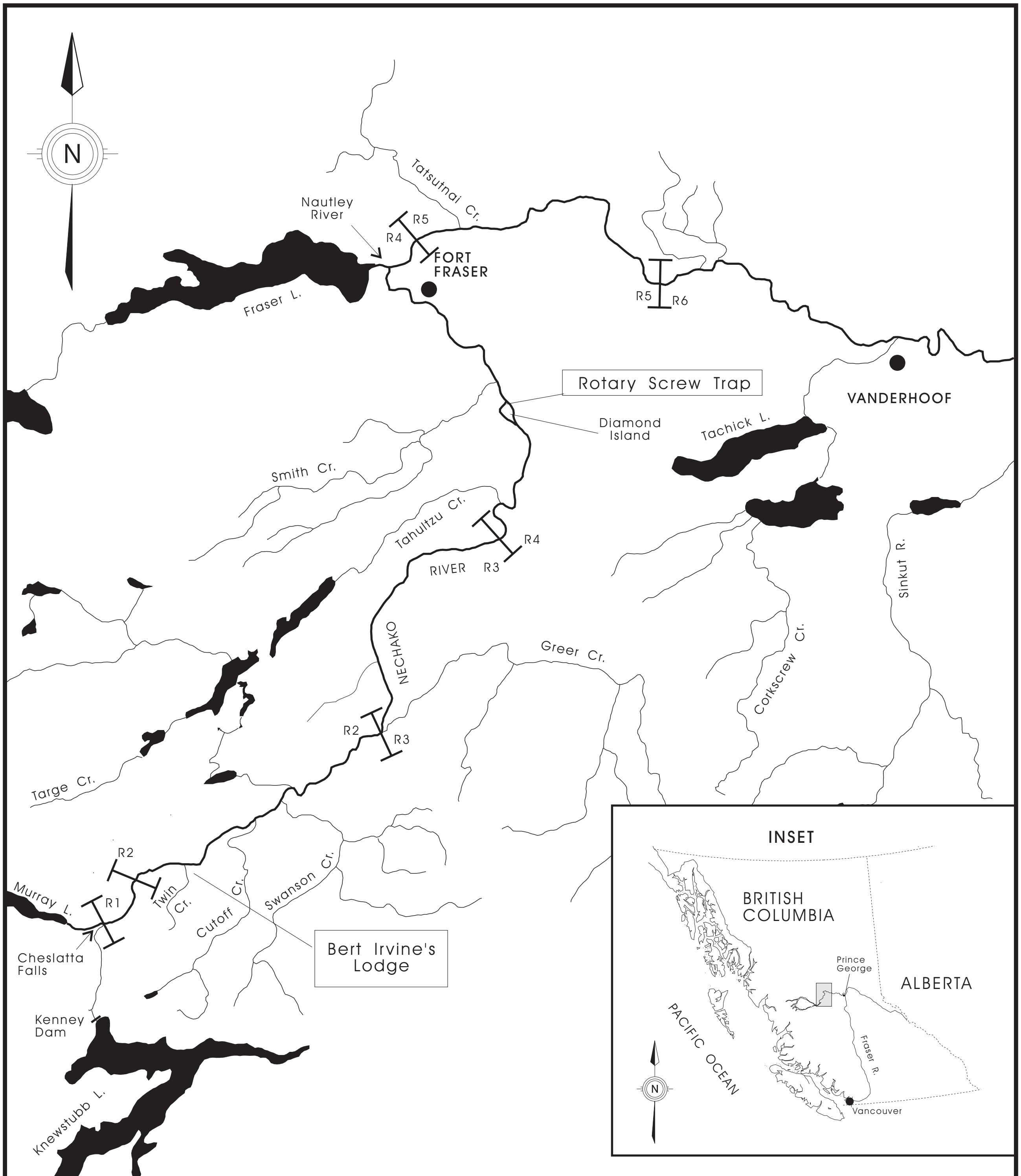
This study was part of the eighth year (1996-1997) of the Nechako Fisheries Conservation Program (NFCP). The primary objectives of the 1996 survey were to measure the growth and spatial distribution of juvenile chinook in the upper Nechako River, and to obtain an index of the number of juvenile chinook that migrated downstream of Diamond Island from March to July. The secondary objective was to compare the biological parameters measured in 1996 with those measured over the previous seven years.

NFCP monitoring efforts are concentrated in the upper 100 km of the Nechako River because it is the part of the river most subject to changes in flow due to fluctuations in discharge from the Nechako Reservoir. Other parts of the river are buffered by flow from the Nautley and Stuart Rivers as well as from large tributaries. Thus, the upper Nechako is the best part of the river to concentrate monitoring efforts to determine effects of flow on juvenile chinook.

METHODS

Study Sites

The study area included the upper 100 km of the Nechako River from Kenney Dam to Fort Fraser (Figure 1). It was divided into four reaches with the



Nechako Fisheries Conservation Program

Map # M96-3-1

FIGURE 1. 1996 NECHAKO RIVER STUDY AREA AND TRAP LOCATIONS

following boundaries, as originally defined by Envirocon Ltd. (1984):

Reach	Distance (km) from Kenney Dam
1	9.0-14.6
2	14.6-43.0
3	43.0-66.6
4	66.6-100.6

In this report, all longitudinal distances are in kilometers from Kenney Dam. However, the first 9 km are upstream of Cheslatta Falls within the Nechako River Canyon, which was dewatered by the closing of Kenney Dam in October 1952. Thus, the first 10 km from Kenney Dam has only 1 km of flowing water from Cheslatta Falls that provides significant fish habitat.

Water Temperature and Discharge

Mean daily water temperatures were measured by a datalogger at Bert Irvine's Lodge in Reach 2 of the river, 19 km below Kenney Dam, and are reported as preliminary data from Environment Canada. That is the only continuous daily record of water temperature in the upper Nechako River, and so it is the principal record used for comparing temperatures among years.

Spot water temperatures were also recorded with handheld thermometers during the day and night at sites throughout reaches 1 to 4 as part of the monthly electrofishing surveys of the upper Nechako.

Daily water flows were recorded at Skins Lake Spillway (WSC station 08JA013) and at the Nechako River below Cheslatta Falls (WSC station 08JA017), and are reported as preliminary data from Water Survey of Canada (WSC).

Electrofishing Surveys

Each year since 1990, NFCP has conducted electrofishing surveys of the upper Nechako River to measure the relative abundance and spatial distribution of juvenile chinook. The surveys began as a temporary replacement for inclined plane traps that were rendered inoperable in 1990 due to high river flows. Over the last six years they have become one of the most important components of the chinook monitoring program, mainly because they show spatial variation in juvenile density during spring and summer-something no fixed gear can do-and because electrofishing can be done at high flow levels that would render some fixed gear inoperable.

In 1996, as in previous years, an index of juvenile chinook salmon abundance was obtained from single-pass electrofishing surveys of each of the four reaches. Surveys began in April and continued through May, June and early July. As in previous years, surveys were discontinued during late July and August because flows were too high to allow safe and effective electrofishing. Large flows are released into the upper river during July and August to cool the river and thereby reduce prespawning mortality of sockeye salmon (*Oncorhynchus nerka*) migrating through the lower Nechako River to spawning grounds in the Stuart, Stellako and Nadina River systems. The program of releases is called the Summer Temperature Management Program or STMP. A final survey was conducted in November. Surveys of Reaches 1 through 4 were completed in each of the months sampled. Electrofishing surveys were carried out at night as well as during the day. Night was defined as the time period between sunset and sunrise.

Surveys were conducted on prime habitat for juvenile chinook salmon, defined as depth>0.5 m, velocity>0.3 $m \cdot s^{-1}$ and a substrate of gravel and cobbled (Envirocon Ltd. 1984). That habitat was found mainly along the margins of the river, so electrofishing surveys did not sample the portion of the population that may have resided in mid-channel. However, mid-channel residents are a minor component of the population of juvenile chinook. Electrofishing surveys conducted by the Department of Fisheries and Oceans showed that the densities of chinook inhabiting the margins of the river were 70 times greater than mid-channel densities (Nechako River Project 1987). Also, snorkelling surveys conducted during the same study showed that 97% of juvenile chinook were seen along the margins of the river.

Fish were captured with a single pass of a Smith Root model 15A backpack electrofisher, identified to species, counted, and released live back into the river. Catch-per-unit-effort (CPUE) of juvenile chinook was the number of fish caught at a site divided by the area that was electrofished. Area was expressed in units of 100 m^2 to avoid fractional CPUE. Age of juvenile chinook was recorded as 0+ or 1+, based on fork length. Juvenile chinook less than 90 mm long were classified as 0+. Those over 90 mm in length in the spring and early summer were classified as 1+, but those over 90 mm long in late summer were classified as 0+ because by that time all 1+ chinook had migrated out of the upper Nechako River. Rainbow trout were classified as juveniles if their length was <200 mm and adults if their length was >200 mm.

Before release, 10 to 15 chinook were measured for body size. Fork length was measured to the nearest 1 mm with a measuring board, and wet weight was measured to the nearest 0.01 g with an electronic balance. Following the practice of previous years, Fulton's condition factor (Ricker 1975):

(1) $CF = \text{weight (g)} \times 10^5 / [\text{fork length (mm)}]^3$

was used to assess physical condition.

Mean daily length and weight of 0+ and 1+ chinook were calculated separately for day and night catches because fish could potentially avoid sampling gear more successfully during the day than during the night, and because the behaviour of juvenile chinook varies with time of day-resting near instream cover during the day and migrating during dusk and dawn.

It is important to note that electrofished areas were not blocked off with nets, which meant that some fish could avoid capture by leaving a sampling area during a pass or by diving into crevices in the substrate. That meant that electrofishing catch was an underestimate of the total number of fish in a survey area. Two-pass or three-pass sampling of blocked off survey areas would have been necessary to estimate total numbers. However, the Nechako River electrofishing survey was not designed to estimate absolute numbers-it was designed to provide an index of relative abundance which could be compared between years.

That sampling strategy is called "semi-quantitative," to use a term coined by Crozier and Kennedy (1995). It has two advantages over the fully quantitative method. First, it is the only electrofishing technique that can be used when it is impossible or impractical to enclose a survey area in blocking nets because the area is too large to be enclosed or flows through the area are too strong to allow nets to be installed. For example, almost all electrofishing conducted in lakes and reservoirs (DeVries et al. 1995; Van Den Ayle et al. 1995; Miranda et al. 1996), and in large rivers (R.L.&L. Environmental Services Ltd. 1994), is semi-quantitative. The upper Nechako River is too wide, deep and fast-moving to allow any part of the mainstem to be blocked off with nets.

Second, it is often necessary to use semi-quantitative methods when the region to be surveyed is large and contains many possible survey sites, but the time and resources available for sampling are limited (Crozier and Kennedy 1995). The upper Nechako River is too long for cost-effective quantitative sampling of its entire length several times a year.

There are two disadvantages of the semi-quantitative method. First, semi-quantitative electrofishing CPUE cannot be compared to fully quantitative CPUE unless the former are calibrated by the latter. That is, unless total numbers are estimated for a subset of the same areas that are semi-quantitatively surveyed, and a calibration relationship is developed from a comparison of the two types of CPUE (e.g., Serns 1982; Hall 1986; Coble 1992; McInerny and Degan 1993; Edwards et al. 1987). At present, conversion of electrofishing CPUE to absolute CPUE is not an NFCP objective because the purpose of the electrofishing surveys is to search for among-year variation in relative abundance of juvenile chinook abundance and not to compare it with absolute abundances of other chinook streams.

Second, semi-quantitative sampling assumes that the efficiency of capture, the fraction of total number of fish in a survey area that are caught in a single electrofishing pass, is constant for all sites and species of fish. However, electrofishing catch efficiency is known to vary significantly with fish species, fish body size, type of habitat, time of day, water temperature, and the training and experience of personnel conducting the survey (Bohlin et al. 1989, 1990). The NFCP electrofishing project reduced error in estimation of CPUE by sampling only one type of habitat (prime juvenile chinook habitat), by focusing analysis on only one species (chinook), by analysing CPUE from night and day surveys separately, and by using the same experienced crew leaders each year. However, the study plan does not account for changes in catch efficiency due to seasonal changes in fish size and water temperature.

Rotary Screw Traps

Rotary screw traps (RST) were used to estimate the number of juvenile chinook that migrated downstream past Diamond Island. RSTs were installed in early April and removed in mid July to avoid the high summer cooling flows in July and August. The traps were not re-installed in September because too few chinook salmon had been caught in the fall of previous years to justify re-installation of traps in the fall of 1996.

An RST consisted of a floating platform on top of which was a rotating cone. In front of the cone was an A-frame with a winch that was used to set the vertical position of the mouth of the cone, half of which was always submerged. In the back of the cone was a live box where captured fish were kept alive until the trap was emptied. The cone was 1.43 m long and was made of 3 mm thick aluminum sheet metal with multiple perforations to allow for draining of water. The diameter of the cone tapered from 1.55 m at the mouth to 0.3 m at the downstream end. Inside the cone was an auger or screw, the blades of which were painted black to reduce avoidance by fish. As the current of the river struck the blades of the screw, it forced the cone to rotate. Any fish that entered the cone were trapped in a temporary chamber formed by the screw blades. As the cone rotated, the chamber moved down the cone until its contents were deposited in the live box.

Three RSTs were installed off Diamond Island: RST 1 near the left bank, RST 2 in the middle of the river, and RST 3 near the right bank. RSTs were suspended from a cable strung across the river channel. The 1.5 m space between the right bank of the river and RST 3 was blocked with a wing made of wood beams with wire mesh. The 15 m long space between the left bank of the river and RST 1 was not blocked with a wing. Instead, one 2'x3' inclined plane trap (IPT) and three fyke nets were set side-by-side in the space to measure the outmigration of fish along the margin of the left river.

Each trap was emptied twice each day at about 0700 and 2000 hours. All fish were collected from the live trap and counted and identified to species. A subsample of chinook salmon was kept for length and weight measurement, after which all fish, including the subsampled fish, were released live back into the river. The lengths and weights of a subsample of 10 to 15 chinook salmon were measured using the same techniques described above for the electrofishing surveys.

An index of the number of juvenile chinook passing Diamond Island in a day was calculated by multiplying the total number of fish caught in an RST in a time period (day or night) by the ratio of the total flow of the river to the flow that passes through the RST:

(2) $N_{ij} = n_{ij}(V_j / v_{ij})$

where N_{ij} = number of juvenile salmon passing Diamond Island on the *jth* date as estimated by the catches of the *ith* trap, n_{ij} = number of chinook salmon caught in the *ith* trap on the *jth* date, v_{ij} = water flow (m^3/s) through the *ith* trap on the *jth* date, and V_j = total water flow (m^3/s) of the Nechako River past Diamond Island on the *jth* date. All estimates of the rate at which the numbers of juvenile chinook changed with time were based on expanded numbers rather than on catches.

V_j was estimated from the height of the river surface at Diamond Island, as measured with a staff gauge, with a predictive regression between flow and the height of the staff gauge (cm) that had been calculated under steady flow conditions ($n = 16$, $r^2 = 0.91$, $P<0.001$):

(3) $\log_e(\text{Nechako flow}) = -4.548 + 1.920\log_e(\text{staff height, cm})$,

Flow of the Nechako River was judged to be steady from April 26 to May 30, ranging from 67.4 to 72.6 m^3/s at Cheslatta Falls and from 79.9 to 93.3 m^3/s at Smith Creek near Diamond Island. Equation (3) was similar to flow-height equations used in previous years. Flows and staff gauge height were $\log_e$-transformed to linearize the exponential relationship between the two variables.

Water flow through a trap (v_{ij}) was the product of one half the cross-sectional area (1.61 m^2) of the mouth of the trap (the trap mouth was always half-submerged) and average water velocity in front of the trap. Average water velocity (m/s) was measured with a Swoffler (Model 2100) flow meter at three different places in the front of the mouth of the RST. The one exception to this rule was RST 3, where v_{ij} was increased to include the water that flowed between it and the right bank of the river because the fish that would ordinarily have passed through this gap were diverted into RST 3 by the right wing.

Since there were three RSTs, there were three estimates of total number each day. The best estimate of the total index number of chinook salmon was the mean of the three estimates weighted by the flow that passed through each trap.

Inclined Plane Traps

An inclined plane trap (IPT) was installed at Diamond Island in early April and removed in early July. As in previous years, too few chinook salmon were caught after June to justify operating the IPT during the remainder of the year.

The 2'x3' IPT was set just left of RST 1, located near the left bank, at Diamond Island. Its purpose was to measure the number of fish passing between RST 1 and the left margin of the river. This allowed an assessment of the practical effect of blocking the 15 m distance between RST 1 and the left margin of the river with a wood and mesh wing, as was done in years previous to 1992. Although, the catches of the IPT are not used in the determination of the total index numbers of fish passing by Diamond Island, due to avoidance problems, it does provide an understanding of timing and magnitude of fish that pass along the left margin.

The IPT consisted of two aluminum pontoons supporting an inclined plane 0.9 m wide, the bottom edge of which touched the bottom of the river. The IPT was anchored by pushing its four steel supporting legs into the substrate. Fish that approached the trap were forced by water flow up the plane and over its downstream edge into a live box at the back of the trap. Some large fish were undoubtedly able to avoid capture by swimming upstream before falling over the edge of the trap. However, this was unlikely to have significantly reduced catches of 0+ chinook because fish larger than the largest 0+ chinook were captured by IPTs. The box was emptied twice each day at the same time as the live boxes of the RSTs, and the contents were processed in the same manner as those of the RSTs. The daily catches of the IPT were not expanded by water volume to calculate indices of the number of fish passing Diamond Island.

Fyke Nets

Fyke nets were used for the same purpose as the IPT, and they were installed and removed at the same times as the IPT.

Fyke nets are mesh bags with a rectangular mouth 30 cm high and 60 cm wide supported by metal bars. Three fyke nets were anchored to the left of the IPT with steel poles pushed into the river substrate. Fyke net 1 was placed closest to the left bank of the river in water about 10 cm deep. Fyke net 2 was placed farther out into the river in about 20 cm of water, and fyke net 3 was placed between fyke net number 2 and the IPT in about 30 cm of water. The bottom of each net mouth touched the river bottom and the top was about 10 cm above the water surface so the entire water column was sampled. The net was 1 m long with a mesh width of 0.64 cm. The net led into the top of a live box. The contents of the box were collected twice a day at the same time as the RSTs and the IPT, and they were processed the same way. Fyke net catches were not expanded to calculate indices of total population number.

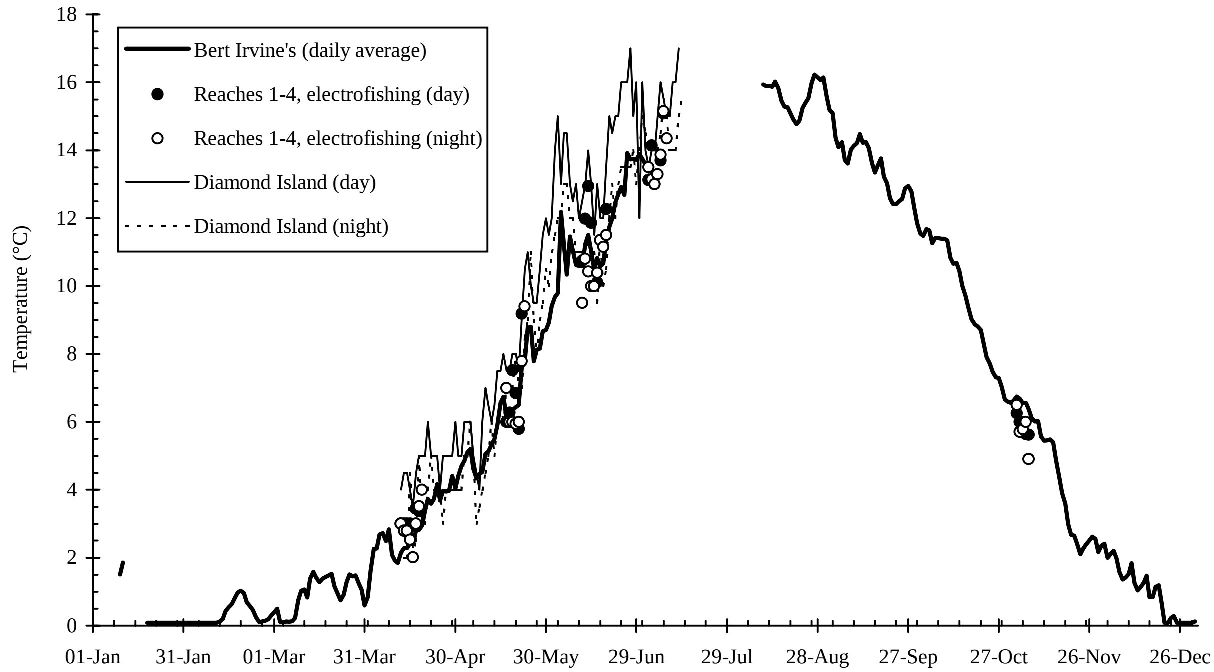
RESULTS AND DISCUSSION

Water Temperature

Mean daily water temperature of the Nechako River at Bert Irvine's Lodge rose from a minimum of 0.1°C in January to a maximum of 16.2°C in late August and then decreased with time to a low of 0.1°C in early December (Figure 2).

Spot temperatures taken during daytime electrofishing surveys of Reaches 1 to 4 during spring and early summer were generally higher than mean temperatures recorded at Bert Irvine's, most likely from solar heating of the river. In contrast, daytime

Figure 2
Mean Daily Water Temperatures of the Nechako River, 1996



spot temperatures taken during November were lower than those recorded at Bert Irvine's due to cooling of the river in the absence of substantial solar radiation. Spot temperatures taken during night-time electrofishing surveys of Reaches 1 to 4 were lower than spot temperatures taken during the day due to diel variation in solar heating.

Discharge

Flow of the Nechako River was roughly constant at an average of 35 m^3/s from January 1 to April 7, 1996 (Figure 3). From April 1 to June 28, flows increased to a maximum of 75 m^3/s due to spring run-off in local tributaries and to a small increase in flows from the Skins Lake Spillway. From June 29 to September 1, flows from the Skins Lake Spillway were increased as part of the Summer Temperature Management Project. The increases were in the form of two broad pulses, the first to a maximum of 260 m^3/s on June 29, and the second to 170 m^3/s on August 1. After falling to 35 m^3/s in early September, flows then rose in a series of steps to a maximum of about 225 m^3/s over October and November due to a spill of water from the Nechako Reservoir. The purpose of the spill was to make room in the reservoir for the anticipated freshet flows of the spring of 1997. Flows decreased to about 50 m^3/s over the second half of November and December.

Size and Growth of Chinook Salmon

Electrofishing

0+ Chinook Salmon: Sources of Variation

To determine the factors responsible for changes in the size of 0+ chinook salmon over time, standard two-factor analyses of variance (ANOVA) of length-at-date and weight-at-date were conducted with two factors: time of day (two classes: day and night) and date (four classes: April, May, June, July and November). (In this case, and in all subsequent ANOVAs of this study, the date classes were chosen so that there was a roughly equal distribution of data in each class.) The ANOVAs showed that:

(1) there was highly significant variation with date in mean length ($F_{4,5089}$ = 1766.8, P<0.001) and mean weight ($F_{4,5079}$ = 1324.5, P<0.001). Figures 4 and 5 (and Appendix 1) showed that the effects were due to growth;

Figure 3
Mean Daily Flow of the Nechako River at Skins Lake Spillway and Cheslatta Falls, 1996

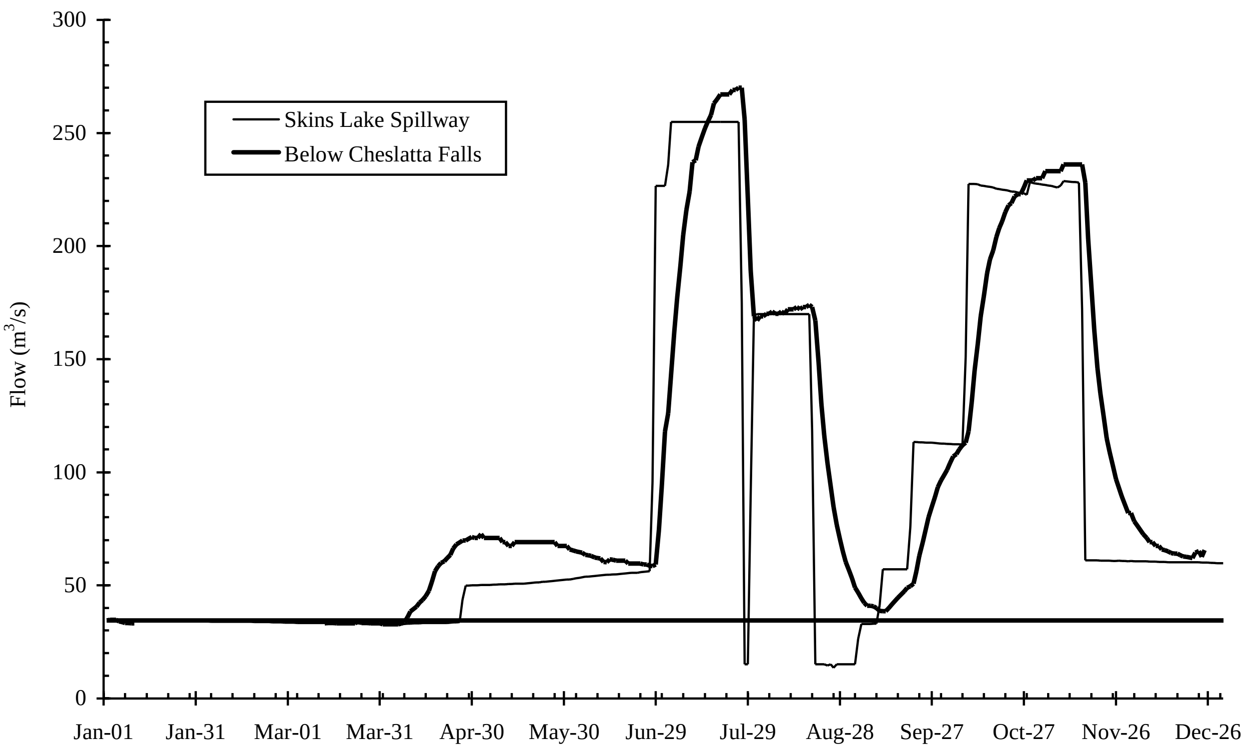


Figure 4
Mean (±1 SD) Length-at-date of 0+ Chinook Salmon, Nechako River, 1996: Electrofishing

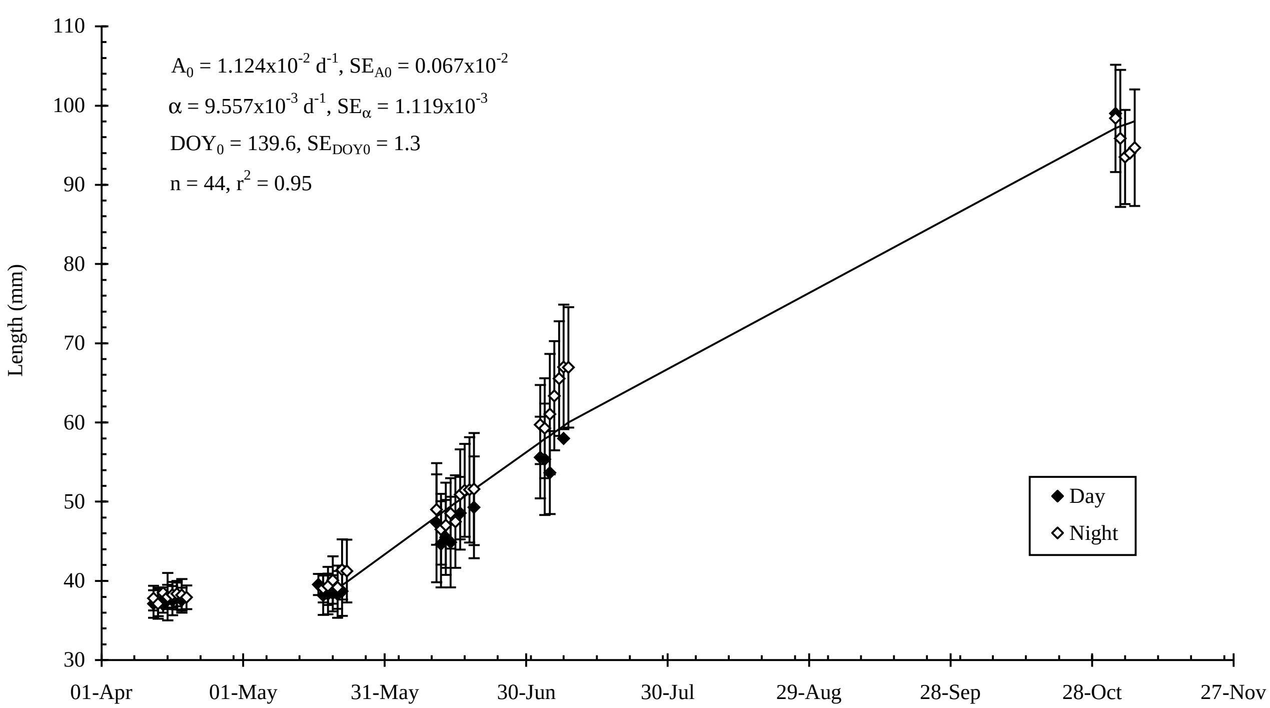
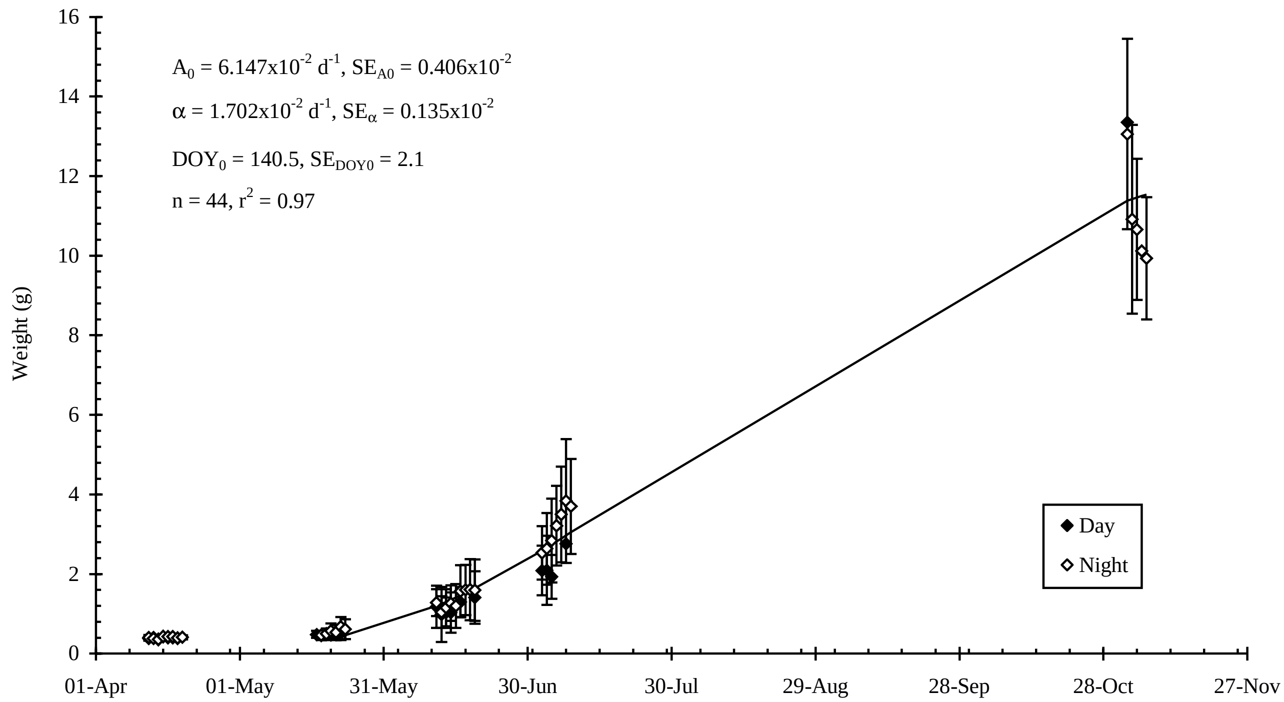


Figure 5
Mean (±1 SD) Weight-at-date of 0+ Chinook Salmon, Nechako River, 1996: Electrofishing



(2) mean length ($F_{1,5089}$ = 3.7, P = 0.055) and mean weight ($F_{1,5079}$ = 1.3, P = 0.248) were not significantly different between day and night. Therefore, they could be combined in growth analyses; and

(3) the interaction of date and time of day was significant for both length ($F_{4,5089}$ = 29.3, P = 0.001) and weight ($F_{4,5079}$ = 38.269, P = 0.001). Figures 4 and 5 showed that mean night sizes were almost identical to mean day sizes for April, but that they were greater than mean day sizes for May, June and July. The situation was reversed in November with mean lengths and weights of November day catches being greater than mean lengths and weights of November night classes. The interaction effects are most likely due to measurement error and do not have any obvious biological significance. Thus, day and night data were combined in subsequent analyses.

0+ Chinook Salmon: Growth

Growth of 0+ chinook salmon electrofished along the river margins appeared to follow two separate growth stanzas (Ricker 1979). Growth was slow between April and May, but then it increased between May and November (Figures 4 and 5). The first stanza was due to continuous emergence of fry over a period of several weeks-the numbers of emergent fry were great enough to force the mean size of all fry caught to stay close to the mean size of emergent fry. However, after emergence ceased, the second stanza began and the true growth rate of juvenile chinook became apparent. Based on the curvature of the mean length-at-date and weight-at-date plots shown in Figures 4 and 5, emergence ceased in late May.

Growth of 0+ chinook salmon after emergence ceased was described with a one-cycle Gompertz growth curve (Zweifel and Lasker 1976), the standard growth model for the early life history stages of fish. A "cycle" is a period of constant growth pattern with the same meaning as a "growth stanza." The Gompertz model for length was:

(4) $L = L_0 \exp[(A_0/\alpha)(1-\exp(-\alpha t))]$

where L = length (mm) at age t (d), L_0 = length (mm) at emergence, A_0 = instantaneous growth rate (d^{-1}) at emergence, and α = instantaneous rate (d^{-1}) at which A_0 decayed with age. The one-cycle Gompertz model for weight was the same as equation (4) except that W_0, the weight (g) at emergence, was substituted for L_0.

The simplest way of estimating age from date was to modify equation (4) by inserting the parameter DOY_0, the mean day of the year (DOY) on which emergence ceased and the second growth stanza began. Therefore, $t = DOY - DOY_0$ and the modified Gompertz model for length was:

(5) $L = L_0 \exp[(A_0/\alpha)(1-\exp(-\alpha(DOY - DOY_0)))]$.

L_0 was fixed at 38 mm and W_0 was fixed at 0.38 g, the mean length and weight of emergent chinook fry caught in emergence traps located near Bert Irvine's (Triton Environmental Consultants Ltd. 1996). Values of A_0, α and DOY_0 were estimated from mean daily lengths and weights with the non-linear regression program NLR of the SPSS statistical library (SPSS 1994). Each daily mean was weighted by its sample size. Day and night data were pooled to produce a single growth curve. Mean length-at-date and weight-at-date collected in April were excluded because they belonged to the first growth stanza.

The modified Gompertz curves provided good fits to lengths-at-date and weights-at-date, explaining up to 97% of the variation in mean size (Figures 4 and 5). The average date at which emergence ceased was estimated to be May 19 (DOY = 140) for both length and weight.

1+ Chinook Salmon: Growth

Growth of 1+ fish was best described with simple linear regressions of mean length and weight on day of year, with mean size weighted by sample size (Figures 6 and 7). The length-DOY regression was significant-mean length of 1+ chinook rose from 95 mm on April 12 (DOY = 103) to 108 mm on June 14 (DOY = 166) at a rate (±1 SE) of 0.21±0.02 mm/d. The weight-DOY regression was also significant-mean weight rose from 10.70 g on April 12 to 17.20 g on June 14 at a rate (±1 SE) of 0.10±0.01 g/d.

Figure 6
Mean (±1 SD) Length-at-date of 1+ Chinook Salmon, Nechako River, 1996: Electrofishing

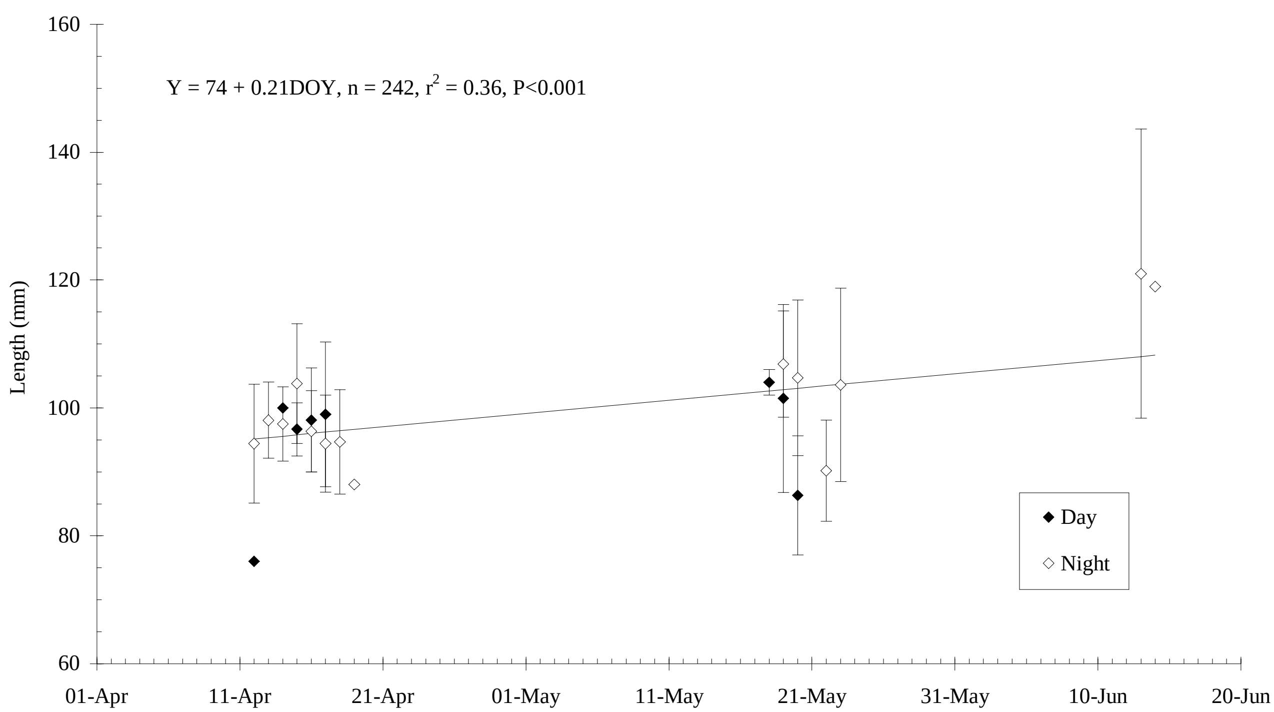
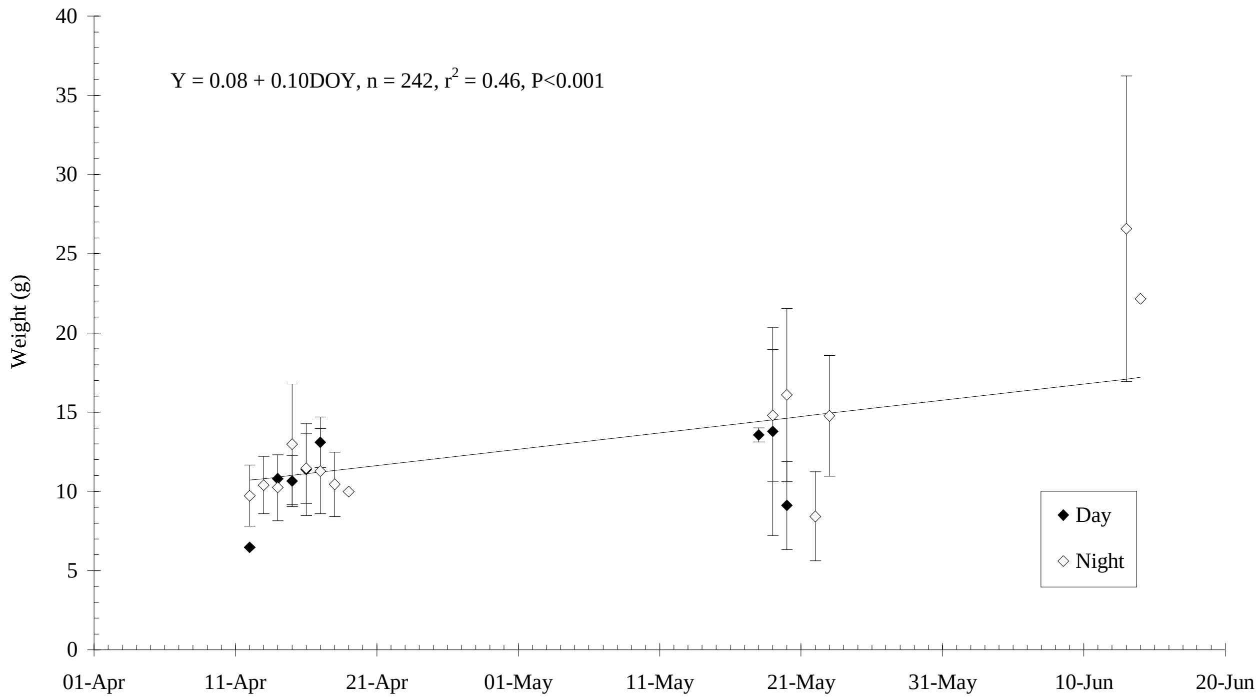


Figure 7
Mean (±1 SD) Weight-at-date of 1+ Chinook Salmon, Nechako River, 1996: Electrofishing



0+ and 1+ Chinook Salmon: Weight-Length Relationship

Following customary practice in fisheries science (Ricker 1975), a power function was used to model the relationship between weight and length of 0+ and 1+ chinook salmon:

(6a) $W = aL^b$

where a was a coefficient with units of g / mm and b was the length exponent. Equation (6a) was fit to individual weights and lengths after logarithmic transformation converted it to a linear regression:

(6b) $\log_e(W) = \log_e(a) + b\log_e(L)$.

Equation (6b) explained 97% of the variance in $\log_e(W)$ (Figure 8). However, it overestimated the weight of the largest fish, indicating that the weight-length relationship for juvenile chinook was not linear over the entire juvenile stage. Instead, there appeared to be one linear relationship for small 0+ fish and a second linear relationship for large 0+ fish plus all 1+ fish. The approximate $\log_e(L)$ at which the two groups diverged was 4.40 or a length of 81 mm. That average length was reached in August (see Figure 4).

0+ and 1+ Chinook Salmon: Condition

Condition of 0+ chinook increased from a mean of 0.7 g / mm^3 in April to an asymptotic value of about 1.2 g / mm^3 in July and November (Figure 9). Condition of 1+ chinook salmon was constant over April and June at a mean condition similar to that of 0+ chinook captured in the fall of 1996 (Figure 10).

Diamond Island Traps

0+ Chinook Salmon: Sources of Variation

To determine if there were day-night differences in the size of juvenile chinook salmon caught by all three types of traps at Diamond Island, standard two-factor ANOVAs of length-at-date and weight-at-date were conducted. The ANOVAs were identical in structure to those conducted on chinook caught by electrofishing. (See the previous section on electrofishing). They showed that:

(1) there was highly significant variation in mean length ($F_{3,4451} = 2011.0$, $P<0.001$) and in mean weight ($F_{3,4384} = 1607.2$, $P<0.001$) of 0+ chinook with date. Figures 11 and 12 (and Appendix 2) showed that the effects were due to growth;

Figure 8

Regression of Weight on Length for Juvenile Chinook Salmon, Nechako River, 1996: Electrofishing

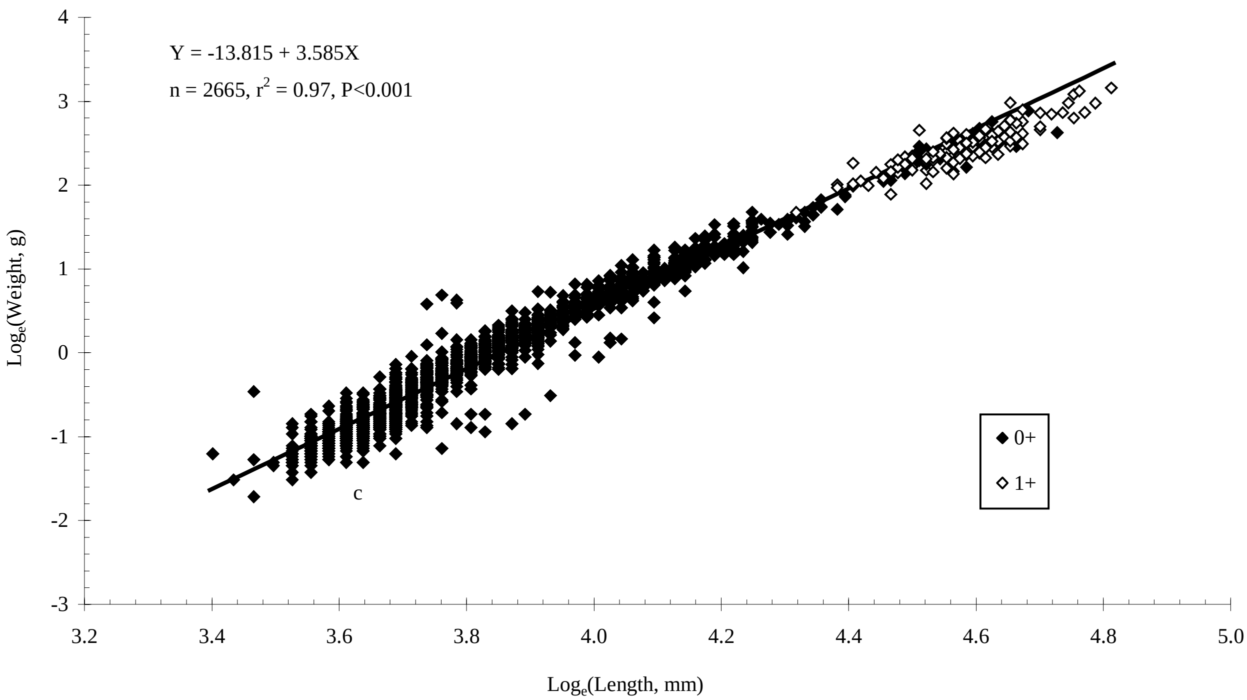


Figure 9

Mean (±1 SD) condition-at-date of 0+ chinook salmon, Nechako River, 1996: electrofishing

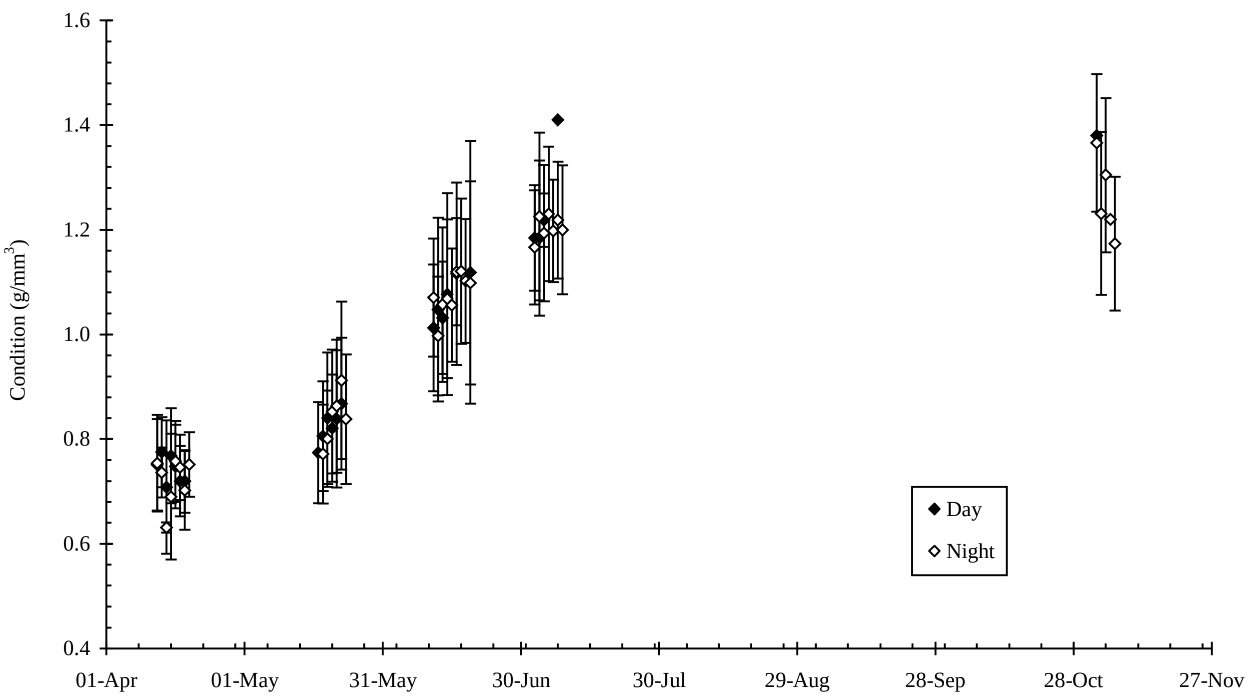


Figure 10
Mean (±1 SD) Condition-at-date of 1+ Chinook Salmon, Nechako River, 1996: Electrofishing

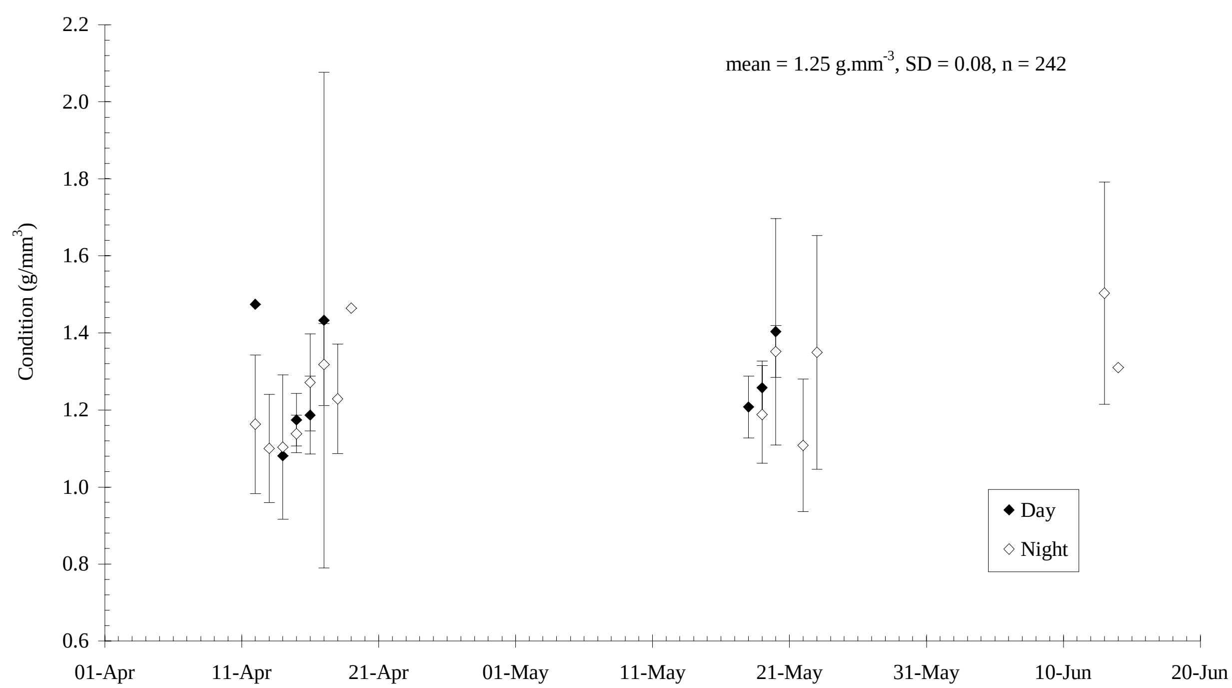


Figure 11
Mean (±1 SD) Length-at-date of 0+ Chinook Salmon Captured in Traps
at Diamond Island, Nechako River, 1996

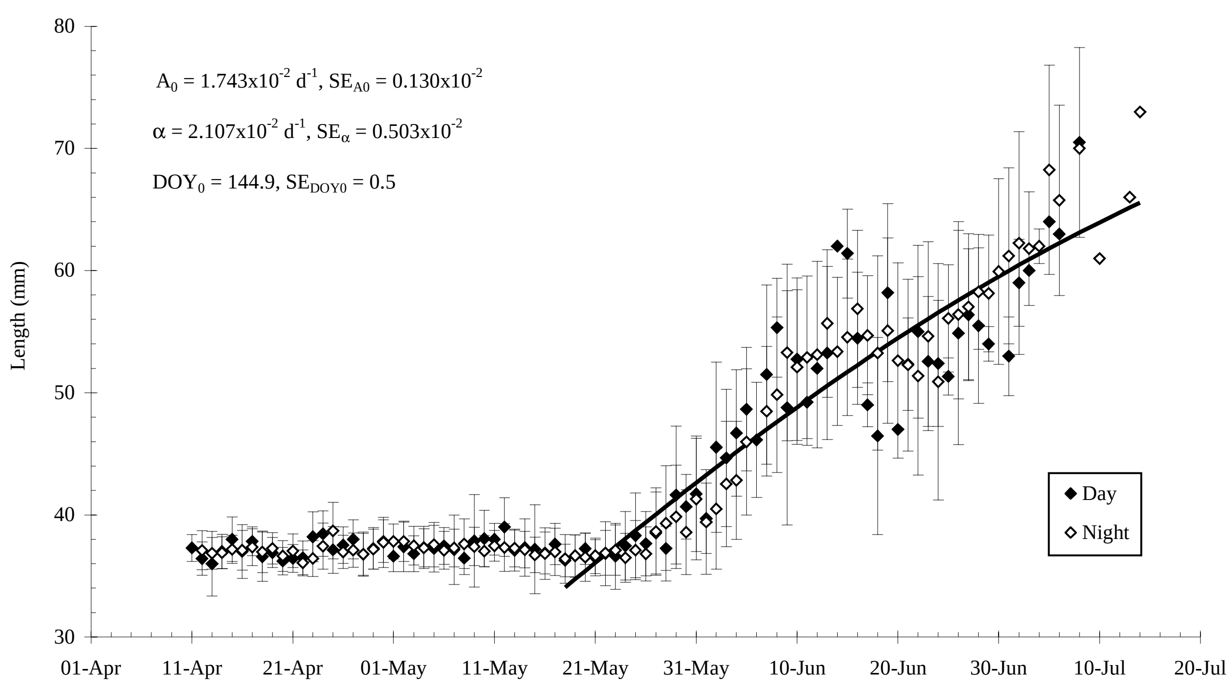
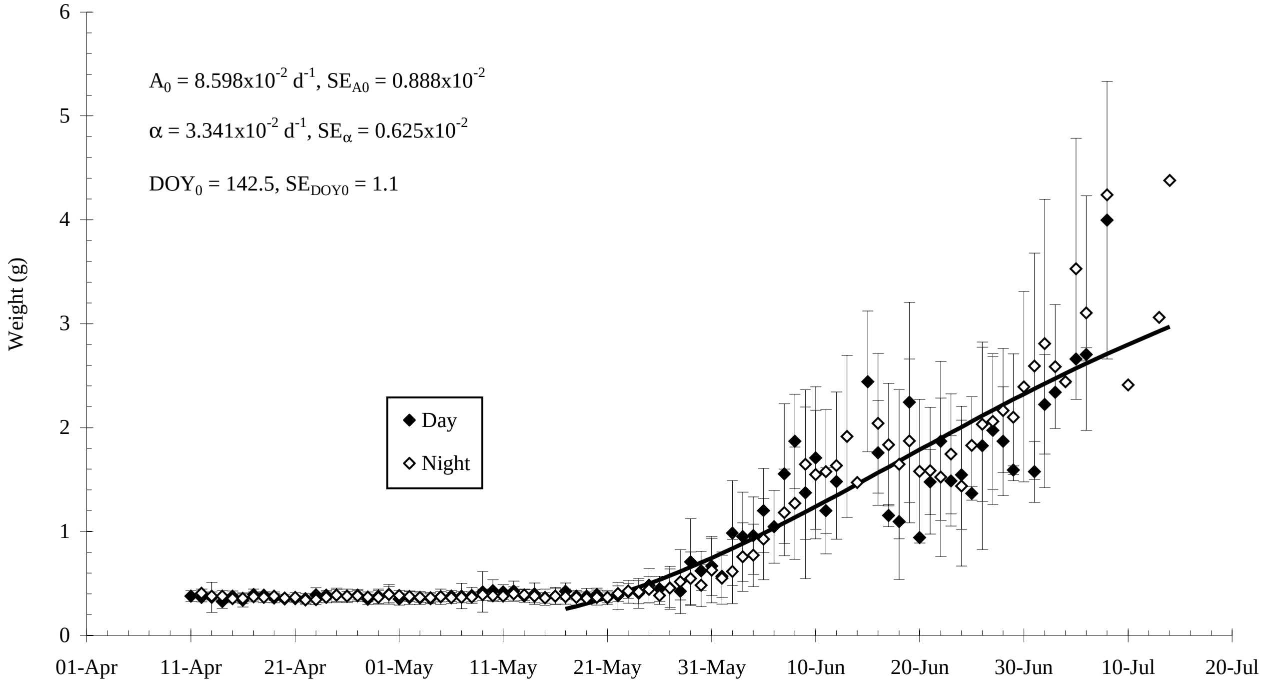


Figure 12
Mean (±1 SD) Weight-at-date of 0+ Chinook Salmon Captured in Traps
at Diamond Island, Nechako River, 1996



(2) mean length ($F_{1,4451}$ = 14.6, P<0.001) and mean weight ($F_{1,4384}$ = 28.8, P<0.001) of 0+ chinook salmon varied significantly between day and night catches, being greater in night catches than in day catches. Figures 11 and 12 showed that mean size was greater at night than during the day. The most likely reasons for the apparent day-night size differences are: (a) greater vulnerability of fish of all sizes to capture at night than during the day because fish cannot detect and avoid electrofishing gear as well at night as during the day; and (b) a wider size range of fish are active along the river margins at night than during the day because all juvenile chinook tend to migrate more at night than during the day to avoid predators; and,

(3) the interaction of date and time of day was highly significant for both length ($F_{3,4451}$ = 12.0, P<0.001) and weight ($F_{3,4384}$ = 16.3, P<0.001). This was due to an increase in the day-night differences in mean size in June and July compared to April and May.

0+ Chinook Salmon: Growth

Lengths and weights of 0+ chinook captured at Diamond Island followed a complex trajectory with date (Figures 11 and 12). The first stanza of growth ran from mid-April to late May, at which time the rate of fry emergence had dropped to a level that allowed the true population growth curve to become apparent. However, the second stanza of growth was interrupted by an unusual pattern of constant length and decreasing weight between June 15 to June 25 followed by increasing length and weight from June 25 to mid-July. It appears that population growth rate declined rapidly during that 10 day period and then recovered afterward. This pattern is unlikely to have been caused by irregularities in sampling techniques or misidentification of other smaller fish as chinook fry because the sampling team was experienced and followed a routine that has been repeated without substantial change every year for at least the last five years. It is also unlikely to have been caused by changes in flow of the upper Nechako River. Although a major spill from the Nechako Reservoir occurred on June 29 and caused a rise in flows of the Nechako River at Cheslatta Falls on June 30 (Figure 3), that spill cannot explain the change in size-at-date that began on or about June 15. The most likely explanation was that the interruption of growth was caused by a brief period of reduced temperatures in early- and mid-June (Figure 2).

To fit Gompertz growth curves to the Diamond Island size-at-age data, the second stanza was defined as starting between May 17 (DOY = 138) and May 25 (DOY = 146), based on a visual assessment of the plots of size-at-date. Gompertz curves were then fit to size-at-date for each of the nine possible starting dates and the regression that explained the most variation in size, i.e. had the highest r^2, was chosen. Starting dates of DOY = 139 and 138 were found to provide the highest r^2 for length and weight, respectively (Figures 11 and 12).

1+ Chinook Salmon: Growth

A total of 290 1+ chinook salmon were captured in 1996 (Appendix 2). There were no significant changes in mean length ($F_{3,285}$ = 1.1, P = 0.371) or mean weight ($F_{3,279}$ = 1.1, P = 0.351) with date, so no growth models were fit to the data (Figures 13 and 14).

0+ and 1+ Chinook Salmon: Weight-Length Relationship

A regression of weight on length for trap-caught juvenile chinook salmon at Diamond Island: $\log_e(W) = -13.556 + 3.489\log_e(L)$ (n = 2337, r^2 = 0.98, P<0.001), was almost identical to the regression for juvenile chinook salmon captured by electrofishing and so it is not shown as a figure in this report.

0+ and 1+ Chinook Salmon: Condition

The plot of mean condition-at-date of 0+ chinook salmon was similar to that shown for electrofished fish-condition increased over April and May to an asymptote in June and July (Figure 15). The asymptote lay between 1.0 and 1.2 g / mm^3.

Condition of 1+ chinook was constant with date. Mean condition of 1+ fish was similar to the asymptotic mean condition of 0+ chinook in summer (Figure 16).

Figure 13
Mean (±1 SD) Length-at-date of 1+ Chinook Salmon Captured in Traps at Diamond Island, Nechako River, 1996

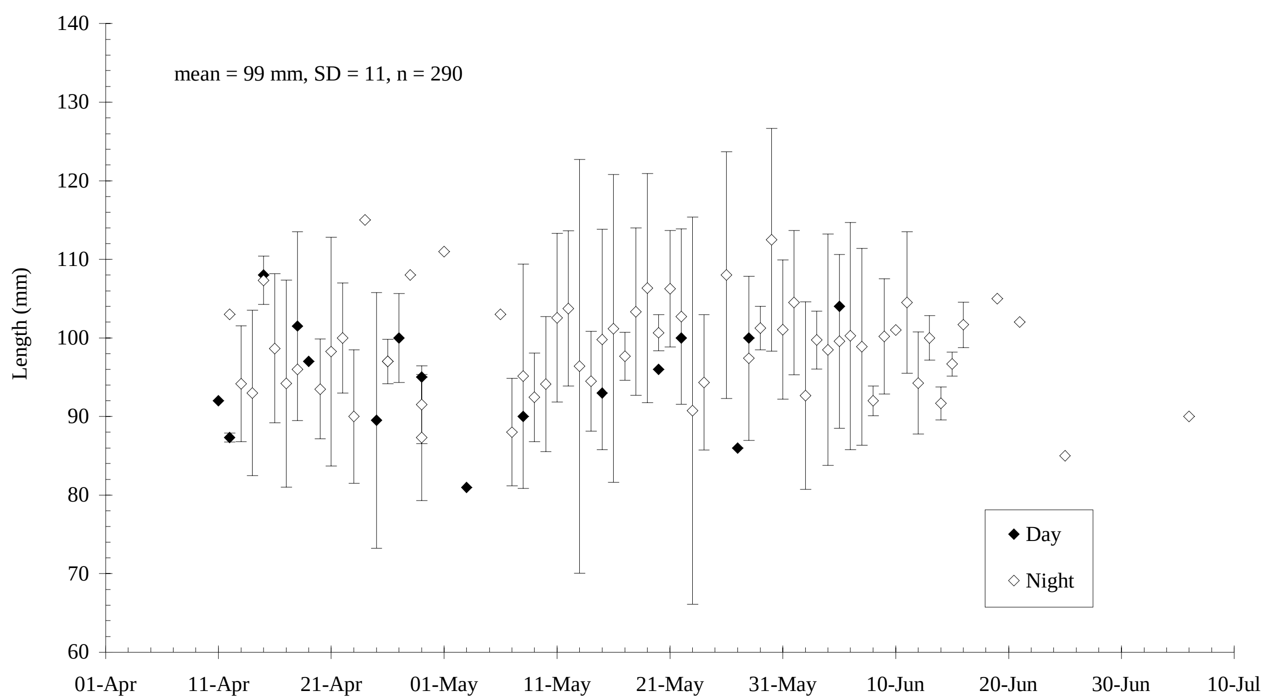


Figure 14
Mean (±1 SD) Weight-at-date of 1+ Chinook Salmon Captured in Traps
at Diamond Island, Nechako River, 1996

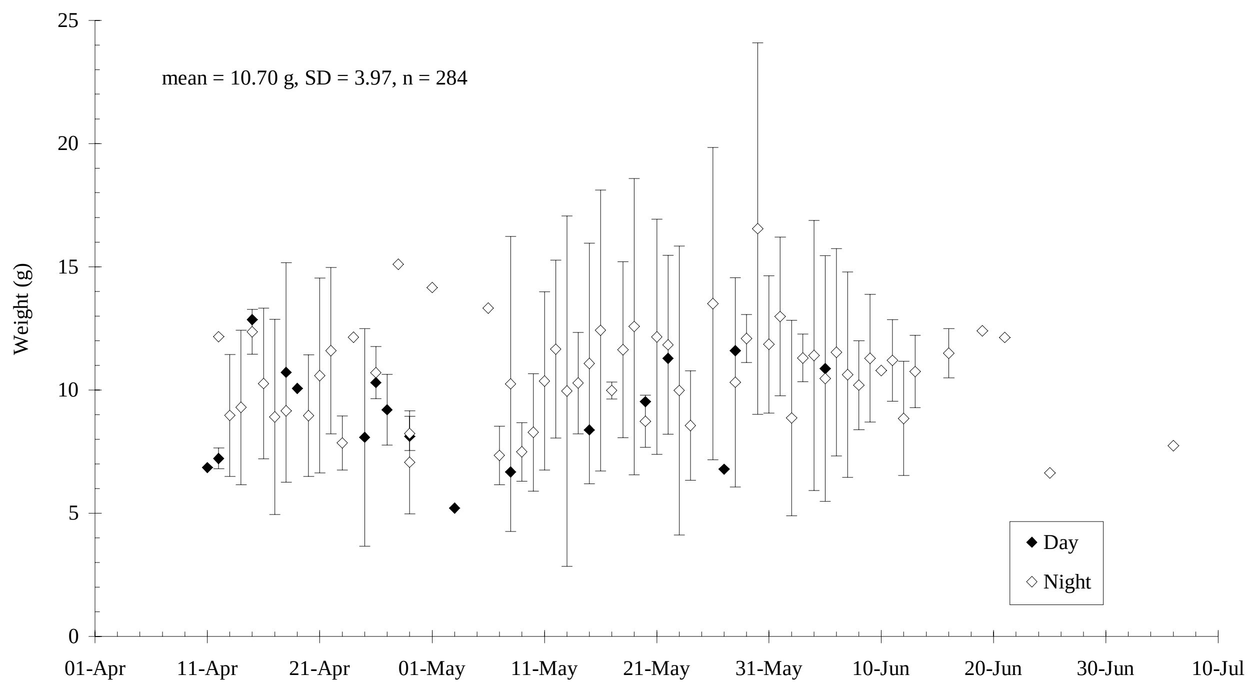


Figure 15
Mean (±1 SD) Condition-at-date of 0+ Chinook Salmon Captured in Traps
at Diamond Island, Nechako River, 1996

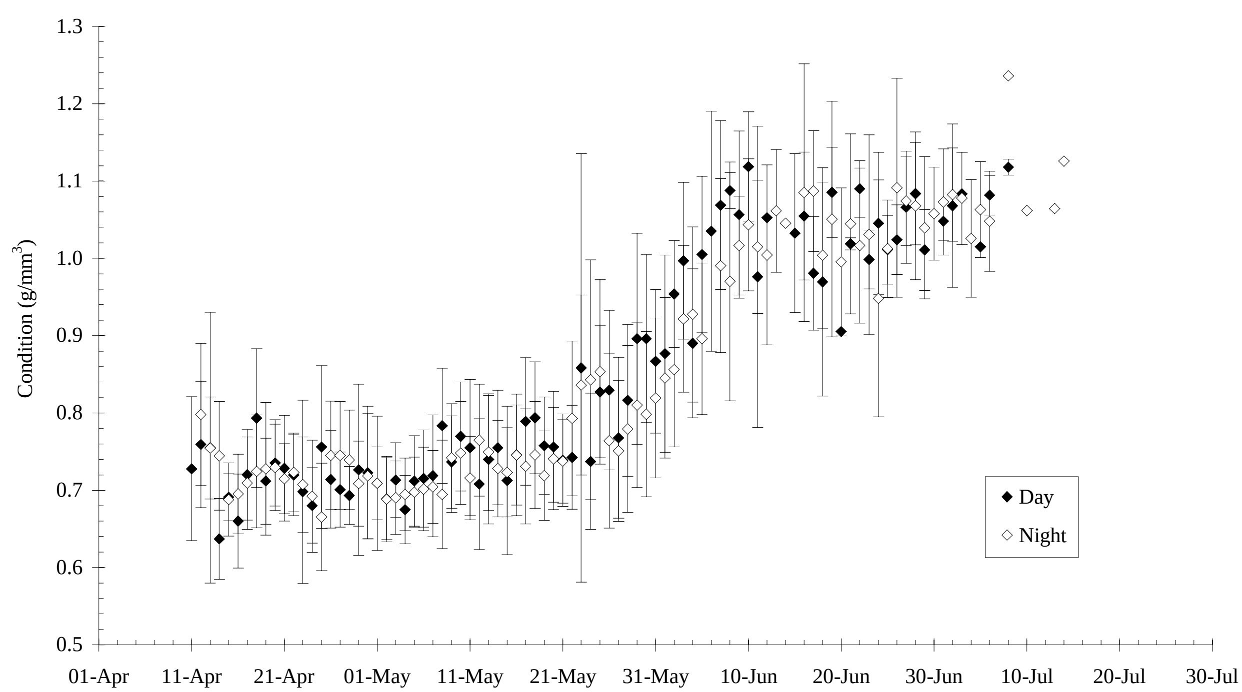
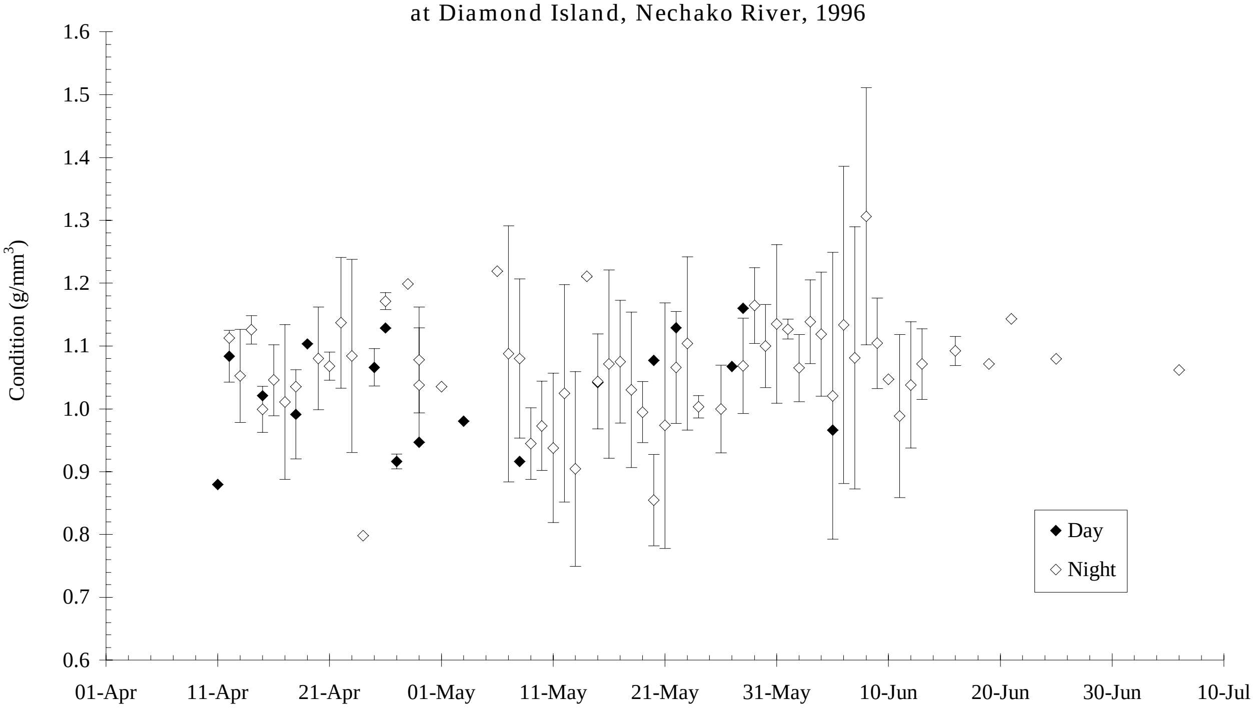


Figure 16
Mean (±1 SD) Condition-at-date of 1+ Chinook Salmon Captured in Traps
at Diamond Island, Nechako River, 1996



Catches of Chinook Salmon

Electrofishing/All Species

A total of 1,248 electrofishing sweeps were made along the margins of the upper Nechako River from April 12 to November 6, 1996. The average area covered by a sweep was 133 m^2 (SD = 122). A total of 57,610 fish from 14 species or families were captured and then released (Table 1). Redsided shiner (*Richardsonius balteatus*) was the most common species (n = 16,499 or 28.6% of the total number) and bull trout (*Salvelinus confluentus*) was the least common species (n = 4 or 0.007%). Juvenile chinook salmon was the second most common species (n = 15,314 or 26.6%).

Electrofishing/0+ Chinook

A total of 15,016 0+ chinook were captured by electrofishing (Table 2), of which 19.47% were taken during daylight and the rest were taken at night. Catch-per-unit-effort (CPUE) of electrofishing catches of 0+ chinook ranged from 0.0 to 271.7 fish / 100 m^2. The variance of mean monthly CPUE increased directly with mean monthly CPUE, indicating that CPUE was not normally distributed. Therefore, the $\log_e$(CPUE + 1) transformation was used to stabilise the variance (Sokal and Rohlf 1981).

Temporal Distribution of CPUE

Plots of mean monthly $\log_e$(CPUE + 1) on date showed that maximum density of 0+ chinook salmon occurred in mid-May for day catches and mid-June for night catches (Table 2 and Figure 17). After the date of maximum density, $\log_e$(CPUE + 1) decreased linearly with date through to November.

To calculate the average rate of loss of 0+ chinook density with time, individual measurements of $\log_e$(CPUE + 1) were regressed on day of year for day and night catches separately. Data collected in April were excluded because it fell on the ascending left-hand limb of the catch curves. The predictive regressions were highly significant ($P<0.001$). The percent of variance explained by the regressions did not exceed 35% because of the large variation in $\log_e$(CPUE + 1) due to non-uniform distribution of chinook along the river.

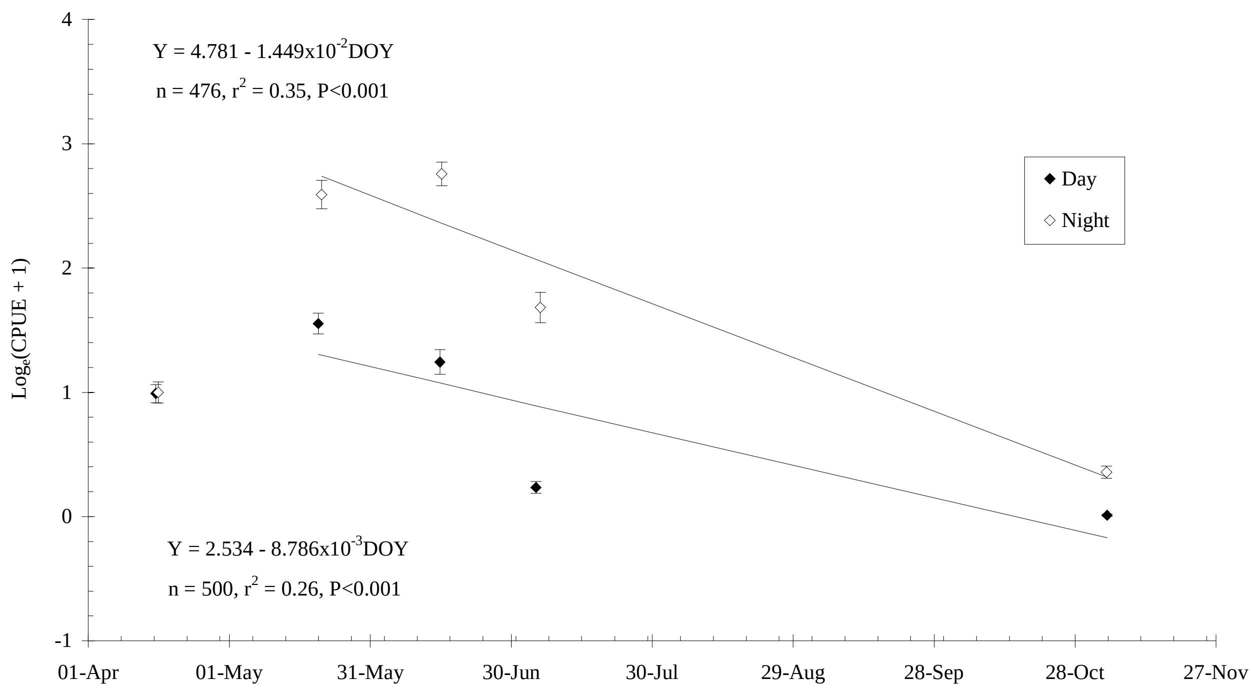
Table 1
Number of Fish Captured in the Upper Nechako River, 1996, by Electrofishing

Species	Scientific Name	Adult				Juvenile				Total			
		Day	Night	Total	Percent	Day	Night	Total	Percent	Day	Night	Total	Percent
Redsided shiner	*Richardsonius balteatus*	988	1287	2275	3.949	4897	9327	14224	24.690	5885	10614	16499	28.639
Chinook salmon	*Oncorhynchus tshawytscha*	0	0	0	0.000	2950	12364	15314	26.582	2950	12364	15314	26.582
Northern squawfish	*Ptychocheilus oregonensis*	86	6	92	0.160	1184	6614	7798	13.536	1270	6620	7890	13.696
Largescale sucker	*Catostomus macrocheilus*	15	15	30	0.052	1888	3908	5796	10.061	1903	3923	5826	10.113
Leopard dace	*Rhinichthys falcatus*	276	399	675	1.172	1835	1890	3725	6.466	2111	2289	4400	7.638
Longnose dace	*Rhinichthys cataractae*	84	139	223	0.387	3409	495	3904	6.777	3493	634	4127	7.164
Sculpins (General)	*Cottidae*	217	674	891	1.547	630	658	1288	2.236	847	1332	2179	3.782
Rocky mountain whitefish	*Prosopium williamsoni*	11	121	132	0.229	33	760	793	1.376	44	881	925	1.606
Rainbow trout	*Oncorhynchus mykiss*	6	29	35	0.061	48	184	232	0.403	54	213	267	0.463
Peamouth chub	*Mylocheilus caurinus*	0	1	1	0.002	61	10	71	0.123	61	11	72	0.125
Coho salmon	*Oncorhynchus kisutch*	0	0	0	0.000	36	22	58	0.101	36	22	58	0.101
Burbot	*Lota lota*	0	8	8	0.014	6	20	26	0.045	6	28	34	0.059
Sockeye salmon	*Oncorhynchus nerka*	0	0	0	0.000	8	7	15	0.026	8	7	15	0.026
Bull trout	*Salvelinus confluentus*	0	2	2	0.003	1	1	2	0.003	1	3	4	0.007
Total		1683	2681	4364	7.575	16986	36260	53246	92.425	18669	38941	57610	100.000

Table 2
Mean Monthly Electrofishing Catch-Per-Unit-Effort (CPUE) of Juvenile Chinook Salmon in the Nechako River, 1996

Date	Number 0+	Number 1+	n	0+ CPUE mean	0+ CPUE SD	1+ CPUE mean	1+ CPUE SD	0+ Log_e(CPUE+1) mean	0+ Log_e(CPUE+1) SD	1+ Log_e(CPUE+1) mean	1+ Log_e(CPUE+1) SD
Day											
15-Apr	480	15	136	2.948	4.005	0.087	0.432	0.9910	0.8530	0.0506	0.2126
19-May	1223	11	137	6.670	9.112	0.056	0.280	1.5526	0.9864	0.0360	0.1659
14-Jun	1126	0	137	6.597	12.757	0.000	0.000	1.2443	1.1567	0.0000	0.0000
05-Jul	93	0	121	0.585	1.786	0.000	0.000	0.2350	0.5331	0.0000	0.0000
03-Nov	2	0	105	0.016	0.114	0.000	0.000	0.0115	0.0833	0.0000	0.0000
sum	2924	26									
Night											
15-Apr	592	242	136	3.690	5.837	1.398	3.179	0.9986	0.9937	0.4760	0.7557
20-May	5242	27	137	29.026	43.534	0.165	0.490	2.5916	1.3420	0.1028	0.2776
15-Jun	4539	3	137	27.249	38.030	0.021	0.146	2.7579	1.1230	0.0148	0.1001
06-Jul	1650	0	110	12.355	24.990	0.000	0.000	1.6819	1.2907	0.0000	0.0000
03-Nov	69	0	92	0.610	0.873	0.000	0.000	0.3577	0.4657	0.0000	0.0000
sum	12092	272									
Total	15016	298									

Figure 17
Mean (±1 SE) Monthly Electrofishing Catch-per-unit-effort (CPUE) of 0+ Chinook Salmon in the Nechako River, 1996



The night-time rate of loss of $\log_e(CPUE + 1)$ of 1.45 % / d (SE = 0.066) was 1.6 times greater than the daytime rate of loss of 0.89 % / d (SE = 0.090) (Figure 17). The difference in rates was highly significant ($t_{974} = 5.134$, $P<0.001$). The cause of the day-night difference in loss rates was a day-night difference in mean $\log_e(CPUE + 1)$ in May, June and July. The main reason for the difference was that young chinook in spring were far more vulnerable to capture at night than during day, either because they were less able to detect and avoid the gear at night than during the day or because their distribution across habitats was different between night and day. That is, fry may have sought refuge during the day in habitat that was difficult to sample, but they came out of refuge at night and were therefore caught in greater numbers. This meant that estimates of mean night $\log_e(CPUE + 1)$ in May and June were more realistic, accurate and higher than estimates of mean day $\log_e(CPUE + 1)$ over the same time period. However, by November the vulnerability of chinook fry to capture was the same at night as it was during the day, either because the fish were large enough to avoid capture at night as well as they were able to avoid capture during the day or because there was less of a day-night difference in habitat choice.

The differences between the predicted $\log_e(CPUE + 1)$ of day and night catches at the beginning and end of the regression period provide a range of estimates of the day-night difference in electrofishing catchability of 0+ chinook. On May 19 to 20, 1996, the night-day difference was 1.039 (= 2.592 - 1.553), which means that night electrofishing caught an average of 3 times (= exp(1.039)) more 0+ chinook than day electrofishing. On November 3, 1996, night electrofishing caught an average of 1.4 times (= exp(0.358 - 0.011)) more 0+ chinook than day electrofishing.

Spatial Distribution of CPUE

Figures 18 and 19 and Appendix 3 show the monthly distribution of mean $\log_e(CPUE + 1)$ of 0+ chinook salmon over the upper 100 km of the Nechako River, aggregated into 10 km intervals.

In April, day sampling showed that the greatest CPUE of 0+ chinook was 20.0-29.9 km from Kenney Dam, while the lowest CPUE was measured 80.0-89.9 km from the Dam. A second peak of high CPUE was observed in the 70-79.9 km interval. Night sampling in April showed a similar pattern. This pattern reflected the spatial distribution of spawning in the upper Nechako River.

In May, the bimodal distribution of CPUE was still apparent in both day and night sampling, but there was an increase in density of 0+ chinook in the 10.0-19.9 km interval. This change was due to colonisation of upstream habitat by juveniles that had emerged further downstream. It may also have been due to late emergence of fry in the 10.0-19.9 km interval.

By June, the upstream peak had moved much closer to the Dam-the greatest densities were recorded in the 10.0-19.9 km interval in both day and night catches. By July, the greatest night densities were recorded in the 0.0-9.9 km interval.

By November, the 0+ chinook remaining in the river had redistributed themselves roughly evenly along the length of the river.

To quantify these observations, the monthly x-centroid, x_m (km), or weighted center of distribution of 0+ chinook along the longitudinal (x-axis) of the river, was calculated as:

$$(7) \quad x_m = \sum^{i} (CPUE_i . x_i) / \sum^{i} CPUE_i$$

where $CPUE_i$ = CPUE at site i, and x_i = longitudinal distance (km) from Kenney Dam to site i. The centroids confirmed the upstream migration of juvenile chinook towards Kenney Dam between May and June followed by downstream movement in fall as resident fish searched for overwintering habitat (Table 3).

Electrofishing/1+ Chinook

A total of 298 1+ chinook were captured by electrofishing (Table 2), of which 8.72% were taken during daylight and the rest were taken at night. CPUE of 1+ chinook ranged from 0.0 to 20.6 fish / 100 m^2. It decreased so rapidly with date that most, if not all, 1+ fish had left the upper Nechako River by the end of June (Table 2 and Figure 20). Greater numbers of 1+ fish were caught at night than during the day.

Figure 18
Mean (±1 SD) Monthly Catch-per-unit-effort (CPUE) of 0+ Chinook Salmon,
Nechako River, 1996: Electrofishing (day)

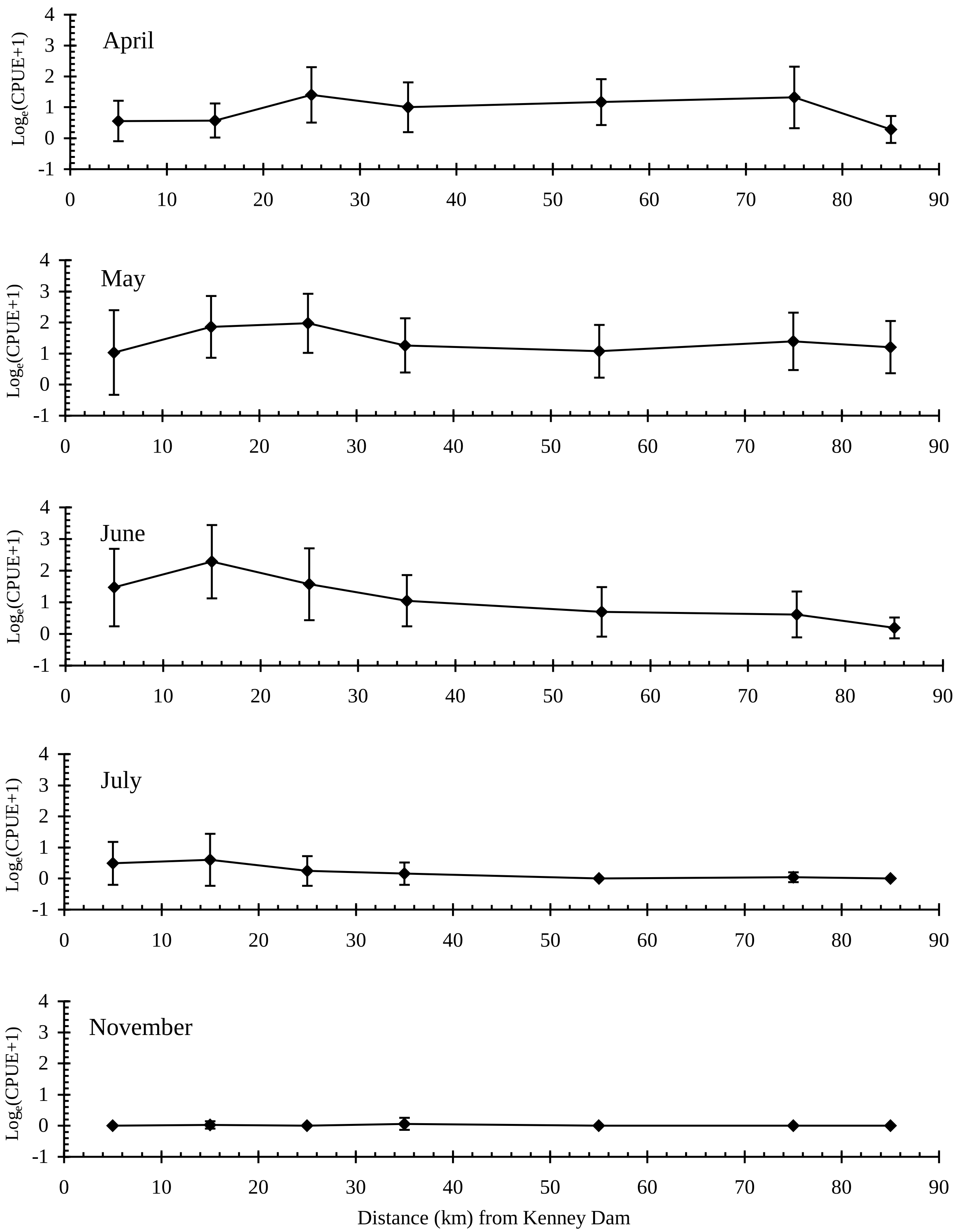


Figure 19
Mean (±1 SD) Monthly Catch-per-unit-effort (CPUE) of 1+ Chinook Salmon,
Nechako River, 1996: Electrofishing (night)

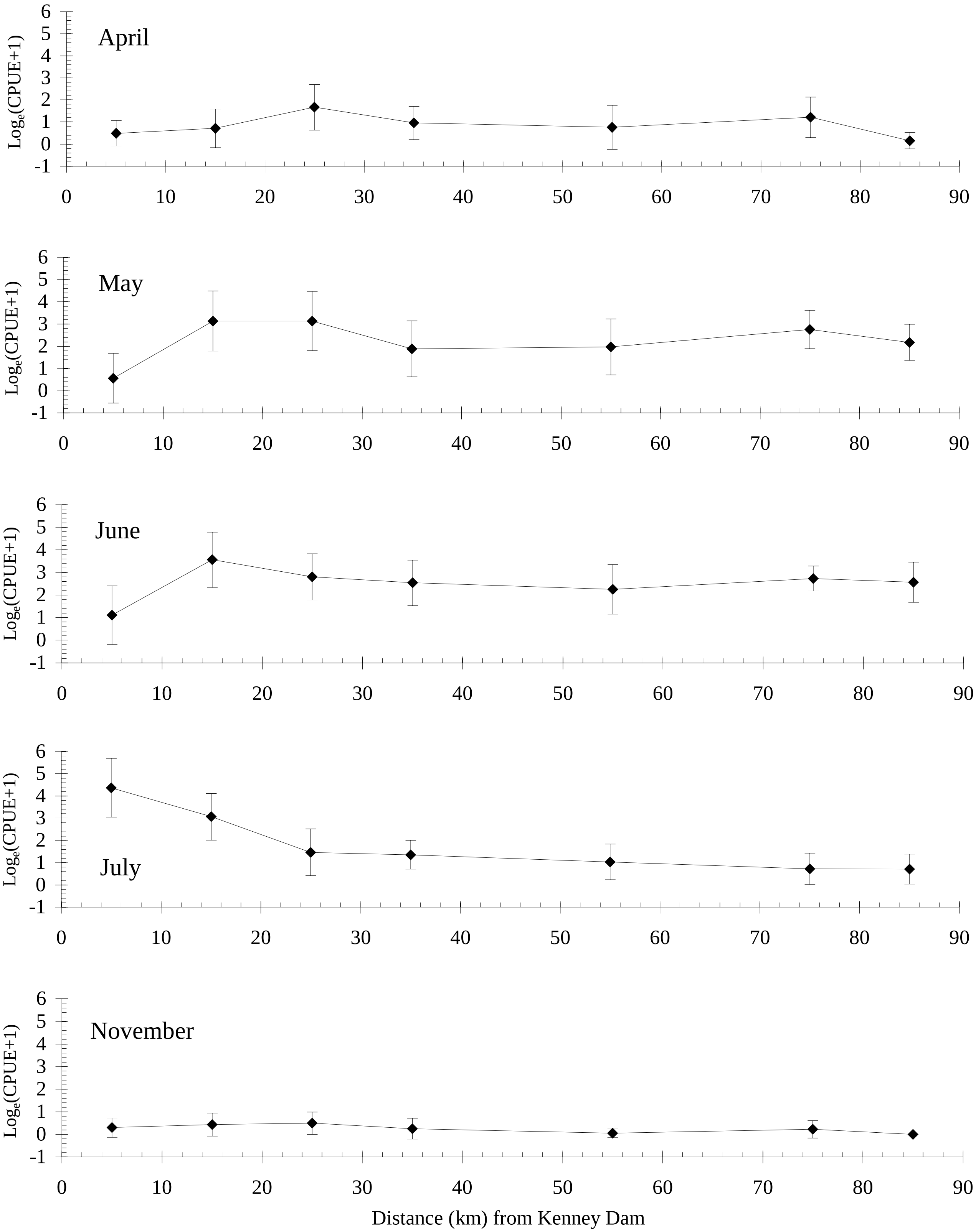


Table 3
Centroids of Juvenile Chinook Salmon Along the Longitudinal Axis of the Nechako River, 1996

Date	Centroid (km) 0+	1+
Day		
15-Apr	39.9	26.0
19-May	32.1	29.6
14-Jun	22.0	-
05-Jul	18.0	-
03-Nov	25.5	-
Night		
15-Apr	34.0	35.9
20-May	29.9	39.1
15-Jun	30.7	17.1
06-Jul	17.8	-
03-Nov	25.6	-

An average rate of loss of 1+ chinook at night over May, June and July of 0.77 %/d (SE = 0.094) was obtained by regressing mean monthly $\log_e(\text{CPUE} + 1)$ against the three dates with non-zero catches (Figure 20).

An average rate of loss of 1+ chinook during the day could not be calculated using regression techniques due to a lack of day captures in June. Instead, a total instantaneous loss rate of night catches of 0.042 %/d over April and May was calculated as:

(8) $$\text{loss rate} = -[100/(t_{i+1} - t_i)][\log_e(\text{CPUE} + 1)_{i+1} - \log_e(\text{CPUE} + 1)_i],$$

where t_i = mid-date of month i, and t_{i+1} = mid-date of the following month.

Electrofishing CPUE for 1+ chinook showed that these fish also tended to concentrate in the upper river in April and May (Figure 21). The centroids of 1+ chinook were all in reach 2 (Table 3).

Diamond Island Traps

A total of 27,541 juvenile chinook salmon were caught by traps at Diamond Island in 1996, of which 78.56% were caught in the three RSTs, 12.93% were caught in the IPT, and 8.51% were caught by the three fyke nets (Table 4). Over 98% of all juveniles were 0+ fish. Over 98% of all 1+ chinook were caught by the RSTs-less than 2% were caught by fyke nets and the IPT.

Figure 20
Mean (±1 SE) Monthly Electrofishing CPUE of 1+ Chinook Salmon, Nechako River, 1996

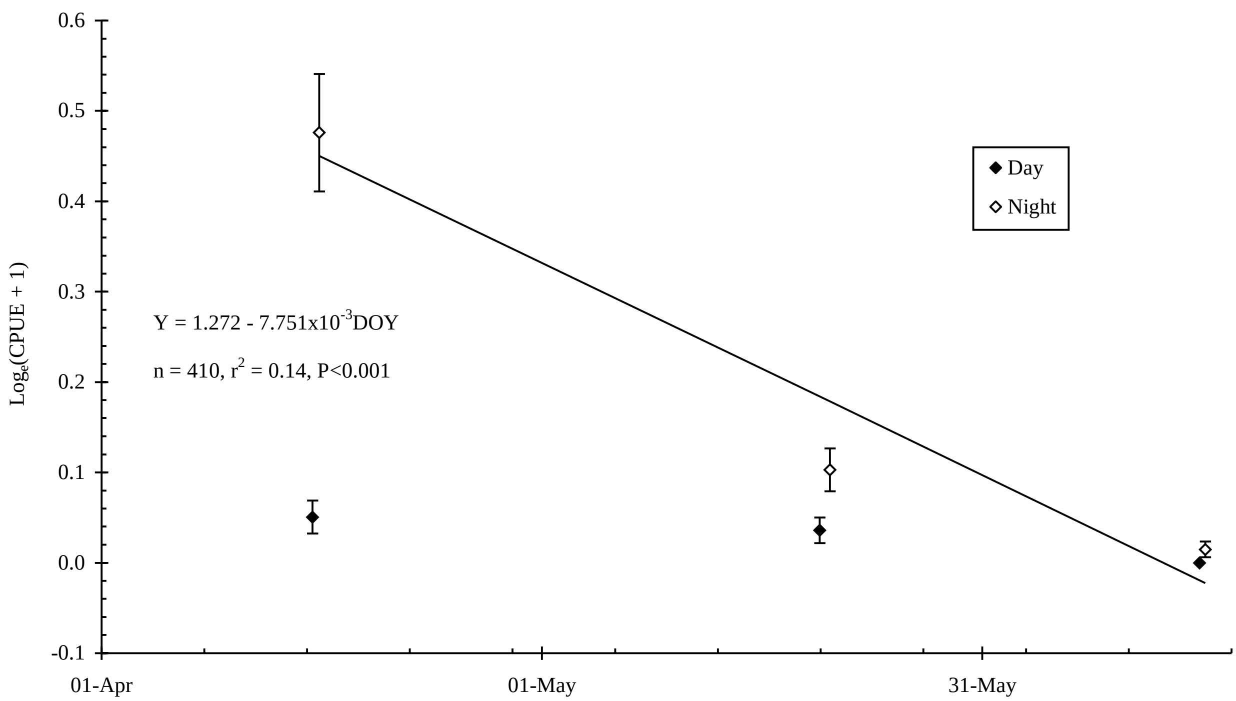


Figure 21
Spatial Distribution of 1+ Chinook Salmon in the Upper Nechako River, 1996: Electrofishing

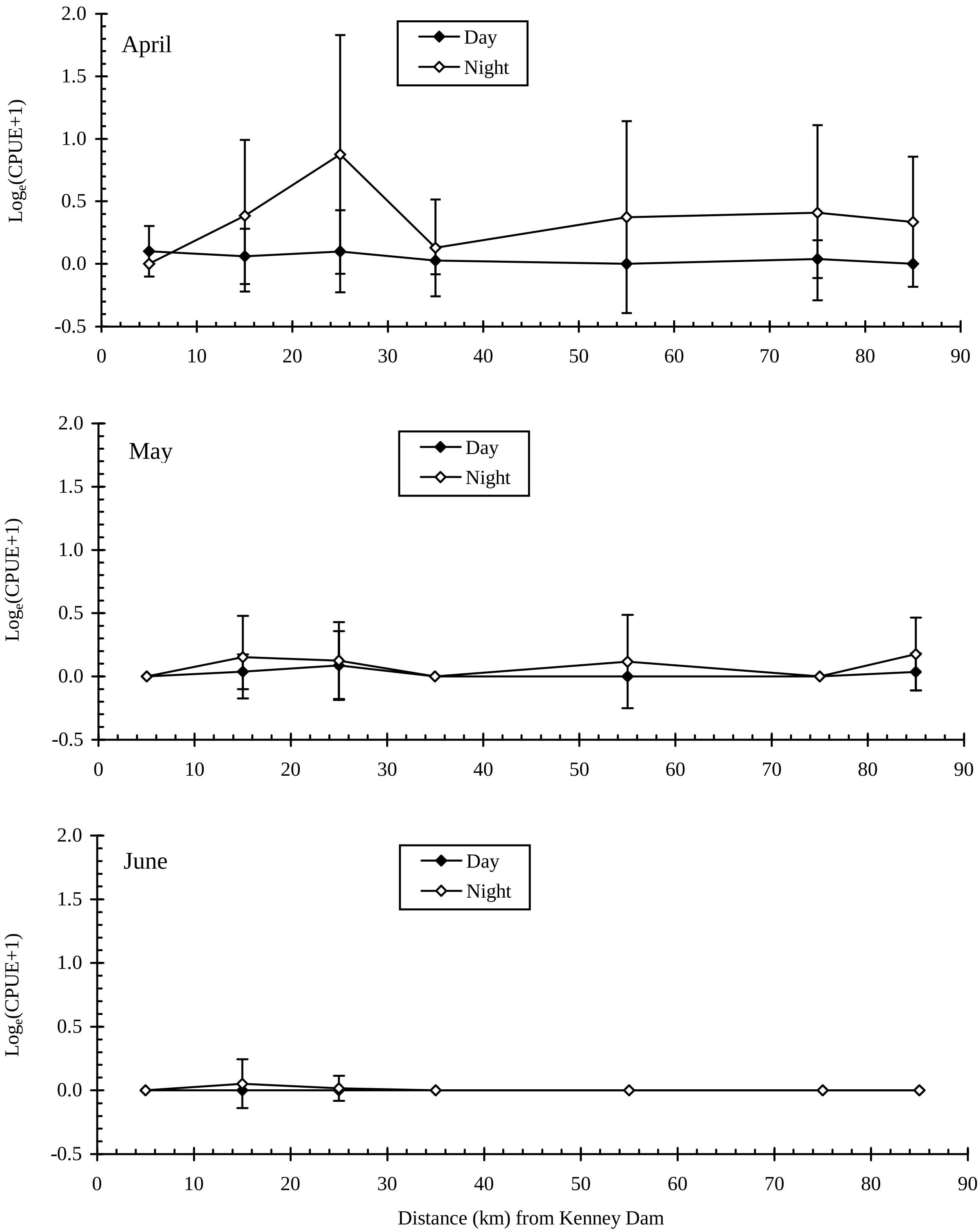


Table 4
Numbers of Juvenile Chinook Salmon Caught in Traps at Diamond Island, Nechako River, 1996

Trap type	Trap number	Chinook 0+ Day	Chinook 0+ Night	Chinook 0+ Total	Chinook 1+ Day	Chinook 1+ Night	Chinook 1+ Total	Total
Fyke	1	25	415	440	0	0	0	440
	2	29	663	692	0	0	0	692
	3	49	1164	1213	0	0	0	1213
	subtotal	103	2242	2345	0	0	0	2345
IPT	0	172	2212	3558	0	3	3	3561
RST	1	137	883	3558	5	141	146	3704
	2	244	1670	7116	8	101	109	7225
	3	624	1516	10674	8	24	32	10706
	subtotal	1005	4069	21348	21	266	287	21635
	Total	1280	8523	27251	21	269	290	27541

Methods of Analysis

All analyses of fyke net catches and IPT catches presented below were carried out on the numbers only-no adjustments were made for variation in flow through the traps. However, all analyses of RST catches were based on catches expanded by the ratio of river flow to trap flow according to equation (2).

The frequency distributions of catches of juvenile chinook salmon at Diamond Island were highly non-normal, which meant that they required $\log_e$-transformation before analysis. However, the $\log_e$(number) transformation, rather than the $\log_e$(number + 1) transformation, was used for fyke net, IPT and RST catches because the population expansion procedure that was applied to RST catches effectively divided catches into two clusters of data: zero catches and non-zero catches. Non-zero catches were expanded by a factor of about 100 because most RSTs sampled about 1% of the daily flow of the river past Diamond Island, but zero catches were expanded to population estimates of zero-in effect they were not expanded at all. To avoid the problem of treating two separate clusters of data together, all zero catches of all Diamond Island traps were excluded from the analyses presented below.

Fyke Net Catches

To determine which factors were responsible for changes in fyke net catches, a standard three-way ANOVA of $\log_e$(number) with fyke net (three classes: fyke nets 1, 2 and 3), time of day (two classes: day and night), and date (two classes: April and May) was conducted. The ANOVA showed that there was a highly significant effect of time of day ($F_{1,147}$ = 46.1, P<0.001), but no significant effects of date ($F_{1,147}$ = 0.621, P = 0.431), trap number ($F_{2,147}$ = 1.8, P = 0.176) or the interactions of time of day, date, and net number (Table 4 and Figure 22). The effect of time of day was due to greater catches at night than during the day, presumably due to greater net avoidance during the day than at night. The ANOVA did not detect a date effect because the selection of date categories fortuitously corresponded to bisecting the catch curve.

Night catches showed two maxima; catches decreased from a peak in early April to a minimum in early May, rose to a second peak in late May and then decreased to zero by the beginning of June. The decrease in catches over April is unexplained. The decrease in catches in late May was due to three factors: (a) avoidance of the traps by juveniles; (b) a shift in preferred habitat from the margins of the river, where the fyke nets were placed, towards the mid-channel where there were no fyke nets; and (c) natural mortality.

In summary, fyke net catches showed that a significant portion of the total population of 0+ chinook salmon captured at Diamond Island moved in shallow water down the left margin of the Nechako River at Diamond Island. That finding supported the assumption that the wing placed between RST 3 and the left margin of the river in 1991 was directing fish into RST 3.

Inclined Plane Trap Catches

IPT numbers showed many of the same patterns seen in fyke net numbers (Figure 23); a two-way ANOVA of $\log_e$-transformed IPT numbers found significantly greater catches at night than during the day ($F_{1,91}$ = 74.4, P<0.001), no significant effect of date

Figure 22
Number of 0+ Chinook Salmon Captured at Diamond Island, Nechako River, 1996: Fyke Nets

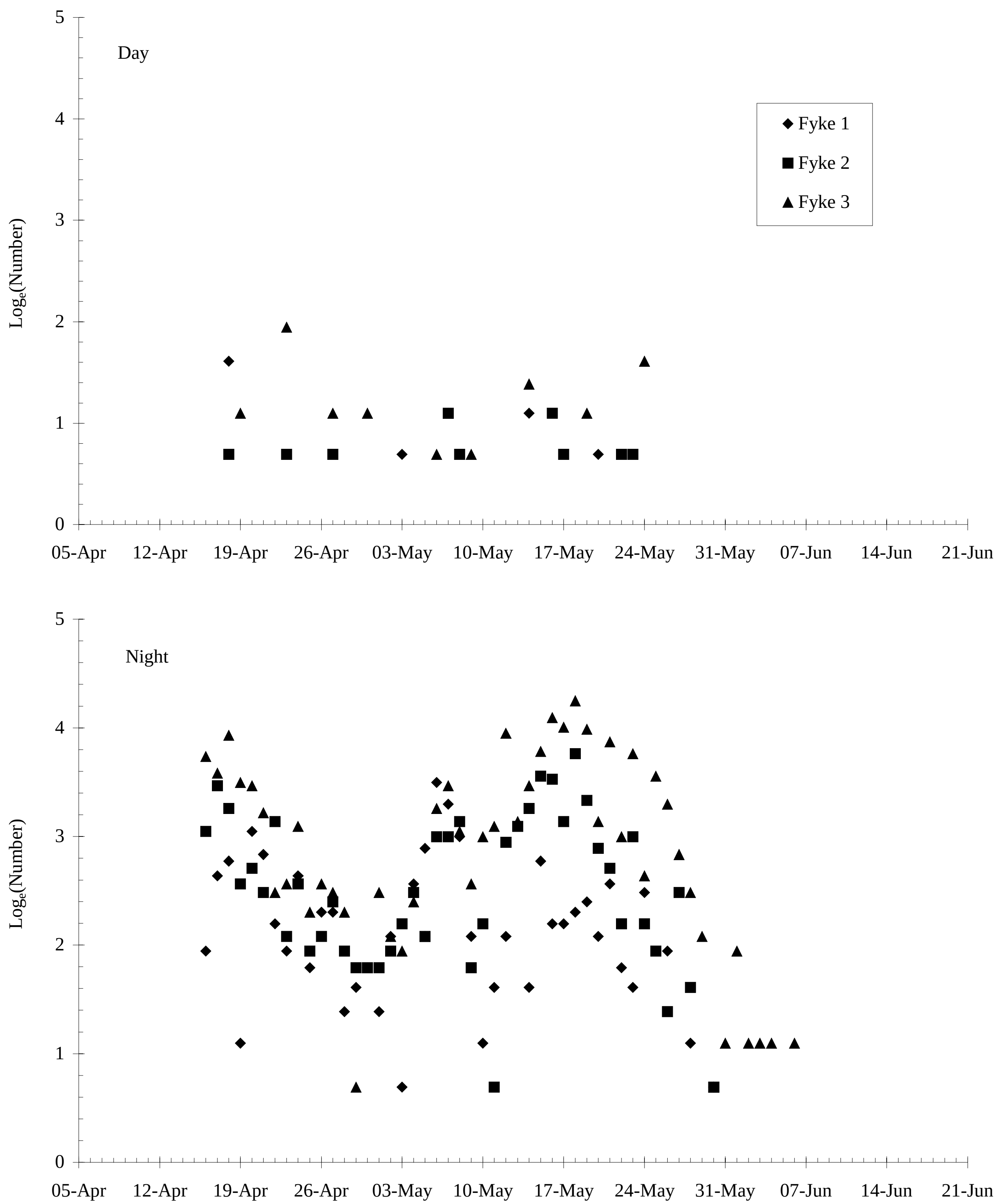
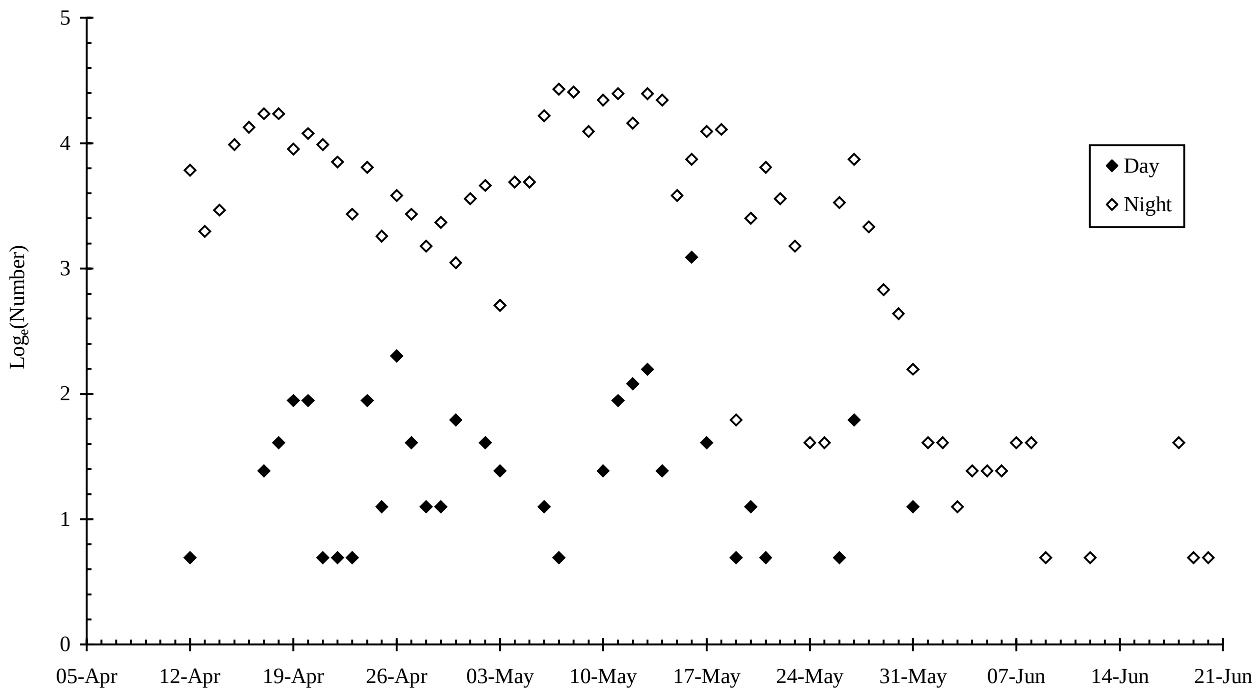


Figure 23
Number of 0+ Chinook Salmon Captured at Diamond Island, Nechako River, 1996: Inclined Plane Trap



($F_{1,91}$ = 3.2, P = 0.076), and a barely significant interaction of time of day and date ($F_{1,91}$ = 4.5, P = 0.036). Substantially more fish were caught at night than during the day due to daytime net avoidance and to day-night differences in the distribution of fish over habitat types (i.e., greater numbers of juveniles migrating downstream at night than during the day).

Diamond Island Rotary Screw Traps/0+ Chinook

Temporal Variance of Estimated Number

To determine which factors were responsible for changes in volume-adjusted numbers of 0+ chinook salmon caught in rotary screw traps, a standard three-way ANOVA of $\log_e$(number) on RST (three classes corresponding to the three traps), date (three classes: April, May and June-July), and time of day (two classes: day and night), was conducted. There were highly significant differences in $\log_e$(number) among traps ($F_{2,398}$ = 39.3, P<0.001), among dates ($F_{2,398}$ = 27.4, P<0.001), and between day and night ($F_{1,398}$ = 123.2, P<0.001), and there were highly significant (P<0.001) interactions of trap number, date and time of day.

The date effect was due to variation in catch rates over the April to July period caused by recruitment of juveniles to the traps over April and early May followed by loss of juveniles over late May, June to July due to a combination of downstream dispersal, natural mortality, and changes in the catchability of the traps as chinook fry grew in size and increased their ability to avoid capture (Figures 24 and 25).

The time effect was caused by substantially greater catches at night than during the day due to a preference for night-time movement and to avoidance of traps during the day (Figures 24 and 25).

The catch curves for the weighted average volume-expanded numbers measured during the day showed the typical three-part dome-shaped pattern observed in previous years. There was an initial period of increasing catches in April and early May as juveniles were recruited to Diamond Island from upstream emergence sites. Catches reached a peak in the third week of May, and then decreased over June and July due to a combination of downstream dispersal, natural mortality, and changes in the catchability of the traps.

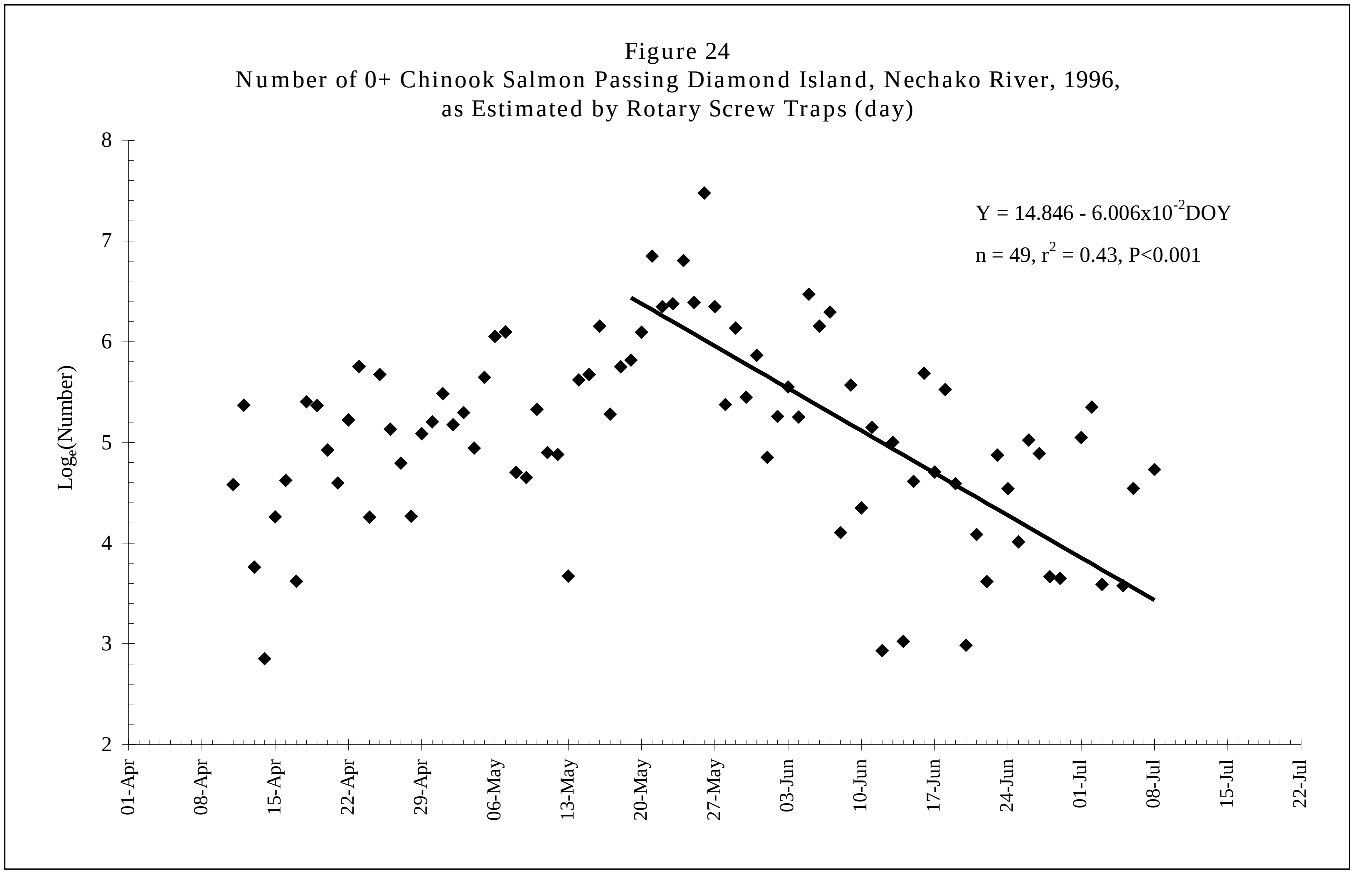


Figure 24
Number of 0+ Chinook Salmon Passing Diamond Island, Nechako River, 1996,
as Estimated by Rotary Screw Traps (day)
Y = 14.846 - 6.006x10^-2 DOY
n = 49, r^2 = 0.43, P<0.001
Log_e(Number)
01-Apr
08-Apr
15-Apr
22-Apr
29-Apr
06-May
13-May
20-May
27-May
03-Jun
10-Jun
17-Jun
24-Jun
01-Jul
08-Jul
15-Jul
22-Jul

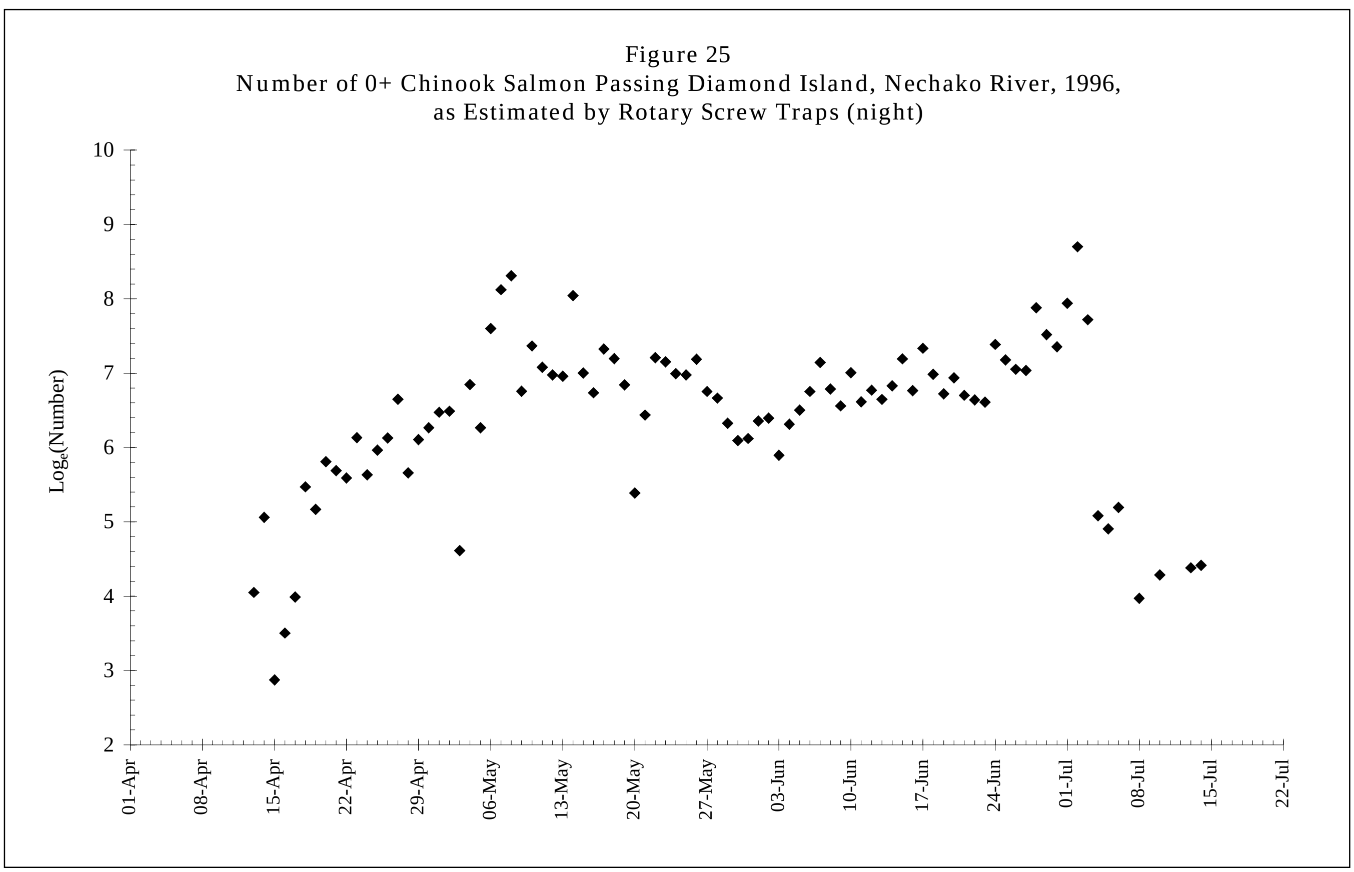


Figure 25
Number of 0+ Chinook Salmon Passing Diamond Island, Nechako River, 1996,
as Estimated by Rotary Screw Traps (night)
Log_e(Number)
01-Apr
08-Apr
15-Apr
22-Apr
29-Apr
06-May
13-May
20-May
27-May
03-Jun
10-Jun
17-Jun
24-Jun
01-Jul
08-Jul
15-Jul
22-Jul

The pattern was different for night catches: the dome of the catch curve occurred in mid-May rather than late-May, and there was an unexplained increase in night catches at the end of June and the beginning of July. The increase may be related to relatively large flows occurring at that time, however that explanation does not account for the lack of such an increase in the day catches.

To estimate the time rates of loss and day-night differences in catchability of the traps, regressions of $\log_e$(weighted average number) on day of year (DOY) were fit to the declining right-hand limb of the catch curves for day and night separately. May 19 (DOY = 140) was chosen as the peak of the two catch curves and the beginning date of the regression period, based on Figures 24 and 25 plus the estimated dates of the end of the fry emergence period from growth analyses. The instantaneous rate of loss for day catches was 6.01 % / d^{-1} (SE = 0.990), which was seven times greater than the loss rates estimated from day electrofishing catches. The regression for night catches was not significant ($P = 0.076$).

A total of 5074 0+ chinook salmon were caught at the rotary screw traps in 1996 (Appendix 4). Summing the volume-expanded number of 0+ chinook that were estimated to have passed Diamond Island over the study period produced totals ranging from 67,753 for trap 1 to 136,664 for trap 3 (Appendix 4). The total index number of 0+ chinook that passed Diamond Island, weighted by the average percent of river flow filtered by each trap, was 105,576. That was the third greatest number of outmigrating 0+ chinook that has been estimated over the last 6 years (Table 7), based on a sampling period restricted to April-July.

Diamond Island Rotary Screw Traps/1+ Chinook

All analysis of 1+ chinook salmon was restricted to the rotary screw trap data because so few 1+ chinook were caught in fyke nets or the IPT. There were no obvious temporal trends of $\log_e$(number) with date (Figure 26), apart from a maxima of night numbers in the second half of May. Mean $\log_e$(number) was much greater at night than during the day.

A total of 287 1+ chinook were captured in the rotary screw traps which, when expanded by the percentage of river flow sampled by the traps, was equivalent to an index total of 5,349 chinook that passed Diamond Island in 1996 (Appendix 4).

Diamond Island Rotary Screw Traps/Other Fishes

A total of 11,360 fish from 13 species or families were captured by the rotary screw traps in 1996 (Table 5). Chinook salmon was the most common species, making up 47.19% of all fish. The three most common non-salmonid fishes were northern squawfish, largescale sucker, and redsided shiner. The least common fish was coho salmon-only one juvenile was caught in 1996.

Comparison with Previous Years

Daily winter and spring temperatures recorded at Bert Irvine's were among the lowest ever recorded since 1987 (Figure 27). In fact, temperatures at Bert Irvine's did not approach the 9-year average until October.

Unlike temperatures, the flows of the upper Nechako River at Cheslatta Falls followed the average trend for 1987 to 1995 over the winter, spring and early- to mid-summer (Figure 28). However, the 1996 flow pattern differed substantially from the 1987-1995 trend in September to November due to the large spill required to prepare the Reservoir for 1997 freshet flows. Since the important biological events for most juvenile chinook salmon that emerged in the upper Nechako River occurred prior to September (since most juveniles had left the upper river by that time), this spill could not be responsible for the biological differences between 1996 and 1987 to 1995.

Plots of the mean length-at-date and weight-at-date of 0+ chinook salmon calculated from the electrofishing surveys (Figure 29), and from rotary screw catches at Diamond Island (Figure 30), both show that the mean size of 1996 fry was consistently lower than that of any of the previous six years. (Condition-at-date of the Diamond Island catches was also lower than the mean for previous years, but condition-at-date of the electrofished fish fell within the range of other years.) This finding may be due either to low growth rates of the 1996 fry or to a delayed emergence in the spring of 1996. To determine which is correct, the mean length-at-age and weight-at-age predicted by the growth curves for electrofished fish were compared (Table 6 and Figures 31 and 32). These plots show clearly that juvenile chinook grew as fast (or faster) in 1996 as they did in any previous year, which means that the low size-at-age of the 1996 fish

Table 5
Number of Fish Captured at Diamond Island, Nechako River, 1996, by Rotary Screw Traps

		Adult				Juvenile				Total			
Species	Scientific Name	Day	Night	Total	Percent	Day	Night	Total	Percent	Day	Night	Total	Percent
Chinook salmon	*Oncorhynchus tshawytscha*	0	0	0	0.00	1026	4335	5361	47.19	1026	4335	5361	47.19
Northern squawfish	*Ptychocheilus oregonensis*	0	23	23	0.20	78	1822	1900	16.73	78	1845	1923	16.93
Largescale sucker	*Catostomus macrocheilus*	3	29	32	0.28	161	1521	1682	14.81	164	1550	1714	15.09
Redsided shiner	*Richardsonius balteatus*	35	319	354	3.12	137	762	899	7.91	172	1081	1253	11.03
Leopard dace	*Rhinichthys falcatus*	41	141	182	1.60	57	284	341	3.00	98	425	523	4.60
Sockeye salmon	*Oncorhynchus nerka*	0	0	0	0.00	32	144	176	1.55	32	144	176	1.55
Longnose dace	*Rhinichthys cataractae*	8	15	23	0.20	23	121	144	1.27	31	136	167	1.47
Peamouth chub	*Mylocheilus caurinus*	0	0	0	0.00	5	87	92	0.81	5	87	92	0.81
Rainbow trout	*Oncorhynchus mykiss*	0	5	5	0.04	7	60	67	0.59	7	65	72	0.63
Rocky mountain whitefish	*Prosopium williamsoni*	0	6	6	0.05	7	32	39	0.34	7	38	45	0.40
Sculpins (General)	*Cottidae*	6	13	19	0.17	1	11	12	0.11	7	24	31	0.27
Burbot	*Lota lota*	0	2	2	0.02	0	0	0	0.00	0	2	2	0.02
Coho salmon	*Oncorhynchus kisutch*	0	0	0	0.00	0	1	1	0.01	0	1	1	0.01
Total		93	553	646	5.69	1534	9180	10714	94.31	1627	9733	11360	100.00

Figure 26
Number of 1+ Chinook Salmon Passing Diamond Island, 1996,
as Estimated by Rotary Screw Traps

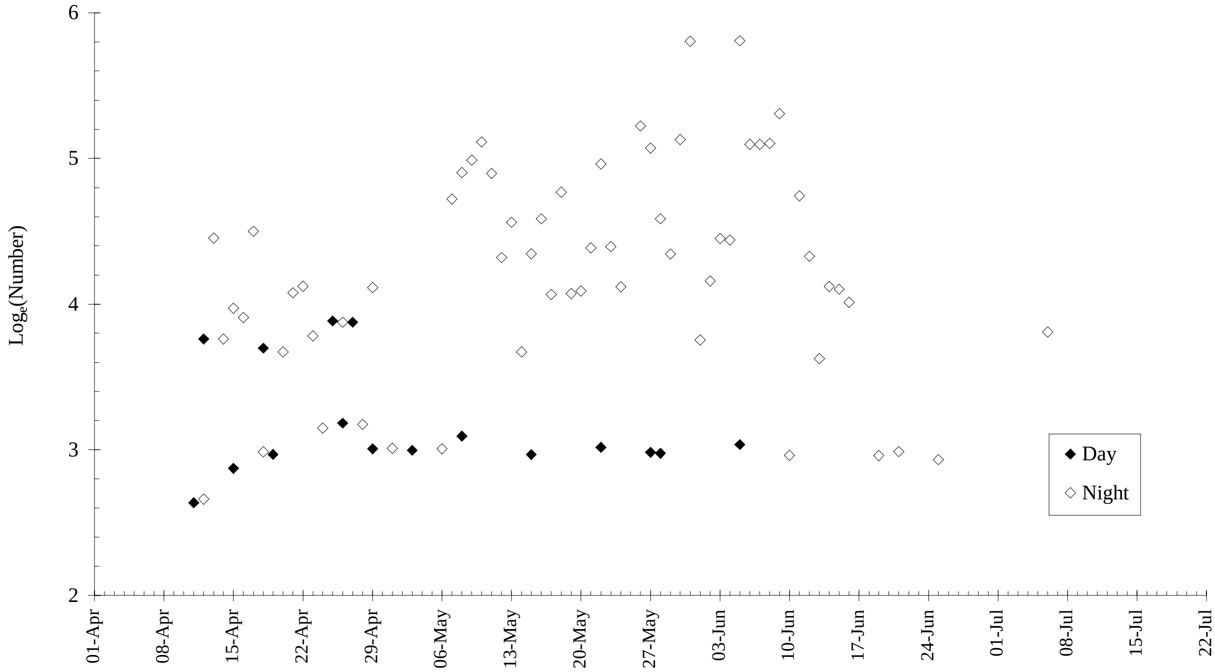


Figure 27
Comparison of Mean, Minimum and Maximum Daily Water Temperatures of the
Upper Nechako River at Bert Irvine's, 1987 to 1995, with Mean 1996 Temperatures

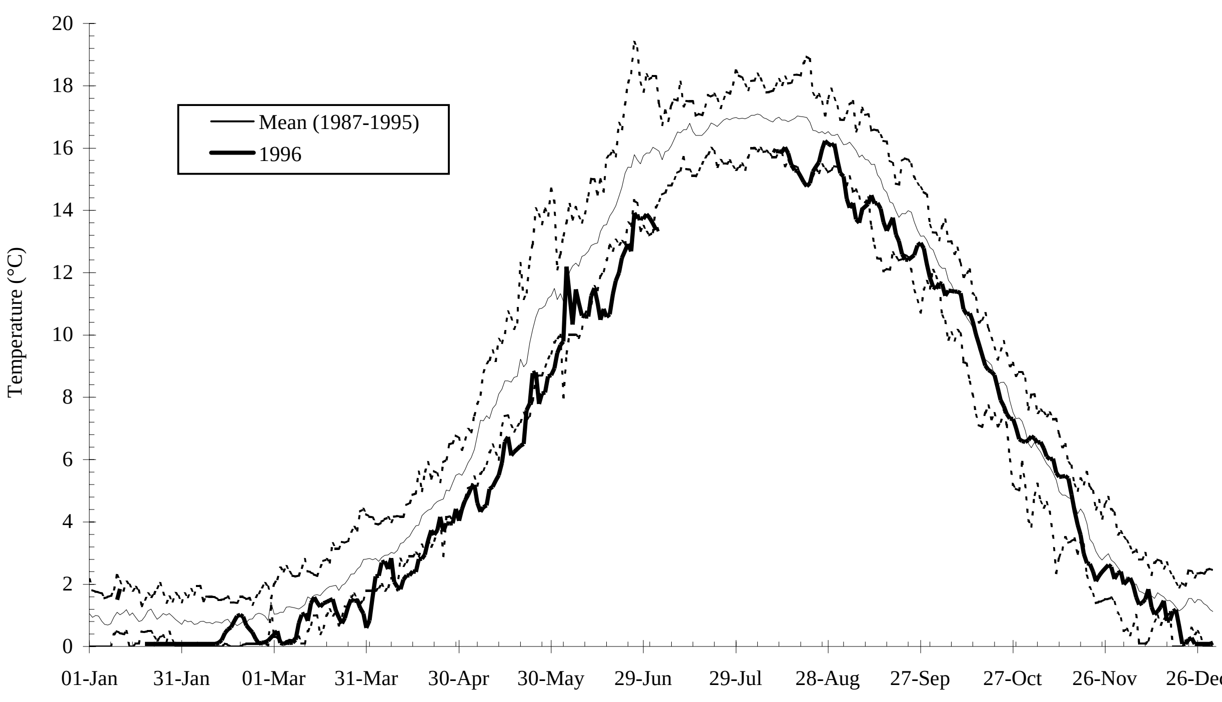


Figure 28
Comparison of Mean, Minimum and Maximum Daily Flows of the Nechako River at Cheslatta Falls, 1987 to 1995, with 1996 Flows

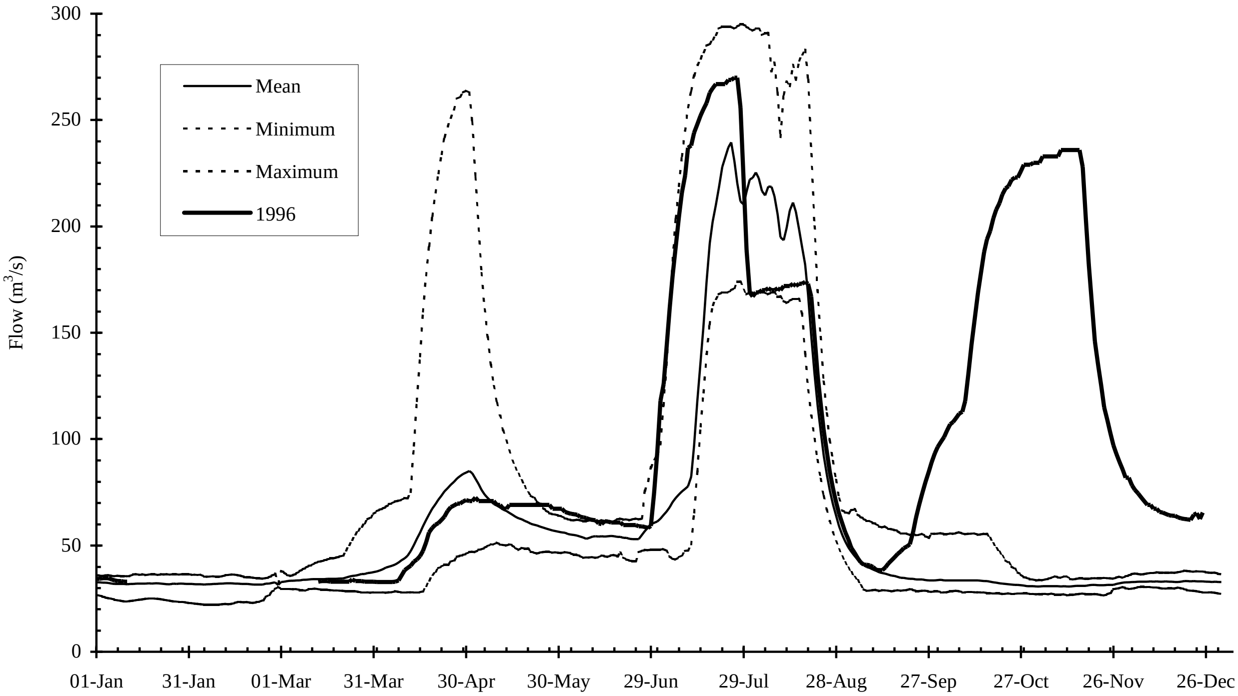


Table 7
Comparison of the Index Numbers of Juvenile Chinook Salmon Migrating out of the Upper Nechako River with Numbers of the Parent Generation

Year	Total number of spawners	Number of spawners upstream of Diamond Island	Index number of outmigrating 0+ chinook the following year	Sampling period	Total index number of outmigrating 0+ chinook the following year	Total sampling period
1990	2642	1686	104182	Apr. 5 - July 31	105702	Apr. 5 - Nov. 15
1991	2360	1306	116538	Mar. 14 - July 17	119860	Mar. 14 - Nov. 17
1992	2498	1074	143000	Apr. 2 - July 19	146170	Apr. 2 - Nov. 16
1993	664	347	47589	Apr. 2 - July 17	47589	Apr. 2 - July 17
1994	1144	659	45025	Apr. 13 - July 13	45025	Apr. 13 - July 11
1995	1689	1143	105576	Apr. 12- July 14	105576	Apr. 12- July 14

Note: the number of outmigrants estimated in 1991 (brood year 1990) is not comparable to the numbers of outmigrants estimated in subsequent years because one of the RSTs in 1991 had a wooden wing attached to one side that funneled additional fry into the RST, and which, therefore, required the assumption of greater flow into the trap.

Figure 29
Comparison of Mean Size-at-date of 0+ Chinook Salmon,
Upper Nechako River, 1989 to 1996 (electrofishing)

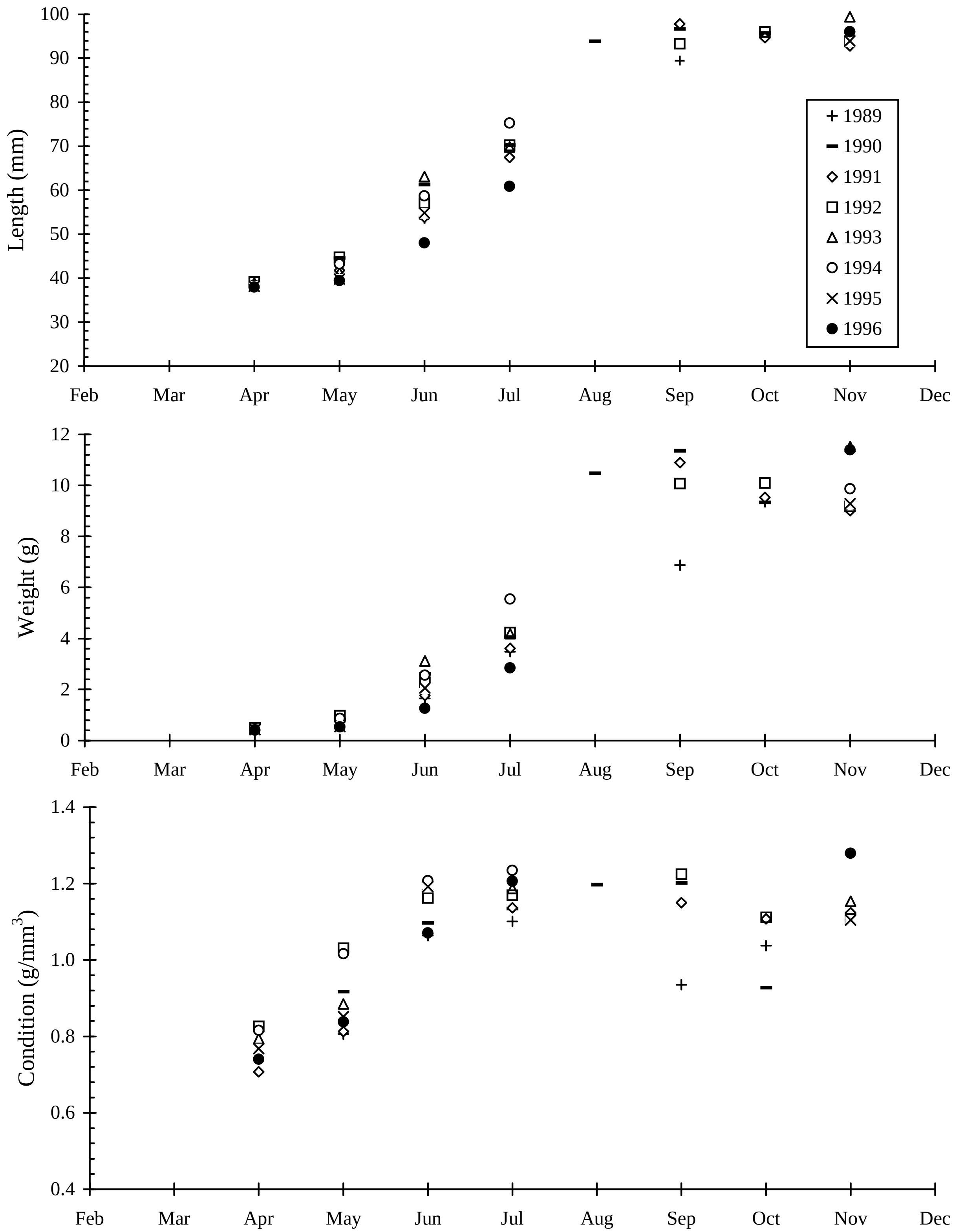


Figure 30
Comparison of Mean Size-at-date of 0+ Chinook Salmon,
Diamond Island, Nechako River, 1990 to 1996

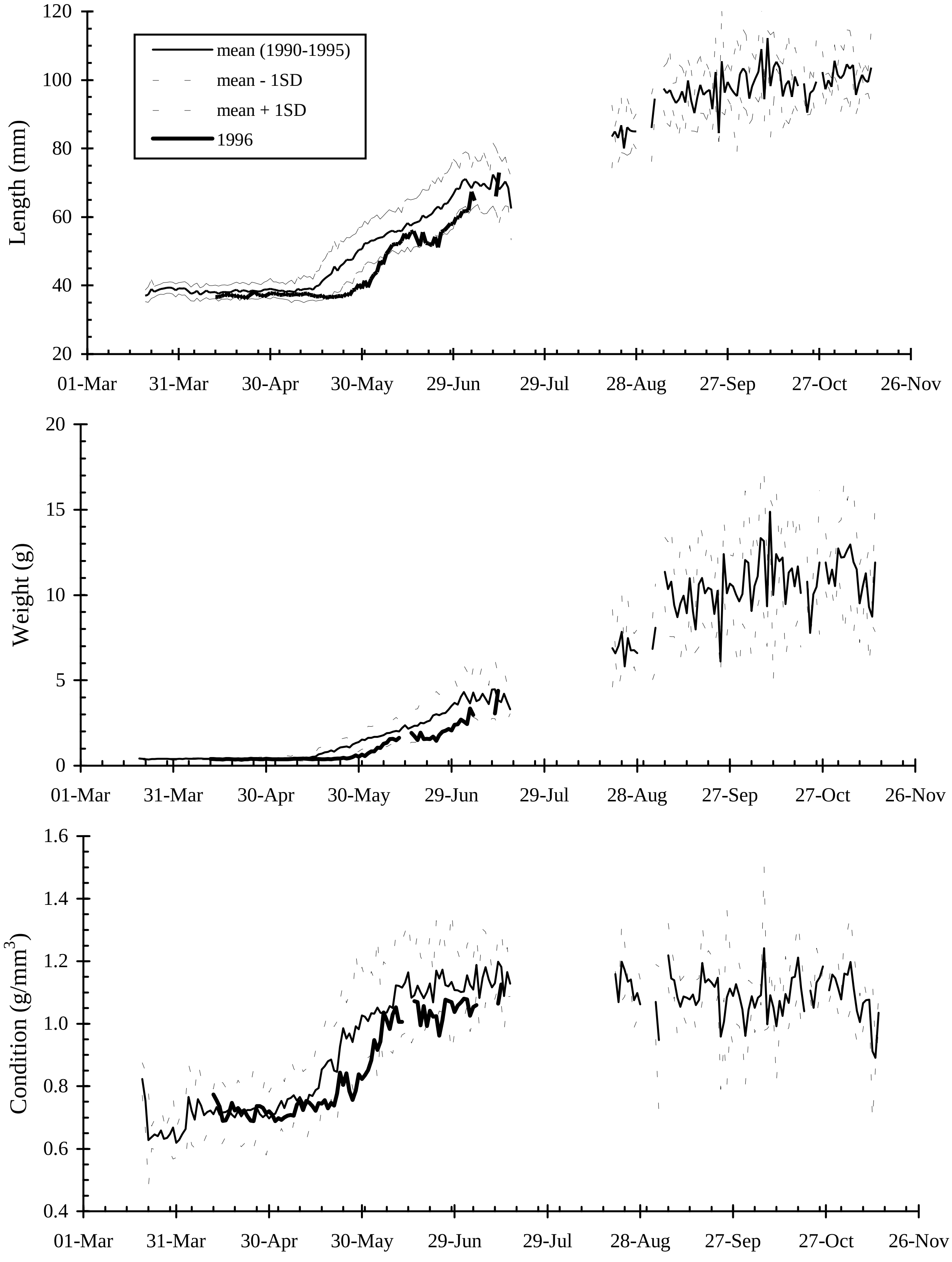


Table 6
Comparison of Growth of 0+ Chinook Salmon, Nechako River, 1991 to 1996

	Length (mm)				Weight (g)				
Year	L_0	DOY_0	A_0	α	W_0	DOY_0	A_0	α	Comments
Electroshocking									
1991	38.2	121.2	0.007677	0.005271	0.40	139.8	0.067570	0.020670	day, 1st and 2nd stanza pooled
1991	38.2	121.6	0.010650	0.009778	0.40	135.9	0.072750	0.022430	night, 1st and 2nd stanza pooled
1992	39.0	114.2	0.006313	0.003245	0.45	127.7	0.060320	0.019060	day, 1st and 2nd stanza pooled
1992	39.0	112.8	0.009206	0.008405	0.45	126.4	0.066320	0.021250	night, 1st and 2nd stanza pooled
1993	39.0	116.0	0.010600	0.009590	0.45	124.0	0.062600	0.018700	day and night pooled, 1st and 2nd stanza pooled
1994	38.5	111.1	0.011100	0.010300	0.41	128.2	0.081300	0.025200	day and night pooled, 1st and 2nd stanza pooled
1995	38.0	129.1	0.013710	0.013870	0.40	127.9	0.067060	0.020830	day and night pooled, 2nd stanza only
1996	38.0	139.6	0.011240	0.009557	0.38	140.5	0.061470	0.017020	day and night pooled, 2nd stanza only
Diamond Island traps									
1991	38.2	123.3	0.009134	0.006193	0.40	124.1	0.045530	0.012100	day, 1st and 2nd stanza pooled
1991	38.2	121.3	0.008835	0.005634	0.40	124.7	0.047100	0.012400	night, 1st and 2nd stanza pooled
1992	39.0	102.1	0.005937	0.002211	0.45	114.4	0.039290	0.012210	day, 1st and 2nd stanza pooled
1992	39.0	102.3	0.007691	0.004576	0.45	114.6	0.043170	0.011780	night, 1st and 2nd stanza pooled
1993	39.0	120.7	0.009540	0.005340	0.45	127.1	0.061000	0.017200	day and night pooled, 1st and 2nd stanza pooled
1994	38.5	114.0	0.007220	0.009280	0.41	119.2	0.056900	0.012600	day and night pooled, 1st and 2nd stanza pooled
1995	38.0	134.8	0.021760	0.028320	0.40	134.2	0.110300	0.066370	day and night pooled, 2nd stanza only
1996	38.0	144.9	0.017430	0.021070	0.38	142.5	0.085980	0.033410	day and night pooled, 2nd stanza only

Figure 31
Comparison of Predicted Growth in Length of 0+ Chinook Sampled by Electrofishing in the Upper Nechako River, 1991 to 1996

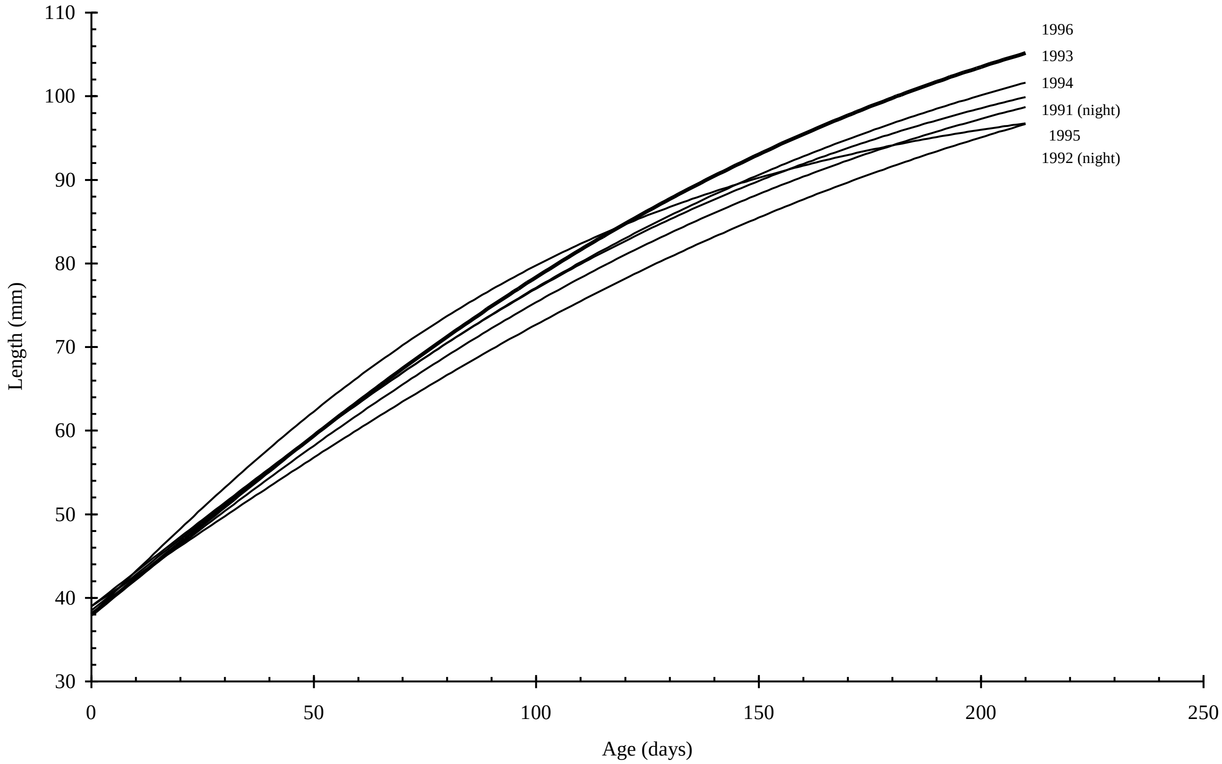
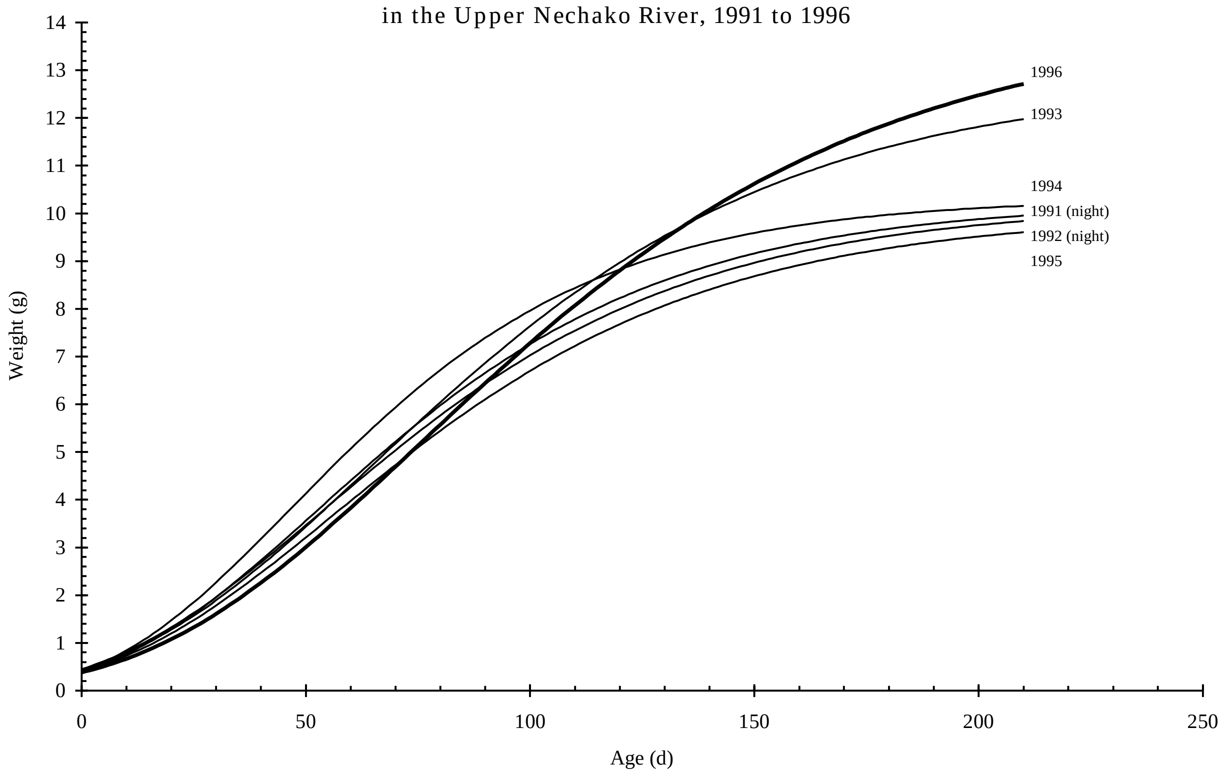


Figure 32
Comparison of Predicted Growth in Weight of 0+ Chinook Sampled by Electrofishing in the Upper Nechako River, 1991 to 1996



was due to a relatively late emergence of the 1996 fry compared to previous years. This is further confirmed by comparison of the estimated date at complete emergence of fry for 1991 to 1996 (Table 6) -DOY_0 was at least 1-2 weeks later in 1996 than in any previous year.

Unlike the growth data, the 1996 pattern of monthly electrofishing CPUE (Figure 33), and of monthly centroids (Figure 34), appeared similar to that of previous years. This indicates that a 1-2 week delayed emergence of fry in 1996 was not great enough to be reflected in the monthly electrofishing surveys.

However, the daily index of outmigration measured at Diamond Island in 1996 was unusual compared to the previous 5 years (Figure 35). From 1991 to 1995, the total number of outmigrating fry reached a peak in early May and then decreased thereafter, but in 1996, the total peak of day catches was not reached until July 1. This indicates that the time trend of the rotary screw trap catches at Diamond Island is more sensitive to the date of complete fry emergence than the time trend of electrofishing CPUE.

The number of outmigrating 0+ chinook was not significantly (P = 0.069) correlated with the number of parents that spawned upstream of Diamond Island (Figure 36), however, there is clearly a positive relationship between the two variables. The lack of significance of the correlation is due to low sample size-only 5 years of data are currently available for comparison.

In summary, lower-than-average spring-summer temperatures in the upper Nechako River in 1996 delayed the complete emergence of chinook fry by at least 1-2 weeks, compared to the previous 5 years. This had no apparent effect on the spatial distribution of juvenile chinook in the upper river, or on their size-at-age. However, it caused apparent low sizes-at-date and may have obscured the catch curve of the Diamond Island traps.

Figure 33
Comparison of Mean Monthly CPUE of 0+ Chinook, Upper Nechako River, 1989 to 1996

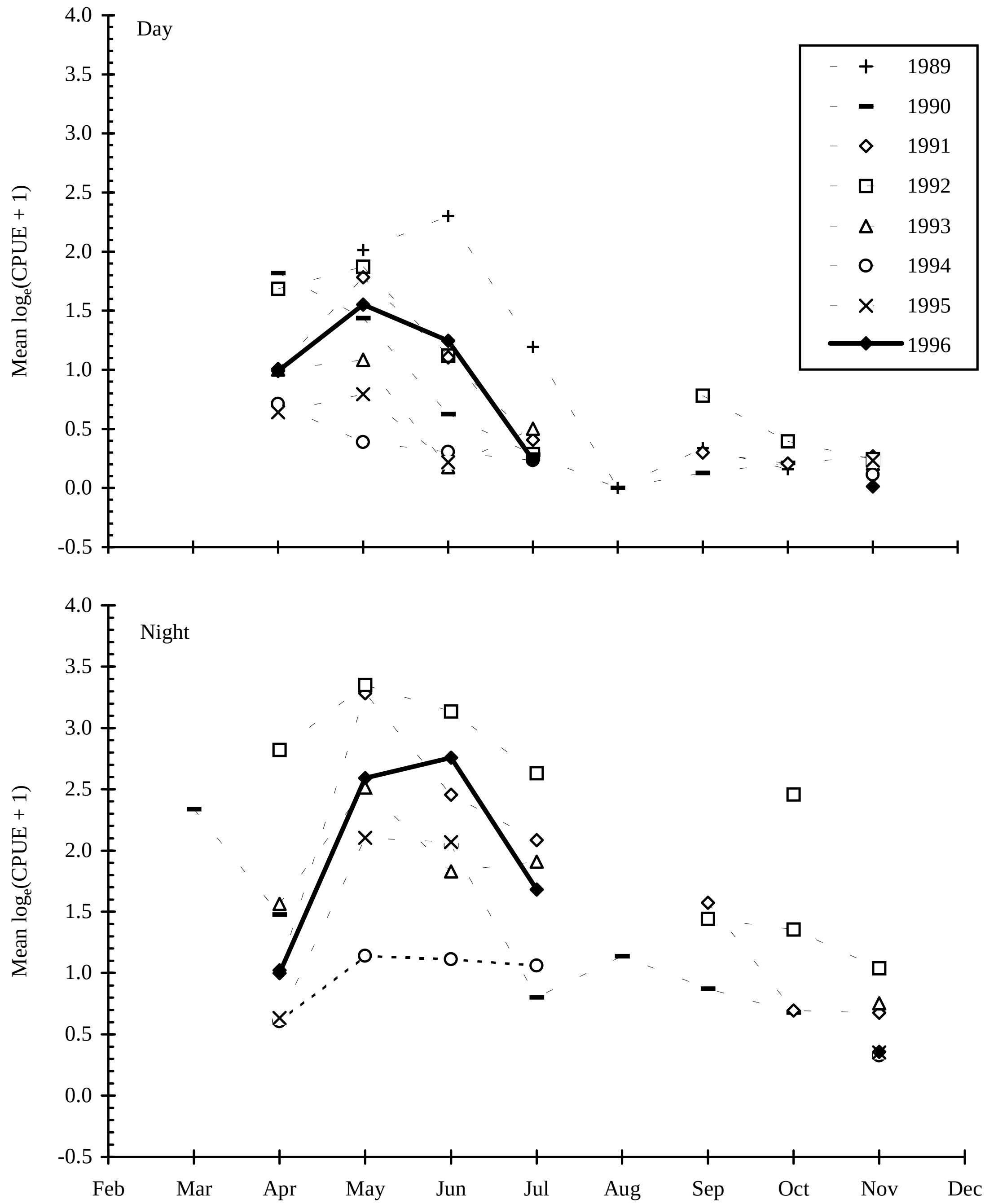


Figure 34
Comparison of the Monthly Centroids of 0+ Chinook, Upper Nechako River, 1991 to 1996

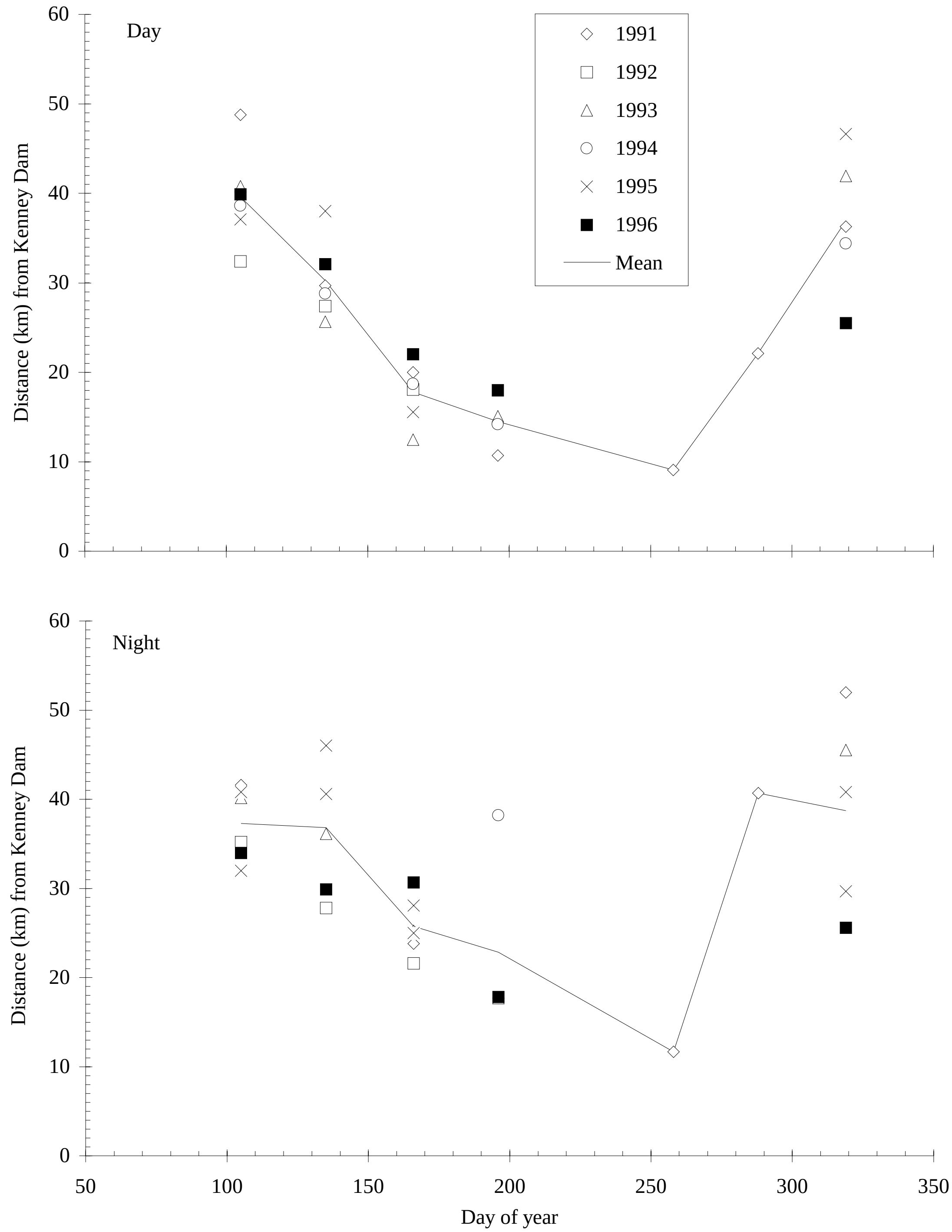


Figure 35
Comparison of the Daily Index of 0+ Chinook Outmigration, Diamond Island, Nechako River, 1991 to 1996

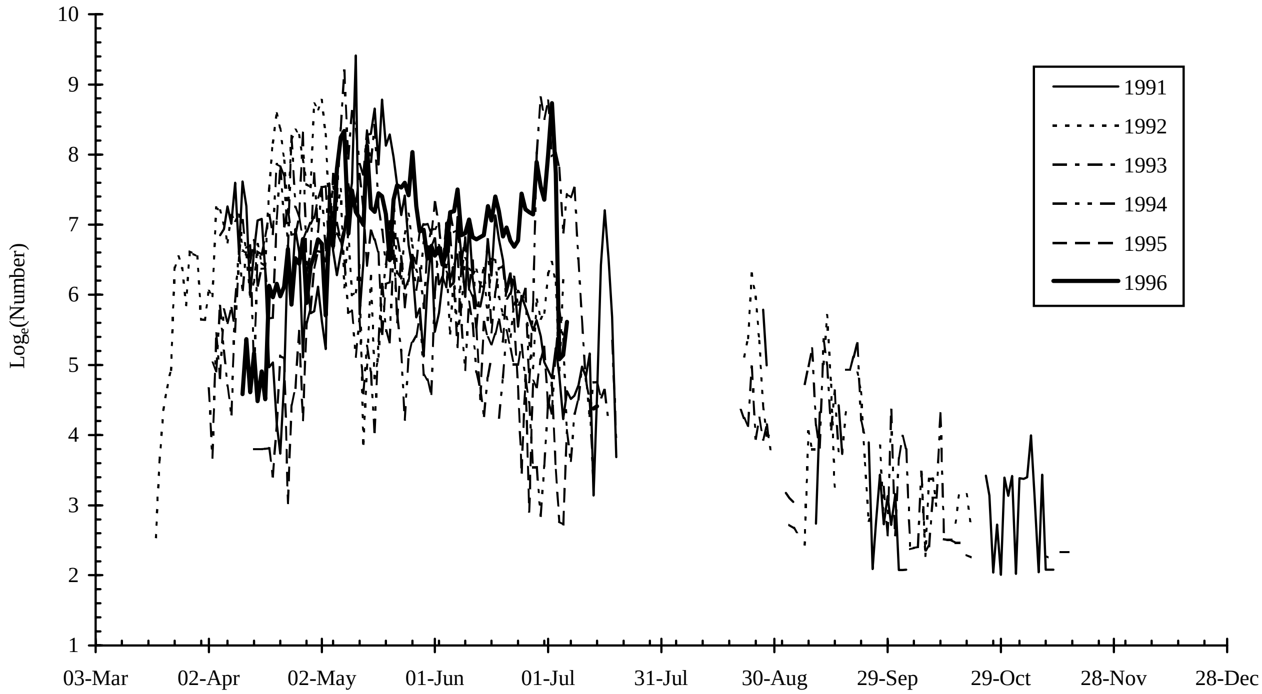
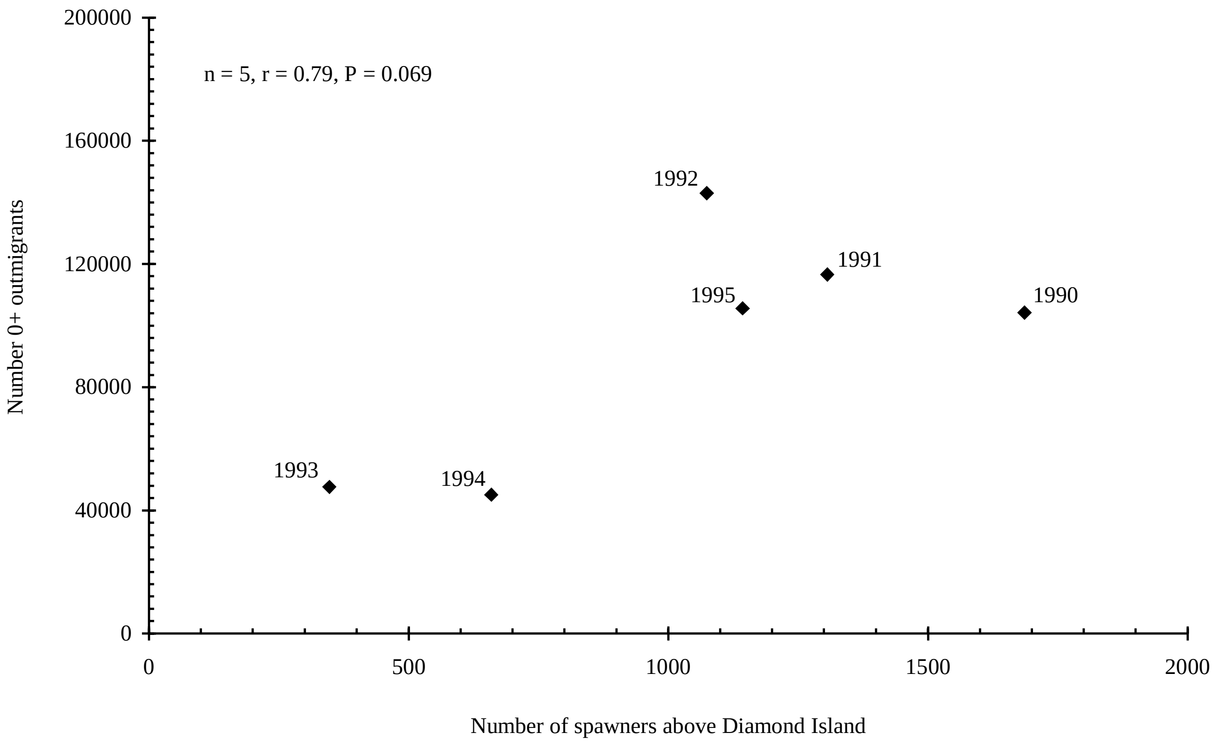


Figure 36
Plot of the Number of 0+ Chinook Salmon Outmigrants on the Number of Parent Spawners Above Diamond Island, Nechako River



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APPENDIX 1

Mean Size and Condition of Fish Captured by Electrofishing in the Nechako River, 1996

APPENDIX 1

Mean Size and Condition of Fish Captured by Electrofishing in the Nechako River, 1996

		Length (mm)				Weight (g)				Condition (g / mm^3)			
Date	DOY	mean	SD	n	SE	mean	SD	n	SE	mean	SD	n	SE
Chinook salmon 0+ (day)													
12-Apr	103	37	2	69	0.21	0.38	0.06	69	0.01	0.75	0.09	69	0.01
13-Apr	104	37	2	9	0.60	0.41	0.06	9	0.02	0.78	0.07	9	0.02
14-Apr	105	37	1	3	0.58	0.36	0.05	3	0.03	0.71	0.13	3	0.07
15-Apr	106	38	2	37	0.25	0.42	0.05	37	0.01	0.77	0.09	37	0.01
16-Apr	107	38	2	145	0.15	0.40	0.07	145	0.01	0.75	0.08	145	0.01
17-Apr	108	38	2	92	0.18	0.40	0.06	92	0.01	0.72	0.07	92	0.01
18-Apr	109	38	2	62	0.20	0.38	0.05	62	0.01	0.72	0.06	62	0.01
17-May	138	40	1	13	0.37	0.48	0.09	13	0.02	0.77	0.10	13	0.03
18-May	139	38	2	177	0.19	0.46	0.11	177	0.01	0.81	0.10	177	0.01
19-May	140	38	3	187	0.19	0.48	0.15	187	0.01	0.84	0.13	187	0.01
20-May	141	38	2	136	0.19	0.47	0.12	136	0.01	0.82	0.10	136	0.01
21-May	142	38	3	54	0.40	0.48	0.14	54	0.02	0.84	0.13	54	0.02
22-May	143	39	3	145	0.26	0.52	0.17	145	0.01	0.87	0.13	145	0.01
11-Jun	163	47	8	18	1.77	1.17	0.53	18	0.13	1.01	0.12	18	0.03
12-Jun	164	45	5	211	0.37	0.99	0.69	211	0.05	1.05	0.18	211	0.01
13-Jun	165	45	5	127	0.42	1.03	0.38	117	0.04	1.03	0.11	117	0.01
14-Jun	166	45	6	103	0.56	1.03	0.51	103	0.05	1.08	0.19	103	0.02
16-Jun	168	49	5	33	0.80	1.30	0.38	33	0.07	1.12	0.17	33	0.03
19-Jun	171	49	6	33	1.12	1.41	0.66	33	0.12	1.12	0.25	33	0.04
03-Jul	185	56	5	43	0.79	2.09	0.62	43	0.09	1.18	0.10	43	0.02
04-Jul	186	55	7	37	1.15	2.10	0.87	37	0.14	1.18	0.15	37	0.02
05-Jul	187	54	5	6	2.14	1.93	0.55	6	0.23	1.22	0.05	6	0.02
08-Jul	190	58	-	1	-	2.76	-	1	-	1.41	-	1	-
02-Nov	307	99	-	1	-	13.35	-	1	-	1.38	-	1	-
Chinook salmon 0+ (night)													
12-Apr	103	38	2	65	0.19	0.41	0.06	65	0.01	0.75	0.09	65	0.01
13-Apr	104	37	2	10	0.59	0.38	0.06	10	0.02	0.74	0.05	10	0.02
14-Apr	105	39	1	2	0.50	0.36	0.01	2	0.01	0.63	0.01	2	0.01
15-Apr	106	38	3	20	0.67	0.43	0.05	20	0.01	0.69	0.12	20	0.03
16-Apr	107	38	2	130	0.14	0.43	0.07	130	0.01	0.76	0.08	130	0.01
17-Apr	108	38	2	148	0.13	0.42	0.06	148	0.01	0.75	0.06	148	0.01
18-Apr	109	38	2	78	0.22	0.39	0.06	78	0.01	0.70	0.08	78	0.01
19-Apr	110	38	1	16	0.37	0.41	0.05	16	0.01	0.75	0.06	16	0.02
18-May	139	39	2	87	0.19	0.46	0.09	87	0.01	0.77	0.09	87	0.01
19-May	140	39	2	239	0.15	0.50	0.13	239	0.01	0.80	0.09	239	0.01
20-May	141	40	3	243	0.19	0.57	0.19	243	0.01	0.85	0.12	243	0.01
21-May	142	39	3	170	0.21	0.54	0.18	170	0.01	0.86	0.13	170	0.01
22-May	143	41	4	157	0.30	0.67	0.25	157	0.02	0.91	0.15	157	0.01
23-May	144	41	4	190	0.29	0.62	0.25	190	0.02	0.84	0.12	190	0.01
11-Jun	163	49	4	8	1.57	1.28	0.34	8	0.12	1.07	0.11	8	0.04
12-Jun	164	47	4	72	0.53	1.05	0.40	72	0.05	1.00	0.11	72	0.01
13-Jun	165	47	5	227	0.36	1.15	0.47	227	0.03	1.06	0.15	227	0.01

APPENDIX 1 (continued)
Mean Size and Condition of Fish Captured by Electrofishing in the Nechako River, 1996

		Length (mm)				Weight (g)				Condition (g/mm^3)			
Date	DOY	mean	SD	n	SE	mean	SD	n	SE	mean	SD	n	SE
14-Jun	166	49	4	224	0.30	1.27	0.44	224	0.03	1.07	0.15	224	0.01
15-Jun	167	47	6	164	0.46	1.20	0.55	164	0.04	1.06	0.11	164	0.01
16-Jun	168	51	6	68	0.69	1.57	0.66	68	0.08	1.12	0.10	68	0.01
17-Jun	169	51	6	154	0.47	1.60	0.63	154	0.05	1.12	0.14	154	0.01
18-Jun	170	51	7	183	0.49	1.61	0.77	183	0.06	1.10	0.12	183	0.01
19-Jun	171	52	7	69	0.85	1.60	0.77	69	0.09	1.10	0.19	69	0.02
03-Jul	185	60	5	60	0.64	2.53	0.67	60	0.09	1.17	0.11	60	0.01
04-Jul	186	59	6	194	0.45	2.64	0.90	194	0.06	1.23	0.16	194	0.01
05-Jul	187	61	8	121	0.69	2.84	1.05	121	0.10	1.19	0.13	121	0.01
06-Jul	188	63	7	62	0.87	3.22	1.00	62	0.13	1.23	0.13	62	0.02
07-Jul	189	66	7	62	0.92	3.50	1.20	62	0.15	1.20	0.10	62	0.01
08-Jul	190	67	8	42	1.21	3.84	1.56	42	0.24	1.22	0.11	42	0.02
09-Jul	191	67	8	23	1.58	3.70	1.19	23	0.25	1.20	0.12	23	0.03
02-Nov	307	98	7	19	1.55	13.05	2.39	19	0.55	1.37	0.13	19	0.03
03-Nov	308	96	9	34	1.49	10.91	2.37	34	0.41	1.23	0.16	34	0.03
04-Nov	309	94	6	10	1.88	10.66	1.77	10	0.56	1.30	0.15	10	0.05
05-Nov	310	94	-	1	-	10.12	-	1	-	1.22	-	1	-
06-Nov	311	95	7	6	3.01	9.94	1.54	6	0.63	1.17	0.13	6	0.05
Chinook salmon 1+ (day)													
12-Apr	103	76	-	1	-	6.47	-	1	-	1.47	-	1	-
14-Apr	105	100	-	1	-	10.81	-	1	-	1.08	-	1	-
15-Apr	106	97	4	3	2.40	10.66	1.61	3	0.93	1.17	0.07	3	0.04
16-Apr	107	98	8	8	2.88	11.38	2.91	8	1.03	1.19	0.10	8	0.04
17-Apr	108	99	11	2	8.00	13.11	1.59	2	1.13	1.43	0.64	2	0.46
18-May	139	104	2	3	1.15	13.57	0.44	3	0.25	1.21	0.08	3	0.05
19-May	140	102	15	4	7.35	13.78	6.55	4	3.28	1.26	0.07	4	0.03
20-May	141	86	9	3	5.36	9.11	2.79	3	1.61	1.40	0.29	3	0.17
Chinook salmon 1+ (night)													
12-Apr	103	94	9	7	3.52	9.72	1.94	7	0.73	1.16	0.18	7	0.07
13-Apr	104	98	6	13	1.66	10.40	1.81	13	0.50	1.10	0.14	13	0.04
14-Apr	105	98	6	8	2.06	10.24	2.08	8	0.74	1.10	0.19	8	0.07
15-Apr	106	104	9	5	4.18	12.97	3.81	5	1.70	1.14	0.05	5	0.02
16-Apr	107	96	6	90	0.67	11.46	2.21	90	0.23	1.27	0.13	90	0.01
17-Apr	108	94	8	49	1.08	11.28	2.68	49	0.38	1.32	0.11	49	0.02
18-Apr	109	95	8	10	2.58	10.44	2.03	10	0.64	1.23	0.14	10	0.04
19-Apr	110	88	-	1	-	9.98	-	1	-	1.46	-	1	-
19-May	140	107	8	14	2.22	14.80	4.16	14	1.11	1.19	0.13	14	0.03
20-May	141	105	12	7	4.60	16.08	5.47	7	2.07	1.35	0.07	7	0.03
22-May	143	90	8	5	3.54	8.43	2.81	5	1.26	1.11	0.17	5	0.08
23-May	144	104	15	5	6.76	14.77	3.82	5	1.71	1.35	0.30	5	0.14
13-Jun	165	121	23	2	16.00	26.58	9.64	2	6.82	1.50	0.29	2	0.20
14-Jun	166	119	-	1	-	22.15	-	1	-	1.31	-	1	-

APPENDIX 1 (continued)
Mean Size and Condition of Fish Captured by Electrofishing in the Nechako River, 1996

		Length (mm)				Weight (g)				Condition (g/mm^3)			
Date	DOY	mean	SD	n	SE	mean	SD	n	SE	mean	SD	n	SE
Burbot, adult (night)													
12-Apr	103	320	-	1		-	-	-	-	-	-	-	-
14-Apr	105	280	-	1		-	-	-	-	-	-	-	-
Burbot, juvenile (night)													
12-Apr	103	120	-	1		12.12	-	1	-	0.70	-	1	-
13-Apr	104	125	-	1		12.69	-	1	-	0.65	-	1	-
14-Apr	105	123	11	2		15.18	6.97	2	4.93	0.78	0.16	2	0.11
16-Apr	107	215	-	1		82.25	-	1	-	0.83	-	1	-
17-Jun	169	142	16	3		28.82	10.70	3	6.18	0.96	0.08	3	0.05
18-Jun	170	135	19	5		20.58	9.20	5	4.12	0.80	0.07	5	0.03
19-Jun	171	120	9	3		12.76	3.08	3	1.78	0.74	0.09	3	0.05
09-Jul	191	138	-	1		17.32	-	1	-	0.66	-	1	-
Coho salmon 0+ (day)													
11-Jun	163	34	2	5	0.68	0.33	0.04	5	0.02	0.88	0.12	5	0.05
12-Jun	164	34	1	7	0.44	0.30	0.04	7	0.02	0.76	0.05	7	0.02
14-Jun	166	32	2	3	0.88	0.26	0.05	3	0.03	0.76	0.07	3	0.04
16-Jun	168	30	-	1	-	0.21	-	1	-	0.78	-	1	-
03-Jul	185	37	-	1	-	0.51	-	1	-	1.01	-	1	-
Coho salmon 0+ (night)													
11-Jun	163	34	2	10	0.50	0.31	0.05	10	0.02	0.80	0.11	10	0.03
12-Jun	164	36	1	5	0.63	0.37	0.02	5	0.01	0.79	0.08	5	0.03
13-Jun	165	32	-	1	-	0.28	-	1	-	0.85	-	1	-
03-Jul	185	40	1	2	1.00	0.68	0.10	2	0.07	1.06	0.04	2	0.03
Rainbow trout, adult (day)													
21-May	142	160	-	1	-	50.00	-	1	-	1.22	-	1	-
Rainbow trout, adult (night)													
15-Apr	106	250	-	1		-	-	-	-	-	-	-	-
16-Apr	107	190	-	1		75.00	-	1	-	1.09	-	1	-
17-Apr	108	230	-	1		-	-	-	-	-	-	-	-
18-Apr	109	236	54	7		-	-	-	-	-	-	-	-
21-May	142	254	-	1		-	-	-	-	-	-	-	-
11-Jun	163	267	29	3		-	-	-	-	-	-	-	-
13-Jun	165	190	-	1		-	-	-	-	-	-	-	-
18-Jun	170	250	-	1		-	-	-	-	-	-	-	-
08-Jul	190	235	21	2		-	-	-	-	-	-	-	-
02-Nov	307	300	0	6		-	-	-	-	-	-	-	-
03-Nov	308	250	-	1		-	-	-	-	-	-	-	-

APPENDIX 1 (continued)
Mean Size and Condition of Fish Captured by Electrofishing in the Nechako River, 1996

		Length (mm)				Weight (g)				Condition (g/mm^3)			
Date	DOY	mean	SD	n	SE	mean	SD	n	SE	mean	SD	n	SE
Rainbow trout, juvenile (day)													
13-Apr	104	257	4	2		35.91	7.33	2	5.18	0.21	0.05	2	0.04
14-Apr	105	99	14	4		11.57	5.44	4	2.72	1.16	0.06	4	0.03
15-Apr	106	95	11	6		10.32	3.68	6	1.50	1.16	0.09	6	0.04
16-Apr	107	87	-	1		8.78	-	1	-	1.33	-	1	-
17-Apr	108	167	45	2		32.40	7.48	2	5.29	0.79	0.44	2	0.31
18-Apr	109	116	-	1		18.73	-	1	-	1.20	-	1	-
17-May	138	135	46	4		15.22	4.92	4	2.46	0.85	0.47	4	0.23
18-May	139	96	-	1		12.65	-	1	-	1.43	-	1	-
20-May	141	118	36	2		25.19	23.09	2	16.33	1.28	0.20	2	0.14
21-May	142	123	13	3		21.98	4.24	3	2.45	1.18	0.17	3	0.10
22-May	143	100	-	1		10.30	-	1	-	1.03	-	1	-
11-Jun	163	129	9	4		23.07	4.57	4	2.29	1.07	0.15	4	0.07
12-Jun	164	101	27	6		12.99	6.76	6	2.76	1.09	0.05	6	0.02
13-Jun	165	350	-	1		-	-	-	-	-	-	-	-
14-Jun	166	83	18	5		7.20	3.56	5	1.59	1.19	0.13	5	0.06
19-Jun	171	96	-	1		8.22	-	1	-	0.93	-	1	-
02-Nov	307	76	-	1		6.12	-	1	-	1.39	-	1	-
Rainbow trout, juvenile (night)													
13-Apr	104	156	35	2		49.16	37.50	2	26.52	1.15	0.21	2	0.15
14-Apr	105	96	9	16		9.60	2.08	16	0.52	1.09	0.13	16	0.03
15-Apr	106	91	9	9		8.61	3.14	9	1.05	1.12	0.10	9	0.03
16-Apr	107	112	29	11		21.18	17.39	11	5.24	1.24	0.11	11	0.03
17-Apr	108	165	7	2		55.70	4.72	2	3.34	1.24	0.05	2	0.04
18-Apr	109	112	36	7		20.12	19.91	7	7.53	1.11	0.08	7	0.03
17-May	138	106	8	5		13.07	3.19	5	1.43	1.08	0.09	5	0.04
18-May	139	94	-	1		8.82	-	1	-	1.06	-	1	-
19-May	140	101	21	10		14.47	13.75	10	4.35	1.22	0.13	10	0.04
20-May	141	128	45	2		27.81	24.65	2	17.43	1.14	0.05	2	0.03
21-May	142	116	-	1		18.49	-	1	-	1.18	-	1	-
22-May	143	120	31	15		21.28	13.16	15	3.40	1.17	0.42	15	0.11
23-May	144	132	27	4		27.30	15.62	4	7.81	1.10	0.23	4	0.11
11-Jun	163	120	7	8		18.87	4.35	8	1.54	1.08	0.08	8	0.03
12-Jun	164	107	9	7		13.72	3.53	7	1.33	1.09	0.06	7	0.02
13-Jun	165	108	10	6		13.67	3.75	6	1.53	1.09	0.12	6	0.05
14-Jun	166	133	15	5		26.86	17.32	5	7.74	1.09	0.39	5	0.17
15-Jun	167	101	3	4		11.20	1.99	4	1.00	1.07	0.15	4	0.08
16-Jun	168	117	31	4		20.00	13.23	4	6.61	1.11	0.10	4	0.05
17-Jun	169	123	24	16		24.82	12.75	16	3.19	1.24	0.15	16	0.04
18-Jun	170	133	24	11		31.34	14.72	11	4.44	1.24	0.13	11	0.04
19-Jun	171	158	13	5		52.02	8.94	5	4.00	1.33	0.12	5	0.05
03-Jul	185	137	-	1		27.32	-	1	-	1.06	-	1	-

APPENDIX 1 (continued)
Mean Size and Condition of Fish Captured by Electrofishing in the Nechako River, 1996

		Length (mm)				Weight (g)				Condition (g/mm^3)			
Date	DOY	mean	SD	n	SE	mean	SD	n	SE	mean	SD	n	SE
04-Jul	186	135	23	9		30.97	15.47	9	5.16	1.18	0.12	9	0.04
05-Jul	187	128	16	4		20.85	8.54	4	4.27	0.96	0.13	4	0.06
06-Jul	188	130	16	6		27.21	10.59	6	4.32	1.20	0.19	6	0.08
07-Jul	189	132	11	3		31.02	6.66	3	3.84	1.34	0.04	3	0.02
08-Jul	190	82	-	1		5.62	-	1	-	1.02	-	1	-
09-Jul	191	146	16	4		37.08	14.77	4	7.38	1.15	0.17	4	0.09
02-Nov	307	86	9	3		7.44	3.28	3	1.89	1.12	0.13	3	0.08
03-Nov	308	113	51	2		18.99	19.26	2	13.62	1.08	0.13	2	0.10
04-Nov	309	116	-	1		12.06	-	1	-	0.77	-	1	-
Sockeye salmon 0+ (day)													
12-Jun	164	26	1	3		0.15	0.02	3	0.01	0.82	0.01	3	0.01
14-Jun	166	28	1	3		0.13	0.02	3	0.01	0.64	0.14	3	0.08
Sockeye salmon 0+ (night)													
12-Jun	164	30	-	1		0.16	-	1	-	0.59	-	1	-
13-Jun	165	32	3	2		0.27	0.08	2	0.05	0.80	0.03	2	0.02
16-Jun	168	30	-	1		0.18	-	1	-	0.67	-	1	-
04-Jul	186	40	0	2		0.61	0.06	2	0.04	0.95	0.09	2	0.06
05-Jul	187	43	-	1		0.81	-	1	-	1.02	-	1	-

Appendix 2

Mean Size and Condition of Fish Captured in Traps at Diamond Island, Nechako River, 1996

Appendix 2
Mean Size and Condition of Fish Captured in Traps at Diamond Island, Nechako River, 1996

		Length (mm)			Weight (g)			Condition (g / mm^3)		
Date	DOY	mean	SD	n	mean	SD	n	mean	SD	n
Chinook salmon 0+ (day)										
11-Apr	102	37	1	7	0.38	0.05	7	0.73	0.09	7
12-Apr	103	36	1	17	0.37	0.05	17	0.76	0.08	17
13-Apr	104	36	3	3	0.37	0.14	3	0.76	0.18	3
14-Apr	105	37	1	2	0.33	0.06	2	0.64	0.05	2
15-Apr	106	38	2	4	0.38	0.05	4	0.69	0.03	4
16-Apr	107	37	2	6	0.34	0.06	6	0.66	0.06	6
17-Apr	108	38	1	6	0.39	0.05	6	0.72	0.06	6
18-Apr	109	37	2	24	0.39	0.03	24	0.79	0.09	24
19-Apr	110	37	1	22	0.36	0.05	22	0.71	0.06	22
20-Apr	111	36	1	14	0.35	0.02	14	0.74	0.06	14
21-Apr	112	36	1	7	0.35	0.03	7	0.73	0.07	7
22-Apr	113	37	1	12	0.35	0.05	12	0.72	0.05	12
23-Apr	114	38	2	25	0.39	0.07	25	0.70	0.12	25
24-Apr	115	38	2	11	0.39	0.05	11	0.68	0.05	11
25-Apr	116	37	2	15	0.39	0.07	15	0.76	0.11	15
26-Apr	117	38	2	19	0.38	0.06	19	0.71	0.06	19
27-Apr	118	38	2	15	0.39	0.04	15	0.70	0.05	15
28-Apr	119	37	2	9	0.35	0.05	9	0.69	0.04	9
29-Apr	120	37	2	12	0.38	0.07	12	0.73	0.11	12
30-Apr	121	38	2	19	0.40	0.09	19	0.72	0.09	19
01-May	122	37	1	13	0.35	0.06	13	0.71	0.09	13
02-May	123	37	2	16	0.36	0.06	16	0.69	0.05	16
03-May	124	37	1	16	0.36	0.06	16	0.71	0.05	16
04-May	125	37	2	9	0.35	0.05	9	0.67	0.04	9
05-May	126	37	2	13	0.37	0.07	13	0.71	0.06	13
06-May	127	37	2	26	0.38	0.05	26	0.72	0.06	26
07-May	128	37	3	21	0.38	0.12	21	0.72	0.08	21
08-May	129	36	1	9	0.38	0.08	9	0.78	0.07	9
09-May	130	38	4	8	0.42	0.20	8	0.74	0.06	8
10-May	131	38	2	16	0.43	0.10	16	0.77	0.07	16
11-May	132	38	1	14	0.42	0.07	14	0.76	0.09	14
12-May	133	39	2	15	0.43	0.10	15	0.71	0.08	15
13-May	134	37	2	12	0.38	0.06	12	0.74	0.08	12
14-May	135	37	2	25	0.40	0.10	25	0.76	0.07	25
15-May	136	37	4	16	0.37	0.08	16	0.71	0.10	16
16-May	137	37	2	34	0.38	0.08	34	0.75	0.08	34
17-May	138	38	2	18	0.42	0.08	18	0.79	0.08	18
18-May	139	36	1	15	0.38	0.04	15	0.79	0.07	15
19-May	140	37	2	22	0.38	0.07	22	0.76	0.06	22
20-May	141	37	1	26	0.39	0.06	26	0.76	0.07	26
21-May	142	36	1	33	0.36	0.07	33	0.74	0.06	33
22-May	143	37	3	28	0.38	0.13	28	0.74	0.07	28
23-May	144	37	3	29	0.42	0.11	29	0.86	0.28	29

Appendix 2 (continued)
Mean Size and Condition of Fish Captured in Traps at Diamond Island, Nechako River, 1996

Date	DOY	Length (mm) mean	SD	n	Weight (g) mean	SD	n	Condition (g/mm^3) mean	SD	n
24-May	145	37	3	31	0.40	0.14	31	0.74	0.09	31
25-May	146	38	3	29	0.48	0.16	29	0.83	0.09	29
26-May	147	38	3	25	0.45	0.12	25	0.83	0.10	25
27-May	148	39	3	25	0.46	0.21	25	0.77	0.10	25
28-May	149	37	2	12	0.43	0.09	12	0.82	0.10	12
29-May	150	42	6	19	0.71	0.41	19	0.90	0.14	19
30-May	151	41	3	12	0.62	0.19	12	0.90	0.11	12
31-May	152	42	5	18	0.67	0.29	18	0.87	0.09	18
01-Jun	153	40	3	7	0.57	0.20	7	0.88	0.13	7
02-Jun	154	46	7	11	0.98	0.50	11	0.95	0.07	11
03-Jun	155	45	6	12	0.95	0.43	12	1.00	0.10	12
04-Jun	156	47	5	10	0.96	0.37	10	0.89	0.10	10
05-Jun	157	49	5	23	1.20	0.41	23	1.00	0.10	23
06-Jun	158	46	5	14	1.04	0.35	14	1.04	0.16	14
07-Jun	159	52	7	12	1.56	0.67	12	1.07	0.11	12
08-Jun	160	55	4	3	1.87	0.45	3	1.09	0.02	3
09-Jun	161	49	10	13	1.37	0.83	13	1.06	0.11	13
10-Jun	162	53	7	4	1.71	0.69	4	1.12	0.07	4
11-Jun	163	49	4	9	1.20	0.42	9	0.98	0.20	9
12-Jun	164	52	-	1	1.48	-	1	1.05	-	1
13-Jun	165	53	7	8	-	-	-	-	-	-
14-Jun	166	62	-	1	-	-	-	-	-	-
15-Jun	167	61	4	5	2.44	0.68	5	1.03	0.10	5
16-Jun	168	54	5	17	1.76	0.51	17	1.05	0.08	17
17-Jun	169	49	2	6	1.15	0.11	6	0.98	0.07	6
18-Jun	170	46	8	13	1.09	0.56	13	0.97	0.15	13
19-Jun	171	58	7	5	2.24	0.96	5	1.09	0.06	5
20-Jun	172	47	-	1	0.94	-	1	0.91	-	1
21-Jun	173	52	4	3	1.48	0.31	3	1.02	0.01	3
22-Jun	174	55	7	2	1.87	0.76	2	1.09	0.04	2
23-Jun	175	53	5	7	1.49	0.43	7	1.00	0.04	7
24-Jun	176	52	5	5	1.55	0.52	5	1.05	0.09	5
25-Jun	177	51	2	3	1.37	0.06	3	1.01	0.04	3
26-Jun	178	55	9	8	1.82	1.00	8	1.02	0.05	8
27-Jun	179	56	5	8	1.97	0.71	8	1.07	0.07	8
28-Jun	180	56	6	2	1.87	0.52	2	1.08	0.07	2
29-Jun	181	54	1	2	1.59	0.04	2	1.01	0.05	2
01-Jul	183	53	3	6	1.58	0.30	6	1.05	0.02	6
02-Jul	184	59	4	7	2.22	0.48	7	1.07	0.11	7
03-Jul	185	60	-	1	2.34	-	1	1.08	-	1
05-Jul	187	64	-	1	2.66	-	1	1.01	-	1
06-Jul	188	63	0	2	2.71	0.06	2	1.08	0.03	2
08-Jul	190	71	8	2	4.00	1.34	2	1.12	0.01	2

Appendix 2 (continued)
Mean Size and Condition of Fish Captured in Traps at Diamond Island, Nechako River, 1996

		Length (mm)			Weight (g)			Condition (g / mm^3)		
Date	DOY	mean	SD	n	mean	SD	n	mean	SD	n
Chinook salmon 0+ (night)										
12-Apr	103	37	2	10	0.41	0.04	10	0.80	0.09	10
13-Apr	104	37	1	14	0.38	0.04	14	0.75	0.07	14
14-Apr	105	37	1	21	0.38	0.05	21	0.74	0.07	21
15-Apr	106	37	1	11	0.35	0.04	11	0.69	0.05	11
16-Apr	107	37	2	39	0.36	0.05	39	0.70	0.05	39
17-Apr	108	37	2	43	0.37	0.05	43	0.71	0.06	43
18-Apr	109	37	2	52	0.37	0.05	52	0.72	0.07	52
19-Apr	110	37	1	42	0.38	0.04	42	0.73	0.09	42
20-Apr	111	37	1	57	0.36	0.04	57	0.73	0.06	57
21-Apr	112	37	1	51	0.37	0.05	51	0.72	0.05	51
22-Apr	113	36	1	52	0.34	0.04	52	0.72	0.05	52
23-Apr	114	36	1	49	0.34	0.05	49	0.71	0.06	49
24-Apr	115	37	2	52	0.36	0.05	52	0.69	0.07	52
25-Apr	116	39	2	44	0.39	0.06	44	0.67	0.07	44
26-Apr	117	37	1	52	0.38	0.05	52	0.75	0.07	52
27-Apr	118	37	1	64	0.38	0.06	64	0.75	0.07	64
28-Apr	119	37	2	42	0.37	0.05	42	0.74	0.06	42
29-Apr	120	37	2	32	0.37	0.07	32	0.71	0.06	32
30-Apr	121	38	2	44	0.39	0.08	44	0.72	0.08	44
01-May	122	38	1	51	0.39	0.05	51	0.71	0.05	51
02-May	123	38	2	53	0.37	0.05	53	0.69	0.06	53
03-May	124	37	2	33	0.36	0.04	33	0.69	0.05	33
04-May	125	37	2	70	0.36	0.05	70	0.69	0.05	70
05-May	126	38	2	50	0.37	0.05	50	0.70	0.05	50
06-May	127	37	2	60	0.36	0.05	60	0.70	0.05	60
07-May	128	37	2	60	0.37	0.05	60	0.70	0.05	60
08-May	129	38	2	60	0.37	0.05	60	0.69	0.07	60
09-May	130	37	2	54	0.39	0.05	54	0.74	0.07	54
10-May	131	37	1	55	0.38	0.05	55	0.75	0.07	55
11-May	132	37	1	49	0.38	0.05	49	0.72	0.05	49
12-May	133	37	2	58	0.40	0.07	58	0.76	0.07	58
13-May	134	37	2	51	0.39	0.06	51	0.75	0.08	51
14-May	135	37	1	55	0.38	0.06	55	0.73	0.06	55
15-May	136	37	1	64	0.36	0.05	64	0.72	0.06	64
16-May	137	37	2	59	0.38	0.08	59	0.75	0.06	59
17-May	138	37	2	63	0.37	0.07	63	0.73	0.07	63
18-May	139	36	2	60	0.36	0.07	60	0.75	0.07	60
19-May	140	37	2	57	0.36	0.06	57	0.72	0.06	57
20-May	141	37	2	49	0.36	0.07	49	0.74	0.07	49
21-May	142	37	1	57	0.37	0.05	57	0.74	0.05	57
22-May	143	37	2	55	0.40	0.07	55	0.79	0.10	55
23-May	144	37	2	55	0.43	0.07	55	0.84	0.12	55
24-May	145	36	2	55	0.42	0.11	55	0.84	0.16	55
25-May	146	37	2	35	0.44	0.13	35	0.85	0.12	35

Appendix 2 (continued)
Mean Size and Condition of Fish Captured in Traps at Diamond Island, Nechako River, 1996

		Length (mm)			Weight (g)			Condition (g/mm^3)		
Date	DOY	mean	SD	n	mean	SD	n	mean	SD	n
26-May	147	37	2	53	0.38	0.09	53	0.76	0.11	53
27-May	148	39	4	50	0.45	0.19	50	0.75	0.09	50
28-May	149	39	5	49	0.52	0.31	49	0.78	0.11	49
29-May	150	40	4	39	0.55	0.26	39	0.81	0.11	39
30-May	151	39	3	36	0.48	0.20	36	0.80	0.11	36
31-May	152	41	5	35	0.62	0.31	35	0.82	0.10	35
01-Jun	153	39	4	29	0.55	0.25	29	0.85	0.10	29
02-Jun	154	40	5	29	0.61	0.31	29	0.86	0.10	29
03-Jun	155	43	5	23	0.75	0.33	23	0.92	0.09	23
04-Jun	156	43	5	24	0.77	0.30	24	0.93	0.11	24
05-Jun	157	46	6	30	0.93	0.39	30	0.90	0.10	30
07-Jun	159	48	5	35	1.18	0.42	35	0.99	0.11	35
08-Jun	160	50	6	25	1.27	0.54	25	0.97	0.15	25
09-Jun	161	53	7	27	1.64	0.72	27	1.02	0.06	27
10-Jun	162	52	6	29	1.55	0.62	29	1.04	0.09	29
11-Jun	163	53	7	29	1.58	0.60	29	1.01	0.09	29
12-Jun	164	53	8	31	1.64	0.71	31	1.00	0.12	31
13-Jun	165	56	6	31	1.91	0.78	31	1.06	0.08	31
14-Jun	166	53	6	29	1.47	-	1	1.05	-	1
15-Jun	167	55	6	31	-	-	-	-	-	-
16-Jun	168	57	6	24	2.04	0.68	24	1.08	0.17	24
17-Jun	169	55	5	30	1.84	0.59	30	1.09	0.08	30
18-Jun	170	53	8	36	1.65	0.72	36	1.00	0.09	36
19-Jun	171	55	8	27	1.87	0.79	27	1.05	0.15	27
20-Jun	172	53	8	33	1.58	0.69	33	1.00	0.10	33
21-Jun	173	52	7	26	1.59	0.61	26	1.04	0.12	26
22-Jun	174	51	8	21	1.52	0.76	21	1.02	0.10	21
23-Jun	175	55	8	27	1.75	0.58	27	1.03	0.13	27
24-Jun	176	51	10	30	1.44	0.77	30	0.95	0.15	30
25-Jun	177	56	4	30	1.83	0.47	30	1.01	0.06	30
26-Jun	178	56	7	30	2.03	0.74	30	1.09	0.14	30
27-Jun	179	57	6	30	2.06	0.65	30	1.07	0.06	30
28-Jun	180	58	5	30	2.16	0.60	30	1.07	0.10	30
29-Jun	181	58	5	30	2.10	0.61	30	1.04	0.09	30
30-Jun	182	60	8	30	2.39	0.92	30	1.06	0.06	30
01-Jul	183	61	7	30	2.59	1.09	30	1.07	0.07	30
02-Jul	184	62	9	27	2.81	1.39	27	1.08	0.06	27
03-Jul	185	62	5	30	2.59	0.60	30	1.08	0.06	30
04-Jul	186	62	1	2	2.44	0.01	2	1.03	0.08	2
05-Jul	187	68	9	4	3.53	1.26	4	1.06	0.06	4
06-Jul	188	66	8	4	3.10	1.13	4	1.05	0.06	4
08-Jul	190	70	-	1	4.24	-	1	1.24	-	1
10-Jul	192	61	-	1	2.41	-	1	1.06	-	1
13-Jul	195	66	-	1	3.06	-	1	1.06	-	1
14-Jul	196	73	-	1	4.38	-	1	1.13	-	1

Appendix 2 (continued)
Mean Size and Condition of Fish Captured in Traps at Diamond Island, Nechako River, 1996

		Length (mm)			Weight (g)			Condition (g/mm^3)		
Date	DOY	mean	SD	n	mean	SD	n	mean	SD	n
Chinook salmon 1+ (day)										
11-Apr	102	92	-	1	6.85	-	1	0.88	-	1
12-Apr	103	87	1	3	7.22	0.42	3	1.08	0.04	3
15-Apr	106	108	-	1	12.86	-	1	1.02	-	1
18-Apr	109	102	12	2	10.72	4.45	2	0.99	0.07	2
19-Apr	110	97	-	1	10.07	-	1	1.10	-	1
25-Apr	116	90	16	2	8.08	4.41	2	1.07	0.03	2
26-Apr	117	97	-	1	10.30	-	1	1.13	-	1
27-Apr	118	100	6	2	9.20	1.44	2	0.92	0.01	2
29-Apr	120	95	-	1	8.12	-	1	0.95	-	1
03-May	124	81	-	1	5.21	-	1	0.98	-	1
08-May	129	90	-	1	6.68	-	1	0.92	-	1
15-May	136	93	-	1	8.38	-	1	1.04	-	1
20-May	141	96	-	1	9.53	-	1	1.08	-	1
22-May	143	100	-	1	11.29	-	1	1.13	-	1
27-May	148	86	-	1	6.79	-	1	1.07	-	1
28-May	149	100	-	1	11.60	-	1	1.16	-	1
05-Jun	157	104	-	1	10.87	-	1	0.97	-	1
Chinook salmon 1+ (night)										
12-Apr	103	103	-	1	12.16	-	1	1.11	-	1
13-Apr	104	94	7	6	8.97	2.47	6	1.05	0.07	6
14-Apr	105	93	11	3	9.30	3.14	3	1.13	0.02	3
15-Apr	106	107	3	3	12.36	0.91	3	1.00	0.04	3
16-Apr	107	99	10	3	10.27	3.05	3	1.05	0.06	3
17-Apr	108	94	13	5	8.91	3.96	5	1.01	0.12	5
18-Apr	109	96	-	1	9.16	-	1	1.04	-	1
20-Apr	111	94	6	2	8.96	2.47	2	1.08	0.08	2
21-Apr	112	98	15	4	10.59	3.95	4	1.07	0.02	4
22-Apr	113	100	7	3	11.59	3.38	3	1.14	0.10	3
23-Apr	114	90	8	2	7.85	1.10	2	1.08	0.15	2
24-Apr	115	115	-	1	12.14	-	1	0.80	-	1
26-Apr	117	97	3	2	10.71	1.06	2	1.17	0.01	2
28-Apr	119	108	-	1	15.10	-	1	1.20	-	1
29-Apr	120	87	8	3	7.07	2.09	3	1.04	0.09	3
29-Apr	120	92	5	2	8.24	0.69	2	1.08	0.08	2
01-May	122	111	-	1	14.16	-	1	1.04	-	1
06-May	127	103	-	1	13.32	-	1	1.22	-	1
07-May	128	88	7	5	7.35	1.19	5	1.09	0.20	5
08-May	129	95	14	7	10.25	5.99	7	1.08	0.13	7
09-May	130	92	6	7	7.49	1.19	7	0.94	0.06	7
10-May	131	94	9	9	8.29	2.38	9	0.97	0.07	9
11-May	132	103	11	7	10.37	3.62	7	0.94	0.12	7
12-May	133	104	10	4	11.66	3.61	4	1.02	0.17	4
13-May	134	96	26	5	9.96	7.10	5	0.90	0.15	5

Appendix 2 (continued)
Mean Size and Condition of Fish Captured in Traps at Diamond Island, Nechako River, 1996

		Length (mm)			Weight (g)			Condition (g/mm^3)		
Date	DOY	mean	SD	n	mean	SD	n	mean	SD	n
14-May	135	95	6	2	10.29	2.06	2	1.21	0.00	2
15-May	136	100	14	5	11.08	4.87	5	1.04	0.08	5
16-May	137	101	20	5	12.42	5.70	5	1.07	0.15	5
17-May	138	98	3	3	9.98	0.34	3	1.08	0.10	3
18-May	139	103	11	6	11.64	3.56	6	1.03	0.12	6
19-May	140	106	15	3	12.58	6.01	3	0.99	0.05	3
20-May	141	101	2	3	8.74	1.06	3	0.85	0.07	3
21-May	142	106	7	4	12.16	4.77	4	0.97	0.20	4
22-May	143	103	11	7	11.83	3.62	7	1.07	0.09	7
23-May	144	91	25	4	9.98	5.86	4	1.10	0.14	4
24-May	145	94	9	3	8.56	2.22	3	1.00	0.02	3
26-May	147	108	16	9	13.51	6.34	9	1.00	0.07	9
28-May	149	97	10	5	10.31	4.25	5	1.07	0.08	5
29-May	150	101	3	4	12.09	0.97	4	1.16	0.06	4
30-May	151	113	14	8	16.55	7.54	8	1.10	0.07	8
31-May	152	101	9	16	11.85	2.79	16	1.14	0.13	16
01-Jun	153	105	9	2	12.99	3.22	2	1.13	0.02	2
02-Jun	154	93	12	3	8.86	3.96	3	1.07	0.05	3
03-Jun	155	100	4	4	11.30	0.97	4	1.14	0.07	4
04-Jun	156	99	15	4	11.40	5.48	4	1.12	0.10	4
05-Jun	157	100	11	16	10.47	4.98	16	1.02	0.23	16
06-Jun	158	100	14	8	11.54	4.21	8	1.13	0.25	8
07-Jun	159	99	13	8	10.63	4.16	8	1.08	0.21	8
08-Jun	160	92	2	6	10.20	1.80	6	1.31	0.20	6
09-Jun	161	100	7	10	11.29	2.59	10	1.10	0.07	10
10-Jun	162	101	-	1	10.79	-	1	1.05	-	1
11-Jun	163	105	9	6	11.20	1.66	6	0.99	0.13	6
12-Jun	164	94	7	4	8.85	2.32	4	1.04	0.10	4
13-Jun	165	100	3	2	10.75	1.47	2	1.07	0.06	2
14-Jun	166	92	2	3	-	-	-	-	-	-
15-Jun	167	97	2	3	-	-	-	-	-	-
16-Jun	168	102	3	3	11.49	1.00	3	1.09	0.02	3
19-Jun	171	105	-	1	12.40	-	1	1.07	-	1
21-Jun	173	102	-	1	12.13	-	1	1.14	-	1
25-Jun	177	85	-	1	6.63	-	1	1.08	-	1
06-Jul	188	90	-	1	7.74	-	1	1.06	-	1
Coho salmon 0+ (night)										
17-Jun	169	40	-	1	0.57	-	1	0.89	-	1
Rainbow trout, adult (night)										
16-Jun	168	300	-	1	-	-	-	-	-	-

Appendix 2 (continued)
Mean Size and Condition of Fish Captured in Traps at Diamond Island, Nechako River, 1996

		Length (mm)			Weight (g)			Condition (g/mm^3)		
Date	DOY	mean	SD	n	mean	SD	n	mean	SD	n
Rainbow trout, juvenile (day)										
25-Apr	116	131	-	1	23.03	-	1	1.02	-	1
26-Apr	117	124	-	1	16.81	-	1	0.88	-	1
16-May	137	55	-	1	1.59	-	1	0.96	-	1
23-May	144	107	-	1	10.45	-	1	0.85	-	1
26-May	147	69	-	1	3.06	-	1	0.93	-	1
08-Jun	160	133	-	1	23.14	-	1	0.98	-	1
30-Jun	182	150	-	1	-	-	-	-	-	-
Rainbow trout, juvenile (night)										
18-Apr	109	124	-	1	18.45	-	1	0.97	-	1
20-Apr	111	138	-	1	28.18	-	1	1.07	-	1
21-Apr	112	120	-	1	17.12	-	1	0.99	-	1
22-Apr	113	106	7	2	13.60	2.19	2	1.14	0.04	2
27-Apr	118	99	-	1	9.47	-	1	0.98	-	1
28-Apr	119	114	-	1	15.26	-	1	1.03	-	1
29-Apr	120	66	-	1	2.63	-	1	0.91	-	1
30-Apr	121	101	-	1	12.86	-	1	1.25	-	1
03-May	124	102	-	1	10.50	-	1	0.99	-	1
06-May	127	113	12	3	14.58	6.04	3	0.97	0.07	3
06-May	127	115	17	2	15.80	8.00	2	0.99	0.08	2
07-May	128	109	5	2	13.48	2.98	2	1.05	0.09	2
08-May	129	170	-	1	47.90	-	1	0.97	-	1
09-May	130	159	16	2	26.65	17.97	2	0.62	0.26	2
10-May	131	115	-	1	12.37	-	1	0.81	-	1
12-May	133	117	-	1	15.88	-	1	0.99	-	1
14-May	135	118	-	1	16.19	-	1	0.99	-	1
15-May	136	129	-	1	19.84	-	1	0.92	-	1
16-May	137	122	-	1	19.13	-	1	1.05	-	1
17-May	138	96	45	2	12.14	13.53	2	1.02	0.06	2
18-May	139	99	30	2	10.67	8.05	2	1.02	0.10	2
19-May	140	77	17	4	4.80	3.26	4	0.92	0.07	4
23-May	144	95	42	2	12.70	13.96	2	1.11	0.11	2
24-May	145	95	-	1	9.10	-	1	1.06	-	1
25-May	146	115	-	1	17.50	-	1	1.15	-	1
26-May	147	105	11	2	11.45	1.75	2	1.01	0.15	2
27-May	148	136	23	4	26.04	11.96	4	0.98	0.04	4
28-May	149	116	-	1	17.65	-	1	1.13	-	1
30-May	151	122	-	1	17.71	-	1	0.98	-	1
31-May	152	67	-	1	2.86	-	1	0.95	-	1
01-Jun	153	81	-	1	4.78	-	1	0.90	-	1
02-Jun	154	146	-	1	31.39	-	1	1.01	-	1
04-Jun	156	68	-	1	3.19	-	1	1.01	-	1
05-Jun	157	70	-	1	3.01	-	1	0.88	-	1
09-Jun	161	115	13	2	15.26	6.48	2	0.98	0.08	2

Appendix 2 (continued)
Mean Size and Condition of Fish Captured in Traps at Diamond Island, Nechako River, 1996

		Length (mm)			Weight (g)			Condition (g/mm^3)		
Date	DOY	mean	SD	n	mean	SD	n	mean	SD	n
10-Jun	162	186	-	1	40.34	-	1	0.63	-	1
13-Jun	165	88	14	2	7.28	5.98	2	0.93	0.41	2
14-Jun	166	120	-	1	-	-	-	-	-	-
18-Jun	170	107	-	1	13.64	-	1	1.11	-	1
26-Jun	178	90	-	1	6.82	-	1	0.94	-	1
01-Jul	183	131	34	2	27.55	20.14	2	1.10	0.03	2
02-Jul	184	128	-	1	22.37	-	1	1.07	-	1
13-Jul	195	175	-	1	79.87	-	1	1.49	-	1
Sockeye salmon, juvenile (day)										
11-May	132	34	-	1	0.24	-	1	0.61	-	1
16-May	137	27	-	1	0.12	-	1	0.61	-	1
20-May	141	26	-	1	0.12	-	1	0.68	-	1
22-May	143	29	-	1	0.15	-	1	0.62	-	1
24-May	145	26	-	1	0.11	-	1	0.63	-	1
26-May	147	27	-	1	0.13	-	1	0.66	-	1
28-May	149	31	-	1	0.19	-	1	0.64	-	1
08-Jun	160	27	-	1	0.12	-	1	0.61	-	1
09-Jun	161	30	-	1	0.17	-	1	0.63	-	1
16-Jun	168	33	3	2	0.24	0.04	2	0.66	0.07	2
17-Jun	169	30	2	2	0.20	0.10	2	0.75	0.22	2
21-Jun	173	32	2	2	0.24	0.07	2	0.76	0.07	2
22-Jun	174	34	-	1	0.31	-	1	0.79	-	1
24-Jun	176	35	-	1	0.36	-	1	0.84	-	1
25-Jun	177	37	3	5	0.42	0.07	5	0.83	0.14	5
26-Jun	178	33	-	1	0.31	-	1	0.86	-	1
27-Jun	179	38	2	6	0.43	0.07	6	0.78	0.06	6
28-Jun	180	40	-	1	0.47	-	1	0.73	-	1
29-Jun	181	38	-	1	0.44	-	1	0.80	-	1
01-Jul	183	42	-	1	0.56	-	1	0.76	-	1
03-Jul	185	45	-	1	0.74	-	1	0.81	-	1
05-Jul	187	49	-	1	1.04	-	1	0.88	-	1
06-Jul	188	44	-	1	0.69	-	1	0.81	-	1
08-Jul	190	43	2	2	0.67	0.11	2	0.87	0.02	2
Sockeye salmon, juvenile (night)										
28-Apr	119	27	-	1	0.11	-	1	0.56	-	1
03-May	124	28	-	1	0.13	-	1	0.59	-	1
04-May	125	28	-	1	0.14	-	1	0.64	-	1
06-May	127	28	-	1	0.12	-	1	0.55	-	1
08-May	129	28	1	5	0.13	0.02	5	0.56	0.07	5
14-May	135	27	-	1	0.10	-	1	0.51	-	1
17-May	138	28	1	10	0.13	0.03	10	0.59	0.09	10
18-May	139	27	1	17	0.12	0.03	17	0.61	0.09	17
19-May	140	31	-	1	0.20	-	1	0.67	-	1

Appendix 2 (continued)
Mean Size and Condition of Fish Captured in Traps at Diamond Island, Nechako River, 1996

		Length (mm)			Weight (g)			Condition (g/mm^3)		
Date	DOY	mean	SD	n	mean	SD	n	mean	SD	n
20-May	141	27	1	15	0.12	0.02	15	0.58	0.06	15
21-May	142	28	1	8	0.12	0.02	8	0.54	0.06	8
22-May	143	26	1	5	0.16	0.06	5	0.89	0.34	5
23-May	144	27	1	4	0.16	0.03	4	0.84	0.09	4
24-May	145	27	2	4	0.20	0.07	4	0.97	0.28	4
25-May	146	26	0	2	0.12	0.01	2	0.65	0.04	2
26-May	147	28	1	3	0.14	0.01	3	0.65	0.01	3
27-May	148	29	1	3	0.15	0.04	3	0.65	0.19	3
28-May	149	28	4	4	0.16	0.01	4	0.88	0.50	4
29-May	150	27	2	3	0.14	0.04	3	0.67	0.04	3
30-May	151	30	1	2	0.15	0.01	2	0.56	0.01	2
31-May	152	27	1	2	0.12	0.02	2	0.58	0.02	2
02-Jun	154	28	1	4	0.14	0.02	4	0.60	0.04	4
03-Jun	155	28	-	1	0.15	-	1	0.68	-	1
04-Jun	156	31	0	2	0.19	0.00	2	0.64	0.00	2
05-Jun	157	30	2	2	0.15	0.01	2	0.59	0.07	2
06-Jun	158	34	5	2	0.21	0.09	2	0.53	0.01	2
07-Jun	159	34	1	4	0.29	0.04	4	0.72	0.04	4
09-Jun	161	33	5	3	0.28	0.16	3	0.75	0.14	3
10-Jun	162	29	2	11	0.18	0.07	11	0.70	0.14	11
11-Jun	163	29	4	4	0.18	0.08	4	0.75	0.11	4
14-Jun	166	29	1	4	-	-	-	-	-	-
17-Jun	169	33	-	1	0.28	-	1	0.78	-	1
18-Jun	170	36	-	1	0.12	-	1	0.26	-	1
19-Jun	171	31	2	2	0.20	0.08	2	0.67	0.13	2
21-Jun	173	30	-	1	0.21	-	1	0.78	-	1
22-Jun	174	30	-	1	0.24	-	1	0.89	-	1
23-Jun	175	31	4	2	0.22	0.08	2	0.74	0.02	2
24-Jun	176	35	4	12	0.37	0.15	12	0.81	0.05	12
25-Jun	177	34	2	10	0.31	0.08	10	0.80	0.07	10
26-Jun	178	36	3	9	0.35	0.10	9	0.74	0.06	9
27-Jun	179	37	3	15	0.40	0.09	15	0.79	0.03	15
28-Jun	180	38	4	11	0.46	0.17	11	0.79	0.05	11
29-Jun	181	38	2	11	0.43	0.08	11	0.77	0.04	11
30-Jun	182	38	1	9	0.42	0.05	9	0.75	0.05	9
01-Jul	183	42	3	3	0.62	0.18	3	0.82	0.12	3
02-Jul	184	41	1	3	0.53	0.06	3	0.78	0.03	3
03-Jul	185	41	-	1	0.84	-	1	1.22	-	1
05-Jul	187	40	8	3	0.60	0.35	3	0.83	0.10	3
07-Jul	189	44	1	2	0.75	0.11	2	0.92	0.18	2
09-Jul	191	44	-	1	0.96	-	1	1.13	-	1

Appendix 3
Mean Monthly Electrofishing Catch-per-unit-effort (CPUE)
of Juvenile Chinook Salmon by 10 km Intervals
of the Nechako River, 1996

Appendix 3
Mean Monthly Electrofishing Catch-per-unit-effort (CPUE)
of Juvenile Chinook Salmon by 10 km Intervals of the Nechako River, 1996

Date	Distance (km) from Kenney Dam	0+ Log_e(CPUE + 1) mean	0+ SD	0+ n	1+ Log_e(CPUE + 1) mean	1+ SD	1+ n
Day							
April	0.0-9.9	0.5584	0.6543	4	0.1014	0.2027	4
	10.0-19.9	0.5744	0.5493	26	0.0610	0.2220	26
	20.0-29.9	1.4038	0.8922	38	0.1009	0.3291	38
	30.0-39.9	1.0007	0.8016	16	0.0276	0.1105	16
	50.0-59.9	1.1693	0.7393	19	0.0000	0.0000	19
	70.0-79.9	1.3215	0.9962	16	0.0379	0.1515	16
	80.0-89.9	0.2878	0.4390	17	0.0000	0.0000	17
May	0.0-9.9	1.0311	1.3618	4	0.0000	0.0000	4
	10.0-19.9	1.8601	0.9944	27	0.0375	0.1378	27
	20.0-29.9	1.9741	0.9552	38	0.0872	0.2718	38
	30.0-39.9	1.2615	0.8753	16	0.0000	0.0000	16
	50.0-59.9	1.0735	0.8528	19	0.0000	0.0000	19
	70.0-79.9	1.3914	0.9236	16	0.0000	0.0000	16
	80.0-89.9	1.2055	0.8418	17	0.0357	0.1470	17
June	0.0-9.9	1.4655	1.2231	4	0.0000	0.0000	4
	10.0-19.9	2.2846	1.1594	27	0.0000	0.0000	27
	20.0-29.9	1.5720	1.1331	38	0.0000	0.0000	38
	30.0-39.9	1.0487	0.8051	16	0.0000	0.0000	16
	50.0-59.9	0.6972	0.7789	19	0.0000	0.0000	19
	70.0-79.9	0.6174	0.7207	16	0.0000	0.0000	16
	80.0-89.9	0.1934	0.3298	17	0.0000	0.0000	17
July	0.0-9.9	0.4904	0.6936	2	0.0000	0.0000	2
	10.0-19.9	0.6000	0.8369	26	0.0000	0.0000	26
	20.0-29.9	0.2445	0.4806	37	0.0000	0.0000	37
	30.0-39.9	0.1577	0.3627	14	0.0000	0.0000	14
	50.0-59.9	0.0000	0.0000	17	0.0000	0.0000	17
	70.0-79.9	0.0404	0.1565	15	0.0000	0.0000	15
	80.0-89.9	0.0000	0.0000	10	0.0000	0.0000	10
November	0.0-9.9	0.0000	0.0000	2	0.0000	0.0000	2
	10.0-19.9	0.0233	0.1189	26	0.0000	0.0000	26
	20.0-29.9	0.0000	0.0000	32	0.0000	0.0000	32
	30.0-39.9	0.0606	0.1917	10	0.0000	0.0000	10
	50.0-59.9	0.0000	0.0000	14	0.0000	0.0000	14
	70.0-79.9	0.0000	0.0000	14	0.0000	0.0000	14
	80.0-89.9	0.0000	0.0000	7	0.0000	0.0000	7

Appendix 3 (continued)
Mean Monthly Electrofishing Catch-per-unit-effort (CPUE)
of Juvenile Chinook Salmon by 10 km Intervals of the Nechako River, 1996

	Distance (km) from	0+ Log_e(CPUE + 1)			1+ Log_e(CPUE + 1)		
Date	Kenney Dam	mean	SD	n	mean	SD	n
Night							
April	0.0-9.9	0.4904	0.5663	4	0.0000	0.0000	4
	10.0-19.9	0.7141	0.8660	26	0.3856	0.6063	26
	20.0-29.9	1.6677	1.0271	38	0.8755	0.9540	38
	30.0-39.9	0.9562	0.7433	16	0.1295	0.3872	16
	50.0-59.9	0.7593	0.9916	19	0.3738	0.7668	19
	70.0-79.9	1.2145	0.9102	16	0.4087	0.7007	16
	80.0-89.9	0.1622	0.3751	17	0.3366	0.5207	17
May	0.0-9.9	0.5584	1.1168	4	0.0000	0.0000	4
	10.0-19.9	3.1371	1.3477	27	0.1520	0.3255	27
	20.0-29.9	3.1388	1.3294	38	0.1253	0.3028	38
	30.0-39.9	1.8865	1.2581	16	0.0000	0.0000	16
	50.0-59.9	1.9718	1.2588	19	0.1165	0.3690	19
	70.0-79.9	2.7612	0.8597	16	0.0000	0.0000	16
	80.0-89.9	2.1775	0.8159	17	0.1769	0.2876	17
June	0.0-9.9	1.1087	1.2887	4	0.0000	0.0000	4
	10.0-19.9	3.5646	1.2233	27	0.0525	0.1912	27
	20.0-29.9	2.8013	1.0222	38	0.0160	0.0983	38
	30.0-39.9	2.5417	1.0057	16	0.0000	0.0000	16
	50.0-59.9	2.2516	1.0984	19	0.0000	0.0000	19
	70.0-79.9	2.7240	0.5538	16	0.0000	0.0000	16
	80.0-89.9	2.5685	0.8913	17	0.0000	0.0000	17
July	0.0-9.9	4.3686	1.3218	2	0.0000	0.0000	2
	10.0-19.9	3.0640	1.0436	26	0.0000	0.0000	26
	20.0-29.9	1.4709	1.0461	35	0.0000	0.0000	35
	30.0-39.9	1.3596	0.6479	10	0.0000	0.0000	10
	50.0-59.9	1.0402	0.7969	15	0.0000	0.0000	15
	70.0-79.9	0.7285	0.7046	14	0.0000	0.0000	14
	80.0-89.9	0.7161	0.6773	8	0.0000	0.0000	8
November	0.0-9.9	0.3031	0.4286	2	0.0000	0.0000	2
	10.0-19.9	0.4344	0.5105	25	0.0000	0.0000	25
	20.0-29.9	0.4964	0.4926	32	0.0000	0.0000	32
	30.0-39.9	0.2537	0.4629	7	0.0000	0.0000	7
	50.0-59.9	0.0551	0.1828	11	0.0000	0.0000	11
	70.0-79.9	0.2267	0.3862	14	0.0000	0.0000	14
	80.0-89.9	0.0000	-	1	0.0000	-	1

Appendix 4

Catches of Juvenile Chinook Salmon by Rotary Screw Traps at Diamond Island, Nechako River, 1996

Appendix 4. Daily catch of juvenile chinook salmon by rotary screw traps, and index of outmigrants at Diamond Island, Nechako River, 1996.

			RST No. 1						RST No. 2						RST No. 3								
Date	RST staff gage (cm)	River flow (m³/s)	Trap flow (m³/s)	Percent flow sampled	Catch 1+	Catch 0+	Population estimate 1+	Population estimate 0+	Trap flow (m³/s)	Percent flow sampled	Catch 1+	Catch 0+	Population estimate 1+	Population estimate 0+	Trap flow (m³/s)	Percent flow sampled	Catch 1+	Catch 0+	Population estimate 1+	Population estimate 0+	Total Catch 1+	Total Catch 0+	Weighted average catch 1+	Weighted average catch 0+
Day																								
11-Apr	80.5	48.3	1.034	2.1	0	0	0	0	1.405	2.9	0	0	0	0	1.019	2.1	1	7	47	332	1	7	14	98
12-Apr	81.5	49.5	1.034	2.1	3	1	144	48	1.405	2.8	0	7	0	247	1.019	2.1	0	7	0	340	3	15	43	215
13-Apr	81.5	49.5	1.034	2.1	0	0	0	0	1.405	2.8	0	0	0	0	1.019	2.1	0	3	0	146	0	3	0	43
14-Apr	90.0	59.9	1.034	1.7	0	1	0	58	1.405	2.3	0	0	0	0	1.019	1.7	0	0	0	0	0	1	0	17
15-Apr	91.0	61.2	1.034	1.7	0	1	0	59	1.405	2.3	1	1	44	44	1.019	1.7	0	2	0	120	1	4	18	71
16-Apr	95.0	66.5	1.317	2.0	0	4	0	202	1.481	2.2	0	2	0	90	1.123	1.7	0	0	0	0	0	6	0	102
17-Apr	100.0	73.3	1.317	1.8	0	1	0	56	1.481	2.0	0	1	0	50	1.123	1.5	0	0	0	0	0	2	0	37
18-Apr	104.0	79.1	1.317	1.7	0	1	0	60	1.481	1.9	1	5	53	267	1.123	1.4	1	5	70	352	2	11	40	222
19-Apr	106.0	82.0	1.358	1.7	0	1	0	60	1.452	1.8	0	3	0	169	1.402	1.7	1	7	59	410	1	11	19	214
20-Apr	106.5	82.8	1.358	1.6	0	0	0	0	1.452	1.8	0	6	0	342	1.402	1.7	0	1	0	59	0	7	0	138
21-Apr	107.0	83.5	1.355	1.6	0	0	0	0	1.458	1.7	0	3	0	172	1.392	1.7	0	2	0	120	0	5	0	99
22-Apr	109.0	86.5	1.355	1.6	0	1	0	64	1.458	1.7	0	3	0	178	1.392	1.6	0	5	0	311	0	9	0	185
23-Apr	110.0	88.1	1.107	1.3	0	3	0	239	1.461	1.7	0	0	0	0	1.342	1.5	0	11	0	722	0	14	0	315
24-Apr	112.5	91.9	1.107	1.2	0	1	0	83	1.461	1.6	0	1	0	63	1.342	1.5	0	1	0	68	0	3	0	71
25-Apr	114.5	95.1	1.107	1.2	0	0	0	0	1.461	1.5	1	3	65	195	1.342	1.4	1	9	71	638	2	12	49	292
26-Apr	114.0	94.3	1.107	1.2	0	0	0	0	1.461	1.5	0	2	0	129	1.342	1.4	1	5	70	351	1	7	24	169
27-Apr	114.0	94.3	1.107	1.2	0	2	0	170	1.461	1.5	0	0	0	0	1.342	1.4	2	3	141	211	2	5	48	121
28-Apr	113.0	92.7	1.107	1.2	0	0	0	0	1.461	1.6	0	2	0	127	1.342	1.4	0	1	0	69	0	3	0	71
29-Apr	112.0	91.2	1.352	1.5	0	1	0	67	1.455	1.6	0	3	0	188	1.700	1.9	1	4	54	214	1	8	20	162
30-Apr	112.0	91.2	1.352	1.5	0	1	0	67	1.455	1.6	0	2	0	125	1.700	1.9	0	6	0	322	0	9	0	182
01-May	112.5	91.9	1.352	1.5	0	0	0	0	1.484	1.6	0	5	0	310	1.737	1.9	0	7	0	370	0	12	0	241
02-May	111.0	89.6	1.352	1.5	0	1	0	66	1.484	1.7	0	4	0	241	1.737	1.9	0	4	0	206	0	9	0	176
03-May	110.5	88.8	1.337	1.5	1	3	66	199	1.490	1.7	0	0	0	0	1.616	1.8	0	7	0	385	1	10	20	200
04-May	110.5	88.8	1.337	1.5	0	1	0	66	1.490	1.7	0	2	0	119	1.616	1.8	0	4	0	220	0	7	0	140
05-May	110.0	88.1	1.375	1.6	0	0	0	0	1.481	1.7	0	1	0	59	1.499	1.7	0	13	0	764	0	14	0	283
06-May	110.0	88.1	1.375	1.6	0	5	0	320	1.481	1.7	0	4	0	238	1.499	1.7	0	12	0	705	0	21	0	425
07-May	109.0	86.5	1.322	1.5	0	0	0	0	1.464	1.7	0	2	0	118	1.104	1.3	0	18	0	1411	0	20	0	445
08-May	108.5	85.8	1.322	1.5	0	1	0	65	1.464	1.7	1	0	59	0	1.104	1.3	0	4	0	311	1	5	22	110
09-May	108.0	85.0	1.308	1.5	0	1	0	65	1.473	1.7	0	2	0	115	1.275	1.5	0	2	0	133	0	5	0	105
10-May	107.0	83.5	1.308	1.6	0	1	0	64	1.473	1.8	0	2	0	113	1.275	1.5	0	7	0	458	0	10	0	206
11-May	106.0	82.0	1.287	1.6	0	0	0	0	1.449	1.8	0	0	0	0	1.550	1.9	0	7	0	370	0	7	0	134
12-May	105.0	80.5	1.287	1.6	0	0	0	0	1.449	1.8	0	3	0	167	1.550	1.9	0	4	0	208	0	7	0	132
13-May	106.5	82.8	1.331	1.6	0	0	0	0	1.476	1.8	0	0	0	0	1.400	1.7	0	2	0	118	0	2	0	39
14-May	106.5	82.8	1.331	1.6	0	1	0	62	1.476	1.8	0	4	0	224	1.400	1.7	0	9	0	532	0	14	0	275
15-May	108.0	85.0	1.411	1.7	0	7	0	422	1.499	1.8	1	2	57	113	1.461	1.7	0	6	0	349	1	15	19	292
16-May	108.5	85.8	1.411	1.6	0	3	0	182	1.499	1.7	0	7	0	401	1.461	1.7	0	14	0	822	0	24	0	471
17-May	108.5	85.8	1.411	1.6	0	1	0	61	1.499	1.7	0	2	0	114	1.461	1.7	0	7	0	411	0	10	0	196
18-May	108.5	85.8	1.411	1.6	0	0	0	0	1.499	1.7	0	12	0	687	1.461	1.7	0	4	0	235	0	16	0	314
19-May	109.0	86.5	1.246	1.4	0	7	0	486	1.493	1.7	0	2	0	116	1.645	1.9	0	8	0	421	0	17	0	336
20-May	110.0	88.1	1.246	1.4	0	2	0	141	1.493	1.7	0	7	0	413	1.645	1.9	0	13	0	696	0	22	0	442
21-May	110.0	88.1	1.246	1.4	0	11	0	778	1.493	1.7	0	18	0	1062	1.645	1.9	0	18	0	963	0	47	0	944
22-May	111.0	89.6	1.246	1.4	0	14	0	1007	1.493	1.7	1	3	60	180	1.645	1.8	0	11	0	599	1	28	20	572
23-May	110.5	88.8	1.246	1.4	0	6	0	428	1.493	1.7	0	10	0	595	1.645	1.9	0	13	0	702	0	29	0	588

Appendix 4. Daily catch of juvenile chinook salmon by rotary screw traps, and index of outmigrants at Diamond Island, Nechako River, 1996.

Date	RST staff gage (cm)	River flow (m^3/s)	RST No. 1 Trap flow (m^3/s)	RST No. 1 Percent flow sampled	RST No. 1 Catch 1+	RST No. 1 Catch 0+	RST No. 1 Population estimate 1+	RST No. 1 Population estimate 0+	RST No. 2 Trap flow (m^3/s)	RST No. 2 Percent flow sampled	RST No. 2 Catch 1+	RST No. 2 Catch 0+	RST No. 2 Population estimate 1+	RST No. 2 Population estimate 0+	RST No. 3 Trap flow (m^3/s)	RST No. 3 Percent flow sampled	RST No. 3 Catch 1+	RST No. 3 Catch 0+	RST No. 3 Population estimate 1+	RST No. 3 Population estimate 0+	Total Catch 1+	Total Catch 0+	Weighted average catch 1+	Weighted average catch 0+
24-May	110.0	88.1	1.361	1.5	0	5	0	324	1.496	1.7	0	11	0	647	1.437	1.6	0	28	0	1716	0	44	0	902
25-May	110.0	88.1	1.361	1.5	0	9	0	582	1.496	1.7	0	9	0	530	1.437	1.6	0	11	0	674	0	29	0	595
26-May	109.0	86.5	1.396	1.6	0	2	0	124	1.452	1.7	0	14	0	834	1.421	1.6	0	71	0	4322	0	87	0	1763
27-May	107.5	84.3	1.396	1.7	0	1	0	60	1.452	1.7	1	9	58	522	1.421	1.7	0	19	0	1126	1	29	20	572
28-May	107.0	83.5	1.378	1.7	0	1	0	61	1.505	1.8	1	0	55	0	1.377	1.6	0	10	0	606	1	11	20	216
29-May	106.0	82.0	1.378	1.7	0	3	0	179	1.505	1.8	0	5	0	272	1.377	1.7	0	16	0	953	0	24	0	462
30-May	106.0	82.0	1.293	1.6	0	1	0	63	1.434	1.7	0	3	0	172	1.158	1.4	0	7	0	496	0	11	0	232
31-May	105.0	80.5	1.293	1.6	0	1	0	62	1.434	1.8	0	4	0	225	1.158	1.4	0	12	0	835	0	17	0	352
01-Jun	104.5	79.8	1.258	1.6	0	0	0	0	1.343	1.7	0	1	0	59	1.139	1.4	0	5	0	350	0	6	0	128
02-Jun	104.5	79.8	1.258	1.6	0	2	0	127	1.343	1.7	0	2	0	119	1.139	1.4	0	5	0	350	0	9	0	192
03-Jun	104.5	79.8	1.249	1.6	0	2	0	128	1.387	1.7	0	1	0	58	1.093	1.4	0	9	0	657	0	12	0	257
04-Jun	104.0	79.1	1.249	1.6	0	1	0	63	1.387	1.8	0	2	0	114	1.093	1.4	0	6	0	434	0	9	0	191
05-Jun	103.0	77.6	1.249	1.6	1	3	62	186	1.387	1.8	0	12	0	671	1.093	1.4	0	16	0	1136	1	31	21	645
06-Jun	102.0	76.2	1.231	1.6	0	0	0	0	1.370	1.8	0	4	0	222	1.128	1.5	0	19	0	1283	0	23	0	470
07-Jun	101.0	74.8	1.231	1.6	0	1	0	61	1.370	1.8	0	1	0	55	1.128	1.5	0	25	0	1656	0	27	0	541
08-Jun	100.0	73.3	1.040	1.4	0	0	0	0	1.349	1.8	0	0	0	0	1.244	1.7	0	3	0	177	0	3	0	61
09-Jun	100.0	73.3	1.040	1.4	0	3	0	212	1.349	1.8	0	2	0	109	1.244	1.7	0	8	0	472	0	13	0	262
10-Jun	99.5	72.6	1.205	1.7	0	0	0	0	1.378	1.9	0	0	0	0	1.174	1.6	0	4	0	247	0	4	0	77
11-Jun	99.0	71.9	1.205	1.7	0	0	0	0	1.378	1.9	0	0	0	0	1.174	1.6	0	9	0	551	0	9	0	172
12-Jun	98.0	70.5	1.210	1.7	0	0	0	0	1.352	1.9	0	1	0	52	1.199	1.7	0	0	0	0	0	1	0	19
13-Jun	97.5	69.9	1.210	1.7	0	0	0	0	1.352	1.9	0	1	0	52	1.199	1.7	0	7	0	408	0	8	0	149
14-Jun	97.0	69.2	1.122	1.6	0	0	0	0	1.213	1.8	0	1	0	57	1.030	1.5	0	0	0	0	0	1	0	21
15-Jun	96.0	67.8	1.122	1.7	0	1	0	60	1.213	1.8	0	4	0	224	1.030	1.5	0	0	0	0	0	5	0	101
16-Jun	96.0	67.8	1.196	1.8	0	2	0	113	1.331	2.0	0	8	0	407	1.149	1.7	0	6	0	354	0	16	0	295
17-Jun	96.0	67.8	1.196	1.8	0	0	0	0	1.331	2.0	0	0	0	0	1.149	1.7	0	6	0	354	0	6	0	111
18-Jun	96.0	67.8	1.146	1.7	0	1	0	59	1.375	2.0	0	2	0	99	0.993	1.5	0	10	0	683	0	13	0	251
19-Jun	97.0	69.2	1.146	1.7	0	4	0	241	1.375	2.0	0	0	0	0	0.993	1.4	0	1	0	70	0	5	0	98
20-Jun	97.0	69.2	1.137	1.6	0	0	0	0	1.370	2.0	0	0	0	0	0.983	1.4	0	1	0	70	0	1	0	20
21-Jun	97.0	69.2	1.137	1.6	0	0	0	0	1.370	2.0	0	0	0	0	0.983	1.4	0	3	0	211	0	3	0	59
22-Jun	96.0	67.8	1.231	1.8	0	2	0	110	1.399	2.1	0	0	0	0	1.007	1.5	0	0	0	0	0	2	0	37
23-Jun	96.0	67.8	1.231	1.8	0	0	0	0	1.399	2.1	0	3	0	145	1.007	1.5	0	4	0	269	0	7	0	131
24-Jun	96.0	67.8	1.202	1.8	0	3	0	169	1.352	2.0	0	0	0	0	1.060	1.6	0	2	0	128	0	5	0	94
25-Jun	95.0	66.5	1.202	1.8	0	0	0	0	1.352	2.0	0	0	0	0	1.060	1.6	0	3	0	188	0	3	0	55
26-Jun	95.0	66.5	1.199	1.8	0	1	0	55	1.331	2.0	0	1	0	50	0.979	1.5	0	6	0	407	0	8	0	152
27-Jun	95.0	66.5	1.199	1.8	0	0	0	0	1.331	2.0	0	2	0	100	0.979	1.5	0	5	0	339	0	7	0	133
28-Jun	95.0	66.5	1.122	1.7	0	0	0	0	1.246	1.9	0	1	0	53	1.026	1.5	0	1	0	65	0	2	0	39
29-Jun	94.0	65.1	1.122	1.7	0	1	0	58	1.246	1.9	0	0	0	0	1.026	1.6	0	1	0	63	0	2	0	38
30-Jun	100.0	73.3	1.140	1.6	0	0	0	0	1.231	1.7	0	0	0	0	1.084	1.5	0	0	0	0	0	0	0	0
01-Jul	111.0	89.6	1.140	1.3	0	2	0	157	1.231	1.4	0	0	0	0	1.084	1.2	0	4	0	331	0	6	0	156
02-Jul	120.0	104.1	1.140	1.1	0	1	0	91	1.231	1.2	0	1	0	85	1.084	1.0	0	5	0	480	0	7	0	211
03-Jul	132.0	125.0	1.140	0.9	0	0	0	0	1.231	1.0	0	0	0	0	1.084	0.9	0	1	0	115	0	1	0	36
04-Jul	140.0	139.9	1.358	1.0	0	0	0	0	1.019	0.7	0	0	0	0	1.617	1.2	0	0	0	0	0	0	0	0
05-Jul	141.6	142.9	1.358	1.0	0	0	0	0	1.019	0.7	0	1	0	140	1.617	1.1	0	0	0	0	0	1	0	36
06-Jul	149.1	157.8	1.358	0.9	0	0	0	0	1.096	0.7	0	2	0	288	0.904	0.6	0	0	0	0	0	2	0	94
07-Jul	152.3	164.4	1.358	0.8	0	0	0	0	1.096	0.7	0	0	0	0	0.904	0.5	0	0	0	0	0	0	0	0

Appendix 4. Daily catch of juvenile chinook salmon by rotary screw traps, and index of outmigrants at Diamond Island, Nechako River, 1996.

Date	RST staff gage (cm)	River flow (m^3/s)	RST No. 1 Trap flow (m^3/s)	RST No. 1 Percent flow sampled	RST No. 1 Catch 1+	RST No. 1 Catch 0+	RST No. 1 Population estimate 1+	RST No. 1 Population estimate 0+
08-Jul	164.1	189.7	1.358	0.7	0	0	0	0
09-Jul	168.3	199.4	1.084	0.5	0	0	0	0
10-Jul	172.6	209.2	1.084	0.5	0	0	0	0
11-Jul	175.8	216.8	1.084	0.5	0	0	0	0
12-Jul	178.0	221.9	1.084	0.5	0	0	0	0
13-Jul	180.1	227.0	1.084	0.5	0	0	0	0
Total Day:					5	137	272	8995
Night								
12-Apr	81.5	49.5	1.034	2.1	0	0	0	0
13-Apr	81.5	49.5	1.034	2.1	2	2	96	96
14-Apr	81.5	49.5	1.034	2.1	1	7	48	336
15-Apr	91.0	61.2	1.034	1.7	1	0	59	0
16-Apr	94.0	65.1	1.317	2.0	1	2	49	99
17-Apr	98.0	70.5	1.317	1.9	1	0	54	0
18-Apr	103.0	77.6	1.317	1.7	0	1	0	59
19-Apr	106.0	82.0	1.358	1.7	0	0	0	0
20-Apr	106.5	82.8	1.358	1.6	0	7	0	427
21-Apr	106.5	82.8	1.355	1.6	2	1	122	61
22-Apr	109.0	86.5	1.355	1.6	1	0	64	0
23-Apr	108.5	85.8	1.107	1.3	1	1	77	77
24-Apr	112.0	91.2	1.107	1.2	0	1	0	82
25-Apr	114.5	95.1	1.107	1.2	0	1	0	86
26-Apr	114.0	94.3	1.107	1.2	0	0	0	0
27-Apr	114.0	94.3	1.107	1.2	0	6	0	511
28-Apr	113.5	93.5	1.107	1.2	1	0	84	0
29-Apr	112.5	91.9	1.352	1.5	1	0	68	0
30-Apr	112.0	91.2	1.352	1.5	0	0	0	0
01-May	113.0	92.7	1.352	1.5	1	4	69	274
02-May	112.0	91.2	1.352	1.5	0	12	0	809
03-May	111.0	89.6	1.337	1.5	0	2	0	134
04-May	110.5	88.8	1.337	1.5	0	10	0	664
05-May	110.0	88.1	1.375	1.6	0	0	0	0
06-May	110.0	88.1	1.375	1.6	1	0	64	0
07-May	109.5	87.3	1.322	1.5	1	0	66	0
08-May	109.5	87.3	1.322	1.5	6	0	396	0
09-May	108.0	85.0	1.308	1.5	6	0	390	0
10-May	107.5	84.3	1.308	1.6	4	3	258	193
11-May	106.0	82.0	1.287	1.6	1	2	64	127
12-May	105.0	80.5	1.287	1.6	3	0	188	0
13-May	105.0	80.5	1.331	1.7	2	1	121	60
14-May	106.5	82.8	1.331	1.6	0	0	0	0
15-May	107.5	84.3	1.411	1.7	2	4	119	239

Date	RST No. 2 Trap flow (m^3/s)	RST No. 2 Percent flow sampled	RST No. 2 Catch 1+	RST No. 2 Catch 0+	RST No. 2 Population estimate 1+	RST No. 2 Population estimate 0+
08-Jul	1.096	0.6	0	0	0	0
09-Jul	0.963	0.5	0	0	0	0
10-Jul	0.963	0.5	0	0	0	0
11-Jul	0.963	0.4	0	0	0	0
12-Jul	0.963	0.4	0	0	0	0
13-Jul	0.963	0.4	0	0	0	0
Total Day:			8	244	451	14133
Night						
12-Apr	1.405	2.8	0	0	0	0
13-Apr	1.405	2.8	1	2	35	71
14-Apr	1.405	2.8	0	4	0	141
15-Apr	1.405	2.3	0	1	0	44
16-Apr	1.481	2.3	1	0	44	0
17-Apr	1.481	2.1	2	2	95	95
18-Apr	1.481	1.9	0	8	0	419
19-Apr	1.452	1.8	0	8	0	452
20-Apr	1.452	1.8	0	10	0	570
21-Apr	1.458	1.8	1	14	57	795
22-Apr	1.458	1.7	0	7	0	415
23-Apr	1.461	1.7	1	17	59	998
24-Apr	1.461	1.6	1	5	62	312
25-Apr	1.461	1.5	0	15	0	977
26-Apr	1.461	1.5	0	15	0	968
27-Apr	1.461	1.5	0	18	0	1162
28-Apr	1.461	1.6	0	11	0	704
29-Apr	1.455	1.6	1	8	63	506
30-Apr	1.455	1.6	0	21	0	1316
01-May	1.484	1.6	0	21	0	1312
02-May	1.484	1.6	0	21	0	1290
03-May	1.490	1.7	0	2	0	120
04-May	1.490	1.7	0	25	0	1490
05-May	1.481	1.7	0	22	0	1308
06-May	1.481	1.7	0	59	0	3507
07-May	1.464	1.7	3	42	179	2505
08-May	1.464	1.7	0	59	0	3519
09-May	1.473	1.7	1	12	58	693
10-May	1.473	1.7	3	48	172	2746
11-May	1.449	1.8	6	32	340	1811
12-May	1.449	1.8	1	29	56	1612
13-May	1.476	1.8	3	11	164	600
14-May	1.476	1.8	2	20	112	1122
15-May	1.499	1.8	2	18	112	1012

Date	RST No. 3 Trap flow (m^3/s)	RST No. 3 Percent flow sampled	RST No. 3 Catch 1+	RST No. 3 Catch 0+	RST No. 3 Population estimate 1+	RST No. 3 Population estimate 0+	Total Catch 1+	Total Catch 0+	Weighted average catch 1+	Weighted average catch 0+
08-Jul	0.904	0.5	0	2	0	420	0	2	0	113
09-Jul	0.763	0.4	0	0	0	0	0	0	0	0
10-Jul	0.763	0.4	0	0	0	0	0	0	0	0
11-Jul	0.763	0.4	0	0	0	0	0	0	0	0
12-Jul	0.763	0.3	0	0	0	0	0	0	0	0
13-Jul	0.763	0.3	0	0	0	0	0	0	0	0
Total Day:			8	624	512	39173	21	1005	418	20427
Night										
12-Apr	1.019	2.1	1	0	49	0	1	0	14	0
13-Apr	1.019	2.1	3	0	146	0	6	4	86	57
14-Apr	1.019	2.1	2	0	97	0	3	11	43	158
15-Apr	1.019	1.7	2	0	120	0	3	1	53	18
16-Apr	1.123	1.7	1	0	58	0	3	2	50	33
17-Apr	1.123	1.6	2	1	126	63	5	3	90	54
18-Apr	1.123	1.4	1	3	69	207	1	12	20	238
19-Apr	1.402	1.7	0	1	0	59	0	9	0	175
20-Apr	1.402	1.7	2	0	118	0	2	17	39	334
21-Apr	1.392	1.7	0	0	0	0	3	15	59	295
22-Apr	1.392	1.6	2	6	124	373	3	13	62	268
23-Apr	1.342	1.6	0	3	0	192	2	21	44	461
24-Apr	1.342	1.5	0	6	0	407	1	12	23	280
25-Apr	1.342	1.4	0	0	0	0	0	16	0	389
26-Apr	1.342	1.4	2	4	141	281	2	19	48	458
27-Apr	1.342	1.4	0	8	0	562	0	32	0	772
28-Apr	1.342	1.4	0	1	0	70	1	12	24	287
29-Apr	1.700	1.8	1	14	54	757	3	22	61	449
30-Apr	1.700	1.9	0	5	0	268	0	26	0	526
01-May	1.737	1.9	0	7	0	374	1	32	20	649
02-May	1.737	1.9	0	0	0	0	0	33	0	658
03-May	1.616	1.8	0	1	0	55	0	5	0	101
04-May	1.616	1.8	0	12	0	660	0	47	0	940
05-May	1.499	1.7	0	4	0	235	0	26	0	526
06-May	1.499	1.7	0	40	0	2350	1	99	20	2002
07-May	1.104	1.3	1	108	79	8539	5	150	112	3366
08-May	1.104	1.3	0	122	0	9645	6	181	135	4061
09-May	1.275	1.5	0	29	0	1933	7	41	147	859
10-May	1.275	1.5	1	25	66	1652	8	76	166	1579
11-May	1.550	1.9	0	28	0	1482	7	62	134	1186
12-May	1.550	1.9	0	28	0	1455	4	57	75	1071
13-May	1.400	1.7	0	43	0	2473	5	55	96	1053
14-May	1.400	1.7	0	138	0	8157	2	158	39	3108
15-May	1.461	1.7	0	35	0	2018	4	57	77	1099

Appendix 4. Daily catch of juvenile chinook salmon by rotary screw traps, and index of outmigrants at Diamond Island, Nechako River, 1996.

	RST		RST No. 1						RST No. 2						RST No. 3									
	staff	River	Trap	Percent			Population		Trap	Percent			Population		Trap	Percent			Population				Weighted	
	gage	flow	flow	flow	Catch		estimate		flow	flow	Catch		estimate		flow	flow	Catch		estimate		Total Catch		average catch	
Date	(cm)	(m^3/s)	(m^3/s)	sampled	1+	0+	1+	0+	(m^3/s)	sampled	1+	0+	1+	0+	(m^3/s)	sampled	1+	0+	1+	0+	1+	0+	1+	0+
16-May	108.5	85.8	1.411	1.6	3	0	182	0	1.499	1.7	2	24	114	1373	1.461	1.7	0	19	0	1115	5	43	98	844
17-May	108.0	85.0	1.411	1.7	0	4	0	241	1.499	1.8	2	11	113	624	1.461	1.7	1	63	58	3665	3	78	58	1517
18-May	108.5	85.8	1.411	1.6	4	0	243	0	1.499	1.7	2	22	114	1259	1.461	1.7	0	46	0	2700	6	68	118	1334
19-May	108.5	85.8	1.246	1.5	0	1	0	69	1.493	1.7	3	12	172	689	1.645	1.9	0	35	0	1825	3	48	59	939
20-May	109.5	87.3	1.246	1.4	2	0	140	0	1.493	1.7	1	6	58	351	1.645	1.9	0	5	0	265	3	11	60	219
21-May	110.0	88.1	1.246	1.4	2	1	141	71	1.493	1.7	2	24	118	1415	1.645	1.9	0	6	0	321	4	31	80	623
22-May	111.0	89.6	1.246	1.4	5	1	360	72	1.493	1.7	2	20	120	1200	1.645	1.8	0	45	0	2451	7	66	143	1349
23-May	110.5	88.8	1.246	1.4	3	0	214	0	1.493	1.7	0	26	0	1547	1.645	1.9	1	37	54	1998	4	63	81	1276
24-May	110.0	88.1	1.361	1.5	0	1	0	65	1.496	1.7	3	24	177	1413	1.437	1.6	0	28	0	1716	3	53	62	1087
25-May	109.0	86.5	1.361	1.6	0	0	0	0	1.496	1.7	0	3	0	174	1.437	1.7	0	50	0	3012	0	53	0	1068
26-May	110.0	88.1	1.396	1.6	4	2	252	126	1.452	1.6	4	40	243	2426	1.421	1.6	1	22	62	1363	9	64	186	1320
27-May	108.0	85.0	1.396	1.6	4	0	244	0	1.452	1.7	4	27	234	1581	1.421	1.7	0	16	0	957	8	43	159	856
28-May	107.0	83.5	1.378	1.7	3	1	182	61	1.505	1.8	2	20	111	1110	1.377	1.6	0	19	0	1152	5	40	98	784
29-May	106.0	82.0	1.378	1.7	2	4	119	238	1.505	1.8	2	18	109	981	1.377	1.7	0	7	0	417	4	29	77	558
30-May	106.0	82.0	1.293	1.6	4	2	254	127	1.434	1.7	4	8	229	457	1.158	1.4	0	11	0	779	8	21	169	443
31-May	105.0	80.5	1.293	1.6	9	0	561	0	1.434	1.8	7	12	393	674	1.158	1.4	0	10	0	696	16	22	332	456
01-Jun	104.5	79.8	1.258	1.6	2	2	127	127	1.343	1.7	0	20	0	1188	1.139	1.4	0	5	0	350	2	27	43	576
02-Jun	104.5	79.8	1.258	1.6	2	1	127	63	1.343	1.7	1	18	59	1070	1.139	1.4	0	9	0	631	3	28	64	598
03-Jun	104.5	79.8	1.249	1.6	2	3	128	192	1.387	1.7	2	10	115	575	1.093	1.4	0	4	0	292	4	17	86	364
04-Jun	104.0	79.1	1.249	1.6	3	3	190	190	1.387	1.8	1	19	57	1083	1.093	1.4	0	4	0	289	4	26	85	551
05-Jun	103.0	77.6	1.249	1.6	3	15	186	932	1.387	1.8	13	6	727	336	1.093	1.4	0	11	0	781	16	32	333	666
06-Jun	102.0	76.2	1.231	1.6	7	8	433	495	1.370	1.8	1	13	56	723	1.128	1.5	0	21	0	1418	8	42	163	858
07-Jun	102.0	76.2	1.231	1.6	4	12	248	743	1.370	1.8	4	18	222	1001	1.128	1.5	0	32	0	2161	8	62	163	1267
08-Jun	101.0	74.8	1.040	1.4	6	19	431	1366	1.349	1.8	2	14	111	776	1.244	1.7	0	10	0	601	8	43	165	885
09-Jun	100.0	73.3	1.040	1.4	9	10	635	705	1.349	1.8	1	19	54	1033	1.244	1.7	0	6	0	354	10	35	202	707
10-Jun	99.5	72.6	1.205	1.7	1	19	60	1146	1.378	1.9	0	8	0	422	1.174	1.6	0	30	0	1855	1	57	19	1102
11-Jun	99.0	71.9	1.205	1.7	3	13	179	776	1.378	1.9	3	7	157	365	1.174	1.6	0	19	0	1164	6	39	115	747
12-Jun	98.5	71.2	1.210	1.7	4	26	235	1530	1.352	1.9	0	11	0	580	1.199	1.7	0	9	0	535	4	46	76	871
13-Jun	98.0	70.5	1.210	1.7	2	17	117	991	1.352	1.9	0	15	0	783	1.199	1.7	0	9	0	530	2	41	38	769
14-Jun	97.0	69.2	1.122	1.6	3	25	185	1541	1.213	1.8	0	13	0	741	1.030	1.5	0	7	0	470	3	45	62	925
15-Jun	96.0	67.8	1.122	1.7	3	32	181	1934	1.213	1.8	0	24	0	1341	1.030	1.5	0	10	0	658	3	66	60	1330
16-Jun	96.0	67.8	1.196	1.8	2	23	113	1304	1.331	2.0	1	20	51	1019	1.149	1.7	0	4	0	236	3	47	55	867
17-Jun	96.0	67.8	1.196	1.8	0	33	0	1871	1.331	2.0	0	25	0	1273	1.149	1.7	0	25	0	1476	0	83	0	1531
18-Jun	96.0	67.8	1.146	1.7	0	21	0	1243	1.375	2.0	0	22	0	1085	0.993	1.5	0	13	0	888	0	56	0	1081
19-Jun	96.0	67.8	1.146	1.7	1	10	59	592	1.375	2.0	0	27	0	1331	0.993	1.5	0	6	0	410	1	43	19	830
20-Jun	97.0	69.2	1.137	1.6	0	13	0	791	1.370	2.0	0	29	0	1465	0.983	1.4	0	10	0	704	0	52	0	1031
21-Jun	97.0	69.2	1.137	1.6	0	6	0	365	1.370	2.0	1	24	51	1212	0.983	1.4	0	11	0	774	1	41	20	813
22-Jun	96.0	67.8	1.231	1.8	0	7	0	386	1.399	2.1	0	30	0	1454	1.007	1.5	0	4	0	269	0	41	0	764
23-Jun	97.0	69.2	1.231	1.8	0	8	0	449	1.399	2.0	0	22	0	1088	1.007	1.5	0	9	0	618	0	39	0	742
24-Jun	96.0	67.8	1.202	1.8	0	39	0	2201	1.352	2.0	0	31	0	1555	1.060	1.6	0	16	0	1024	0	86	0	1614
25-Jun	96.0	67.8	1.202	1.8	0	28	0	1580	1.352	2.0	1	25	50	1254	1.060	1.6	0	17	0	1087	1	70	19	1314
26-Jun	95.0	66.5	1.199	1.8	0	25	0	1386	1.331	2.0	0	23	0	1148	0.979	1.5	0	13	0	882	0	61	0	1155
27-Jun	95.0	66.5	1.199	1.8	0	25	0	1386	1.331	2.0	0	23	0	1148	0.979	1.5	0	12	0	815	0	60	0	1136
28-Jun	95.0	66.5	1.122	1.7	0	55	0	3257	1.246	1.9	0	53	0	2827	1.026	1.5	0	27	0	1749	0	135	0	2643
29-Jun	95.0	66.5	1.122	1.7	0	44	0	2606	1.246	1.9	0	40	0	2134	1.026	1.5	0	10	0	648	0	94	0	1841

Appendix 4. Daily catch of juvenile chinook salmon by rotary screw traps, and index of outmigrants at Diamond Island, Nechako River, 1996.

Date	RST staff gage (cm)	River flow (m^3/s)	RST No. 1 Trap flow (m^3/s)	RST No. 1 Percent flow sampled	RST No. 1 Catch 1+	RST No. 1 Catch 0+	RST No. 1 Population estimate 1+	RST No. 1 Population estimate 0+	RST No. 2 Trap flow (m^3/s)	RST No. 2 Percent flow sampled	RST No. 2 Catch 1+	RST No. 2 Catch 0+	RST No. 2 Population estimate 1+	RST No. 2 Population estimate 0+	RST No. 3 Trap flow (m^3/s)	RST No. 3 Percent flow sampled	RST No. 3 Catch 1+	RST No. 3 Catch 0+	RST No. 3 Population estimate 1+	RST No. 3 Population estimate 0+	Total Catch 1+	Total Catch 0+	Weighted average catch 1+	Weighted average catch 0+
30-Jun	96.5	68.5	1.140	1.7	0	29	0	1742	1.231	1.8	0	30	0	1669	1.084	1.6	0	20	0	1263	0	79	0	1566
01-Jul	106.0	82.0	1.140	1.4	0	57	0	4102	1.231	1.5	0	51	0	3398	1.084	1.3	0	10	0	756	0	118	0	2801
02-Jul	116.0	97.5	1.140	1.2	0	138	0	11807	1.231	1.3	0	68	0	5386	1.084	1.1	0	7	0	630	0	213	0	6012
03-Jul	125.0	112.6	1.140	1.0	0	24	0	2370	1.231	1.1	0	25	0	2286	1.084	1.0	0	20	0	2077	0	69	0	2248
04-Jul	134.0	128.6	1.358	1.1	0	0	0	0	1.019	0.8	0	0	0	0	1.617	1.3	0	5	0	398	0	5	0	161
05-Jul	137.3	134.7	1.358	1.0	0	3	0	298	1.019	0.8	0	1	0	132	1.617	1.2	0	0	0	0	0	4	0	135
06-Jul	145.8	151.3	1.358	0.9	0	3	0	334	1.096	0.7	1	1	138	138	0.904	0.6	0	0	0	0	1	4	45	180
07-Jul	152.3	164.4	1.358	0.8	0	0	0	0	1.096	0.7	0	0	0	0	0.904	0.5	0	0	0	0	0	0	0	0
08-Jul	158.7	178.0	1.358	0.8	0	1	0	131	1.096	0.6	0	0	0	0	0.904	0.5	0	0	0	0	0	1	0	53
09-Jul	165.1	192.1	1.084	0.6	0	0	0	0	0.963	0.5	0	0	0	0	0.763	0.4	0	0	0	0	0	0	0	0
10-Jul	170.5	204.3	1.084	0.5	0	0	0	0	0.963	0.5	0	1	0	212	0.763	0.4	0	0	0	0	0	1	0	73
11-Jul	173.7	211.7	1.084	0.5	0	0	0	0	0.963	0.5	0	0	0	0	0.763	0.4	0	0	0	0	0	0	0	0
12-Jul	175.8	216.8	1.084	0.5	0	0	0	0	0.963	0.4	0	0	0	0	0.763	0.4	0	0	0	0	0	0	0	0
13-Jul	179.1	224.5	1.084	0.5	0	1	0	207	0.963	0.4	0	0	0	0	0.763	0.3	0	0	0	0	0	1	0	80
14-Jul	182.3	232.3	1.084	0.5	0	1	0	214	0.963	0.4	0	0	0	0	0.763	0.3	0	0	0	0	0	1	0	83
Total Night:					141	883	8983	58758			101	1670	5762	97094			24	1516	1421	97491	266	4069	5349	85149
Total:					146	1020	9256	67753			109	1914	6213	111227			32	2140	1932	136664	287	5074	5766	105576