BC Environment

# Lakelse River Steelhead: Summary of Current Data and Status Review, 1997

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**Skeena Fisheries Report SK 105**
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## Abstract

A review of all information on Lakelse River steelhead, *Oncorhynchus mykiss,* available from B.C. Ministry of Environment, Lands and Parks (MELP), Skeena Region, Canada Department of Fisheries and Oceans (DFO), forest licensees, native bands, federal and provincial ministry staff and local anglers was conducted in March, 1997. Tagging records on 347 fish collected over approximately 30 years indicated that Lakelse River steelhead entered the river in two major runs; a fall run from October to January and a spring run from March until May. The majority of these fish spent three years in freshwater and two or three years in saltwater. Steelhead were observed spawning throughout the mainstem river below Lakelse Lake and in White, Coldwater, Herman and Williams creeks. Over this time period repeat spawners accounted for 15.6% of tagged fish and there were 1.43 females for each male. Juveniles utilized most of the low gradient parts of the watershed for rearing. The lake is believed to hold the main critical overwintering habitat. No enhancement attempts were reported. Data on the annual adult population sizes were considered unreliable. Anglers' reports of catch suggested an average catch rate of 0.353 fish/angler day. No guiding was allowed on the Lakelse River or its tributaries. More rigorous study designs, studies to estimate population size and distribution and an extension of the catch and release regulation to cover the entire watershed throughout the year were recommended.

## Acknowledgements

The authors would like to thank Mark Beere (MELP), Rob Brown and Grant Hazelwood (Steelhead Society of B.C.), Chris and Jim Culp (Terrace Salmonid Enhancement Society), Dionys DeLeeuw (MELP), Mitch Drewes (DFO), John Hipp (retired-DFO), Damian Keating (Skeena Sawmills), Archi MacDonald (Skeena Cellulose), Steve Roberts (Kitsumkalum Band Council), Len Seefried (BioLith) and Ron Tetreau (MELP) for their help on this project. We especially appreciated the substantial editing contribution by Dana Atagi (MELP) and Charles Parken (Cascadia Natural Resources Consulting).

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# 1. Introduction

The steelhead (*Oncorhynchus mykiss*) population of Lakelse River is a major part of the recreational sport fishing opportunity for residents of the Terrace area as well as for visitors from around the world. Compared to other streams in the Terrace area, such as the Zymoetz and Kitsumkalum, the Lakelse is a relatively warm water river with good access, and offers high quality angling throughout most of the year. Lakelse Lake acts to stabilize the water levels and discharges water of relatively good clarity, even when other local rivers are turbid. These factors make the Lakelse an especially productive and important resource.
Factors such as easy access throughout most of the year, relatively high angler effort and continued forestry development activities in the watershed make it important that the steelhead population and habitat be carefully monitored to allow intervention if there are significant changes. The purpose of this report is to provide a summary of data currently available on Lakelse River steelhead and to provide suggestions for protection of this resource and for improvements in the information base for fisheries management.

The report covers the following topics:

1. Freshwater and ocean life history
2. Spawning, rearing and overwintering areas
3. Review of past enhancement attempts
4. Review of adult assessments
5. Review of adult run timing
6. Review of harvest, catch and angler effort
7. Review of angling guide activity
8. Review of creel survey information
9. Review of current angling regulations
10. Description of recreational fisheries
11. Review of First Nations uses and harvest
12. Review of minimum escapement requirements
13. Summary of current stock status

Information about steelhead in the Lakelse River has been collected since at least 1967, however it has not been comprehensively collated and summarized in the past 25 years. This literature review involved searching all existing information available as of March, 1997 and summarizing it in the form of a stock status report.

## 2. Study Area

Lakelse River (Watershed Code 420) is an 18 km long, 4th order (1:50,000) stream which runs northwesterly and enters the south bank of the Skeena River approximately 84 km above its mouth at Tyee and 13 km downstream from Terrace, B.C. (Figure 1). It drains Lakelse Lake, a shallow, relatively warm lake which is the central feature of the watershed. The river drains approximately 552 $km^2$ (55,200 ha) and has three major tributaries, Williams Creek, Coldwater Creek and White Creek, as well as a number of smaller tributaries, including Mink, Herman, Blackwater, Furlong, Granite, Hatchery, Schulbuckhand, Clearwater and Andalus creeks. Much of the watershed surrounding the lake and the river is of low relief so that many of these streams have a low gradient. This, combined with relatively warm water in the lake combine to make this river very productive. Species found in the Lakelse River include steelhead (*O. mykiss*), chinook (*O. tshawytscha*), sockeye (*O. nerka*), pink (*O. gorbuscha*), coho (*O. kisutch*) chum (*O. keta*), cutthroat trout (*O. clarki*), Dolly Varden (*Salvelinus malma*) and mountain whitefish (*Prosopium williamsoni*, MELP 1977).

## 3. Methods

All information that was considered potentially relevant to steelhead in Lakelse River was sought from the B.C. Ministry of Environment, Lands and Parks (MELP), Skeena Region files, the Canada Department of Fisheries and Oceans (DFO), Repap B.C. Inc., Skeena Sawmills, the Kitselas and Kitsumkalum Band Councils, regional ministry staff and local anglers (see list of persons contacted in Appendix A).

All tagging data were entered into a MS Access database. The database was then used to search for and remove duplicate entries, to clean the data of spurious entries and to then analyze the data. A parsimonious approach was taken in interpreting all recorded data.

### 3.1. Removal of Duplicate Records

In many cases the same tagged fish was recorded in more than one record. These duplications were detected after all records were entered into the database and then sorted. Each record corresponded to one fish, with information such as age, sex, weight, length and other parameters recorded. In a significant number of cases, no tag numbers were recorded, however much of the other data recorded suggested duplication of records. These duplicates were of two types.

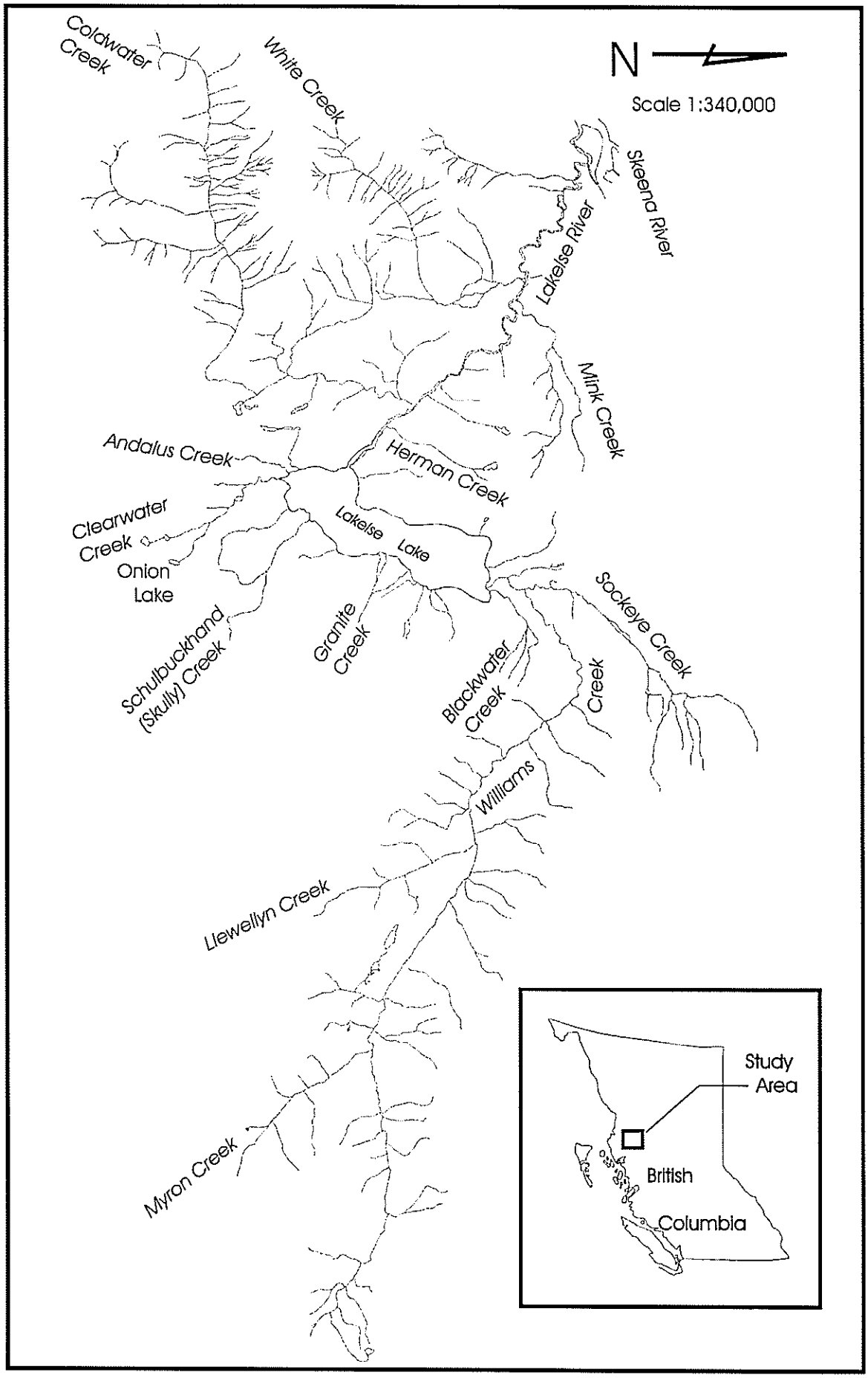



Figure 1. Map showing the location of the Lakelse River.

The first type included those cases in which all recorded data in the suspected multiple entries were in complete agreement. In these cases the records were deemed to be duplications. Since one record for a given fish often contained some information missing from the duplicate record, the record with the most information was retained. It was then augmented with information it did not contain but which was present in the less comprehensive record. After this the less comprehensive record was deleted from the working copy of the database. The simplified example below shows two duplicate records and the record that would have been retained following the procedure described above.

| | Sex | Weight | Length | Date Tagged | Location | Colour |
|---|---|---|---|---|---|---|
| Record 1 | M | 4.6 kg | 67 cm | 78/10/25 | Powerline | Bright |
| Record 2 | M | 4.6 kg | 67 cm | 78/10/25 | | |
| Augmented & Retained Record | M | 4.6 kg | 67 cm | 78/10/25 | Powerline | Bright |

The second type included those cases where there was some minor disagreement between one or more data fields recorded in multiple records for the same fish. The disagreements were not enough to suggest that the records referred to different fish, but were significant enough to make both records' fields suspect. In order to be deemed the same fish, the two records were required to agree in at least the date of capture and in two of either weight, length, or age. The disagreements usually involved the sex, length or weight of the fish. In the case of disagreements in weight and length , the data was labeled suspect if the difference exceeded 5%. Disagreements in sex were settled only if there was a minority of one discrepant record among all multiple entries. For example, a common situation encountered involved five records for the same fish. Four listed the fish as a male and the other listed it as female. In this case the augmented and retained record listed the fish as male. However, if more than one out of the five multiple entries listed a female while the majority listed it as male then the sex was listed as suspect. Furthermore, if there were only two entries for the same fish and the sexes were contradictory, then the sex was noted as suspect data. Some of the records for ages from scales included two ages. These were the results from two different individuals who estimated the age of the same fish. The first age record was arbitrarily recorded in the database. The second age record was not recorded into the database and was not considered further in this study. Suspect data were not used in any further analyses in this study.

## 3.2. Other Comments

For the purposes of this report, references to rainbow trout were assumed to mean juvenile steelhead, as they are extremely difficult to differentiate.

The only fish considered in the analyses of size and time in freshwater and saltwater were those

- with no regenerated scales, and
- that were not recorded as repeat spawners.

Although the data refers to a total of 347 steelhead, specific analyses of the data usually involved smaller sample sizes due to the constraints placed on the database search. For

example, analyses of subsets of the population, such as lengths of males, could only utilize the records of fish for which a length was given.

Fall run fish were defined as female and male adult fish captured from October through January. Spring run fish were defined as female and male adult fish that were captured for their first time from March through May and that were recorded as bright. As a result, the sample size for spring run fish was relatively small. In analyses labeled 'all steelhead', the data used included relevant records from all fish, of both sexes and regardless of when they were captured.

All references to locations were converted to the zones developed by Whelpley (1983) and shown in Figure 2.

Requests for information on steelhead in the Lakelse River system were directed to the First Nations with interests in the Lakelse River watershed. Faxes, followed by phone calls failed to get a response from the Kitselas Band. Steve Roberts, chief councillor for the Kitsumkalum Band, was interviewed. Both forest companies with interests in the Lakelse were contacted by telephone. Archi MacDonald of Repap B.C. Inc. explained that his company had no more information on steelhead than the Ministry of Environment, Lands and Parks. A similar response was given by Damian Keating of Skeena Sawmills. A list of persons contacted is given in Appendix A.

Original data are presented in Appendices B and C.

MELP and DFO are acronyms frequently used in this report. They refer to the Ministry of Environment, Lands and Parks and the Department of Fisheries and Oceans respectively.

Tests that showed a significant difference between two statistics are reported with a p-value < the relevant critical value. Tests that showed no significant difference are reported with a p-value > the relevant critical value of p.

# 4. Results

## 4.1. Freshwater and Ocean Life History

Freshwater and ocean life history data from aging of scales taken from adult Lakelse River steelhead between fiscal years 1966-67 and 1995-96 are summarized in Table 1 (MELP 1984b). The age designators listed along the left hand margin of this table record the number of years spent in freshwater (smolt age) on the left, separated from the saltwater age on the right by a period. An S indicates that the captured fish had spawned. A number or another S to the right of the first S indicates that the fish returned to freshwater. An R indicates that the analyzed scale was a replacement scale from which information was missing.

These data indicate that juveniles remained in freshwater for two to five years (mean = 3.27 years, S.E. = 0.04, n = 220) and that the majority of Lakelse juveniles spent three (64%) or four (34%) years in freshwater. They further showed that steelhead spent one to four years (mean = 2.55 years, S.E. 0.05, n = 240) in the ocean before returning to spawn and that the majority of the juveniles spent two (49%) or three (45%) years in salt water.

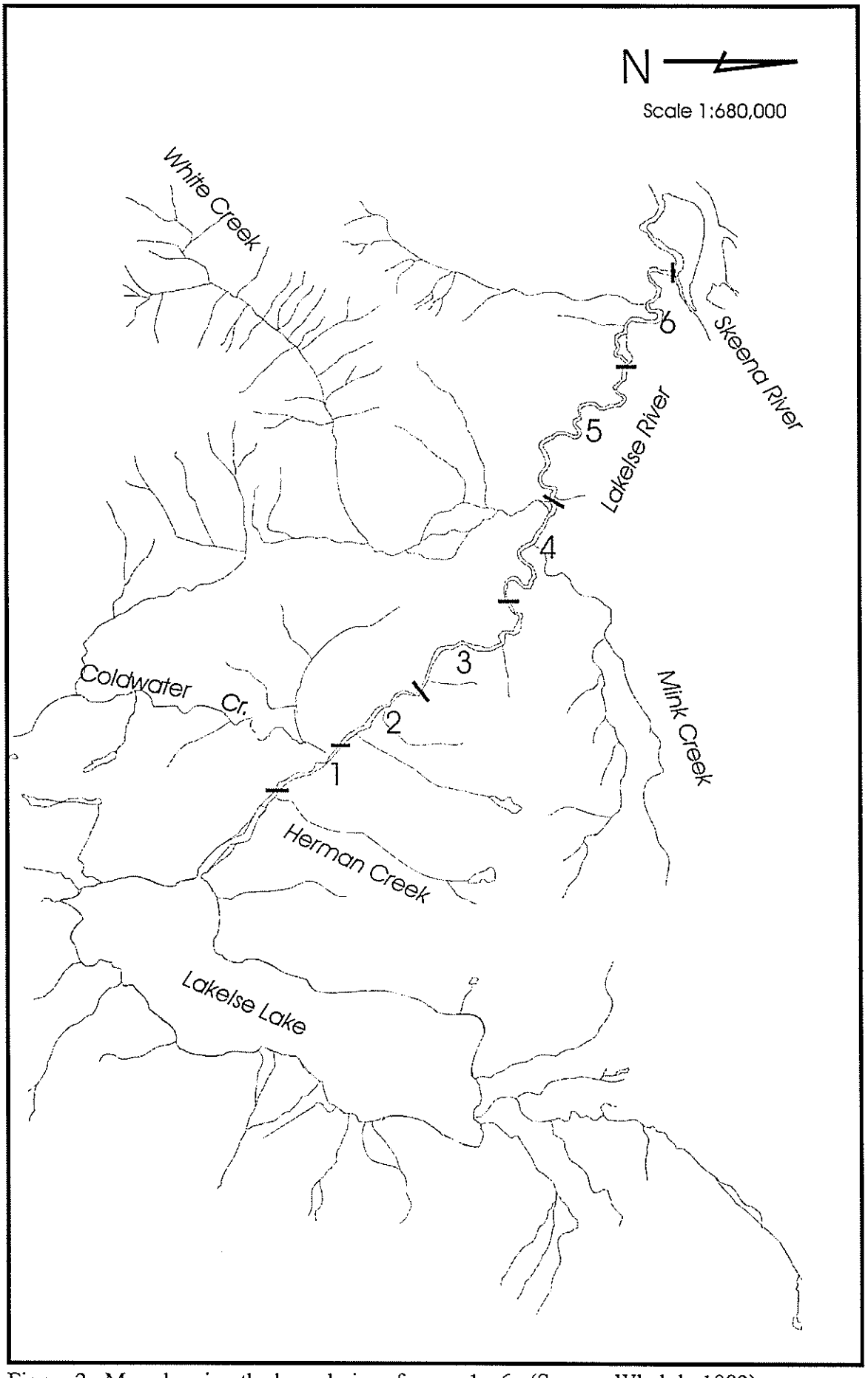



Figure 2. Map showing the boundaries of zones 1 - 6. (Source: Whelply 1983).

Table 2 is a summary of the recorded number of years female, male, fall run and spring run steelhead spent in freshwater and saltwater. There was no significant difference (Student's t-test, $p>0.05$) between the recorded mean number of years males and females spent in freshwater before smolting, although there were three males and no females that spent 5 years in freshwater. Also, there was no significant difference (Student's t-test, $p>0.05$) between the mean smolt ages of fall and spring run fish. Similarly, there was no significant difference (Student's t-test, $p>0.05$) between the recorded mean number of years males and females spent in saltwater before returning to freshwater, or between the time spring run and fall run fish remained in saltwater before their first return to freshwater.

## 4.2. Repeat Spawning

Although not specifically referring to Lakelse River fish, approximately 46% of the 1994 mixed stock Skeena River steelhead radio tagged in the ocean emigrated after spawning (Alexander *et al.* 1996). Repeat spawning was also reported in the scale aging data for Lakelse fish (MELP 1984a, b). For the purposes of the database search, repeat spawners were defined to be fish whose age record indicated that either it had spent at least one year in freshwater after spawning the first time or that it had spawned again after spawning the first time. Of 244 tagged Lakelse River adults whose ages were determined from scale samples (MELP 1984b), 37 (15.2%) were reported to be repeat spawners. Twenty two of these repeat spawners were females while 15 were males, and seven were fall run fish while three were spring run fish. These repeat spawners were recorded from 1976 to 1978 and from 1982 to 1984.

Table 1. Summary of age data for Lakelse River steelhead. (Source: MELP 1984b).

| | Fall Run | | | Spring Run | | | All Fish* |
|---|---|---|---|---|---|---|---|
| Age Designator | Male | Female | All | Male | Female | All | |
| 2.1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| 2.2 | 0 | 1 | 1 | 0 | 0 | 0 | 2 |
| 2.2S | | | | | | | 1 |
| 2.3 | 0 | 1 | 1 | 0 | 0 | 0 | 4 |
| 3.2 | | | | | | | 1 |
| 3.2S1 | | | | | | | 1 |
| 3.3 | | | | | | | 1 |
| 3.1 | 1 | 2 | 3 | 0 | 0 | 0 | 3 |
| 3.1S | | | | | | | 1 |
| 3.1S1 | 2 | 1 | 3 | 0 | 0 | 0 | 7 |
| 3.1SS | | | | | | | 2 |
| 3.1SS1 | 0 | 1 | 1 | 0 | 0 | 0 | 2 |
| 3.2 | 12 | 13 | 26 | 0 | 5 | 11 | 42 |
| 3.2S | | | | | | | 6 |
| 3.2S1 | 0 | 1 | 1 | 1 | 1 | 0 | 5 |

| | Fall Run | | | Spring Run | | | All Fish* |
|---|---|---|---|---|---|---|---|
| **Age Designator** | **Male** | **Female** | **All** | **Male** | **Female** | **All** | |
| 3.2SS | | | | | | | 1 |
| 3.3 | 13 | 19 | 32 | 3 | 8 | 0 | 73 |
| 3.4 | 2 | 1 | 3 | 0 | 0 | 0 | 4 |
| 4.1S | | | | | | | 1 |
| 4.1S1 | 1 | 0 | 1 | 0 | 0 | 0 | 2 |
| 4.1S1S | | | | | | | 1 |
| 4.1SS | | | | | | | 1 |
| 4.1SS1 | | | | | | | 1 |
| 4.2 | 3 | 3 | 6 | 0 | 0 | 0 | 23 |
| 4.2S | | | | | | | 2 |
| 4.2S1 | | | | | | | 7 |
| 4.2SS | | | | | | | 3 |
| 4.3 | 4 | 5 | 9 | 0 | 0 | 0 | 20 |
| 5.1S | | | | | | | 1 |
| 5.2S | | | | | | | 2 |
| R.1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| R.1S1 | | | | | | | 1 |
| R.1SS | | | | | | | 1 |
| R.2 | 2 | 2 | 4 | 0 | 0 | 0 | 5 |
| R.2S1 | 0 | 1 | 1 | 1 | 0 | 1 | 2 |
| R.3 | 3 | 1 | 4 | 0 | 1 | 1 | 11 |
| R.4 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| Totals | 44 | 54 | 99 | 5 | 15 | 20 | 243 |

* Many of the numbers recorded under 'All Fish' are larger than the sum of 'all spring run' and 'all fall run' fish because the definitions adopted for fall and spring run fish were restrictive. For example, there were many fish captured in the March through May period that did not fit the criteria for spring run fish, and therefore, were not counted under 'all spring run'.

Table 2. Summary of time spent in freshwater and saltwater. (Source: MELP 1984b).

| | Freshwater | | | | | Saltwater | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Years** | **Males** | **Females** | **Fall Run** | **Spring Run** | **All** | **Males** | **Females** | **Fall Run** | **Spring Run** | **All** |
| 1 | | | | | | 13 | 12 | 10 | | 25 |
| 2 | 3 | 5 | 3 | | 8 | 46 | 56 | 39 | 8 | 102 |
| 3 | 68 | 79 | 69 | 22 | 147 | 46 | 62 | 46 | 12 | 108 |
| 4 | 21 | 41 | 17 | 2 | 62 | 3 | 2 | 4 | | 5 |
| 5 | 3 | | | | 3 | | | | | |
| n | 95 | 125 | 89 | 24 | 220 | 108 | 132 | 99 | 20 | 240 |
| Mean Time (years) | 3.25 | 3.29 | 3.20 | 3.10 | 3.27 | 2.55 | 2.55 | 2.40 | 2.60 | 2.55 |
| S.E. | 0.06 | 0.05 | 0.05 | 0.06 | 0.04 | 0.07 | 0.06 | 0.07 | 0.11 | 0.05 |

### 4.3. Sex Ratio

The sex was recorded unambiguously for 343 adult steelhead. Males accounted for 141 while females numbered 202, for an adult sex ratio of 1 male:1.43 females (MELP 1984a, b). The ratio of females to males for fall run steelhead was 1.25 (n=99). The same ratio for the spring run was 3.00 (n=20) but the small sample size makes this statistics less reliable.

### 4.4. Size Distribution of Mature Steelhead

There was no significant difference (Student's t-test, $p>0.05$) in mean fork length between adult steelhead males and females but there was a greater range (14.7%) of fork lengths in the males sampled (Table 3). Similarly, there was no significant difference (Student's t-test, $p>0.05$) in mean fork length between fall and spring run fish, but there was a greater range (29.4%) in the fall population. The longest male (103 cm) was 5.6% longer than the longest female (97.5 cm) and the longest fall run steelhead (97.0 cm) was 9.1% longer than the longest spring run fish (88.9 cm).

Table 3. Summary of fork lengths of adult Lakelse River steelhead. (Source: MELP 1984a).

| | **Range (cm)** | **Mean (cm)** | **Standard Error** | **Sample Size** |
|---|---|---|---|---|
| Females | 60.9 - 97.5 | 78.6 | 0.6 | 123 |
| Males | 61.0 - 103.0 | 80.3 | 0.9 | 100 |
| Fall Run | 60.9 - 97.0 | 79.6 | 0.8 | 96 |
| Spring Run | 61.0 - 88.9 | 76.5 | 1.9 | 18 |
| All Fish | 60.9 - 103.0 | 79.4 | 0.5 | 224 |

Adult male steelhead were 14.3% heavier (Student's t-test, $p<0.01$) on average than adult females and males exhibited a greater range (64.4%) of weights than did females (Table 4).

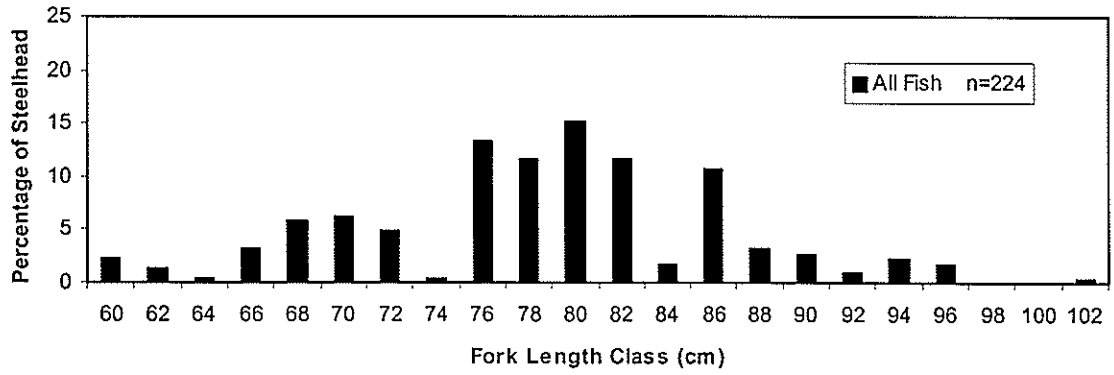
Similarly, fall run fish were 31.8% heavier (Student's t-test, $p<0.01$) than spring run fish and exhibited an 87.8% greater range in weights. The heaviest fall run fish was 47.0% heavier than the heaviest spring run fish and the heaviest male steelhead was 48.8% heavier than the heaviest female.

Table 4. Summary of weights of adult Lakelse River steelhead. (Source: MELP 1984a).

| | **Range (kg)** | **Mean (kg)** | **Standard Error** | **Sample Size** |
|---|---|---|---|---|
| Females | 2.3 - 8.2 | 5.2 | 0.2 | 79 |
| Males | 2.5 - 12.2 | 5.9 | 0.3 | 57 |
| Fall Run | 2.3 - 10.0 | 5.8 | 0.2 | 59 |
| Spring Run | 2.7 - 6.8 | 4.4 | 0.4 | 13 |
| All Fish | 2.3 - 12.2 | 5.4 | 0.1 | 138 |

The distribution of fork lengths and weights are presented in the frequency histograms in Figure 3. These diagrams suggested a possibly tri-modal distribution of fork lengths in all fish. No obvious differences in fork length distributions were apparent between male and female, or between fall run and spring run fish. Note that the sample sizes for spring run steelhead were small and therefore relatively unreliable.

a

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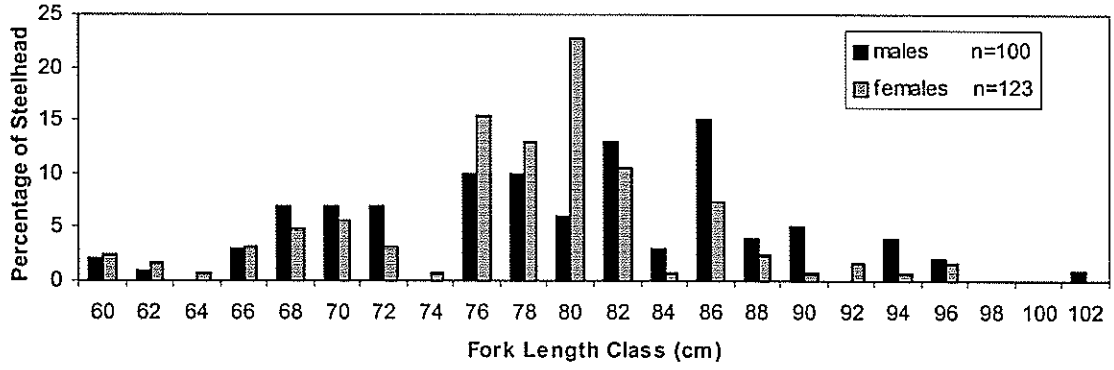


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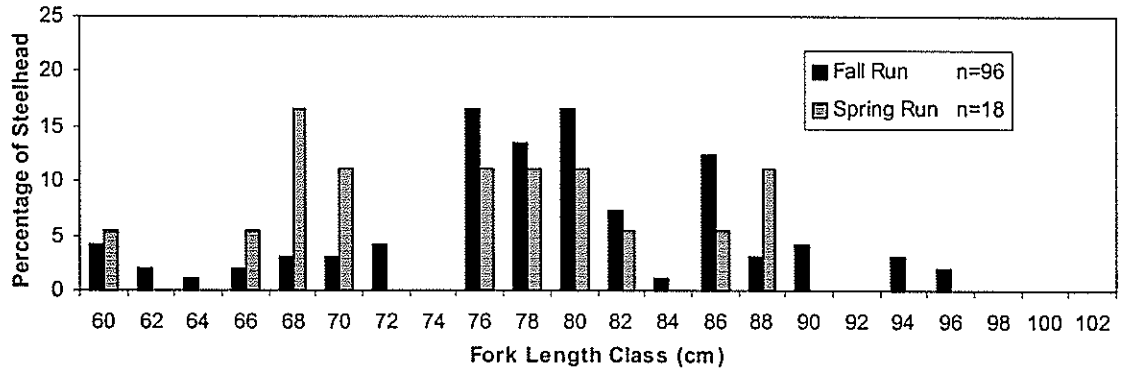


Figure 3. Fork length frequency histogram for (a) all, (b) male and female and (c) fall and spring run Lakelse River steelhead. (Source: MELP 1984a).

### 4.4.1. Length-Weight Relationships

The relationships between the log-transformed adult fork length and weight for female, male, fall run and spring run fish are shown in Figures 4 through 6. Their linear regression coefficients indicated slightly negative allometric growth in weight with respect to length. These coefficients for male and fall run steelhead were significantly larger (t-test for differences between slopes (Zar 1984), $p<0.01$) than for female and spring run steelhead respectively. There was no significant difference (Student's t-test, $p>0.05$) between Fulton's condition factor for males and females or between fall and spring run steelhead. The mean Fulton's condition factor for all steelhead whose records included both length and weight was 1.07 (S.E. = 0.017, n = 121) with a range of from 0.81 to 2.05.

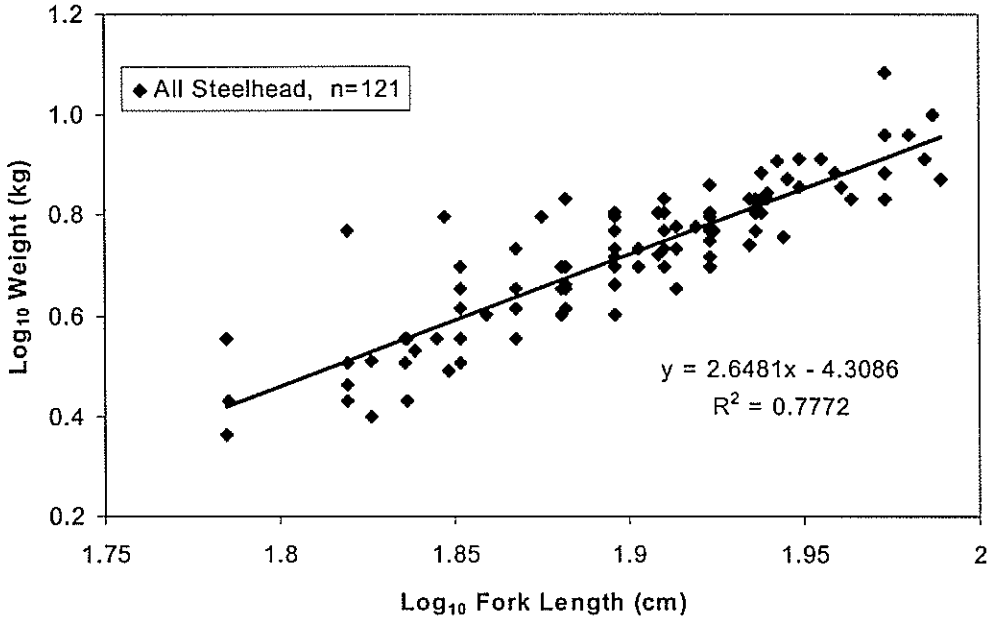


Figure 4. Relationship between log-transformed length and weight for all adult Lakelse River steelhead. (Source: MELP 1984a).

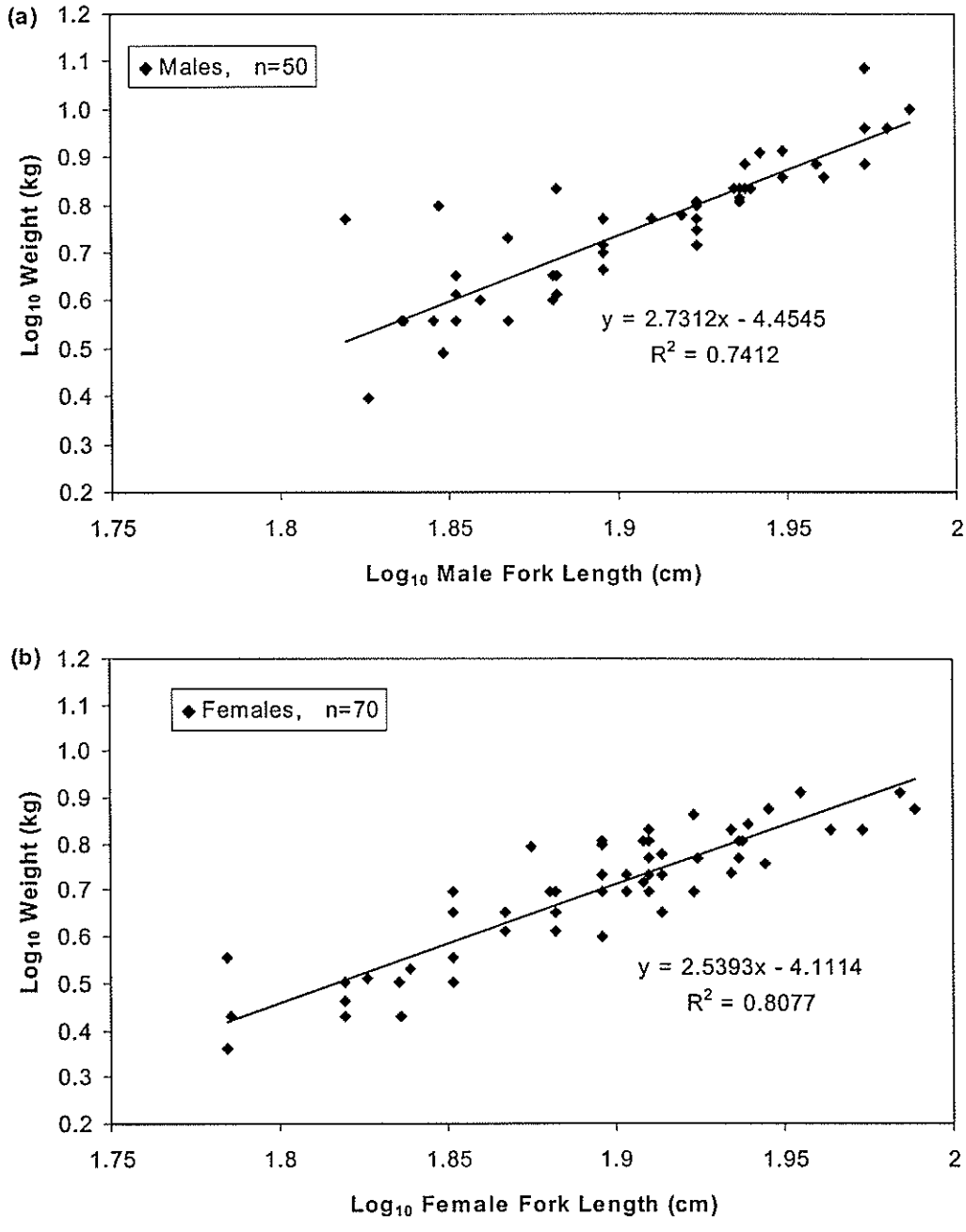


Figure 5. Relationship between log-transformed length and weight for adult (a) male and (b) female Lakelse River steelhead. (Source: MELP 1984a).

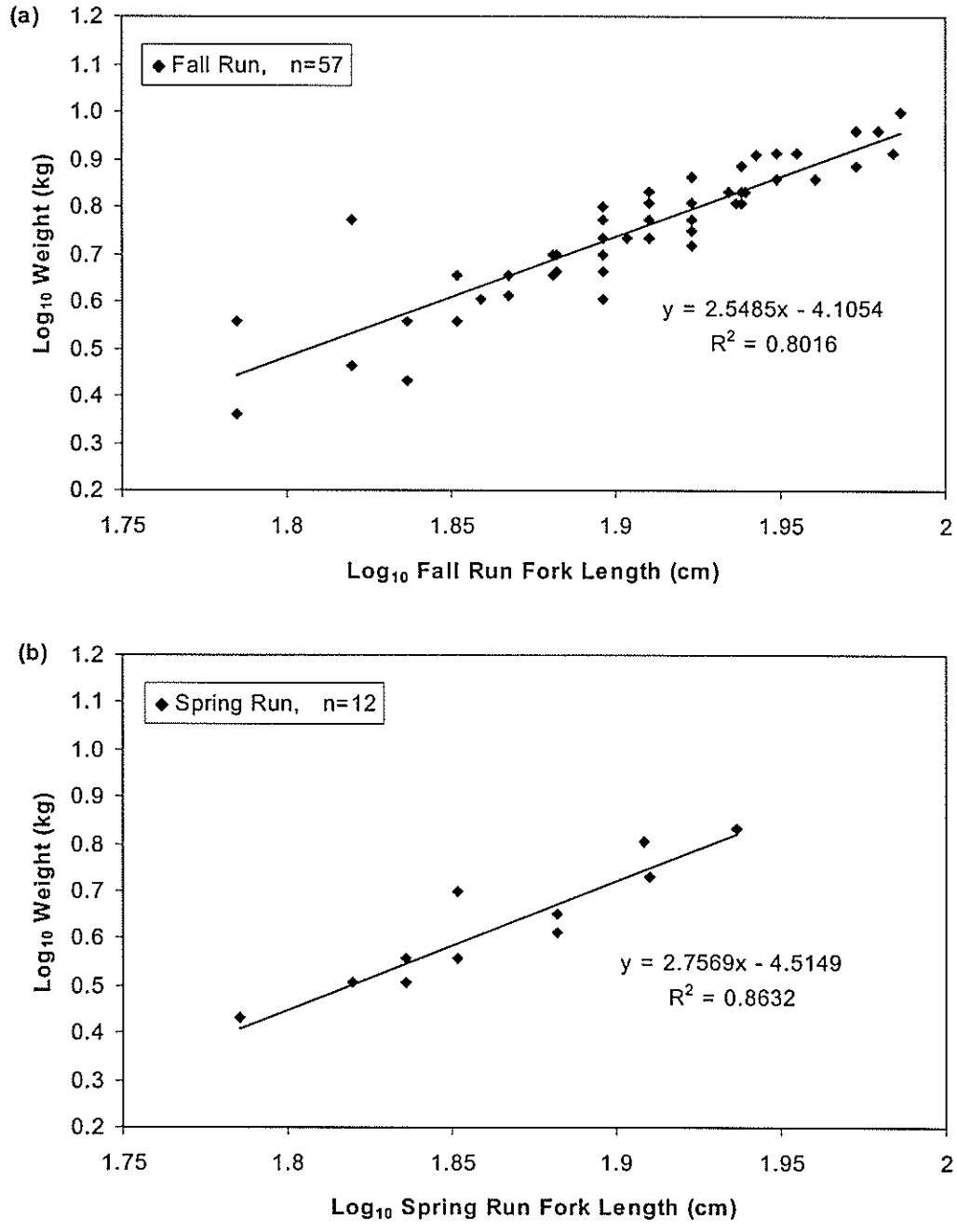


Figure 6. Relationship between log-transformed length and weight for (a) fall run and (b) spring run Lakelse River steelhead. (Source: MELP 1984a).

### 4.4.2. Relationship Between Time Spent Rearing in Freshwater and Length and Weight

The relationships between time in freshwater (smolt age) and mean adult length and weight are shown in Figure 7. These data show a direct relationship between smolt age and adult length and weight. There was no significant difference (t-test for differences between slopes (Zar 1984), $p>0.1$) between the length or weight regression coefficients for females and males, nor between fall run and spring run fish.

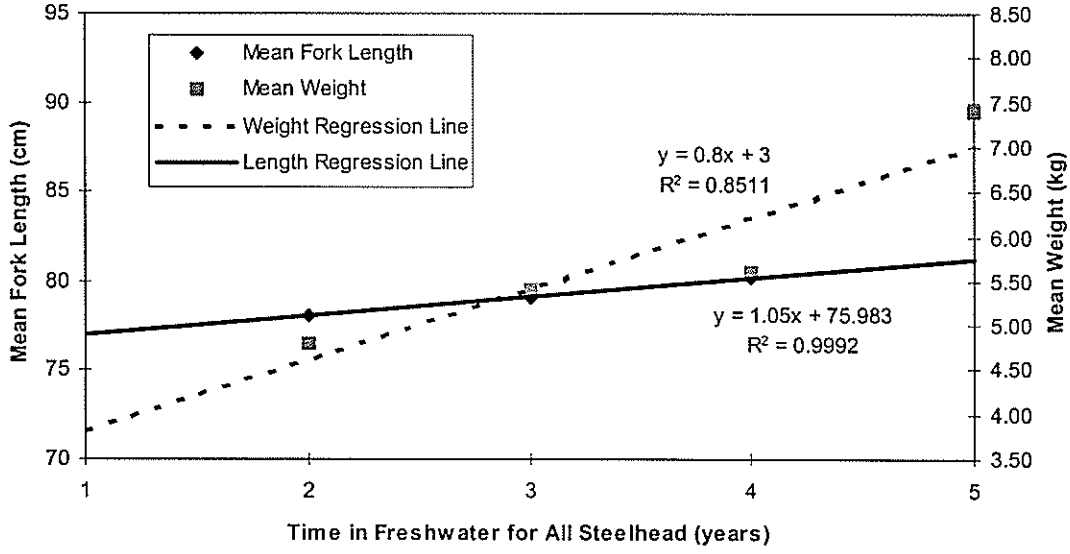


Figure 7. Relationship between years in freshwater (smolt age) and the mean length and weight of all adult steelhead. (Source: MELP 1984a, b; $n_{length}=3$, $n_{weight}=4$).

### 4.4.3. Relationship Between Time Spent Rearing in Saltwater and Length and Weight

The relationships between time spent in saltwater and adult length and weight are shown in Figures 8 to 12. These data show there was a direct relationship between time spent in saltwater and the length and weight of adult Lakelse River steelhead, but there were no apparent differences in this regard between females and males or between fall and spring run steelhead. A comparison of the slopes for all fish in freshwater (Figure 7) versus saltwater (Figure 8) showed no significant difference (t-test for differences between slopes (Zar 1984), $p>0.1$).

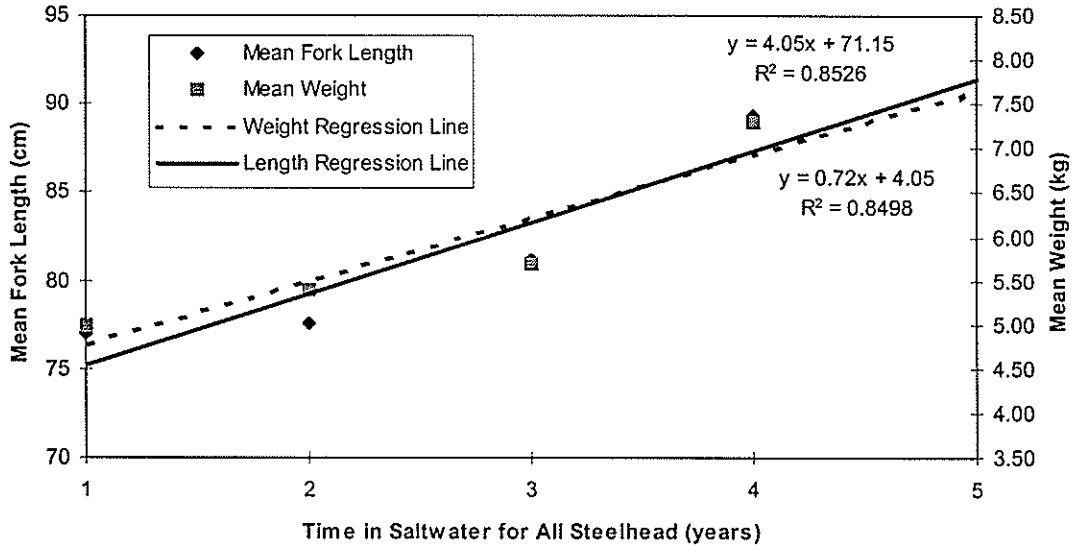


Figure 8. Relationship between years in saltwater (smolt age) and the mean length and weight of all adult steelhead. (Source: MELP 1984a, b; $n_{length}=4$, $n_{weight}=4$).

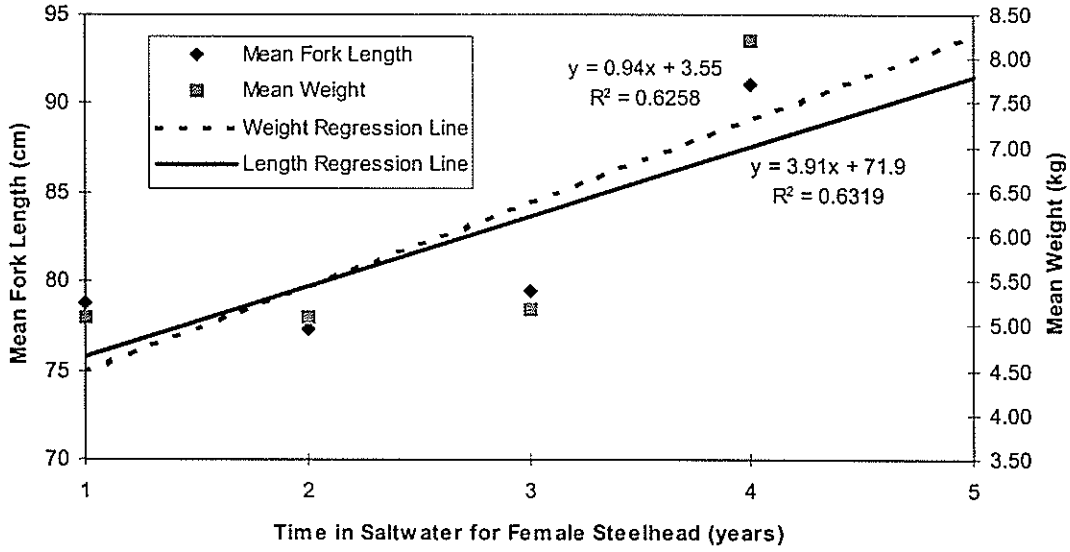


Figure 9. Relationship between years in saltwater (smolt age) and the mean length and weight of adult female steelhead. (Source: MELP 1984a, b; $n_{length}=4$, $n_{weight}=4$).

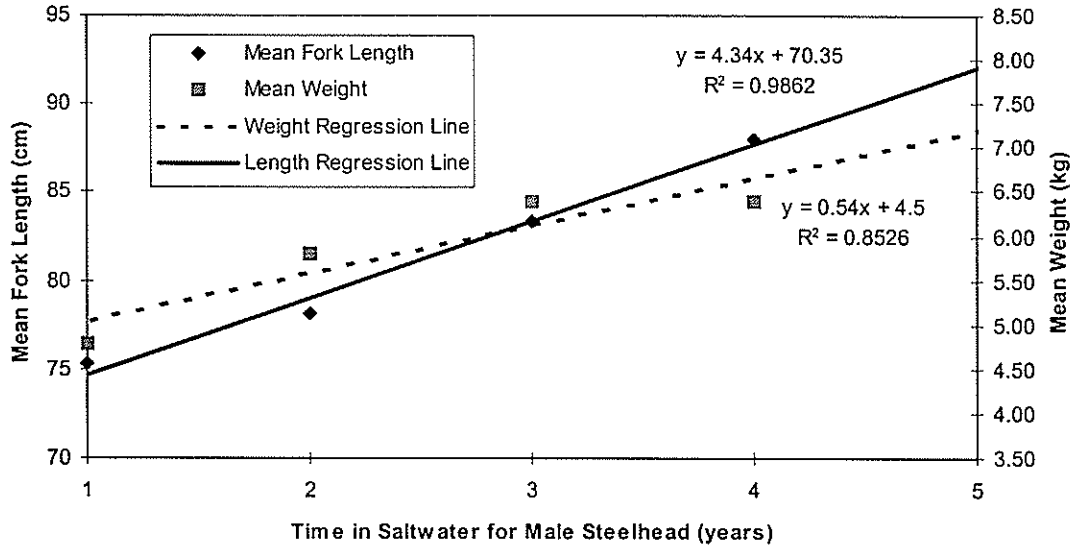


Figure 10. Relationship between years in saltwater (smolt age) and the mean length and weight of adult male steelhead. (Source: MELP 1984a, b; $n_{length}=4$, $n_{weight}=4$).

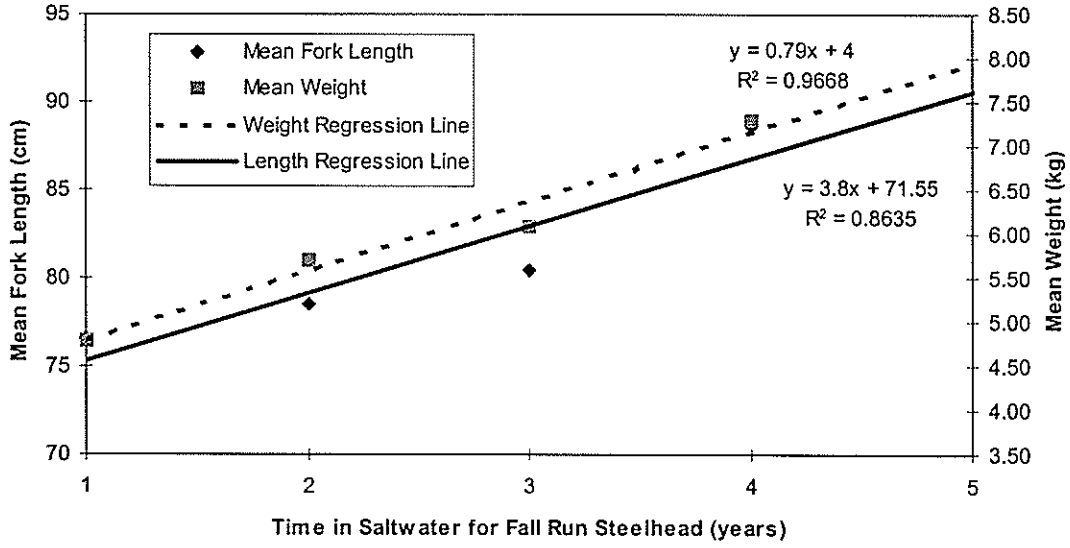


Figure 11. Relationship between years in saltwater (smolt age) and the mean length and weight of fall run steelhead. (Source: MELP 1984a, b; $n_{length}$=3, $n_{weight}$=4).

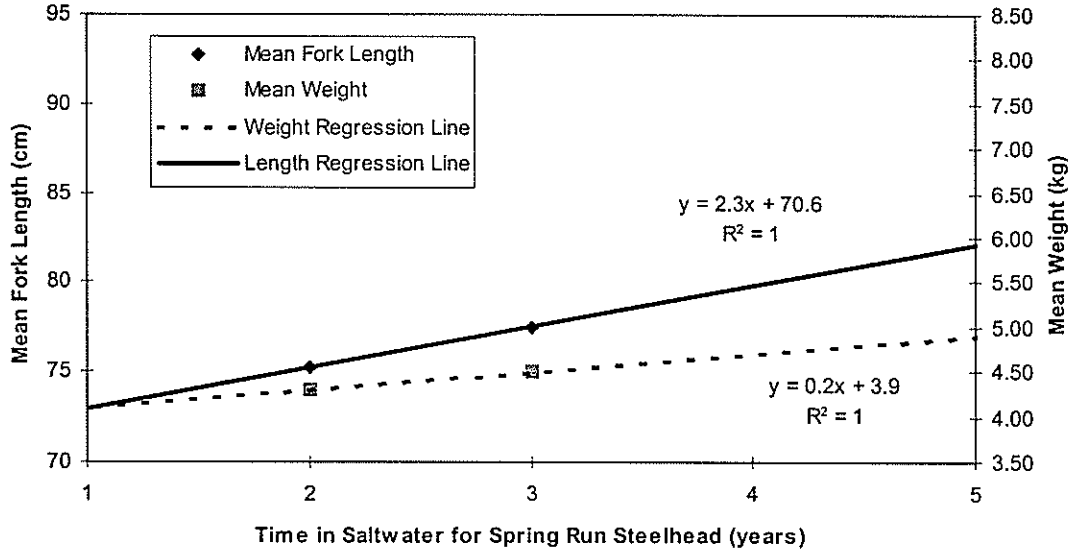


Figure 12. Relationship between years in saltwater (smolt age) and the mean length and weight of spring run steelhead. (Source: MELP 1984a, b; $n_{length}$=2, $n_{weight}$=2).

## 4.5. Spawning, Rearing and Overwintering Areas

### 4.5.1. Spawning Sites

Documented spawning sites (Figure 13) were reported as a patch work of small areas extending the total length of the mainstem river (MELP 1967, 1970, 1972; Imbleau 1978). Spawning steelhead were observed at various sites in the mainstem of the Lakelse from the lake outlet to the river's confluence with the Skeena during snorkel surveys conducted in the spring of 1978, 1979, 1982, 1983 and 1984 (Whelpley 1983, 1984). A major spawning area was reported at the outlet of the lake (Department of Fisheries and Oceans 1991). Spawning steelhead have been observed in the lower reaches of Herman Creek, White Creek, Williams Creek (Whelpley 1983) and Coldwater Creek (Gordon *et al.* 1996; Department of Fisheries and Oceans 1991), however, information on these extensive, and possibly significant tributaries is minimal.

The observation of an adult steelhead at a particular site does not necessarily mean that it is a spawning site. Fall run fish especially, had from three to six months during which they may have moved from where they were observed before they spawned. On the other hand, recapture data (MELP 1984a) indicated a strong degree of site fidelity among Lakelse steelhead. Of the 23 fish recaptured and whose initial capture as well as recapture locations were recorded, 16 (70%) were recaptured in the same zone in which they were initially tagged. The other seven fish (30%) moved one zone but stayed within either the lower or upper river. One fish was caught on May 23, 1983 in Zone 6 and then recaptured a year later on May 15, 1984 in the same Zone.

Although this has not been conclusively determined, if it is assumed that steelhead did spawn near where they were observed, then analysis of tagging dates and locations (MELP 1984a) lent support to the idea commonly held by local anglers that fall run steelhead generally use the upper river to spawn, while spring run fish mostly use the lower river (R. Brown and D. Webb, pers. comm. 1997; Whelpley 1984). Of the 91 fall run adult steelhead whose initial tagging locations were recorded, 90 of them were tagged in the upper river. Of the 109 fish tagged in March, April or May, 103 were captured in the lower river. Bright or silver steelhead in the river are commonly thought to have recently entered the river from the ocean, while darkly coloured fish are believed to have been in freshwater for some time. All seven of the fall run fish that were reported as bright and whose initial tagging locations were given were captured in the upper river. All 14 of the spring run fish that were reported as bright and whose initial tagging locations were recorded were captured in the lower river. Furthermore, all of the adults recorded as dark, and that were captured in March, April or May ($n = 9$), were captured in the upper river, suggesting that these presumably fall run fish likely spawned in the upper river.

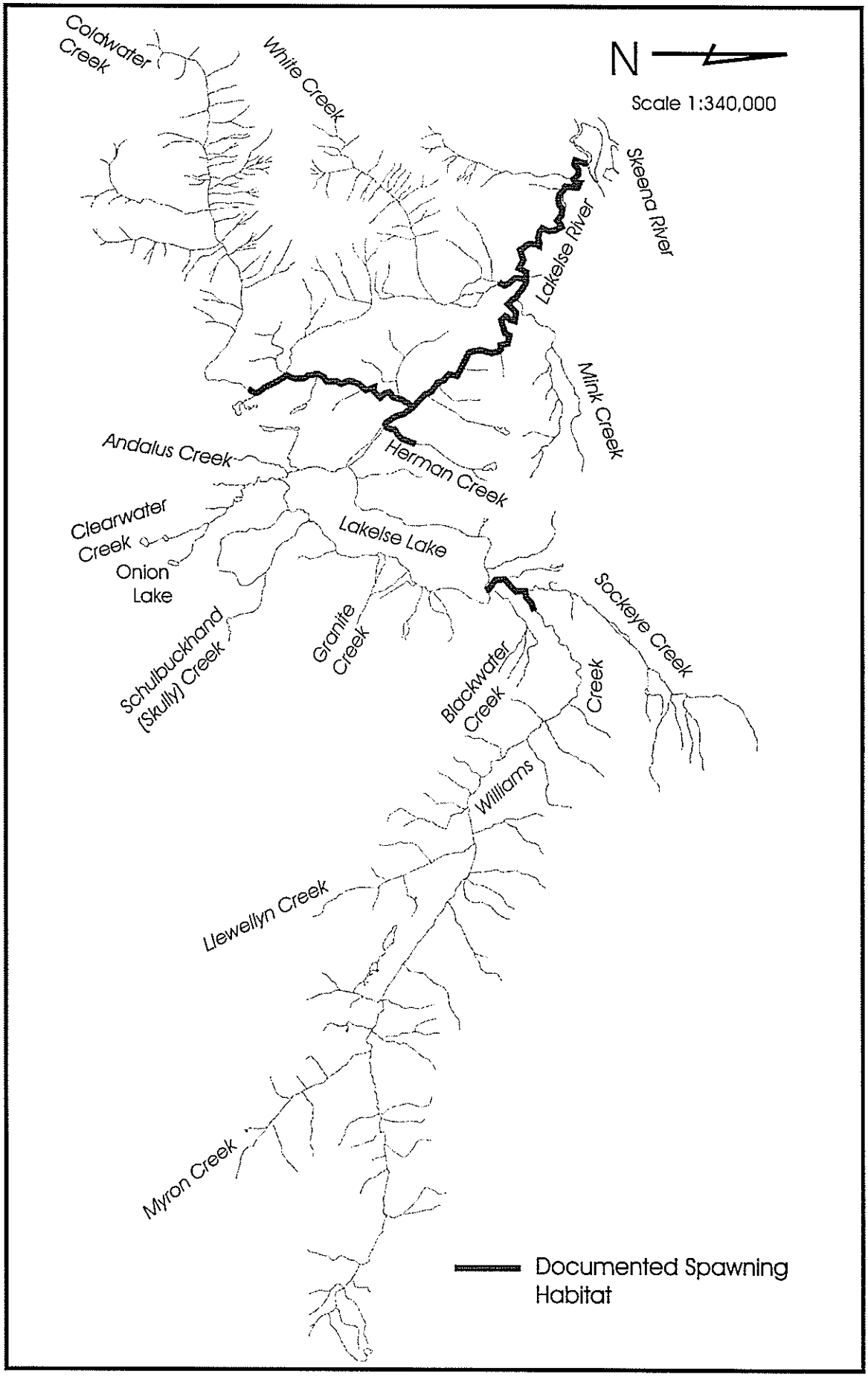


Figure 13. Map showing the locations of documented spawning habitat in the Lakelse River system. (Sources: Brown and Webb 1997; DFO 1991; Gordon *et al.* 1996; Imbleau 1978; MELP, 1967, 1970, 1972, 1984a; Whelply 1983, 1984)

### 4.5.2. Juvenile Rearing Sites

Rainbow trout, which were assumed to be juvenile steelhead for the purposes of this study, are reported throughout the Lakelse River watershed (Figure 14) including lakes and tributaries (Department of Fisheries and Oceans 1991; Gordon *et al.* 1996; Grieve 1996). Fry and parr have been observed or trapped throughout the mainstem (Chudyk 1978, 1982, 1984; Lough and Chudyk 1979; Lough 1983; Bergsma 1996; Gordon *et al.* 1996). Rainbows have been noted in Williams Creek (MELP 1977; Department of Fisheries and Oceans 1991; Grieve 1996), in Eel Creek, End Lake, Coldwater Creek, in a Coldwater Creek tributary called Johnstone Creek, in Clearwater Creek, in Junction Creek and in White Creek (Gordon *et al.* 1996). Hatlevik *et al.* (1981), reported that four of a total of 526 fish caught in Lakelse Lake between June 3 and August 23, 1979 were rainbow trout. There are large portions of the tributaries for which no information exists on the presence or absence of juveniles. More information on the utilization of this extensive habitat would benefit management.

### 4.5.3. Adult Overwinter Areas

The locations of overwintering habitat are shown in Figure 15. One anecdotal report stated that natives used to net steelhead at the lake's outlet in the late fall and gillnet the bay off Clearwater and Andalus creeks during winter, and one observation of a steelhead caught through the ice in the period between February 8 and 12, 1982 off Squirrel Point at the lake's outlet has been recorded (Tetreau 1982). Of a total of 15 fish radio tagged during a two year study, one fish was observed in the lake intermittently between February 13 and May 26 of 1984 (Whelpley 1984). There was a general absence of observations of seven radio tagged fish in the river during the winter months (Whelpley 1983, 1984) and there were no records of any steelhead caught in the river from early January until early March from 1972 through 1984 (MELP 1984a). These data, along with the observation that most of the fishing is over by Christmas (Tetreau 1982) have resulted in the suggestion that most summer and fall run fish, after ascending to the Herman Creek area, used the lake to overwinter (Tetreau 1982; Whelpley 1983, 1984; Lough 1984).

Although Lakelse Lake probably contains the most significant and critical overwintering habitat in the Lakelse system, steelhead may also hold overwinter in the Skeena River off the mouth of the Lakelse and in some deep pool canyon water in the Lakelse mainstem, and in Coldwater, Williams and White creeks. A more extensive radio tracking program would help to identify these other, potentially critical sites.

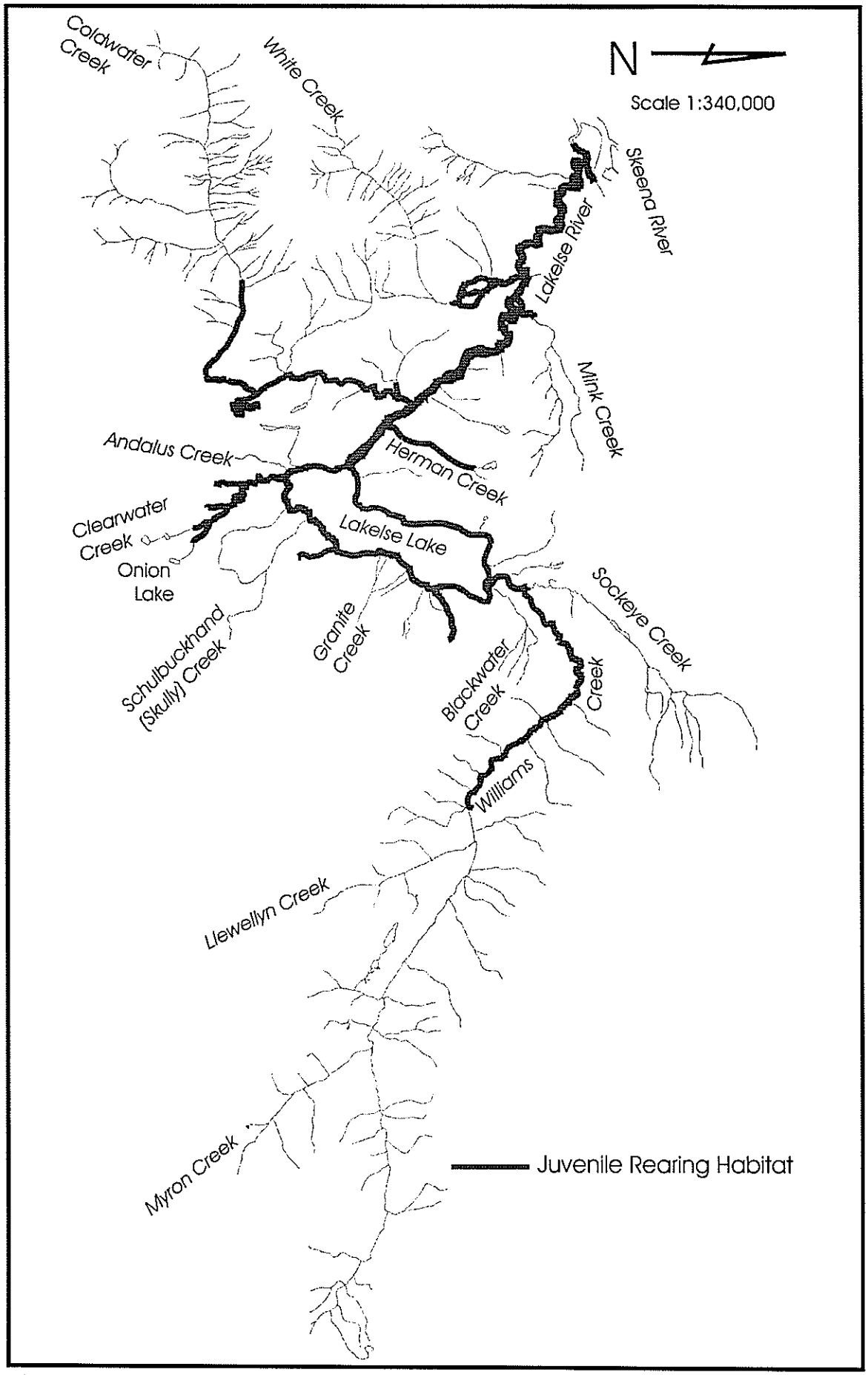


Figure 14. Map showing the locations of rearing habitat for juvenile steelhead in the Lakelse River system. (Sources: Bergsma 1996; Chudyk 1978, 1982, 1984; DFO 1991; Gordon *et al.* 1996; Grieve 1996; Hatlevik *et al* 1981; Lough 1983; Lough and Chudyk 1979; MELP 1977).

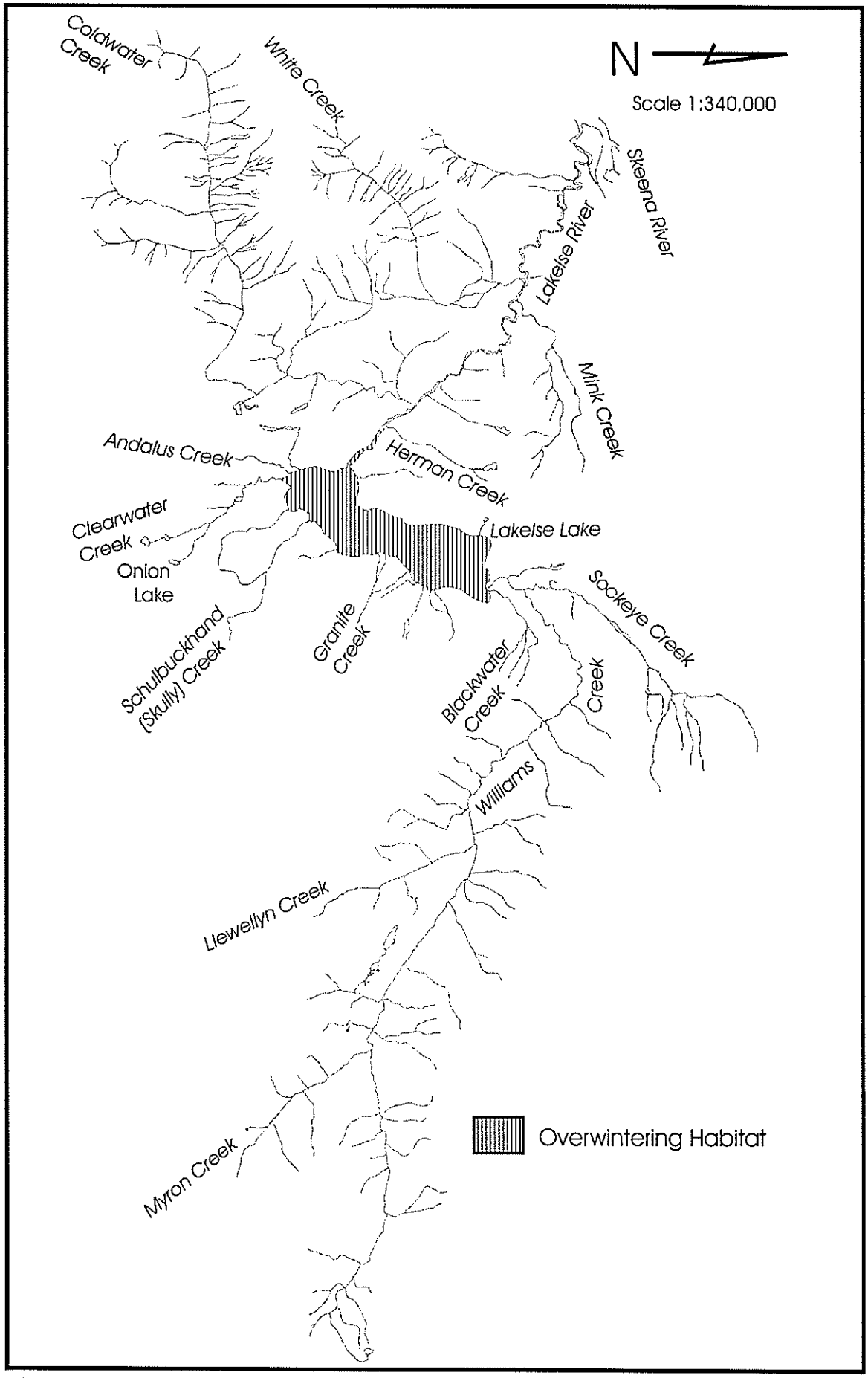


Figure 15. Map showing the location of overwintering habitat for adult Lakelse River steelhead. (Sources: Lough 1984; MELP 1984a; Tetreau 1982; Whelpley 1983, 1984).

## 4.6. Past Enhancement Attempts

No records of any steelhead enhancement attempts on the Lakelse were found. There were, however, records of hatchery fish in the Steelhead Harvest Analysis database (MELP 1996a). Hatchery-raised steelhead have their adipose fins removed as a means of differentiation. It was presumed that all reports of hatchery fish were based on the observation of a missing adipose fin. It is known (D. Atagi, pers. comm. 1997) that the absence of an adipose fin can occur naturally and through causes other than fin clipping, so that this may explain the existence of these records of hatchery fish in the Lakelse River system.

Steelhead Harvest Analysis data (MELP 1996a) recorded that hatchery fish were caught in fiscal year 1981-82 and from fiscal year 1983-84 through 1995-96 (Figure 16). Over this 15 year period, hatchery fish comprised an annual average 2.13% of the total catch and ranged from 0 to 4% of the total catch. The largest number of hatchery fish reported was 79 in fiscal year 1989-90. With the exception of the 1988-1989 fiscal year, the majority of these fish were released (Figure 17). Possible explanations for these records of hatchery fish included accidental loss of adipose fin (D. Atagi, pers. comm. 1997), mistaken identification by anglers (R. Tetreau, C. Culp and J. Culp, pers. comm., 1997), deliberate fin clip falsification (D. De Leeuw, pers. comm., 1997) and straying (D. Webb, pers. comm., 1997). With respect to straying, small, short duration steelhead enhancement efforts took place on the Kitsumkalum River and the Zymoetz (Copper) River (J. Culp and C. Culp, pers. comm., 1997), which are nearby, and on Toboggan Creek near Smithers (R. Tetreau, pers. comm., 1997).

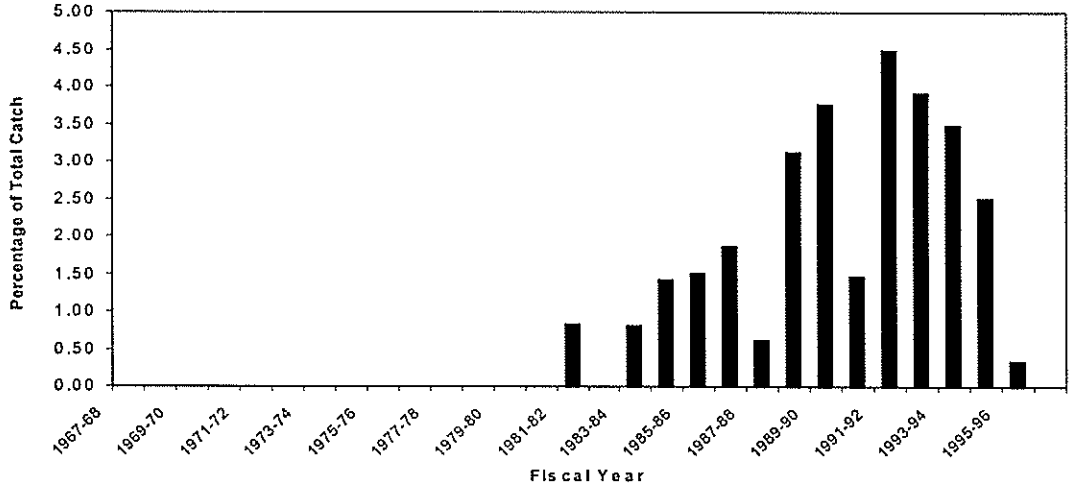


Figure 16. Hatchery raised steelhead as a percentage of the total number of steelhead reported caught by anglers in Lakelse River from fiscal year 1967-68 through 1995-96. (Source: MELP 1996a).

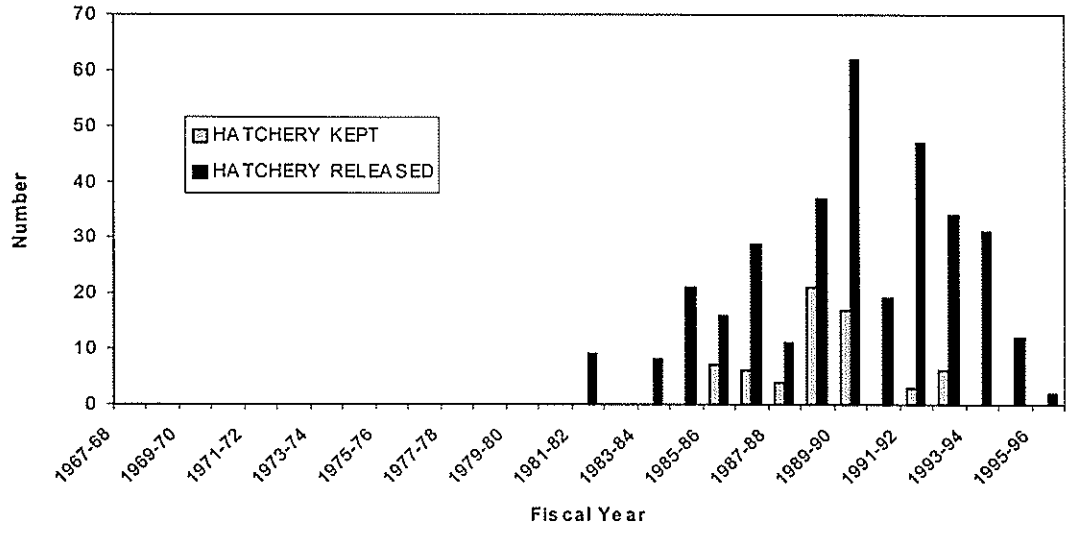


Figure 17. Kept and released steelhead caught by anglers from fiscal year 1981-82 through 1995-96 in Lakelse River and reported as hatchery-raised fish. (Source: MELP 1996a).

## 4.7. Adult Assessments

None of the available estimates of the population size for adult steelhead in the Lakelse River system were considered reliable. In 1972 the population of steelhead estimated by helicopter counts and reportedly verified by ground checks was recorded as approximately 900 fish (MELP 1972). It was further estimated that 200 of these were summer run fish and 700 were winter run fish. These estimates did not account for any spring run fish. No methods were recorded and no references were given to support any of these claims.

Escapement records from 1963-84 (Department of Fisheries and Oceans 1991) reported a mean annual escapement of 251 steelhead with a maximum of 858. No information on how these counts were determined was available. These data are considered unreliable and suspect.

Snorkel surveys, which are not necessarily a reliable index of abundance, were conducted in April or May intermittently from 1978 to 1984 (Table 5). The maximum number of adult steelhead counted during conditions of good visibility was 229.

Table 5. Summary of results from snorkel surveys in the Lakelse River.

| Date | Count | Location | Visibility | Source |
|---|---|---|---|---|
| May 3, 1978 | 30 | Herman's to Mink | 2 m | Chudyk 1978 |
| May 18, 1978 | 229 | Herman's to Mink | 15 m | Chudyk 1978 |
| May 17, 1979 | 24 | Herman's to Mink | 1.25 m | Lough and Chudyk 1979 |
| May 17, 1982 | 40 | Herman's to Mink | 0.6 m | Chudyk 1982 |
| April 18, 1983 | 15 | Powerline run to mouth | good | Lough 1983 |
| April 19, 1983 | 116 | Herman's to lower clay bank | good | Lough 1983 |
| May 8, 1984 | 150 | Herman's to Mink | good | Chudyk 1984 |

The number of adult steelhead harvested from a stream may be useful as an indicator of a minimum population size. Steelhead Harvest Analysis data (MELP 1996a) showed the mean annual harvest was 237 (S.E. = 41.5, n = 29), with a range of from nine adults in both 1994-1995 and 1995-1996, to 1115 in 1967-68 (Figure 21).

## 4.8. Adult run timing

In April and May (Department of Fisheries and Oceans 1991), at a time determined by water temperature, photoperiod and genetic background, steelhead moved onto spawning sites in the Skeena system (Alexander *et al.* 1996). Overwintered fish already in the Lakelse system were joined by a spring run of steelhead (Chudyk 1984). By April and May, steelhead were spawning throughout the river at a water temperature of 6.1°C (MELP 1972).

Adult steelhead entered the Lakelse River as early as September (Department of Fisheries and Oceans 1991). Adults were tagged in the river from as early as October 9 to as late as May 24 (MELP 1984a, b; Figure 18). Local anglers have caught steelhead in the river as early as September 28 (R. Brown, D. Webb, pers. comm. 1997). From 1972 through 1984, none of the 241 fish whose tagging locations in the Lakelse River were recorded were captured in the river after January 19 and before March 9 (MELP 1984a). There were no records of fish tagged during the months of June through September (Figure 18). These data suggested there were two runs of adult steelhead in the Lakelse River system with one population returning in the fall from September through January, and another in the spring in March, April and May (Figure 18). It does not support the suggestion of three separate populations by Whelpley (1984). The reader is cautioned that no data were available to determine whether equal effort to capture fish was expended throughout the year, so that the observed pattern may not be reliable.

The number of steelhead captured for their first time in each week between 1978 and 1984 is shown in Figure 18. Tagging dates were categorized into 'weeks' of eight days in all cases except week #4, which was either six or seven days, depending on the month. This resulted in a potential negative bias in the number of fish recorded in week #4 for all months except February, for which there were no records.

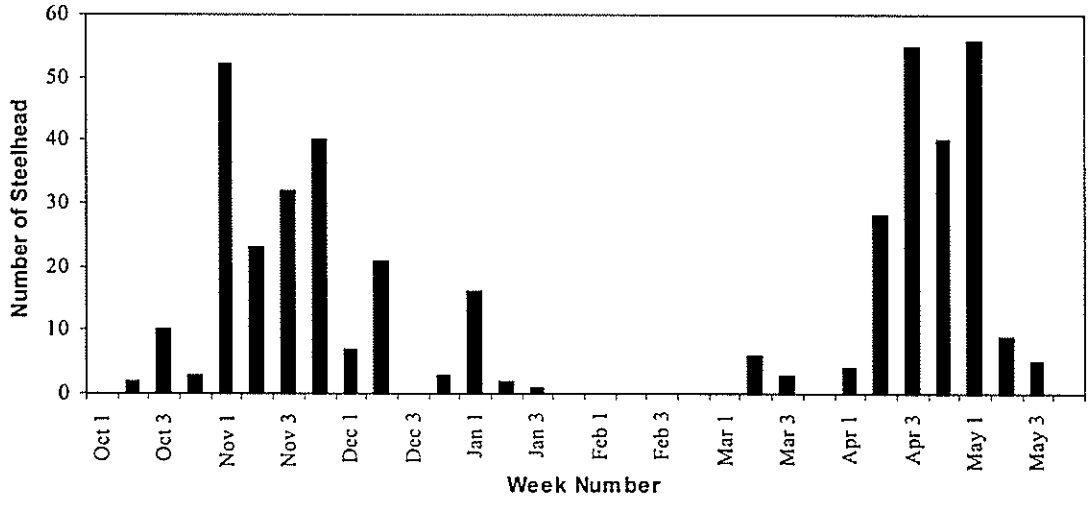


Figure 18. The number of steelhead captured for their first time for each week between 1972 and 1984. (Source: MELP 1984a, b; n=241).

## 4.9. Catch, Harvest, Angler Effort and Angler Residency

### 4.9.1. Catch and Harvest

Annual records of anglers' reports of numbers of anglers, angler days, hatchery fish, wild fish, killed and released fish and total catch were kept for all fiscal years from 1967-68 through 1995-96 for the Lakelse River (MELP 1996a). The mean annual catch was 939 fish (S.E. = 105.5, n = 29), with a range of 260 in 1972-1973 to 2398 in 1987-1988 (Figure 19). The number of reported captures of steelhead generally declined after the 1989-1990 fiscal year.

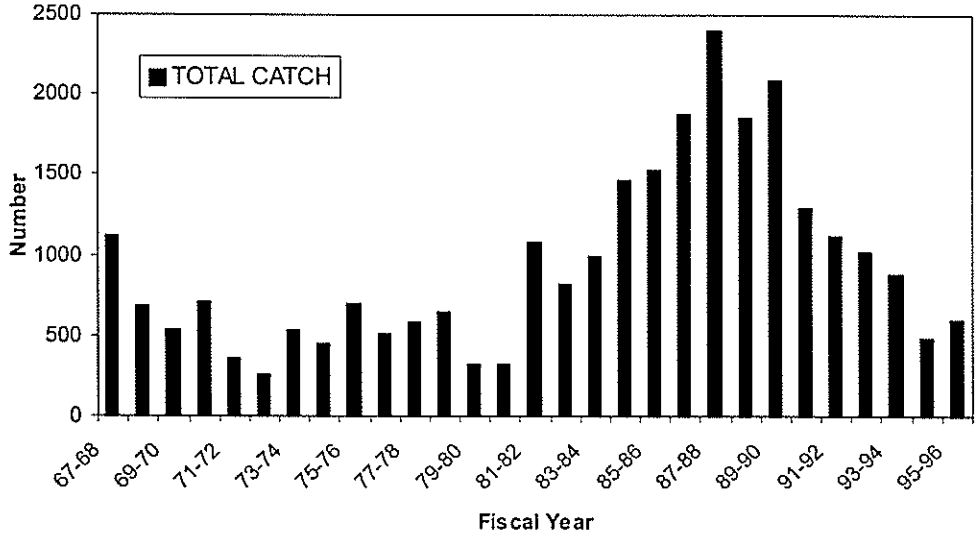


Figure 19. Anglers' reports of the number of steelhead caught in Lakelse River from fiscal year 1967-68 through 1995-96. (Source: MELP 1996a; n=29).

The mean annual number of adult steelhead harvested (Figure 20) from the Lakelse River system from 1967-1968 to 1995-1996 was 237 (S.E. = 41.5, n = 29), with a range of from nine adults in both 1994-1995 and 1995-1996, to 1115 in 1967-68 (MELP 1996a). The number of adult steelhead released each year generally increased over time from zero prior to 1970 -1971, to a maximum of 2224 in 1987-1988, after which it generally declined. The number harvested over this time period generally declined. The observed decline may have been related to changes in angling regulations and angler ethics or to other factors, such as habitat degradation.

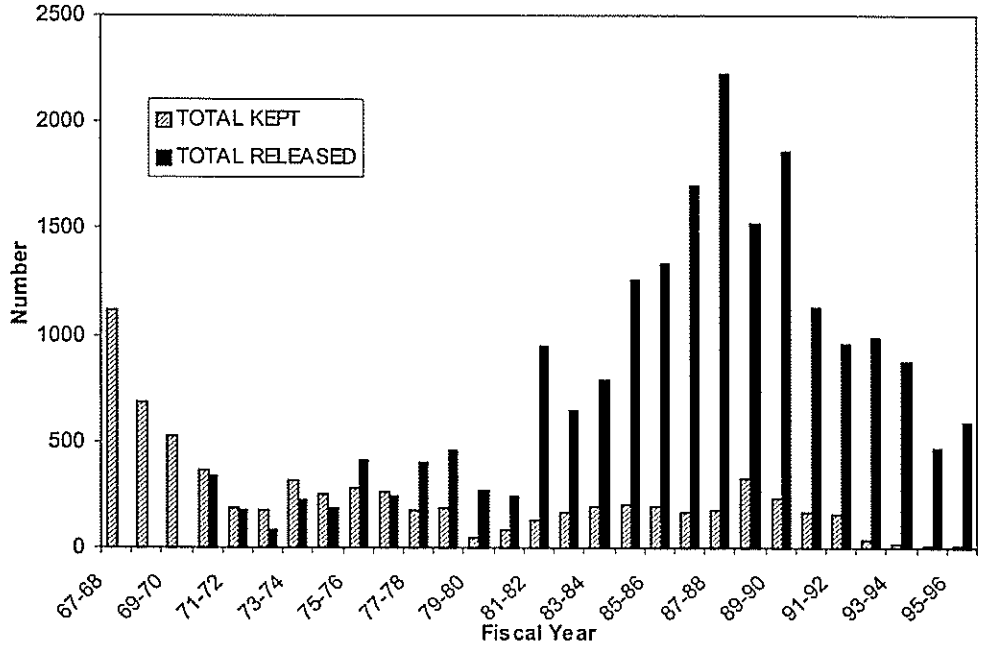


Figure 20. Anglers' reports of the number of steelhead kept and released in Lakelse River from fiscal year 1967-68 through 1995-96. (Source: MELP 1996a; n=29).

The number of adult steelhead harvested each year relative to the total catch (Figure 21) generally declined from 100% to 1.5% over the 29 years when records were kept (MELP 1996a).

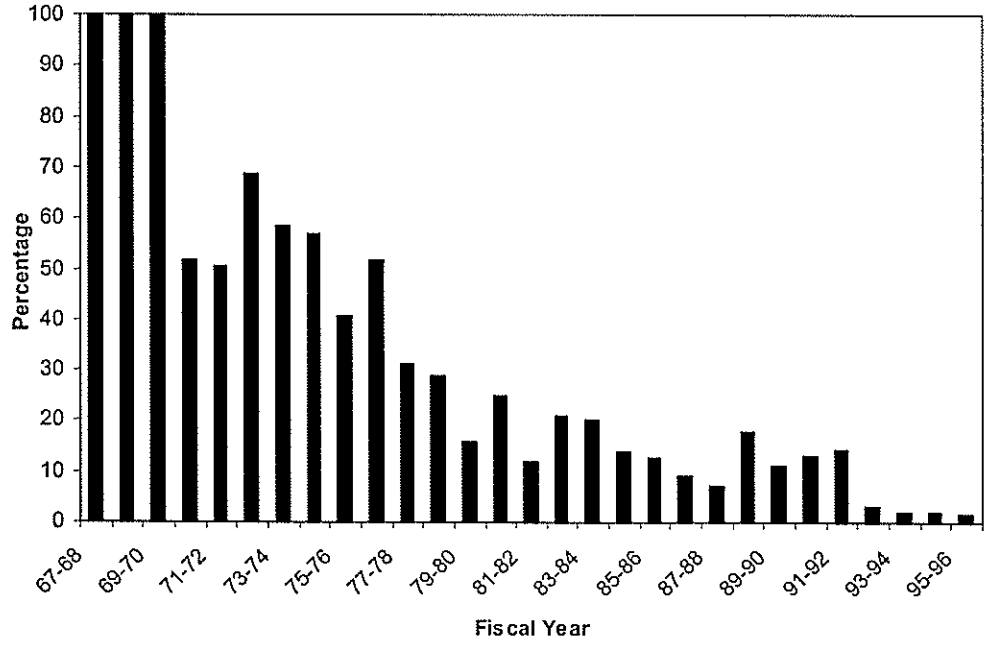


Figure 21. The number of adult Lakelse River steelhead harvested as a percentage of the total catch for each year from fiscal year 1967-68 to 1995-96. (Source: MELP 1996a).

### 4.9.2. Angler Effort

The mean number of anglers per year (Figure 22) was 477.3 (S.E. = 27.2, n =29), with a range of 209 in 1994-1995 to 771 in 1969-1970 (MELP 1996a). There was relatively little change in this number during the recorded time period. The mean number of angler days per year spent on the Lakelse River was 2709.3 (S.E. = 173.4, n = 29), with a range of 879 in 1994 -1995 to 4691 in 1989-1990 (Figure 22). This number varied significantly over the time period recorded.

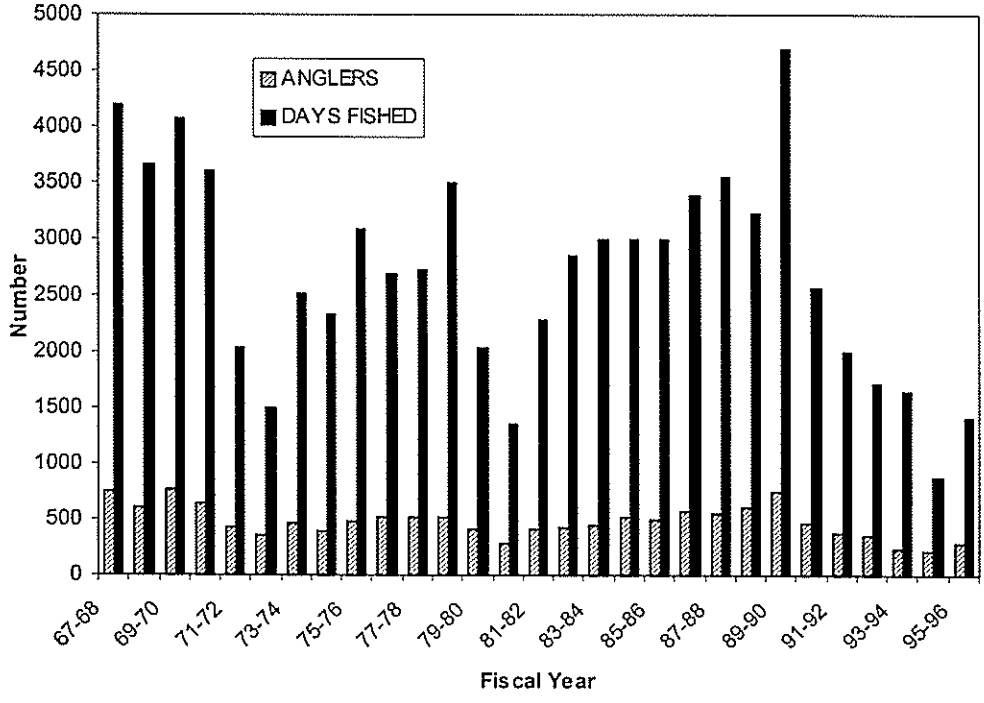


Figure 22. Number of anglers and angler days on the Lakelse River from fiscal year 1967-68 through 1995-96. (Source: MELP 1996a).

### 4.9.3. Catch Per Unit Effort

The mean annual catch per unit effort (Figure 23), in fish per angler day, was 0.353 (S.E. = 0.032, n = 29), with a range of 0.130 in 1969 -1970 to 0.675 in 1987 -1988 (MELP 1996a). The CPUE generally increased until the 1987-1988 fiscal year and generally declined somewhat after.

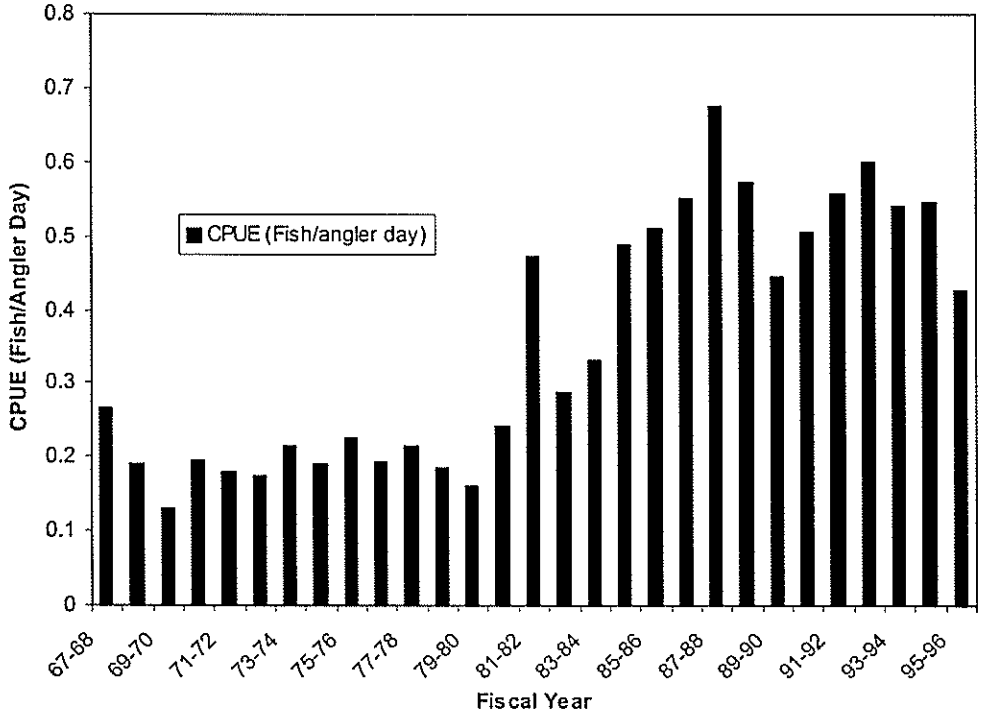


Figure 23. Catch per unit effort (CPUE) for steelhead in the Lakelse River from fiscal year 1967-68 through 1995-96. (Source: MELP 1996a).

### 4.9.4. Angler Residency

Records of angler residency, catch and harvest were available for the Lakelse River from fiscal years 1983-1984 to 1995-1996 (MELP 1996a). Over the 13 years for which records were available, anglers resident in Fish and Wildlife Region 6 generally accounted for a dominant proportion of the number of anglers, angler days, catch and harvest of Lakelse River steelhead adults (Table 6, Figures 24 through 27). The proportions of activity for each resident group have not changed significantly over the thirteen year period. Although Figure 27 shows a marked change in the proportion of harvest activity by Region 6 and other B.C. residents from 1993-94 through 1995-96, this may be misleading because the sample sizes of harvested fish in each of these three years was relatively small (16, 9 and 9 respectively).

Table 6. Number of Lakelse River steelhead anglers resident in Region 6 as a percentage of all anglers. (Source: MELP 1996a).

| | **Mean % (S.E., n)** | **Minimum % (Year)** | **Maximum % (Year)** |
|---|---|---|---|
| Number of Anglers | 69 (2, 13) | 56 (1994-95) | 83 (1993-94) |
| Number of Angler Days | 80 (2, 13) | 67 (1989-90) | 92 (1993-94) |
| Catch | 84 (3, 13) | 63 (191988-89) | 95 (1995-96) |
| Harvest | 71 (7, 13) | 33* (1995-96) | 100* (1993-94 and 1994-95) |

* These statistics may be misleading in that they were based on relatively small sample sizes.

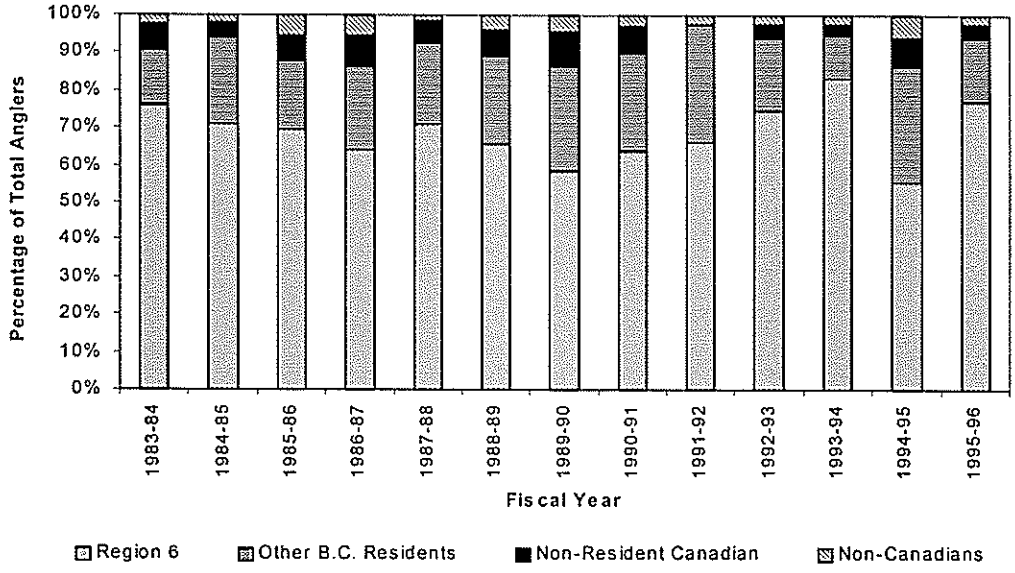


Figure 24. Percentage of anglers by residency group. (Source: MELP 1996a).

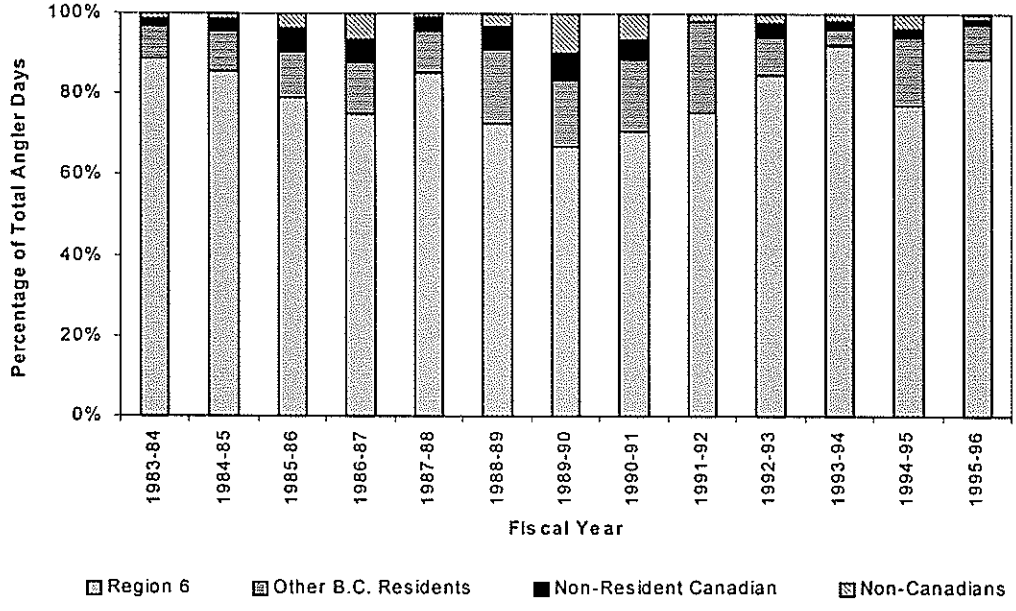


Figure 25. Percentage of angler days by residency group. (Source: MELP 1996a).

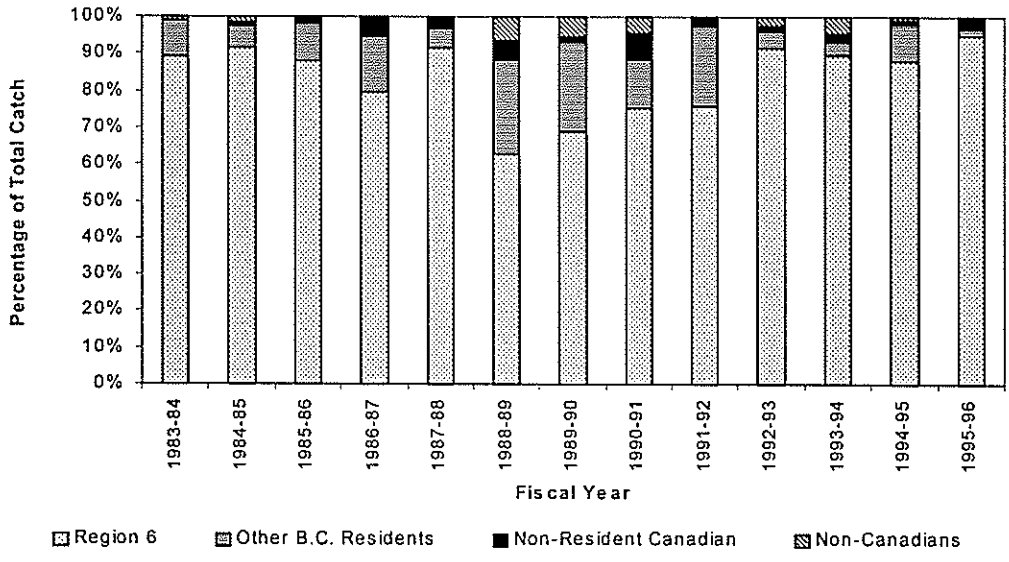


Figure 26. Percentage of catch by residency group. (Source: MELP 1996a).

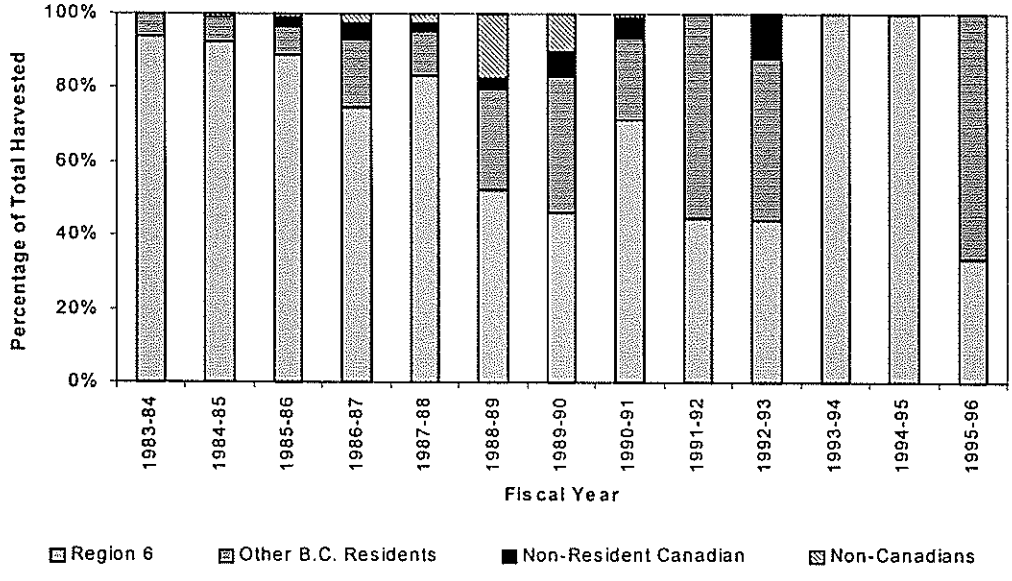


Figure 27. Percentage of harvest by residency group. (Source: MELP 1996a).

## 4.10. Angling Guide Activity

No guiding is allowed on Lakelse River. This restriction was applied in the 1990-91 fiscal year.

## 4.11. Creel Survey Information

A creel survey, primarily concerned with cutthroat trout, was conducted in the Lakelse River between April 2 and May 24 of 1978 (Imbleau 1978). It reported that totals of 73 steelhead and 202 rainbow trout were caught (Table 7). Of these fish, 77% of the steelhead and 81% of the rainbow trout were released.

Imbleau (1978) further distinguished between reports of fish landed and then released or killed and gear type. Compared with steelhead, rainbow trout appeared to be released more frequently. Imbleau (1978) also reported that 67% of the steelhead and 95% of the rainbow trout caught were angled in the fly fishing only areas above the CNR trestle (zones 1 and 2). During April and May only, 1026 anglers were checked and 99% were found to be B.C. residents. The survey reported that anglers fished for 2981 hours above the CNR trestle and estimated that 1000 hours of angling occurred below the trestle.

Hatlevik *et al.* (1981), reported that four of a total of 526 fish caught in Lakelse Lake between June 3 and August 23, 1979 were rainbow trout.

Table 7. Summary of results from a creel survey by Imbleau (1978).

| Date | Steelhead Caught | Rainbow Trout Caught | Cutthroat Trout Caught |
|---|---|---|---|
| April 3 – 9 | 8 | 3 | 8 |
| April 10 – 16 | 11 | 2 | 13 |
| April 17 – 23 | 11 | 20 | 140 |
| April 24 – 30 | 22 | 55 | 312 |
| May 1 – 7 | 11 | 30 | 212 |
| May 8 – 14 | 7 | 36 | 83 |
| May 15 – 21 | 3 | 43 | 92 |
| May 22 - 24 | | 13 | 31 |
| Totals | 73 | 202 | 891 |

## 4.12. Current Angling Regulations

The effects of laws (MELP 1996b) regulating angling for steelhead in Lakelse River and its tributaries included limits to a single hook and a bait ban (Table 8). Barbless hook and catch and release regulations were imposed in zones 1 and 2 from November 1 to June 15 and, in the same zones, fly fishing only from March 1 to May 31. The Lakelse River was designated a Class II water and this required that anglers whose residence was outside B.C., as well as guided B.C. residents must purchase a Classified Waters Licence (MELP 1996c). Guided anglers required a Guided Only Classified Waters Licence and non-guided anglers required a Non-Guided Classified Waters Licence.

Table 8. Summary of angling regulations for Lakelse River during 1996-97. (Source:MELP 1996b).

| Area of Application | Summary of Regulations |
|---|---|
| British Columbia | To fish for steelhead, residents of B.C. over age sixteen required an annual or short term basic fishing license and a steelhead conservation surcharge stamp. |
| | To fish for steelhead, non-residents (includes Canadian and non-Canadian) over age sixteen required an annual or short term basic fishing license, a steelhead conservation surcharge stamp and a special Class 2 Waters license if angling January 1 to December 31. |
| | Annual catch quotas for all BC steelhead was 10. |
| | |
| Skeena System Regulations | The daily catch quota was 1 steelhead over 50 cm (measured from tip of nose to fork of tail). |
| | Daily catch quota for steelhead from 30-50 cm was two. |
| | Release of any steelhead under 30 cm was mandatory. |
| | Possession quota was two daily quotas. |
| | Monthly catch quota was two steelhead. |
| | After catching and retaining the daily quota of steelhead from any waters, the angler was required to stop fishing those waters for the remainder of that day. |
| | Limited to single hook in all streams of region 6, all year. |
| | |
| Lakelse River (including tributaries) | Class II Water |
| | Steelhead catch and release, single barbless hook above CNR trestle bridge, November 1 to June 15. |
| | Bait ban, no power boats. |
| | Fly fishing only between Lakelse Lake outlet and CNR trestle bridge, March 1 to May 1. |
| | Steelhead Quota Changes - special notice in regulations<br>Skeena and Nass steelhead quotas are subject to in-season changes and are likely to be reduced to 0 (catch and release only) beginning July 1 to protect summer run stocks. Anglers must check with their local B.C.Environment office or angling license issuer. |

## 4.13. Recreational Fisheries

The Lakelse River has a substantial recreational steelhead fishery. Over 29 years an average of 477 anglers fished for 2709 days, catching 939 steelhead for a catch rate of 0.353 fish per day (MELP 1996a). It was reported to have one of the few substantial winter run steelhead populations on the Skeena system with excellent late winter and early spring steelhead angling (MELP 1972).

Lakelse River is easily accessible. The upper end of the river can be reached by boat from Lakelse Lake or on the east side via a logging road from Beam Station Road. Partial trails exist on both sides of the river from Herman Creek to the CNR trestle bridge. A series of logging roads from the south end of Lakelse Lake allow access to the CNR bridge from the west side. The middle river can be reached on the east side by using the Thunderbird Main logging road system off Beam Station Road. The lower Lakelse can be reached by using the Whitebottom logging road west of Old Remo and the Lakelse Main (D. Webb, pers. comm., 1997).

Lakelse River steelhead fishing takes place during two general times; in the fall from October to January and in the spring from March to the end of May. The fall and winter steelhead fishery concentrates in the Herman Creek to CNR bridge area (zones 1 and 2) where most of the fish were reportedly located (Whelpley 1984). During the spring, angling intensity is most heavily concentrated above the CNR Bridge (Imbleau 1978 ), but some angling effort is also spread out throughout the river with areas of easiest access receiving the most pressure (Whelpley 1984). A fly fishing only regulation, from April 1 to May 31, was introduced in 1971 for the upper section of the river in order to protect spawning steelhead but still allowed a fishery for cutthroat trout (Imbleau 1978). Whelpley (1984) points out that the river is fishable for the entire time steelhead are in the system and, for summer run fish, this is 8 months.

Based on anglers' reports (MELP 1996a) there was a gradual decline in both the annual number of anglers and the number of angler days from 1967-68 through 1995-96. No information was available on use of the tributaries by anglers.

## 4.14. First Nations Uses and Harvest

Records for Lakelse River were not available from the Kitselas or the Kitsumkalum Band Councils. Historical estimates of native steelhead harvest from the Skeena River system ranged from approximately 4% to 11% of the total steelhead catch (Chudyk and Narver 1976), however, that range was for the summer months and likely does not reflect the situation for the fall, winter and spring Lakelse River steelhead catch (D. Atagi, pers. comm., 1997). The same report further suggested that the native catch in the Skeena may have been as high as 15%.

Tetreau (1982) reported that Dave Crack, a conservation officer in the area during the 1970's and 1980's, stated that Natives used to net steelhead in the outlet of Lakelse Lake in the late fall and gillnet the bay off Clearwater and Andalas creeks during winter.

Telephoned and faxed requests for information were sent to the Kitselas Band Office but no responses were received.

The Chief Councilor for the Kitsumkalum Band (S. Roberts. pers. comm., 1997) stated that other than a few members using rod and reel, the Kitsumkalum band members did not direct any fishery at Lakelse River steelhead.

## 4.15. Minimum Escapement Requirements

To completely utilize the Lakelse spawning area, it was claimed that an estimated escapement of 400 to 500 fish, or approximately 50% of the population entering the river, was needed (MELP 1972). It was further estimated that the maximum area suitable for steelhead spawning was 2,376,000 square feet (5,303 $m^2$). No information on the number of adults required to fill the juvenile habitat was available.

## 4.16. Summary of Current Stock Status

The estimates in the available literature on Lakelse River adult steelhead population size were considered unreliable, mainly due to a lack of descriptions of methods used and a lack

of references cited to support the estimates. The available data were inadequate to estimate the trend in population size.

British Columbia Watershed Restoration Program assessments (Gordon et al. 1996; Grieve 1996) identified a large number of habitat concerns related to past logging practices in the Lakelse River watershed. The general types of problems cited included blocked fish access, channel instability, bank erosion and loss of current and future large woody debris. These problems were mostly associated with the tributaries. A relatively recent slide on Mink Creek has resulted in more turbidity in that creek and in the Lakelse River than there was prior to the slide. This has raised some local concern, however, no reliable information was available on whether this was a problem for fish or not.

The riparian area surrounding the lake has undergone a significant amount of development for residential use in the past 25 years. In addition, the population of the Terrace area has also risen dramatically. Both these factors have resulted in an increased use of the lake for domestic water supply, boating, swimming, snow-mobiling and ice fishing and have also resulted in a probable increase in pollutants entering the lake from motorized vehicles, septic systems, fertilizers and pesticides. This increasing use may be detrimental to the steelhead population, especially for those fish rearing and overwintering in the lake.

Recurrent flooding of the growing number of residential developments on the lakeshore has resulted in some local demand to lower the substrate level in the Lakelse River at Herman's Creek in order to lower the lake's water level. As this area is known to contain what is probably the most productive steelhead spawning habitat in the entire watershed, any such action might be very damaging to Lakelse steelhead.

## 5. Discussion and Conclusions

The Lakelse River is an important recreational angling resource in Region 6, with a steelhead population that is exploited heavily. Relatively easy access, warm water, high aesthetic values, proximity to Terrace, successful angling throughout most of the year and the presence of five other species of Pacific salmon, cutthroat trout and Dolly Varden all result in a high fishing pressure. Yet, although the Lakelse steelhead population is a very significant one in this region, relatively little is known about its biology.

The results of this literature review suggested that good data on:

- overwintering habitat locations,
- spawning habitat locations off the mainstem,
- rearing habitat locations off the mainstem,
- the significance of the tributaries,
- the minimum escapement requirement, and
- the adult population size

were not available.

Although some information was found on adult run timing, the data were suspect due to a lack of records of temporal and spatial effort. A more rigorous design of research programs would help with this problem.

Information on fish age, fish size, harvest, catch, angler effort and anglers' residency was adequate.

Very little information on native peoples' use of Lakelse steelhead was found and local anglers suggest it has been minimal over the last 20 years (R. Brown and D. Webb, pers. comm. 1997). Addressing this deficiency is not recommended at this time.

Records of the presence of hatchery raised fish were not satisfactorily explained.

In general, the quality of data available in the literature reviewed suffered from the lack of statistically rigorous research design.

## 5.1. Management Recommendations

Overwintering fish are more vulnerable to angling than are spring arrivals due to their being exposed to angling for a longer time and their habit of holding in locations known to anglers. The current regulation requiring steelhead release above the CNR bridge from November 1 to June 15 serves to partially protect early run fish through most of their stay in the river. This regulation was likely imposed based on the assumption that most fish hold above the CNR bridge. However, this assumption needs to be verified with more rigorously designed distribution studies, as the currently available data only confirm the fact that many overwintering fish hold in the upper river. Existing data does not establish their absence from the rest of the river. Local knowledge suggests that there may be a significant number of overwintering adults in other sections of the river (R. Brown, pers. comm. 1997).

The data described in this review suggests there are two populations of steelhead, at least in relation to run timing behaviour. If a management objective is to provide equal protection to both the overwintering and the spring run populations, then one option could be to expose both populations to angling pressure for equal periods of time. The current catch and release regulation comes into effect on November 1, allowing a kill fishery for approximately five weeks from the time the first fall fish arrive. The goal of equal fishing pressure on both runs could be met by allowing a kill fishery on newly arrived fish from mid-March until May 1. However, anglers have difficulty distinguishing between newly arrived and overwintered fish, so that overwintered fish would also be killed in such a fishery. Given this difficulty with identification of the two runs, the lack of a sound estimate of the total size of the adult population as well as its two component seasonal populations, and an incomplete knowledge of adult distribution, particularly for overwintering fish, the goal of equal angling pressure on both populations requires a change to the existing regulations. The catch and release regulation could be extended to cover the entire watershed throughout the year. Since only nine steelhead were reported killed in each of the last two fiscal years, the extension of the regulation should not impose any significant hardship on sport fishers.

There is local concern (D. Webb, pers. comm., 1997) that fly fishers angling for cutthroat trout and steelhead are harassing spawning steelhead in the flats below Herman Creek. The North West Branch of the Steelhead Society put up a sign in 1993 appealing to anglers not to bother spawning steelhead. However, the problem persists, probably because of ignorance of steelhead biology. The tagging data indicated that no bright steelhead were found in the upper river at this time of year. As a first step in reducing any harassment of spawning steelhead, the Lakelse River above the CNR bridge should be closed to steelhead angling

during the spring spawning season from March 1 to June 15. If the problem continues, gear restrictions, like restricting the size of hook or type of line (eg. floating line only) could be imposed.

## 5.2. Future Study Recommendations

- There is a need to record the time and place of unsuccessful as well as successful angling effort in future studies.
- Conduct a more extensive radio telemetry tagging study to determine overwintering and spawning habitat locations throughout the watershed.
- Conduct an extensive minnow trapping and electrofishing study in the tributaries to determine the distribution and upstream limits of juvenile rearing habitat.
- Annual efforts to more accurately determine population size should be increased. Useful estimates of population size and stability could be obtained with accurate counts at any stage in the steelhead life cycle. For example, counts of fry, using minnow traps repeatedly set at established locations over many years would provide an index of population trends at a minimum of cost.
- A better estimate of the minimum escapement requirement is needed. This would require an accurate assessment of the Lakelse River watershed's area of accessible and suitable spawning habitat and the development of locally relevant biostandards for spawner/$m^2$ capacities.
- Conduct a creel census during the ice fishing season on Lakelse Lake to assess the impact of this fishery on the steelhead population.
- Determine if steelhead are holding in specific locations that make them unduly vulnerable and if area closures are needed.
- A study should be conducted to determine if spring fly fishing in the area just below Herman Creek is harming eggs from compression by anglers walking on the redds.
- The tagging program involving local anglers should be encouraged.
- The significance of the tributaries, both above and below the lake, should be investigated.

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## Appendix A. List of Contacts

- Jim Culp, Manager, Terrace Salmonid Enhancement Society, Kalum Lake Drive, Terrace, B.C., V8G 4R6.
- Mel Bevan, Chief Councillor, Kitselas Band Council, 4562 Queensway, Terrace, B.C., V8G 3X6.
- Robert Brown, Recreational Angler, 4603 Munthe, Terrace, B.C., V8G 2H5.
- Grant Hazelwood, Biologist, 2711 Skeena Street, Terrace, B.C., V8G 3K3.
- John Hipp, retired DFO Fisheries Officer, 4723 Graham Avenue, Terrace, B.C., V8G 1A6.
- Archi MacDonald, Supervisor, Repap/Skeena Cellulose Inc., 4900 Keith Avenue, Terrace, B.C., V8G 5L8.
- Steve Roberts, Chief Councillor, Kitsumkalum Band Council, West Kalum Road, Terrace, B.C., V8G 2M1.
- Ron Tetreau, Fisheries Technician, Fisheries Branch, Ministry of Environment, Lands and Parks, 3726 Alfred Ave., Smithers, B.C., V0J 2N0.
- Mitchell Drewes, Habitat Technician, Department of Fisheries and Oceans, 5235A Keith Avenue, Terrace, B.C., V8G 1L2.
- Dionys DeLeeuw, Senior Habitat Biologist, Ministry of Environment, Lands and Parks, 104 - 3220 Eby Street, Terrace, B.C., V8G 5K8.

# Appendix B. Steelhead Tagging and Aging Data

* Numbered locations are described in the text. Source: MELP 1984a, b

| D/M/Y | SEX | LENGTH (cm) | WEIGHT (kg) | AGE | LOCATION TAGGED* | COMMENTS | LOCATION* RECAPTURED | DATE RECAPTURED | TAG # | DATABASE ID |
|---|---|---|---|---|---|---|---|---|---|---|
| | F | 76.2 | 4.8 | | | WINTER | | | 0 | 36 |
| | F | 85.1 | | | | BRIGHT WINTER RUN, CH 13 - 72 BPM | | | 0 | 40 |
| | F | 75.0 | | | | WINTER | | | 0 | 44 |
| | | | | | | | Lakelse River | 08/10/93 | 34452 | 917 |
| | F | 88.2 | 7.5 | 4.2 | | BRIGHT SILVER, 1976/77 | | | 0 | 276 |
| 11-Nov-72 | F | 78.7 | 4 | 4.2+ | | | | | 0 | 275 |
| 11-Nov-72 | F | 76.2 | 6.3 | | | | | | 0 | 274 |
| 29-Apr-76 | F | 81.2 | | 3.2S | | KELT | | | 0 | 265 |
| 17-Oct-76 | M | 64.7 | 3.1 | | | STRANGE SHAPE, ROTTEN | | | 0 | 266 |
| 11-Nov-76 | M | 83.8 | 5.6 | 4.3 | | | | | 0 | 268 |
| 11-Nov-76 | M | 87.6 | 8.1 | 4.3 | | | | | 0 | 267 |
| 20-Nov-76 | F | 76.2 | 5 | 3.3 | | | | | 0 | 270 |
| 20-Nov-76 | M | 86.3 | | 4.3 | | | | | 0 | 269 |
| 24-Nov-76 | F | 78.7 | 6.3 | 4.3 | | | | | 0 | 271 |
| 26-Nov-76 | M | 72.3 | 4 | 4.2 | | | | | 0 | 272 |
| 10-May-77 | M | 83 | 6 | 4.2S | | KELT DARK | | | 0 | 255 |
| 09-Oct-77 | F | 80 | 5.4 | R.2 | | | | | 0 | 273 |
| 05-Apr-78 | F | 88 | 5.75 | 4.1S1S | | KELT | | | 0 | 259 |
| 09-Apr-78 | M | 67 | 2.5 | 3.2 | | GREEN | | | 0 | 242 |
| 09-Apr-78 | M | 76 | 4 | 4.2 | | RIPE, SLIGHTLY COLORED | | | 0 | 247 |
| 11-Apr-78 | F | 87 | 7 | 4.1SS | | KELT DARK | | | 0 | 257 |
| 11-Apr-78 | M | 76.2 | 6.8 | 3.1S1 | | RIPE | | | 0 | 249 |

| D/M/Y | SEX | LENGTH (cm) | WEIGHT (kg) | AGE | LOCATION TAGGED* | COMMENTS | LOCATION* RECAPTURED | DATE RECAPTURED | TAG # | DATABASE ID |
|---|---|---|---|---|---|---|---|---|---|---|
| 12-Apr-78 | F | 80 | 5 | 3.3 | | RIPE, SLIGHTLY COLORED | | | 0 | 251 |
| 15-Apr-78 | F | 66 | 2.7 | 4.2 | | RIPE, GOOD SHAPE | | | 0 | 241 |
| 16-Apr-78 | M | 76.2 | | 4.2 | | RIPE | | | 0 | 250 |
| 16-Apr-78 | F | 87.6 | | 4.1SS1 | | RIPE | | | 0 | 258 |
| 18-Apr-78 | M | | 7.9 | 5.2S | | RIPE | | | 0 | 235 |
| 18-Apr-78 | M | | 5.4 | 5.1S | | DARK | | | 0 | 264 |
| 18-Apr-78 | F | 86 | 5.5 | 4.2S | | KELT | | | 0 | 256 |
| 21-Apr-78 | F | 82 | 4.5 | 4.3 | | RIPE, DARK | | | 0 | 254 |
| 21-Apr-78 | F | 81 | 5.25 | 4.2+ | | RIPE, DARK | | | 0 | 252 |
| 21-Apr-78 | F | 76 | 5 | 4.2 | | RIPE, BRIGHT | | | 0 | 248 |
| 21-Apr-78 | F | | 6.5 | R.3 | | RIPE | | | 0 | 233 |
| 22-Apr-78 | M | 70.3 | 6.3 | R.1SS | | KELT | | | 0 | 244 |
| 22-Apr-78 | F | 97.5 | 7.5 | 4.3+ | | RIPE | | | 0 | 261 |
| 22-Apr-78 | F | 67 | 3.25 | 4.2 | | RIPE, FRESH | | | 0 | 243 |
| 24-Apr-78 | F | | 6.5 | 4.2SS | | RIPE | | | 0 | 234 |
| 27-Apr-78 | M | | 5.4 | 3.2S | | KELT DARK | | | 0 | 263 |
| 28-Apr-78 | M | 94 | 12.2 | 4.3 | | RIPE, DARK | | | 0 | 260 |
| 30-Apr-78 | F | 75 | 6.25 | 3.1S | | DARK, PAIR WITH # 245 | | | 0 | 246 |
| 30-Apr-78 | M | 70.5 | 3.1 | 4.1S | | DARK, PAIR WITH # 246 | | | 0 | 245 |
| 01-May-78 | F | 82 | 6 | 4.3 | | RIPE, FRESH, BRIGHT | | | 0 | 253 |
| 18-May-78 | M | | 9 | 5.2S | | FOUND ON BANK | | | 0 | 236 |
| 20-May-78 | M | 103 | | 4.2SS | | DARK | | | 0 | 262 |
| 11-Nov-81 | M | 95.5 | 9.1 | 3.3+ | | | | | 0 | 237 |
| 18-Nov-81 | M | 81.3 | 5.9 | R.3+ | | DARK SUMMER RUN | | | 0 | 239 |
| 18-Nov-81 | F | 73.7 | 4.1 | 3.2+ | | BRIGHT | | | 0 | 238 |
| 02-Dec-81 | M | 94 | 7.7 | 3.3+ | | DARK SUMMER RUN | | | 0 | 240 |
| 19-Jan-82 | F | 73.7 | 3.6 | | 1 | SCAR L. SIDE | | | 587 | 707 |
| 29-Apr-82 | F | 71.1 | 3.6 | 3.2+ | | BRIGHT | | | 0 | 209 |

| D/M/Y | SEX | LENGTH (cm) | WEIGHT (kg) | AGE | LOCATION TAGGED* | COMMENTS | LOCATION* RECAPTURED | DATE RECAPTURED | TAG # | DATABASE ID |
|---|---|---|---|---|---|---|---|---|---|---|
| 12-May-82 | F | 61 | 2.7 | 3.2 | | BRIGHT | | | 0 | 210 |
| 12-May-82 | F | 86.7 | 6.4 | 4.2S1+ | | DARK | | | 0 | 211 |
| 13-May-82 | F | 78.7 | 6.4 | 4.2S1 | | DARK | | | 0 | 213 |
| 13-May-82 | M | 71.1 | 4.1 | 4.2 | | DARK | | | 0 | 212 |
| 24-May-82 | M | 78.7 | 5 | 4.2S1+ | | DARK | | | 0 | 216 |
| 24-May-82 | F | 76.2 | 4.1 | 4.2+ | | | | | 0 | 215 |
| 24-May-82 | F | 76.2 | 4.5 | 3+.2 | | BRIGHT | | | 0 | 214 |
| 17-Oct-82 | M | 68.5 | 3.6 | | LAKELSE | BRIGHT | | | 0 | 817 |
| 17-Oct-82 | M | 68.5 | 3.6 | | | BRIGHT | | | 0 | 557 |
| 17-Oct-82 | M | 68.6 | 3.6 | 3.2 | | BRIGHT | | | 0 | 217 |
| 21-Oct-82 | M | 94 | 9.1 | R.2+ | | DARK, R FRESH W | | | 0 | 219 |
| 21-Oct-82 | F | 83.8 | 7.3 | 3.2+ | | DARK, SUMMER, 1 SCALE | | | 0 | 218 |
| 21-Oct-82 | M | 94 | 9.1 | | LAKELSE | DARK | | | 0 | 819 |
| 21-Oct-82 | F | 83.8 | 7.2 | | LAKELSE | DARK | | | 0 | 818 |
| 21-Oct-82 | M | 94 | 9.1 | | | DARK, SUMMER RUN | | | 0 | 559 |
| 21-Oct-82 | F | 83.8 | 7.2 | | | DARK, SUMMER RUN | | | 0 | 558 |
| 29-Oct-82 | F | 71.1 | 3.6 | | LAKELSE | | | | 365 | 816 |
| 30-Oct-82 | F | 74.9 | 4.5 | | LAKELSE | | | | 364 | 815 |
| 01-Nov-82 | F | 71.1 | 3.6 | 2.1+ | | BRIGHT | | | 0 | 221 |
| 01-Nov-82 | M | 78.7 | 5.9 | 3.3+ | | BRIGHT | | | 0 | 220 |
| 03-Nov-82 | F | 86.7 | 6.4 | 3.2+ | | BRIGHT | | | 0 | 224 |
| 03-Nov-82 | F | 81.3 | 6.3 | | | | | | 0 | 564 |
| 03-Nov-82 | F | 81.3 | 5.4 | 4.2+ | | BRIGHT | | | 0 | 223 |
| 03-Nov-82 | M | 86.4 | 6.8 | | | | | | 0 | 563 |
| 03-Nov-82 | M | 86.7 | 6.8 | 4.1S1 | | | | | 0 | 225 |
| 03-Nov-82 | F | 86.4 | 6.3 | | | BRIGHT | | | 0 | 562 |
| 03-Nov-82 | F | 81.3 | 5.4 | | | BRIGHT | | | 0 | 561 |
| 03-Nov-82 | F | 71.1 | 4.6 | | | BRIGHT | | | 0 | 560 |
| 03-Nov-82 | F | 81.3 | 6.3 | | LAKELSE | | | | 0 | 824 |

| D/M/Y | SEX | LENGTH (cm) | WEIGHT (kg) | AGE | LOCATION TAGGED* | COMMENTS | LOCATION* RECAPTURED | DATE RECAPTURED | TAG # | DATABASE ID |
|---|---|---|---|---|---|---|---|---|---|---|
| 03-Nov-82 | F | 81.3 | 6.4 | 3.2+ | | BRIGHT | | | 0 | 226 |
| 03-Nov-82 | F | 71.1 | 4.6 | | LAKELSE | BRIGHT | | | 0 | 820 |
| 03-Nov-82 | F | 81.3 | 5.4 | | LAKELSE | BRIGHT | | | 0 | 821 |
| 03-Nov-82 | M | 86.4 | 6.8 | | LAKELSE | | | | 0 | 823 |
| 03-Nov-82 | F | 71.1 | 4.5 | 3.2+ | | BRIGHT | | | 0 | 222 |
| 03-Nov-82 | F | 86.4 | 6.3 | | LAKELSE | BRIGHT | | | 0 | 822 |
| 04-Nov-82 | F | 78.7 | 4.9 | | | BRIGHT | | | 0 | 566 |
| 04-Nov-82 | F | 78.7 | 4.9 | | LAKELSE | BRIGHT | | | 0 | 826 |
| 04-Nov-82 | F | 73.7 | 4.6 | | LAKELSE | BRIGHT | | | 0 | 825 |
| 04-Nov-82 | F | 78.7 | 5 | 3.1+ | | BRIGHT | | | 0 | 228 |
| 04-Nov-82 | F | 73.7 | 4.5 | R.2+ | | BRIGHT, R-FW | | | 0 | 227 |
| 04-Nov-82 | F | 73.7 | 4.6 | | | BRIGHT | | | 0 | 565 |
| 05-Nov-82 | F | 76.2 | 4.9 | | | | POWERLINE | MAY / YR? | 0 | 567 |
| 05-Nov-82 | F | 81.3 | 6.3 | | | | | | 0 | 568 |
| 05-Nov-82 | M | 86.7 | 7.7 | 4.2+ | | SUMMER | | | 0 | 231 |
| 05-Nov-82 | M | 86.4 | 7.7 | | | SUMMER | | | 0 | 569 |
| 05-Nov-82 | F | 76.2 | 4.9 | | | SUMMER | | | 0 | 570 |
| 05-Nov-82 | M | 88.9 | 8.2 | | | SUMMER | | | 0 | 571 |
| 05-Nov-82 | F | 78.7 | 5.4 | 3.2+ | | | | | 0 | 191 |
| 05-Nov-82 | F | 76.2 | 5 | 3.2+ | | SUMMER | | | 0 | 232 |
| 05-Nov-82 | F | 76.2 | 5 | 3.2+ | | | | | 0 | 229 |
| 05-Nov-82 | F | 76.2 | 4.9 | | LAKELSE | | | | 0 | 827 |
| 05-Nov-82 | F | 81.3 | 6.3 | | LAKELSE | | | | 0 | 828 |
| 05-Nov-82 | M | 86.4 | 7.7 | | LAKELSE | DARK | | | 0 | 829 |
| 05-Nov-82 | F | 76.2 | 4.9 | | LAKELSE | DARK | | | 0 | 830 |
| 05-Nov-82 | M | 88.9 | 8.2 | | LAKELSE | DARK | | | 0 | 831 |
| 05-Nov-82 | M | 88.9 | 8.2 | 3.2+ | | SUMMER | | | 0 | 190 |
| 05-Nov-82 | F | 78.7 | 5.4 | | | | | | 0 | 572 |
| 05-Nov-82 | F | 81.3 | 6.4 | 3.2+ | | | | | 0 | 230 |

| D/M/Y | SEX | LENGTH (cm) | WEIGHT (kg) | AGE | LOCATION TAGGED* | COMMENTS | LOCATION* RECAPTURED | DATE RECAPTURED | TAG # | DATABASE ID |
|---|---|---|---|---|---|---|---|---|---|---|
| 05-Nov-82 | F | 78.7 | 5.4 | | LAKELSE | | | | 0 | 832 |
| 07-Nov-82 | F | 68.6 | 2.7 | 3.1+ | 1 | | | | 251 | 192 |
| 10-Nov-82 | M | 87 | 6.8 | 3.2+ | 1 | | | | 201 | 193 |
| 11-Nov-82 | F | | 0.68 | 4+ | 1 | RESIDENT? | | | 252 | 194 |
| 13-Nov-82 | M | 45 | 1.4 | | 1 | 1 scale | | | 2228 | 749 |
| 13-Nov-82 | M | 66 | 5.9 | 3.3 | 1 | BRIGHT | | | 2225 | 592 |
| 13-Nov-82 | F | | 6.2 | 4.3 | 1 | | | | 2230 | 301 |
| 13-Nov-82 | F | 60.9 | 3.6 | 3.3 | 1 | Bright | | | 2216 | 809 |
| 17-Nov-82 | M | 78.7 | | 3.2+ | Lakelse | | | | 2057 | 204 |
| 17-Nov-82 | M | 83.8 | | 3.2+ | 2 | | | | 204 | 734 |
| 17-Nov-82 | M | 91.4 | 7.2 | 3.2+ | 2, E/R | CH 2 - 57 BPM | | | 1303 | 206 |
| 17-Nov-82 | F | 71.1 | | | 1 | | | | 270 | 578 |
| 17-Nov-82 | M | 86.7 | | 3.2+ | 1 | | | | 2055 | 202 |
| 17-Nov-82 | M | 61 | | 3.1+ | 1 | Recap | White Cr. | May 5/? | 202 | 195 |
| 17-Nov-82 | M,F | 76.2 | 4.6 | 3.2+ | 1 | Bright | | | 1325 | 287 |
| 17-Nov-82 | M | 83.8 | 5.9 | 3.2+ | 2 | | | | 2056 | 800 |
| 17-Nov-82 | M | 88.9 | 7.2 | 3.2+ | 2 | CH 2 - 67 BPM, COLORED | | | 1301 | 586 |
| 17-Nov-82 | F | 73.7 | | 2.2+ | 1 | BRIGHT | | 17/11/82 | 2054 | 582 |
| 17-Nov-82 | M | 78.7 | 4.6 | R.2+ | 1 | BRIGHT, 1 scale R-FW | | | 2052 | 581 |
| 17-Nov-82 | F | 60.9 | 2.3 | R.1+ | LAKELSE | BRIGHT,R-FW | | | 2151 | 580 |
| 20-Nov-82 | M | 73.7 | 6.3 | | 1 | Dark, no scales | | | 276 | 435 |
| 24-Nov-82 | F | 78.7 | 4.9 | | 1 | CH 8 - 31 BPM, Bright, Killed on 4th recapture at | 1 | 30/11/82 | 1305 | 279 |
| 24-Nov-82 | M | 81.3 | | 3.2+ | 1 | | | | 2058 | 805 |
| 25-Nov-82 | F | 76.2 | 4.6 | | 1 | CH 8 - 37 BPM, SCARRED, EYE DAMAGE | | | 1309 | 590 |
| 25-Nov-82 | F | 81.3 | 5.9 | | 1,2 | Ch 7-66 BPM | | | 1311 | 807 |
| 02-Dec-82 | F | 96.5 | 8.2 | 3.1SS1 | | | | | 0 | 208 |
| 15-Dec-82 | F | 81.3 | 5.0 | 4.3 | | Pink yarn thru dorsal | | | 0 | 436 |
| 15-Dec-82 | F | 81.3 | 5.4 | 3.3 | 1 | | | | 2059 | 302 |

| D/M/Y | SEX | LENGTH (cm) | WEIGHT (kg) | AGE | LOCATION TAGGED* | COMMENTS | LOCATION* RECAPTURED | DATE RECAPTURED | TAG # | DATABASE ID |
|---|---|---|---|---|---|---|---|---|---|---|
| 15-Dec-82 | F | 76.2 | | 3.3 | 2 | LEFT EYE BLOODSHOT | | | 2060 | 303 |
| 15-Dec-82 | F | 81.3 | | | 1 | | | | 0 | 305 |
| 15-Dec-82 | F | 81.3 | 5 | | LAKELSE RIVER | DORSAL TAG | | | 0 | 598 |
| 15-Dec-82 | F | 81.3 | 5 | | LAKELSE | | | | 0 | 730 |
| 15-Dec-82 | M | 78.7 | | 3.2 | 1 | | | | 2061 | 597 |
| 01-Apr-83 | M | 71.1 | 3.6 | 3.2 | 6 | | | | 2062 | 813 |
| 07-Apr-83 | M | 76.2 | 4.1 | 3.1S1 | 1 | | | | 2075 | 136 |
| 12-Apr-83 | F | | 4.5 | 3.3 | 6 | SLIGHT COLOR | | | 190 | 601 |
| 15-Apr-83 | M | 78.7 | | R.3 | 5 | | | | 2074 | 607 |
| 15-Apr-83 | M | 82.8 | | 3.3 | LAKELSE RIVER | | | | 1317 | 610 |
| 15-Apr-83 | M | 73.7 | | 3.2 | 6 | Scar right side | | | 2063 | 308 |
| 15-Apr-83 | M | 86.4 | | 3.3 | 6 | DARK | | | 2068 | 605 |
| 15-Apr-83 | M | 82.6 | | | 5 | | | | 1017 | 317 |
| 15-Apr-83 | M | 68.6 | | | 5 | | | | 1312 | 315 |
| 15-Apr-83 | M | 81.3 | | 3.1SS1 | 6 | | | | 1318 | 318 |
| 15-Apr-83 | M | 91.4 | | 3.3 | 6 | CH 9 - 84 BPM, FRESH, R=BRIGHT | | | 2065 | 612 |
| 15-Apr-83 | F | 80 | | 3.3 | 5 | CH 9 - 69 BPM, FRESH, BRIGHT | | | 2069 | 613 |
| 15-Apr-83 | F | 83.8 | | 3.3 | 5 | Bright | | | 1316 | 316 |
| 15-Apr-83 | M | 63.5 | | 3.2 | 5 | | | | 2072 | 134 |
| 15-Apr-83 | M | 68.5 | | 3.2 | LAKELSE | | | | 1315 | 768 |
| 15-Apr-83 | M | 83.8 | | 3.3 | 6 | RECAP - TAG REMOVED | 6 | 1/5/83 | 2067 | 131 |
| 15-Apr-83 | F | 76.2 | 4.5 | 3.3 | 6 | PINKISH | | | 2064 | 763 |
| 16-Apr-83 | F | 71.1 | 5 | 3.3 | 6 | BRIGHT | | | 194 | 615 |
| 16-Apr-83 | F | | 4.5 | 3.1SS | 5 | MENDED KELT | 5 | 5/5/83 | 2209 | 147 |
| 17-Apr-83 | F | 66 | 3.2 | R.3 | 6 | BRIGHT | | | 126 | 653 |
| 17-Apr-83 | M | 76.2 | 4.1 | 3.3 | 6 | Bright | | | 151 | 725 |

| D/M/Y | SEX | LENGTH (cm) | WEIGHT (kg) | AGE | LOCATION TAGGED* | COMMENTS | LOCATION* RECAPTURED | DATE RECAPTURED | TAG # | DATABASE ID |
|---|---|---|---|---|---|---|---|---|---|---|
| 17-Apr-83 | F | 81.3 | 5.4 | | 6 | Dark, no scale | | | 2153 | 745 |
| 17-Apr-83 | F | 73.7 | | | 4 | | | | 2149 | 740 |
| 17-Apr-83 | F | 68.5 | 3.2 | 3.2 | 6 | Bright | | | 152 | 726 |
| 19-Apr-83 | M | | 6.3/5.4 | 3.3 | 6 | BRIGHT | | | 182 | 661 |
| 19-Apr-83 | M | | 4.5 | R.2 | 6 | Coloured | | | 2203 | 748 |
| 22-Apr-83 | M | 96.5 | | 3.3 | 6 | DARK | | | 1321 | 616 |
| 22-Apr-83 | F | 71.1 | | 3.2 | 6, Bel Pol | CH 9 - 36 BPM, Bright | | | 1319 | 141 |
| 22-Apr-83 | F | 81.3 | | | | KELT | | | 0 | 628 |
| 23-Apr-83 | F | | 5.4 | | 6 | Bright | | | 181 | 727 |
| 23-Apr-83 | F | | 4.0 | | 6 | BRIGHT | | | 191 | 331 |
| 23-Apr-83 | F | 73.7 | | 3.1S1 | 6 | Slight Colour | | | 3377 | 154 |
| 23-Apr-83 | F | 78.7 | | 3.3 | 5 | Bright | | | 120 | 713 |
| 23-Apr-83 | F | 78.7 | | | 5 | CH 9 - 28 BPM | | | 1323 | 285 |
| 23-Apr-83 | F | | 5.4 | 3.3 | | BRIGHT | | | 148 | 189 |
| 23-Apr-83 | F | 76.2 | | 3.2S | 5 | Kelt, Dark | | | 3376 | 779 |
| 23-Apr-83 | F | 83.8 | | 3.3 | 6, P/L | COLORED, Age & Length on recapture 3.2S, 90cm | 6 | 15/4/84 | 1322 | 619 |
| 24-Apr-83 | F | 81.3 | | 3.2S | | | | | 1315 | 133 |
| 26-Apr-83 | F | 76.2 | | 3.3 | 5 | COLORED | | | 3378 | 625 |
| 26-Apr-83 | M | 81.3 | | R.3 | 5 | Dark | | | 3380 | 334 |
| 26-Apr-83 | F | 78.7 | | 3.2S | 6, P/L | Kelt | | | 102 | 714 |
| 26-Apr-83 | F | 88.9 | | 3.3 | 5, W/C | Bright | | | 101 | 715 |
| 26-Apr-83 | F | 83.8 | | 3.3 | 5 | Coloured | | | 3379 | 742 |
| 27-Apr-83 | F | 68.5 | 3.2 | 3.2 | 4 | BRIGHT | | | 150 | 186 |
| 28-Apr-83 | F | 83.8 | | 2.3 | 5 | | | | 3388 | 347 |
| 28-Apr-83 | M | 85 | | 3.3 | 4 | Dark | | | 3387 | 757 |
| 28-Apr-83 | F | 83.8 | | 3.3 | 4 | KELT | 4 | 3/5/83 | 3386 | 756 |
| 28-Apr-83 | M | 83.8 | | 3.3 | 4 | | | | 3385 | 755 |
| 28-Apr-83 | M | 78.7 | | 3.3 | 4 | Dark | | | 3383 | 753 |

| D/M/Y | SEX | LENGTH (cm) | WEIGHT (kg) | AGE | LOCATION TAGGED* | COMMENTS | LOCATION* RECAPTURED | DATE RECAPTURED | TAG # | DATABASE ID |
|---|---|---|---|---|---|---|---|---|---|---|
| 28-Apr-83 | F | 81.3 | | 3.3 | 4, Below M/C | Bright | | | 103 | 178 |
| 28-Apr-83 | M | 68.5 | | 2.2 | 4 | | | | 3384 | 168 |
| 28-Apr-83 | F | 81.5 | | R.3 | 5 | Cloured | | | 3389 | 759 |
| 28-Apr-83 | M | 87 | | R.3 | 4 | Scars, Kelt | | | 3381 | 340 |
| 28-Apr-83 | M | 83.8 | | 2.3 | 5 | | | | 3393 | 738 |
| 28-Apr-83 | F | 82.6 | | 3.3+ | 4 | Kelt | | | 3390 | 349 |
| 28-Apr-83 | M | 76.2 | | 3.2+ | 5 | | | | 3391 | 350 |
| 28-Apr-83 | M | 88.9 | | 3.2S1 | 4, Below Mink Cr. | Bright | | | 105 | 355 |
| 28-Apr-83 | M | 82 | | 3.3 | 5 | | | | 3392 | 737 |
| 28-Apr-83 | F | 81.3 | | 3.3 | 5 | PINK CHEEK - BRIGHT | | | 104 | 650 |
| 28-Apr-83 | F | 81.3 | | 3.3 | 4 | KELT | | | 3382 | 637 |
| 29-Apr-83 | F | 78.7 | | 3.3 | 6, P/L | BRIGHT | | | 107 | 652 |
| 01-May-83 | F | 78.7 | 5 | 3.3 | 4 | Dark | | | 2175 | 747 |
| 01-May-83 | M | 73.7 | 5.4 | 2.3 | 5 | | | | 2126 | 739 |
| 01-May-83 | F | 71.1 | | | 5 | | | | 2150 | 741 |
| 02-May-83 | F | 81.3 | 5.4 | 3.3 | 4 | Bright | | | 147 | 722 |
| 02-May-83 | M | 68.5 | 3.6 | 3.3 | 4 | Bright | | | 148 | 723 |
| 03-May-83 | F | 78.7 | | | 4 | | | | 2015 | 361 |
| 03-May-83 | M | 83.8 | 6.3 | R.3 | 4 | Dark | | | 2156 | 362 |
| 03-May-83 | F | 78.7 | 5.0 | 3.3 | LAKELSE | DARK | | | 2152 | 158 |
| 03-May-83 | M | 86.4 | 6.8 | R.2S1 | 4 | BRIGHT | | | 146 | 654 |
| 05-May-83 | M | 73.7 | | 4.2+ | 5 | | | | 3394 | 363 |
| 05-May-83 | F | 78.7 | | 4.2+ | 5 | | | | 3395 | 98 |
| 06-May-83 | F | 68.5 | | | | R. FRESH | | | 2166 | 123 |
| 06-May-83 | F | 68.5 | 3.2 | | | | | | 2162 | 124 |
| 06-May-83 | M | 83.8 | 6.3 | | | | | | 2167 | 125 |
| 11-May-83 | M | 81.3 | 6.3 | | 6 | KELT | | | 196 | 663 |
| 11-May-83 | F | 63.5 | 2.7 | | 6 | KELT | | | 198 | 664 |

| D/M/Y | SEX | LENGTH (cm) | WEIGHT (kg) | AGE | LOCATION TAGGED* | COMMENTS | LOCATION* RECAPTURED | DATE RECAPTURED | TAG # | DATABASE ID |
|---|---|---|---|---|---|---|---|---|---|---|
| 11-May-83 | M | 88.9 | 8.2 | | 6 | | | | 184 | 665 |
| 16-Oct-83 | M | 78.7 | 5.9 | 4.2+ | 2 | Bright | 1 | 19/3/84 | 254 | 669 |
| 28-Oct-83 | F | | 3.6 | 2.3 | 1 | | 2 | 13/12/83 | 2142 | 2 |
| 03-Nov-83 | M | 97 | 10 | 3.3 | 2 | Fresh run | | | 2158 | 366 |
| 04-Nov-83 | F | 63.5 | | 3.2 | 2 | | | | 3396 | 5 |
| 04-Nov-83 | F | 63.5 | | | 2 | | | | 3346 | 876 |
| 04-Nov-83 | M | 83.8 | 6.4 | 3.4 | 1 | R-FW | 2 | 23/11/83 | 205 | 524 |
| 07-Nov-83 | M | 91.4 | | 3.3 | 2 | | | | 207 | 7 |
| 07-Nov-83 | M | 85.1 | | 3.3 | 1 | | | | 206 | 526 |
| 07-Nov-83 | F | 77.4 | | 3.3 | 2 | BRIGHT | | | 3397 | 528 |
| 07-Nov-83 | F | 80 | | 3.3 | 2 | | | | 3398 | 878 |
| 08-Nov-83 | M | 91.4 | | 3.4 | 2 | | 2 | 4/1/84 | 208 | 673 |
| 08-Nov-83 | F | 77.5 | | 3.3 | 2 | | 2 | 23/11/83 | 3399 | 11 |
| 09-Nov-83 | F | 81.3 | 5.9 | 3.3 | 2 | | | | 2226 | 533 |
| 09-Nov-83 | F | 65 | | 3.2 | 2 | Looks Winter | 2 | 2/1/84 | 209 | 374 |
| 09-Nov-83 | M | 76.2 | | R.3 | 4 | | | | 210 | 535 |
| 09-Nov-83 | F | 76.2 | | 3.3 | 2 | | 2 | 23/11/83 | 3400 | 532 |
| 10-Nov-83 | F | 69.9 | | | 2 | | | | 2232 | 536 |
| 10-Nov-83 | F | 78.7 | | 3.2 | 2 | AGE S1 | | | 2227 | 17 |
| 10-Nov-83 | F | 69.9 | | 3.3 | | | | | 2282 | 16 |
| 13-Nov-83 | F | 81.3 | 6.8 | 3.2S1 | | WINTER FISH | | | 0 | 21 |
| 13-Nov-83 | F | 81.3 | 6.8 | | | | | | 0 | 541 |
| 13-Nov-83 | F | 81.3, 76.2 | 5.4, 5.0 | 3.3 | 2 | | | | 2169 | 540 |
| 13-Nov-83 | F | 81.3 | 5.4 | R.2S1 | 1 | Recap fr 82 - Wht tag/retagged | | | 2157 | 18 |
| 13-Nov-83 | F | 81.3 | 5.4 | R.3 | 1 | | | | 2154 | 20 |
| 18-Nov-83 | F | 76.2 | | 3.3 | 1 | BRIGHT, Winter | | | 2233 | 542 |
| 19-Nov-83 | F | 66.0 | 2.9 | 3.2 | 2 | WINTER, BRIGHT | | | 2424 | 23 |
| 20-Nov-83 | M | 71.1 | 4.5 | 3.3 | 1 | WINTER, BRIGHT | 1 | 27/12/83 | 192 | 24 |

| D/M/Y | SEX | LENGTH (cm) | WEIGHT (kg) | AGE | LOCATION TAGGED* | COMMENTS | LOCATION* RECAPTURED | DATE RECAPTURED | TAG # | DATABASE ID |
|---|---|---|---|---|---|---|---|---|---|---|
| 20-Nov-83 | M | 86.4 | 6.4 | 3.3 | 1 | SUMMER, DARK | | | 291 | 25 |
| 22-Nov-83 | F | 80 | | 3.3 | 1 | Winter | | | 211 | 549 |
| 22-Nov-83 | M | 88.9 | | R.4 | 1 | SUMMER | | | 212 | 30 |
| 22-Nov-83 | F | 78.7 | | 3.3 | 1 | Winter | | | 2234 | 889 |
| 22-Nov-83 | F | 76.2 | | 3.3 | 2 | | | | 2402 | 891 |
| 22-Nov-83 | F | 77.5 | | 3.3 | 2 | WINTER | | | 2401 | 27 |
| 23-Nov-83 | M | 80 | | 3.1S1 | 1 | | | | 231 | 551 |
| 23-Nov-83 | M | 61 | | 3.2 | 1 | | | | 2403 | 892 |
| 23-Nov-83 | F | 86.4 | 6.4 | 3.3 | 2 | Summer | | | 2155 | 894 |
| 23-Nov-83 | F | 78.7 | | 3.3 | 2 | | | | 2404 | 893 |
| 26-Nov-83 | M | 83.8 | 5.2 | 3.3 | | SUMMER, BRIGHT | | | 0 | 35 |
| 26-Nov-83 | M | 83.8 | 5.2 | | | BRIGHT | | | 0 | 555 |
| 27-Nov-83 | F | 76 | 5.0 | 3.1S1 | 1 | Bright | | | 122 | 403 |
| 27-Nov-83 | M | 76 | 4.5 | R.3 | 1 | | 1 | 8/3/84 | 2432 | 399 |
| 27-Nov-83 | F | 76 | 4.8 | | 1 | | | | 125 | 402 |
| 05-Dec-83 | F | 85 | | | 2, L/C | CH 13 - 72 BPM, BRIGHT | | | 1730 | 411 |
| 05-Dec-83 | M | 76.2 | | 3.3 | 2 | Winter | 2 | 10/12/83 | 232 | 682 |
| 05-Dec-83 | M | 81 | | 3.3 | 2 | Summer | | | 233 | 388 |
| 05-Dec-83 | M | 86.4 | | 3.1S1 | 2 | SUMMER | | | 234 | 41 |
| 05-Dec-83 | F | 81.3 | | 4.3 | LAKELSE | RADIO TAG; CH 7, Summer Run, Bright | | 8/3/84 - SEINE | 1728 | 896 |
| 10-Dec-83 | F | 75 | | | 2 | | | | 2405 | 404 |
| 10-Dec-83 | F | 62.3 | | | Lakelese | NO SCALES, CH 8 - 52 BPM | | | 1726 | 46 |
| 10-Dec-83 | F | 62 | | | 1 | Radio | | | 1727 | 412 |
| 10-Dec-83 | M | 86 | | 3.3 | 2 | Dark | | | 2436 | 405 |
| 13-Dec-83 | F | 90.2 | 8.2 | 3.4 | 1 | | | | 2437 | 901 |
| 13-Dec-83 | M | 83.8 | | | 2 | | | | 2438 | 495 |
| 13-Dec-83 | F | 77.5 | | 4.3 | 2 | | | | 2439 | 102 |
| 16-Dec-83 | F | 63.5 | | 4.2 | 2 | | 1 | 12/1/84 | 2440 | 103 |

| D/M/Y | SEX | LENGTH (cm) | WEIGHT (kg) | AGE | LOCATION TAGGED* | COMMENTS | LOCATION* RECAPTURED | DATE RECAPTURED | TAG # | DATABASE ID |
|---|---|---|---|---|---|---|---|---|---|---|
| 31-Dec-83 | F | 77.0 | | | 2 | | | | 2443 | 106 |
| 31-Dec-83 | F | 84 | | | 2 | | | | 2442 | 499 |
| 31-Dec-83 | F | 80 | | | 1 | | | | 2441 | 498 |
| 02-Jan-84 | F | 89 | | | 2 | | | | 2477 | 509 |
| 02-Jan-84 | F | 88 | | | 2 | | | | 2447 | 911 |
| 02-Jan-84 | F | 83.0 | | | 2 | | 1 | 12/1/84 | 2449 | 112 |
| 02-Jan-84 | M | 67.0 | | | 2 | | | | 2446 | 109 |
| 02-Jan-84 | M | 90 | | | 2 | | | | 2476 | 508 |
| 02-Jan-84 | F | 78 | | | 2 | | | | 2450 | 507 |
| 02-Jan-84 | M | 88 | | | 2 | | 2 | 2/1/84 | 2448 | 505 |
| 02-Jan-84 | M | 93 | | | 2 | RECAP | 2 | 2/1/84 | 2445 | 909 |
| 02-Jan-84 | M | 73 | | | 1 | Dark | | | 2444 | 908 |
| 04-Jan-84 | M | 61 | | | 1 | TAG FOUND IN LAKELSE R. 21/6/84 | | | 2478 | 510 |
| 04-Jan-84 | F | 83 | | | 2 | | | | 2480 | 512 |
| 04-Jan-84 | M | 82 | | | 1 | RECAPTURE - SEINE | 1 | 8/3/84 | 2481 | 513 |
| 04-Jan-84 | F | 79 | | | 2 | | | | 2479 | 858 |
| 06-Jan-84 | M | 84.0 | | | 2 | | 2 | 12/1/84 | 2482 | 120 |
| 06-Jan-84 | M | 86.0 | 6.8 | 4.3 | 2, E.R. | | | | 235 | 75 |
| 06-Jan-84 | F | 87.0 | | | 2, E.R. | | | | 236 | 122 |
| 12-Jan-84 | F | 82 | | 3.3 | 1 | | | | 2483 | 862 |
| 12-Jan-84 | F | 79 | | 4.3 | 1 | | | | 2484 | 863 |
| 09-Mar-84 | M | | 5.4 | 3.3 | 1 | | | | 2211 | 66 |
| 09-Mar-84 | M | 78.7 | 5.2 | 3.3 | 1 | | | | 2218 | 67 |
| 09-Mar-84 | M | 79 | | | 1 | | | | 2118 | 446 |
| 11-Mar-84 | F | 82 | 5.4 | R.1S1 | 1 | | | | 2219 | 445 |
| 12-Mar-84 | M | 84-73.7 | 5.9 | 3.3 | 1 | | | | 2224 | 844 |
| 13-Mar-84 | F | 71.1 | 3.6 | 4.3 | 4 | | | | 2213 | 459 |
| 19-Mar-84 | M | 70 | 3.6 | 3.1S1 | 4 | | | | 2222 | 460 |

| D/M/Y | SEX | LENGTH (cm) | WEIGHT (kg) | AGE | LOCATION TAGGED* | COMMENTS | LOCATION* RECAPTURED | DATE RECAPTURED | TAG # | DATABASE ID |
|---|---|---|---|---|---|---|---|---|---|---|
| 19-Mar-84 | F | 81.3 | 5.4 | 3.1S | 4 | Kelt, See raW DATA FOR AGE | | | 2210 | 867 |
| 20-Mar-84 | F | 71.1 | 3.2 | 4.2 | 4 | | | | 2223 | 461 |
| 06-Apr-84 | F | 94.0 | 6.8 | 4.2SS | 4 | Kelt 1/2 spawned | Lakelse River | 23/4/85 | 277 | 70 |
| 11-Apr-84 | M | 81.0 | | | 6 | | | | 127 | 93 |
| 11-Apr-84 | M | 91 | 7.7 | 3.2S1 | 4 | | | | 2161 | 845 |
| 14-Apr-84 | M | 73.7 | 3.6 | 3.1SS | 4 | Kelt | | | 112 | 695 |
| 20-Apr-84 | F | 91.3/81.3 | 5.0 | 4.3 | 4 | | | | 109 | 692 |
| 20-Apr-84 | F | 81.3 | 5.0 | 4.2S1 | 4 | | | | 110 | 693 |
| 20-Apr-84 | M | 83 | | | 6 | | | | 174 | 699 |
| 20-Apr-84 | M | 71.1 | 3.6 | 4.1S1 | 4 | Dark | | | 229 | 439 |
| 20-Apr-84 | F | 81 | 6.4 | 3.2S1 | 4 | Bright | | | 2434 | 847 |
| 20-Apr-84 | F | 86 | 6.8 | 4.2S1 | 4 | | | | 2433 | 846 |
| 20-Apr-84 | F | 69.0 | | 4.2 | 6 | | | | 183 | 91 |
| 20-Apr-84 | F | 86.4/87.7 | 5.4 | 3+.2S1 | 4 | | | | 111 | 97 |
| 20-Apr-84 | M | 83.0 | | 3.3 | 6 | | | | 179 | 92 |
| 21-Apr-84 | M | 73.0 | | 3.2 | 6 | | | | 2488 | 58 |
| 21-Apr-84 | M | 86 | | 3+.3 | 6 | | 5 | 23/4/84 | 2494 | 469 |
| 21-Apr-84 | F | 87 | | 3.2S1 | 5 | | | | 114 | 696 |
| 21-Apr-84 | M | | | | 4 | | | | 230 | 438 |
| 21-Apr-84 | F | 79.0 | | 4.3 | 5 | | | | 115 | 94 |
| 21-Apr-84 | M | 69.0 | | 3.2 | 6 | | | | 2487 | 57 |
| 21-Apr-84 | F | | 3.2 | | | | | | 228 | 448 |
| 21-Apr-84 | F | 83 | | 4.2S1 | 5 | | | | 2486 | 835 |
| 21-Apr-84 | M | 68.0 | | 4.2 | 5 | | | | 2490 | 52 |
| 23-Apr-84 | F | 80.0 | | 4.2 | tree farm | RADIO TAG: CH 9 OR 10 | | | 1732 | 64 |
| 23-Apr-84 | M | 85 | | 3.3 | 5 | | | | 2489 | 836 |
| 23-Apr-84 | F | 86.4 | 5.9 | 4.3 | 4 | Dark | | | 2426 | 76 |
| 23-Apr-84 | F | 81 | | 4.3 | 6 | CH 9 | | | 1736 | 866 |

| D/M/Y | SEX | LENGTH (cm) | WEIGHT (kg) | AGE | LOCATION TAGGED* | COMMENTS | LOCATION* RECAPTURED | DATE RECAPTURED | TAG # | DATABASE ID |
|---|---|---|---|---|---|---|---|---|---|---|
| 23-Apr-84 | M | 86.4 | 6.5 | 3.3 | 3 | Canyon | | | 2491 | 101 |
| 23-Apr-84 | F | 76.2 | | | Lakelse | | | | 2204 | 470 |
| 24-Apr-84 | F | 84 | 5.9 | 4.3 | 4 | | | | 2420 | 849 |
| 25-Apr-84 | M | 79 | 5 | | 4 | | | | 2163 | 850 |
| 25-Apr-84 | M | 78.7 | 5.0 | 4.2 | | | | | 2160 | 78 |
| 25-Apr-84 | M | 76.2 | 4.5 | 3.2 | 4 | | | | 128 | 79 |
| 26-Apr-84 | F | 80.0 | | 3.3 | 6 | RADIO TAG; CH 10, 33 BPM | | | 1734 | 90 |
| 26-Apr-84 | M | 67 | | 3.2 | 5 | | | | 2496 | 423 |
| 26-Apr-84 | M | 69 | | 4.2 | 5 | | | | 2495 | 853 |
| 26-Apr-84 | F | 92 | | 3.4 | 5 | | | | 2497 | 422 |
| 27-Apr-84 | F | 83.8 | 5.0 | 3.2SS | 4 | Kelt | | | 279 | 83 |
| 27-Apr-84 | F | 69 | 3.4 | 3.2S | 4 | Kelt | | | 285 | 426 |
| 28-Apr-84 | F | 92 | 6.8 | 2.2S | 4 | Kelt | | | 294 | 427 |
| 29-Apr-84 | M,F | 72-79 | 4.5 | 3.3 | 4 | | | | 282 | 705 |
| 03-May-84 | M | 72.0 | | 3.2 | 4 | | | | 2498 | 87 |
| 04-May-84 | F | 76.2 | 4.5 | 4.3 | 5 | | | | 129 | 474 |
| 15-May-84 | F | 81.3 | | 4.2S1 | 4 | | | | 2499 | 473 |

# Appendix C. Steelhead Harvest Analysis Data

Source: MELP 1996a

| FISCAL YEAR | ANGLERS | DAYS FISHED | WILD KEPT | WILD RELEASED | HATCHERY KEPT | HATCHERY RELEASED | TOTAL KEPT | TOTAL RELEASED | TOTAL CATCH |
|---|---|---|---|---|---|---|---|---|---|
| 67-68 | 757 | 4191 | 1115 | 0 | 0 | 0 | 1115 | 0 | 1115 |
| 68-69 | 616 | 3658 | 690 | 0 | 0 | 0 | 690 | 0 | 690 |
| 69-70 | 771 | 4071 | 531 | 0 | 0 | 0 | 531 | 0 | 531 |
| 70-71 | 644 | 3606 | 365 | 338 | 0 | 0 | 365 | 338 | 703 |
| 71-72 | 421 | 2040 | 185 | 181 | 0 | 0 | 185 | 181 | 366 |
| 72-73 | 356 | 1501 | 179 | 81 | 0 | 0 | 179 | 81 | 260 |
| 73-74 | 457 | 2525 | 315 | 225 | 0 | 0 | 315 | 225 | 540 |
| 74-75 | 394 | 2341 | 253 | 190 | 0 | 0 | 253 | 190 | 443 |
| 75-76 | 483 | 3098 | 284 | 413 | 0 | 0 | 284 | 413 | 697 |
| 76-77 | 521 | 2689 | 267 | 249 | 0 | 0 | 267 | 249 | 516 |
| 77-78 | 512 | 2730 | 182 | 400 | 0 | 0 | 182 | 400 | 582 |
| 78-79 | 514 | 3501 | 186 | 456 | 0 | 0 | 186 | 456 | 642 |
| 79-80 | 414 | 2037 | 51 | 274 | 0 | 0 | 51 | 274 | 325 |
| 80-81 | 286 | 1355 | 81 | 245 | 0 | 0 | 81 | 245 | 326 |
| 81-82 | 403 | 2281 | 127 | 941 | 0 | 9 | 127 | 950 | 1077 |
| 82-83 | 430 | 2857 | 173 | 651 | 0 | 0 | 173 | 651 | 824 |
| 83-84 | 453 | 2995 | 200 | 782 | 0 | 8 | 200 | 790 | 990 |
| 84-85 | 524 | 2994 | 203 | 1241 | 0 | 21 | 203 | 1262 | 1465 |
| 85-86 | 508 | 3001 | 187 | 1317 | 7 | 16 | 194 | 1333 | 1527 |
| 86-87 | 565 | 3395 | 164 | 1674 | 6 | 29 | 170 | 1703 | 1873 |
| 87-88 | 552 | 3551 | 170 | 2213 | 4 | 11 | 174 | 2224 | 2398 |
| 88-89 | 614 | 3240 | 305 | 1489 | 21 | 37 | 326 | 1526 | 1852 |
| 89-90 | 745 | 4691 | 218 | 1795 | 17 | 62 | 235 | 1857 | 2092 |
| 90-91 | 466 | 2570 | 168 | 1108 | 0 | 19 | 168 | 1127 | 1295 |
| 91-92 | 371 | 2006 | 158 | 908 | 3 | 47 | 161 | 955 | 1116 |

| FISCAL YEAR | ANGLERS | DAYS FISHED | WILD KEPT | WILD RELEASED | HATCHERY KEPT | HATCHERY RELEASED | TOTAL KEPT | TOTAL RELEASED | TOTAL CATCH |
|---|---|---|---|---|---|---|---|---|---|
| 92-93 | 350 | 1708 | 28 | 954 | 6 | 34 | 34 | 988 | 1022 |
| 93-94 | 226 | 1642 | 16 | 840 | 0 | 31 | 16 | 871 | 887 |
| 94-95 | 209 | 879 | 9 | 458 | 0 | 12 | 9 | 470 | 479 |
| 95-96 | 280 | 1418 | 9 | 591 | 0 | 2 | 9 | 593 | 602 |