

**1998 TOBOGGAN CREEK  
STEELHEAD ASSESSMENT**

by

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Skeena Fisheries Report SK-118

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## **ABSTRACT**

The fish counting fence on Toboggan Creek near Smithers, B.C. was in operation from April 7 to June 23, 1998 for steelhead enumeration; this is the sixth consecutive year of operation. Stream discharge and water temperature, fish length, sex, and age data were collected and fish tagged as part of a mark-recapture program. A population estimate of 377 adult steelhead above the fence was calculated based on the tagging program. Female fish were found to be significantly larger than males in this year, and a trend of decreasing size over time is suggested by the historic and present data. The sex ratio indicates that, for the first time since sampling began, females outnumber males. The 1998 data are compared with the previous five years and recommendations regarding future sampling are presented.

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# 1. INTRODUCTION

## 1.1 Background

Toboggan Creek is a small system draining into the Bulkley River west of Smithers, B.C. and is one of three systems in the mid- and upper Skeena watershed with a fish counting fence utilized for steelhead assessment located on it (the others being the Sustut and Babine rivers). Prior to 1993, assessment of the steelhead trout (*Oncorhynchus mykiss*) population in Toboggan Creek watershed was limited (see O'Neill 1995, 1996; Gibson 1997). The Toboggan Creek counting fence was first operated for steelhead in 1978 (D. Atagi, pers. comm., Jan. 1999) though it has been in operation for coho salmon (*Oncorhynchus kisutch*) since 1989 (SKR Consultants 1996). Since 1993 steelhead population estimates based on fence counts have ranged from 120 - 505 with most of the estimates being in the range of 200-400 individuals.

1998 was the sixth consecutive year of adult steelhead enumeration via fence counts on Toboggan Creek. This document details the findings of 1998, and also summarizes the previous five years in order to determine trends and place this years results in context. Funding and support for this project was provided by the Habitat Conservation Trust Fund.

## 1.2 Objectives

The objectives of this project were to:

- 1) Estimate the size of the adult steelhead population utilizing Toboggan Creek above the fish counting fence by a mark-recapture procedure.
- 2) Document run timing of steelhead to Toboggan Creek in 1998.
- 3) Collect information on size, sex ratio, age and life histories (via scales).



## 2. STUDY AREA

Toboggan Creek is 17 km long, draining north into the Bulkley River 23 km north-northwest of Smithers, B.C. (Gibson 1997). There are numerous tributaries contributing to the mainstem, draining an area of approximately 110 km<sup>2</sup> (Tredger 1979). The stream originates from twin glaciers on Hudson Bay Mountain and is located within two Biogeoclimatic zones; the Englemann Spruce-Subalpine Fir, wet-very cold (ESSFwv) at higher elevations and the Interior Cedar Hemlock moist-cold (ICHmc) lower down (Gibson 1997). The stream flows largely through agricultural land and pasture leases in the reaches below Toboggan Lake. The creek is also paralleled on the west side by the Canadian National (CN) rail tracks.

Toboggan Creek supports rainbow/steelhead trout (*Oncorhynchus mykiss*), cutthroat trout (*O. clarki clarki*), coho salmon (*O. kisutch*), pink salmon (*O. gorbuscha*), kokanee (*O. nerka*), Dolly Varden char (*Salvelinus malma*), Mountain whitefish (*Prosopium williamsoni*), lamprey (*Lampetra* sp.) and sculpins (*Cottus* sp.) (SKR Consultants 1996; Gibson 1997). There is an estimated 17 km of available fish habitat in the system distributed between the mainstem and tributaries (Tredger 1979).

The fish counting fence on Toboggan Creek is located approximately 2.5 km upstream of the confluence with the Bulkley River (SKR Consultants 1996); the property surrounding this location of the stream is owned by Mr. K. Landrock.

### 3. METHODS

#### 3.1 Physical

##### Stream flow

Stream height (m) was recorded daily by use of a staff gauge adjacent to the Toboggan Creek Fish Hatchery. This was converted to discharge (Litres per minute [L/min.]) using the function:

$$\text{Discharge (L/min)} = H_{\text{staff}} * (700 \text{ L} * \text{min}^{-1} \text{ per cm})$$

Where  $H_{\text{staff}}$  = height on staff gauge (cm)

$\text{L} * \text{min}^{-1} \text{ per cm}$  = discharge (Litres/minute) per cm on staff gauge

##### Temperature

Daily morning and afternoon temperatures were recorded ( $^{\circ}\text{C}$ ) in Toboggan Creek using an alcohol thermometer at a station adjacent to the Toboggan Creek Fish Hatchery. For purpose of this analysis, mean daily temperature was determined by averaging these morning and afternoon temperatures for each day.

#### 3.2 Biological

Operation of the counting fence began on April 7, 1998 and continued until June 23, 1998. There were four interruptions in which the fence was laid down due to high stream flows (Figure 1); these were April 30-May 1 (16 hours), May 2 - May 3 (12

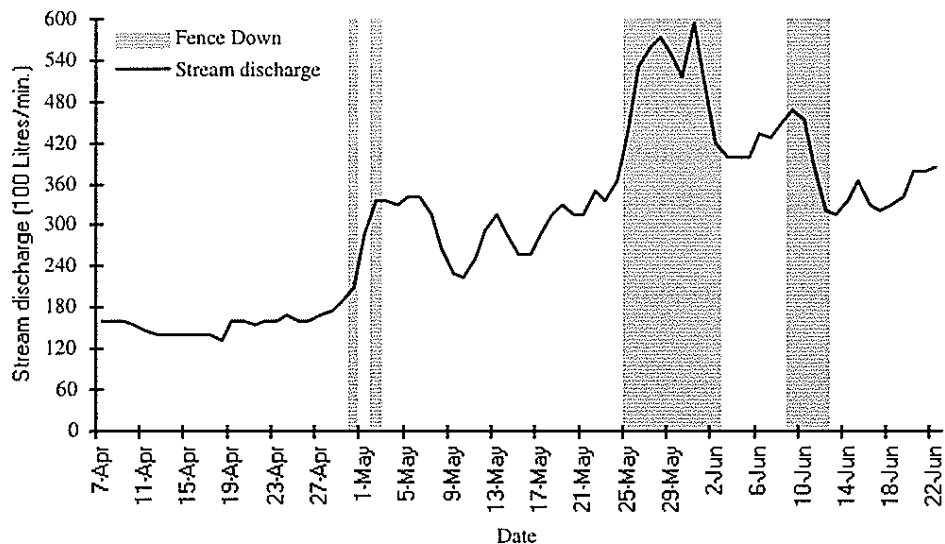


Figure 1. Periods of fence being laid down compared with stream discharge, Toboggan Creek, April 7 - June 22, 1998. See also Figure 2 for stream discharge.

hours), May 25-June 3 (9 days), and June 9 - June 11 (44 hours). Reported fish numbers in this report appearing to fall near or within these dates were from sampling immediately prior to laying the fence down. While the fence was operational, fish travelling upstream were captured in the box at the fence and tagged by insertion of a Floy anchor tag in the right dorsal muscle and secondarily marked by punching a small disc out of the right operculum. Tag number, fish sex (female vs male), origin (hatchery vs wild) and fork length (mm) were recorded, previous tags noted, and unusual scarring (i.e. gill net marks, seal bites, etc.) visually noted and recorded. Scale samples were taken for aging from the first 100 fish then approximately every third one after that, and the operculum punch retained from selected fishes for DNA analysis.

Downstream migrating kelts were beach seined above the fence (May 11 - June 23). Previously marked fish (those marked on the upstream migration) were recorded and released below the fence. Unmarked fish were anchor tagged, measured, and origin and unusual scarring noted. All fish were examined for tag loss and secondary marks (i.e., operculum punch).

### 3.3 Population Estimation Procedure

The Seber (1982) estimator of the Petersen method was used to estimate population size, and large sample binomial 95% Confidence Intervals were calculated. The Seber Estimator is (from Krebs 1989):

$$N' = \frac{((M+1)(C+1))}{(R+1)} - 1$$

Where  $N'$  = Estimate of population size at time of marking

$M$  = Number of individuals marked in first sample

$C$  = Total number of individuals captured in second sample

$R$  = Number of individuals in second sample that are marked

The large sample binomial 95% Confidence Intervals are calculated as (from Krebs 1989):

$$CI = R/C \pm Z_{\alpha/2} \left[ \frac{(R/C)(1-R/C)}{(C-1)} \right]^{0.5}$$

Where  $CI$  = Confidence Interval

$R, C$  = as above

$Z_{\alpha/2}$  = Standard normal deviate for  $(1-\alpha)$  level of confidence;

(1.96 at  $\alpha = 0.05$ )

Absolute confidence interval values are calculated for lower and upper values as:

$$N'' = (1/CI) * M$$

Where  $N''$  = Lower (upper) 95% Confidence Interval of population estimate

$R, C, M$  = as above

### 3.4 Other Statistical Procedures

Steelhead fork length for 1998 was assessed for probability that it comes from a normal distribution using histograms and normal probability plots using SYSTAT 5.0. It was determined that these measurements were not sufficiently normally distributed for parametric analysis to be used, and so the Wilcoxon Signed Rank test was used to test for differences in fork length between male and female fish for 1998. The Wilcoxon test is never very much less efficient than the parametric *t*-test and may be much more efficient if the underlying distribution is far from normal (DeVore 1987).

Despite the violation of Normality, 95% Confidence Intervals for fork length were still calculated via the parametric approach, that is (from DeVore 1987):

$$\text{mean value} \pm z_{\alpha/2} * s / n^{0.5}$$

Where:  $Z_{\alpha/2}$  = Standard normal deviate for (1- $\alpha$ ) level of confidence;

1.96 at  $\alpha = 0.05$ )

s = sample standard deviation

n = sample size

The use of the parametric approach was for ease of use, provision of comparability with other studies, and use of complex non-parametric approach is thought to not greatly affect estimated final values.

## 4. RESULTS AND DISCUSSION

### 4.1 Stream Flow and Water Temperature

#### Stream flow

Discharge in Toboggan Creek over the time of sampling ranged from 13,300 L/min. to 59,500 L/min (Figure 2, Appendix A). Discharge was low prior to April 30<sup>th</sup>, rose relatively steadily between April 30 and May 31, then declined, with occasional spikes, for the remainder of the sampling period. These high flows, and the rate at which the stream flow increased, created periods of hydraulic risk to the fence, and so it was lowered during these periods (Figure 1).

#### Stream temperature

Toboggan Creek stream temperature ranged from 2.5 to 12.5 °C and displayed a general increasing trend over the period of sampling (Figure 2, Appendix A). The mean stream temperature on the day of initiation of the upstream migration was 5.25 °C.

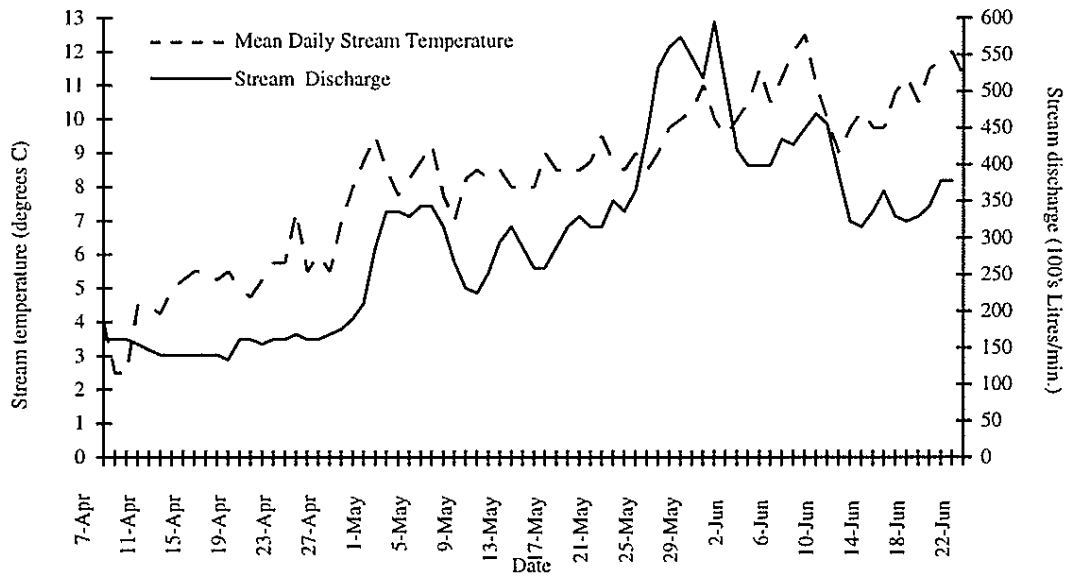


Figure 2. Stream temperature and estimated discharge of Toboggan Creek, April 7 - June 22, 1998.

## 4.2 Run Timing

The first steelhead to pass upstream through the fence were sampled on April 21, 1998 (2 males, 2 females) and the last date of fish passing upstream was May 25 (4 males, 5 females). Thus, the fish were passing upstream over a period of 35 days. There was an early peak in number of fish passing between April 21 and April 25 (17 fish passed) with the majority (90%) of the estimated run having passed through by May 17 (Table 1, Figures 3 and 4, Appendix B). The upstream run of steelhead appears to have been complete by the time of spring high flows (Figures 4 and 5). However, the fence

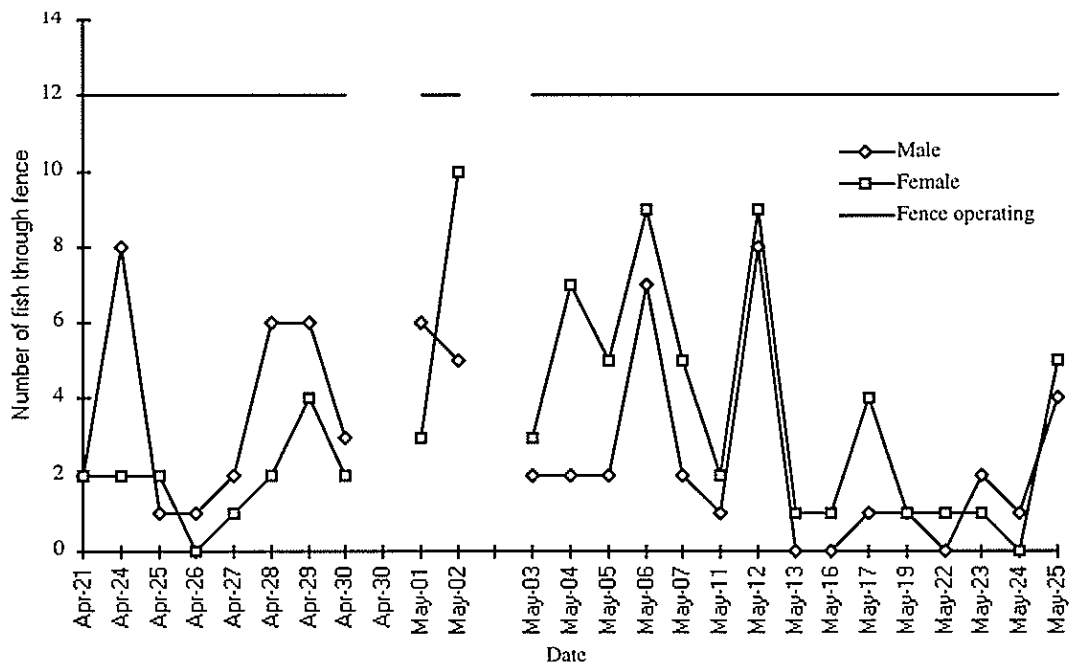
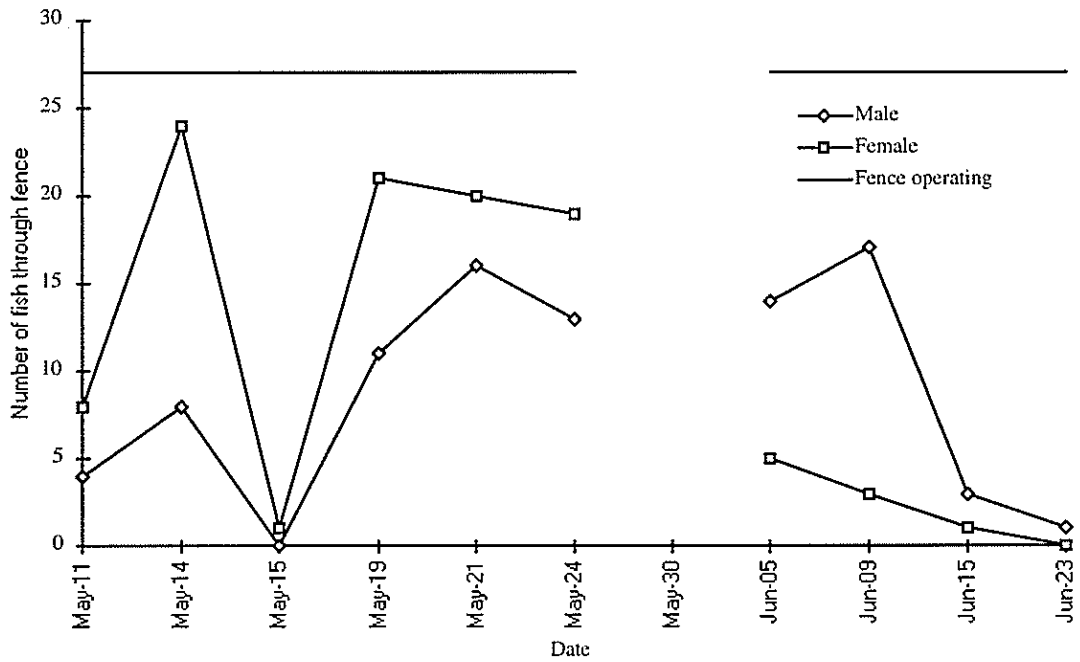


Figure 3. Number of steelhead passing upstream (upper) and downstream (lower) through fence by date.



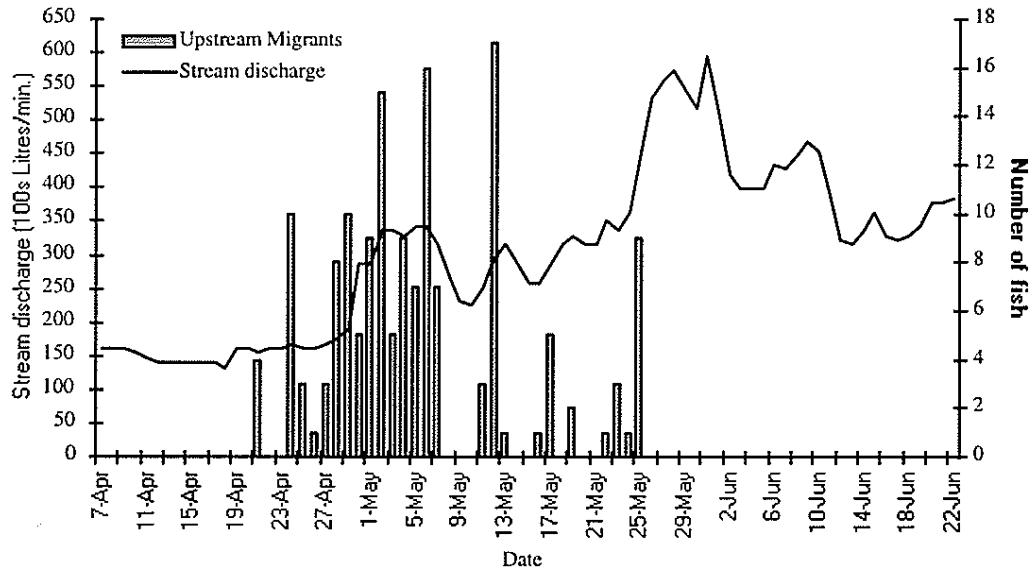


Figure 4. Stream discharge and steelhead passage upstream (scaled to match discharge) Toboggan Creek, April 7 - June 22, 1998.

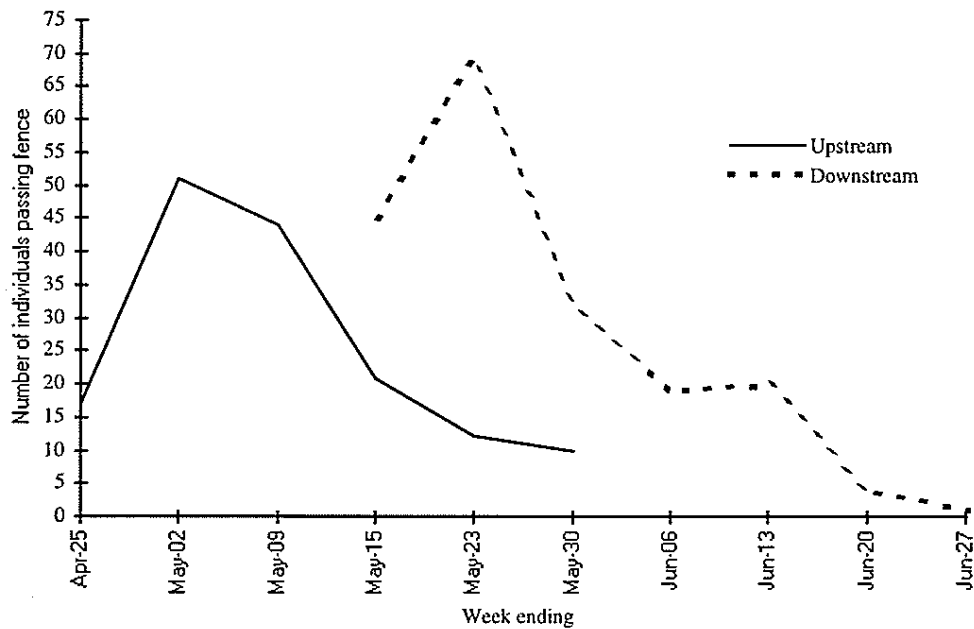


Figure 5. Run timing of steelhead upstream and downstream past Toboggan Creek counting fence, for weeks ending April 25-June 27, 1998

was laid down for nine days at this point so determination of how many fish moved upstream during the high flow period is not possible, though it appears that the run was declining by this point. Six days of fence operation after the peak flows indicated no further upstream migration (Figures 1 and 5).

Returning downstream, the first fish were placed over the fence on May 11 (4 males, 8 females) and the last fish was June 23 (1 male). The duration of downstream passage was 44 days. The primary peak in numbers of fish returning downstream occurred between the weeks ending May 16 - May 30 (i.e., May 16 - May 24), with a secondary peak during the week ending June 13 (Table 1, Figures 3 and 5, Appendix C). The majority of the run (90%) downstream had passed by June 5 - 9.

Male steelhead in Toboggan Creek move upstream prior to females and return downstream later than females. The majority (90%) of the males were upstream by May 15, females by May 23. Returning downstream, 90% of the males were passed by June 13 while 90% of the females had passed by May 30. This indicates the males may spend as much as 3 weeks longer than the females on the spawning grounds.

Table 1. Weekly steelhead movement upstream and downstream in Toboggan Creek April 7 - June 27, 1998. (Percentage of run in brackets).

| Week ending  | UPSTREAM  |           |            | DOWNSTREAM |            |            |
|--------------|-----------|-----------|------------|------------|------------|------------|
|              | Male      | Female    | Total      | Male       | Female     | Total      |
| April 25     | 11 (15.0) | 6 (7.3)   | 17 (11.0)  |            |            |            |
| May 2        | 29 (39.7) | 22 (26.8) | 51 (32.9)  |            |            |            |
| May 9        | 15 (20.5) | 29 (35.3) | 44 (28.4)  |            |            |            |
| May 15       | 9 (12.3)  | 12 (14.6) | 21 (13.5)  | 12 (13.6)  | 33 (32.3)  | 45 (23.7)  |
| May 23       | 4 (5.5)   | 8 (9.7)   | 12 (7.7)   | 28 (31.8)  | 41 (40.2)  | 69 (36.3)  |
| May 30       | 5 (6.8)   | 5 (6.1)   | 10 (6.4)   | 13 (14.8)  | 19 (18.6)  | 32 (16.8)  |
| June 6       |           |           |            | 14 (15.9)  | 5 (4.9)    | 19 (10)    |
| June 13      |           |           |            | 17 (19.3)  | 3 (2.9)    | 20 (10.5)  |
| June 20      |           |           |            | 3 (3.4)    | 1 (1.0)    | 4 (2.1)    |
| June 27      |           |           |            | 1 (1.1)    | 0          | 1 (0.5)    |
| <b>Total</b> | <b>73</b> | <b>82</b> | <b>155</b> | <b>88</b>  | <b>102</b> | <b>190</b> |

### 4.3 Population Estimate and Confidence Interval

The 1998 steelhead population estimate for Toboggan Creek above the fish counting fence is 377 fish, with the 95% confidence intervals bracketing the range of 323-456 individuals (Table 2). There were 155 individuals marked migrating upstream (M), and of 190 passing downstream (C), 78 were tagged (R) including three that lost their tags (evident by the operculum punch). The sex ratio of the population is estimated at 1.19:1, female:male (i.e. 1.19 females/male). Figures 6 and 7 and Table 2 illustrate the current population estimate and female to male ratio together with historic estimates since 1993 (historic data from O'Neill 1994, 1995, 1996; O'Neill unpublished data 1993, 1997).

Table 2. Population estimates, with 95 % Confidence Intervals, and female to male ratio for Toboggan Creek, 1993-1998.

| Year | Population estimate<br>(95% confidence intervals) | Female:Male ratio |
|------|---|-------------------|
| 1993 | 435 <sup>a</sup>                                  | 0.775             |
| 1994 | 237 (201 - 288)                                   | 0.977             |
| 1995 | 330 (296 - 370)                                   | 0.538             |
| 1996 | 120 (103 - 147)                                   | 0.818             |
| 1997 | 543 (363 - 1482) <sup>b</sup>                     | 0.724             |
| 1998 | 377(323 - 456)                                    | 1.19              |

<sup>a</sup> 1993 did not involve a recapture phase, estimate is based on visual observation of tagged to untagged above fence.

<sup>b</sup> 1997 estimate based on small sample size of marked (M = 43, R = 10) relative to unmarked (C = 135), thus inflating the 95% confidence intervals

Toboggan Creek has supported up to 550 steelhead spawners upstream of the counting fence during the 1990's. Spawning below the fence is known to occur but has not been quantified as yet.

The sex ratio of the fish has ranged from 0.54 females to males to 1.19. Interestingly, 1998 is the first year that females numbers have exceeded males though in 1994 they were equal (Figure 7). This demonstrates a great degree of variability in female:male ratios. Over the six years of record, the mean ratio is 0.842 females to males.

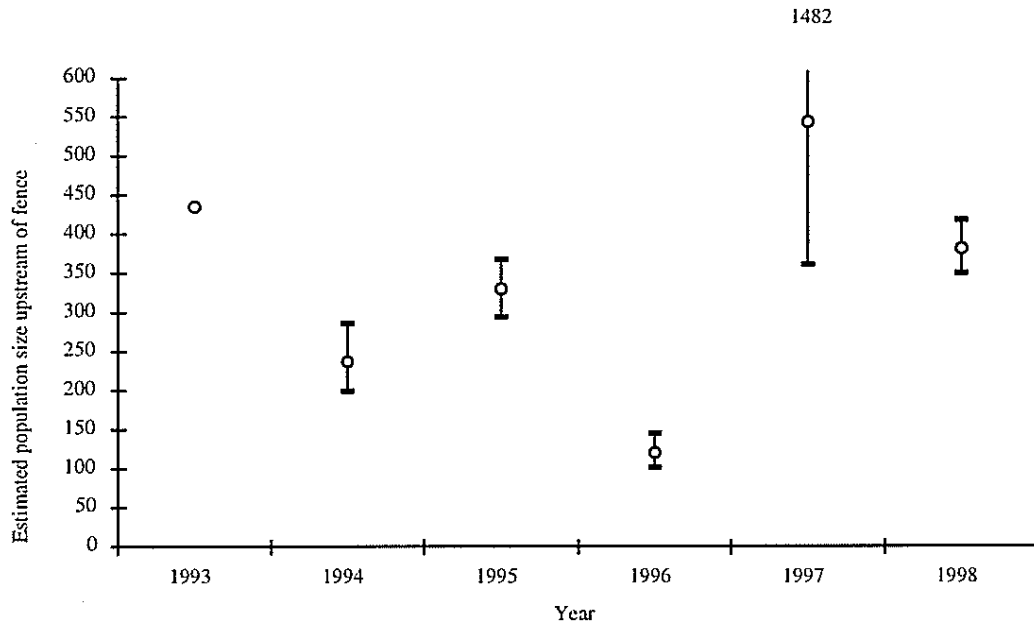


Figure 6. Steelhead population estimates with 95% confidence intervals (CI) for Toboggan Creek, 1993-1998 (1993 not mark-recapture so no CI; 1997 upper CI (1482) not shown for clarity of remaining points).

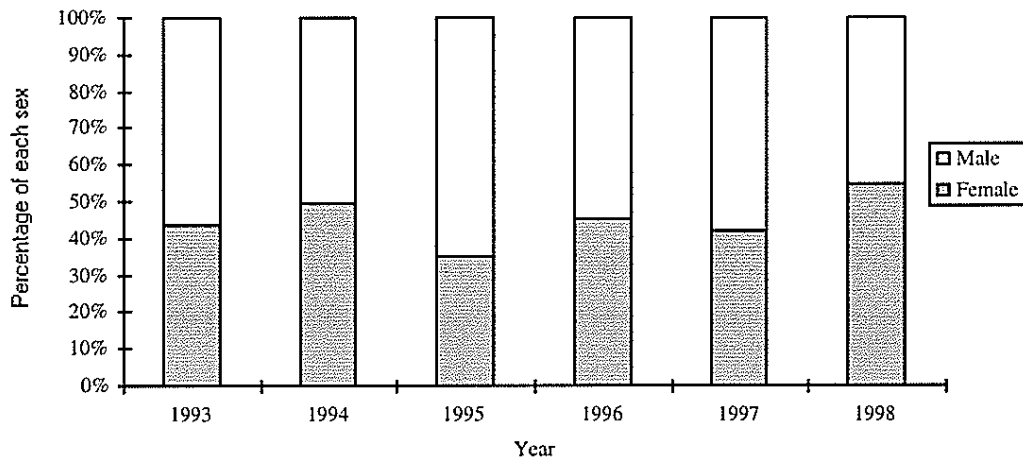


Figure 7. Proportion of each sex comprising steelhead population in Toboggan Creek, 1993-1998.

Rate of tag loss in this year of sampling was 7.3% (3 of 41) for females and 0% (0 of 37) for males. The combined sexes rate of 3.8 % compares favorably with 1994 and 1995 as indicated in Table 3, but female rate of tag loss is high, and male low, relative to previous years. The previously reported population estimate accounts for this tag loss.

Table 3. Rate of tag loss (expressed as % of tagged fish which lost tags) for the years 1994 to 1998.

|      | Females | Males | Combined |
|------|---------|-------|----------|
| 1994 | 3.4     | 4.2   | 3.8      |
| 1995 | 0       | 5.7   | 3.6      |
| 1996 | 0       | 27.3  | * 18.8   |
| 1997 | 0       | 0     | 0        |
| 1998 | 7.3     | 0     | 3.8      |
| Mean | 2.1     | 7.4   | 6.0      |

\* some tags were observed to be lost by kelts during seine recapture

#### 4.4 Steelhead Age, Size and Recaptures

##### Age

Twenty seven scale books were prepared from scales taken from the returning Toboggan Creek steelhead, resulting in 134 scales read. The results are provided in Table 4. The range of ages of fish were from 3.1+ up to 5.1S1S1+ with 60% of the fish sampled comprising initial spawning ages of 3.2+ and 4.2+ (see Appendix D for data).

Table 4. Distribution of ages of a sample of Toboggan Creek steelhead passing through the fence in 1998 (n=134).

| Age | Number | Percentage |
|-----|--------|------------|
| R.1 | 7      | 5.2        |
| R.2 | 10     | 7.5        |
| R.3 | 1      | 0.8        |
| 3.1 | 7      | 5.2        |
| 3.2 | 39     | 29.1       |
| 3.3 | 2      | 1.5        |
| 4.1 | 10     | 7.5        |
| 4.2 | 42     | 31.3       |
| 4.3 | 2      | 1.5        |
| 5.1 | 5      | 3.7        |
| 5.2 | 7      | 5.2        |
| 5.3 | 2      | 1.5        |

## DNA

128 DNA samples were collected from returning Toboggan Creek steelhead. DNA results were not available at the time of report preparation, thus are not reported here.

## Size

The mean fork length of the female steelhead sampled in Toboggan Creek in 1998 was 705.6 mm (S.D. = 51.0 mm, n = 145) and the mean fork length of males was 689.7 mm (S.D. = 116.9 mm, n = 122). Fork length distributions of male and female steelhead are presented in Figure 8. The difference was found to be statistically significant (Wilcoxon test,  $Z = 14.167$ ,  $Z_{crit} = 2.575$ ,  $P < 0.0001$ ). There appears to be a decline in mean size of fish in Toboggan Creek over time for both males and females (Table 5, Figure 9), however, this may be a result of sample size bias. Ricker (1981) reports a decrease in size of fish caught between 1951 and 1975 for all five species of

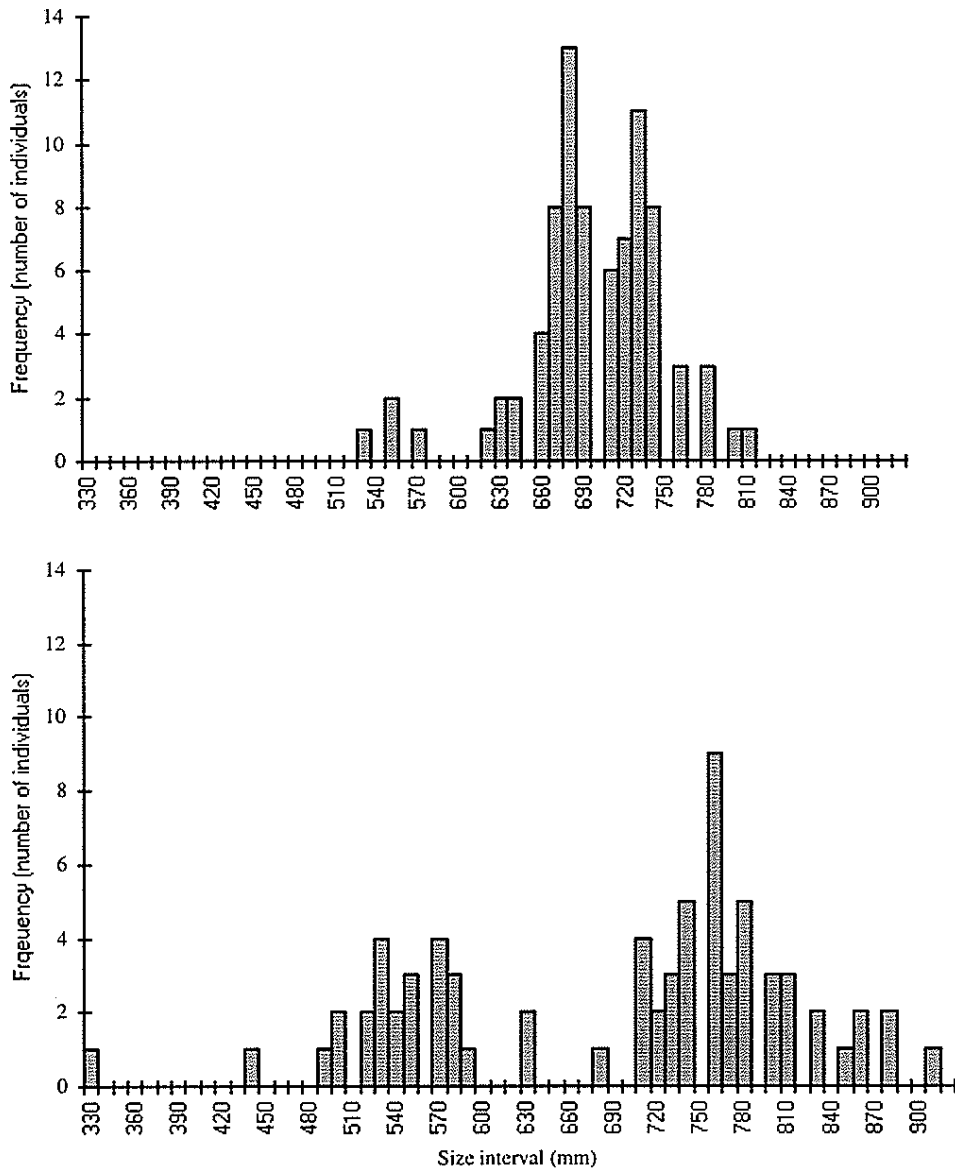


Figure 8. Fork length frequency histograms for female (upper) and male (lower) steelhead for Toboggan Creek sampling, 1998.

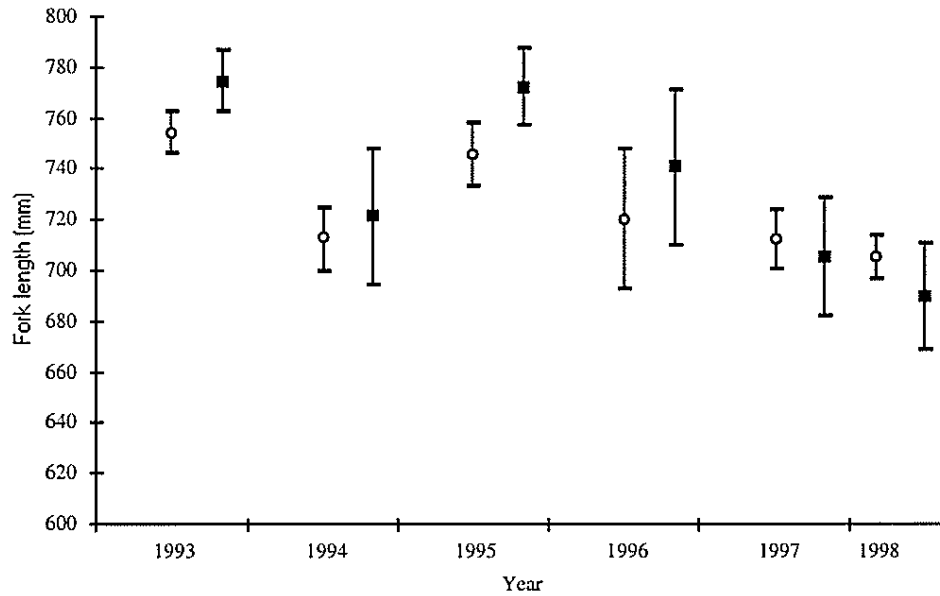


Figure 9. Mean fork length with 95% confidence intervals for female (open circles) and male (closed squares) steelhead for Toboggan Creek, 1993-1998.

salmon (*Oncorhynchus* spp.) and Wilkman and Stockerl (1981) found a modest correlation of 0.689 between length and fecundity for Skeena River steelhead between 1977 and 1979. Thus decreasing female size, if it is real, over time may result in reduced fecundity with implications for future population sizes. This should be intensively monitored in the future to determine if the trend is real or an artifact of the sample sizes.

Table 5. Minimum, mean, and maximum fork lengths (mm), and sample sizes, for steelhead in Toboggan Creek, 1993-1998.

|      | Female |       |       |     | Male  |       |       |     |
|------|--------|-------|-------|-----|-------|-------|-------|-----|
|      | Min.   | Mean  | Max.  | n   | Min.  | Mean  | Max.  | n   |
| 1993 | 635    | 754.5 | 901.7 | 76  | 609.7 | 774.7 | 939.8 | 98  |
| 1994 | 431.8  | 712.9 | 965.2 | 89  | 342.9 | 721.4 | 914.4 | 91  |
| 1995 | 558.8  | 745.8 | 873.6 | 112 | 444.5 | 772.4 | 965.2 | 135 |
| 1996 | 533.4  | 720.5 | 939.8 | 37  | 508   | 740.7 | 939.8 | 68  |
| 1997 | 560    | 712.4 | 814   | 67  | 330.5 | 705.4 | 967   | 101 |
| 1998 | 533.4  | 705.6 | 838.2 | 145 | 330.2 | 689.7 | 914.4 | 122 |



## Recaptures

Of the 155 steelhead tagged passing upstream, 78 were recaptured moving downstream, for a recapture rate of 50.3%. A total of 10 adult steelhead (two female, eight males) were found dead near the fence (i.e., in the upstream pool or washed up against fence panels) for a minimum mortality rate of 2.6% of the estimated population. These dead fish were included in the population estimate as during the upstream migration they were active parts of the population, and they had successfully spawned prior to death. A total of 267 different steelhead were captured and sampled during the 1998 study.

A total of nine previously-tagged fish (i.e. tagged elsewhere or in previous years) were captured during the 1998 sampling. These are presented in Table 6. The five tagged fish from Moricetown come from a marked population of 709 tags (Anonymous, 1997) applied in August and September, 1997.

Table 6. Recaptures of previously tagged steelhead between April 7 and June 23, 1998.

| Tag Number   | Capture date  | Origin of previous tag           |
|--------------|---------------|----------------------------------|
| MOE N04889   | Apr. 25, 1998 | Toboggan fence - May 29, 1996    |
| MOE N07822   | Apr. 28, 1998 | Moricetown - Sept. 09, 1997      |
| MOE N05081   | May 07, 1998  | Toboggan confl. - Sept. 11, 1997 |
| Orange 00380 | May 11, 1998  | Moricetown - Aug. 21, 1997       |
| MOE N04982   | May 19, 1998  | Toboggan fence - May 21, 1997    |
| MOE N04835   | May 19, 1998  | Toboggan fence - May 14, 1996    |
| Orange 00987 | May 19, 1998  | Moricetown - Aug. 22, 1997       |
| MOE N07471   | May 21, 1998  | Moricetown - Aug. 26, 1997       |
| MOE N07880   | May 21, 1998  | Moricetown - Sept. 11, 1997      |

## 4.5 Repeat Versus Maiden Spawning Migrations

Of 134 scale samples read seven fish were repeat spawners (5.2%) of which one was a twice-repeat spawner (5.1S1S1+). Five of the repeat spawners were male and two were female and three of the fish had been previously tagged at the fence (Table 7). Fish number N04835 was an adipose-clipped hatchery fish which had been previously tagged in Toboggan Creek in 1996 while N04982 had been previously tagged in Toboggan Creek in 1997, and was back for its second spawn in consecutive years (Appendix C).

Table 7. Age, sex and tag numbers of repeat spawning steelhead in Toboggan Creek sampled in 1998.

| 1998 Tag # | Previous Tag | Age      | Sex    |
|------------|--------------|----------|--------|
| OS00580    |              | 1.1S1+   | Female |
| OS00593    | N04889 (MOE) | 1.1S1+   | Male   |
| OS00863    |              | 5.1S1S1+ | Male   |
| OS00864    |              | 4.1S1+   | Male   |
| OS00860    |              | 4.1S1+   | Male   |
| N08329     | N04835 (MOE) | 4.2S1+   | Female |
| Not Tagged | N04982 (MOE) | 3.1S+    | Male   |

## 5. CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusions

Sampling at the Toboggan Creek counting fence in 1998 provide an estimate of 377 adult steelhead utilizing Toboggan Creek upstream of the fence. The sex ratio of females to males indicates more females than males for the first time in six years, and the mean fork length of females is significantly longer than males in 1998. There also appears to be a decline in steelhead size over time between 1993 and 1998. Steelhead migration upstream occurred primarily between April 21 and May 25, 1998, and the downstream movement of kelts was between May 11 and June 23, 1998.

## 5.2 Recommendations

The following recommendations are for the future operation of the Toboggan Creek steelhead enumeration program.

Continued fence operation for monitoring of population size, fish length and sex ratio should be a high priority. This fence provides valuable information and now has a six year database for examining changes over time.

There has been some concern raised over the counting fence holding up spawner migration upstream and kelt movements downstream (M. O'Neill, pers. comm., July 1998). This may result in spawners utilizing downstream areas more due to difficulty accessing upstream sites, and postponement of downstream movements of kelts. Either of these activities will affect the population estimation. In order to more closely approximate free movement upstream and downstream for fish (i.e. allowing them to behave normally), it is suggested that a systematic sampling strategy be employed. Operation of the fence for 3.5 days then lowering it for 12 hours, followed by reinstating it for a further 3.5 days on a cycle will allow for a "normal fish movement" or at least reduce the barrier effect of the fence. In addition, this strategy will provide a distribution of fish movement prior to lowering and after raising the fence, which can then be used to interpolate probable fish movement during the time the fence is down. Thus, the use of a systematic sampling regime in which the fence is up for a specified period of time, then lowered to allow fish passage, would provide more accurate estimates by allowing natural behaviour of the fish moving upstream and downstream.

More consistent and detailed recording of location and magnitude of damage (i.e. seal bites, gill net marks, hook scars, etc.). These are indirect evidence of some of the predation and human pressures on these fish and may be useful in assessing the relative importance of various pressures.

Continue to monitor fork lengths and compare with other data sources and historical records to evaluate reality of trend of decreasing female size over time.

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Appendix A. Daily stream discharge and temperature for Toboggan Creek, 1998, as measured at the Toboggan Creek fish hatchery.

|       |    | Daily Stream Temperature (C) |      |      | Stream Height (m) | Est. Stream Discharge (L/min) |
|-------|----|------------------------------|------|------|-------------------|-------------------------------|
|       |    | AM                           | PM   | Mean |                   |                               |
| April | 7  | 3                            | 5    | 4    | 0.23              | 16100.00                      |
| April | 8  | 2                            | 3    | 2.5  | 0.23              | 16100.00                      |
| April | 9  | 2                            | 3    | 2.5  | 0.23              | 16100.00                      |
| April | 10 | 2                            | 7    | 4.5  | 0.22              | 15400.00                      |
| April | 11 | 2                            | 7    | 4.5  | 0.21              | 14700.00                      |
| April | 12 | 2                            | 6.5  | 4.25 | 0.2               | 14000.00                      |
| April | 13 | 3                            | 7    | 5    | 0.2               | 14000.00                      |
| April | 14 | 2.5                          | 8    | 5.25 | 0.2               | 14000.00                      |
| April | 15 | 3                            | 8    | 5.5  | 0.2               | 14000.00                      |
| April | 16 | 3                            | 8    | 5.5  | 0.2               | 14000.00                      |
| April | 17 | 3.5                          | 7    | 5.25 | 0.2               | 14000.00                      |
| April | 18 | 4                            | 7    | 5.5  | 0.19              | 13300.00                      |
| April | 19 | 3                            | 7    | 5    | 0.23              | 16100.00                      |
| April | 20 | 3.5                          | 6    | 4.75 | 0.23              | 16100.00                      |
| April | 21 | 3.5                          | 7    | 5.25 | 0.22              | 15400.00                      |
| April | 22 | 3.5                          | 8    | 5.75 | 0.23              | 16100.00                      |
| April | 23 | 3.5                          | 8    | 5.75 | 0.23              | 16100.00                      |
| April | 24 | 4.5                          | 10   | 7.25 | 0.24              | 16800.00                      |
| April | 25 | 5                            | 6    | 5.5  | 0.23              | 16100.00                      |
| April | 26 | 5                            | 7    | 6    | 0.23              | 16100.00                      |
| April | 27 | 3.5                          | 7.5  | 5.5  | 0.24              | 16800.00                      |
| April | 28 | 5                            | 9    | 7    | 0.25              | 17500.00                      |
| April | 29 | 5.5                          | 10.5 | 8    | 0.27              | 18900.00                      |
| April | 30 | 5                            | 12.5 | 8.75 | 0.3               | 21000.00                      |
| May   | 1  | 6                            | 13   | 9.5  | 0.41              | 28700.00                      |
| May   | 2  | 6                            | 11   | 8.5  | 0.48              | 33600.00                      |
| May   | 3  | 5.5                          | 10   | 7.75 | 0.48              | 33600.00                      |
| May   | 4  | 5                            | 11.5 | 8.25 | 0.47              | 32900.00                      |
| May   | 5  | 6.5                          | 11   | 8.75 | 0.49              | 34300.00                      |
| May   | 6  | 8                            | 10.5 | 9.25 | 0.49              | 34300.00                      |
| May   | 7  | 6                            | 9.5  | 7.75 | 0.45              | 31500.00                      |
| May   | 8  | 5                            | 9    | 7    | 0.38              | 26600.00                      |
| May   | 9  | 6                            | 10.5 | 8.25 | 0.33              | 23100.00                      |
| May   | 10 | 5.5                          | 11.5 | 8.5  | 0.32              | 22400.00                      |
| May   | 11 | 7                            | 9.5  | 8.25 | 0.36              | 25200.00                      |
| May   | 12 | 7                            | 10   | 8.5  | 0.42              | 29400.00                      |
| May   | 13 | 6.5                          | 9.5  | 8    | 0.45              | 31500.00                      |
| May   | 14 | 6                            | 10   | 8    | 0.41              | 28700.00                      |
| May   | 15 | 5.5                          | 10.5 | 8    | 0.37              | 25900.00                      |

|      |    | Daily Stream Temperature (C) |      |       | Stream Height (m) | Est. Stream Discharge (L/min) |
|------|----|------------------------------|------|-------|-------------------|-------------------------------|
|      |    | AM                           | PM   | Mean  |                   |                               |
| May  | 16 | 7                            | 11   | 9     | 0.37              | 25900.00                      |
| May  | 17 | 7                            | 10   | 8.5   | 0.41              | 28700.00                      |
| May  | 18 | 7                            | 10   | 8.5   | 0.45              | 31500.00                      |
| May  | 19 | 5.5                          | 11.5 | 8.5   | 0.47              | 32900.00                      |
| May  | 20 | 6                            | 11.5 | 8.75  | 0.45              | 31500.00                      |
| May  | 21 | 7                            | 12   | 9.5   | 0.45              | 31500.00                      |
| May  | 22 | 8                            | 9.5  | 8.75  | 0.5               | 35000.00                      |
| May  | 23 | 8                            | 9    | 8.5   | 0.48              | 33600.00                      |
| May  | 24 | 8                            | 10   | 9     | 0.52              | 36400.00                      |
| May  | 25 | 7.5                          | 9.5  | 8.5   | 0.63              | 44100.00                      |
| May  | 26 | 8                            | 10   | 9     | 0.76              | 53200.00                      |
| May  | 27 | 7.5                          | 12   | 9.75  | 0.8               | 56000.00                      |
| May  | 28 | 8.5                          | 11.5 | 10    | 0.82              | 57400.00                      |
| May  | 29 | 8.5                          | 12   | 10.25 | 0.78              | 54600.00                      |
| May  | 30 | 9                            | 13   | 11    | 0.74              | 51800.00                      |
| May  | 31 | 9                            | 11   | 10    | 0.85              | 59500.00                      |
| June | 1  | 8                            | 11   | 9.5   | 0.73              | 51100.00                      |
| June | 2  | 8                            | 12   | 10    | 0.6               | 42000.00                      |
| June | 3  | 8.5                          | 12.5 | 10.5  | 0.57              | 39900.00                      |
| June | 4  | 10                           | 13   | 11.5  | 0.57              | 39900.00                      |
| June | 5  | 8                            | 13   | 10.5  | 0.57              | 39900.00                      |
| June | 6  | 9                            | 13.5 | 11.25 | 0.62              | 43400.00                      |
| June | 7  | 10                           | 14   | 12    | 0.61              | 42700.00                      |
| June | 8  | 11                           | 14   | 12.5  | 0.64              | 44800.00                      |
| June | 9  | 10.5                         | 11.5 | 11    | 0.67              | 46900.00                      |
| June | 10 | 9.5                          | 10.5 | 10    | 0.65              | 45500.00                      |
| June | 11 | 8                            | 10   | 9     | 0.55              | 38500.00                      |
| June | 12 | 8                            | 11.5 | 9.75  | 0.46              | 32200.00                      |
| June | 13 | 8.5                          | 12   | 10.25 | 0.45              | 31500.00                      |
| June | 14 | 9                            | 10.5 | 9.75  | 0.48              | 33600.00                      |
| June | 15 | 9                            | 10.5 | 9.75  | 0.52              | 36400.00                      |
| June | 16 | 9.6                          | 12   | 10.8  | 0.47              | 32900.00                      |
| June | 17 | 10.5                         | 12   | 11.25 | 0.46              | 32200.00                      |
| June | 18 | 10                           | 11   | 10.5  | 0.47              | 32900.00                      |
| June | 19 | 9                            | 14   | 11.5  | 0.49              | 34300.00                      |
| June | 20 | 9.5                          | 14   | 11.75 | 0.54              | 37800.00                      |
| June | 21 | 10                           | 14   | 12    | 0.54              | 37800.00                      |
| June | 22 | 10.5                         | 12   | 11.25 | 0.55              | 38500.00                      |

Appendix B. Upstream migrating steelhead spawners put through the Toboggan Creek counting fence, April 21 - May 25, 1998.

| Date<br>1998 | Sex | Length<br>(mm) | Tag Number | Scale Number | Previous Tags/Comments  |                    |
|--------------|-----|----------------|------------|--------------|-------------------------|--------------------|
| Apr-21       | M   | 749.3          | S00578     | 40507-R1     |                         |                    |
|              | F   | 723.9          | S00579     | 40507-R2     |                         |                    |
|              | F   | 787.4          | S00580     | 40507-R3     |                         |                    |
|              | M   | 787.4          | S00581     | 40507-R4     |                         |                    |
| Apr-24       | M   | 762            | S00582     | 40507-R5     |                         |                    |
|              | F   | 660.4          | S00583     | 40508-R1     |                         |                    |
|              | M   | 711.2          | S00584     | 40508-R2     |                         |                    |
|              | M   | 762            | S00585     | 40508-R3     |                         |                    |
|              | M   | 800.1          | S00586     | 40508-R4     |                         |                    |
|              | F   | 736.6          | S00587     | 40508-R5     |                         |                    |
|              | M   | 723.9          | S00588     | 40509-R1     |                         |                    |
|              | M   | 711.2          | S00589     | 40509-R2     |                         |                    |
|              | M   | 736.6          | S00590     | 40509-R3     |                         |                    |
|              | M   | 546.1          | S00591     | 40509-R4     |                         |                    |
| Apr-25       | F   | 685.8          | S00592     | 40509-R5     |                         |                    |
|              | M   | 749.3          | S00593     | 40510-R1     | N04889 (MOE) ***(1996)  |                    |
|              | F   | 749.3          | S00595     | 40510-R2     |                         |                    |
| Apr-26       | M   | 889            | S00596     | 40510-R3     |                         |                    |
| Apr-27       | M   | 609.6          | S00597     | 40510-R4     |                         |                    |
|              | M   | 774.7          | S00598     | 40510-R5     |                         |                    |
|              | F   | 749.3          | S00599     | 40511-R1     | Head scar, damaged tail |                    |
| Apr-28       | M   | 558.8          | S00600     | 40511-R2     |                         |                    |
|              | M   | 762            | S00873     | 40511-R3     |                         |                    |
|              | M   | 736.6          | S00872     | 40511-R4     | N07822 (MOE) *          |                    |
|              | M   | 762            | S00871     | 40511-R5     |                         |                    |
|              | F   | 787.4          | S00870     | 40512-R1     |                         |                    |
|              | F   | 685.8          | S00869     | 40512-R2     |                         |                    |
|              | M   | 863.6          | S00868     | 40512-R3     |                         |                    |
|              | M   | 584.2          | S00867     | 40512-R4     |                         |                    |
| Apr-29       | F   | 673.1          | S00866     | 40512-R5     |                         | Damaged dorsal fin |
|              | F   | 723.9          | S00865     | 40513-R1     |                         |                    |
|              | M   | 685.8          | S00864     | 40513-R2     |                         |                    |
|              | M   | 800.1          | S00863     | 40513-R3     |                         |                    |
|              | F   | 736.6          | S00862     | 40513-R4     |                         |                    |
|              | F   | 673.1          | S00861     | 40513-R5     |                         |                    |
|              | M   | 635            | S00860     | 40514-R1     |                         |                    |
|              | M   | 812.8          | S00859     | 40514-R2     |                         |                    |
|              | M   | 800.1          | S00858     | 40514-R3     |                         |                    |



| Date<br>1998 | Sex   | Length<br>(mm) | Tag Number | Scale Number | Previous Tags/Comments  |
|--------------|-------|----------------|------------|--------------|-------------------------|
| Apr-29       | M     | 508            | S00857     | 40514-R4     |                         |
| Apr-30       | M     | 863.6          | S00856     | 40514-R5     |                         |
|              | M     | 495.3          | S00855     | 40515-R1     |                         |
|              | F     | 698.5          | S00854     | 40515-R2     |                         |
|              | M     | 762            | S00853     | 40515-R3     |                         |
|              | F     | 736.6          | S00852     | 40515-R4     |                         |
| May-01       | M     | 330.2          | NO3851     | 40515-R5     |                         |
|              | M     | 749.3          | NO3852     | 40516-R1     |                         |
|              | M     | 723.9          | NO3853     | 40516-R2     |                         |
|              | M     | 762            | NO3854     | 40516-R3     |                         |
|              | F     | 723.9          | NO3855     | 40516-R4     |                         |
|              | M     | 571.5          | NO3856     | 40516-R5     |                         |
|              | F     | 558.8          | NO3857     | 40517-R1     | Blind in right eye      |
|              | F     | 685.8          | NO3858     | 40517-R2     |                         |
| M            | 711.2 | NO3859         | 40517-R3   |              |                         |
| May-02       | F     | 762            | NO3860     | 40517-R4     |                         |
|              | F     | 685.8          | NO3861     | 40517-R5     |                         |
|              | F     | 647.7          | NO3862     | 40518-R1     |                         |
|              | F     | 787.4          | NO3863     | 40518-R2     |                         |
|              | F     | 685.8          | NO3864     | 40518-R3     |                         |
|              | M     | 914.4          | NO3865     | 40518-R4     |                         |
|              | F     | 749.3          | NO3866     | 40518-R5     |                         |
|              | F     | 749.3          | NO3867     | 40519-R1     |                         |
|              | M     | 635            | NO3869     | 40519-R3     |                         |
|              | M     | 508            | NO3870     | 40519-R4     |                         |
|              | F     | 711.2          | NO3868     | 40519-R2     |                         |
|              | F     | 647.7          | NO3871     | 40519-R5     |                         |
|              | M     | 787.4          | NO3872     | 40520-R1     |                         |
|              | F     | 711.2          | NO3873     | 40520-R2     |                         |
|              | M     | 596.9          | NO3874     | 40520-R3     |                         |
| May-03       | F     | 698.5          | N03875     | 40520-R4     |                         |
|              | M     | 889            | N03876     | 40520-R5     |                         |
|              | F     | 723.9          | N03877     | 40521-R1     |                         |
|              | M     | 558.8          | N03878     | 40521-R2     |                         |
|              | F     | 736.6          | N03879     | 40521-R3     |                         |
| May-04       | F     | 762            | N03880     | 40521-R4     | Ripe, predator bit tail |
|              | F     | 723.9          | N03881     | 40521-R5     | Predator bit tail       |
|              | M     | 762            | N03882     | 40522-R1     |                         |
|              | M     | 711.2          | N03883     | 40522-R2     |                         |
|              | F     | 685.8          | N03884     | 40522-R3     |                         |
|              | F     | 711.2          | N03885     | 40522-R4     | Predator bit tail       |

| Date<br>1998 | Sex   | Length<br>(mm) | Tag Number      | Scale Number | Previous Tags/Comments                  |
|--------------|-------|----------------|-----------------|--------------|---|
| May-04       | F     | 673.1          | N03886          | 40522-R5     |   |
|              | F     | 673.1          | N03887          | 40523-R1     |   |
|              | F     | 711.2          | N03888          | 40523-R2     | Damaged tail                            |
| May-05       | F     | 736.6          | N03889          | 40523-R3     |   |
|              | F     | 635            | N03890          | 40523-R4     |   |
|              | F     | 736.6          | N03891          | 40523-R5     | Ripe                                    |
|              | F     | 736.6          | N03892          | 40524-R1     |   |
|              | M     | 749.3          | N03893          | 40524-R2     |   |
|              | M     | 838.2          | N03894          | 40524-R3     |   |
|              | F     | 685.8          | N03895          | 40524-R4     |   |
| May-06       | M     | 838.2          | N03896          | 40524-R5     | Tail bit                                |
|              | F     | 749.3          | N03898          | 40525-R1     |   |
|              | M     | 762            | N03899          | 40525-R2     |   |
|              | M     | 850.9          | N03900          | 40525-R3     |   |
|              | F     | 749.3          | N05101          | 40525-R4     |   |
|              | F     | 558.8          | N05102          | 40525-R5     |   |
|              | M     | 533.4          | N05103          | 40526-R1     |   |
|              | M     | 520.7          | N05104          | 40526-R2     |   |
|              | F     | 533.4          | N05105          | 40526-R3     |   |
|              | F     | 685.8          | N05106          | 40526-R4     | Predator damaged, blind in right<br>eye |
|              | M     | 812.8          | N05107          | 40526-R5     |   |
|              | F     | 685.8          | N05108          | No Scales    |   |
|              | F     | 711.2          | N05109          | No Scales    |   |
|              | M     | 762            | N05110          | No Scales    |   |
|              | F     | 698.5          | N05111          | No Scales    |   |
| F            | 673.1 | N05112         | No Scales       |              |   |
| May-07       | M     | 787.4          | N05113          | 40527-R1     |   |
|              | F     | 698.5          | N05114          | 40527-R2     | N05081 (MOE) **                         |
|              | M     | 812.8          | N05115          | 40527-R3     |   |
|              | F     | 673.1          | N05116 & N05117 | 40527-R4     |   |
|              | F     | 635            | N05118          | 40527-R5     |   |
|              | F     | 698.5          | N05119          | 40528-R1     |   |
|              | F     | 736.6          | N05120          | 40528-R2     |   |
| May-11       | M     | 736.6          | N05121          | No Scales    | Partly spawned                          |
|              | F     | 685.8          | N05122          | 40528-R3     | 00380(Orange)                           |
|              | F     | 622.3          | N05123          | No Scales    | Predator bit tail - dorsal lobe         |
| May-12       | F     | 698.5          | N05132          | 40528-R4     |   |
|              | F     | 673.1          | N05133          | No Scales    |   |
|              | F     | 698.5          | N05134          | No Scales    |   |
|              | M     | 444.5          | N05135          | No Scales    |   |
|              | M     | 558.8          | N05136          | No Scales    | Predator bite - dorsal fin              |

| Date<br>1998 | Sex | Length<br>(mm) | Tag Number  | Scale Number | Previous Tags/Comments            |
|--------------|-----|----------------|-------------|--------------|-----------------------------------|
| May-12       | M   | 749.3          | N05137      | No Scales    |                                   |
|              | F   | 723.9          | N05138      | 40528-R5     |                                   |
|              | F   | 660.4          | N05139      | No Scales    |                                   |
|              | F   | 723.9          | N05140      | 40529-R1     |                                   |
|              | M   | 774.7          | N05141      | No Scales    | Predator bite - tail & dorsal fin |
|              | M   | 774.7          | N05142      | No Scales    | Predator bite - dorsal fin        |
|              | F   | 749.3          | N05143      | 40529-R2     |                                   |
|              | M   | 787.4          | N05144      | No Scales    | Predator bit tail - dorsal lobe   |
|              | M   | 520.7          | N05145      | No Scales    |                                   |
|              | M   | 787.4          | N05146      | 40529-R3     | Dorsal fin damage                 |
|              | F   | 800.1          | N05147      | No Scales    |                                   |
|              | F   | 698.5          | N05148      | 40529-R4     |                                   |
| May-13       | F   | 736.6          | N05149      | No Scales    |                                   |
| May-16       | F   | 812.8          | N05169      | No Scales    |                                   |
| May-17       | F   | 685.8          | N05170      | No Scales    |                                   |
|              | F   | 749.3          | N05171      | No Scales    |                                   |
|              | F   | 762            | N05172      | 40529-R5     |                                   |
|              | F   | 685.8          | N05173      | No Scales    |                                   |
|              | M   | 584.2          | N05174      | No Scales    |                                   |
| May-19       | M   | 546.1          | N05175      | No Scales    | Hook damage - blind in left eye   |
|              | F   | 571.5          | N08333      | 40530-R2     |                                   |
| May-22       | F   | 685.8          | N08296      | No Scales    |                                   |
| May-23       | M   | 533.4          | N08297      | No Scales    |                                   |
|              | M   | 571.5          | N08298      | No Scales    |                                   |
|              | F   | 660.4          | N08299      | No Scales    |                                   |
| May-24       | M   | 533.4          | N05176      | No Scales    |                                   |
| May-25       | M   | 571.5          | N05197      | No Scales    |                                   |
|              | F   | 736.6          | N05198      | No Scales    |                                   |
|              | F   | 736.6          | N05199      | No Scales    |                                   |
|              | M   | 533.4          | N05200      | No Scales    |                                   |
|              | M   | 584.2          | (TCH) 01955 | No Scales    |                                   |
|              | M   | 571.5          | (TCH) 01956 | No Scales    |                                   |
|              | F   | 673.1          | (TCH) 01957 | No Scales    |                                   |
|              | F   | 711.2          | (TCH) 01958 | No Scales    |                                   |
|              | F   | 660.4          | (TCH) 01959 | No Scales    |                                   |

\* = Previously tagged at Moricetown Canyon

\*\* = Previously tagged at Toboggan Creek - Bulkley river confluence

\*\*\*(19 ) = Previously tagged at Toboggan Creek fence (year of tagging in brackets)

Appendix C. Downstream migrating steelhead kelts put through the Toboggan Creek counting fence, May 11 - June 23, 1998.

| Date<br>1998 | Sex    | Length<br>(mm) | Tagged/<br>Punched | Tag Number | Scale Number | Comments  |
|--------------|--------|----------------|--------------------|------------|--------------|---|
| May-11       | F      | 698.5          | N/N                | N05124     | No Scale     |   |
|              | F      | 723.9          | N/N                | N05125     | No Scale     | Hook scar - right maxilla   |
|              | M      | 825.5          | N/N                | N05126     | No Scale     |   |
|              | F      | PS             | Y/Y                | S00579     | PS           | Predator bit tail   |
|              | F      | 762            | N/N                | N05127     | No Scale     |   |
|              | F      | PS             | Y/Y                | S00587     | PS           |   |
|              | F      | 673.1          | N/N                | N05128     | No Scale     |   |
|              | F      | 673.1          | N/N                | N05129     | No Scale     | Predator bit tail - dorsal lobe                                   |
|              | F      | 774.7          | N/N                | N05130     | No Scale     |   |
|              | M      | PS             | Y/Y                | N05113     | PS           |   |
|              | M      | PS             | Y/Y                | S00598     | PS           |   |
|              | M      | 711.2          | N/N                | N05131     | No Scale     |   |
|              | May-14 | F              | PS                 | Y/Y        | N05106       | PS  |
| M            |        | PS             | Y/Y                | N05137     | No scale     |   |
| M            |        | PS             | Y/Y                | N05115     | PS           |   |
| M            |        | 838.2          | N/N                | N05150     | No Scale     |   |
| F            |        | 673.1          | N/N                | N05151     | No Scale     | Predator bite - right pectoral fin                                |
| F            |        | 660.4          | N/N                | N05152     | No Scale     |   |
| F            |        | 711.2          | N/N                | N05153     | No Scale     |   |
| F            |        | 660.4          | N/N                | N05154     | No Scale     | Hook scar - left nostril  |
| F            |        | PS             | Y/Y                | N03866     | PS           |   |
| M            |        | PS             | Y/Y                | S00593     | PS           | P.T. = N04889 *(1996)   |
| F            |        | PS             | Y/Y                | N03875     | PS           |   |
| F            |        | PS             | Y/Y                | N03898     | PS           |   |
| F            |        | 762            | N/N                | N05155     | No Scale     | Hook scar - right maxilla, and<br>Predator bit tail - dorsal lobe |
| F            |        | 673.1          | N/N                | N05156     | No Scale     |   |
| F            |        | PS             | Y/Y                | N05101     | PS           | Hook scar - right maxilla   |
| F            |        | 660.4          | N/N                | N05157     | No Scale     |   |
| F            |        | 736.6          | N/N                | N05158     | No Scale     |   |
| M            |        | 711.2          | N/N                | N05159     | No Scale     |   |
| F            |        | PS             | Y/Y                | N03862     | PS           |   |
| M            |        | 762            | N/N                | N05160     | No Scale     |   |
| F            |        | 711.2          | N/N                | N05161     | No Scale     |   |
| F            |        | 736.6          | N/N                | N05162     | No Scale     |   |
| F            |        | 812.8          | N/N                | N05163     | No Scale     |   |
| M            |        | PS             | Y/Y                | N03896     | PS           |   |
| F            |        | 787.4          | N/N                | N05164     | No Scale     | Hook scar - left maxilla  |
| F            |        |                | Y/Y                | S00851     |              |   |
| F            |        | PS             | Y/Y                | N03884     | PS           |   |
| F            |        | 660.4          | N/N                | N05165     | No Scale     | Hook scar - left maxilla  |
| F            | 774.7  | N/N            | N05166             | No Scale   |              |   |
| F            | 711.2  | N/N            | N05167             | No Scale   |              |   |

| Date<br>1998 | Sex   | Length<br>(mm) | Tagged/<br>Punched | Tag Number | Scale Number | Comments                                |
|--------------|-------|----------------|--------------------|------------|--------------|---|
| May-14       | M     | 800.1          | N/N                | N05168     | No Scale     | Hook scar - right mandible              |
|              | F     |                | Y/Y                | N03860     | PS           |   |
| May-15       | F     | PS             | Y/Y                | N03871     | PS           | Dead Pitch                              |
| May-19       | M     | 533.4          | N/N                | N08326     | No Scale     | P.T. = 00987 (Moricetown, 1997)         |
|              | M     | PS             | Y/Y                | N03882     | PS           |   |
|              | F     | PS             | Y/Y                | N03861     | PS           |   |
|              | M     | 711.2          | N/N                | N03827     | No Scale     | Predator bit tail - dorsal lobe         |
|              | F     | PS             | Y/Y                | N05108     | No Scale     |   |
|              | F     | 736.6          | N/N                | N08328     | No Scale     |   |
|              | F     | PS             | Y/Y                | N03868     | PS           | P.T. = N04835***(1996); Adipose clipped |
|              | F     | 838.2          | N/N                | N08329     | 40530-R1     |   |
|              | M     | PS             | Y/Y                | N05121     | No Scale     |   |
|              | F     | 698.5          | N/N                | N08330     | No Scale     |   |
|              | M     | PS             | Y/Y                | S00578     | PS           |   |
|              | M     | 774.7          | N/N                | N08331     | No Scale     |   |
|              | F     | 698.5          | N/N                | N08332     | No Scale     |   |
|              | F     | PS             | Y/Y                | S00869     | PS           |   |
|              | F     | PS             | Y/Y                | N03880     | PS           |   |
|              | M     | 838.2          | N/N                | N05642     | No Scale     |   |
|              | F     | 660.4          | N/N                | N05643     | No Scale     |   |
|              | F     | PS             | Y/Y                | N03885     | PS           |   |
|              | F     | 723.9          | N/N                | N05644     | No Scale     |   |
|              | F     | 711.2          | N/N                | N05645     | No Scale     |   |
|              | F     | 736.6          | N/N                | N05646     | No Scale     |   |
|              | F     | 685.8          | N/N                | N05647     | No Scale     |   |
|              | F     | PS             | Y/Y                | N05147     | No Scale     |   |
|              | F     | 762            | N/N                | N05648     | No Scale     |   |
|              | F     | PS             | Y/Y                | N05111     | No Scale     |   |
|              | F     | 685.8          | N/N                | N05649     | No Scale     |   |
|              | M     | PS             | Y/Y                | S00589     | PS           |   |
| M            | 774.7 | N/N            | N05650             | No Scale   |              |   |
| F            | 685.8 | N/N            | N08280             | No Scale   |              |   |
| M            | 647.7 | N/N            | N04982             | 40530-R3   | *** (1997)   |   |
| F            | 673.1 | N/N            | N08281             | No Scale   | Dead Pitch   |   |
| M            | 749.3 | N/N            |                    | No Scale   |              |   |
| May-21       | M     | 685.8          | N/N                | N08282     | No Scale     | Lost Original Tag                       |
|              | M     | PS             | Y/Y                | S00590     | PS           |   |
|              | M     | PS             | Y/Y                | S00600     | PS           |   |
|              | F     | PS             | Y/Y                | N05123     | No Scale     |   |
|              | F     | 787.4          | N/N                | N08283     | No Scale     |   |
|              | F     | PS             | Y/Y                | S00599     | PS           |   |
|              | F     | 685.8          | N/Y                | N08284     |              |   |
|              | F     | PS             | Y/Y                | N05102     | PS           |   |
|              | M     | PS             | Y/Y                | S00872     | PS           |   |

| Date<br>1998 | Sex | Length<br>(mm) | Tagged/<br>Punched | Tag Number | Scale Number | Comments  |
|--------------|-----|----------------|--------------------|------------|--------------|---|
| May-21       | F   | PS             | Y/Y                | N05114     | PS           | P.T. = N05081**   |
|              | M   | PS             | Y/Y                | S00867     | PS           |   |
|              | F   | 698.5          | N/N                | N08285     | No Scale     |   |
|              | M   | PS             | Y/Y                | S00582     | PS           | P.T. = Moricetown tag (1997)  |
|              | M   | PS             | Y/Y                | N05142     | No Scale     |   |
|              | F   | 711.2          | N/N                | N07471     | 40530-R4     |   |
|              | F   | 838.2          | N/N                | N08286     | 40530-R5     |   |
|              | M   | PS             | Y/Y                | S00858     | PS           |   |
|              | M   | PS             | Y/Y                | N05104     | PS           |   |
|              | M   | 596.9          | N/N                | N08287     | No Scale     |   |
|              | F   | PS             | Y/Y                | S00866     | PS           |   |
|              | F   | PS             | Y/Y                | N05118     | PS           |   |
|              | M   | PS             | Y/Y                | S00860     | PS           |   |
|              | M   | PS             | Y/Y                | S00586     | PS           | P.T. = Moricetown tag (1997)  |
|              | F   | PS             | Y/Y                | N05172     | PS           |   |
|              | M   | 609.6          | N/N                | N08288     | No Scale     |   |
|              | M   | 800.1          | N/N                | N08289     | 40531-R1     |   |
|              | M   | 596.9          | N/N                | N08290     | No Scale     |   |
|              | F   | PS             | Y/Y                | N03863     | PS           |   |
|              | F   | 723.9          | N/N                | N08291     | No Scale     |   |
|              | M   | PS             | Y/Y                | N03900     | PS           |   |
|              | F   | NS             | N/N                | N07880     | No Scale     |   |
|              | F   | 723.9          | N/N                | N08292     | 40531-R2     |   |
|              | F   | 647.7          | N/N                | N08293     | 40531-R3     | Dorsal fin damage<br>2nd time, 1st capture May 14                         |
|              | F   | 685.8          | N/N                | N08294     | No Scale     |   |
|              | F   | PS             | Y/Y                | N03898     | PS           |   |
|              | F   | 749.3          | N/N                | N08295     | No Scale     |   |
| F            | PS  | Y/Y            | N03888             | PS         |              |   |
| May-22       | M   | PS             | Y/Y                | N03853     | PS           | Dead Pitch  |
| May-24       | F   | PS             | Y/Y                | S00854     | PS           | Hook scar<br>Hook scar<br>Hook scar<br>Hook scar<br>Snag mark - left side |
|              | F   | PS             | Y/Y                | N05170     | No Scale     |   |
|              | F   | PS             | Y/Y                | N03887     | PS           |   |
|              | M   | 774.7          | N/N                | N05177     | No Scale     |   |
|              | M   | PS             | Y/Y                | N03865     | PS           |   |
|              | M   | 711.2          | N/N                | N05178     | No Scale     |   |
|              | F   | PS             | Y/Y                | N05112     | No Scale     |   |
|              | F   | 685.8          | N/N                | N05179     | No Scale     |   |
|              | F   | 723.9          | N/N                | N05180     | No Scale     |   |
|              | M   | 762            | N/N                | N05181     | No Scale     |   |
|              | F   | 673.1          | N/N                | N05182     | No Scale     |   |
|              | M   | 749.3          | N/N                | N05183     | No Scale     |   |
|              | F   | PS             | Y/Y                | N05133     | No Scale     |   |
|              | M   | 749.3          | N/N                | N05184     | No Scale     |   |
|              | F   | 685.8          | N/N                | N05185     | No Scale     |   |
| M            | PS  | Y/Y            | S00871             | PS         |              |   |

| Date<br>1998 | Sex    | Length<br>(mm) | Tagged/<br>Punched | Tag Number | Scale Number | Comments                        |
|--------------|--------|----------------|--------------------|------------|--------------|---------------------------------|
| May-24       | F      | 647.7          | N/N                | N05186     | No Scale     |                                 |
|              | F      | 736.6          | N/N                | N05187     | No Scale     | Predator bit tail               |
|              | F      | PS             | Y/Y                | N05138     | PS           |                                 |
|              | F      | 774.7          | N/N                | N05188     | No Scale     |                                 |
|              | M      | PS             | Y/Y                | S00857     | PS           |                                 |
|              | F      | 673.1          | N/N                | N05189     | No Scale     | Gill net marks - dorsal surface |
|              | M      | 584.2          | N/N                | N05190     | No Scale     |                                 |
|              | F      | 698.5          | N/Y                | N05191     | No Scale     | Lost original tag               |
|              | F      | PS             | Y/Y                | S00862     | PS           |                                 |
|              | F      | 749.3          | N/N                | N05192     | No Scale     |                                 |
|              | M      | 762            | N/N                | N05193     | No Scale     | Gill net marks -hook scar       |
|              | M      | 736.6          | N/N                | N05194     | No Scale     | Gill net marks                  |
|              | M      | 723.9          | N/N                | N05195     | No Scale     | Gill net marks                  |
|              | M      | 584.2          | N/N                | N05196     | No Scale     |                                 |
|              | F      | PS             | Y/Y                | N03864     | PS           | Gill net marks                  |
|              | F      | PS             | Y/Y                | N05139     | No Scale     |                                 |
|              | Jun-04 | M              | PS                 | Y/Y        | N05159       | No Scale                        |
| Jun-05       | F      | 571.5          | N/N                |            | No Scale     | Dead Pitch                      |
|              | M      | 774.7          | N/N                |            | No Scale     | Dead Pitch                      |
|              | M      | PS             | Y/Y                | N05110     | No Scale     | Dead Pitch, hook scar           |
|              | M      | 736.6          | N/N                | C06715     | 40531-R4     | Gill net marks                  |
|              | M      | 749.3          | N/N                |            | No Scale     | Dead, gill net marks            |
|              | M      | PS             | Y/Y                | N05197     | No Scale     |                                 |
|              | M      | 584.2          | N/N                | C06716     | No Scale     | Gill net marks                  |
|              | F      | 584.2          | N/N                | C06717     | 40531-R5     | Hook scar                       |
|              | M      | PS             | Y/Y                | N03893     | PS           |                                 |
|              | M      | 584.2          | N/N                | C06718     | 40532-R1     | Hook scar                       |
|              | M      | PS             | Y/Y                | N05200     | 40532-R2     |                                 |
|              | F      | 723.9          | N/N                | C06719     | 40532-R3     |                                 |
|              | M      | 482.6          | N/N                | C06720     | No Scale     |                                 |
|              | F      | 647.7          | N/N                | C06721     | 40532-R4     | Gill net marks                  |
|              | M      | 584.2          | N/N                | C06722     | 40532-R5     | Gill net marks                  |
|              | M      | 584.2          | N/N                | C06723     | No Scale     | Hook scar                       |
|              | M      | 482.6          | N/N                | C06724     | 40533-R1     | Predator scar - pectoral fin    |
|              | F      | 685.8          | N/N                | C06725     | 40533-R2     |                                 |
|              | M      | 533.4          | N/N                | C06726     | 40533-R3     |                                 |
| Jun-09       | M      | 762            | N/N                | C06727     | No Scale     |                                 |
|              | M      | 520.7          | N/N                | C06728     | 40533-R4     |                                 |
|              | M      | 533.4          | N/N                | C06729     | No Scale     |                                 |
|              | M      | 762            | N/N                | C06730     | No Scale     | Gill net marks                  |
|              | M      | 596.9          | N/N                | C06731     | No Scale     |                                 |
|              | M      | 749.3          | N/N                | C06732     | No Scale     |                                 |
|              | M      | 787.4          | N/N                | C06733     | No Scale     |                                 |

| Date<br>1998 | Sex | Length<br>(mm) | Tagged/<br>Punched | Tag Number  | Scale Number | Comments          |
|--------------|-----|----------------|--------------------|-------------|--------------|-------------------|
| Jun-09       | M   | 558.8          | N/N                | C06734      | No Scale     |                   |
|              | M   | 723.9          | N/N                | C06735      | No Scale     |                   |
|              | M   | 558.8          | N/N                | C06736      | No Scale     |                   |
|              | M   | PS             | Y/Y                | N03894      | PS           |                   |
|              | M   | PS             | Y/Y                | S00597      | PS           |                   |
|              | M   | PS             | Y/Y                | N08297      | No Scale     |                   |
|              | M   | 812.8          | N/N                | C06737      | No Scale     | Predator bite     |
|              | F   | 723.9          | N/N                | C06738      | No Scale     | Damaged gill      |
|              | F   | 673.1          | N/Y                | C06739      | 40533-R5     | Lost original Tag |
|              | M   | PS             | Y/Y                | N05136      | No Scale     |                   |
|              | F   | 711.2          | N/N                | C06740      | No Scale     |                   |
|              | M   | 787.4          | N/N                |             | No Scale     | Dead Pitch        |
|              | M   | 736.6          | N/N                |             | No Scale     | Dead Pitch        |
| Jun-15       | M   | PS             | Y/Y                | N03872      | PS           |                   |
|              | F   | 723.9          | N/N                | C06741      | No Scale     |                   |
|              | M   | PS             | Y/Y                | (TCH) 01955 | No Scale     |                   |
|              | M   | PS             | Y/Y                | N03856      | PS           |                   |
| Jun-23       | M   | PS             | Y/Y                | N05175      | No scale     |                   |

PS =Previously Sampled during upstream migration

NS = Not Sampled

\*\* = Previously tagged at Toboggan Creek- Bulkley River confluence

\*\*\*(19 ) = Previously tagged at Toboggan Creek fence (year of tagging in brackets)



Appendix D. Results of scale analysis from Birkenhead Scale Analyses.

| Scale Book | Fish No. | Floy Tag | Date       | Water Body     | Sex | Wild/Hatch | Fork Length (mm) | Spawned | Age      | Comments          |
|------------|----------|----------|------------|----------------|-----|------------|------------------|---------|----------|-------------------|
| 40507      | 1        | OS00578  | 1998/04/21 | Toboggan Creek | M   | W          | 749              | U       | 3.2+     |                   |
| 40507      | 1        | OS00578  | 1998/04/21 | Toboggan Creek | M   | W          | 749              | N       | 3.2+     |                   |
| 40507      | 2        | OS00579  | 1998/04/21 | Toboggan Creek | F   | W          | 724              | N       | 4.2+     |                   |
| 40507      | 3        | OS00580  | 1998/04/21 | Toboggan Creek | F   | W          | 787              | N       | R.1S1+   |                   |
| 40507      | 4        | OS00581  | 1998/04/21 | Toboggan Creek | M   | W          | 787              | N       | 4.2+     |                   |
| 40507      | 5        | OS00582  | 1998/04/24 | Toboggan Creek | M   | W          | 762              | N       | 5.2+     |                   |
| 40508      | 1        | OS00583  | 1998/04/24 | Toboggan Creek | F   | W          | 660              | N       | 3.2+     |                   |
| 40508      | 2        | OS00584  | 1998/04/24 | Toboggan Creek | M   | W          | 711              | N       | 3.2+     |                   |
| 40508      | 3        | OS00585  | 1998/04/24 | Toboggan Creek | M   | W          | 762              | N       | 3.2+     |                   |
| 40508      | 4        | OS00586  | 1998/04/24 | Toboggan Creek | M   | W          | 800              | N       | 3.2+     |                   |
| 40508      | 5        | OS00587  | 1998/04/24 | Toboggan Creek | F   | W          | 737              | N       | 4.2+     |                   |
| 40509      | 1        | OS00588  | 1998/04/24 | Toboggan Creek | M   | W          | 724              | N       | 4.2+     |                   |
| 40509      | 2        | OS00589  | 1998/04/24 | Toboggan Creek | M   | W          | 711              | N       | R.2+     |                   |
| 40509      | 3        | OS00590  | 1998/04/24 | Toboggan Creek | M   | W          | 737              | N       | 3.2+     |                   |
| 40509      | 4        | OS00591  | 1998/04/24 | Toboggan Creek | M   | W          | 546              | N       | 5.1+     |                   |
| 40509      | 5        | OS00592  | 1998/04/25 | Toboggan Creek | F   | W          | 686              | N       | 3.2+     |                   |
| 40510      | 1        | OS00593  | 1998/04/25 | Toboggan Creek | M   | W          | 749              | N       | R.1S1+   |                   |
| 40510      | 2        | OS00595  | 1998/04/25 | Toboggan Creek | F   | W          | 749              | N       | 4.2+     |                   |
| 40510      | 3        | OS00596  | 1998/04/26 | Toboggan Creek | M   | W          | 889              | N       | 4.3+     |                   |
| 40510      | 4        | OS00597  | 1998/04/27 | Toboggan Creek | M   | W          | 610              | N       | 3.1+     |                   |
| 40510      | 5        | OS00598  | 1998/04/27 | Toboggan Creek | M   | W          | 775              | N       | R.2+     |                   |
| 40511      | 1        | OS00599  | 1998/04/27 | Toboggan Creek | F   | W          | 749              | N       | 4.2+     |                   |
| 40511      | 2        | OS00600  | 1998/04/28 | Toboggan Creek | M   | W          | 559              | N       | R.1+     |                   |
| 40511      | 3        | OS00873  | 1998/04/28 | Toboggan Creek | M   | W          | 762              | N       | 4.2+     |                   |
| 40511      | 4        | OS00872  | 1998/04/28 | Toboggan Creek | M   | W          | 737              | N       | 3.2+     |                   |
| 40511      | 5        | OS00871  | 1998/04/28 | Toboggan Creek | M   | W          | 762              | N       | 3.2+     |                   |
| 40512      | 1        | OS00870  | 1998/04/28 | Toboggan Creek | F   | W          | 787              | N       | 4.2+     |                   |
| 40512      | 2        | OS00869  | 1998/04/28 | Toboggan Creek | F   | W          | 686              | N       |          | REGENERATED SCALE |
| 40512      | 3        | OS00868  | 1998/04/28 | Toboggan Creek | M   | W          | 864              | N       | 4.3+     |                   |
| 40512      | 4        | OS00867  | 1998/04/28 | Toboggan Creek | M   | W          | 584              | N       | R.1+     |                   |
| 40512      | 5        | OS00866  | 1998/04/29 | Toboggan Creek | F   | W          | 673              | N       | R.2+     |                   |
| 40513      | 1        | OS00865  | 1998/04/29 | Toboggan Creek | F   | W          | 724              | N       | 5.2+     |                   |
| 40513      | 2        | OS00864  | 1998/04/29 | Toboggan Creek | M   | W          | 686              | N       | 4.1S1+   |                   |
| 40513      | 3        | OS00863  | 1998/04/29 | Toboggan Creek | M   | W          | 800              | N       | 5.1S1S1+ |                   |
| 40513      | 4        | OS00862  | 1998/04/29 | Toboggan Creek | F   | W          | 737              | N       | 3.2+     |                   |
| 40513      | 5        | OS00861  | 1998/04/29 | Toboggan Creek | F   | W          | 673              | N       | R.2+     |                   |
| 40514      | 1        | OS00860  | 1998/04/29 | Toboggan Creek | M   | W          | 635              | N       | 4.1S1+   |                   |
| 40514      | 2        | OS00859  | 1998/04/29 | Toboggan Creek | M   | W          | 813              | N       | 4.2+     |                   |
| 40514      | 3        | OS00858  | 1998/04/29 | Toboggan Creek | M   | W          | 800              | N       | 4.2+     |                   |
| 40514      | 4        | OS00857  | 1998/04/29 | Toboggan Creek | M   | W          | 508              | N       | 4.1+     |                   |
| 40514      | 5        | OS00856  | 1998/04/30 | Toboggan Creek | M   | W          | 864              | N       | 4.2+     |                   |
| 40515      | 1        | OS00855  | 1998/04/30 | Toboggan Creek | M   | W          | 495              | N       | 4.1+     |                   |
| 40515      | 2        | OS00854  | 1998/04/30 | Toboggan Creek | F   | W          | 699              | N       | 3.2+     |                   |
| 40515      | 3        | OS00853  | 1998/04/30 | Toboggan Creek | M   | W          | 762              | N       | 4.2+     |                   |
| 40515      | 4        | OS00852  | 1998/04/30 | Toboggan Creek | F   | W          | 737              | N       | 4.2+     |                   |
| 40515      | 5        | ON03851  | 1998/05/01 | Toboggan Creek | M   | W          | 330              | N       | R.3+     |                   |
| 40516      | 1        | ON03852  | 1998/05/01 | Toboggan Creek | M   | W          | 749              | N       | R.2+     |                   |
| 40516      | 2        | ON03853  | 1998/05/01 | Toboggan Creek | M   | W          | 724              | N       | 3.2+     |                   |
| 40516      | 3        | ON03854  | 1998/05/01 | Toboggan Creek | M   | W          | 762              | N       | 4.2+     |                   |
| 40516      | 4        | ON03855  | 1998/05/01 | Toboggan Creek | F   | W          | 724              | N       | 4.2+     |                   |
| 40516      | 5        | ON03856  | 1998/05/01 | Toboggan Creek | M   | W          | 572              | N       | 3.1+     |                   |

|       |   |         |            |                |   |   |     |   |      |
|-------|---|---------|------------|----------------|---|---|-----|---|------|
| 40517 | 1 | ON03857 | 1998/05/01 | Toboggan Creek | F | W | 559 | N | 3.1+ |
| 40517 | 2 | ON03858 | 1998/05/01 | Toboggan Creek | F | W | 686 | N | 4.2+ |
| 40517 | 3 | ON03859 | 1998/05/01 | Toboggan Creek | M | W | 711 | N | 4.2+ |
| 40517 | 4 | ON03860 | 1998/05/02 | Toboggan Creek | F | W | 762 | N | 4.2+ |
| 40517 | 5 | ON03861 | 1998/05/02 | Toboggan Creek | F | W | 686 | N | 3.2+ |
| 40518 | 1 | ON03862 | 1998/05/02 | Toboggan Creek | F | W | 648 | N | 3.2+ |
| 40518 | 2 | ON03863 | 1998/05/02 | Toboggan Creek | F | W | 787 | N | 3.3+ |
| 40518 | 3 | ON03864 | 1998/05/02 | Toboggan Creek | F | W | 686 | N | 3.2+ |
| 40518 | 4 | ON03865 | 1998/05/02 | Toboggan Creek | M | W | 914 | N | 5.3+ |
| 40518 | 5 | ON03866 | 1998/05/02 | Toboggan Creek | F | W | 749 | N | 5.2+ |
| 40519 | 1 | ON03867 | 1998/05/02 | Toboggan Creek | F | W | 749 | N | 3.2+ |
| 40519 | 2 | ON03868 | 1998/05/02 | Toboggan Creek | F | W | 711 | N | 3.2+ |
| 40519 | 3 | ON03869 | 1998/05/02 | Toboggan Creek | M | W | 635 | N | 4.1+ |
| 40519 | 4 | ON03870 | 1998/05/02 | Toboggan Creek | M | W | 508 | N | R.1+ |
| 40519 | 5 | ON03871 | 1998/05/02 | Toboggan Creek | F | W | 648 | N | R.2+ |
| 40520 | 1 | ON03872 | 1998/05/02 | Toboggan Creek | M | W | 787 | N | 3.2+ |
| 40520 | 2 | ON03873 | 1998/05/02 | Toboggan Creek | F | W | 711 | N | 5.2+ |
| 40520 | 3 | ON03874 | 1998/05/02 | Toboggan Creek | M | W | 597 | N | 5.1+ |
| 40520 | 4 | ON03875 | 1998/05/03 | Toboggan Creek | F | W | 699 | N | R.2+ |
| 40520 | 5 | ON03876 | 1998/05/03 | Toboggan Creek | M | W | 889 | N | 5.3+ |
| 40521 | 1 | ON03877 | 1998/05/03 | Toboggan Creek | F | W | 724 | N | R.2+ |
| 40521 | 2 | ON03878 | 1998/05/03 | Toboggan Creek | M | W | 559 | N | 3.1+ |
| 40521 | 3 | ON03879 | 1998/05/03 | Toboggan Creek | F | W | 737 | N | 4.2+ |
| 40521 | 4 | ON03880 | 1998/05/04 | Toboggan Creek | F | W | 762 | N | 3.2+ |
| 40521 | 5 | ON03881 | 1998/05/04 | Toboggan Creek | F | W | 724 | N | 4.2+ |
| 40522 | 1 | ON03882 | 1998/05/04 | Toboggan Creek | M | W | 762 | N | 4.2+ |
| 40522 | 2 | ON03883 | 1998/05/04 | Toboggan Creek | M | W | 711 | N | 4.2+ |
| 40522 | 3 | ON03884 | 1998/05/04 | Toboggan Creek | F | W | 686 | N | 3.2+ |
| 40522 | 4 | ON03885 | 1998/05/04 | Toboggan Creek | F | W | 711 | N | 3.2+ |
| 40522 | 5 | ON03886 | 1998/05/04 | Toboggan Creek | F | W | 673 | N | 4.2+ |
| 40523 | 1 | ON03887 | 1998/05/04 | Toboggan Creek | F | W | 673 | N | 3.2+ |
| 40523 | 2 | ON03888 | 1998/05/04 | Toboggan Creek | F | W | 711 | N | 5.2+ |
| 40523 | 3 | ON03889 | 1998/05/05 | Toboggan Creek | F | W | 737 | N | 3.2+ |
| 40523 | 4 | ON03890 | 1998/05/05 | Toboggan Creek | F | W | 635 | N | 3.2+ |
| 40523 | 5 | ON03891 | 1998/05/05 | Toboggan Creek | F | W | 737 | N | 4.2+ |
| 40524 | 1 | ON03892 | 1998/05/05 | Toboggan Creek | F | W | 737 | N | 4.2+ |
| 40524 | 2 | ON03893 | 1998/05/05 | Toboggan Creek | M | W | 749 | N | R.2+ |
| 40524 | 3 | ON03894 | 1998/05/05 | Toboggan Creek | M | W | 838 | N | 4.2+ |
| 40524 | 4 | ON03895 | 1998/05/05 | Toboggan Creek | F | W | 686 | N | 4.2+ |
| 40524 | 5 | ON03896 | 1998/05/06 | Toboggan Creek | M | W | 838 | N | 4.2+ |
| 40525 | 1 | ON03898 | 1998/05/06 | Toboggan Creek | F | W | 749 | N | 3.2+ |
| 40525 | 2 | ON03899 | 1998/05/06 | Toboggan Creek | M | W | 762 | N | 4.2+ |
| 40525 | 3 | ON03900 | 1998/05/06 | Toboggan Creek | M | W | 851 | N | 4.2+ |
| 40525 | 4 | ON05101 | 1998/05/06 | Toboggan Creek | F | W | 749 | N | 5.2+ |
| 40525 | 5 | ON05102 | 1998/05/06 | Toboggan Creek | F | W | 559 | N | 5.1+ |
| 40526 | 1 | ON05103 | 1998/05/06 | Toboggan Creek | M | W | 533 | N | R.1+ |
| 40526 | 2 | ON05104 | 1998/05/06 | Toboggan Creek | M | W | 521 | N | 3.1+ |
| 40526 | 3 | ON05105 | 1998/05/06 | Toboggan Creek | F | W | 533 | N | 3.2+ |
| 40526 | 4 | ON05106 | 1998/05/06 | Toboggan Creek | F | W | 686 | N | 4.2+ |
| 40526 | 5 | ON05107 | 1998/05/06 | Toboggan Creek | M | W | 813 | N | 4.2+ |
| 40527 | 1 | ON05113 | 1998/05/07 | Toboggan Creek | M | W | 787 | N | 3.2+ |
| 40527 | 2 | ON05114 | 1998/05/07 | Toboggan Creek | F | W | 699 | N | 3.2+ |
| 40527 | 3 | ON05115 | 1998/05/07 | Toboggan Creek | M | W | 813 | N | 4.2+ |
| 40527 | 4 | ON05116 | 1998/05/07 | Toboggan Creek | F | W | 673 | N | 3.2+ |
| 40527 | 5 | ON05118 | 1998/05/07 | Toboggan Creek | F | W | 635 | N | 4.2+ |
| 40528 | 1 | ON05119 | 1998/05/07 | Toboggan Creek | F | W | 699 | N | R.2+ |
| 40528 | 2 | ON05120 | 1998/05/07 | Toboggan Creek | F | W | 737 | N | 3.2+ |

|       |   |         |            |                |   |   |     |   |        |
|-------|---|---------|------------|----------------|---|---|-----|---|--------|
| 40528 | 3 | ON05122 | 1998/05/11 | Toboggan Creek | F | W | 686 | N | 3.2+   |
| 40528 | 4 | ON05132 | 1998/05/12 | Toboggan Creek | F | W | 699 | N | 5.2+   |
| 40528 | 5 | ON05138 | 1998/05/12 | Toboggan Creek | F | W | 724 | N | 4.2+   |
| 40529 | 1 | ON05140 | 1998/05/12 | Toboggan Creek | F | W | 724 | N | 3.2+   |
| 40529 | 2 | ON05143 | 1998/05/12 | Toboggan Creek | F | W | 749 | N | 4.2+   |
| 40529 | 3 | ON05146 | 1998/05/12 | Toboggan Creek | M | W | 787 | N | 4.2+   |
| 40529 | 4 | ON05148 | 1998/05/12 | Toboggan Creek | F | W | 699 | N | 3.2+   |
| 40529 | 5 | ON05172 | 1998/05/17 | Toboggan Creek | F | W | 762 | N | 4.2+   |
| 40530 | 1 | na      | 1998/05/19 | Toboggan Creek | F | W | 838 | N | 4.2S1+ |
| 40530 | 2 | ON08333 | 1998/05/19 | Toboggan Creek | F | W | 572 | N | 5.1+   |
| 40530 | 3 | na      | 1998/05/19 | Toboggan Creek | M | W | 648 | N | 3.1S1+ |
| 40530 | 4 | na      | 1998/05/19 | Toboggan Creek | F | W | 711 | N | 3.2+   |
| 40530 | 5 | na      | 1998/05/19 | Toboggan Creek | F | W | 838 | N | 3.3+   |
| 40531 | 1 | na      | 1998/05/19 | Toboggan Creek | M | W | 800 | N | 4.2+   |
| 40531 | 2 | na      | 1998/05/19 | Toboggan Creek | F | W | 724 | N | 3.2+   |
| 40531 | 3 | na      | 1998/05/19 | Toboggan Creek | F | W | 648 | N | 3.2+   |
| 40531 | 4 | na      | 1998/05/19 | Toboggan Creek | M | W | 737 | N | 3.2+   |
| 40531 | 5 | na      | 1998/05/19 | Toboggan Creek | F | W | 584 | N | 4.1+   |
| 40532 | 1 | na      | 1998/05/19 | Toboggan Creek | M | W | 584 | N | 4.1+   |
| 40532 | 2 | na      | 1998/05/19 | Toboggan Creek | M | W | 538 | N | 4.1+   |
| 40532 | 3 | na      | 1998/05/19 | Toboggan Creek | F | W | 724 | N | 4.2+   |
| 40532 | 4 | na      | 1998/05/19 | Toboggan Creek | F | W | 648 | N | 3.2+   |
| 40532 | 5 | na      | 1998/05/19 | Toboggan Creek | M | W | 584 | N | R.1+   |
| 40533 | 1 | na      | 1998/05/19 | Toboggan Creek | M | W | 483 | N | 3.1+   |
| 40533 | 2 | na      | 1998/05/19 | Toboggan Creek | F | W | 686 | N | 4.2+   |
| 40533 | 3 | na      | 1998/05/19 | Toboggan Creek | M | W | 533 | N | 4.1+   |
| 40533 | 4 | na      | 1998/05/19 | Toboggan Creek | M | W | 521 | N | 4.1+   |
| 40533 | 5 | na      | 1998/05/19 | Toboggan Creek | F | W | 673 | N | 3.2+   |

Appendix E. Copies of field notes.

APRIL 21/98 15:45

① WM 29 1/2" SB 40507 R1  
500578

② WF 28 1/2" SB 40507 R2  
500579

③ WF 31" SB 40507 R3  
500580

④ WM 31" SB 40507 R4  
500581

1 1/2 HRS

APRIL 22/98

⑤ WM 30" SB 40507 R5  
500582

⑥ WF 26" SB 40508 R1  
500583

⑦ WM 28" SB 40508 R2  
500584

⑧ WM 30" SB 40508 R3  
500585

APRIL 25/98 09:00

⑮ WF 27" SB 40509 R5  
500592

⑯ WM P.T. MOE NO 4689  
500593 SB 40510 R1

29 1/2"

(COST 594)  
⑰ WF 27 1/2" SB 40510 R2  
500595

APRIL 26/98 18:30

⑱ WM 35" SB 40510 R3  
500596

APRIL 27/98 17:30

⑲ WM 24" SB 40510 R4  
500597

⑳ WM 20 1/2" SB 40510 R5  
500598

㉑ WF 29 1/2" SB 40511 R1  
500599 head scar, damaged  
tail

⑨ WM 3 1/2" SB 40508 R4  
500586

⑩ WF 29" SB 40508 R5  
500587

⑪ WM 28 1/2" SB 40509 R1  
500588

⑫ WM 29" SB 40509 R2  
500589

⑬ WM 29" SB 40509 R2  
500590

⑭ WM 21 1/2" SB 40509 R4  
500591

April 28/98

⑯ WM 22" SB 40511 R2  
500600

⑰ WM 30" SB 40511 R3  
500873

⑱ WM RT NO 7822 MOE  
500874 29" SB 40511 R4  
\* (500872)

⑲ WM 30" SB 40511 R5  
\* 500875  
(500871)

⑳ WF 31" SP 40512 R1  
\* 500876  
(500870)

㉑ WF 27" SB 40512 R2  
\* 500877  
(500869)

㉒ WM 34" SB 40512 R3  
\* 500878  
(500868)

㉓ WM 23" SB 40512 R4  
\* 500879 (500867)  
APRIL 29/98 ✓

⑳ WF 26 1/2" SB 40512 R5  
DANAGKO DORSAL FIN  
500866

APR 29/98 (cont)

(31) WM 28 1/2" SB 40513 R1 500865

(32) WM 27" SB 40513 R2 500864

P.M.

(33) WM 3 1/2" SB 40513 R3 500863

(34) WF 29" SB 40513 R4 500862

(35) WF 26 1/2" SB 40513 R5 500861

(36) WM 25" SB 40514 R1 500860

(37) WM 28" SB 40514 R2 500859

(38) WM 3 1/2" SB 40514 R3 500858

(39) WM 20" SB 40514 R4 500857

(48) WM 30" SB 40516 R3 NO 3855

(49) WF 28 1/2" SB 40516 R4 NO 3855

(50) WM 22 1/2" SB 40516 R5 NO 3856

(51) WF 22" SB 40517 R1 NO 3857 blind in right eye

P.M.

(52) WF 27" SB 40517 R2 NO 3858

(53) WM 28" SB 40517 R3 NO 3859

✓

MAY 02/98 A.M

50 WF 30" SB 40517 R4  
NO 3860

55 WF-27" SB 40517 R5  
NO 3861

56 WF-25 1/2" SP 40518 R1  
NO 3862

57 WF-31" SB 40518 R2  
NO 3863

58 WF-27" SB 40518 R3  
NO 3864

59 WA-36" SB 40518 R4  
NO 3865

60 WF-29 1/2" SB 40518 R5  
NO 3866

61 WF-29 1/2" SB 40519 R1  
NO 3867 P.M.

62 WF-28" SB 40519 R2  
NO 3868

April 30/98

40 WM 34" SB 40514 R5  
NO 3856

41 WM 19 1/2" SB 40515 R1  
NO 3855

42 WF 27 1/2" SB 40515 R2  
NO 3854

43 WM 30" SB 40515 R3  
NO 3853

44 WF 29" SB 40515 R4  
NO 3852

MAY 1/98

45 WM 13" SB 40515 R5  
NO 3851

46 WM 29 1/2" SB 40516 R1  
NO 3852

47 WM 29 1/2" SB 40516 R2  
NO 3853



62 WM-25" SB 40519 R3  
# 3869

63 WM-20" SB 40519 R4  
# 3870

P.M

65 WF 25 1/2" SB 40519 R3  
NO 3871

66 WM 31" SB 40520 R1  
NO 3872

67 WF 28" SB 40520 R2  
NO 3873

68 WM 23 1/2" SB 40520 R3  
NO 3874

Major OK/98 cont'd.

76 WM 30" SB 40522 R1  
NO 3882

77 WM 28" SB 40522 R2  
NO 3883

78 WF (kelt) 27" SB 40522 R3  
NO 3884

79 WF 28" SB 40522 R4  
NO 3885 seal bit tail

80 WF 26 1/2" SB 40522 R5  
NO 3886

81 WF 26 1/2" SB 40523 R1  
NO 3887

82 WF 28" SB 40523 R2  
NO 3888 damaged tail

Major 05/98 (P.M)

83 WF 29" SB 40523 R3  
NO 3889

84 WF 25" SB 40523 R1  
NO 3890

MAY 03/98 (AM)  
69) WF 27 1/2" SB 40520 R4  
NO 3895

70) WM 35" SB 40520 R5  
NO 3876

71) WF 28 1/2" SB 40521 R1  
NO 3877

72) WM 22" SB 40521 R2  
NO 3878

73) WF 29" SB 40521 R3  
NO 3879

NOV 04/98 (AM)

74) WF 30" SB 40521 R4  
NO 3880 (rip) bit too

75) WF 28 1/2" SB 40521 R5  
NO 3881 seal bit too

85) WF 29" SB 40523 R5  
NO 3891 (ripe)

86) WF 29" SB 40524 R1  
NO 3892

87) WM 29 1/2" SB 40521 R2  
NO 3893

88) WM 33" SB 40521 R3  
NO 3894

89) WF 27" SB 40521 R4  
NO 3895

MAY 06/98 (AM) cloudy:

90) WM - 33" SB 40524 R5  
NO 3826 TRAIL RITE  
(LOST NO 3897)

91) WF - 29 1/2" SB 40525 R1  
NO 3898

92) WM - 30" SB 40525 R2  
NO 3899

93) WM - 33 1/2" SB 40525 R3  
NO 3900

94) WF 29 1/2" SB 40525 R4  
NO 5101

cloudy. MAY 07/98 (PM).

- WM 31" SB 40527 R1  
NO 5113
- WF 87 moe NO5081 SB 40527 R2  
NO 5114 27 1/2" photo #4
- WM 32" SB 40527 R3  
NO 5115
- WF 26 1/2" SB 40527 R4  
NO 5116 and NO 5117
- WF 25" SB 40527 R5  
NO 5118
- WF 27 1/2" SB 40528 R1  
NO 5119
- WF (left) 29" SB 40528 R2  
NO 5120

- 95 WF-22 SB 40525 R5  
NO 5102
- 96 WM-21 SB 40526 R1  
NO 5103
- 97 WM-20 1/2 SB 40526 R2  
NO 5104
- 98 WF-21 SB 40526 R3  
NO 5105

(PM) partly cloudy  
 99 WF-27" SB 40526 R4  
 NO 5106. seal damaged  
 (check right eye)

- 100 WM-32" SB 40526 R5  
NO 5107
- 101 WF-27" - NO scales  
NO 5108
- WF-28" NO 5109
- WM-30" NO 5110
- WF-27 1/2" NO 5111
- WF-26 1/2" NO 5112

Overcast, cloudy, light wind \* upstream  
May 11/98 (AM)

WM 29" TAH # N05181  
partly spawed no. (etc.)

WF 27" 00380 (monoclonal loc) orange.  
TAS # N05122  
SIS 40528  
POW 3

WF 24.5" TAH # N05123.  
Seal bit tail - upper lobe

Helix May 11/98 (AM)  
WF NTNP 27.5"  
Tas # N05124  
Returned downstream

WF NTNP 28.5"  
Tas # N05125  
hook score light max 1/2  
Returned downstream

WM NTNP 32.5"  
Tas # N05126  
Returned downstream

(RAIN) MAY 12/99

\* \* NO 5126

WF - 5040528 R4 NO 5132  
27 1/2

WF 26 1/2 NO 5133

P.M (CLOWD)

WF 27 1/2 NO 5134

WM 17 1/2 NO 5135

WM 22 NO 5136  
seal bite on top of dorsal

WM 29 1/2 NO 5137

WF 28 1/2 NO 5138  
SB 40528 RS

WF 26 NO 5139

WF 28 1/2 NO 5140  
5040529 K1

WF 30 1/2 NO 5141  
~~strip of tail~~ dorsal chewed

MAY 11/98 (cont)

WF TP 500579  
Returned downstream  
seal bit tail

WF NTNP 30"  
Tag # NO 5127  
Returned downstream

WF TP 500587  
Returned downstream

WF NTNP 26.5"  
Tag # NO 5128  
Returned downstream

WF NTNP 26.5"  
Tag # NO 5129  
Returned downstream  
Seal bit tail - upper lobe

WF NTNP 30.5"  
Tag # NO 5130  
Returned downstream

WM NO 5113  
TP returned downstream

WM TP  
500598 returned downstream

WM 30 1/2" NO5142  
top of dorsal chewed

WF 29 1/2" NO5143  
SB 40529 R2

WM 31" NO5144  
top of tail chewed

WM 30 1/2" NO5145

WM 31" NO5146  
dorsal damage SB 40529 R3

WF 31 1/2" NO5147

WF 27 1/2" NO5148  
SB 40529 R4

May 11/99  
WM NINP 28" (cont)  
Tag # NO5131  
Released & mishandled

12 fish (4 TP / 8 NTNP).

\* Held the 3 run fish in bag  
until felt sampling was complete.

(Cloud) MAY 13/98

WF 29 NO 5149

MAY 14/98  
Results of seiwings

NO 5146 returned d/s ♀ TP  
NO 5137 returned d/s ♂ TP  
NO 5115 returned d/s ♂ TP  
NO 5150 WM 33" NTNP  
- returned d/s

NO 5151 WF NTNP 26.5"  
- seal bit fin (rt pedrad)  
- returned d/s

NO 5152 WF NTNP 26"  
- returned d/s

NO 5153 WF NTNP 28"  
- returned d/s

NO 5154 WF NTNP 26"  
- Hook scar - left nostril  
- returned d/s

NO 3866 returned d/s ♀ TP

500593 (NO 1889) - returned d/s ♂ TP

NO 3875 TP ♀ returned d/s

NO 3898 TP ♀ returned d/s

NO 5155 NTNP ♀ WF 30"

- Hook scar rt maxilla  
- seal bite top libe covered  
- returned d/s

May 14/98  
(cont)

NO 3896 TP WM

- returned deminstration

NO 5164 WF NTNP 31"

- hook scar left maxilla  
- returned d/s

500851 TP WF

NO 3884 TP WF

NO 5165 NTNP WF 26"

- Hook scar left maxilla  
- returned d/s

NO 5166 NTNP WF 30.5"

- returned d/s

NO 5167 NTNP WF 29.0"

- returned d/s

NO 5168 NTNP WM 31.5"

- hook scar rt mandible  
- returned d/s

NO 3860 WF TP

MAY 15/98

POSS. - kept on panels

♀ NO 3871

NO5156 WF NTNP 26.5"  
-returned d/s

NO5161 TP WF  
-hook scar rt maxilla  
-returned d/s

NO5157 WF NTNP 26"  
-Hook scar (small) rt maxilla  
-returned d/s

NO5158 WF NTNP 29"  
-returned d/s

NO5159 WM NTNP 28"  
-returned d/s

NO3862 TP WF  
-returned d/s

NO5160 WM NTNP 30"  
-returned d/s

NO5161 WF NTNP 28"  
-returned d/s

NO5162 WF NTNP 29"  
-returned d/s

NO5163 WF NTNP 30"  
-returned d/s



MAY 16/98

WF 22" NO 5169 (RAIN)

MAY 17/98 (CLOUD)

(DOWNSTREAM) PT # NO 5160 WM

WF 27" NO 5170

WF 29" NO 5171

WF 30" NO 5172  
SB 40529 RS

WF 27" NO 5173

WM 23" NO 5174

Wise Sunny - Warm MAY 19/98

Going upstream  
WM NTNP 21.5"

\* Tag # NO 5175

Tagged & punch  
Blind in left eye due to hook  
damage

Returning downstream

NO 9987 (maxi-tannin - left hand side  
orange NTNP WM dorsal)  
Add NO 8386 to this fish  
returned d/s 21"

NO 3882 TP WM  
returned d/s

NO 3861 WF TP

NTNP NO 8327 WM 28"  
returned d/s

NO 5148 TP WF  
returned d/s

NTNP NO 8328 WF 29"  
seed blue top lobe of tail  
returned d/s

May 19 1988  
Proct

NO3868 TP WM  
returned d/s

NO4835 Af NTNP 33'  
Hatchery fishy tagged  
- returned d/s couple years ago

NO5121 WM TP  
- returned d/s

same fish  
SB 40830 Row 1  
for NO4835  
NO8329 added to this female

NTNP WF 27.5"  
add tag NO8330  
returned d/s

NO5578 TP WM  
returned d/s

NTNP WM 30.5"  
add NO8331 tag  
returned d/s

NTNP NO8332 WF 27.5"  
returned d/s

MAY 21/98

In trap some u/s

NO 5160 WM (put d/s previously)  
returned d/s P.T.

NO 8282 - WM - NTNP 27"

500590 - WM - TP

500600 - WM - TP

NO 5123 - WF - TP

NO 8283 - WF - NTNP 31"

500599 - WF - TP

NO 8284 - WF - TP 27"  
(lost original tag)

NO 5102 - WF - TP

NO 7822 / 500872 - TP WM

NO 5001 / NO 5114 - TP WF

500867 - WM TP

MAY 19 98

TP 500869 WF  
returned d/s

TP NO 3880 WF  
returned d/s

\* NTNP NO 8333 WF 22.5"  
\* X Trashing u/s and so release upstream  
of fence.

S/S 40.530 Row 2.

NTNP NO 5642 WM 33"  
returned d/s

NTNP NO 5643 WF 26"  
returned d/s

NO 3885 WF TP

NO 5644 NTNP WF 28.5"

NO 5645 NTNP WF 28"

NO 5646 NTNP WF 29"

NO 5647 NTNP WF 27"

NO 5147 TP WF

NO 5648 NTNP WF 30"

May 19/98

N05111 WF TP

N05649 WF NTNP 27"

S00589 WM TP

N05650 WM NTNP 30.5"

N08280 WF NTNP 27"

N04982 WM NTNP 25.5"  
(Paw. 105) SB40530 R.B.

N08281 WF NTNP 26.5"

(dead patch) WM NTNP 29.5"

~~32 ft (12 TP / 20 NTNP)~~

May 15 - Ron Sumoto

(dead patch) WF # N03871

N08285 - NTNP - WF 27.5"

S00582 - WM - TP

N05142 - WM - TP

N07471 - WF - NTNP 28"  
(% pruned by (tagged)  
SB40530 - TP)

N08286 - WF - NTNP - 33"  
SB40520 - TP)

S00858 - WM - TP

N05104 - WM - TP

N08287 - WM - NTNP 23.5"

S00866 - WF - TP

N05118 - WF - TP

S00860 - WM - TP

S00586 - WM - TP

N05172 - WF - TP

N08288 - WM - NTNP 24"

N08289 - WM - NTNP 31.5"  
(SBH0531-R1)

N08290 - WM - NTNP 23.5"

N03863 - WF - TP

N08291 - WF - NTNP 28.5"

N03900 - WM - TP

\* N07880 - WF - TP ?

N08292 - WF - NTNP 28.5"  
(SBH0531-R2)

N08293 - WF - NTNP - 25.5"  
(SBH0531-R3)

N08294 - WF - NTNP - 27"  
*dorsal damage*

N03898 - WF - TP

N08295 - WF - NTNP - 29.5"

N03888 - WF - TP

WF 27" MAY 22/98 (SUNNY)  
N08296

WM 21" MAY 23/98 N08297  
PT (WM RDS.T. N08289)  
WM 22.5" N08298  
WF 26" N08299

10:00 AM MAY 24/98 HIGH OVERCAST bright  
WF 26.5" mostly spawning part down stream up stream  
WM 21" N08300 N05176

GOING DOWN

WF TP 500854  
WF TP N05170  
WF TP N03887  
WM NTNP 30.5" N05177  
WM TP N003865

WM NTNP 28" N05178  
WF TP N05112  
WF NTNP 27" N05171

WF NTNP 28.5" N05180 Hook  
WM NTNP 30" N05181 Seal  
WF NTNP 26.5" N05182 Hook  
WM NTNP 25.5" N05183 Seal  
WF TP N05133 Hook  
WM NTNP 29.5" N05184 Hook Seal (B16)

May 25 - Por S.  
 (hard-pitch) - WM # N03853

(MAY 24 cont.)

|    |      |         |        |                           |
|----|------|---------|--------|---------------------------|
| WF | NTNP | 27"     | N05185 | snag mark<br>left side.   |
| WM | TP   |         | S00871 | ✓                         |
| WF | NTNP | 25 1/2" | N05184 |                           |
| WF | NTNP | 29"     | N05187 | partial<br>bite seal      |
| WF | TP   |         | N05138 | seal bite                 |
| WF | NTNP | 30 1/2" | N05188 | tail                      |
| WM | TP   |         | S00857 |                           |
| WF | NTNP | 26 1/2" | N05181 | Gill net<br>marks on back |
| WM | NTNP | 23"     | N05150 |                           |
| WF | PNF  | 27 1/2" | N05191 |                           |
| WF | TP   |         | S00862 |                           |
| WF | NTNP | 29 1/2" | N05192 |                           |
| WM | NTNP | 30"     | N05193 | Gill net<br>Hook Seal     |
| WM | NTNP | 29"     | N05194 | Gill net                  |
| WM | NTNP | 28 1/2" | N05195 | Gill net                  |
| WM | NTNP | 23"     | N05196 | Gill net                  |
| WF | TP   |         | N03864 |                           |
| WF | TP   |         | N05129 |                           |

(upstream) May 25/48 cloud/sun.

|    |        |  |        |         |
|----|--------|--|--------|---------|
| WM | eye    |  | N05197 |         |
| WF | 29     |  | N05198 | partial |
| WF | 29     |  | N05199 |         |
| WM | 21     |  | N05200 |         |
| WM | 23     |  | 019155 |         |
| WM | 22 1/2 |  | 019156 |         |
| WF | 26 1/3 |  | 019157 |         |
| WF | 28     |  | 019158 |         |
| WF | 26     |  | 019159 |         |

JUNE 04/98 sunny

DEAD PITCH NO 5159  
(tagged as KEH May 4)

JUNE 05/98

DEAD PITCH NTNP  
WF 222"

DEAD PITCH NTNP  
WM 30 1/8"

DEAD PITCH hook scar  
WM NO 5110 TP

JUNE 05 KEH SAMPLING sunny

WM SB 40531 R4 29"  
(102) NTNP COB715 (gill net marks)

WM NO SCALE 29 1/8  
(103) NTNP killed (gill net marks)

WM NO 5197  
TP

WM 23"  
(104) NTNP COB716 (gill net marks)

JUNE 05/98

WF NTNP COB725 27"  
(114) SB 40533 RA

WM NTNP COB726 21"  
(115) SB 40533 R3

19 kelts (4 TP / 15 NTNP)

WF SB40531 R5 23"  
(105) NTNP CO 6717 (Hook scar)

WM TP NO5200 21"  
106 NTNP CO 6718 (Hook scar)

WF SB40532 R1 23"  
(107) NTNP CO 6719

WF SB40533 R3 28 1/2"  
(108) NTNP CO 6719

WF SB40532 R4 (High barrel, legible)  
(109) NTNP CO 6720 19"  
~~SB40532 R4~~

WF SB40532 R5 23"  
(110) NTNP CO 6721 25 1/2" (gill net)

WF SB40532 R5 23"  
(111) NTNP CO 6722 (gill net)

WF SB40533 R1 19"  
(112) NTNP CO 6723 (large hook scar)

WF SB40533 R1 19"  
(113) NTNP CO 6724 (predator scar on p. fin)



Cloud/RAIN JUNE 09/98 (SEIGMAN)

WM NTNP 06727 30"  
(116)

WM NTNP 06728 20 1/2"  
(117) SB 40533R4

WM NTNP 06729 21"  
(118)

WM NTNP 06730 30" gill net  
(119)

WM NTNP 06731 23 1/2"  
(120)

WM NTNP 06732 29 1/2"  
(121)

WM NTNP 06733 31"  
(122)

WM NTNP 06734 22"  
(123)

WM NTNP 06735 28 1/2"  
(124)

WM NTNP 06736 22"  
(125)

June 15/95  
Cloudy, cool, overcast

TP NO 3872 - WM  
Released d/s

NTNP WF 06741 - 28 1/2 inch  
Released d/s

TP WM TCH  
01955

TP NO 3856 - WM

June 23/98

WM PT NO 5175

WM PT N03894

WM PT S00597

WM PT N08297

WM NTNP C06737 32" seal bite

(126)

WF NTNP C06738 28 1/2" damaged

(127)

WF TP <sup>new case</sup> 108-109 C06739 26 1/2" \*  
SB40533 R5

WM TP N05136

WF NTNP C06740 28"

(128)

WM NTNP (dead pitch)

WM NTNP

20 658 (5TP / 15 NTNP)