BC Environment

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Skeena Fisheries Report SK-124

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## Abstract

In 1998, the first abundance estimate of the summer steelhead escapement to the Nass River was estimated with mark-recapture methods. The preliminary estimate was exploratory in nature and the primary objective of the marking and recovery of steelhead was to conduct an assessment of the fishwheels. From July 1 to October 13, steelhead were marked with numbered Floy anchor tags and adipose fin clips at the Nass River fishwheels (application sample). The tags and fin clips distinguished marked from unmarked steelhead in the recovery sample, collected from the Bell-Irving, Cranberry, Kwinageese, and Meziadin rivers and Damdochax Creek and the upper Nass River (August 26 to November 25). Unbiased Petersen (Chapman's modification) and Bayesian mark-recapture estimators were used to calculate a preliminary estimate of the abundance of steelhead that migrated during fishwheel operations. Abundance was estimated under conditions of differential loss of marked fish resulting from capture and handling mortality and differential vulnerability to the Nisga'a fishery. Accordingly, Petersen and Bayesian estimators were calculated by reducing the number of fish marked in the application sample by 0%, 5%, 10%, 15% and 20%. Sampling selectivity was investigated by examining the spatial, size, age, and sex biases in the tag application and recovery samples and temporal bias in the recovery sample; however, none were detected.

For 1998, the Bayesian abundance estimate (mode) was 10,004 steelhead (95% confidence limits: 7,324-15,964 steelhead) and the Petersen abundance was 9,657 steelhead (95% confidence limits: 6,780-14,132 steelhead) when 10% of the marked steelhead were removed. Petersen mark-recapture estimates were consistently lower than the Bayesian modes which indicated the application and recovery samples may have been too small and the number of marked steelhead recovered may have been too small for accurate Petersen estimates. The Bayesian estimator is recommended under these conditions of small samples. The escapement estimates and confidence intervals provided must be interpreted cautiously.

The mean fork lengths of female steelhead ranged from 67.1 cm (fishwheels) to 73.1 cm (Damdochax Creek and the upper Nass River), and differed between locations (Kruskal-Wallis = 58.27, $P < 0.001$). The mean fork lengths of male steelhead ranged from 68.2 cm (fishwheels) to 75.2 cm (Damdochax Creek and the upper Nass River), and differed between locations (Kruskal-Wallis = 17.30, $P = 0.004$). Within each location, the fork lengths of male and female steelhead were statistically similar. The sex ratios were skewed to males in the Bell-Irving River, balanced at the Kwinageese River and fishwheels, and skewed toward females in the Meziadin River, Cranberry River, and Damdochax Creek and the upper Nass River. The mean smolt age of steelhead ranged from 3.21 years (Bell-Irving River) to 3.51 years (Meziadin River), and differed between locations (ANOVA, F = 4.17, $P = 0.001$). For most locations, the ocean age composition differed between sexes; females had relatively fewer ocean age 1+ fish than males. Repeat spawners were generally rare among steelhead with readable ocean ages and ranged from 6% (Damdochax Creek and the upper Nass River) to 16% (Meziadin River). The proportions of repeat spawners were generally higher than previous estimates for Nass River steelhead populations. Twenty-five (6%) of the 438 steelhead in the recovery sample were tagged at the fishwheels, however one (4%) had lost its tag. Of the 400 steelhead examined for condition, 23 (6%) had head wounds, 34 (9%) had gillnet marks, 66 (17%) had predator scars and 26 (7%) had hook scars.

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## 1.0.0.0 Introduction

On the Nass River, measuring the summer steelhead (*Oncorhynchus mykiss*) escapement is particularly important to ensure conservation goals are met and determine if surplus fish are available for Native and recreational sectors. For the Nass River, fishwheels were developed as the main stock assessment tool to estimate the in- and post-season abundance of salmon since 1992 (Bocking 1993; Link *et al.* 1993; Koski *et al.* 1996a, b; Link and English 1997; Link and Gurak 1997) and summer steelhead since 1994 (Link draft 1998).

The summer steelhead escapement to areas upstream of the fishwheels was expanded from period specific catches of steelhead and expansion factors at each fishwheel (Link draft 1998). Time periods were standardized for fishwheels 1 and 2 (July 1 to September 1) and fishwheels 3 and 4 (July 1 to September 3), which Link (draft 1998) assumed represented about 50% of the total escapement timing on average. The expansion factors were estimated for each year and each fishwheel from the marking of sockeye salmon (*O. nerka*) at the fishwheels during the month of August and their subsequent recovery at the Meziadin River fishway (Link draft 1998). The expansion factors varied annually because the catchability of sockeye salmon varied annually. Similarly, the catchability of sockeye salmon varied between fishwheels. In each year, separate steelhead abundance estimates were determined for each fishwheel, then the average of the estimates was the abundance estimate.

Link (draft 1998) and the Ministry of Environment, Lands and Parks (MELP) discussed the main assumptions regarding the use of the fishwheels to estimate the summer steelhead escapement. The discussions indicated a thorough assessment was needed of the assumptions and methods used to estimate the in- and post-season abundance of summer steelhead. Accordingly, a large scale program was initiated in 1998 with the primary objective to assess the use of the fishwheels to estimate the in- and post-season abundance of summer steelhead. Part of this program involved collecting measurements and marking steelhead at the fishwheels and later collecting measurements and examining steelhead for marks at the tributaries. The information and sampling design were appropriate to estimate the post-season abundance of the summer steelhead escapement with a different method (mark-recapture) as a secondary objective, which is the focus of this report.

The mark-recapture method will provide abundance estimates independent of the expansion factors estimated from sockeye salmon and the information will assist fishery managers with interpreting the abundance estimates based on the expansion factors. The objectives of the Nass River summer steelhead abundance component were:

1) to investigate sampling selectivity in the application and recovery samples by examining spatial, size, age, sex and temporal related bias, and tag loss bias;
2) to develop a preliminary estimate (accuracy = ±50%; Krebs 1989) of the summer steelhead escapement in 1998 with mark-recapture methods at the main tributaries;
3) and to estimate the summer steelhead escapement in 1998 and 1997 with mark-recapture methods at the Cranberry River.

The objectives of the summary of life history and other characteristics component were:

1) to examine the size, sex and age composition of steelhead between locations;
2) to examine the length-at-age of steelhead between locations;
3) to examine the sex, tag number and size of recaptured steelhead;
4) and to summarize observations of steelhead condition for each location.

## 2.0.0.0 Study Area

The Nass River originates in the Skeena Mountains of northwestern British Columbia and flows southwest for approximately 400 km into Portland Inlet (Figure 1). The Nass River watershed is the third largest watershed entirely contained within British Columbia and drains approximately 20,500 km$^2$ (Alexander and Koski 1995). The Nass River has nine main tributaries: Ishkheenickh, Tseax, Tchitin, Cranberry, White, Meziadin, Bell-Irving and Kwinageese rivers and Damdochax Creek. Common fish species in the Nass River watershed include sockeye salmon, chinook salmon (*O. tshawytscha*), coho salmon (*O. kisutch*), pink salmon (*O. gorbuscha*), chum salmon (*O. keta*), steelhead trout, cutthroat trout (*O. clarki*), Rocky Mountain whitefish (*Prosopium williamsoni*), bull char (*Salvelinus confluentus*), Dolly Varden char (*S. malma*), largescale sucker (*Catostomus macrocheilus*), redside shiner (*Richardsonius balteatus*), peamouth chub (*Mylocheilus caurinus*) and northern pikeminnow (*Ptychocheilus oregonesis*; McPhail and Carveth 1994). In contrast to the nearby Skeena River watershed, lake trout, (*S. namaycush*), lake whitefish (*Coregonus clupeaformis*), pygmy whitefish (*Prosopium coulteri*), lake chub (*Couesius plumbeus*), white sucker (*Catostomus commersoni*) and burbot (*Lota lota*) have not been reported in the Nass River watershed (McPhail and Carveth 1994). The Nass River watershed lies within two ecoprovinces (Coastal Mountains and Sub-Boreal Interior) and contains six biogeoclimatic zones: Alpine Tundra, Sub-Boreal Spruce, Engelmann Spruce-Subalpine Fir, Interior Cedar-Hemlock, Mountain Hemlock, Coastal Western Hemlock (Pojar and Nuzsdorfer 1988).

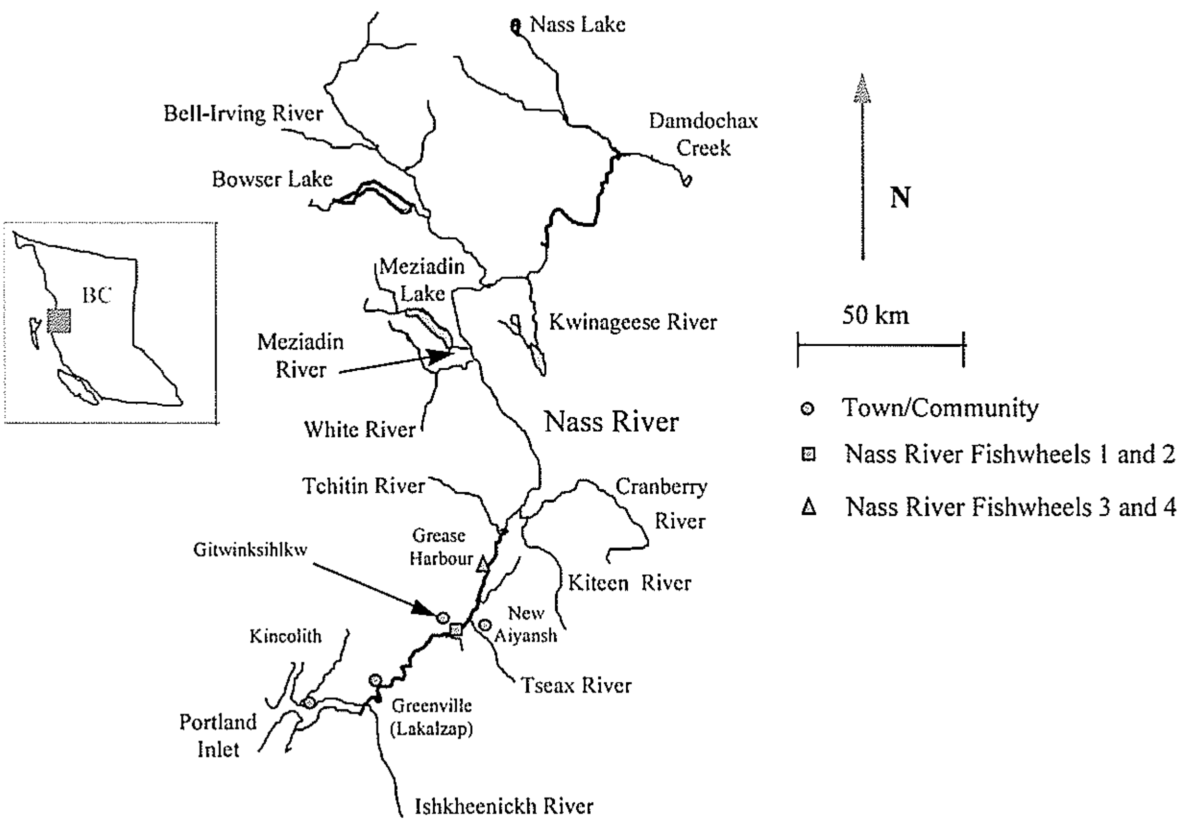


Figure 1. The Nass River watershed and major tributaries.

# 3.0.0.0 Methods

## *3.1.0.0 Steelhead Abundance Estimates*

Krebs (1989) described three general rules to follow when estimating the abundance of populations;

**Rule 1.** Evaluate your objectives before starting, and do not assume that mark-recapture methods are the easiest path to valid population estimates.

**Rule 2.** Pick your mark-recapture method before starting field work, and build into your sampling program a test of the models assumptions.

**Rule 3.** Treat all population estimates and confidence intervals with caution, and recheck your assumptions as often as possible.

The primary objective was to assess the use of the fishwheels to estimate the in- and post-season abundance of summer steelhead and the specific objectives of this study were described in the introduction. The preliminary mark-recapture estimate was intended to compliment the fishwheels assessment and provide an absolute abundance estimate for comparison. Thus, an estimate with ±50% accuracy was deemed appropriate for the comparison, and studies at this level of accuracy are termed preliminary surveys (Krebs 1989). The level of accuracy preferred for management (±25%) or research work (±10%; Krebs 1989) and the sampling design required to attain the higher accuracy was not compatible with the primary objective to assess the use of the fishwheels to estimate the in- and post-season abundance of summer steelhead and the specific objectives of this study were described in the introduction. The sample size goals for mark-recapture surveys described by Link (draft 1998) and Robson and Regier (1964) provided a guideline for sample size goals for the different Nass River summer steelhead populations. Link (draft 1998) recommended a range of sample sizes depending on different mark rates (fishwheel capture efficiencies), population sizes and levels of accuracy, whereas Robson and Regier (1964) provided sample size charts for the number of animals marked, recovered, the population size and the accuracy level. The sampling design was intended to develop a representative estimate from the main tributary populations and specific data were collected to test the assumptions of the mark-recapture method. The escapement estimates and confidence intervals provided must be interpreted cautiously.

The preliminary estimate of the escapement of summer steelhead to areas upstream of the fishwheels on the Nass River was calculated with mark-recapture methods. Steelhead were marked with numbered Floy anchor tags at the fishwheels and then recaptured upstream in the tributaries. These occasions refer to the application and recovery samples, respectively.

For the application sample, steelhead were captured at four fishwheels in the lower Nass River. Fishwheels 1 and 2 were located near Gitwinksihlkw and fishwheels 3 and 4 were located about 20 km upstream at Grease Harbour (Link draft 1998; Figure 1). The fishwheels did not operate for the same length of time due to low water level problems encountered in late September to early October (R. Alexander, personal communication). The operation of fishwheels 1 and 2 ended on September 17 and 20, respectively. Fishwheel 3 was not operating from August 15 to 17 or on August 30 and its operation ended on October 5. The operation of fishwheel 4 ended on October 13. All steelhead caught at the fishwheels before July 1, 1998 were assumed to be downstream migrating kelts or winter steelhead and they were not tagged.

During the application sample, steelhead were marked with a uniquely numbered orange or white Floy anchor tag below the dorsal fin. A small piece of adipose fin tissue was removed from 95% of steelhead for genetic analysis and stock identification. Not all steelhead were sampled for adipose fin tissue because some escaped between tagging and adipose fin sample collection. The tagging puncture wound and the clipped adipose fin functioned as a secondary mark to allow the assessment of Floy anchor tag loss. Approximately five scales per fish were collected between the lateral line and dorsal fin for aging from 97% of steelhead. The sex, fork length, and fishwheel number were recorded for all steelhead sampled.

For the recovery sample, fish were captured by angling in the Bell-Irving (Parken 1999a), Cranberry (Parken 1999b), Kwinageese (1999c), and Meziadin rivers (Parken 1999d) and Damdochax Creek and the adjacent upper Nass River (Parken 1999e) on days between October 6 and November 25, 1998. Also, fish were captured in the Meziadin River at the fishway from August 26 to October 21 by LGL Ltd. (Parken 1999d). These locations represented the main populations of Nass River summer steelhead (Alexander and Koski 1995; Koski and English 1996; Parken 1997a).

During the recovery sample, the tag number, sex and location (river) were recorded for all recaptured (marked) steelhead. The sex, fork length, location and the presence of gillnet marks, predator scars, or head wounds were recorded for unmarked steelhead. Five or more scales were collected from unmarked steelhead for aging. A small piece of adipose fin tissue was removed from unmarked steelhead for genetic analysis and stock identification and it also identified that the fish was inspected in the recovery sample. The presence of a tag puncture wound below the dorsal fin distinguished a steelhead that had lost its tag from one that was adipose fin sampled during the recovery sample.

The abundance of summer steelhead ($\hat{N}$) migrating passed the Nass River fishwheels was estimated with unbiased Petersen mark-recapture estimators (Chapman's modification) and Bayesian maximum likelihood estimators. The steelhead abundance estimate represented a proportion of the steelhead escapement because the fishwheels may not have operated throughout the entire steelhead run, as a few steelhead were caught into early October. Also, the abundance estimate represented a proportion of the steelhead escapement because the tag recovery efforts were limited to the five main populations and smaller populations were not surveyed. Thus, the abundance estimate represented all steelhead populations with similar mark rates to the steelhead at the five recovery sample locations.

The unbiased Petersen estimator ($\hat{N}$) was calculated for the summer steelhead escapement to the Nass River with equation 1 (Seber 1982; Krebs 1989):

**Equation 1**
$$\hat{N} = \frac{(M+1)(C+1)}{R+1} - 1$$

where $M$ was the number of steelhead marked during the application sample, $C$ was the number of steelhead examined for marks during the recovery sample and $R$ was the number of marked steelhead observed during the recovery sample. The variance of the unbiased Petersen estimator ($Var(\hat{N})$) was calculated with equation 2 (Starr and Schubert 1990; Farwell *et al.* 1992; Schubert 1993; Atagi 1995):

**Equation 2**

$$Var(\hat{N}) = \frac{(\hat{N})^2(C-R)}{(C+1)(R+2)}$$

Poisson confidence limits were chosen over binomial and normal approximation confidence limits because the mark rate (*R/C*) was less than 0.10 and the number of recaptures was less than 50 steelhead (Krebs 1989). Poisson confidence limits (95%) for $\hat{N}$ were calculated by substituting the Poisson confidence limits (95%) for the number of recaptures (*R*; from Appendix 1.2 in Krebs 1989) into equation 3 (Krebs 1989):

**Equation 3**

$$\text{95\% Poisson Confidence Limits on } \hat{N} = \frac{(M+1)(C+1)}{(R+1)} - 1$$

The Bayesian estimator was calculated with a sequential Bayes algorithm described by Gazey and Staley (1986) with the assumption that the prior distribution was uniform. The mode of the posterior probability distribution was the population abundance estimate. The upper and lower 95% confidence limits were the 2.5 and 97.5% quantiles, respectively (Gazey and Staley 1986; Hilborn and Walters 1992).

The Bayesian maximum likelihood estimator yields larger abundance estimates than the unbiased Petersen mark-recapture estimator when the number of animals marked and the total number examined is low (Gazey and Staley 1986). This results from the unbiased Petersen mark-recapture estimator yielding abundance estimates with substantial negative bias and exceedingly large confidence limits when the number of animals marked and the total number examined is low (Robson and Regier 1964; Gazey and Staley 1986). However, both estimators yield similar abundance estimates for large samples ($M/\hat{N} > 0.5$), but when small samples were collected the Bayesian estimator was recommended ($M/\hat{N} < 0.5$; Gazey and Staley 1986). Gazey and Staley (1986) reported the following advantages of the Bayesian estimator over the unbiased Petersen mark-recapture estimator: the probability of observing the data at feasible population sizes is calculated exactly, the method works well for all cases regardless of sample size or sampling procedure, and inferences can be made directly, since the estimate completely describes the uncertainty of the population size given the data.

#### 3.1.1.0 Sampling Selectivity

A number of assumptions were required for the unbiased Petersen and Bayesian estimators to be accurate. The main assumptions were (1) the population was closed and thus the population size did not change between the application and recovery samples; (2) the probability of capturing a marked steelhead at any given time was equal to the proportion of marked steelhead in the population at that time; (3) steelhead did not lose their marks between the application and recovery samples; and (4) all marked steelhead were identified in the recovery sample (Gazey and Staley 1986).

To investigate if marked steelhead were randomly distributed among unmarked steelhead (assumption 2), spatial, size, age and sex related biases were examined in the recovery sample (Starr and Schubert 1990; Begich 1992; Farwell *et al.* 1992; Schubert 1993; Pahlke and Bernard 1996; Begich 1997; Parken and Atagi 1998). To examine if all fish had the same probability of occurring in the recovery sample (assumption 2), spatial, size, age, sex and temporal related biases were examined in the application sample (Starr and Schubert 1990; Begich 1992; Farwell *et al.* 1992; Schubert 1993; Pahlke and Bernard 1996; Begich 1997; Parken and Atagi 1998).

Other characteristics observed on steelhead were not used for bias investigations. The incidence of gillnet marks could not be used for bias investigations because there was a small First Nations (Nisga'a) fishery between Gitwinksihlkw and Grease Harbour and therefore the gillnet mark rate may increase after the fish pass fishwheels 1 and 2. Similarly, the incidence of predator scars or head wounds could not be used for bias investigations since these rates may increase with the amount of time steelhead reside in the Nass River and tributaries. For example, some predators such as river otters were observed in the rivers and a steelhead may be more likely to have an encounter with one as the fish spends more time in the river. Similarly, head wounds may be related to surmounting impediments such as canyons and rock falls.

For bias investigations regarding location, steelhead age, steelhead sex and time period, a *post hoc* power analysis was performed to investigate if there was no effect (or bias) or whether the analysis had a low probability of detecting an effect if one was present (Peterman 1990). The statistical power of a test was the probability of detecting a sampling bias, provided differences existed between the application and recovery samples. A statistical test with power equal to 0.80 or 0.95 was considered to have high power (Cohen 1988; Peterman 1990). The effect size was reported to indicate the standardized degree of the difference between the application and recovery samples, and it was an indicator of the biological significance of the differences between the application and recovery samples (Cohen 1988; Thomas and Juanes 1996). The power of the effect size observed in the sample and the detectable effect size was estimated with G*Power software (Erdfelder *et al.* 1996; Buchner *et al.* 1997). The detectable effect size was estimated when alpha and beta were set at 0.05 and 0.20, respectively and with the observed sample size and variance (Cohen 1988; Peterman 1990). The detectable effect size was the effect size required to indicate sampling bias between the application and recovery samples (reject the null hypothesis) with an 80% chance. A retrospective power analysis was not performed for steelhead size because G*Power was unable to calculate power for the Kolmogorov-Smirnov two-sample test.

#### *3.1.1.1 Location*

Spatial bias in the application sample was investigated by comparing the mark incidence between the Bell-Irving, Cranberry, Kwinageese and Meziadin rivers, and Damdochax Creek and the upper Nass River in the recovery sample with a chi-square test of homogeneity. This analysis determined if fish sampled at the different tributary locations were marked at similar rates at the fishwheels, which was a criteria for pooling stratified data to produce a consistent abundance estimator (Ricker 1975; Seber 1982; Pahlke and Bernard

1996). Spatial recovery bias was investigated by stratifying the application sample by fishwheels 1 and 2 (Gitwinksihlkw) and fishwheels 3 and 4 (Grease Harbour) and comparing the composition of recovered and non-recovered components with a Yates continuity correction of the chi-square test of homogeneity.

#### *3.1.1.2 Steelhead Size*

Size related bias in the application sample was investigated by comparing the size distribution of marked and unmarked steelhead in the recovery sample with a Kolmogorov-Smirnov two-sample test. Size related recovery bias was investigated by stratifying the application sample by recovered and non-recovered components and comparing the size distributions of each with a Kolmogorov-Smirnov two-sample test. Size related application and recovery biases were investigated separately for males and females, since significant size differences between the sexes were reported for other steelhead populations (Hooton *et al.* 1987; Parken *et al.* 1997a).

#### *3.1.1.3 Steelhead Age*

Age related bias in the application sample was investigated by comparing the ocean age composition of marked and unmarked steelhead in the recovery sample with a chi-square test of homogeneity and the freshwater age composition with a Student's *t*-test. Age related recovery bias was investigated by stratifying the application sample into recovered and non-recovered components and comparing the ocean age composition of each with a chi-square test of homogeneity and the freshwater age composition with a Student's *t*-test. For age related application and recovery bias analyses, ocean age 3+ and older steelhead (including repeat spawners) were grouped to meet the assumptions of the chi-square test for expected cell counts. All scales were aged by C. Lidstone at Birkenhead Scale Analyses, Lone Butte, B.C. (Lidstone 1999).

#### *3.1.1.4 Steelhead Sex*

Sex related bias in the application sample was investigated by comparing the sex ratio of marked and unmarked steelhead in the recovery sample with a Yates continuity correction of the chi-square test of homogeneity. Sex related recovery bias was investigated by stratifying the application sample into recovered and non-recovered components and comparing the sex composition of each with a Yates continuity correction of the chi-square test of homogeneity.

#### *3.1.1.5 Time Period*

Temporal related recovery bias was investigated by stratifying the application sample into time periods and comparing the frequency of recovered and non-recovered steelhead in the application sample with a Yates continuity correction of the chi-square test of homogeneity. Steelhead were grouped for all fishwheels to meet the assumptions of the chi-square test for expected cell counts (Zar 1984). The period strata for the application sample were fish tagged between July 1 and August 31 and fish tagged between September 1 and October 13. The strata dates were based on the date when the median fish was tagged at fishwheels 3 and 4. Fishwheels 3 and 4 operated for a longer period than fishwheels 1 and 2 and therefore fishwheel 3 and 4 provided an improved estimate of the period for fish migration. Temporal related application bias was not assessed because temporal representation was not possible for all the recovery sample locations, since some locations were sampled over a period of 2 or 3 days.

*3.1.1.6 Tag Loss*

Floy anchor tag loss was examined by tagging all steelhead in the application sample and the tag puncture wound was a secondary mark. A small piece of the adipose fin was removed for genetic analyses from 95% of marked steelhead during the application sample and served as a secondary mark for those steelhead. In the recovery sample, all steelhead were examined for a tag puncture wound which distinguished a steelhead that had lost its tag from an unmarked steelhead.

### 3.1.2.0 Mark - Recapture Estimates

Steelhead abundance was estimated for the proportion of Nass River steelhead that migrated during the fishwheel operations that had mark rates similar to steelhead at the recovery sample locations. Both Petersen and Bayesian estimators were calculated for different numbers of fish marked in the application sample to account for the differential loss of tagged fish resulting from handling mortality and increased vulnerability to the Nisga'a fishery (Ricker 1975).

Tagged fish may suffer mortality related to the stress of capture, handling and tagging at the fishwheels (Link and Gurak 1997). Also, there may be differential vulnerability, and subsequently removal of tagged fish at the Nisga'a fishery between Gitwinksihlkw and Grease Harbour (Bocking and English 1994; Nass *et al.* 1995; Nass *et al.* 1996; Nass and Gurak 1997; Link and Gurak 1997). Differential tag removal by the Nisga'a fishery was indicated by the higher incidence of marked fish (sockeye, chinook, and coho salmon) in the fishery than in the recovery sample (Link and English 1994; Link and English 1997; Link and Gurak 1997). The higher tag rates for salmon in the Nisga'a fishery indicated the tagged fish did not have sufficient time to mix with unmarked fish before being captured or that capture, handling and tagging stress may have altered the behaviour of tagged fish and increased their vulnerability to the fishery (Ricker 1975). The differential vulnerability may result from some of the tagged fish moving downstream immediately after tagging (Alexander *et al.* 1996; Pahlke and Bernard 1996) or slowing their daily migration rates because of physiological stress or possibly psychological disturbance from the capture and tagging procedure. For example, 55% of Skeena River summer steelhead captured and radio tagged at the Kitselas fishwheels elicited downstream movements in 1995 (Alexander *et al.* 1996). Alexander *et al.* (1996) estimated the capture and radio tagging procedure caused Skeena River summer steelhead to drop back for six days, on average. The radio tagging procedure was much more invasive and probably more stressful than the Floy anchor tagging procedure, although no studies were found that compared the survival, stress or migration rate of radio and Floy anchor tagged summer steelhead. Accordingly, Petersen and Bayesian estimators were calculated by decreasing the number of fish marked in the application sample by 0, 5, 10, 15 and 20% to account for the differential loss of marked fish.

Steelhead abundance was also estimated for Nass River steelhead from the mark recovery data collected from the Cranberry River in 1998 to determine if the Cranberry River steelhead population was indicative of the abundance of the Nass River steelhead. Thus, the abundance estimate represented the proportion of the Nass River summer steelhead run that migrated during the fishwheel operations and had a similar mark rate and run timing as Cranberry River steelhead. Petersen and Bayesian estimators were calculated by decreasing the number of fish marked in the application sample by 0, 5, 10, 15 and 20% to account for the differential loss of marked fish. No sampling selectivity bias tests were conducted due to few recaptures and therefore the estimate must be interpreted extremely cautiously.

For 1997, the abundance of Nass River steelhead was estimated from the tag application data at the fishwheels (Link draft 1998) and the mark recovery data collected from the Cranberry River in 1997 (Parken and Atagi 1998). The estimate was compared to the 1998 estimate based on the Cranberry River data to determine if the mark-recovery data from the Cranberry River in both years was sufficient to make meaningful inferences about the trends in the abundance of Nass River steelhead. Thus, the abundance estimate represented the proportion of the Nass River summer steelhead run that migrated during the fishwheel operations and had a similar mark rate and run timing as Cranberry River steelhead. Petersen and Bayesian estimators were calculated by decreasing the number of fish marked in the application sample by 0, 5, 10, 15 and 20% to account for the differential loss of marked fish. No sampling selectivity bias tests were conducted due to few recaptures and therefore the estimate must be interpreted extremely cautiously.

## *3.2.0.0 Life History and Other Characteristics*

### 3.2.1.0 Steelhead Length Distributions

Steelhead fork lengths were measured to the nearest centimeter. Fork lengths of steelhead were compared between sampling locations with length-frequency histograms. Also, fork lengths of male and female steelhead were compared between locations with a non-parametric Kruskal-Wallis test to avoid the assumptions of equal variances and normality (Zar 1984). At each location, the fork lengths of male and female steelhead were compared with a Mann-Whitney U test to avoid the assumptions of equal variances and normality (Zar 1984).

The median fork lengths of steelhead were compared between locations with a Median test (Zar 1984) to investigate if the relative length distribution differed between locations. The fork lengths of steelhead at the fishwheels were compared to steelhead sampled at the Nass River and tributaries with Mann-Whitney U tests to avoid the assumptions of equal variances and normality (Zar 1984). The analysis investigated if the populations in the recovery sample were similar in size to the fish sampled at the fishwheels. Also, the size distribution of steelhead at the fishwheels was compared to the size distributions of steelhead at the Nass River and tributaries with a Kolmogorov-Smirnov two-sample test. The analysis investigated if the size distributions of populations in the recovery sample were similar to the size distribution of fish sampled at the fishwheels.

#### 3.2.2.0 Steelhead Sex Ratios

The sex composition of steelhead was compared between locations with a chi-square test of homogeneity. The sex composition was illustrated with pie graphs and the sex ratio was expressed by the number of females per male (female:male).

#### 3.2.3.0 Steelhead Age Distributions

The mean smolt age was compared between locations with an ANOVA test where Tukey's HSD test was used for *post hoc* pairwise comparisons (Zar 1984). The distribution of ocean ages was illustrated with ocean age-frequency histograms to facilitate comparisons between male and female steelhead. The ocean age composition was compared between male and female steelhead with a chi-square test of homogeneity for each river. For analyses between sexes, ocean age 3+ and older steelhead were grouped to meet the assumptions of the chi-square test for expected cell counts (Zar 1984) at the tributary locations. However, at the fishwheels ocean age 4+ and older steelhead were grouped to meet the assumptions of the chi-square test for expected cell counts. The ocean age compositions of male and female steelhead were compared between locations with a chi-square test of homogeneity. The frequency of repeat spawners was compared between locations with a chi-square test of homogeneity. For the comparisons of repeat spawners, single and double repeat spawners were grouped to meet the assumptions of the chi-square test of homogeneity for expected cell counts. All scales were aged by C. Lidstone at Birkenhead Scale Analyses, Lone Butte, B.C. (Lidstone 1999).

#### 3.2.4.0 Steelhead Length at Age

Parametric tests were used for comparisons of length at age because lengths were normally distributed and had similar variances within an age group. At each location, the mean fork lengths were compared between males and females for each ocean age group with a Student's *t*-test. For ocean age 3+ and 4+ steelhead, comparisons between males and females were limited to the fishwheels because few fish existed in these categories for other locations. For each ocean age group, the mean fork length of male and female steelhead were compared between locations with an ANOVA test and Tukey's HSD test was used for *post hoc* comparisons (Zar 1984). No comparisons were made for ocean age 3+ or 4+ fish because of few samples in these categories at the other locations.

### 3.2.5.0 Steelhead Recaptures

Sex, fork length, location and the presence of gillnet marks, predator scars, or head wounds were recorded for recaptured steelhead with Floy tags applied at the fishwheels. The tag colour and number were recorded and compared to the MELP Skeena Region TAGS database. The sex ratio was compared between tagged and untagged steelhead in the recovery sample with a Yates continuity correction of the chi-square test of homogeneity. The fork lengths of tagged and untagged steelhead were compared with a Mann-Whitney U test to avoid the assumptions of normality and investigate size selectivity of the Nass River fishwheels.

### 3.2.6.0 Steelhead Condition

The incidence of head wounds, gillnet marks, predator scars and hook scars were summarized for each location in the recovery sample. Fish condition comments were not summarized for fish at the fishwheels since few comments were made. Also, no fish condition comments were made for fish sampled at the Meziadin fishway by LGL Ltd. and thus these fish were excluded from the fish condition summaries. The incidence of head wounds, gillnet marks, predator scars were compared between the Bell-Irving, Cranberry, and Kwinageese rivers, and Damdochax Creek and the upper Nass River with a chi-square test of homogeneity. The Meziadin River steelhead sampled by MELP were excluded from the statistical comparisons due to few samples.

# 4.0.0.0 Results

## *4.1.0.0 Steelhead Abundance Estimates*

### 4.1.1.0 Sampling Selectivity

#### *4.1.1.1 Location*

In the recovery sample the mark incidence was similar in the Bell-Irving, Cranberry, Meziadin and Kwinageese rivers, and Damdochax Creek and the upper Nass River (chi-square $\chi^2 = 6.61$, $P = 0.158$; Table 1). The detectable effect size (w = 0.17) was larger than the observed effect size (w = 0.12), and thus power was moderate (power = 0.51). Although no statistical difference in mark incidence was detected, locations in the upper Nass River watershed (Bell-Irving River, Kwinageese River, and Damdochax Creek and upper Nass River) had a higher adjusted tag rate than locations in the middle Nass River watershed (Cranberry and Meziadin rivers). The similar mark incidence and moderate power of the analysis indicated there was no detectable spatial bias in the application sample. When the application sample was stratified by fishwheel location, Gitwinksihlkw (fishwheels 1 and 2) and Grease Harbour (fishwheels 3 and 4), the percentage of steelhead recovered was similar between locations (chi-square $\chi^2 = 0.27$, $P = 0.604$; Table 2). The detectable effect size (w = 0.11) was larger than the observed effect size (w = 0.03), and thus power was low (power = 0.10). The similar percentages of tagged steelhead recovered by stratum and the small effect size indicated there was no detectable spatial related recovery bias.

Table 1. The number of steelhead examined in the recovery sample, the number of marked fish recovered, the mark incidence in the recovery sample by Nass River tributaries.

| Recovery Location | Number Examined (C) | Number Marked (R) | Mark Incidence (%) (R/C) | Adjusted Tag Rate (C+1) / (R+1) |
|---|---|---|---|---|
| Bell-Irving River | 95 | 4 | 4.2 | 19.2 |
| Cranberry River | 113 | 11 | 9.7 | 9.5 |
| Kwinageese River | 95 | 3 | 3.2 | 24.0 |
| Meziadin River | 46 | 4 | 8.7 | 9.4 |
| Damdochax Creek and upper Nass River | 89 | 3 | 3.4 | 22.5 |
| **Total** | **438** | **25** | **5.7** | **16.9** |
| Chi-Square *P* Value | 0.158 | | | |

Table 2. The number of steelhead tagged by fishwheel stratum, the number recaptured in the Nass River tributaries and the percentage of tagged steelhead recovered.

| Fishwheel Location | Number Tagged (M) | Number Recaptured (R) | Percentage Recovered (%) (R/M) |
|---|---|---|---|
| Gitwinksihlkw (fishwheels 1 and 2) | 169 | 8 | 4.7 |
| Grease Harbour (fishwheels 3 and 4) | 465 | 16 | 3.4 |
| **Total** | **634** | **24** | **3.8** |
| Chi-Square *P* Value | 0.604 | | |

*4.1.1.2 Steelhead Size*

In the recovery sample the size distribution was similar for marked and unmarked female steelhead (Kolmogorov-Smirnov Z = 0.986, $P = 0.285$) and for marked and unmarked male steelhead (Kolmogorov-Smirnov Z = 1.109, $P = 0.171$). The similar size of marked and unmarked steelhead among males and females in the recovery sample indicated there was no detectable size related bias in the application sample (Figure 2). In the application sample the size distribution was similar for recovered and non-recovered females (Kolmogorov-Smirnov Z = 0.721, $P = 0.677$) and for recovered and non-recovered males (Kolmogorov-Smirnov Z = 0.907, $P = 0.383$). The similar size of marked and unmarked steelhead among males and females in the application sample indicated there was no detectable size related bias in the recovery sample (Figure 3).

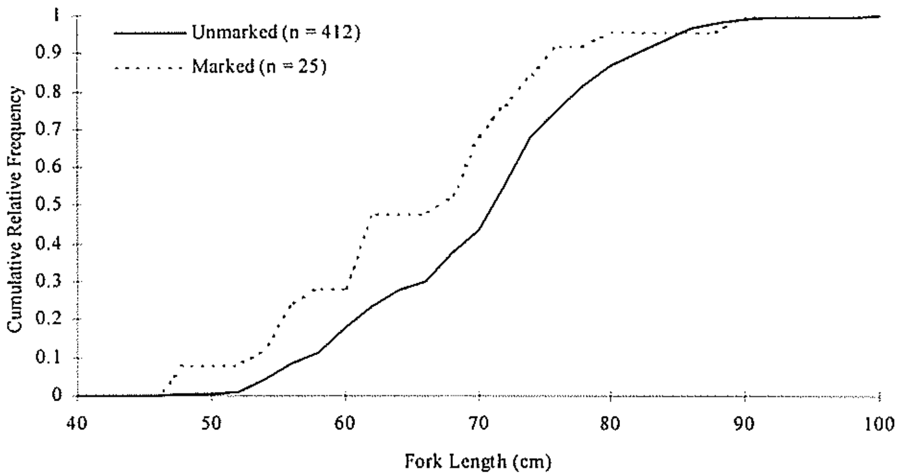


Figure 2. The cumulative relative frequencies of marked and unmarked steelhead inspected in the Nass River tributaries (Bell-Irving, Cranberry, Kwinageese and Meziadin rivers, and Damdochax Creek and upper Nass River; recovery sample).

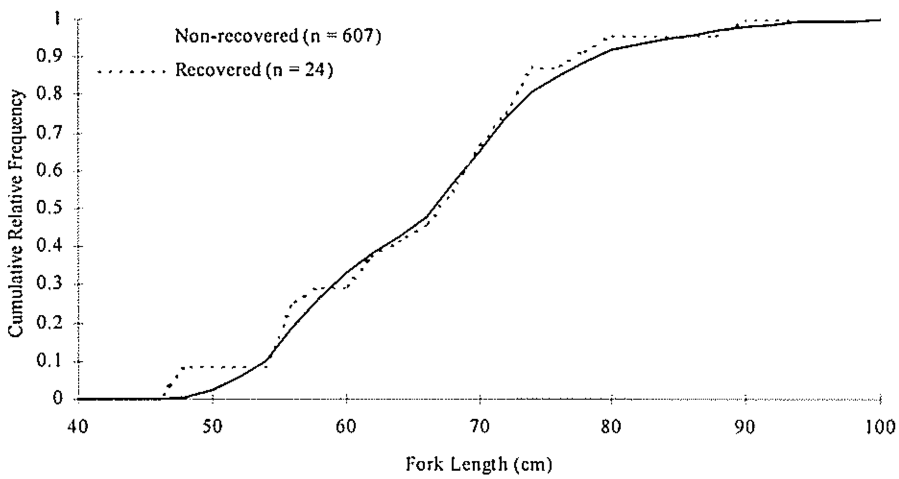


Figure 3. The cumulative relative frequencies of recovered and non-recovered steelhead tagged at the fishwheels (application sample).

#### *4.1.1.3 Steelhead Age*

In the recovery sample the ocean age distribution was similar between marked and unmarked steelhead (chi-square $\chi^2 = 0.42$, $P = 0.812$; Table 3). The detectable effect size (w = 0.15) was larger than the observed effect size (w = 0.03), and thus power was low (power = 0.08). The similar age distribution and small effect size indicated there was no detectable ocean age related bias in the application sample. In the application sample the ocean age distribution was similar for recovered and non-recovered steelhead (chi-square $\chi^2 = 1.50$, $P = 0.472$). The detectable effect size (w = 0.13) was larger than the observed effect size (w = 0.05) and thus power was low (power = 0.18). The similar ocean age distribution and small effect size indicated there was no detectable ocean age related recovery bias.

In the recovery sample the mean smolt age was similar between marked and unmarked steelhead (*t*-test = 0.047, $P = 0.963$). The detectable effect size (d = 0.67) was much larger than the observed effect size (d = 0.001), and thus power was low (power = 0.05). The similar mean smolt age and small effect size indicated there was no detectable freshwater age related bias in the application sample. In the application sample the mean smolt age distribution was similar for recovered and non-recovered steelhead (*t*-test = 0.739, $P = 0.461$). The detectable effect size (d = 0.68) was much larger than the observed effect size (d = 0.20), and thus power was low (power = 0.13). The similar mean smolt ages and small effect size indicated there was no detectable freshwater age related recovery bias.

Table 3. The ocean age composition of Nass River steelhead by percentage (%) and number (n) for the application and recovery samples.

| | Application Sample | | | Recovery Sample | | |
|---|---|---|---|---|---|---|
| **Ocean Age** | **Recovered (n)** | **Not Recovered (n)** | **Total (n)** | **Marked (n)** | **Unmarked (n)** | **Total (n)** |
| 1+ | 30.4% (7) | 37.7% (219) | 37.4% (226) | 29.2% (7) | 26.6% (109) | 26.7% (116) |
| 2+, | 56.5% (13) | 43.7% (254) | 44.2% (267) | 58.3% (14) | 55.9% (229) | 56.0% (243) |
| 3+[1] | 13.0% (3) | 18.6% (108) | 18.4% (111) | 12.5% (3) | 17.6% (72) | 17.3% (75) |
| **Total (n)** | **100% (23)** | **100% (581)** | **100% (604)** | **100% (24)** | **100% (410)** | **100% (434)** |
| Chi-Square *P* Value | 0.472 | | | 0.812 | | |

1. The ocean age 3+ category includes ages .3+, .1S1+, .4+, .2S1+, .1S1S1+, .3S1+, and .2S1S1+.

#### *4.1.1.4 Steelhead Sex*

In the recovery sample the sex ratio was similar for marked and unmarked steelhead (chi-square $\chi^2 = 0.02$, $P = 0.886$; Table 4). The detectable effect size (w = 0.14) was larger than the observed effect size (w = 0.02), and thus power was low (power = 0.06). The similar sex ratio and small effect size indicated there was no detectable sex related bias in the application sample. In the application sample the sex ratio was similar for recovered and non-recovered steelhead (chi-square $\chi^2 = 0.18$, $P = 0.675$; Table 4). The detectable effect size (w = 0.11) was larger than the observed effect size (w = 0.02), and thus power was low (power = 0.10). The similar sex ratio and small effect size indicated there was no detectable sex related recovery bias.

Table 4. The sex composition of Nass River steelhead by percentage (%) and number (n) for the application and recovery samples.

| | Application Sample | | | Recovery Sample | | |
|---|---|---|---|---|---|---|
| | **Recovered (n)** | **Not Recovered (n)** | **Total (n)** | **Marked (n)** | **Unmarked (n)** | **Total (n)** |
| Female | 58.3% (14) | 51.8% (315) | 52.1% (329) | 60.0% (15) | 56.4% (233) | 56.6% (248) |
| Male | 41.7% (10) | 48.2% (293) | 47.9% (303) | 40.0% (10) | 43.6% (180) | 43.4% (190) |
| **Total** | **100% (24)** | **100% (608)** | **100% (632)** | **100% (25)** | **100% (413)** | **100% (438)** |
| Chi-Square *P* Value | 0.675 | | | 0.886 | | |

### *4.1.1.5 Time Period*

In the application sample the proportion of steelhead within each temporal strata was similar for recovered and non-recovered steelhead (chi-square $\chi^2 = 0.50$, $P = 0.479$; Table 5). The detectable effect size (w = 0.11) was larger than the observed effect size (w = 0.04), and thus power was low (power = 0.15). The similar proportions of recovered and non-recovered steelhead within each temporal strata and small effect size indicated there was no detectable temporal related recovery bias.

Table 5. The incidence of recovered and non-recovered Nass River steelhead by percentage (%) and number (n) for the application sample stratified by time period.

| Time Period | Application Sample | | |
|---|---|---|---|
| | **Recovered (n)** | **Not Recovered (n)** | **Total (n)** |
| July 1-August 31 | 66.7% (16) | 57.2% (349) | 57.6% (365) |
| September 1-October 13 | 33.3% (8) | 42.8% (261) | 42.4% (269) |
| **Total** | **100% (24)** | **100% (610)** | **100% (634)** |
| Chi-Square *P* Value | 0.479 | | |

### *4.1.1.6 Tag Loss*

One (4.0%) of the 25 steelhead recovered had lost the Floy anchor tag, but was identified by the missing piece of adipose fin and by the tag puncture wound below the dorsal fin. Thus, the total number of marked steelhead recovered was corrected to 25 from 24 steelhead. There was no need to further adjust the number of recaptured steelhead since all marked steelhead had a secondary tag puncture mark below the dorsal fin that would not have healed during the study period, 95% of all steelhead in the application sample were marked with an adipose fin clip, and staff closely examined all steelhead for these marks.

## 4.1.2.0 Mark - Recapture Estimates

In 1998, the abundance of the Nass River summer steelhead escapement was estimated with Petersen and Bayesian estimators for different rates of tagged fish mortality or differential removal (Table 6). The estimates represented steelhead migrating passed the fishwheels and were based on the marking of 634 steelhead (M) at the fishwheels with Floy anchor tags from July 3 to October 13 and the recapture of 25 of them (R) among 438 steelhead (C) inspected for tags in the recovery sample from August 26 to November 25. The Petersen estimates ranged from 8,576 steelhead (95% confidence limits: lower = 6,021, upper = 12,550) with 20% removal of tagged fish, up to 10,721 steelhead (95% confidence limits:

lower = 7,527, upper = 15,688) for conditions with 0% removal of tagged fish. The Bayesian mode estimates ranged from 8,880 steelhead (95% confidence limits: lower = 6,500, upper = 14,260) with 20% removal of tagged fish, up to 11,098 steelhead (95% confidence limits: lower = 8,134, upper = 17,406) for conditions with 0% removal of tagged fish. The Bayesian estimates were 3.6% higher, on average, than Petersen estimates. The confidence intervals for the Bayesian estimates were wider than the confidence intervals for the Petersen estimates (Table 6).

In 1998, the abundance of part of the Nass River summer steelhead run migrating passed the fishwheels was estimated with Petersen and Bayesian estimators for different rates of tagged fish mortality or differential removal (Table 7). These estimates represented the proportion of the entire Nass River steelhead escapement that had a similar mark rate and migration timing as Cranberry River steelhead. The estimates were based on the marking of 634 steelhead (M) at the fishwheels with Floy anchor tags from July 3 to October 13 and the recapture of 11 of them (R) among 113 steelhead (C) inspected for tags in the recovery sample at the Cranberry River from September 19 to November 20. The Petersen estimates ranged from 4,825 steelhead (95% confidence limits: lower = 2,887, upper = 9,158) with 20% removal of tagged fish, up to 6,032 steelhead (95% confidence limits: lower = 3,609, upper = 11,448) for conditions with 0% removal of tagged fish. The Bayesian mode estimates ranged from 5,209 steelhead (95% confidence limits: lower = 3,449, upper = 11,569) with 20% removal of tagged fish, up to 6,516 steelhead (95% confidence limits: lower = 4,316, upper = 14,256) for conditions with 0% removal of tagged fish. The Bayesian estimates were 8.0% higher, on average, than the Petersen estimates. The confidence intervals for the Bayesian estimates were wider than the confidence intervals for the Petersen estimates (Table 7). These abundance estimates must be interpreted extremely cautiously because sampling selectivity tests were not performed for this analysis.

In 1997, the abundance of part of the Nass River summer steelhead run migrating passed the fishwheels was estimated with Petersen and Bayesian estimators for different rates of tagged fish mortality or differential removal (Table 8). These estimates represented the proportion of the entire Nass River steelhead escapement that had a similar mark rate and migration timing as Cranberry River steelhead. The estimates were based on the marking of 399 steelhead (M) at the fishwheels with Floy anchor tags from July 20 to September 2 and the recapture of 12 of them (R) among 241 steelhead (C) inspected for tags in the recovery sample at the Cranberry River from October 6 to November 7. The Petersen estimates ranged from 5,956 steelhead (95% confidence limits: lower = 3,629, upper = 10,074), with 20% removal of tagged fish, up to 7,445 steelhead (95% confidence limits: lower = 4,536, upper = 12,593) for conditions with 0% removal of tagged fish. The Bayesian mode estimates ranged from 6,408 steelhead (95% confidence limits: lower = 4,228, upper = 13,668), with 20% removal of tagged fish, up to 8,008 steelhead (95% confidence limits: lower = 5,288, upper = 16,428) for conditions with 0% removal of tagged fish. The Bayesian estimates were 7.6% higher, on average, than the Petersen estimates. The confidence intervals for the Bayesian estimates were wider than the confidence intervals for the Petersen estimates (Table 8). These abundance estimates must be interpreted extremely cautiously because sampling selectivity tests were not performed for this analysis.

Table 6. The Nass River steelhead mark-recapture estimates (Petersen and Bayesian) with different levels of assumed tag mortality and loss.

| Assumed Mortality/ Removal of Tagged Fish | Number of Fish Marked (M) | Number of Fish Examined (C) | Number of Marks Recovered (R) | Adjusted Tag Rate (C+1)/(R+1) | Petersen Estimate ($\hat{N}$) | Lower 95% Confidence Limit | Upper 95% Confidence Limit | Bayesian Estimate ($\hat{N}$) Mode | Lower 95% Confidence Limit | Upper 95% Confidence Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 634 | 438 | 25 | 16.9 | 10,721 | 7,527 | 15,688 | 11,098 | 8,134 | 17,406 |
| 5% | 602 | 438 | 25 | 16.9 | 10,181 | 7,148 | 14,898 | 10,555 | 7,715 | 16,715 |
| 10% | 571 | 438 | 25 | 16.9 | 9,657 | 6,780 | 14,132 | 10,004 | 7,324 | 15,964 |
| 15% | 539 | 438 | 25 | 16.9 | 9,117 | 6,401 | 13,341 | 9,452 | 6,912 | 15,132 |
| 20% | 507 | 438 | 25 | 16.9 | 8,576 | 6,021 | 12,550 | 8,880 | 6,500 | 14,260 |

Table 7. The Nass River steelhead mark-recapture estimates (Petersen and Bayesian) based on the mark recovery sample from the Cranberry River, 1998.

| Assumed Mortality/ Removal of Tagged Fish | Number of Fish Marked (M) | Number of Fish Examined (C) | Number of Marks Recovered (R) | Adjusted Tag Rate (C+1)/(R+1) | Petersen Estimate ($\hat{N}$) | Lower 95% Confidence Limit | Upper 95% Confidence Limit | Bayesian Estimate ($\hat{N}$) Mode | Lower 95% Confidence Limit | Upper 95% Confidence Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 634 | 113 | 11 | 9.5 | 6,032 | 3,609 | 11,448 | 6,516 | 4,316 | 14,256 |
| 5% | 602 | 113 | 11 | 9.5 | 5,719 | 3,428 | 10,871 | 6,184 | 4,084 | 13,604 |
| 10% | 571 | 113 | 11 | 9.5 | 5,433 | 3,251 | 10,312 | 5,873 | 3,873 | 12,953 |
| 15% | 539 | 113 | 11 | 9.5 | 5,129 | 3,069 | 9,735 | 5,541 | 3,661 | 12,281 |
| 20% | 507 | 113 | 11 | 9.5 | 4,825 | 2,887 | 9,158 | 5,209 | 3,449 | 11,569 |

Table 8. The Nass River steelhead mark-recapture estimates (Petersen and Bayesian) based on the mark recovery sample from the Cranberry River, 1997.

| Assumed Mortality/ Removal of Tagged Fish | Number of Fish Marked (M) | Number of Fish Examined (C) | Number of Marks Recovered (R) | Adjusted Tag Rate (C+1)/(R+1) | Petersen Estimate ($\hat{N}$) | Lower 95% Confidence Limit | Upper 95% Confidence Limit | Bayesian Estimate ($\hat{N}$) Mode | Lower 95% Confidence Limit | Upper 95% Confidence Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| 0% | 399 | 241 | 12 | 18.6 | 7,445 | 4,536 | 12,593 | 8,008 | 5,288 | 16,428 |
| 5% | 379 | 241 | 12 | 18.6 | 7,073 | 4,309 | 11,964 | 7,608 | 5,028 | 15,808 |
| 10% | 359 | 241 | 12 | 18.6 | 6,701 | 4,082 | 11,334 | 7,208 | 4,768 | 15,148 |
| 15% | 339 | 241 | 12 | 18.6 | 6,328 | 3,856 | 10,704 | 6,808 | 4,508 | 14,428 |
| 20% | 319 | 241 | 12 | 18.6 | 5,956 | 3,629 | 10,074 | 6,408 | 4,228 | 13,668 |

## *4.2.0.0 Life History and Other Characteristics*

### 4.2.1.0 Steelhead Length Distributions

In 1998, 1,069 steelhead were measured at the fishwheels and tributaries (Figure 4; Table 9). The length-frequency distributions, as grouped by 2 cm categories, illustrated that steelhead populations were not normally distributed (Figure 4). Steelhead in the Cranberry, Kwinageese and Meziadin rivers had two main peaks which represented the two main ocean age groups (1+ and 2+). Three peeks in the length distribution were evident for steelhead sampled in the Bell-Irving River, Damdochax Creek and the upper Nass River, and at the Nass River fishwheels. The right peak was considerably smaller than the other peaks and included steelhead with ocean age 3+, 4+, and repeat spawners.

The mean fork lengths of female steelhead ranged from 67.1 cm at the fishwheels to 73.1 cm at Damdochax Creek and the upper Nass River, and differed between locations (Kruskal-Wallis = 58.27, $P < 0.001$; Table 9). The mean fork lengths of male steelhead ranged from 68.2 cm at the fishwheels to 75.2 cm at Damdochax Creek and the upper Nass River, and differed between locations (Kruskal-Wallis = 17.30, $P = 0.004$). Within each location, the fork lengths of male and female steelhead were statistically similar (Table 9).

Table 9. A summary of the mean, standard error, standard deviation and range in fork lengths for male and female summer steelhead sampled at the fishwheels (FW.), Bell-Irving (Bell.), Cranberry (Cran.), Kwinageese (Kwin.) and Meziadin (Mez.) rivers, and Damdochax Creek and upper Nass River (Damd.).

| | Location | | | | | | ***Kruskal-Wallis*** |
|---|---|---|---|---|---|---|---|
| | **FW.** | **Bell.** | **Cran.** | **Kwin.** | **Mez.** | **Damd.** | ***P* values** |
| **Female** | | | | | | | |
| Mean fork length (cm) | 67.1 | 69.1 | 72.6 | 71.3 | 71.1 | 73.1 | <0.001 |
| Standard error (cm) | 0.47 | 1.07 | 0.98 | 1.05 | 1.87 | .92 | |
| Standard deviation (cm) | 8.50 | 7.06 | 7.90 | 7.26 | 10.60 | 7.06 | |
| Size range (cm) | 42-98 | 48-84 | 48-89 | 54-86 | 53.5-100 | 55-90 | |
| Sample size | 329 | 44 | 65 | 48 | 32 | 59 | |
| **Male** | | | | | | | |
| Mean fork length (cm) | 68.2 | 68.8 | 71.0 | 69.8 | 71.4 | 75.2 | 0.004 |
| Standard error (cm) | 0.66 | 1.77 | 1.46 | 1.63 | 2.50 | 1.69 | |
| Standard deviation (cm) | 11.57 | 12.50 | 10.14 | 11.15 | 9.35 | 9.27 | |
| Size range (cm) | 48-100 | 49.5-93 | 54-90 | 47-89 | 55.5-83.5 | 60.5-89 | |
| Sample size | 303 | 50 | 48 | 47 | 14 | 30 | |
| Mann-Whitney U, *P* values | 0.568 | 0.553 | 0.534 | 0.524 | 0.424 | 0.068 | |

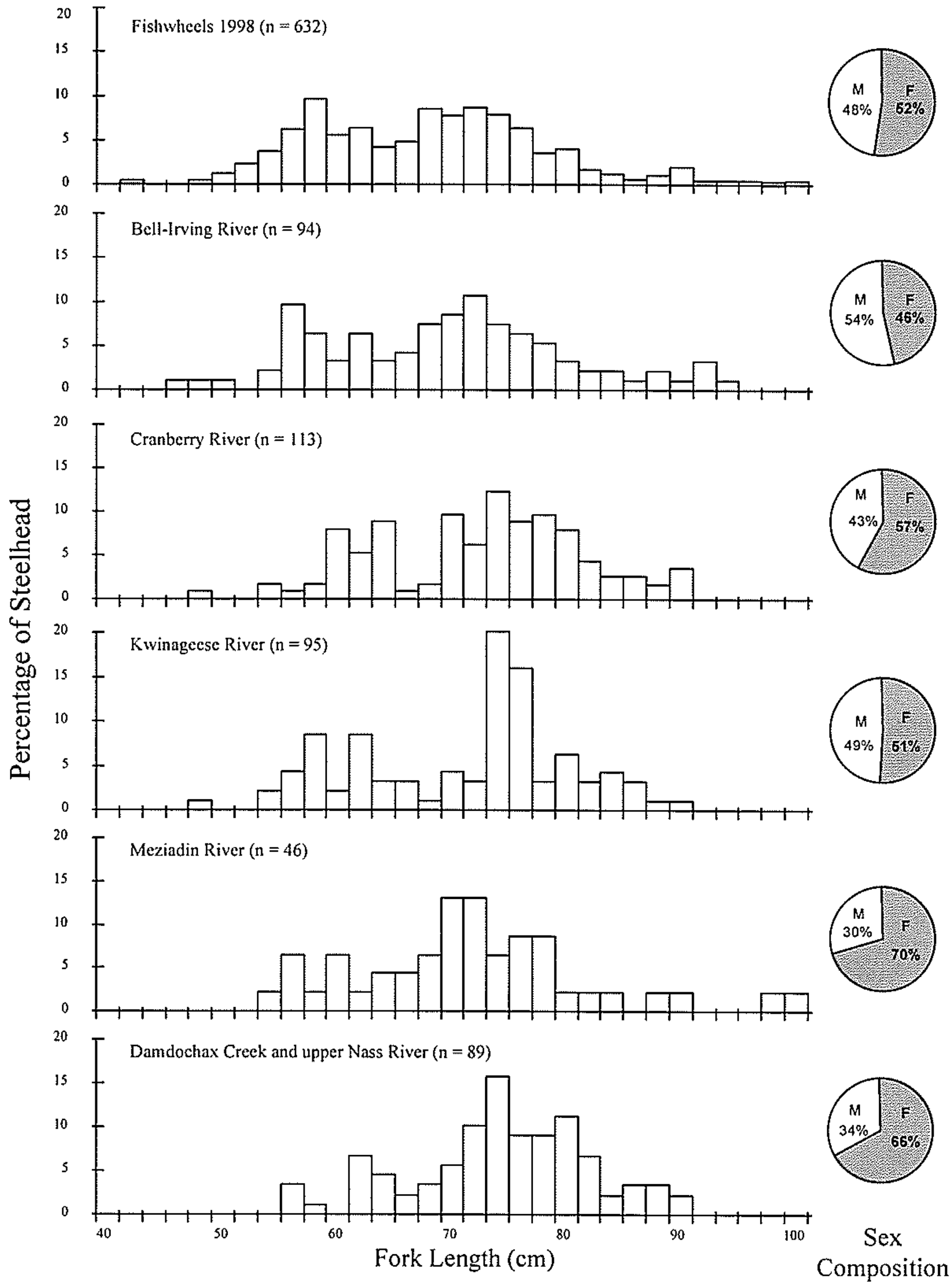


Figure 4. The length-frequency distributions and sex composition for steelhead sampled at the fishwheels, Bell-Irving, Cranberry, Kwinageese and Meziadin rivers, and Damdochax Creek and the upper Nass River.

For steelhead length distributions, the median fork length differed between locations (Median test $\chi^2 = 54.70$, $P < 0.001$), which indicated the length distributions differed between locations. Fork lengths of steelhead sampled at the fishwheels were smaller than steelhead sampled at the Cranberry, Kwinageese, and Meziadin rivers, and Damdochax Creek and the upper Nass River, but they were similar in size to steelhead sampled at the Bell-Irving River (Table 10). The length distribution of steelhead sampled at the fishwheels was similar to steelhead at the Bell-Irving and Meziadin rivers, but differed from the length distributions of steelhead sampled at the Cranberry River, Kwinageese River, and Damdochax Creek and the upper Nass River (Table 10).

Table 10. The statistical results of comparing the fork lengths and length distributions of steelhead sampled at the fishwheels to those sampled at the Bell-Irving, Cranberry, Kwinageese and Meziadin rivers, and Damdochax Creek and the upper Nass River.

| Fishwheels compared to: | Fork Length Comparisons Mann-Whitney U Test | | Length Distribution Comparisons Kolmogorov-Smirnov Two-Sample Test | |
|---|---|---|---|---|
| | U Test Statistic | *P* -value | Z Test Statistic | *P* -value |
| Bell-Irving River | 27525.5 | 0.251 | 0.653 | 0.787 |
| Cranberry River | 25221.5 | <0.001 | 2.396 | <0.001 |
| Kwinageese River | 23659.0 | 0.001 | 2.587 | 0.001 |
| Meziadin River | 11697.5 | 0.027 | 1.268 | 0.080 |
| Damdochax Creek and upper Nass River | 16884.0 | <0.001 | 3.064 | 0.005 |

### 4.2.2.0 Steelhead Sex Ratios

The sex composition of steelhead differed between the sampling locations (chi-square $\chi^2 = 14.14$, $P = 0.015$; Figure 4; Table 11). The sex composition was strongly skewed toward females in the Meziadin River and Damdochax Creek and the upper Nass River where females were about twice as frequent as males. Females were also more frequent than males in the Cranberry River. At the fishwheels and the Kwinageese River, male and female steelhead were almost equally represented, but at the Bell-Irving River males were more frequent than females.

Table 11. The sex composition by percentage (%) and number (n) for steelhead at the fishwheels (FW.), Bell-Irving (Bell.), Cranberry (Cran.), Kwinageese (Kwin.), and Meziadin (Mez.) rivers, and the Damdochax Creek and adjacent upper Nass River.

| | Location | | | | | |
|---|---|---|---|---|---|---|
| | **FW. (n)** | **Bell. (n)** | **Cran. (n)** | **Kwin. (n)** | **Mez. (n)** | **Damd. (n)** |
| Females | 52.1% (329) | 46.3% (44) | 57.5% (65) | 50.5% (48) | 69.6% (32) | 66.3% (59) |
| Males | 47.9% (303) | 53.7% (51) | 42.5% (48) | 49.5% (47) | 30.4% (14) | 33.7% (30) |
| **Total** | **100% (632)** | **100% (95)** | **100% (113)** | **100% (95)** | **100% (46)** | **100% (89)** |
| Female:Male | 1.09:1 | 0.86:1 | 1.35:1 | 1.02:1 | 2.29:1 | 1.97:1 |
| Chi-Square *P* Value | 0.015 | | | | | |

### 4.2.2.0 Steelhead Age Distributions

The mean smolt age of steelhead ranged from 3.21 years at the Bell-Irving River to 3.51 years at the Meziadin River, and differed between locations (ANOVA, F = 4.17, $P$ = 0.001; Table 12). The mean smolt age of Bell-Irving River steelhead differed from steelhead at the fishwheels (Tukey HSD = -0.28, $P$ = 0.001) and Damdochax Creek and the upper Nass River 1997 (Tukey HSD = 0.26, $P$ = 0.039), but was similar to steelhead at the Kwinageese and Meziadin rivers (Tukey HSD < -0.30, $P$ > 0.089). All other pairwise comparisons indicated the mean smolt ages were similar (Tukey HSD < -0.30, $P$ > 0.089).

Table 12. A summary of the mean, standard error (SE), standard deviation (SD) and range in smolt age for steelhead sampled at the fishwheels (FW.), Bell-Irving (Bell.), Cranberry (Cran.), Kwinageese (Kwin.) and Meziadin (Mez.) rivers, and Damdochax Creek and upper Nass River (Damd.).

| | Location | | | | | | *ANOVA* |
|---|---|---|---|---|---|---|---|
| | **FW.** | **Bell.** | **Cran.** | **Kwin.** | **Mez.** | **Damd.** | ***P* value** |
| Mean smolt age (yr.) | 3.49 | 3.21 | 3.33 | 3.42 | 3.51 | 3.48 | 0.001 |
| SE (yr.) | 0.03 | 0.05 | 0.05 | 0.07 | 0.10 | 0.06 | |
| SD (yr.) | 0.61 | 0.49 | 0.52 | 0.63 | 0.64 | 0.55 | |
| Age range (yr.) | 2-5 | 2-5 | 2-5 | 3-5 | 3-5 | 3-5 | |
| Sample size | 490 | 85 | 93 | 79 | 39 | 86 | |

The distribution of ocean ages between male and female steelhead illustrated that females had relatively fewer ocean age 1+ fish than males (Figure 5). The ocean age composition differed between males and females at the fishwheels, (chi-square $\chi^2$ = 12.34, $P$ = 0.006), and the Bell-Irving (chi-square $\chi^2$ = 23.96, $P$ < 0.001), Cranberry (chi-square $\chi^2$ = 16.04, $P$ < 0.001), and Kwinageese rivers (chi-square $\chi^2$ = 9.21, $P$ = 0.010), and Damdochax Creek and the upper Nass River (chi-square $\chi^2$ = 9.85, $P$ = 0.007). Although, the ocean age composition was statistically similar for male and female steelhead in the Meziadin River (chi-square $\chi^2$ = 1.93, $P$ = 0.382). Among female steelhead, the ocean age composition differed between locations (chi-square $\chi^2$ = 41.96, $P$ < 0.001), however for male steelhead the ocean age composition was similar between locations (chi-square $\chi^2$ = 10.42, $P$ = 0.404). The ocean age composition comparisons between locations should be interpreted cautiously since there was a discrepancy in the sexual identification of 25% of the marked steelhead from the fishwheels that were recaptured in the recovery sample.

Repeat spawners were generally rare among steelhead with readable ocean ages and ranged from about 6% in Damdochax Creek and the upper Nass River to 16% in the Meziadin River (Table 13). Double repeat spawners were observed at the fishwheels, Cranberry River, and Damdochax Creek and the upper Nass River. The frequency of repeat spawners was statistically similar between locations (chi-square $\chi^2$ = 7.10, $P$ = 0.213).

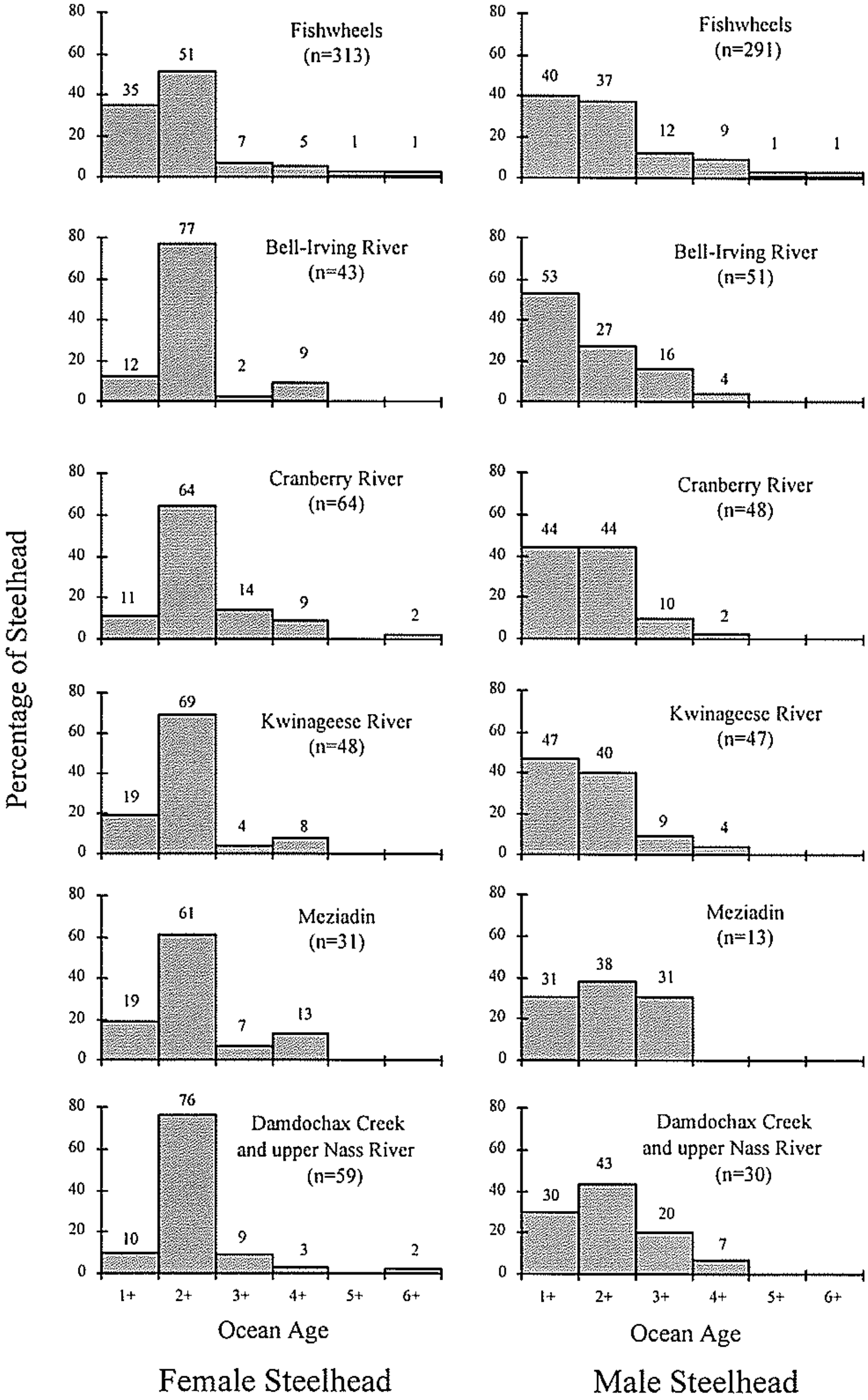


Figure 5. The ocean age-frequency distributions for male and female steelhead sampled at the fishwheels, Bell-Irving, Cranberry, Kwinageese and Meziadin rivers, and Damdochax Creek and upper Nass River. Repeat spawner steelhead were included with 3+, 4+, 5+ and 6+. The sexual identification of steelhead at the fishwheels differed for 25% of the steelhead recaptured at the tributary locations. Comparisons to the fishwheels should be made cautiously.

Table 13. The spawning history composition (%) and number (n) for steelhead from the fishwheels (FW.), Bell-Irving (Bell.), Cranberry (Cran.), Kwinageese (Kwin.), and Meziadin (Mez.) rivers, and the Damdochax Creek and adjacent upper Nass River by percentage (%) and number (n).

| **Spawning History** | **Location** | | | | | |
|---|---|---|---|---|---|---|
| | **FW. (n)** | **Bell. (n)** | **Cran. (n)** | **Kwin. (n)** | **Mez. (n)** | **Damd. (n)** |
| Maiden | 88.8% (538) | 93.6% (88) | 86.6% (97) | 91.6% (87) | 84.1% (37) | 94.4% (84) |
| Single Repeat | 10.1% (61) | 6.4% (6) | 12.5% (14) | 8.4% (8) | 15.9% (7) | 4.5% (4) |
| Double Repeat | 1.2% (7) | 0% (0) | 0.9% (1) | 0% (0) | 0% (0) | 1.1% (1) |
| **Total** | **100% (606)** | **100% (95)** | **100% (112)** | **100% (95)** | **100% (44)** | **100% (89)** |

### 4.2.3.0 Steelhead Length at Age

For ocean age 1+ steelhead, males and females were similar in size at the fishwheels (*t*-test = -0.84, $P = 0.405$; Table 14), and the Bell-Irving (*t*-test = -0.66, $P = 0.516$), Kwinageese (*t*-test = -0.14, $P = 0.888$), and Meziadin rivers (*t*-test = -0.05, $P = 0.962$). However males were larger than females at the Cranberry River (*t*-test = -2.46, $P = 0.021$) and Damdochax Creek and the upper Nass River (*t*-test = -2.51, $P = 0.026$). In contrast to ocean age 1+ steelhead, males were consistently larger than females for ocean age 2+ fish. Males were larger than females at the fishwheels (*t*-test = -2.18, $P = 0.030$), and the Bell-Irving (*t*-test = -3.81, $P < 0.001$), Cranberry (*t*-test = -4.57, $P < 0.001$), Kwinageese (*t*-test = -3.49, $P = 0.001$), and Meziadin rivers (*t*-test = -3.91, $P = 0.001$), and Damdochax Creek and the upper Nass River (*t*-test = -5.37, $P < 0.001$). At the fishwheels, males were similar in size to females at ocean age 3+ (*t*-test = -1.06, $P = 0.296$) and ocean age 4+ (*t*-test = -1.32, $P = 0.192$). The lengths of male and female steelhead were not compared for ocean age 3+ or 4+ at the other locations due to few samples.

The mean fork lengths were compared between locations separately for males and females by ocean age. For ocean age 1+ steelhead, females were similar in size between locations (ANOVA F = 0.24, $P = 0.943$; Table 14), however male steelhead differed in size between locations (ANOVA F = 3.16, $P = 0.009$). The male steelhead at the fishwheels differed from male steelhead at Damdochax Creek and the upper Nass River (Tukey HSD = -4.58, $P < 0.036$), but were similar in size to male steelhead at the other locations (Tukey HSD < 3.01, $P > 0.051$). All other pairwise comparisons indicated the lengths were similar (Tukey HSD < 3.87, $P > 0.220$).

For ocean age 2+ steelhead, females differed in size between locations (ANOVA F = 7.91, $P < 0.001$; Table 14). Female steelhead at Damdochax Creek and the upper Nass River were larger than female steelhead at the fishwheels (Tukey HSD = 2.68, $P = 0.001$), Bell-Irving (Tukey HSD = 3.16, $P = 0.008$) and Meziadin rivers (Tukey HSD = 3.60, $P = 0.013$), but were similar in size to female steelhead at the Cranberry (Tukey HSD = 1.16, $P = 0.758$) and Kwinageese rivers (Tukey HSD = -0.83, $P = 0.945$). Female steelhead at Kwinageese River were larger than female steelhead at the fishwheels (Tukey HSD = 3.51, $P < 0.001$), Bell-Irving River (Tukey HSD = 3.99, $P = 0.001$), and Meziadin River (Tukey HSD = 4.43, $P = 0.002$), but were similar in size to female steelhead at the Cranberry River (Tukey HSD = 1.99, $P = 0.270$) and Damdochax Creek and the upper Nass River. All other pairwise

Table 14. A summary of the mean, standard error (SE), standard deviation (SD), and range in fork length of ocean age 1+, 2+, 3+ and 4+ steelhead at the fishwheels (FW.), Bell-Irving (Bell.), Cranberry (Cran.), Kwinageese (Kwin.) and Meziadin (Mez.) rivers, and Damdochax Creek and upper Nass River (Damd.).

| Ocean Age | | Fork Length | Location FW. | Bell. | Cran. | Kwin. | Mez. | Damd. | *ANOVA* *P* values |
|---|---|---|---|---|---|---|---|---|---|
| 1+ | Female | Mean (cm) | 58.3 | 57.2 | 57.1 | 59.0 | 58.5 | 58.6 | 0.943 |
| | | SE (cm) | 0.41 | 1.59 | 1.85 | 1.13 | 1.62 | 1.68 | |
| | | SD (cm) | 4.24 | 3.55 | 4.90 | 3.39 | 3.98 | 4.13 | |
| | | Range (cm) | 42-76 | 54.5-62 | 48-62 | 54-64 | 53.5-65 | 55-65 | |
| | | Sample size | 110 | 5 | 7 | 9 | 6 | 6 | |
| | Male | Mean (cm) | 57.8 | 58.5 | 60.8 | 59.2 | 58.6 | 62.3 | 0.009 |
| | | SE (cm) | 0.46 | 0.78 | 0.62 | 0.91 | 1.95 | 0.52 | |
| | | SD (cm) | 4.96 | 4.00 | 2.85 | 4.28 | 3.90 | 1.56 | |
| | | Range (cm) | 48-78 | 49.5-67 | 54-64 | 47-65.5 | 55.5-64 | 60.5-65 | |
| | | Sample size | 116 | 26 | 21 | 22 | 4 | 9 | |
| | Mann-Whitney U *P* Value | | 0.405 | 0.516 | 0.021 | 0.888 | 0.962 | 0.026 | |
| 2+ | Female | Mean (cm) | 70.5 | 70.0 | 72.0 | 74.0 | 69.6 | 73.2 | <0.001 |
| | | SE (cm) | 0.36 | 0.56 | 0.62 | 0.40 | 0.83 | 0.55 | |
| | | SD (cm) | 4.52 | 3.22 | 3.96 | 2.28 | 3.60 | 3.66 | |
| | | Range (cm) | 55-82 | 63-78 | 63-79 | 68-79 | 62-76 | 62-81 | |
| | | Sample size | 158 | 33 | 41 | 33 | 19 | 45 | |
| | Male | Mean (cm) | 72.0 | 74.7 | 76.9 | 77.5 | 76.3 | 79.4 | <0.001 |
| | | SE (cm) | 0.59 | 1.33 | 0.89 | 1.12 | 1.04 | 1.01 | |
| | | SD (cm) | 6.12 | 4.97 | 4.06 | 4.88 | 2.33 | 3.65 | |
| | | Range (cm) | 57-100 | 62.5-84 | 69-84 | 69-87 | 74-80 | 73-86.5 | |
| | | Sample size | 109 | 14 | 21 | 19 | 5 | 13 | |
| | Mann-Whitney U *P* Value | | 0.030 | <0.001 | <0.001 | 0.001 | 0.001 | <0.001 | |
| 3+ | Female | Mean (cm) | 75.4 | 80.5 | 78.4 | 68.0 | 88.5 | 81.4 | NA |
| | | SE (cm) | 1.32 | NA | 1.82 | 12.0 | 11.5 | 2.07 | |
| | | SD (cm) | 6.31 | NA | 5.46 | 16.97 | 16.26 | 4.63 | |
| | | Range (cm) | 67-94 | 80.5 | 72-89 | 56-80 | 77-100 | 76-87 | |
| | | Sample size | 23 | 1 | 9 | 2 | 2 | 5 | |
| | Male | Mean (cm) | 78.1 | 86.3 | 85.3 | 83.5 | 75.4 | 81.7 | NA |
| | | SE (cm) | 1.95 | 1.73 | 1.66 | 3.01 | 3.17 | 1.61 | |
| | | SD (cm) | 11.37 | 4.89 | 3.70 | 6.02 | 6.34 | 3.93 | |
| | | Range (cm) | 53-83 | 79-93 | 80-90 | 75-89 | 69-83.5 | 76-87 | |
| | | Sample size | 34 | 8 | 5 | 4 | 4 | 6 | |
| | Mann-Whitney U *P* Value | | 0.296 | NA | NA | NA | NA | NA | |
| 4+ | Female | Mean (cm) | 79.1 | 79.1 | 83.6 | 77.8 | 86.9 | 86.0 | NA |
| | | SE (cm) | 1.90 | 1.98 | 1.59 | 3.33 | 4.86 | 2.08 | |
| | | SD (cm) | 8.93 | 3.97 | 4.21 | 6.65 | 9.72 | 3.61 | |
| | | Range (cm) | 58-98 | 75-84 | 77-89 | 71-86 | 74-97.5 | 83-90 | |
| | | Sample size | 22 | 4 | 7 | 4 | 4 | 3 | |
| | Male | Mean (cm) | 82.8 | 91.8 | 89.0 | 85.0 | NA | 86.5 | NA |
| | | SE (cm) | 1.92 | 0.25 | NA | 1.00 | NA | 2.50 | |
| | | SD (cm) | 10.88 | 0.35 | NA | 1.41 | NA | 3.54 | |
| | | Range (cm) | 57-100 | 91.5-92 | 89 | 84-86 | NA | 84-89 | |
| | | Sample size | 32 | 2 | 1 | 2 | NA | 2 | |
| | Mann-Whitney U *P* Value | | 0.192 | NA | NA | NA | NA | NA | |

comparisons indicated the lengths were similar between locations (Tukey HSD < 2.43, $P >$ 0.241). Similar to females, males also differed in size between locations (ANOVA F = 8.46, $P < 0.001$). Male steelhead at the fishwheels were smaller than male steelhead at the Cranberry River (Tukey HSD = -4.98, $P = 0.002$), Kwinageese River (Tukey HSD = -5.56, $P < 0.001$), and at Damdochax Creek and the upper Nass River (Tukey HSD = -7.44, $P <$ 0.001), but were similar to steelhead at the Bell-Irving (Tukey HSD = -2.73, $P = 0.500$) and Meziadin rivers (Tukey HSD = -4.36, $P = 0.512$). All other pairwise comparisons indicated the lengths were similar between locations (Tukey HSD < 4.71, $P > 0.229$).

### 4.2.4.0 Steelhead Recaptures

Of the 24 steelhead recaptured with their Floy tags attached, most (10) were tagged at fishwheel 4, followed by six at fishwheel 3, five at fishwheel 1 and three at fishwheel 2 (Table 15). Ten steelhead were male and 14 were female. All 24 steelhead were identified for sex upon recapture and for six there was a discrepancy in the sex recorded at recapture and initial tagging. The sex of steelhead may be more difficult to correctly identify at the fishwheels since the fish do not have well developed secondary sexual dimorphisms, such as kype development or coloration, at this point in their life history. These characteristics become more distinct as summer steelhead spend more time in freshwater which made sexual identification more accurate during the recovery sample. Three of the steelhead identified as male in the recovery sample were identified as female at the fishwheels and three of the steelhead identified as female in the recovery sample were identified as male at the fishwheels. Based on these few misidentified fish there did not appear to be any directional bias in the sexual misidentification. Four of these six steelhead were small (48 to 58 cm) and the other two were moderate in size (71 and 75 cm) which indicated that discrepancies may be more common among smaller fish, however it is difficult to draw inferences from such small samples. For the fish identified in the recovery sample, the sex ratio was similar between marked and unmarked steelhead (chi-square $\chi^2 = 0.021$, $P = 0.886$).

In the recovery sample, the mean lengths of recaptured male and female steelhead were 64.6 cm and 67.8 cm, respectively (Table 15). Tagged steelhead (mean = 66.5 cm) were smaller than untagged steelhead (mean = 71.6 cm; Mann-Whitney U = 3656, $P = 0.015$). The approximate 5 cm difference between the mean length of tagged and untagged steelhead may indicate negative size bias (selectivity) at the Nass River fishwheels. For tagged steelhead, fork lengths differed by an average of 1.6 cm (range, 0.0 to 8.0 cm) between measurements taken at the fishwheels and at the tributaries. Of the 22 fish with paired measurements in the recovery sample and at the fishwheels, 7 were the same size whereas 11 were smaller and 4 were larger in the recovery sample than when they were measured at the fishwheels.

In addition, there were two recaptured steelhead that were tagged at the fishwheels in 1997. The first fish was tagged (Orange N06237) at fishwheel 2 on August 25, 1997 and was recaptured at the Meziadin River fishway on October 15, 1998. No scales were collected from this fish in 1998. This fish may be a repeat spawner that made spawning migrations in successive years or it may have been tagged in 1997 as an emigrating kelt, however the

August 25 tagging date suggested it was a fresh-run fish. Thus, it was assumed to have migrated up the Nass River in 1998, but was not captured at the fishwheels. The second fish was tagged (Orange N06374) at fishwheel 1 on August 21, 1997 and was recaptured in the Bell-Irving River on November 25, 1998. The fish was a repeat spawner as determined by its scales. The fish may have made spawning migrations in successive years or it may have been tagged in 1997 as an emigrating kelt. Although, there was no winter annulus following the spawning check on the fish's scales which indicated it was a successive spawner that did not spend a winter in the ocean between spawning migrations. This fish was assumed to have migrated up the Nass River in 1998, but was not captured at the fishwheels. This life history pattern is rare among Nass River summer steelhead.

Table 15. A summary of fishwheel tag recoveries in the Nass River, 1998 by location (FW=fishwheel).

| | Tagging Information | | | | Recapture Information | | | |
|---|---|---|---|---|---|---|---|---|
| **Tag No.[1]** | **Location** | **Date** | **Sex** | **Length (cm)** | **Location** | **Date** | **Sex** | **Length (cm)** |
| Or. N6590 | FW1 | Aug. 20 | m | 59.0 | Bell-Irving | Nov. 6 | m | 57.0 |
| Or. N6487 | FW4 | July 24 | f | 63.0 | Bell-Irving | Oct. 27 | f | NA |
| Wh. 8358 | FW4 | Aug. 28 | m | 49.0 | Bell-Irving | Nov. 6 | m | 49.5 |
| Tag Lost | NA | NA | NA | NA | Bell-Irving | Nov. 25 | f | 71.0 |
| Or. N6666 | FW1 | Aug. 24 | f | 71.0 | Cranberry | Oct. 15 | f | 73.0 |
| Or. N6979 | FW1 | Sep. 10 | f• | 75.0 | Cranberry | Oct. 29 | m | 75.0 |
| Or. N6488 | FW3 | July 26 | f | 69.0 | Cranberry | Oct. 15 | f | 73.0 |
| Or. N6836 | FW3 | Aug. 21 | f | 74.0 | Cranberry | Nov. 20 | f | 76.5 |
| Or. N6849 | FW3 | Aug. 21 | m | 90.0 | Cranberry | Oct. 15 | m | 90.0 |
| Wh. 8481 | FW3 | Sep. 7 | f | 78.0 | Cranberry | Nov. 20 | f | 76.5 |
| Or. N6752 | FW4 | Aug. 7 | f | 71.0 | Cranberry | Oct. 15 | f | 63.0 |
| Or. N6807 | FW4 | Aug. 20 | f | 70.0 | Cranberry | Oct. 15 | f | 70.0 |
| Wh. 8532 | FW4 | Sep. 12 | f• | 57.0 | Cranberry | Nov. 20 | m | 54.5 |
| Wh. 8584 | FW4 | Sep. 21 | m | 66.0 | Cranberry | Oct. 29 | m | 63.5 |
| Wh. 8597 | FW4 | Sep. 28 | m• | 49.0 | Cranberry | Oct. 29 | f | 48.0 |
| Or. N6616 | FW2 | July 28 | m• | 72.0 | Nass River | Nov. 4 | f | 71.0 |
| Or. N6570 | FW2 | Aug. 16 | f | 81.0 | Damdochax | Nov. 4 | f | 81.0 |
| Or. N6784 | FW4 | Aug. 16 | f | 74.0 | Damdochax | Nov. 2 | f | 70.0 |
| Or. N6749 | FW3 | Aug. 20 | m | 73.0 | Kwinageese | Oct. 14 | m | 74.0 |
| Or. N6824 | FW3 | Aug. 21 | f• | 58.0 | Kwinageese | Oct. 20 | m | 58.0 |
| Wh. 8454 | FW4 | Sep. 6 | m• | 56.0 | Kwinageese | Oct. 14 | f | est. 55.0 |
| Or. N6974 | FW1 | Sep. 8 | f | 63.0 | Meziadin | Oct. 15 | f | 63.0 |
| Or. N6981 | FW1 | Sep. 10 | f | 65.0 | Meziadin | Sep. 29 | f | 62.0 |
| Or. N6632 | FW2 | Aug. 1 | m | 69.0 | Meziadin | Sep. 25 | m | 69.0 |
| Or. N6897 | FW4 | Aug. 23 | m | 57.0 | Meziadin | Sep. 19 | m | 56.0 |

• denotes discrepancy in sex identification.

1. The tag colours were orange (Or.) and white (Wh.).

## 4.2.5.0 Steelhead Condition

Twenty-three (6%) of the 400 steelhead examined in the tributaries had head wounds which appeared as a red open sore on the skin of the head (Figure 6; Table 16). The frequency of steelhead with head wounds was highest in the Cranberry and Kwinageese rivers and no fish had head wounds in Damdochax Creek and the upper Nass River. The frequency of fish with head wounds differed between locations (chi-square $\chi^2 = 14.93$, $P = 0.002$) when Meziadin River steelhead were excluded due to few samples.

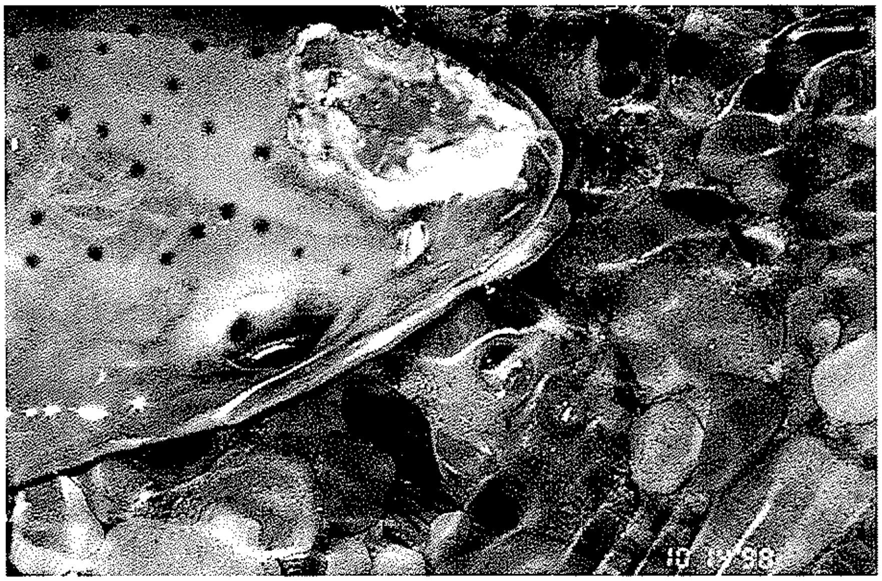

Figure 6. A steelhead with a head wound and exposed brain observed on a Kwinageese River steelhead.

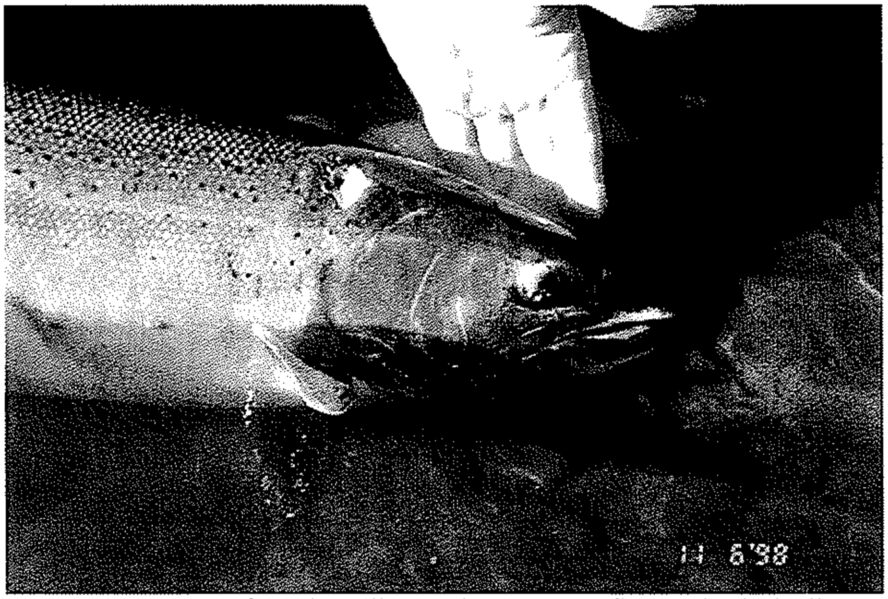

Figure 7. Male steelhead (73.0 cm) from the Bell-Irving/Oweegee confluence that had gillnet marks which wore through the skin.

Table 16. The incidence of head wounds on steelhead from the Bell-Irving (Bell.), Cranberry (Cran.), Kwinageese (Kwin.), and Meziadin (Mez.) rivers, and the Damdochax Creek and adjacent upper Nass River by percentage (%) and number (n).

| | Location | | | | | |
|---|---|---|---|---|---|---|
| | **Bell. (n)** | **Cran. (n)** | **Kwin. (n)** | **Mez. (n)** | **Damd. (n)** | **Total (n)** |
| Head Wound | 2% (2) | 7% (8) | 12% (11) | 25% (2) | 0% (0) | 6% (23) |
| No Head Wounds | 98% (93) | 93% (105) | 88% (84) | 75% (6) | 100% (89) | 94% (377) |
| **Total** | **100% (95)** | **100% (113)** | **100% (95)** | **100% (8)** | **100% (89)** | **100% (400)** |

Thirty-four (9%) of the 400 steelhead examined had gillnet marks (Figure 7; Table 17). The incidence of gillnet marks was highest for steelhead in the Bell-Irving, Cranberry and Meziadin rivers, and few steelhead (1%) had gillnet marks in the Kwinageese River. The incidence of gillnet marks differed between locations (chi-square $\chi^2 = 13.23$ $P = 0.004$) when Meziadin River steelhead were excluded due to few samples.

Table 17. The incidence of gillnet marks on steelhead from the Bell-Irving (Bell.), Cranberry (Cran.), Kwinageese (Kwin.), and Meziadin (Mez.) rivers, and the Damdochax Creek and adjacent upper Nass River by percentage (%) and number (n).

| | Location | | | | | |
|---|---|---|---|---|---|---|
| | **Bell. (n)** | **Cran. (n)** | **Kwin. (n)** | **Mez. (n)** | **Damd. (n)** | **Total (n)** |
| Gillnet Marks | 13% (12) | 13% (15) | 1% (1) | 13% (1) | 6% (5) | 9% (34) |
| No Gillnet Marks | 87% (93) | 87% (98) | 99% (94) | 87% (7) | 94% (84) | 91% (366) |
| **Total** | **100% (95)** | **100% (113)** | **100% (95)** | **100% (8)** | **100% (89)** | **100% (400)** |

Sixty-six (17%) of the 400 steelhead examined had predator scars (Table 18). The incidence of predator scars was similar for all locations (chi-square $\chi^2 = 0.46$ $P = 0.928$) when Meziadin River steelhead were excluded due to few samples.

Table 18. The incidence of predator scars on steelhead from the Bell-Irving (Bell.), Cranberry (Cran.), Kwinageese (Kwin.), and Meziadin (Mez.) rivers, and the Damdochax Creek and adjacent upper Nass River by percentage (%) and number (n).

| | Location | | | | | |
|---|---|---|---|---|---|---|
| | **Bell. (n)** | **Cran. (n)** | **Kwin. (n)** | **Mez. (n)** | **Damd. (n)** | **Total (n)** |
| Predator Scars | 16% (15) | 15% (17) | 18% (17) | 50% (4) | 15% (13) | 17% (66) |
| No Predator Scars | 84% (80) | 85% (96) | 82% (78) | 50% (4) | 85% (76) | 83% (334) |
| **Total** | **100% (95)** | **100% (113)** | **100% (95)** | **100% (8)** | **100% (89)** | **100% (400)** |

Twenty-six (7%) of the 400 steelhead examined had hook scars (Table 19). The incidence of hook scars was highest in Damdochax Creek (20%) and few fish in the other rivers had hook scars. The incidence of hook scars differed between locations (chi-square $\chi^2 = 37.01$ $P < 0.001$) when Meziadin River steelhead were excluded due to few samples.

Table 19. The incidence of hook scars on steelhead from the Bell-Irving (Bell.), Cranberry (Cran.), Kwinageese (Kwin.), and Meziadin (Mez.) rivers, and the Damdochax Creek and adjacent upper Nass River by percentage (%) and number (n).

| | Location | | | | | |
|---|---|---|---|---|---|---|
| | **Bell. (n)** | **Cran. (n)** | **Kwin. (n)** | **Mez. (n)** | **Damd. (n)** | **Total (n)** |
| Hook Scar | 2% (2) | 3% (3) | 2% (2) | 13% (1) | 20% (18) | 7% (26) |
| No Hook Scar | 98% (93) | 97% (110) | 98% (93) | 87% (7) | 80% (71) | 93% (374) |
| **Total** | **100% (95)** | **100% (113)** | **100% (95)** | **100% (8)** | **100% (89)** | **100% (400)** |

# 5.0.0.0 Discussion

## *5.1.0.0 Steelhead Abundance Estimates*

The mark-recapture abundance estimates were susceptible to bias from a number of sources such as non-representative tag application or recovery, an open population, a higher mortality for tagged fish than untagged fish, and tag loss. The tag application and recovery samples were examined for biases to investigate non-representative tag application and recovery. The assumption that the population was closed was difficult to evaluate. To address the differential mortality of marked fish, the number of fish marked in the application sample was adjusted for rates of differential tag removal. Tag loss bias was eliminated because all tagged fish were marked by a tag puncture wound below the dorsal fin and 95% of the tagged steelhead in the application had a small adipose fin clip as a secondary mark that could not be lost or regenerated between sample periods.

The true representativeness of the application and recovery samples could not be tested because the true population parameters were unknown. However, the application and recovery samples were examined for spatial, size, age and sex related biases as indicators of weakness in the study design. The application sample was investigated for temporal recovery bias, but none was detected (Table 20). Also, no biases were detected that related to location, size, age, or sex in the recovery or application samples. Although, these results should be interpreted cautiously because of the small number of marked steelhead that were recovered. Nearly 3.9% of steelhead in the application sample (unadjusted for differential mortality of tagged fish) were recovered. However, the number recovered was small (R = 25) which decreased the ability of the chi-square, Kolmogorov-Smirnov and Student's *t*- tests to detect application and recovery biases as indicated by the *post hoc* power analysis.

Table 20. Summary of statistical test results for sampling selectivity bias investigations.

| Bias Test | Application Sample | Recovery Sample |
|---|---|---|
| Location | No bias detected | No bias detected |
| Steelhead Size | No bias detected | No bias detected |
| Steelhead Age | No bias detected | No bias detected |
| Steelhead Sex | No bias detected | No bias detected |
| Time Period | Not tested | No bias detected |

The observed effect sizes in the application and recovery bias investigations were generally small (Cohen 1988) and suggested the differences were biologically insignificant (Thomas and Juanes 1996). However, too few steelhead were sampled to conclusively determine whether the small observed differences were statistically different, as indicated by the *post hoc* power analysis. For bias investigations with small effect sizes (near 0.10), very large sample sizes of at least an order of magnitude higher would have been necessary to achieve 80% power, the level recommended by Cohen (1988) and Peterman (1990). If 10,000 steelhead were present in the Nass River, then 40 to 60% of the fish would have to be handled to achieved 80% power. Since all the observed effect sizes were less than the detectable effect sizes for alpha of 0.05 and beta of 0.20, the bias investigations should be interpreted cautiously, but the small observed effect sizes indicated the differences were biologically insignificant.

The study design indicated that migrating steelhead had an equal probability of being captured and tagged at the fishwheels and that the locations and timing of the recovery samples had permitted sufficient mixing of marked and unmarked fish. A preliminary analysis suggested steelhead were captured in proportion to their abundance at the fishwheels (Link draft 1998). For sockeye and coho salmon, the fishwheels captured fish in proportion to their relative abundance as they passed Gitwinksihlkw and Grease Harbour (Link and English 1997; Link and Gurak 1997), however for chinook salmon in 1997, small fish (50 to 71 cm) were 1.3 times more likely to be tagged than large fish (72 + cm; Link and Nass 1998 *cited in* Link draft 1998). For 1998, steelhead sampled at the fishwheels were generally smaller than steelhead sampled at the tributary locations, however these differences were not large enough to cause detectable application or recovery biases. The timing and location of the recovery sample in the tributaries and upper Nass River mainstem was sufficient to permit complete mixing of marked and unmarked fish.

The assumption that the population was closed was less certain, but steelhead were captured and tagged at the fishwheels throughout the majority of the summer steelhead run and few steelhead were believed to enter the study area after the fishwheel operations ended. None of the steelhead tagged in the Nass River watershed have been recaptured outside of the watershed, except in the marine environment. Also, the Nisga'a fishery did not target steelhead and most of the fishery was located downstream of the fishwheels. If substantial immigration of unmarked steelhead occurred between samples then the unbiased Petersen and Bayesian estimators would be inflated (Krebs 1989). However, the application and recovery samples were collected over as short period of time as possible to minimize changes in steelhead abundance from these factors. Steelhead abundance may have changed between samples due to emigration, immigration, poaching, native harvest, natural mortality or predation (Bison 1993). Although, Ricker (1975) stated that natural mortality will not interfere with the accuracy of the results, as long as it is the same for the marked and unmarked groups. Poaching by anglers was assumed to be similar for marked and unmarked groups. For the recovery sample, fish were sampled from the main summer steelhead populations only, and thus marked and unmarked fish destined for other locations had no chance of being recaptured. The bias investigations suggested the probability of observing a fish in the recovery sample was independent of mark status. Also, the mark incidence was similar between locations in the recovery sample.

Marked fish may have experienced higher mortality than unmarked fish as a result of capture, handling and tagging at the fishwheels and they may have experienced higher vulnerability to the Nisga'a fishery (Link and English 1994, 1997). The extent of these factors on the number of marked steelhead was not measured and therefore conditions were examined with different levels of assumed mortality and differential removal of tagged fish. The tag application sample was adjusted in other fish abundance studies to account for handling mortality, sampling gear mortality or differential tag removal from fisheries. These studies involved other species and used spaghetti tags, which are more invasive and secure than Floy anchor tags, and therefore the rates of adjustment were not directly comparable to this study. Nonetheless, measuring the differential rate of removal of tagged steelhead was beyond the scope of this study and inappropriate for a preliminary abundance estimate. For the Nass River fishwheels, Link and Gurak (1997) estimated 10% of the marked coho salmon in 1995 were removed before they were recovered at the Meziadin River fishway. Link and Gurak (1997) attributed 8% of the mortality to handling and sampling gear, and 2% to differential removal at the Nisga'a fishery. Link and Gurak (1997) also adjusted the tag application sample to account for handling mortality, sampling gear mortality and differential tag removal for sockeye and chinook salmon to derive mark-recapture abundance estimates in 1995. On the Tanana River, Alaska, chum salmon were tagged at a pair of fishwheels in the lower river and then recovered in a pair of fishwheels in the upper river to derive a Petersen mark-recapture escapement estimate (Cappiello and Bromaghin 1997). Cappiello and Bromaghin (1997) reduced the number of chum salmon in tagged in the lower fishwheels (application sample) by 5% to account for handling and sampling gear mortality.

Floy anchor tag loss in the Nass River was within the range reported for other steelhead enumeration programs. Four percent of Nass River steelhead lost their Floy anchor tags between the application and recovery samples, which was about five months (July 1 to November 25). In 1997, 5.6% of Cranberry River steelhead lost their Floy anchor tags during the month long period between samples (Parken and Atagi 1998). In Toboggan Creek, Floy anchor tag loss was measured among adult steelhead between the pre- and post-spawning periods, which usually spanned one to two months between tag application and recovery (unpublished data, O'Neill 1994, 1995 and 1996). In Toboggan Creek, tag loss was similar between 1994 (3.8%; unpublished data, O'Neill 1994) and 1995 (3.6%; unpublished data, O'Neill 1995), but was considerably higher in 1996 (18.8%; unpublished data, O'Neill 1996). Floy anchor tag loss was also measured between the pre- and post-spawning periods in the Karluk River, Alaska (Begich 1992, 1997). Begich (1992) reported a lower tag loss (3%) for Karluk River steelhead in the spring of 1992 for samples collected from two to four months after tagging, but higher tag loss (11%) was observed for samples collected from one to three months after tagging in 1996 (Begich 1997). The variability in tag loss estimates indicated tag loss may also be influenced by factors other than the amount of time between application and recovery samples, such as spawning, sex, or predators.

The Bayesian abundance estimates were higher than the Petersen estimates for all comparisons, which was consistent to the results of Gazey and Staley (1986), Atagi (1995) and Parken and Atagi (1998). The Bayesian estimates were 3.6%, 8.0% and 7.6% higher than the respective Petersen estimators for the Nass River based on all recovery sample locations in 1998, Nass River based on the Cranberry River recovery sample in 1998, and the Nass River based on the Cranberry River sample in 1997. Due to the small samples ($M+C \leq N$) and low numbers of recaptures, the Petersen abundance estimates were negatively biased (Robson and Regier 1964; Ricker 1975; Gazey and Staley 1986; Krebs 1989; Edwards *et al.* 1997). Under these conditions the Bayesian estimators and confidence limits were preferred over the Petersen estimators, since the Bayesian estimator works well for small samples (Gazey and Staley 1986; Atagi 1995; Parken and Atagi 1998).

In 1998, the Bayesian mode abundance estimate ranged from 8,880 steelhead (20% removal of tagged fish) to 11,098 steelhead (0% removal of tagged fish) migrating passed the fishwheels. The mortality resulting from capture, handling and tagging at the fishwheels or differential tag removal by the Nisga'a fishery was not measured in 1998. In 1995, Link and Gurak (1997) estimated 10% of the coho salmon marked at the Nass River fishwheels were differentially removed. This level of assumed mortality and removal of marked fish may approximate the rate for Nass River summer steelhead since steelhead and coho salmon migrate in the Nass River during similar time periods. Although different tag types and recovery methods were used for the two species, this was the best estimate available.

The mark-recapture abundance estimate of Nass River summer steelhead in 1998 was higher than previous estimates from 1994 to 1997 that were estimated from the period specific catches of steelhead at each fishwheel and the August sockeye catch rate for each fishwheel (Table 21). For 1998, the Bayesian abundance estimate was 10,004 steelhead when 10% of the marked steelhead were removed. From 1994 to 1997, Link (draft 1998) estimated the abundance of Nass River summer steelhead ranged from 3,994 steelhead (1995) to 8,378 steelhead (1997).

Table 21. Summary of Nass River steelhead abundance estimated from fishwheel catchability (estimates from Table 4 in Link draft 1998) and mark-recapture sampling.

| Return Year | Steelhead Abundance Estimate | Method | Source |
|---|---|---|---|
| 1994 | 7,049 (SD = 565) | Mean of 3 fishwheels: based on sockeye catch rates in August, 1994 | Link draft 1998 |
| 1995 | 3,994 (SD = 1,231) | Mean of 4 fishwheels: based on sockeye catch rates in August, 1995 | Link draft 1998 |
| 1996 | 6,512 (SD = 1,444) | Mean of 4 fishwheels: based on sockeye catch rates in August, 1996 | Link draft 1998 |
| 1997 | 8,378 (SD = 3,378) | Mean of 4 fishwheels: based on sockeye catch rates in August, 1997 | Link draft 1998 |
| 1997[1,3] | 7,208 [4,768, 15,148][2] | Mark-recapture: based on Cranberry River recovery sample | Current Report |
| 1998[1] | 10,004 [7,324, 15,964][2] | Mark-recapture: based on recovery sample from 5 main locations | Current Report |
| 1998[1,3] | 5,873 [3,873, 12,953][2] | Mark-recapture: based on Cranberry River recovery sample | Current Report |

1. Steelhead abundance estimate based on the Bayesian mode for conditions with 10% removal of tagged fish.
2. 95% confidence limits for the Bayesian mode.
3. These estimates must be interpreted extremely cautiously because no sampling selectivity tests were performed.

For comparisons in 1998 and 1997, the mark-recapture abundance estimates of Nass River steelhead based only on the Cranberry River steelhead recapture information were less than the estimates derived from the fishwheel catchability (1997) and the mark-recapture samples from five locations (1998; Table 21). The Bayesian mode abundance of Nass River steelhead in 1998, based on the Cranberry River recapture data (5,873 steelhead), was approximately 59% of the Bayesian mode estimated from the recovery samples at the five locations (10,004 steelhead). Similarly, the Bayesian mode abundance of Nass River steelhead in 1997, based on the Cranberry River recapture data (7,208 steelhead), was less than (86%) the abundance estimate from the fishwheels (8,378 steelhead; Link draft 1998).

These results indicated that abundance estimates of Nass River steelhead based on recapture data from the Cranberry River only would likely underestimate the abundance of Nass River summer steelhead. Also, the difference between the estimates indicated that Cranberry River steelhead may have migration timing past the fishwheels that was not representative of all other Nass River steelhead populations. The different point estimates must be compared cautiously since they were calculated with different methods and there was overlap between the confidence limits for the mark-recapture estimates.

The mark rate (R/C) observed on Cranberry River steelhead in 1998 (0.097) was about twice the mark rate in 1997 (0.05; Parken and Atagi 1998). The difference may be attributed to the duration of the period when steelhead were tagged at the fishwheels. In 1997 steelhead were tagged up to September 2, whereas in 1998 they were tagged up to October 13. In 1998, 5 of the 11 steelhead with Floy tags recaptured in the Cranberry River were tagged after September 2. Had the fishwheel operations ceased on September 2, 1998 then 6 of the 113 steelhead sampled in the Cranberry River would have had Floy tags, and the mark rate would be 5.3%. However, the mark rate estimates were not directly comparable between years because of the annual variability in the catchability at the fishwheels. The longer tagging period in 1998 may have caused the tag rate to increase.

### *5.2.0.0 Life History and Other Characteristics*

Nass River summer steelhead were not normally distributed in size similar to the results of other Nass River steelhead investigations (Parken 1997a; Link draft 1998; Parken and Atagi 1998). In 1998, two or three peaks in the length distributions were observed for Nass River steelhead sampled at different locations. Nass River summer steelhead sampled at the fishwheels from 1992 to 1997 also had two or three peaks in their length distribution (Link draft 1998). In 1997, Cranberry River steelhead had two distinct peaks in the length-frequency distribution (Parken and Atagi 1998). The three peaks indicated the relative abundance of ocean age 1+, 2+ and 3+ or older steelhead for each location.

The similar size of male and female steelhead at different Nass River locations in 1998 was consistent with previous results for Nass River steelhead populations. However size differences were noted for comparisons within an ocean age group (Parken 1997a; Parken and Atagi 1998). In 1998, ocean age 1+ males were significantly larger than ocean age 1+ females only at the Cranberry River and Damdochax Creek and upper Nass River, but ocean age 2+ males were larger than ocean age 2+ females at all locations. Larger males than females at a given ocean age was similar to the results reported for Cranberry River steelhead in 1997 (Parken and Atagi 1998), other Nass River steelhead populations (Parken 1997a), Skeena River steelhead in the Tyee test fishery (Chudyk 1976), Kitsumkalum River (Lough and Whately 1984), Kispiox River (Whately 1977), Babine River (Narver 1969), as well as steelhead in Copper Creek (Chudyk and Walsh 1982; Queen Charlotte Islands (QCI)), Yakoun River (de Leeuw 1987; QCI), Vancouver Island (Hooton *et al.* 1987) and Keogh River (Ward and Slaney 1988). Size differences between males and females that were pooled among ocean ages may be less evident, since the proportion of the returning adult population in the different ocean age groups may vary between years and sexes (Whately 1977; Chudyk *et al.* 1977; Whately *et al.* 1978; Chudyk and Whately 1980; O'Neill and Whately 1984; Hooton *et al.* 1987; Ward and Slaney 1988).

Comparisons of the sex ratios (female:male) for Nass River steelhead in 1998 to previous ratios indicated that sex composition was variable over time. For example, at the Cranberry River, the sex ratio was skewed to females in 1998 (1.35:1) and 1997 (1.29:1), but was balanced in 1978 (1:1) and skewed toward males in 1996 (0.65:1) and 1979 (0.77:1; Parken and Atagi 1998). Similarly, the sex ratio of steelhead at the Kwinageese River in 1998 (1.02:1) was balanced compared to 1981 when the ratio was skewed toward males (0.71:1; Schultze 1981). However, in 1998 the sex ratio at the Bell-Irving River (0.86:1) was similar to the 1997 ratio (0.84:1; Parken 1997b). Also, the sex ratio of steelhead in southeast Alaska was highly variable between years in some streams (Lohr and Bryant 1999). The ratios may change through time due to variable recruitment, ocean survival (Ward and Slaney 1988), inter-annual variability between populations, and the time of year when the fish were sampled, accordingly comparisons between populations and years should be made cautiously.

The sex ratios for Nass River summer steelhead were comparable to the sex ratios observed for Skeena River steelhead. In 1998, the sex composition for Nass River summer steelhead ranged from mostly males (0.86:1; Bell-Irving River) to mostly females (2.29:1; Meziadin River). At the upper Sustut River fish counting fence, the sex ratios were 2.32:1 (1997) and 1.73:1 (1998) when the sex was identified for all steelhead passing the fence (Williamson 1998; Williamson 1999), which was similar to steelhead at the Meziadin River and Damdochax Creek and the upper Nass River. The sex ratio for Cranberry River steelhead was similar to the ratios reported for steelhead populations in the Zymoetz (1.42:1; Chudyk and Whately 1980), Bulkley (1.26:1; O'Neill and Whately 1984), Babine (1.25:1; Narver 1969, Whately and Chudyk 1979) and Morice rivers (1.20:1; Whately *et al.* 1978). The sex composition of steelhead at the fishwheels and the Kwinageese River were similar to the Tyee test fishery (1.16:1; Chudyk 1976), Kispiox River (1.12:1; Whately 1977) and Suskwa River (1:1; Chudyk 1978) where males and females were more closely balanced. The higher frequency of male than female steelhead at the Bell-Irving River was similar to the results for the Kitsumkalum River (0.81:1; Lough and Whately 1989).

In 1998, the mean smolt age estimates were generally similar to previous estimates for Nass River summer steelhead populations, although small differences existed (Parken 1997a; Parken 1998; Parken and Atagi 1998). For Cranberry River steelhead, the mean smolt age in 1998 (3.33 years) was lower than the 1997 estimate (3.53 years) and the Bell-Irving estimate in 1998 (3.21 years) was considerably lower than the 1997 estimate (3.73 years; Parken 1998). In comparison, the estimate for the fishwheels in 1998 (3.49 years) was higher than 1997 (3.35 years) and the estimate for Meziadin River in 1998 was also higher than 1997 (3.27 years; Parken 1998).

The mean smolt ages of Nass River summer steelhead were lower than the range of mean smolt ages reported for Skeena River summer steelhead populations (Bocking and

English 1992), but older than the range for summer steelhead populations in coastal, southeast Alaska (Lohr and Bryant 1999). For fish returning in 1998, the mean smolt age of Nass River summer steelhead ranged from 3.21 years (Bell-Irving River) to 3.51 years (Meziadin River). In contrast, Skeena River summer steelhead ranged in mean smolt age from 3.45 years (Buck Creek) to 5.68 years (Goathorn Creek; Bocking and English 1992). Tautz *et al.* (1992) estimated the mean smolt age of Skeena River summer steelhead ranged from 3.3 years (Babine River) to 4.5 years (upper Sustut River) based on the length of the growing season. The mean smolt age of summer steelhead in coastal, southeast Alaska ranged from 2.3 years (Karluk River) to 2.9 years (Anchor River; Lohr and Bryant 1999), which was about a half year to a year less than the mean smolt ages of Nass River steelhead populations.

For most Nass River locations, the ocean age composition differed between male and female steelhead in 1998. Parken and Atagi (1998) reported similar results for Cranberry River steelhead in 1997 where 35% of all males were ocean age 1+, but only 10% of females were ocean age 1+. At the Kwinageese River, 61% of males were ocean age 1+ whereas only 23% of females were ocean age 1+ in 1981 (Schultze 1981), which were similar to the results for male (47%) and female (19%) steelhead in 1998. Chudyk (1976) reported similar differences in the ocean age composition between male and female Skeena River summer steelhead at the Tyee test fishery. Chudyk (1976) remarked that the ocean age 1+ and 3+ groups were composed primarily of males.

For steelhead at different Nass River locations, the frequency of repeat spawners were generally higher than previous estimates for Nass River steelhead populations. The frequency of repeat spawners ranged from 6% (Damdochax and upper Nass River) to 16% (Meziadin River). The frequency of repeat spawners at the fishwheels was higher in 1998 (11%) than 1996 (4%; Parken 1997a) and 1997 (8%; data from Parken 1998). For the Bell-Irving River, the proportion of repeat spawners was also higher in 1998 (6%) than 1997 (0%; data from Parken 1998). For the Cranberry River, repeat spawners were more frequent in 1998 (13%) than 1997 (2%; Parken and Atagi 1998) and previous estimates for the population (5%; Parken 1997a). The frequency of repeat spawners at the Kwinageese River in 1998 (8%) was higher than it was in 1981 (6%; Schultze 1981). For the Meziadin River, the frequency of repeat spawners was much higher in 1998 (16%) than 1996 (6%; Parken 1997a). In contrast, the frequency of repeat spawners at Damdochax Creek and the upper Nass River in 1998 (6%) was less than the estimate from 1979 (13%; Parken 1997a). The frequency of repeat spawners should be compared cautiously between years because the results may reflect variable recruitment, ocean survival (Ward and Slaney 1988), sample size, or inter-annual variability between populations.

The range in the proportion of repeat spawners for Nass River summer steelhead in 1998 was comparable to the results reported for other steelhead populations, but was considerably lower than the range reported for summer steelhead in southeast Alaska. The frequencies of repeat spawning summer steelhead in the Nass River was higher than the results reported for Skeena River steelhead populations in the upper Sustut (1-6%; Saimoto 1995, Parken and Morten 1996), Kitsumkalum (3%; Lough and Whately 1984), Bulkley

(3%; O'Neill and Whately 1984), Suskwa (4%; Chudyk 1978), and Babine rivers (4%; Narver 1969; 9%; Whately and Chudyk 1979). The frequency of repeat spawners in the Nass River was similar to the Morice River (7%; Whately *et al.* 1978), however the percentage of repeat spawners was reported to be substantially higher in the Kispiox (18%; Whately 1977) and Zymoetz rivers (29%; Chudyk and Whately 1980). Hooton *et al.* (1987) reported approximately 7% of Vancouver Island summer steelhead were repeat spawners which was similar to the 6% reported for Kalama River summer steelhead (Washington; Leider *et al.* 1986). The frequency of repeat spawners in the Nass River was lower than summer steelhead populations in coastal, southeast Alaska where the mean frequency of repeat spawners was 18% for females and 9% for males in the Anchor River and the mean was 19% for females and 9% for males in the Karluk River (Lohr and Bryant 1999).

The recaptured steelhead migrated through the Nass River from late July to late September and the migration timing of specific populations was summarized by Parken (1999f). In 1998, recaptured steelhead with fishwheel tags (mean = 66.5 cm) were smaller than untagged fish (mean = 71.5 cm), which was similar to the results from the Cranberry River in 1997 where recaptured fish with fishwheel tags (mean = 61.2 cm) were also smaller than untagged fish (mean = 68.8 cm; Parken and Atagi 1998). For recaptured steelhead with fishwheel tags, the fork lengths differed by an average of 1.6 cm in 1998 whereas they differed by an average of 2.1 cm in 1997 (Parken and Atagi 1998). In 1998, 25% of the recaptured steelhead had a discrepancy in the sex recorded at recapture and initial tagging, whereas in 1997, the error discrepancy was 50% (Parken and Atagi 1998).

The incidence of head wounds on Nass River summer steelhead ranged from 0% (Damdochax Creek and the upper Nass River) to 25% (Meziadin River), although there were few observations (n=8) at Meziadin River. Head wounds were less common among Cranberry River steelhead in 1998 (7%) than 1997 (13%; Parken and Atagi 1998). These wounds were observed on Cranberry River steelhead in other years (G. Wolfe, personal communication), although none were observed on the 29 steelhead sampled in 1996 (Tetreau 1996). In 1998, 12% of Kwinageese River steelhead had head wounds and in 1981 they were also common (Schultze 1981). Furthermore, head wounds were rare among steelhead sampled at the fishwheels (M.R. Link, personal communication) and they were rare among Skeena River summer steelhead (M.C. Beere, personal communication). The cause of these head wounds was unknown, however they could be associated with migrations through canyon areas or rock falls or they may be influenced from disease infecting an open wound or scrape. The higher incidence of these marks in the Cranberry, Kwinageese and Meziadin rivers than Damdochax Creek and the upper Nass River indicated these marks were related to conditions specific to the tributary or population. Rock falls exist in the Cranberry and Kwinageese rivers and in the Meziadin River there is a man-made falls of approximately 2 m.

The frequency of gillnet marks on Nass River summer steelhead ranged from 1% (Kwinageese River) to 13% (Bell-Irving, Cranberry and Meziadin rivers). The incidence of gillnet marks on Cranberry River steelhead was higher in 1998 than 1997 (6%; Parken and Atagi 1998). Similarly, the incidence of gillnet marks on Bell-Irving River steelhead was also higher in 1998 than 1997 (0%; Parken 1997b). For comparison, the frequency of gillnet marks observed on upper Sustut River steelhead was lower in 1998 (14%; Williamson 1999) than in 1997 (15%; Williamson 1998) and ranged from 2% to 23% between 1992 and 1996 (Parken *et al.* 1997).

## 6.0.0.0 Conclusions

1. For 1998, the Bayesian abundance estimate (mode) of the Nass River summer steelhead escapement was 10,004 steelhead (95% confidence limits: 7,324-15,964 steelhead) and the Petersen abundance was 9,657 steelhead (95% confidence limits: 6,780-14,132 steelhead) when 10% of the marked steelhead were removed to account for differential mortality resulting from capture, handling and tagging at the fishwheels and differential vulnerability to the Nisga'a fishery. Petersen mark-recapture estimates were consistently lower than the Bayesian modes which indicated the application and recovery samples may have been too small and the number of marked steelhead recovered may have been too small for accurate Petersen estimates. The Bayesian estimator is recommended under these conditions of small samples.

2. The Petersen estimates had narrower confidence limits (-30%, +46%) than the Bayesian estimates (-27%, +60%). However, the precision of the estimates must not be inferred as accuracy, since accuracy can only be calculated when the true population size is known. Furthermore, an estimate can be very precise (narrow confidence intervals) and inaccurate, and the difference between the two parameters is the amount of bias in the estimate.

3. The sample sizes for the marked sample (571 steelhead) and recovery sample (438 steelhead ) were within the sample size range recommended by Robson and Regier (1964) for a preliminary survey with an accuracy of ±50%. For a population of 10,000 animals, Robson and Regier (1964) recommended a recovery sample size of 450 animals when 500 were marked and a recovery sample size of 375 animals when 600 were marked.

4. Nass River summer steelhead escapement estimates derived from the Cranberry River recovery sample were lower than the escapement estimates from the fishwheels in 1997 and the mark-recapture estimate from the main tributary locations in 1998.

5. Sampling selectivity was investigated by examining the spatial, size, age, and sex biases in the tag application and recovery samples and temporal bias in the recovery sample; however, none were detected. These results should be interpreted cautiously because of the small number of marked steelhead recovered.

6. The mean fork lengths of female steelhead ranged from 67.1 cm (fishwheels) to 73.1 cm (Damdochax Creek and the upper Nass River), and differed between locations. The mean fork lengths of male steelhead ranged from 68.2 cm (fishwheels) to 75.2 cm (Damdochax Creek and the upper Nass River), and differed between locations. Within each location, the fork lengths of male and female steelhead were statistically similar.

7. The sex ratios were skewed to males in the Bell-Irving River, balanced at the Kwinageese River and fishwheels and skewed toward females in the Meziadin and Cranberry rivers and Damdochax Creek and the upper Nass River.

8. The mean smolt age of steelhead ranged from 3.21 years (Bell-Irving River) to 3.51 years (Meziadin River), and differed between locations. For most locations, the ocean age composition differed between sexes; females had relatively fewer ocean age 1+ fish than males.

9. Repeat spawners were generally rare among steelhead with readable ocean ages and ranged from 6 (Damdochax Creek and the upper Nass River) to 16% (Meziadin River). The proportions of repeat spawners were generally higher than previous estimates for Nass River steelhead populations.

10. Of the 400 steelhead examined for condition, 23 (6%) had head wounds, 34 (9%) had gillnet marks, 66 (17%) had predator scars and 26 (7%) had hook scars.

11. The preliminary estimates of the escapement of summer steelhead to the Nass River must be interpreted cautiously, especially if the estimates are used for more than preliminary assessments. Few recaptured steelhead limited the statistical power of the bias investigations which compromised the ability of the statistical tests to detect weaknesses in the study design. The level of precision reported for these preliminary estimates may not be suitable for fisheries management or research work.

## 7.0.0.0 Recommendations

1. The potential of using a hole punch to collect the genetic sample from steelhead at the fishwheels should be considered as a good secondary mark. This would provide a clearly distinguishable secondary mark on the adipose fin different from the one used in the tributaries. Also, the clearly distinguishable secondary mark will facilitate the recognition of fish that have lost their tags. At the Meziadin fishway, genetic samples were collected with a hole punch, which left a very distinctive mark on the adipose fin.

2. If a similar mark-recapture study is repeated, then the condition (activity or vigor) of tagged steelhead when they are released at the fishwheels should be recorded to test for biases related to release condition and tagging stress. The release condition could be stratified into two (or more) groups and the proportion of fish recovered could be compared between groups. If biologically significant differences exist then the fish in the poor release condition could be removed from the application sample. A suggested release condition rating system is 1 for good/active, 2 for sluggish release and 3 for poor/revival required.

3. Scales should be collected from all steelhead in the application and recovery sample, and especially recaptured steelhead. This would eliminate the chances of collecting a regenerated scale, and increase the sample size and power for age bias investigations. The scale collections could verify tag data indicating successive repeat spawners and both the tagging history and scales would be used to improve scale reading techniques.

4. At least 10 scale samples should be collected from each fish to increase the chance collecting a scale that displays the first-year annulus and reduce the chances of collecting scales with partial regeneration. Also, regeneration issues are more important for large fish or repeat spawners and increase with longer freshwater residency adult residency. Therefore the number of scales collected from large fish must be increased.

5. If a similar mark-recapture study is repeated, then a secondary non-lethal mark, such as the adipose fin clip, should continue to be used during the application sample in adult steelhead mark-recapture studies. Thus, all tagged steelhead should be sampled for DNA to assess tag loss. In addition to assessing tag loss between sampling periods, the tissue can be used for stock identification and other genetic studies. Begich (1997) used a left ventral fin clip to assess tag loss in steelhead between samples.

6. If a similar mark-recapture study is repeated, more sampling effort should occur in the Nass River mainstem in the area adjacent to Damdochax Creek. If sufficient samples can be collected (about 100), then this location should not be grouped with fish from Damdochax Creek. Also, fish sampling should occur at the confluence of the Meziadin and Nass rivers in late October or early November to address angler reports that indicated steelhead were holding and possibly overwintering there.

7. A radio tagging study is recommended to provide basic overwintering and spawner distribution. The radio tags must be applied with representation throughout the run (July-

October), based on information from the fishwheels in 1998. Also, a large, representative proportion of the fish captured at the fishwheels must be tagged in order to develop defensible inferences from the fish tracked to their final destinations.

8. The adjusted tag rates indicated there may be two groups of steelhead with different tag rates. Meziadin and Cranberry river fish were similar and the Kwinageese River, Bell-Irving River, and Damdochax Creek and the upper Nass River were similar. Although tag rates were not statistically different between locations, future Nass River fishwheels assessments or mark-recapture studies with these groups should investigate this pattern to see if it was an anomaly or if it persists.

9. Detailed comments on fish condition should continue to be recorded at the Nass River fishwheels, with specific attention to gillnet marks or other wounds or markings.

10. If size selectivity for steelhead at the fishwheels is reported by the current fishwheels assessment, then future mark-recapture estimates of the escapement of Nass River steelhead should be stratified by size or ocean age categories.

11. During angling surveys, detailed field notes should be made when steelhead are hooked in a vital area (gills, eye, or tongue) or if they are bleeding. These notes may assist in estimating the number of steelhead that may experience hooking mortality.

## 8.0.0.0 Acknowledgments

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# 10.0.0.0 Appendixes

Appendix A. A summary of steelhead tag application data at the Nass River fishwheels, 1998.

Steelhead ages were reported with the number of winters spent in freshwater before the decimal point followed by the number of winters spent in the ocean. A + identifies a summer steelhead with some scale growth after its last winter in the ocean. In contrast, winter steelhead do not have a + because they entered freshwater near the end of the winter. An S identifies a previous spawning event and represents 1 ocean year and an R represents regenerated scales that could not be used to determine age. A steelhead age 3.2S1+ was a summer steelhead that spent 3 winters in freshwater before smolting and then spent 2 winters in the ocean before its first spawning run and then spent another winter in the ocean before making its second spawning migration. The steelhead was freshwater age 3 and ocean age 4. Steelhead ages that were not linked to length or sex data were summarized in a box beside the sampling date and related information.

| Tag[1] | | | | | | | Length | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C. | L. | Number | Date | F.W. | Time | Sex | (cm) | Book # | Scale # | Age | Comments |
| O | N | 6458 | 27-Aug-98 | 2 | 15:37 | F | 72 | 43624 | 5 | 4.1S1+ | Sea lice. Missing 1 scale. |
| O | N | 6459 | 28-Aug-98 | 1 | 17:25 | F | 61 | 43653 | 1 | 3.1+ | |
| O | N | 6460 | 29-Aug-98 | 1 | 8:58 | F | 71 | 43654 | 1 | 3.2+ | |
| O | N | 6461 | 29-Aug-98 | 1 | 8:58 | M | 85 | 43654 | 2 | 3.2S1+ | |
| O | N | 6462 | 30-Aug-98 | 2 | 15:20 | M | 76 | 43656 | 1 | 3.2+ | |
| O | N | 6467 | 30-Aug-98 | 2 | 15:20 | M | 66 | 43656 | 2 | 4.2+ | |
| O | N | 6468 | 30-Aug-98 | 2 | 15:20 | F | 62 | 43656 | 3 | 4.1+ | |
| O | N | 6469 | 31-Aug-98 | 2 | 9:23 | F | 70 | 43659 | 1 | 3.2+ | |
| O | N | 6471 | 31-Aug-98 | 2 | 9:23 | F | 76 | 43659 | 2 | R.1S1+ | |
| O | N | 6476 | 22-Jul-98 | 4 | 9:22 | M | 75 | NA | NA | NA | No scale |
| O | N | 6477 | 22-Jul-98 | 4 | 9:22 | M | 73 | 86843 | 1 | 4.2+ | |
| O | N | 6478 | 22-Jul-98 | 3 | 17:30 | M | 75 | 86843 | 2 | R.2+ | |
| O | N | 6479 | 22-Jul-98 | 3 | 18:00 | M | 78 | 86843 | 3 | R.2+ | |
| O | N | 6482 | 23-Jul-98 | 4 | 9:40 | F | 67 | NA | NA | NA | Net marks |
| O | N | 6483 | 23-Jul-98 | 4 | 9:40 | F | 73 | 86845 | 1 | 4.2+ | |
| O | N | 6484 | 23-Jul-98 | 4 | 17:45 | M | 74 | 86845 | 2 | 4.2+ | |
| O | N | 6485 | 24-Jul-98 | 3 | 15:15 | M | 65 | 86846 | 1 | 3.2+ | |
| O | N | 6487 | 24-Jul-98 | 4 | 15:15 | F | 63 | 86846 | 2 | R.2+ | |
| O | N | 6488 | 26-Jul-98 | 3 | 8:52 | F | 69 | 86847 | 1 | 4.2+ | |
| O | N | 6489 | 26-Jul-98 | 3 | 18:03 | M | 67 | 86847 | 2 | 4.2+ | |
| O | N | 6490 | 28-Jul-98 | 3 | 14:45 | M | 73 | 86865 | 1 | 3.2+ | |
| O | N | 6491 | 30-Jul-98 | 3 | 11:46 | F | 75 | 86864 | 1 | 3.2+ | Missing tag #6492. |
| O | N | 6493 | 30-Jul-98 | 3 | 11:46 | F | 68 | 86864 | 2 | R.2+ | |
| O | N | 6494 | 31-Jul-98 | 3 | 9:25 | M | 80 | 86848 | 1 | R.2+ | |
| O | N | 6498 | 18-Jul-98 | 4 | 9:25 | F | 78 | NA | NA | NA | No scales, fresh and bright |
| O | N | 6499 | 15-Jul-98 | 3 | 15:25 | M | 68 | 86844 | 1 | NA | Clipped adipose! |
| O | N | 6555 | 8-Aug-98 | 1 | 11:45 | F | 66 | 43601 | 1 | 4.1+ | |
| O | N | 6556 | 8-Aug-98 | 1 | 11:52 | M | 83 | 43601 | 2 | 4.2+ | |
| O | N | 6559 | 10-Aug-98 | 1 | 9:15 | F | 61 | 43602 | 2 | R.R+ | |
| O | N | 6560 | 10-Aug-98 | 2 | 9:48 | F | 67 | 43602 | 3 | 3.2+ | |
| O | N | 6561 | 10-Aug-98 | 1 | 15:15 | M | 50 | 43602 | 4 | R.1+ | |
| O | N | 6562 | 12-Aug-98 | 2 | 8:50 | F | 51 | 43605 | 1 | 3.1+ | |
| O | N | 6563 | 12-Aug-98 | 2 | 8:50 | F | 71 | 43605 | 2 | 3.2+ | |
| O | N | 6564 | 12-Aug-98 | 1 | 10:05 | F | 69 | 43605 | 3 | 3.2+ | |
| O | N | 6565 | 12-Aug-98 | 1 | 10:05 | F | 72 | 43605 | 4 | 4.2+ | |

| Tag[1] C. | L. | Number | Date | F.W. | Time | Sex | Length (cm) | Book # | Scale # | Age | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| O | N | 6566 | 13-Aug-98 | 2 | 9:10 | F | 72 | 43607 | 1 | 4.2+ | |
| O | N | 6567 | 13-Aug-98 | 1 | 15:10 | M | 52 | 43607 | 2 | R.1+ | |
| O | N | 6568 | 15-Aug-98 | 2 | 9:33 | F | 72 | 43610 | 1 | 3.2+ | |
| O | N | 6569 | 15-Aug-98 | 2 | 16:20 | F | 65 | 43610 | 2 | 3.2+ | |
| O | N | 6570 | 16-Aug-98 | 2 | 19:30 | F | 81 | 43608 | 1 | 3.2+ | |
| O | N | 6571 | 16-Aug-98 | 2 | 19:30 | F | 68 | 43608 | 2 | 3.2+ | |
| O | N | 6572 | 17-Aug-98 | 1 | 9:29 | M | 61 | 43612 | 1 | 4.1+ | |
| O | N | 6573 | 17-Aug-98 | 1 | 9:29 | F | 73 | 43612 | 2 | 3.2+ | Net marks |
| O | N | 6574 | 17-Aug-98 | 1 | 9:29 | M | 54 | 43612 | 3 | 4.1+ | |
| O | N | 6575 | 17-Aug-98 | 2 | 10:42 | F | 73 | 43612 | 4 | 3.2+ | |
| O | N | 6576 | 17-Aug-98 | 2 | 20:17 | F | 74 | 43612 | 5 | 4.2+ | |
| O | N | 6577 | 18-Aug-98 | 1 | 8:55 | F | 81 | 43613 | 1 | R.2+ | |
| O | N | 6578 | 18-Aug-98 | 1 | 8:55 | M | 79 | 43613 | 2 | 4.2S1+ | |
| O | N | 6579 | 18-Aug-98 | 1 | 8:55 | F | 94 | 43613 | 3 | 3.3+ | |
| O | N | 6580 | 18-Aug-98 | 1 | 8:55 | F | 58 | 43613 | 4 | 4.1+ | |
| O | N | 6581 | 18-Aug-98 | 2 | 15:40 | M | 53 | 43613 | 5 | 3.1+ | |
| O | N | 6582 | 19-Aug-98 | 1 | 8:50 | F | 71 | 43615 | 1 | R.1S1+ | |
| O | N | 6585 | 19-Aug-98 | 1 | 8:50 | M | 57 | 43615 | 2 | R.1+ | Missing tag #'s: 6583, 6584 |
| O | N | 6586 | 19-Aug-98 | 1 | 8:50 | M | 70 | 43615 | 3 | 3.2+ | |
| O | N | 6587 | 19-Aug-98 | 1 | 14:54 | F | 54 | 43615 | 4 | 5.1+ | |
| O | N | 6588 | 19-Aug-98 | 2 | 15:35 | M | 63 | 43615 | 5 | 3.1+ | Net marks |
| O | N | 6589 | 19-Aug-98 | 1 | 18:05 | M | 73 | 43615 | 6 | 3.2+ | |
| O | N | 6590 | 20-Aug-98 | 1 | 8:59 | M | 57 | 43625 | 1 | 3.1+ | |
| O | N | 6593 | 20-Aug-98 | 2 | 11:05 | F | 90 | 43625 | 3 | 3.2S1+ | |
| O | N | 6594 | 20-Aug-98 | 2 | 11:05 | F | 87 | 43625 | 4 | 3.3+ | |
| O | N | 6595 | 20-Aug-98 | 2 | 11:05 | F | 62 | 43625 | 5 | 4.1+ | |
| O | N | 6596 | 20-Aug-98 | 1 | 14:46 | F | 68 | 43625 | 6 | 5.2+ | |
| O | N | 6597 | 20-Aug-98 | 1 | 14:46 | F | 69 | 43625 | 7 | 3.2+ | |
| O | N | 6598 | 21-Aug-98 | 1 | 8:51 | F | 52 | 43614 | 1 | 3.1+ | |
| O | N | 6599 | 21-Aug-98 | 1 | 8:51 | F | 59 | 43614 | 2 | 4.1+ | |
| O | N | 6600 | 7-Jul-98 | 1 | 10:18 | F | 57 | 86895 | 1 | 3.1+ | |
| O | N | 6601 | 12-Jul-98 | 2 | 9:25 | F | 66 | 87037 | 1 | 5.2+ | |
| O | N | 6602 | 13-Jul-98 | 1 | 17:35 | M | 50 | 87039 | 1 | 5.1+ | Cut a piece off the adipose |
| O | N | 6604 | 13-Jul-98 | 1 | 17:35 | M | 71 | 87039 | 2 | 5.2+ | Missing tag #6603 |
| O | N | 6605 | 13-Jul-98 | 2 | 18:04 | M | 72 | 87039 | 3 | R.2+ | |
| O | N | 6607 | 21-Jul-98 | 2 | 9:20 | M | 75 | 87048 | 1 | 3.2+ | |
| O | N | 6608 | 22-Jul-98 | 1 | 10:25 | F | 65 | 43552 | 1 | 3.2+ | |
| O | N | 6609 | 23-Jul-98 | 1 | 8:58 | F | 98 | 43578 | 1 | 3.3S1+ | Net marks |
| O | N | 6610 | 26-Jul-98 | 2 | 9:35 | F | 78 | 43579 | 1 | 3.2+ | |
| O | N | 6611 | 26-Jul-98 | 1 | 18:01 | M | 78 | 43579 | 2 | R.2+ | |
| O | N | 6612 | 26-Jul-98 | 1 | 18:01 | M | 56 | 43579 | 3 | R.1+ | Sea lice |
| O | N | 6613 | 27-Jul-98 | 2 | 9:45 | F | 56 | 43582 | 1 | 4.1+ | |
| O | N | 6614 | 27-Jul-98 | 1 | 14:52 | F | 62 | 43582 | 2 | 4.1+ | |
| O | N | 6615 | 28-Jul-98 | 2 | 15:07 | M | 73 | 43583 | 1 | 4.2+ | |
| O | N | 6616 | 28-Jul-98 | 2 | 15:07 | M | 72 | 43583 | 2 | 3.2+ | |
| O | N | 6617 | 28-Jul-98 | 1 | 16:31 | F | 56 | 43583 | 3 | R.1+ | |
| O | N | 6618 | 29-Jul-98 | 1 | 10:20 | F | 72 | 43584 | 1 | R.2+ | |
| O | N | 6619 | 29-Jul-98 | 2 | 18:04 | M | 89 | 43584 | 2 | 3.2S1+ | |
| O | N | 6621 | 30-Jul-98 | 2 | 9:00 | M | 78 | 43587 | 1 | R.1S1+ | |
| O | N | 6622 | 30-Jul-98 | 1 | 9:00 | F | 82 | 43587 | 2 | 3.2S1+ | |
| O | N | 6624/25 | 30-Jul-98 | 1 | 9:45 | F | 56 | 43587 | 3 | 4.1+ | Fish tagged with 2 tag #'s. |
| O | N | 6626 | 30-Jul-98 | 1 | 15:37 | F | 52 | 43587 | 4 | 3.1+ | |

| C. | L. | Tag[1] Number | Date | F.W. | Time | Sex | Length (cm) | Book # | Scale # | Age | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| O | N | 6627 | 30-Jul-98 | 1 | 15:37 | F | 54 | 43587 | 5 | 4.1+ | |
| O | N | 6628 | 31-Jul-98 | 2 | 14:55 | F | 78 | 43589 | 1 | 3.2+ | |
| O | N | 6630 | 1-Aug-98 | 2 | 9:09 | M | 79 | 43590 | 1 | 4.2S1+ | |
| O | N | 6631 | 1-Aug-98 | 2 | 9:09 | M | 88 | 43590 | 2 | R.3+ | |
| O | N | 6632/33 | 1-Aug-98 | 2 | 14:50 | M | 69 | 43590 | 3 | 3.1S1+ | Fish tagged with 2 tag #'s. |
| O | N | 6634 | 2-Aug-98 | 1 | 16:00 | F | 68 | 43592 | 1 | 3.2+ | |
| O | N | 6635 | 3-Aug-98 | 1 | 15:35 | F | 75 | 43591 | 1 | 3.1S1+ | |
| O | N | 6637/38 | 4-Aug-98 | 2 | 7:45 | M | 73 | 43594 | 1 | 3.2+ | Fish tagged with 2 tag #'s. |
| O | N | 6639 | 4-Aug-98 | 2 | 7:45 | M | 100 | 43594 | 2 | 4.3S1S1+ | |
| O | N | 6640 | 4-Aug-98 | 2 | 7:45 | M | 68 | 43594 | 3 | 4.2+ | Net marks on head. |
| O | N | 6641 | 4-Aug-98 | 2 | 7:45 | M | 61 | 43594 | 4 | 3.1+ | |
| O | N | 6642 | 5-Aug-98 | 1 | 9:35 | F | 60 | 43595 | 1 | R.2+ | |
| O | N | 6643/44/45 | 5-Aug-98 | 2 | 14:49 | F | 55 | 43595 | 2 | 4.1+ | 3 tag #'s |
| O | N | 6647 | 6-Aug-98 | 1 | 8:57 | F | 65 | 43597 | 1 | 3.2+ | |
| O | N | 6648 | 6-Aug-98 | 1 | 17:45 | F | 77 | 43597 | 2 | 3.2+ | |
| O | N | 6649 | 7-Aug-98 | 1 | 10:00 | F | 57 | 43598 | 1 | 4.1+ | |
| O | N | 6650 | 7-Aug-98 | 1 | 17:50 | F | 70 | 43598 | 2 | 3.2+ | |
| O | N | 6651 | 23-Aug-98 | 1 | 9:31 | F | 56 | 43619 | 4 | R.1+ | 2 pieces |
| O | N | 6652 | 23-Aug-98 | 1 | 9:31 | F | 58 | 43619 | 5 | R.1+ | |
| O | N | 6653 | 23-Aug-98 | 1 | 9:31 | M | 82 | 43619 | 6 | 3.2S1+ | |
| O | N | 6654 | 23-Aug-98 | 2 | 15:12 | M | 56 | 43619 | 7 | 4.1+ | |
| O | N | 6655 | 23-Aug-98 | 1 | 15:37 | F | 61 | 43619 | 8 | 4.1+ | |
| O | N | 6657 | 10-Aug-98 | 1 | 9:15 | M | 70 | 43602 | 1 | 3.2+ | |
| O | N | 6658 | 23-Aug-98 | 1 | 15:37 | M | 65 | 43619 | 9 | 5.1+ | |
| O | N | 6659 | 24-Aug-98 | 1 | 8:46 | F | 79 | 43620 | 1 | 3.2+ | |
| O | N | 6660 | 24-Aug-98 | 1 | 8:46 | F | 63 | 43620 | 2 | 4.1+ | |
| O | N | 6661 | 24-Aug-98 | 1 | 8:46 | F | 59 | 43620 | 3 | 4.1+ | |
| O | N | 6662 | 24-Aug-98 | 1 | 8:46 | M | 62 | 43620 | 4 | 3.1+ | 2 DNA samples taken |
| O | N | 6663 | 24-Aug-98 | 2 | 10:52 | M | 89 | 43620 | 5 | 3.3+ | |
| O | N | 6664 | 24-Aug-98 | 2 | 10:52 | F | 69 | 43620 | 6 | 4.2+ | |
| O | N | 6665 | 24-Aug-98 | 1 | 18:03 | F | 61 | 43620 | 7 | 4.1+ | Sea lice |
| O | N | 6666 | 24-Aug-98 | 1 | 18:03 | F | 71 | 43620 | 8 | 3.2+ | |
| O | N | 6667 | 25-Aug-98 | 1 | 8:58 | F | 73 | 43621 | 1 | 3.2+ | |
| O | N | 6669 | 25-Aug-98 | 1 | 8:58 | F | 61 | 43621 | 2 | R.1+ | |
| O | N | 6670 | 25-Aug-98 | 2 | 10:10 | M | 60 | 43621 | 3 | R.1+ | |
| O | N | 6671 | 27-Aug-98 | 1 | 9:28 | M | 59 | 43624 | 1 | 3.1+ | |
| O | N | 6672 | 27-Aug-98 | 2 | 10:24 | F | 71 | 43624 | 2 | 3.2S1S1+ | Missing tag #6673 |
| O | N | 6674 | 27-Aug-98 | 2 | 10:24 | M | 58 | 43624 | 3 | 4.1+ | |
| O | N | 6675 | 27-Aug-98 | 1 | 15:08 | F | 78 | 43624 | 4 | 3.2S1+ | |
| O | N | 6676 | 21-Aug-98 | 1 | 8:51 | F | 71 | 43614 | 3 | 3.2+ | |
| O | N | 6677 | 21-Aug-98 | 1 | 8:51 | M | 59 | 43614 | 4 | 3.2+ | |
| O | N | 6678 | 21-Aug-98 | 1 | 8:51 | M | 74 | 43614 | 5 | R.2+ | |
| O | N | 6679 | 21-Aug-98 | 1 | 8:51 | M | 69 | 43614 | 6 | 3.2+ | |
| O | N | 6680 | 21-Aug-98 | 1 | 8:51 | F | 68 | 43614 | 7 | 4.2+ | |
| O | N | 6681 | 21-Aug-98 | 1 | 8:51 | F | 58 | 43614 | 8 | 3.1+ | |
| O | N | 6682 | 21-Aug-98 | 1 | 8:51 | M | 86 | 43614 | 9 | 3.3+ | |
| O | N | 6683 | 21-Aug-98 | 1 | 8:51 | F | 80 | 43614 | 10 | 4.2S1+ | |
| O | N | 6684 | 21-Aug-98 | 1 | 17:28 | F | 58 | 43616 | 1 | 3.1+ | |
| O | N | 6685 | 21-Aug-98 | 1 | 17:28 | F | 74 | 43616 | 2 | 3.2+ | |
| O | N | 6686 | 22-Aug-98 | 1 | 8:56 | F | 55 | 43617 | 1 | 4.1+ | |
| O | N | 6687 | 22-Aug-98 | 1 | 8:56 | M | 79 | 43617 | 2 | 4.2+ | |
| O | N | 6688 | 22-Aug-98 | 1 | 8:56 | M | 71 | 43617 | 3 | 3.2+ | |

| Tag[1] C. | L. | Number | Date | F.W. | Time | Sex | Length (cm) | Book # | Scale # | Age | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| O | N | 6689 | 22-Aug-98 | 1 | 8:56 | F | 69 | 43617 | 4 | 3.2+ | |
| O | N | 6690 | 22-Aug-98 | 1 | 8:56 | F | 58 | 43617 | 5 | 4.1+ | |
| O | N | 6691 | 22-Aug-98 | 1 | 8:56 | F | 67 | 43617 | 6 | 4.2+ | |
| O | N | 6692 | 22-Aug-98 | 1 | 8:56 | M | 79 | 43617 | 7 | 4.2+ | |
| O | N | 6693 | 22-Aug-98 | 1 | 8:56 | F | 72 | 43617 | 8 | 4.2+ | |
| O | N | 6694 | 22-Aug-98 | 2 | 11:20 | F | 60 | 43617 | 9 | R.1+ | |
| O | N | 6695 | 22-Aug-98 | 2 | 11:20 | F | 55 | 43617 | 10 | R.1+ | Missing tag #6695 |
| O | N | 6696 | 22-Aug-98 | 1 | 15:00 | F | 55 | 43618 | 1 | 3.1+ | |
| O | N | 6697 | 22-Aug-98 | 1 | 17:45 | M | 52 | 43618 | | NA | No scales taken |
| O | N | 6698 | 23-Aug-98 | 1 | 9:31 | F | 68 | 43619 | 1 | 3.2+ | |
| O | N | 6699 | 23-Aug-98 | 1 | 9:31 | F | 57 | 43619 | 2 | 3.1+ | |
| O | N | 6700 | 23-Aug-98 | 1 | 9:31 | F | 58 | 43619 | 3 | 4.1+ | |
| O | N | 6701 | 31-Jul-98 | 3 | 9:30 | M | 79 | 86848 | 2 | 3.2+ | Vial Not Found! |
| O | N | 6702 | 31-Jul-98 | 4 | 10:11 | F | 74 | 86848 | 3 | R.2+ | Clipped it but lost it. |
| O | N | 6703 | 31-Jul-98 | 3 | 15:10 | F | 82 | 86848 | 4 | 3.2S1+ | |
| O | N | 6704 | 1-Aug-98 | 3 | 17:41 | M | 78 | 86849 | 1 | 3.3+ | |
| O | N | 6705 | 2-Aug-98 | 3 | 8:55 | M | 67 | 86850 | 1 | 4.1+ | |
| O | N | 6706 | 3-Aug-98 | 3 | 18:00 | F | 57 | 86863 | 1 | 3.1+ | |
| O | N | 6707 | 4-Aug-98 | 4 | 9:11 | F | 76 | 86862 | 1 | 3.2+ | |
| O | N | 6708 | 4-Aug-98 | 3 | 9:42 | F | 69 | 86862 | 2 | 5.2+ | |
| O | N | 6709 | 4-Aug-98 | 3 | 9:42 | M | 94 | 86862 | 3 | 3.2S1+ | |
| O | N | 6710 | 4-Aug-98 | 3 | 9:42 | M | 50 | 86862 | 4 | 3.1+ | |
| O | N | 6711 | 4-Aug-98 | 4 | 17:30 | M | 60 | 86862 | 5 | 4.1+ | |
| O | N | 6712 | 4-Aug-98 | 3 | 18:02 | F | 82 | 86862 | 6 | 3.2+ | |
| O | N | 6713 | 4-Aug-98 | 3 | 18:02 | F | 67 | 86862 | 7 | 3.2+ | |
| O | N | 6714 | 4-Aug-98 | 3 | 18:02 | M | 72 | 86862 | 8 | 3.2+ | |
| O | N | 6715 | 5-Aug-98 | 3 | 9:20 | M | 54 | 86851 | 1 | 4.1+ | |
| O | N | 6718 | 5-Aug-98 | 3 | 9:20 | M | 62 | 86851 | 2 | R.2+ | |
| O | N | 6719 | 5-Aug-98 | 4 | 10:00 | M | 71 | 86851 | 3 | 3.2+ | |
| O | N | 6723 | 5-Aug-98 | 4 | 15:10 | M | 95 | 86851 | 4 | 4.2S1+ | |
| O | N | 6725 | 5-Aug-98 | 4 | 15:10 | M | 84 | 86851 | 5 | R.3+ | |
| O | N | 6726 | 18-Aug-98 | 4 | 16:05 | M | 71 | 86853 | 1 | 3.2+ | |
| O | N | 6727 | 19-Aug-98 | 3 | 9:03 | M | 53 | 30999 | 1R | 4.1+ | |
| O | N | 6728 | 19-Aug-98 | 3 | 9:03 | M | 80 | 30999 | 1L | 3.2+ | Missing tag #6729 |
| O | N | 6730 | 19-Aug-98 | 4 | 10:14 | F | 73 | 30999 | 2R | 3.1S1+ | |
| O | N | 6731 | 19-Aug-98 | 4 | 10:14 | F | 72 | 30999 | 2L | 5.2+ | |
| O | N | 6733 | 19-Aug-98 | 4 | 10:54 | M | 80 | 30999 | 3R | R.1S1+ | Missing tag #6734 |
| O | N | 6735 | 19-Aug-98 | 3 | 15:10 | M | 84 | 30999 | 3L | 3.2+ | |
| O | N | 6736 | 19-Aug-98 | 3 | 15:10 | M | 60 | 30999 | 4R | 4.1+ | |
| O | N | 6737 | 19-Aug-98 | 3 | 15:10 | M | 56 | 30999 | 4L | R.1+ | |
| O | N | 6738 | 19-Aug-98 | 4 | 16:05 | | | 30999 | 4R | NA | |
| O | N | 6739 | 19-Aug-98 | 4 | 16:05 | M | 56 | 30999 | 5L | 4.1+ | |
| O | N | 6740 | 19-Aug-98 | 4 | 16:05 | M | 57 | 30999 | 5R | 4.1+ | |
| O | N | 6741 | 19-Aug-98 | 4 | 16:05 | M | 56 | 30992 | 1R | 4.1+ | |
| O | N | 6742 | 19-Aug-98 | 4 | 16:05 | M | 58 | 30992 | 1L | 3.1+ | |
| O | N | 6743 | 19-Aug-98 | 4 | 16:05 | M | 89 | 30992 | 2R | 4.4+ | Missing tag #6744 |
| O | N | 6745 | 19-Aug-98 | 4 | 18:15 | F | 78 | 30992 | 2L | R.2+ | |
| O | N | 6748 | 20-Aug-98 | 3 | 9:20 | M | 70 | 43553 | 1 | 4.2+ | |
| O | N | 6749 | 20-Aug-98 | 3 | 9:20 | M | 73 | 43553 | 2 | 4.2+ | |
| O | N | 6750 | 20-Aug-98 | 3 | 9:20 | M | 70 | 43553 | 3 | 3.2+ | Missing tag #'s: 6751-6800 |
| O | N | 6751 | 7-Aug-98 | 3 | 9:15 | F | 70 | 86860 | 1 | 5.2+ | |
| O | N | 6752 | 7-Aug-98 | 4 | 15:45 | F | 71 | 86860 | 2 | 3.2+ | |

| Tag[1] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C. | L. | Number | Date | F.W. | Time | Sex | Length (cm) | Book # | Scale # | Age | Comments |
| O | N | 6753 | 7-Aug-98 | 4 | 15:45 | M | 55 | 86860 | 3 | 4.1+ | Missing tag #6754 |
| O | N | 6755 | 7-Aug-98 | 4 | 17:30 | M | 64 | 86860 | 4 | R.1+ | |
| O | N | 6756 | 8-Aug-98 | 4 | 9:25 | M | 80 | 86859 | 1 | 4.3+ | |
| O | N | 6757 | 8-Aug-98 | 3 | 16:20 | F | 60 | 86859 | 2 | 4.1+ | |
| O | N | 6758 | 8-Aug-98 | 3 | 16:20 | M | 58 | 86859 | 3 | 4.1+ | |
| O | N | 6759 | 8-Aug-98 | 3 | 16:20 | M | 84 | 86859 | 4 | 3.2S1+ | |
| O | N | 6760 | 8-Aug-98 | 3 | 16:20 | F | 67 | 86859 | 5 | 4.2+ | |
| O | N | 6761 | 8-Aug-98 | 3 | 16:20 | M | 49 | 86859 | 6 | 3.1+ | |
| O | N | 6762 | 12-Aug-98 | 4 | 9:24 | F | 60 | 86852 | 1 | 4.1+ | |
| O | N | 6763 | 12-Aug-98 | 4 | 9:24 | M | 75 | 86852 | 2 | 3.2+ | |
| O | N | 6764 | 12-Aug-98 | 4 | 9:24 | F | 72 | 86852 | 3 | 4.1S1+ | |
| O | N | 6765 | 12-Aug-98 | 4 | 9:24 | F | 71 | 86852 | 4 | 4.2+ | |
| O | N | 6766 | 6-Aug-98 | 4 | 17:55 | F | 66 | 86861 | 4 | 3.2+ | |
| O | N | 6768 | 6-Aug-98 | 3 | 9:20 | M | 70 | 86861 | 1 | 4.2+ | |
| O | N | 6769 | 6-Aug-98 | 3 | 9:20 | M | 76 | 86861 | 2 | 4.2S1+ | |
| O | N | 6770 | 6-Aug-98 | 4 | 10:30 | F | 66 | 86861 | 3 | 4.2+ | |
| O | N | 6772 | 5-Aug-98 | 4 | 15:10 | M | 68 | 86851 | 6 | 3.2+ | |
| O | N | 6773 | 5-Aug-98 | 4 | 15:10 | F | 67 | 86851 | 7 | 4.1S1+ | |
| O | N | 6774 | 5-Aug-98 | 3 | 17:45 | M | 80 | 86851 | 8 | 3.3+ | |
| O | N | 6777 | 14-Aug-98 | 3 | 16:35 | M | 74 | 86858 | 1 | 3.2+ | |
| O | N | 6778 | 14-Aug-98 | 3 | 16:35 | F | 58 | 86858 | 2 | R.1+ | |
| O | N | 6779 | 14-Aug-98 | 3 | 18:20 | M | 92 | 86858 | 3 | 4.2S1+ | |
| O | N | 6780 | 15-Aug-98 | 4 | 9:35 | F | 67 | 86857 | 1 | R.1+ | Net marks |
| O | N | 6781 | 15-Aug-98 | 4 | 9:35 | M | 57 | 86857 | 2 | 3.1+ | |
| O | N | 6782 | 15-Aug-98 | 4 | 15:20 | M | 74 | 86857 | 3 | 3.1S1+ | |
| O | N | 6783 | 16-Aug-98 | 4 | 18:53 | M | 57 | 86856 | 1 | 4.1+ | |
| O | N | 6784 | 16-Aug-98 | 4 | 18:53 | F | 74 | 86856 | 2 | 4.2+ | |
| O | N | 6785 | 17-Aug-98 | 4 | 9:34 | F | 60 | 86855 | 1 | 4.1+ | |
| O | N | 6786 | 17-Aug-98 | 4 | 9:34 | F | 53 | 86855 | 2 | 4.1+ | |
| O | N | 6787 | 17-Aug-98 | 4 | 18:29 | M | 90 | 86855 | 3 | R.3+ | |
| O | N | 6788 | 17-Aug-98 | 4 | 18:29 | F | 76 | 86855 | 4 | 3.2+ | |
| O | N | 6789 | 18-Aug-98 | 3 | 9:50 | M | 77 | 86854 | 1 | 3.2+ | |
| O | N | 6790 | 18-Aug-98 | 4 | 9:40 | F | 71 | 86854 | 2 | 4.1S1+ | |
| O | N | 6791 | 18-Aug-98 | 4 | 9:40 | F | 56 | 86854 | 3 | 3.1+ | |
| O | N | 6792 | 18-Aug-98 | 4 | 9:40 | F | 72 | 86854 | 4 | 4.2+ | |
| O | N | 6793 | 18-Aug-98 | 4 | 9:40 | F | 72 | 86854 | 5 | R.2S1+ | |
| O | N | 6794 | 18-Aug-98 | 4 | 9:40 | M | 74 | 86854 | 6 | R.2+ | |
| O | N | 6795 | 18-Aug-98 | 3 | 14:55 | M | 62 | 86854 | 7 | 3.1+ | |
| O | N | 6796 | 18-Aug-98 | 4 | 16:05 | M | 58 | 86854 | 8 | R.1+ | |
| O | N | 6797 | 18-Aug-98 | 4 | 16:05 | M | 89 | 86854 | 9 | 5.4+ | Missing tag #6798 |
| O | N | 6799 | 18-Aug-98 | 4 | 16:05 | F | 76 | 86854 | 10 | R.1+ | |
| O | N | 6800 | 18-Aug-98 | 4 | 16:05 | F | 56 | 43613 | 10 | NA | |
| O | N | 6801 | 20-Aug-98 | 3 | 9:20 | M | 71 | 43553 | 4 | 5.2+ | |
| O | N | 6802 | 20-Aug-98 | 4 | 10:20 | M | 55 | 43553 | 5 | 4.1+ | |
| O | N | 6803 | 20-Aug-98 | 4 | 10:20 | F | 70 | 43553 | 6 | R.2+ | |
| O | N | 6804 | 20-Aug-98 | 4 | 10:20 | M | 80 | 43553 | 7 | 4.2+ | |
| O | N | 6805 | 20-Aug-98 | 4 | 10:20 | F | 62 | 43553 | 8 | 4.1+ | |
| O | N | 6806 | 20-Aug-98 | 4 | 10:20 | F | 76 | 43553 | 9 | 3.2+ | |
| O | N | 6807 | 20-Aug-98 | 4 | 10:20 | F | 70 | 43553 | 10 | 3.2+ | |
| O | N | 6809 | 20-Aug-98 | 4 | 10:20 | M | 54 | 43554 | 1 | 4.1+ | Missing tag #:6810 |
| O | N | 6811 | 20-Aug-98 | 4 | 10:20 | M | 68 | 43554 | 2 | 4.2+ | |
| O | N | 6812 | 20-Aug-98 | 4 | 10:20 | M | 75 | 43554 | 3 | 4.2+ | |

| C. | L. | Tag[1] Number | Date | F.W. | Time | Sex | Length (cm) | Book # | Scale # | Age | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| O | N | 6813 | 20-Aug-98 | 4 | 10:20 | M | 70 | 43554 | 4 | 4.2+ | |
| O | N | 6814 | 20-Aug-98 | 4 | 15:50 | F | 76 | 43554 | 5 | 3.2+ | |
| O | N | 6815 | 20-Aug-98 | 4 | 15:50 | F | 56 | 43554 | 6 | U.1+ | |
| O | N | 6816 | 20-Aug-98 | 4 | 15:50 | M | 58 | 43554 | 7 | 3.1+ | Missing tag #'s: 6817, 6818 |
| O | N | 6819 | 20-Aug-98 | 4 | 15:50 | M | 71 | 43554 | 8 | NA | |
| O | N | 6821 | 21-Aug-98 | 3 | 9:10 | F | 68 | 43555 | 1 | 3.2+ | |
| O | N | 6822 | 21-Aug-98 | 3 | 9:10 | F | 72 | 43555 | 2 | R.2+ | |
| O | N | 6823 | 21-Aug-98 | 3 | 9:10 | M | 63 | 43555 | 3 | 4.1+ | |
| O | N | 6824 | 21-Aug-98 | 3 | 9:10 | F | 58 | 43555 | 4 | R.1+ | |
| O | N | 6825 | 21-Aug-98 | 4 | 10:25 | F | 75 | 43555 | 5 | 3.2+ | Missing tag #6826 |
| O | N | 6827 | 21-Aug-98 | 4 | 10:25 | F | 56 | 43555 | 6 | 4.1+ | Missing tag #6828 |
| O | N | 6829 | 21-Aug-98 | 4 | 10:25 | F | 79 | 43555 | 7 | U.3+ | |
| O | N | 6830 | 21-Aug-98 | 4 | 10:25 | M | 90 | 43555 | 8 | 3.2S1S1+ | |
| O | N | 6831 | 21-Aug-98 | 4 | 10:25 | M | 68 | 43555 | 9 | 4.2+ | |
| O | N | 6832 | 21-Aug-98 | 4 | 10:25 | F | 62 | 43555 | 10 | 3.1+ | |
| O | N | 6833 | 21-Aug-98 | 4 | 10:25 | F | 87 | 43556 | 1 | R.2S1+ | |
| O | N | 6834 | 21-Aug-98 | 4 | 10:25 | F | 59 | 43556 | 2 | 4.1+ | |
| O | N | 6835 | 21-Aug-98 | 3 | 15:15 | M | 73 | 43556 | 3 | 5.2+ | Net marks |
| O | N | 6836 | 21-Aug-98 | 3 | 15:15 | F | 74 | 43556 | 4 | 3.2+ | |
| O | N | 6837 | 21-Aug-98 | 3 | 15:15 | F | 72 | 43556 | 5 | 3.2+ | |
| O | N | 6838 | 21-Aug-98 | 3 | 15:15 | M | 53 | 43556 | 6 | 3.1+ | Net marks |
| O | N | 6840 | 21-Aug-98 | 3 | 15:15 | M | 52 | 43556 | 7 | 4.1+ | Missing tag #3839 |
| O | N | 6841 | 21-Aug-98 | 3 | 15:15 | M | 59 | 43556 | 8 | 4.1+ | |
| O | N | 6842 | 21-Aug-98 | 3 | 15:15 | F | 85 | 43556 | 9 | 4.2S1+ | |
| O | N | 6843 | 21-Aug-98 | 3 | 15:15 | F | 65 | 43556 | 10 | 4.2+ | |
| O | N | 6844 | 21-Aug-98 | 3 | 15:15 | M | 68 | 43557 | 1 | 4.2+ | |
| O | N | 6846 | 21-Aug-98 | 3 | 15:15 | M | 65 | 43557 | 2 | 3.1+ | Missing tag #6845 |
| O | N | 6848 | 21-Aug-98 | 3 | 15:15 | M | 61 | 43557 | 3 | 4.1+ | Missing tag #6847 |
| O | N | 6849 | 21-Aug-98 | 3 | 15:15 | M | 90 | 43557 | 4 | R.3+ | |
| O | N | 6850 | 21-Aug-98 | 4 | 16:25 | M | 57 | 43557 | 5 | 3.1+ | Missing tag #6851 |
| O | N | 6852 | 21-Aug-98 | 4 | 16:25 | F | 56 | 43557 | 6 | 3.1+ | |
| O | N | 6853 | 21-Aug-98 | 4 | 16:25 | F | 76 | 43557 | 7 | R.2+ | Missing tag #'s: 6854, 6855 |
| O | N | 6856 | 21-Aug-98 | 3 | 18:00 | M | 56 | 43557 | 8 | 3.1+ | |
| O | N | 6857 | 22-Aug-98 | 3 | 9:00 | M | 59 | 43558 | 1 | 3.1+ | |
| O | N | 6858 | 22-Aug-98 | 3 | 9:00 | M | 70 | 43558 | 2 | 4.1S1+ | Missing tag #6859-60. |
| O | N | 6861 | 22-Aug-98 | 3 | 9:00 | F | 89 | 43558 | 3 | 5.2S1+ | Missing tag #6862-63. |
| O | N | 6864 | 22-Aug-98 | 3 | 9:00 | M | 77 | 43558 | 4 | 3.2+ | Missing tag #6865 |
| O | N | 6866 | 22-Aug-98 | 4 | 10:35 | M | 54 | 43558 | 5 | 4.1+ | Missing tag #6867-68. |
| O | N | 6869 | 22-Aug-98 | 4 | 10:35 | F | 73 | 43558 | 6 | 3.2+ | |
| O | N | 6870 | 22-Aug-98 | 4 | 10:35 | F | 57 | 43558 | 7 | 4.1+ | |
| O | N | 6871 | 22-Aug-98 | 4 | 10:35 | M | 68 | 43558 | 8 | 3.1+ | |
| O | N | 6872 | 22-Aug-98 | 3 | 15:15 | M | 56 | 43558 | 9 | 4.1+ | Missing tag #6873 |
| O | N | 6874 | 22-Aug-98 | 3 | 15:15 | M | 68 | 43558 | 10 | 4.2+ | |
| O | N | 6875 | 22-Aug-98 | 3 | 15:15 | M | 90 | 43559 | 1 | 3.3+ | |
| O | N | 6876 | 22-Aug-98 | 4 | 16:10 | F | 70 | 43559 | 2 | U.2+ | Missing tag #6877,78,79. |
| O | N | 6880 | 22-Aug-98 | 4 | 16:10 | M | 88 | 43559 | 3 | 4.3+ | Missing tag #6881 |
| O | N | 6882 | 22-Aug-98 | 3 | 17:50 | M | 68 | 43559 | 4 | 4.2S1+ | |
| O | N | 6884 | 23-Aug-98 | 3 | 9:50 | M | 53 | 43560 | 1 | R.1+ | |
| O | N | 6887 | 23-Aug-98 | 4 | 10:22 | F | 69 | 43560 | 2 | 4.2+ | |
| O | N | 6888 | 23-Aug-98 | 4 | 10:22 | F | 64 | 43560 | 3 | 3.2+ | |
| O | N | 6891 | 23-Aug-98 | 4 | 10:22 | M | 68 | 43560 | 4 | R.2+ | |
| O | N | 6892 | 23-Aug-98 | 4 | 10:22 | M | 73 | 43560 | 5 | 3.2+ | |

| Tag[1] C. | L. | Number | Date | F.W. | Time | Sex | Length (cm) | Book # | Scale # | Age | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| O | N | 6893 | 23-Aug-98 | 4 | 10:22 | M | 85 | 43560 | 6 | 4.3+ | |
| O | N | 6894 | 23-Aug-98 | 4 | 17:16 | M | 59 | 43561 | 1 | 4.1+ | |
| O | N | 6895 | 23-Aug-98 | 3 | 18:01 | M | 55 | 43561 | 2 | 4.1+ | Very small, no adipose left now. |
| O | N | 6897 | 23-Aug-98 | 4 | 16:42 | M | 57 | 43560 | 7 | 3.1+ | |
| O | N | 6898 | 23-Aug-98 | 4 | 16:42 | F | 72 | 43560 | 8 | 4.2+ | |
| O | N | 6899 | 23-Aug-98 | 4 | 16:42 | M | 91 | 43560 | 9 | 4.4+ | |
| O | N | 6900 | 23-Aug-98 | 4 | 17:12 | F | 78 | 43560 | 10 | 3.2+ | |
| O | N | 6901 | 24-Aug-98 | 3 | 15:00 | F | 77 | 43562 | 1 | R.2+ | |
| O | N | 6902 | 24-Aug-98 | 4 | 15:36 | M | 57 | 43562 | 2 | 3.1+ | |
| O | N | 6903 | 24-Aug-98 | 4 | 15:36 | M | 70 | 43562 | 3 | 3.2+ | |
| O | N | 6904 | 24-Aug-98 | 4 | 15:36 | F | 75 | 43562 | 4 | R.2+ | |
| O | N | 6905 | 24-Aug-98 | 4 | 15:36 | F | 56 | 43562 | 5 | R.1+ | |
| O | N | 6906 | 24-Aug-98 | 3 | 17:45 | M | 57 | 43562 | 6 | 4.1+ | |
| O | N | 6907 | 24-Aug-98 | 3 | 17:45 | M | 59 | 43562 | 7 | 4.1+ | |
| O | N | 6908 | 24-Aug-98 | 3 | 17:45 | F | 70 | 43562 | 8 | 3.2+ | |
| O | N | 6909 | 24-Aug-98 | 4 | 18:21 | M | 59 | 43562 | 9 | R.1+ | |
| O | N | 6911 | 25-Aug-98 | 3 | 9:02 | F | 71 | 43563 | 1 | 4.2+ | Missing tag #6910 |
| O | N | 6913 | 25-Aug-98 | 3 | 9:02 | F | 72 | 43563 | 2 | R.2+ | Missing tag #6912 |
| O | N | 6914 | 25-Aug-98 | 4 | 9:30 | F | 53 | 43563 | 3 | 3.1+ | |
| O | N | 6915 | 25-Aug-98 | 3 | 15:02 | F | 71 | 43563 | 4 | 4.2+ | |
| O | N | 6916 | 25-Aug-98 | 3 | 15:02 | F | 72 | 43563 | 5 | 3.1S1S1+ | |
| O | N | 6917 | 25-Aug-98 | 3 | 15:02 | F | 68 | 43563 | 6 | 3.2+ | |
| O | N | 6918 | 25-Aug-98 | 3 | 15:02 | F | 66 | 43563 | 7 | 3.2+ | |
| O | N | 6919 | 25-Aug-98 | 4 | 15:30 | F | 56 | 43563 | 8 | 3.1+ | |
| O | N | 6920 | 25-Aug-98 | 4 | 15:30 | M | 77 | 43563 | 9 | 4.2+ | |
| O | N | 6921 | 25-Aug-98 | 4 | 15:30 | F | 77 | 43563 | 10 | 3.3+ | |
| O | N | 6922 | 25-Aug-98 | 4 | 15:30 | F | 55 | 43564 | 1 | 5.1+ | |
| O | N | 6923 | 25-Aug-98 | 4 | 15:30 | M | 78 | 43564 | 2 | 3.2+ | |
| O | N | 6924 | 25-Aug-98 | 4 | 15:30 | F | 77 | 43564 | 3 | 4.3+ | |
| O | N | 6925 | 26-Aug-98 | 3 | 9:16 | F | 74 | 43565 | 1 | 4.3+ | |
| O | N | 6926 | 26-Aug-98 | 3 | 9:16 | M | 61 | 43565 | 2 | 3.1+ | |
| O | N | 6927 | 26-Aug-98 | 3 | 9:16 | F | 66 | 43565 | 3 | R.R+ | |
| O | N | 6928 | 26-Aug-98 | 3 | 9:16 | F | 67 | 43565 | 4 | 3.2+ | |
| O | N | 6929 | 26-Aug-98 | 3 | 9:16 | M | 59 | 43565 | 5 | R.1+ | |
| O | N | 6930 | 26-Aug-98 | 3 | 9:16 | F | 71 | 43565 | 6 | R.2+ | |
| O | N | 6931 | 26-Aug-98 | 4 | 16:15 | F | 61 | 43565 | 7 | R.1+ | |
| O | N | 6932 | 26-Aug-98 | 4 | 16:15 | M | 67 | 43565 | 8 | 3.2+ | |
| O | N | 6933 | 26-Aug-98 | 4 | 16:15 | M | 67 | 43565 | 9 | 3.2+ | |
| O | N | 6934 | 26-Aug-98 | 4 | 16:15 | M | 73 | 43565 | 10 | 3.2+ | |
| O | N | 6935 | 26-Aug-98 | 4 | 16:15 | F | 69 | 43566 | 1 | 3.2S1+ | |
| O | N | 6936 | 26-Aug-98 | 4 | 16:15 | F | 62 | 43566 | 2 | 3.2+ | |
| O | N | 6937 | 26-Aug-98 | 4 | 16:15 | F | 58 | 43566 | 3 | 4.1+ | |
| O | N | 6939 | 27-Aug-98 | 3 | 8:55 | F | 74 | 43577 | 1 | 5.2+ | |
| O | N | 6941 | 27-Aug-98 | 3 | 8:55 | M | 53 | 43577 | 2 | 3.1+ | Missing tag #6940 |
| O | N | 6943 | 27-Aug-98 | 4 | 9:25 | M | 63 | 43577 | 3 | 3.1+ | Missing tag #6942 |
| O | N | 6944 | 27-Aug-98 | 3 | 15:05 | M | 61 | 43577 | 4 | 3.1+ | |
| O | N | 6945 | 27-Aug-98 | 4 | 15:30 | M | 61 | 43577 | 5 | 3.1+ | |
| O | N | 6946 | 27-Aug-98 | 4 | 15:30 | M | 63 | 43577 | 6 | R.1+ | |
| O | N | 6947 | 27-Aug-98 | 4 | 15:30 | F | 56 | 43577 | 7 | 4.1+ | |
| O | N | 6948 | 27-Aug-98 | 4 | 15:30 | F | 76 | 43577 | 8 | 3.2+ | |
| O | N | 6949 | 27-Aug-98 | 4 | 15:30 | F | 62 | 43577 | 9 | 4.1+ | |
| O | N | 6950 | 27-Aug-98 | 4 | 15:30 | F | 67 | 43577 | 10 | R.2+ | |

| C. | L. | Tag[1] Number | Date | F.W. | Time | Sex | Length (cm) | Book # | Scale # | Age | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| O | N | 6952 | 1-Sep-98 | 2 | 9:48 | M | 51 | 43660 | 1 | 4.1+ | |
| O | N | 6953 | 1-Sep-98 | 2 | 9:48 | M | 72 | 43660 | 2 | 3.2+ | |
| O | N | 6956 | 1-Sep-98 | 2 | 14:57 | M | 57 | 43660 | 3 | 5.1+ | |
| O | N | 6958 | 2-Sep-98 | 1 | 9:46 | M | 84 | 43661 | 1 | 3.2S1S1+ | Missing tag #6957 |
| O | N | 6959 | 3-Sep-98 | 1 | 17:34 | F | 58 | 43662 | 1 | 3.1+ | |
| O | N | 6960 | 4-Sep-98 | 1 | 14:49 | F | 57 | 43663 | 1 | R.1+ | |
| O | N | 6961 | 5-Sep-98 | 1 | 9:00 | F | 72 | 43664 | 1 | R.2+ | |
| O | N | 6962 | 5-Sep-98 | 1 | 9:00 | F | 69 | 43664 | 2 | 3.2+ | |
| O | N | 6963 | 5-Sep-98 | 1 | 9:00 | M | 52 | 43664 | 3 | 3.1+ | Net marks |
| O | N | 6964 | 5-Sep-98 | 1 | 9:00 | F | 53 | 43664 | 4 | R.1+ | Missing tag #6965 |
| O | N | 6965 | 5-Sep-98 | 1 | 9:00 | F | 57 | 43664 | 5 | 4.1+ | |
| O | N | 6966 | 5-Sep-98 | 2 | 9:54 | F | 67 | 43664 | 6 | 3.2+ | |
| O | N | 6967 | 6-Sep-98 | 1 | 9:33 | F | 69 | 43665 | 1 | 3.2+ | |
| O | N | 6968 | 6-Sep-98 | 1 | 9:33 | F | 72 | 43665 | 2 | 3.2+ | |
| O | N | 6969 | 6-Sep-98 | 1 | 9:33 | F | 67 | 43665 | 3 | 4.2+ | |
| O | N | 6970 | 6-Sep-98 | 1 | 9:33 | F | 68 | 43665 | 4 | 3.2+ | |
| O | N | 6971 | 7-Sep-98 | 1 | 11:30 | F | 59 | 43666 | | NA | NO SCALES TAKEN |
| O | N | 6972 | 7-Sep-98 | 2 | 14:21 | F | 61 | 43666 | 1 | 3.1+ | |
| O | N | 6973 | 8-Sep-98 | 1 | 11:33 | M | 58 | 43667 | 1 | 3.1+ | |
| O | N | 6974 | 8-Sep-98 | 1 | 11:33 | F | 63 | 43667 | 2 | 4.2+ | |
| O | N | 6975 | 8-Sep-98 | 1 | 11:33 | F | 68 | 43667 | 3 | 3.2+ | |
| O | N | 6976 | 8-Sep-98 | 1 | 14:24 | F | 63 | 43667 | 4 | 4.1+ | |
| O | N | 6977 | 10-Sep-98 | 2 | 10:55 | F | 75 | 43669 | 1 | 3.3+ | |
| O | N | 6978 | 10-Sep-98 | 1 | 11:10 | M | 75 | 43669 | 2 | 3.2S1+ | |
| O | N | 6979 | 10-Sep-98 | 1 | 11:10 | F | 75 | 43669 | 3 | 4.2+ | |
| O | N | 6980 | 10-Sep-98 | 1 | 11:10 | F | 70 | 43669 | 4 | 4.2+ | |
| O | N | 6981 | 10-Sep-98 | 1 | 11:10 | F | 65 | 43669 | 5 | 4.2+ | |
| O | N | 6982 | 11-Sep-98 | 1 | 10:49 | M | 78 | 43670 | 1 | R.3+ | |
| O | N | 6983 | 13-Sep-98 | 1 | 12:03 | M | 56 | 43672 | 1 | 3.1+ | |
| O | N | 6984 | 14-Sep-98 | 1 | 11:45 | F | 59 | 43675 | 1 | R.2+ | |
| O | N | 6985 | 15-Sep-98 | 1 | 11:07 | F | 70 | 43673 | 1 | 4.1S1+ | |
| O | N | 6986 | 15-Sep-98 | 2 | 11:15 | M | 68 | 43673 | 2 | R.1+ | |
| O | N | 6987 | 15-Sep-98 | 2 | 17:40 | M | 68 | 43673 | 3 | 3.2S1+ | |
| O | N | 6989 | 17-Sep-98 | 1 | 11:48 | F | 56 | 43674 | 1 | 3.1+ | |
| O | N | 6991 | 18-Sep-98 | 2 | 15:50 | F | 57 | 43695 | 1 | 4.1+ | |
| | | 7794 | 5-Sep-98 | 4 | 12:08 | F | 70 | 43627 | 7 | 3.2+ | Chinook Operculum. tag #'s |
| | | 7795 | 5-Sep-98 | 4 | 12:08 | F | 73 | 43627 | 8 | 4.2S1+ | Chinook Operculum. tag #'s |
| | | 7796 | 5-Sep-98 | 4 | 12:08 | M | 73 | 43627 | 9 | 3.2+ | Chinook Operculum. tag #'s |
| | | 7797 | 5-Sep-98 | 4 | 12:08 | F | 67 | 43627 | 10 | 4.1S1S1+ | Chinook Operculum. tag #'s |
| | | 7798 | 5-Sep-98 | 4 | 12:08 | M | 54 | NA | NA | NA | Chinook Operculum. tag #'s. Net marks |
| | | 7799 | 5-Sep-98 | 4 | 12:08 | M | 62 | NA | NA | NA | Chinook Operculum. tag #'s |
| | | 7800 | 5-Sep-98 | 4 | 12:08 | F | 65 | NA | NA | NA | Chinook Operculum. tag #'s |
| W | | 8351 | 28-Aug-98 | 3 | 9:05 | M | 93 | 43567 | 1 | 3.3+ | |
| W | | 8352 | 28-Aug-98 | 3 | 9:05 | F | 60 | 43567 | 2 | 3.1+ | |
| W | | 8353 | 28-Aug-98 | 3 | 9:05 | M | 54 | 43567 | 3 | R.1+ | |
| W | | 8354 | 28-Aug-98 | 3 | 16:55 | F | 81 | 43567 | 4 | R.2S1+ | Net marks |
| W | | 8356 | 28-Aug-98 | 3 | 16:55 | M | 65 | 43567 | 6 | 4.2+ | |
| W | | 8357 | 28-Aug-98 | 4 | 17:35 | F | 64 | 43567 | 7 | 3.1+ | |
| W | | 8358 | 28-Aug-98 | 4 | 17:35 | M | 49 | 43567 | 8 | 3.1+ | |
| W | | 8359 | 28-Aug-98 | 4 | 17:35 | F | 42 | 43567 | 9 | 4.1+ | |
| W | | 8360 | 28-Aug-98 | 4 | 17:35 | F | 55 | 43567 | 10 | 3.2+ | |
| W | | 8361 | 28-Aug-98 | 4 | 17:35 | M | 80 | 43568 | 1 | 4.1S1+ | |

| Tag[1] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C. | L. | Number | Date | F.W. | Time | Sex | Length (cm) | Book # | Scale # | Age | Comments |
| W | | 8362 | 28-Aug-98 | 4 | 17:35 | M | 75 | 43568 | 2 | 4.2+ | |
| W | | 8363 | 29-Aug-98 | 4 | 9:35 | M | 64 | 43570 | 1 | 3.1+ | |
| W | | 8364 | 29-Aug-98 | 4 | 9:35 | F | 55 | 43570 | 2 | 3.1+ | |
| W | | 8365 | 29-Aug-98 | 4 | 15:40 | F | 68 | 43570 | 3 | R.2+ | |
| W | | 8367 | 31-Aug-98 | 4 | 9:35 | M | 73 | 43572 | 1 | 4.2+ | |
| W | | 8368 | 31-Aug-98 | 3 | 15:00 | F | 54 | 43572 | 2 | 3.1+ | |
| W | | 8369 | 31-Aug-98 | 4 | 15:45 | F | 56 | 43572 | 3 | 3.1+ | |
| W | | 8371 | 1-Sep-98 | 3 | 9:10 | F | 69 | 43573 | 1 | 4.2+ | |
| W | | 8372 | 1-Sep-98 | 3 | 9:10 | M | 66 | 43573 | 2 | 3.2+ | |
| W | | 8373 | 1-Sep-98 | 3 | 9:10 | M | 55 | 43573 | 3 | 3.1+ | |
| W | | 8374 | 1-Sep-98 | 3 | 9:10 | F | 65 | 43573 | 4 | 3.2+ | |
| W | | 8375 | 1-Sep-98 | 4 | 10:10 | M | 59 | 43573 | 5 | 4.1+ | |
| W | | 8376 | 1-Sep-98 | 3 | 15:49 | F | 80 | 43573 | 6 | 3.2S1+ | Missing tag #8377 |
| W | | 8378 | 1-Sep-98 | 4 | 16:21 | M | 51 | 43573 | 7 | 3.1+ | |
| W | | 8379 | 1-Sep-98 | 4 | 16:21 | F | 74 | 43573 | 8 | 3.2+ | |
| W | | 8380 | 1-Sep-98 | 4 | 16:21 | F | 79 | 43573 | 9 | 4.2+ | |
| W | | 8381 | 1-Sep-98 | 3 | 17:34 | F | 57 | 43573 | 10 | 4.1+ | |
| W | | 8382 | 2-Sep-98 | 3 | 9:00 | M | 63 | 43574 | 1 | 3.2+ | |
| W | | 8383 | 2-Sep-98 | 4 | 9:37 | M | 76 | 43574 | 2 | 3.2+ | |
| W | | 8384 | 2-Sep-98 | 4 | 9:37 | F | 73 | 43574 | 3 | 3.2+ | |
| W | | 8385 | 2-Sep-98 | 3 | 17:15 | F | 71 | 43574 | 4 | 3.2+ | |
| W | | 8386 | 2-Sep-98 | 4 | 17:49 | M | 65 | 43574 | 5 | R.1+ | |
| W | | 8387 | 2-Sep-98 | 4 | 17:49 | M | 60 | 43574 | 6 | 4.1+ | |
| W | | 8388 | 3-Sep-98 | 3 | 9:10 | F | 70 | 43575 | 1 | 3.2+ | |
| W | | 8389 | 3-Sep-98 | 4 | 9:35 | F | 73 | 43575 | 2 | 3.2+ | |
| W | | 8390 | 3-Sep-98 | 4 | 17:56 | M | 54 | 43575 | 3 | R.1+ | Net marks |
| W | | 8391 | 3-Sep-98 | 4 | 17:56 | F | 71 | 43575 | 4 | R.3+ | |
| W | | 8392 | 3-Sep-98 | 4 | 17:56 | M | 83 | 43575 | 5 | 4.3+ | |
| W | | 8393 | 4-Sep-98 | 3 | 9:00 | M | 60 | 43635 | 1 | 4.1+ | |
| W | | 8394 | 4-Sep-98 | 3 | 9:00 | M | 71 | 43635 | 2 | 4.2+ | |
| W | | 8395 | 4-Sep-98 | 3 | 9:00 | M | 63 | 43635 | 3 | R.1+ | |
| W | | 8396 | 4-Sep-98 | 3 | 9:00 | M | 54 | 43635 | 4 | 5.1+ | |
| W | | 8397 | 4-Sep-98 | 3 | 9:00 | F | 75 | 43635 | 5 | 4.2+ | |
| W | | 8398 | 4-Sep-98 | 4 | 10:00 | M | 48 | 43635 | 6 | R.1+ | |
| W | | 8399 | 4-Sep-98 | 4 | 10:00 | M | 73 | 43635 | 7 | 3.2+ | |
| W | | 8400 | 4-Sep-98 | 3 | 15:04 | F | 63 | 43635 | 8 | 5.1+ | |
| W | | 8401 | 4-Sep-98 | 4 | 15:36 | F | 70 | 43635 | 9 | 3.2+ | |
| W | | 8402 | 4-Sep-98 | 4 | 15:36 | M | 53 | 43635 | 10 | 3.1+ | Net marks |
| W | | 8403 | 4-Sep-98 | 4 | 15:36 | M | 68 | 43634 | 1 | R.1+ | |
| W | | 8404 | 4-Sep-98 | 4 | 15:36 | F | 68 | 43634 | 2 | R.2+ | Net marks |
| W | | 8405 | 4-Sep-98 | 4 | 17:35 | M | 57 | 43634 | 3 | 3.1+ | |
| W | | 8406 | 4-Sep-98 | 4 | 17:35 | F | 65 | 43634 | 4 | 3.2+ | |
| W | | 8407 | 4-Sep-98 | 4 | 17:35 | F | 68 | 43634 | 5 | 3.2+ | |
| W | | 8408 | 4-Sep-98 | 4 | 17:35 | M | 55 | 43634 | 6 | R.1+ | |
| W | | 8409 | 5-Sep-98 | 3 | 11:32 | F | 57 | 43626 | 1 | 3.1+ | |
| W | | 8410 | 5-Sep-98 | 3 | 11:32 | F | 80 | 43626 | 2 | R.2S1S1+ | |
| W | | 8411 | 5-Sep-98 | 3 | 11:32 | M | 56 | 43626 | 3 | 3.1+ | |
| W | | 8412 | 5-Sep-98 | 3 | 11:32 | F | 68 | 43626 | 4 | 3.2+ | No DNA sample |
| W | | 8413 | 5-Sep-98 | 3 | 11:32 | F | 69 | 43626 | 5 | R.2+ | |
| W | | 8414 | 5-Sep-98 | 4 | 12:08 | F | 71 | 43626 | 6 | 3.2+ | |
| W | | 8415 | 5-Sep-98 | 4 | 12:08 | F | 67 | 43626 | 7 | 4.2+ | |
| W | | 8416 | 5-Sep-98 | 4 | 12:08 | M | 75 | 43626 | 8 | 4.2+ | |

| Tag[1] C. | L. | Number | Date | F.W. | Time | Sex | Length (cm) | Book # | Scale # | Age | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W | | 8417 | 5-Sep-98 | 4 | 12:08 | M | 70 | 43626 | 9 | 3.2+ | |
| W | | 8418 | 5-Sep-98 | 4 | 12:08 | F | 71 | 43626 | 10 | 3.2+ | Missing tag # 8419 |
| W | | 8420 | 5-Sep-98 | 4 | 12:08 | F | 73 | 43627 | 1 | 4.2+ | |
| W | | 8421 | 5-Sep-98 | 4 | 12:08 | F | 88 | 43627 | 2 | 4.2S1+ | |
| W | | 8422 | 5-Sep-98 | 4 | 12:08 | M | 62 | 43627 | 3 | 3.1+ | |
| W | | 8423 | 5-Sep-98 | 4 | 12:08 | M | 56 | 43627 | 4 | 4.1+ | |
| W | | 8424 | 5-Sep-98 | 4 | 12:08 | M | 95 | 43627 | 5 | 4.2S1+ | |
| W | | 8425 | 5-Sep-98 | 4 | 12:08 | M | 69 | 43627 | 6 | U.2+ | |
| W | | 8426 | 5-Sep-98 | 4 | 16:50 | F | 75 | 86854 | 1 | 3.2+ | No scales taken |
| W | | 8427 | 5-Sep-98 | 4 | 16:50 | M | 53 | 86854 | 2 | 4.1S1+ | Missing tag #'s: 8428, 8429 |
| W | | 8430 | 5-Sep-98 | 4 | 16:50 | F | 51 | 86854 | 3 | 3.1+ | No scales taken |
| W | | 8431 | 5-Sep-98 | 4 | 16:50 | F | 61 | 86854 | 4 | 4.2+ | No scales taken |
| W | | 8432 | 5-Sep-98 | 4 | 16:50 | M | 57 | 86854 | 5 | R.2S1+ | No scales taken |
| W | | 8433 | 5-Sep-98 | 4 | 16:50 | M | 58 | 86854 | 6 | R.2+ | No scales taken |
| W | | 8434 | 5-Sep-98 | 4 | 16:50 | M | 78 | 86854 | 7 | 3.1+ | No scales taken |
| W | | 8435 | 5-Sep-98 | 4 | 16:50 | F | 58 | 86854 | 8 | R.1+ | Missing tag # 8436 |
| W | | 8437 | 5-Sep-98 | 4 | 16:50 | M | 84 | 86854 | 9 | 5.4+ | No scales taken |
| W | | 8438 | 5-Sep-98 | 4 | 16:50 | F | 64 | NA | NA | NA | No scales taken |
| W | | 8439 | 5-Sep-98 | 4 | 16:50 | F | 60 | 86854 | 10 | R.1+ | No scales taken |
| W | | 8440 | 6-Sep-98 | 3 | 12:05 | F | 58 | 43628 | 1 | U.1+ | |
| W | | 8441 | 6-Sep-98 | 3 | 12:05 | M | 50 | 43628 | 2 | R.1+ | |
| W | | 8442 | 6-Sep-98 | 3 | 12:05 | M | 57 | 43628 | 3 | R.1+ | |
| W | | 8443 | 6-Sep-98 | 3 | 12:05 | M | 70 | 43628 | 4 | 4.1S1+ | |
| W | | 8444 | 6-Sep-98 | 3 | 12:05 | M | 59 | 43628 | 5 | 4.1+ | |
| W | | 8445 | 6-Sep-98 | 3 | 12:05 | F | 58 | 43628 | 6 | R.1+ | |
| W | | 8446 | 6-Sep-98 | 3 | 12:05 | F | 60 | 43628 | 7 | 5.1+ | |
| W | | 8447 | 6-Sep-98 | 3 | 12:05 | M | 90 | 43628 | 8 | 4.3+ | |
| W | | 8448 | 6-Sep-98 | 3 | 12:05 | F | 82 | 43628 | 9 | 3.3+ | |
| W | | 8449 | 6-Sep-98 | 4 | 13:00 | F | 67 | 43628 | 10 | 3.2+ | |
| W | | 8450 | 6-Sep-98 | 4 | 13:00 | M | 60 | 43629 | 1 | 4.1+ | |
| W | | 8451 | 6-Sep-98 | 4 | 13:00 | F | 70 | 43629 | 2 | 3.2+ | |
| W | | 8452 | 6-Sep-98 | 4 | 13:00 | M | 52 | 43629 | 3 | 3.1+ | |
| W | | 8453 | 6-Sep-98 | 3 | 16:16 | M | 77 | 43629 | 4 | 3.2+ | |
| W | | 8454 | 6-Sep-98 | 4 | 16:34 | M | 56 | 43629 | 5 | R.1S1+ | |
| W | | 8455 | 6-Sep-98 | 4 | 16:34 | F | 66 | 43629 | 6 | 3.2+ | |
| W | | 8456 | 6-Sep-98 | 4 | 16:34 | F | 72 | 43629 | 7 | R.2+ | |
| W | | 8457 | 6-Sep-98 | 4 | 16:34 | M | 100 | 43629 | 8 | 4.3S1+ | |
| W | | 8458 | 6-Sep-98 | 4 | 16:34 | F | 72 | 43629 | 9 | 4.2+ | |
| W | | 8459 | 6-Sep-98 | 4 | 16:34 | M | 87 | 43629 | 10 | 3.2+ | |
| W | | 8460 | 6-Sep-98 | 4 | 16:34 | F | 76 | NA | NA | NA | No scales taken |
| W | | 8461 | 6-Sep-98 | 4 | 16:34 | M | 61 | NA | NA | NA | No scales taken |
| W | | 8462 | 6-Sep-98 | 4 | 16:34 | F | 58 | NA | NA | NA | No scales taken |
| W | | 8463 | 7-Sep-98 | 4 | 8:42 | F | 57 | 43630 | 1 | U.1+ | |
| W | | 8464 | 7-Sep-98 | 4 | 8:42 | F | 52 | 43630 | 2 | U.1+ | |
| W | | 8465 | 7-Sep-98 | 4 | 8:42 | M | 58 | 43630 | 3 | R.1+ | |
| W | | 8466 | 7-Sep-98 | 4 | 8:42 | F | 60 | 43630 | 4 | R.1+ | |
| W | | 8467 | 7-Sep-98 | 4 | 8:42 | F | 74 | 43630 | 5 | 4.2+ | |
| W | | 8468 | 7-Sep-98 | 4 | 8:42 | F | 58 | 43630 | 6 | 5.1+ | |
| W | | 8469 | 7-Sep-98 | 4 | 8:42 | F | 58 | 43630 | 7 | R.1+ | 2 SCALE Net marks |
| W | | 8470 | 7-Sep-98 | 4 | 8:42 | M | 61 | 43630 | 8 | 5.1+ | |
| W | | 8471 | 7-Sep-98 | 4 | 8:42 | M | 51 | 43630 | 9 | 5.1+ | |
| W | | 8472 | 7-Sep-98 | 4 | 8:42 | M | 61 | 43630 | 10 | R.1+ | |

| Tag[1] C. | L. | Number | Date | F.W. | Time | Sex | Length (cm) | Book # | Scale # | Age | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W | | 8473 | 7-Sep-98 | 4 | 8:42 | F | 56 | 43631 | 1 | 3.1+ | |
| W | | 8474 | 7-Sep-98 | 4 | 8:42 | F | 74 | 43631 | 2 | 3.2+ | |
| W | | 8475 | 7-Sep-98 | 4 | 8:42 | F | 63 | 43631 | 3 | 4.1+ | |
| W | | 8476 | 7-Sep-98 | 4 | 8:42 | F | 73 | 43631 | 6 | 3.1S1+ | |
| W | | 8477 | 7-Sep-98 | 3 | 10:03 | F | 75 | 43631 | 7 | 4.2+ | |
| W | | 8478 | 7-Sep-98 | 3 | 10:03 | M | 57 | 43631 | 8 | 2.2+ | |
| W | | 8480 | 7-Sep-98 | 3 | 16:20 | M | 62 | 43631 | 9 | NA | |
| W | | 8481 | 7-Sep-98 | 3 | 16:20 | F | 78 | 43631 | 10 | NA | |
| W | | 8482 | 7-Sep-98 | 4 | 18:00 | M | 76 | NA | NA | NA | No scales taken |
| W | | 8483 | 7-Sep-98 | 4 | 18:00 | F | 61 | NA | NA | NA | Net marks |
| W | | 8484 | 7-Sep-98 | 4 | 18:00 | F | 70 | NA | NA | NA | No scales taken |
| W | | 8485 | 7-Sep-98 | 4 | 18:00 | M | 73 | NA | NA | NA | No scales taken |
| W | | 8486 | 7-Sep-98 | 4 | 18:00 | M | 89 | NA | NA | NA | No scales taken |
| W | | 8487 | 7-Sep-98 | 4 | 17:00 | F | 73 | NA | NA | NA | No scales taken |
| W | | 8488 | 8-Sep-98 | 4 | 8:55 | M | 73 | 43636 | 1 | R.2+ | |
| W | | 8489 | 8-Sep-98 | 4 | 8:55 | F | 70 | 43636 | 2 | 3.1S1+ | |
| W | | 8490 | 8-Sep-98 | 4 | 8:55 | F | 75 | 43636 | 3 | 3.2+ | |
| W | | 8491 | 8-Sep-98 | 4 | 8:55 | F | 68 | 43636 | 4 | 4.2+ | |
| W | | 8492 | 8-Sep-98 | 4 | 8:55 | M | 75 | 43636 | 5 | 3.2+ | Sea lice |
| W | | 8493 | 8-Sep-98 | 3 | 9:32 | M | 79 | 43636 | 6 | 3.2+ | |
| W | | 8494 | 8-Sep-98 | 3 | 16:06 | F | 60 | 43636 | 7 | R.1+ | Net marks |
| W | | 8495 | 8-Sep-98 | 4 | 17:57 | F | 72 | 43636 | 8 | 3.2+ | |
| W | | 8496 | 8-Sep-98 | 4 | 17:57 | M | 67 | 43636 | 9 | 3.2+ | |
| W | | 8497 | 9-Sep-98 | 4 | 8:41 | F | 62 | 43637 | 1 | 4.1+ | |
| W | | 8498 | 9-Sep-98 | 4 | 8:41 | M | 75 | 43637 | 2 | 3.2+ | |
| W | | 8499 | 7-Sep-98 | 4 | 8:42 | F | 69 | 43631 | 5 | 3.2+ | |
| W | | 8500 | 7-Sep-98 | 4 | 8:42 | F | 68 | 43631 | 4 | 5.1+ | |
| W | | 8501 | 9-Sep-98 | 4 | 8:41 | F | 72 | 43637 | 3 | 3.2+ | |
| W | | 8502 | 9-Sep-98 | 3 | 9:10 | M | 64 | 43637 | 4 | 3.2+ | |
| W | | 8503 | 9-Sep-98 | 4 | 17:48 | F | 66 | 43637 | 5 | 5.1+ | |
| W | | 8504 | 9-Sep-98 | 4 | 17:48 | M | 66 | 43637 | 6 | R.1+ | |
| W | | 8505 | 9-Sep-98 | 4 | 17:48 | M | 84 | 43637 | 7 | R.3+ | |
| W | | 8506 | 9-Sep-98 | 4 | 17:48 | F | 74 | 43637 | 8 | 4.2+ | |
| W | | 8507 | 9-Sep-98 | 4 | 17:48 | F | 69 | 43637 | 9 | 3.2+ | |
| W | | 8508 | 10-Sep-98 | 3 | 8:31 | M | 59 | 43638 | 1 | R.1+ | |
| W | | 8509 | 10-Sep-98 | 4 | 8:52 | F | 75 | 43638 | 2 | R.2+ | |
| W | | 8510 | 10-Sep-98 | 4 | 8:52 | F | 61 | 43638 | 3 | 4.1+ | Missing tag #8511 |
| W | | 8512 | 10-Sep-98 | 4 | 8:52 | F | 57 | 43638 | 4 | 4.1+ | |
| W | | 8513 | 10-Sep-98 | 4 | 8:52 | M | 80 | 43638 | 5 | 3.2+ | |
| W | | 8514 | 10-Sep-98 | 4 | 8:52 | M | 61 | 43638 | 6 | 5.1+ | Missing tag #8515 |
| W | | 8516 | 10-Sep-98 | 4 | 17:44 | F | 57 | 43638 | 7 | R.1+ | |
| W | | 8518 | 10-Sep-98 | 4 | 17:44 | M | 95 | 43638 | 8 | 3.3S1+ | Missing tag #8517 |
| W | | 8519 | 11-Sep-98 | 4 | 8:47 | F | 58 | 43676 | 1 | 3.1+ | No DNA |
| W | | 8520 | 11-Sep-98 | 4 | 8:47 | M | 100 | 43676 | 2 | 4.3S1+ | |
| W | | 8521 | 11-Sep-98 | 4 | 8:47 | M | 65 | 43676 | 3 | 5.1S1+ | Missing tag #8522 |
| W | | 8523 | 11-Sep-98 | 4 | 8:47 | F | 54 | 43676 | 4 | 3.1+ | |
| W | | 8524 | 11-Sep-98 | 3 | 17:39 | M | 63 | 43676 | 5 | 3.2+ | |
| W | | 8525 | 11-Sep-98 | 4 | 18:03 | M | 81 | 43676 | 6 | 3.3+ | |
| W | | 8526 | 11-Sep-98 | 4 | 18:03 | M | 51 | 43676 | 7 | R.1+ | |
| W | | 8527 | 11-Sep-98 | 4 | 18:03 | M | 59 | 43676 | 8 | 3.1+ | |
| W | | 8528 | 11-Sep-98 | 4 | 18:03 | F | 50 | 43676 | 9 | 3.1+ | |
| W | | 8529 | 12-Sep-98 | 4 | 8:58 | M | 63 | 43677 | 1 | R.1S1+ | |

| Tag[1] C. | L. | Number | Date | F.W. | Time | Sex | Length (cm) | Book # | Scale # | Age | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W | | 8530 | 12-Sep-98 | 4 | 8:58 | F | 63 | 43677 | 2 | 4.1+ | |
| W | | 8531 | 12-Sep-98 | 4 | 8:58 | F | 79 | 43677 | 3 | U.2S1+ | |
| W | | 8532 | 12-Sep-98 | 4 | 8:58 | F | 57 | 43677 | 4 | R.1+ | |
| W | | 8533 | 12-Sep-98 | 3 | 17:44 | F | 74 | 43677 | 5 | 3.2+ | |
| W | | 8534 | 12-Sep-98 | 4 | 18:00 | M | 74 | 43677 | 6 | 3.2S1+ | |
| W | | 8535 | 12-Sep-98 | 4 | 18:00 | F | 58 | 43677 | 7 | R.1+ | |
| W | | 8536 | 12-Sep-98 | 4 | 18:00 | F | 57 | 43677 | 8 | 3.1+ | |
| W | | 8537 | 12-Sep-98 | 4 | 18:00 | M | 80 | 43677 | 9 | R.2S1+ | |
| W | | 8538 | 12-Sep-98 | 4 | 18:00 | M | 62 | 43677 | 10 | 3.1+ | |
| W | | 8539 | 12-Sep-98 | 4 | 18:00 | M | 53 | 43639 | 1 | 3.1+ | |
| W | | 8540 | 12-Sep-98 | 4 | 18:27 | M | 64 | 43639 | 2 | 4.2+ | |
| W | | 8541 | 13-Sep-98 | 4 | 9:14 | M | 74 | 43640 | 1 | 3.2+ | |
| W | | 8542 | 13-Sep-98 | 3 | 10:05 | F | 71 | 43640 | 2 | R.2+ | |
| W | | 8543 | 13-Sep-98 | 4 | 18:04 | M | 91 | 43640 | 3 | 3.2S1+ | |
| W | | 8544 | 14-Sep-98 | 4 | 8:20 | M | 69 | 43641 | 1 | 3.2+ | |
| W | | 8545 | 14-Sep-98 | 3 | 17:28 | F | 71 | 43641 | 2 | 3.2+ | |
| W | | 8546 | 14-Sep-98 | 3 | 17:28 | M | 75 | 43641 | 3 | 3.2S1+ | |
| W | | 8547 | 14-Sep-98 | 3 | 17:28 | F | 58 | 43641 | 4 | 4.1+ | |
| W | | 8548 | 14-Sep-98 | 4 | 17:51 | M | 58 | 43641 | 5 | 3.1+ | |
| W | | 8549 | 14-Sep-98 | 4 | 17:51 | M | 81 | 43641 | 6 | 3.2S1+ | |
| W | | 8550 | 14-Sep-98 | 4 | 17:51 | M | 63 | 43641 | 7 | 4.1+ | Missing tag #8551 |
| W | | 8552 | 14-Sep-98 | 4 | 17:51 | M | 80 | 43641 | 8 | 3.3+ | |
| W | | 8553 | 15-Sep-98 | 3 | 13:17 | F | 63 | 43678 | 1 | 3.1+ | |
| W | | 8554 | 15-Sep-98 | 4 | 13:52 | M | 65 | 43678 | 2 | 3.2+ | |
| W | | 8555 | 15-Sep-98 | 4 | 13:52 | F | 65 | 43678 | 3 | 4.1+ | |
| W | | 8556 | 15-Sep-98 | 4 | 13:52 | M | 75 | 43678 | 4 | 3.2+ | |
| W | | 8557 | 15-Sep-98 | 4 | 13:52 | F | 80 | 43678 | 5 | 3.3+ | |
| W | | 8558 | 15-Sep-98 | 4 | 13:52 | M | 68 | 43678 | 6 | 2.2S1+ | |
| W | | 8559 | 15-Sep-98 | 4 | 13:52 | M | 69 | 43678 | 7 | 3.2+ | |
| W | | 8560 | 15-Sep-98 | 4 | 13:52 | M | 76 | 43678 | 8 | 3.2+ | |
| W | | 8561 | 15-Sep-98 | 4 | 13:52 | M | 76 | 43678 | 9 | 4.2+ | |
| W | | 8562 | 15-Sep-98 | 3 | 16:31 | F | 74 | 43678 | 10 | 3.2+ | |
| W | | 8563 | 15-Sep-98 | 3 | 16:31 | F | 71 | 43643 | 1 | 4.2+ | |
| W | | 8564 | 16-Sep-98 | 4 | 10:12 | F | 72 | 43642 | 1 | 3.2+ | |
| W | | 8565 | 16-Sep-98 | 4 | 10:12 | M | 68 | 43642 | 2 | 3.2+ | |
| W | | 8566 | 16-Sep-98 | 4 | 10:12 | F | 67 | 43642 | 3 | R.2+ | |
| W | | 8567 | 16-Sep-98 | 4 | 10:12 | M | 64 | 43642 | 4 | 3.1+ | |
| W | | 8568 | 16-Sep-98 | 4 | 10:12 | F | 62 | 43642 | 5 | 3.2+ | |
| W | | 8569 | 16-Sep-98 | 4 | 10:12 | F | 65 | 43642 | 6 | 4.1+ | |
| W | | 8570 | 16-Sep-98 | 4 | 10:12 | F | 59 | 43642 | 7 | 4.1+ | |
| W | | 8571 | 16-Sep-98 | 3 | 17:39 | M | 58 | 43642 | 8 | 3.1+ | Net marks |
| W | | 8572 | 17-Sep-98 | 4 | 9:49 | M | 69 | 43650 | 1 | 3.2+ | |
| W | | 8573 | 17-Sep-98 | 4 | 9:49 | M | 73 | 43650 | 2 | 4.2+ | |
| W | | 8574 | 17-Sep-98 | 4 | 9:49 | M | 90 | 43650 | 3 | 3.3+ | |
| W | | 8575 | 17-Sep-98 | 4 | 9:49 | F | 69 | 43650 | 4 | 4.2+ | |
| W | | 8576 | 17-Sep-98 | 4 | 17:55 | M | 76 | 43650 | 5 | 4.2+ | |
| W | | 8577 | 18-Sep-98 | 3 | 8:41 | F | 67 | 43679 | 1 | 4.2+ | |
| W | | 8578 | 19-Sep-98 | 3 | 8:35 | M | 61 | 43680 | 1 | 3.2+ | Net marks |
| W | | 8579 | 19-Sep-98 | 4 | 9:18 | F | 80 | 43680 | 2 | 3.2S1+ | |
| W | | 8580 | 19-Sep-98 | 4 | 9:18 | M | 76 | 43680 | 3 | 3.2+ | |
| W | | 8581 | 19-Sep-98 | 4 | 17:00 | F | 68 | 43680 | 4 | 3.2+ | |
| W | | 8582 | 19-Sep-98 | 4 | 17:00 | F | 69 | 43680 | 5 | 3.2+ | |

| Tag[1] C. | L. | Number | Date | F.W. | Time | Sex | Length (cm) | Book # | Scale # | Age | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W | | 8583 | 20-Sep-98 | 4 | 9:36 | M | 55 | 43681 | 1 | 3.1+ | |
| W | | 8584 | 21-Sep-98 | 4 | 9:11 | M | 66 | 43682 | 1 | 3.1+ | |
| W | | 8585 | 21-Sep-98 | 4 | 9:11 | M | 73 | 43682 | 2 | 4.2+ | |
| W | | 8586 | 21-Sep-98 | 4 | 15:45 | M | 61 | 43682 | 3 | 3.1+ | |
| W | | 8587 | 22-Sep-98 | 4 | 9:20 | M | 74 | 43683 | 1 | R.2+ | Net marks |
| W | | 8588 | 22-Sep-98 | 4 | 9:20 | M | 61 | 43683 | 2 | 4.1+ | |
| W | | 8589 | 22-Sep-98 | 3 | 9:09 | M | 68 | 43684 | 1 | 3.2+ | Net marks |
| W | | 8590 | 25-Sep-98 | 4 | 16:10 | F | 64 | 43644 | 1 | 5.1+ | |
| W | | 8591 | 25-Sep-98 | 4 | 16:10 | F | 59 | 43644 | 2 | 4.1+ | |
| W | | 8592 | 26-Sep-98 | 3 | 9:05 | F | 81 | 43645 | 1 | R.3+ | |
| W | | 8593 | 27-Sep-98 | 4 | 17:58 | F | 71 | 43646 | 1 | 3.2+ | |
| W | | 8594 | 27-Sep-98 | 4 | 17:58 | F | 72 | 43646 | 2 | 4.2+ | |
| W | | 8595 | 28-Sep-98 | 4 | 9:10 | M | 87 | 43647 | 1 | 5.2S1+ | |
| W | | 8596 | 28-Sep-98 | 3 | 17:42 | M | 74 | 43647 | 2 | 3.2+ | |
| W | | 8597 | 28-Sep-98 | 4 | 17:10 | M | 49 | 43647 | 3 | 4.1+ | |
| W | | 8598 | 30-Sep-98 | 4 | 10:00 | M | 62 | 43648 | 1 | 4.2+ | |
| W | | 8599 | 30-Sep-98 | 4 | 10:00 | M | 66 | 43648 | 2 | R.2+ | |
| W | | 8600 | 30-Sep-98 | 4 | 10:00 | M | 57 | 43648 | 3 | 3.1+ | |
| W | | 8601 | 1-Oct-98 | 3 | 8:50 | F | 70 | 43649 | 1 | R.2+ | |
| W | | 8602 | 5-Oct-98 | 4 | 16:30 | M | 70 | 43697 | 1 | 3.2+ | |
| W | | 8603 | 6-Oct-98 | 4 | 9:11 | M | 51 | 43700 | 1 | 3.1+ | |
| W | | 8604 | 6-Oct-98 | 4 | 9:11 | M | 71 | 43700 | 2 | R.2+ | |
| W | | 8605 | 7-Oct-98 | 4 | 17:54 | F | 57 | 43698 | 1 | 3.1+ | |
| W | | 8606 | 7-Oct-98 | 4 | 17:54 | F | 53 | 43698 | 2 | 4.1+ | |
| W | | 8607 | 7-Oct-98 | 4 | 17:54 | F | 57 | 43698 | 3 | 3.1+ | |
| W | | 8608 | 13-Oct-98 | 4 | 9:20 | F | 77 | 70606 | 1 | 4.2+ | |
| W | | 8670 | 31-Aug-98 | 4 | 15:45 | NA | NA | NA | NA | NA | No sex, length, scales, DNA sample taken. |

1. Tag C. represents tag colour and Tag L. represents letter. O and W indicate orange or white tags, respectively and there were not letters on the white tags.

Appendix B. A summary of steelhead recovery data from the Nass River and tributaries, 1998.

| River | Date | Length (cm) | Sex | Tag Colour | Tag Letter | Tag Number | DNA Number | Scale Number | Age | Section | Reach | Samplers | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cranberry | 19-Sep | 75 | f | | | | 1 | 1 | U.2+ | 2 | 2 | CP/KM | gillnet marks |
| Cranberry | 19-Sep | 58 | m | | | | 2 | 2 | 4.1+ | 2 | 2 | CP/KM | clean |
| Cranberry | 1-Oct | 68 | f | | | | 3 | 3 | 3.2+ | 2 | 2 | CP/KM | GN mark, head wound |
| Cranberry | 1-Oct | 74 | f | | | | 4 | 4 | R.1S1+ | 2 | 2 | CP/KM | GN mark, head wound |
| Cranberry | 2-Oct | 69.5 | f | | | | 5 | 5 | R.2+ | 2 | 2 | CP/KM | clean |
| Cranberry | 2-Oct | 79 | f | | | | 6 | 6 | 3.2+ | 2 | 2 | CP/KM | sm. head wound |
| Cranberry | 2-Oct | 80 | m | | | | 7 | 7 | 3.2+ | 2 | 2 | CP/KM | hook scar |
| Cranberry | 15-Oct | 83 | f | | | | 8 | 8 | 4.3+ | 6 | 3 | DA/CP | head scar |
| Cranberry | 15-Oct | 54 | m | | | | 9 | 9 | 3.1+ | 6 | 3 | DA/CP | clean |
| Cranberry | 15-Oct | 53 | f | | | | 10 | 10 | 4.1+ | 6 | 3 | DA/CP | deep hook, blood |
| Cranberry | 15-Oct | 73 | f | | | | 11 | 11 | R.2+ | 6 | 3 | DA/CP | GN mark, predator. scar, hook in eye |
| Cranberry | 15-Oct | 78 | m | | | | 12 | 12 | 3.2+ | 6 | 3 | DA/CP | predator scars |
| Cranberry | 15-Oct | 75 | f | | | | 13 | 13 | 3.2+ | 6 | 3 | DA/CP | predator scars, split dorsal |
| Cranberry | 15-Oct | 63 | f | Orange | N | 6752 | NA | NA | 3.2+ | 6 | 3 | DA/CP | no scales |
| Cranberry | 15-Oct | 87 | f | | | | 15 | 15 | U.2S1+ | 6 | 3 | DA/CP | clean |
| Cranberry | 15-Oct | 63 | f | | | | 16 | 16 | 3.2+ | 6 | 3 | DA/CP | clean |
| Cranberry | 15-Oct | 70.5 | m | | | | 17 | 17 | U.2+ | 6 | 3 | DA/CP | |
| Cranberry | 15-Oct | 71 | m | | | | 18 | 18 | 4.2+ | 6 | 3 | DA/CP | predator scars |
| Cranberry | 15-Oct | 71 | f | | | | 19 | 19 | R.2+ | 6 | 3 | DA/CP | clean |
| Cranberry | 15-Oct | 59 | m | | | | 20 | 20 | 4.1+ | 6 | 3 | DA/CP | clean |
| Cranberry | 15-Oct | 60 | m | | | | 21 | 21 | 3.1+ | 6 | 3 | DA/CP | troll hook scar |
| Cranberry | 15-Oct | 72 | f | | | | 22 | 22 | 3.1S1+ | 6 | 3 | DA/CP | clean |
| Cranberry | 15-Oct | 73 | f | Orange | N | 6488 | NA | NA | 4.2+ | 6 | 3 | DA/CP | hook scar, Orange N6488, DNA taken previously |
| Cranberry | 15-Oct | 78 | m | | | | 24 | 24 | 4.2+ | 6 | 3 | DA/CP | clean, red |
| Cranberry | 15-Oct | 59 | m | | | | 25 | 25 | 3.1+ | 6 | 3 | DA/CP | predator scars |
| Cranberry | 15-Oct | 80 | m | | | | 26 | 26 | 3.1S1+ | 6 | 3 | PG/SH | |
| Cranberry | 15-Oct | 63 | m | | | | 27 | 27 | 4.1+ | 6 | 3 | PG/SH | |
| Cranberry | 15-Oct | 70 | f | Orange | N | 6807 | 28 | 28 | 3.2+ | 6 | 3 | PG/SH | Orange 6807, DNA/scales previously taken |
| Cranberry | 15-Oct | 64 | f | | | | 29 | 29 | 2.2+ | 6 | 3 | PG/SH | |
| Cranberry | 15-Oct | 60 | f | | | | 30 | 30 | R.1+ | 6 | 3 | PG/SH | otter scars and head wound |
| Cranberry | 15-Oct | 82 | f | | | | 31 | 31 | 3.2S1+ | 6 | 3 | PG/SH | |
| Cranberry | 15-Oct | 76 | f | | | | 32 | 32 | 3.2+ | 6 | 3 | PG/SH | |
| Cranberry | 15-Oct | 60 | m | | | | 33 | 33 | 4.1+ | 6 | 3 | PG/SH | |
| Cranberry | 15-Oct | 68 | f | | | | 34 | 34 | 3.2+ | 6 | 3 | PG/SH | |
| Cranberry | 15-Oct | 60 | m | | | | 35 | 35 | 3.1+ | 6 | 3 | PG/SH | |
| Cranberry | 15-Oct | 64 | m | | | | 36 | 36 | 3.1+ | 6 | 3 | PG/SH | |
| Cranberry | 15-Oct | 62 | f | | | | 37 | 37 | 4.1+ | 6 | 3 | PG/SH | |
| Cranberry | 15-Oct | 90 | m | Orange | N | 6849 | NA | NA | R.3+ | 6 | 3 | PG/SH | Orange N6849, nose scar |
| Cranberry | 15-Oct | 62 | m | | | | 39 | 39 | 4.1+ | 6 | 3 | PG/SH | bleeding, mortality?? |
| Cranberry | 15-Oct | 73 | f | Orange | N | 6666 | NA | NA | 3.2+ | 6 | 3 | DA/CP | net scars, already sampled |
| Cranberry | 23-Oct | 61 | m | | | | 41 | 41 | 3.1+ | 2 | 2 | CP/KM | head divot |
| Cranberry | 28-Oct | 85.5 | m | | | | 42 | 42 | 3.3+ | 6 | 3 | DA/RT/CP/RA | |
| Cranberry | 28-Oct | 79 | m | | | | 43 | 43 | R.2+ | 6 | 3 | DA/RT/CP/RA | |
| Cranberry | 28-Oct | 80 | m | | | | 44 | 44 | 3.2+ | 6 | 3 | DA/RT/CP/RA | |

| River | Date | Length (cm) | Sex | Tag Colour | Tag Letter | Tag Number | DNA Number | Scale Number | Age | Section | Reach | Samplers | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cranberry | 28-Oct | 80 | m | | | | 45 | 45 | 3.2+ | 6 | 3 | DA/RT/CP/RA | head wound, hooked in tongue - bleeding, appears to have been sampled in previous years |
| Cranberry | 28-Oct | 70 | f | | | | 46 | 46 | 3.2+ | 6 | 3 | DA/RT/CP/RA | ovary sample #2 |
| Cranberry | 28-Oct | 75.5 | f | | | | 47 | 47 | 3.2+ | 6 | 3 | DA/RT/CP/RA | ovary sample #3 |
| Cranberry | 28-Oct | 89 | m | | | | 48 | 48 | 3.2S1+ | 6 | 3 | DA/RT/CP/RA | scrape on operculum |
| Cranberry | 28-Oct | 82 | f | | | | 49 | 49 | 3.3+ | 6 | 3 | DA/RT/CP/RA | ovary sample #4 |
| Cranberry | 28-Oct | 77 | f | | | | 50 | 50 | 4.2S1+ | 2 | 2 | DA/RT/CP/RA | clean + bright, killed for ovary sample |
| Cranberry | 29-Oct | 64 | m | | | | 51 | 51 | 5.1+ | 2 | 2 | DA/RT/CP/RA | clean, |
| Cranberry | 29-Oct | 81 | m | | | | 52 | 52 | 3.2+ | 2 | 2 | DA/RT/CP/RA | |
| Cranberry | 29-Oct | 78 | m | | | | 53 | 53 | 4.2+ | 2 | 2 | DA/RT/CP/RA | |
| Cranberry | 29-Oct | 75 | f | | | | 54 | 54 | 4.2+ | 2 | 2 | DA/RT/CP/RA | |
| Cranberry | 29-Oct | 69 | m | | | | 55 | 55 | 3.2+ | 2 | 2 | DA/RT/CP/RA | |
| Cranberry | 29-Oct | 87 | m | | | | 56 | 56 | 3.3+ | 2 | 2 | DA/RT/CP/RA | |
| Cranberry | 29-Oct | 77 | f | | | | 57 | 57 | 4.2+ | 2 | 2 | DA/RT/CP/RA | |
| Cranberry | 29-Oct | 73.5 | f | | | | 58 | 58 | 4.2+ | d/s Kiteen | 1 | DA/RT/CP/RA | tail damage, |
| Cranberry | 29-Oct | 86 | f | | | | 59 | 59 | R.2S1S1+ | d/s Kiteen | 1 | DA/RT/CP/RA | nose damage |
| Cranberry | 29-Oct | 75 | m | | | | 60 | 60 | 3.2+ | d/s Kiteen | 1 | DA/RT/CP/RA | |
| Cranberry | 29-Oct | 77 | f | | | | 61 | 61 | 3.2+ | d/s Kiteen | 1 | DA/RT/CP/RA | tail damage, |
| Cranberry | 29-Oct | 72 | f | | | | 62 | 62 | 3.2+ | d/s Kiteen | 1 | DA/RT/CP/RA | predator scar |
| Cranberry | 29-Oct | 75 | m | Orange | N | 6979 | NA | NA | 4.2+ | d/s Kiteen | 1 | DA/RT/CP/RA | Orange N6979, operculum damage |
| Cranberry | 29-Oct | 78 | f | | | | 64 | 64 | 4.2+ | d/s Kiteen | 1 | DA/RT/CP/RA | clean |
| Cranberry | 29-Oct | 78 | f | | | | 65 | 65 | 3.2+ | d/s Kiteen | 1 | DA/RT/CP/RA | anal fin rays missing, killed for fecundity sample |
| Cranberry | 29-Oct | 89 | f | | | | 66 | 66 | 3.2S1+ | d/s Kiteen | 1 | DA/RT/CP/RA | predator scars, big female |
| Cranberry | 29-Oct | 73 | f | | | | 67 | 67 | 3.2+ | d/s Kiteen | 1 | DA/RT/CP/RA | predator scars (caudal), previously sampled-not tag puncture scar |
| Cranberry | 29-Oct | 75 | f | | | | 68 | 68 | 3.1S1+ | d/s Kiteen | 1 | DA/RT/CP/RA | clean |
| Cranberry | 29-Oct | 79 | f | | | | 69 | 69 | 4.1S1+ | d/s Kiteen | 1 | DA/RT/CP/RA | predator scars, chrome |
| Cranberry | 29-Oct | 48 | f | White | | 8597 | NA | NA | 4.1+ | d/s Kiteen | 1 | DA/RT/CP/RA | White 8597 ovary sample, already sampled |
| Cranberry | 29-Oct | 73 | f | | | | 71 | 71 | 3.2+ | d/s Kiteen | 1 | DA/RT/CP/RA | head wound, pectoral fin damage |
| Cranberry | 29-Oct | 59 | f | | | | 72 | 72 | 3.1+ | d/s Kiteen | 1 | DA/RT/CP/RA | predator scars |
| Cranberry | 29-Oct | 84.5 | f | | | | 73 | 73 | 3.2S1+ | d/s Kiteen | 1 | DA/RT/CP/RA | caudal fin erosion |
| Cranberry | 29-Oct | 75 | f | | | | 74 | 74 | R.2+ | d/s Kiteen | 1 | DA/RT/CP/RA | predator scars, scrape on head |
| Cranberry | 29-Oct | 70 | f | | | | 75 | 75 | 4.2+ | d/s Kiteen | 1 | DA/RT/CP/RA | net marks |
| Cranberry | 29-Oct | 79 | m | | | | 76 | 76 | 3.2+ | d/s Kiteen | 1 | DA/RT/CP/RA | |
| Cranberry | 29-Oct | 82 | m | | | | 77 | 77 | 3.2+ | d/s Kiteen | 1 | DA/RT/CP/RA | net marks |
| Cranberry | 29-Oct | 63.5 | m | White | | 8584 | NA | NA | 3.1+ | d/s Kiteen | 1 | DA/RT/CP/RA | White 8584, predator scar on caudal fin, already sampled |
| Cranberry | 29-Oct | 78 | f | | | | 79 | 79 | 3.3+ | d/s Kiteen | 1 | DA/RT/CP/RA | hook scar, predator scar |
| Cranberry | 20-Nov | 72.5 | f | | | | 80 | 80 | 4.2+ | 6 | 3 | RT/CP | spotless |
| Cranberry | 20-Nov | 74 | f | | | | 81 | 81 | 4.1S1+ | 6 | 3 | RT/CP | |
| Cranberry | 20-Nov | 64 | m | | | | 82 | 82 | 4.1+ | 6 | 3 | RT/CP | |
| Cranberry | 20-Nov | 73.5 | m | | | | 83 | 83 | 3.2+ | 7 | 3 | RT/CP | |
| Cranberry | 20-Nov | 66 | f | | | | 84 | 84 | 3.2+ | 7 | 3 | RT/CP | hook in roof of mouth, cut hook |
| Cranberry | 20-Nov | 61 | m | | | | 85 | 85 | R.1+ | 7 | 3 | RT/CP | |
| Cranberry | 20-Nov | 74 | m | | | | 86 | 86 | 3.2+ | 7 | 3 | RT/CP | |
| Cranberry | 20-Nov | 63 | m | | | | 87 | 87 | R.1+ | 6 | 3 | RT/CP | |

| River | Date | Length (cm) | Sex | Tag Colour | Tag Letter | Tag Number | DNA Number | Scale Number | Age | Section | Reach | Samplers | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cranberry | 20-Nov | 89 | f | | | | 88 | 88 | 3.3+ | 6 | 3 | RT/CP | |
| Cranberry | 20-Nov | 74 | m | | | | 89 | 89 | 4.2+ | 6 | 3 | RT/CP | |
| Cranberry | 20-Nov | 69 | f | | | | 90 | 90 | 3.2+ | 6 | 3 | RT/CP | |
| Cranberry | 20-Nov | 74 | m | | | | 91 | 91 | U.2+ | 6 | 3 | RT/CP | net marks |
| Cranberry | 20-Nov | 70 | f | | | | 92 | 92 | R.2+ | 6 | 3 | RT/CP | net marks |
| Cranberry | 20-Nov | 70 | f | | | | 93 | 93 | 3.2+ | 6 | 3 | RT/CP | |
| Cranberry | 20-Nov | 60 | m | | | | 94 | 94 | 4.1+ | 6 | 3 | RT/CP | white mark on dorsal |
| Cranberry | 20-Nov | 61 | m | | | | 95 | 95 | 3.1+ | 6 | 3 | RT/CP | |
| Cranberry | 20-Nov | 76 | f | | | | 96 | 96 | R.2+ | 6 | 3 | RT/CP | gillnet marks |
| Cranberry | 20-Nov | 60 | f | | | | 97 | 97 | 4.1+ | 6 | 3 | RT/CP | |
| Cranberry | 20-Nov | 69.5 | f | | | | 98 | 98 | 3.2+ | 6 | 3 | RT/CP | gillnet marks |
| Cranberry | 20-Nov | 57.5 | f | | | | 99 | 99 | 3.1+ | 6 | 3 | RT/CP | predator scar |
| Cranberry | 20-Nov | 76.5 | f | Orange | N | 6836 | 100 | 100 | 3.3+ | 2 | 2 | MB/PG | Orange N6836, clean, hook in eye |
| Cranberry | 20-Nov | 76.5 | f | White | | 8481 | 101 | 101 | NA | d/s Kiteen | 1 | MB/PG | White 8481, nasty head scar, line marks, hook scar, huge adipose fin clip--almost all taken |
| Cranberry | 20-Nov | 54.5 | m | White | | 8532 | 102 | 102 | R.1+ | d/s Kiteen | 1 | MB/PG | White 8532, clean |
| Cranberry | 20-Nov | 84 | m | | | | 103 | 103 | 4.1S1+ | d/s Kiteen | 1 | MB/PG | clean |
| Cranberry | 20-Nov | 61 | m | | | | 104 | 104 | 3.1+ | d/s Kiteen | 1 | MB/PG | gillnet marks |
| Cranberry | 20-Nov | 84 | m | | | | 105 | 105 | R.2+ | d/s Kiteen | 1 | MB/PG | clean |
| Cranberry | 20-Nov | 73.5 | f | | | | 106 | 106 | 3.2+ | d/s Kiteen | 1 | MB/PG | clean, minor head wound |
| Cranberry | 20-Nov | 70 | f | | | | 107 | 107 | 3.2+ | d/s Kiteen | 1 | MB/PG | |
| Cranberry | 20-Nov | 70 | f | | | | 108 | 108 | 3.2+ | d/s Kiteen | 1 | MB/PG | gillnet marks |
| Cranberry | 20-Nov | 71 | f | | | | 109 | 109 | 3.2+ | d/s Kiteen | 1 | MB/PG | clean |
| Cranberry | 20-Nov | 64 | m | | | | 110 | 110 | 3.1+ | d/s Kiteen | 1 | MB/PG | net marks, bite out of caudal fin |
| Cranberry | 20-Nov | 72 | f | | | | 111 | 111 | 3.2+ | d/s Kiteen | 1 | MB/PG | predator scar, 1/3 of caudal missing, gillnet marks |
| Cranberry | 20-Nov | 80 | f | | | | 112 | 112 | 4.2S1+ | d/s Kiteen | 1 | MB/PG | |
| Cranberry | 20-Nov | 80.5 | m | | | | 113 | 113 | 4.2+ | d/s Kiteen | 1 | MB/PG | clean |
| Meziadin | 26-Aug | 71 | f | | | | 1 | 43701 | R.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 3-Sep | 75.5 | f | | | | 2 | 43701 | 4.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 6-Sep | 72 | f | | | | 3 | 43701 | 4.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 7-Sep | 77 | m | | | | 4 | 43701 | R.1S1+ | Fishway | | LGL Ltd. | |
| Meziadin | 11-Sep | 59.5 | f | | | | 5 | 43701 | 3.1+ | Fishway | | LGL Ltd. | |
| Meziadin | 11-Sep | 74 | f | | | | 6 | 43701 | 3.2S1+ | Fishway | | LGL Ltd. | |
| Meziadin | 11-Sep | 71 | f | | | | 7 | 43701 | 4.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 13-Sep | 77 | f | | | | 8 | 43701 | 4.1S1+ | Fishway | | LGL Ltd. | |
| Meziadin | 15-Sep | 87 | f | | | | 9 | 43701 | 4.2S1+ | Fishway | | LGL Ltd. | |
| Meziadin | 18-Sep | 82 | m | | | | 10 | 43701 | NA | Fishway | | LGL Ltd. | |
| Meziadin | 18-Sep | 69.5 | f | | | | 11 | 43742 | 3.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 25-Sep | 69 | m | Orange | N | 6632/6633 | NA | 43742 | 3.1S1+ | Fishway | | LGL Ltd. | |
| Meziadin | 3-Oct | 71 | f | | | | 12 | 43742 | 3.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 3-Oct | 74 | m | | | | 13 | 43742 | 3.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 5-Oct | 65.5 | f | | | | 14 | 43742 | R.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 5-Oct | 53.5 | f | | | | 15 | 43742 | 3.1+ | Fishway | | LGL Ltd. | |
| Meziadin | 5-Oct | 69 | f | | | | 16 | 43742 | 3.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 6-Oct | 97.5 | f | | | | 17 | 43742 | 4.4+ | Fishway | | LGL Ltd. | |
| Meziadin | 6-Oct | 55.5 | m | | | | 18 | 43742 | 4.1+ | Fishway | | LGL Ltd. | |

| River | Date | Length (cm) | Sex | Tag Colour | Tag Letter | Tag Number | DNA Number | Scale Number | Age | Section | Reach | Samplers | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Meziadin | 6-Oct | 76 | f | | | | 19 | 43742 | 4.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 9-Oct | 56 | f | | | | 20 | 70689 | R.1+ | Fishway | | LGL Ltd. | |
| Meziadin | 9-Oct | 69 | f | | | | 21 | 70689 | 3.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 12-Oct | 57 | f | | | | 22 | 70689 | 3.1+ | Fishway | | LGL Ltd. | |
| Meziadin | 12-Oct | 65 | f | | | | 23 | 70689 | 3.1+ | Fishway | | LGL Ltd. | |
| Meziadin | 13-Oct | 67.5 | f | | | | 24 | 70689 | 3.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 14-Oct | 83.5 | m | | | | 25 | 70689 | 3.3+ | Fishway | | LGL Ltd. | |
| Meziadin | 14-Oct | 68 | f | | | | 26 | 70689 | 3.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 15-Oct | 59 | m | | | | 27 | 70689 | 5.1+ | Fishway | | LGL Ltd. | |
| Meziadin | 17-Oct | 68 | f | | | | 28 | 70689 | 3.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 17-Oct | 80 | m | | | | 29 | 70689 | 5.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 19-Oct | 60 | f | | | | 30 | 84737 | 3.1+ | Fishway | | LGL Ltd. | |
| Meziadin | 20-Oct | 89 | f | | | | 31 | 84737 | 3.2S1+ | Fishway | | LGL Ltd. | |
| Meziadin | 21-Oct | 77 | m | | | | 32 | 84737 | 3.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 21-Oct | 75 | m | | | | 33 | 84737 | 5.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 19-Sep | 76.5 | f | Orange | N | 6237 | | | NA | Fishway | | LGL Ltd. | |
| Meziadin | 19-Sep | 56 | m | Orange | N | 6897 | | | 3.1+ | Fishway | | LGL Ltd. | |
| Meziadin | 15-Oct | 63 | f | Orange | N | 6974 | | | 4.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 29-Sep | 62 | f | Orange | N | 6981 | | | 4.2+ | Fishway | | LGL Ltd. | |
| Meziadin | 6-Oct | 70 | f | | | | 34 | 34 | 3.2+ | lake outlet | | RT/CP | head wound |
| Meziadin | 6-Oct | 72 | m | | | | 35 | 35 | 4.1S1+ | halfway | | RT/CP | GN marks, chin wound |
| Meziadin | 6-Oct | 64 | m | | | | 36 | 36 | 4.1+ | bridge | | RT/CP | good |
| Meziadin | 6-Oct | 100 | f | | | | 37 | 37 | 3.3+ | halfway | | RT/CP | rt. pectoral. fin damage, hook scar |
| Meziadin | 6-Oct | 73 | f | | | | 38 | 38 | 4.2+ | bridge | | RT/CP | scrape on head, predator. scar |
| Meziadin | 7-Oct | 75.5 | m | | | | 39 | 39 | R.2+ | lake outlet | | RT/CP | predator. scar |
| Meziadin | 22-Oct | 69.5 | f | | | | 40 | 40 | 4.2+ | bridge | | MB/PG | predator. scar |
| Meziadin | 22-Oct | 72 | f | | | | 41 | 41 | 3.2+ | bridge | | MB/PG | |
| Nass/Dam | 4-Nov | 72 | f | | | | 1 | 1 | 3.2+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | 65 | m | | | | 2 | 2 | 4.1+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | 72 | f | | | | 3 | 3 | 4.2+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | 70 | f | | | | 4 | 4 | 3.2+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | 63 | m | | | | 5 | 5 | 4.1+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | 62.5 | f | | | | 6 | 6 | 4.1+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | 77 | f | | | | 7 | 7 | 3.2+ | 1 | | DA/RT/CP | gillnet marks |
| Nass/Dam | 4-Nov | 56 | f | | | | 8 | 8 | 5.1+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | 68 | f | | | | 9 | 9 | 3.2+ | 1 | | DA/RT/CP | gillnet marks |
| Nass/Dam | 4-Nov | 57 | f | | | | 10 | 10 | 4.1+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | est80 | m | | | | 11 | 11 | 4.2+ | 1 | | DA/RT/CP | caudal, damage, not recorded |
| Nass/Dam | 4-Nov | 70.5 | f | | | | 12 | 12 | 4.2+ | 1 | | DA/RT/CP | predator scars, operculum damage |
| Nass/Dam | 4-Nov | 84.5 | f | | | | 13 | 13 | 4.3+ | 1 | | DA/RT/CP | predator scars |
| Nass/Dam | 4-Nov | 79 | m | | | | 14 | 14 | 3.2+ | 1 | | DA/RT/CP | hook scar, predator. scar, nose rub |
| Nass/Dam | 4-Nov | 55 | f | | | | 15 | 15 | 4.1+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | 79.5 | f | | | | 16 | 16 | 4.2+ | 1 | | DA/RT/CP | rub, divot on head |
| Nass/Dam | 4-Nov | 82 | m | | | | 17 | 17 | 3.2+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | 77 | f | | | | 19 | 19 | 3.2+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | 75 | f | | | | 20 | 20 | 4.2+ | 1 | | DA/RT/CP | predator scars |
| Nass/Dam | 4-Nov | 72 | f | | | | 21 | 21 | R.2+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | 73 | f | | | | 22 | 22 | 3.2+ | 1 | | DA/RT/CP | |

| River | Date | Length (cm) | Sex | Tag Colour | Tag Letter | Tag Number | DNA Number | Scale Number | Age | Section | Reach | Samplers | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nass/Dam | 4-Nov | 72 | f | | | | 23 | 23 | 3.2+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | 63 | m | | | | 24 | 24 | 3.1+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | 70 | f | | | | 25 | 25 | 3.2+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | 74 | f | | | | 26 | 26 | 3.2+ | 1 | | DA/RT/CP | |
| Nass/Dam | 4-Nov | 71 | f | Orange | N | 6616 | NA | NA | 3.2+ | 1 | | DA/RT/CP | divot on head, N6616, already sampled |
| Damdochax | 2-Nov | 73.5 | f | | | | 1 | 1 | 4.2+ | 1 | | DA/RT/CP | |
| Damdochax | 2-Nov | 65 | f | | | | 2 | 2 | 4.1+ | 1 | | DA/RT/CP | |
| Damdochax | 2-Nov | 73 | f | | | | 3 | 3 | R.2+ | 1 | | DA/RT/CP | anal fin damage |
| Damdochax | 2-Nov | 80 | m | | | | 4 | 4 | 3.3+ | 1 | | DA/RT/CP | |
| Damdochax | 2-Nov | 86.5 | m | | | | 5 | 5 | 3.2+ | 1 | | DA/RT/CP | hook scars |
| Damdochax | 2-Nov | 83 | f | | | | 6 | 6 | 4.2S1+ | 1 | | DA/RT/CP | gillnet marks, >3 hook scars |
| Damdochax | 2-Nov | 73.5 | m | | | | 7 | 7 | 3.2+ | 1 | | DA/RT/CP | hook scars |
| Damdochax | 2-Nov | 73 | m | | | | 8 | 8 | 3.2+ | 1 | | DA/RT/CP | hook scar, lower caudal fin eroded |
| Damdochax | 2-Nov | 78 | f | | | | 9 | 9 | 3.2+ | 1 | | DA/RT/CP | predator scars |
| Damdochax | 2-Nov | 84 | m | | | | 10 | 10 | U.2S1+ | 1 | | DA/RT/CP | hook wound/scar |
| Damdochax | 2-Nov | 74 | f | | | | 11 | 11 | 4.2+ | 1 | | DA/RT/CP | predator scar |
| Damdochax | 2-Nov | 69.5 | f | | | | 12 | 12 | 4.2+ | 1 | | DA/RT/CP | |
| Damdochax | 2-Nov | 70 | f | Orange | N | 6784 | NA | NA | 4.2+ | 1 | | DA/RT/CP | line marks, N6784, already sampled |
| Damdochax | 2-Nov | 82 | f | | | | 14 | 14 | 4.3+ | 1 | | DA/RT/CP | lateral predator scars |
| Damdochax | 2-Nov | 56 | f | | | | 15 | 15 | 3.1+ | 1 | | DA/RT/CP | clean |
| Damdochax | 2-Nov | 72 | f | | | | 16 | 16 | 4.2+ | 1 | | DA/RT/CP | |
| Damdochax | 2-Nov | 62 | f | | | | 17 | 17 | 4.2+ | 1 | | DA/RT/CP | |
| Damdochax | 2-Nov | 76 | m | | | | 18 | 18 | 5.3+ | 1 | | DA/RT/CP | hook scar |
| Damdochax | 2-Nov | 77 | f | | | | 19 | 19 | 3.2+ | 1 | | DA/RT/CP | caudal fin damage, hook scar |
| Damdochax | 2-Nov | 87 | f | | | | 20 | 20 | 3.3+ | 1 | | DA/RT/CP | tail damage |
| Damdochax | 2-Nov | 85 | m | | | | 21 | 21 | 4.3+ | 1 | | DA/RT/CP | hook scars |
| Damdochax | 2-Nov | 77 | f | | | | 22 | 22 | 3.2+ | 1 | | DA/RT/CP | |
| Damdochax | 2-Nov | 80 | m | | | | 23 | 23 | 3.2+ | 1 | | DA/RT/CP | |
| Damdochax | 2-Nov | 69 | f | | | | 24 | 24 | 3.2+ | 1 | | DA/RT/CP | |
| Damdochax | 2-Nov | 90 | f | | | | 25 | 25 | 3.2S1S1+ | 1 | | DA/RT/CP | tail damage |
| Damdochax | 2-Nov | 62 | m | | | | 26 | 26 | 4.1+ | 1 | | DA/RT/CP | |
| Damdochax | 2-Nov | 76 | f | | | | 27 | 27 | 4.2+ | 1 | | DA/RT/CP | gillnet marks |
| Damdochax | 3-Nov | 87 | m | | | | 28 | 28 | 4.4+ | 2 | | DA/RT/CP | nose damage |
| Damdochax | 3-Nov | 72 | f | | | | 29 | 29 | 4.2+ | 2 | | DA/RT/CP | |
| Damdochax | 3-Nov | 64 | m | | | | 30 | 30 | 3.1+ | 2 | | DA/RT/CP | |
| Damdochax | 3-Nov | 76 | m | | | | 31 | 31 | 3.2+ | 2 | | DA/RT/CP | dorsal fin damage |
| Damdochax | 3-Nov | 61 | m | | | | 32 | 32 | 3.1+ | 2 | | DA/RT/CP | |
| Damdochax | 3-Nov | 82 | m | | | | 33 | 33 | 4.3+ | 2 | | DA/RT/CP | scar on tail |
| Damdochax | 3-Nov | 79 | m | | | | 34 | 34 | 3.2+ | 2 | | DA/RT/CP | |
| Damdochax | 3-Nov | 77 | f | | | | 35 | 35 | 4.2+ | 2 | | DA/RT/CP | |
| Damdochax | 3-Nov | 76 | f | | | | 36 | 36 | 4.3+ | 2 | | DA/RT/CP | |
| Damdochax | 3-Nov | 82 | m | | | | 37 | 37 | 4.2+ | 2 | | DA/RT/CP | found dead, photos of carcass |
| Damdochax | 3-Nov | 80 | m | | | | 38 | 38 | 3.2+ | 2 | | DA/RT/CP | |
| Damdochax | 3-Nov | 89 | m | | | | 39 | 39 | 3.2S1+ | 2 | | DA/RT/CP | |
| Damdochax | 3-Nov | 73.5 | f | | | | 40 | 40 | 3.2+ | 2 | | DA/RT/CP | |
| Damdochax | 3-Nov | 75.5 | f | | | | 41 | 41 | 3.2+ | 2 | | DA/RT/CP | |
| Damdochax | 3-Nov | 75.5 | f | | | | 42 | 42 | 3.2+ | 2 | | DA/RT/CP | scrape on operculum |
| Damdochax | 3-Nov | 80 | m | | | | 43 | 43 | 3.3+ | 2 | | DA/RT/CP | |

| River | Date | Length (cm) | Sex | Tag Colour | Tag Letter | Tag Number | DNA Number | Scale Number | Age | Section | Reach | Samplers | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Damdochax | 3-Nov | 79 | f | | | | 44 | 44 | 3.2+ | 2 | | DA/RT/CP | hook scars |
| Damdochax | 3-Nov | 76.5 | f | | | | 45 | 45 | 4.2+ | 2 | | DA/RT/CP | hook scars |
| Damdochax | 3-Nov | 60.5 | m | | | | 46 | 46 | 3.1+ | 2 | | DA/RT/CP | predator scars, hook in gill arch, little blood |
| Damdochax | 3-Nov | 73.5 | f | | | | 47 | 47 | 4.2+ | 2 | | DA/RT/CP | hook scar, scrape on operculum |
| Damdochax | 3-Nov | 73 | f | | | | 48 | 48 | 3.2+ | 2 | | DA/RT/CP | hook scar, predator scar |
| Damdochax | 3-Nov | 77.5 | f | | | | 49 | 49 | 4.3+ | 2 | | DA/RT/CP | |
| Damdochax | 3-Nov | 62 | m | | | | 50 | 50 | 4.1+ | 2 | | DA/RT/CP | |
| Damdochax | 3-Nov | 73 | f | | | | 51 | 51 | 4.2+ | 2 | | DA/RT/CP | hook scar |
| Damdochax | 3-Nov | 76 | f | | | | 52 | 52 | 3.2+ | 2 | | DA/RT/CP | |
| Damdochax | 3-Nov | 66.5 | f | | | | 53 | 53 | 3.2+ | 2 | | DA/RT/CP | |
| Damdochax | 3-Nov | 73 | f | | | | 54 | 54 | 3.2+ | 2 | | DA/RT/CP | puff of blood |
| Damdochax | 3-Nov | 82 | m | | | | 55 | 55 | 3.2+ | 2 | | DA/RT/CP | hook scars |
| Damdochax | 3-Nov | 60.5 | m | | | | 56 | 56 | 4.1+ | 2 | | DA/RT/CP | hook scar, predator scar |
| Damdochax | 4-Nov | 73.5 | f | | | | 57 | 57 | 4.2+ | 2 | | DA/RT/CP | predator scars |
| Damdochax | 4-Nov | 85 | f | | | | 58 | 58 | 3.2S1+ | 2 | | DA/RT/CP | predator. scars, hook scars, major scale loss |
| Damdochax | 4-Nov | 81 | f | Orange | N | 6570 | NA | NA | 3.2+ | 2 | | DA/RT/CP | N6570, hook scar, anal fin damage |
| Damdochax | 4-Nov | 73 | f | | | | 60 | 60 | 3.2+ | 2 | | DA/RT/CP | |
| Damdochax | 4-Nov | 67.5 | f | | | | 61 | 61 | 3.2+ | 2 | | DA/RT/CP | gillnet marks |
| Damdochax | 4-Nov | 71 | f | | | | 62 | 62 | 4.2+ | 2 | | DA/RT/CP | pectoral fin damage |
| Damdochax | 4-Nov | 79 | m | | | | 63 | 63 | 3.2+ | 2 | | DA/RT/CP | |
| Bell-Irving | 23-Oct | 84 | m | | | | 1 | 1 | 3.2+ | Oweegee | | CP/KM | diseased, photos |
| Bell-Irving | 23-Oct | 75 | f | | | | 2 | 2 | 4.2+ | Oweegee | | CP/KM | head wound |
| Bell-Irving | 23-Oct | 72 | f | | | | 3 | 3 | 3.2+ | Oweegee | | CP/KM | predator scar |
| Bell-Irving | 23-Oct | 68 | f | | | | 4 | 4 | 3.2+ | Oweegee | | CP/KM | 2 red spots on side |
| Bell-Irving | 23-Oct | 70.5 | f | | | | 5 | 5 | 4.2+ | Oweegee | | CP/KM | some blood, hooked on roof of mouth |
| Bell-Irving | 23-Oct | 57 | m | | | | 6 | 6 | 3.1+ | Oweegee | | CP/KM | hook in eye slightly, removed |
| Bell-Irving | 27-Oct | 62 | f | | | | 7 | 7 | 3.1+ | Teigen | | RT/SH | |
| Bell-Irving | 27-Oct | 69 | f | | | | 8 | 8 | 3.2+ | Teigen | | RT/SH | |
| Bell-Irving | 27-Oct | 68 | f | | | | 9 | 9 | 3.2+ | Teigen | | RT/SH | net scar |
| Bell-Irving | 27-Oct | 65 | f | | | | 10 | 10 | 3.2+ | Teigen | | RT/SH | |
| Bell-Irving | 27-Oct | 72 | m | | | | 11 | 11 | 3.2+ | Teigen | | RT/SH | |
| Bell-Irving | 27-Oct | 63 | f | Orange | N | 6487 | NA | NA | R.2+ | Teigen | | RT/SH | Orange N6487 |
| Bell-Irving | 27-Oct | 64 | m | | | | 13 | 13 | 4.1+ | Teigen | | RT/SH | net scars |
| Bell-Irving | 27-Oct | 73 | f | | | | 14 | 14 | 3.2+ | Teigen | | RT/SH | |
| Bell-Irving | 27-Oct | 68 | f | | | | 15 | 15 | 3.2+ | Teigen | | RT/SH | |
| Bell-Irving | 27-Oct | 55 | m | | | | 16 | 16 | 3.1+ | Teigen | | RT/SH | |
| Bell-Irving | 27-Oct | 76 | m | | | | 17 | 17 | 3.2+ | Teigen | | RT/SH | nose damage |
| Bell-Irving | 27-Oct | 58 | m | | | | 18 | 18 | 3.1+ | Teigen | | RT/SH | |
| Bell-Irving | 27-Oct | 62 | m | | | | 19 | 19 | 3.1+ | Teigen | | RT/SH | |
| Bell-Irving | 27-Oct | 55 | f | | | | 20 | 20 | 4.1+ | Teigen | | RT/SH | good |
| Bell-Irving | 27-Oct | 60 | f | | | | 21 | 21 | 4.1+ | Oweegee | | MB/CP | predator scar |
| Bell-Irving | 27-Oct | 54.5 | f | | | | 22 | 22 | 3.1+ | Oweegee | | MB/CP | |
| Bell-Irving | 27-Oct | 66 | f | | | | 23 | 23 | 3.2+ | Oweegee | | MB/CP | gillnet marks, predator scar |
| Bell-Irving | 27-Oct | 78 | f | | | | 24 | 24 | 4.2+ | Oweegee | | MB/CP | |
| Bell-Irving | 27-Oct | 69 | f | | | | 25 | 25 | 3.2+ | Oweegee | | MB/CP | clean, some blood from nose |
| Bell-Irving | 27-Oct | 56 | m | | | | 26 | 26 | R.1+ | Oweegee | | MB/CP | clean |
| Bell-Irving | 6-Nov | 55.5 | m | | | | 27 | 27 | R.1+ | Oweegee | | DA/CP/DA | predator scar |
| Bell-Irving | 6-Nov | 72 | m | | | | 28 | 28 | 3.2+ | Oweegee | | DA/CP/DA | hook scar |

| River | Date | Length (cm) | Sex | Tag Colour | Tag Letter | Tag Number | DNA Number | Scale Number | Age | Section | Reach | Samplers | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bell-Irving | 6-Nov | 78 | m | | | | 29 | 29 | 3.2+ | Oweegee | | DA/CP/DA | big spots |
| Bell-Irving | 6-Nov | 65 | m | | | | 30 | 30 | 4.1+ | Oweegee | | DA/CP/DA | gillnet marks |
| Bell-Irving | 6-Nov | 57 | m | Orange | N | 6590 | NA | NA | 3.1+ | Oweegee | | DA/CP/DA | Orange N6590 |
| Bell-Irving | 6-Nov | 74 | f | | | | 32 | 32 | R.2+ | Oweegee | | DA/CP/DA | gillnet marks |
| Bell-Irving | 6-Nov | 49.5 | m | White | | 8358 | NA | NA | 3.1+ | Oweegee | | DA/CP/DA | White 8358, predator scar |
| Bell-Irving | 6-Nov | 71 | f | | | | 34 | 34 | 3.2+ | Oweegee | | DA/CP/DA | few spots, skin ulcer?, predator. scar |
| Bell-Irving | 6-Nov | 72 | f | | | | 35 | 35 | 3.2+ | Oweegee | | DA/CP/DA | scale loss evident |
| Bell-Irving | 6-Nov | 76 | m | | | | 36 | 36 | 3.2+ | Oweegee | | DA/CP/DA | minor predator scarring |
| Bell-Irving | 6-Nov | 69 | f | | | | 37 | 37 | 3.2+ | Oweegee | | DA/CP/DA | killed for ovary samples |
| Bell-Irving | 6-Nov | 60.5 | m | | | | 38 | 38 | 3.1+ | Oweegee | | DA/CP/DA | |
| Bell-Irving | 6-Nov | 62 | m | | | | 39 | 39 | 3.1+ | Oweegee | | DA/CP/DA | hook scar, damaged dorsal and caudal |
| Bell-Irving | 6-Nov | 87 | m | | | | 40 | 40 | 3.3+ | Oweegee | | DA/CP/DA | predator scar |
| Bell-Irving | 6-Nov | 75 | f | | | | 41 | 41 | 3.2S1+ | Oweegee | | DA/CP/DA | |
| Bell-Irving | 6-Nov | 84 | f | | | | 42 | 42 | 5.2S1+ | Oweegee | | DA/CP/DA | |
| Bell-Irving | 6-Nov | 74.5 | f | | | | 43 | 43 | 4.2+ | Oweegee | | DA/CP/DA | gillnet marks |
| Bell-Irving | 6-Nov | 73 | m | | | | 44 | 44 | 3.2+ | Oweegee | | DA/CP/DA | bad gillnet marks, photo #17 |
| Bell-Irving | 6-Nov | 92 | m | | | | 45 | 45 | 3.2S1+ | Oweegee | | DA/CP/DA | |
| Bell-Irving | 6-Nov | 93 | m | | | | 46 | 46 | 3.4+ | Oweegee | | DA/CP/DA | gillnet marks |
| Bell-Irving | 6-Nov | 80.5 | f | | | | 47 | 47 | 3.3+ | Oweegee | | DA/CP/DA | small predator scars |
| Bell-Irving | 6-Nov | 78 | m | | | | 48 | 48 | 4.2+ | Oweegee | | DA/CP/DA | |
| Bell-Irving | 6-Nov | 57 | m | | | | 49 | 49 | 3.1+ | Oweegee | | DA/CP/DA | predator scar |
| Bell-Irving | 6-Nov | 78.5 | m | | | | 50 | 50 | 3.2+ | Oweegee | | DA/CP/DA | |
| Bell-Irving | 6-Nov | 91.5 | m | | | | 51 | 51 | 3.2S1+ | Oweegee | | DA/CP/DA | nose scar |
| Bell-Irving | 6-Nov | 69 | f | | | | 52 | 52 | 4.2+ | Teigen | | DA/CP/DA | |
| Bell-Irving | 6-Nov | 79 | m | | | | 53 | 53 | 3.3+ | Teigen | | DA/CP/DA | head divot |
| Bell-Irving | 6-Nov | 75 | m | | | | 54 | 54 | 3.2+ | Teigen | | DA/CP/DA | |
| Bell-Irving | 6-Nov | 62.5 | m | | | | 55 | 55 | 3.1+ | Teigen | | DA/CP/DA | head wound |
| Bell-Irving | 6-Nov | 67 | f | | | | 56 | 56 | 3.2+ | Teigen | | DA/CP/DA | deep hook, GN marks, killed for ovary sample |
| Bell-Irving | 6-Nov | 55 | m | | | | 57 | 57 | 3.1+ | Teigen | | DA/CP/DA | |
| Bell-Irving | 6-Nov | 54.5 | f | | | | 58 | 58 | 4.1+ | Teigen | | DA/CP/DA | nose divot, deep hook, killed for ovary sample |
| Bell-Irving | 6-Nov | 60 | m | | | | 59 | 59 | 4.1+ | Teigen | | DA/CP/DA | |
| Bell-Irving | 6-Nov | 56 | m | | | | 60 | 60 | R.1+ | Teigen | | DA/CP/DA | head divot, gillnet marks |
| Bell-Irving | 6-Nov | 73.5 | f | | | | 61 | 61 | 2.2+ | Teigen | | DA/CP/DA | divot on nose |
| Bell-Irving | 25-Nov | 62.5 | m | | | | 62 | 62 | 3.2+ | Oweegee | | DA/CP | |
| Bell-Irving | 25-Nov | 67 | m | | | | 63 | 63 | 4.1+ | Oweegee | | DA/CP | |
| Bell-Irving | 25-Nov | est 62/63 | m | | | | 64 | 64 | 4.1+ | Oweegee | | DA/CP | |
| Bell-Irving | 25-Nov | 66 | f | | | | 65 | 65 | 3.2+ | Oweegee | | DA/CP | |
| Bell-Irving | 25-Nov | 69 | f | | | | 66 | 66 | 4.2+ | Oweegee | | DA/CP | predator scar |
| Bell-Irving | 25-Nov | 77.5 | m | | | | 67 | 67 | 3.2+ | Oweegee | | DA/CP | |
| Bell-Irving | 25-Nov | 73 | f | | | | 68 | 68 | 3.2+ | Oweegee | | DA/CP | |
| Bell-Irving | 25-Nov | 71 | f | | | | 69 | 69 | 3.2+ | Oweegee | | DA/CP | predator scar |
| Bell-Irving | 25-Nov | 69.5 | f | | | | 70 | 70 | 3.2+ | Oweegee | | DA/CP | puff of blood |
| Bell-Irving | 25-Nov | 67 | f | | | | 71 | 71 | 3.2+ | Oweegee | | DA/CP | predator scar, killed for ovary sample |
| Bell-Irving | 25-Nov | 91 | m | | | | 72 | 72 | 3.3+ | Oweegee | | DA/CP | |
| Bell-Irving | 25-Nov | 80 | m | | | | 73 | 73 | 4.3+ | Oweegee | | DA/CP | damaged caudal fin |

| River | Date | Length (cm) | Sex | Tag Colour | Tag Letter | Tag Number | DNA Number | Scale Number | Age | Section | Reach | Samplers | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bell-Irving | 25-Nov | 71 | f | tag was lost | | | 74 | 74 | 3.2+ | Oweegee | | DA/CP | lost its tag, puncture wound, was unsampled |
| Bell-Irving | 25-Nov | 71 | m | | | | 75 | 75 | R.2+ | Oweegee | | DA/CP | scrape on head, infected/ulcer on side |
| Bell-Irving | 25-Nov | 87 | m | | | | 76 | 76 | 3.3+ | Oweegee | | DA/CP | eroded lower lobe of caudal, hook in tongue, cut hook, no blood |
| Bell-Irving | 25-Nov | 69 | f | | | | 77 | 77 | 4.2+ | Oweegee | | DA/CP | gillnet marks |
| Bell-Irving | 25-Nov | 77 | f | Orange | N | 6374 | 78 | 78 | 3.2S1+ | Oweegee | | DA/CP | Orange N6374, Adipose fin unsampled, appeared to be sampled for scales, scrape on head |
| Bell-Irving | 25-Nov | 85 | m | | | | 79 | 79 | 3.3+ | Oweegee | | DA/CP | |
| Bell-Irving | 25-Nov | 88.5 | m | | | | 80 | 80 | U.3+ | Oweegee | | DA/CP | predator scar |
| Bell-Irving | 25-Nov | 80.5 | f | | | | 81 | 81 | U.2S1+ | Oweegee | | DA/CP | |
| Bell-Irving | 25-Nov | 67.5 | f | | | | 82 | 82 | 3.2+ | Oweegee | | DA/CP | Killed for ovary sample, predator damage to caudal fin, lower lobe missing |
| Bell-Irving | 25-Nov | 58 | m | | | | 83 | 83 | 3.1+ | Oweegee | | DA/CP | |
| Bell-Irving | 25-Nov | 72 | m | | | | 84 | 84 | R.2+ | Oweegee | | DA/CP | |
| Bell-Irving | 25-Nov | 68.5 | f | | | | 85 | 85 | 2.2+ | Oweegee | | DA/CP | |
| Bell-Irving | 25-Nov | 72.5 | f | | | | 86 | 86 | 3.2+ | Oweegee | | DA/CP | |
| Bell-Irving | 25-Nov | 56 | m | | | | 87 | 87 | 3.1+ | Teigen | | RT/MB | |
| Bell-Irving | 25-Nov | 60.5 | m | | | | 88 | 88 | 3.1+ | Teigen | | RT/MB | net marks |
| Bell-Irving | 25-Nov | 58 | m | | | | 89 | 89 | 3.1+ | Teigen | | RT/MB | |
| Bell-Irving | 25-Nov | 73 | f | | | | 90 | 90 | 3.2+ | Teigen | | RT/MB | clean |
| Bell-Irving | 25-Nov | 61.5 | m | | | | 91 | 91 | 3.1+ | Teigen | | RT/MB | clean |
| Bell-Irving | 25-Nov | 54 | m | | | | 92 | 92 | 3.1+ | Teigen | | RT/MB | clean |
| Bell-Irving | 25-Nov | 48 | f | | | | 93 | 93 | NA | Teigen | | RT/MB | Old troller scar, much scale loss, no scales collected |
| Bell-Irving | 25-Nov | 60 | m | | | | 94 | 94 | 4.1+ | Teigen | | RT/MB | |
| Bell-Irving | 25-Nov | 53 | m | | | | 95 | 95 | 3.1+ | Teigen | | RT/MB | |
| Kwinageese | 14-Oct | 54 | m | | | | 1 | 1 | 3.1+ | site 2 | | PG/SH | wounded eye |
| Kwinageese | 14-Oct | 56 | m | | | | 2 | 2 | 4.1+ | site 2 | | PG/SH | |
| Kwinageese | 14-Oct | 78 | m | | | | 3 | 3 | 3.2+ | site 2 | | PG/SH | |
| Kwinageese | 14-Oct | 74 | m | | | | 4 | 4 | 3.2+ | site 2 | | PG/SH | |
| Kwinageese | 14-Oct | 74 | f | | | | 5 | 5 | 3.2+ | site 2 | | PG/SH | head scar |
| Kwinageese | 14-Oct | 76 | f | | | | 6 | 6 | R.2+ | site 2 | | PG/SH | |
| Kwinageese | 14-Oct | 74 | f | | | | 7 | 7 | 3.2+ | site 2 | | PG/SH | |
| Kwinageese | 14-Oct | 57 | f | | | | 8 | 8 | 3.1+ | site 2 | | PG/SH | deep hook, bleeding |
| Kwinageese | 14-Oct | 74 | f | | | | 9 | 9 | 3.2+ | site 2 | | PG/SH | head wound |
| Kwinageese | 14-Oct | 73 | m | | | | 10 | 10 | 3.2+ | site 2 | | PG/SH | |
| Kwinageese | 14-Oct | 71 | f | | | | 11 | 11 | 3.2+ | site 2 | | PG/SH | |
| Kwinageese | 14-Oct | 68 | f | | | | 12 | 12 | 3.2+ | site 2 | | PG/SH | |
| Kwinageese | 14-Oct | 74 | f | | | | 13 | 13 | 3.2+ | site 2 | | PG/SH | |
| Kwinageese | 14-Oct | 74 | f | | | | 14 | 14 | 3.2+ | site 2 | | PG/SH | nose scar |
| Kwinageese | 14-Oct | 87 | m | | | | 15 | 15 | 3.2+ | site 2 | | PG/SH | deep hook, bleeding |
| Kwinageese | 14-Oct | 74 | m | Orange | N | 6749 | NA | 16 | 4.2+ | site 2 | | PG/SH | Orange N06749, head wound, scars |
| Kwinageese | 14-Oct | 56 | f | White | | 8454 | NA | 17 | R.1S1+ | site 2 | | PG/SH | White 08454, previously sampled |
| Kwinageese | 14-Oct | 57 | f | | | | 18 | 18 | 4.1+ | site 2 | | PG/SH | |
| Kwinageese | 14-Oct | 74 | f | | | | 19 | 19 | R.2+ | site 2 | | PG/SH | |
| Kwinageese | 14-Oct | 76 | f | | | | 20 | 20 | 3.2+ | site 3 | | DA/CP | head wound, photos |

| River | Date | Length (cm) | Sex | Tag Colour | Tag Letter | Tag Number | DNA Number | Scale Number | Age | Section | Reach | Samplers | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kwinageese | 14-Oct | 60 | m | | | | 21 | 21 | 3.1+ | site 3 | | DA/CP | clean |
| Kwinageese | 14-Oct | 65 | m | | | | 22 | 22 | 4.1+ | site 3 | | DA/CP | clean, deep hook, puff blood |
| Kwinageese | 14-Oct | 75 | f | | | | 23 | 23 | 3.2+ | site 3 | | DA/CP | troller hook scar |
| Kwinageese | 14-Oct | 75 | f | | | | 24 | 24 | R.2+ | site 3 | | DA/CP | deep hook, some blood |
| Kwinageese | 14-Oct | 78 | m | | | | 25 | 25 | 3.2+ | site 3 | | DA/CP | predator scar, photos |
| Kwinageese | 14-Oct | 60 | m | | | | 26 | 26 | 3.1+ | site 3 | | DA/CP | |
| Kwinageese | 14-Oct | 74 | f | | | | 27 | 27 | 3.2S1+ | site 3 | | DA/CP | predator scar |
| Kwinageese | 14-Oct | 60.5 | m | | | | 28 | 28 | 3.1+ | site 3 | | DA/CP | predator scar, scrape on operculum |
| Kwinageese | 14-Oct | 55 | m | | | | 29 | 29 | 3.1+ | site 3 | | DA/CP | predator scar |
| Kwinageese | 14-Oct | 74 | f | | | | 30 | 30 | 5.2+ | site 1 | | DA/CP | predator scar |
| Kwinageese | 14-Oct | 62 | m | | | | 31 | 31 | 3.1+ | site 1 | | DA/CP | predator scar |
| Kwinageese | 14-Oct | 58 | m | | | | 32 | 32 | 3.1+ | site 1 | | DA/CP | clean |
| Kwinageese | 14-Oct | 71 | f | | | | 33 | 33 | 3.2S1+ | site 1 | | DA/CP | head wound, predator scar, dorsal dmg |
| Kwinageese | 14-Oct | 74 | m | | | | 34 | 34 | 3.2+ | site 1 | | DA/CP | |
| Kwinageese | 14-Oct | 75 | f | | | | 35 | 35 | 4.2+ | site 1 | | DA/CP | rub on head, predator scar |
| Kwinageese | 14-Oct | 63 | f | | | | 36 | 36 | 4.1+ | site 1 | | DA/CP | |
| Kwinageese | 14-Oct | 80.5 | m | | | | 37 | 37 | R.2+ | site 1 | | DA/CP | predator scar |
| Kwinageese | 14-Oct | 72 | f | | | | 38 | 38 | 3.2+ | site 1 | | DA/CP | clean |
| Kwinageese | 14-Oct | 84 | m | | | | 39 | 39 | 3.2S1+ | site 1 | | DA/CP | clean |
| Kwinageese | 14-Oct | 75 | f | | | | 40 | 40 | 5.2+ | site 1 | | DA/CP | scrape on operculum |
| Kwinageese | 14-Oct | 61 | f | | | | 41 | 41 | 4.1+ | site 1 | | DA/CP | predator scar |
| Kwinageese | 14-Oct | 56 | m | | | | 42 | 42 | 3.1+ | site 1 | | DA/CP | spotless, clean |
| Kwinageese | 14-Oct | 81.5 | m | | | | 43 | 43 | 4.2+ | site 1 | | DA/CP | kype |
| Kwinageese | 14-Oct | 83 | m | | | | 44 | 44 | 3.2+ | site 1 | | DA/CP | daggertooth scar |
| Kwinageese | 14-Oct | 64 | f | | | | 45 | 45 | 4.1+ | site 1 | | DA/CP | head wound |
| Kwinageese | 3-Oct | 73 | f | | | | 46 | 46 | R.2+ | 1km d/s of bridge | | CP/KM | predator. scar, sm. scrape on head |
| Kwinageese | 3-Oct | 75 | f | | | | 47 | 47 | 4.2+ | 2.5 km d/s of bridge | | CP/KM | head wound |
| Kwinageese | 20-Oct | 69 | f | | | | 48 | 48 | 3.2+ | site 1 | | SH/CP | GN marks, hook in gill arch, removed, sm. amt. blood |
| Kwinageese | 20-Oct | 58 | m | Orange | N | 6824 | 49 | 49 | R.1+ | site 1 | | SH/CP | Orange N06824, already sampled |
| Kwinageese | 20-Oct | 70 | m | | | | 50 | 50 | 3.2+ | site 1 | | SH/CP | head scrape, troller scar |
| Kwinageese | 20-Oct | 89 | m | | | | 51 | 51 | 4.3+ | site 1 | | SH/CP | |
| Kwinageese | 20-Oct | 62 | m | | | | 52 | 52 | 3.1+ | site 1 | | SH/CP | hook in tongue, removed, no blood |
| Kwinageese | 20-Oct | 80 | f | | | | 53 | 53 | 3.3+ | site 1 | | SH/CP | head wound |
| Kwinageese | 20-Oct | 74 | f | | | | 54 | 54 | 3.2+ | site 1 | | SH/CP | hemorrhaged eye from rocks |
| Kwinageese | 20-Oct | 57 | m | | | | 55 | 55 | R.1+ | site 4 | | SH/CP | predator scar |
| Kwinageese | 20-Oct | 86 | m | | | | 56 | 56 | 3.3+ | site 4 | | SH/CP | head wound |
| Kwinageese | 20-Oct | 84 | m | | | | 57 | 57 | 3.3+ | site 4 | | SH/CP | hook scar |
| Kwinageese | 20-Oct | 74 | f | | | | 58 | 58 | R.2+ | site 4 | | SH/CP | scrapes on side of head, predator. scar |
| Kwinageese | 20-Oct | 77 | m | | | | 59 | 59 | 3.2+ | site 4 | | SH/CP | hook scar |
| Kwinageese | 20-Oct | 54 | f | | | | 60 | 60 | 4.1+ | site 5 | | SH/CP | predator scar |
| Kwinageese | 20-Oct | 75 | f | | | | 61 | 61 | 3.2+ | site 5 | | SH/CP | |
| Kwinageese | 20-Oct | 56.5 | m | | | | 62 | 62 | 3.1+ | site 1 | | SH/CP | |
| Kwinageese | 20-Oct | 58 | m | | | | 63 | 63 | 4.1+ | | | MB/PG | |
| Kwinageese | 20-Oct | 56 | f | | | | 64 | 64 | 3.1+ | | | MB/PG | |
| Kwinageese | 20-Oct | 82 | m | | | | 65 | 65 | 3.2+ | | | MB/PG | |

| River | Date | Length (cm) | Sex | Tag Colour | Tag Letter | Tag Number | DNA Number | Scale Number | Age | Section | Reach | Samplers | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kwinageese | 20-Oct | 74 | m | | | | 66 | 66 | 3.2+ | | | MB/PG | |
| Kwinageese | 20-Oct | 75 | f | | | | 67 | 67 | 3.2+ | | | MB/PG | |
| Kwinageese | 20-Oct | 61 | m | | | | 68 | 68 | 4.1+ | | | MB/PG | no marks |
| Kwinageese | 20-Oct | 80 | m | | | | 69 | 69 | 5.2+ | | | MB/PG | |
| Kwinageese | 20-Oct | 58 | f | | | | 70 | 70 | 3.1+ | | | MB/PG | |
| Kwinageese | 20-Oct | 62 | m | | | | 71 | 71 | R.1+ | | | MB/PG | |
| Kwinageese | 20-Oct | 86 | m | | | | 72 | 72 | 3.2S1+ | | | MB/PG | double striper, dark |
| Kwinageese | 20-Oct | 76 | f | | | | 73 | 73 | 4.2+ | | | SH/CP | |
| Kwinageese | 20-Oct | 74 | m | | | | 74 | 74 | 5.2+ | | | SH/CP | |
| Kwinageese | 20-Oct | 75 | m | | | | 75 | 75 | 3.1S1+ | | | SH/CP | |
| Kwinageese | 20-Oct | 47 | m | | | | 76 | 76 | 3.1+ | | | SH/CP | |
| Kwinageese | 20-Oct | 73 | f | | | | 77 | 77 | 3.2+ | | | SH/CP | |
| Kwinageese | 20-Oct | 86 | f | | | | 78 | 78 | 4.2S1+ | site 7 | | MB/PG | |
| Kwinageese | 20-Oct | 74.5 | f | | | | 79 | 79 | 4.2+ | site 7 | | MB/PG | left eye wound from hook, left hook in |
| Kwinageese | 20-Oct | 69 | m | | | | 80 | 80 | R.2+ | site 6 | | MB/PG | |
| Kwinageese | 20-Oct | 74.5 | f | | | | 81 | 81 | 3.2+ | site 7 | | MB/PG | |
| Kwinageese | 20-Oct | 64.5 | m | | | | 82 | 82 | 5.1+ | site 7 | | MB/PG | |
| Kwinageese | 20-Oct | 79 | f | | | | 83 | 83 | R.2+ | site 7 | | MB/PG | |
| Kwinageese | 20-Oct | 80 | f | | | | 84 | 84 | 4.2S1+ | site 8 | | MB/PG | |
| Kwinageese | 20-Oct | 61.5 | m | | | | 85 | 85 | 4.1+ | site 2 | | MB/PG | |
| Kwinageese | 20-Oct | 61 | f | | | | 86 | 86 | 3.1+ | site 2 | | MB/PG | |
| Kwinageese | 20-Oct | 73.5 | f | | | | 87 | 87 | R.2+ | site 2 | | MB/PG | head scar RS size of nickel, predator. scar |
| Kwinageese | 20-Oct | 78.5 | f | | | | 88 | 88 | 5.2+ | site 2 | | MB/PG | |
| Kwinageese | 20-Oct | 79.5 | m | | | | 89 | 89 | R.2+ | site 2 | | MB/PG | |
| Kwinageese | 20-Oct | 84 | m | | | | 90 | 90 | 3.2+ | site 2 | | MB/PG | |
| Kwinageese | 20-Oct | 65.5 | m | | | | 91 | 91 | 4.1+ | site 2 | | MB/PG | clean |
| Kwinageese | 20-Oct | 74.5 | f | | | | 92 | 92 | R.2+ | site 2 | | MB/PG | head scar on nose |
| Kwinageese | 20-Oct | 63.5 | m | | | | 93 | 93 | R.1+ | site 2 | | MB/PG | |
| Kwinageese | 20-Oct | 74.5 | f | | | | 94 | 94 | 4.2+ | site 2 | | MB/PG | |
| Kwinageese | 20-Oct | 69 | f | | | | 95 | 95 | 3.2+ | site 2 | | MB/PG | |