

**Enumeration of Adult Steelhead  
in the  
Upper Sustut River 1997**

by  
C.J. Williamson

Skeena Fisheries Report SK 112

May 1998

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## Abstract

The upper Sustut River steelhead (*Oncorhynchus mykiss*) population was enumerated from July 31 1997 to September 30 1997 for the sixth consecutive year. A floating PVC fence located approximately 500 m upstream of the confluence of the Sustut River with Moosevale Creek, was used for enumeration. Six-hundred forty-nine (649) steelhead passed through the fence between August 9 and September 30. An additional 52 steelhead were counted downstream of the fence to the Moosevale Creek confluence. This estimate does not include tagged fish that were previously counted as they migrated upstream through the fence and were then released downstream. The total estimated steelhead escapement to the upper Sustut River was 701 individuals. The fall escapement was 167.7% of the estimated number of spawners required for maximum sustainable yield (418), and was 67.7% of the estimated carrying capacity (1036). The steelhead mortality rate due to handling at the fence was 1.5 percent. In 1997, 15.4 percent of steelhead had gillnet marks and 14.0 percent had predator scars. The percentage of gillnet marked fish was high in the early part of the run and declined steadily until the last enumeration date. Between July 31 and September 30, a total of 965 sockeye salmon (*O. nerka*), 5 male coho salmon (*O. kisutch*), 24 bull trout (*Salvelinus confluentus*), 6 resident rainbow trout (*O. mykiss*) and 4 Rocky Mountain whitefish (*Prosopium williamsoni*) were counted at the fence. The first steelhead arrived at the fence on August 9 and by September 13, 50 percent of steelhead had passed the fence. Steelhead of both sexes had similar run timing (Student's t-test = -1.18,  $P > 0.05$ ). Of the four steelhead recaptured in 1997, three were repeat spawners (0.6 percent of those tagged in 1994) and data was unavailable for the fourth fish. In 1997, increases in steelhead migration coincided with changes in water temperature, but did not coincide with increases in river height. Male steelhead (mean = 81.4 cm) were significantly larger than female steelhead (mean = 73.3 cm; Student's t-test = 19.42,  $P < 0.05$ ). In 1997, 9.2% of male steelhead and 17.8% of female steelhead passing the fence were gillnet marked. Gillnet marked males were larger than unmarked males (Student's t-test = 1.70,  $P < 0.025$ ). Gillnet marked and unmarked females were similar in size (Student's t-test = 0.31,  $P > 0.025$ ).

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## 1.0 Introduction

With active commercial, native and sports fisheries in northern British Columbia accurate and timely population estimates are essential for sustainable management of summer run steelhead populations. For the past six years, the upper Sustut River steelhead have been enumerated in an effort to index early run steelhead population levels and trends for the Skeena River (Spence *et al.* 1990; Bustard 1993; Saimoto 1994; Saimoto 1995; Parken and Morten 1996; Parken *et al.* 1997). Early run steelhead are of particular concern for fisheries managers because they migrate during and are caught incidentally by the commercial fishery for more abundant sockeye (*Oncorhynchus mykiss*) and pink (*O. gorbuscha*) salmon (Ward *et al.* 1993; Cox-Rogers 1994).

In 1997, in-season projections for the run size for Upper Sustut Steelhead indicated that the run would be a near record low (<300). These projections were based on the cumulative steelhead index values generated by the Tye test fishery and previous population indices of the upper Sustut steelhead run. The 1997 Upper Sustut steelhead run was more than double the predicted values.

The objectives of the 1997 enumeration program were:

1. to enumerate the Upper Sustut River steelhead population,
2. to examine the sex, number, growth, and size distribution of previously tagged steelhead that returned in 1997,
3. to examine the effect of water height and temperature on steelhead migration,
4. to examine the sex ratio, and size distribution of steelhead throughout the run,
5. to examine the number of gillnet marked steelhead and the distribution of gillnet marked fish throughout the run and,
6. to examine the relative run timing of male and female steelhead.

## 2.0 Study Area

The Sustut River is an upper Skeena River tributary in north central British Columbia (Figure 1). From Sustut and Johanson Lakes, the Sustut River flows southwest for approximately 100 km to its confluence with the Skeena River. The Sustut River drains approximately 3 574 km<sup>2</sup> and has seven main tributaries: Birdflat Creek, Bear River, Asitka River, Red Creek, Two Lake Creek, Moosevale Creek and Johanson Creek. The common fish species in the upper Sustut River are steelhead, chinook salmon (*O. tshawytscha*), sockeye salmon, coho salmon (*O. kisutch*), bull trout (*Salvelinus confluentus*), Dolly Varden (*S. malma*), and Rocky Mountain whitefish (*Prosopium williamsoni*; Bustard 1993; Saimoto 1994; Saimoto 1995). The physical boundary for the upper Sustut River steelhead population is the Sustut River upstream of the Moosevale Creek confluence,

including Johanson Creek and Sustut and Johanson Lakes (Spence *et al.* 1990; Figure 1). Whereas, the physical boundary for the lower Sustut River steelhead population is the Sustut River downstream of the Bear River confluence, including Bear River and Bear Lake (Spence *et al.* 1990; Figure 1).

### **3.0 Methods**

#### **3.1 Steelhead Enumeration**

One 3.8 cm P.V.C. floating fish counting fence was placed in the Sustut River, 500 m upstream of the confluence with Moosevale Creek and 70 km upstream of the confluence with Bear River (Figures 2, 3). The fence was operated from July 31 until the evening of September 30, 1997. Steelhead holding between the fence and Moosevale Creek were counted in a streamside visual survey on September 27 using polarized glasses. Further attempts were made to count steelhead below the fence after this date, however turbid water prevented observation of the fish. The fence was inspected daily for debris accumulation and fence openings. Debris was removed and repairs made as necessary. The fence trap box was checked in the morning and evening during low levels of fish migration and was checked more frequently during higher migration.

All fish passing the fence were identified to species using visual characteristics described in Scott and Crossman (1973) and McPhail and Carveth (1994). All steelhead were tagged below the dorsal fin and measured for fork-length. Sex, gillnet marks, scars, wounds, as well as general condition and unusual observations were also recorded for all steelhead. Orange, N-series, uniquely numbered t-bar anchor tags were used for steelhead tagging. Adipose tissue was collected from 71 steelhead to aid in stock identification and molecular genetic comparisons between upper/lower Sustut steelhead and resident rainbow trout populations. A sample of 10 scales, taken mid-laterally between the dorsal and anal fins, was collected from the same 71 steelhead. Scales will be used for age estimates. All fish mortalities due to fence operation or handling by personnel were recorded. Adipose tissue and scales were collected from 16 resident rainbow trout and 27 bull trout.

#### **3.2 Steelhead Recaptures**

Sex, fork length and the presence of gillnet marks or predator scars were recorded for previously tagged steelhead (identified by tag presence). Tag colour and number were recorded and compared to the Ministry of Environment, Lands and Parks Skeena Region TAGS database.



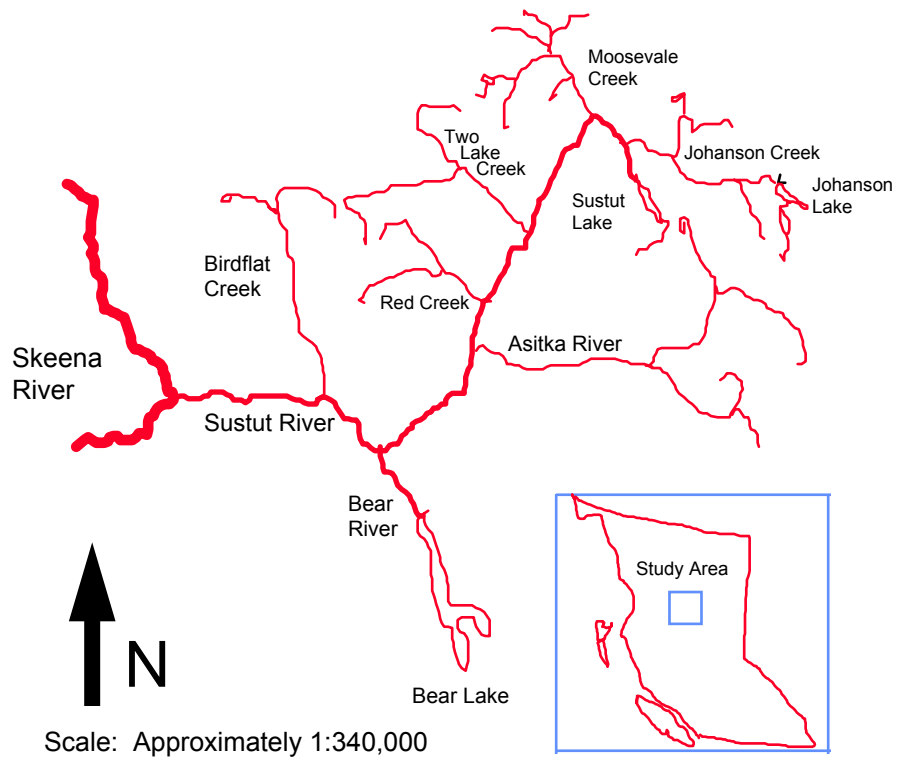


Figure 1. The Sustut River and major tributaries (from Saimoto 1995).

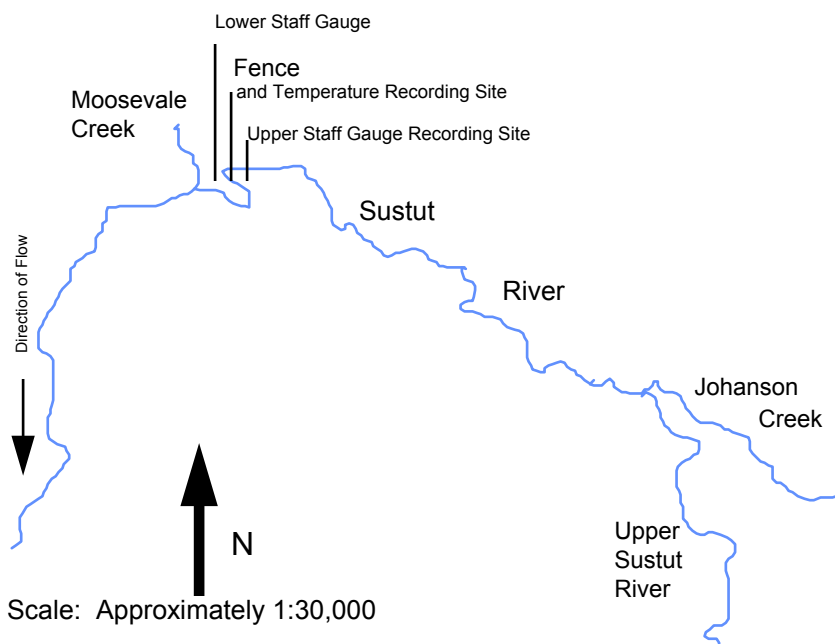


Figure 2. Detailed map of the study area (adapted from Saimoto 1995).

a



b'



Figure 3. Aerial photograph of the steelhead enumeration fence looking downstream (a) and photograph of the fence from the trail on the right bank (b) of the Sustut River, 1997.

### **3.3 Steelhead Migration and Physical Data**

Stream temperatures were recorded hourly at the fence by a (Onset Optic Stow Away Temp) temperature data logger and once daily by personnel at the fence using a Brannon minimum-maximum thermometer. Water levels were recorded twice daily at two sites, using staff gauges. One site was located above the fence and one site was located below the fence (Figure 2).

### **3.4 Steelhead Length Distributions**

Steelhead fork-lengths were measured to the nearest 0.5 cm with an Evazote lined measuring tray. Fork-lengths were compared using length-frequency histograms and mean fork-lengths of male and female steelhead were compared with a Student's t-test.

### **3.5 Steelhead Gillnet Marks**

The presence of gill net marks was recorded for all steelhead. The cumulative daily percentage of steelhead with gillnet marks was compared with the cumulative total number of steelhead for the duration of the run. The numbers of male and female gill net marked steelhead were compared to males and females without gill net marks using a chi-square analysis. The mean fork-lengths of gillnet marked and unmarked steelhead were compared with a Student's t-test for each sex.

### **3.6 Male and Female Steelhead Run Timing**

The run timing of male and female steelhead was compared using a time-series histogram. The mean migration date passed the fence for male and female steelhead was compared using a Mann-Whitney U-test.

### **3.7 Upper Sustut River and Tyee Test Fishery Indices**

The cumulative steelhead index at the Tyee test fishery has been used to indicate the relative abundance of steelhead and salmon migrating into the Skeena River (Cox-Rogers and Jantz 1993; Ward *et al.* 1993; Cox-Rogers 1994; Koski *et al.* 1995; Labelle *et al.* 1995). The cumulative steelhead index on August 10 was used to indicate the relative abundance of early run Skeena River steelhead (upper Sustut River steelhead). For tagged upper Sustut River steelhead, August 10 was the last date to migrate past the Tyee test fishery (Parken *et al.* 1997).

In 1996 the relative abundance of upper Sustut River steelhead was standardized into a population index to reduce the variability resulting from the different enumeration methods (Parken *et al.* 1997). Parken *et al.* (1997) found that the August tenth cumulative Tye steelhead index was positively correlated with and was a significant predictor of the Upper Sustut steelhead index. However, the predictive relationship was dependent on an outlying datum (1986 index). For the 1997 data, correlation analysis was used to determine if the upper Sustut River steelhead population index was still positively correlated with the cumulative August 10 Tye steelhead index. A simple linear regression model was then used *a posteriori* to determine if the August 10 index was a significant predictor of the Upper Sustut Steelhead index.

## **4.0 Results**

### **4.1 Steelhead Enumeration**

After fence operations ceased September 30, 1997 a total of 649 steelhead had passed upstream of the fence. An additional 96 steelhead were observed between the fence in Moosevale Creek on September 27. Eighty-five of those fish were observed in the pool immediately below the fence. Attempts were made to perform stream-side visual counts below the fence after September 27. However, a storm event caused the river to rise and water turbidity to increase, preventing visual observation. Therefore, the September 27 visual count was used in calculating the final escapement estimate. At the time of the final streamside survey, 14 previously tagged steelhead that had been released downstream, remained downstream. Between the final visual survey and the last fence count on September 30, a total of 30 steelhead had migrated upstream. Therefore, a conservative estimate of the total steelhead escapement to the Upper Sustut for 1997 is 701 individuals.

The first steelhead passed through the fence on August 9 and by September 13, 50% of the run had passed the fence. (Figure 4; Table 1) The handling mortality at the fence was 1.5% (10 steelhead) (Appendix Table 1). Seven out of the ten mortalities had no visual signs of trauma or disease. These fish apparently died as a direct result of the fence operation. Two of the remaining steelhead had severe fungal infections at old injury sites. The last steelhead was missing one eye and probably had difficulty with visual orientation. Fourteen (14.0) percent of steelhead had predator scars and 15.3 percent had gillnet marks. Thirty-eight steelhead that passed the fence were subsequently released downstream of the fence. These fish were either exhausted from handling or exhibited repeat downstream swimming behavior. Twenty four or (63.1 percent) of the fish released downstream, passed the fence a second time before fence operations ceased on September 30 .

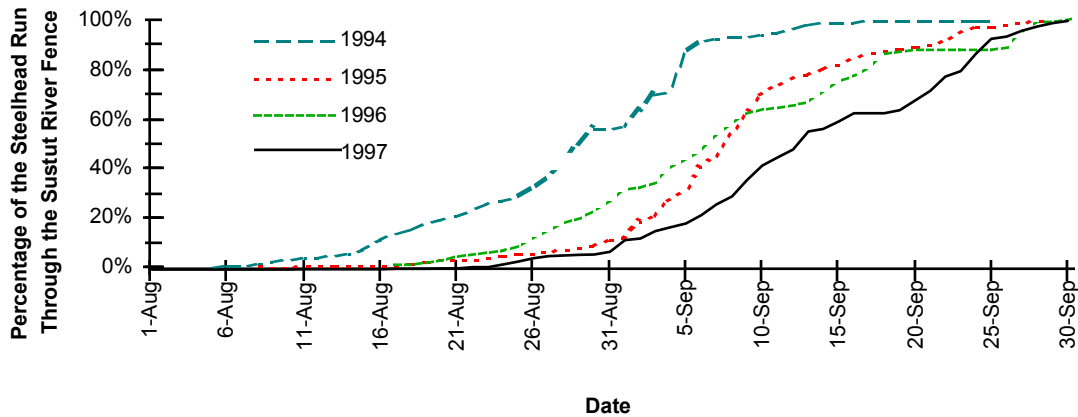


Figure 4. 1994, 1995, 1996 and 1997 daily cumulative percentages of the upper Sustut River steelhead index.

Table 1. Dates when 50 percent of steelhead migrated through the upper and/or lower fences on the upper Sustut River.

Year	Date 50 percent of steelhead run had passed:	
	Upper Fence	Lower Fence
1993	Aug-28	N/A
1994	Sep-15	Aug-29
1995	Sep-10	Sep-08
1996	N/A	Sep-07
1997	N/A	Sep-13

Between July 31 and September 30, a total of 965 sockeye salmon (*O. nerka*), 5 male coho salmon, 24 bull trout, 6 resident rainbow trout and 4 Rocky Mountain whitefish migrated through the fence (Appendix Tables 3, 4).

#### 4.2 Steelhead Recaptures

Twenty-eight (28) previously tagged steelhead were captured at the fence. Three of these fish were repeat spawners tagged at the lower fence in 1995; data was unavailable for the fourth fish (Cox-Rogers, pers comm.; Table 2). Four-hundred eighty-three steelhead (483) were tagged at the lower fence in 1995. Assuming 100% tag retention, an estimated 0.6 percent of the 1995 upper Sustut River steelhead were repeat spawners. Three steelhead tagged at the lower fence in 1995 grew an average of 9.8 cm from the date they were tagged in 1995. The remaining 24 (of 28) steelhead were released downstream of the fence after initial tagging in 1997 (Appendix Table 2). Steelhead that were released downstream of the fence in 1997 and subsequently recaptured, remained below the fence for an average of 9.8 days (range 1-27 days, Figure 5).

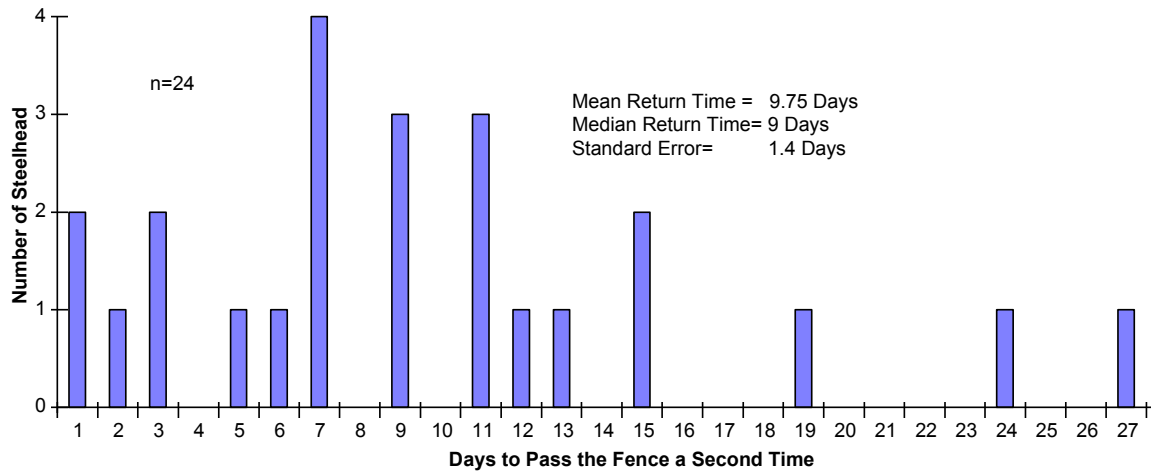


Figure 5. Frequency distribution of the number of days it took for steelhead released downstream of the fence to migrate past the fence a second time.

Table 2. Steelhead Recaptures not tagged in 1997 at the fence.

Recapture Data				Tagging Data				
Date (yyymmdd)	Sex	Fork Length (cm)	Tag Colour	Tag Number	Date (yyymmdd)	Location	Sex	Fork Length (cm)
970824	f	86.5	Orange	CO5813	950902	Sustut Lower Fence	m	73.0
970831	f	76.5	Orange	CO5811	950902	Sustut Lower Fence	f	70.5
970911	f	83.0	Orange	CO6244	950923	Sustut Lower Fence	f	73.0
970914	f	69.0	Orange	CDFO-SEP 00108		Data Unavailable		

### 4.3 Steelhead Migration and Physical Data

Maximum daily water temperature (from data logger) and lower staff gauge height were plotted with steelhead migration at the fence for 1997 (Figures 6, 7). Temperature increases appeared to coincide with increased migration through the fence. For most increases in temperature there was a corresponding increase in migration. Two significant storm events occurred during the main period of steelhead migration; one on August 29 and the other on September 14. Both storms coincided with decreased migration during the storm event (rising limb of hydrograph) and increased migration after the storm (falling limb of hydrograph) (Figure 7).

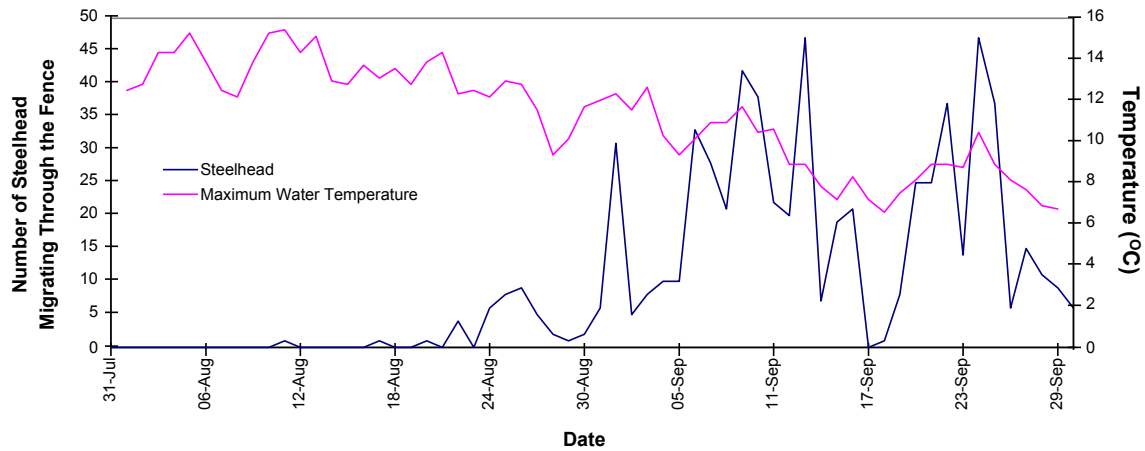


Figure 6. Daily maximum water temperatures and the number of steelhead migrating past the fence.

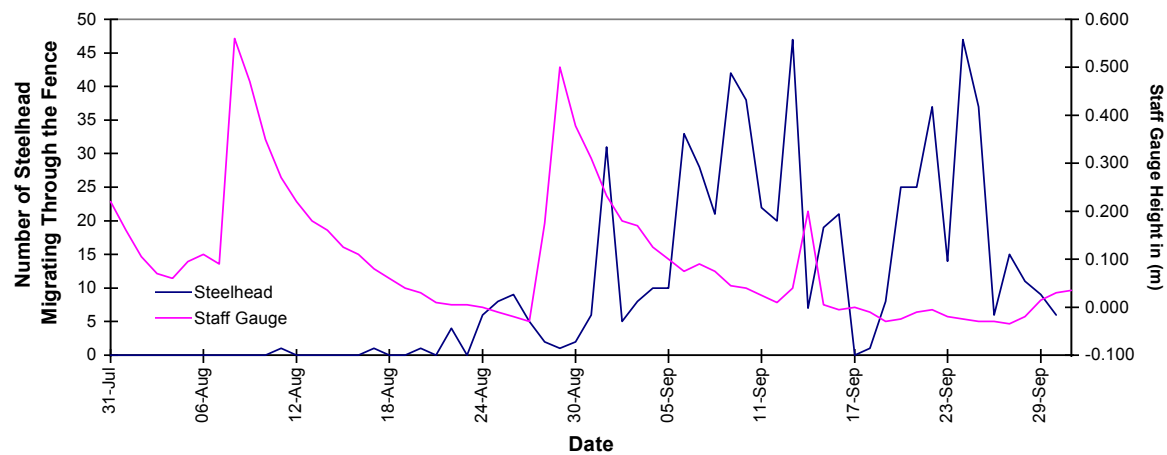


Figure 7. Daily lower staff gauge height and the number of steelhead migrating past the fence.

#### 4.4 Steelhead Length Distributions

Of 649 steelhead measured at the fence, 195 (30.0 percent) were males and 454 (70.0 percent) were females. Thus the ratio of female to male steelhead was 1.43:1. The mean fork-length of female steelhead was 73.3 cm whereas the mean fork-length of male steelhead was 81.4 cm. The average male steelhead was larger than the average female steelhead (Students t-test = 19.43  $P < 0.025$ ) (Figure 8).

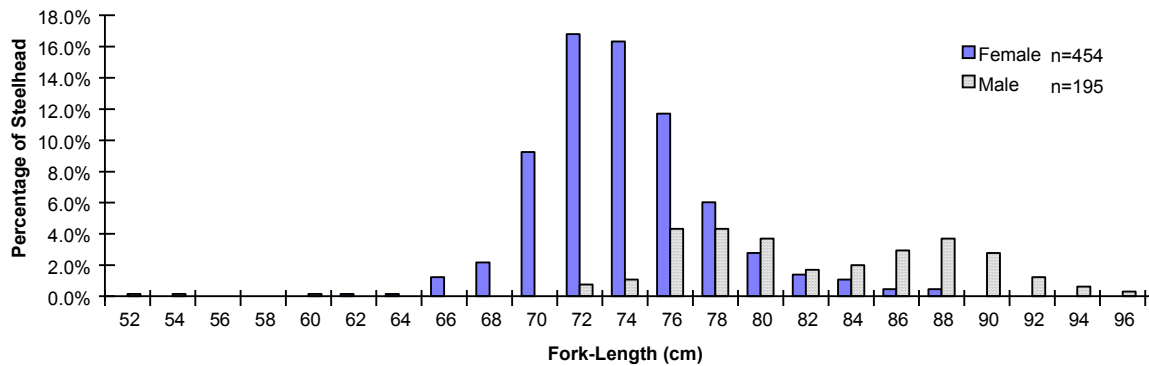


Figure 8. Percentage of male and female steelhead by 2 cm categories of fork-length.

#### 4.5 Steelhead Gillnet Marks

Gillnet marks were present on 15.4 percent of the total steelhead tagged at the fence. The daily cumulative percentage of gillnet marked steelhead was plotted with the daily cumulative total steelhead (Figure 9). Early in the run, as high as 57 percent (August 23-24) of the steelhead were gillnet marked. The percentage of gillnet marked steelhead was pooled and plotted by statistical week (Figure 10). A steady decline in the number of gillnet marked fish was observed until statistical week 10-1.

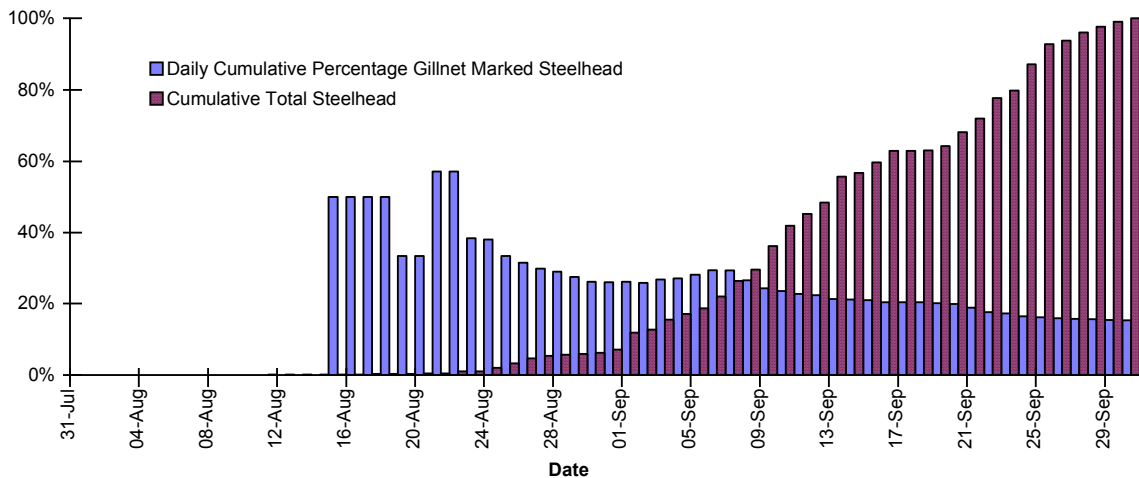


Figure 9. Daily cumulative total gillnet marked steelhead and daily cumulative total steelhead.



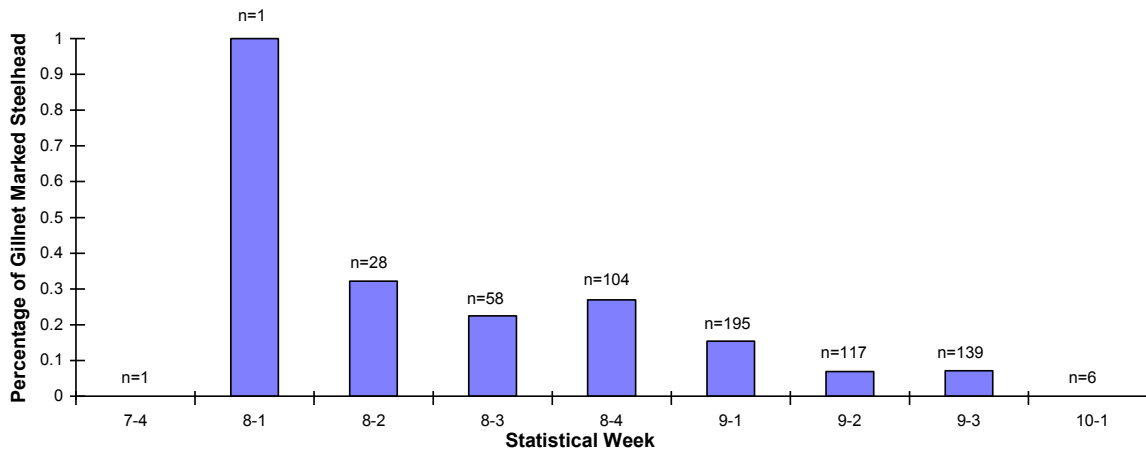


Figure 10. Percentage of gillnet marked steelhead by statistical week.

The ratio of gillnet marked males to unmarked males in the 1997 upper Sustut population index was different than the ratio of gillnet marked to unmarked females (Chi-square,  $P=0.005$ ). Only 9.2 percent of male steelhead observed at the fence were gillnet marked whereas, 17.8 percent of females observed at the fence were gillnet marked. Gillnet marked males were larger than unmarked males (Students t-test = 1.70,  $P<0.025$ ), whereas marked and unmarked females were the same size (Students t-test = 0.31  $P>0.025$ ).

#### 4.6 Male and Female Steelhead Run Timing

The first female steelhead passed through the fence on August 9 whereas the first male steelhead passed the fence on August 23. The cumulative total percentage of both sexes remained similar throughout the enumeration period. A short lag in timing for male steelhead occurred in the middle of the run (Figure 11). However, there was no statistical difference in the mean date for migration past the fence (Mann-Whitney U-Test = 0.5575,  $P>0.05$ ).

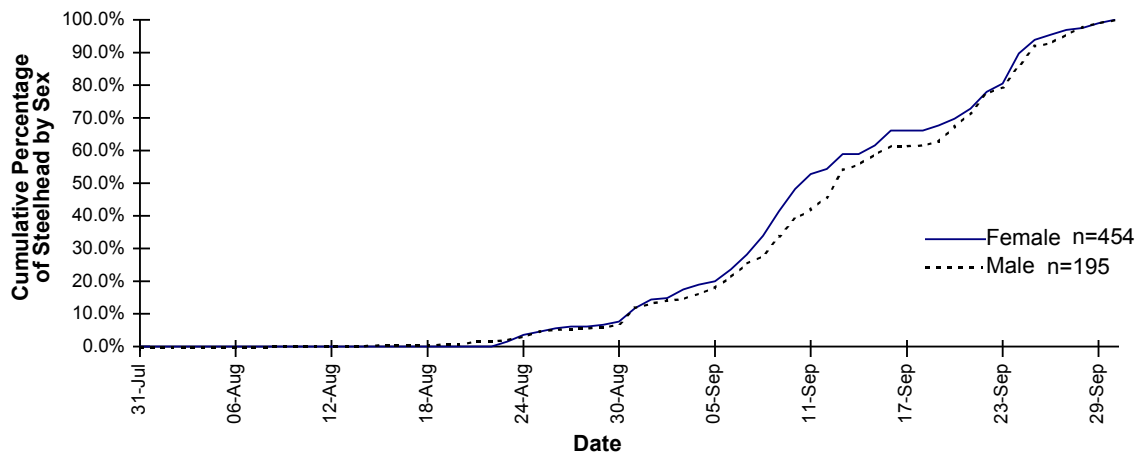


Figure 11. Cumulative percentages of total male and total female steelhead.

#### 4.7 Upper Sustut River and Tyee Test Fishery Indices

After inclusion of the 1997 datum, the upper Sustut River steelhead population index was poorly correlated with the August 10 cumulative Tyee steelhead index (Figure 12; Pearson Correlation,  $R=0.57$ ). Furthermore, there was no significant relationship between the upper Sustut River population index and the August 10 cumulative Tyee steelhead index (ANOVA  $F=2.407$ ,  $P=0.181$ ). Thus, the use of the Tyee steelhead index for predicting the upper Sustut steelhead population index must be re-evaluated.

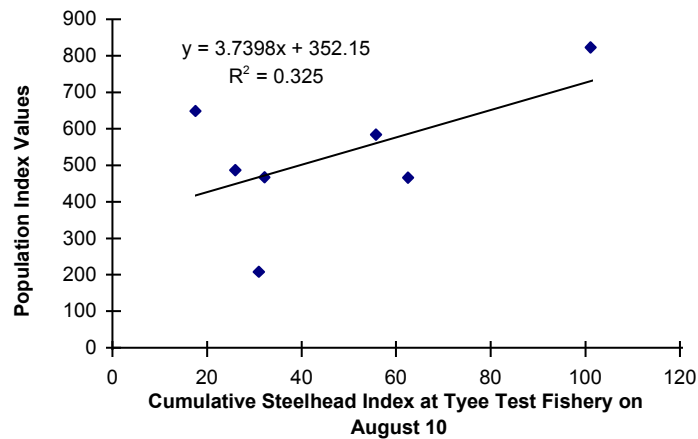


Figure 12. Linear Relationship between the upper Sustut River steelhead population index and the cumulative steelhead index at Tyee test fishery on August 10.

## 5.0 Discussion

For 1997 the total estimated steelhead escapement was 701 fish. This value was the highest recorded for all years of fence operation. The 1997 upper Sustut River steelhead population index (649) was also the highest recorded during the past six years of fence operation. In contrast, the cumulative August 10 Tye test fishery steelhead index was one of the lowest steelhead index values in the history of the test fishery. Two factors likely contributed to the anomalously low test fishery index. First, a late run this year, as evidenced by the late median migration date, could indicate that some of the upper Sustut River steelhead had migrated past the Tye test fishery after the August 10 index date. Second, steelhead may have had a low catchability ( $q$ - see Cox-Rogers and Jantz 1993) in the test fishery nets. The catchability for sockeye salmon, a much more abundant fish, is variable between years and results in a large margin of error for the prediction of returning adults. Steelhead are caught in small numbers in the test fishery and the addition or subtraction of a few fish can have large effects on the value of the cumulative Tye Steelhead index.

The 1997 median migration date (September 13) past the fence was one week later than the 1995 (September 8; Parken and Morten 1996) and 1996 (September 7; Parken *et al.* 1997) median migration dates and two weeks later than the 1994 (August 29, Saimoto 1995) median migration date. Furthermore, 35 percent of the steelhead (population index) passed the fence after September 20. Based on this data, the 1997 upper Sustut River steelhead run was substantially later than runs from previous years. The late arrival of fish in the upper Sustut River may reflect a late migration of the fish past the Tye test fishery as well; thus a late run timing could have resulted in the low August 10 cumulative Tye steelhead index.

Three steelhead tagged in 1995 at the lower fence were recaptured at the fence in 1997. Assuming no tag loss and 100 percent survival this winter, 0.6 percent of the 1995 steelhead run will be repeat spawners. This value is approximately half the number of tagged, repeat spawners reported by Parken and Morten (1996), and Parken *et al.* (1997).

Daily migration past the fence in 1997 appeared to be directly related to increases in temperature and inversely related to increases in stream discharge during storm events. Three significant storm events caused increased water levels and increased water temperatures during the month of September. For each increase in water temperature there was a corresponding increase in steelhead migration. The effect of increased temperature was not proportional to the magnitude of increased migration. It is probable that the variation in the number of steelhead observed migrating past the fence reflected the number of steelhead that were present below and ready to migrate in response to temperature increases of any magnitude. Water levels during the enumeration period were very low compared with other years and likely slowed migration rates, especially in the lower Sustut River. After each of the three storm events, there was an increase in the level of steelhead migration that lasted for several days. The highest level of migration tended to occur right after water levels began to drop.

In 1997, 70.0 percent of the steelhead migrating past Sustut Fence were female and 30.0 percent were male. Only 9.2 percent of male steelhead observed at the fence were gillnet marked, whereas 17.8 percent of female steelhead that passed the fence were gillnet marked. Furthermore, males tagged at the fence were larger (mean = 81.4 cm) than females (mean 73.3 cm). One would expect the percentage of marked males to be the same as marked females unless there was a differential rate of escape from the nets for males or females. Given that males were statistically larger than females and fewer gillnet marked males returned than would be expected, it can be surmised that male steelhead had an increased likelihood of perishing in a gillnet or had a decreased ability to migrate upriver once marked.

Male and female run timing past Sustut Fence were statistically similar in 1997 Parken *et al.* (1997) suggested that the strongly skewed sex ratios observed in previous years could be the result of insufficient sampling of earlier run timed male steelhead. However, in 1997 there was no statistical difference in the run timing of male and female steelhead. Furthermore, a graphical presentation (Fig 9) of the run timing of male and females suggests that males possibly lag behind females. The mean migration date past the fence for males was one full day after that of females. Thus this explanation for a strongly skewed sex ratio towards females would not hold true for the 1997 population.

The handling mortality at the fence was within the range (0 - 4.3 percent) reported for previous years (Bustard 1993; Saimoto 1994; Saimoto 1995; Parken and Morten 1996; Parken *et al.* 1997). However, seven out of the ten mortalities were the result of steelhead being stranded overnight in low water on the river left side of the fence. Periodically in September, half of the fence panels (river left) were completely out of the water. Most steelhead that exhibited downstream migratory behaviour after tagging became stranded on the fence, on river right. Some of these fish were able to swim off the fence again after a period of rest. Fish that were unable to get off the fence on river right were usually facing into the current, still submerged and could be released alive. However, fish that swam over to river left on the fence (from river right) became stranded out of the water. If personnel operating the fence were unable to rescue these fish after a short time they died (i.e. overnight). All seven steelhead stranding mortalities were found on the river left side of the fence. A baffle like device could prevent steelhead fence stranded steelhead from swimming over to the low water side of the fence, preventing their subsequent deaths.

## 6.0 Recommendations

1. The upper Sustut River Steelhead population should continue to be enumerated in future years. Including the previous six years, these data provide valuable measures for population trends and levels specifically for the Upper Sustut River steelhead and generally for the Skeena river steelhead.
2. Sampling methods at Sustut fence should be continued as recommended by Parken and Morten 1996. A reduction in the variability of sampling methods used will likely reduce the level of error between comparisons made from different years.

3. Run timing estimates for the Upper Sustut River steelhead population should be updated. A possible late migration of Upper Sustut steelhead past the Tyee fishery may account for the loss of predictive power of the Upper Sustut steelhead population model.
4. The cumulative Tyee steelhead index should not be used for predicting Upper Sustut River steelhead run strength until more data are available. At 649 individuals, the 1997 Upper Sustut steelhead population index was more than double the levels predicted by the August 10, Tyee cumulative steelhead index. After inclusion of the 1997 datum, the Tyee steelhead index held no predictive power for the Upper Sustut River steelhead run.
5. An investigation into the catchability of steelhead passing the Tyee test fishery must be undertaken to justify future use of the Tyee steelhead index in predicting up river steelhead returns. Variation in the catchability of sockeye salmon in the Tyee test fishery leads to relatively inaccurate estimates for up river sockeye returns (Cox-Rogers and Jantz 1993). Sockeye are, by orders of magnitude, more abundant than steelhead in the Skeena River during their upriver migration. Given the predictive variability of the test fishery for sockeye returns in addition to small numbers of steelhead caught in the test fishery, there is likely a very large error associated with cumulative Tyee steelhead index values.
6. Steps should be taken to reduce 'stranding' mortality of steelhead at the fence especially during low water periods. The installation of a moveable, baffle device on the fence would likely prevent most downstream migrating steelhead from moving to sections of the fence with no water flow after being washed onto the fence.
7. Streamside visual surveys of steelhead holding below the fence to the pool immediately past the Moosevale Creek confluence should be initiated daily during the later stages of enumeration. In 1997, a high water event prevented a visual survey on the last day of fence operation, however a visual survey performed before the high water event allowed for the calculation of an escapement estimate for 1997.

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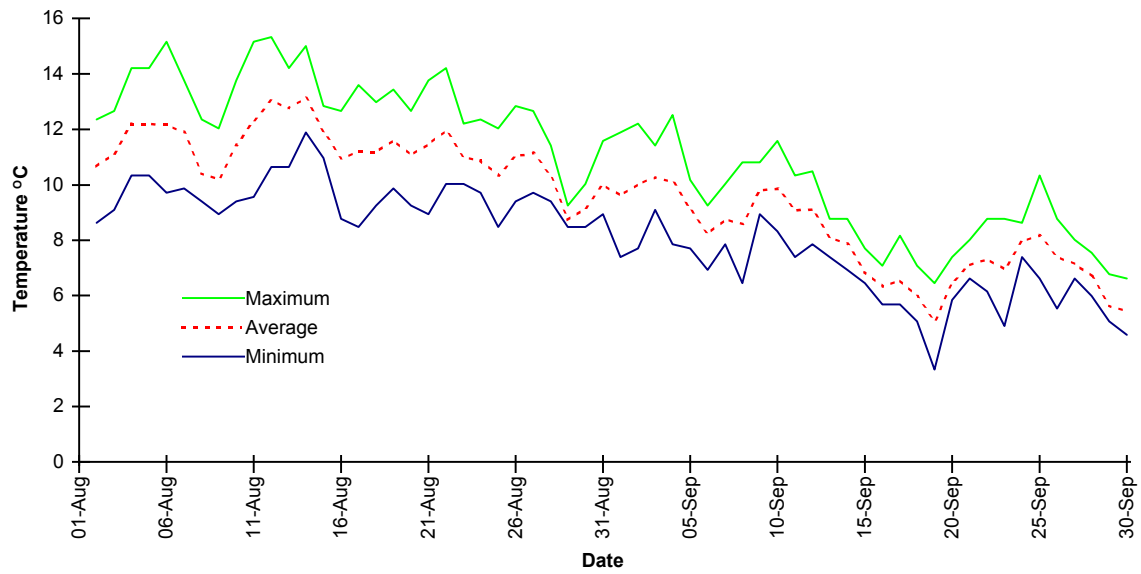
## 8.0 Literature Cited

- Bustard, D. 1993. Adult steelhead studies in the upper Sustut River 1992. Unpublished manuscript prepared for British Columbia Ministry of Environment, Lands and Parks, Smithers, BC
- Cox-Rogers, S 1997. Stock assessment biologist, DFO, Prince Rupert, BC; pers. comm.
- Cox-Rogers, S. 1994. Description of daily simulation model for the Area 4 (Skeena) commercial gillnet fishery. Canadian Manuscript Report of Fisheries and Aquatic Sciences No. 2256.
- Cox-Rogers, S. and L. Jantz. 1993. Recent trends in the catchability of sockeye salmon in the Skeena River gillnet test fishery and impacts on escapement estimation. Canadian Manuscript Report of Fisheries and Aquatic Sciences No. 2219.
- Koski, W.R., R.F. Alexander, and K.K. English. 1995. Distribution, timing, fate and numbers of coho salmon and steelhead returning to the Skeena watershed in 1994. Report by LGL Limited, Sidney, B.C., for Fisheries Branch, British Columbia Ministry of Environment, Lands and Parks, Victoria, B.C.
- Labelle, M., S. Pollard, R. Frith and K. English. 1995. Skeena River steelhead stock-assessment program: 1994 catch and escapement monitoring plan. British Columbia Ministry of Environment, Lands and Parks. Fisheries Branch. Fisheries Progress Report No. 44.
- McPhail, J.D. and R. Carveth. 1994. Field key the freshwater fishes of British Columbia. British Columbia Resource Inventory Committee Publication #44.
- Parken, C.K. and K.L. Morten. 1996. Enumeration of adult steelhead in the upper Sustut River 1995. British Columbia Ministry of Environment, Lands and Parks. Fisheries Branch. Skeena Fisheries Report #95.
- Parken, C.K., K.L. Morten, and D.Y. Atagi. 1997. Review of the escapement of adult steelhead to the upper Sustut River 1986, 1992-1996. British Columbia Ministry of Environment, Lands and Parks. Fisheries Branch. Skeena Fisheries Report #107.
- Saimoto, R.S. 1994. Enumeration of adult steelhead in the upper Sustut River 1993. British Columbia Ministry of Environment, Lands and Parks. Smithers, B.C., Skeena Fisheries Report SK#87.

- Saimoto, R.K. 1995. Enumeration of adult steelhead in the upper Sustut River 1994. Unpublished Manuscript prepared for British Columbia Ministry of Environment, Lands and Parks. Smithers, BC
- Spence, C.R., M.C. Beere and M.J. Lough. 1990. Sustut River steelhead investigations 1986. British Columbia Ministry of Environment, Lands and Parks. Smithers, B.C., Skeena Fisheries Report SK#64.
- Scott, W.B. and E.J. Crossman. 1973. Freshwater fishes of Canada. Fisheries Research Board of Canada, Bulletin No. 184, Ottawa, Ontario.
- Ward, B.R., A.F. Tautz, S. Cox-Rogers, and R.S. Hooton. 1993. Migration timing and harvest rates of the steelhead trout populations of the Skeena River system. PSARC Working Paper S93-06.



## Appendix Figures



Appendix Figure 1. Daily minimum, average, and maximum temperatures at Sustut Fence.

## Appendix Tables

Appendix Table 1. Steelhead handling mortalities 1997.

Date (yymmdd)	TAG	Date Tagged	Comments As Mortality
970827	NO3564	970826	washed on fence - drowned
970917	NO4543	970916	washed on fence - drowned, picture 7 roll #5
970919	NO5966	970913	appeared healthy, no fungus, had lower caudal wear/damage
970921	NO3566	970825	washed on fence first time 970920, badly fungused; Sept. 21 almost dead counted as mort
970923	NO5737	970904	fungus on head and operculum (see tagging comments)
970927	NO7104	970915	died on river left panels overnight, picture 1 roll 6
970928	NO8125	970924	died on river left panels overnight, picture 5 roll 6, (see tagging comments)
970929	NO5970	970913	found barely alive in am, tried to revive, caught in low water fence panels river left, picture 19 roll 6
970930	NO8123	970924	died on river left panels overnight, picture 20 roll 6
970930	NO8172	970925	died on river left panels overnight, picture 21 roll 6

Appendix Table 2. Definition of statistical weeks.

Statistical Week	Corresponding Dates
8-1	August 05 to August 11
8-2	August 12 to August 18
8-3	August 19 to August 25
8-4	August 26 to September 01
9-1	September 02 to September 08
9-2	September 09 to September 15
9-3	September 16 to September 29
10-1	September 30 to October 6

Appendix Table 3 Recaptured steelhead that were tagged in 1997 and released below the fence.

Date Recaptured	Sex	Tag Number	Date Tagged	Number of Days to Return
02-Sep	m	N03590	31-Aug	2
06-Sep	m	N05708	31-Aug	6
07-Sep	f	N03583	29-Aug	9
07-Sep	f	NO5770	06-Sep	1
07-Sep	f	NO5704/05	31-Aug	7
07-Sep	m	NO5710	31-Aug	7
07-Sep	f	NO3572	31-Aug	7
07-Sep	f	NO3559	25-Aug	13
21-Sep	f	NO7103	14-Sep	7
22-Sep	m	N05969	13-Sep	9
22-Sep	m	N08057	21-Sep	1
24-Sep	f	NO5711	31-Aug	24
24-Sep	f	N05965	13-Sep	11
24-Sep	f	NO5971	13-Sep	11
24-Sep	m	NO7120	15-Sep	9
24-Sep	m	NO5969	13-Sep	11
24-Sep	f	NO8072	21-Sep	3
25-Sep	f	NO4681	10-Sep	15
25-Sep	f	NO5769	06-Sep	19
25-Sep	f	NO5985	13-Sep	12
25-Sep	m	NO8094	22-Sep	3
28-Sep	f	NO8117	23-Sep	5
28-Sep	f	NO5984	13-Sep	15
28-Sep	m	NO5717	01-Sep	27

Appendix Table 4. Daily totals of steelhead, rainbow trout, bull trout, and Rocky Mountain Whitefish at Sustut Fence, 1997.

Date (yymmdd)	Steelhead		Rainbow Trout		Bull Trout		Whitefish	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
970731	0	0	0	0	0	0	0	0
970801	0	0	0	0	0	0	0	0
970802	0	0	0	0	0	0	0	0
970803	0	0	1	1	0	0	0	0
970804	0	0	0	1	0	0	0	0
970805	0	0	0	1	1	1	1	1
970806	0	0	2	3	0	1	0	1
970807	0	0	0	3	0	1	0	1
970808	0	0	0	3	0	1	0	1
970809	0	0	0	3	0	1	0	1
970810	0	0	0	3	0	1	0	1
970811	1	1	0	3	0	1	0	1
970812	0	1	0	3	0	1	0	1
970813	0	1	0	3	0	1	0	1
970814	0	1	0	3	0	1	0	1
970815	0	1	0	3	0	1	0	1
970816	0	1	0	3	0	1	0	1
970817	1	2	0	3	0	1	0	1
970818	0	2	1	4	1	2	0	1
970819	0	2	0	4	0	2	0	1
970820	1	3	0	4	0	2	0	1
970821	0	3	0	4	0	2	1	2
970822	4	7	0	4	0	2	1	2
970823	0	7	0	4	0	2	1	2
970824	6	13	0	4	0	2	1	2
970825	8	21	0	4	0	2	1	2
970826	9	30	0	4	0	2	2	4
970827	5	35	1	5	0	2	0	4
970828	2	37	0	5	2	4	0	4
970829	1	38	0	5	0	4	0	4
970830	2	40	0	5	0	4	0	4
970831	6	46	0	5	0	4	0	4
970901	31	77	0	5	0	4	0	4
970902	5	82	0	5	1	5	0	4
970903	8	101	0	5	1	6	0	4
970904	10	111	0	5	1	7	0	4
970905	10	121	0	5	0	7	0	4
970906	33	143	0	5	1	8	0	4
970907	28	171	0	5	0	8	0	4
970908	21	192	0	5	1	9	0	4
970909	42	234	0	5	2	11	0	4

Date (yymmdd)	Steelhead		Rainbow Trout		Bull Trout		Whitefish	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
970910	38	272	0	5	2	13	0	4
970911	22	294	0	5	0	13	0	4
970912	20	314	0	5	0	13	0	4
970913	47	361	0	5	0	13	0	4
970914	7	368	0	5	0	13	0	4
970915	19	387	0	5	0	13	0	4
970916	21	408	0	5	2	15	0	4
970917	0	408	0	5	0	15	0	4
970918	1	409	0	5	1	16	0	4
970919	8	417	0	5	1	17	0	4
970920	25	442	0	5	0	17	0	4
970921	25	467	0	5	0	17	0	4
970922	37	504	1	6	1	18	0	4
970923	14	518	0	6	0	18	0	4
970924	47	565	0	6	2	20	0	4
970925	37	602	0	6	1	21	0	4
970926	6	608	0	6	0	21	0	4
970927	15	623	0	6	0	21	0	4
970928	11	634	0	6	1	22	0	4
970929	9	643	0	6	1	23	0	4
970930	6	649	0	6	1	24	0	4

Appendix Table 5. Daily totals of salmon at Sustut Fence, 1997.

Date (yymmdd)	Chinook		Sockeye		Coho	
	Daily	Cum.	Daily	Cum.	Daily	Cum.
970731	10	10	0	0	0	0
970801	113	123	0	0	0	0
970802	76	299	0	0	0	0
970803	170	369	0	0	0	0
970804	52	421	7	7	0	0
970805	69	490	18	25	0	0
970806	34	524	17	42	0	0
970807	6	530	1	43	0	0
970808	10	540	3	46	0	0
970809	14	554	7	53	0	0
970810	6	560	4	57	0	0
970811	12	572	18	75	0	0
970812	5	577	4	79	0	0
970813	7	584	20	99	0	0
970814	3	587	0	99	0	0
970815	8	595	11	110	0	0
970816	7	602	64	174	0	0
970817	1	603	17	191	0	0
970818	6	609	11	202	0	0
970819	3	612	29	231	0	0
970820	5	617	56	287	0	0
970821	4	621	62	349	0	0
970822	0	621	27	376	0	0
970823	1	622	98	474	0	0
970824	1	623	43	517	0	0
970825	0	623	85	602	0	0
970826	0	623	43	645	0	0
970827	0	623	40	685	0	0
970828	1	624	17	702	0	0
970829	1	625	12	714	0	0
970830	1	626	37	751	0	0
970831	1	627	11	762	0	0
970901	1	628	20	782	1	1
970902	0	628	6	788	0	1
970903	0	628	9	797	1	2
970904	0	628	10	807	0	2
970905	0	628	1	808	1	3
970906	0	628	10	818	0	3
970907	0	628	10	828	0	3
970908	0	628	17	845	0	3
970909	0	628	5	850	0	3
970910	0	628	1	851	0	3

Date (yymmdd)	Chinook		Sockeye		Coho	
	Daily	Cum.	Daily	Cum.	Daily	Cum.
970911	0	628	2	853	0	3
970912	0	628	4	857	1	4
970913	0	628	8	865	0	4
970914	0	628	9	874	0	4
970915	0	628	20	898	0	4
970916	0	628	19	913	0	4
970917	0	628	5	918	0	4
970918	0	628	8	926	0	4
970919	0	628	9	935	0	4
970920	0	628	12	947	0	4
970921	0	628	6	953	0	4
970922	0	628	2	955	0	4
970923	0	628	3	958	0	4
970924	0	628	1	959	1	5
970925	0	628	0	959	0	5
970926	0	628	0	959	0	5
970927	0	628	2	961	0	5
970928	0	628	2	963	0	5
970929	0	628	2	965	0	5
970930	0	628	0	965	0	5

Appendix Table 6. Upper and lower staff gauge height, creek temperatures, and weather. Temperatures were recorded manually with a max-min thermometer.

Date (yymmdd)	Time	Staff Gauge Height (m)		Temperature °C		Weather
		Upper	Lower	Max	Min	
970730	8:00	0.290	n/a			Heavy rains am, scattered clouds pm
	21:00	0.335	0.220			
970731	9:00	0.310		11	9	scattered clouds, sunny periods, periodic showers
	22:00	0.380	0.160			
970801	8:30	0.360	0.130	13	9	scattered clouds with sunny periods, light showers
	22:00	0.340	0.105			
970802	8:30	0.330	0.080	12	9	scattered clouds
	22:00	0.310	0.070			
970803	9:00	0.310	0.060	12	9	clear and sunny am, clouds and rain late pm
	21:00	0.300	0.060			
970804	9:00	0.365	0.110	14	11	rain in am, scattered clouds pm
	22:00	0.400	0.095			
970805	9:00	0.360	0.105	14	10	scattered clouds am, clear sunny pm
	21:30	0.340	0.110			
970806	9:30	0.335	0.100	14	11	heavy clouds and rain am, cloudy with sunny periods in afternoon, 19:30 the rains came( all night)

Date (yymmdd)	Time	Staff Gauge Height (m)		Temperature °C		Weather
		Upper	Lower	Max	Min	
970807	14:30	0.320	0.090			
	16:30	0.530	0.330	12	9	rained all last night ~30 mm, continued to rain until ~19:00 hours today
970808	21:30	0.810	0.560			
	8:45	0.780	0.530	12	9	mainly cloudy, rain showers, sunny breaks
970809	21:45	0.660	0.470			
	10:00	0.600	0.400	13	10	mainly clear sunny, some scattered clouds
970810	22:00	0.540	0.350			
	9:30	0.520	0.320	15	10	clear and sunny
970811	22:00	0.470	0.270			
	9:30	0.460	0.250	15	11	mainly clear and sunny, scattered cloud in afternoon
970812	22:00	0.420	0.220			
	9:30	0.420	0.220	14	11	scattered cloud with sunny periods, wind from west late afternoon
970813	21:30	0.400	0.180			
	9:30	0.390	0.170	15	12	very cloudy all day, no rain however, strong west winds all day
970814	21:30	0.370	0.160			
	9:00	0.375	0.160	14	12	clouds, light showers in afternoon and evening, winds continue
970815	21:30	0.360	0.125			
	9:30	0.355	0.130	12	9	100% clear morning, mainly sunny throughout day
970816	21:20	0.330	0.110			
	9:30	0.330	0.100	13	9	frost on truck window early am, 100% clear, scattered cloud in afternoon, rain 20:30 for one hour
970817	21:15	0.310	0.080			
	10:20	0.310	0.060	12	10	scattered cloud am, rain 18:30-22:00, heavy clouds late pm
970818	21:20	0.290	0.060			
	10:00	0.295	0.050	13	10	scattered clouds and sunny periods
970819	21:00	0.290	0.040			
	10:00	0.280	0.035	12	10	scattered clouds and sunny periods in am and afternoon, heavy clouds in pm
970820	21:00	0.275	0.030			
	8:45	0.270	0.025	13	9	high cloud in am, sunny and warm, rain showers in afternoon-clear late pm
970821	21:15	0.260	0.010			
	8:45	0.260	0.010	13	10	cloudy with sunny periods, thundershowers in pm, clearing late pm
970822	21:15	0.255	0.005			
	8:00	0.250	0.005	12	10	heavy clouds, rain in pm
970823		0.255	0.005			
	9:30	0.260	0.010	12	9	heavy cloud and rain showers in am, scattered cloud in pm
970824	21:30	0.250	0.000			
	8:30	0.250	-0.005	11	9	scattered cloud sin am, heavy clouds and rain in late afternoon
970825	21:10	0.245	-0.010			
	9:30	0.245	-0.015	12	10	scattered cloud and sunny periods



Date (yymmdd)	Time	Staff Gauge Height (m)		Temperature °C		Weather
		Upper	Lower	Max	Min	
	21:50	0.240	-0.020			
970826	9:00	0.235	-0.030	12	9	cloudy and rainy periods
	19:30	0.230	-0.030			
970827	9:35	0.260	0.001	12	10	poured rain- river on the rise
	20:15	0.380	0.175			
970828	9:30	0.580	0.355	9	8	river very high
	19:50	0.760	0.500			
970829	9:10	0.670	0.440	10	9	showers, partly cloudy
	20:25	0.590	0.378			
970830	9:15	0.560	0.350	10.5	10	partly cloudy, fog in am, beauty evening
	19:50	0.520	0.310			
970831	10:15	0.475	0.255	11	10	sunny, warm
	19:20	0.455	0.232			
970901	11:15	0.420	0.205	11	9.5	sunny, warm
	19:50	0.400	0.180			
970902	11:10	0.400	0.175	11	10	clouds, showers, clearing
	19:45	0.395	0.170			
970903	10:05	0.380	0.150	11	9	sunny, warm, cold night
	20:30	0.350	0.125			
970904	9:30	0.335	0.110	11	9	partly cloudy morning, windy wet noon, afternoon clear
	20:30	0.330	0.100			
970905	9:00	0.315	0.085	9.5	8	foggy in am, clear afternoon, clouding- rain in evening 08:30 1°C
	20:00	0.310	0.075			
970906	10:15	0.330	0.105	10	8	clear early am, clouding light showers, clearing late afternoon
	20:30	0.325	0.090			
970907	9:20	0.315	0.085	9	7	foggy 1°C in am, sunny clear, cloudy evening
	20:30	0.305	0.075			
970908	9:00	0.290	0.055	10	10	cloudy , afternoon sunny and warm
	20:30	0.285	0.045			
970909	10:00	0.280	0.040	11	9.5	clear sunny morning
	20:45	0.275	0.040			
970910	10:40	0.260	0.025	9	7	sunny with cloudy periods, showers in late pm
	20:45	0.260	0.025			
970911	9:30	0.260	0.015	10	8.5	high clouds, sunny afternoon, cloudy and rain late afternoon and evening
	20:10	0.255	0.010			
970912	10:40	0.275	0.035	9	8	cloudy rain cool 8°C
	20:30	0.275	0.040			
970913	10:30	0.265	0.030	8	7.5	cloudy in am, showers and scattered cloud in pm
	20:30	0.260	0.200			
970914	10:00	0.255	0.010	6	6	high overcast, showers and cold
	20:00	0.250	0.005			

Date (yymmdd)	Time	Staff Gauge Height (m)		Temperature °C		Weather
		Upper	Lower	Max	Min	
970915	10:30	0.245	0.000	7	6	clouds throughout day
	20:30	0.250	-0.005			
970916	10:30	0.250	0.000	9	7.5	1 °C in early am, mainly cloudy with sunny periods, 4 °C afternoon
	21:15	0.245	0.000			
970917	10:00	0.245	-0.010	7	7	snow flurries in am, cloudy with sunny periods, clear night
	19:30	0.240	-0.010			
970918	10:00	0.235	-0.020	6.5	6	-6 °C at 8:30, high clouds all day, winds in late pm
	20:00	0.225	-0.030			
970919	10:00	0.225	-0.030	8	6.5	river slightly turbid river right, clouds and rain showers
	19:30	0.225	-0.025			
970920	10:15	0.235	-0.020	8	7	water turbid river right from creek above fence, cloudy and raining
	19:40	0.240	-0.010			
970921	10:00	0.245	-0.005	9	8	clouds early am, clearing afternoon, sunny warm, high overcast late pm
	20:00	0.260	-0.005			
970922	10:00	0.250	-0.015	7.5	9	sunny warm, high clouds
	19:00	0.245	-0.020			
970923	10:30	0.235	-0.025	8	8	cloudy am with sunny periods, scattered clouds with showers afternoon
	20:00	0.240	-0.025			
970924	10:15	0.240	-0.030	8	5	sunny and warm
	19:45	0.240	-0.030			
970925	10:40	0.225	-0.030	8.5	6	sunny warm afternoon clouds, high 25 °C
	18:45	0.230	-0.030			
970926	9:30	0.215	-0.045	9	6	clouds and rain 5 °C
	20:00	0.230	-0.035			
970927	10:20	0.240	-0.010	7.5	5	cloud with sunny periods in am, clouds and rain pm, cold
	19:41	0.235	-0.020			
970928	10:15	0.240	-0.010	7.5	4.5	wet and cold, high 5 degrees
	20:00	0.270	0.015			
970929	11:30	0.280	0.035	7	4.5	scattered cloud and sunny periods
	18:50	0.275	0.030			
970930	10:15	0.265	0.020	6	4	snow in am, clouds and rain throughout the day
	18:30	0.280	0.035			

Appendix Table 7. Steelhead tagging data.

Date (yyymmdd)	Time	Sex	Fork Length (cm.)	Tag Colour	Tag Letter	Tag Number	Comments
970809	1630	f	74.0	orange	n	n03192	DNA, Scales #1, 8 cm dorsal to tail scar
970815	1930	f	75.5	orange	n	n03193	DNA, Scales #2, gillnet marks
970819	1630	f	70.5	orange	n	n03194	DNA, Scales #3, 10 cm dorsal to ventral scar left side
970821	1400	f	75.0	orange	n	n03195	DNA, Scales #4, Caudal peduncal scar right, mid lat. left., rgt. scars 3 cm.
970821	1400	f	74.0	orange	n	n03196	gillnet marks just past operculum, also quarter sizes scar rgt. top head.
970821	1600	f	75.0	orange	n	n03197	gillnet marks even with rear of operculum
970821	1600	f	74.0	orange	n	n03198	gillnet marks even with rear of operculum
970823	1630	m	76.0	orange	n	n03199	DNA, Scales #5, scar left side and left caudal
970823	1930	m	75.5	orange	n	n03200	no scars
970823	1930	f	81.0	orange	n	n03290	no scars
970823	1930	f	77.0	orange	n	n03291	mid-lateral rgt. c-shaped scar
970823	1930	m	89.0	orange	n	n03292	no scars- wow!
970823	1930	f	74.0	orange	c	c05813	gillnet marks - operculum
970824	1500	f	86.5	orange	n	n03293	Tag Recovery- No Scars
970824	1500	f	73.0	orange	n	n03294	gillnet marks and scars right side
970824	1500	f	76.0	orange	n	n03295/6	gillnet marks, pectoral fins split, bottom of caudal bruised, double tagged
970824	1500	f	71.0	orange	n	n03298	dime sized white scar top-o-head, right side 10 cm. scar
970824	1500	m	88.0	orange	n	n03299	DNA, Scales #6, gillnet marks- operculum
970824	1500	m	78.0	orange	n	n03300	no scars
970824	1930	m	86.0	orange	n	n03553	no scars
970824	1930	m	92.0	orange	n	n03554	no scars wow!
970825	1530	m	83.0	orange	n	n03555	unhealed 5 cm. gash right side
970825	1530	f	76.5	orange	n	n03556	DNA, Scales #7, lateral abrasions
970825	1530	f	75.0	orange	n	n03557	no marks
970825	1530	f	70.5	orange	n	n03558	minor lateral abrasions
970825	1530	f	72.5	orange	n	n03559	minor abrasions on left side, released downstream (repeatedly washed on fence)
970825	1700	m	78.5	orange	n	n03560	no marks
970825	1700	f	75.0	orange	n	n03561	DNA, Scales #8, No Marks
970825	1945	f	77.0	orange	n	n03562	gillnet marks
970825	1945	f	78.5	orange	n	n03563	gillnet marks
970826	850	m	76.0	orange	n	n03564	DNA, Scales #9
970826	850	f	76.0	orange	n	n03565	gillnet marks, chunk off top of tail, lots of minor abrasions
970826	850	f	72.0	orange	n	n03566	note- fish stressed, problems with tag guns
970826	1545	m	84.0	orange	n	n03576	clean
970826	1900	f	69.0	orange	n	n03578	DNA, Scales #10, clean
970827	915	m	85.0	orange	n	n03579	DNA, Scales #11, clean
970827	2010	f	85.7	orange	n	n03580	Scars
970828	920	f	70.0	orange	n	n03581	DNA, Scales #12, clean
970829	907	m	87.0	orange	n	n03582	DNA, Scales #13, clean
970829	1615	f	79.5	orange	n	n03583	DNA, Scales #14, clean
970830	900	f	75.0	orange	n	n03584	DNA, Scales #15, seal Scar
970830	900	f	79.0	orange	n	n03585	DNA, Scales #16, seal Scar
970830	1250	m	77.0	orange	n	n03586	DNA, Scales #17, gillnet marks
970830	1250	f	72.0	orange	n	n03587	clean
970830	1934	f	72.5	orange	n	n03577	clean

Date (yyymmdd)	Time	Sex	Fork Length (cm.)	Tag Colour	Tag Letter	Tag Number	Comments
970831	1934	m	80.5	orange	n	n03567	clean
970831	1945	f	73.0	orange	n	n03568	gillnet marks
970831	1945	f	70.5	orange	n	n03569	fungus on head
970831	1945	m	82.0	orange	n	n03570	clean
970831	1945	m	85.0	orange	n	n03571	
970831	1945	f	69.0	orange	n	n03572	seal scars
970831	1945	f	72.5	orange	n	n03574	
970831	1945	f	78.0	orange	n	n03575	
970831	1945	f	74.0	orange	n	n03588	
970831	1945	f	73.0	orange	n	n03589	
970831	1945	m	88.0	orange	n	n03590	
970831	1945	f	72.0	orange	n	n03591	seal scar
970831	1945	f	69.5	orange	n	n03592	gillnet scar
970831	1945	f	71.5	orange	n	n03593	gillnet marks
970831	1945	m	86.0	orange	n	n03594	
970831	1945	f	71.0	orange	n	n03595	scar on head
970831	1945	f	73.0	orange	n	n03596	DNA, Scales #18, seal scar
970831	1945	f	70.5	orange	n	n03597	gillnet marks, seal scars
970831	1945	f	76.5	orange	c	c05811	TAG RECOVERY seal scar
970831	1745	f	71.0	orange	n	n03598	
970831	1745	f	69.0	orange	n	n03599	
970831	1745	m	87.0	orange	n	n03600	DNA Scales, #19
970831	1745	f	75.0	orange	n	n05701	gillnet marks
970831	1745	f	71.5	orange	n	n05702	gillnet marks
970831	1745	f	72.0	orange	n	n05703	seal scars
970831	1745	f	67.5	orange	n	n05704/5	double tagged, put downstream of fence
970831	1745	m	71.5	orange	n	n05706	DNA, Scales #20, gillnet marks
970831	1745	f	72.0	orange	n	n05707	seal scars
970831	1745	m	92.5	orange	n	n05708	DNA, Scales #21
970831	1745	f	71.5	orange	n	n05709	gillnet marks, seal scars
970831	1745	m	88.0	orange	n	n05710	put downstream of fence
970831	1745	f	71.0	orange	n	n05711	
970901	1111	m	74.5	orange	n	n05712	DNA, Scales #22
970901	1111	m	80.0	orange	n	n05713	DNA, Scales #23, seal scar
970901	1111	f	72.0	orange	n	n05714	DNA, Scales #24, seal scar
970901	1715	f	72.5	orange	n	n05715	gillnet marks, seal marks
970901	1715	m	82.5	orange	n	n05716	
970901	1715	m	91.5	orange	n	n05717	DNA, Scales #25, hook scar, put downstream of fence
970901	1715	m	75.0	orange	n	n05718	
970901	1715	f	75.5	orange	n	n05719	
970901	1715	f	77.0	orange	n	n05720	seal scar
970901	1715	m	78.0	orange	n	n05721	DNA, Scales #26, scales
970901	1945	f	72.0	orange	n	n05722	gillnet marks, lamprey scar
970902	1046	f	72.0	orange	n	n05723	gillnet marks
970902	1933	f	67.0	orange	n	n05725	
970902	1933	f	72.0	orange	n	n05724	
970902	1933	f	69.5	orange	n	n05726	seal scar
970902	1933	m	89.0	orange	n	n05727	Bleeding?- quick release
970903	955	m	88.0	orange	n	n05728	DNA, Scales #27
970903	955	m	82.0	orange	n	n05729	DNA, Scales #28, gillnet marks, fungus on adipose
970903	1615	m	74.5	orange			No Tag Applied - Fish Lost Upstream due to orientation of measuring tray

Date (yyymmdd)	Time	Sex	Fork Length (cm.)	Tag Colour	Tag Letter	Tag Number	Comments
970903	1615	f	71.0	orange	n	n05731	gillnet marks, split adipose
970903	1615	f	73.5	orange	n	n05730	old gillnet marks, healing scars
970903	1615	f	68.0	orange	n	n05732	old scar left lateral, hole on top of head
970903	1615	m	74.5	orange	n	n05733	ventral mid-body seal bite hole
970903	1615	m	77.0	orange	n	n05734	old lateral abrasions
970904	900	f	70.0	orange	n	n05735	DNA, Scales #29
970904	900	m	80.0	orange	n	n05736	DNA, Scales #30, old seal scars
970904	900	f	73.0	orange	n	n05737	gillnet marks, minor bleeding from gill area, damaged operculum
970904	900	m	75.5	orange	n	n05738	
970904	900	f	74.0	orange	n	n05739	gillnet marks
970904	1200	m	83.0	orange	n	n05740	clean no scars etc.
970904	1700	f	75.5	orange	n	n05741	right lateral scar (old)
970904	1700	f	68.5	orange	n	n05742	clean no scars
970904	1700	f	72.0	orange	n	n05743	lesion on top of nose
970904	2030	f	72.0	orange	n	n05744	dorsal fin split, gillnet marks
970905	900	m	84.5	orange	n	n05745	dorsal fin and lateral abrasions(old)
970905	900	f	76.5	orange	n	n05746	two fungused lesions(ventral) in front of pelvic fins
970905	900	f	70.0	orange	n	n05747	old lateral abrasions
970905	1540	m	94.5	orange	n	n05748	dorsal fin and top of caudal fin split, see Cory Williamson for personal picture
970905	1540	f	74.0	orange	n	n05750	gillnet marks
970905	1540	f	77.0	orange	n	n05749	old ventral scars behind pelvics
970905	1540	f	68.5	orange	n	n05751	gillnet marks, 3 cm behind operculum and old lateral scars
970905	1540	f	68.5	orange	n	n05752	old left lateral scrape on head
970905	1540	f	71.0	orange	n	n05753	DNA, Scales #31, gillnet marks, abrasions on top of head
970905	1540	f	70.5	orange	n	n05754	DNA, Scales #32, bad gillnet marks, marks behind operculum and on dorsal fin area
970906	915	m	85.0	orange	n	n05755	big 5 cm X 2 cm gash behind head
970906	915	f	75.5	orange	n	n05756	gillnet marks, possible hook marks
970906	915	f	76.0	orange	n	n05758	DNA, Scales #33, old scar left lateral, gillnet marks
970906	915	m	79.5	orange	n	n05759	DNA, Scales #34, 2 splits on tail, gillnet marks
970906	915	f	72.0	orange	n	n05760	old slash right side
970906	915	f	71.0	orange	n	n05761	Clean! Bright! Beautiful!
970906	915	f	77.5	orange	n	n05762	old healed gillnet marks on head and dorsal
970906	1430	m	80.0	orange	n	n05763	gillnet marks
970906	1430	f	80.5	orange	n	n05764	old left scar
970906	1820	m	80.0	orange	n	n05765	gillnet marks, dark fish
970906	1820	m	77.0	orange	n	n05766	no marks
970906	1820	f	75.5	orange	n	n05767	clean
970906	1820	f	82.5	orange	n	n05768	left side old scar
970906	1820	f	87.0	orange	n	n05769	small hole right side (hook hole?)
970906	1820	f	69.5	orange	n	n05770	old scars by adipose right side
970906	1820	f	74.0	orange	n	n05771	small marks on head
970906	1820	f	72.0	orange	n	n05772	no scars etc.
970906	1820	f	75.5	orange	n	n05773	gillnet marks
970906	1820	m	77.0	orange	n	n05774	gillnet marks, ventral right scar on side
970906	1820	f	69.0	orange	n	n05775	small scrapes on head
970906	1820	m	88.0	orange	n	n05776	DNA, Scales #35, head abrasions
970906	1820	f	70.5	orange	n	n05777	DNA, Scales #36, old lateral abrasions

Date (yymmdd)	Time	Sex	Fork Length (cm.)	Tag Colour	Tag Letter	Tag Number	Comments
970907	920	m	86.5	orange	n	n05778	DNA, Scales #37, hook marks in mouth
970907	920	f	82.0	orange	n	n05779	DNA, Scales #38, gillnet marks, 2 caudal splits, various abrasions
970907	920	f	75.5	orange	n	n05780	gillnet marks, hole in right operculum, top-o-tail missing, piece missing from adipose, nose abrasions, left operculum. deformed
970907	920	m	70.5	orange	n	n05781	tail damage, gillnet marks
970907	1745	m	81.5	orange	n	n05782	dorsal fin cut and hook scars
970907	1745	m	76.0	orange	n	n05783	mouth abrasions
970907	1745	m	84.0	orange	n	n05784	gillnet marks
970907	1745	f	76.0	orange	n	n05785	abrasion lower chin
970907	1745	m	90.0	orange	n	n05786	old right lateral scar, hook scar
970907	1745	m	80.5	orange	n	n05787	no scars etc.
970907	1745	f	71.5	orange	n	n05788	
970907	1745	m	91.0	orange	n	n05789	
970907	1745	f	69.0	orange	n	n05790	gillnet marks
970907	1745	m	76.0	orange	n	n05791	half of dorsal fin missing, left side abrasions
970907	1745	f	73.0	orange	n	n05792	left side abrasions
970907	1745	f	72.0	orange	n	n05794	gillnet marks, small marks on head
970907	1745	f	75.0	orange	n	n05793	lots of old scars on body, caudal and dorsal splits, fungused round scar on head
970907	1745	f	66.5	orange	n	n05795	no scars etc.
970907	1745	f	71.0	orange	n	n05796	top caudal and dorsal damage, torn out piece of left gill!
970907	1745	f	72.0	orange	n	n05797	bright beauty
970907	1745	f	75.5	orange	n	n05798	seal bite left side
970907	1745	f	71.0	orange	n	n05799	abrasions on side
970907	1745	f	76.0	orange	n	n05800	scrapes on right operculum.
970907	1745	f	72.5	orange	n	n05801	DNA, Scales #39, clean as a whistle
970907	1745	f	77.0	orange	n	n05802	DNA, Scales #40, dorsal fin split
970907	1745	f	74.5	orange	n	n05803	DNA, Scales #41, old new seal bites/scars
970907	1745	f	72.0	orange	n	n05804	DNA, Scales #42, gillnet marks, left side 20 cm scar
970907	1745	f	75.0	orange	n	n05805	gillnet marks, hole on head
970908	830	m	81.0	orange	n	n05806	gillnet marks, small lateral abrasions
970908	830	m	96.0	orange	n	n05807	DNA, Scales #43, cut on dorsal fin, right pectoral with fungus, small scars on body
970908	830	m	82.5	orange	n	n05808	ripped opercula, massive half healed 10 cm gash right side
970908	830	f	81.0	orange	n	n05809	3/4 of dorsal fin missing, left side healed scars
970908	830	f	78.0	orange	n	n05810	head has minor abrasions
970908	830	m	74.0	orange	n	n05811	gillnet marks
970908	1330	m	89.5	orange	n	n05812	dark, clean
970908	1330	m	58.5	orange	n	n05813	DNA, Scale #44, gillnet marks all over body
970908	1330	m	80.0	orange	n	n05814	minor scrape left side
970908	1330	f	70.0	orange	n	n05815	minor scrapes both sides
970908	1330	f	75.5	orange	n	n05816	DNA, Scales #45, minor lateral abrasions
970908	1900	m	84.5	orange	n	n05817	clean as a whistle
970908	1900	f	71.5	orange	n	n05818	clean as a whistle
970908	1900	m	79.5	orange	n	n05819	bad- but healed scar on belly
970908	1900	f	75.0	orange	n	n05820	nose abrasions, healing scar 10 cm left side
970908	1900	m	75.0	orange	n	n05821	wound on tail
970908	1900	f	72.5	orange	n	n05822	split dorsal fin
970908	1900	f	76.5	orange	n	n05823	dime sized open lesion right side, gillnet

Date (yyymmdd)	Time	Sex	Fork Length (cm.)	Tag Colour	Tag Letter	Tag Number	Comments
							marks
970908	1900	f	71.5	orange	n	n05824	bright, clean
970908	1900	f					untagged, lost upstream, clean
970909	915	m	88.0	orange	n	n05826	dark, no scars
970909	915	f	70.0	orange	n	n05827	clean, bright
970909	915	m	88.5	orange	n	n05828	clean
970909	915	f	70.5	orange	n	n05829	left side two healed (bad) 20 cm scars
970909	915	f	80.5	orange	n	n05830	left 5 cm cut-healing
970909	915	m	78.0	orange	n	n05831	clean, bright
970909	915	f	73.0	orange	n	n05832	small scar left side, abrasions right side
970909	915	m	78.5	orange	n	n05833	gillnet marks, dark
970909	915	m	88.0	orange	n	n05834	left side 10 cm semi-fresh cut
970909	915	f	74.5	orange	n	n05835	clean
970909	915	f	72.0	orange	n	n05836	DNA, Scales #46, gillnet marks
970909	915	m	79.0	orange	n	n05837	DNA, Scales #47
970909	915	m	78.0	orange	n	n05838	dark, no marks
970909	915	f	72.0	orange	n	n05839	clean, bright
970909	915	f	72.0	orange	n	n05840	clean, bright
970909	1645	m	85.0	orange	n	n05841	dark, clean
970909	1645	f	73.0	orange	n	n05842	clean, bright
970909	1645	f	80.0	orange	n	n05843	two splits in tail
970909	1645	f	77.0	orange	n	n05844	gillnet marks, lateral abrasions
970909	1645	m	85.5	orange	n	n05845	clean, thick fish
970909	1645	f	73.5	orange	n	n05846	gillnet marks
970909	1645	f	75.0	orange	n	n05847	gillnet marks
970909	1645	m	86.0	orange	n	n05848	caudal split, abrasions on nose, piece of tail missing
970909	1645	m	84.0	orange	n	n05849	gillnet marks, minor damage to tail and dorsal fin, marks around eyes
970909	1645	f	74.0	orange	n	n05850	minor scrapes right side
970909	1645	f	72.0	orange	n	n05851	left side marks, nose marks
970909	1645	f	78.0	orange	n	n05852	fungus on abrasion right side
970909	1645	f	76.5	orange	n	n05853	minor scrape on nose
970909	1645	f	71.0	orange	n	n05854	
970909	1645	f	72.5	orange	n	n05855	minor head abrasions
970909	1645	f	72.0	orange	n	n05856	DNA, Scales #48, small cut right side
970909	1645	f	85.0	orange	n	n05857	DNA, Scales #49, lots of small cuts and abrasions
970909	1645	m	75.0	orange	n	n05858	DNA, Scales #50, dark, clean
970909	1645	f	72.5	orange	n	n05859	bright clean
970909	1645	f	73.0	orange	n	n05860	old scar left side 5 cm.
970909	1645	m	70.5	orange	n	n05861	split dorsal fin
970909	1645	m	75.0	orange	n	n05862	sex uncertain
970909	1940	f	73.0	orange	n	n05863	gillnet marks
970909	1940	f	73.0	orange	n	n05864	clean, bright
970909	1940	f	76.0	orange	n	n05865	clean, bright
970909	1940	m	82.0	orange	n	n05866	clean, bright
970909	1940	f	75.0	orange	n	n05867	minor abrasions
970910	945	m	89.5	orange	n	n05868	lower tail and dorsal split, gillnet marks
970910	945	m	79.0	orange	n	n05869	dark, no scars marks
970910	945	f	69.0	orange	n	n05870	minor abrasions on sides
970910	945	f	65.5	orange	n	n05871	clean, bright
970910	945	m	91.0	orange	n	n05872	small lesion right side
970910	945	f	74.0	orange	n	n05873	clean, bright

Date (yymmdd)	Time	Sex	Fork Length (cm.)	Tag Colour	Tag Letter	Tag Number	Comments
970910	945	f	76.0	orange	n	n05874	clean, bright
970910	945	m	78.0	orange	n	n05875	mark by right eye, piece missing from nose
970910	945	f	74.0	orange	n	n05876	clean, bright
970910	945	m	76.0	orange	n	n05877	clean, bright
970910	945	f	75.0	orange	n	n05878	gillnet marks, bad with fungus
970910	945	f	72.0	orange	n	n05879	left side abrasions
970910	945	m	80.5	orange	n	n05880	dark, no marks
970910	945	f	74.0	orange	n	n05881	scrapes- head and nose
970910	945	f	73.0	orange	n	n05882	clean, bright, frisky
970910	945	m	85.0	orange	n	n05884	dark, small abrasion right side has fungus
970910	1400	f	73.0	orange	n	n05885	caudal split head abrasions
970910	1400	f	70.5	orange	n	n05886	clean, bright
970910	1400	f	77.0	orange	n	n05887	gillnet marks, abrasions on sides
970910	1400	m	87.0	orange	n	n05883	dark, no marks
970910	1840	f	79.5	orange	n	n05888	dark, minor abrasion right side
970910	1840	f	74.0	orange	n	n05889	old scars both sides
970910	1840	f	76.0	orange	n	n05890	minor abrasions, old healed scar right side 20 cm
970910	1840	f	76.0	orange	n	n05891	clean, a little colour
970910	1840	m	85.0	orange	n	n05892	dark, no marks
970910	1840	f	76.0	orange	n	n05893	clean, huge numbers of spots (like cutthroat)
970910	1840	m	86.5	orange	n	n05894	minor head abrasions
970910	1840	f	71.0	orange	n	n05895	gillnet marks
970910	1840	f	71.0	orange	n	n05896	clean, bright
970910	1840	f	75.5	orange	n	n05897	old gillnet marks, scar on head to dorsal fin
970910	1840	m	77.0	orange	n	n05898	dark, no marks
970910	1840	f	69.5	orange	n	n05899	gillnet marks
970910	1840	f	71.0	orange	n	n05900	bottom of tail missing, head abrasions
970910	1840	f	71.0	orange	n	n05901	old abrasions on sides
970910	1840	f	73.0	orange	n	n05902	minor head abrasions, old abrasions on sides
970910	1840	m	77.0	orange	n	n05903	gillnet marks, two tail splits
970910	2030	f	74.5	orange	n	n05904	head and side abrasions, bleeding from tag hole
970910	2030	f	76.0	orange	n	n05905	old scar left side
970911	950	f	72.0	orange	n	n05906	operculum scrape and old scar, both on right side
970911	950	f	73.0	orange	n	n05907	operculum abrasions
970911	950	m	75.0	orange	n	n05908	gillnet scar, scar right side 5 cm
970911	1940	f	83.0	orange	n	c06244	RECAPTURE, operculum and jaw abrasions, tail split and top gone gillnet marks
970911	1940	m	92.5	orange	n	n05909	dark, no marks
970911	1940	f	73.0	orange	n	n05910	old lateral abrasions right side
970911	1940	f	72.0	orange	n	n05911	clean, bright
970911	1940	f	70.0	orange	n	n05912	clean, bright
970911	1940	m	92.0	orange	n	n05913	tail splits
970911	1940	f	78.0	orange	n	n05914	clean, bright
970911	1940	m	78.0	orange	n	n05915	dark, no marks
970911	1940	m	87.0	orange	n	n05916	dark, no marks
970911	1940	m	84.5	orange	n	n05917	dark, no marks
970911	1940	f	71.0	orange	n	n05918	dark, no marks
970911	1940	m	76.5	orange	n	n05919	dark, no marks
970911	1940	m	85.0	orange	n	n05920	minor head abrasions
970911	1940	m	74.5	orange	n	n05921	minor head abrasions, left side scar 10 cm.



Date (yymmdd)	Time	Sex	Fork Length (cm.)	Tag Colour	Tag Letter	Tag Number	Comments
970911	1940	f	75.0	orange	n	n05922	old abrasions left side
970911	1940	f	75.0	orange	n	n05923	abrasions- nose and right side
970911	1940	f	73.5	orange	n	n05924	clean, bright
970911	1940	f	72.5	orange	n	n05925	bad gillnet marks head to dorsal
970911	1940	f	83.0	orange	n	n05926	minor abrasions right side
970912	1030	f	74.0	orange	n	n05927	clean no marks
970912	1030	f	66.0	orange	n	n05928	old lateral abrasions both sides
970912	1030	f	83.5	orange	n	n05929	old lateral abrasions both sides
970912	1030	f	70.5	orange	n	n05930	clean, bright
970912	1030	m	78.0	orange	n	n05931	minor head abrasions
970912	1545	f	72.5	orange	n	n05932	clean no marks
970912	1545	m	52.0	orange	n	n05933	DNA, Scales #51, gillnet marks, sex uncertain, picture number 4 roll five
970912	1545	f	75.0	orange	n	n05934	minor abrasion right side
970912	1545	f	75.5	orange	n	n05936	clean, bright, minor trap box marks
970912	1545	f	69.0	orange	n	n05937	split dorsal fin minor side abrasions
970912	1545	m	75.0	orange	n	n05938	dark large old scar left side
970912	1545	f	67.0	orange	n	n05939	clean, bright
970912	1545	f	71.0	orange	n	n05940	5 cm X 1 cm healing gash on right side
970912	1545	f	73.0	orange	n	n05941	gillnet marks, tip of nose abraded
970912	1545	f	69.0	orange	n	n05942	clean, bright
970912	1545	f	73.0	orange	n	n05943	dark, old abrasions on sides
970912	2015	f	76.5	orange	n	n05944	no marks
970912	2015	f	73.0	orange	n	n05945	clean, bright
970912	2015	f	81.0	orange	n	n05946	clean, bright
970912	2015	f	72.0	orange	n	n05947	gillnet marks, new growth on tail (edge all white)
970913	1015	m	76.5	orange	n	n05948	ventral seal bite gash in front of pelvic fins
970913	1015	m	76.5	orange	n	n05949	end of nose abrasions, old scar right side
970913	1015	f	77.5	orange	n	n05950	minor abrasion right side
970913	1015	m	80.0	orange	n	n05951	dark, no marks
970913	1015	f	73.0	orange	n	n05952	minor gillnet marks
970913	1015	f	72.0	orange	n	n05953	clean, bright
970913	1730	f	65.5	orange	n	n05954	clean
970913	1730	f	73.0	orange	n	n05955	left side minor abrasions and lesions
970913	1730	m	90.0	orange	n	n05956	minor head abrasions, dark, old scar (5 cm) left side
970913	1730	f	76.5	orange	n	n05957	clean, bright
970913	1730	f	72.0	orange	n	n05958	gillnet marks, scars right side
970913	1730	f	72.0	orange	n	n05959	old scars both sides
970913	1730	f	73.0	orange	n	n05960	clean, bright
970913	1730	f	74.0	orange	n	n05963	minor lateral abrasions
970913	1730	m	88.0	orange	n	n05962	dark, no marks
970913	1730	f	75.5	orange	n	n05964	clean
970913	1730	f	84.5	orange	n	n05965	right side lateral abrasion
970913	1730	m	93.0	orange	n	n05966	right operculum scrapes, possible hook marks
970913	1730	f	75.0	orange	n	n05967	abrasions both sides
970913	1730	f	72.5	orange	n	n05968	gillnet marks, bit Cory!
970913	1730	m	75.0	orange	n	n05969	old scar left side, possible hook damage, monofilament cuts in lower jaw
970913	1730	m	87.5	orange	n	n05970	caudal damage- two splits
970913	1730	f	70.5	orange	n	n05971	washed on fence panels untagged, bad gillnet marks, left operculum split, dime size white lesion on head

Date (yyymmdd)	Time	Sex	Fork Length (cm.)	Tag Colour	Tag Letter	Tag Number	Comments
970913	1730	f	72.0	orange	n	n05972	gillnet marks
970913	1730	f	70.0	orange	n	n05973	right side semi healed seal bite
970913	1730	f	68.0	orange	n	n05974	beautiful women
970913	1730	f	75.5	orange	n	n05975	just beautiful
970913	1730	f	69.0	orange	n	n05976	clean beautiful
970913	1730	f	74.5	orange	n	n05977	lateral abrasions
970913	1730	f	70.5	orange	n	n05978	lateral abrasions
970913	1730	f	81.5	orange	n	n05979	lot of lateral scale loss, split dorsal
970913	1730	f	72.5	orange	n	n05980	nice fish!
970913	1730	f	71.0	orange	n	n05981	beautiful, clean female
970913	1730	f	70.0	orange	n	n05982	nasty large scrape-scar on top of head
970913	1730	f	71.0	orange	n	n05983	minor gillnet marks
970913	1730	f	74.0	orange	n	n05984	gillnet marks, predator scar (15 cm) right side
970913	1730	f	76.0	orange	n	n05985	beautiful, clean
970913	1730	f	79.0	orange	n	n05986	gillnet marks, left lateral abrasions
970913	1730	f	76.0	orange	n	n05987	dark and fat (healthy)
970913	1730	f	69.0	orange	n	n05988	left side abrasions
970913	1730	f	78.5	orange	n	n05989	clean
970913	1730	f	73.0	orange	n	n05990	no marks
970913	1730	f	70.0	orange	n	n05991	clean, bright
970913	1730	f	74.5	orange	n	n05992	old healed dorsal scar
970913	1730	f	78.0	orange	n	n05993	lateral abrasions
970913	1730	f	67.5	orange	n	n05994	clean
970913	1730	f	73.5	orange	n	n05995	clean, bright
970913	2031	m	76.5	orange	n	n05996	clean
970914	1400	f	75.0	orange	n	n05997	minor scars both sides
970914	1400	f	79.5	orange	n	n05998	minor lateral abrasions, lower jaw lesions
970914	1400	f	73.5	orange	n	n05999	lateral predator abrasions both sides
970914	1400	f	70.0	orange	n	n06000	old scar left side
970914	1845	f	69.0	orange		CDFO-SEP 00108	RECAPTURE, clean, bright
970914	1845	f	69.0	orange	n	n07102	gillnet marks, old healed patch on head
970914	1845	f	65.0	orange	n	n07103	caudal damage, split left pectoral, lateral scars, nose abrasions
970915	1300	f	68.5	orange	n	n07104	very skinny, lateral abrasions
970915	1815	m	90.5	orange	n	n07105	scar 20 cm left side
970915	1815	f	71.0	orange	n	n07106	minor gillnet marks, bruised lower tail, split anal, abrasions on sides
970915	1815	f	76.0	orange	n	n07107	minor abrasions on sides
970915	1815	f	75.5	orange	n	n07108	gillnet marks
970915	1815	m	77.5	orange	n	n07109	clean, bright
970915	1815	f	70.5	orange	n	n07110	clean
970915	1815	f	73.0	orange	n	n07111	coloured, dark
970915	1815	f	73.0	orange	n	n07112	head and nose abrasions
970915	1815	f	71.0	orange	n	n07113	possible hook scar
970915	1815	m	79.0	orange	n	n07114	bad large white lesion on head, lower caudal damage, gillnet marks
970915	1815	m	74.5	orange	n	n07115	clean
970915	1815	f	73.0	orange	n	n07116	old scars right side
970915	1815	f	67.0	orange	n	n07117	clean
970915	1815	f	74.0	orange	n	n07118	gillnet marks, left lateral abrasions
970915	1815	f	70.0	orange	n	n07119	clean, bright
970915	1815	m	77.5	orange	n	n07120	dark, thick (well conditioned)

Date (yyymmdd)	Time	Sex	Fork Length (cm.)	Tag Colour	Tag Letter	Tag Number	Comments
970915	1815	f	74.0	orange	n	n07121	caudal damage- missing parts
970915	1815	f	78.0	orange	n	n04526	lateral abrasions left side
970916	1000	f	71.0	orange	n	n04527	clean, bright
970916	1945	m	92.0	orange	n	n04528	dark red sides, dorsal fin cut,
970916	1945	f	72.5	orange	n	n04529	gillnet marks, hook damage
970916	1945	m	79.5	orange	n	n04530	dark, no marks
970916	1945	m	53.5	orange	n	n04531	clean, sex uncertain
970916	1945	m	82.5	orange	n	n04532	lateral abrasions both sides
970916	1945	f	78.0	orange	n	n04533	left side scar 20 cm, gillnet marks, dorsal fin cut
970916	1945	m	83.0	orange	n	n04534	large kype, dark
970916	1945	f	77.0	orange	n	n04535	scar left side 10 cm, nasty hook scar bottom right jaw
970916	1945	f	71.5	orange	n	n04536	abrasions on tip of nose and dorsal
970916	1945	m	88.5	orange	n	n04537	nose abrasion, mouth bleeding
970916	1945	f	88.0	orange	n	n04538	split dorsal, minor lateral abrasions
970916	1945	f	74.5	orange	n	n04539	left pelvic fin abrasion
970916	1945	m	78.5	orange	n	n04540	dark, no marks
970916	1945	m	73.0	orange	n	n04541	marks on head
970916	1945	f	68.5	orange	n	n04542	bruised dorsal left lateral abrasion
970916	1945	f	68.0	orange	n	n04543	clean
970916	1945	f	79.0	orange	n	n04544	clean
970916	1945	m	76.5	orange	n	n04545	clean, bright
970916	1945	f	69.0	orange	n	n04546	blood from tag hole
970916	1945	f	69.0	orange	n	n04547	clean, bright
970918	1600	f	72.0	orange	n	n04548	dark, left operculum scrape, bottom caudal damage
970919	1345	f	73.5	orange	n	n04549	right lateral abrasion
970919	1745	m	86.5	orange	n	n04550	bleeding from left gill
970919	1745	m	87.0	orange	n	n04676	seal bite-gash on lower caudal
970919	1745	f	68.5	orange	n	n04677	bad gillnet marks in dorsal fin area
970919	1745	f	71.0	orange	n	n04678	left maxilla deformed, grown into mouth
970919	1745	f	79.5	orange	n	n04679	bright end of nose abrasion
970919	1745	m	77.0	orange	n	n04680	dark red side, no scars
970919	1745	f	67.0	orange	n	n04681	left lateral fungus patch
970920	1830	f	75.5	orange	n	n04682	top one quarter of tail missing
970920	1830	f	78.0	orange	n	n04683	clean, no marks
970920	1830	f	73.0	orange	n	n04684	gillnet marks, split dorsal fin
970920	1830	f	69.5	orange	n	n04685	gillnet marks, left lateral abrasions
970920	1830	f	73.0	orange	n	n04686	minor abrasions both sides
970920	1830	m	78.0	orange	n	n04687	dark
970920	1830	m	74.0	orange	n	n04688	old scar right side, minor tail cut
970920	1830	m	86.0	orange	n	n04689	dark, kype highly developed
970920	1830	f	71.5	orange	n	n04690	hook mark lower right jaw
970920	1830	f	72.5	orange	n	n04691	abrasions left side, minor gillnet marks, hook marks
970920	1830	f	72.5	orange	n	n04692	clean
970920	1830	f	71.0	orange	n	n04693	scrapes on head
970920	1830	f	84.0	orange	n	n04694	hook mark upper right jaw
970920	1830	f	78.5	orange	n	n04695	clean
970920	1830	f	73.5	orange	n	n04696	blood from right gills, dorsal fin split
970920	1830	f	72.0	orange	n	n04697	gillnet marks
970920	1830	f	71.0	orange	n	n04698	minor left abrasions
970920	1830	f	72.0	orange	n	n04699	left side abrasions

Date (yymmdd)	Time	Sex	Fork Length (cm.)	Tag Colour	Tag Letter	Tag Number	Comments
970920	1830	f	73.5	orange	n	n04700	deformed discolored hump between head and dorsal
970920	1830	f	72.0	orange	n	n08051	seal gash pelvic to anal right side, has fungus
970920	1830	f	73.5	orange	n	n08052	clean
970920	1830	f	69.5	orange	n	n08053	head and left side abrasions
970920	1830	f	72.5	orange	n	n08054	dark, no marks
970920	1830	f	72.0	orange	n	n08055	clean, bright
970920	1830	m	74.0	orange	n	n08056	tired,, trapped in weird position in back of trap box
970921	1600	m	83.5	orange	n	n08057	dark, no marks
970921	1600	m	90.0	orange	n	n08058	abrasions head and operculum, minor from gills
970921	1600	m	71.5	orange	n	n08059	dark, thin-skinny
970921	1600	m	79.0	orange	n	n08060	clean
970921	1600	f	78.5	orange	n	n08061	dorsal and lateral punctures from seal bite, has fungus and was bleeding
970921	1900	f	71.5	orange	n	n08062	old predator scar right side
970921	1900	m	78.5	orange	n	n08063	clean, bright
970921	1900	f	76.0	orange	n	n08064	clean, bright
970921	1900	f	74.0	orange	n	n08065	no marks
970921	1900	f	81.0	orange	n	n08066	clean, bright
970921	1900	f	70.5	orange	n	n08067	clean, bright
970921	1900	m	86.5	orange	n	n08068	scrapes right side by anal fin
970921	1900	f	70.0	orange	n	n08069	dorsal split
970921	1900	f	75.5	orange	n	n08070	clean, bright
970921	1900	f	69.0	orange	n	n08071	clean, bright
970921	1900	f	72.0	orange	n	n08072	clean, bright
970921	1900	f	68.5	orange	n	n08073	mark behind head, bruised fungused scar
970921	1900	f	78.0	orange	n	n08074	abrasions right side
970921	1900	f	68.5	orange	n	n08075	head abrasions
970921	1900	f	72.5	orange	n	n08076	scrapes on head, ulcerated wound bottom of tail
970921	1900	f	73.0	orange	n	n08077	clean, bright
970921	1900	f	72.0	orange	n	n08078	scrapes right operculum, abrasions left side
970921	1900	f	68.5	orange	n	n08079	dime sized white scrape on head
970921	1900	f	70.0	orange	n	n08080	clean, bright
970921	1900	f	70.0	orange	n	n08081	abrasion left side
970922	1825	f	81.0	orange	n	n08082	dark, rub marks on pelvic fins
970922	1825	m	81.0	orange	n	n08083	dark, no marks
970922	1825	f	77.0	orange	n	n08084	clean, no marks
970922	1825	f	72.0	orange	n	n08085	minor top of tail damage
970922	1825	f	75.0	orange	n	n08086	minor gillnet marks and operculum scrapes
970922	1825	m	76.0	orange	n	n08087	minor head scrapes
970922	1825	m	88.5	orange	n	n08088	gillnet marks, adipose gone (old DNA sample??)
970922	1825	f	73.0	orange	n	n08089	gillnet marks, old abrasions both sides
970922	1825	m	76.0	orange	n	n08090	tail split, left 10 cm old scar
970922	1825	m	80.0	orange	n	n08091	3 minor - dime sized head, dorsal/tail wounds
970922	1825	f	64.5	orange	n	n08092	gillnet marks, two dorsal splits
970922	1825	f	73.5	orange	n	n08093	clean, no marks
970922	1825	m	88.5	orange	n	n08094	dark, no marks
970922	1825	f	69.5	orange	n	n08095	bright, lots of spots, dorsal fin split
970922	1825	m	82.5	orange	n	n08096	clean, bright

Date (yymmdd)	Time	Sex	Fork Length (cm.)	Tag Colour	Tag Letter	Tag Number	Comments
970922	1825	f	73.0	orange	n	n08097	gillnet marks, operculum scrapes
970922	1825	f	71.0	orange	n	n08098	no marks, clean
970922	1825	f	77.5	orange	n	n08099	clean, bright
970922	1825	f	70.0	orange	n	n08100	right pectoral split, minor bruising top of tail
970922	1825	m	83.0	orange	n	n08039	old left scar between anal and dorsal
970922	1825	f	75.5	orange	n	n08040	bleeding from tag hole
970922	1825	f	73.0	orange	n	n08041	minor head and right side abrasions
970922	1825	f	70.5	orange	n	n08042	no spots, split dorsal
970922	1825	f	74.0	orange	n	n08043	clean, bright
970922	1825	f	74.0	orange	n	n08044	bad gillnet marks
970922	1825	f	75.0	orange	n	n08045	minor abrasions both sides
970922	1825	f	76.0	orange	n	n08046	10 cm seal bite right site, minor one left side
970922	1825	f	70.0	orange	n	n08047	clean, no marks
970922	1825	f	71.0	orange	n	n08048	clean, bright
970922	1825	f	67.0	orange	n	n08049	clean, bright
970922	1825	m	74.0	orange	n	n08050	dark, no marks
970922	1825	f	79.0	orange	n	n08101	look'n fine
970922	1825	m	80.5	orange	n	n08102	dark, no marks
970922	1825	f	75.0	orange	n	n08103	old ventral predator scars
970922	1825	f	70.5	orange	n	n08104	minor abrasions both sides
970922	1825	f	70.5	orange	n	n08105	clean bright
970922	1825	f	74.0	orange	n	n08106	clean
970923	1000	f	75.0	orange	n	n08107	hook scar, split dorsal fin, split left pectoral, lots of abrasions both sides
970923	1000	m	77.0	orange	n	n08108	deformed right cleithrum
970923	1000	m	78.5	orange	n	n08109	two tail splits, multiple nose abrasions
970923	1000	f	72.5	orange	n	n08110	no marks
970923	1000	m	76.0	orange	n	n08111	old scar right side between adipose and dorsal fins
970923	1815	f	74.0	orange	n	n08112	clean, bright
970923	1815	f	70.5	orange	n	n08113	old abrasions rights side
970923	1815	f	76.5	orange	n	n08114	bright, split dorsal fin
970923	1815	f	76.5	orange	n	n08115	old left abrasions
970923	1815	f	73.0	orange	n	n08116	split dorsal fin, top of tail gone, tail splits
970923	1815	f	70.0	orange	n	n08117	clean, few spots
970923	1815	m	72.0	orange	n	n08118	predator scar right side anterior to pelvics, operculum scrapes
970923	1815	m	85.0	orange	n	n08119	new tail growth, dark red lateral colouration, nose/jaw abrasions
970923	1815	f	75.0	orange	n	n08120	nose abrasions, bright
970924	950	m	74.0	orange	n	n08121	dark, no marks
970924	950	f	74.0	orange	n	n08122	minor head scrape, damage to adipose
970924	950	m	89.5	orange	n	n08123	dorsal, caudal, adipose splits and wear, abrasions on sides/chin/pectorals
970924	950	m	79.0	orange	n	n08124	nose worn away, tail edges worn (rounded)
970924	950	m	88.0	orange	n	n08125	right side jaw- hook scar and eye loss
970924	1830	f	79.0	orange	n	n08126	head and operculum scrapes
970924	1830	m	82.5	orange	n	n08127	gillnet marks, old lateral scars both sides
970924	1830	m	91.0	orange	n	n08128	nose abrasions, small scar near right operculum
970924	1830	m	87.5	orange	n	n08129	red colouration, old scars both sides
970924	1830	m	88.0	orange	n	n08130	bright, left side old scars
970924	1830	m	86.5	orange	n	n08131	minor dorsal splits, head and operculum scrapes
970924	1830	m	74.5	orange	n	n08132	red no marks

Date (yyymmdd)	Time	Sex	Fork Length (cm.)	Tag Colour	Tag Letter	Tag Number	Comments
970924	1830	m	86.0	orange	n	n08133	dark, tail and dorsal splits
970924	1830	f	69.0	orange	n	n08134	right operculum scrapes, nose abrasions
970924	1830	m	89.5	orange	n	n08135	dark, big slab
970924	1830	m	80.0	orange	n	n08136	abrasions- nose and right side
970924	1830	m	75.0	orange	n	n08137	gillnet marks, tail and dorsal splits
970924	1830	f	73.0	orange	n	n08138	ventral seal bite in front of pelvics- healing
970924	1830	f	74.5	orange	n	n08139	clean, no marks
970924	1830	f	79.5	orange	n	n08140	quarter sized scar right side, 5 cm seal gash left side- healing
970924	1830	f	71.0	orange	n	n08141	piece missing from tail, nose and jaw with net marks
970924	1830	f	69.0	orange	n	n08143	gillnet marks, split dorsal and tail
970924	1830	f	72.0	orange	n	n08142	our net broke- fish was caught anterior to dorsal as in a gill net, lot of scale loss
970924	1830	f	72.0	orange	n	n08144	bright, left side scar 5 cm
970924	1830	f	70.0	orange	n	n08145	gillnet marks, dorsal fin scrapes
970924	1830	f	77.5	orange	n	n08146	old predator scars both sides
970924	1830	f	74.0	orange	n	n08147	multiple nose/head abrasions, predator scar right side
970924	1830	m	76.5	orange	n	n08148	dark, anal fin damage
970924	1830	f	71.0	orange	n	n08149	old predator scars both sides
970924	1830	m	85.0	orange	n	n08150	hook scar upper right jaw, old predator scar on right side near dorsal
970924	1830	f	71.0	orange	n	n08151	nose and dorsal fin abrasions
970924	1830	f	72.0	orange	n	n08152	old predator scar left
970924	1830	m	75.0	orange	n	n08153	dark, no marks
970924	1830	f	75.0	orange	n	n08154	clean, bright
970924	1830	f	73.5	orange	n	n08155	wear on belly anterior to pelvics, bright
970924	1830	f	78.5	orange	n	n08156	clean, bright
970924	1830	f	70.0	orange	n	n08157	minor head and operculum abrasions
970924	1830	f	73.0	orange	n	n08158	clean, bright
970924	1830	f	73.0	orange	n	n08159	bright, split dorsal
970924	1830	f	70.5	orange	n	n08160	clean, bright
970924	1830	f	78.0	orange	n	n08161	2 large scrapes on head
970924	1830	f	64.0	orange	n	n08162	clean
970924	1830	f	71.0	orange	n	n08163	lower tail gone, healed
970924	1830	f	71.5	orange	n	n08164	clean, bright
970924	1830	f	71.0	orange	n	n08165/6	double tagged, gillnet marks, bright
970924	1830	m	76.5	orange	n	n08167	bright, operculum scrapes both sides
970924	1830	f	68.0	orange	n	n08168	clean, bright
970925	1035	f	67.5	orange	n	n08169	top-o-tail deformed, bright
970925	1035	m	76.0	orange	n	n08170	abrasions both sides and on head
970925	1035	f	75.0	orange	n	n08171	bright, marked up adipose
970925	1035	f	83.0	orange	n	n08172	old, almost healed predator scar on right side parallel to anal fin
970925	1035	f	77.0	orange	n	n08173	left side scar 40 cm X 1 cm- healed-scale regeneration
970925	1035	f	65.5	orange	n	n08174	chrome bright, clean
970925	1830	f	72.0	orange	n	n08175	dark, minor head/ dorsal fin abrasions
970925	1830	f	71.0	orange	n	n08201	gillnet marks, bright
970925	1830	f	68.5	orange	n	n08202	tag bleeder, dorsal and tail splits
970925	1830	m	78.5	orange	n	n08203	dark
970925	1830	f	74.5	orange	n	n08204	old lateral abrasions
970925	1830	f	65.5	orange	n	n08205	bright, predator scar healed on right side
970925	1830	m	78.0	orange	n	n08206	dark, lots of wear around kype

Date (yyymmdd)	Time	Sex	Fork Length (cm.)	Tag Colour	Tag Letter	Tag Number	Comments
970925	1830	f	73.0	orange	n	n08207	clean, bright
970925	1830	f	77.0	orange	n	n08208	gillnet marks, split lower tail
970925	1830	m	90.0	orange	n	n08209	2 tail and 1 dorsal split
970925	1830	f	74.0	orange	n	n08210	bright, no marks
970925	1830	m	85.0	orange	n	n08211	red, no marks
970925	1830	f	73.5	orange	n	n08212	tiny abrasions on dorsal fin, large abrasion right side
970925	1830	f	77.0	orange	n	n08213	clean, bright
970925	1830	m	88.5	orange	n	n08214	red, no marks
970925	1830	f	70.5	orange	n	n08215	clean, bright, lots of spots
970925	1830	f	73.0	orange	n	n08216	dark no marks, split dorsal, tail wear
970925	1830	f	73.5	orange	n	n08217	bright, lots of old predator scars
970925	1830	f	75.0	orange	n	n08218	5 cm predator scar left side
970925	1830	f	75.5	orange	n	n08219	dime sized scar on top of head
970925	1830	f	72.0	orange	n	n08220	bad head scrape, new tail growth
970925	1830	m	88.5	orange	n	n08221	red, dark
970925	1830	m	75.0	orange	n	n08222	dark, two old predator scars right side
970925	1830	f	76.0	orange	n	n08223	bright, healed adipose damage
970925	1830	f	75.0	orange	n	n08224	gillnet marks, head and top of tail abrasions
970925	1830	f	78.0	orange	n	n08225	scars, right side
970925	1830	f	74.0	orange	n	n08226	split tail minor left side abrasions
970925	1830	f	68.5	orange	n	n08227	clean, bright, adipose deformed
970925	1830	f	73.0	orange	n	n08228	old predator scar right side anterior to pelvics
970925	1830	f	72.0	orange	n	n08229	minor head abrasions, bright
970925	1830	f	65.5	orange	n	n08230	bad gillnet marks, split dorsal, found pinned in rear of trap box
970926	940	m	80.0	orange	n	n08231	dark, no marks
970926	940	f	77.5	orange	n	n08232	clean, bright
970926	940	f	74.0	orange	n	n08233	bright, small cut on nose
970926	940	m	94.0	orange	n	n08234	dark, no marks
970926	1820	f	72.0	orange	n	n08235	posterior to anal fin lots of seal bite damage
970926	1820	m	86.5	orange	n	n08236	top of tail deformed, old scar dorsal, 2 loonie sized seal gashes on belly (open wounds)
970927	1000	f	72.5	orange	n	n08237	abrasions right side, bright
970927	1845	f	80.0	orange	n	n08238	DNA, Scales #52, deformed top of tail, old predator scars left side near adipose
970927	1845	f	72.5	orange	n	n08239	DNA, Scales #53, clean, bright
970927	1845	f	61.5	orange	n	n08240	deformed body (electroshocked when young?) picture #4 roll #6
970927	1845	f	73.0	orange	n	n08241	bright, right operculum scrapes, hook scar through left eye
970927	1845	f	69.0	orange	n	n08242	DNA, Scales #54, bright, old predator scar right side
970927	1845	m	90.0	orange	n	n08243	DNA, Scales #55, lower tail damage, red
970927	1845	f	73.0	orange	n	n08244	DNA, Scales #56, healed predator scar anterior to pelvics- both sides
970927	1845	f	76.0	orange	n	n08245	DNA, Scales #57, badly split dorsal fin, head and operculum scrapes, tired
970927	1845	f	69.0	orange	n	n08246	DNA, Scales #58, bright, dime-seize ulcer on back with fungus
970927	1845	m	82.0	orange	n	n08247	gillnet marks, ripped left operculum, possible old DNA, Scales sample from adipose
970927	1845	f	76.0	orange	n	n08248	DNA, Scales #59, clean, bright
970927	1845	m	73.0	orange	n	n08249	lower tail missing, dark
970927	1845	f	70.0	orange	n	n08250	split dorsal, bright
970927	1845	f	75.0	orange	n	n08251	DNA, Scales #60, clean, bright

Date (yyymmdd)	Time	Sex	Fork Length (cm.)	Tag Colour	Tag Letter	Tag Number	Comments
970928	1015	f	77.5	orange	n	n08252	gillnet marks
970928	1015	f	78.0	orange	n	n08253	bright, split dorsal, minor tail damage
970928	1808	f	69.0	orange	n	n08254	DNA, Scales #61, minor head abrasions
970928	1808	f	69.5	orange	n	n08256	DNA, Scales #62, clean, bright
970928	1808	f	83.0	orange	n	n08258	clean, bright
970928	1808	f	70.0	orange	n	n08259	DNA, Scales #63, minor abrasions top of head
970928	1808	f	68.0	orange	n	n08260	DNA, Scales #64, left operculum scrape, bruised tail
970928	1808	m	77.0	orange	n	n08261	DNA, Scales #65, red, clean
970928	1808	f	72.0	orange	n	n08262	predators scars dorsal area, abrasions both sides
970928	1808	f	72.0	orange	n	n08263	DNA, Scales #66, minor abrasions both sides
970928	1808	f	74.0	orange	n	n08264	DNA, Scales #67, clean, bright
970929	1030	m	76.5	orange	n	n08265	head and operculum scrapes, minor abrasions right side
970929	1030	m	90.0	orange	n	n08266	DNA, Scales #68, piece of lower tail missing loonie sized scrape on head
970929	1030	f	76.0	orange	n	n08267	DNA, Scales #69, clean, bright
970929	1030	f	75.0	orange	n	n08268	DNA, Scales #70, old predator scar posterior to pelvics
970929	1030	m	87.0	orange	n	n08269	damaged right eye with fungus, no hook scar
970929	1030	f	74.5	orange	n	n08270	DNA, Scales #71, clean, bright
970929	1030	f	74.0	orange	n	n08271	clean, bright
970929	1030	f	79.5	orange	n	n08272	clean, bright
970929	1846	f	71.0	orange	n	n08273	clean, bright
970930	1000	f	72.0	orange	n	n08274	small dorsal scar right side
970930	1000	f	72.5	orange	n	n08275	operculum scrapes both sides, right side predator scar near dorsal
970930	1000	f	76.0	orange	n	n08276	old predator scar on tail, hook scar left side
970930	1000	f	73.0	orange	n	n08277	abrasions right side'
970930	1825	m	74.5	orange	n	n08278	caudal damage
970930	1825	m	78.5	orange	n	n08279	open wound dorsal, damaged operculum

Appendix Table 8. Bull trout data.

Date (yyymmdd)	Location	Sex	Fork Length (cm)	DNA Vial #	Fin Env. #	Picture	Branch.	Comments
970801	Sustut River	?	44.0	8	8	1R-1	n/a	angled below fence, possible teeth marks fro chinook on side
970801	Sustut River	?		9	9	n/a	n/a	angled, yellow spot on ventral surface between pelvic fins
970801	Sustut River	?	46.0	10	10	n/a	n/a	angled has been sampled in previous years, left pelvic clip and adipose clip
970804	Sustut Fence	?	44.0	8	8	n/a	n/a	migrated through trap box released u/s, sampled on August 1, 1997
970810	Johanson Creek Outlet	m	58.0	11	11	4,5R-3	n/a	angled at Johanson Creek outlet
970810	Johanson Creek Outlet	f	57.5	12	12	6,7R-3	n/a	angled at Johanson Creek outlet



Date (yyymmdd)	Location	Sex	Fork Length (cm)	DNA Vial #	Fin Env. #	Picture	Branch.	Comments
970810	Johanson Creek Outlet	?	37.5	13	13	8R-3	n/a	angled at Johanson Creek outlet
970815	Sustut Fence	?	38.0	21	21	16R-3	n/a	angled, yellow spot on ventral just behind left pelvic
970815	Johanson Creek Outlet	f	51.0	22	22	17R-3	n/a	angle sample
970817	Sustut Fence	?		9	9	24,25R-3	n/a	migrated through trap box released u/s, sampled also on August , 1997
970817	Sustut Fence	f	62.0	23	23	21,22,R-3	n/a	thin coat of fungus on body, swimming in front of fence for two days.
970818	Sustut Fence	?	50.0	25	25	26R-3	n/a	died holding pen, gilled in dowels, otoliths collected
970820	Sustut Fence	m	39.0	26	26	5R-4	n/a	angle sample
970820	Sustut Fence	?	34.0	28	28	7R-4	n/a	angle sample mort, otoliths collected
970820	Sustut Fence	?	37.0	29	29	8R-4	n/a	angle sampled
970820	Sustut Fence	?	38.5	30	30	9R-4	n/a	appeared to have been previously sampled, adipose clip
970821	Sustut Fence	?	27.5	33	33	13R-4	n/a	angle sampled
970827	Sustut Fence							Note: two BT migrated u/s through trap box no inf. collected
970902	Sustut Fence	?	43.0	35	35	20,21-R4	25	dead on fence
970903	Sustut Fence	?	38.0	n/a	n/a	n/a	n/a	migrated through trap box u/s
970904	Sustut Fence	?	40.5	36	37	1,2R-5	n/a	u/s migrant, strange spot pattern with rounded tai, possible hybrid?
970906	Sustut Fence	m?	42.0	n/a	n/a	n/a	n/a	large adipose, bit of a kype, ventral orange, u/s migrant
970908	Sustut Fence	?	42.0	n/a	n/a	n/a	n/a	u/s migrant
970909	Sustut Fence	f	51.0	n/a	n/a	n/a	n/a	u/s migrant
970909	Sustut Fence	f	57.0	n/a	n/a	n/a	n/a	old sampled DNA-pelvic and adipose, u/s migrant
970910	Sustut Fence	f	53.5	n/a	n/a	n/a	n/a	u/s migrant
970910	Sustut Fence	?	44.0	n/a	n/a	n/a	n/a	u/s migrant
970912	Sustut Fence	f	53.5	39	40	n/a	26	died between rear dowels rear of trap box, otoliths taken, old DNA sample pelvic and adipose
970916	Sustut Fence	m	57.5	n/a	n/a	n/a	n/a	ripe possibly spawned male, fungus on head adipose and tail, washed up on fence in am

Date (yymmdd)	Location	Sex	Fork Length (cm)	DNA Vial #	Fin Env. #	Picture	Branch.	Comments
970916	Fence Trap Box	m	47.5	41	42	n/a	26	no parasites/15 cm vertebral column in stom, died in rear of trap box
970916	Fence Trap Box	?	49.0	n/a	n/a	n/a	n/a	died in trap box, decomposed
970916	Fence Trap Box	?	45.5	n/a	n/a	n/a	n/a	u/s migrant
970916	Fence Trap Box	?	47.0	n/a	n/a	n/a	n/a	u/s migrant
970917	Sustut Fence	m	48.0	42	42	7R-5	26	larval leaches? in intestine/rd. worms in swim bladder/otoliths taken/ mort in fence
970918	Sustut Fence	m	44.0	43	43	22R5	24	died in trap box/rd worms in swim bladder/empty stomach
970918	Sustut Fence	f	46.0	n/a	n/a	n/a	n/a	u/s migrant
970919	Sustut Fence	?	48.5	n/a	n/a	n/a	n/a	u/s migrant, clean no marks
970920	Sustut Fence	m	49.5	44	44	24(TOP)R-5	25	otoliths, died on fence overnight, rd worms in swim bladder, eating salmon eggs
970920	Sustut Fence	m	55.0	45	45	24(MID)R-5	27	otoliths, tapeworms in intestine, rd worms in swim bladder, stom. empty, died in rear dowels- trap box
970920	Sustut Fence	m	49.0	46	46	24(BOT)R-5	n/a	otoliths, tapeworms in intestine, rd worms in swim bladder, stom. 1 caterpillar, died in rear dowels- trap box
970921	Sustut Fence	n/a	n/a	n/a	n/a	n/a	n/a	washed d/s through fence panels
970922	Sustut Fence	m	49.0	n/a	n/a	n/a	n/a	MT, large dev. kype & adipose, orange belly coloration
970924	Sustut Fence	?	45.5	n/a	n/a	n/a	n/a	u/s migrant, old tail scar
970924	Sustut Fence	m	43.0	n/a	n/a	n/a	n/a	u/s migrant, org. ventral. colour, small kype, MT
970925	Sustut Fence	?	42.0	n/a	n/a	n/a	n/a	u/s migrant
970927	Sustut Fence	m	46.0	48	49	3R-6	26	died in rear dowels trap box, stom empty, no parasites
970928	Sustut Fence	m	~48.0	n/a	n/a	n/a	n/a	u/s migrant, escaped before measured, dev. kype, orange ventral color
970929	Sustut Fence	f	45.5	n/a	n/a	n/a	n/a	u/s migrant
970930	Sustut Fence	?	46.0	n/a	n/a	n/a	n/a	u/s migrant

Appendix Table 9. Rainbow trout data

Date (yymmdd)	Location	Sex	Fork Length (cm)	DNA Vial #	Scale Env. #	Picture	Comments
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Date (yymmdd)	Location	Sex	Fork Length (cm)	DNA Vial #	Scale Env. #	Picture	Comments
970802	Sustut Fence	?	n/a	n/a	n/a	n/a	rbt/sthd smolt?, u/s migrant
970805	Sustut Fence	?	n/a	n/a	n/a	n/a	2 rbt/sthd smolt? u/s migrant
970812	Sustut Fence	?	43.0	14	14	9R-3	angle sampled at fence
970812	Sustut Fence	?	28.5	15	15	10R-3	angle sampled at fence
970812	Sustut Fence	m	35.5	16	16	11R-3	angle sample mort, fresh water lice on pectoral, stom. content = 1 beetle, 1 mayfly nymph
970812	Sustut Fence	?	41.5	17	17	12R-3	angle sample at fence
970812	Sustut Fence	?	37.5	18	18	13R-3	angle sample at fence
970814	Sustut Fence	?	32.5	19	19	14R-3	angle sample at fence
970814	Sustut Fence	?	28.0	20	20	15R-3	angle sample at fence
970817	Sustut Fence	?	44.0	24	24	23R-3	u/s migrant
970820	Sustut Fence	f	37.0	27	27	6R-4	angle sample at fence
970820	Sustut Fence	?	29.0	31	31	10R-4	angle sample at fence
970820	Sustut Fence	?	26.0	32	32	11R-4	angle sample at fence
970826	Sustut Fence	?	43.0	34	34	15R-4	u/s migrant
970901	Sustut Fence	?	34.0	37	37	n/a	angled adjacent to fence
970907	Sustut Fence	?	38.5	38	38	3R-5	angled behind trap box
970913	Sustut Fence	?	38.0	40	40	5R-5	angled adjacent to fence
970922	Sustut Fence	m	37.5	47	47	25R-5	developed kype and dark spawning colors, u/s migrant

Appendix Table 10. Arctic grayling data.

Date (yymmdd)	Location	Sex	Fork Length (cm)	DNA Vial #	Picture	Comments
970831	Firesteel River	?	37.0	1	Y	angled, DNA, scales
970831	Firesteel River	?	32.0	2	N	angled, DNA, scales

Appendix Table 11. Coho salmon DNA and scale samples

Date (yymmdd)	Sex	Fork Length (cm)	Length P.O.H	DNA Sample #	Scale Book # and Position	Scale Envelope	Comments
970901	m	74.0	n/a	1	40632 1-21R		chrome/clean
970903	m	54.0	n/a	1	40632 1-21L		chrome/clean
970905	m	74.0	n/a	1	40632 2-22R		dark fish, large hook nose- holy huge adipose, see Cory Williamson for personal picture
970912	m	52.5	n/a	1	40633 2-22L		small bright fish/ has scale parasite
970923	m	50.0	n/a	1	40634 3-23R		no scars, marks

970924	m	53.0	n/a	1	40635 3-23L	found dead on fence panels, unsampled, hook marks, Note-not counted in daily totals
970927	m	51.0	n/a	1	40636 4-24R	found dead on fence panels, unsampled, clean, Picture 2R-6, Note- not counted in daily totals

Appendix Table 12. Sockeye salmon DNA and scale samples.

Date (yyymmdd)	Sex	Fork Length (cm)	Length P.O.H	DNA Sample #	Scale Book # and Position	Scale Envelope	Comments
970808	m	71.0	58.5	1		1	
970809	m	70.0	56.0	2		2	
970809	m	71.0	57.0	3		3	
970809	f	67.5	56.0	4		4	
970809	m	65.5	52.5	5		5	
970809	m	68.0	55.5	6		6	
970809	m	67.0	55.5	7		7	
970809	m	67.0	54.0	8		8	
970810	f	70.0	59.0	9		9	
970810	m	72.0	59.0	10		10	
970810	m	64.0	52.5	11		11	
970810	f	65.0	54.5	12		12	
970811	m	69.5	57.5	13		13	
970811	m	67.0	54.5	14		14	
970811	m	71.0	58.0	15		15	
970811	m	70.0	58.0	16		16	
970811	f	64.5	53.5	17		17	
970811	f	60.0	50.5	18		18	
970812	m	70.5	56.5	19		19	
970812	m	69.5	57.5	20		20	
970812	f	66.0	57.5	21		21	
970813	m	72.0	59.0	22		22	
970813	f	65.5	56.0	23		23	
970815	m	74.5	58.5	24		24	
970815	m	68.0	56.5	25		25	
970816	f	59.0	48.5	26		26	
970816	f	66.0	55.0	27		27	
970817	f	56.5	48.0	28		28	
970817	f	65.5	54.5	29		29	
970818	f	64.0	53.0	30		30	
970818	m	70.0	57.0	31		31	
970819	f	63.5	54.0	32		32	
970820	f	67.5	56.5	34		34	
970820	f	57.0	48.0	35		35	
970821	f	61.5	51.5	36		36	
970821	f	65.5	55.0	37		37	
970823	m	71.5	58.5	38		38	
970823	m	60.0	49.0	39		39	
970823	f	59.0	49.5	40		40	
970823	m	64.5	53.5	41		41	
970824	m	70.0	58.0	42		42	
970824	f	56.5	46.5	43		43	
970825	f	67.5	57.0	44		44	
970825	m	68.5	55.5	45		45	
970826	m	66.5		Aug-26			
970826	f	63.7		Aug-26	40636 1-21R		
970826	m	70.5		Aug-26	40636 1-21L		
970826	m	65.0		Aug-26	40636 2-22R		
970827	f	63.0		Aug-26			Pre-spawn mort

Date (yymmdd)	Sex	Fork Length (cm)	Length P.O.H	DNA Sample #	Scale Book # and Position	Scale Envelope	Comments
970828	m	71.0		Aug-26	40636 2-22L		
970829	f	63.0		Aug-26	40636 3-23R		
970830	m	64.5		Aug-26	40636 3-23L		
970830	m	67.5		Aug-26	40634 1-21R		
970830	m	70.5		Aug-26			No Scales
970830	m	66.0		Aug-26			No Scales
970831	m	66.0		Aug-26	40634 1-21L		
970901	f	73.5		Sep-01	40633 1-21R		
970902	m	68.0		Sep-01	40633 1-21L		
970902	m	70.0		Sep-01	40633 2-22R		
970902	f	67.0		Sep-01	40633 2-22L		
970902	f	65.0		Sep-01	40633 3-23R		
970904	m	69.0		Sep-01	40633 3-23L		
970904	m	69.0		Sep-01	40633 4-24R		
970905	m	71.0		Sep-01	40633 4-24L		
970906	m	66.0		Sep-01	40633 5-25R		
970906	f	63.5		Sep-01	40633 5-25L		
970907	m	69.0		Sep-01	40631 1-21R		
970907	f	59.0		Sep-01	40631 1-21L		
970908	f	66.5		Sep-08	40631 2-22R		
970908	f	67.0		Sep-08	40631 2-22L		
970909	m	73.0		Sep-08	40631 3-23R		
970910	m	64.0		Sep-08	40631 3-23L		
970911	m	67.5		Sep-08	40631 4-24R		
970911	m	69.5		Sep-08	40631 4-24L		
970912	m	71.0		Sep-08	40631 5-25R		
970912	m	64.5		Sep-08	40631 5-25L		
970913	f	64.5		Sep-08	40630 1-21R		
970913	f	68.0		Sep-08	40630 1-21L		
970914	m	69.0		Sep-08	40630 2-22R		
970914	f	64.0		Sep-08	40630 2-22L		
970915	m	66.0		Sep-15	40630 3-23R		
970915	m	70.5		Sep-15	40630 3-23L		
970916	f	62.0		Sep-15	40630 4-24R		
970916	f	63.0		Sep-15	40630 4-24L		
970917	m	67.0		Sep-15	40630 5-25R		
970917	f	66.0		Sep-15	40630 5-25L		
970918	f	63.5		Sep-15	40629 1-21R		
970918	m	63.0		Sep-15	40629 1-21L		
970919	m	67.0		Sep-15	40629 2-22R		
970919	f	60.5		Sep-15	40629 2-22L		
970920	f	61.0		Sep-15	40629 3-23R		
970920	f	62.0		Sep-15	40629 3-23L		
970921	m	65.0		Sep-15	40629 4-24R		
970921	m	65.0		Sep-15	40629 4-24L		
970922	f	65.0		Sep-22	40629 5-25R		
970923	m	65.0		Sep-22	40629 5-25L		
970923	m	65.0		Sep-22	40628 1-21R		
970924	f	65.5		Sep-22	40628 1-21L		
970927	f	64.5		Sep-22	40628 2-22R		
970927	f	63.5		Sep-22	40628 2-22L		

Date (yymmdd)	Sex	Fork Length (cm)	Length P.O.H	DNA Sample #	Scale Book # and Position	Scale Envelope	Comments
970928	m	70.0		Sep-22	40628 3-23R		
970928	f	65.0		Sep-22	40628 3-23L		
970929	m	63.0		Sep-29	40628 4-24R		
970929	m	65.0		Sep-29	40628 4-24L		

Appendix Table 13. Chinook salmon DNA and scale samples.

Date (yymmdd)	Sex	Fork Length (cm)	Length P.O.H	DNA Sample #	Scale Book # and Position	Scale Envelope	Comments
970808	f	100.0		1		1	
970808	f	97.0		2		2	
970808	m	69.5		3		3	
970808	f	91.0	75.0	4		4	
970808	f	91.0	75.0	5		5	
970808	m	10.90	85.0	6		6	
970808	m	94.0	74.0	7		7	
970808	f	88.0	73.5	8		8	
970809	f	85.5	70.0	9		9	
970809	f	88.5	71.0	10		10	
970809	f	92.0	77.0	11		11	
970809	f	88.0	71.5	12		12	
970809	f	84.0	67.5	13		13	
970809	m	41.0	33.5	14		14	
970809	f	94.0	77.5	15		15	
970809	m	70.0	57.5	16		16	
970809	m	73.0	57.0	17		17	
970809	m	72.5	57.5	18		18	
970809	f	88.5	73.0	19		19	
970809	f	90.5	73.0	20		20	
970809	f	93.0	76.0	21		21	
970809	m	69.5	55.5	22		22	
970810	m	63.0	51.0	23		23	
970810	f	96.0	78.0	24		24	
970810	m	67.0	54.0	25		25	
970810	m	67.5	54.0	26		26	
970810	m	70.0	56.0	27		27	
970810	f	86.0	71.5	28		28	
970811	m	87.0	70.0	29		29	
970811	f	94.0	77.5	30		30	
970811	m	87.0	70.0	31		31	
970811	f	93.5	77.0	32		32	
970811	f	83.0	68.5	33		33	
970811	f	87.0	71.0	34		34	
970811	f	98.0	81.0	35		35	
970811	m	69.5	56.0	36		36	
970811	f	80.5	65.5	37		37	
970812	f	84.0	70.5	38		38	
970812	m	83.0	67.5	39		39	
970813	f	99.0	81.5	40		40	
970813	f	94.5	77.5	41		41	

Date (yymmdd)	Sex	Fork Length (cm)	Length P.O.H	DNA Sample #	Scale Book # and Position	Scale Envelope	Comments
970813	m	74.0	58.5	42		42	
970813	m	97.0	79.5	43		43	
970814	m	72.0	58.0	44		44	
970814	f	84.0	70.0	45		45	
970816	m	69.0	54.0	46		46	
970818	f	95.0	78.5	47		47	
970818	m	36.0	30.0	48		48	
970818	m	44.0	36.0	49		49	
970818	f	89.0	73.0	50		50	
970821	m	37.0	30.0	50		50	
970826	m	95.6	n/a	Aug-26		n/a	
970827	m	58.0	n/a	Aug-26		n/a	Mort
970827	m	57.3	n/a	Aug-26		n/a	Mort
970827	m	73.5	n/a	Aug-26		n/a	Mort
970828	m	59.0	n/a	Aug-26	40635 1-21R		
970829	m	68.0	n/a	Aug-26	40635 1-21L		