JUVENILE STEELHEAD SURVEYS

IN THE

SUSTUT RIVER 1993

Prepared by

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for

B.C. ENVIRONMENT

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SUMMARY

Surveys of juvenile steelhead abundance were conducted in the Sustut River and several tributaries during early September 1993. This is the third consecutive year that index surveys have been conducted in this system. In total, 36 sites were sampled.

Steelhead fry densities in the lower Sustut and Bear rivers were higher than in the past two years, but still below levels measured in the mid-1980's. Fry densities averaged 0.18 fry/m^2 in the lower reach of the Sustut and 0.45 fry/m^2 in the Bear River.

Steelhead fry densities in the upper three reaches of the Sustut River averaged just under 0.4 fry/m^2 and were slightly lower than 1992 levels. The highest fry densities in the entire Sustut system continue to occur in the reach from just upstream of Moosevale Creek downstream for approximately 7 km. For the first time in the three years of sampling, significant numbers of steelhead fry were found in the mid-reaches of the Sustut River upstream from the Bear River confluence. This suggests better seeding to these reaches from the upper Sustut River where most spawning occurs.

Fry estimates in Johanson Creek (0.15 fry/m^2) were up considerably from the previous two years, but overall densities are still relatively low with a spotty distribution in this system.

Steelhead parr densities in 1993 were similar to 1992 levels in the lower Sustut and down from 1992 levels in the upper river. The higher fry densities measured in the Sustut system in 1992 did not translate into higher parr abundance in the 1993 surveys. Overall, there was a decrease in age 1+ parr and an increase in age 2+ or older parr. Parr densities in all sections of the river were higher than in 1991, and emphasize how poor 1991 levels were. The highest parr densities (0.09 parr/m^2) again occurred in Reach 7 upstream from the Johanson Creek confluence.

If the upper Sustut is to be used as an index stream for Skeena River steelhead, then juvenile surveys should be continued in an effort to relate adult spawner estimates to the resulting fry and parr production. Consecutive years of sampling through a range of escapements will help in any assessment of numbers of adults required to provide adequate recruitment to this system.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

Surveys of juvenile steelhead fry and parr abundance were conducted in the Sustut River and a number of tributaries during early September 1993. This is the third consecutive year that index surveys of juvenile abundance have been conducted in this system. The surveys were conducted under contract to B.C. Environment and were funded through the Habitat Conservation Fund.

The results of the previous two years of surveys are presented in Bustard (1992) and Bustard (1993a). These earlier surveys included sampling in other Skeena River summer steelhead streams (Morice, Kitwanga, and upper Zymoetz rivers). The 1993 sample results for these other systems are summarized in Beere (1993). A small number of index sites were also sampled in the Sustut and Bear rivers during the period 1983 to 1985 (Tredger 1986).

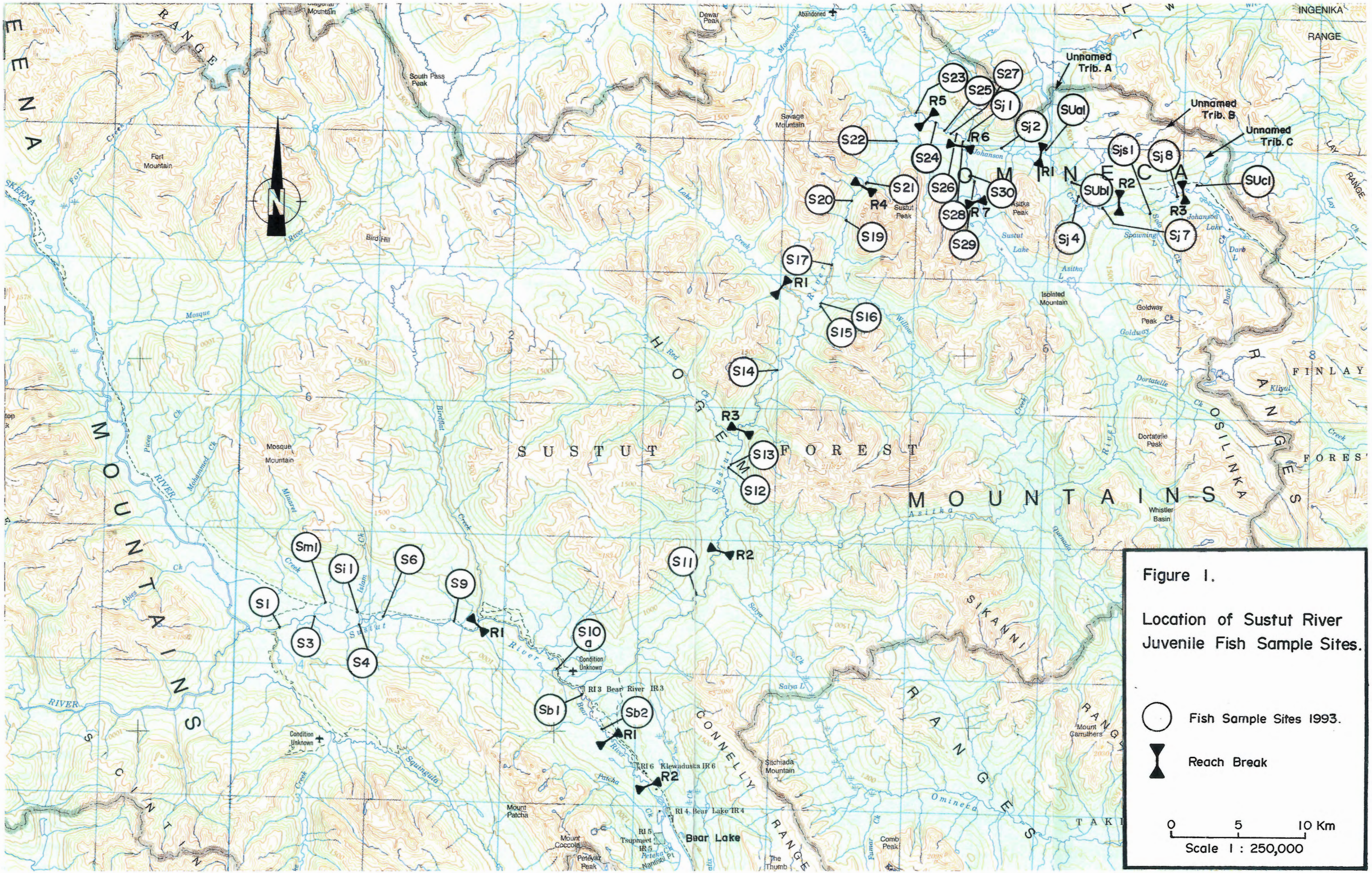
Sampling of steelhead fry at these index sites provides a systematic basis for evaluating the strength of past adult escapements to this summer steelhead stream. At the same time, repeated sampling of these sites over time can provide a valuable tool for assessing the condition of the steelhead stocks in the Sustut River relative to their potential, particularly if they are conducted in conjunction with adult escapement studies.

The 1993 juvenile index work in the Sustut River is complemented by adult steelhead studies conducted during the fall of 1992 and the spring of 1993. The fall studies provided an escapement estimate for the upper river (Bustard 1993b). As well, the subsequent spring assessments identified the distribution of spawners in the upper Sustut River and Johanson Creek (Bustard 1994). This is the first year that fry production in the upper Sustut River can be related to a known number of adults. This information should form an important benchmark for interpretation of results from future juvenile studies in this system.

The 1993 juvenile studies had the following objectives:

1.) To continue sampling at a network of index sites established throughout the Sustut River and tributaries to estimate juvenile steelhead fry and parr abundance.

2.) To compare these estimates of juvenile steelhead to those conducted at the same sites during 1991 and 1992. Comparisons to data collected during the mid-1980's will be made when available.


Unnamed Trib. A
Unnamed Trib. B
Unnamed Trib. C
S23
S25
S27
Sj1
SUal
Sj2
R5
R6
S22
S24
S26
S30
R1
S21
R4
S20
S19
S28
R7
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S11
Sml
Si1
S6
S9
S1
S3
S4
R1
S10a
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Sb1
Sb2
R1
RI 6 Klewadusta IR 6
R2
RI 4, Bear Lake IR 4
RI 5 Tsupmeet IR 5
Bear Lake
Condition Unknown
Squingula
Mount Patcha
Mount Coccola
Peteyar Peak
Peteka
Nanfisut Pt
Sitchiada Mountain
Mount Carruthers
The Thumb
Comb Peak
Whistler Basin
Dortatelle Peak
Goldway Peak
Isolated Mountain
Asitka Peak
Sustut Peak
Savage Mountain
Dewar Peak
South Pass Peak
Fort Mountain
Bird Hill
Mosque Mountain
Diagonal Mountain
Abandoned
INGENIKA
RANGE
SUSTUT FOREST
MOUNTAINS
SKEENA
MOUNTAINS
SIKANNI
RANGE
OMINECA
RANGES
OSILINKA
RANGES
FINLAY
RANGE
CONNELLY
RANGE
Sustut Lake
Asitka Lake
Johanson Lake
Spawning L
Asitka L
Darb L
Saiya L
Figure 1.
Location of Sustut River Juvenile Fish Sample Sites.
Fish Sample Sites 1993.
Reach Break
0 5 10 Km
Scale 1 : 250,000

2.0 METHODS

Juvenile sampling was conducted by a crew of three between September 7 and 17, 1993. This is the same time period as the sampling program for 1991 and 1992. Streamflow conditions were clear and low throughout the Sustut, comparable to the previous two years.

A helicopter (Pacific Western Helicopters) was used to access all sites downstream of Moosevale Creek on the Sustut, upper Sustut River sites above S28 and several of the Johanson Creek sites (Figure 1). All of the helicopter sampling was based out of Suskeena Lodge since there was no helicopter base at Aiken Lake in 1993. Sites on the Sustut River from the Johanson confluence to Moosevale Creek were accessed by an inflatable boat. The remaining sites had road access.

The 36 sample sites assessed in 1993 were mainly at the same locations as those sampled in 1992. New mainstem sites were established at Site S21 and S30 (moved downstream) to provide better coverage in this productive rearing reach. Site S23 was included in the 1993 sampling at the same location as 1991 after being omitted in 1992. Minor shifts were made to five other sites to adjust for channel changes in the upper river. These are noted on the individual sample sheets in Appendix 2. UTM coordinates were recorded for all of the helicopter sites to improve the ease of re-locating sites from the air in the future.

A number of sites in the vicinity of Sustut Lake were omitted from the 1993 sampling program. No juveniles were captured at these sites in 1992 and there was no indication of spawner use in these areas during the spring of 1993. Data from electrofishing at four sites in Minaret and Islam creeks, tributaries to the lower Sustut River (Figure 1) has been included in Appendix 2. Sampling was conducted in these tributaries in conjunction with another project during the same time period in 1993 (Bustard 1993c).

Sample sites ranged in length from 11 to 33 m with a mean length of 20 m. Stopnets were used to enclose the sites. On smaller tributaries and sidechannels of the mainstem river, the nets were located at the top and bottom ends of the sites. In mainchannel locations, rebar and a minimum of 30 m of stopnet was used to enclose a section of the margin of the site out into the fastwater habitat, often 5-8 m out from the edge in mainstem sites. Considerable care was taken to minimize site disturbance when installing stopnets.

Sample crews worked up and down through the site at least twice with a Coffelt gas-powered electroshocker. A two-step removal was used to estimate fish populations from catches within these sites

(Seber and LeCren 1967). If a suitable declining catch was not obtained, a third pass was made. All fish were sorted by species, counted, fork lengths measured to the nearest mm, and returned to the stream after sampling. At least 30 steelhead fry were measured at each site when available.

A sample of weights from all fish species and a range of size classes was obtained to estimate biomass. Separate length/age regressions were obtained for the Sustut River below the Bear River, the upper Sustut, Bear River and Johanson Creek. In total, 448 juvenile fish including 224 steelhead, were weighed using a Sartorius electronic balance. Scales were retained from a representative range of juvenile steelhead size classes for aging. Typically scales were taken from large fry and small age 1+ steelhead as well as most larger parr to determine age class separation for various fork lengths. Scales were removed from 42 steelhead during the 1993 studies.

Sample site areas were calculated from the length and a series of width measurements at each site. MOE/DFO Stream Survey Forms were completed at each site. This provided basic descriptions of the physical characteristics of the site. A photo record of each site was retained. Aside from physical habitat information recorded on these forms for each site, water temperature and total dissolved solids (TDS) were measured.

An effort was made to locate sample sites in what was judged to be the best available habitat for steelhead fry and parr. A four class suitability rating system for steelhead fry and parr based on the site physical features (water velocity, depth, bed material and cover characteristics) was developed and each index site was rated accordingly (Table 1). This is the same system that was used during the past two surveys.

Some comparisons have been made grouping the results for the sites that were considered **good** and **excellent** habitat compared to those rated **poor** or **moderate** habitat. This is an important distinction to make, particularly when assessing the steelhead parr results. Many of the sites that were selected based on their suitability for steelhead fry are poorly suited for steelhead parr rearing, and these differences need to be recognized when assessing the sampling results.

Table 1. Juvenile Steelhead Habitat Suitability Rating Criteria.	
STEELHEAD FRY	
EXCELLENT	Shallow (<50 cm) low velocity (<30 cm/sec) cobble\boulder sites with interstitial spaces for hiding and food production - often riffle locations.
GOOD	Similar to above but might include some smaller bed material with less interstitial spaces, higher water velocities, etc.
MODERATE	Limited habitat due to smaller bed material size, poor cover, higher velocities and deeper habitat, etc.
POOR	Generally unsuitable for fry rearing due to high water velocities, small bed material with no hiding spaces, poor cover, etc.
STEELHEAD PARR	
EXCELLENT	Deep (>15 cm) boulder or cobble bed material with moderate water velocity (<75 cm/sec). Large interstitial spaces or good adjacent cover within the site (eg, log jam).
GOOD	Similar to above but poorer cover and less suitable water velocities.
MODERATE	Either too fast or too slow water velocity with poorer cover (few interstitial spaces or lack of debris cover). Typically smaller bed material.
POOR	Unsuitable for parr rearing - typically water velocities are too slow and depths are shallow. In this study, many of the shallow riffle sites selected as good fry rearing offered poor parr rearing habitat.

3.0 RESULTS

A total of 36 sample sites were located on the Sustut River including 25 on the mainstem Sustut River and an additional 11 sites in tributaries including Johanson Creek (5 sites) and the Bear River (2 sites). Other tributary sites included Solo Creek and three unnamed tributaries to Johanson Creek.

The mainstem sites comprised 3425 m^2 of habitat (477 m of margin) in the seven reaches of the Sustut River to its confluence with the Skeena River (Table 2). A total of 1252 m^2 of habitat (230 m of stream margin) was sampled in the tributaries. Specific site descriptions and catch data for each site are presented in Appendix 2.

3.1 SUSTUT RIVER CATCH COMPOSITION

3.1.1 Mainstem Catch Composition

A total of 1546 fish were estimated in the mainstem Sustut River sites in 1993 (Table 2). This is up from the estimates of 704 fish (1991) and 1065 fish (1992). It should be noted that the catches are based on sampling 10% more habitat in 1993 than in 1992. As well, resident rainbow trout are present in the Sustut River (Bustard 1993b), and some of the juveniles referred to as steelhead may, in fact, be resident rainbow trout.

Steelhead fry and parr comprised 52% and 10% of the total catch repectively (Table 2). Steelhead fry were captured at all of the 25 mainstem sites sampled (Appendix 1 Table 1). Juvenile chinook comprised nearly 34% of the overall mainstem catch in 1993. Chinook fry were also present at all of the mainstem sites with the exception of S29 located at the top end of the Sustut River (Appendix 1 Table 1).

Juvenile Dolly Varden comprised 4% of the catch while other species including mountain whitefish, longnose dace and burbot together comprised 1% of the fish captured in the mainstem Sustut. No coho juveniles were captured at any of the mainstem sites.

3.1.2 Tributary Catch Composition

Total numbers of fish captured in Sustut tributaries are shown in Table 2. It should be noted that less total area was sampled in 1993 since several tributary sites that apparently do not contribute to steelhead recruitment based on previous sample results were not included in this year's sample program.

Table 2. Catch Composition of Fish in the Sustut River and Tributary Sample Sites from 1991 to 1993.

	MAINSTEM			TRIBUTARIES		
	1991	1992	1993	1991	1992	1993
Steelhead 0+	395	429	802	87	166	220
(%)	(56.1)	(40.3)	(51.9)	(31.9)	(36.3)	(46.4)
Steelhead 1+	27	116	105	16	21	24
(%)	(3.8)	(10.9)	(6.8)	(5.9)	(4.6)	(5.1)
Steelhead >2+	11	32	46	11	14	16
(%)	(1.6)	(3.0)	(2.9)	(4.0)	(3.1)	(3.4)
Chinook	203	321	523	25	40	47
(%)	(28.8)	(30.1)	(33.8)	(9.2)	(8.8)	(10.0)
Coho	18	35	0	12	33	17
(%)	(2.6)	(3.3)	(0)	(4.4)	(7.2)	(3.6)
Dolly Varden	41	73	55	112	159	146
(%)	(5.8)	(6.9)	(3.6)	(41.0)	(34.8)	(30.7)
RM Whitefish	8	52	9	7	22	3
(%)	(1.1)	(4.9)	(0.6)	(2.6)	(4.7)	(1.0)
LN Dace	0	0	4	3	2	1
(%)	(0)	(0)	(0.3)	(1.1)	(0.4)	(0.2)
Burbot	1	7	2	0	0	0
%	(0.1)	(0.7)	(0.1)	(0)	(0)	(0)
TOTAL	704	1065	1546	273	457	474
AREA (m*m)	4282	3038	3425	2355	1616	1252
LENGTH (m)	670.8	430.1	477	375.2	299.3	230.5

Steelhead fry and parr comprised 46% and 8% of the overall catch respectively, while chinook juveniles comprised 10% of the catch. Chinook were captured at the Bear River sites and several sites in lower Johanson Creek (Appendix 1 Table 1).

Coho comprised less than 4% of the tributary catch. Coho were captured at one site in upper Johanson Creek and in three tributaries to Johanson Creek. No coho were captured in the Bear River in 1993. Yearling coho were captured in several very small tributaries located between Minaret and Islam creeks in the lower Sustut River during sampling for a different project in September 1993 (Bustard 1993c). Adult surveys during the fall of 1992 indicated that very few coho adults were present in the upper Sustut River (Bustard 1993b). A maximum of 30 coho (mainly jacks) were observed during the surveys.

Dolly Varden were present at all of the tributary sites except Sb2 in the Bear River. They comprised 31% of the overall tributary catch.

Sampling results from two sites on Minaret and Islam creeks (Sm1 and Si1) indicated that only Dolly Varden were present in these tributaries. The results for these sites are summarized at the end of Appendix 2.

As in the mainstem river, mountain whitefish and longnose dace comprised approximately 1% of the overall tributary catch.

3.2 JUVENILE STEELHEAD DENSITIES

3.2.1 Mainstem Sustut River Steelhead Fry Densities

Juvenile steelhead fry densities in mainstem sites in the Sustut River averaged 0.26 fry/m^2 for all of the sites combined (Table 3). This is an improvement from densities of 0.18 fry/m^2 and 0.13 fry/m^2 in 1992 and 1991 respectively (Table 3). Steelhead fry were captured at every site sampled in the mainstem river, with an average of over 30 fry per sample site (Appendix 1 Table 1).

Similar to past years, the highest fry densities (0.59 fry/m^2) were found in Reach 5 of the Sustut River. An additional two sites were included in this reach in 1993 to ensure that an adequate area was sampled to obtain reliable estimates. The highest densities occurred at Site S22 (0.76 fry/m^2) located approximately 4.5 km downstream from Moosevale Creek. This was a shallow cobble site along the mainchannel edge of the river, typical of much of this reach of the upper Sustut River during the late summer period.

Table 3. Summary of Juvenile Steelhead Density Estimates in the Sustut River from 1991 to 1993.

SITE	FRY/M*M			PARR/M*M		
	1991	1992	1993	1991	1992	1993
S1	0.11	0.17	0.17	0.00	0.04	0.02
S2	0.06	0.05	0.12	0.00	0.02	0.02
S4	0.27	0.01	0.21	0.02	0.03	0.01
S6	0.11	<0.01	0.17	0.00	0.08	0.10
S9	0.04	0.21	0.23	0.00	0.03	0.03
REACH 1 mean	**0.12**	**0.09**	**0.18**	**<0.01**	**0.04**	**0.04**
S10a	NS	0.20	0.34	NS	0.04	0.06
S11	0.00	0.00	0.08	<0.01	0.00	0.01
REACH 2 mean	**0.00**	**0.10**	**0.21**	**<0.01**	**0.02**	**0.03**
S12	0.01	0.10	0.11	0.00	0.03	0.00
S13	0.04	0.05	0.12	0.00	0.00	0.00
REACH 3 mean	**0.02**	**0.03**	**0.12**	**0.00**	**0.02**	**0.00**
S14	0.06	0.01	0.10	0.00	0.02	0.01
S15	0.08	0.10	0.24	0.00	0.03	0.03
S16	0.04	0.17	0.45	0.01	0.01	0.00
S17	0.26	0.10	0.22	0.02	0.03	0.06
S19	0.14	0.07	0.17	0.06	0.10	0.17
S20	0.06	0.07	0.14	0.01	0.07	0.02
REACH 4 mean	**0.11**	**0.08**	**0.22**	**0.02**	**0.05**	**0.05**
S21	NS	NS	0.59	NS	NS	0.00
S22	0.32	0.59	0.76	0.00	0.10	0.05
S23	0.32	NS	0.42	NS	NS	0.03
REACH 5 mean	**0.32**	**0.59**	**0.59**	**0.00**	**0.10**	**0.02**
S24	0.11	0.43	0.06	0.00	0.19	0.03
S25	0.19	0.31	0.46	0.00	0.01	0.02
S26	0.34	0.21	0.10	0.02	0.00	0.02
S27	0.04	0.61	0.47	0.00	0.02	0.09
REACH 6 mean	**0.17**	**0.39**	**0.27**	**<0.01**	**0.05**	**0.04**
S28	0.37	0.18	0.23	0.03	0.13	0.14
S29	0.22	0.51	0.12	0.06	0.17	0.10
S30	NS	NS	0.35	NS	NS	0.04
REACH 7 mean	**0.29**	**0.35**	**0.24**	**0.05**	**0.15**	**0.09**
MEAN REACH 1–7	**0.13**	**0.18**	**0.26**	**0.01**	**0.05**	**0.04**

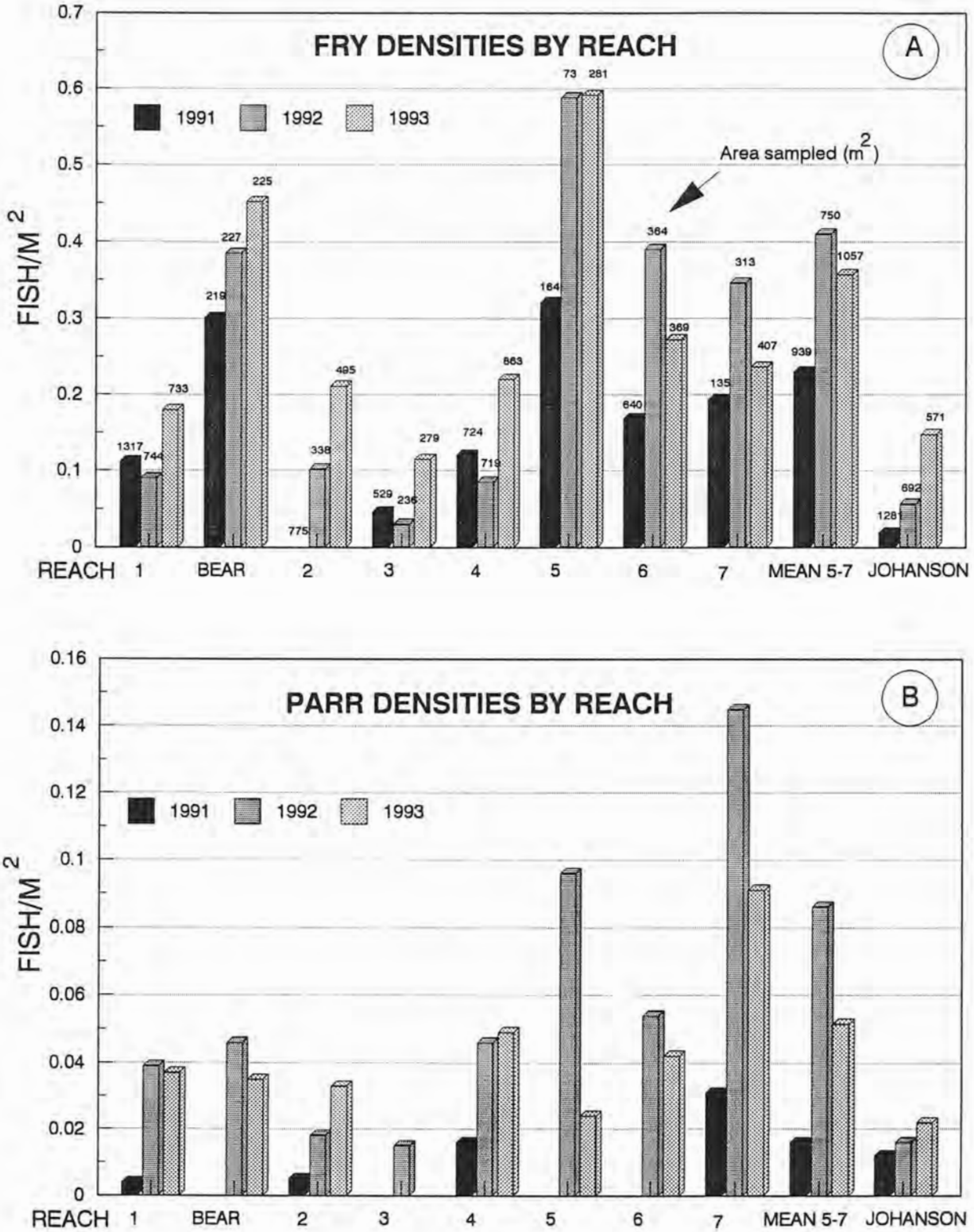


Figure 2. Steelhead Fry and Parr Densities by Reach in the Sustut River.

Fry densities in Reaches 6 and 7 in the upper Sustut River were between 0.2 and 0.3 fry/m^2, down slightly from 1992 estimates.

While overall fry densities in the upper three reaches of the Sustut River combined were slightly lower, fry densities in the mid and lower reaches of the Sustut were at least double the levels measured in 1992 and were higher than 1991 levels (Figure 2).

Fry densities in mid-reaches of the Sustut were in the 0.1 to 0.2 fry/m^2 range in 1993. It is assumed that steelhead fry recruitment to the reaches upstream of the Bear confluence is derived primarily from the upper reaches of the Sustut. Average fry densities measured for Sites S11 to S20 (combined) were at least twice as high as densities measured at these sites in the past (Table 3).

Downstream from the Bear confluence, steelhead fry densities were improved over 1991 and 1992 levels. Fry densities in 1993 for all sites below the Bear confluence were 0.21 fry/m^2 compared to 0.26 fry/m^2 in the Sustut upstream from the Bear (Figure 3).

The 1993 results are in the mid-range of densities obtained for sites both above and below the Bear confluence in the mid-1980's (Figure 3). However, the mid-1980's sampling data is based on a very small sample area, with the results from a single sample site having a large influence on the overall estimates. For example, the only site sampled in the upper Sustut in 1985 was in Reach 5. Fry densities at this site in 1985 (0.7 fry/m^2) are comparable to results collected in the past two years in this reach (Figure 2). However, when all of the sites for the three reaches in the upper river are averaged, the mean is considerably lower than results for this reach only.

Fry densities in sites rated as **poor** and **moderate** habitat were slightly lower than in sites rated as **good** or **excellent** fry habitat (Figure 4). This is the first year that any differences have shown up when the poor habitats are compared to areas rated as good fry rearing areas.

Steelhead fry densities were higher in mainchannel sites than in sidechannels in 1993 (Figure 4). This pattern was similar to 1991. Little difference was noted in the 1992 results.

3.2.2. Mainstem Sustut River Steelhead Parr Densities

The parr estimates in the mainstem Sustut River are based on the capture of 151 parr in 1993. Of this total, 105 were age 1+ and 46 were age 2+ or older. The choice of sample sites and method of sampling tends to exclude the older age classes of fish unless the entire channel is blocked. This is possible in sidechannel locations and the mainstem Sustut upstream of the Johanson

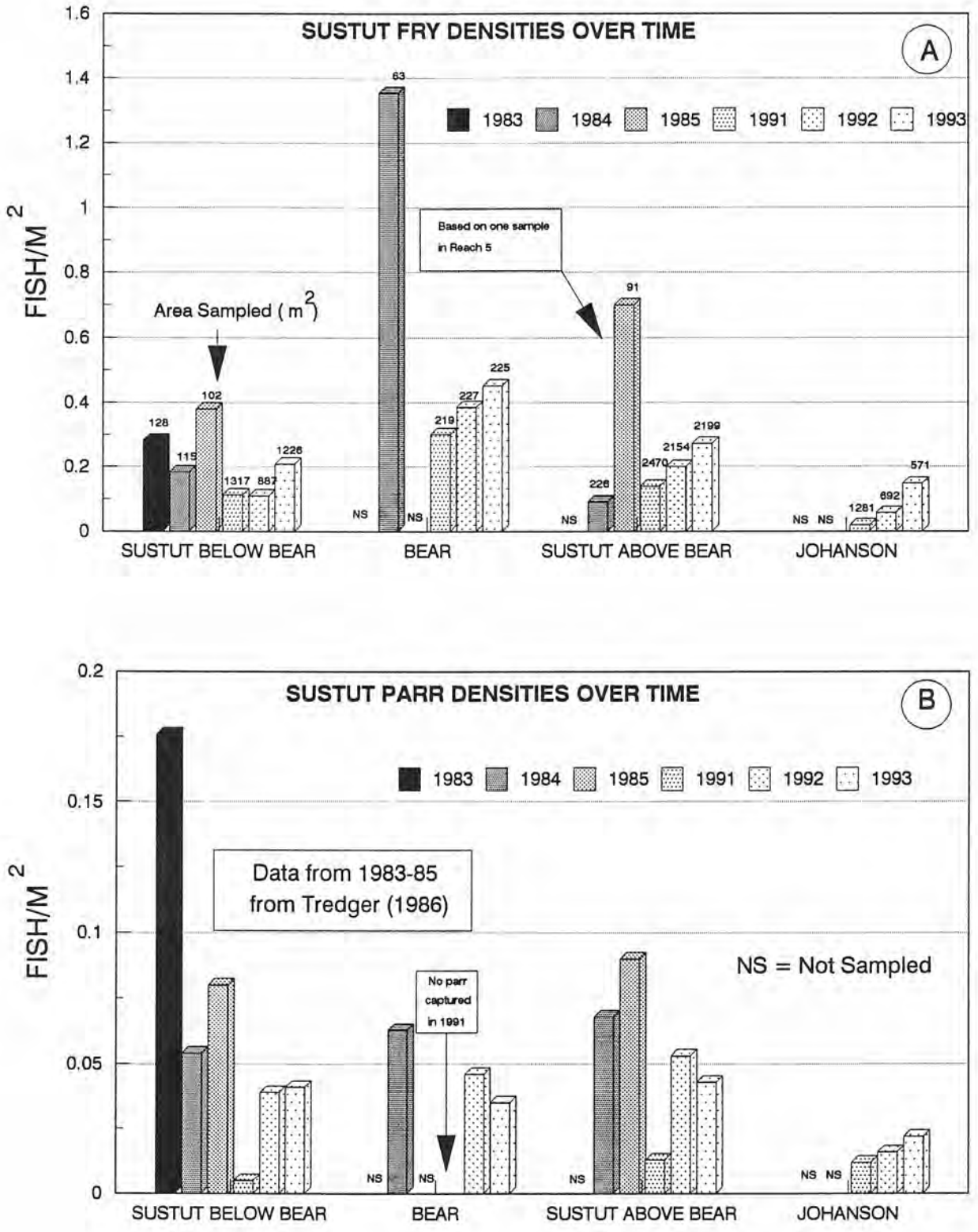


Figure 3. Steelhead Densities in the Sustut River Over Time.

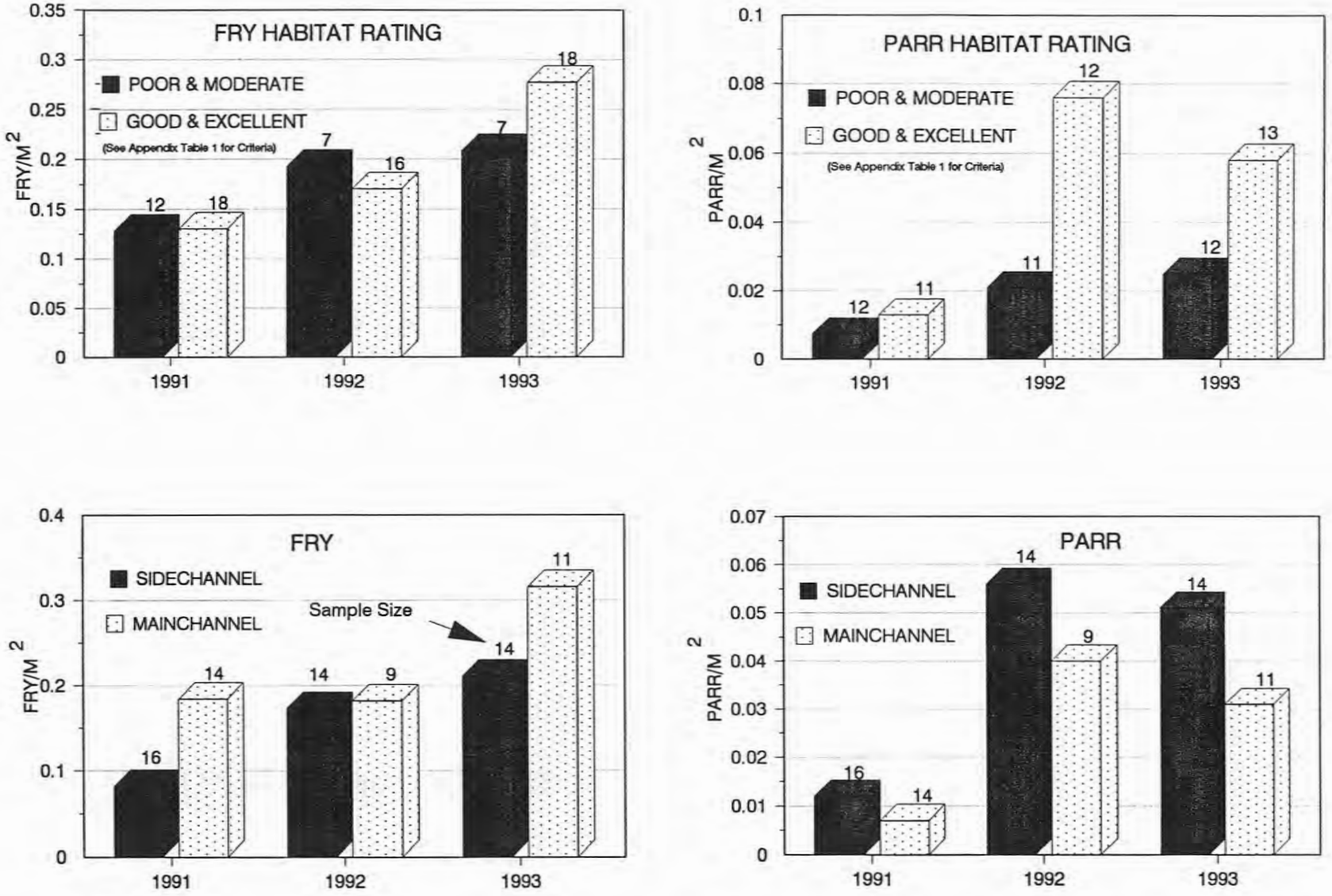


Figure 4. Summary of Juvenile Steelhead Densities in Habitat Categories and in Sidechannel Versus Mainchannel Habitat in the Sustut River for the Period 1991 to 1993.

confluence (eg., Site S28).

Steelhead parr densities averaged 0.04 parr/m^2 in Reach 1 of the Sustut, very similar to 1992 and higher than 1991 (Table 3 and Figure 2). The highest parr densities in the mainstem river continued to occur in Reach 7, the section of river upstream from the Johanson Creek confluence. The mean densities were 0.09 parr/m^2 in this section, down from 1992 levels of 0.15 parr/m^2 (Table 3). The main reason for the drop is the lower numbers of parr at the new site (S30) added in 1993 (Table 3).

Densities at one of the best parr sites that can be effectively sampled (S28) were similar in 1993 and 1992. A 20 m section of the entire river channel is blocked at this site. A total of 28 parr were estimated at this site in 1993 compared to 26 in 1992.

Parr densities in Reach 5 were down significantly in 1993 compared to 1992 (Table 3). Two new sites were added to the sampling in this reach in 1993. These sites were good fry sites but poor parr habitat, and this was reflected in the low catches at these sites.

Figure 3 indicates that parr densities in both the upper and lower reaches of the Sustut River during the past two years are well above the very low 1991 results, but still fall short of densities measured in these sections of the river in the period between 1983 and 1985.

Sites that were rated as possessing **good** or **excellent** habitat capability for parr continued to have much higher parr densities than **poor** or **moderate** sites (Figure 4). Many of the good fry sites are simply too shallow and have water velocities too slow to provide good parr rearing areas.

As in past years, sidechannel locations had higher parr densities than mainchannel sites (Figure 4). In most cases, we are able to more effectively enclose sidechannel sites with a minimum of disturbance compared to the mainchannel edge areas. This probably has a more direct bearing on parr estimates, since the larger fish will often leave the site if they can prior to net installation. Fry tend to move directly into cover in the immediate area.

3.2.3. Tributary Steelhead Fry Densities

Juvenile steelhead densities in 11 tributary sample sites are presented in Table 4. As in past years, the highest steelhead fry densities occurred in the Bear River sites (0.45 fry/m^2). These are the highest densities recorded in the past three years, but are still well below the densities in excess of 1.3 fry/m^2 measured at a single site in the Bear River in 1984 (Figure 3).

Table 4. Summary of Juvenile Steelhead Density Estimates in Tributaries to the Sustut River from 1991 to 1993.

SITE	FRY/M*M			PARR/M*M		
	1991	1992	1993	1991	1992	1993
Sb1	0.29	0.50	0.59	0.00	0.01	0.00
Sb2	0.31	0.27	0.31	0.00	0.08	0.07
BEAR RIVER mean	**0.30**	**0.38**	**0.45**	**0.00**	**0.05**	**0.04**
Sj1	0.00	<0.01	0.04	0.00	0.02	0.00
Sj2	0.02	0.02	0.40	0.02	0.04	0.03
Sj4	0.00	0.06	0.08	0.06	0.00	0.00
Sj7	0.01	0.00	0.00	0.01	0.03	0.04
Sj8	0.09	0.19	0.22	0.00	0.00	0.04
JOHANSON mean	**0.02**	**0.06**	**0.15**	**0.02**	**0.02**	**0.02**
TRIBUTARY A	0.00	0.00	0.01	0.06	0.05	0.12
TRIBUTARY B	0.00	0.00	0.02	0.01	0.03	0.04
TRIBUTARY C	NS	0.28	0.07	NS	0.00	0.03
Sjs1 SOLO	NS	0.00	0.00	NS	0.00	0.00
Sjd1 DARB	NS	0.00	NS	NS	0.05	NS
SUSTUT LAKE INLETS	NS	0.00	NS	NS	0.00	NS

NS = Not Sampled

Mean steelhead fry densities in Johanson Creek were 0.15 fry/m^2 (Table 4). While these levels are above those measured in the past two years, the distribution of fry was quite scattered and two of the five sample sites accounted for most of the fry captured (Table 4). A big increase in fry numbers was noted at Site Sj2, a large sidechannel site located in the lower reach of Johanson Creek. Fry numbers at this site increased from 3 fry in 1992 (0.02 fry/m^2) to 56 fry (0.40 fry/m^2) in 1993. Site Sj8, located just downstream from the main spawning section in Johanson Creek, had fry densities of 0.22 fry/m^2, up slightly from 1992 levels (Table 4).

Fry densities at Tributary C in 1993 (0.07 fry/m^2) were down from levels measured in 1992 (0.28 fry/m^2). Only a single pair of steelhead were observed in this tributary to upper Johanson Creek in the spring of 1993, and they spawned downstream from the juvenile sample site on this tributary (Bustard 1993b).

Several steelhead fry were captured in Tributaries A and B. It is assumed these fry moved up into the lower ends of these tributaries from Johanson Creek. No steelhead fry were captured in Solo Creek.

3.2.4 Tributary Parr Densities

Steelhead parr densities of 0.04 parr/m^2 in the Bear River in 1993 were similar to 1992 (Table 4). Johanson Creek parr densities continued to be very low, and were comparable to the past two years.

Parr densities in Tributary A were the highest of the tributary streams and were approximately double the levels obtained in the previous two years. Most of these parr were age 2+ or older (Appendix 2 - Site SUA1). A few parr were also present in Johanson Creek Tributaries B and C.

3.3 SUSTUT RIVER JUVENILE STEELHEAD BIOMASS ESTIMATES

Steelhead fry (0.2 g/m^2) and parr (0.5 g/m^2) mainstem biomass estimates were up slightly in 1993 compared to 1992, and were well above levels measured in 1991 (Table 5). The main fry increases were in the lower and mid reaches, while biomass estimates in the upper reaches declined. Steelhead parr biomass was higher in the lower Sustut in 1993, but lower in Reaches 3, 5 and 6. Reach 7 parr biomass estimates were higher even though densities were lower, reflecting more older parr in the upper sites in 1993.

Steelhead fry biomass estimates were up in the Bear River and Johanson Creek. The mean biomass in the Bear River was approximately four times the level measured in Johanson Creek and

Table 5. Summary of Biomass Estimates in the Sustut River and Tributary Sample Sites from 1991 to 1993.

REACH	FRY (g/m*m)			PARR (g/m*m)			ALL SPECIES (g/m*m)		
	1991	1992	1993	1991	1992	1993			
1	0.09	0.07	0.13	0.03	0.27	0.53	0.38	1.21	1.32
2	0.00	0.13	0.21	0.13	0.22	0.30	0.43	1.22	1.13
3	0.05	0.06	0.11	0.01	0.39	0.00	0.28	1.20	0.97
4	0.14	0.10	0.18	0.18	0.49	0.69	0.39	1.22	1.29
5	0.31	0.53	0.46	0.00	0.60	0.13	0.58	1.72	0.81
6	0.15	0.33	0.32	0.03	0.43	0.22	0.43	1.51	0.85
7	0.14	0.30	0.17	0.42	1.60	2.17	0.65	2.13	2.80
REACHES 1–7	0.12	0.17	0.22	0.09	0.50	0.54	0.41	1.37	1.24
BEAR	0.22	0.29	0.41	0.00	0.40	0.42	1.13	1.35	1.40
JOHANSON	0.08	0.06	0.10	0.04	0.21	0.27	0.41	0.68	0.83

twice that measured in the mainstem of the Sustut River.

Overall biomass estimates for all fish species combined were generally comparable for the mainstem Sustut, the Bear River and Johanson Creek for 1992 and 1993, and well above the 1991 levels. A detailed summary of the biomass estimates for each site for all species is presented in Appendix 3 Table 1. Juvenile chinook comprised a significant component of the overall site biomass in the mainstem Sustut and Bear River sites.

3.4 SUSTUT RIVER FISH SIZE ESTIMATES

Juvenile steelhead mean fork lengths are summarized in Table 6. The mean fork length data has been combined for those sites located upstream of the Bear River confluence with the Sustut and those located downstream, and is presented along with summaries from the Bear River and Johanson Creek. The length-frequency distribution for steelhead captured in 1993 is shown in Appendix 4 Figure 1.

These data indicate that steelhead fry mean fork lengths were similar throughout the Sustut and Bear rivers in 1993, but that fry were slightly smaller in Johanson Creek. Steelhead fry in the lower Sustut River were 6 mm smaller than in 1992.

Steelhead fry in the lower Sustut in 1993 were smaller than all years except 1983, a year of very high fry densities (Table 7 and Figure 3). However, fry weights were similar to the mean for past years. Fry fork lengths and weights for all of the upper river sites combined were very similar to the mean for past years.

Age 1+ parr sizes in 1993 were similar in the Sustut above and below the Bear River (Table 6). Parr in the upper Sustut were approximately 4 mm smaller than in the past two years. Lower Sustut River parr lengths were similar to 1992, the only year with a reasonable sample size. The sample size of age 1+ parr in the Bear River and Johanson Creek is very small.

Table 6. Summary of Mean Fork Lengths of Steelhead Fry and Parr in the Sustut River , Bear River, and Johanson Creek from 1991 to 1993.

LOCATION	FRY			AGE 1+ PARR		
	1991	1992	1993	1991	1992	1993
SUSTUT BELOW BEAR						
mean	42.8	46.4	40.3	83.3	81.7	81.9
number	127	69	138	4	29	17
STD of mean	0.44	0.78	0.46	4.90	1.43	2.67
SUSTUT ABOVE BEAR						
mean	45.1	42.3	41.7	86.3	85.7	81.7
number	227	290	443	23	73	69
STD of mean	0.34	0.31	0.24	1.21	0.78	1.18
BEAR RIVER						
mean	41.8	40.3	41.2	NS	85.9	90.8
number	59	76	84		8	4
STD of mean	0.69	0.55	0.69		3.08	4.30
JOHANSON CREEK						
mean	44.7	42.6	39.3	NS	85.4	79.0
number	20	49	93		7	11
STD of mean	0.85	0.60	0.40		2.38	3.53

Table 7. Summary of Juvenile Steelhead Mean Fork Lengths and Weights in the Sustut River Compared to Past Sample Data.

YEAR	SUSTUT BELOW BEAR		SUSTUT ABOVE BEAR	
	FORK LENGTH (mm)	WEIGHT (g)	FORK LENGTH (mm)	WEIGHT (g)
1983	39.4	0.58	No sample	No Sample
1984	41.2	0.65	41.1	0.67
1985	41.1	0.79	40.5	0.75
1991	42.8	0.81	45.1	0.95
1992	46.4	0.97	42.3	0.93
MEAN	42.2	0.76	42.3	0.83
1993	40.3	0.74	41.7	0.86

Data from 1983–85 provided by D. Tredger, B.C. Environment, Victoria.
Sampling was conducted during late September and early October.

4.0 CONCLUSIONS

4.1 FRY ESTIMATES

Studies conducted by Spence et al. (1990) suggest that steelhead in the Sustut may be comprised of two stocks - an early run of steelhead that move into the top of the system and a second more numerous group of fish that move into the lower Sustut and Bear rivers during September and October. The fry sampling conducted in the past three years suggests that recruitment has been weaker in the lower river than in the upriver areas. Fry densities improved in the Bear River (0.45 fry/m^2) and Reach 1 of the Sustut (0.18 fry/m^2) in 1993. However, fry densities in Reach 1 are still low relative to upriver sites (Reaches 5-7, Figure 2) and compared to fry sampling conducted in the lower river during two of three years in the mid-1980's (Figure 3). The increase in fry densities in the mid-reaches of the Sustut River (Reaches 3 and 4) suggests a better seeding of fry to these reaches in 1993.

Overall fry densities in the upper Sustut River (Reaches 5-7) were just under 0.4 fry/m^2, slightly lower than in 1992 (Figure 2). The fry densities measured in the upper Sustut in the fall of 1993 represent the recruitment from a pre-spawning population of 465 fish estimated during the fall of 1992 (Bustard 1993b). Approximately 80% or 370 of these fish were females.

Figure 5 compares fry densities in the Sustut and Bear rivers and Johanson Creek to fry estimates in several other Skeena summer steelhead streams where information has been collected in the past three years. These data suggest that the higher fry densities observed in the lower Sustut, Bear River, and Johanson Creek in 1993 compared to 1992 also occurred in the Kitwanga, upper Morice and Zymoetz rivers. The low fry densities observed in 1991 throughout the Sustut system did not occur in the Kitwanga and Zymoetz rivers.

The lower Sustut and Johanson Creek steelhead fry densities have tended to remain at depressed levels compared to these other systems. Density estimates following several years of high escapements are needed to provide a basis for comparison of what these systems are capable of supporting compared to estimates from the past three years.

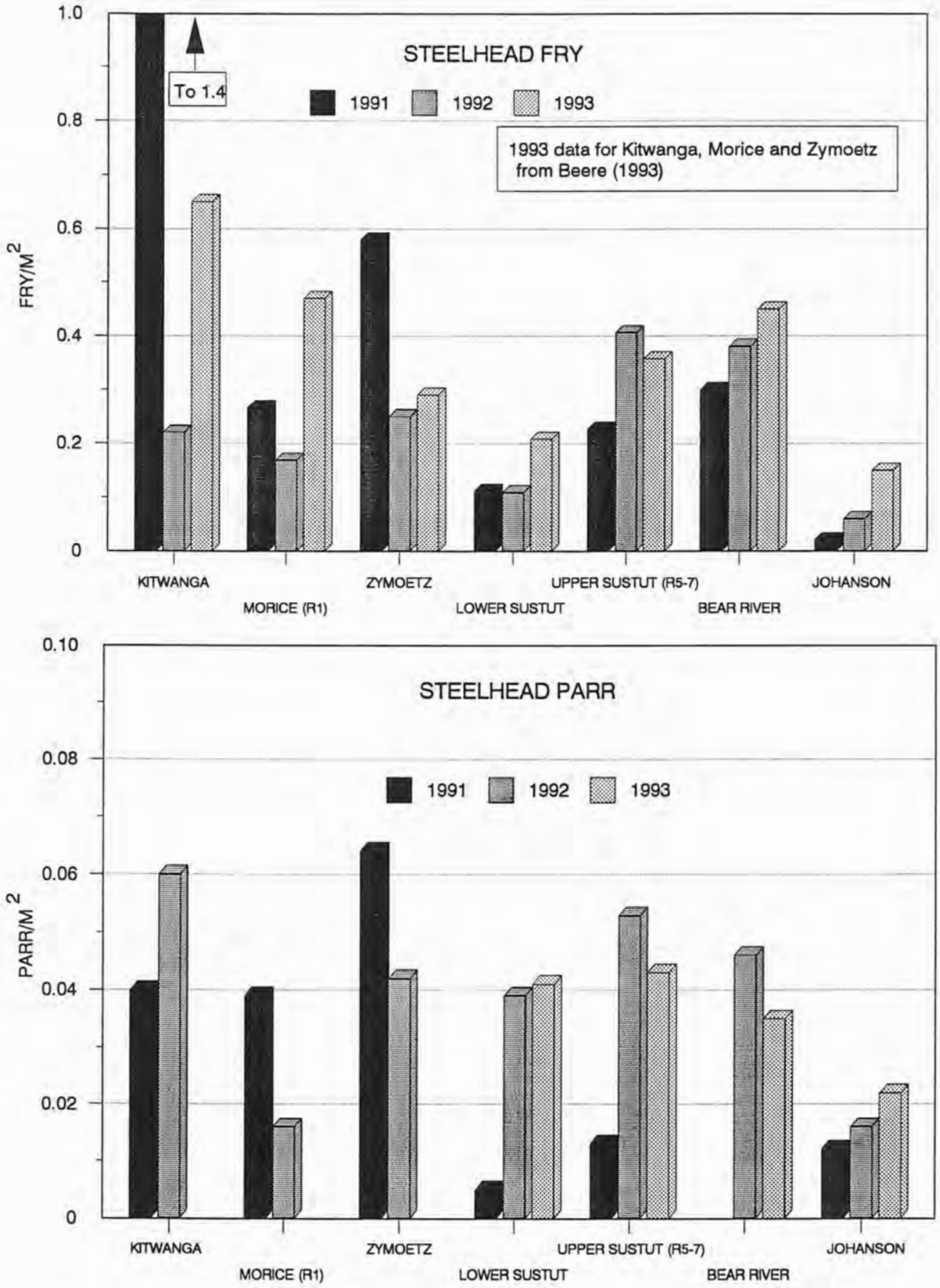


Figure 5. Steelhead Fry and Parr Densities in the Sustut River and Tributaries Compared to Other Large Skeena Steelhead Tributaries.

4.2 PARR ESTIMATES

Steelhead parr densities in 1993 were similar to 1992 levels in the lower river and down from 1992 levels in the upper reaches (Figure 2). Parr densities in all sections of the river and tributaries were higher than in 1991. Overall, there was a decrease in age 1+ parr and an increase in age 2+ parr compared to 1992 (Table 2).

Parr densities continued to be highest in Reach 7 upstream from Johanson Creek confluence, emphasizing the importance of this reach for steelhead parr production. Parr densities were 0.09 parr/m^2 in this reach. The large reduction in parr densities in Reach 5 may be partly related to incorporating several new sites into this reach that were primarily fry rearing sites (Table 3).

If sites that are generally unsuitable for parr rearing (eg., shallow, low velocity sites often suited for fry) are omitted from the estimates, then a more reasonable estimate of parr densities within suitable habitat can be made. For example, habitat areas that were rated as **good** or **excellent** for parr had densities consistently higher than **poor** or **moderate** parr sites (Figure 4). If only these sites are compared, then overall parr densities were down approximately 25% in 1993 compared to 1992. Parr densities averaged approximately 0.06 parr/m^2 at the better parr sites.

It is interesting to note that the generally higher fry densities measured in the Sustut system in 1992 did not lead to higher parr abundance in 1993 compared to the 1992 estimates (Figure 5). The results continue to suggest that 1991 was a year of exceptionally low parr abundance, presumably reflecting unusually low fry recruitment in 1990. This may have been the result of either very poor adult returns throughout the Sustut in 1989 leading to poor fry recruitment the following summer, or very poor survival of fry.

In the past two years, parr densities in the mainstem Sustut and in the Bear River have been typically in the range of 0.04 to 0.06 parr/m^2. This is comparable to the range measured in the Kitwanga and Zymoetz rivers in 1991 and 1992 and in the upper Morice in 1991 (Figure 5). Smaller steelhead tributaries in the Morice and Zymoetz typically have higher parr densities that can range as high as 0.3 parr/m^2 (Bustard 1993a).

It should be noted that steelhead parr estimates become increasingly unreliable with older age classes due to the increased difficulty of sampling the the deeper faster habitats that these fish use. Catchability may remain similar from year-to-year, but total numbers at many sites probably under-estimate the actual population, particularly for parr older than age 1+.

Parr estimates in the Morice, Kitwanga and Zymoetz rivers for 1993 presented in Beere (1993) are not included in Figure 5. Differences in the methods used to enclose sites in 1993 could lead to lower parr estimates than the methods used in 1991 and 1992. The differences would have little bearing on fry estimates.

5.0 RECOMMENDATIONS

It is recommended that the index sampling in the upper Sustut be continued in the fall of 1994. As in 1993, there is an estimate of adult steelhead pre-spawners in the upper river that would help to relate juvenile production to adult numbers. Although total spawner estimates this year are very close to those made in 1992/93, a higher proportion of these fish moved into Johanson Creek (Saimoto 1994).

The overall distribution of fry, particularly between Johanson Creek and the upper Sustut River should provide useful information relative to the potential of the system. Johanson Creek has continued to have low fry and parr estimates compared to the rest of the Sustut. Sampling during the fall of 1994 would help to determine whether higher fry densities occur following a larger run of steelhead spawners into this system in 1994. As well, a sampling program could assess whether higher fry densities measured in Johanson Creek in 1993 will lead to higher parr numbers in 1994.

For the juvenile monitoring to be effective, it should be conducted every year using identical procedures. Each year that the information is collected in this fashion strengthens the database and allows for more interpretation in terms of what the capability of the system really is. Every year that the juvenile data can be related to a known number of adults should provide fisheries managers with a stronger basis for target escapement estimates to provide adequate recruitment to the system.

A program of estimating smolt output from at least a portion of the system would complement the juvenile surveys. Unfortunately, the logistics of operating such a program are very complex, considering the remoteness of the system and access difficulties during the spring period when smolt movements would be occurring.

6.0 LITERATURE CITED

Beere, M. 1994. Juvenile steelhead surveys in the Kitwanga, Morice, and Zymoetz rivers, 1993. Skeena Fisheries Report #SK 87. B.C. Environment, Recreational Fisheries Branch, Smithers.

Bustard, D. 1992. Juvenile steelhead surveys in the Kitwanga, Morice, Sustut, and Zymoetz rivers, 1991. Man. report prepared for B.C. Environment, Smithers.

Bustard, D. 1993a. Juvenile steelhead surveys in the Kitwanga, Morice, Sustut, and Zymoetz rivers, 1992. Man. report prepared for B.C. Environment, Smithers.

Bustard, D. 1993b. Adult steehead studies in the upper Sustut River 1992. Man. report prepared for B.C. Environment, Smithers.

Bustard, D. 1993c. Stream classification Islam to Minaret Creeks Lower Sustut River. Man. report prepared for Rustad Bros. and Co. Ltd., Prince George.

Bustard, D. 1994. Steelhead spawning studies upper Sustut River 1993. Man. report prepared for B.C. Environment, Smithers.

Saimoto, R.S. 1994. Enumeration of adult steelhead in the upper Sustut River 1993. Skeena Fisheries Report #SK-87, Smithers.

Seber, G.A.F. and E.D. LeCren. 1967. Estimating population parameters from catches large relative to the population. J. Anim. Ecol. 36: 631-643.

Spence, C.R., M.C. Beere and M.J. Lough. 1990. Sustut River Steelhead Investigiations 1986. Skeena Fisheries Report #SK 64. B.C. Ministry of Environment, Smithers, B.C.

Tredger, C.D. 1986. Upper Skeena steelhead fry population monitoring (Babine, Sustut, and Kluatantan rivers). Steelhead stock monitoring report prepared by the Fish Habitat Improvement Section of the Ministry of Environment. Man. report on file, B.C. Environment, Smithers.

Appendix 1. Catch Composition and Density Summaries by Reach and Channel Types.

Appendix 1 Table 1. Sustut River Catch Composition for Sample Sites 1993.

FILE = FISH3

SITE	LOCATION	RAINBOW 0+	1+	2+	3+	4+	Parr	CHIN	COHO	DV	RMW	LN DACE	BURBOT	AREA (M)2	LENGTH (M)
S1	Sustut	21	3				3	30						127	19.8
S3	below Bear	21	2	1			3	5		2	8			165	17.3
S4	"	16	1				1	13		2				77	21.9
S6	"	40	16	4	2	1	23	88		18				233	21.0
S9	"	29	1	2	1		4	26				5		129	20.6
S10a	"	58	9	1			10	18			1			168	16.0
S11	Sustut	25	2				2	63		8				327	31.3
S12	above Bear	21						67		3				196	17.0
S13	"	10						14		1				83	20.0
S14	"	12			1		1	37		3				127	14.8
S15	"	36	2	1	2		5	17		2				149	23.0
S16	"	76						15		6				168	21.0
S17	"	37	8		2		10	19		3				174	22.6
S19	"	21	12	4	4	1	21	9		1				123	10.8
S20	"	17	2				2	7						123	20.3
S21	"	54						14						92	15.0
S22	"	86	5				5	13		1				112	15.3
S23	"	32	2				2	16		1				76	19.4
S24	"	6	2	1			3	2		1				100	15.8
S25	"	39	2				2	32						83	18.2
S26	"	10	2				2	3						101	18.9
S27	"	40	8				8	5		2				85	15.8
S28	"	48	16	1	9	2	28	9		1			1	206	19.1
S29	"	13	6	2	1	1	10						1	104.5	22
S30	"	34	3	1			4	1		1				97	20.5
TOTAL		801.9	104.6	18.0	22.0	5.0	149.6	523.3	0.0	55.1	9.0	4.5	2.0	3425.2	477.4
PERCENT		51.9	6.8	1.2	1.4	0.3		33.8	0.0	3.6	0.6	0.3	0.1		99.93533
													TOTAL FISH =	1546.4	
Sj1	Johanson Ck	4						8		20				105	21.0
Sj2	"	67	4		1		5	1		14				165	25.5
Sj4	"	7								2				90	17.3
Sj7	"		2		1		3			2	1			70	16.7
Sj8	"	31	5				5		2	4	1			142	27.0
SUa1	Unnamed A	1	1	4	5		10			5				80	15.6
SUb1	Unnamed B	2	4			1	5	1	6	32				136	24.5
SUc1	Unnamed C	8	4				4		5	37	1			127	28.5
Sjs1	"								4	28				113	15.4
Sb1	Bear River	62						5				1		104	21.0
Sb2	"	38	4	5			9	33		2				121	18.0
TOTAL		219.7	24.0	8.5	6.5	1.0	40.0	47.2	16.8	145.5	3.0	1.0		1252.4	230.5
PERCENT		46.4	5.1	1.8	1.4	0.2		10.0	3.6	30.7	0.6	0.2			100
													TOTAL FISH =	473.2	

Appendix 1 Table 2. Sustut River Catch Composition by Section in the Sustut River and Tributaries 1993.

LOCATION	RAINBOW						CHIN	COHO	DV	RMW	LN DACE	BURBOT	AREA (M)2	Total Catch
	0+	1+	2+	3+	4+	Parr								
Sustut below Bear	185.2	32.0	8.0	3.0	1.0	44.0	179.7	0.0	21.6	9.0	4.5	0.0	898.8	488
%	38.0	6.6	1.6	0.6	0.2	9.0	36.8	0.0	4.4	1.8	0.9	0.0		100
Sustut above Bear	616.7	72.6	11.0	19.0	4.0	104.6	343.6	0.0	33.5	0.0	0.0	2.0	2526.4	1207
%	51.1	6.0	0.9	1.6	0.3	8.7	28.5	0.0	2.8	0.0	0.0	0.2		100
Johanson Creek	109.0	11.0	0.0	2.0	0.0	13.0	9.0	2.0	42.0	2.0	0.0	0.0	571.1	190
%	57.4	5.8	0.0	1.1	0.0	6.8	4.7	1.1	22.1	1.1	0.0	0.0		100
Johanson Tribs	11.3	9.0	4.0	4.5	1.0	18.5	1.0	14.8	101.5	1.0	0.0	0.0	455.9	166.6
%	6.8	5.4	2.4	2.7	0.6	11.1	0.6	8.9	60.9	0.6	0.0	0.0		100
Bear River	99.4	4.0	4.5	0.0	0.0	8.5	37.2	0.0	2.0	0.0	1.0	0.0	225.4	156.6
%	63.5	2.6	2.9	0.0	0.0	5.4	23.8	0.0	1.3	0.0	0.6	0.0		100
Sustut River Total	801.9	104.6	17.0	22.0	5.0	148.6	523.3	0.0	55.1	9.0	4.5	2.0	3425.2	1693
%	47.4	6.2	1.0	1.3	0.3	8.8	30.9	0.0	3.3	0.5	0.3	0.1		100

Appendix 1 Table 3. Mainstem Sustut River Steelhead Fry and Parr Density Estimates by Reach 1993.

SYSTEM	REACH	SITE	FRY	AGE 1+	AGE 2+	AGE 3+	AGE 4+	PARR	AREA	RATING FRY	RATING PARR
Sustut	1	1	0.167	0.024	0.000	0.000	0.000	0.024	127	4	1
	1	3	0.125	0.012	0.006	0.000	0.000	0.018	165	3	2
	1	4	0.208	0.013	0.000	0.000	0.000	0.013	77	2	3
	1	6	0.172	0.069	0.017	0.009	0.004	0.099	233	3	2
	1	9	0.228	0.008	0.016	0.008	0.000	0.032	129	4	1
		Mean	**0.180**	**0.025**	**0.008**	**0.003**	**0.001**	**0.037**	**731**		
Sustut	2	10a	0.345	0.054	0.006	0.000	0.000	0.060	168	3	3
	2	11	0.076	0.006	0.000	0.000	0.000	0.006	327	3	2
		Mean	**0.211**	**0.030**	**0.003**	**0.000**	**0.000**	**0.033**	**495**		
Sustut	3	12	0.109	0.000	0.000	0.000	0.000	0.000	196	3	3
	3	13	0.120	0.000	0.000	0.000	0.000	0.000	83	3	2
		Mean	**0.115**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**279**		
Sustut	4	14	0.095	0.000	0.000	0.008	0.000	0.008	127	4	3
	4	15	0.242	0.013	0.007	0.013	0.000	0.033	149	2	3
	4	16	0.454	0.000	0.000	0.000	0.000	0.000	168	2	1
	4	17	0.215	0.046	0.006	0.012	0.000	0.064	174	3	3
	4	19	0.174	0.100	0.033	0.033	0.008	0.174	123	1	4
	4	20	0.137	0.016	0.000	0.000	0.000	0.016	123	4	3
		Mean	**0.220**	**0.029**	**0.008**	**0.011**	**0.001**	**0.049**	**863**		
	5	21	0.592	0.000	0.000	0.000	0.000	0.000	91.8	3	1
Sustut	5	22	0.761	0.047	0.000	0.000	0.000	0.047	112	3	1
	5	23	0.419	0.026	0.000	0.000	0.000	0.026	76.4	3	1
		Mean	**0.591**	**0.024**	**0.000**	**0.000**	**0.000**	**0.024**	**281**		
Sustut	6	24	0.060	0.020	0.010	0.000	0.000	0.030	100	1	3
	6	25	0.462	0.024	0.000	0.000	0.000	0.024	83	3	1
	6	26	0.097	0.020	0.000	0.000	0.000	0.020	101	2	1
	6	27	0.469	0.094	0.000	0.000	0.000	0.094	85	3	3
		Mean	**0.272**	**0.040**	**0.003**	**0.000**	**0.000**	**0.042**	**369**		
Sustut	7	28	0.231	0.078	0.005	0.044	0.010	0.137	206	1	3
	7	29	0.125	0.057	0.019	0.010	0.010	0.096	105	3	3
	7	30	0.351	0.031	0.010	0.000	0.000	0.041	97	3	3
		Mean	**0.236**	**0.055**	**0.011**	**0.018**	**0.007**	**0.091**	**407**		

Appendix 1 Table 4. Sustut River Steelhead Fry and Parr Summaries by Channel Type 1993.

REACH	SITE	FRY	AGE 1+	AGE 2+	AGE 3+	AGE 4+	PARR	AREA	CHANNEL S=1 M=2	RATING FRY	RATING PARR
4	16	0.454	0.000	0.000	0.000	0.000	0.000	168	1	2	1
1	1	0.167	0.024	0.000	0.000	0.000	0.024	127	1	4	1
1	3	0.125	0.012	0.006	0.000	0.000	0.018	165	1	3	2
1	6	0.172	0.069	0.017	0.009	0.004	0.099	233	1	3	2
1	4	0.208	0.013	0.000	0.000	0.000	0.013	77	1	2	3
4	15	0.242	0.013	0.007	0.013	0.000	0.033	149	1	2	3
6	27	0.469	0.094	0.000	0.000	0.000	0.094	85	1	3	3
4	14	0.095	0.000	0.000	0.008	0.000	0.008	127	1	4	3
7	29	0.125	0.057	0.019	0.010	0.010	0.096	105	1	3	3
2	10a	0.345	0.054	0.006	0.000	0.000	0.060	168	1	3	3
3	12	0.109	0.000	0.000	0.000	0.000	0.000	196	1	3	3
6	24	0.060	0.020	0.010	0.000	0.000	0.030	100	1	1	3
4	17	0.215	0.046	0.006	0.012	0.000	0.064	174	1	3	3
4	19	0.174	0.100	0.033	0.033	0.008	0.174	123	1	1	4
5	21	0.592	0.000	0.000	0.000	0.000	0.000	91.8	2	3	1
5	23	0.419	0.026	0.000	0.000	0.000	0.026	76.4	2	3	1
6	26	0.097	0.020	0.000	0.000	0.000	0.020	101	2	2	1
1	9	0.228	0.008	0.016	0.008	0.000	0.032	129	2	4	1
5	22	0.761	0.047	0.000	0.000	0.000	0.047	112	2	3	1
6	25	0.462	0.024	0.000	0.000	0.000	0.024	83	2	3	1
2	11	0.076	0.006	0.000	0.000	0.000	0.006	327	2	3	2
3	13	0.120	0.000	0.000	0.000	0.000	0.000	83	2	3	2
7	30	0.351	0.031	0.010	0.000	0.000	0.041	97	2	3	3
7	28	0.231	0.078	0.005	0.044	0.010	0.137	206	2	1	3
4	20	0.137	0.016	0.000	0.000	0.000	0.016	123	2	4	3

HABITAT CAPABILITY RATING:

1 = POOR 3 = GOOD

2 = MODERATE 4 = EXCELLENT

CHANNEL: SIDE = 1 MAIN = 2

Appendix 1 Table 5. Mainstem Sustut River Fry and Parr Summaries Above and Below Bear River 1993

SITE	FRY	AGE 1+	AGE 2+	AGE 3+	AGE 4+	PARR
1	0.167	0.024	0.000	0.000	0.000	0.024
3	0.125	0.012	0.006	0.000	0.000	0.018
4	0.208	0.013	0.000	0.000	0.000	0.013
6	0.172	0.069	0.017	0.009	0.004	0.099
9	0.228	0.008	0.016	0.008	0.000	0.032
10a	0.345	0.054	0.006	0.000	0.000	0.060
BELOW BEAR R. TOTAL AVG.	**0.208**	**0.030**	**0.008**	**0.003**	**0.001**	**0.041**
11	0.076	0.006	0.000	0.000	0.000	0.006
12	0.109	0.000	0.000	0.000	0.000	0.000
13	0.120	0.000	0.000	0.000	0.000	0.000
14	0.095	0.000	0.000	0.008	0.000	0.008
15	0.242	0.013	0.007	0.013	0.000	0.033
16	0.454	0.000	0.000	0.000	0.000	0.000
17	0.215	0.046	0.006	0.012	0.000	0.064
19	0.174	0.100	0.033	0.033	0.008	0.174
20	0.137	0.016	0.000	0.000	0.000	0.016
21	0.592	0.000	0.000	0.000	0.000	0.000
22	0.761	0.047	0.000	0.000	0.000	0.047
23	0.419	0.026	0.000	0.000	0.000	0.026
24	0.060	0.020	0.010	0.000	0.000	0.030
25	0.462	0.024	0.000	0.000	0.000	0.024
26	0.097	0.020	0.000	0.000	0.000	0.020
27	0.469	0.094	0.000	0.000	0.000	0.094
28	0.231	0.078	0.005	0.044	0.010	0.137
29	0.125	0.057	0.019	0.010	0.010	0.096
30	0.351	0.031	0.010	0.000	0.000	0.041
ABOVE BEAR R. TOTAL AVG.	**0.273**	**0.030**	**0.005**	**0.006**	**0.001**	**0.043**
TOTAL SITES S1–S30 AVG.	**0.257**	**0.030**	**0.005**	**0.005**	**0.001**	**0.042**

Appendix 1 Table 6. Sustut Tributaries Steelhead Fry and Parr Density Estimates 1993.

SYSTEM	REACH	SITE		FRY	AGE 1+	AGE 2+	AGE 3+	AGE 4+	PARR	AREA	RATING FRY	RATING PARR
Johanson	1	1		0.038	0.000	0.000	0.000	0.000	0.000	104.6	2	1
	1	2		0.405	0.024	0.000	0.006	0.000	0.030	165	3	2
	2	4		0.078	0.000	0.000	0.000	0.000	0.000	90	3	3
	2	7		0.000	0.029	0.000	0.014	0.000	0.043	70	1	3
	3	8		0.220	0.035	0.000	0.000	0.000	0.035	142	3	1
			Mean	**0.148**	**0.018**	**0.000**	**0.004**	**0.000**	**0.022**	**571**		
Sua1	1	1		0.012	0.012	0.050	0.056	0.000	0.118	80	1	3
			Mean	**0.012**	**0.012**	**0.050**	**0.056**	**0.000**	**0.118**	**80**		
Sub1	1	1		0.015	0.029	0.000	0.000	0.007	0.036	136	2	4
			Mean	**0.015**	**0.029**	**0.000**	**0.000**	**0.007**	**0.036**	**136**		
Suc1	1	1		0.066	0.032	0.000	0.000	0.000	0.032	127	2	1
			Mean	**0.066**	**0.032**	**0.000**	**0.000**	**0.000**	**0.032**	**127**		
SjS1	1	1		0.000	0.000	0.000	0.000	0.000	0.000	113.2	1	3
			Mean	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**113**		
Bear	1	1		0.591	0.000	0.000	0.000	0.000	0.000	104	4	3
	1	2		0.312	0.033	0.037	0.000	0.000	0.070	121.2	2	3
			Mean	**0.452**	**0.017**	**0.019**	**0.000**	**0.000**	**0.035**	**225**		

HABITAT CAPABILITY RATING:

1 = POOR
2 = MODERATE
3 = GOOD
4 = EXCELLENT

Appendix 2. Site Descriptions and Detailed Results of Fish Sampling in the Sustut River in 1993.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S1 REACH: 1 MAP#: 94 D/6 PHOTO: (1)#22 ACCESS: HEL DATE: Sept 10

SITE LOCATION: Approximately 3 km upstream from the Skeena River confluence.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: S SLOPE (%): 1 TEMP (C): 6.3 TDS (ppm): 53.8 pH: N/A
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS: Estimated discharge in the sample sidechannel was 40 cfs.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	29-44	36.5	16	4	20	21.3	2.0	0.167	1.08	0.52	0.09
Rbt	1+	72-80	76.0	3	0	3	3.0	0.0	0.024	0.15	5.34	0.13
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	43-71	54.6	28	2	30	30.2	0.5	0.237	1.52	1.99	0.47
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							54.5		0.428	2.75		0.68

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	5.3	LOD		POOL		15
3	7.2	COBBLE/BOULDER	100	RIFFLE		15
6	7.7	IN VEG		RUN	50	
9	8.6	OVER VEG		OTHER	50	
12	6.4	CUTBANK				
15	3.4					
18		TOTAL	50	D90/50: 25/8		
20				(cm)		
24						
	6.4					
AREA (M*M)	127.4	MARGIN (M)	19.8			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 90% Excellent 10% Moderate
RATIONALE: Excellent habitat in low velocity cobble flats. Good cover within interstitial spaces.

STEELHEAD PARR RATING: 100% Poor
RATIONALE: Limited by shallow depth and low water velocity.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S3 REACH: 1 MAP#: 94 D/6 PHOTO: (1)#23 ACCESS: HEL DATE: Sept 10

SITE LOCATION: Approximately 4.2 km upstream from the Skeena River confluence.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: S SLOPE (%): 1 TEMP (C): 8.7 TDS (ppm): 49.2 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Sampled a small sidechannel with an estimated 10–12 cfs. Observed 1 pink carcass near sample site.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN–M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	31–50	40.2	12	5	17	20.6	5.0	0.125	1.19	0.73	0.09
Rbt	1+	68–69	68.5	2	0	2	2.0	0.0	0.012	0.12	3.96	0.05
Rbt	2+	95	95.0	1	0	1	1.0	0.0	0.006	0.06	10.15	0.06
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	58–75	66.8	5	0	5	5.0	0.0	0.030	0.29	3.66	0.11
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	74–95	84.5	1	1	2	2.0	0.0	0.012	0.12	6.19	0.08
M. Whitefish	0+	50–62	57.5	4	2	6	8.0	4.9	0.049	0.46	1.73	0.08
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							38.6		0.234	2.23		0.47

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	9.1	LOD		POOL		
3	9.1	GRAVEL	100	RIFFLE	90	12
6	10.0	IN VEG		RUN	10	30
9	9.9	OVER VEG		OTHER		
12		CUTBANK				
15						
18		TOTAL	20	D90/50: 13/4		
20				(cm)		
24						
	9.5					
AREA (M*M)	164.8	MARGIN (M)	17.3			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 80% Poor 20% Good
RATIONALE: Limited by moderate to high water velocity with small substrate.
Good habitat along section of cobble margin.

STEELHEAD PARR RATING: 20% Moderate 80% Poor
RATIONALE: Moderate habitat in cobble run section. Limited cover for parr in other areas within the site.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S4 REACH: 1 MAP#: 94 D/6 PHOTO: (1)#24 ACCESS: HEL DATE: Sept 10

SITE LOCATION: Approximately 4 km downstream from Suskeena Lodge.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: S SLOPE (%): 1 TEMP (C): 9.7 TDS (ppm): 53.3 pH: N/A
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS: Sampled the margin of a large sidechannnel. Had difficulty installing outer edge of net.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	31-49	40.6	12	3	15	16.0	1.7	0.208	0.73	0.76	0.16
Rbt	1+	88	88.0	1	0	1	1.0	0.0	0.013	0.05	8.14	0.11
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	48-73	55.8	10	2	12	12.5	1.1	0.162	0.57	2.12	0.34
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	75-83	79.0	1	1	2	2.0	0.0	0.026	0.09	5.09	0.13
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							31.5		0.409	1.44		0.74

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	3.1	LOD		POOL			
3	3.7	COBBLE/BOULDER	100	RIFFLE			
6	3.9	IN VEG		RUN	100		70
9	4.3	OVER VEG		OTHER			
12	2.6	CUTBANK					
15							
18		TOTAL	100	D90/50:	30/10		
20				(cm)			
24							
	3.5						
AREA (M*M)	77.1	MARGIN (M)	21.9				

HABITAT COMMENTS:

STEELHEAD FRY RATING: 80% Poor 20% Moderate
RATIONALE: Moderate along cobble edge. Water velocity was too high in other sections.

STEELHEAD PARR RATING: 100% Good
RATIONALE: Good habitat due to large cobble substrate with adequate depth.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S6 **REACH: 1** **MAP#: 94 D/6** **PHOTO: (3)#2** **ACCESS: HEL** **DATE: Sept 10**

SITE LOCATION: Approximately 3 km downstream from Suskeena Lodge.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: S **SLOPE (%): <1** **TEMP (C): 9.6** **TDS (ppm): 52.0** **pH: N/A**
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Sampled a low velocity (nearly ponded) section of sidechannel.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	33-52	38.7	19	10	29	40.1	12.6	0.172	1.91	0.64	0.11
Rbt	1+	75-100	83.0	4	3	7	16.0	31.7	0.069	0.76	6.88	0.47
Rbt	2+	109-116	113.7	2	1	3	4.0	3.5	0.017	0.19	17.03	0.29
Rbt	3+	123-139	131.0	2	0	2	2.0	0.0	0.009	0.10	25.62	0.22
Rbt	4+	266	266.0	1	0	1	1.0	0.0	0.004	0.05	209.50	0.90
Chinook	0+	49-73	60.5	45	22	67	88.0	15.3	0.378	4.19	2.71	1.02
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	76-142	105.5	12	1	13	13.1	0.4	0.056	0.62	11.80	0.66
M. Whitefish	0+	45-58	51.3	3	1	4	4.5	1.5	0.019	0.21	1.24	0.02
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							168.7		0.724	8.04		3.70

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	11.7	LOD		POOL		
3	10.0	COBBLE/BOULDER	100	RIFFLE		
6	11.2	IN VEG		RUN		
9	11.6	OVER VEG		FLAT	100	80
12	11.0	CUTBANK				
15						
18		TOTAL	90	D90/50: 35/8		
20				(cm)		
24						
	11.1					
AREA (M*M)	233.1	MARGIN (M)	21.0			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 70% Moderate 30% Good
RATIONALE: Good habitat along shallow cobble margin. Limited by deep water with no riffle.

STEELHEAD PARR RATING: 100% Moderate
RATIONALE: Good cover in large cobble bed material. Could be improved with increased water velocity.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S9 **REACH: 1** **MAP#: 94 D/6** **PHOTO: (3)#3** **ACCESS: HEL** **DATE: Sept 10**

SITE LOCATION: Approximately 13 km downstream from the Bear River confluence.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: M **SLOPE (%): <1** **TEMP (C): 10.3** **TDS (ppm): 54.5** **pH: N/A**
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS: Sampled a margin of the mainstem river identical to 1992.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	28-51	41.5	21	6	27	29.4	2.9	0.228	1.43	0.82	0.19
Rbt	1+	80	80.0	1	0	1	1.0	0.0	0.008	0.05	6.19	0.05
Rbt	2+	95-97	96.0	2	0	2	2.0	0.0	0.016	0.10	10.46	0.16
Rbt	3+	133	133.0	1	0	1	1.0	0.0	0.008	0.05	26.77	0.21
Chinook	0+	42-65	53.7	21	4	25	25.9	1.5	0.201	1.26	1.89	0.38
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all	43-51	47.0	3	1	4	4.5	1.5	0.035	0.22	1.06	0.04
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							63.8		0.496	3.10		1.02

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	4.9	LOD		POOL		
3	7.4	COBBLE/BOULDER	100	RIFFLE		
6	8.5	IN VEG		RUN	20	30
9	6.7	OVER VEG		FLAT	80	15
12	6.7	CUTBANK				
15	3.3					
18		TOTAL	100	D90/50:	40/15	
20				(cm)		
24						
	6.3					
AREA (M*M)	128.8	MARGIN (M)	20.6			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 100% Excellent
RATIONALE: Loose cobble substrate in shallow flats.

STEELHEAD PARR RATING: 100% Poor
RATIONALE: Limited by shallow depth and low velocity.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S10a REACH: 2 MAP#: 94 D/7 PHOTO: (1)#20 ACCESS: HEL DATE: Sept 8

SITE LOCATION: Approximately 100 m downstream of the Meathole (below the Bear River).
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: S SLOPE (%): 2.5 TEMP (C): 10.5 TDS (ppm): 53.0 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Slightly higher discharge than 1992.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	30-54	43.1	43	11	54	57.8	3.4	0.345	3.61	0.94	0.32
Rbt	1+	62-100	88.8	3	2	5	9.0	13.4	0.054	0.56	8.14	0.44
Rbt	2+	114	114.0	1	0	1	1.0	0.0	0.006	0.06	17.16	0.10
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	50-70	58.8	17	1	18	18.1	0.3	0.108	1.13	2.49	0.27
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	0+	70	70.0	1	0	1	1.0	0.0	0.006	0.06	3.07	0.02
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							86.8		0.518	5.43		1.15

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	11.2	LOD		POOL		30
3	10.8	COBBLE/BOULDER	100	RIFFLE	100	20
6	10.0	IN VEG		RUN		
9	9.9	OVER VEG		OTHER		
12		CUTBANK				
15						
18		TOTAL	100	D90/50:	35/15	
20				(cm)		
24						
	10.5					
AREA (M*M)	167.6	MARGIN (M)	16.0			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 50% Good 50% Moderate
RATIONALE: Good habitat in cobble with interstitial spaces for cover. Moderate in deeper sections with slightly higher velocity.

STEELHEAD PARR RATING: 75% Good 25% Moderate
RATIONALE: Good habitat in sections of deeper riffle. Moderate habitat in shallow flats along margin.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S11 REACH: 2 MAP#: 94 D/7 PHOTO: (1)#19 ACCESS: HEL DATE: Sept 9

SITE LOCATION: Approximately 2 km downstream from Saiya Creek.
Same location as the 1992 site. Note: The 1992 location was different from 1991.

S = SIDE / M = MAINSTEM: S SLOPE (%): 1 TEMP (C): 10.7 TDS (ppm): 52.4 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Slightly higher discharge in sample sidechannel from 1992.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	31-53	44.9	18	5	23	24.9	2.6	0.076	0.80	1.13	0.09
Rbt	1+	92-95	93.5	2	0	2	2.0	0.0	0.006	0.06	9.23	0.06
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	46-75	60.0	39	15	54	63.4	7.5	0.194	2.02	2.63	0.51
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	88-160	123.3	4	2	6	8.0	4.9	0.024	0.26	18.55	0.45
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							98.3		0.301	3.14		1.11

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	8.0	LOD		POOL		
3	8.3	COBBLE/BOULDER	100	RIFFLE	30	18
6	9.0	IN VEG		RUN		
9	10.7	OVER VEG		FLAT	70	
12	12.9	CUTBANK				
15	13.8					
18		TOTAL	70	D90/50:	50/20	
20				(cm)		
24						
	10.5					
AREA (M*M)	327.1	MARGIN (M)	31.3			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 100% Good
RATIONALE: Low velocity flats throughout most of site. This site could be improved with less fines in the bed material.

STEELHEAD PARR RATING: 20% Moderate 80% Poor
RATIONALE: Moderate haibtat in the small section of riffle. Limited by shallow depth and low water velocity.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S12 REACH: 3 MAP#: 94 D/7 PHOTO: (1)#17 ACCESS: HEL DATE: Sept 9

SITE LOCATION: Approximately 1 km downstream from Red Creek.
Same location a the 1992 site.

S = SIDE / M = MAINSTEM: S SLOPE (%): 1 TEMP (C): 8.1 TDS (ppm): 41.1 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Sampled a small sidechannel off a gravel island.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	35-52	41.8	16	4	20	21.3	2.0	0.109	1.25	0.87	0.09
Rbt	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	51-87	62.2	62	5	67	67.4	0.8	0.344	3.97	2.94	1.01
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	85-142	121.7	3	0	3	3.0	0.0	0.015	0.18	17.87	0.27
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							91.8		0.468	5.40		1.38

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	12.2	LOD		POOL		
3	13.0	COBBLE/BOULDER	100	RIFFLE	50	18
6	11.2	IN VEG		RUN	50	
9	9.7	OVER VEG		OTHER		
12		CUTBANK				
15						
18		TOTAL	80	D90/50: 35/8		
20				(cm)		
24						
	11.5					
AREA (M*M)	195.9	MARGIN (M)	17.0			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 40% Good 30% Moderate 30% Poor
RATIONALE: Good habitat in lower velocity shallow sections.

STEELHEAD PARR RATING: 60% Good 40% Moderate
RATIONALE: Good in riffle areas with large cobble substrate. Limited by shallow depth in other sections.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S13 REACH: 3 MAP#: 94 D/7 PHOTO: (1)#18 ACCESS: HEL DATE: Sept 9

SITE LOCATION: Approximately 3–4 km downstream of Red Creek.
Same approximate location as the 1992 site. May be the same location as the 1991 site.

S = SIDE / M = MAINSTEM: M SLOPE (%): 1.5 TEMP (C): 8.1 TDS (ppm): 41.0 pH: N/A
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS: Sampled a section of mainstem edge habitat similar to 1992.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN–M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	27–53	43.1	10	0	10	10.0	0.0	0.120	0.50	0.97	0.12
Rbt	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	45–70	56.6	10	3	13	14.3	2.2	0.172	0.71	2.19	0.38
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	76	76.0	0	1	1	1.0	0.0	0.012	0.05	4.55	0.05
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							25.3		0.304	1.26		0.55

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	3.2	LOD		POOL		30
3	4.9	COBBLE/BOULDER	100	RIFFLE	20	15
6	4.9	IN VEG		RUN	80	
9	4.6	OVER VEG		FLAT		
12	3.2	CUTBANK				
15						
18		TOTAL	70	D90/50: 30/10		
20				(cm)		
24						
	4.2					
AREA (M*M)	83.2	MARGIN (M)	20.0			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 50% Good 50% Moderate
RATIONALE: Good habitat along lower velocity sections near the margin.

STEELHEAD PARR RATING: 50% Moderate 50% Poor
RATIONALE: Moderate habitat in outer sections with cobble substrate. Could be improved with more irregular bed material.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S14 REACH: 4 MAP#: 94 D/7 PHOTO: (1)#16 ACCESS: HEL DATE: Sept 09

SITE LOCATION: Approximately 8 km upstream from Red Creek.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: S SLOPE (%): 1 TEMP (C): 7.1 TDS (ppm): 40.5 pH: N/A
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS: Sampled a margin of a large sidechannel.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	37-48	44.0	12	0	12	12.0	0.0	0.095	0.81	1.05	0.10
Rbt	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+	138	138.0	1	0	1	1.0	0.0	0.008	0.07	29.51	0.23
Chinook	0+	45-81	56.7	34	3	37	37.3	0.6	0.294	2.52	2.31	0.68
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	83-116	104.0	3	0	3	3.0	0.0	0.024	0.20	11.23	0.27
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							53.3		0.420	3.60		1.28

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	8.9	LOD		POOL			20
3	9.6	COBBLE/BOULDER	100	RIFFLE	50		15
6	9.5	IN VEG		RUN			
9	8.1	OVER VEG		FLAT	50		
12	6.8	CUTBANK					
15							
18		TOTAL	100	D90/50:	40/8		
20				(cm)			
24							
	8.6						
AREA (M*M)	127.0	MARGIN (M)	14.8				

HABITAT COMMENTS:

STEELHEAD FRY RATING: 50% Excellent 50% Good
RATIONALE: Excellent habitat in big cobble along shallow inside edge.

STEELHEAD PARR RATING: 50% Good 50% Moderate
RATIONALE: Moderate habitat in slower shallow sections.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S15 REACH: 4 MAP#: 94 D/10 PHOTO: (1)#15 ACCESS: HEL DATE: Sept 9

SITE LOCATION: Approximately 250 m upstream from Two Lakes Creek.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: S SLOPE (%): 1 TEMP (C): 6.8 TDS (ppm): 38.2 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS:

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	32-48	43.2	18	9	27	36.0	10.4	0.242	1.57	0.98	0.24
Rbt	1+	82-98	90.0	1	1	2	2.0	0.0	0.013	0.09	8.23	0.11
Rbt	2+	120	120.0	1	0	1	1.0	0.0	0.007	0.04	19.44	0.13
Rbt	3+	138-143	140.5	1	1	2	2.0	0.0	0.013	0.09	31.13	0.42
Chinook	0+	48-77	62.1	10	4	14	16.7	4.2	0.112	0.72	2.93	0.33
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	69-116	92.6	2	0	2	2.0	0.0	0.013	0.09	8.08	0.11
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							59.7		0.402	2.59		1.33

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	6.1	LOD		POOL		
3	4.8	COBBLE/BOULDER	90	RIFFLE	30	15
6	5.8	IN VEG		RUN	70	20
9	7.4	OVER VEG		OTHER		
12	8.2	CUTBANK	10			
15						
18		TOTAL	80	D90/50:	20/7	
20				(cm)		
24						
	6.5					
AREA (M*M)	148.6	MARGIN (M)	23.0			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 75% Poor 25% Moderate
RATIONALE: Moderate habitat in shallow cobble sections along margin. Limited in other sections by high water velocity.

STEELHEAD PARR RATING: 25% Good 50% Moderate 25% Poor
RATIONALE: Good and Moderate habitats in sections with cobble substrate and along cutbank.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S16 REACH: 4 MAP#: 94 D/10 PHOTO: (1)#14 ACCESS: HEL DATE: Sept 9

SITE LOCATION: Approximately 300 m upstream of Two Lakes Creek.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: S SLOPE (%): 1.5 TEMP (C): 11.9 TDS (ppm): 40.4 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Estimated 8 cfs in sample sidechannel.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	33-48	39.6	40	19	59	76.2	13.2	0.454	3.63	0.71	0.32
Rbt	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	42-67	51.7	15	0	15	15.0	0.0	0.089	0.71	1.65	0.15
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+	47	47.0	1	0	1	1.0	0.0	0.006	0.05	1.22	0.01
Dolly Varden	1+	78-113	96.3	3	1	4	4.5	1.5	0.027	0.21	8.33	0.22
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							96.7		0.576	4.60		0.70

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)	MEAN DEPTH (cm)
0	9.3	LOD		POOL		
3	7.2	COBBLE/BOULDER	80	RIFFLE	50	15
6	6.6	IN VEG	20	RUN	30	20
9	8.6	OVER VEG		FLAT	20	
12	8.3	CUTBANK				
15						
18		TOTAL	50	D90/50: 30/10 (cm)		
20						
24						
	8.0					
AREA (M*M)	168.0	MARGIN (M)	21.0			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 80% Moderate 20% Poor
RATIONALE: Compacted cobble substrate.

STEELHEAD PARR RATING: 100% Poor
RATIONALE: Limited by shallow depth and low velocity.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S17 REACH: 4 MAP#: 94 D/10 PHOTO: (1)#6 ACCESS: HEL DATE: Sept 7

SITE LOCATION: Approximately 3 km upstream from Willow Creek.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: S SLOPE (%): 0.5 TEMP (C): 11.4 TDS (ppm): 40.8 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Estimate 20 cfs in the sample sidechannel.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	33-48	41.2	22	9	31	37.2	6.5	0.215	1.65	0.82	0.18
Rbt	1+	65-98	84.5	8	0	8	8.0	0.0	0.046	0.35	6.82	0.31
Rbt	2+	120	120.0	0	1	1	1.0	0.0	0.006	0.04	19.44	0.11
Rbt	3+	137-138	137.5	1	1	2	2.0	0.0	0.012	0.09	29.19	0.34
Chinook	0+	50-75	60.8	15	3	18	18.8	1.3	0.108	0.83	2.74	0.30
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	66-155	99.7	3	0	3	3.0	0.0	0.017	0.13	10.01	0.17
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							70.0		0.403	3.10		1.41

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)	MEAN DEPTH (cm)
0	7.6	LOD	20	POOL	20	40
3	7.8	COBBLE/BOULDER	80	RIFFLE	80	15
6	7.8	IN VEG		RUN		
9	7.7	OVER VEG		OTHER		
12	7.5	CUTBANK				
15						
18		TOTAL	90	D90/50:	40/10	
20				(cm)		
24						
	7.7					
AREA (M*M)	173.6	MARGIN (M)	22.6			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 30% Good 70% Moderate
RATIONALE: Good habitat in shallow cobbles. Moderate habitat in deeper sections with higher velocity.

STEELHEAD PARR RATING: 80% Good 20% Moderate
RATIONALE: Good habitat in sections with higher velocity and boulder substrate.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S19 REACH: 4 MAP#: 94 D/10 PHOTO: (1)#5 ACCESS: HEL DATE: Sept 7

SITE LOCATION: Approximately 7.2 km upstream of the Willow Creek confluence.
This site was moved upstream 200 m from the 1992 loaction.

S = SIDE / M = MAINSTEM: S SLOPE (%): 3 TEMP (C): 10.6 TDS (ppm): 38.8 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Estimate 20 cfs in sample sidechannel.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	31-47	40.2	16	4	20	21.3	2.0	0.174	1.98	0.75	0.13
Rbt	1+	62-85	74.2	7	3	10	12.3	4.2	0.100	1.13	4.63	0.46
Rbt	2+	107-120	112.5	2	2	4	4.0	0.0	0.033	0.37	16.04	0.52
Rbt	3+	132-142	135.5	4	0	4	4.0	0.0	0.033	0.37	29.94	0.97
Rbt	4+	170	170.0	1	0	1	1.0	0.0	0.008	0.09	55.01	0.45
Chinook	0+	43-72	56.6	6	2	8	9.0	2.1	0.073	0.83	2.19	0.16
Dolly Varden	0+	47	47.0	1	0	1	1.0	0.0	0.008	0.09	1.22	0.01
Dolly Varden	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							52.6		0.428	4.87		2.71

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	11.1	LOD		POOL			
3	11.5	COBBLE/BOULDER	100	RIFFLE	70		18
6	11.8	IN VEG		RUN	30		
9	11.1	OVER VEG		OTHER			
12		CUTBANK					
15							
18		TOTAL	100	D90/50:	30/15		
20				(cm)			
24							
	11.4						
AREA (M*M)	122.9	MARGIN (M)	10.8				

HABITAT COMMENTS:

STEELHEAD FRY RATING: 90% Poor 10% Moderate
RATIONALE: Poor fry habitat due to large substrate with high water velocity.

STEELHEAD PARR RATING: 90% Excellent 10% Poor
RATIONALE: Excellent parr habitat due to the presence of large substrate with adequate water depth and velocity.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S20 REACH: 4 MAP#: 94 D/10 PHOTO: (1)#4 ACCESS: HEL DATE: Sept 7

SITE LOCATION: Approximately 10 km downstream of Moosevale Creek.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: M SLOPE (%): 1.5 TEMP (C): 9.1 TDS (ppm): 41.0 pH: N/A
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS:

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	32-45	41.0	13	3	16	16.9	1.6	0.137	0.83	0.81	0.11
Rbt	1+	71-81	76.0	2	0	2	2.0	0.0	0.016	0.10	4.97	0.08
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	48-70	57.4	7	0	7	7.0	0.0	0.057	0.34	2.29	0.13
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							25.9		0.211	1.28		0.32

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)	MEAN DEPTH (cm)
0	5.9	LOD		POOL		
3	7.0	COBBLE/BOULDER	100	RIFFLE	60	
6	7.8	IN VEG		RUN	40	
9	6.2	OVER VEG		OTHER		
12	3.4	CUTBANK				
15						
18		TOTAL	70	D90/50:	40/8	
20				(cm)		
24						
	6.1					
AREA (M*M)	123.0	MARGIN (M)	20.3			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 40% Good to Excellent 60 % Moderate
RATIONALE: Clean cobble with good interstitial spaces for cover.

STEELHEAD PARR RATING: 30% Good 70% Poor to Moderate
RATIONALE: Reduced flows have limited the parr habitat in this site (better in 1992).

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S21 REACH: 5 MAP#: 94 D/10 PHOTO: (1)#1 ACCESS: HEL DATE: Sept 7

SITE LOCATION: Approximately 4 km below site S22.
New site location.

S = SIDE / M = MAINSTEM: M SLOPE (%): 1 TEMP (C): 7.9 TDS (ppm): 42.8 pH: N/A
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS: Observed chinook carcass near sample site. Some rbt fry were newly-emerged (29-30 mm).

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	29-45	38.6	39	11	50	54.3	3.9	0.592	3.62	0.65	0.38
Rbt	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	38-71	52.7	14	0	14	14.0	0.0	0.153	0.93	1.75	0.27
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							68.3		0.744	4.55		0.65

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	4.5	LOD		POOL		
3	7.3	COBBLE/BOULDER	100	RIFFLE	50	20
6	7.8	IN VEG		RUN		
9	7.9	OVER VEG		FLAT	40	10
12	3.1	CUTBANK				
15						
18		TOTAL	70	D90/50:	25/10	
20				(cm)		
24						
	6.1					
AREA (M*M)	91.8	MARGIN (M)	15.0			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 75% Good 25% Poor
RATIONALE: Good habitat in low velocity flats. Poor in higher velocity sections.

STEELHEAD PARR RATING: 100% Poor
RATIONALE: Limited by shallow depth and low water velocity.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S22 **REACH:** 5 **MAP#:** 94 D/10 **PHOTO:** (1)#2&3 **ACCESS:** HEL **DATE:** Sept 7

SITE LOCATION: Approximately 4.5 km downstream from Moosevale Creek.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: M **SLOPE (%):** N/A **TEMP (C):** 8.5 **TDS (ppm):** 41.3 **pH:** N/A
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS:

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	31-49	39.4	57	19	76	85.5	6.5	0.761	5.59	0.70	0.53
Rbt	1+	71-87	78.8	4	1	5	5.3	1.0	0.047	0.35	5.54	0.26
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	38-72	47.5	12	1	13	13.1	0.4	0.117	0.86	1.23	0.14
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+	57	57.0	1	0	1	1.0	0.0	0.009	0.07	1.92	0.02
Dolly Varden	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							104.9		0.934	6.86		0.96

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)	MEAN DEPTH (cm)
0	6.3	LOD		POOL		
3	8.0	COBBLE/BOULDER	100	RIFFLE	100	7
6	12.2	IN VEG		RUN		
9	8.2	OVER VEG		OTHER		
12	2.0	CUTBANK				
15						
18		TOTAL	80	D90/50:	30/5	
20				(cm)		
24						
	7.3					
AREA (M*M)	112.3	MARGIN (M)	15.3			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 50% Good 50% Moderate
RATIONALE: Good habitat in cobble sections with low water velocity. Moderate habitat in sections with smaller subsrate (gravel) and higher water velocity.

STEELHEAD PARR RATING: 100% Poor
RATIONALE: Limited by shallow water depth.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S23 REACH: 5 MAP#: 94 D/10 PHOTO: (2)#9 ACCESS: VEH DATE: Sept 17

SITE LOCATION: Max–min corner located just upstream from the Moosevale Ck confluence.
Same location as the 1991 site. Not sampled in 1992.

S = SIDE / M = MAINSTEM: M SLOPE (%): 1 TEMP (C): 9.3 TDS (ppm): 44.9 pH: N/A
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS: Had problems sealing part of the lower net during pass 1.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN–M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	34–48	41.6	16	8	24	32.0	9.8	0.419	1.65	0.85	0.36
Rbt	1+	68–80	74.0	2	0	2	2.0	0.0	0.026	0.10	4.59	0.12
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	44–59	50.9	8	4	12	16.0	6.9	0.209	0.82	1.57	0.33
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	88	88.0	1	0	1	1.0	0.0	0.013	0.05	6.97	0.09
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							51.0		0.667	2.63		0.90

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	2.0	LOD	10	POOL			
3	4.9	COBBLE/BOULDER	60	RIFFLE	50		15
6	5.9	IN VEG		RUN	50		35
9	4.1	OVER VEG	30	FLAT			
12	2.8	CUTBANK					
15							
18		TOTAL	50	D90/50:	25/6		
20				(cm)			
24							
	3.9						

AREA (M*M) 76.4 MARGIN (M) 19.4

HABITAT COMMENTS:

STEELHEAD FRY RATING: 30% Good 70% Moderate
RATIONALE: Good habitat along margin in cobble with some debris. Moderate habitat in sections with less cover.

STEELHEAD PARR RATING: 10% Moderate 90% Poor
RATIONALE: Limited by shallow depth and small cobble substrate.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S24 REACH: 6 MAP#: 94 D/10 PHOTO: (2)#8 ACCESS: RAFT DATE: Sept 17

SITE LOCATION: Approximately 4 km upstream from Moosevale Creek.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: S SLOPE (%): 1.5 TEMP (C): 9 TDS (ppm): 41.6 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Water level was up slightly from 1992. Poor site due to difficulty of holding lower net. Fast water.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	41-55	48.0	1	1	2	6.0	0.0	0.060	0.38	1.43	0.09
Rbt	1+	74-67	70.5	0	0	0	2.0	0.0	0.020	0.13	3.97	0.08
Rbt	2+	108	108.0	1	0	1	1.0	0.0	0.010	0.06	14.19	0.14
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	58-77	67.5	1	1	2	2.0	0.0	0.020	0.13	3.80	0.08
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	78	78.0	1	0	1	1.0	0.0	0.010	0.06	4.91	0.05
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							12.0		0.120	0.76		0.43

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	6.5	LOD	80	POOL		
3	6.3	COBBLE/BOULDER		RIFFLE	10	25
6	6.3	IN VEG		RUN	80	40
9	6.2	OVER VEG		FLAT		
12		CUTBANK	20			
15						
18		TOTAL	30	D90/50: 9/3		
20				(cm)		
24						
	6.3					
AREA (M*M)	99.9	MARGIN (M)	15.8			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 100% Poor
RATIONALE: Limited by small substrate and high water velocity.

STEELHEAD PARR RATING: 30% Good 70% Poor
RATIONALE: Good along section of cutbank and LOD.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S25 REACH: 6 MAP#: 94 D/10 PHOTO: (2)#7 ACCESS: RAFT DATE: Sept 17

SITE LOCATION: Margin of the mainstem just below the Big Rock Pool.
This site was moved upstream approximately 30 m from the 1992 location.

S = SIDE / M = MAINSTEM: M SLOPE (%): 0.5 TEMP (C): 8.4 TDS (ppm): 44.0 pH: N/A
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS: Chinook redds abundant in this section of river.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	38-52	45.0	34	4	38	38.5	0.9	0.462	2.12	1.13	0.52
Rbt	1+	72-81	76.5	2	0	2	2.0	0.0	0.024	0.11	5.07	0.12
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	42-78	54.4	21	7	28	31.5	4.0	0.378	1.73	1.94	0.73
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							72.0		0.864	3.96		1.38

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	3.9	LOD	50	POOL	25	40
3	4.9	COBBLE/BOULDER	50	RIFFLE		
6	6.0	IN VEG		RUN		
9	4.9	OVER VEG		FLAT	75	15
12	3.2	CUTBANK				
15						
18		TOTAL	100	D90/50: 10/3		
20				(cm)		
24						
	4.6					
AREA (M*M)	83.4	MARGIN (M)	18.2			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 50% Good 50% Moderate
RATIONALE: Good fry habitat along sections of margin with debris cover. Moderate habitat along outer edge with less cover (smaller substrate).

STEELHEAD PARR RATING: 100% Poor
RATIONALE: Limited by small bed material and shallow water depth.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S26 REACH: 6 MAP#: 94 D/10 PHOTO: (2)#5 ACCESS: RAFT DATE: Sept 17

SITE LOCATION: Approximately 40 m downstream of the Junction Pool.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: M SLOPE (%): 1.5 TEMP (C): 5.5 TDS (ppm): 43.2 pH: N/A
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS: Chinook redds present around this site.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	37-52	43.8	7	2	9	9.8	1.7	0.097	0.52	1.03	0.10
Rbt	1+	69-77	73.0	0	2	2	2.0	0.0	0.020	0.11	4.41	0.09
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	53-69	61.3	3	0	3	3.0	0.0	0.030	0.16	2.81	0.08
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							14.8		0.147	0.78		0.27

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	2.2	LOD		POOL			20
3	6.2	COBBLE/BOULDER	100	RIFFLE	70		5
6	6.2	IN VEG		RUN	20		
9	6.7	OVER VEG		FLAT	10		
12		CUTBANK					
15							
18		TOTAL	25	D90/50:	12/4		
20				(cm)			
24							
	5.3						
AREA (M*M)	100.6	MARGIN (M)	18.9				

HABITAT COMMENTS:

STEELHEAD FRY RATING: 50% Moderate 50% Poor
RATIONALE: Limited cover due to small substrate.

STEELHEAD PARR RATING: 100% Poor
RATIONALE: Poor habitat for parr with small bed material and shallow water depth.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S27 REACH: 6 MAP#: 94 D/10 PHOTO: (2)#6 ACCESS: RAFT DATE: Sept 17

SITE LOCATION: Sidechannel at the White Rock Pool.
Due to changes in stream channel, moved this site upstream approximately 30 m from the 1992 location.

S = SIDE / M = MAINSTEM: S SLOPE (%): 1 TEMP (C): 6.9 TDS (ppm): 37.5 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Estimated 10 cfs in sample sidechannel. Used a 3-pass removal for this site in 1993.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	32-59	45.2	29	8	37	40.0	3.2	0.469	2.53	1.15	0.54
Rbt	1+	68-95	80.1	8	0	8	8.0	0.0	0.094	0.51	5.81	0.55
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	48-75	59.4	5	0	5	5.0	0.0	0.059	0.32	2.79	0.16
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+	40-59	49.5	1	1	2	2.0	0.0	0.023	0.13	1.03	0.02
Dolly Varden	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							55.0		0.645	3.48		1.27

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	5.4	LOD		POOL		
3	4.1	COBBLE/BOULDER	100	RIFFLE	70	
6	4.9	IN VEG		RUN		
9	7.2	OVER VEG		FLAT	30	
12		CUTBANK				
15						
18		TOTAL	75	D90/50:	17/5	
20				(cm)		
24						
	5.4					
AREA (M*M)	85.3	MARGIN (M)	15.8			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 20% Good 80% Poor
RATIONALE: Good habitat in shallow, low velocity sections along the margin.

STEELHEAD PARR RATING: 50% Good 30% Moderate 20% Poor
RATIONALE: Good habitat in riffle sections with cobble bed material. Poor in shallow sections near the margin.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S28 REACH: 7 MAP#: 94 D/9 PHOTO: (2)#4 ACCESS: HEL DATE: Sept 16

SITE LOCATION: Approximately 250 m upstream from the Junction Pool.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: M SLOPE (%): 1 TEMP (C): 9.4 TDS (ppm): 43.4 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS:

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	29-47	39.8	39	7	46	47.5	1.8	0.231	2.49	0.73	0.17
Rbt	1+	71-100	86.5	12	3	15	16.0	1.7	0.078	0.84	7.31	0.57
Rbt	2+	108	108.0	0	1	1	1.0	0.0	0.005	0.05	14.19	0.07
Rbt	3+	127-147	135.6	3	2	5	9.0	13.4	0.044	0.47	28.00	1.22
Rbt	4+	200-210	205.0	0	2	2	2.0	0.0	0.010	0.10	96.23	0.93
Chinook	0+	58-79	67.9	8	1	9	9.1	0.5	0.044	0.48	3.87	0.17
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	132	132.0	0	1	1	1.0	0.0	0.005	0.05	22.62	0.11
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all	220	220.00	1	0	1	1.0	0.0	0.005	0.05	96.60	0.47
TOTAL							86.7		0.421	4.54		3.71

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	11.2	LOD	5	POOL			
3	9.2	COBBLE/BOULDER	95	RIFFLE	95		20
6	10.7	IN VEG		RUN			
9	11.6	OVER VEG		FLAT	5		
12	11.2	CUTBANK					
15							
18		TOTAL	80	D90/50:	70/15		
20				(cm)			
24							
	10.8						
AREA (M*M)	205.9	MARGIN (M)	19.1				

HABITAT COMMENTS:

STEELHEAD FRY RATING: 15% Good 85% Poor
RATIONALE: Good in lower velocity sections along the margin.

STEELHEAD PARR RATING: 80% Good
RATIONALE: Good habitat in large cobble substrate with moderate velocity.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S29 REACH: 7 MAP#: 94 D/9 PHOTO: (1)#9 ACCESS: HEL DATE: Sept 8

SITE LOCATION: Approximately mid-way upstream from the Junction Pool to Mud Lake.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: S SLOPE (%): 2 TEMP (C): N/A TDS (ppm): N/A pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Difficult to access this site with a helicopted (2 loads).

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	39-51	46.3	12	1	13	13.1	0.4	0.125	0.60	1.26	0.16
Rbt	1+	72-94	84.0	6	0	6	6.0	0.0	0.057	0.27	6.70	0.38
Rbt	2+	114-116	115.0	2	0	2	2.0	0.0	0.019	0.09	17.12	0.33
Rbt	3+	148	148.0	1	0	1	1.0	0.0	0.010	0.05	36.37	0.35
Rbt	4+	165	165.0	1	0	1	1.0	0.0	0.010	0.05	50.32	0.48
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all	142	142.00	1	0	1	1.0	0.0	0.010	0.05	19.40	0.19
TOTAL							24.1		0.231	1.10		1.89

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)	MEAN DEPTH (cm)
0	5.9	LOD	2	POOL	10	40
3	4.1	COBBLE/BOULDER	98	RIFFLE	80	20
6	3.7	IN VEG		RUN		
9	3.4	OVER VEG		FLAT		
12	6.4	CUTBANK				
15	5.0					
18		TOTAL	80	D90/50: 35/12		
20				(cm)		
24						
	4.8					
AREA (M*M)	104.5	MARGIN (M)	22.0			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 50% Good 50% Poor
RATIONALE: Good in shallow cobble section at top of site.

STEELHEAD PARR RATING: 50% Good
RATIONALE: Good habitat in riffle section with boulder substrate.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: S30 REACH: 7 MAP#: 94 D/9 PHOTO: (1)#7&8 ACCESS: HEL DATE: Sept 8

SITE LOCATION: Approximately 300 m upstream from Site S29.
New site located at steelhead spawning site S3.

S = SIDE / M = MAINSTEM: M SLOPE (%): 3.5 TEMP (C): 9.9 TDS (ppm): 42.3 pH: N/A
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS:

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	31-51	39.5	28	5	33	34.1	1.5	0.351	1.66	0.71	0.25
Rbt	1+	79-99	91.3	3	0	3	3.0	0.0	0.031	0.15	8.59	0.27
Rbt	2+	122	122.0	1	0	1	1.0	0.0	0.010	0.05	20.42	0.21
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	68	68.0	1	0	1	1.0	0.0	0.010	0.05	3.89	0.04
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	140	140.0	1	0	1	1.0	0.0	0.010	0.05	26.84	0.28
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							40.1		0.413	1.96		1.04

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	3.0	LOD		POOL			
3	6.2	COBBLE/BOULDER	100	RIFFLE	100		12
6	5.6	IN VEG		RUN			
9	6.5	OVER VEG		FLAT			
12	5.3	CUTBANK					
15	1.8						
18		TOTAL	95	D90/50:	35/10		
20				(cm)			
24							
	4.7						
AREA (M*M)	97.0	MARGIN (M)	20.5				

HABITAT COMMENTS:

STEELHEAD FRY RATING: 25% Good 75% Poor
RATIONALE: Good habitat in shallow low velocity riffle habitat along the margin.

STEELHEAD PARR RATING: 90% Good 10% Poor
RATIONALE: Good parr habitat in moderate to high velocity riffle sections.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: SJ1 REACH: 1 MAP#: 94 D/9 PHOTO: (2)#3 ACCESS: VEH DATE: Sept 16

SITE LOCATION: Approximately 20 m upstream from the access trail to the Junction Pool.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: M SLOPE (%): 1 TEMP (C): 7.9 TDS (ppm): 41.7 pH: N/A
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS: Water level slightly lower than 1992.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	35-43	38.8	4	0	4	4.0	0.0	0.038	0.19	0.62	0.02
Rbt	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	52-81	59.6	8	0	8	8.0	0.0	0.076	0.38	2.20	0.17
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+	38-51	44.3	12	3	15	16.0	1.7	0.153	0.76	1.06	0.16
Dolly Varden	1+	72-110	89.5	4	0	4	4.0	0.0	0.038	0.19	7.75	0.30
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							32.0		0.306	1.52		0.65

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	3.2	LOD	10	POOL			
3	7.6	COBBLE/BOULDER	90	RIFFLE	60		10
6	6.1	IN VEG		RUN			
9	6.0	OVER VEG		FLAT	40		
12	2.0	CUTBANK					
15							
18		TOTAL	20	D90/50:	12/4		
20				(cm)			
24							
	5.0						
AREA (M*M)	104.6	MARGIN (M)	21.0				

HABITAT COMMENTS:

STEELHEAD FRY RATING: 50% Moderate 50% Poor
RATIONALE: Limited by small substrate providing poor cover.

STEELHEAD PARR RATING: 100% Poor
RATIONALE: Poor habitat due to shallow depth with small bed material.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: SJ2 REACH: 1 MAP#: 94 D/9 PHOTO: (1)#10 ACCESS: HEL DATE: Sept 8

SITE LOCATION: Approximately 5.5 km upstream from the Junction Pool.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: S SLOPE (%): 2.5 TEMP (C): 9.9 TDS (ppm): 38.7 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS:

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	33-48	40.7	40	16	56	66.7	8.3	0.405	2.61	0.74	0.30
Rbt	1+	70-100	89.5	4	0	4	4.0	0.0	0.024	0.16	8.70	0.21
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+	137	137.0	0	1	1	1.0	0.0	0.006	0.04	31.39	0.19
Chinook	0+	62	62.0	1	0	1	1.0	0.0	0.006	0.04	2.48	0.02
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+	56-59	57.5	2	0	2	2.0	0.0	0.012	0.08	1.96	0.02
Dolly Varden	1+	68-145	112.2	6	3	9	12.0	6.0	0.073	0.47	14.08	1.03
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							86.7		0.527	3.40		1.77

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)	MEAN DEPTH (cm)
0	7.9	LOD	5	POOL	10	20
3	6.0	COBBLE/BOULDER	95	RIFFLE	90	9
6	5.1	IN VEG		RUN		
9	6.2	OVER VEG		FLAT		
12	6.5	CUTBANK				
15	7.0					
18		TOTAL	80	D90/50:	20/8	
20				(cm)		
24						
	6.5					
AREA (M*M)	164.5	MARGIN (M)	25.5			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 40% Good 40% Moderate 20% Poor
RATIONALE: Good habitat in low velocity riffle sections. Moderate habitat in sections with slightly higher velocity.

STEELHEAD PARR RATING: 50% Moderate 50% Poor
RATIONALE: Limited by shallow depth and low velocity.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: SJ4 REACH: 2 MAP#: 94 D/6 PHOTO: (2)#12 ACCESS: VEH DATE: Sept 18

SITE LOCATION: Approximately 100 m downstream from burned-out trappers cabin.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: M SLOPE (%): 0.5 TEMP (C): 7.4 TDS (ppm): 41.2 pH: N/A
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS:

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	37-47	40.7	7	0	7	7.0	0.0	0.078	0.40	0.74	0.06
Rbt	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+	52	52.0	1	0	1	1.0	0.0	0.011	0.06	1.54	0.02
Dolly Varden	1+	82	82.0	1	0	1	1.0	0.0	0.011	0.06	6.03	0.07
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							9.0		0.100	0.52		0.14

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	3.3	LOD		POOL		
3	6.7	COBBLE/BOULDER	100	RIFFLE	80	10
6	7.2	IN VEG		RUN		
9	5.8	OVER VEG		FLAT	20	
12	2.9	CUTBANK				
15						
18		TOTAL	60	D90/50:	18/7	
20				(cm)		
24						
	5.2					
AREA (M*M)	89.6	MARGIN (M)	17.3			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 50% Good 50% Moderate to Poor
RATIONALE: Water velocity to high through most of site.

STEELHEAD PARR RATING: 25% Good 50% Moderate 25% Poor
RATIONALE: Good habitat in deeper areas along outer edge.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: SJ7 **REACH:** 2 **MAP#:** 94 D/9 **PHOTO:** (2)#2 **ACCESS:** VEH **DATE:** Sept 16

SITE LOCATION: Approximately 10 m upstream from old bridge.
Same location as 1992 site.

S = SIDE / M = MAINSTEM: M **SLOPE (%):** 2 **TEMP (C):** 6.3 **TDS (ppm):** 39 **pH:** N/A
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS: Water level was slightly lower than 1992.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	1+	78-80	79.0	2	0	2	2.0	0.0	0.029	0.12	5.84	0.17
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+	152	152.0	1	0	1	1.0	0.0	0.014	0.06	42.91	0.61
Chinook	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	71-77	74.0	1	1	2	2.0	0.0	0.029	0.12	4.49	0.13
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+	120	120.0	1	0	1	1.0	0.0	0.014	0.06	14.74	0.21
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							6.0		0.086	0.36		1.12

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)	MEAN DEPTH (cm)
0	2.0	LOD		POOL	
3	3.9	COBBLE/BOULDER	100	RIFFLE 100	
6	4.2	IN VEG		RUN	
9	4.7	OVER VEG		FLAT	
12	5.6	CUTBANK			
15	4.8				
18		TOTAL	75	D90/50: 25/10	
20				(cm)	
24					
	4.2				

AREA (M*M) 70.1 **MARGIN (M)** 16.7

HABITAT COMMENTS:

STEELHEAD FRY RATING: 100% Poor
RATIONALE: Limited by high water velocity.

STEELHEAD PARR RATING: 80% Good 20% Moderate
RATIONALE: Moderate in shallow sections along margin.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: SJ8 REACH: 3 MAP#: 94 D/9 PHOTO: (1)#11 ACCESS: HEL DATE: Sept 8

SITE LOCATION: Approximately 300 m downstream from the main Johanson Creek steelhead spawning area. Same general area as the 1992 site.

S = SIDE / M = MAINSTEM: S SLOPE (%): 1 TEMP (C): 14.2 TDS (ppm): 35.9 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS:

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	31-42	36.5	25	5	30	31.3	1.7	0.220	1.16	0.50	0.11
Rbt	1+	64-80	70.6	5	0	5	5.0	0.0	0.035	0.19	4.26	0.15
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Coho	all	51-58	55.0	2	2	4	2.0	0.0	0.014	0.07	1.90	0.03
Dolly Varden	0+	38-47	42.5	2	0	2	2.0	0.0	0.014	0.07	0.96	0.01
Dolly Varden	1+	76-95	85.5	2	0	2	2.0	0.0	0.014	0.07	6.80	0.10
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+	108	108.0	1	0	1	1.0	0.0	0.007	0.04	10.68	0.08
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							43.3		0.304	1.60		0.47

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	8.0	LOD		POOL		15
3	6.9	COBBLE/BOULDER	100	RIFFLE	70	10
6	5.6	IN VEG		RUN	30	
9	5.1	OVER VEG		FLAT		
12	4.3	CUTBANK				
15	3.3					
18	3.7	TOTAL	40	D90/50: 15/4 (cm)		
20						
24						
	5.3					
AREA (M*M)	142.3	MARGIN (M)	27.0			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 35% Good 70% Moderate
RATIONALE: Good habitat in loose cobble substrate.

STEELHEAD PARR RATING: 100% Poor
RATIONALE: Limited by shallow depth and small bed material.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: SUA1 REACH: MAP#: 94 D/9 PHOTO: (2)#10 ACCESS: VEH DATE: Sept 18

SITE LOCATION: Small inlet tributary to Johanson Creek. Sample site located 30 m upstream from the bridge crossing. Same location as the 1992 site.

S = SIDE / M = MAINSTEM: M SLOPE (%): 4.5 TEMP (C): 4.7 TDS (ppm): 20.4 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS:

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	37	37.0	0	1	1	1.0	0.0	0.012	0.06	0.53	0.01
Rbt	1+	92	92.0	1	0	1	1.0	0.0	0.012	0.06	9.46	0.12
Rbt	2+	103-118	109.3	4	0	4	4.0	0.0	0.050	0.26	15.89	0.79
Rbt	3+	125-139	132.5	3	1	4	4.5	1.5	0.056	0.29	28.38	1.59
Chinook	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	80-113	92.8	0	5	5	5.0	0.0	0.062	0.32	8.30	0.52
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							15.5		0.193	0.99		3.03

LOCATION	WIDTH (m)		SITE COVER (%)	SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	5.5	LOD		POOL		
3	5.8	COBBLE/BOULDER	100	RIFFLE	80	20
6	5.1	IN VEG		RUN	20	
9	5.4	OVER VEG		FLAT		
12	3.9	CUTBANK				
15						
18		TOTAL	70	D90/50:	60/12	
20				(cm)		
24						
	5.1					
AREA (M*M)	80.2	MARGIN (M)	15.6			

HABITAT COMMENTS:

STEELHEAD FRY RATING: 100% Poor
RATIONALE: Limited by large substrate with high water velocity.

STEELHEAD PARR RATING: 100% Good
RATIONALE: Large cobble/boulder bed material with adequate depth and velocity. This site would be excellent if there were no fines between the substrate.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: SUB1 REACH: MAP#: 94 D/9 PHOTO: (2)#11 ACCESS: VEH DATE: Sept 18

SITE LOCATION: Small inlet tributary of Johanson Creek. Sample Site Sub1 is located 15 m upstream from the bridge crossing. Same location as the 1992 site.

S = SIDE / M = MAINSTEM: M SLOPE (%): 3 TEMP (C): 8.1 TDS (ppm): 25.3 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Sampled a slightly larger section of stream than 1992.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	48	48.0	1	1	2	2.0	0.0	0.015	0.08	1.33	0.02
Rbt	1+	77-94	86.0	2	1	3	4.0	3.5	0.029	0.16	7.72	0.23
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	4+	163	163.0	1	0	1	1.0	0.0	0.007	0.04	52.97	0.39
Chinook	0+	77	77.0	1	0	1	1.0	0.0	0.007	0.04	4.82	0.04
Coho	all	73-117	89.7	5	1	6	6.3	0.8	0.046	0.26	8.22	0.38
Dolly Varden	0+	35-57	47.5	8	4	12	16.0	6.9	0.118	0.65	1.19	0.14
Dolly Varden	1+	70-142	99.3	8	4	12	16.0	6.9	0.118	0.65	10.03	1.18
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							46.3		0.341	1.89		2.37

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	6.9	LOD		POOL	25		50
3	5.9	COBBLE/BOULDER	100	RIFFLE	75		30
6	5.3	IN VEG		RUN			
9	5.4	OVER VEG		FLAT			
12	4.2	CUTBANK					
15							
18		TOTAL	100	D90/50:	100/20		
20				(cm)			
24							
	5.5						
AREA (M*M)	135.7	MARGIN (M)	24.5				

HABITAT COMMENTS:

STEELHEAD FRY RATING: 30% Moderate 70% Poor
RATIONALE: Moderate habitat in slower sections along the margin.

STEELHEAD PARR RATING: 50% excellent 50% Good
RATIONALE: Good and excellent habitat with large substrate and adequate water depth.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: SUC1 REACH: MAP#: 94 D/9 PHOTO: (2)#1 ACCESS: VEH DATE: Sept 16

SITE LOCATION: Approximately 200 m downstream from the twin culverts at the road crossing.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: M SLOPE (%): 1 TEMP (C): 7.1 TDS (ppm): 32.1 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Steelhead observed spawning in this creek during spring spawner survey.
No rainbow trout fry observed above culverts this season.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	33-37	35.9	5	2	7	8.3	2.9	0.066	0.29	0.48	0.03
Rbt	1+	61-71	64.7	2	1	3	4.0	3.5	0.032	0.14	3.27	0.10
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Coho	all	61-65	63.0	3	1	4	4.5	1.5	0.035	0.16	2.86	0.10
Dolly Varden	0+	31-59	39.4	9	5	14	20.3	10.5	0.160	0.71	0.59	0.09
Dolly Varden	1+	66-109	81.6	9	4	13	16.2	5.2	0.128	0.57	5.79	0.74
M. Whitefish	0+	52	52.0	1	0	1	1.0	0.0	0.008	0.04	1.29	0.01
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							54.3		0.428	1.90		1.08

0.00

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)	MEAN DEPTH (cm)
0	6.2	LOD		POOL	40	30
3	4.1	COBBLE/BOULDER	50	RIFFLE	40	6
6	4.2	IN VEG		RUN	20	
9	5.3	OVER VEG		FLAT		
12	4.0	CUTBANK	50			
15	2.9					
18		TOTAL	30	D90/50:	15/4	
20				(cm)		
24						
	4.5					

AREA (M*M) 126.8 MARGIN (M) 28.5

HABITAT COMMENTS:

STEELHEAD FRY RATING: 80% Moderate 5% Good 15% Poor
RATIONALE: Good habitat in small section of cobble flats.

STEELHEAD PARR RATING: 95% Poor 5% Good
RATIONALE: Limited by shallow depth and low velocity. Good parr habitat under cutbank.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: SJS1 REACH: MAP#: 94 D/9 PHOTO: (1)#12&13 ACCESS: HEL DATE: Sept 8

SITE LOCATION: Approximately 350 m downstream from the section of rapids on Solo Creek.
This site was moved downstream 300–400 m from the 1992 site location.

S = SIDE / M = MAINSTEM: M SLOPE (%): 1 TEMP (C): 13 TDS (ppm): 34.1 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: One steelhead adult was observed near this site during the 1993 spring spawner survey.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN–M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Coho	all	77–98	85.3	2	1	3	4.0	3.5	0.035	0.26	7.11	0.25
Dolly Varden	0+	42	42.0	1	0	1	1.0	0.0	0.009	0.06	0.83	0.01
Dolly Varden	1+	62–153	92.8	18	6	24	27.0	3.7	0.239	1.75	8.30	1.98
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							32.0		0.283	2.08		2.24

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	4.9	LOD		POOL	20		80
3	4.8	COBBLE/BOULDER	100	RIFFLE			
6	12.2	IN VEG		RUN	80		
9	9.4	OVER VEG		FLAT			
12	6.3	CUTBANK					
15	6.5						
18		TOTAL	70	D90/50:	60/5		
20				(cm)			
24							
	7.4						
AREA (M*M)	113.2	MARGIN (M)	15.4				

HABITAT COMMENTS:

STEELHEAD FRY RATING: 15% Good 85% Poor
RATIONALE: Good habitat along edge of margin and in shallow bay. Limited by high velocity and large substrate.

STEELHEAD PARR RATING: 75% Good 25% Poor
RATIONALE: Good habitat in large boulder run sections. Poor in sections with sand snbstrate.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: SB1 REACH: 1 MAP#: 94 D/7 PHOTO: (1)#21 ACCESS: HEL DATE: Sept 9

SITE LOCATION: Approximately 0.8 km upstream from the Sustut River confluence.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: M SLOPE (%): 1.5 TEMP (C): 14.1 TDS (ppm): 30.5 pH: N/A
M = MARGIN / F = FULL SAMPLE: M

SAMPLING COMMENTS: Noticed an increase in brown algae growth from past seasons.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	29-52	38.6	49	10	59	61.6	2.5	0.591	2.93	0.76	0.45
Rbt	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	57-68	62.5	3	1	4	4.5	1.5	0.043	0.21	3.27	0.14
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all	56	56.0	1	0	1	1.0	0.0	0.010	0.05	1.61	0.02
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							67.1		0.644	3.19		0.61

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	4.0	LOD		POOL			
3	5.9	COBBLE/BOULDER	100	RIFFLE	60		12
6	6.3	IN VEG		RUN			
9	4.7	OVER VEG		FLAT	40		
12	3.9	CUTBANK					
15							
18		TOTAL	70	D90/50:	24/11		
20				(cm)			
24							
	5.0						
AREA (M*M)	104.2	MARGIN (M)	21.0				

HABITAT COMMENTS:

STEELHEAD FRY RATING: 80% Excellent 20% Moderate
RATIONALE: Excellent habitat in shallow cobble riffle habitat. Poor in deeper sections along the outer edge.

STEELHEAD PARR RATING: 20% Good 80% Poor
RATIONALE: Limited by shallow depth near the margin.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: SB2 REACH: 1 MAP#: 94 D/2 PHOTO: (3)#1 ACCESS: HEL DATE: Sept 10

SITE LOCATION: Approximately 6 km downstream from the north end of airstrip.
Same location as the 1992 site.

S = SIDE / M = MAINSTEM: S SLOPE (%): 1 TEMP (C): 12.6 TDS (ppm): 30.5 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Noticed an increase in brown algae growth from past seasons. Chinook spawners observed nearby.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+	37-56	45.5	23	9	32	37.8	6.0	0.312	2.10	1.19	0.37
Rbt	1+	77-98	90.8	4	0	4	4.0	0.0	0.033	0.22	9.10	0.30
Rbt	2+	102-109	106.3	3	1	4	4.5	1.5	0.037	0.25	14.40	0.53
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+	43-83	63.0	14	8	22	32.7	14.6	0.270	1.81	3.35	0.90
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	72-85	78.5	2	0	2	2.0	0.0	0.017	0.11	5.00	0.08
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							81.0		0.668	4.50		2.19

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	5.8	LOD	30	POOL			
3	5.6	COBBLE/BOULDER	70	RIFFLE	40		25
6	6.6	IN VEG		RUN	40		40
9	7.4	OVER VEG		FLAT	20		
12	7.8	CUTBANK					
15	7.2						
18		TOTAL	70	D90/50:	20/5		
20				(cm)			
24							
	6.7						
AREA (M*M)	121.2	MARGIN (M)	18.0				

HABITAT COMMENTS:

STEELHEAD FRY RATING: 10% Good 50% Moderate 40% Poor
RATIONALE: Good habitat in low velocity flats along margin. Poor cover in most of site with small substrate.

STEELHEAD PARR RATING: 20% Good 20% Moderate 60% Poor
RATIONALE: Good habitat in debris sections. Poor cover in areas with adequate depth due to fines between subsrate.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: SM1a REACH: 1 MAP#: PHOTO: 24(2) ACCESS: HEL DATE: Sept 11/93

SITE LOCATION: Minaret Creek approximately 20 m downstream from the B.C Rail Grade crossing.

S = SIDE / M = MAINSTEM: S SLOPE (%): 6 TEMP (C): 8.9 TDS (ppm): 19.6 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENT: Effective sampling within fully enclosed site. Approximately one-half of the total stream.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	1+	69-153	97.7	15	3	18	18.8	1.3	0.259	1.25	9.44	2.45
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							18.8		0.259	1.25		2.45

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	6.7	LOD		POOL	30		30
3	5.7	COBBLE/BOULDER	60	RIFFLE	70		15
6	3.3	IN VEG		RUN			
9	4.1	OVER VEG		FLAT			
12	4.3	CUTBANK					
15		DEEP POOL	40				
18		TOTAL	70	D90/50:	45/5		
20				(cm)			
24							
	4.8						
AREA (M*M)	72.3	MARGIN (M)	15.0				

HABITAT COMMENTS:
Sections with good potential steelhead fry and parr rearing habitat.
Much of the site was located in angular rip-rap from B.C. Rail Grade.
Culvert at B.C. Rail Grade is 3.6 m diameter/ 38 m long with 2% slope.
No drop at the outlet.

Creek has high potential to move large debris. Quite unstable below B.C. Rail Grade for 200-300 m with several channels and lots of channel shifting.
Narrow confined section approximately 400 m downstream that is better for crossing site.
Accessible from the Sustut to this point.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: SM1b REACH: 1 MAP#: PHOTO: 3(3) ACCESS: HEL DATE: Sept 11/93

SITE LOCATION: Minaret Creek approximately 50 m upstream from B.C. Rail Grade.

S = SIDE / M = MAINSTEM: M SLOPE (%): 3 TEMP (C): 9.3 TDS (ppm): 18.3 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Effective electrofishing sample within an enclosed site – full channel.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+	52-53		1	1	2	2.0	NA	0.019	0.08	1.55	0.03
Dolly Varden	1+	62-162		9	4	13	16.2	5.2	0.152	0.63	9.77	1.48
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							18.2		0.170	0.71		1.51

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)	MEAN DEPTH (cm)
0	5.7	LOD		POOL	50	80
3	5.1	COBBLE/BOULDER	100	RIFFLE	50	20
6	5.9	IN VEG		RUN		
9	2.8	OVER VEG		FLAT		
12	1.3	CUTBANK				
15						
18		TOTAL	60	D90/50:	25/11	
20				(cm)		
24						
	4.2					
AREA (M*M)	106.9	MARGIN (M)	25.7			

HABITAT COMMENTS:

Good parr rearing in large bed material.
Large bed material suggests high discharge at times.
Lower velocities than downstream sites.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: SI1a REACH: 1 MAP#: PHOTO: 19(3) ACCESS: HEL DATE: Sept 11/93

SITE LOCATION: Islam Creek approximately15 m below B.C. Rail Grade culverts.

S = SIDE / M = MAINSTEM: M SLOPE (%): 3 TEMP (C): 6.8 TDS (ppm): 15.2 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Effective electrofishing sample within an enclosed full−channel site.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN−M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+	51	51.0	1	0	1	1.0	0.0	0.011	0.05	1.43	0.02
Dolly Varden	1+	70−128	83.8	19	4	23	24.1	1.6	0.253	1.12	6.04	1.53
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							25.1		0.264	1.17		1.55

LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)	MEAN DEPTH (cm)
0	4.2	LOD		POOL	10	35
3	4.7	COBBLE/BOULDER	80	RIFFLE	80	15
6	5.0	IN VEG		RUN		
9	5.2	OVER VEG		FLAT	10	
12	3.0	CUTBANK				
15						
18		TOTAL	60	D90/50:	30/8	
20				(cm)		
24						
	4.4					
AREA (M*M)	95.0	MARGIN (M)	21.5			

HABITAT COMMENTS:

No spawning habitat located near B.C. Rail Grade.
3 culverts at rail crossing − 1.5 m diameter /18.3 m long/4−5% slope
Drops at the outlets of all three culverts ranging from 0.6 − 0.8 m.

SUSTUT RIVER STEELHEAD INDEX SITE 1993

SITE: SI1b REACH: 1 MAP#: PHOTO: 19(3) ACCESS: HEL DATE: Sept 11/93

SITE LOCATION: Islam Creek approximately 10 m upstream from the B.C. Rail Grade.

S = SIDE / M = MAINSTEM: S SLOPE (%): 2.5 TEMP (C): 6.8 TDS (ppm): 15.2 pH: N/A
M = MARGIN / F = FULL SAMPLE: F

SAMPLING COMMENTS: Fully enclosed site – effective sample.

POPULATION ESTIMATES:

SPECIES	AGE	FL RANGE	FL MEAN	PASS 1	PASS 2	U1+U2	NUMBER	S.E.	N/M*M	N/LIN-M	MEAN WT	BIOMASS (g/m*m)
Rbt	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	2+			0	0	0	0.0	0.0	0.000	0.00		0.00
Rbt	3+			0	0	0	0.0	0.0	0.000	0.00		0.00
Chinook	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
Coho	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Dolly Varden	0+	52	52.0	1	0	1	1.0	0.0	0.012	0.05	1.51	0.02
Dolly Varden	1+	81-128	100.7	11	2	13	13.4	1.0	0.157	0.67	10.31	1.62
M. Whitefish	0+			0	0	0	0.0	0.0	0.000	0.00		0.00
M. Whitefish	1+			0	0	0	0.0	0.0	0.000	0.00		0.00
Longnose Dace	all			0	0	0	0.0	0.0	0.000	0.00		0.00
Burbot	all			0	0	0	0.0	0.0	0.000	0.00		0.00
TOTAL							14.4		0.169	0.72		1.64

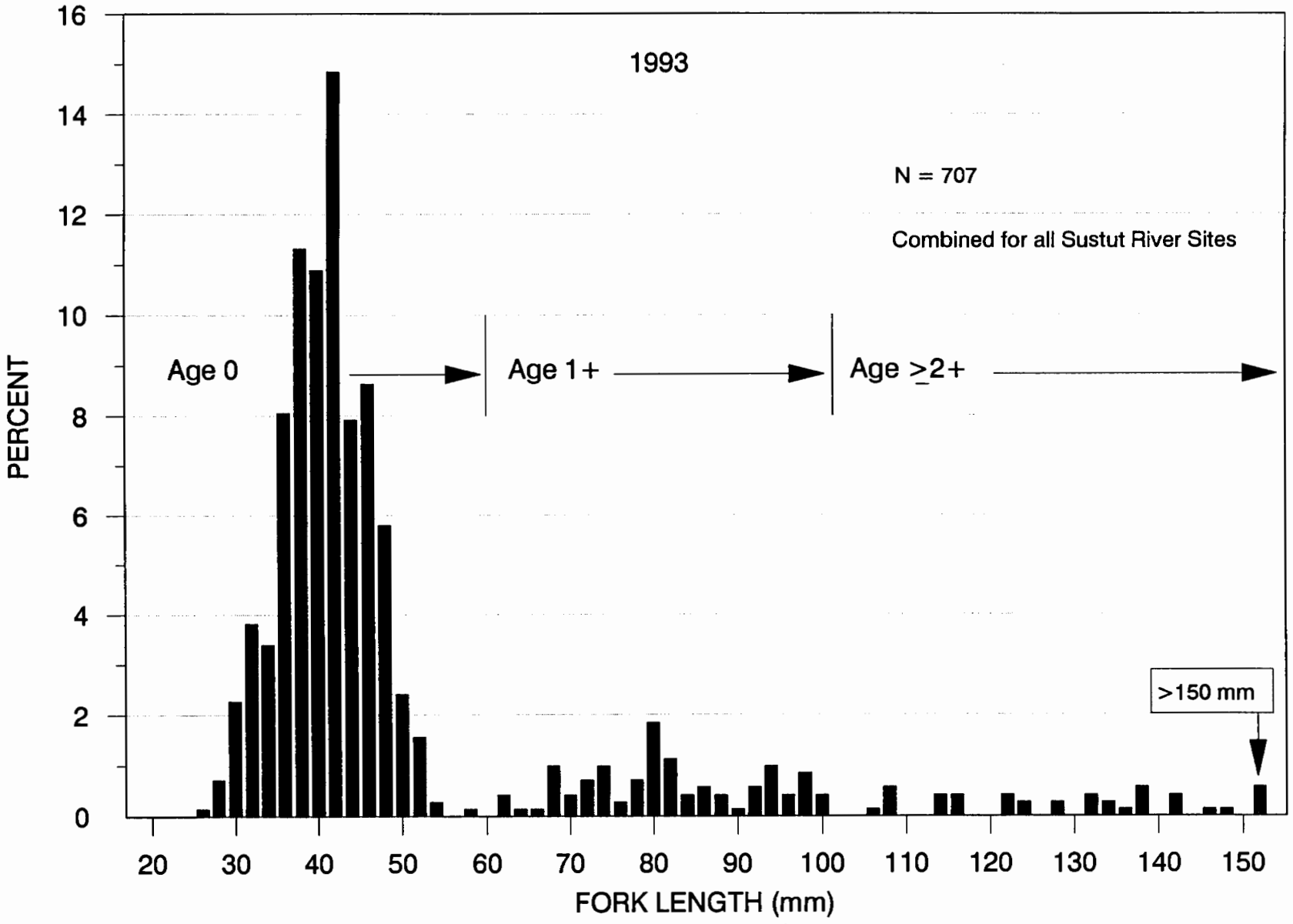
LOCATION	WIDTH (m)		SITE COVER (%)		SITE WATER TYPE (%)		MEAN DEPTH (cm)
0	6.5	LOD		POOL			
3	5.0	COBBLE/BOULDER	100	RIFFLE	100		12
6	4.1	IN VEG		RUN			
9	2.5	OVER VEG		FLAT			
12	3.2	CUTBANK					
15	4.2						
18		TOTAL	80	D90/50:	22/7		
20				(cm)			
24							
	4.3						
AREA (M*M)	85.4	MARGIN (M)	20.1				

HABITAT COMMENTS:

Estimate 3–4 cfs in sidechannel compared to 10 cfs in creek.
High potential to move debris.

Appendix 3 Table 1. Sustut River Biomass Estimates by Reach and Tributaries 1993.

SITE	LOCATION	RAINBOW 0+	RAINBOW 1+	RAINBOW 2+	RAINBOW 3+	RAINBOW Parr	CHIN	COHO	DV	RMW	LN DACE	BURBOT	AREA (M)2	TOTAL
S1	Reach 1	0.09	0.13	0.00	0.00	0.13	0.47	0.00	0.00	0.00	0.00	0.00	127.4	0.68
S3	"	0.09	0.05	0.06	0.00	0.11	0.11	0.00	0.08	0.08	0.00	0.00	164.8	0.47
S4	"	0.16	0.11	0.00	0.00	0.11	0.34	0.00	0.13	0.00	0.00	0.00	77.1	0.74
S6	"	0.11	0.47	0.29	1.12	1.88	1.02	0.00	0.66	0.02	0.00	0.00	233.1	3.70
S9	"	0.19	0.05	0.16	0.21	0.42	0.38	0.00	0.00	0.00	0.04	0.00	128.8	1.02
	Mean	0.13	0.16	0.10	0.27	0.53	0.46	0.00	0.17	0.02	0.01	0.00	**731.2**	1.32
S10a	Reach 2	0.32	0.44	0.10	0.00	0.54	0.27	0.00	0.00	0.02	0.00	0.00	167.6	1.15
S11	"	0.09	0.06	0.00	0.00	0.06	0.51	0.00	0.45	0.00	0.00	0.00	327.1	1.11
	Mean	0.21	0.25	0.05	0.00	0.30	0.39	0.00	0.23	0.01	0.00	0.00	**494.7**	1.13
S12	Reach 3	0.09	0.00	0.00	0.00	0.00	1.01	0.00	0.27	0.00	0.00	0.00	195.9	1.38
S13	"	0.12	0.00	0.00	0.00	0.00	0.38	0.00	0.05	0.00	0.00	0.00	83.2	0.55
	Mean	0.11	0.00	0.00	0.00	0.00	0.70	0.00	0.16	0.00	0.00	0.00	**279.1**	0.97
S14	Reach 4	0.10	0.00	0.00	0.23	0.23	0.68	0.00	0.27	0.00	0.00	0.00	127.0	1.28
S15	"	0.24	0.11	0.13	0.42	0.66	0.33	0.00	0.11	0.00	0.00	0.00	148.6	1.33
S16	"	0.32	0.00	0.00	0.00	0.00	0.15	0.00	0.23	0.00	0.00	0.00	168.0	0.70
S17	"	0.18	0.31	0.11	0.34	0.76	0.30	0.00	0.17	0.00	0.00	0.00	173.6	1.41
S19	"	0.13	0.46	0.52	1.42	2.40	0.16	0.00	0.01	0.00	0.00	0.00	122.9	2.71
S20	"	0.11	0.08	0.00	0.00	0.08	0.13	0.00	0.00	0.00	0.00	0.00	123.0	0.32
	Mean	0.18	0.16	0.13	0.40	0.69	0.29	0.00	0.13	0.00	0.00	0.00	**863.1**	1.29
S21	Reach 5	0.38	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	91.8	0.65
S22	"	0.53	0.26	0.00	0.00	0.26	0.14	0.00	0.02	0.00	0.00	0.00	112.3	0.96
	Mean	0.46	0.13	0.00	0.00	0.13	0.21	0.00	0.01	0.00	0.00	0.00	204.1	0.81
S23	Reach 6	0.36	0.12	0.00	0.00	0.12	0.33	0.00	0.09	0.00	0.00	0.00	76.4	0.90
S24		0.09	0.08	0.14	0.00	0.22	0.08	0.00	0.05	0.00	0.00	0.00	99.9	0.43
S25	"	0.52	0.12	0.00	0.00	0.12	0.73	0.00	0.00	0.00	0.00	0.00	83.4	1.38
S26	"	0.10	0.09	0.00	0.00	0.09	0.08	0.00	0.00	0.00	0.00	0.00	100.6	0.27
S27	"	0.54	0.55	0.00	0.00	0.55	0.16	0.00	0.02	0.00	0.00	0.00	85.3	1.27
	Mean	0.32	0.19	0.03	0.00	0.22	0.28	0.00	0.03	0.00	0.00	0.00	**445.6**	0.85
S28	Reach 7	0.17	0.57	0.07	2.15	2.79	0.17	0.00	0.11	0.00	0.00	0.47	205.9	3.71
S29	"	0.16	0.38	0.33	0.83	1.54	0.00	0.00	0.00	0.00	0.00	0.19	104.5	1.89
S30	"	0.25	0.27	0.21	0.00	0.48	0.04	0.00	0.28	0.00	0.00	0.00	97.0	1.04
	Mean	0.17	0.48	0.20	1.49	2.17	0.09	0.00	0.06	0.00	0.00	0.33	**310.4**	2.80
Total All Reaches		5.44	4.71	2.12	6.72	13.55	8.24	0.00	3.00	0.12	0.04	0.66	3425.20	31.05
Mean All Reaches		**0.218**	**0.188**	**0.085**	**0.269**	**0.542**	**0.330**	**0.000**	**0.120**	**0.005**	**0.002**	**0.026**		**1.24**
Sb1	Bear River	0.45	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.02	0.00	104.2	0.61
Sb2	"	0.37	0.30	0.53	0.00	0.83	0.90	0.00	0.08	0.00	0.00	0.00	121.2	2.19
	Mean	0.41	0.15	0.27	0.00	0.42	0.52	0.00	0.04	0.00	0.01	0.00	**225.4**	1.40
Sj1	Johanson Ck	0.02	0.00	0.00	0.00	0.00	0.17	0.00	0.46	0.00	0.00	0.00	104.6	0.65
Sj2	"	0.30	0.21	0.00	0.19	0.40	0.02	0.00	1.05	0.00	0.00	0.00	164.5	1.77
Sj4	"	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	89.6	0.14
Sj7	"	0.00	0.17	0.00	0.61	0.78	0.00	0.00	0.13	0.21	0.00	0.00	70.1	1.12
Sj8	"	0.11	0.15	0.00	0.00	0.15	0.00	0.03	0.11	0.08	0.00	0.00	142.3	0.47
		0.10	0.11	0.00	0.16	0.27	0.04	0.01	0.37	0.06	0.00	0.00	**571.1**	0.83
SUa1	Unnamed A	0.01	0.12	0.79	1.59	2.50	0.00	0.00	0.52	0.00	0.00	0.00	80.2	3.03
SUb1	Unnamed B	0.02	0.23	0.00	0.39	0.62	0.04	0.38	1.32	0.00	0.00	0.00	135.7	2.37
Suc1	Unnamed C	0.03	0.10	0.00	0.00	0.10	0.00	0.10	0.83	0.01	0.00	0.00	126.8	1.08
Sjs1	Solo Ck	0.00	0.00	0.00	0.00	0.00	0.00	0.25	1.99	0.00	0.00	0.00	113.2	2.24



Appendix 4 Figure 1. Length-frequency of Juvenile Steelhead in the Sustut River 1993.